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Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP SYNTHESIS 468

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

A Synthesis of Highway Practice

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

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

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

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

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

NOTE: The Transportation Research Board of the National Academies, the National Research Council, the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the individual states participating in the National Cooperative Highway Research Program do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

NOTICE

The project that is the subject of this report was a part of the National Cooperative Highway Research Program conducted by the Transportation Research Board with the approval of the Governing Board of the National Research Council. Such approval reflects the Governing Board's judgment that the program concerned is of national importance and appropriate with respect to both the purposes and resources of the National Research Council.

The members of the technical committee selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and, while they have been accepted as appropriate by the technical committee, they are not necessarily those of the Transportation Research Board, the National Research Council, the American Association of State Highway and Transportation Officials, or the Federal Highway Administration of the U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical committee according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

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FOREWORD

Highway administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to highway administrators and engineers. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire highway community, the American Association of State Highway and Transportation Officials—through the mechanism of the National Cooperative Highway Research Program—authorized the Transportation Research Board to undertake a continuing study. This study, NCHRP Project 20-5, "Synthesis of Information Related to Highway Problems," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an NCHRP report series, *Synthesis of Highway Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE
By Jon M. Williams
Program Director
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The maintenance and operations personnel of state departments of transportation and the field personnel of local public works agencies are on the front lines during emergencies and disasters. Therefore, their preparedness is essential to public safety. The goal of this study was to identify interactive emergency training tools and sources appropriate for these field personnel, identify obstacles to implementation, and create a toolkit of relevant training and exercise information. The key focus for the synthesis is maintenance and operations field personnel and their managers.

Findings were generated from literature review, a screening survey, and follow-up communications.

Yuko J. Nakanishi and Pierre M. Auza, Nakanishi Research and Consulting, LLC, Forest Hills, New York, collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable with the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

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

INTERACTIVE TRAINING FOR ALL-HAZARDS EMERGENCY PLANNING, PREPARATION, AND RESPONSE FOR MAINTENANCE AND OPERATIONS FIELD PERSONNEL

SUMMARY
The maintenance and operations (M&O) personnel of state departments of transportation (DOTs) and the field personnel of tribal and local public works agencies (PWs) are on the front lines during emergencies and disasters. Therefore, their preparedness is essential to public safety. Over the past decade, their roles in all-hazards emergencies have been expanding; at the same time, public expectations for a safe and secure transportation infrastructure and quick restoration of public services after emergencies and disasters have been growing.

The goals of the NCHRP Synthesis 44-12 report were to identify interactive emergency training tools and sources appropriate for the M&O field personnel of state DOTs and PWs, identify obstacles to their implementation, and create a toolkit of relevant training and exercise information. The key focus for the synthesis is M&O field personnel, and the target audience is their managers.

Findings were generated from information from case studies, a screening survey and follow-up communications, a literature review, and organizations such as AASHTO, the American Public Works Association (APWA), FHWA, the International Municipal Signal Association (IMSA), the Local and Tribal Technical Assistance Program (LTAP/TTAP) centers, TSA, the university transportation center (UTC) consortia, the National Association of County Engineers (NACE), and the National Emergency Management Association (NEMA). Twenty-five state DOTs and 22 PWs responded to the screening survey.

Emergency training and exercise needs stem from federal, state, local, and industry requirements. They include the National Incident Management System (NIMS) training standard and state DOT emergency operations plans, which reflect the state DOTs' roles and responsibilities in the Transportation Emergency Support Function (ESF-1) and the Public Works and Engineering Emergency Support Function (ESF-3). Federal preparedness grants and assistance require the adoption of NIMS. Needs are also identified through various other plans including occupational health and safety plans and procedural documents, and through after-action reports from exercises and actual events. In addition, security awareness is important for transportation personnel, especially those in the field. Hazards-specific training and exercises may also be warranted on the basis of an agency's risk assessment and by federal, state, and local safety plans and regulations.

Implementation challenges identified by the screening survey, case example participants, and panel members included the following:

- Scheduling difficulties and conflict with work priorities
- Limited budgets
- Lack of qualified training staff
- Personnel turnover
- Limited training content
- Insufficient information about available training

2

- Infrequent need for training
- Lack of PC/Internet access
- Distance issues.

Additional challenges for state DOTs and PWs identified during the study included the lack of refresher training; need for more clarification/training on ESF and Incident Command System (ICS) roles; need for exercises designed for field personnel; training for field support personnel in areas such as procurement, construction, and human resources; and training on coordination among state DOTs, PWs, law enforcement, fire, and other emergency response providers. State DOT exercises, full-scale exercises, and functional exercises, in particular, are typically organized by the state emergency management agencies (EMAs) and other agencies, and are held infrequently. Also, state DOTs and PWs may not always be viewed as equal partners in the emergency management community.

Compounding these challenges for PWs are agency-to-agency variations in roles and personnel responsibilities, organizational structures, and governance.

This synthesis identified the following strategies and tools to deliver cost-effective emergency training and exercises:

- *Field crew meetings*: Combining emergency training with regularly scheduled training or activities for field personnel makes sense, because many of their regular and emergency job functions are similar. Field crew meetings are often used to discuss issues of relevance to field personnel and are regularly scheduled meetings at the district level. These meetings provide excellent opportunities to train field personnel.
- *Just-in-time training (JITT)*: JITT is used to train field personnel on specific skills that are not needed on a continuous basis; for example, disaster reimbursement application procedures. A state DOT may provide JITT to PWs on reimbursement procedures for the Federal Emergency Management Agency (FEMA) Public Assistance and the FHWA Emergency Relief programs once a disaster strikes. Agencies noted that on-demand online training is a useful type of JITT.
- *Interjurisdictional and interagency training and exercises:* These are useful for preparation for larger and more complex disasters and emergencies that require effective coordination among transportation agencies (state DOTs, PWs, transit agencies, toll authorities); public safety agencies; and private and nonprofit organizations. Also, the effectiveness of any assistance received through mutual aid agreements with other states will increase if the agencies have opportunities to meet, interact, train, and exercise together.
- *Joint training*: Combining training topics can alleviate scheduling challenges and enhance intra-agency communications by providing field personnel from different divisions or units with an opportunity to interact. For example, courses on incident management and response are typically mandatory for many field personnel, so emergency training could be incorporated into incident management training. The new National Traffic Incident Management Responder Training course developed through the Second Strategic Highway Research Program (SHRP 2) contains elements of the Incident Command System (ICS). Winter maintenance is another example. It is a typically required training topic for field personnel in states that experience severe winters, so emergency training could be integrated into winter maintenance training. Although emergency training functions differ from incident management and winter maintenance, field personnel require these trainings; therefore, joint training on these and other topics can address scheduling difficulties.
- *Asynchronous training*: This is self-paced training that occurs without the presence of live instructors. Asynchronous training can be interactive and maintain trainee interest and attention, but it requires self-discipline. Examples of asynchronous training are YouTube videos and prepackaged CDs and DVDs.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

3

- *Train-the-trainer (TTT)*: This type of training leverages training resources by training one or more in-house trainers or otherwise qualified personnel who then provide the training to other personnel; for example, district trainers who train district field personnel. This strategy is especially useful to train large numbers of personnel in a relatively short time.
- *Planned events, incidents, and exercises*: Because disasters do not happen regularly, planned events, incidents, and exercises are excellent opportunities for field personnel to practice what they have learned. After-action reports and lessons learned for planned events, exercises, and major incidents and disasters can identify additional training needs and gaps for individual field personnel and teams, and provide useful training content and scenarios.
- *Classroom training*: Classroom training [including closed circuit television (CCTV), video teleconferencing (VTC), and Voice over Internet Protocol (VoIP)] is a synchronous training method that can provide a high-quality interactive learning environment for trainees. The instructor can use various media and technology options to facilitate learning and interaction and maintain participant interest.
- *Online training with live instructors*: Online training with live instructors (e.g., webinars) is a synchronous method of training. Software that facilitates the delivery of webinars—including the facilitation of student-instructor and student-student interaction—is readily available and usually allows the sessions to be recorded so those who could not attend can view them later.
- *Computer simulations and virtual exercises*: Computer simulations and virtual exercises immerse participants in realistic environments and allow real-time interaction. They can be delivered using web-based or non-web-based technologies. While they usually require some type of facilitation and scheduling, some provide simulated players and enable individual players to participate in exercise scenarios on demand. Hence, they can be both synchronous and asynchronous.

Blended training combines two or more of these methods and allows agencies to select elements from various methods and adapt them to their needs and constraints.

The role of supervision in the development of field personnel is important. First-line supervisors have intimate knowledge of the work being performed by field personnel. They should have not only the technical expertise to evaluate the quality of the work produced but also the ability to identify needed training and motivate their workers to take the training seriously and implement it in their work.

A screening survey, literature review, and case examples were performed for this synthesis.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

5

CHAPTER ONE

INTRODUCTION

BACKGROUND

Maintenance and operations (M&O) field personnel of state departments of transportation (DOTs) and public works agencies (PWs) are often first on the scene when an emergency occurs; they have the very significant responsibility of taking the appropriate actions to save lives, prevent injuries, and minimize property damage. They also play an important support role to other agencies in fulfilling their responsibilities. Therefore, their preparedness is essential during emergencies.

> Training is not nearly as costly as the mistakes made in a crisis. (*The Federal Response to Hurricane Katrina: Lessons Learned 2006*, p. 72)

The roles of state DOTs and local PWs in all-hazards emergencies have been expanding over the past decade. Emergency response is becoming a larger part of state, tribal, and local transportation staffs' responsibilities, from the front office to the front lines. As noted in *NCHRP Report 525 Volume 16: Guide to Emergency Response Planning* (2010), transportation agencies "are assuming greater responsibility for large-scale evacuations in response to natural disasters . . . " (p. 1) and "are also being asked to establish and assume new roles and systems to address no-notice evacuations and situations requiring limited mobility (e.g., shelter-in-place/quarantine), such as responding to biological outbreaks, epidemics, pandemics, and the threat of weapons of mass destruction (WMDs)" (p. 1). This change is being driven by increasing numbers of emergencies and disasters and the increasing expectations of the public that the government will immediately respond and fix everything in the aftermath of such events. Field personnel are required to work a wide variety of tasks during emergencies and other stressful situations, using different tools and equipment and frequently alongside traffic in view of and under scrutiny from the public.

Presidential Policy Directive 21 (PPD-21) on Critical Infrastructure Security and Resilience, released in February 2013, elevated the role of the U.S. Department of Transportation to co-sector-specific agency along with the Department of Homeland Security. This is likely to result in the continued expansion of the role of state DOTs and PWs in emergency preparation and response. PPD-21 is aligned with Presiden-tial Policy Directive 8 (PPD-8) on National Preparedness, which was released in March 2011. PPD-8 replaced the 2003 Homeland Security Presidential Directive on National Preparedness (HSPD-8) and defines the five national preparedness mission areas: prevention, protection, mitigation, response, and recovery. PPD-8 seeks to strengthen national security and resilience through "systematic preparation for the threats that pose the greatest risk to the security of the Nation, including acts of terrorism, cyber-attacks, pandemics, and catastrophic natural disasters." PPD-8 mandated the creation of policy and planning documents including the National Preparedness Goal and the National Preparedness System (PPD-8 2011). The National Preparedness Goal was released in September 2011 and identified core capabilities for each of the five mission areas; mitigation was a new mission area that was added to the goal. The National Preparedness System includes the five National Planning Frameworks, which develop and deliver the core capabilities. PPD-8 also directs the monitoring and assessment of progress toward "building, sustaining, and delivering" the 31 core capabilities through an annual National Preparedness Report.

A key component of the National Preparedness System is the National Training and Education System (NTES). NTES comprises the "policies, processes, and tools through which the requirements for homeland security training and education will drive the supply of training and education courses offered to the Whole Community" (Holtermann 2013). The function of the NTES is to identify courses for NTES funding through a "risk-centric, capability-based approach" and to select the right students for those courses. Because the NTES will focus on "complex and unique programming" rather than the basic awareness training that can be delivered locally, the courses will probably not be appropriate for field personnel.

Security-related training and exercise direction emanates from the 9/11 Commission Act, signed into law on August 3, 2007. The act is focused on the implementation of the recommendations of the National Commission on Terrorist Attacks Upon the United States. Topics addressed include homeland security and emergency management grants, national exercise program and model exercises for ICS, the National Domestic Preparedness Consortium, the National Transportation Security Center of Excellence, transportation security planning and information sharing, transporta-

6

tion security enhancements, surface transportation security, public transportation security, aviation, and maritime cargo.

As budgets tighten, public agencies and their employees are being asked to do more with fewer resources. Bergner notes the lack of training for public works personnel: "Though Public Works is a fundamental component of emergency management, most agencies lack even basic training on NIMS and ICS" (Bergner 2013). Another obstacle for PWs is their diverse organizational structures and governance. Some PW M&O field personnel are located in a single unit, such as Street Maintenance, while others are included in two or more units.

Access is needed to tools and training, including exercises, to prepare field personnel to perform reliably and effectively with other partners under the National Incident Management System (NIMS), regardless of agency size or the nature of the occurrence, leading to improved preparedness for emergencies. An excellent training and exercise program can also help agencies recruit and retain high-quality workers (*Training Programs, Processes, Policies, and Practices* 2007). This project identified and synthesized existing tools, training, and exercises that can be used to effectively prepare transportation M&O field personnel for their roles in emergencies.

FHWA includes the management of traffic incidents as part of emergency transportation operations. FHWA stresses that these routine events, which occur frequently, can help state DOT personnel prepare for larger, more complex emergencies. M&O field personnel are typically involved in all incidents, from minor traffic accidents to catastrophic disasters. As the incident complexity increases, the number of agencies that must interact increases as well. Figure 1 presents the Emergency Transportation Operations Continuum, which shows the inverse relationship between event severity and likelihood of event occurrence. For instance, although traffic incidents occur on a daily basis, they are usually much less severe than wildfires, major storms, or malevolent acts such as terrorism.
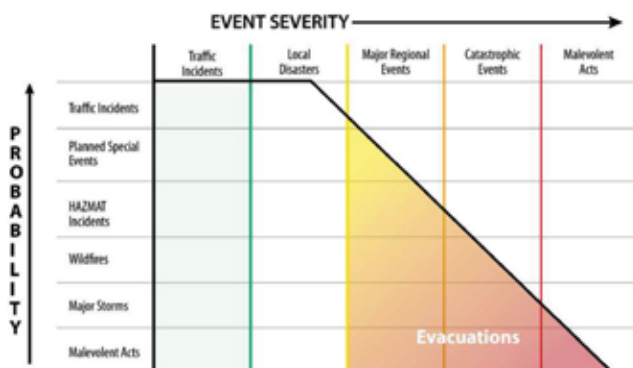
FIGURE 1 Emergency Transportation Operations Continuum (*Traffic Incident Management Cost Management and Cost Recovery Primer,* FHWA 2012).

NATIONAL INCIDENT MANAGEMENT SYSTEM

The National Incident Management System is a "core set of doctrine, concepts, principles, terminology, and organizational processes that enables effective, efficient, and collaborative incident management" (*NIMS Training Program*, FEMA 2011, p. 1). The system can be used by emergency response personnel in response to any incident, large or small, as well as in any planned event. Incidents and emergencies larger in scope and complexity require effective coordination and benefit most from the use of NIMS.

Furthermore, the adoption and implementation of NIMS is required for federal assistance as per the Homeland Security Presidential Directive 5 (HSPD-5). As stated in the *NIMS Training Program* (FEMA 2011, p. 1), "NIMS implementation relies upon comprehensive NIMS training and standardized personnel qualification."

State DOTs and PWs can become vulnerable to liability issues if they do not provide the necessary emergency training to their personnel. These issues may arise even if the training is not mandated but is available and highly recommended. Therefore, managers should check with their compliance units to understand the liability issues and implications of their training programs.

> The institutionalization of these [NIMS] elements nationwide through training helps to mitigate risk by achieving greater preparedness. (*NIMS Training Program*, FEMA 2011, p. 1)

DEFINITIONS

Training and Exercises

For the purposes of this synthesis, the following definitions of emergency training and exercises will be used:

- Training is the *delivery of new information*.
- Exercises provide the opportunity to *practice knowledge, skills, and plans*. Exercises are "controlled activities conducted under realistic conditions" ("Security and Emergency Management—An Information Briefing," FHWA 2009) and can be used for multiple purposes. They range from tabletop exercises to full-scale exercises.

M&O Field Personnel

M&O field personnel are defined in this synthesis as agency employees (not contractors) who primarily work in the field, with duties related to preservation and repair of transportation infrastructure and related facilities (maintenance) and

to the achievement of safe and reliable traffic movement (operations). The following are the most common titles:

- Equipment operator
- Maintenance crew leader, foreman, supervisor, or superintendent
- Roadway lighting electrician/technician
- Street or highway maintenance worker/laborer
- Traffic signs and marking worker/technician
- Traffic signal technician/specialist
- Truck driver.

Other state DOT and PW support personnel who may assist in emergencies and events include these:

- Administrative staff (finance, human resources, procurement, etc.)
- Construction inspectors
- Dispatchers
- Maintenance personnel from other departments such as Parks or Water/Wastewater
- Mechanics
- Structural and environmental code inspectors
- Traffic operations center technicians.

Emergency Response Provider

According to *NCHRP Research Results Digest 385*, there is no consistent definition of "first responder" among federal, state, and local agencies. In both the Homeland Security Act of 2002 and the Post-Katrina Emergency Management Reform Act for 2006, "emergency response provider" is used to refer to those who are first to respond to disasters or emergencies (*NCHRP Research Results Digest 385: The Legal Definitions of "First Responder"* 2013). The formal definition in the Homeland Security Act of 2002 is "Federal, State, and local governmental and nongovernmental emergency public safety, fire, law enforcement, emergency response, emergency medical (including hospital emergency facilities) and related personnel, agencies, and authorities" (Homeland Security Act of 2002, United States Code, Title 6, Section 101, Paragraph 6). In this synthesis we will use "emergency response provider" to refer to state DOT and PW personnel who are the first to respond to disasters and emergencies.

TRAINING AND EXERCISES

Training and exercises are integral parts of emergency planning and the emergency preparedness cycle. The preparedness cycle, depicted in Figure 2, begins with the development of a plan that leads to organizing and identifying personnel and equipping them with the necessary resources to achieve the core capabilities. The third step is training personnel in the plan. The importance of training

on agency plans is stated in the *Comprehensive Preparedness Guide 101*, Version 2.0. The guide states that personnel must be trained "so that they have the knowledge, skills, and abilities needed to perform the tasks identified in the plan. Personnel should also be trained on the organization-specific procedures necessary to support those plan tasks" (CPG 101, Version 2, pp. 4–25). Personnel participate in exercises through which they can practice what they have learned and demonstrate their capabilities. Exercise evaluations help agencies understand the strengths and weaknesses of the plan, demonstrate the emergency response capabilities of participants, and identify additional training needs of individuals and teams. Evaluations lead to the development of improvement plans that include appropriate corrective actions.

FIGURE 2 Preparedness Cycle (CPG 101, Version 2.0, FEMA 2010).

EMERGENCY OPERATIONS PLAN

The primary emergency plan for state DOTs and PWs is the emergency operations plan (EOP). State DOTs either have a standalone EOP or are covered under an annex to a state EOP or state emergency response plan (ERP). PWs have a standalone EOP or are covered under an annex to a city or county plan.

The EOP or ERP typically contains the following elements:

- Operations
- Resources
- Training
- Exercising
- Post-response activities.

8

Specifically, EOPs and ERPs address

> who will respond and how they will be prepared to respond; when response operations will commence and how they will be conducted; how to obtain additional resources; how coordination will occur; communications plans; chain of command; organizational structures; how response operations will terminate; and, how improvements will be made. ("Security and Emergency Management—An Information Briefing," FHWA 2009)

See Appendix F for the Training and Exercises component of the Washington State DOT's EOP and Appendix H for Missouri DOT's Training Plan. After-action information generated from exercises and post-response activities for planned events and incidents can be used to develop an improvement plan that identifies additional training needs and to modify the plan to enhance response.

The Full Emergency Response Requirements Matrix in the NCHRP *Guide to Emergency Response Planning* (2010) provides details for each step in each phase of the emergency response planning process: PLAN, PREPARE, RESPOND, and RECOVER. The emergency response activities for each step of the RESPOND phase include the following:

Step 1: Initiate Emergency Response

1. Detect and Verify Emergencies

2. Assess Status of Transportation Infrastructure

3. Gain and Maintain Situation Awareness.

Step 2: Address Emergency Needs and Requests for Support

1. Coordinate Response to the Emergency

2. Evaluate Need for Additional Assistance from Neighboring States, Jurisdictions, and/or Federal Government.

Step 3: Manage Evacuations, Shelter-in-Place, or Quarantine

1. Make and/or Support Decision to Evacuate, Shelter-In-Place, or Quarantine

2. Issue and/or Support Evacuation/Shelter-in-Place/Quarantine Order.

Step 4: Implement Emergency Response Actions

1. Take Response Actions

2. Deploy Response Teams

3. Communicate Evacuation/Shelter-in-Place/Quarantine Order and Incident Management Measures.

Step 5: Continue Response Requirements

1. Monitor Response Efforts

2. Prepare for Next Operational Period.

Step 6: Conclude Response Actions

1. Prepare for Demobilization.

(*Guide to Emergency Response Planning*, NCHRP 2010, pp. 69–83)

As incident size and complexity increase, the need for coordination on these activities with other agencies and jurisdictions increases as well. Transportation's role can vary depending on the hazard. During the RECOVER phase, state DOTs and PWs typically need to "assess, restore, and manage the essential transportation services and infrastructure element of the affected area" (*Guide to Emergency Response Planning*, NCHRP 2010). Field personnel would engage in activities such as debris removal and roadway repairs.

OTHER PLANS AND PROCEDURAL DOCUMENTS

In addition to the EOP, other plans and procedural documents can require emergency training and exercises. They include the following:

- *Joint operational plans and regional coordination plans* involve different levels of government to address a specific incident or event.
- *Preparedness plans* develop and maintain capabilities required for prevention, protection, response, recovery, and mitigation. They address training through the development of a schedule to identify and meet training and exercise needs, including exercise evaluations and improvement plans.
- *Continuity of operations* (*COOP*) *plans* identify core capabilities and critical operations that need to be continued during incidents.
- *Recovery plans* ensure a coordinated, unified, and expedited recovery effort.
- *Prevention/protection plans* are usually procedural or tactical plans focused on specific sectors, facilities, or incidents.
- *Mitigation plans* outline activities that reduce the impact of a disaster. Both EOPs and mitigation efforts are products of hazards-based analysis.
- *Procedural documents* contain the details of how to accomplish the goals, objectives, functions, and tasks included in the EOP or other plans. As noted in CPG 101, Version 2.0, "Plans describe the 'what' and (procedural documents) describe the 'how' " (FEMA 2010,

pp. 3–10). Standard operating procedures (SOPs) and standard operating guidelines (SOGs) are examples of procedural documents (FEMA 2010).

In addition to the types of plans mentioned in CPG 101 version 2.0, emergency operations training and exercises for M&O field personnel must reflect the roles and responsibilities set forth in the following kinds of plans:

- *Winter weather operations plans* govern winter weather operations, such as snow and ice control.
- *Debris management plans* govern the coordination and management of debris removal operations. For more information on debris management plans, refer to *NCHRP Report 781: A Debris Management Handbook for State and Local DOTs and Departments of Public Works.*

STUDY APPROACH

Surveys were distributed to all voting members of the AASHTO Special Committee on Transportation Security and Emergency Management, AASHTO Subcommittee on Maintenance, APWA, and International Municipal Signal Association (IMSA). The primary purpose of the surveys was to identify agencies for case examples. However, as other information was identified, it was incorporated into the synthesis as well. A total of 48 responses were received—from 25 state DOTs and 22 local PWs (one DOT responded twice).

Case example interviews were conducted with the following agencies:

- Arizona DOT (ADOT)
- California DOT (Caltrans)
- Iowa DOT
- Missouri DOT (MoDOT)
- Rhode Island DOT
- Tennessee DOT (TDOT)
- Texas DOT (TxDOT)
- Vermont Agency of Transportation (VTrans)
- Washington State DOT (WSDOT)
- Plant City, Florida
- City of Keene, New Hampshire.

In addition, information sources—AASHTO, APWA, FHWA, IMSA, LTAP/TTAP centers, TSA, university transportation center (UTC) consortia, NACE, and NEMA— were contacted by phone or e-mail, and their websites were reviewed for pertinent information. Also, relevant literature and reports were reviewed, including Homeland Security Exercise and Evaluation Program (HSEEP 2013); CPG 101, Version 2 (FEMA 2010); *NCHRP Report 525*, Volumes 14 (2009) and 16 (2010); NCHRP 20-59(42) "A Guide to Regional Transportation Planning for Disasters, Emergencies and Significant Events"; and *NCHRP Report 525/TCRP Report 86*, Volume 9, *Guidelines for Transportation Emergency Training Exercises* (2006).

Using the results of the case example interviews, the screening survey and follow-up calls, and the information review, emergency training and exercise sources were identified and individual course information was input into a spreadsheet toolkit. Guidance documents were also identified, incorporated into the toolkit, and referenced in the text of the synthesis.

REPORT ORGANIZATION

Chapter two focuses on the emergency training and exercise needs of M&O field personnel. Chapter three reviews emergency training and exercise delivery. Chapter four describes emergency training and exercise practices, along with challenges, needs, solutions, and other findings of the case examples and screening surveys. Chapter five focuses on the toolkit and sources of emergency training and exercises. Chapter six presents highlights of the findings and topics for further research. The synthesis also includes the following appendices:

APPENDIX A   TOOLKIT

APPENDIX B   SURVEY QUESTIONNAIRE

APPENDIX C   SCREENING SURVEY RESPONSES

APPENDIX D   INTERVIEW GUIDE

APPENDIX E   LIST OF INTERVIEWEES AND CASE EXAMPLES

APPENDIX F   WSDOT EMERGENCY OPERATIONS PLAN

APPENDIX G   ARIZONA DOT EMERGENCY PLANNING, MANAGEMENT, AND MAINTENANCE TRAINING MATRICES

APPENDIX H   MISSOURI DOT TRAINING PLAN

APPENDIX I   MISSOURI DOT NIMS TRAINING GUIDE

10

CHAPTER TWO

EMERGENCY TRAINING AND EXERCISE NEEDS

This chapter provides an overview of the emergency training and exercise needs of M&O field personnel. Needs stem from several sources. First, they stem from the state DOTs' EOPs, which reflect the DOTs' National Response Framework (NRF) ESF-1 and ESF-3 roles and responsibilities, continuity of operations plans, emergency evacuation plans, and other plans and SOPs that involve field personnel. In addition, they stem from federal and state regulations; industry requirements and position-specific requirements; and federal and state disaster reimbursement programs. Post-event and after-action reports from exercises can identify additional training and exercise needs. Finally, the agency's risk assessment may also warrant hazards-specific training and exercises.

SYSTEMS, FRAMEWORKS, PLANS, AND GOALS RESULTING FROM PRESIDENTIAL DIRECTIVES

The three Homeland Security Presidential Directives—HSPD-5, HSPD-7, and HSPD-8—produced valuable national guidance, systems, plans, and tools. HSPD-5, "Management of Domestic Incidents," generated both NIMS and the National Response Framework (NRF). NIMS was released in 2004 and updated in 2008, incorporating lessons learned from Hurricane Katrina. The NRF was released in 2008 and updated in 2013. The NRF is an expanded version of the original National Response Plan, which was initially generated by HSPD-5. HSPD-7, "Critical Infrastructure Identification, Prioritization, and Protection," generated the National Infrastructure Protection Plan (NIPP 2013). HSPD-7 was replaced by Presidential Policy Directive 21 (PPD-21), through which a revised and updated NIPP was produced and released in 2013. HSPD-8, "National Preparedness," released in 2003, has been replaced by Presidential Policy Directive 8 (PPD-8).

The National Incident Management System and the National Response Framework

The goal of NIMS and the NRF is the same: the effective and efficient management of incidents. The NRF provides the national-level policy, and NIMS supplies the template. NIMS offers a common approach in both "pre-event preparedness and post-event response activities that allow responders from many different organizations to effectively and efficiently work together at the scene of an incident" ("Security and Emergency Management—An Information Briefing," FHWA 2009). The Incident Command System element of NIMS is a standardized management process that enables "effective, efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure" ("Incident Command System," FEMA 2013). As an incident evolves, the ICS organization can expand in a modular fashion because of its "flexible, yet standardized core mechanism" that allows for "coordinated and collaborative incident management" ("Incident Command System," FEMA 2013). If field personnel are sent to another county or state, ICS will enable them to coordinate effectively with other agencies and organizations with which they may not be familiar. Another element of the NIMS command and management component is the Multiagency Coordination System (MACS), which is useful for incidents that span multiple jurisdictions and require responses by multiple agencies.

The NRF is built on NIMS concepts. It "describes the principles, roles and responsibilities, and coordinating structures for delivering the core capabilities required to respond to an incident and further describes how response efforts integrate with those of the other mission areas" (*National Response Framework*, FEMA 2013, p. i). The NRF is an important part of the National Preparedness Goal (NPG), applies to any type of disaster, and "sets the doctrine for how the Nation builds, sustains, and delivers the response core capabilities identified in the National Preparedness Goal" (*National Response Framework*, FEMA 2013, p. 1).

The NRF also contains the Emergency Support Function Annexes. ESF Annexes describe "the Federal coordinating structures that group resources and capabilities into functional areas that are most frequently needed in a national response" (*National Response Framework,* FEMA 2013, p. 32). The ESF Annexes are usually adapted by state DOTs for use in their EOPs.

ESF-1 is Transportation, which "coordinates the support of management of transportation systems and infrastructure, the regulation of transportation, management of the Nation's airspace, and ensuring the safety and security of the national transportation system" (*National Response Framework*, FEMA 2013, p. 32). Each state DOT adapts the ESF

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

11

according to its own requirements. Table 1 shows the key response core capability and functions pertaining to ESF-1.

TABLE 1
ESF#1—TRANSPORTATION

Key Response Core Capability	Functions
• Critical transportation	• Transportation modes management and control
	• Transportation safety
	• Stabilization and reestablishment of transportation infrastructure
	• Movement restrictions
	• Damage and impact assessment

ESF-3 is Public Works and Engineering, which "coordinates the capabilities and resources to facilitate the delivery of services, technical assistance, engineering expertise, construction management, and other support to prepare for, respond to, and/or recover from a disaster or an incident." Table 2 shows the key response core capabilities and functions pertaining to ESF-3.

TABLE 2
ESF #3—PUBLIC WORKS AND ENGINEERING

Key Response Core Capability	Functions
• Infrastructure systems	• Transportation modes management and control
• Critical transportation	• Transportation safety
• Public and private services and resources	• Stabilization and reestablishment of transportation infrastructure
• Environmental response/ health and safety	• Movement restrictions
• Fatality management	• Damage and impact assessment
• Mass care services	
• Mass search and rescue operations	

The NRF has two other types of annexes (*National Response Framework*, FEMA 2013, p. 2):

- Support Annexes describe "the essential supporting processes and considerations that are most common to the majority of incidents."
- Incident Annexes describe "the unique response aspects of incident categories."

National Preparedness Goal

In the NPG, success is defined as—

> A secure and resilient Nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk. (*National Preparedness Goal*, FEMA 2011, p. 1)

NPG mission areas are shown in Table 3 (*National Preparedness Goal*, FEMA 2011, p. 1).

TABLE 3
NATIONAL PREPAREDNESS GOAL (NPG) MISSION AREAS

Prevention—Preventing, avoiding, or stopping a threatened or an actual act of terrorism
Protection—Protecting our citizens, residents, visitors, and assets against the greatest threats and hazards in a manner that allows our interests, aspirations, and way of life to thrive
Mitigation—Mitigating the loss of life and property by lessening the impact of future disasters
Response—Responding quickly to save lives, protect property and the environment, and meet basic human needs in the aftermath of a catastrophic incident
Recovery—Recovering through a focus on the timely restoration, strengthening, and revitalization of infrastructure, housing, and a sustainable economy, as well as the health, social, cultural, historic, and environmental fabric of communities affected by a catastrophic incident

While the National Response Framework provides the context by which the whole community works together to fulfill the RESPONSE mission area of the NPG, it is only one of the five National Planning Frameworks. The other four frameworks address the other four mission areas of the NPG and PPD-8. These frameworks are—

- **PREVENTION.** National Prevention Framework (2013)
- **PROTECTION.** National Protection Framework (2014)
- **MITIGATION.** National Mitigation Framework (2013)
- **RECOVERY.** National Disaster Recovery Framework (2011)
  ("National Planning Frameworks," FEMA 2014).

The National Prevention Framework describes what the whole community—from community members to senior leaders in government—should do upon the discovery of intelligence or information regarding an imminent threat to the homeland to thwart an initial or follow-on terrorist attack. This framework helps achieve the National Preparedness Goal of a secure and resilient nation that is optimally prepared to prevent a terrorist attack within the United States (*National Prevention Framework* 2013, Executive Summary).

The National Protection Framework describes what the whole community should do to safeguard against acts of terrorism, natural disasters, and other threats or hazards. The framework presents the core capabilities; roles and responsibilities; and coordinating structures that facilitate the protection of individuals, communities, and the nation. This framework is focused on actions to protect against the greatest risks in a manner that allows American interests, aspirations, and way of life to thrive (*National Protection Framework* 2014, Executive Summary).

The National Mitigation Framework establishes a common platform and forum for coordinating and addressing

how the nation manages risk through mitigation capabilities. Mitigation reduces the impact of disasters by supporting protection and prevention activities, easing response, and speeding recovery to create better prepared and more resilient communities. This framework describes mitigation roles across the whole community. It addresses how the nation will develop, employ, and coordinate core mitigation capabilities to reduce loss of life and property by lessening the impact of disasters. Building on a wealth of objective and evidence-based knowledge and community experience, the framework seeks to increase risk awareness and leverage mitigation products, services, and assets across the whole community (*National Mitigation Framework* 2013, Executive Summary).

The *National Disaster Recovery Framework* (2011) provides guidance that enables effective recovery support to disaster-affected states, tribes, and local jurisdictions. It provides a flexible structure that enables disaster recovery managers to operate in a unified and collaborative manner. It focuses on how best to restore, redevelop, and revitalize the health, social, economic, natural, and environmental fabric of the community and build a more resilient nation (*National Disaster Recovery Framework* 2011, Executive Summary).

The *National Response Framework*'s focus is on the RESPONSE mission area, which is key to effectively addressing emergencies and disasters. The framework's core capabilities were identified by the NRF and integrated into the NPG (*National Preparedness Goal*, FEMA 2011, p. 2):

- Critical transportation
- Environmental response/health and safety
- Fatality management services
- Infrastructure systems
- Mass care services
- Mass search and rescue operations
- On-scene security and protection
- Operational communications
- Public and private services and resources
- Public health and medical services
- Situational assessment.

The National Preparedness System will enable the implementation of these core capabilities through a collaborative and whole community approach involving all sectors of the government and industry as well as individuals, families, and communities. NIMS ensures a unified approach to the implementation process. In addition, NIMS compliance is required for federal emergency grants; therefore, it is important to incorporate NIMS concepts and principles into all relevant training and exercises. The NCHRP *Guide to Emergency Response Planning* (2010) notes that state DOTs can implement the following actions to improve their response capabilities and coordination among responders, and to ensure compliance:

- Incorporate NIMS/ICS into all state/territorial and regional training and exercises.
- Establish employee and contractor training and exercise programs.
- Participate in joint multiagency training and exercises. This could include an all-hazards exercise program based on NIMS that involves responders from multiple disciplines and multiple jurisdictions.
- Identify through exercises and simulations the estimated time needed to complete an evacuation/shelter-in-place/quarantine for each of the catastrophic hazards identified and provide this information to highway, public safety, and transit agencies for coordination purposes.
- Identify through training exercises the time it takes to have field personnel and equipment in place to support an evacuation/shelter-in-place/quarantine.
- Conduct post-exercise debriefings to identify lessons learned during the exercise.
- Incorporate the results of training exercises, including corrective actions, into preparedness response plans and procedures.
- Leverage training facilities to coordinate and deliver NIMS training requirements in conformance with the NIMS National Standard Curriculum.
- Ensure that all personnel with a direct role in emergency preparedness and incident management or response complete the designated FEMA training. (*Guide to Emergency Response Planning* 2010, p. 64)

National Infrastructure Protection Plan

The revised *National Infrastructure Protection Plan—Partnering for Critical Infrastructure Security and Resilience* (NIPP 2013) guides the national effort to manage risk to critical infrastructure. To implement a key NIPP risk management element—reduction of vulnerabilities—it is essential to develop and conduct training and exercises, identify lessons learned, and apply corrective actions resulting from the exercises and actual incidents.

NIPP action item #9 is "Strengthen Coordinated Development and Delivery of Technical Assistance, Training, and Education"; action item #12 is "Learn and Adapt During and After Exercises and Incident" (NIPP 2013, p. 21).

The NIPP provides the following detailed recommendations for action item #9:

- "Capture, report, and prioritize the technical assistance, training, and education needs of the various partners within the critical infrastructure community."
- "Increase coordination of technical assistance efforts—particularly within the DHS and among the SSAs—and leverage a wider network of partners to deliver training and education programs to better

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

13

serve recipients and reach a wider audience while conserving resources."

- "Partner with academia to establish and update critical infrastructure curricula that help to train critical infrastructure professionals, including executives and managers, to manage the benefits and inherent vulnerabilities introduced by information and communications technologies in critical infrastructure assets, systems, and networks." (NIPP 2013, p. 25)

For action item #12, the NIPP recommends the following:

- "Given the evolving nature of threats and hazards, the national aspiration of secure and resilient critical infrastructure is achievable only through the collective efforts of numerous partners grounded in continuous learning and adaptation to changing environments. The critical infrastructure community can better realize the opportunities for learning and adaptation during and after exercises and incidents through more collaborative exercise design, coordinated lessons learned and corrective action processes, and streamlined sharing of best practices."
- "Develop and conduct exercises through participatory processes to suit diverse needs and purposes. Promote broad participation and coordination among government and interested private sector partners—including the R&D community—in exercise design, conduct, and evaluation to reflect the perspectives of all partners and maximize the value for future planning and operations."
- "Develop exercises at multiple levels and in various formats to suit national, regional, and SLTT (State, Local, Tribal, and Territorial) needs."
- "Design exercises to reflect lessons learned and test corrective actions from previous exercises and incidents, address both physical and cyber threats and vulnerabilities, and evaluate the transition from steady state to incident response and recovery efforts."
- "Share lessons learned and corrective actions from exercises and incidents and rapidly incorporate them into technical assistance, training, and education programs to improve future security and resilience efforts." (NIPP 2013, p. 26)

NIMS TRAINING

The FEMA National Integration Center (NIC) released the NIMS Training Program in 2011. It supersedes the 2008 Five-Year NIMS Training Plan. The program aims to define "a national NIMS training curriculum and personnel qualifications and to assemble and update the training guidance for available NIMS courses (organized as a core curriculum)" (FEMA 2011, p. vi).

State DOTs that have experienced significant disasters have a firsthand understanding of the importance of NIMS

and ICS. According to the Vermont Agency of Transportation Irene Innovation Task Force, which was created after Hurricane Irene to identify lessons learned from the disaster, "One of the most frequently heard comments during the interview and focus groups was the need for ongoing training and preparedness in emergency response and also in the ICS" (*Irene Innovation Task Force Report*, VTrans 2012, p. 13).

> The training and qualification of emergency management response personnel is critical to the success of NIMS implementation nationally. (NIMS Training Program, FEMA 2011, p. 2)

Case example agencies for this report generally provide the introductory NIMS and ICS courses to their field personnel. First-line supervisors typically receive additional training in ICS for Single Resources and Initial Action Incidents. For example,

- Washington State DOT (WSDOT) requires IS-100 (Introduction to ICS) and IS-700 (Introduction to NIMS) for emergency response providers. WSDOT states in its *Emergency Operations Plan M 54-11.01* (2011), "WSDOT employees who have a role in emergency response shall receive training on the National Incident Management System and the Incident Command System." WSDOT requires first-line supervisors to take IS-200 in addition to IS-100 and IS-700. (See Appendix F for the Training and Exercises component of Washington DOT's EOP.)
- Texas DOT (TxDOT) requires maintenance personnel, including field personnel, to take IS-100 and IS-700. Like WSDOT, TxDOT requires supervisors to take the IS-200 course as well.
- Arizona DOT (ADOT) requires IS-100, IS-700, and traffic incident management (TIM) training for M&O field personnel. First-line supervisors are required to take IS-200 (ICS for Single Resources) and IS-800 (Introduction to NRF) as well. Table 4 shows ADOT's Emergency Planning and Management Training Matrix Requirements for M&O field personnel under Operations #1 and #2. (See ADOT's Maintenance Training Matrix in Appendix G for additional training requirements for maintenance workers.)
- Missouri DOT (MoDOT) recommends that of its employees, including all motorist assist and emergency response field staff, take IS-100 and IS-700, and recommends that first-line response supervisors take IS-200 as well. MoDOT emergency responders include Traffic Management Center operators and both urban and rural field staff. (See Appendices H and I for MoDOT's Training Plan and the NIMS Training Guide, respectively.)
- Tennessee DOT (TDOT) field personnel are required to take IS-100 and IS-700. These courses are delivered online. If the region prefers the classroom method,

14

TABLE 4
ADOT'S EMERGENCY PLANNING AND MANAGEMENT TRAINING MATRIX REQUIREMENTS FOR OPERATIONS #1 AND OPERATIONS #2 PERSONNEL

ADOT Level	Required Training	ADOT Employee / Job Descriptions / Other Info
Operations #1 – 100, 700	Available on-line. 1. IS-700.A - National Incident Management System (NIMS), An Introduction 2. ICS 100 - Introduction to Incident Command System: • IS-100.B - Introduction to Incident Command System, • IS-100.PWB - Intro to ICS for Public Works, or • IS-100.LEB - Intro to ICS for Law Enforcement	• Equipment Services Shop and Fuels Management staff • Equipment Services Supervisors and Managers • Facilities Supervisors and Managers • Accounts Payable Supervisors and Managers • Human Resources Supervisors and Managers • Maintenance/Operations Personnel (field and office) • Safety & Risk Management Staff • Grand Canyon National Park Airport Staff • Construction Inspectors and Support Staff • Environmental Services Staff • MVD Customer Service Managers and Supervisors • Procurement Managers and Specialists • Emergency Response Team Personnel (Building Emergency Coordinators, etc.) • All Enforcement and Compliance Personnel
Operations #2 – 100, 200, 700, 800	Available on-line. 1. IS-700.A - National Incident Management System (NIMS), An Introduction 2. ICS 100 - Introduction to Incident Command System: • IS-100.B - Introduction to Incident Command System, • IS-100.PWB - Intro to ICS for Public Works, or • IS-100.LEB - Intro to ICS for Law Enforcement 3. IS-200.B - (ICS 200) ICS for Single Resources and Initial Action Incidents 4. IS-800.B - National Response Framework, An Introduction	• State Engineer • Deputy and Assistant State Engineers • Construction Resident Engineers • Bridge Engineers / Inspectors • Chief Procurement Officer • Chief Financial Officer • Physical Plant Operations Administrator • Manager Budget and Strategic Planning • Fiscal Operations Controller • Safety & Risk Management Director • Safety & Risk Deputy Directors • Traffic Operations Center personnel • Maintenance Supervisors • Maintenance Analysts

Courtesy: Arizona DOT.

IS-100 and IS-700 can be delivered in a classroom format. Supervisors are required to take IS-200 and IS-800 in a classroom format, in addition to taking IS-100 and IS-700 online.

- Rhode Island DOT recommends that all field personnel take ICS-100 and ICS-200, and that midlevel managers take ICS-300 (Intermediate ICS) and ICS-400 (Advanced ICS). These courses are provided at the Rhode Island Emergency Management Agency.
- Caltrans requires IS-100 for all new field personnel, along with training on the Standardized Emergency Management System (SEMS) for California. SEMS and ICS are included in the 2-week training provided to new maintenance employees. SEMS is similar to NIMS/ICS and includes key components of NIMS, such as ICS at the field level, mutual aid, and the operational area. California self-certifies NIMS compliance. In recognition of the fact that interactive field training would enhance content retention and preparedness of field personnel, Caltrans is developing ICS field training in conjunction with the Mineta Transportation Institute. Course development funding is through the Transportation Research Board's project NCHRP 20-59(30).
- Plant City, Florida, provides NIMS training to all field personnel through FEMA EMI Independent Study online training.

NCHRP 20-59(30) Project

The NCHRP 20-59(30) project on the Role of Transportation in the Incident Command System Structure and the National Incident Management System Structure will develop ICS training for state DOT field personnel. The training is expected to be applicable to PW field personnel as well and will address some of the training and exercise needs identified in this synthesis (TRB senior program officer, personal communication, July 28, 2014).

The 20-59(30) project is necessary and timely, especially because two FHWA publications concerning NIMS and ICS—the *National Incident Management System* (*NIMS*): *A Workbook for State Departments of Transportation Frontline Workers* (2009) and the *Simplified Guide to the Incident Command System for Transportation Professionals* (2006)—contain content based on FEMA Independent Study material that has since been updated (TRB senior program officer, personal communication, July 28, 2014).

The NCHRP 20-59(30) project is expected to produce the following products:

- A 1-hour PowerPoint-based ICS training customized for transportation field personnel;

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

15

- Three 15-minute PowerPoint-based training modules on specialized topics—safety, communications, and collaboration;
- Four 10-minute scenario-driven, discussion-based exercises;
- Supporting material for the training and exercises, including instructor manuals and student manuals;
- ICS guide cards and a file folder for field supervisors to use in any emergency; and
- A checklist of personal and family emergency kit items for field personnel.

(TRB senior program officer, personal communication, July 28, 2014)

NIMS Training Program and Courses

Panel members, respondents, and researchers have noted that the delivery of NIMS and ICS training to M&O field personnel is inconsistent and needs improvement, even though NIMS and ICS training and content are available through a number of sources and are based on the NIMS training standard contained in the NIMS Training Program (FEMA 2011).

FEMA's NIMS Training Program includes a national NIMS training curriculum and personnel qualifications, and guidance on the development of training plans, as well as the NIMS training standard. The program, established by FEMA's National Integration Center, has the following three objectives (*NIMS Training Program*, FEMA 2011, p. 2):

- Support NIMS education and training for all emergency management personnel;
- Adapt the functional capabilities defined by NIMS into guidelines, courses, and a curriculum that help stakeholders develop personnel training and credentialing plans that yield the desired capabilities; and
- Define the minimum personnel qualifications required for service on complex multijurisdictional incidents nationwide.

The training program also expects stakeholders in the public and private sectors to do the following (p. 4):

- Identify appropriate personnel to take NIMS training;
- Ensure that all course delivery meets the standard set forth in the NIMS Training Program and other training guidance provided by the NIC; and
- Credential emergency/incident management personnel.

The training program document recommends sequencing training and exercises so that trainees can apply their learning before additional training. Because a training plan has "significant programmatic, schedule, and budget implications for the stakeholder," stakeholders are allowed to create their own plans according to their needs and constraints in order

to meet the NIMS Training Program requirements (*NIMS Training Program*, FEMA 2011, p. 8). The document states that training and experience can be gained through courses; practical applications, including a wide range of exercises; and on-the-job training (e.g., job shadowing, planned events, and incident management for small incidents).

Most of the concepts and guidance in the 2011 NIMS Training Program document are applicable to other emergency training needs of state DOTs, tribal entities, and PW agencies.

Congruent with the widespread federal practice of basing assessment and training systems on competencies, the NIMS Training Program is based on core competencies. As the program document states, operational needs define core competencies (*NIMS Training Program*, FEMA 2011, p. 8). Operational needs are predicated on NIMS and other emergency functions, related responsibilities and activities of personnel, and the size and complexity of an incident. Core competencies identified through these needs then become the basis for the development of a training plan.

Figure 3 shows the NIMS and ICS training needs for field personnel identified in the 2011 NIMS Training Program.

*based on position-specific requirements and jurisdiction risk
FIGURE 3 Training for field personnel (adapted from *NIMS Training Program,* FEMA 2011, p. 18).

Training needs of field personnel are categorized by incident type, from 1 through 5. Type 1 incidents are the most complex, while type 5 incidents are of the lowest complexity. Type 5 incidents require Introduction to ICS (either the instructor-led ICS-100 course or the online IS-100 version) and Introduction to NIMS (IS-700). Type 5 incidents can be handled with one or two resources and a maximum of six persons. They do not require activation of command or general staff positions. ICS for Single Resources and Initial Action Incidents (either the instructor-led ICS-200 course or the online IS-200 version) is recommended for type 4 incidents. These incidents require several resources and might require activation of command and general staff positions. For larger

16

and more complex incidents—types 1, 2, and 3—additional courses are needed, including ICS-300 (Intermediate ICS), ICS-400 (Advanced ICS), and IS-800 (Introduction to NRF).

Table 5 highlights the characteristics of each of the five incident types as presented in the NIMS Training Program document (FEMA 2011, pp. 16–17).

TABLE 5
CHARACTERISTICS OF RESPONSE BY LEVEL OF INCIDENT COMPLEXITY

Type 1	• Most complex • Requires national resources • High impact on local jurisdiction • Total personnel will usually exceed 1,000
Type 2	• Extends past local capabilities • May require regional and/or national resources • High impact on local jurisdiction • Total personnel will not exceed 500
Type 3	• When incident needs exceed capabilities, the appropriate ICS positions should be added • Some or all of the command and general staff positions may be activated as well as division/group supervisor and/or unit leader–level positions • May extend into multiple operational periods
Type 4	• Several resources are required, including a task force or strike team • Command and general staff positions are activated only if needed • The incident is limited to one operational phase
Type 5	• Can be handled with one or two single resources with up to six personnel • Command and general staff positions (other than incident commander) are not activated • Is contained in the first operational period, often within a few hours after resources arrive on the scene

The FEMA Public Works Working Group developed models for Emergency Mutual Aid Compact (EMAC) mission-ready packages using NIMS resource typing and personnel credentialing. The mission-ready packages facilitate accurate and efficient identification and request of needed resources. They include details of missions supported, estimated cost, and location of the resource, in addition to resource-typed definitions. The packages are available on the APWA website through APWA's Emergency Management Resource Center ("Resource Center: Emergency Management," APWA n.d.).

NIMS resource typing facilitates the identification and inventorying of resources. Resource typing is "categorizing, by capability, the resources requested, deployed, and used in incidents." Resource-typed definitions include the following: *category*, the function for which the resource is used; kind or like resources; components, the elements that comprise the resource; measures, the delineation of a resource's capability

or capacity; and type, the level of resource capability (*National Incident Management System*, FEMA 2008, pp. 42–43).

Personnel credentialing is "the administrative process for validating personnel qualifications and providing authorization to perform specific tasks under specific conditions during an incident." Personnel credentialing involves "the objective evaluation and documentation of an individual's current certification, license, or degree; training and experience; and competence or proficiency to meet nationally accepted standards, provide particular services and/or functions, or perform specific tasks under specific conditions during an incident" (*National Incident Management System,* FEMA 2008, p. 40).

Table 6 lists the NIMS training requirements for some public works resources; specifically, damage assessment teams, debris removal teams, debris management teams, disaster recovery teams, heavy equipment maintenance teams, and management teams. These five types of PW resources are only a subset of the 44 resource types included in the mission-ready package for public works on EMAC-Web.org ("Public Works," EMACWeb.org n.d.).

TABLE 6
TRAINING REQUIREMENTS FOR SOME PUBLIC WORKS RESOURCES

Damage Assessment Teams, Debris Removal, Heavy Equipment Maintenance
• NIMS, IS-100, IS-200
Supervisors for Damage Assessment Teams, Debris Removal
• NIMS, IS-100, IS-200, IS-300, IS-800
Public Works Management Team, Disaster Recovery Team, Debris Management Team
• NIMS, IS-100, IS-200, IS-300, IS-700, IS-800

Source: "Public Works," EMACWeb.org, n.d.

MUTUAL AID AND GRANTS

Emergency Management Assistance Compact and Mutual Aid Training

State DOTs participate in mutual assistance efforts. They send their qualified personnel, including field personnel, to other states that are experiencing disasters or emergencies. They also request assistance when needed. Personnel who are sent to another state need to know exactly what is expected of them, how long they will be deployed, what to bring, how to document expenditures, and how to use the disaster software tools in use in that state. State DOTs that are receiving assistance need to prepare for the arrival of out-of-state crews and provide instructions on how to document work and costs. Training on mutual assistance procedures, including Emergency Mutual Aid Compact procedures, can improve the preparedness of both requesting and providing entities.

All 50 states, the District of Columbia, Puerto Rico, Guam, and the U.S. Virgin Islands are members of EMAC. The compact is administered by the National Emergency Management Association and facilitates emergency assistance through pre-arranged agreements that allow states to send resources (personnel, equipment, and commodities) to other states. EMAC was established in 1993 and ratified by Congress in 1995. There are five EMAC phases: pre-event preparation, activation, request and offer, response, and reimbursement.

Article 1 of the EMAC legislation ratified by the member states authorizes these states to request and provide assistance for emergency training and exercises through EMAC:

> This compact shall also provide for mutual cooperation in emergency-related exercises, testing, or other training activities using equipment and personnel simulating performance of any aspect of the giving and receiving of aid by party states or subdivisions of party states during emergencies, such actions occurring outside actual declared emergency periods. Mutual assistance in this compact may include the use of the states' National Guard forces, either in accordance with the National Guard Mutual Assistance Compact or by mutual agreement between states. ("EMAC Legislation," EMACWeb.org n.d.)

Emergency Management Accreditation Program

The Emergency Management Accreditation Program (EMAP) is an independent nonprofit organization that provides accreditation to government emergency management programs. Accreditation is voluntary and is achieved through compliance with the EMAP emergency management standard (*Emergency Management Standard* 2013), which addresses training and exercises, evaluations, and corrective action.

The standard states that an accredited emergency management program includes a formal and documented training program that has "the assessment, development and implementation of appropriate training for Program officials, emergency management/response personnel and the public" (p. 12). The standard also indicates that emergency personnel should have training aligned with their current and potential responsibilities (p. 12), as well as specialized training related to specific threats to their jurisdiction. Training should be based on the results of the needs assessment, internal and external requirements, and deficiencies identified in the corrective action process (p. 12).

The standard states that an accredited emergency management program includes an exercise, an evaluation, and a corrective action process. The exercise program should test the "skills, abilities, and experience of emergency personnel as well as the plans, policies, procedures, equipment, and facilities" to address possible hazards (*Emergency Management Standard* 2013, p. 12). Evaluation methods may include "periodic reviews, testing, post-incident reports, lessons learned, performance evaluations, exercises and real-world events" (p. 13). Evaluations are documented and disseminated to appropriate stakeholders and partners, and a corrective action process is implemented to identify deficiencies and needed corrective actions (p. 13).

Records should include the personnel who participated in the training, the types of training provided or being planned, names and qualifications of trainers, and the retention period for the records (*Emergency Management Standard* 2013, p. 12).

An accredited emergency management program also has an incident management system to facilitate effective response and recovery, resource management processes, and mutual aid procedures. The standard document notes the importance of incident management training for all personnel with an emergency response role (*Emergency Management Standard* 2013, p. 9). The standard also addressed the following topics:

- Resource management and logistics
- Mutual aid
- Program management
- Administration and finance
- Laws and authorities
- Hazard identification, risk assessment, and consequence analysis
- Hazard mitigation
- Prevention
- Operational planning
- Communications and warning
- Operations and procedures
- Facilities
- Crisis communications, public education, and information.

The FEMA Emergency Management Institute in Emmitsburg, Maryland, offers a course on the Emergency Management Accreditation Program (E0122). (For more information on EMAP, training, and the standard, go to the EMAP website at www.emaponline.org.)

Grants

The states receive grant funds from FEMA's Emergency Management Performance Grant Program that enable them to engage in preparedness activities such as planning, developing, and delivering training and exercises to state and local agencies, including state DOTs and PWs. Emergency Management Performance Grant funds are also distributed to various jurisdictions within a state. Because of minimum exercise participation requirements for recipients, jurisdictions may collaborate in the organization of exercises. Homeland Security Grant Program funds help state EMAs develop and deliver various homeland security training and exercises, usually at no cost to participating agencies. States also receive other grants through the Port Security Grant Pro-

18

gram, Transit Security Grant Program, and State Fire Training Systems Grants. State DOTs and PWs can benefit from coordinating with their state EMA and selected jurisdictions to take advantage of training and exercise opportunities.

HAZARDS AWARENESS, SAFETY TRAINING, AND HAZARD-SPECIFIC TRAINING

State DOTs train their field personnel to recognize hazardous situations and assess them. Field personnel also need to know how to approach various hazards and what to do when they encounter them.

State DOTs comply with or exceed Occupational Safety and Health Administration (OSHA) standards and requirements. OSHA provides guidance on how to determine safety and health hazards and how to perform a Job Hazard Analysis, which examines each component of a job, identifies hazards or potential hazards, and determines how to perform the job to mitigate the hazards. Also, while state agency workers are not directly covered by OSHA, state DOT workers may be covered by OSHA-approved state health and safety plans. Currently, 22 states or territories have OSHA-approved plans (OSHA Directorate of Training and Education, personal communication, Dec. 4, 2014). OSHA also provides methods of identifying employees at greater occupational risk. OSHA online resources, accessible at www.osha.gov, offer training guidance on the development of instructional programs. In addition, state DOTs and PWs within the vicinity of a nuclear power reactor may be required to undergo additional training and exercises.

Disclaimer on Hazmat Training

Hazmat training is required for personnel who handle hazardous materials, and detailed federal requirements concerning hazmat training must be followed. Because the focus of this synthesis is not on hazmat training, the topic is not fully addressed. For information on OSHA requirements, consult your compliance unit.

Hazards Assessment Training

The Washington State DOT's hazards assessment training includes the following topics: understanding the hazard assessment process; site safety awareness; proper application of processes to call out situations; and how to close roads and shut down activity ("Hazards Assessment Presentation," provided by G. Selstead, WSDOT, personal communication, April 18, 2013). Specific training content on site safety awareness provided to WSDOT field personnel includes instructions on assessing an incident scene for safety and recommendations on incident management and safety. Table 7 shows the content of one presentation used by WSDOT in its hazards assessment training.

TABLE 7
RECOMMENDATIONS FOR ASSESSING AN INCIDENT SCENE FOR SAFETY

Assessing the Incident Scene for Safety	Incident Management and Safety Recommendations
• Observe the surroundings • Identify possible hazards • Understand what may have caused the accident/incident and • Request any needed additional assistance.	• Check your equipment • Keep in communication with supervisor and Transportation Management Center • Be certain you have received necessary training • Have and use the proper personal protective equipment • Be certain you have the proper traffic signs • Do you need more personnel to do the job safely? • Just because you are asked to do something by another responder, doesn't mean it is safe to do • You have the power to walk away, shut down the job, or even shut down the road • Always think about what is happening as you approach the scene • Look around • Do pre-activity safety planning • Mitigate hazards as best as possible before starting work • If it looks like danger is developing, stop the work and reassess.

Missouri DOT offers a Hazardous Material Recognition Introduction course. This course introduces employees working or traveling on highways to hazardous materials spilled or lost on state highways and right-of-ways. Oriented toward raising employee awareness, the course "teaches how to use the emergency response guidebook, who to identify, how to identify other signs of hazardous materials, and what MoDOT can do, if anything, to prevent the spread of a hazardous material" (MoDOT District Incident Response Plan Training).

Safety Training

Safety refers to the prevention of "accidental deaths and injuries due to natural or inadvertent manmade activities" (Edwards and Goodrich 2011, p. 6). Survey respondents and case example participating agencies indicate that field personnel receive both the safety training required by OSHA state health and safety plans and training for other job-specific requirements. Some OSHA general industry and construction requirements include training guidance. OSHA requirements include Hazardous Waste Operations and Emergency Response (HAZWOPER), Emergency Action Plans, Medical and First Aid, and Fall Protection (OSHA 1998). HAZWOPER training is based on the OSHA HAZWOPER standard and is important for workers involved in emergency response and exposed or potentially

exposed to hazardous substances. The following practices are observed among some of the agencies participating in the case examples:

- ADOT provides a hazard communications and an OSHA/DOT hazardous materials course along with safety courses on confined space awareness, fire safety, and first aid. Other courses are related to technology use, such as basic computer skills and the use of a two-way radio. Personnel in ADOT's four technical levels are required to take additional courses.
- Caltrans safety officers provide safety and hazards training that includes the following content: hazmat communications, confined spaces, standard emergency management (SEM), hazardous waste generation, emergency responder awareness, emergency responder operations (for supervisors), and management for hazmat specialists.
- Plant City, Florida, provides its field personnel with hazardous materials cleanup and water resource management training once a year. Also, Florida requires intermediate traffic certification for all personnel involved in work zones.
- Missouri DOT provides the following safety-related courses to its employees: Advanced Work Zone Training, Basic First Aid, Blood-Borne Pathogens, Adult CPR, Child and Infant CPR, and Air Bag and Hybrid Vehicle Safety Training. Additional district training is also offered when available, including Dump Truck Operations, Fire Extinguisher Training, Flagger and Work Zone Training, and Front-End Loader Operations.
- The Rhode Island DOT's Safety Office provides personal safety and hazards awareness courses to field personnel.

Hazard-Specific Training

In addition to all-hazards training, state DOTs must deal with hazards specific to their regions and must deliver appropriate training to field personnel and supervisors. Additional training and exercises may be required for state DOTs and other agencies in the vicinity of a nuclear power reactor.

TxDOT

For example, TxDOT provides training on wildland fires and hurricanes to field personnel. During wildland fires, these people are responsible for traffic control and incident response, providing water to firefighters, providing fuel to volunteer fire departments, debris removal, and repairs to their facilities. During the Bastrop County fires in the fall of 2011—in which TxDOT personnel were at risk as they worked without interruption to clear the highway and other roads of debris—it became clear that field personnel also need to know how to use personal protective equipment to prevent injury from fires.

For hurricanes, TxDOT field personnel are responsible for traffic control and incident response, debris removal, and repairs to the facilities. Hurricane training is provided in a daylong workshop that covers protocols, evacuation and reentry, cleanup and response techniques, and communications and interoperability issues. Also covered are debris and environmental contracts, issues related to the Moving Ahead for Progress in the 21st Century Act (MAP-21), and FEMA Public Assistance and FHWA Emergency Relief reimbursement issues. Coastal leadership also participates in regional hurricane conferences and the annual Texas Emergency Management Conference.

Other States and Cities

Plant City, Florida, provides field personnel with in-house hurricane training before the start of the hurricane season. The training includes hazards awareness, emergency operations, safety issues, and communications.

The Iowa DOT is challenged with winter weather and uses winter weather scenarios for its tabletop exercises for field personnel.

Homeland-Security-Related Training Needs

Security, defined as "freedom from harm resulting from intentional acts or circumstances" in *NCHRP Report 525, Volume 14, Security 101: A Physical Security Primer for Transportation Agencies* (2009), is an important responsibility of field personnel and their supervisors. They are the frontline personnel who can prevent and respond to incidents. Responsibilities include security awareness, situational assessment, and response. All field personnel are trained to observe and to report suspicious activities and items; supervisors are responsible for assessment and decision making. Field personnel need to know what to do before the arrival of law enforcement and other responders (Chen et al. 2006; Lowrie and Shaw 2011; *NCHRP Report 793: Incorporating Transportation Security Awareness into Routine State DOT Operations and Training***).**

Security awareness programs consist of consistent and centralized security information dissemination policy and reminders, handbooks and tip cards, and training (*Security 101* 2009). As noted in Chen et al. (2006), federal agencies have taken on a significant role in providing nationwide security training and training content. For example, the National Domestic Preparedness Consortium (NDPC) is sponsored through the DHS/FEMA National Preparedness Directorate. It consists of seven members: the Center for Domestic Preparedness (CDP) in Anniston, Alabama; the New Mexico Institute of Mining and Technology (New Mexico Tech); Louisiana State University's Academy of Counter-Terrorist Education (National Center for Biomedical Research and Training); Texas A&M University's National Emergency

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

20

Response and Rescue Training Center (TEEX); the Department of Energy's Nevada Test Site; the Transportation Technology Center, Inc.; and the National Disaster Preparedness Training Center at the University of Hawaii.

NCHRP Report 793: Incorporating Transportation Security Awareness into Routine State DOT Operations and Training presents techniques to integrate all-hazards security awareness into routine state DOT operations, maintenance, and training. The report also provides a listing of transportation security training courses, training centers, and relevant resources.

NCHRP Report 793, Appendix A, provides information on transportation security training courses and identifies the following training sources:

- Department of Homeland Security/Transportation Security Administration
- National Transit Institute
- Transportation Research Board
- Center for Transportation Safety, Security and Risk
- Federal Highway Administration
- Federal Transit Administration
- Federal Motor Carrier Safety Administration
- Pipeline and Hazardous Materials Safety Administration
- Federal Emergency Management Agency Security Training
- Other Federal Training
- State Emergency Management Agency Training
- Rural Domestic Preparedness Consortium.

Interviewees noted that training content is "too generic" and must be more relevant to the audience and maintain the interest of personnel (J. Western, personal communication, Sept. 12, 2013). There are gaps in NIMS training, and combining security awareness training with NIMS, ICS, TIM, and/or hazmat training may be a good idea. These comments are in line with results obtained from this synthesis report.

Refer to the *NCHRP Report 793* appendices for additional security training information—Appendix A: Transportation Security Training Courses, Appendix B: Training Center Resources, and Appendix C: a Directory of Transportation Security Resources.

Security Awareness Training Programs

The following effective security awareness training programs were identified and reviewed for the NCHRP 20-59(43) project, pursuant to the project's Task 1 (J. Western, personal communication, Sept. 12, 2013).

TxDOT's security awareness training course, considered to be exemplary in the industry, provides the skills and knowledge TxDOT personnel need to understand and carry out their roles and responsibilities regarding system security. The course familiarizes personnel with the different roles in system security, the types of terrorist weapons, and why terrorist do what they do. It teaches them how to hold group exercises to discuss possible terrorist targets in their area of responsibility as well as how to spot and report suspicious activities and packages, and how to report possible terrorist incidents;. The course includes the following modules:

- Module 1: What Is System Security?
- Module 2: What Is Your Role in Reducing Vulnerability?
- Module 3: What Is Suspicious Activity?
- Module 4: What Is a Suspicious Object?
- Module 5: What Is Your Top Priority?
- Module 6: What Is Your Role in Incident Response?
- Module 7: What Are You Doing to Prepare?

The Georgia DOT has worked with its employees, especially field personnel, to encourage heightened awareness during their normal work routines.

The Minnesota DOT requires all employees to attend a 4-hour security awareness class. In addition, the DOT developed functional exercises with live play, focusing on statewide objectives as well as objectives developed by each district. The department brought in the National Guard, State Patrol, Coast Guard, and others for a 30-hour exercise, a major resource commitment. The exercises went beyond the tabletop experience to simulate real experiences, with participants actually responding to the incidents. Employee feedback was positive.

The New Jersey DOT developed security awareness training for every transportation subsector. The Ohio DOT is emphasizing the use of ICS and Unified Command to enhance on-scene operations management and coordination with response agencies.

The Oregon DOT collaborated with the Oregon Emergency Management Agency, FEMA, WSDOT, and the Idaho DOT to develop a security awareness training program: Bio, Nuclear, Incendiary, Chemical, and Explosive. The Pennsylvania DOT delivers security awareness training through train-the-trainer programs. The DOT developed a facilities emergency operations guide to use during its training sessions.

WSDOT delivers two security training courses: (1) an awareness training course for all employees, focusing on pre-incident indicators and reporting protocol; and (2) a course for all levels of managers, including supervisors, that addresses their responsibilities in information gathering and analysis, hazard risk identification, and decision making (G. Selstead, WSDOT, personal communication, April 18, 2013).

The Virginia DOT (VDOT) has a separate budget for security training and facilities hardening. VDOT has

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

21

developed a security program delivered in a classroom that focuses on "Stop, Look, and Listen" awareness. All new VDOT employees take the class, which incorporates FEMA components adapted to meet the needs of VDOT.

DOT field personnel from many states have participated in the TRB course System Security Awareness for Transportation Employees (2005), developed by the National Transit Institute (NTI) in cooperation with FTA, DHS, the FBI, AASHTO, and WSDOT. The 3- to 4-hour CD-based interactive multimedia course is appropriate for both field personnel and their supervisors. It helps them understand their roles and responsibilities in transportation system security, recognizing suspicious activities and objects, observing and reporting relevant information, and minimizing harm to themselves and others. Modules include system security, reducing vulnerability, suspicious activity, suspicious objects, top priorities, and preparation. A 6-hour train-the-trainer (TTT) session is also available (System Security Awareness for Transportation Employees, TRB 2005).

Online training to identify, report, evaluate, and share terrorism indicators is available to the emergency management community through the nationwide suspicious activity reporting (SAR) website ("Nationwide SAR Initiative" 2010–2013: http://nsi.ncirc.gov). The program is led by the U.S. Department of Justice, Bureau of Justice Assistance, in partnership with DHS, the FBI, and state, local, tribal, and territorial law enforcement partners. Its purpose is to help prevent terrorism and related criminal activity by establishing a national capacity for gathering, documenting, processing, analyzing, and sharing SAR information.

The TSA First Observer™ program trains transportation professionals, including highway M&O field personnel, to observe, assess, and report suspicious individuals, vehicles, packages, and objects to protect national transportation systems against terrorism and other threats. The program also shares security-related information with transportation professionals and communicates critical security-related information. First Observer modules have been unavailable online from the expiration of the grant funding at the end of 2012 through November 2014. The modules are again available. The online program will remain functional while TSA develops a fully revised First Observer program that will be introduced in the near future (TSA First Observer project manager, personal communication, June 2, 2014).

Cybersecurity Training Needs

Cybersecurity is a national concern, as successful attacks by nation-states, criminals, "hacktivists," and hackers increase. The computer systems and databases of many government agencies and private organizations have been compromised. Because any computer user can become a target, state DOTs might provide basic cybersecurity training to employees;

for example, ADOT requires field personnel to take a computer security awareness course. Additional information on this topic will be identified in the NCHRP 20-59(48) project, Effective Practices for the Protection of Transportation Infrastructure from Cyber Incidents.

TRAFFIC INCIDENT MANAGEMENT TRAINING

Traffic incident management is a "multi-disciplinary process to detect, respond to, and clear traffic incidents so that traffic flow may be restored as safely and quickly as possible" ("Traffic Incident Management," FHWA 2013). The FHWA TIM program is included in FHWA's emergency transportation operations area. Emergency functions are separate from incident management functions, but field personnel usually perform TIM activities during disasters.

To achieve satisfactory TIM training outcomes on a regional level, the FHWA primer *Making the Connection: Advancing Traffic Incident Management in Transportation Planning* (2013) suggests "making the NIMS training and the SHRP 2 National TIM Responder Training Course widely available to all relevant staff in the region. TIM leaders in the region could take the SHRP 2 Train-the-Trainer course to become a trainer of the SHRP 2 National TIM Responder Training Course" (p. 47).

The National Unified Goal for TIM developed by the National Traffic Incident Management Coalition consists of the following:

- Responder safety;
- Safe, quick clearance; and
- Prompt, reliable, interoperable communications.
(*Field Operations Guide*, FHWA 2009, p. 1)

TIM training content includes ICS and activities that are also necessary for emergencies and disasters, including road or lane closures, establishment of detours, and debris removal. The next generation TIM is expected to focus on standardized multidisciplinary training, organizational capacity, practices and protocols, and a connected responder environment ("Traffic Incident Management Programs," National Traffic Incident Management Coalition n.d.).

The Second Strategic Highway Research Program (SHRP 2) has developed a National Traffic Incident Management Responder Training Course for TIM responders and managers. The SHRP 2 training, designed to be multidisciplinary and interjurisdictional, allows representatives from various agencies and jurisdictions to interact with each other. Evaluation of the classroom training using the Kirkpatrick four-level evaluation approach is also being developed. As of July 2014, the following SHRP 2 projects had been completed:

22

- "Train-the-Trainer Pilot Courses for Incident Responders and Managers," SHRP 2 Project L32-A, Second Strategic Highway Research Program (SHRP 2), Transportation Research Board of the National Academies, Washington, D.C., April 2013 [Online]. Available: http://www.trb. org/main/blurbs/168921.aspx.
- "Training of Traffic Incident Responders," SHRP 2 Report S2-L12-RW-1, Second Strategic Highway Research Program (SHRP 2), Transportation Research Board of the National Academies, Washington, D.C., 2012 [Online]. Available: http://www.trb.org/main/ blurbs/166877.aspx.

As of July 2014, the following SHRP 2 projects were either in progress or on the verge of completion:

- "e-Learning for Training Traffic Incident Responders and Managers," SHRP 2 Project L32-B, Second Strategic Highway Research Program (SHRP 2), Transportation Research Board of the National Academies, Washington, D.C. [Online]. Available: http://apps.trb.org/cmsfeed/TRBNetProjectDisplay. asp?ProjectID=3340.

Note: This project has been implemented through the National Highway Institute online course FHWA-NHI-133126, which is available free of charge through the NHI website.

- "Post-Course Assessment and Reporting Tool for Trainers and TIM Responders Using the SHRP 2 Interdisciplinary Traffic Incident Management Curriculum," SHRP 2 Project L32-C, Second Strategic Highway Research Program (SHRP 2), Transportation Research Board of the National Academies, Washington, D.C. [Online]. Available: http://apps.trb.org/cmsfeed/TRBNetProjectDisplay. asp?ProjectID=3341.

Note: The final report will be available on the SHRP 2 website in January 2015.

The map in Figure 4 shows the status of TIM SHRP 2 training in late 2014.

Most of the case example states have conducted SHRP 2 National Traffic Incident Management Responder training, including TTT sessions. For example, the Arizona DOT requires all its M&O field personnel to take TIM and has been working with the Arizona Department of Public Safety (AZDPS) to provide TIM training that has been developed based on the new SHRP 2 training. Statewide, approximately 70 trainers from several agencies—including ADOT and AZDPS—are using the SHRP 2 4-hour format in Arizona to deliver the training to federal, state, county, and local emergency response providers as well as

FIGURE 4 National TIM Training Program Implementation Progress (*Courtesy:* Paul Jodoin, FHWA, personal communication, Jan. 21, 2014).

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

23

to private companies such as tow truck operators and debris removal contractors.

The National Highway Institute offers courses relevant to TIM. These courses include Managing Traffic Incident and Roadway Emergencies (133048A), Managing Travel for Planned Special Events (133099), and Using the Incident Command System (ICS) at Highway Incidents (133101) as well as the aforementioned National Traffic Incident Management Responder Training (133126) course. For additional information and to search for courses, visit the NHI website ("National Highway Institute: Search for Courses," NHI n.d.: https://www.nhi.fhwa.dot.gov/default.aspx).

The I-95 Corridor Coalition offers several resources relevant to TIM. One is a quick clearance toolkit to help initiate or improve quick clearance programs and activities. The toolkit includes videos, documents, and workshops ("Quick Clearance Toolkit & Workshop," I-95 Corridor Coalition n.d.). Another resource is the coalition's Virtual Incident Management Training, an online training program that uses computer gaming simulation technology and distance learning technologies to test, validate, certify, and reinforce the dissemination of the most effective incident management practices. This training is accessible at www.i95vim.com, although new users must register for an account ("Virtual Incident Management Training," I-95 Corridor Coalition n.d.).

Other Traffic-Incident-Management-Related FHWA Publications

In addition to its *Making the Connection* primer (2013) and *Field Operations Guide* (2009), FHWA has released other publications related to traffic incident management (in chronological order here):

- *Simplified Guide to the Incident Command System for Transportation Professionals* (2006)
- *Traffic Incident Management in Construction and Maintenance Work Zones* (Jan. 2009)
- *Traffic Incident Management in Hazardous Materials Spills in Incident Clearance* (Jan. 2009)
- *Traffic Incident Management Handbook* (Jan. 2010)
- *Best Practices in Traffic Incident Management* (Sept. 2010)
- *Traffic Incident Management Cost Management and Cost Recovery Primer* (2012).

The purpose of the 2006 *Simplified Guide to the Incident Command System for Transportation Professionals* is to introduce ICS to stakeholders who may be called upon to provide specific expertise, assistance, or material during highway incidents. These stakeholders—who may be unfamiliar with ICS organization and operations—include professionals at transportation agencies, companies involved in towing and recovery, and elected officials and government agency managers at all levels (*Simplified Guide to the Incident Command System for Transportation Professionals* 2006, p. 1).

The 2009 *Traffic Incident Management in Construction and Maintenance Work Zones* primer provides work zone planners, traffic operations, and incident responders with strategies and techniques they can use to improve incident detection, responses, and clearance in work zones, and to improve site management and information sharing with both responders and the public about incidents in work zones. Each strategy and technique contains a list of online references that can be accessed to obtain more detailed information about when, where, why, and how the strategy can be deployed. With this information, work zone planners, traffic operations, and incident responders can devise an incident management program that fits the specific needs of their own work zones. While adopting incident management programs and policies may not eliminate all impacts, quick detection, removal, and clearance of incidents in the work zone area shows an agency's commitment to mitigating the effects of work zones on traffic operations and congestion, and to improving safety in work zones (*Traffic Incident Management in Construction and Maintenance Work Zones* 2009, Executive Summary).

The *Traffic Incident Management in Hazardous Materials Spills in Incident Clearance* primer documents several practices dealing with the cleanup of hazardous materials resulting from a traffic incident. These include, but are not limited to, the following:

- Using quick cleanup techniques by properly trained and certified first responders.
- Including the proper tools and materials necessary to facilitate the safe cleanup and storage for proper disposal of these materials as part of standard equipment carried by transportation personnel and tow truck operators.
- Implementing quick containment procedures to prevent spills from infiltrating water resources.
- Hiring predesignated private response contractors to handle spills.
- Improving coordination and preparedness efforts among first responder resources.
- Establishing formal written policies regarding the responsibilities and roles of the various first responders in hazardous materials cleanup.
- Developing explicit written guidelines addressing the conditions in which transportation personnel and tow truck operators can assist in smaller vehicle fluid cleanups, and providing the necessary instructions on the procedures to follow.
- Sharing video links from traffic management centers with law enforcement and fire-rescue.
- Having preplanned, coordinated response and traffic control protocols among the stakeholders to minimize

24

traffic delays resulting from extensive hazardous materials cargo spills.

(*Traffic Incident Management in Hazardous Materials Spills in Incident Clearance* 2009, Executive Summary)

The 2010 version of the *Traffic Incident Management Handbook* includes the latest advances in TIM programs and practices across the country, and offers practitioners insights into the latest innovations in TIM tools and technologies. The handbook also features a parallel web-based version that can be conveniently bookmarked, browsed, or keyword-searched for quick reference. This version supersedes the *Freeway Incident Management Handbook* published by FHWA in 1991 and the *Traffic Incident Management Handbook* published in 2000 ["Traffic Incident Management (TIM)," FHWA 2013].

Over time, various tools and strategies have been developed and implemented in an effort to improve overall traffic incident management efforts. To this end, the *Best Practices in Traffic Incident Management* report (2010) describes task-specific and cross-cutting issues and challenges commonly encountered by TIM responders in the performance of their duties, and novel and effective strategies for overcoming these issues and challenges (i.e., best practices) ["Traffic Incident Management (TIM)," FHWA 2013].

Finally, the *Traffic Incident Management Cost Management and Cost Recovery* primer (2012) provides midlevel managers at transportation and other stakeholder agencies with the resources they need to explain the benefits of traffic incident management and TIM cost management and cost recovery to executive leadership. It also provides them with information that will help them implement TIM cost management and cost recovery techniques. This primer focuses on recoverable costs related to TIM, as there are costs associated with TIM that cannot accurately be measured or replaced. However, costs related to responder and motorist injury, disability, fatality, and the related medical and societal costs are not addressed in this primer, as those issues are addressed in a variety of ways in the existing literature ["Traffic Incident Management (TIM)," FHWA 2013].

WINTER MAINTENANCE AND OPERATIONS TRAINING

Snow events can become disastrous snowstorms and blizzards, and their exact nature cannot be predicted with high accuracy. A good foundation and training in the understanding of snow removal concepts and equipment operations is important for state DOT and PW maintenance and operations personnel to fulfill their agencies' emergency response functions during winter storms (Bergner 2014).

Related winter M&O training content that can supplement emergency training includes the following topics:

- Worker safety, including driving in snow and icy conditions.
- Understanding route prioritization and optimization strategies.
- Understanding how to operate snow removal vehicles and equipment.

Relevant winter training is also important for supervisors. APWA offers a winter maintenance supervisor certificate program for supervisors and managers, to enhance their understanding of winter weather, planning and preparation, chemicals and equipment, communications with the public, and training ("Winter Maintenance Supervisor Certificate," APWA n.d., accessed on June 2, 2014).

EVACUATION

Evacuation is the strategic, expedient, immediate, and rapid transportation of people or animals away from the threat or actual occurrence of hazardous conditions to safety (*Principles of Evacuation Planning Tutorial* n.d.). States that experience hurricanes and flooding have comprehensive evacuation plans that are typically included in emergency operations plans and that recognize the importance of training and exercises. Field personnel are involved in traffic management, incident management, closing and opening roadways, and setting up contraflow lanes for emergency evacuation and re-entry. Because evacuations require coordination among multiple levels of local, state, and federal agencies, and between transportation and emergency response agencies, a thorough understanding of NIMS and ICS is essential.

A Transportation Guide for All-Hazards Emergency Evacuation (Matherly et al. 2013) states that training on evacuation plans can vary in complexity and may involve walkthroughs of the plan, tabletop exercises, event simulations, and full deployment drills. The guide also stresses the importance of incident debriefings after any evacuation, because that may be the only practice for the plan.

The 6-hour FHWA-NHI Principles of Evacuation Planning tutorial (FHWA-NHI-133107) was developed through an FHWA pooled fund study. It is an Internet-based asynchronous/independent training that presents an introductory overview of evacuation planning and covers the roles and responsibilities of local, regional, and state agencies.

CONTINUITY OF OPERATIONS

Continuity of operations is another training need identified by our panel, survey respondents, and case example participating agencies. HSPD-20 established a national policy on continuity and set continuity requirements for federal, state, and local and tribal entities. The policy requires state DOTs

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

25

to create a continuity of operations plan. Continuity is "an effort within individual executive departments and agencies to ensure that Primary Mission-Essential Functions continue to be performed during a wide range of emergencies, including localized acts of nature, accidents, and technological or attack-related emergencies" (HSPD-20 2007, section 2d).

Primary mission-essential functions are "Government Functions that must be performed in order to support or implement the performance of NEFs before, during, and in the aftermath of an emergency" (HSPD-20 2007, section 2i). COOP supports continuity of government (COG), which, according to HSPD-20, is "a coordinated effort within the Federal Government's executive branch to ensure that National Essential Functions continue to be performed during a Catastrophic Emergency" (HSPD-20 2007, section 2c). National essential functions are "Government Functions that are necessary to lead and sustain the Nation during a catastrophic emergency and that, therefore, must be supported through COOP and COG capabilities" (HSPD-20 2007, section 2h).

One element of COOP is personal and family preparedness. There have been instances in which, during an emergency, responders have left their posts to tend to their families (Edwards and Goodrich 2011, p. 14). By preparing employees and their families for emergency situations, agencies can ensure that their workers will not be distracted and can focus on the emergency itself.

FEMA course IS-450 (Emergency Preparedness for Federal Employees) addresses personal emergency preparedness and its relevance to professional responsibilities. The course presents the four steps to personal emergency preparedness (Be Informed, Make a Plan, Build a Kit, and Get Involved), then applies the four steps to a particular scenario ("IS-450: Emergency Preparedness for Federal Employees," FEMA 2013, accessed June 2, 2014).

Edwards and Goodrich of the Mineta Transportation Institute (MTI) have created comprehensive training focused on COOP and COG for state DOTs. They have researched the issue of how to integrate COOP/COG into the NIMS approach to emergency management and address it in the training (Edwards and Goodrich 2011, Abstract). While the training material is directed toward emergency operations center staff, some of it is also applicable to state DOT and PW field personnel. The material, including training presentations, is a part of the *Continuity of Operations/Continuity of Government for State-Level Transportation Organizations* report available to the public through the MTI website, www.transweb.sjsu.edu.

Disclaimer on Cost-Recovery-Related Training Needs

Training is necessary for several categories of DOT personnel, including M&O field personnel, in order to recover costs and reimbursements successfully through programs such as the FHWA Emergency Relief and FEMA Public Assistance programs. Program requirements for damage assessment and documentation of work performed may directly affect the procedures M&O field personnel and their supervisors must follow in performing their duties. Meanwhile, other nonfield DOT personnel would be responsible for understanding the cost recovery process, reimbursement procedures, application process, eligibility requirements, federal-aid rules and regulations, and state requirements.

Training for M&O field personnel in supporting damage assessment and documentation is generally beyond the scope of this report. The toolkit includes a few resources, but state DOTs and PW agencies have a useful resource in their own personnel who are responsible for interacting with relevant FHWA and FEMA programs. These personnel can interpret how the requirements of these programs can affect M&O field procedures and, consequently, the training of M&O field personnel.

SUPERVISOR TRAINING

Supervisors play an important role in motivating field personnel to perform well and take training courses and exercise programs seriously. However, supervisors themselves require appropriate training. Supervisors need to understand the work performed by their subordinates and have excellent technical skills and knowledge to supervise and evaluate this work. They are also required to be cognizant of the state DOT or PW agency's human resources practices. As stated in *A Call to Action: Improving First-Level Supervision of Federal Employees*, "given the complexity and impact of supervisory jobs, all new supervisors need training both to learn how to manage their employees effectively and to understand the agency's expectations for supervisors" (U.S. Merit Systems Protection Board 2010). The key areas in which supervisors require training are "performance management, including developing performance goals and standards; assigning, reviewing, and documenting employees' work; providing feedback; developing employees; evaluating employee performance; and managing poor performers" (U.S. Merit Systems Protection Board 2010). Supervisors and managers need to emphasize the importance of training so that workers take it seriously, are motivated to retain what they have learned, and implement and apply training content in their work (Kirkpatrick and Kirkpatrick 2007, pp. 24–25). In a study performed on behalf of the Wisconsin DOT, almost all the responding state DOTs offered some form of supervisor training program. Hence, there is joint training opportunity for emergency training for field personnel supervisors.

First-line supervisors need to know whether field personnel have been properly trained. All the FEMA EMI courses

26

pertaining to NIMS and ICS have evaluation exams. State DOTs typically require their first-line field supervisors to take additional NIMS training. For example, the Missouri DOT (MoDOT) recommends that all of its employees, including motorist assist and emergency response field staff, take IS-100 (Introduction to ICS) and IS-700 (Introduction to NIMS), and that its first-line response supervisors take IS-100, IS-700, and IS-200 (ICS for Single Resources) training.

One NCHRP training course is intended for first- and second-line supervisors and is designed to be conducted over two days. NCHRP project 14-11(2) produced material to supplement the course called Effective Motivation of Highway Maintenance Personnel: Tools for Peak Performance (2001). These supplementary materials included a participant's workbook and an instructor's manual. NYS-DOT hosts these materials online ("Transportation Maintenance Training—Tools for Peak Performance," NYSDOT n.d.). The instructional material contains the following nine chapters and 13 exercises:

- Chapter 1—Importance and challenges of highway maintenance
- Chapter 2—Attributes of a successful organization and the role of motivation
- Chapter 3—Individuals' needs, desires, and motivations
- Chapter 4—The use of rewards to motivate workers
- Chapter 5—Determining expected performance, measuring and analyzing actual performance, and identifying performance problems
- Chapter 6—Necessary elements for achieving expected performance
- Chapter 7—Principles and techniques for improving worker performance
- Chapter 8—Communication as a means to improve workers' performance
- Chapter 9—Developing written action plans and a self-assessment test for supervisors.

The NYSDOT Transportation Maintenance Division's *Basic Supervision—Study Guide* notes that a supervisor must be a delegator, a decision maker, a coach, an instructor, a motivator, and, most important, a leader (NYSDOT 2005, p. 8). The guide lists the primary responsibilities of a supervisor (p. 10):

- Training and development
- Planning and organizing
- Processing the work
- Controlling the operation
- Administering the rules
- Keeping people informed
- Making improvements
- Handling personnel matters
- Monitoring safety and security
- Serving as a representative.

In a study performed on behalf of the Wisconsin DOT (WisDOT), important training topics for supervisors included the following (CTC & Associates LLC 2009, p. 3):

- Planning
- Weather and weather forecasting
- Working with the public
- Employee issues (discipline, contract issues, split shifts)
- Post-storm meetings
- Road weather information systems
- Stockpile management
- Budgeting
- Selecting and maintaining equipment
- Establishing service levels and performance measurements
- Liability issues
- Selecting and purchasing materials
- Security issues
- Sharing facilities with other state agencies.

Field personnel should demonstrate whether they have acquired the needed skills to safely operate the heavy or specialized equipment required for emergencies. NYSDOT, for instance, provides equipment certification to field personnel. Supervisors use certification forms and evaluation guides to help them determine whether field personnel are ready to be certified on a particular piece of equipment (e.g., a pavement-striping machine). These guides contain lists of competencies that must be demonstrated before being certified in the operation of the equipment. The same content is used by equipment operator instructors to teach field personnel in preparation for their skills demonstrations (*Evaluation Guides for Skills Demonstration,* NYSDOT).

EXERCISES

Exercises provide the opportunity to practice knowledge, skills, and plans. Exercises are "controlled activities conducted under realistic conditions" ("Security and Emergency Management—An Information Briefing," FHWA 2009) and can be used for multiple purposes. Exercises "can be used to train and familiarize personnel with their roles and responsibilities" and "to (1) test the written assumptions in the transportation management plan and (2) see what must be changed and how the plan can be improved" (*Tabletop Exercise Instructions for Planned Events*, FHWA 2007, p. 4).

Exercises can be categorized into discussion-based or operations-based exercises (HSEEP 2013, pp. 2-4–2-6). Exercise programs are useful for multiple purposes, including practice and assessment, and can be implemented in agencies using various structures. Results of exercises can be used to strengthen and improve training programs and to develop new training content. Exercise programs are typically established by an exercise coordinator in transportation agencies with sufficient budgets and are supported by various departments,

including operations and maintenance. If an agency does not have an exercise coordinator, the responsibility might be assigned to the senior manager in operations or maintenance, or a manager in the training, safety, or security department.

State DOTs do not typically take the lead in full-scale exercises but do participate in state and federal exercises. For example, Edwards and Goodrich (2014) find that the HSEEP 2013 document has no transportation-specific information and is oriented toward multijurisdictional exercises with public safety responders in the lead, as in the past (p. 15). ICS still views the transportation unit as a logistics section function rather than an operations section function.

Consequently, exercise programs are not consistent from agency to agency, and even if the agency participates, the number of field personnel who participate is typically low. There are various reasons for this. Full-scale exercises, in particular, require the resources to carry out the exercise and a great deal of staff time in preparation, outreach, and planning activities. Also, the state EMA usually organizes full-scale exercises in which the state DOT is an invited participant.

Drills are a common form of exercise in which M&O field personnel participate; they are useful for teaching a specific function or procedure, providing instruction on how to safely and correctly operate equipment, and assessing worker performance to ensure that they have acquired the necessary skills. Small incidents that occur frequently (such as traffic incidents) can enable field personnel to practice NIMS and ICS, though they are not formally defined as exercises.

The HSEEP document (2013) notes that exercises are essential for national preparedness (Intro-1). They not only prepare personnel but help with planning, assessing, and validating capabilities, and addressing weaknesses. Exercises are cost-effective tools that "bring together and strengthen the whole community in its efforts to prevent, protect against, mitigate, respond to, and recover from all hazards." Furthermore, exercises offer the opportunity to "practice and refine our collective capacity to achieve the core capabilities in the National Preparedness Goal" (HSEEP 2013, Intro-1).

Homeland Security Exercise and Evaluation Program

The Homeland Security Exercise and Evaluation Program is "a set of guiding principles for exercise programs, as well as a common approach to exercise program management, design and development, conduct, evaluation, and improvement planning" (HSEEP 2013, Intro-1). The 2013 version supersedes the 2007 version. Edwards and Goodrich (2014) note that the 2013 version is the result of condensing four volumes of guidance into one volume (p. 15).

The HSEEP addresses the following topics: HSEEP fundamentals, exercise program management guidance, exer-

cise design and development methodology, exercise conduct guidance, evaluation planning and conduct guidance, and the improvement planning and corrective actions process. Compliance with HSEEP guidance supports the National Preparedness System and helps ensure that exercise programs are using the most effective practices and a consistent approach to developing and implementing programs.

The key phases of the exercise cycle are shown in Figure 5; they include exercise design and development, exercise conduct, exercise evaluation, and improvement planning. The factors to consider in the development of exercise program priorities (shown in Table 8) include threats and hazards, areas for improvement, external sources requirements, and accreditation standards/regulations.

FIGURE 5 HSEEP Exercise Cycle (HSEEP 2013, p. 1-2).

TABLE 8
FACTORS FOR CONSIDERATION IN DEVELOPING EXERCISE PROGRAM PRIORITIES

Threats and Hazards	• National threats and hazards
	• Jurisdictional threats and hazards
	• Hazard vulnerability analysis
Areas for Improvement/ Capabilities	• Real-world incident corrective actions
	• Exercise corrective actions
	• Identified and/or perceived areas for improvements
External Sources Requirements	• Industry reports
	• State or national preparedness reports
	• Homeland security strategies
Accreditation Standards/ Regulations	• Accreditation standards and/or requirements
	• Grants or funding-specific requirements
	• Occupational Safety and Health Administration regulations

Source: HSEEP (2013, pp. 2–3).

28

The HSEEP document (2013) recommends that exercise programs be progressive in nature, meaning that they begin with small discussion-based exercises and proceed to operations-based exercises; start with drills and proceed to functional and then full-scale exercises (p. 2-4). HSEEP 2013 emphasizes the importance of addressing known weaknesses through training or other means before the actual exercise.

Key activities required to initiate exercise programs include the following:

- Assigning responsibility for the exercise program to a full-time position or part time to an existing position. (In terms of personnel requirements, one to three employees can develop discussion-based exercises, while operations-based exercises require three to five employees.)
- Creating a committee or task force of internal staff and/or external responders to oversee the program.
- Establishing permanent or ad hoc working groups with local responders and others who might participate in the transportation agency's exercises.
- Developing a program schedule that identifies activities to be performed over the 3-year exercise cycle. Establishing a budget for the program, including the identification of internal resources, outside grant programs, and pooled funding sources. (*Guidelines for Transportation Emergency Training Exercises* 2006, p. 22)

Figure 6 depicts the relationships among exercise priorities, objectives, and core capabilities. Exercise program priorities are based on threats and hazards analysis, areas in which improvement is needed, external requirements, and standards or regulations. These priorities then inform the exercise objectives; each objective should be aligned with one or more core capabilities. The mnemonic acronym SMART reflects the objectives an exercise should have (see Table 9) (HSEEP 2013, p. 3-11).
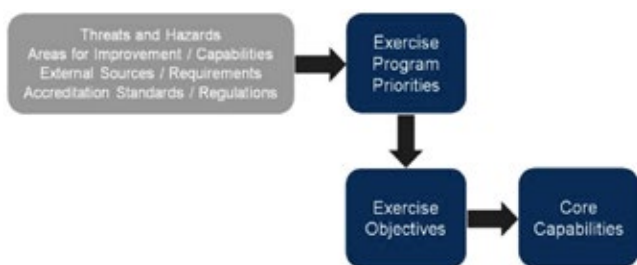
FIGURE 6 Priorities, objectives, and core capabilities (HSEEP 2013, p. 3-11).

WSDOT notes that exercise objectives are the "cornerstone of exercise design and development" and are created "to test particular capabilities that have been deficient in the past, or to verify those that have been successful" (WSDOT 2011, Appendix C).

TABLE 9
SMART GUIDELINES FOR EXERCISE OBJECTIVES

Specific	Objectives should address the five Ws—who, what, when, where, and why. The objective specifies what needs to be done with a timeline for completion.
Measurable	Objectives should include numeric or descriptive measures that define quantity, quality, cost, etc. Their focus should be on observable actions and outcomes.
Achievable	Objectives should be within the control, influence, and resources of exercise play and participant actions.
Relevant	Objectives should be instrumental to the mission of the organization and link to its goals or strategic intent.
Time-bound	A specified and reasonable timeframe should be incorporated into all objectives.

HSEEP provides a toolkit that includes training, technology systems, tools, and technical assistance to help organizations implement HSEEP; it is accessible through the HSEEP website at https://www.llis.dhs.gov/hseep ("Homeland Security Exercise and Evaluation Program," DHS n.d.).

Evaluations

The Kirkpatrick evaluation method is used by many organizations in various industries. Composed of the following four levels, it can be used to assess emergency training (Kirkpatrick and Kirkpatrick 2006, 2007).

- *Level 1: Reaction.* This level solicits the reaction of trainees to the training. It is the most basic level and the easiest to implement. Trainees are asked to provide their reactions to the instructor or facilitator, training subject/content, facilities, and schedule, and to suggest any improvements they would make to the training.
- *Level 2: Learning.* This level determines the extent to which the trainees have learned the material. To implement this level, it is necessary to determine what the trainee knew before the training (pretest) and compare it with what the trainee has learned from the training (posttest). A test or knowledge check can also be inserted during the training after a section or module has been given. To be certain that other factors did not affect the change in learning, control groups can be used when practical.
- *Level 3: Behavior.* In this level, trainees are evaluated to ensure that they are actually applying training content to their jobs. In some cases, immediate implementation of level 3 evaluation is appropriate. This level can be implemented by having supervisors observe personnel at work or during drills to ensure that they are demonstrating the desired behavior and, if not, to correct them. Another way to implement this level is to survey anyone who is directly observing the trainee or assessing work completed by the trainee. To be certain that other factors did not affect the change in behavior, control groups can be used when practical.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

29

- *Level 4: Results.* Results show whether the training is having the desired outcome (e.g., faster response to an incident) and can provide organizations with information on the effectiveness of a training program. To implement level 4, outcomes need to be measured before and after the training. Operations-based exercises can be useful in measuring outcomes. To be certain that other factors did not affect the change in outcomes, Kirkpatrick recommends the use of control groups, although this is not typically practical. Exercises can be used to assess worker, team, and agency performance, and to identify the need for further training.

HSEEP 2013 recommends that evaluation mechanisms be developed early in the planning of exercises. Capability targets, or the "performance thresholds for each core capability," are based on threat and hazard identification or risk assessment processes and should be evaluated (HSEEP 2013, p. 3-12).

Discussion-based exercises may be more appropriate for some activities, while operations-based exercises may be better for others, such as evacuations. *Guidelines for Emergency Transportation Training Exercises* contains an exercise needs assessment (2006, pp. 135–140). The guidelines also identify exercise types appropriate for specific transportation emergency planning and response activities (see Table 10).

TABLE 10
EMERGENCY EXERCISES FOR ASSESSING TRANSPORTATION ACTIVITIES

Transportation Emergency Planning and Response Activities	Seminar or Workshop	TTX	Game	Drill	FE	FSE
Emergency Planning						
Develop Mission Statement and Operational Concept for Transportation Agency Emergency Management	x	x				
Coordinate Local/Regional/State Response Plans and Evacuation Plans	x	x				
Develop Public Information Dissemination Strategies	x	x				
Develop System to Monitor Threat Levels (Weather, Security)	x	x	x			
Develop Transportation EOPs and Procedures	x	x	x			
Develop Transportation Training to Support Plans, Procedures	x	x	x			
Emergency Response						
Detect Events		x	x	x	x	x
Verify Events		x	x	x	x	x
Notify the Appropriate People/Organizations		x	x	x	x	x
Assess Situations		x	x	x	x	x
Evacuate Passengers and Facilities				x	x	x
Manage Casualties					x	x
Protect Property/Equipment				x	x	x
Evaluate/Combat Dangers at Incident Scene					x	x
Develop Operations Objectives and Strategies		x	x	x	x	x
Integrate with Local/Regional Incident Management System		x	x	x	x	x
Coordinate Transportation Field Response		x	x	x	x	x
Protect Scene and Control Traffic				x	x	x
Provide Support for Emergency Responders	x	x	x	x	x	x
Develop Area Traffic Control Strategies			x	x	x	x
Evacuation						
Manage Evacuation Traffic			x	x	x	x
Coordinate and Monitor Evacuation			x	x	x	x
Provide Incident Management of Evacuation Routes			x	x	x	x
Facilitate Traffic/Evacuation Re-Entry			x	x	x	x
Stabilize Events					x	x
Continuity of Operations/Recovery						
Restore Critical Services					x	x
Manage Area Transportation				x	x	x
Dissipate Traffic				x	x	x
Restore Transportation Service			x	x	x	x

Source: Adapted from *Guidelines for Transportation Emergency Training Exercises* (2006, p. 168).

30

Scenarios

A scenario is a narrative or timeline and may be used for all types of exercises, including tabletop exercises (TTXs). HSEEP 2013 defines a scenario as "an outline or model of the simulated sequence of events for the exercise" and says that a scenario should be "realistic, plausible, and challenging . . . but not so complicated that it overwhelms players" (HSEEP 2013, p. 3-12). According to WSDOT's Training and Exercise Plan, the type of hazard should not be the starting point for exercise development; capabilities that need to be tested and relevant objectives should be determined first (WSDOT 2011, Appendix C). A scenario should contain the following elements: "(1) the general context or comprehensive story; (2) the required conditions that will allow players to demonstrate proficiency and competency in conducting critical tasks, demonstrating core capabilities, and meeting objectives; and (3) the technical details necessary to accurately depict scenario conditions and events" (HSEEP 2013, p. 3-12).

The *TCRP Web-Only Document 60/NCHRP Web-Only Document 200* (available at: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_w60.pdf) provides a list of emergency management exercise scenarios from the following sources: TRB A-36 RFP, Emergency Management Staff Trainer, National Planning Scenarios, Public Transportation System Security and Emergency Preparedness Planning Guide, Airport Emergency Response Operations Simulation, and Subject Matter Expert Meetings (Table 3, *TCRP Web-Only Document 60/NCHRP Web-Only Document 200* 2013). The document also provides detailed scenario outlines for the six scenarios addressed in the Transit Cooperative Research Program (TCRP) Project A-36, "Command Level Decision Making for Transit Emergency Managers": flood, hurricane, earthquake, power outage, hazardous materials, and active shooter.

The following are examples of blizzard emergency and flooding scenarios from Wisconsin Emergency Management's *Tabletop Exercise Scenarios, Volume 1* (n.d., pp. 10 and 12).

Blizzard Emergency Scenario Example

It is the morning of January 26, a cloudy day with a temperature reading of 28 degrees Fahrenheit. By noon, snow begins to fall and winds begin to increase. By 3:00 p.m., five inches of snow have fallen and forecasters are calling for snow to continue throughout the afternoon and evening. As offices close down early, traffic jams form throughout the city. By 6:00 p.m., snowfall has reached 12 inches and many vehicles are getting stuck in drifting snow. By 10:00 p.m., accumulations have reached 18 inches and temperatures have fallen to 21 degrees Fahrenheit. Hundreds of vehicles are abandoned in high drifts and people are forced to walk to shelters or remain in their vehicles. The interstate highway that runs through town is also full of stranded motorists who are unfamiliar with the area. People who leave their vehicles run the risk of becoming disoriented and lost, while those who remain in their vehicles run the risk of freezing or being poisoned by carbon monoxide from their vehicles' exhausts. The overnight forecast calls for temperatures to dip into the teens with continued blowing snow.

Questions

1. What actions should the city have taken early in the afternoon to reduce the number of motorists becoming stuck?

2. What actions can be taken to rescue stranded motorists?

3. What arrangements can be made to provide shelter for motorists who have abandoned their vehicles?

4. How will emergency information concerning the storm and survival techniques be disseminated?

5. What procedures will be implemented to facilitate the delivery of emergency services such as medical treatment, firefighting, and law enforcement?

Flood Scenario Example

(Scenario planners and participants are to fill in each of the blanks with the information most appropriate to their agency.)

It has been raining heavily for two days in the town of _____. Six inches of rain have caused small stream flooding, with moderate damage to local roads, parks, and structures in low-lying areas.

The _____ River is running three feet above normal and is rising. The forecast calls for continued showers and thunderstorms for the next three days. If such heavy rainfall occurs, severe flooding should be expected for the _____ downtown business district and homes along the _____ River. Small stream flooding will affect the nearby downstream towns of _____ and _____ .

Questions

1. If the flooding appears imminent, how will the evacuation order be disseminated?

2. How will the evacuation actually occur?

3. If people do not evacuate in time and become stranded, how will you go about rescuing them?

4. Where will evacuation shelters be set up? Who will operate them?

5. Where are supplies of sandbags located?

6. Who will coordinate the services of volunteers during sandbagging operations?

7. When the floodwaters recede, what recovery phase operations will be conducted?

8. Who will be involved?

32

CHAPTER THREE

EMERGENCY TRAINING AND EXERCISE DELIVERY METHODS

This chapter is based on a review of literature and interviews with information sources, and includes the following topics:

- Field crew meetings
- Just-in-time training (JITT)
- Interjurisdictional and interagency training and exercises
- Joint training
- Asynchronous training
  - Computer-based training without instructors
  - Prepackaged CDs and DVDs
- Train-the-trainer
- Planned events and incidents, exercises
  - Exercises
  - Discussion-based training
    › Workshops
    › Seminars
    › Tabletop exercises
    › Games
  - Operations-based training
    › Drills
    › Functional exercises
    › Full-scale exercises
- Classroom training (including CCTV, VTC, VoIP)
- Online training with live instructors—webinars
- Computer simulations.

> "Learning is not an automatic consequence of pouring information into another person's head. It requires the learner's own mental and physical involvement." (Silberman 2005, p. 1)

For adult learners who bring a great deal of experience and skills to the table and whose motivation is problem-centered, interactive training is ideal. Edwards and Goodrich say that "training . . . must be interactive to be effective" and cite Knowles (1980), who notes that motivation for adult learners is problem-centered (Edwards and Goodrich, Mineta Transportation Institute, personal communication, March 5, 2013). The Rutgers security training assessment study (Lowrie and Shaw 2011) concluded that, for frontline personnel, hands-on scenario-based training maximizes the integration of learning goals. Interaction can be generated through case examples, brainstorming, role playing, and problem-solving activities; quizzes and tests with immediate feedback; and facilitated discussions. As stated in one FHWA-NHI publication, "To involve adults in their own learning and adhere to adult learning principles, introduce interactivity wherever possible into your instruction" ("Principles of Adult Learning and Instructional Systems Design" 2004). Exercises and opportunities to practice the training on the job are also important.

Because agencies differ in terms of size, budget, and capability, training and exercise delivery methods must be adaptable and scalable. Some agencies have several in-house trainers, while others—especially small agencies—have determined that the training cost per worker would be excessive. While training and exercises through the state EMA or through FEMA's EMI may be free of charge, training and exercises from other sources may not be and would also require the agency to pay for personnel time; agencies have to budget for these costs. Also, state DOTs and PWs have found that difficulties in scheduling are a common challenge in the implementation of training and exercises for field personnel. Hence, it is important to differentiate between synchronous and asynchronous learning methods.

Synchronous methods require a live instructor and take place at a fixed time. Participants interact with the instructor and with each other through the web or in person. *Asynchronous methods,* such as CDs and YouTube videos, are more flexible, are less costly, and can take place according to the learner's schedule and pace. These methods, while not always appropriate in addressing complex training requirements, can play an important role in meeting the overall training needs of state DOTs and PWs. While there is no live instructor, some forms of asynchronous training can be facilitated and provide the learner with a certain amount of structure.

NCHRP Report 793: Incorporating Transportation Security Awareness into Routine State DOT Operations and Training highlights the importance of security awareness for all state DOT employees and contractors. The report is intended to be used to improve transportation security in the context of existing resource and budget constraints and "outlines techniques to integrate all-hazards security awareness concepts and reminders into routine state DOT operations, maintenance, and training" (*NCHRP Report 793,* p. 1).

The 2011 Rutgers study of security training needs and delivery preferences observed that classroom training is

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

33

the most effective format for learning; however, classroom training may not always be feasible. Therefore, as *Security 101* recommends, the trainings should be designed to be flexible in terms of time duration and be designed as modules that can be integrated with other trainings or meetings (*Security 101* 2009).

The second part of Edwards and Goodrich (2014) contains a handbook to help transportation sector staff create, develop, implement, and wrap up federally mandated exercises (p. 1). Because the HSEEP 2013 document lacks guidance specific to the transportation sector, Edwards and Goodrich orient their guidance to the experiences and work of that sector (p. 15). The handbook contains the following tools and aids:

- Exercise definitions
- Checklists to guide the initiation, planning, execution, evaluation, and wrap-up of different types of exercises (e.g., seminars, workshops, drills, TTXs)
- Guidance to explain the checklists in detail
- A sample feedback form and after-action report
- A list of references and training resources for exercises.

There is not one ideal training and exercise method for all state DOTs or all PWs, nor one ideal method for every type of emergency training needed by field personnel. This chapter identifies a variety of alternative delivery methods to fulfill the emergency training and exercise needs of field personnel, along with the advantages and disadvantages of each method.

FIELD CREW MEETINGS

Regularly scheduled field crew meetings—also known as tailgate, hip pocket, and toolbox talks—address problems and issues encountered by field personnel. The meetings are typically held at a garage, district office, or other location convenient to the field crew. Topics may include recent incidents, new equipment or technology, or new procedures or plans. The Connecticut Interlocal Risk Management Agency's document on tailgate safety meetings (*Tail Gate Topics II*) notes that experienced workers can share their knowledge and help train co-workers at these meetings (CIRMA 2010). Researching the topic before the meeting is important. CIRMA recommends holding the meeting at the start of a shift or after a work break and offers a sample presentation outline:

- Talk about what is going to be taught.
- Tell why the subject or training is important.
- Describe the safety procedures, general to specific.
- Demonstrate them.
- Repeat the steps if necessary; be patient.
- Don't let the meeting drift onto other subjects. (CIRMA 2010)

CIRMA also recommends performing procedures when appropriate and correcting any errors immediately. Table 11 summarizes the advantages and disadvantages of this method.

TABLE 11
FIELD CREW MEETINGS

Advantages	Disadvantages
• Meetings are brief and are held on a regular basis at a location/time convenient to field personnel. • Meetings are also focused and very relevant to field crew. • Hands-on training is possible. Field personnel can practice a procedure or skill.	The panel and the interviewees have identified few disadvantages to this method.

JUST-IN-TIME TRAINING

Just-in-time training is provided immediately prior to its use. It can be cost-effective and useful in certain cases. JITT may be appropriate if there is the possibility that a large number of persons from varied backgrounds will respond to an emergency of a specific nature, and it would be impractical to train everyone in advance. Online or offline training available on demand may be useful for JITT, including FEMA EMI's Independent Study Program and videos available on CD, DVD, and YouTube. JITT can also be delivered in person. For instance, the Center for Food Security and Public Health offers an animal health emergency JITT, and some state DOTs provide JITT to public works employees on reimbursement application procedures.

The Management System Dictionary (n.d.) defines JITT as "the provision of training only when it is needed to all but eliminate the loss of knowledge and skill caused by a lag between training and use." Jensen's Technology Glossary (n.d.) elaborates on circumstances that warrant the use of JITT:

> In many technical and complex areas it is not practical for employees or other persons to be knowledgeable about all details at all times. JITT refers to a process . . . in which the person receives training "just-in-time" when it is needed for a particular purpose. The JITT process may change the entire process of education and training, because the focus may become how to effectively access and utilize JITT rather than how to teach students and/or employees technical details that have to be memorized long before they are needed in practice.

Don Clark's Learning and Performance Glossary (n.d.) defines JITT as "a method of providing training when it is needed," and lists several advantages of JITT:

- Eliminates the need for refresher training due to subject knowledge loss experienced if training precedes

34

use of the training, over an extended period of time (prevents decay if the learner cannot use the material upon returning to the job).

- Prevents training being wasted on people who leave the job before the training they received is used on the job.
- Allows the customers to receive training when they need it. Not weeks or months later.

Table 12 summarizes the advantages and disadvantages of this method.

TABLE 12
JUST-IN-TIME TRAINING

Advantages	Disadvantages
• Retention of training content is high because the time period between training and its use is short.	• During emergency response, every second counts and taking the time to train personnel may delay the response effort.
• This method is cost-effective because only those who need the training undergo the training. Also, because the training is provided only when they need it, there is no issue regarding personnel having been trained and then leaving the agency without having used the training.	• Training personnel in an emergency situation when their level of stress is high may hinder the learning process. • The ideal training process involves learning, reflecting, and doing. Personnel are not provided the opportunity to practice a skill or process before its real-life application, unless the training also includes drills of some sort.

INTERJURISDICTIONAL AND INTERAGENCY TRAINING AND EXERCISES

Interjurisdictional training involves agencies from different jurisdictions, while interagency training involves agencies from different disciplines. Another term for this type of training is *cross-training*. Interjurisdictional and interagency response is particularly significant for large or complex emergencies and disasters; for example, a severe flooding situation that affects multiple counties would require state DOT district personnel, counties, and municipalities to work together and with law enforcement, EMS, public safety, towing companies, and possibly other organizations. Previous interaction among the agencies and entities, and understanding of their roles and responsibilities in the ICS, are essential. For this reason, many full-scale and functional exercises and trainings are both interjurisdictional and interdisciplinary. Table 13 summarizes the advantages and disadvantages of this method.

JOINT TRAINING

Joint training as defined in this synthesis is the delivery of training on two similar topics at the same time. Integrating similar training topics (e.g., traffic incident management and winter maintenance) facilitates scheduling. For instance,

courses on incident management and response are typically mandatory for many field personnel. Emergency training could be incorporated into incident management training. The new National Traffic Incident Management Responder Training course developed through the SHRP 2 program has elements of ICS. Another related topic is winter maintenance, which is a required training topic for field personnel in states with severe winter weather. Integrating emergency training into the topic would also alleviate scheduling issues. Chen et al. (2006) recommend combining security and traditional safety training to increase the quality of both training areas. In addition, joint training that involves field personnel from different divisions or units may facilitate intra-agency interaction and communications within the state DOT. Because state DOTs typically offer supervisor training programs, these programs present opportunities for joint training for supervisors. Table 14 summarizes the advantages and disadvantages of this method.

TABLE 13
INTERJURISDICTIONAL AND INTERAGENCY TRAINING AND EXERCISES

Advantages	Disadvantages
• Opportunity for face-to-face interactions with peers from other response agencies through these exercises is essential preparation for larger and more complex events. • They will also help prepare agencies and their field personnel understand the ICS structure, their roles and responsibilities within the structure, and how they should integrate with personnel from other entities for these events.	• These are typically synchronous learning events that need to be scheduled on a fixed day and time. Scheduling difficulties may impede the ability of a large percentage of field personnel to attend these sessions.

TABLE 14
JOINT TRAINING

Advantages	Disadvantages
• Scheduling difficulties may be mitigated by delivering emergency training in conjunction with another related topic. • Intra-agency interaction and communications may be facilitated.	• Emergency training component may need to be shortened or modified.

ASYNCHRONOUS TRAINING

Asynchronous training does not occur according to a fixed schedule and does not have live instructors. The training takes place according to the learner's own schedule and pace. Asynchronous training includes computer-based training without live instructors, and prepackaged CDs and DVDs.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

35

Computer-Based Training Without Live Instructors

Online training is easily accessible wherever there is access to the web. Computer-based training that is available on demand without a live instructor alleviates the need to schedule the training in advance and can be taken anytime. For example, asynchronous online training, including training videos and recorded webinars, is available through FEMA EMI's Independent Study Program (ISP), FHWA's National Highway Institute (NHI), file-sharing sites, and professional organizations and private vendors. This training is usually offered at no or low cost; it can be used by agencies to provide JITT to field personnel when the need arises and is an ideal way to reach a large audience. This type of training can still be interactive to a certain extent by incorporating videos, audios, and short quizzes. This method may be especially appropriate for refresher training. Table 15 summarizes the advantages and disadvantages of this method.

TABLE 15
COMPUTER-BASED TRAINING WITHOUT LIVE INSTRUCTORS

Advantages	Disadvantages
• Training content/videos that are available on-demand online alleviate the need to schedule the training in advance and allow 24-hour access to the material. Some on demand services have automated record keeping and trainee progress tracking.	• Training without live instructors and lack of ability to interact with other students limit learning that may be gained through interaction with instructors and peers. • Student distraction may be more likely to occur. • Self-direction is needed.

Prepackaged DVDs and CDs

Using prepackaged DVDs and CDs is a common way to deliver training. Many videos and other training mechanisms are not interactive but can still be effective. Because videos are best at presenting concepts and content visually, training developers should make the most use of this capability. DVDs and CDs do not normally have an on-demand option, however, and training does need to be scheduled. If CCTV, VTC, and SKYPE (or similar) technology are available to the agency, multiple locations might be able to access the training at the same time. This type of non-web-based training can be useful where web access is limited. Table 16 summarizes the advantages and disadvantages of this method.

TRAIN-THE-TRAINER

Train-the-trainer is a training force multiplier that can benefit state DOTs and PWs of all sizes. Larger DOTs find TTT to be an effective way to train a large number of personnel in a cost-effective manner. Typically, the trainer will attend training, which may require time and travel to a distant location. The trainer can then adapt the training to the needs of

his or her agency and personnel. Once the trainer returns to the agency and prepares the training material, he or she can train many others. If all the agency's personnel had attended the off-site training, the cost would have been considerably higher. Also, in a large state, field personnel and PW personnel in distant areas might find it difficult to travel to a central location for training, even if it is held within the state. Iowa and Arizona are two states whose DOTs use this method. Table 17 summarizes the advantages and disadvantages.

TABLE 16
PREPACKAGED DVDS AND CDS

Advantages	Disadvantages
• These allow trainers to select appropriate training videos or CD or DVD training packages. The packages usually focus on a particular topic and contain a variety of tools such as an instructor manual or notes, student guide, training presentation material in video or other formats, and handouts useful for the instructor. • They allow trainers to select the video or training package that is the best value for their needs. In general, they are considered cost-effective because many trainees may view the content and receive the training for one fixed cost. Online on-demand training may charge the agency per trainee. • With VTC, CCTV, or SKYPE technology, it is possible to present the content to multiple locations.	• When VTC, CCTV, or SKYPE technology is used, technology-related issues can arise and connectivity and quality of the transmission may be inconsistent. These issues would require a technician to assist. • Training videos and packages on CD ROMs and DVDs are not "on-demand;" the training needs to be scheduled. • Interaction with instructors and other trainees is limited.

TABLE 17
TRAIN-THE-TRAINER

Advantages	Disadvantages
• This is a cost-effective way to leverage limited resources. • It alleviates having to hire additional training staff or consultants	• Content dilution could be possible as additional training tiers are added

PLANNED EVENTS, INCIDENTS, AND EXERCISES

Lessons learned from planned special events, incidents, and exercises can be very useful in developing training content and scenarios for future training and exercises, and in identifying areas for improvement that require additional training. For exercises, lessons learned are typically gathered through hot washes and after-action reviews. For incidents, the information can come from focus groups, one-on-one interviews, and surveys. A key difference between exercises and inci-

36

dents is that exercises are conducted in a "controlled, low-risk setting" (HSEEP 2013, p. 6-1). Incidents, even minor ones, have more risk associated with them; for instance, a minor traffic accident could become a multicar crash with many fatalities and injuries as a result of changing weather conditions, responder error, or a delay in response.

Planned Events

Planned events "have many characteristics in common with incidents, particularly as the focus on security . . . has increased" ("Supporting Technologies," FHWA 2013). Technologies and traffic control practices for planned events are similar to those used to manage disasters and traffic incidents. Therefore, after-action reviews from these events can be a potential source of training and exercise content. For example, lessons learned from 35 national special security events held between September 1998 and February 2010 were identified and integrated into the FHWA report *National Special Security Events: For Planned Special Events Transportation Planning* (2011). Also, the events themselves can be considered exercise opportunities for field personnel.

Incidents

Incidents are an excellent opportunity to gain experience responding to emergencies and disasters. After-action reviews and lessons learned from actual events can be the basis of training and exercise content and scenarios, and can suggest actions for improvement plans. A case in point is the task force convened after Hurricane Irene in Vermont by VTrans. The task force sought out the experiences of those who participated in the response effort and carefully analyzed the areas that were ripe for improvement. The task force's recommendations were comprehensive and well-justified for implementation because they were based on lessons learned from an actual disaster. Field personnel also can use minor incidents to practice emergency response and NIMS/ICS before the occurrence of a major disaster. Table 18 summarizes the advantages and disadvantages of this method.

TABLE 18
INCIDENTS

Advantages	Disadvantages
• Both planned events and incidents are "real" and immerse field personnel in stressful situations.	• There is no guarantee that a series of minor incidents, aside from traffic accidents, will occur prior to a disaster.
• Since incidents are usually minor emergencies or mini-disasters, they are good opportunities for field personnel to practice before a disaster occurs. Also, traffic incidents happen daily and can provide many opportunities for field personnel to practice NIMS/ICS.	• Incidents, even minor ones, have more risk associated with them; for instance, a minor traffic accident could become a multi-car crash with many fatalities and injuries due to changing weather conditions, responder error, a delay in response for any reason, or other reasons.

Exercises

Exercises are planned in advance and take place in a controlled and low-risk setting. Different kinds of discussion-based and operations-based exercises are described in more detail later in this chapter. This section focuses on the documentation and gathering of lessons learned from exercises, primarily by means of hot washes and after-action reviews (AARs).

Hot washes are performed after exercises to gather data relevant to the after-action report/improvement plan. AARs can be conducted for exercises and for planned and actual events.

- *Hot wash:* A hot wash is conducted by an experienced facilitator immediately after an exercise so that important insights, issues, and questions are not lost. Information for generating the after-action report/improvement plan can also be collected during the hot wash. HSEEP notes that hot washes should be conducted for each functional area for operations-based exercises (HSEEP 2013, p. 4-7).
- *After-action review:* The AAR evaluates the exercise conduct according to the parameters established by the exercise planning team and analyzes core capabilities demonstrated during the exercise. Participant feedback forms are used to seek relevant information for the AAR from players, facilitators, controllers, and evaluators, as well as information on exercise conduct and logistics. Exercise evaluation guides are used as a tool for exercise observation and data collection to measure the achievement of exercise objectives and the strength of core capabilities (HSEEP 2013, p. 3-18). The HSEEP document offers guidance on how AARs should be developed.

Participants receive a copy of the draft AAR to help them better understand their strengths and areas of improvement as they relate to meeting the exercise objectives and demonstrating core capabilities. Elected and appointed officials review the final AAR and identify the elements that require corrective action. These elements will be included in the improvement plan and implemented as part of a continuous process of increased preparedness.

COMPUTER-ASSISTED SIMULATIONS

Computer-assisted simulations provide a realistic but safe training and exercise setting for participants. They may be either synchronous (which requires scheduling the session in advance) or asynchronous (which uses simulated players and is available on demand). Virtual exercises are a type of computer-assisted simulation through the Internet or other video or teleconferencing technology. Basic computer skills are necessary for all online training; however, computer-assisted simulations and virtual training and exercises may require more familiarity with PCs and the Internet. A younger demo-

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

37

graphic may be more comfortable with this training and exercise method, and may be more motivated to participate in simulated scenarios and exercises. Table 19 summarizes the advantages and disadvantages of this method.

TABLE 19
COMPUTER-ASSISTED SIMULATIONS

Advantages	Disadvantages
• A large, geographically dispersed audience can be reached.	• Good PC and Internet skills of the personnel are necessary to maximize the learning that takes place through this method.
• Allows identification of weaknesses or resource deficiencies in training, plans, procedures, and policies.	• In remote locations or other areas without Internet access, online training would not be possible.
• Allows key personnel to interact and become acquainted with each other.	• Unforeseen connection problems may arise during the actual exercise. If the problems occur on the host's end, there may be interruptions during the training. If the problems are at individual locations, they will miss portions of the training.
• Allows the participation of key personnel in different geographic regions to interact with each other.	
• Improves individual performance, organizational communication, and coordination.	• Bandwidth issues may arise. Bandwidth refers to the rate of data transfer. If the data being transferred on the network is high capacity, problems and consequent delays may occur.
• Dangerous scenarios may be simulated safely.	
• May or may not be web-based. Non-web-based activities reduce the likelihood of hackers compromising the content/discussions.	• Lacks a certain amount of realism, and may not provide a true test of capabilities and how teams and individuals and system will react in an emergency situation.
	• For synchronous simulations, scheduling can be a problem.

While computer-assisted simulations and virtual exercises are generally believed to be less costly than full-scale physical exercises, an analysis of costs for WSDOT-specific scenarios for emergency training and exercises concluded that it would still be "cost-prohibitive" for the department (G. Selstead, WSDOT, personal communication, April 18, 2013).

CLASSROOM TRAINING

The classroom is a vehicle for synchronous learning: training takes place at the same time, in one location. For centuries, universities have used traditional classroom training involving lectures as the primary teaching tool. While classroom training can be more costly than other types of training, instructors are able to monitor student progress in real time, provide personalized assistance, and make any needed adjustments to the training. Also, the trainees can interact with the instructor and with each other. The 2011 Rutgers study of security training needs and delivery preferences observed that classroom training is the most effective format for learning; however, to be feasible, the trainings should be flexible in terms of duration and be designed as modules that can be integrated with other trainings or meetings (Lowrie and Shaw 2011).

Formal classroom training can be provided in-house or at other facilities: universities or community colleges, LTAP/TTAP centers, a local fire or police department, the state EMA, or some other organization.

Inserting interactive elements into the classroom training—video, discussions, breakout activities, and web-based tools—can increase trainee interest and attention compared with a lecture-only format. Chen et al. 2006 recommend the expansion of the repertoire of training tools by incorporating different forms. As noted by the NCHRP 20-59(43) principal investigator, agencies prefer courses that incorporate video and role-playing activities (J. Western, personal communication, Sept. 12, 2013).

One of the negative aspects of the classroom delivery method is the difficulty participants might have getting there; however, various technologies address this problem by providing real-time audio and video communications that can link trainees in different locations with the classroom. Key technologies include VoIP and VTC.

- *Voice over Internet Protocol* (*VoIP*): VoIP allows voice and data communications to be transmitted over the Internet. This results in lower costs, because participants do not have to purchase a separate audio communications service and a phone handset; all they need is a microphone and headset for the PC or laptop. However, VoIP does have potential issues (e.g., bandwidth efficiency) that need to be addressed to ensure smooth functioning of the technology. Because reliable Internet service is required for VoIP service, a remote location without Internet service would not be a good candidate for this technology (Jensen's Technology Dictionary).
- *Video teleconferencing* (*VTC*): VTC systems use cameras—including CCTVs, video cameras, and webcams—along with audio communications through the camera itself, through the Internet, or through a normal phone line. Add-on systems require only a microphone, speakers, and a camera. Dedicated systems can be categorized into large group systems that support large meeting rooms and auditoriums, small group systems that support small meeting rooms, and individual systems. The group systems are typically fixed to the room and are not portable, while individual systems integrate camera, speakers, and a microphone in small portable units. Because VTC systems can be vulnerable to access by unauthorized users, the National Security Agency recommends the following actions: change all default passwords, enable encryption, disable broadcast streaming, disable the far-end camera control feature, disable insecure IP services,

perform initial VTC settings locally, update and apply patches, disable the auto-answering feature, disable wireless capabilities, separate VTCs from the rest of the IP network, and—if remote access is necessary—have strict access controls ("Video Teleconferencing," National Security Agency n.d.). Table 20 summarizes the advantages and disadvantages of this method.

TABLE 20
CLASSROOM TRAINING

Advantages	Disadvantages
• Can present up-to-date information. • Summarizes materials from various sources. • Can adapt the material to student backgrounds and interests. • Highlights important concepts and materials. • Instructor enthusiasm can motivate students and enhance learning (McKeachie and Svinicki 2013).	• Reduced development of problem-solving skills and interaction among students if sufficient interaction opportunities are not provided. • Scheduling difficulties, and the cost of the training and travel, including time. (Scheduling and travel issues may be alleviated through the use of VTC, VoIP, or similar technology.)

ONLINE TRAINING WITH LIVE INSTRUCTORS

Online training through the Internet is an excellent way to provide training to a large workforce in disparate locations. Web-based and online training programs have grown in popularity and gained acceptance throughout the academic and training communities, and the robustness and integrity of trainee testing and assessment have improved. There are numerous forms of online or web-based training.

The training delivery method may be "live," with real-time interaction between the instructor and the students. Live web-based training can bring together trainees from different geographic locations to get to know each other and engage in peer-to-peer (P2P) interaction. Webcams, VTC, CCTVs, and VoIP technologies can facilitate this interaction. Table 21 summarizes the advantages and disadvantages of this method.

TABLE 21
ONLINE TRAINING WITH LIVE INSTRUCTORS

Advantages	Disadvantages
• Cost is lower than with classroom training, since travel can be avoided. • Training is standardized. • Training can be provided anywhere with web access.	• Training must be scheduled in advance. • Trainees may be distracted. • Ability to monitor student progress may be limited. • Access to a PC and Internet are required. • Familiarity with the Internet and basic PC skills are required.

* See "Note on identifying units and individuals" below.

BLENDED TRAINING

Blended training involves the combination of two or more of these training methods. Blended training is favored by many agencies because the most effective elements of various methods can be incorporated into a training solution that is suitable to the particular agency's training needs and constraints.

EXERCISES

Exercises allow participants to practice what they have learned in previous training. Participants are usually given realistic scenarios with different degrees of stress, from minimal to a significant amount. They have the opportunity to resolve issues and obstacles they encounter in the scenarios, and to work with and learn from their peers.

In practice, large numbers of field personnel cannot participate in exercises or training at any one time; and if exercises occur only once a year, important issues and information may be lost. Also, exercises do not always focus on the topics of most interest and relevance to field personnel. In this synthesis, exercises are categorized as either discussion-based or operations-based. Detailed descriptions of each exercise type follow.

Discussion-Based Exercises

In discussion-based exercises, facilitators lead discussions that focus on strategy or policy issues. They help participants become familiar with, learn about, or develop new plans, policies, agreements, and procedures. Tabletop exercises, games, workshops, and seminars are discussion-based exercises.

Tabletop Exercises

A tabletop exercise (TTX) is a discussion-based exercise that may "enhance general awareness, validate plans and procedures, rehearse concepts, and/or assess the types of systems needed to guide the prevention of, protection from, mitigation of, response to, and recovery from a defined incident" (HSEEP 2013, p. 2-4). TTXs are facilitated, scenario-based discussions that allow participants to role play; they can identify problems that should be addressed before holding a larger exercise (*Tabletop Exercise Instructions for Planned Events,* FHWA 2007). A basic TTX involves one emergency scenario and allows participants to address problems presented by the facilitator. Advanced TTXs generate pre-scripted messages that alter the original scenario. Players are able to discuss the issues and make decisions, which are incorporated into the scenario as it progresses (HSEEP 2013, p. 2-5).

The FHWA *Tabletop Exercise Guidelines for Planned Events and Unplanned Incidents/Emergencies* provides tips for effective TTXs. They include the following:

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

39

- The exercise should be held in a room with a conference table, or with the seating arranged in a manner in which the participants are able to see all other participants.
- Having coffee/soda available for the participants helps promote a relaxed atmosphere.
- Provide a large detailed map of the exercise area so that all participants can visualize the area involved.
- If the exercise fails to become productive within the first hour, discontinue and discuss the possible reasons why this has occurred.
(FHWA 2007)

Games

A game is a simulation that can involve competition between and among two or more teams; it is more stressful than a TTX, workshop, or seminar. Decisions need to be made by the players at key points during the game. The consequences of the decisions by each team and by individual players can be reviewed and evaluated (HSEEP 2013, p. 2-5). Games and interactive videos allow trainees to experience the consequences of making particular decisions and can make the training more interesting; however, the scenarios should be tailored to the agency so they seem realistic to the trainees (Lowrie and Shaw 2011).

Workshops and Seminars

Workshops and seminars are similar, but workshops have more interaction among participants and are focused on achieving a goal or producing a product (e.g., an emergency operations plan). Seminars provide an overview of authorities, strategies, plans, policies, procedures, protocols, resources, concepts, and ideas, and can help in assessing the capabilities of interagency or interjurisdictional operations (HSEEP 2013, p. 2-4). Table 22 summarizes the advantages and disadvantages of these discussion-based exercise methods.

TABLE 22
DISCUSSION-BASED EXERCISES (TABLE-TOPS, GAMES, WORKSHOPS, SEMINARS)

Advantages	Disadvantages
• Various scenarios can be addressed in a safe, non-stressful environment. • They are less costly than operations-based exercises. • The interaction that takes place among peers can foster learning. • Feedback obtained from AARs, debriefings, and hot washes can be beneficial in identifying additional training needs of individuals and groups.* • Lessons learned from the exercises can become the basis for future training content and scenarios.	• Cost could be an issue if the exercise is held at a location that is difficult to access. • Discussion-based exercises do not provide the realism that operations-based methods provide.

* See "Note on identifying units and individuals" below.

Operations-Based Exercises

In operations-based exercises such as drills, functional exercises (FEs), and full-scale exercises (FSEs), participants react to a scenario. Operations-based exercises not only train personnel but can provide opportunities for them to practice what they have learned. These exercises can also "clarify roles and responsibilities; identify resource gaps; and be used to validate plans, policies, agreements, and procedures" (HSEEP 2013, p. 2-5). Operations-based exercises are in real time and can last hours, days, or even weeks. Drills typically last 2 to 4 hours; FEs may last 4 to 8 hours; and FSEs can last a full day, several days, or even weeks (*Security 101* 2009, p. 62).

Drills

A drill is a supervised operations-based exercise focusing on a function or capability, such as training on new equipment in the agency. Drills can also be used to practice and maintain abilities and skills (HSEEP 2013). A drill does not need to be a formal "HSEEP-type" exercise; it can be hands-on training provided by a knowledgeable supervisor, instructor, or peer. The Pipeline and Hazardous Materials Safety Administration training program guide notes that hands-on training simulates the job and allows employees to integrate theory and practice by using critical thinking skills to engage in a problem-solving process that incorporates professional knowledge. OSHA also emphasizes the importance of hands-on exercises in a safe setting to provide workers the opportunity to practice complex and hazardous tasks. Table 23 summarizes the advantages and disadvantages of this method.

TABLE 23
DRILLS

Advantages	Disadvantages
• When training on a specific function, activity, or equipment is required, drills provide hands-on experiential learning. • Provides a sense of urgency to develop alternatives and make decisions without the possibility of serious consequences. • In-house trainers may have more credibility because they have specific experience relating to the subject being taught and the job site. • Procedural and policy gaps can be identified. • May avoid comprehension problems related to literacy/language deficiencies.	• Providing hands-on training to a large number of individuals can be time-consuming and costly. • Scheduling drills can be difficult due to the following constraints—availability of the field personnel, the instructor, and the facility or equipment. • Variables differ based on the individual, so guaranteed outcomes are difficult. • Personality differences between the instructor or mentor and the worker may cause issues.

Functional Exercises

FE scenarios focus on capabilities, multiple functions or subfunctions, or interdependent groups of functions. While typi-

40

cal participants include managers in command and control functions, several state DOT survey respondents and case example participants indicated that their field personnel participate in FEs. These exercises are conducted in a realistic and real-time setting and use scenarios; however, movement of personnel and equipment do not occur. A master scenario events list is used to align the exercise activities with exercise objectives (HSEEP 2013, pp. 2-5–2.6). Table 24 summarizes the advantages and disadvantages of this method.

TABLE 24
FUNCTIONAL EXERCISES

Advantages	Disadvantages
• When training and practicing on a capability or function, experiential learning in a realistic setting will facilitate the retention of the knowledge and skills needed by trainees. • After-action reports, debriefings, and hot washes can identify units and individuals that would benefit from additional training.* • Lessons learned from the exercises can become the basis for future training content and scenarios.	• Arranging and scheduling FEs can be difficult and time-consuming.

*See "Note on identifying units and individuals" below.

Full-Scale Exercises

As noted in HSEEP 2013, FSEs are the most complex and resource-intensive type of exercise (p. 2-6). They involve numerous agencies, organizations, and jurisdictions, and can be used to assess and validate many activities. FSEs are conducted in a real-time setting that is more realistic than that of FEs. They provide the highest level of realism for any exercise type and require "critical thinking, rapid problem solving, and effective responses by trained personnel." Actual personnel, equipment, and other resources may be deployed (HSEEP 2013, p. 2-6). Table 25 summarizes the advantages and disadvantages of this method.

TABLE 25
FULL-SCALE EXERCISES

Advantages	Disadvantages
• Highly realistic, complex situations are presented to personnel. • After-action reports, debriefings, and hot washes can identify units and individuals that would benefit from additional training.* • Lessons learned from the exercises can become the basis for future training content and scenarios.	• Significant coordination, preparation, resources, and time are required.

*See "Note on identifying units and individuals" below.

Note on Identifying Units and Individuals in After-Action Reports

Although identifying units and individuals in after-action reports, debriefings, and hot washes might be useful for an improvement plan or to guide additional training, it could open your jurisdiction to issues of legal liability. Readers are strongly advised to check with legal counsel on this point, as it varies from state to state and from jurisdiction to jurisdiction.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

41

EMERGENCY TRAINING AND EXERCISE PRACTICES

This chapter provides detailed findings from case examples, the screening survey, state DOTs, and the literature review. In particular, the emergency training implementation challenges of state DOTs and PW agencies are presented, along with solutions and practices identified through this synthesis study.

Case example subjects were identified through the screening survey and follow-up interviews and through consultation with information sources and industry experts. The interview guide used for the case example interviews is presented in Appendix D, and the list of interviewees and their positions is provided in Appendix E. The details of the case examples can also be found in Appendix E. Supplemental information obtained from ADOT, MoDOT, and WSDOT is presented in Appendices F, G, H, and I. Information for the case examples was gathered through phone and e-mail interviews with the selected agencies. An objective of the agency selection for the case examples was to provide diversity in terms of state size, population, and location. Two case exam-

ples involve local PW agencies. Information regarding PWs was also obtained from the state DOT case example participants, screening survey, synthesis panel members, and the American Public Works Association. The locations of the case example agencies are shown in the map in Figure 7.

Surveys were distributed to all voting members of the AASHTO Special Committee on Transportation Security and Emergency Management, the AASHTO Subcommittee on Maintenance, APWA, and the International Municipal Signal Association. The survey conducted for this synthesis study was intended to be a screening survey to identify case example agencies. However, as other information emerged, it was incorporated into the synthesis. There were a total of 48 responses from state DOTs and PW agencies—from 25 state DOTs and 22 PW agencies (one DOT responded twice). The survey questionnaire is presented in Appendix B, and the survey responses are summarized in Appendix C.
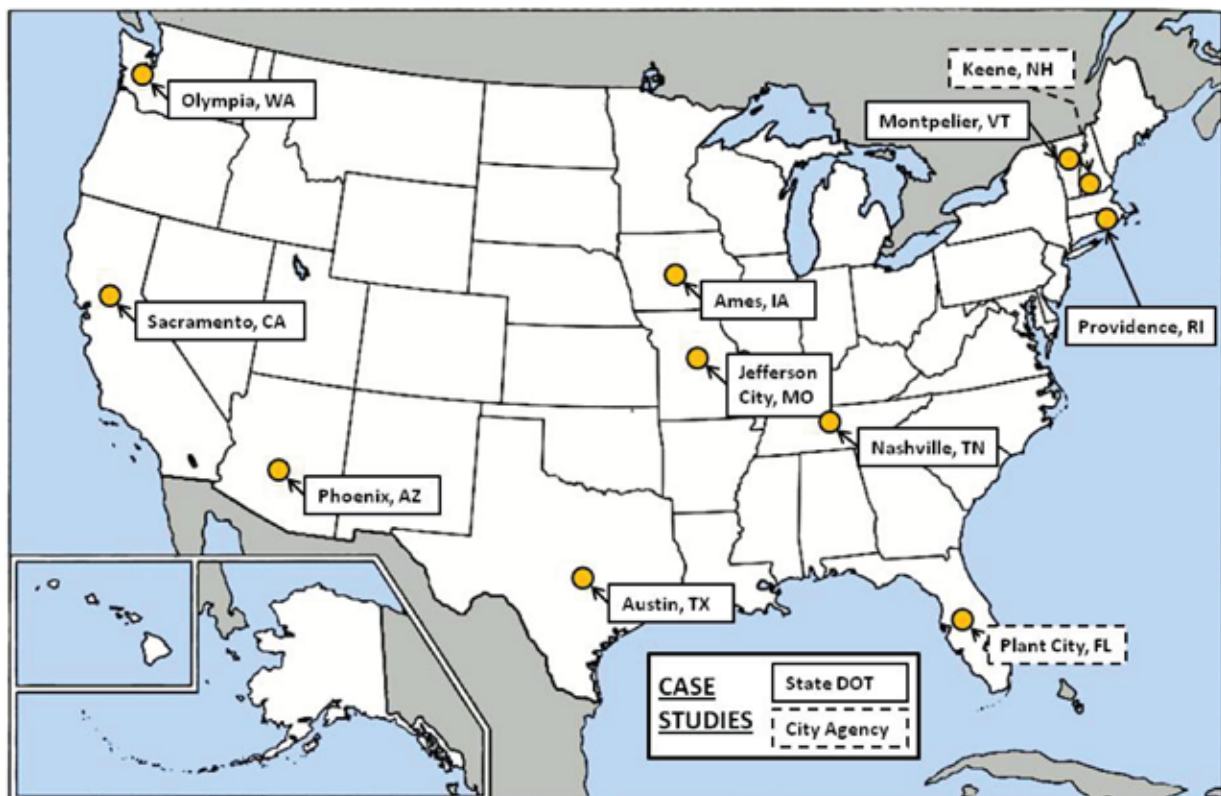
FIGURE 7 Locations of the case study agencies.

42

The distributions by size of the FTE field personnel for the state DOT respondents and PW respondents are shown in Tables 26 and 27. For each case example state, Table 28 provides a summary of the state's demography, as well as characteristics of the state DOT and its facilities.

TABLE 26

STATE DOT FIELD PERSONNEL

<50	4
250–499	3
500–999	4
1,000–1,999	7
2,000–4,999	6
>5,000	1
Total	25

TABLE 27

PUBLIC WORKS AGENCY FIELD PERSONNEL

<50	13
51–99	4
100–249	5
Total	22

California is the most populous state among the case example participants, with 36.8 million residents, followed by Texas with 24.3 million residents. Vermont is the least populous with only 621,270 residents. States range in size from 1,045 square miles (Rhode Island) to 261,231 square miles (Texas). Texas is the largest state among the case example participants, followed by California and Arizona; the smallest states are Rhode Island and Vermont. Population density ranges from 45.2 persons per square mile in Arizona to 1,003 in Rhode Island. The range for number of full-time employees is between 780 and 22,000. Caltrans is the largest state DOT in terms of full-time employees; the next largest is TxDOT, which has about half of Caltrans' workforce. However, it is interesting to note that field personnel make up only about 20 percent of the Caltrans workforce, compared with almost 50 percent of TxDOT's workforce. In terms of the number of districts, TxDOT takes the lead with 25 district offices; the state is further subdivided into 246 maintenance sections. TDOT has 12 super districts, which are subdivided into 22 districts. In terms of highway/roadway mileage and bridges, the state DOTs with the most miles and bridges are TxDOT and Caltrans. TxDOT is responsible for the most centerline miles—almost 80,000—and more than 50,000 bridges. Meanwhile, Caltrans is responsible for 50,000 miles and more than 12,000 bridges. The Rhode Island DOT has the lowest number of centerline miles and the lowest number of bridges.

TABLE 28

CHARACTERISTICS OF PARTICIPATING CASE STUDY STATE DOTs

STATE	POPU-LATION	SIZE (sq. miles)	DENSITY (persons/ sq. mile)	DOT SIZE (full time employees)	DOT FIELD PERSONNEL (full time employees)	HEAD QUARTERS	NO. OF DISTRICT OFFICES	ROADWAY OR HIGHWAY MILEAGE (centerline miles)	BRIDGES
Arizona DOT	6,500,180	113,635	45.2	4,600	900	Phoenix	9	6,722	4,735
Caltrans	36,756,666	155,959	217.2	22,000	4,500	Sacramento	12	50,000	>12,000
Iowa DOT	3,002,555	55,869	52.4	2,522	1,378	Ames	6	9,000	4,000
Missouri DOT	5,911,605	68,885.93	81.2	5,100	2,500	Jefferson City	7	33,845	10,000
Rhode Island DOT	1,050,788	1,045	1,003	780	224	Providence	NA	1,100	800
Tennessee DOT	6,495,978	42,146	154.1	3,900	2,600	Nashville	12 Super Districts, 22 districts	13,896 (state-maintained)	19,650
Texas DOT	24,326,974	261,231	96.3	12,120	5,000	Austin	25 districts, 246 maintenance sections	79,000	51,808
VTrans	621,270	9,249.56	65.8	1,300	400	Montpelier	9	2,700	4,000
Washington DOT	6,882,400	71,362	103	>6,800	1,600	Olympia	6 regions, 24 maintenance areas	20,677	>3,500

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

43

IMPLEMENTATION CHALLENGES

The case example participants viewed emergency training and exercises as an important aspect of preparedness. In the screening survey, only 3 of the 25 state DOT respondents reported that they do not provide emergency training or exercises for their M&O field personnel. This observation coincides with the preliminary results obtained by the NCHRP 20-59(43) project team (J. Western, personal communication, April 16, 2013). The team found that 18 of 20 state DOT respondents required or encouraged training in emergency preparedness.

Of the 22 PW respondents, 12 reported that they do not provide emergency training or exercises for their M&O field personnel. Both state DOTs and PWs face a number of implementation challenges, many of them resulting from resource constraints. These challenges are discussed in this section. Practical solutions that have been identified and are being used by the agencies are presented later in this chapter.

Implementation challenges identified by the case example participants included the following:

- Scheduling difficulties
- Limited budgets
- Lack of qualified training staff
- Personnel turnover
- Distance issues
- Senior management issues.

Additional issues noted by the state DOT and PW respondents included the following:

- Inadequate facilities and other resources (e.g., PCs, Internet access)
- Insufficient information about available training
- Infrequent need for training.

These challenges were also mentioned by the screening survey respondents.

Additional challenges for state DOTs and PWs included limited training content, including lack of refresher training; ESF and ICS roles; exercises designed for field personnel; training for field support personnel such as procurement, construction, and HR; and training on coordination among state DOTs, PWs, law enforcement, fire departments, and other emergency response providers.

Lack of Qualified Training Staff and Personnel Turnover

Some state DOTs noted that their field personnel and supervisors take on training responsibilities, even though the agencies do not have formal training positions. Even if these personnel are qualified to conduct the training, it can take a toll on them because they must also fulfill their normal duties. Personnel turnover creates shortages in training staff and at the same time creates an increased need for training.

Case example respondents noted the following implementation challenges:

- Personnel frequently perform training duties outside of their normal positions.
- Training gaps occur as a result of personnel and leadership turnover.
- Experiences and lessons learned are lost when employees leave or retire.
- The agency lacks the staff needed to train field personnel in ICS.

Limited Budgets and Scheduling Difficulties

State DOTs do not have unlimited budgets for training field personnel. Even if training is provided free of charge, it requires field personnel to be pulled out of their normal work assignments. This can cause delays in their fulfillment of their assignments, may require overtime compensation, or may require other personnel to fill in for them. If field personnel are required to undergo training outside their normal work hours, they will typically need to be compensated for their overtime hours. In terms of implementing training programs, 12 of 16 respondents indicated difficulty in scheduling or conflict with work priorities as a problem. In terms of incorporating field personnel into emergency exercises, 27 of 32 respondents cited difficulty in scheduling or conflict with work priorities as a problem. These observations coincide with the preliminary finding from the NCHRP 20-59(43) project that fewer and fewer resources are available for training in general (J. Western, personal communication, April 16, 2013). The 12 PWs that reported difficulty implementing training programs said they did not have a large enough budget to hire a training contractor.

Case example respondents also noted these implementation challenges:

- A state DOT's traffic and highway department has been downsized by 20 percent, creating major challenges owing to a lack of time and funding for training.
- Another state DOT stated that scheduling new training is difficult because field personnel already have other training requirements. Even if the training itself is free, it requires interrupting their normal duties and use of their paid time.

At Caltrans, newly hired M&O field personnel must take the following courses as part of the two-week New Employee Maintenance Orientation (NEMO). Training for emergency operations and hazards awareness is necessarily limited in light of all the other topics that must be covered:

44

- NIMS
- Standard First Aid and CPR
- Chapter 8 Training
- Hearing Protection
- Heat Stress
- Ladder Safety
- Diversity Training
- Stormwater Management
- Temporary Traffic Control Training
- Defensive Driver Training
- Sexual Harassment and Violence in Workplace and Employment Assistance Program
- HR Overview
- First Responder Awareness
- Hazard Communication
- Caltrans Overview
- Career Development
- International Union of Operating Engineers
- Batteries
- Backing Course
- Brake Lab
- Decs and Dust
- Equipment Responsibility
- Pre-Ops
- Radio Communications
- Temporary Traffic Control Training—Field Activities
- Way Traffic Control
- Lane Closures
- Shoulder Closures
- Driving Test
- Tires
- Trailers and Chain ID
- Transmissions
- Trucks
- Turbos
- Substance Abuse.

Distance Issues

Some of the DOTs in larger states must provide training to a large M&O field workforce located in disparate areas. For example, although California is the third largest state in the United States, Caltrans has a sufficient training budget to enable it to send new hires and existing personnel from its district offices to its training academy in Sacramento. On occasion, academy trainers travel to the district offices to provide safety and other training.

In contrast, another DOT in a large state has difficulty covering the great distances required to reach each of its district offices. Resources tend to be concentrated in urban areas, so trainers have to make a special effort to reach out to suburban and rural personnel. This DOT has used the train-the-trainer method to resolve this problem.

Another state DOT that lacked sufficient staff qualified to perform the initial ICS training for its field personnel also used

the TTT strategy. They found that TTT was cost-effective and did not require them to hire additional personnel.

Senior Management

Because budgets are limited and scheduling is difficult, provision of training to a large number of employees is a challenging endeavor, even if it is deemed necessary by mid-level managers or district staff. It is important to obtain the support of senior management and their active promotion of emergency training. In cases where senior management mandated all-hazards emergency training, the training was implemented expeditiously and successfully.

For example, VTrans issued a senior-level mandate for all personnel, including field personnel, to undergo ICS training after Hurricane Irene in 2011. All field personnel were required to take both the instructor-led ICS 100 introductory course provided by the Vermont State Police Academy and the FEMA IS-100 online course. Supervisors of field personnel were required to take additional courses, including IS-200 (ICS for Single Resources), ICS-300 (Intermediate ICS), and ICS-400 (Advanced ICS), depending on their job responsibilities.

At the Iowa DOT, the director mandated implementation of ICS training. TTT courses trained instructors at each district office; they in turn trained all their district field personnel.

One municipal PW agency indicated that it is making an effort to provide NIMS and ICS training to its field personnel; however, implementation and delivery have been difficult because of insufficient support from senior management. The agency representative noted that other PW agencies share this problem.

TRAINING NEEDS

The screening survey results and case example participants indicated that state DOTs and PWs had certain training needs that would benefit from increased attention and resources. Table 29 shows the training needs of participating state DOTs and local PWs. All participants shared the need to obtain funding and train new staff. Comments on new staff training by both state DOTs and PWs implied that high levels of staff turnover could be problematic. State DOTs also noted issues with refresher training and involvement of field personnel in FSEs.

Refresher Training

Refresher training for those who have already taken the NIMS/ICS courses at least once is not available through FEMA EMI or other sources. APWA has been considering the development of refresher training by combining key content from related courses (e.g., ICS-100 and IS-700) and

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

45

offering the training in a shortened, more concise format than the original courses (D. Bergner, personal communication, May 3, 2013). Tennessee DOT does require its field personnel to take a 4-hour refresher NIMS and ICS course every 5 years. The refresher training is delivered by the TDOT Emergency Service Coordinator.

TABLE 29
TRAINING NEEDS

State DOTs	Local Public Works
• Obtaining funding	• Obtaining funding
• Training new staff	• Addressing personnel shortages
• Emergency operations plan training	• Training new staff
• ESF#1 and ICS roles, responsibilities training	• Search-and-rescue training
• Training for M&O field support personnel—procurement, HR, budgeting, construction	• Dealing with trauma
• Response to hazardous conditions and HAZMAT training	• Preparedness for out-of-area deployment
• Training on coordination among the DOT, police and fire	• Preparedness for disasters/ emergencies when they are infrequent
• Refresher courses	
• Lack of PCs in the field	
• Full-scale exercises designed for field personnel	

Linking Implementation Issues to Solutions

Table 30 links implementation issues to possible solutions. The solutions were identified through the case examples, screening surveys, follow-up phone calls, and interviews with information sources.

TRAINING SOLUTIONS

DOTs identified training delivery solutions in the both the case examples and the screening survey. (These solutions were described in more detail in chapter three.) Most of them are not standalone solutions; they can be offered in various combinations as deemed appropriate by the state DOT or PW. Blended training solutions are viewed favorably by many agencies.

Field Crew Meetings

Field crew meetings provide good opportunities for training because they are regularly scheduled and held at times and locations convenient to field personnel. Screening survey results indicated that field crew meetings are a preferred training method used by 17 of the 25 responding DOTs. This is higher than the preliminary result obtained by the NCHRP 20-59(43) project team; their result indicated that 5 of 20 responding DOTs incorporate training into existing internal meetings (J. Western, personal communication, April 16, 2013).

TABLE 30
EMERGENCY TRAINING AND EXERCISE
IMPLEMENTATION ISSUES AND POSSIBLE SOLUTIONS

Implementation Issues	Solutions
• Lack of training staff • Limited budget • Employee turnover	• Field crew meetings • Joint training • Just-in-time training • Interjurisdictional/interagency training and exercises • Computer-based training without live instructors • Prepackaged CDs and DVDs • Train-the-trainer • Planned events, incidents, and exercises • Online training with live instructors • Computer simulations
• Scheduling difficulties	• Field crew meetings • Joint training • Just-in-time training • Computer-based training without live instructors • Prepackaged CDs and DVDs • Planned events, incidents
• Limited training content • Insufficient information about available training	• FEMA EMI, ISP, NIMS/ICS/ NRF training • Synthesis toolkit • Universities, LTAP/TTAP centers • Prepackaged CD/DVDs
• Infrequent need for training	• Just-in-time training • Computer-based training without live instructors • Prepackaged CDs and DVDs
• Lack of Internet access • Lack of PCs	• Field crew meetings • Joint training • Prepackaged CD/DVDs • Train-the-trainer • Classroom training • Planned events, incidents
• Distance issues	• Field crew meetings • Computer-based training without live instructors • Prepackaged CDs and DVDs • Train-the-trainer • Classroom training using VTC/VoIP/CCTV • Planned events, incidents

At WSDOT, crew meetings focusing on field personnel skills and safety are held on a regular basis. TDOT also uses field crew meetings as a training delivery method. At Caltrans, tailgate meetings are held every 10 days at every main-

46

tenance yard. These meetings are used to share information and to train field personnel on new procedures, technologies, equipment, and safety issues. Missouri DOT uses field crew meetings to train field personnel on specific tasks.

At Plant City, Florida, weekly safety meetings are held during lunch; they combine training, discussion, and information sharing. Each of Plant City's divisions has up to nine employees, and they all hold weekly safety meetings. Topics covered include hazards awareness and emergency operations. When training is the focus of the meeting, a superintendent prepares the training content and trains personnel. For discussions, a worker may prepare content and lead a discussion. Also, an incident may become the focal point for a discussion.

Just-in-Time Training

Just-in-time training is used to train personnel and PWs when the need arises. One agency that used JITT to train personnel in ICS after a large disaster realized that the response would have been better had their personnel already been trained in ICS. Seven of the 25 state DOT screening survey respondents indicated that they use JITT. Online training that is available on demand—such as the FEMA ISP as well as videos on emergency operations and hazard awareness on YouTube or other file-sharing sites—can be used for JITT.

At the Texas DOT, information on FHWA and FEMA reimbursement procedures is disseminated at meetings of district engineers and key maintenance staff. JITT in reimbursement procedures is provided to local counties once a disaster strikes. TxDOT also provides JITT to local governments on FHWA Emergency Relief Program reimbursement eligibility. This training was provided to the county of Bastrop immediately following a major wildland fire in 2011.

The Missouri DOT has used JITT in the past and is developing a new training program incorporating additional JITT. The new training will instruct field personnel on their responsibilities and job duties as they expand.

The Rhode Island DOT considers self-paced online training (for example, FEMA ISP) to be a form of JITT because it is always available and can be delivered when it is needed.

At the Tennessee DOT, the JITT method is used to train field personnel on specific skills or knowledge required for exercises immediately before an exercise.

One state DOT, however, discovered that providing JITT on ICS during a disaster is not an effective way to provide this training to its field personnel. The DOT has since required its M&O field personnel to take both the instructor-led ICS 100 course offered by the state police academy and the FEMA IS-100 course online at its training facility.

Interjurisdictional and Interagency Training and Exercises

For larger and more complex disasters, emergencies and planned events, effective response requires good coordination among stakeholders in multiple jurisdictions. These include transportation agencies (state DOTs, local DOTs, transit agencies, toll authority), PWs, public safety agencies, NGOs, and the private sector. Hence, it is important for state DOTs and PWs to participate in interjurisdictional and interagency training and exercises. These training and exercise opportunities are also a way for state DOTs and PWs to leverage scarce resources.

State EMAs typically hold interjurisdictional and interagency exercises, develop after-action reports and hot washes based on the exercises, and may also identify lessons learned from disasters and planned events. In addition, state EMAs usually offer comprehensive emergency training programs and host statewide or regional interagency exercises. State EMAs receive federal funds to deliver a wide range of training and exercises, so these programs are often offered at nominal or no cost to the participating agencies.

For example the Arizona Division of Emergency Management (ADEM) Training and Exercise Office offers a wide variety of courses in five major areas: emergency management, hazardous materials, multihazard emergency planning for schools, Community Emergency Response Team, and weapons of mass destruction/homeland security. Within each of these areas are a wide range of courses that cover emergency planning, mitigation, awareness, operations, incident command, and domestic preparedness. ADEM also offers training to ADOT and other agencies to help them prepare to respond to an unlikely accident at the Palo Verde Nuclear Generating Station.

State and local police, fire, and safety departments are also excellent sources of interjurisdictional and interagency training. For example, in Texas, local fire departments and police departments routinely host ICS-300 (Intermediate ICS) and ICS-400 (Advanced ICS) courses. In Arizona, the Arizona Department of Public Safety is among several entities (including ADOT and the Arizona Division of Emergency Management) that coordinate training and exercises. In Tennessee, TDOT has an arrangement with the Tennessee Emergency Management Agency (TEMA) to "exchange" training: training delivered by TEMA is complimentary to TDOT personnel and training delivered by TDOT is complimentary to TEMA personnel. In addition, interdisciplinary training with the Civil Air Patrol is organized at least once a year.

SHRP 2 has developed the National Traffic Incident Management Responder Training course. It is a multidisciplinary training course on TIM that may lend itself to interjurisdictional and interagency training and exercises.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

47

State DOTs identified other agencies and stakeholders with which they coordinate, including county emergency managers; the state departments of corrections, energy, health, and public safety; state forestry agencies; and water resources.

Joint Training

Joint training, for the purposes of this synthesis, is different from interjurisdictional and interagency training in that it focuses on combining training topics. Because scheduling training for field personnel is a major issue for state DOTs and PWs, joint training is used by some agencies to make the delivery of training more efficient and possibly more effective as well. While some joint training may include participants from other jurisdictions or agencies, joint training that does not involve other agencies can also generate delivery efficiencies.

The Arizona DOT's TIM training started in 2013 and promotes a shared understanding of TIM requirements. The training includes a strong ICS element, including a section devoted entirely to incident command. The training is conducted by the Arizona Department of Public Safety using the train-the-trainer version of the SHRP 2 National TIM Responder Training course. SHRP 2's 2-day TTT course facilitates widespread use of the multidisciplinary training; the training was shortened to a 4-hour format by AZDPS. The training is being delivered to state DOT personnel and federal, state, county, and local emergency response providers throughout Arizona, and to private companies such as tow truck operators and contractors.

The Texas DOT's wildland fire training for field personnel includes both emergency response and safety training. TxDOT field personnel are responsible for traffic control and incident response, providing water to firefighters and fuel to volunteer fire departments, debris removal, and repairs to their own facilities. For their personal safety, TxDOT field personnel also need to know how to use personal protective equipment.

Plant City, Florida's, weekly safety meetings include hazards awareness and emergency operations. These meetings combine training, discussions, and information sharing, and are an example of joint training.

Asynchronous Training

Computer-Based Training Without Live Instructors

Computer-based training without live instructors can be offered on an on-demand basis and does not need to be scheduled. Free training is available through the FEMA Emergency Management Institute Independent Study Program and through YouTube, which can be accessed on the Internet. Fourteen of the 25 state DOTs that responded to the screening survey noted that they used online or PC-based training. Among the screening survey respondents, responses were rel-

atively evenly distributed among FEMA's Independent Study Program, the ICS Training and Resource Center (FEMA), the NIMS Training Program and Resource Center (FEMA), the NRF Resource Center (FEMA), the National Highway Institute (FHWA), the National Transit Institute (FTA), LTAP/TTAP centers, and university/college. YouTube users may have uploaded educational videos; for example, by searching for ICS training, it is possible to find numerous emergency response training videos on the topic.

Prepackaged CDs and DVDs

CDs and DVDs with videos, PowerPoint presentations, training manuals, and other training tools are relatively inexpensive and can usually be adapted to the needs of state DOTs and PWs. They are also useful in locations where Internet access is difficult or unavailable.

The Rhode Island DOT's Safety Office has recently acquired and distributed a CD on safety training created by the American Road and Transportation Builders Association (ARTBA), OSHA, and the U.S. Department of Labor.

ARTBA offers training CD-ROMs developed with the National Safety Council, designed for roadway construction workers and focused on the hazards and situations they face on a daily basis. The CD-ROM training package meets OSHA's requirements for 10-hour accreditation. It includes a detailed instructor manual with notes and interactive student activities; photos, video clips, diagrams, and text in PowerPoint format; and one student guide. The cost of the package is $395.

J. J. Keller & Associates has a CD-ROM training package on OSHA's Hazardous Waste Operations and Emergency Response emergency response for hazmat operations. The package contains four courses and costs $1,595.

BLR® (Business & Legal Resources, http://store.blr.com/index.php) helps U.S. businesses comply with state and federal training requirements in safety, environmental, HR, and related topics. It offers training for both supervisors and employees.

Train-the-Trainer

TTT is especially useful to train large numbers of personnel in a relatively short period. Ten of the 25 state DOT respondents in the screening survey use TTT.

In the first rollout of its NIMS/ICS training, the Arizona DOT trained 10 instructors to teach Introduction to ICS and Introduction to NIMS to district personnel in a classroom setting. Both are now available in the FEMA ISP catalog as self-paced online training, as IS-100 (Introduction to ICS) and IS-700 (Introduction to NIMS). Online versions of

48

these courses have made the training accessible to ADOT personnel. ADOT has nine district offices with more than 4,600 employees; it would have been challenging to schedule and pay for all the employees to attend the courses at a single location.

The Iowa DOT also used TTT for the IS-100 and IS-200 (ICS for Single Resources) courses. The courses were provided to district office and DMV enforcement trainers, who then trained more than 1,600 personnel over the course of a year. Trainers and field personnel trainees attained a high level of interaction. A variety of scenarios were developed, and breakout teams were established in each class to respond to each of the scenarios.

The Tennessee DOT relies heavily on TTT to meet its emergency training needs. The emergency services coordinator at the main office holds training sessions for trainers at each of TDOT's four regions. The coordinator identifies and schedules adjunct instructors to deliver TTT sessions for specific topics when necessary, and TTT is used to deliver IS-100, IS-200, ICS-700, IS-800, radio communications, and traffic incident management training.

One state DOT noted that it has had limited success with TTT because its field staff do not have sufficient time to deliver complex and time-consuming courses such as Intermediate ICS (ICS-300) or Advanced ICS (ICS-400). However, this DOT has used the method for simple training (e.g., training on two-way radios) and task-based training.

SHRP 2's National Traffic Incident Management Responder Training includes a multidisciplinary training course on TIM and a TTT course. The objective of the TTT program is to train a set of trainers in a region or state according to common practices and standards. TTT training includes interactive seminars, case example analysis, role playing, and field practicums (supervised practical applications of training content) that focus on the safety of responders and drivers, quick clearance, and effective communications.

The TSA First Observer™ program offered a 110- to 140-minute TTT course that was taken by many highway field personnel. They were trained to observe, assess, and report suspicious activities on roadways and highways, including activities surrounding critical infrastructure, and to identify and report suspicious individuals, vehicles, packages, and objects. First Observer modules have been unavailable online from the expiration of the grant funding at the end of 2012 through November 2014. The modules are again available online. The online program will remain functional while TSA develops a fully revised First Observer program that will be introduced in the near future (TSA First Observer project manager, personal communication, June 2, 2014).

Planned Events, Incidents, and Exercises

Planned events, incidents, and exercises provide an excellent opportunity for field personnel to practice what they have learned. Minor incidents such as traffic accidents occur frequently and can provide opportunities for field personnel to practice NIMS/ICS and emergency response. After-action reviews and hot washes from planned and actual events and exercises can provide useful training material and scenarios for the development of future exercises.

The Missouri DOT has several major incidents a year and views them as the best opportunities for field personnel to practice what they have learned in their training. In fact, MoDOT uses the number of exercises in which their personnel have participated in a performance metric.

The Washington DOT also uses lessons learned from incidents as the basis for exercise development and exercises as the basis for training development. For instance, the 50-vehicle pileup on Snoqualmie Pass that occurred on February 28, 2007, was used as the basis for the creation of a tabletop exercise. WSDOT field personnel participated in the exercise, which was held in May 2007.

Computer Simulations

Use of computer simulations and virtual training and exercises go beyond online training. They typically immerse participants in realistic environments created through the computer and enable participants to interact in real time with each other.

While computer simulations and virtual exercises have not traditionally been used to deliver training to field personnel, there have been advancements in virtual technologies, and virtual training and exercise opportunities are now becoming available. Adoption of this technology is not yet common, for reasons unique to each agency. For example, one state DOT considered the development of interactive computerized emergency training and exercises but ultimately found them to be cost-prohibitive. However, other state DOTs are considering the use of virtual training and exercise tools at their agencies.

3-D Virtual Incident Management Training for First Responders

The I-95 Corridor Coalition's three-dimensional, multiplayer computer gaming simulation technology (www.i95vim.com) complies with federal incident management program goals and teachings and provides scenario-based, interactive, and real-time incident management training (Virtual Incident Management Training, I-95 Corridor Coalition n.d.). The technology can also assist in the testing, validation, and dissemination of best practices.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

49

Because responders are exposed to peers from different agencies and can discuss issues and solutions with them, the expectation is that their real-world performance will be enhanced.

The June 2012 virtual training had 190 attendees across 14 sessions in the following locales: Hanover, Maryland; Hawthorne, New York; Atlanta, Georgia; Newark, New Jersey; Hamilton, New Jersey; Middletown, Connecticut; and Cheetowaga, New York ("3-D Virtual Incident Management Training for First Responders: Attendee Snapshot, June 2012," I-95 Corridor Coalition 2012). Many of the participants were state DOT personnel involved in emergency highway operations. The breakdown of attendees demonstrates the multijurisdictional nature of the training:

- Transportation agencies: 46.3%
- Police: 17.4%
- Fire: 14.2%
- EMSs: 5.3%
- Towing companies: 8.9%
- Cities/metropolitan planning organizations: 6.8%
- FHWA: 1.1%.

The evaluations provided by the participants were very positive:

- 99% of attendees were "very satisfied" or "satisfied" with the instructor's knowledge and encouragement of questions and discussion.
- 96% of attendees were "very satisfied" or "satisfied" with the 3-D virtual world as a useful training environment.
- 96% of attendees were "very satisfied" or "satisfied" with the overall course.

("3-D Virtual Incident Management Training for First Responders: Attendee Snapshot, June 2012," I-95 Corridor Coalition 2012)

The delivery model for the Virtual Incident Management Training has changed from a multistation delivery to installation in computer facilities at member agencies so that each agency can deliver the training. The software is free for any agency in the 16 I-95 Corridor Coalition states from Maine to Florida. Because of the licensing agreement, the software is not available to a noncoalition states (T. Martin, personal communication, July 3, 2013). Screenshots from the training are shown in Figures 8 and 9.

The I-95 Corridor Coalition uses the same platform (www.i95vim.com) to host the Virtual Incident Management Core Competencies Online Training course. This 1-hour virtual course is one of the modules from the virtual training. It is online and asynchronous, available on demand to the public, and requires Internet access. This course covers scene safety and traffic management core competencies, and uses instructional videos followed by quizzes.

FIGURE 8 Virtual Incident Management Training Screenshot 1 (*Courtesy*: I-95 Corridor Coalition).

FIGURE 9 Virtual Incident Management Training Screenshot 2 (*Courtesy*: I-95 Corridor Coalition).

ON-line eXercise System

ONX is a web-based system that can implement tabletop, functional, and full-scale exercises using the Internet. The online disaster training focuses on communities and disaster professionals. The system was created by the Disaster Resistant Communities Group (DRC Group) LLC and assists in the "development, facilitation and evaluation of tabletop, functional, and full-scale exercises that are compliant with Homeland Security Exercise and Evaluation Program (HSEEP) guidelines" (www.onxsystem.com, "Welcome to the ONX System," DRC Group n.d.). Two virtual exercises involving volunteer communities across the United States have been held: Resilient Response for Floods—A Readiness and Response Exercise (March 21, 2013) and Resilient Response for Hurricanes—A Readiness and Response Exercise (May 23, 2013). These exercises were part of the nationwide 2013 Disaster Preparedness Virtual Exercise series created by the HandsOn Network and Points of Light organizations to increase the disaster preparedness of communities ("Resilient Response," DRC Group 2013).

Virtual Tabletop Exercise Program

FEMA's Emergency Management Institute (EMI) has developed a series of 12 virtual tabletop exercises (VTTXs)

50

focused on disaster training; they are offered monthly. The VTTX program was launched in September 2012 as an initiative to leverage technology and reach a large training audience. Participants receive a certificate of completion from the EMI. State DOTs and local PW agencies have participated in these exercises. The VTTX is designed for a community-based group of 10 or more representatives from a local emergency management community of practice (T. Wheeler, FEMA EMI, personal communication, April 16, 2013).

Transportation Emergency Response Application

The Transportation Emergency Response Application (TERA) is a free, web-based exercise system for emergency management professionals in the transportation, transit, rail, and airport domains. TERA achieves NRF goals and is compliant with NIMS/ICS and HSEEP. It is a transportation-specific version of the Emergency Management Staff Trainer, an automated, functional exercise simulation system capable of providing on-demand emergency response training and exercises for various levels of learning. It immerses participants in realistic emergency scenarios and provides role-specific exercise opportunities for a single person, a team, or multiple agencies working together. It can facilitate communication, coordination, and standard operating procedures. TERA was initially focused on transit scenarios. The scenarios and a prototype system were developed and field-tested under Transit Cooperative Research Program (TCRP) Project A-36, Command-Level Decision Making for Transit Emergency Managers. The transit scenarios included flood, hurricane, earthquake, power outage, hazardous materials, and active shooter. TERA was modified and expanded with supplemental funding from NCHRP to include state DOT roles. The initial expansion started with the flood scenario and included training. Scenarios can be customized to reflect individual agency and geographic characteristics. Emergency management professionals can register to use TERA at www.tera.train-emst.com. Additional information regarding TERA and the A-36 project can be found in *TCRP Web-Only Document 60/NCHRP Web-Only Document 200,* available online at: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_w60.pdf.

Classroom Training

Classroom training provides personnel with varying degrees of interactive training. Trainees in different locations can be patched into the classroom using technologies such as VTC, VoIP, and CCTV. Classroom courses are delivered in-house through the state EMA, local or state police department or academy, or local or state fire department or academy. Nineteen of the 25 state DOT respondents to the screening survey indicated that they use classroom training.

- The Arizona Division of Emergency Management provides emergency management classroom training to ADOT field personnel. ADOT also uses Texas A&M for emergency classroom training.
- Caltrans provides classroom training at its Maintenance Training Academy to new and existing maintenance personnel. The training includes SEMS and NIMS/ICS training.
- Plant City, Florida, uses the LTAP Center at the University of South Florida and the Public Works Academy for hazards awareness, hazmat, emergency management, and safety training.
- Rhode Island's state EMA provides, at its facilities, NIMS and ICS training to Rhode Island DOT field personnel. The Rhode Island DOT also partners with the University of Rhode Island Transportation Center to deliver classroom training to its field personnel.
- All of TDOT's field personnel are required to take IS-100 (Introduction to ICS) and IS-700 (Introduction to NIMS). While the courses are generally taken online, if a TDOT region prefers the classroom method, IS-100 and IS-700 can be delivered in that format. Supervisors are required to take IS-200 (ICS for Single Resources) and IS-800 (Introduction to the NRF) delivered in a classroom format. Managers are required to take ICS-300 (Intermediate ICS) and ICS-400 (Advanced ICS), also delivered through classroom training.

The screening survey responses revealed that the state DOTs were using the following instructor-led classroom training resources:

- FEMA Center for Domestic Preparedness
- FEMA Emergency Management Institute
- FHWA National Highway Institute
- FTA National Transit Institute
- FEMA National Training and Education Division
- LTAP/TTAP centers
- Universities or colleges.

The responses were distributed evenly among these resources.

Online Training with Live Instructors

Webinars are one example of online training with live instructors. With a computer and Internet access, it can be relatively easy to attend and participate in a webinar or any type of online training. One drawback is that because the instructors are live, the training needs to be scheduled at fixed times and therefore may cause scheduling difficulties for field personnel. Ten of the 25 state DOT respondents indicated that they use webinars.

Another example of online training with live instructors is BLR® (Business & Legal Resources, http://store.blr.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

51

com/index.php), which helps U.S. businesses comply with state and federal training requirements in safety, environmental, HR, and related topics. It offers training for both supervisors and employees. BLR offers online training courses that include training presentations, notes for instructors, and quizzes in topics such as safety management procedures, workplace safety, hazard communication, and forklift operator safety. The administration area enables the following:

- Generation of e-mail invitations for employee training.
- Tracking of training sessions and employee quiz scores.
- Secure, permanent record keeping for compliance purposes.

ADDITIONAL FINDINGS

Peer-to-Peer Training

The FHWA Peer-to-Peer (P2P) program provides short-term technical assistance including training and education on traffic incident management/planned special event (TIM/PSE) planning, procurement, deployment, and operations. Eligible agencies include state DOTs, local DOTs, law enforcement, emergency and public safety organizations, metropolitan planning organizations, towing and recovery groups, turnpike and tollway authorities, motor carrier offices, and transportation management agencies. Knowledgeable peers train and share information on TIM/PSE practices and experiences, including solutions to coordination, communication, response, and traffic management challenges.

Field Training

Onsite field training would provide interactive training to field personnel, eliminating the costs and time involved in traveling to another location. This type of training is being developed by the Mineta Transportation Institute (for Caltrans. The focus of the course is on operationalizing ICS among field personnel and their supervisors. In order to train all field personnel, MTI trainers would train field supervisors, who would in turn train field personnel. The course is expected to take 3.5 to 4 hours, and up to 15 percent of the field personnel can take it at the same time.

In-House Training

Larger state DOTs are more likely to have dedicated in-house trainers. For example, Caltrans has a Maintenance Training Academy near its headquarters in Sacramento that is dedicated to the training of personnel. The academy has 9 to 10 full-time trainers and support personnel, and provides new employees with a 2-week training program that incorporates a pre- and posttest to evaluate their learning.

Some state DOTs have learning or training centers that contain classrooms and Internet-enabled computers. A 4-hour Homeland Security course required of all TxDOT personnel, including field personnel, is provided through the TxDOT Learning Center.

Security awareness programs have been successful in reaching large numbers of frontline transportation and transit employees, and members of the public as well. TSA's Highway Watch program began in 2003 to recruit and train highway workers to spot unusual activities and report them to a central information sharing and analysis center. In 2009, the program evolved into the First Observer program, described earlier.

FTA's Transit Watch was initiated in 2003 as a national public awareness and outreach campaign. The initial toolkit allowed transit agencies to select the materials most appropriate for their communities and adapt them as needed. FTA and DHS enhanced the original toolkit in 2006, adding supplemental information; the enhanced toolkit contains the transit evacuation "Listen, Look, Leave" campaign; the unattended items "Be Alert" and "Is This Yours?" campaigns; a 5-step strategy for linking Transit Watch and Citizen Corps; and a Spanish language translation of the original Transit Watch campaign. The toolkit is being disseminated as a downloadable CD and is available through the FTA website. These programs show that providing agencies with alternative ways to deliver training can facilitate training implementation ("Transit Watch," FTA n.d.).

Professional Organizations and Certifications

Field personnel are often members of professional organizations such as APWA, IMSA, ARTBA, and the American Traffic Safety Services Association (ATSSA), which offer certification and training opportunities. AASHTO's Transportation Curriculum Coordination Council (TCCC) offers free online training developed through an identification of competency gaps for transportation personnel. Certifications may also be issued by colleges and universities, and by vendors. These programs can help field personnel advance in their careers and can motivate them to obtain emergency training voluntarily. Although certifications are not the same as professional licenses, which are issued by government agencies, they provide evidence that an individual is qualified to perform certain jobs and job functions. Certifications can be particularly useful in verifying the qualifications of contractors, because they do not operate under supervision as agency employees do.

Agencies may require workers and contractors to have specific certification or specific assessment-based certificates in various topics related to their duties, based on federal, state, or local requirements or the agency's own requirements. Some agencies pay for these certifications and certificates, while others place this burden on the employee or contractor. Typically, professional or personnel certifica-

52

tion programs provide recognition and the use of a credential for a limited period, and require renewal on a regular basis. The renewal process may involve continuing education or other types of learning. While a professional or personnel certification program is independent of any specific classes, courses, or providers, an assessment-based certificate program requires a person to take a particular course or series of courses and pass an exam based on the knowledge gained. The differences between professional or personnel certification programs and assessment-based certification programs are described at length in Knapp and Kendzel (2009).

American Public Works Association

The American Public Works Association (www.apwa.net) includes individuals, agencies, and corporations from local, county, state/province, and federal agencies, and the private sector. APWA expert resources in disaster management are extensive; association members can log onto the Peer Resource Directory to consult this network of disaster management subject matter experts ("Opportunities to Participate," APWA n.d.).

APWA issues the following certifications to its members who are employed by PW agencies and meet eligibility criteria ("Certification," APWA n.d.):

- The Certified Public Fleet Professional is intended for fleet professionals who supervise, manage, oversee, or administer fleet services within or for a public fleet entity.
- The Certified Public Infrastructure Inspector is intended for persons who inspect the construction of public infrastructure (e.g., roadways, highways, utilities, bridges, dams), facilities (e.g., pump stations, treatment plants, water storage facilities), and other types of construction work and materials to ensure compliance with plans and specifications.
- The Certified Stormwater Manager is intended for experts in the public and private sectors who coordinate and implement stormwater management programs for city, county, state, provincial, and federal agencies. These people assist in administering drainage, flood control, and water quality programs.

APWA also has an accreditation program for PW agencies, divisions, or special districts that complete a voluntary, objective compliance with the recommended practices set forth in the Public Management Practices Manual ("Accreditation and Self-Assessment," APWA n.d.). The objectives of the program are to

- Create impetus for organizational self-improvement and stimulate a general raising of standards for the department.
- Offer a voluntary evaluation and educational program developed by and for a public works agency rather than a government-regulated activity.

- Improve public works performance and the provision of services.
- Recognize good performance and provide motivation to maintain and continuously improve and maintain performance.
- Increase professionalism.
- Provide for succession planning.
- Instill pride among agency staff and local elected officials.

AASHTO Transportation Curriculum Coordination Council

AASHTO's Transportation Curriculum Coordination Council (TCCC, www.tccc.gov) seeks to "improve the quality of construction, rehabilitation and maintenance of the transportation infrastructure by increasing the knowledge and skills of the personnel who work in these disciplines." The TCCC has partnered with FHWA and NHI to provide state DOTs and PWs and the industry with free online courses that cover the range of competencies identified for various levels of transportation personnel in the following technical areas:

- Construction
- Employee development
- Maintenance
- Materials
- Pavement preservation
- Traffic and safety.

Competencies are defined as "observable, measurable actions to be performed" and are assigned to four skill levels starting at Level I (entry level) and progressing to Level IV (management and administrative level). All state DOTs—along with PWs, universities, and the private sector—have used this training resource ("Training Resources," TCCC n.d.).

International Municipal Signal Association

The International Municipal Signal Association (www.imsasafety.org) is "dedicated to providing quality certification programs for the safe installation, operation and maintenance of public safety systems; delivering value for members by providing the latest information and education in the industry" ("IMSA—International Municipal Signal Association" n.d.). IMSA offers education and certification programs in the following areas:

- Electronics in traffic signals
- Fiber optics for ITS
- Fire alarm monitoring
- Flagging and basic traffic control
- Interior fire alarm
- Microprocessors in traffic signals
- Municipal fire alarm
- Roadway lighting
- Signs and markings

- Telecommunicator/public safety dispatch
- Traffic signals
- Traffic signal inspection
- Work zone traffic control safety.

American Traffic Safety Services Association

The American Traffic Safety Services Association (www.atssa.com) is an international trade association representing companies and individuals in the traffic control and roadway safety industry. ATSSA also provides related resources, including a webpage with state training requirements ("State Training Requirements," ATSSA n.d.). ATSSA offers the following seven categories of certification:

- Traffic Control Technician
- Traffic Control Specialist
- Pavement Marking Technician
- Pavement Marking Specialist
- Traffic Control Design Specialist
- Flagger Instructor Training
- Certified Pedestrian Safety Professional.

American Road and Transportation Builders Association

The American Road and Transportation Builders Association (www.artba.org) is a national transportation-construction-related association that offers safety-related training and publications through its online store, including the following:

- OSHA 10-Hour Training: This course addresses 12 key construction-work-zone-related safety and health topics. It is appropriate for workers, supervisors, owners, and safety managers.
- *The OSHA Answer Book:* This publication contains all of OSHA's general industry regulations and explanations of the Injury and Illness Prevention Program.
- Safety Video Three-Pack: This three-pack includes the safety videos *Avoiding Runovers & Backovers, Playing It Safe with PPE* (*Personal Protective Equipment*), and *Flagging Fundamentals.*

Other Training

State DOTs and PWs provide their field personnel with new employee training and orientation. Incorporating emergency training sessions into these established programs can alleviate scheduling difficulties and ensure that new hires receive required training.

Personal and family preparedness, an aspect of continuity of operations, is an important topic, as there have been instances in which responders have returned home to tend to their families during a disaster or emergency. By preparing employees and their families for emergency situations,

agencies can ensure that their workers will not be overly distracted and will be able to focus on the emergency itself (Edwards and Goodrich 2011, p. 14).

FINDINGS ON THE USE OF EXERCISES

Exercises are very useful in providing personnel with opportunities to practice what they have learned. Exercises provide information and insights about plans, processes, practices, and training needs; and provide information for the creation of improvement plans. Hot washes and after-action reports are formal HSEEP mechanisms designed to solicit and gather this information.

The participation level of M&O field personnel in exercises varies from state to state. The case example participating agencies and information obtained from the screening survey suggest that while it is impractical for a high percentage of field personnel in any one district to attend an exercise at any one time, state DOTs do encourage their field personnel to participate in exercises when feasible. Some state DOTs indicated that not many of their field personnel are able to do so. As noted earlier, other agencies often take the lead in organizing exercises and may not always view state DOTs and PWs as equal emergency management partners, making it difficult to schedule exercises on dates and locations convenient to their field personnel. Emergency preparedness exercise requirements for nuclear power plant operators and state and local governments related to nuclear facilities are determined by the Nuclear Regulatory Commission and FEMA. State DOT and PW personnel within the vicinity of a nuclear facility may be required to participate in these exercises.

For example, New Hampshire's nuclear power plant, Seabrook Station, is located in Rockingham County and has a 10-mile Emergency Planning Zone (EPZ). Seventeen towns in the county and six Massachusetts towns are within the Seabrook EPZ. The New Hampshire communities have emergency response plans that include their local highway agencies and state DOT districts. The plans are developed with assistance from the state EMA and input from stakeholders. The communities hold a series of about three exercises involving these plants every other year; these exercises lead up to a graded exercise led by New Hampshire Homeland Security and Emergency Management. New Hampshire also has five towns in Cheshire County that are located in the EPZ for a nuclear power plant in Vernon, Vermont. The communities and highway agencies participate in a similar exercise program (K. DesRoches, Community College System of New Hampshire, personal communication, May 3, 2013).

The screening survey includes a question on the extent of M&O field personnel participation in exercises. The results are presented in Table 31. More than half of the state DOTs

54

responding to this question (11 of 21) reported that M&O field personnel are required to participate in full-scale exercises; 9 of 21 state DOTs reported that they are required to participate in functional exercises. In addition, 7 of 20 state DOTs reported required participation in drills, 9 of 21 in TTXs, 6 of 20 in workshops, and 6 of 19 in seminars.

TABLE 31

STATE DOT FIELD PERSONNEL PARTICIPATION IN EXERCISES (BY EXERCISE TYPE)

Exercise Type	M&O Field Personnel Do Not Participate	Required	Voluntary	Total Responses
Full-scale exercises	6	11	4	21
Functional exercises	5	9	7	21
Drills	5	7	8	20
Table-top exercises	6	9	6	21
Workshops on emergency operations and/or hazards awareness	5	6	9	20
Seminars on emergency operations and/or hazards awareness	4	6	9	19

The Missouri DOT's philosophy is to participate in as many state and local exercises as possible. MoDOT has a performance measure for involvement in emergency and disaster response that tracks involvement of its personnel in exercises; about 10 percent of the DOT's field personnel are able to participate. MoDOT also treats actual incidents as learning opportunities for its field personnel.

The Arizona DOT's M&O management encourages its districts to hold exercises and to participate in local drills, TTXs, workshops, FEs, and FSEs as available; and to use statewide FSE results to develop TTXs for district field personnel. ADOT noted that, at any one time, participation levels cannot be a high percentage of the field personnel owing to the nature of their work responsibilities.

At the Texas DOT, most district-level emergency response personnel, including the emergency management coordinator, participate in exercises (FSEs, FEs, drills, TTXs, seminars, and workshops) held throughout the state. The Tennessee DOT organized one FSE a year for its field personnel from 2011 to 2013. About 15 percent of its field personnel participated.

The Illinois DOT conducts annual exercises (TTXs, FEs, and FSEs) on its plans—evacuation plan, earthquake plan, and other emergency operations plans—in which field

personnel participate. The plans are adjusted based on the results of the exercises. The percentage of participating field personnel varies by worker category and across the DOT's nine districts: approximately 75 percent to 80 percent of the operations engineers, field engineers, field technicians, lead/lead workers, and lead workers participate in these exercises, and 35 percent to 50 percent of highway maintainers participate in the FSEs (T. Korty, Illinois DOT, personal communication, Sept. 18, 2013).

At WSDOT, the Exercise Planning Teams design, develop, conduct, and evaluate exercises and are comprised of the Emergency Management Working Group, Office of Emergency Management, and relevant regions, areas, and divisions. The Team "is the backbone of exercises and a high level of interest, cooperation and commitment by the members will be the difference between a successful and unsuccessful exercise. (WSDOT 2011, Appendix C). WSDOT's EOP states that the agency will conduct a minimum of one FSE a year; however, if there is an activation, the requirement can be waived. The office/region/district may organize some exercises while the WSDOT Office of Emergency Management may organize others. WSDOT participates in collaborative exercises with other entities including other states, local jurisdictions, FEMA, and the U.S. Coast Guard (though not many field personnel are able to participate in these exercises). The WSDOT Emergency Management Working Group with oversight from the WSDOT Office of Emergency Management determines which WSDOT personnel must attend the exercises.

Other state DOTs participate in exercises conducted by other entities—usually their state EMAs—and send a portion of their field personnel to these exercises. For instance, the Ohio DOT participates in exercises required by its state EMA. WSDOT states that exercises "had a substantial impact on improving performance during an actual emergency" and also notes that exercises provide a way to inform and educate the public, news media, and the community (WSDOT 2011, Appendix C).

Discussion-Based Exercises

Discussion-based exercises were discussed in detail in chapter three. This section presents findings related to the participation of case example state DOT M&O field personnel in discussion-based exercises.

Tabletop Exercises

The Iowa DOT plans three or four regional TTXs a year. In the spring of 2013, two regional TTXs were held with 50–60 persons attending each. Participants included both state DOT personnel and the state patrol. The TTXs focused on winter weather with multiple crashes and included scenarios on communications and resource movement. A future exer-

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

55

cise will focus on flooding. In the future these exercises may be converted into functional exercises.

The New Hampshire LTAP Center provided interactive TTXs to personnel. Several training scenarios had been created for training purposes, but additional scenarios were desired. Other agencies were interested in the type of training New Hampshire had been providing and expressed similar concerns and interests (K. DesRoches, personal communication, Oct. 23, 2012).

The Arizona DOT's districts hold TTXs that relate to ADOT's statewide exercises. For instance, in 2012, each of ADOT's districts held a TTX focusing on the improvised explosive device scenario that had been the focus of ADOT's 2011 statewide exercise. Half of the Missouri DOT's exercises are TTXs, and field personnel from MoDOT's district offices participate in these exercises.

The Washington DOT developed a TTX based on an actual incident, a 50-vehicle pileup that occurred at Snoqualmie Pass in 2007. The TTX scenario involves severe winter weather causing whiteout conditions. A semi spins out of control on the I-90 and, within minutes, 57 vehicles are involved in the crash and the entire roadway is blocked. The exercise sought to test communications, transportation response capabilities to clear the roadway and assist stranded drivers, and public notification.

The I-STEP Highway and Motor Carrier AASHTO Peer Exchange Tabletop Exercise, which took place at the 2012 Transportation Hazards and Security Summit and Peer Exchange, highlighted regional prevention, protection, and response practices. The TTX scenario consisted of a terrorist attack against critical infrastructure and an attack against a critical bridge coinciding with a natural disaster. The participants were primarily state DOT representatives, but the exercise was not targeted toward field personnel.

Workshops and Seminars

At the Texas DOT, most district-level emergency response providers participate in various workshops and seminars held throughout the state. For instance, TxDOT provides annual hurricane training in the form of a workshop. The 2013 day-long workshop was held on April 23, 2013; it covered evacuation, re-entry, cleanup, and response techniques. Protocols concerning the suspension of construction schedules were presented, and radio communications and interoperability issues were discussed. Debris and environmental contracts, issues related to the Moving Ahead for Progress in the 21st Century Act (MAP-21), and FWHA Emergency Relief and FEMA Public Assistance reimbursement issues were also covered. Data input needs for the Maintenance Management System were discussed, and volunteer management guidance was provided. Typically, 90–100 TxDOT personnel partici-

pate in the workshops. Key district staff members, including district engineers and M&O directors, are in attendance.

Field personnel from the Vermont Agency of Transportation typically attend six discussion-based exercises (seminars or workshops) a year. The seminars are on hazards and threats pertinent to Vermont and to VTrans facilities, and are held in various locations and venues.

Operations-Based Exercises

Operations-based exercises (drills, FEs, and FSEs) were discussed in detail in chapter three. This section presents findings related to the participation of field personnel in operations-based exercises.

Drills

State DOTs and PWs use drills to provide their field personnel with hands-on experience on specific functions/processes, equipment and technologies. Drills are typically held at the local or regional level. For instance, Arizona, Tennessee, and Texas DOTs hold local or district level drills on specific functions and equipment.

- Arizona DOT and VTrans noted that their personnel undergo drills in radiological response.
- WSDOT holds drills to "practice and perfect one small part of the response plan and help prepare for more extensive exercises, in which several functions will be coordinated and tested." Who must attend is determined by the WSDOT Emergency Management Working Group with oversight from the WSDOT Office of Emergency Management.

Functional Exercises

The Iowa DOT plans and holds three to four regional TTXs per year. In the future, these may be converted into FEs. Half of the Missouri DOT's exercises are FEs; typically, 10 percent or more of the field personnel are involved in these exercises. Scenarios have included earthquakes; severe weather, including snow, ice, and tornados; and situations involving nuclear power plants and terrorism.

Full-Scale Exercises

At TxDOT, most district-level emergency response personnel, including the emergency management coordinator, participate in exercises (FSEs, FEs, drills, TTXs, seminars, and workshops) held throughout the state. TxDOT organizes and hosts at least one FSE each year. These exercises typically focus on contraflow evacuation. In 2012, TxDOT, the Texas Department of Public Safety, the fire marshal, and local law enforcement agencies participated in a contraflow exercise spanning a section of I-37 from Corpus Christi to San Antonio (Figures 10

and 11). Personnel and equipment were mobilized at each ramp, although the ramps remained open to traffic. This process was timed and evaluated. The 2013 exercise was held in Houston on May 29, 2013; it was a larger contraflow exercise and involved sections of I-10 and I-45. More districts and a larger number of field personnel participated in this exercise.

FIGURE 10 2012 Texas DOT Contraflow Evacuation Exercise (*Courtesy*: TxDOT).

FIGURE 11 2012 Texas DOT Contraflow Evacuation Exercise—Cable barrier removal (*Courtesy*: TxDOT).

The Tennessee DOT organized one FSE a year for its field personnel from 2011 through 2013. About 15 percent of its field personnel participated in each exercise. Districts hold drills for field personnel on various pieces of equipment, such as snowplows, chainsaws, and salt trucks. Field personnel also participate in numerous exercises held by other agencies and organizations. Because the state has accepted TDOT personnel as emergency responders, TDOT is generally invited to participate in 20–30 exercises held by different entities in different jurisdictions.

Currently, 10 percent of the Rhode Island DOT's field personnel participate in FSEs organized by the state EMA. This level of participation is expected to continue. In Vermont, all VTrans field personnel undergo 4- to 5-day FSEs on hurricanes and weapons of mass destruction organized by the state's Emergency Operations Center. MoDOT participates in at least one multiagency FSE (hosted by another agency) per year. ADOT included M&O, emergency preparedness and management, and communications personnel in a 2011 statewide exercise on an improvised explosive device explosion.

TSA's Intermodal Security Training Exercise Program (I-STEP) offers transportation security exercises, services, and tools to transportation modal operators including state DOTs. The I-STEP tools include TTX and FE exercise design, evaluation, and tracking software. Support services run the gamut from scenario development to development of exercise evaluation guides. TSA recently introduced the Exercise Information System to provide transportation industry stakeholders with scenarios and objectives. The Exercise Evaluation System tool helps evaluators document exercise results and provide immediate feedback to participants, and the Evaluation Director tool can integrate multiple evaluations into an after-action report ("Intermodal Security Training Exercise Program," TSA n.d.).

Exercise Evaluation

The Homeland Security Exercise and Evaluation Program is "a set of guiding principles for exercise programs, as well as a common approach to exercise program management, design and development, conduct, evaluation, and improvement planning" (HSEEP 2013). State EMAs follow HSEEP guidance in designing and evaluating their exercises. In general, state DOT case example participants who develop exercises said they follow this guidance. One state DOT uses HSEEP Exercise Evaluation Guides for large exercises, but it uses less in-depth evaluations and metrics to evaluate smaller exercises. The focus of these evaluations is on comparing player actions with the objectives.

Exercise Scenarios

Scenarios are used in both discussion-based and operations-based exercises. They help participants focus on hypothetical but realistic situations and enhance their critical

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

57

thinking abilities by encouraging them to consider the various response options, risk factors, safety issues, and coordination activities that should be implemented. State DOTs that develop their own exercises usually select all-hazards scenarios or those that focus on hazards and challenges their personnel might actually face.

In choosing scenarios, ADOT selects those with an all-hazards perspective. For instance, some scenarios have been functional—focusing on communications, organization, and so on. ADOT also uses hazard-specific scenarios such as wildfire, hazmat, traffic, terrorism, and power outage.

The Iowa DOT holds three to four TTXs each year. For these exercises, winter weather has been a focus of the scenarios, and flooding is planned as a scenario in a future exercise. All-hazards scenarios including communications and resource movement are also included in the exercises.

MoDOT varies its scenarios to provide training on a wide range of possible disasters and emergencies, including earthquakes, severe weather (snow, ice, tornadoes), nuclear power plant scenarios, and terrorism. TxDOT focuses on contraflow evacuations for its annual exercises.

In Tennessee, each TDOT region faces different hazards, a situation that dictates hazard-specific training and exercises. Eastern Tennessee has two nuclear power plants, four other nuclear facilities, and snowstorms, while western Tennessee has earthquakes and flooding. The midstate area has floods and tornadoes. Flood, rain, and seismic events are of most concern with respect to highway bridges. Of TDOT's 820 scour-critical bridges, 75 percent are in western Tennessee.

WSDOT uses the building block approach to training and exercises, and selects specific hazards (e.g., earthquake, fire, tsunami, dam failure, volcanic debris flow, winter storms) applicable to its state and regions. Needs assessment results are also used to create the scenarios. It should be noted that only a small percentage of WSDOT field personnel are actually able to participate in these exercises.

Table 32 summarizes the exercise scenarios used by state DOTs that participated in the case examples and in the screening survey.

Training and Exercises for PWs

State DOTs typically do not pay public works personnel to undergo training and exercises, and do not provide training or exercises targeted toward them. However, some state DOTs are recognizing that PW agencies—which do not have a good understanding of the federal-aid process, federal reimbursement programs, and state DOT contracting procedures—encounter difficulties during disasters and emergencies. This situation can cause issues for the state DOTs that must admin-

ister the Emergency Relief program on behalf of FHWA or are trying to support PWs in repairing damaged facilities.

TABLE 32

SUMMARY OF EXERCISE SCENARIOS USED BY STATE DOTS

Implementation Issues
All-Hazards
Organization
Communications
Evacuation
Resource movement
Hazard-Specific
Dam failure
Earthquake
Flooding
Hurricane
Lahar
Nuclear
Power outage
Terrorism
Tornado
Traffic
Tsunami
Wildfire
Winter weather—snow, ice

One of the recommendations from the *Irene Innovation Task Force Report* was to clarify the role of VTrans in training key stakeholders (VTrans 2012, p. 15). As noted in the report, VTrans considers its towns to be key stakeholders, especially during disasters. Unfortunately, the towns were confused regarding eligibility criteria for the FEMA Public Assistance and FHWA Emergency Relief programs. In addition, many towns did not have an emergency response plan. Tom McArdle, assistant director of public works for Montpelier, notes in the report:

> Time elapsed before the . . . "kick-off" meetings were conducted and guidance for towns was disseminated. During this time period, many decisions about repairs (immediate needs & permanent) needed to be made. This is a time period when mistakes in procuring services can and often do occur. This can include decisions about whether to repair or rebuild a road or culvert, whether competitive bids for services are necessary or not, whether environmental permits must be secured, and under which circumstances. With a wide impact area, VTrans officials are spread thin and guidance is limited. . . . Periodic training (in public assistance) would be beneficial to conduct self-assessments in advance of the arrival of FEMA & FHWA disaster response teams so that funding of repairs is not jeopardized. (*Irene Innovation Task Force Report,* VTrans, 2012, p. 14)

NYSDOT noted that because of the scope of the Superstorm Sandy disaster, it is being forced to outsource aspects of the reimbursement process pertaining to processing

58

detailed damage incident reports (DDIRs) received from counties and locals.

Training and Exercises for Contractors

State DOTs typically do not pay for contractors to participate in emergency training and exercises. They expect that the contractors have acquired the necessary skills for their work and have completed any required training.

VTrans stated in its *Irene Innovation Task Force Report* that better trained contractors would be beneficial for future disasters (2012, p. 15). One of the report recommendations was to clarify the role of VTrans in training key stakeholders, including its own contractors (2012, p. 15). The report also stated that many contractors were not familiar with VTrans billing requirements (which caused delays in payments) and that some subcontractors were not familiar with VTrans safety regulations (which had safety implications) (2012, p. 15).

ADOT's hazmat contractors for routine and nonroutine response are required by state contract to take IS-100 and IS-700 training in addition to the appropriate hazmat training. Also, ADOT involves the contractors in training and exercises when appropriate; for example, ADOT trainers worked with a towing company to develop a hazmat scenario for a statewide exercise in November 2013. It should be noted that ADOT does not typically pay contractors to participate in training and exercises.

TDOT requires its contractors to have taken IS-100 and IS-700 and to have the appropriate equipment licenses. Contractors who are supervisors must have also taken IS-200 and IS-800. In addition, TDOT requires contractors to participate in TTXs and FEs.

Training and Exercises for Law Enforcement and Fire Departments

Some state DOTs provide training to law enforcement and fire departments; for example, ADOT holds meetings for local police and fire departments for its construction projects, and has held TTXs and workshops on how construction will affect access to the area or affect emergency traffic passing through the area.

CHAPTER FIVE

EMERGENCY TRAINING AND EXERCISES TOOLKIT

The purpose of the Emergency Training and Exercises Toolkit is to provide managers of state DOT and PW field personnel and in-house and external trainers with a wide range of all-hazards emergency training sources that encompass a variety of delivery methods. Practically all the resources in this toolkit are interactive to varying extents.

The chapter begins by describing the structure of the toolkit. It then presents several key courses and course catalogs that emerged in the literature review and through interviews as important basic elements in the training and exercise programs of case example participants. Guidance documents were also identified through the literature review, survey responses, and communications with panel members and case example participants.

The diversity of organizations (public, academic, and private) that provide training and exercise materials necessitates further discussion. The synthesis authors designate these organizations as *source organizations,* and the sheets of the toolkit that list courses and resources belonging to a specific organization are called *source-specific sheets.* The sheets follow a format that is specified in this chapter. The chapter also describes how to search for keywords over the entire toolkit and how to deal with toolkit hyperlinks that are no longer accessible. Such hyperlinks ("dead links") are inevitable as time passes and the websites of source organizations change.

Disclaimer on the currency of information in this toolkit. Any information on courses, catalogs, training resources, guidance documents, and organizations is subject to change. Prices of courses can change. Training resources, such as videos, can be modified or withdrawn. Guidance documents can be replaced or superseded. Organizations can become defunct as a result of a lack of funding. Therefore, the toolkit user is urged to follow up on any information either online or by phone, with qualified colleagues, or with representatives of the organizations to which the information pertains.

Disclaimer on user discretion in employing training resources. Exact roles and responsibilities of state DOTs and PW agencies vary greatly among jurisdictions. Toolkit users must determine whether a specific course, video, module, or other training resource is appropriate for their agency's M&O field personnel in their particular jurisdictions.

STRUCTURE OF THE TOOLKIT

The toolkit is in Excel spreadsheet format and is organized into the following sheets:

- START HERE—the orientation sheet for the 44-12 toolkit.
- Acronyms, Delivery Methods, and Key Courses and Catalogs—three lists for quick reference.
- Guide Docs—a list of guidance documents.
- Source Orgs—a list of organizations that are a source of training and exercises related to emergency operations and hazards awareness.
- Source-specific sheets—17 sheets for individual source organizations that offer numerous training and exercise materials.

START HERE

This sheet welcomes users and orients them to the 44-12 toolkit. It outlines the overall structure of the toolkit, providing hyperlinks to navigate quickly to other sheets. Three "Important Notes for Users" inform them about

1. The *currency of information* in the toolkit,

2. The *necessity of user discretion* in selecting and employing training resources, and

3. The importance of using the *most up-to-date* course catalogs and course information.

This sheet also provides search tips for two potential situations:

1. How to search if a hyperlink is a dead link.

2. How to search over the entire toolkit.

Quick Reference Sheets

Acronyms

The Acronyms sheet is an index of all acronyms used in this report and in the toolkit itself. Several acronyms that appear

60

in the toolkit are not used extensively in this report, thus necessitating the Acronyms sheet for quick reference.

Delivery Methods

The Delivery Methods sheet enumerates and defines all the delivery methods cited in the toolkit. Most of the definitions can be found in chapter 3 and the glossary of this synthesis.

Key Courses and Catalogs

The Key Courses and Catalogs sheet lists important courses and course catalogs related to emergency operations and hazards awareness. Courses and catalogs were chosen for inclusion in the toolkit based on the literature review, suggestions from members of the synthesis panel, and communications with case example participants. More information is available later in this chapter, in the Key Courses and Catalogs section.

Guidance Documents

The Guide Docs sheet lists several guidance documents identified by state DOTs and PW agencies that participated in the case examples and the survey. The survey responses and the case example participants helped augment the initial list of documents resulting from a literature search.

The following information is available for each document on the Guide Docs sheet:

- Publishing organization
- Title and reference
- Description (1–2 paragraphs)
- How to obtain/access content.

Source Organizations

The Source Orgs sheet lists the organizations that have been identified as sources of training and exercise materials related to emergency operations and hazards awareness. This report and the toolkit designate these organizations as source organizations.

For each source organization, the Source Orgs sheet provides the following information:

- General description—a description of the organization.
- Accessing training content—a discussion on how to access the organization's training and exercise resources, such as course catalogs, training material catalogs, exercise pages, and other training and exercise tools.
- Clickable links—hyperlinks to access the organization's main website and the resources presented in the Accessing Training Content column.

The source organizations are grouped into nine categories:

1. Federal (FEMA)
2. Federal (other DHS)
3. Federal (U.S.DOT)
4. Federal (other federal)
5. State
6. Local
7. University/college
8. Associations and coalitions
9. Private firm.

Source-Specific Sheets

Some of the source organizations identified in this synthesis had enough courses, videos, just-in-time training modules, and other training and exercise resources to fill an entire sheet in the toolkit. Thus, the toolkit includes 17 source-specific sheets. Each of these sheets lists a source organization's training and exercise resources, using the following information fields:

- Name/title of the course, video, module, or other training/exercise resource
- Delivery method—method by which training is delivered, such as instructor-led course, online course, video, and so on
- Topics covered (keywords)
- Description and objectives
- Time required to use the resource (e.g., to complete a course or watch a video)
- Source organization(s) that produced the resource
- Cost per participant (Note: This cost does not include the staff time required to use the resource; e.g., to take the class or watch the video)
- Target audience
- Miscellaneous notes
- Information on accessing content, descriptions, or syllabi related to this resource.

The toolkit includes the following delivery methods:

- Field crew meeting
- Just-in-time training
- Computer-based training without live instructors (e.g., self-study online courses)
- Video, either online or via physical media (e.g., DVD, VHS, or CD)

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

61

- Train-the-trainer
- Planned events, incidents, and exercises
- Computer-assisted simulation
- Classroom training and instructor-led courses
- Online training with live instructors.

(For more detailed information on these methods, see Chapter 3 of this synthesis.)

KEY COURSES AND CATALOGS

Key Courses

During interviews with representatives of the state DOTs and local PW agencies that participated as case examples, the following courses emerged as common elements in many of their training programs:

- IS-15.b: Special Events Contingency Planning for Public Safety Agencies
- IS-100: Introduction to the Incident Command System
- IS-200: ICS for Single Resources and Initial Action Incidents
- ICS-300: Intermediate ICS for Expanding Incidents
- ICS-400: Advanced ICS
- IS-552: The Public Works Role in Emergency Management
- IS-554: Emergency Planning for Public Works
- IS-556: Damage Assessment for Public Works
- IS-558: Public Works and Disaster Recovery
- IS-559: Local Damage Assessment
- IS-632: Introduction to Debris Operations
- IS-700: Introduction to the National Incident Management System
- IS-701.a: NIMS Multiagency Coordination System (MACS)
- IS-703.a: NIMS Resource Management
- IS-706: NIMS Intrastate Mutual Aid—An Introduction
- IS-800: Introduction to the National Response Framework
- SHRP 2 National Traffic Incident Management Responder Training.

The Key Courses and Catalogs sheet of the toolkit has the following information on these courses:

- Source organization(s)
- Name/title
- Description and objectives
- How to obtain/access content
- Topics covered (keywords)
- Delivery method
- Length
- Cost per participant
- Target audience
- Notes.

Descriptions of and access to the majority of these key courses can be found in the *NIMS Training Program* (FEMA 2011), the course catalog of the FEMA Independent Study Program, and the course catalog of the Emergency Management Institute.

Although these key courses are well established, they are all subject to being modified or even discontinued. In addition, a course provider might change the web page at which it currently hosts a key course, so the hyperlink provided in the toolkit would become outdated. In this case, users can take advantage of the other information provided about the course (e.g., the title or phrases from the description or objectives) to find the course's current location online. Users might find that the course has been discontinued, modified, or superseded by another course or training resource.

Key Course Catalogs

Survey responses and communications with the case example participants suggest that state DOTs and local PW agencies could meet the majority of their emergency training and exercise needs through courses in the following catalogs.

- *FEMA Independent Study Program Course List/ Catalog:* Federal Emergency Management Agency (FEMA), "Independent Study (IS) Course List," U.S. Department of Homeland Security, Washington, D.C., n.d. [Online]. Available: http://training.fema.gov/IS/ crslist.aspx.
- *FEMA Emergency Management Institute Course Catalog:* Federal Emergency Management Agency (FEMA), *EMI Training Catalog: Train, Exercise, Educate,* Emergency Management Institute, U.S. Department of Homeland Security, Washington, D.C., updated annually [Online]. Available: http://training. fema.gov/EMICourses/EMICatalog.asp.
- *National Highway Institute* (*NHI*) *Course Catalog:* National Highway Institute (NHI), "National Highway Institute: Search for Courses," Federal Highway Administration, U.S. Department of Transportation, Washington, D.C., n.d. [Online]. Available: http:// www.nhi.fhwa.dot.gov/training/course_search.aspx.

Two catalogs are available from the FEMA National Training and Education Division (NTED): the *National Training and Education Division Course Catalog and the State/Federal Sponsored Catalog.* Both catalogs are available at https://www.firstrespondertraining.gov/content. do?page=training. The former contains courses developed and delivered by NTED's training partners at no cost to the state or local jurisdiction, while the latter contains courses developed by various states and delivered with support from Homeland Security Grant Program funds. (FEMA, *National Training and Education Division Course Catalog,* National Preparedness Directorate, U.S. Department of Homeland

62

Security, Washington, D.C., updated monthly; FEMA, *State/Federal Sponsored Course Catalog,* National Training and Education Division, National Preparedness Directorate, U.S. Department of Homeland Security, Washington, D.C., updated monthly.)

For each of the key course catalogs, the toolkit provides the following information:

- Publishing organization
- Title and reference
- Description (1–2 paragraphs)
- How to obtain/access content.

Using the Most Up-to-Date Version of a Course Catalog

Users who are interested in any of the courses listed in the toolkit are advised to find the most recent version of the course provider's catalog, because all the key catalogs are updated continuously on at least an annual basis. These updates occur as courses are modified or discontinued, and as new courses are approved. To help users find updated catalogs, this chapter and the toolkit provide the full reference for key catalogs cited.

ACCESSING THE GUIDANCE DOCUMENTS

The guidance documents in the toolkit consist primarily of those identified by state DOTs and PW agencies that participated in the case examples and the survey, augmented by a literature search. Synthesis panel members suggested several additional guidance documents.

Accessing Guidance Documents

On the Guide Docs sheet, the documents are arranged in ascending alphabetical order by publishing organization and then by title and reference. The publishing organizations represented on the Guide Docs sheet include:

- Federal Emergency Management Agency
- Federal Highway Administration
- Occupational Safety and Health Administration
- Pipeline and Hazardous Materials Safety Administration
- Mineta Transportation Institute at San Jose State University
- Transportation Research Board
- U.S. Department of Health and Human Services
- U.S. Department of Homeland Security
- U.S. Nuclear Regulatory Commission.

Excel's Find function (Ctrl+F) can be used to search for keywords on the Guide Docs sheet. Many keywords are embedded in the one- to two-paragraph description of each guidance document.

Dealing with Dead Links to Guidance Documents

Each guidance document is accessible through a hyperlink in the field "How to obtain/access content." However, as time progresses after the publication of the toolkit, a document might be discontinued, withdrawn, or modified by the publishing organization, or superseded by a newer document. Even if the publishing organization has maintained the document, the host website or page might be discontinued, modified, or moved; the result is a dead link. In such cases, users can use reference information about the guidance document in a search engine to determine whether it still exists or has been discontinued or modified. The title and publishing organization or phrases from the description can be useful keywords for the search engine.

CATEGORIES OF SOURCE ORGANIZATIONS

While the majority of the entities whose training and exercise materials are included in the toolkit are from the federal government, the toolkit also includes public, academic, and even a few private sector entities. This synthesis collectively designates these entities as source organizations and locates all information on them on the Source Orgs sheet. After describing the categories, the synthesis authors present the layout of the sheet to facilitate access to the training and exercise materials of a source organization of interest. Finally, the authors list the criteria for a source organization to warrant its own sheet in the toolkit.

Descriptions of the Categories

Order of Categories and Organizations in Each Category

The Source Orgs sheet does not list categories alphabetically. It begins with four categories of federal sources: FEMA, DHS, U.S.DOT, and sources from other parts of the federal government. The order then roughly flows from state and local government sources, to academic ones, to nonprofits, and finally to private firms.

Within each category, the organizations are not necessarily listed alphabetically. In several categories, the ordering is roughly based on the literature review, survey respondents, panel members, and case examples. Generally, organizations that were mentioned in both the survey results and case example interviews are placed closer to the top of the list in each category. Organizations that were mentioned in one or the other, and those that were identified only through the literature review, are generally placed lower down in the list.

Federal (FEMA)

The sources in this category belong to FEMA itself or to a constituent division or agency within FEMA. These sources

were initially taken from survey responses, panel members, and the literature review. The investigation made clear that the Independent Study Program and the NIMS and ICS training programs are important elements in the training programs of several case example participants. Thus, those sources are first in this category.

- FEMA Independent Study (IS) Program
- FEMA NIMS Training Program
- FEMA ICS Training Program and Resource Center
- FEMA National Response Framework (NRF) Resources
- FEMA Emergency Management Institute (EMI)
- FEMA National Training and Education Division (FEMA NTED)
- FEMA National Fire Academy.

Federal (Other DHS)

The sources in this category belong to the Department of Homeland Security itself or to a constituent division or agency within DHS, or they are organizations that are closely associated with DHS. None of the sources in this category belong to FEMA.

- DHS Homeland Security Exercise and Evaluation Program (HSEEP)
- DHS Lessons Learned Information Sharing (LLIS)
- National Domestic Preparedness Consortium (NDPC)
- Center for Domestic Preparedness (CDP)
- Rural Domestic Preparedness Consortium (RDPC)
- First Observer™ (https://www.tsa.gov/firstobserver).

These sources were initially taken from survey responses, panel members, and the literature review. HSEEP)is at the top of the list because of its primary role in establishing the doctrines to be followed in emergency training and exercises. The HSEEP and LLIS resources belong directly to DHS. NDPC and RDPC are training partners of FEMA NTED while the CDP is a member of the NDPC.

Federal (U.S.DOT)

The sources in this category belong either directly to the U.S. Department of Transportation or to a division or agency within U.S.DOT. These sources were initially taken from survey responses, panel members, and the literature review. They were placed in the current order when the investigation made clear that the FHWA National Highway Institute and the SHRP 2 National Traffic Incident Management Responder Training are important elements in the training programs of several case example participants.

- FHWA National Highway Institute (NHI)
- SHRP 2 National Traffic Incident Management Responder Training
- U.S.DOT Research and Innovative Technology Administration Transportation Safety Institute

- FTA Transit Safety and Oversight, through the Volpe National Transportation Systems Center.

Federal (Other Federal)

The sources in this category belong to other parts of the federal government outside of DHS and U.S.DOT; specifically, the U.S. Department of Justice and the U.S. Department of Energy. These sources were taken from survey responses, panel members, and the literature review.

- Counter Terrorism Operations Support Program at the Nevada National Security Site
- IncidentCommander.net (Department of Justice, National Institute of Justice)
- Nationwide Suspicious Activity Reporting Initiative.

State

The source organizations in this category primarily belong to specific states. Several of them were identified in the survey responses, and the list was augmented by an online investigation of the DOTs and EMAs of the states that participated in the case examples. This investigation retrieved several training and exercise resources that the case example participants identified as useful for their particular state DOT.

The state organizations are listed in alphabetical order by the name of the state, but the category begins with two national sources for which the states are the intended audiences. The first national source is FEMA's online directory of State Offices and Agencies of Emergency Management, with useful phone numbers and web addresses; the second is the Emergency Management Assistance Compact website. The toolkit includes both of these sources.

- State Offices and Agencies of Emergency Management
- EMACWeb.org
- Arizona Department of Transportation (ADOT)
- Arizona Division of Emergency Management
- California Department of Transportation (Caltrans)
- California Specialized Training Institute
- Connecticut Interlocal Risk Management Agency/ Connecticut Conference of Municipalities (CIRMA/ CCM)
- Iowa Department of Transportation
- Iowa Homeland Security and Emergency Management Department
- Minnesota Division of Homeland Security and Emergency Management
- Missouri Department of Transportation (MoDOT)
- Missouri State Emergency Management Agency
- Ohio Emergency Management Agency
- Pennsylvania State Fire Academy

64

- Rhode Island Department of Transportation
- Rhode Island Emergency Management Agency
- Tennessee Department of Transportation (TDOT)
- Tennessee Emergency Management Agency (TEMA)
- Texas Department of Transportation (TxDOT)
- Texas Division of Emergency Management
- Vermont Agency of Transportation (VTrans)
- Vermont Division of Emergency Management and Homeland Security
- Vermont State Police Academy
- Washington State Department of Transportation (WSDOT)
- Washington Military Department Emergency Management Division.

Local

Two of the source organizations in this category are national programs intended for local audiences: Community Emergency Response Teams and the Local/Tribal Technical Assistance Program. The other two sources on this list refer to the two local PW agencies that are case example participants.

- Community Emergency Response Teams
- Local/Tribal Technical Assistance programs
- Keene, New Hampshire
- Plant City, Florida.

University/College

The source organizations in this category are associated with universities or colleges. They were identified by survey responses, panel members, and case example participants. Many of the organizations are members of the National Domestic Preparedness Consortium. The list is alphabetized by the name of the university rather than by the name of the source organization.

- National Center for Biomedical Research and Training at Louisiana State University Energetic Materials Research and Testing Center at New Mexico Tech
- Public Works Academy, offered by the Pinellas Technical Education Centers
- Center for Transportation Safety, Security and Risk at Rutgers University
- National Transit Institute (NTI) at Rutgers University
- Mineta Transportation Institute (MTI) at San Jose State University
- Texas Engineering Extension Service (TEEX) at Texas A&M University
- National Disaster Preparedness Training Center at the University of Hawaii University of Rhode Island Transportation Center and the Rhode Island Technology Transfer Center
- University of South Florida OSHA Training Institute.

Associations and Coalitions

The source organizations in this category include trade associations and regional coalitions identified by the synthesis panel and the literature review, and augmented by the survey responses and the case study examples. The list is alphabetized by the name of the association or coalition.

- All-Hazards Incident Management Teams Association
- American Public Works Association (APWA)
- American Road and Transportation Builders Association (ARTBA)
- American Traffic Safety Services Association (ATSSA)
- Emergency Responder Safety Institute (ERSI)
- I-95 Corridor Coalition
- International Municipal Signal Association (IMSA)
- Massachusetts Arborists Association
- National Association of County Engineers
- National Traffic Incident Management Coalition and the TIM Network
- Transportation Curriculum Coordination Council (TCCC), American Association of State Highway and Transportation Officials (AASHTO)
- Transportation Technology Center, Inc., Association of American Railroads.

Private Firm

The sources in this category belong to private firms and were identified during the literature review. There are two private firms in the toolkit.

- Disaster Resistant Communities Group LLC
- Emergency Film Group.

Accessing Source Organization Materials

For each organization, the Source Orgs sheet provides a general description, a description of some of the organization's training and exercise resources (in the column Accessing Training Content), and clickable links to those resources. There are two ways to browse through the toolkit for source organizations:

- *By category:* Click on any one of the nine hyperlinks at the top of the Source Orgs sheet for quick navigation to the source organizations in a specific category. These nine categories are always visible at the top of the sheet.
- *Using the Find function in Windows:* Press Ctrl+F to open the Find function and search for a source organization by typing a keyword.

Dealing with Dead Links to Source Organization Websites and Training/Exercise Resources

The hyperlinks in the Clickable Links field are intended to provide quick access to a source organization's training

and exercise content, such as hyperlinks to course catalogs, product catalogs, exercise pages, and other tools. However, over time a source organization might discontinue, withdraw, or modify the web address of its main website or of the pages that contain its training and exercise resources. Even if the organization has maintained the website or web page, the corresponding hyperlink in the toolkit might no longer work. The result is a dead link.

If a hyperlink on the Source Orgs sheet has become a dead link, users may need to search online to determine whether the site or page still exists or has been discontinued or modified. To do so, follow this procedure:

1. Take note of the information provided in the toolkit about the desired website or page. This includes:
   b. Name of the organization
   c. Key phrases from the general description
   d. The reference to the website or page under Clickable Links. For example, Link 1 in the FEMA Independent Study Program provides the following reference: FEMA, "Independent Study (IS) Course List" [Online]. Available: http://training.fema.gov/IS/crslist.aspx.

2. Open the search engine of your choice (such as Google or Yahoo) in a browser.

3. Use information from Step 1 as keywords to search for the desired website or page.

Criteria for Creating a Source-Specific Sheet

Some of the source organizations in the toolkit have corresponding source-specific sheets. This is particularly the case for organizations that have large catalogs of training and exercise materials, such as the FEMA Independent Study Program and the FEMA National Training and Education Division. The toolkit does not have a source-specific sheet for every single source organization, for several reasons:

- Some source-specific sheets may contain materials from more than one source organization if these sources are closely related (e.g., FEMA Independent Study and the Emergency Management Institute).
- Some sources do not have source-specific sheets because their training and exercise materials can be derived from another source included in this toolkit.
- Several source organizations recommend or directly use training and exercise materials created by other organizations identified in this toolkit. For example, several state DOTs and EMAs train their staffs on courses from the FEMA Emergency Management Institute course catalog, so these state DOTs and EMAs might include the EMI courses in their own catalogs. This toolkit does not include duplicates if the courses are already represented

in the source-specific sheet of another organization. To the greatest extent possible, the toolkit attempts to list only those materials that are unique to a specific source.

USING THE SOURCE-SPECIFIC SHEETS

The toolkit provides the following features in order to navigate within a source-specific sheet and between the sheet and its corresponding source organization:

- *From source organization to source-specific sheet:* If the toolkit has a source-specific sheet corresponding to a source organization, a hyperlink to the source-specific sheet will appear under the clickable links of that source organization.
- *Within a source-specific sheet:* The following information is available for each training/exercise resource (e.g., course, video) on a source-specific sheet:
  – Name/title
  – Topics covered (keywords)
  – Description and objectives
  – Length
  – Source organization(s)
  – Delivery method
  – Cost per participant
  – Target audience
  – Notes
  – Accessing content, descriptions, or syllabi.
- *From source-specific sheet to source organization:* Each source-specific sheet has a hyperlink that leads back to the source organization's entry on the Source Orgs sheet. This hyperlink is usually placed in the Name/Title cell of the source-specific sheet, in Row 1, Column A.

Criteria for Including a Course, Video, or Other Resource on a Source-Specific Sheet

The general criteria for including a source organization's course, video, or other training/exercise resource on its source-specific sheet are as follows:

- *Public works/M&O field audience:* Is the training/exercise resource (e.g., course, video, just-in-time training module) applicable to PWs in general and, ideally, to M&O field personnel and their supervisors in particular?
- *Emergency operations and hazards awareness:* Does the material support the conduct of emergency operations or raise the level of hazard awareness in the PW/M&O field audience?

Some materials have been included under a broad application of these criteria, especially the one that says the resource's intended audience must be M&O and field supervisors. For example, several courses list disciplines (e.g., emergency medical services, police, fire, PWs) rather than occupational

66

or functional categories (e.g., bridge inspectors, medical technicians, transit safety managers, field supervisors). Thus, the toolkit includes courses that identify "public works" as a target audience. With this ambiguity in mind, toolkit users who work for PW agencies should follow up and determine whether such courses, videos, modules, and other training/exercise resources are ultimately appropriate for their own field personnel. Similarly, in addition to exercises, some exercise-*related* courses are included, in order to facilitate the actual conduct of exercises. Often the primary audience for these courses is emergency management rather than public works, although PW is often included as a target audience.

Dealing with Dead Links in the Source-Specific Sheets

A cautionary note is appropriate regarding all source-specific sheets in the toolkit. Any course, video, or other training or exercise resource included on a source-specific sheet can be discontinued, withdrawn, or modified by the source organization. Even if the source organization has maintained the desired training/exercise resource, the toolkit's hyperlink for that resource might no longer work.

If a hyperlink on the specific-source sheet has become a dead link, users may need to search online to determine whether the site or page still exists or has been discontinued or modified. To do so, follow this procedure:

1. Take note of the information provided in the toolkit about the desired course, module, or other training/exercise resource. This includes:
   a. Name/title
   b. Source organization
   c. Key phrases from the description and objectives.

2. Open the search engine of your choice (such as Google or Yahoo) in a browser.

3. Use information from Step 1 as keywords to search for the desired website or page.

SEARCHING EFFECTIVELY WITHIN THE TOOLKIT

Dealing with Dead Links in the Toolkit

As time goes on, hyperlinks to the guidance documents, the source organizations, and these organizations' training and exercise resources may become inaccessible because the original document or resource has been discontinued, modified, or moved to another location online. If users encounter dead links in guidance documents, source organizations, or source-specific sheets, they may need to search online to determine whether the document or resource still exists at another location online or has been discontinued or modified.

The following information from the toolkit could be useful as keywords in a search engine:

- Name/title (of a course, video, module, or training/exercise resource)
- Name of source organization
- Name of publishing organization of a guidance document
- Title and reference for a guidance document
- Phrases from the description of a guidance document
- Phrases from the general description of a source organization
- Phrases from the description or objectives of a training/exercise resource
- The reference to the website or page under Clickable Links.

This list is not exhaustive, and such a search—particularly for an old document or resource—may require some patience and creativity in keyword selection.

Searching Within the Entire Toolkit

The Find function (Ctrl+F in Windows systems) can perform quick searches over the entire toolkit:

1. Hold Ctrl+F to open Excel's Find function.

2. Select Workbook from the drop-down menu for the Within: setting.

   This will search for keywords over the entire toolkit rather than restricting the search to the current sheet.

3. Type the desired keywords into the Find What: field.

4. Press Find All.

5. Click on individual search results to navigate to the corresponding sheet and cell.

Figure 12 shows the location of the Within: setting in the Find and Replace dialog box for Microsoft Office Excel 2007 and 2010. The appearance of the dialog box and the location of the setting may differ in different operating systems (e.g., Apple).
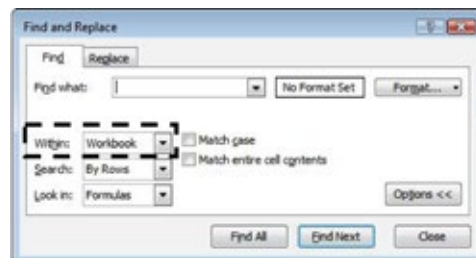
FIGURE 12 Find and Replace dialog box in Microsoft Office Excel 2007 and 2010. The "Within:" setting (dotted box) must be set to "Workbook" to search over the entire Toolkit.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

67

CHAPTER SIX

CONCLUSIONS

Training and exercises enable state department of transportation (DOT) and public works (PW) field personnel to prepare for and respond to emergencies and disasters. Emergency training and exercise issues, challenges, and solutions (including delivery methods and training sources) were identified in this synthesis. Individual course information and relevant resources were integrated into a spreadsheet-based toolkit based on information from the screening survey, literature review, case examples, and several organizations. These organizations included AASHTO, the American Public Works Association (APWA), FHWA, the International Municipal Signal Association (IMSA), Local and Tribal Technical Assistance Program (LTAP/TTAP) centers, TSA, University Transportation Center (UTC) Consortia, the National Association of County Engineers (NACE), and the National Emergency Management Association (NEMA). Twenty-five state DOTs and 22 PW agencies responded to the screening survey. Guidance documents were also identified, incorporated into the toolkit, and referenced in the text of the synthesis.

KEY FINDINGS

Emergency training and exercise needs are identified using federal guidance and requirements, as well as an agency's emergency operations plans, standard operating procedures, and other plans and procedural documents. Needs are also identified through after-action reports from exercises and actual incidents. In particular, the National Incident Management System (NIMS) is a standardized approach to incident management that enables personnel from different agencies and entities, disciplines, and jurisdictions to work together on any type of incident. After the terrorist attacks on September 11, 2001, security awareness became an even more important responsibility for all transportation personnel, especially those in the field. Because field personnel are familiar with what is normal in terms of transportation infrastructure—roads, bridges, and operations—they are able to recognize what is *not* normal and alert supervisors to suspicious activities.

Synthesis findings indicate that while state DOTs strive to include their field personnel in exercises, many find it difficult to schedule a large number of these personnel for an exercise or training at any one time. Full-scale exercises and functional exercises, in particular, are usually organized by the state emergency management agency (EMA) and other agencies, are held infrequently, and offer less scheduling flexibility than other kinds of exercises. Also, in many cases, the transportation unit is not viewed as an important operations section function in the Incident Command System (ICS); thus, state DOTs and PWs may have a hard time being viewed as equal partners by the emergency management community.

The synthesis identified the following key implementation challenges for state DOTs:

- Scheduling difficulties and conflict with work priorities
- Limited budgets
- Lack of training staff
- Employee turnover
- Limited training content
- Insufficient information about available training
- Infrequent need for training
- Lack of PC/Internet access
- Distance issues.

Other issues included the lack of refresher training and the need for more clarification/training on emergency support function (ESF) and ICS roles; more exercises designed for field personnel; training for field support personnel such as procurement, construction, and human resources; and training on coordination among state DOTs, PWs, law enforcement, fire, and other emergency response providers.

Emergency Training and Exercise Sources

The synthesis identified sources for emergency operations and hazards awareness training and exercises; these sources are included in the toolkit. One of the primary federal sources—the Federal Emergency Management Agency (FEMA)—offers training through the Emergency Management Institute (EMI), the Center for Domestic Preparedness (CDP), and the National Training and Education Division (NTED). Other important sources include the National Highway Institute (NHI), universities and colleges, local and tribal technical assistance program (LTAP/TTAP) centers, and the National Transit Institute (NTI). OSHA offers numerous resources and training guidance on occupational health and safety. Some NCHRP and TCRP products also provide useful training content.

68

Online and computer-based training resources include the ICS Training Program and Resource Center (FEMA), Independent Study Program (FEMA), NIMS Training Program and Resource Center (FEMA), NRF Resource Center (FEMA), National Transit Institute (FTA), National Highway Institute (FHWA), LTAP/TTAP centers, and universities/colleges.

The sources in the toolkit are organized as follows:

- Federal (FEMA)—sources within FEMA
- Federal (Other DHS)—sources in the U.S. Department of Homeland Security or its agencies
- Federal (U.S.DOT)—sources in the U.S. Department of Transportation
- Federal (Other Federal)—federal government sources that are not part of DHS or U.S.DOT
- State—state-level sources identified from the survey and from case examples
- Local—local sources identified from the survey and from case examples
- University—sources in universities and university-affiliated training and research centers
- Associations and Coalitions—sources in trade associations and regional coalitions
- Private Firm—sources in private firms.

STRATEGIES AND TOOLS TO DELIVER EMERGENCY TRAINING AND EXERCISES

The synthesis identified effective training strategies and tools, including some that make use of existing agency activities (such as field crew meetings) and training that offers scheduling flexibility. These solutions, all interactive to varying extents, were as follows:

- *Field crew meetings:* Delivering condensed emergency training through regularly scheduled field crew meetings or similar activities for field personnel alleviates scheduling difficulties.
- *Just-in-time training (JITT):* JITT is provided when the need for the training arises. Online training that is available on demand can be used for JITT.
- *Interjurisdictional and interagency training and exercises:* Effective coordination across jurisdictions and among transportation agencies, public safety agencies, and other organizations is essential for response in large or complex disasters and emergencies. Interjurisdictional and interagency training and exercises provide opportunities for personnel from agencies and organizations to meet, interact, and train together
- *Joint training:* Combining emergency training with similar topics can alleviate scheduling challenges. For example, courses on incident management and response are typically mandatory for many field personnel, so emergency training could be incorporated into incident management training. Joint training also facilitates intra-agency communications and helps break down any silos that might exist within the state DOT.
- *Asynchronous training:* Asynchronous training is self-paced training that eliminates scheduling difficulties arising from the need to coordinate the schedules of the trainees and the instructor. This kind of training occurs without the presence of live instructors and is usually online; however, it can still be interactive and maintain the interest and attention of trainees. YouTube is a popular online video-sharing site that offers an asynchronous training platform for distributing educational content.
- *Train-the-trainer (TTT):* TTT is used to train large numbers of personnel in a relatively short period by training one or more qualified persons who then train others.
- *Planned events, incidents, and exercises:* Planned events and incidents are excellent opportunities for field personnel to practice what they have learned. Minor traffic accidents, for instance, can provide an opportunity for field personnel to practice the National Incident Management System (NIMS) and the Incident Command System (ICS). Exercises provide experiential training and allow field personnel to practice and demonstrate emergency skills and processes, and their understanding of NIMS and ICS. After-action reports of planned events, incidents, and exercises can generate lessons learned and identify further training/exercise needs, along with training content and scenarios.
- *Classroom training:* Classroom training is a synchronous training method that allows extensive interaction between the instructor and trainees. While synchronous training methods require scheduling, classroom training can be facilitated through the use of technologies such as closed-circuit television (CCTV), video teleconferencing (VTC), and Voice over Internet Protocol (VoIP).
- *Online training with live instructors:* Online training with live instructors (e.g., webinars) is a synchronous method of training that allows interaction between the trainee and the instructor, and the trainee and other trainees.
- *Computer simulations and virtual exercises:* Computer simulations and virtual exercises can be both synchronous and asynchronous. They are alternatives to traditional exercises that immerse participants in realistic environments, allow real-time interaction, and may use Internet-based or non-Internet-based technologies.

Blended training combines two or more of these methods and allows agencies to select the desired elements of each method and adapt them to their needs and constraints.

Supervision plays an important role in the development of field personnel. First-line supervisors have intimate knowledge of the work being performed by field personnel.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

69

Supervisors must have the technical expertise to be able to evaluate the quality of the work produced, as well as the ability to identify needed training and motivate their workers to take the training seriously and implement it in their work.

FURTHER RESEARCH

The synthesis study identified the following additional research needs:

- Field crew meetings: In what ways can learning during the meetings be enhanced? What are the most effective formats for these meetings?
- Emergency training refreshers are needed. Research into appropriate content, format, and length is required.
- Exercises are not usually designed specifically for maintenance and operations (M&O) field personnel. Research is needed to determine the optimal type of exercise design for field personnel.
- Further research into scenario development and a central repository of scenarios would be useful.
- Research into the following may be useful:
  - Correlation between state and agency characteristics and training implementation problems.
  - Correlation between preferred training/exercise method and state and agency characteristics.
  - Correlation between required training and exercises for district personnel, and whether there is a nuclear power plant within the district or in a nearby district.

- Effectiveness of the train-the-trainer method as additional tiers of training are added. Do the original training objectives and intent remain intact? If not, how is the training transformed, and how does it affect what personnel actually learn?
- Research is needed to understand how new legislation and executive orders—such as the Moving Ahead for Progress in the 21st Century Act (MAP-21) and Presidential Policy Directive 21 (PPD-21)—change the roles of state DOTs and PWs in emergency training and exercises.
- State DOTs expressed interest in specific training topics and content, including general ICS and ESF role awareness; accidents involving hazardous materials; response to flooding and storm damage; training on emergency operations plans; and training for field support personnel, including human resources, procurement, finance, and construction. PWs noted that they desired training on dealing with trauma and preparedness for out-of-area deployments.
- State DOTs and PWs both expressed interest in research into mechanisms that will enable them to participate in all phases of emergency management as full and equal partners with other emergency response disciplines. They also cited the need to establish a stronger working relationship with other emergency response providers in order to develop protocols and policies for effective emergency response performance.

70

GLOSSARY

This glossary is based on *Guidelines for Transportation Emergency Training Exercises* (2006) and on the HSEEP (2013) Volume I Glossary, unless otherwise noted.

Asynchronous learning. Often called "self-directed" training, asynchronous learning does not include real-time instructor guidance. The learner follows and interacts with computer-based content that was designed and developed before the learning experience ("eLearning Glossary," n.d.).

Drill. A coordinated, supervised activity usually used to test a single, specific operation or function in a single agency. Drills are commonly used to provide training with new equipment, to develop new policies or procedures, to practice and maintain current skills, and to test skills that constitute one or more components of a plan.

Emergency. An incident that threatens human life, health, property, or the environment if not immediately controlled, contained, or eliminated. The threat of the condition, incident, or event requires immediate response actions to save lives; prevent injuries; protect property, public health, the environment, and public safety; or lessen or avert the threat of a disaster.

Emergency response provider. "Federal, State, and local governmental and nongovernmental emergency public safety, fire, law enforcement, emergency response, emergency medical (including hospital emergency facilities) and related personnel, agencies, and authorities" (Homeland Security Act of 2002, United States Code, Title 6, Section 101, Paragraph 6).

Emergency training. Instruction on hazards awareness and emergency operations that is meant to impart foundational knowledge in both procedures and concepts to field maintenance and operations personnel so that they can (1) perform their assigned duties during response and recovery phases, and (2) exercise their roles during the preparedness phase. Note that exercises are a form of training.

Evaluation. The process used to measure the demonstrated ability to accomplish specific objectives within a discrete exercise. Exercise evaluation refers to the act of reviewing or observing and recording exercise activity or conduct; comparing the behavior or activity with exercise objectives; and noting strengths, weaknesses, deficiencies, and other observations.

Event. A planned, nonemergency activity. ICS can be used as the management system for a wide range of events; for example, parades, concerts, or sporting events (ICS Resource Center Glossary).

Exercise. An activity requiring the performance, integration, and coordination of response activities by several individuals and teams. Exercises (except for tabletop exercises) normally involve mobilization of personnel and resources. As noted in HSEEP Volume I, an exercise is carried out to train for, assess, practice, and improve performance. It can also be used to testing and validate policies, plans, procedures, training, equipment, and interagency agreements; clarify and train personnel in roles and responsibilities; improve interagency coordination and communications; identify gaps in resources; improve individual performance; and identify opportunities for improvement.

Field crew meetings. Field crew meetings such as tailgate, hip pocket, and toolbox talks can be good opportunities for personnel training.

Full-scale exercise (FSE). An exercise that enables the validation of major aspects of plans, policies, procedures, systems, and resources, and that involves all levels of participating organizations. FSEs greatly expand the scope and visibility of the exercise program. They include the mobilization of personnel and resources and the actual movement of crisis and consequence management workers, equipment, and resources required to demonstrate coordination and response capability. Large FSEs actively involve agencies and participants.

Functional exercise (FE). An exercise designed to test and evaluate individual capabilities, multiple functions, or activities within a function or interdependent groups of functions. A functional exercise can take place in an operating center, in the field, or a combination of the two. This format is applicable where the activity can be effectively evaluated in isolation from other activities. In contrast to the full-scale exercise, the objective of the functional exercise is to demonstrate the execution of specific plans and procedures and the direct application of established policy, plans, and procedures under emergency conditions within or by a particular function team. The functional exercise simulates the reality of operations in a functional area to the maximum degree possible by presenting complex and realistic problems requiring rapid and effective responses by trained personnel in a highly stressful environment. Through documented evaluation and subsequent corrective action, the capabilities of the functional area are improved and weaknesses are reduced or eliminated. Functional exercises are sometimes called command post exercises.

Hazard. An actual or potential condition that can cause injury, illness, or death of personnel; damage to or loss of equipment or property and the environment; or degradation to an organizational capability.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

71

Incident. An occurrence or event, natural or human-caused, that requires an emergency response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response (ICS Resource Center Glossary).

Just-in-time training (JITT). Just-in-time training refers to training that is provided as the need arises.

Scenario. A sequential account of a hypothetical situation or chain of events that depicts an incident, emergency, or crisis and all the associated consequences used to frame and guide simulation during an exercise.

Seminar. An informal discussion in a group setting, in which a seminar leader facilitates the group's focus on a specific topic or issue. Seminars occur in a low-stress environment. As noted in HSEEP Volume I Glossary, it is a type of discussion-based exercise that orients participants to authorities, strategies, plans, policies, procedures, protocols, resources, concepts, or ideas.

Simulation. An artificially produced condition that replicates a real-life situation. In the broad sense, exercises and games are simulations. The terms *computer-assisted simulation* and *computer simulation* refer to a method of conducting exercises in a virtual environment.

Synchronous methods. Training delivery methods that require a live instructor and take place at a fixed time.

Tabletop exercise (TTX). An exercise that simulates an emergency in an informal, stress-free, conference-room-type environment. As noted in HSEEP Volume I Glossary, it is a type of discussion-based exercise that can be used to facilitate understanding of concepts, identify strengths and shortfalls, or achieve a change in attitude.

Terrorism. The unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof in furtherance of political or social objectives. Terrorism can be domestic or international.

Threat. The known or suspected presence of an actor with the ability, will, and motive to inflict harm.

Train-the-trainer (TTT). Train-the-trainer courses and tools focus on training for instructors of training courses.

Video teleconferencing (VTC). Video teleconferencing is a communication technology that permits users at two or more different locations to interact by creating a face-to-face meeting environment. VTC systems transmit bidirectional audio, video, and data streams during the session ("Video Teleconferencing," National Security Agency, n.d.).

Whole community. The phrase *whole community* appears in many FEMA preparedness materials, as it is a guiding principles. It means two things:

1. Involving people in the development of the national preparedness documents.

2. Ensuring that their roles and responsibilities are reflected in the content of the materials.

Thus, the whole community includes

- Individuals and families, including those with access and functional needs
- Businesses
- Faith-based and community organizations
- Nonprofit groups
- Schools and academia
- Media outlets
- All levels of government, including state, local, tribal, territorial, and federal partners.

Recognizing that preparedness is a shared responsibility, the whole community concept calls for the involvement of everyone—not just the government—in preparedness efforts. By working together, everyone can keep the nation safe from harm and resilient when struck by hazards, such as natural disasters, acts of terrorism, and pandemics ("Whole Community," FEMA 2014).

Workshop. A meeting that generally involves briefings and the use of facilitated breakout sessions at which preestablished topics and issues are discussed and the results of these sessions are reported in a plenum. As noted in HSEEP Volume I glossary, it is a type of discussion-based exercise that provides participant interaction with a focus on achieving or building a product. Workshops are typically used to train groups in coordinated activities; obtain consensus; or test new ideas, processes, or procedures.

72

ACRONYMS

AAR	after-action report/review	**FHWA**	Federal Highway Administration
ADEM	Arizona Division of Emergency Management	**FEMA**	Federal Emergency Management Agency
ADOT	Arizona Department of Transportation	**FSE**	full-scale exercise
AHIMTA	All-Hazards Incident Management Teams Association	**HSEEP**	Homeland Security Exercise and Evaluation Program
APWA	American Public Works Association	**HSEMD**	Homeland Security and Emergency Management Department (Iowa)
ATSSA	American Traffic Safety Services Association	**HSPD**	Homeland Security Presidential Directive
AZDPS	Arizona Department of Public Safety	**ICS**	Incident Command System
Cal EMA	California Emergency Management Agency	**ICS-300**	Incident Command System 300: Intermediate ICS for Expanding Incidents
Cal OES	California Office of Emergency Services (aka Governor's Office of Emergency Services)	**ICS-400**	Incident Command System 400: Advanced ICS
CCTV	closed circuit television	**IMSA**	International Municipal Signal Association
CIRMA	Connecticut Interlocal Risk Management Agency	**IS-100**	Independent Study 100: Introduction to the Incident Command System
COG	continuity of government	**IS-200**	Independent Study 200: ICS for Single Resources and Initial Action Incidents
COOP	continuity of operations		
DEMHS	Division of Emergency Management and Homeland Security (Vermont)	**IS-700**	Independent Study 700: Introduction to the National Incident Management System
DRC Group	Disaster Resistant Communities Group	**IS-800**	Independent Study 800: Introduction to the National Response Framework
EMA	emergency management agency		
EMAC	Emergency Mutual Aid Compact	**ISP**	Independent Study Program (FEMA)
EMI	Emergency Management Institute	**JITT**	just-in-time training
EOP	emergency operations plan	**LLIS**	lessons learned information sharing
ERP	emergency response plan	**MACS**	Multiagency Coordination System
ESF	emergency support function	**M&O**	Maintenance and Operations
FE	functional exercise	**MoDOT**	Missouri Department of Transportation

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

73

MTI	Mineta Transportation Institute	**SHRP 2**	Second Strategic Highway Research Program
NDPC	National Domestic Preparedness Consortium	**SSF-1**	State Support Function One (Transportation) [Vermont]
NEMA	National Emergency Management Association	**SSF-3**	State Support Function Three (Public Works and Engineering) [Vermont]
NIC	National Integration Center (FEMA)	**TCCC**	Transportation Curriculum Coordination Council
NIMS	National Incident Management System		
NIPP	National Infrastructure Protection Plan	**TDEM**	Texas Division of Emergency Management
NPG	National Preparedness Goal	**TDOT**	Tennessee Department of Transportation
NRF	National Response Framework		
NTED	National Training and Education Division	**TEEX**	Texas A&M University Engineering Extension Service
NTES	National Training and Education System	**TEMA**	Tennessee Emergency Management Agency
NYSDOT	New York State Department of Transportation	**TIM**	traffic incident management
OSHA	Occupational Safety and Health Administration	**TSA**	Transportation Security Administration
		TTAP	Tribal Technical Assistance Program
P2P	peer to peer	**TTX**	tabletop exercise
PC	personal computer	**TxDOT**	Texas Department of Transportation
PPD	Presidential Policy Directive	**UTC**	university transportation center
PSE	planned special events	**VDOT**	Virginia Department of Transportation
PW	public works/public works agency	**VoIP**	Voice over Internet Protocol
RIDOT	Rhode Island Department of Transportation	**VTC**	video teleconferencing
		VTrans	Vermont Agency of Transportation
RI EMA	Rhode Island Emergency Management Agency	**VTTC**	Vermont Agency of Transportation (VTrans) Training Center
SAR	suspicious activity report/reporting	**VTTX**	virtual tabletop exercise
SCOTSEM	AASHTO Special Committee on Transportation Security & Emergency Management	**WisDOT**	Wisconsin Department of Transportation
		WSDOT	Washington State Department of Transportation
SEMA	State Emergency Management Agency (Missouri)		
SEMS	Standardized Emergency Management System		

74

REFERENCES

"About TERA," Transportation Emergency Response Application, 2013 [Online]. Available: http://www.train-emst.com/emst/data/branded/tera/TERA.html.

American Public Works Association (APWA), "Accreditation & Self-Assessment," APWA, Kansas City, Mo., and Washington, D.C., n.d. [Online]. Available: http://www2.apwa.net/about/accreditation.

American Public Works Association (APWA), "Certification," APWA, Kansas City, Mo., and Washington, D.C., n.d. [Online]. Available: http://www.apwa.net/credentialing/certification.

American Public Works Association (APWA), "Opportunities to Participate," APWA, Kansas City, Mo., and Washington, D.C., n.d. [Online]. Available: http://www.apwa.net/technical_committees/Emergency-Management/Opportunities-to-Participate.

American Public Works Association (APWA), "Resource Center: Emergency Management," APWA, Kansas City, Mo., and Washington, D.C., n.d. [Online]. Available: http://www.apwa.net/ResourceCenter/Category/Emergency-Management.

American Public Works Association (APWA), "Winter Maintenance Supervisor Certificate," APWA, Kansas City, Mo., and Washington, D.C., n.d. [Online]. Available: http://www.apwa.net/learn/Certificates/Winter-Maintenance-Supervisor-Certificate.

American Traffic Safety Services Association (ATSSA), "State Training Requirements," ATSSA, Fredericksburg, Va., n.d. [Online]. Available: https://www.atssa.com/TrainingCertification/StateTrainingRequirements.aspx.

Arizona Department of Transportation (ADOT), "Emergency Action Guidelines and Plans," ADOT Emergency Preparedness and Management, Phoenix, Oct. 2012.

Bergner, D., "Get Ready: NIMS-Compliant Training for Public Works," *APWA Reporter*, Jan. 2013, p. 41.

Bergner, D., "Winter Weather Operations: Adapting to Changing Times and Roles," presented at the *XIV International Winter Road Congress,* Andorra, Feb. 4–Feb. 7, 2014.

Business & Legal Resources, "BLR Store," Brentwood, Tenn., n.d. [Online]. Available: http://store.blr.com/index.php.

California Governor's Office of Emergency Services (Cal OES), *California Implementation Guidelines for the National Incident Management System: Workbook and User Manual,* California Emergency Management Agency (Cal EMA), Sacramento, Sept. 2006 [Online]. Available: http://www.calema.ca.gov/planningandpreparedness/documents/caimpnims-seci-ii.pdf.

California Governor's Office of Emergency Services (Cal OES), "Standardized Emergency Management System," California Emergency Management Agency (Cal EMA), Sacramento, 2011 [Online]. Available: http://www.calema.ca.gov/planningandpreparedness/pages/standardized-emergency-management-system.aspx [accessed April 5, 2013].

Chen, X., S.Y. Nof, B. Partridge, I. Varkonyi, and Y.J. Nakanishi, "Security Awareness and Alertness Training in State Departments of Transportation," *Transportation Research Record: Journal of the Transportation Research Board, No. 1942,* Transportation Research Board of the National Academies, Washington, D.C., 2006, pp. 39–51.

Clark, D., "Learning and Performance Glossary" [Online]. Available: http://www.nwlink.com/~donclark/hrd/glossary.html [accessed April 5, 2013].

Connecticut Interlocal Risk Management Agency (CIRMA), *Tail Gate Topics II: 80+ Topics for Improving Workplace Safety,* Connecticut Conference of Municipalities (CCM), New Haven, 2010.

CTC & Associates LLC, "Training Supervisors in Winter Maintenance Operations: A Survey of State DOT Practices, Training Tools and Programs," Transportation Synthesis Report, WisDOT Research & Library Services, Madison, Wis., May 4, 2009.

Disaster Resistant Communities Group (DRC Group), "Welcome to the ONX System," Tallahassee, Fla., n.d. [Online]. Available: http://www.onxsystem.com [accessed April 5, 2013].

Disaster Resistant Communities Group (DRC Group), "Resilient Response—A Neighborhood/Community Readiness and Response Exercise Series," Tallahassee, Fla., 2013 [Online]. Available: http://www.drc-group.com/project/rrce.html [accessed April 5, 2013].

Edwards, F.L. and D.C. Goodrich, *Continuity of Operations/Continuity of Government for State-Level Transportation Organizations, Report 11-02,* Mineta Transportation Institute, San Jose, Calif., Sept. 2011.

Edwards, F.L., and D.C. Goodrich, *Exercise Handbook: What Transportation Security and Emergency Preparedness Leaders Need to Know to Improve Emergency Preparedness, Report 12-08,* Mineta Transportation Institute, San Jose, Calif., Feb. 2014.

"Effective Motivation of Highway Maintenance Personnel: Tools for Peak Performance," in *NCHRP Research Results*

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

75

Digest 257, Transportation Research Board of the National Academies, Washington, D.C., July 2001, pp. 1–4.

"eLearning Glossary," ISITE Design Inc., n.d. [Online]. Available: http://www.isitedesign.com/services/e-learning/e-learning-glossary.

"EMAC Legislation," EMACWeb.org, National Emergency Management Association, Lexington, Ky. [Online]. Available: http://www.emacweb.org/index.php/learnaboutemac/emac-legislation.

"EMAP—Welcome to EMAP," Emergency Management Accreditation Program (EMAP), Council of State Governments, Lexington, Ky., n.d. [Online]. Available: http://www.emaponline.org.

"Emergency Management Institute TTX FAQs," provided to Yuko Nakanishi by Todd Wheeler, EMI program manager, Feb. 2013.

Emergency Management Standard, Emergency Management Accreditation Program (EMAP), Council of State Governments, Lexington, Ky., 2013.

"Everything You Need to Know About the Texas Drought," StateImpact Texas, National Public Radio [Online]. Available: http://stateimpact.npr.org/texas/tag/drought/ [accessed April 10, 2013].

Federal Emergency Management Agency (FEMA), *Comprehensive Preparedness Guide 101: Developing and Maintaining Operations Plans, Version 2.0 (CPG 101, Version 2.0)*, U.S. Department of Homeland Security, Washington, D.C., Nov. 2010.

Federal Emergency Management Agency (FEMA), *EMI Training Catalog: Train, Exercise, Educate,* Emergency Management Institute, U.S. Department of Homeland Security, Washington, D.C., n.d. [Online]. Available: http://training.fema.gov/EMICourses/EMICatalog.asp.

Federal Emergency Management Agency (FEMA), "Emergency Support Function #1 (ESF #1)—Transportation Annex," U.S. Department of Homeland Security, Washington, D.C., Jan. 2008.

Federal Emergency Management Agency (FEMA), "Emergency Support Function #3 (ESF #3)—Public Works and Engineering Annex," U.S. Department of Homeland Security, Washington, D.C., Jan. 2008.

Federal Emergency Management Agency (FEMA), "Incident Command System," U.S. Department of Homeland Security, Washington, D.C., last modified Sept. 5, 2013 [Online]. Available: http://www.fema.gov/incident-command-system.

Federal Emergency Management Agency (FEMA), "Independent Study (IS) Course List," U.S. Department of Homeland Security, Washington, D.C., n.d. [Online]. Available: http://training.fema.gov/IS/crslist.aspx.

Federal Emergency Management Agency (FEMA), "IS-450: Emergency Preparedness for Federal Employees," U.S. Department of Homeland Security, Washington, D.C., Oct. 31, 2013 [Online]. Available: https://training.fema.gov/EMIWeb/IS/courseOverview.aspx?code=IS-450.

Federal Emergency Management Agency (FEMA), *National Disaster Recovery Framework: Strengthening Disaster Recovery for the Nation,* U.S. Department of Homeland Security, Washington, D.C., Sept. 2011.

Federal Emergency Management Agency (FEMA), *National Incident Management System* (*NIMS*), U.S. Department of Homeland Security, Washington, D.C., Dec. 2008.

Federal Emergency Management Agency (FEMA), *National Incident Management System* (*NIMS*) *Training Program,* U.S. Department of Homeland Security, Washington, D.C., Sept. 2011.

Federal Emergency Management Agency (FEMA), "National Planning Frameworks," U.S. Department of Homeland Security, Washington, D.C., last updated July 24, 2014 [Online]. Available: http://www.fema.gov/national-planning-frameworks.

Federal Emergency Management Agency (FEMA), *National Preparedness Goal* (NPG), 1st ed., U.S. Department of Homeland Security, Washington, D.C., Sept. 2011.

Federal Emergency Management Agency (FEMA), *National Prevention Framework,* U.S. Department of Homeland Security, Washington, D.C., May 2013.

Federal Emergency Management Agency (FEMA), *National Protection Framework,* U.S. Department of Homeland Security, Washington, D.C., July 2014.

Federal Emergency Management Agency (FEMA), *National Response Framework* (*NRF*), 2nd ed., U.S. Department of Homeland Security, Washington, D.C., May 2013.

Federal Emergency Management Agency (FEMA), *National Mitigation Framework,* U.S. Department of Homeland Security, Washington, D.C., May 2013.

Federal Emergency Management Agency (FEMA), "Working Drafts of the National Planning Frameworks—Protection Framework," U.S. Department of Homeland Security, Washington, D.C., last updated March 4, 2012 [Online]. Available: http://www.fema.gov/media-library/assets/documents/25364.

Federal Emergency Management Agency (FEMA), "Whole Community," U.S. Department of Homeland Security, Washington, D.C., last updated July 24, 2014 [Online]. Available: http://www.fema.gov/national-preparedness/whole-community.

Federal Highway Administration (FHWA), *Best Practices in Traffic Incident Management,* U.S. Department of Transportation, Washington, D.C., Sept. 2010.

Federal Highway Administration (FHWA), *Field Operations Guide for Safety/Service Patrols,* Office of Operations, U.S. Department of Transportation, Washington, D.C., Dec. 2009.

Federal Highway Administration (FHWA), M*aking the Connection: Advancing Traffic Incident Management in Transportation Planning—A Primer,* U.S. Department of Transportation, Washington, D.C., July 2013.

Federal Highway Administration (FHWA), *National Special Security Events: Transportation Planning for Planned Special Events,* U.S. Department of Transportation, Washington, D.C., May 2011.

Federal Highway Administration (FHWA), "Security and Emergency Management—An Information Briefing for Executives and Senior Leaders in State Departments of Transportation," Highway Infrastructure Security and Emergency Management Professional Capacity Building, Washington, D.C., 2009.

Federal Highway Administration (FHWA), *Simplified Guide to the Incident Command System for Transportation Professionals,* U.S. Department of Transportation, Washington, D.C., Feb. 2006.

Federal Highway Administration (FHWA), "Supporting Technologies," U.S. Department of Transportation, Washington, D.C., n.d., last modified July 2, 2013 [Online]. Available: http://www.ops.fhwa.dot.gov/eto_tim_pse/index.htm.

Federal Highway Administration (FHWA), "Traffic Incident Management," U.S. Department of Transportation, Washington, D.C., n.d., last modified July 2, 2013 [Online]. Available: http://www.ops.fhwa.dot.gov/eto_tim_pse/about/tim.htm.

Federal Highway Administration (FHWA), *Traffic Incident Management Cost Management and Cost Recovery Primer,* U.S. Department of Transportation, Washington, D.C., March 2012.

Federal Highway Administration (FHWA), *Traffic Incident Management Handbook,* U.S. Department of Transportation, Washington, D.C., Jan. 2010.

Federal Highway Administration (FHWA), *Traffic Incident Management in Construction and Maintenance Work Zones,* Publication Number FHWA-HOP-08-056, Office of Operations, FHWA, U.S. Department of Transportation, Washington, D.C., Jan. 2009.

Federal Highway Administration (FHWA), *Traffic Incident Management in Hazardous Materials Spills in Incident Clearance,* Publication Number FHWA-HOP-08-058, Office of Operations, FHWA, U.S. Department of Transportation, Washington, D.C., Jan. 2009.

Federal Transit Administration (FTA), "Transit Watch," includes Transit Watch Toolkit, U.S. Department of Transportation, Washington, D.C., n.d. [Online]. Available: http://transit-safety.volpe.dot.gov/Security/TransitWatch/default.asp.

The Federal Response to Hurricane Katrina: Lessons Learned, United States, Executive Office of the President, Washington, D.C., Feb. 2006.

Gray, R., "TSA First Observer Program Goes to Web Only, Managed by New Contractor," *School Transportation News,* Torrance, Calif., March 29, 2013 [Online]. Available: http://www.stnonline.com/home/latest-news/5192-tsa-first-observer-program-goes-to-web-only-managed-by-new-contractor.

Guide to Emergency Response Planning for State Transportation Agencies, NCHRP Report 525: Surface Transportation Security, Volume 16, Transportation Research Board of the National Academies, Washington, D.C., 2010.

Guidelines for Transportation Emergency Training Exercises, TCRP Report 86/NCHRP Report 525: Volume 9, Transportation Research Board of the National Academies, Washington, D.C., 2006.

Holtermann, K., "Implementing the National Training and Education System," 2013 National Training and Exercise Symposium, Federal Emergency Management Agency, Washington, D.C., April 16, 2013 [Online]. Available: http://training.fema.gov/NTE/_assets/NTES_Symposium_PowerPoint.pptx.

Homeland Security Act of 2002 (Public Law 107-296).

Homeland Security Exercise and Evaluation Program (*HSEEP 2013*), U.S. Department of Homeland Security, Washington, D.C., April 2013.

"Homeland Security Exercise and Evaluation Program," U.S. Department of Homeland Security, Washington, D.C., n.d. [Online]. Available: https://www.llis.dhs.gov/hseep.

"Homeland Security Presidential Directive (HSPD-20), National Security Presidential Directive (NSPD-51): National Continuity Policy," The White House, Office of the Press Secretary, Washington, D.C., May 2007.

I-95 Corridor Coalition, "3-D Virtual Incident Management Training for First Responders: Attendee Snapshot, June 2012," provided to Yuko Nakanishi by Tom Martin, I-95 Corridor Coalition, Rockville, Md., June 2012.

I-95 Corridor Coalition, "Quick Clearance Toolkit & Workshop," Rockville, Md. [Online]. Available: http://www.i95coalition.org/i95/Training/QuickClearanceWorkshop/tabid/188/Default.aspx.

I-95 Corridor Coalition, "Virtual Incident Management Training," Rockville, Md. [Online]. Available: http://www.i95vim.com.

"IMSA—International Municipal Signal Association," IMSA Website, Newark, N.J., n.d. [Online]. Available: http://www.imsasafety.org/index.html.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

77

Iowa Homeland Security and Emergency Management Division (HSEMD), *Iowa Emergency Response Plan: Basic Plan PLUS 15 Emergency Support Functions (ESFs)*, *Special Needs Support Annex,* Johnston, Iowa, Oct. 2010.

Iowa Legislature, *Iowa Code,* Title I "State Sovereignty and Management," Chapter 29C, "Emergency Management and Security."

"Jensen's Technology Glossary," Babylon.com [Online]. Available: http://dictionary.babylon.com/computer-internet/internet/jensens-technology-glossary/ [accessed April 5, 2013].

Kirkpatrick, D. and J. Kirkpatrick, *Evaluating Training Programs: The Four Levels,* 3rd ed., Berrett–Koehler, San Francisco, Calif., 2006, 288 pp.

Kirkpatrick, D. and J. Kirkpatrick, *Implementing the Four Levels: A Practical Guide for Effective Evaluation of Training Programs,* Berrett–Koehler, San Francisco, Calif., 2007.

Knapp, L.G. and J. Kendzel, *Background Information ICE 1100 2010 (E)—Standard for Assessment-Based Certificate Programs,* Institute for Credentialing Excellence, Washington, D.C., 2009.

Knowles, M., *The Modern Practice of Adult Education: Andragogy versus Pedagogy,* 2nd ed., Association Press, New York, N.Y., 1980.

Lowrie, K. and J.A. Shaw, "Assessment of Surface Transportation Security Training Needs," Center for Transportation Safety, Security, and Risk, Rutgers University, Newark, N.J., Mar 2011.

"Management System Dictionary," BusinessDictionaries. org [Online]. Available: http://management. businessdictionaries.org/Just-in-time_training [accessed April 5, 2013].

Matherly, D., et al., *NCHRP Report 740: A Transportation Guide for All-Hazards Emergency Evacuation,* Transportation Research Board of the National Academies, Washington, D.C., 2013, 181 pp.

McKeachie, W. and M. Svinicki, *McKeachie's Teaching Tips,* 14th ed., Wadsworth Publishing (Cengage Learning), Stamford, Conn., 2013, 416 pp.

Missouri State Emergency Management Agency, "Declared Disasters in Missouri," Missouri Department of Public Safety, Jefferson City, n.d. [Online]. Available: http://sema.dps.mo.gov/maps_and_disasters/disasters/.

National Highway Institute (NHI), "National Highway Institute: Search for Courses," Federal Highway Administration, U.S. Department of Transportation, Washington, D.C., n.d. [Online]. Available: http://www.nhi.fhwa. dot.gov/training/course_search.aspx.

National Traffic Incident Management Coalition, "Traffic Incident Management Programs: State & Regional Foundations for National Success in Operations," presentation, provided to Yuko Nakanishi by John Corbin, Wisconsin DOT, Madison.

"Nationwide SAR Initiative," Nationwide Suspicious Activity Reporting (SAR) Initiative, Institute for Intergovernmental Research, Tallahassee, Fla., 2010–2013 [Online]. Available: http://nsi.ncirc.gov.

"NCHRP 20-59(43): Incorporating Transportation Security Awareness into Routine State DOT Operations and Training," Transportation Research Board of the National Academies, Washington, D.C., 2013 [Online]. Available: http://apps.trb.org/cmsfeed/TRBNetProjectDisplay. asp?ProjectID=3081.

NCHRP Research Results Digest 385: The Legal Definitions of "First Responder," National Transportation Research Board of the National Academies, Washington, D.C., Nov. 2013 [Online]. Available: http://onlinepubs.trb.org/ onlinepubs/nchrp/nchrp_rrd_385.pdf.

New York State Department of Transportation (NYSDOT), *Basic Supervision—Study Guide,* Transportation Maintenance Division, NYSDOT, Albany, Jan. 2005.

New York State Department of Transportation (NYSDOT), *Evaluation Guides for Skills Demonstration,* 4th ed., Operations Management, Transportation Maintenance, NYSDOT, Albany, n.d. [Online]. Available: https://www. dot.ny.gov/divisions/operating/oom/transportation-maintenance/evaluation-guides.

New York State Department of Transportation (NYSDOT), "Transportation Maintenance Training—Tools for Peak Performance," Operations Management, Transportation Maintenance, NYSDOT, Albany, n.d. [Online]. Available: https://www.dot.ny.gov/divisions/operating/oom/ transportation-maintenance/peak-performance.

National Infrastructure Protection Plan 2013 (NIPP 2013): Partnering for Critical Infrastructure Security and Resilience, U.S. Department of Homeland Security, Washington, D.C., 2013.

National Security Agency, "Video Teleconferencing," Factsheet, Systems and Network Analysis Center Information Assurance Directorate, Fort Meade, Md., n.d.

NCHRP Report 525: Surface Transportation Security, Volume 7: System Security Awareness for Transportation Employees, Transportation Research Board of the National Academies, Washington, D.C., last modified July 27, 2012 [Online]. Available: http://www.trb.org/ Main/Blurbs/157466.aspx.

Occupational Safety and Health Administration, "Training Requirements in OSHA Standards and Training Guidelines," U.S. Department of Labor, Washington,

78

DC, 1998 [Online]. Available: https://www.osha.gov/Publications/2254.html.

Ohio Emergency Management Agency, "Ohio Emergency Operations Plan Emergency Support Function #1," Ohio Department of Transportation, Columbus, July 2011 [Online]. Available: http://ema.ohio.gov/Documents/Ohio_EOP/esf_1.pdf.

"Presidential Policy Directive/PPD-8: National Preparedness," U.S. Department of Homeland Security, Washington, D.C., March 2011.

"Presidential Policy Directive/PPD-21: Critical Infrastructure Security and Resilience," The White House, Office of the Press Secretary, Washington, D.C., Feb. 2013.

"Principles of Adult Learning and Instructional Systems Design," Chapter 2 in the Reference Manual for the *NHI Instructor Development Course* (Course Number FHWA-NHI-420018), FHWA Publication No. NHI-04-115, National Highway Institute, Federal Highway Administration, Washington, D.C., March 2004, pp. 1–12.

Principles of Evacuation Planning Tutorial (*Web-Based*), Course FHWA-NHI-133107, National Highway Institute, Federal Highway Administration, Arlington, Va. [Online]. Available: http://www.nhi.fhwa.dot.gov/downloads/catalog/FHWA-NHI-133107.pdf.

"Public Works," EMACWeb.org, National Emergency Management Association, Lexington, Ky. [Online]. Available: http://www.emacweb.org/index.php/public-works.

Roth, D., "Texas Hurricane History," Hydrometeorological Prediction Center, National Weather Service, Camp Springs, Md., last updated Jan. 17, 2010 [Online]. Available: http://www.hpc.ncep.noaa.gov/research/txhur.pdf.

Security 101: A Physical Security Primer for Transportation Agencies, NCHRP Report 525: Surface Transportation Security Volume 14, Transportation Research Board of the National Academies, Washington, D.C., 2009.

Shiplett, M.H., *NCHRP Synthesis 362: Training Programs, Processes, Policies, and Practices,* Transportation Research Board of the National Academy of Sciences, Washington, D.C., 2007, 89 pp.

Silberman, M., *101 Ways to Make Training Active,* 2nd ed., Pfeiffer (John Wiley & Sons Inc.), Hoboken, N.J., 2005.

Texas Department of Public Safety, *State of Texas Emergency Management Plan,* The State of Texas, Austin, May 2012.

"Texas Drought and Wildfires: Before and After the Severe Weather," *Huffington Post,* Nov. 12, 2011 [Online]. Available: http://www.huffingtonpost.com/2011/09/12/texas-wildfire_n_958780.html.

"Training Resources," Transportation Curriculum Coordination Council, American Association of State Highway and Transportation Officials, Washington, D.C., n.d.

[Online]. Available: http://tccc.gov/trainingoverview.aspx [accessed on Sep. 1, 2013].

Transportation Security Administration (TSA), "Intermodal Security Training Exercise Program (I-STEP)," U.S. Department of Homeland Security, Washington, D.C., n.d. [Online]. Available: http://www.tsa.gov/sites/default/files/assets/pdf/i-step_flyer.pdf.

U.S. Merit Systems Protection Board, *A Call to Action: Improving First-Level Supervision of Federal Employees,* Office of Policy and Evaluation, Washington, D.C., May 2010.

Vermont Agency of Transportation (VTrans), "Catalog of Learning Opportunities," VTrans, Berlin, 2013–2014.

Vermont Agency of Transportation (VTrans), *Irene Innovation Task Force Report,* State of Vermont, Montpelier, March 2012 [Online]. Available: www.acrpc.info/EM/VTrans_IreneInnovationTaskTeam_201203.pdf.

Vermont Division of Emergency Management and Homeland Security (DEMHS), "Agency Annex H: Agency of Transportation," *State of Vermont Emergency Operations Plan,* Department of Public Safety, State of Vermont, Waterbury, 2013.

Vermont Division of Emergency Management and Homeland Security (DEMHS), "Appendix III: State Support Functions Summary," *State of Vermont Emergency Operations Plan,* Department of Public Safety, State of Vermont, Waterbury, 2013.

Vermont Division of Emergency Management and Homeland Security (DEMHS), "State Support Function (SSF) Annex 1: Transportation (SSF-1 Annex)," *State of Vermont Emergency Operations Plan,* Department of Public Safety, State of Vermont, Waterbury, 2013.

Vermont Division of Emergency Management and Homeland Security (DEMHS), "State Support Function (SSF) Annex 3: Public Works and Engineering (SSF-3 Annex)," *State of Vermont Emergency Operations Plan,* Department of Public Safety, State of Vermont, Waterbury, 2013.

Washington Military Department, "Annex C: Activation of State Emergency Support Functions," *Washington State Emergency Operations Plan,* Emergency Management Division, Camp Murray, April 11, 2008.

Washington State Department of Transportation (WSDOT), *Emergency Operations Plan* (*EOP*) *M 54-11.01,* WSDOT Office of Emergency Management, Olympia, May 2011.

Washington State Department of Transportation (WSDOT), "Hazards Assessment Presentation," provided to Yuko Nakanishi by Gregory Selstead, WSDOT, Olympia, April 18, 2013.

Wisconsin Emergency Management, *Tabletop Exercise Scenarios, Volume 1,* Madison, n.d.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

79

BIBLIOGRAPHY

Airasian, P.W., K.A. Cruikshank, R.E. Mayer, P.R. Pintrich, J. Raths, and M.C. Wittrock, A *Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives* (*Complete edition*), L. W. Anderson and D. R. Krathwohl, Eds., Longman, New York, N.Y., 2001.

"A Model of Learning Objectives Based on *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives,"* Center for Excellence in Learning and Teaching, Iowa State University, Ames, 2012 [Online]. Available: http://www.celt.iastate.edu/pdfs-docs/teaching/RevisedBloomsHandout.pdf

ASTD 2005 State of the Industry Report, American Society for Training and Development, Alexandria, Va., 2005.

Atherton, J. S., "Learning and Teaching: Experiential Learning," 2011 [Online] Available: http://www.learningandteaching.info/learning/experience.htm [accessed April 26, 2013].

Bahr, N., E. Gorrie, M. Zannoni, and K. Chandler, *Security and Emergency Management Technical Assistance for the Top 50 Transit Agencies: Final Report,* Federal Transit Administration, U.S. Department of Transportation, Washington, D.C., April 2007.

Balog, J.N., M.G. Devost, and J.P. Sullivan, *TCRP Report 86 Public Transportation Security, Volume 1: Communication of Threats: A Guide,* Transportation Research Board of the National Academies, Washington, D.C., 2002, 42 pp.

Balog, J.N., et al., *TCRP Report 86 Public Transportation Security, Volume 5: Security-Related Customer Communications and Training for Public Transportation Providers,* Transit Cooperative Research Program, Transportation Research Board, Washington, D.C., 2004.

Bernthal, P.R., K. Colteryahn, P. Davis, J. Naughton, W.J. Rothwell, and R. Wellins, *Mapping the Future: ASTD 2004 Competency Study, New Workplace Learning and Performance Competencies,* ASTD Press, Washington, D.C., 2004, 142 pp.

Bloom, B.S., *Taxonomy of Educational Objectives: The Classification of Educational Goals, Handbook 1: Cognitive Domain,* D. McKay, New York, N.Y., 1956

Bloom, B.S., M.B. Englehart, E.J. Furst, W.H. Hill, and D.R. Krathwohl, *Taxonomy of Educational Objectives, The Classification of Educational Goals—Handbook I: Cognitive Domain,* McKay, New York, N.Y., 1956.

Boyd, A., J. Caton, A. Singleton, P. Bromley, and C. Yorks, *TCRP Report 86/NCHRP Report 525 Volume 8: Continuity of Operations* (*COOP*) *Planning Guidelines for Transportation Agencies,* Transportation Research Board of the National Academies, Washington, D.C., 2005, 74 pp.

Clark, R.C. and A. Kwinn, *Evidence-based Guidelines for Synchronous e-Learning, the New Virtual Classroom,* Pfeiffer (John Wiley & Sons Inc.), Hoboken, N.J., 2007, pp. 69–81.

Clark, R.C. and R.E. Mayer, *e-Learning and the Science of Instruction, Proven Guidelines for Consumers and Designers of Multimedia Learning,* John Wiley & Sons, 2011, Hoboken, N.J., 496 pp.

Criteria for Accepted Practices in Safety, Health, and Environmental Training, ANSI/ASSE Z490.1-2009, American Society of Safety Engineers (ASSE), Des Plaines, IL, 2009.

Dornan, D.L. and M.P. Maier, *NCHRP Report 525: Surface Transportation Security, Volume 3: Incorporating Security into the Transportation Planning Process,* Transportation Research Board of the National Academies, Washington, D.C., 2005, 49 pp.

Edwards, F.L. and D. C. Goodrich, *Emergency Management Training and Exercises for Transportation Agency Operations, Report 09-17,* Mineta Transportation Institute, San Jose, Calif., June 2010, 50 pp.

Edwards, F.L. and D.C. Goodrich, *Handbook of Emergency Management for State-Level Transportation Agencies, Report 09-10,* Mineta Transportation Institute, San Jose, Calif., March 2010, 128 pp.

Edwards, F.L. and D.C. Goodrich, *Introduction to Transportation Security,* CRC Press, Boca Raton, Fla., 2013.

Emergency Transportation Operations: Resources Guide for NCHRP Report 525, Volume 6, Web-Only Document 73 (Project 20-59[11]), Transportation Research Board of the National Academies, Washington, D.C., July 2005 [Online]. Available: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w73.pdf.

Employee Performance Management Workgroup, *GOALS-ENGAGEMENT- ACCOUNTABILITY-RESULTS: Getting in GEAR for Employee Performance Management,* National Council on Federal Labor-Management Relations, Office of Personnel Management, Washington, D.C., Nov. 2011, 40 pp.

"Engineering and Computer Simulations," ECS Orlando [Online]. Available: http://www.ecsorl.com/ [accessed April 5, 2013].

Federal Emergency Management Agency (FEMA), "Learn About Presidential Policy Directive 8," U.S. Department of Homeland Security, Washington, D.C., Aug. 23, 2013

80

[Online]. Available: http://www.fema.gov/learn-about-presidential-policy-directive-8.

Federal Emergency Management Agency (FEMA), *Public Assistance Debris Management Guide* (*FEMA 325*), U.S. Department of Homeland Security, Washington, D.C., July 2007.

Federal Highway Administration (FHWA), *FHWA Scenario Planning Guidebook,* U.S. Department of Transportation, Washington, D.C., Feb. 2011.

Federal Highway Administration (FHWA), *Managing Travel for Planned Special Events* (*Handbook*), U.S. Department of Transportation, Washington, D.C., Sept. 2003

Federal Highway Administration (FHWA), *The National Incident Management System: A Workbook for State Department of Transportation Frontline Workers,* U.S. Department of Transportation, Washington, D.C., Sept. 2009.

Federal Highway Administration (FHWA), *Tabletop Exercise Instructions for Planned Events and Unplanned Incidents/Emergencies,* U.S. Department of Transportation, Washington, D.C., Nov. 2007.

Graham, J.L., et al., *NCHRP Report 525 Surface Transportation Security, Volume 13: Guide to Traffic Control of Rural Roads in an Agricultural Emergency,* Transportation Research Board of the National Academies, Washington, D.C., 2008, 37 pp.

Kemp, M., "Best Practices for Just-In-Time Teaching within the Virtual Classroom," EDU656, Dr. Nicole Runyon, Aug. 16, 2011 [Online]. Available: http://www.slideshare.net/MicheleKemp/justintime-training-best-practices.

Kemp, M., "Introducing the Virtual Classroom," EDU656, Dr. Nicole Runyon, Aug. 8, 2011 [Online]. Available: http://www.slideshare.net/MicheleKemp/edu656-week-1-assignment-the-virtual-classroom.

Kolb, D.A., *Experiential Learning: Experience as the Source of Learning and Development,* Prentice-Hall, Upper Saddle River, N.J., 1984.

Lockwood, S., J. O'Laughlin, D. Keever, and K. Weiss, *NCHRP Report 525 Surface Transportation Security Volume 6: Guide for Emergency Transportation Operations,* Transportation Research Board of the National Academies, Washington, D.C., 2005, 56 pp.

Lowrie, K.W., J.A. Shaw, and M.R. Greenberg, "Assessment of Surface Transportation Security Training Needs and Delivery Preferences," *Journal of Public Transportation,* Vol. 14, No. 4, 2011.

McKinney, J. and S. Kurtz-Rossi, *Culture, Health, and Literacy: A Guide to Health Education Materials for Adults with Limited English Literacy Skills,* Health Literacy Special Collection, World Education, Nov. 2000 [Online]. Available: http://healthliteracy.worlded.org/docs/culture.

Occupational Safety and Health Administration (OSHA), "Best Practices for Development, Delivery, and Evaluation of Susan Harwood Training Grants," OSHA, U.S. Department of Labor, Washington, D.C., Sept. 2010 [Online]. Available: http://www.osha.gov/dte/sharwood/best-practices.html.

ODP Strategy for Blended Learning Version 1.0, Office for Domestic Preparedness, U.S. Department of Homeland Security, Washington, D.C., Feb. 10, 2003.

"OSHA Training Standards Policy Statement," Occupational Safety and Health Administration, U.S. Department of Labor, Washington, D.C., April 28, 2010 [Online]. Available: http://www.osha.gov/dep/standards-policy-statement-memo-04-28-10.html.

Pipeline and Hazardous Materials Safety Administration (PHMSA) and the Dangerous Goods Advisory Council (DGAC), *What You Should Know: A Guide to Developing a Hazardous Materials Training Program,* U.S. Department of Transportation, Washington, D.C., July 2009.

Robert T. Stafford Disaster Relief and Emergency Assistance Act, "The Stafford Act" (Public Law 93-288), U.S. Code, Title 42, §5121–5207.

Science Applications International Corporation, *NCHRP Report 525 Surface Transportation Security, Volume 1: Responding to Threats: A Field Personnel Manual,* Transportation Research Board of the National Academies, Washington, D.C., 2004, 17 pp.

Springer, L., "Guidelines for Managerial Development," memorandum for chief human capital officers, U.S. Office of Personnel Management, Washington, D.C., Sept. 12, 2006.

"TCRP A-36 [Active]: Command-Level Decision Making for Transit Emergency Managers," Transportation Research Board of the National Academies, Washington, D.C., 2013 [Online]. Available: http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2891.

"Top 10 Training Best Practices for Effective Learning and Development Programs," LSA Global, Santa Clara, Calif., 2009 [Online]. Available: http://www.lsaglobal.com/about/Training-Best-Practices.asp [accessed Aug 14, 2011].

Transportation of Hazardous Material, U.S. Code, Title 49, §§5101 et seq.

Transportation Research Board Special Report 275: The Workforce Challenge: Recruiting, Training, and Retaining Qualified Workers for Transportation and Transit Agencies, Transportation Research Board of the National Academies, Washington, D.C., 2003, 204 pp.

U.S. National Archives and Records Administration, *Code of Federal Regulations,* Title 49, Parts 100-185, "Hazardous Materials Regulations."

"V-0008—Virtual Tabletop Exercise Series (VTTX) Rail Hazardous Materials Incident," Emergency Management Institute, Federal Emergency Management Agency, Emmitsburg, Md., March 4, 2013 [Online]. Available: http://training.fema.gov/EMIGrams/2013/955%20-%20 Training%20Opportunity%20-%20VTTX%20 V0008%20Training%20Opportunity%20-%20Rail%20 Incident%2024%20Apr%202013.pdf.

Wallerstein, N. and H. Rubenstein, *Teaching about Job Hazards: A Guide for Workers and Their Health Providers,* American Public Health Association, Washington, D.C., 1993.

Warne, T.R., *NCHRP Synthesis 59: Recruiting and Retaining Individuals in State Transportation Agencies,* Transportation Research Board of the National Academies, Washington, D.C., 2003, 59 pp.

Washington Military Department, "The Basic Plan," *Washington State Emergency Operations Plan,* Emergency Management Division, Camp Murray, April 11, 2008.

Wilson, M. and J. Hash, *Building an Information Technology Security Awareness and Training Program,* NIST Special Publication 800-50, Computer Security Division, Information Technology Laboratory, National Institute of Standards and Technology, Gaithersburg, Md., Oct. 2003.

82

APPENDIX A

Toolkit

Welcome to the 44-12 Toolkit (START HERE)

Structure of Toolkit

Quick Reference Sheets

• **Acronyms:** An index of all acronyms used both in the report and in the 44-12 Toolkit itself.
• **Delivery Methods:** A sheet defining all of the delivery methods used within the 44-12 Toolkit.
• **Key Courses and Catalogs:** A sheet presenting important courses and course catalogs related to emergency operations and hazards awareness.

Guidance Documents

The **"Guide Docs" sheet** lists several guidance documents identified by state DOTs and public works agencies participating in the case studies and the survey. The survey responses and the case study participants helped augment the initial list of documents .
• **"Recommended Documents"** are those documents recommended by project panel members, case study participants, and survey respondents.
• **"Other Documents"** are those which were found during the literature search, but were not cited in the main report nor recommended by survey respondents, panel members, or case study participants.

Source Organizations and Source-Specific Sheets

The **"Source Orgs" sheet** lists the organizations which have been identified as sources of training and exercise materials related to emergency operations and hazards awareness. The report and the Toolkit designate these organizations as "Source Organizations". *The Source Organizations are grouped into the nine categories below .*

Federal (FEMA)
Federal (Other DHS)
Federal (US DOT)
Federal (Other Federal)
State
Local
University/College
Associations & Coalitions
Private Firm

Some of the Source Organizations identified through this report had a sufficiently large number of courses, videos, Just-In-Time Training modules, and other training and exercise resources that could fill an entire sheet within the Toolkit. These resources have been placed in 17 separate **"Source-Specific Sheets"** . *Each sheet is accessible from the entry of its respective Source Organization(s).* **Use the links above to browse Source Organizations by category** . Please note that the Toolkit does not have a Source-Specific Sheet for every single Source Organization.

Important Notes for Users

• **Currency of information within this Toolkit.** *Any information* on *courses, catalogs, training resources, guidance documents, and organizations* is **subject to change** . Prices of courses can change. Training resources (such as videos) can be *modified or withdrawn.* Guidance documents can be *replaced or superseded* . Organizations can become *defunct* due to lack of funding. Therefore, the **Toolkit user is urged to follow-up on any information** in this Toolkit either *online* or by *phone* , with *qualified colleagues* , or with *representatives of the organizations* to which that information pertains.
• **User discretion for selecting and employing training resources.** Exact roles and responsibilities of DOTs and public works agencies can vary greatly between jurisdictions. It is *at the discretion of users* to determine if a specific course, video, module, or other training resource is appropriate for their *own agency's* M&O field personnel in their *own particular jurisdictions* .

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

83

• **Using the most up-to-date course catalogs and course information.** A user who is interested in any of the courses found in the Toolkit is advised to find the most up-to-date version of the course provider's catalog, because all key catalogs in this Toolkit are updated continuously on at least an annual basis.

Search Tips

How to search if a hyperlink is a "dead link"?

As time progresses, hyperlinks to the Guidance Documents, the Source Organizations, and these organizations' training and exercise resources may become inaccessible due to the original document or resource being discontinued, modified, or moved to another location online. "Dead links" are the result. *If a dead link is encountered* among Guidance Documents, Source Organizations, or the Source-Specific Sheets, *users may need to search online* to determine whether the document or resource either still *exists at another location online* or has been *discontinued or modified* .

The following information from the Toolkit may be useful as keywords in a search engine:
• Name/Title (of a course, video, module, or training/exercise resource)
• Name of Source Organization
• Name of Publishing Organization (of a Guidance Document)
• Title and Reference (of a Guidance Document)
• Phrases from the Description (of a Guidance Document)
• Phrases from the General Description (of a Source Organization)
• Phrases from the Description and Objectives (of a training/exercise resource)
• The reference to the web site or page under Clickable Links.

The list above is not exhaustive, and such a search – particularly for an old document or resource – may require some patience and creativity in keyword selection.

How to search over the entire Toolkit?

The Find function (Ctrl+F in Windows systems) can perform quick searches over the entire Toolkit:
1.   **Hold Ctrl+F (in Windows) to open Excel's Find function.**
2.   **Select "Workbook" from the drop-down menu for the "Within:" setting (dotted box below).**
       Note: This setting will result in a search for keywords over the entire Toolkit rather than restricting the search to the current Sheet.
3.   **Type the desired keywords into the "Find what:" field.**
4.   **Press "Find All".**

The figure below demonstrates the location of the "Within:" setting inside of the Find and Replace dialog box for Microsoft Office Excel 2007 and 2010. The appearance of the dialog box and the location of the setting may differ depending upon operating system (e.g. Apple vs. Microsoft), version of Microsoft Office, and/or other factors.

84
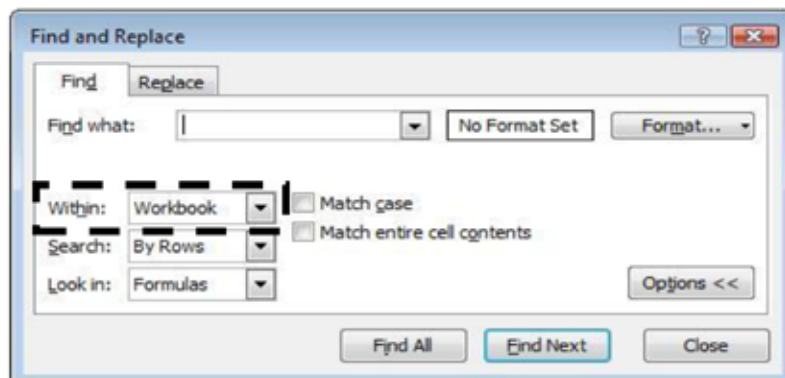
APPENDIX B

Survey Questionnaire

NCHRP Synthesis 44-12 All-Hazards Emergency Training and Exercises for Maintenance & Operations Personnel

Introduction

Dear **AASHTO Special Committee on Transportation Security and Emergency Management (SCOTSEM),
AASHTO Subcommittee on Maintenance,
American Public Works Association (APWA), and
International Municipal Signal Association (IMSA):**

The Transportation Research Board (TRB) is preparing a synthesis on **All-Hazards Emergency Training and Exercises for Maintenance & Operations Personnel**. This is being done for NCHRP, under the sponsorship of the American Association of State Highway and Transportation Officials, in cooperation with the Federal Highway Administration.

The Goal of NCHRP Synthesis 44-12 is to identify emergency training tools, exercises, and courses for the maintenance & operations (M&O) field personnel of (1) tribal and local public works agencies, and of (2) state DOTs, particularly at the district level. Maintenance & operations (M&O) personnel of state DOTs district offices, and tribal and local public works agencies who work in the field are often first on the scene when an emergency occurs. Therefore, their preparedness is essential, and training and exercises in all hazards emergency planning, preparation, and response is the key to their preparedness.

Accordingly, the purpose of this Survey is to gather information on Emergency Operations and Hazards Awareness training and exercise practices of state DOTs and local and tribal public works agencies, as well as information on training and exercise delivery methods. We seek to create a Toolbox of relevant training and exercise information and to identify key training- and exercise-related needs and issues relevant to M&O field personnel.

This questionnaire is being sent to state DOT district offices, and to local and tribal public works agencies around the country. Your cooperation in completing the questionnaire will ensure the success of this effort. **If you are not the appropriate person at your agency or organization to complete this questionnaire, please forward it to the correct person.**

Please compete and submit this survey by **March 12, 2013.** We estimate that it should take approximately 20 minutes to complete. If you have any questions, please contact our principal investigator Dr. Yuko Nakanishi at

85

Dr. Yuko J. Nakanishi.
<u>Email</u>: nakanishi@transresearch.net.
<u>Phone</u>: (347) 512-1959

Any supporting materials can be sent directly to Dr. Nakanishi by email.

QUESTIONNAIRE INSTRUCTIONS

1. <u>To view and print the entire questionnaire,</u> Click on the following link and print using "control p".
2. <u>To save your partial answers and complete the questionnaire later,</u> click on the "Save and Continue Later" link in the upper right hand corner of your screen. A link to the incomplete questionnaire will be emailed to you from *SurveyGizmo.* To return to the questionnaire later, open the email from *SurveyGizmo* and click on the link. We suggest using the "Save and Continue Later" feature if there will be more than 15 minutes of inactivity while the survey is opened, as some firewalls may terminate due to inactivity.
3. <u>To pass a partially completed questionnaire to a colleague,</u> click on the on the "Save and Continue Later" link in the upper right hand corner of your screen. A link to the incomplete questionnaire will be emailed to you from *SurveyGizmo.*" Open the email from *SurveyGizmo* and forward it to a colleague.
4. <u>To view and print your answers before submitting the survey,</u> click forward to the page following questions 19 and 20. Print using "control p."
5. <u>To submit the survey,</u> click on "Submit" on the last page.

Thank you very much for your time and expertise.

Please see the next page for a glossary and a list of acronyms used in this questionnaire.

Please enter the date (MM/DD/YYYY).

[   ]

Please enter your contact information. NCHRP will email you a link to the online report when it is completed.

First Name *****   Last Name *****

[   ]   [   ]

Position/Title

[   ]

Agency/Organization *****

86

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Street Address *****

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Apt/Suite/Office

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City   State *****   Zip *****

Country

Email Address *****

Phone Number *****

Glossary and Acronyms

Glossary and Acronyms

This Glossary is based primarily on NCHRP TCRP Vol. 9 and HSEEP Volume I Glossary:

Drill. A coordinated, supervised activity usually used to test a single, specific operation or function in a single agency. Drills are commonly used to provide training with new equipment, to develop new policies or procedures, to practice and maintain current skills, and to test skills that constitute one or more components of a plan.

Emergency. An incident that threatens human life, health, property, or the environment if not controlled, contained, and/or eliminated immediately. The threat of the condition, incident, or event requires immediate response actions to save lives; prevent injuries; protect property, public health, the environment, and public safety; or lessen or avert the threat of a disaster.

Emergency Training. Instruction on hazards awareness and emergency operations which is meant to impart foundational knowledge (both in procedures and in concepts) to field maintenance and operations personnel so that they can (1) perform their assigned duties during response and

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

87

recovery phases and (2) exercise their roles during the preparedness phase. Note that exercises are a form of training.

Evaluation. The process used to measure the demonstrated ability to accomplish specified objectives within a discrete exercise. Exercise evaluation refers to the act of reviewing or observing and recording exercise activity or conduct; applying the behavior or activity against exercise objectives; and noting strengths, weaknesses, deficiencies, or other observations.

Exercise. An activity requiring a performance, integration, and coordination of response activities by several individuals and teams. Exercises, except for table-top exercises, normally involves mobilization of personnel and resources. As noted in HSEEP Volume I, an exercise is carried out to train for, assess, practice, and improve performance. It can also be used for testing and validating policies, plans, procedures, training, equipment, and inter-agency agreements; clarifying and training personnel in roles and responsibilities; improving interagency coordination and communications; identifying gaps in resources; improving individual performance; and identifying opportunities for improvement.

Field Crew Meetings. Field crew meetings such as tail gate, hip pocket, and tool box talks can be good opportunities for personnel training.

Full-Scale Exercise (FSE). An exercise enabling the validation of major aspects of plans, policies, procedures, systems, and resources and involving all levels of participating organizations. FSEs greatly expand the scope and visibility of the exercise program. FSEs include the mobilization of personnel and resources and the actual movement of crisis and consequence management workers, equipment, and resources required to demonstrate coordination and response capability. Large FSEs actively involve agencies and participants.

Functional Exercise. An exercise designed to test and evaluate individual capabilities, multiple functions, or activities within a function or interdependent groups of functions. A functional exercise can take place in an operating center, in the field, or a combination of the two. This format is applicable where the activity can be effectively evaluated in isolation from other activities. In contrast to the full-scale exercise, the objective of the functional exercise is to demonstrate the execution of specific plans and procedures and the direct application of established policy, plans, and procedures under emergency conditions, within or by a particular function team. The functional exercise simulates the reality of operations in a functional area to the maximum degree possible by presenting complex and realistic problems requiring rapid and effective responses by trained personnel in a highly stressful environment. Through documented evaluation and subsequent corrective action, the capabilities of the functional area are improved and weaknesses are reduced or eliminated. Functional exercises are sometimes called "command post" exercises.

Hazard. An actual or potential condition that can cause injury, illness, or death of personnel; damage to or loss of equipment or property and the environment; or degradation to an organizational capability.

88

Incident. An event that affects normal operations, requires attention, and has the potential to precipitate an emergency or crisis.

Just-in-Time Training. Just-in-Time training refers to training that is provided as the need arises.

Scenario. A sequential account of a hypothetical situation or chain of events that depicts an incident, emergency, or crisis and all the associated consequences used to frame and guide simulation during an exercise.

Seminar. An informal discussion in a group setting, in which a seminar leader facilitates the group's focus on a specific topic or issue. Seminars occur in a low-stress environment. As noted in HSEEP Volume I glossary, it is a type of discussion-based exercise that orients participants to authorities, strategies, plans, policies, procedures, protocols, resources, concepts, and/or ideas.

Simulation. An artificially produced condition that replicates a real-life situation. In the broad sense, exercises and games are simulations. The term, Computer-Assisted Simulation, refers to a method of conducting exercises in a virtual environment.

Tabletop Exercise (TTX). An exercise that simulates an emergency in an informal, stress-free, conference-room-type environment. As noted in HSEEP Volume I glossary, it is a type of discussion-based exercise which can be used to facilitate understanding of concepts, identify strengths and shortfalls, and/or achieve a change in attitude.

Terrorism. The unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives. Terrorism can be domestic or international.

Threat. The known or suspected presence of an actor with the ability, will, and motive to inflict harm.

Train-the-Trainer. Train-the-Trainer courses and tools focus on training for instructors of training courses.

Workshop. A meeting that generally involves briefings and the use of facilitated breakout sessions where pre-established topics and issues are discussed and results of these breakout sessions are reported in a plenum. As noted in HSEEP Volume I glossary, it is a type of discussion-based exercise and provides increased participant interaction with a focus on achieving or building a product. Workshops are typically used to train groups in coordinated activities; obtain consensus; and test new ideas, processes, or procedures.

Acronyms

ICS Incident Command System

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

89

IS Independent Study

LTAP Local Technical Assistance Program

M&O Maintenance and Operations

NIMS National Incident Management System

NRF National Response Framework

TTAP Tribal Technical Assistance Program

VOIP Voice Over Internet Protocol

Background Questions

Background Questions

1. How many employees does your DOT or public works agency employ? Select one.

- ○ <50
- ○ 51-99
- ○ 100-249
- ○ 250-499
- ○ 500-999
- ○ 1000-1999
- ○ 2000-4999
- ○ >5000

2. How many full-time equivalent (FTE) maintenance and operations field personnel does your DOT or public works agency employ? Select one.

- ○ <50
- ○ 51-99

90

- ○ 100-249
- ○ 250-499
- ○ 500-999
- ○ 1000-1999
- ○ 2000-4999
- ○ >5000

3. Does your DOT or public works agency outsource maintenance and operations functions to contractors?

- ○ Yes
- ○ No

If yes, approximately what percentage of your work is outsourced?

[   ]

(cont.) Please provide the maintenance and operations functions that you have outsourced:

[   ]

4. For Fiscal Year 2012, what was the annual training and exercises budget of your DOT or public works agency? (Numeric answer, in $)

[   ]

5. Of the amount given in the previous question, what percentage was expended for maintenance and operations (M&O) field personnel training? (Numeric answer, 0-100%)

[   ]

6. Does your organization provide [training, drills, and/or exercises](#) to its maintenance and operations field personnel in Emergency Operations, Hazards Awareness, or related functions? Please select one:

○ Yes

○ No

If Yes, which hazards are covered? Please select all that apply.

☐ All-hazards

☐ Flood

☐ Earthquake

☐ Wildfire

☐ Hurricane

☐ Windstorm

☐ Snowstorm

☐ Landslide

☐ Please list Other Hazards not mentioned above: [   ]

Questions on Training

Questions on Training
Note that all questions in this section refer to your organization's *maintenance & operations (M&O) field personnel.*

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7. Does your DOT or public works agency make use of any of the following formal **Instructor-led Classroom Training resources** in its program to train field personnel for their role in Emergency Operations and Hazards Awareness?

This includes Instructor-led Classroom training delivered over Closed-Circuit TV (CCTV), Video Tele Conference (VTC), and Voice- or Video-over-IP services (for example, Skype).

Also, please indicate whether it is required or voluntary.

92

	We Do Not Use	Required	Voluntary
Center for Domestic Preparedness (FEMA)	○	○	○
Emergency Management Institute (FEMA)	○	○	○
National Highway Institute (FHWA)	○	○	○
National Transit Institute (FTA)	○	○	○
National Training and Education Division (FEMA)	○	○	○
LTAP/TTAP Center	○	○	○
University/College (other than LTAP/TTAP)	○	○	○

8. Does your DOT or public works agency make use of any of the following **Online- and Computer-Based Training resources** in its program to train field personnel for their role in Emergency Operations and Hazards Awareness?

Also, please indicate whether it is required or voluntary.

	We Do Not Use	Required	Voluntary
ICS Training Program & Resource Center (FEMA)	○	○	○
Independent Study (IS) Program (FEMA)	○	○	○
NIMS Training Program & Resource Center (FEMA)	○	○	○
NRF Resource Center (FEMA)	○	○	○
National Transit Institute (FTA)	○	○	○
National Highway Institute (FHWA)	○	○	○
LTAP/TTAP Center	○	○	○
University/College (other than LTAP/TTAP)	○	○	○

9. In its program to train field personnel for their role in Emergency Operations and Hazards Awareness, are there **other resources** that your DOT or public works agency uses which were *not* listed in the preceding two questions? If so, please list them below:

10. What is/are your DOT's or public works agency's preferred delivery method(s) when training M&O field personnel for their role in Emergency Operations and Hazards Awareness? Please select all methods that apply, and please indicate frequency of training delivery.

		Frequency of Training (e.g. Ongoing, 2-3 times/yr, annually, as needed, when available)
Instructor-led Classroom Training	☐	
Scenario-based Training	☐	
Online- and Computer-based Training	☐	
Interactive Videos	☐	
Field crew meetings (aka "tail-gate", "hip-pocket", or "tool box" talks)	☐	
Webinars	☐	
Seminars or Workshops	☐	
Just-in-Time Training	☐	
Train-the-Trainer	☐	
Other, please specify in textbox at right, along with Frequency	☐	

11. In its program to train field personnel for their role in Emergency Operations and Hazards Awareness, are there other **delivery methods for training** that your DOT or public works agency uses which were *not* listed in the preceding question? If so, please list them below:

Questions on Training

12. Does your DOT or public works agency use performance metrics or other tools in assessing the

effectiveness of training?

○ Yes

○ No

If Yes, please describe these metrics or tools:

13. Has your DOT or public works agency encountered any problems or challenges with implementing its existing program to train field personnel for their role in Emergency Operations and Hazards Awareness? Please select one:

○ Yes

○ No

If Yes, please specify the problems or challenges: (Please select all that apply)

☐ Inadequate facilities and other resources (e.g. PCs, Internet)

☐ Insufficient budget for staff overtime to take training

☐ Insufficient budget for training contractor

☐ Difficulty in scheduling/conflict with work priorities

☐ Lack of desired content

☐ Lack of facility to deliver training

☐ Lack of in-house staff qualified to deliver training

☐ Lack of personnel interest

☐ Lack of management support

☐ NIMS/ICS training requirements are confusing

☐ Evaluation issues

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

95

☐ Language issues

☐ Lack of computer skills

☐ Other, please specify: [   ]

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14. Are there any gaps or unaddressed needs in your current program to train field personnel for their role in Emergency Operations and Hazards Awareness? Please select one:

○ Yes

○ No

If Yes, please describe the needs in further detail here:

[   ]

Questions on Exercises

Questions on Exercises
Note that all questions in this section refer to the inclusion of your DOT's or public work agency's field personnel in emergency exercises. Please refer to the Glossary for a definition of Exercises and for definitions of specific types of exercises.

---

15. Please indicate in which of the following exercise types your DOT or public work agency requires or encourages your field personnel to participate.

Also, please indicate whether the participation of your field personnel is required or voluntary:

	M&O Field Personnel Do Not Participate	Required	Voluntary
Full-Scale Exercises	○	○	○
Functional Exercises	○	○	○
Drills	○	○	○

Table-Top Exercises	○	○	○
Workshops on Emergency Operations and/or Hazards Awareness	○	○	○
Seminars on Emergency Operations and/or Hazards Awareness	○	○	○

Comments: if you have any comments regarding exercises, please provide below:

16. What problems or challenges has your DOT or public work agency encountered in incorporating field personnel into emergency exercises? (Please select all that apply)

☐ Inadequate facilities and other resources (e.g. PCs, Internet)

☐ Insufficient budget for staff overtime to take training

☐ Insufficient budget for training contractor

☐ Difficulty in scheduling/conflict with work priorities

☐ Lack of desired content

☐ Lack of facility to deliver training

☐ Lack of in-house staff qualified to deliver training

☐ Lack of personnel interest

☐ Lack of management support

☐ NIMS/ICS training requirements are confusing

☐ Evaluation issues

☐ Language issues

☐ Lack of computer skills

☐ Other, please specify:

Questions on Guidance Documents

Note that all questions in this section refer to documents which guide your DOT's or public work agency's emergency training and exercise programs.

17. Which guidance documents, if any, does your DOT or public work agency use in designing its training and exercise program related to Emergency Operations and Hazards Awareness? Please specify below:

18. Please list any relevant links to web pages for your DOT's or public work agency's training and/or exercise program related to Emergency Operations and Hazards Awareness:

19. Would you be willing to provide additional information about your training and/or exercise program related to Emergency Operations/Hazards Awareness?

○ Yes

○ No

New Page

20. If you answered No on Question 6, please indicate the reasons why your DOT or public work agency has not implemented an Emergency Operations and Hazards Awareness training or exercise program that incorporates its field personnel: (Please select all that apply)

☐ Inadequate facilities and other resources (e.g. PCs, Internet)

☐ Insufficient budget for staff overtime to take training

- ☐ Difficulty in scheduling/conflict with work priorities
- ☐ Insufficient information about available training
- ☐ Lack of desired content
- ☐ Lack of facility to deliver training
- ☐ Lack of in-house staff qualified to deliver training
- ☐ Lack of personnel interest
- ☐ Lack of management support
- ☐ NIMS/ICS training requirements are confusing
- ☐ Evaluation issues
- ☐ Language issues
- ☐ Lack of computer skills
- ☐ Insufficient budget for training contractor
- ☐ Other, please specify: _____

Please advance to the next page to review your responses.

Please Review Your Responses

Thank You!

Thank you for taking our survey. Your response is very important to us. If you have any questions or comments, please feel free to contact Dr. Yuko Nakanishi at

Dr. Yuko J. Nakanishi.
Email: nakanishi@transresearch.net.
Phone: (347) 512-1959

APPENDIX C

Screening Survey Responses

Screening Survey Results

NCHRP Synthesis 44-12 All-Hazards Emergency Training and Exercises for Maintenance & Operations Personnel

Note that these results may not appear in the same order as the questions in the survey questionnaire.

1. How many employees does your DOT or public works agency employ? Select one.

Employees	All	State	Local
<50	12	3	8
51-99	6	1	5
100-249	6	0	6
250-499	5	2	3
500-999	0	0	0
1000-1999	4	4	0
2000-4999	9	9	0
>5000	6	6	0
Total Responses	48	25	22

2. How many full-time equivalent (FTE) maintenance and operations field personnel does your DOT or public works agency employ? Select one.

Employees	All	State	Local
<50	18	4	13
51-99	4	0	4
100-249	5	0	5
250-499	3	3	0
500-999	4	4	0
1000-1999	7	7	0
2000-4999	6	6	0
>5000	1	1	0
Total Responses	48	25	22

100

3. Does your DOT or public works agency outsource maintenance and operations functions to contractors?

	All	State	Local
Yes	24	13	10
No	24	12	12
Total Responses	48	25	22

Functions identified as being outsourced included the following:

State

- Aviation infrastructure maintenance, operations
- Bridge painting
- Bridge repair
- Brush clearing
- Cable barrier installation
- Crack/chip sealing, seal coats
- Culvert repair
- Debris removal
- Equipment maintenance
- Facility maintenance
- Freeway service patrol
- Guardrail repair
- Heat straightening
- ITS maintenance
- Lighting
- Litter pick-up
- Mowing
- Paving
- Pavement markings/striping
- Pavement overlays
- Pavement repair and replacement
- Plug joints
- Rental of maintenance equipment
- Research
- Rest area security
- Roadway/signage inspections
- Road maintenance
- Sand and salt hauling
- Signal markings
- Signal repair
- Snow and ice control
- Snow removal
- Sweeping

- Traffic control
- Traffic management center staffing
- Transit infrastructure repair and replacement
- Tree trimming

Local

- Asphalt overlay
- Construction
- Electrical, high voltage
- Equipment repair
- Fire alarm maintenance
- Generator maintenance
- Knockdowns
- Lighting maintenance and repair
- New installations
- Paving
- Road reconstruction
- SCADA controls programming
- Security alarm maintenance
- Signage projects
- Snow and ice control
- Snow removal
- Street sweeping, mechanical
- Traffic signal installations
- Traffic signal maintenance and repair
- Trucking
- Refuse and recycling collection
- Road reconstruction
- Rodent control
- Paving, storm sewer pipes
- Vehicle maintenance and repair
- Water and Sewer operations and maintenance
- Utility repair

102

4. Does your organization provide training, drills, and/or exercises to its maintenance and operations field personnel in Emergency Operations, Hazards Awareness, or related functions?

	All	State	Local
Yes	32	22	10
No	16	3	12
Total Responses	48	25	22

The following table breaks down the responses by M&O field personnel FTEs.

	STATE		LOCAL	
FTE	**Yes**	**No**	**Yes**	**No**
<50	3	1	7	6
51-99	0	0	1	3
100-249	0	0	2	3
250-499	2	1	0	0
500-999	3	1	0	0
1000-1999	7	0	0	0
2000-4999	6	0	0	0
>5000	1	0	0	0
Total Responses	22	3	10	12

If Yes, which hazards are covered?

	All	State	Local
All-hazards	19	12	7
Flood	12	11	1
Earthquake	7	7	0
Wildfire	5	5	0
Hurricane	9	7	2
Windstorm	7	5	2
Snowstorm	16	12	4
Landslide	4	4	0
Other	8	6	2
Total Responses	32	22	10

"Other" included Tornado, Accident, Hazmat, Homeland Security, Nuclear, Active Shooter, Continuity of Operations, Electrical.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

103

If "No", please indicate the reasons why your DOT or public works agency has not implemented an Emergency Operations and Hazards Awareness training or exercise program that incorporates its field personnel:

	All	State	Local
Inadequate facilities and other resources (e.g. PCs, Internet)	2	1	1
Insufficient budget for staff overtime to take training	6	1	5
Difficulty in scheduling/conflict with work priorities	7	2	5
Insufficient information about available training	5	1	4
Lack of desired content	0	0	0
Lack of facility to deliver training	0	0	0
Lack of in-house staff qualified to deliver training	7	1	6
Lack of personnel interest	2	0	2
Lack of management support	5	0	5
NIMS/ICS training requirements are confusing	4	0	4
Evaluation issues	1	0	1
Language issues	0	0	0
Lack of computer skills	0	0	0
Other, please specify:	6	2	3
Insufficient budget for training contractor	7	1	6
Total Responses	17	4	12

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

104

5. Does your DOT or public works agency make use of any of the following formal Instructor-led Classroom Training resources in its program to train field personnel for their role in Emergency Operations and Hazards Awareness?

	NO			REQUIRED			VOLUNTARY			TOTAL RESPONSES		
	All	State	Local	All	State	Local	All	State	Local	All	State	Local
Center for Domestic Preparedness (FEMA)	16	10	6	3	1	2	9	8	1	28	19	9
Emergency Management Institute (FEMA)	11	7	4	12	8	4	8	6	2	31	21	10
National Highway Institute (FHWA)	12	7	5	3	2	1	16	13	3	31	22	9
National Transit Institute (FTA)	22	15	7	1	0	1	6	5	1	29	20	9
National Training and Education Division (FEMA)	18	13	5	2	0	2	9	7	2	29	20	9
LTAP/TTAP Center	19	15	4	4	2	2	9	5	4	32	22	10
University/College (other than LTAP/TTAP)	16	10	6	2	1	1	12	10	2	30	21	9

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

105

6. Does your DOT or public works agency make use of any of the following Online- and Computer-Based Training resources in its program to train field personnel for their role in Emergency Operations and Hazards Awareness?

	NO			REQUIRED			VOLUNTARY			TOTAL RESPONSES		
	All	State	Local	All	State	Local	All	State	Local	All	State	Local
ICS Training Program & Resource Center (FEMA)	8	6	2	16	9	7	7	6	1	31	21	10
Independent Study (IS) Program (FEMA)	5	4	1	15	8	7	11	9	2	31	21	10
NIMS Training Program & Resource Center (FEMA)	8	6	2	15	9	6	7	6	1	30	21	9
NRF Resource Center (FEMA)	15	8	7	1	1	0	13	11	2	29	20	9
National Transit Institute (FTA)	20	13	7	0	0	0	8	6	2	28	19	9
National Highway Institute (FHWA)	13	8	5	1	1	0	16	12	4	30	21	9
LTAP/TTAP Center	19	15	4	3	2	1	8	4	4	30	21	9
University/College (other than LTAP/TTAP)	16	10	6	0	0	0	14	11	3	30	21	9

106

7. List of Other Resources used for Emergency Operations and Hazards Awareness training:

State

- California Specialized Training Institute (CSTI)
- Vermont State Police Academy (ICS Level 100)
- Department of Military Affairs - DES Bureau to deliver ICS/NIMS training
- Arizona Division of Emergency Management training.
- State EMA (MEMA), Transit Security Institute, and others.
- Ohio Emergency Management Agency, Ohio Department of Agriculture.
- Minnesota Homeland Security Emergency Management.
- State Fire Academy Certified ICS instructors
- TEEX

Local

- American Public Works Association
- IMSA MOT Training
- Mass Arborists Association
- Private Training Companies and CIRMA/CCM
- USF T2 training

8. What is/are your DOT's or public works agency's preferred delivery method(s) when training M&O field personnel for their role in Emergency Operations and Hazards Awareness?

	All	State	Local
Meetings	22	17	5
Instructor-led Classroom	25	19	6
Interactive Video	8	6	2
JITT	9	7	2
CBT	19	14	5
Other	3	3	0
Scenario-based	17	12	5
Seminars, Workshops	18	12	6
TTT	11	10	1
Webinars	12	10	2

9. Does your DOT or public works agency use performance metrics or other tools in assessing the effectiveness of training?

	All	State	Local
Yes	8	7	1
No	25	15	10
Total Responses	33	22	11

Metrics or Tools Used
- Annual Performance Measures
- Evaluations, After Action Evaluations
- Tracking of participation and course completion.
- Data on traffic incident clearance for an Interstate Corridor
- Pre Exercise Goals
- Post Training Assessment Report/Evaluation.
- Surveys
- Testing

10. Has your DOT or public works agency encountered any problems or challenges with implementing its existing program to train field personnel for their role in Emergency Operations and Hazards Awareness?

	All	State	Local
Yes	16	10	6
No	17	12	5
Total Responses	33	22	11

If Yes, please specify the problems or challenges:

	All	State	Local
Inadequate facilities and other resources (e.g. PCs, Internet)	3	1	2
Insufficient budget for staff overtime to take training	4	2	2
Insufficient budget for training contractor	8	4	4
Difficulty in scheduling/conflict with work priorities	12	8	4
Lack of desired content	2	2	0
Lack of facility to deliver training	0	0	0
Lack of in-house staff qualified to deliver training	6	5	1
Lack of personnel interest	2	1	1
Lack of management support	2	1	1
NIMS/ICS training requirements are confusing	2	1	1
Evaluation issues	0	0	0
Language issues	1	0	1
Lack of computer skills	3	1	2
Other, please specify:	4	2	2
Total Responses	16	10	6

108

11. Are there any gaps or unaddressed needs in your current program to train field personnel for their role in Emergency Operations and Hazards Awareness?

	All	State	Local
Yes	17	12	5
No	16	10	6
Total Responses	33	22	11

12. Please indicate in which of the following exercise types your DOT or public work agency requires or encourages your field personnel to participate.

	FIELD PERSONNEL DO NOT PARTICIPATE			REQUIRED			VOLUNTARY			TOTAL RESPONSES		
	All	State	Local	All	State	Local	All	State	Local	All	State	Local
Full-Scale Exercises	11	6	5	12	11	1	5	4	1	28	21	7
Functional Exercises	9	5	4	11	9	2	8	7	1	28	21	7
Drills	9	5	4	9	7	2	10	8	2	28	20	8
Table-Top Exercises	9	6	3	12	9	3	9	6	3	30	21	9
Workshops	7	5	2	7	6	1	16	9	7	30	20	10
Seminars	6	4	2	8	6	2	15	9	6	29	19	10

13. What problems or challenges has your DOT or public works agency encountered in incorporating field personnel into emergency exercises?

	All	State	Local
Inadequate facilities and other resources (e.g. PCs, Internet)	9	4	5
Insufficient budget for staff overtime to take training	15	10	5
Insufficient budget for training contractor	13	6	7
Difficulty in scheduling/conflict with work priorities	27	19	8
Lack of desired content	2	1	1
Lack of facility to deliver training	1	0	1
Lack of in-house staff qualified to deliver training	13	8	5
Lack of personnel interest	4	3	1
Lack of management support	8	6	2
NIMS/ICS training requirements are confusing	5	3	2
Evaluation issues	0	0	0
Language issues	1	0	1
Lack of computer skills	6	3	3
Other, please specify:	2	1	1
Total Responses	32	22	10

14. Comments regarding Exercises

- State DOT will participate in exercises hosted by other agencies or by our Military Affairs - DES. The number of participants is limited.
- Full scale exercises involving field personnel is needed.
- Hard for field employees to participate and still perform the daily duties required on the roadway.
- State holds annual exercises as required by the state EMA. Some counties do not fully utilize exercises held by the state DOT. First responders more fully utilize the exercises.
- Required for our EMC, most district level emergency response personnel attend all the above.
- We encourage, nurture, and participate in local exercises. We successfully helped a local community develop, get funding, and host an exercise involving traffic incident management (TIM) and state and local response.

110

15. List of relevant links to web pages for Emergency Operations and Hazards Awareness training/exercise programs

State

- FEMA website
- www.azdema.gov
- http://dotweb/organization/operations/highwaymaintenance/index.asp *(Author's Note: This link is to an internal intranet)*
- Internal Emergency Management Page with emergency contacts listing and support procedures.
- Internal intranet. http://www.mbta.com/transitpolice/default.asp?id=25703. http://transnet/MassDOTUniversity/index.html
- Texas DPS Office of Emergency Management Website

Local: *No links suggested by Local respondents.*

16. List of relevant Guidance Documents used to develop Emergency Operations and Hazards Awareness training/exercise programs

State

- CPG101
- Emergency Response Guides (2)
- ETO Manual
- FHWA/SHRP2 Traffic Incident Management training
- Homeland Security
- HSEEP / HSEEP FEMA Independent Study
- NIMS/ICS
- NIMSCAST ICS
- NRC regulations (for drills and exercises pertaining to nuclear plants)
- Ohio Emergency Operations Plan
- Pandemic Flu Plan
- State Emergency Operations Plan
- State Emergency Operations Plan Field Operations Guide
- TRB and NCHRP guidance publications

Local

- EOP, OSHA, FEMA regulations
- EPA and FEMA scenarios
- FEMA documents
- IMSA
- SOP City Emergency DOC

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

111

17. Comments regarding Unaddressed Needs/Gaps

State

- Coordination between fire and police
- Funding
- Insufficient training frequency
- More targeted training for support personnel (e.g., human resources, procurement, budgeting, construction, etc.)
- Need better ICS and ESF1 role awareness
- Preparing and Training on Emergency Operations Plan
- Response to accidents involving hazardous materials, flooding or storm damage (e.g., downed electrical lines, structure damage, etc.)
- Training for new employees (2)

Local

- Dealing with trauma
- Expired certifications
- Funding and personnel coordination issues
- Insufficient frequency of training
- Preparedness for out of area deployment
- Search and rescue
- Training for new employees

112

APPENDIX D

Case Example Interview Guide

NCHRP Synthesis 44-12 Case Example Interview Guide

Background questions

- Agency
- Name/title
- Division
- Address
- Phone/email
- Total number of employees
- Total number of M&O field personnel (not including contractors)
- Total number of contractors performing M&O field work
- Number of district offices
- Annual training budget
- Annual training budget for M&O field personnel
- Number of training personnel

Training and exercise needs

- What are the training and exercise needs of M&O field personnel and first-line supervisors and contractors?
- Training and exercise practices.
- Does your agency or district office have a training and exercise policy for M&O field personnel? If so, please describe or provide a copy of the policy.
- Does your district office provide a training and exercise program for its M&O field personnel? If so, please describe or provide a copy of the program.
- If the following information is included in the copy of the program, there is no need to repeat it:
- What are the key emergency training needs of M&O field personnel?
- What training do M&O field personnel undergo?
- What are the sources of the training?
- How often do they undergo the training?
- How is the training delivered (in-house, consultant, LTAP/TTAP, other agency or organization)?
- Does your agency hold exercises? If so, do M&O field personnel participate in them and what percentage or how many of them participate? What types of exercises are they?
- How often do they undergo the exercises?
- How is the training and exercise schedule for each M&O field personnel determined? Which persons determine the schedule?
- Does your agency use field crew meetings to train your M&O field personnel? If so, please describe.
- Does your agency use (or has it considered for use) other types of training? If so, please describe.
- Please describe technologies being used for training and exercises for M&O field personnel. Please also describe any implementation and maintenance issues, initial costs, ongoing costs, other issues, and benefits of the technologies. Also please include information on feedback received from trainees or trainers on these technologies.
- What technologies has your agency used but discontinued? Please describe them and why they were discontinued.
- What technologies has your agency considered but decided not to use? Please describe them and why they were not selected for training and exercises.
- Does your agency practice just-in-time training (training provided when the need arises)? If so, please describe.
- Do you coordinate with other agencies and organizations to provide training and exercises? If so, please indicate the agencies and organizations and how the coordination takes place.

Training and exercise evaluation

- How do you evaluate your training and exercise program?
- How are trainees/participants evaluated?

- If performance metrics are used, please describe them.
- If results of program evaluations are available, please provide them.

Training and exercise implementation costs and issues

- Are there specific attributes of M&O field personnel that make training and exercise delivery particularly difficult? If so, please describe them and how your agency is addressing them.
- What are the costs of each practice per agency personnel? per contractor?
- Please describe sources of funding for your agency's training and exercise program and any insufficiencies in funding that your agency is facing.
- Does your agency pay for training and exercises of local public works agencies?
- Does your agency require local public works agencies to undergo particular training and/or exercises?
- Does your agency pay for contractor training and exercises?
- Does your agency require contractors to undergo particular training and/or exercises?
- What issues have you faced in terms of your agency personnel?
- What issues have you faced in terms of your local public agency personnel?
- What issues have you faced in terms of your contractors?
- What training and exercise gaps are you currently challenged with?

Scenarios

- What scenarios are used by your agency for training and exercises?
- What are the sources of your agency's training and exercise scenarios?
- Does your agency develop training and exercise scenarios? If so, how are they developed?
- Train-the-trainer
- Does your agency provide train-the-trainer training for M&O field personnel? If so, what are the sources of the training? Which M&O field personnel undergo this training?

114

APPENDIX E

List of Interviewees and Case Examples

List of Case Study Interviewees

State	Position and/or Division
Arizona	Emergency Manager
California	Branch Chief, Homeland Security Office of Emergency Management
Iowa	Director, Statewide Emergency Operations, Office of Traffic Operations
Missouri	Central Office Traffic and Highway Safety
Rhode Island	Division of Highway and Bridge Maintenance
Tennessee	Emergency Services Coordinator, Office of Emergency Operations
Texas	Emergency Management Coordinator, Congressional Liaison, Maintenance Division
Vermont	Program Development Division, Operations Division, Finance and Administration
Washington	Assistant State Maintenance Engineer
Public Works Agency	Position and/or Division
City of Keene, New Hampshire	Public Works Director
Plant City, Florida	Traffic and Street Stormwater Superintendent

ARIZONA DEPARTMENT OF TRANSPORTATION (ADOT) CASE STUDY

State	Arizona
Population	6,500,180
Size	113,635 sq. miles
Density	45.2 persons/sq. mile
DOT Size	4,600 employees
DOT Field Personnel	900 employees
Headquarters	Phoenix
District Offices	9 offices
Roadway or Highway Mileage	6,722 miles
Bridges	4,735 bridges

Half of Arizona is forested, and drought conditions can be frequent as well as severe. This creates a higher likelihood of wildfires. Seasonal rains bring flooding and landslides. Arizona also has a nuclear power station in Maricopa County; the Nuclear Regulatory Commission (NRC) requires additional training and exercises for agencies in the vicinity of the station. In 2013, incidents included nine winter storm events, the Doce Fire (June 16), the Yarnell Hill Fire (June 30), and the 19-vehicle three-fatality I-10 Dust Incident (Oct. 29).

ADOT has nine district offices and over 4,600 employees, of whom 900 are M&O field personnel (these numbers do not include construction personnel and contractors). ADOT has an annual training budget of about $200,000, and two full-time training personnel for M&O personnel. Many ADOT staff perform training duties outside of their normal positions.

Determining which personnel need what training has been difficult. After considerable planning and background research, training matrices were created. ADOT requires a minimum of IS-100, IS-700, and traffic incident management (TIM) training for its M&O field personnel. ADOT does not use contractors for exercise or training and does not pay for local public agency or contractor training.

To facilitate training of its personnel on emergency preparedness and management, ADOT has created a comprehensive course catalog of courses available through ADOT, the Arizona Division of Emergency Management (ADEM), and other

sources. The catalog is also useful for other audiences, including public works personnel and local responders, but is currently not available for public viewing.

TRAINING AND EXERCISE NEEDS OF M&O FIELD PERSONNEL

Emergency Management: In 2007 the NIMS/ICS training matrix was created with four levels of training for M&O field personnel. The current matrix, shown in TABLE 1, has been updated and additional levels have been created. TABLE 1 only includes the first two of several training levels.

TABLE 1
ARIZONA DOT EMERGENCY PLANNING AND MANAGEMENT TRAINING MATRIX FOR OPERATIONS #1 AND #2
(*Courtesy*: ADOT)

ADOT Emergency Planning and Management Training Matrix
As of: August 16, 2013

Please Note:
IS-100.B can be satisfied with:
- IS-100.B Introduction to Incident Command System,
- IS-100.PWB IS-100 for Public Works, or
- IS-100.LEB IS-100 for Law Enforcement.

Changes made since last publication:
- Addition of other matrixes and change of original matrix to operational level
- Removed "FEMA Equivalents" column to reduce confusion.
- Added numerous categories and classes

ADOT Level	Required Training	ADOT Employee / Job Descriptions / Other Info

Operations #1 – 100, 700	Available on-line.
	1. IS-700.A - National Incident Management System (NIMS), An Introduction
	2. ICS 100 - Introduction to Incident Command System:
	  • IS-100.B - Introduction to Incident Command System,
	  • IS-100.PWB - Intro to ICS for Public Works, or
	  • IS-100.LEB - Intro to ICS for Law Enforcement
		• Equipment Services Shop and Fuels Management staff
		• Equipment Services Supervisors and Managers
		• Facilities Supervisors and Managers
		• Accounts Payable Supervisors and Managers
		• Human Resources Supervisors and Managers
		• Maintenance/Operations Personnel (field and office)
		• Safety & Risk Management Staff
		• Grand Canyon National Park Airport Staff
		• Construction Inspectors and Support Staff
		• Environmental Services Staff
		• MVD Customer Service Managers and Supervisors
		• Procurement Managers and Specialists
		• Emergency Response Team Personnel (Building Emergency Coordinators, etc.)
		• All Enforcement and Compliance Personnel

Operations #2 – 100, 200, 700, 800	Available on-line.
	1. IS-700.A - National Incident Management System (NIMS), An Introduction
	2. ICS 100 - Introduction to Incident Command System:
	  • IS-100.B - Introduction to Incident Command System,
	  • IS-100.PWB - Intro to ICS for Public Works, or
	  • IS-100.LEB - Intro to ICS for Law Enforcement
	3. IS-200.B - (ICS 200) ICS for Single Resources and Initial Action Incidents
	4. IS-800.B - National Response Framework, An Introduction
		• State Engineer
		• Deputy and Assistant State Engineers
		• Construction Resident Engineers
		• Bridge Engineers / Inspectors
		• Chief Procurement Officer
		• Chief Financial Officer
		• Physical Plant Operations Administrator
		• Manager Budget and Strategic Planning
		• Fiscal Operations Controller
		• Safety & Risk Management Director
		• Safety & Risk Deputy Directors
		• Traffic Operations Center personnel
		• Maintenance Supervisors
		• Maintenance Analysts

The first two levels apply to M&O field personnel and their supervisors. All courses required for the first two levels are available online as FEMA's Independent Study courses. Additional applicable audiences are also included in the matrix.

- Operations #1 – IS-100 (ICS), IS-700 (NIMS) – M&O Field and Office Personnel, Public Works Personnel
- Operations #2 – IS-100 (ICS), IS-200 (ICS), IS-700 (NIMS), IS-800 (NRF) – Maintenance Supervisors, First Line Supervisors including Field Supervisors and Single Resource Leaders
- Traffic Incident Management for Responders (TIM for Responders) – This course is required of all M&O field personnel and is coordinated with Arizona Department of Public Safety (AZDPS) statewide for first responders.

TRAINING PRACTICES

There is no training policy specific to emergency management, but ADOT the Emergency Preparedness and Management Group maintains intranet pages on training and exercise for all ADOT employees. In addition to the comprehensive Emergency Planning and Management Training Matrix in TABLE 1, ADOT has created a Maintenance Roadway/Signing/Striping

116

Matrix containing ADOT training requirements for various levels of M&O field personnel and supervision. The Maintenance Roadway/Signing/Striping Matrix is presented in TABLE 2.

TABLE 2
ARIZONA DOT FIELD PERSONNEL TRAINING MATRIX FOR MAINTENANCE ROADWAY/SIGNING/STRIPING MATRIX

Highway Ops Worker (S1)			Tech I (S4)	Tech II (S5)	Tech III (S6)	Tech IV (S7)	Supervisor (S9)	Superintendent (S10)
Welcome to State Government ADOR1100W (.5)	Computer Security Awareness GEN1352W (1)	Standards of Conduct for State Employees Law1000W (.5)	Introductory Maintenance Math I TCH3015 (8)	Intermediate Maintenance Math II TCH3016 (8)	Intro to Partnering GEN5180W (2)	Loss Prevention Academy GEN5060 (36)	Managing Resources Effectively GEN5231 (8)	PeCoS Strategic Planning TCH3167 (4)
Preventing Inappropriate Behavior LAW1006W (.5)	Diversity LAW1005W (.5)	Fair Employment LAW1002W (.5)	Work Zone Traffic Control Advanced TCH3005 (8)	Highway Plans Reading TCH3002 (12)	Permit Process and Inspection GEN5236 (8)	Understanding Contract Develop / Admin GEN5240 (8)	Advantage EPS 2nd Lvl GEN1204 (8)	Teach 2 MSLT Classes GEN5249 (16)
Conflict Management COM2002W (3)	Effective Email Techniques COM2015W (2)	Fire Safety MDT1075W (1)	Traffic Incident Management EPM0075 (4)	Maintenance Materials (R) TCH3117 (8)	Incident Reporting, Investigation and Review GEN5050 (4)	Non Discrimination Training for Supervisors/Leads LDR5010 (4)	PeCoS ORG Tactical Planner TCH3166 (16)	ICS for Single Resource IS200 EPM0200W (3)
Driver Orientation GEN5025W (1)	PeCoS Contributor TCH3163 (8)	2 Way Radio TCH4808 (4)	Pavement Preserv(R) GEN5242 (16) Signing Stripe I(SS) TCH3140 (8)	Basic Surveying Concepts TCH3134W (3)	Servant Leadership GEN5238 (2)	Drug and Alcohol Awareness for Supervisors MDT1091 (4)	Performance Management LDR5112 (8)	Intermediate ICS 300 EPM0300 (24)
Personal Protective Equipment TCH1104W (2)	Confined Space Awareness TCH1120 (2)	Hot Work TCH1144 (2)	EOTEP Message Board TCH4890 (4) (4)	Maintaining Roadside Safety Devices (R) TCH3082 (8)	EOTEP Selective II TCH4989 OR EOTEP Instructor Development TCH4995 (4)	START for Supervisors TCH1175 (8)	National Response Framework IS800 EPM0800W (3)	NHI Maintenance Leadership Academy TCH3454 (2 Week Academy) (120)
Fall Prevention and Ladder Safety TCH1115 (3)	Hazard Communication TCH1197 (3)	Exposure Control Awareness TCH1143 (2)	Maintenance Communication TCH3081 (8)	PeCoS Basic Reporting TCH3168 (4)	PeCoSIV CWR Tactical Manager TCH3164 (4)	Negotiating Skills GEN5234 (8)	Procurement Fundamentals MDT1065 (4)	Elective I TCH4991 Course Catalog (8)
OSHA/DOT Hazmat Awareness TCH1112 (2)	Hearing Conservation TCH1102W (2)	CPR/AED/First Aid GEN5004 (6)	Electrical Safety TCH1127 (2)	EOTEP Selective I (8) TCH4988	HCRS - TOC TCH3500 (3)	PeCoS Inventory Manager TCH3165 (8)	MAP for Supervisors MAPYES100W	Elective II TCH4992 Course Catalog (8)
Power Lift Back Safety GEN5012 (2)	Chain Saw Safety (R) TCH1119 (2)	EOTEP Attenuator TCH4870 (4) (8)	Control of Hazardous Energy TCH1113 (2)	Trenching / Shoring (R) TCH1122 (8) Sign / Stripe II (SS) TCH3141 (6)	Intro to Partnering Part II GEN5181 (4)	Supervisor Academy Intro to Supervision MGT1000W (.5)	Ethics in the Workplace MDT1051 (4)	
CDL w/Tanker Endorse CRT1190 (Outside Cert.)	Flagger ATSSA Cert. TCH1114 (4)	EOTEP Powered Industrial Trucks (SS) TCH1129W (.5) (1)	Materials Handling and Storage TCH1125 (SS) (2)	Coaching OJT GEN5195 (12)	PeCoSIV Approach to Planning Study Guide TCH3157W (4)	Supervisor Academy Americans with Disabilities Act LAW1007W (.5)	Supervisor Academy Day to Day Supervision MGT1005W (.5)	
EOTEP Loader (R) TCH4880 (8) (40)	EOTEP Large Trk-Trailer Dump Truck TCH4820 (8) (48)	Basic Work Zone Traffic TCH3004 (8)	Hand and Power Tool Safety TCH1118 (2)		FIS Data Mngt. (4) Roadway TCH3452 (R) FIS Data Mngt. (4) Sign Data TCH3453 (SS)	Supervisor Academy Family and Medical Leave Act LAW1003W (.5)	Supervisor Academy Corrective and Disciplinary Action MGT1006W (.5)	
Bluestake Dig Safety TCH1185 (3)	Risk Management GEN5237 (3)	Pesticides, Herbicides, Fertilizers TCH3071W (2)	NIMS Introduction IS 700 EPM0700W (3)			Supervisor Academy Fair Labors Standards Act LAW1004W (.5)	Supervisor Academy Off Boarding Employees MGT1007W (.5)	
Basic Incident Command System IS-100 EPM0100W (4)	Non-Stormwater Discharges TCH3073W (3)	START for Employees TCH1176 (2)	Stormwater Management for Land Disturbances TCH3074W (4)	401 / 404 Awareness TCH3065W (2)		Supervisor Academy Filling Vacancies MGT1001W (.5)	Supervisor Academy Interviewing and Selection MGT1002W (.5)	
Storm Sewer System/ Highway Maintenance TCH3075W (3)	Stormwater Management Awareness TCH3070W (2)	MAP101W for Employees MAP101 (1)	Basic Computer Skills GEN1390* (NEW)	Managing Interpersonal Relationships GEN5248 (8)		Supervisor Academy On Boarding New Employees MGT1003W (.5)	Supervisor Technical Training LDR3000	
Intro Environmental Awareness GEN5244 (W) (3)	Intro to PeCoS TCH3162W (1)	SPS Employee Handbook SPSORI100W (.5)	Waste Disposal Industrial Sites TCH3072W (2)	Advanced Environmental Awareness GEN5245 (8)	Cost Estimating Maintenance TCH3451 (8)	Supervisor Academy Managing Performance MGT1004W (.5)	Supervisor Technical Training Exam LDR3001	

For example, the following courses are required for the Highway Operations Worker:

• Basic Incident Command IS-100, 3 hours
• National Incident Management Systems IS-700, 3 hours
• Hazard Communication, 2 hours
• OSHA/DOT Hazardous Materials Awareness, 3 hours
• Traffic Incident Management for Responders, 4 hours

Most of the other required courses are related to daily M&O responsibilities, as well as to technology usage such as two-way radio and basic computer skills. A computer security awareness course is also required. Safety courses which are required include topics such as confined space awareness, fire safety, and first aid. Traffic control/management courses include basic work zone traffic and TIM. Wildland fire courses may be required for certain M&O personnel.

There are four technical levels of personnel who are required to take additional courses along with all of the basic courses. For example, a supplemental course for technician level I is Control of Hazardous Energy. A technician level III is required to take a cost estimating maintenance course. A supervisor is expected to take all of the courses taken by the Highway Operations Worker and Technician Levels I–IV, along with courses on ICS for Expanding Incidents (IS-200), National Response Framework (IS-800), and Managing Resources Effectively. In addition, courses on supervisory responsibilities are also required. A superintendent is expected to take additional courses, including Intermediate Incident Command ICS-300 and Advanced Incident Command ICS-400.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

117

In 2007, ADOT created a training requirements matrix for National Incident Management (NIMS) and Incident Command System (ICS) training for M&O field personnel, as well as other ADOT personnel. The training required by field personnel is online through the FEMA Independent Study website. Nine hundred to one thousand (900-1,000) field personnel at ADOT have taken the NIMS and ICS training online. Exercises and the TIM for Responders course also provide an opportunity for ADOT personnel to refresh their understanding and practice of NIMS and ICS. Requirements for higher level supervisors are indicated in the matrix as well and include both online courses as well as classroom courses through ADEM's Event Registration Management Application.

Classroom courses are delivered through ADEM. ADEM, Arizona's state EMA, receives federal grants to provide emergency training and exercises. Additional information about ADEM is appended to this case study. Some courses for M&O field personnel organized through ADEM are also provided from Texas A&M Engineering Extension Service (TEEX). ADOT personnel are also encouraged to apply for off-site FEMA Emergency Management Institute classes.

Field crew meetings are not generally used for emergency management training purposes. ADOT does provide emergency management updates to the Maintenance Servant Leadership Team, which then shares information with the districts.

OTHER TRAINING

ADOT recently purchased an online training development software package through its Organizational and Employee Development Group, so ADOT's trainers will select relevant PowerPoint presentations and convert them for distribution to ADOT's field offices if the training will be effective in this format.

Just-in-time training is provided occasionally when the need arises. For instance, ADOT might give training on the ICS structure to someone who needs to integrate into the system at an incident.

EXERCISE PRACTICES

Exercises are a vital part of any preparedness program. ADOT participates in local, county, and state exercises. ADOT holds exercises in the districts at least every other year. Each district is encouraged to participate in local drills, tabletops, workshops, and functional and full-scale exercises as available. M&O management is supportive of this effort. Several districts request exercises outside of this schedule. ADOT also holds exercises for other divisions, such as Communications, Enforcement, and Compliance, and integrates their functions with M&O personnel. For example, in 2011 ADOT held an executive-level tabletop including the Director, Division Directors, and FHWA partners.

ADOT works with district and division management for internally scheduled exercises and training. Exercises are usually scheduled in the spring and fall to avoid snow and wildfire events. ADOT coordinates with ADEM on statewide exercises and is involved as a stakeholder in the planning meetings.

Example Calendar: Exercise Dates and Locations (2013)

ADOT Vigilant Guard / Shield Tabletop Exercise Series

- January 30th – Phoenix Maintenance, Construction and TOC

2013 Statewide Exercise Series

- January 17th – Tribal WebEOC Workshop
- January 31st – Critical Infrastructure Seminar (Participants included numerous state agencies and ADOT groups, including ADOT's Enforcement and Compliance Division, Bridge Group, Traffic, Pumphouse, Fuels, State Engineers Office, Emergency Preparedness and Management, and Communications)
- February 20th – Workshop on Concept Analysis of Extended Power Outage
- September 19th – Executive Tabletop
- October 10th – Power Outage School
- November 6th and 7th – State Emergency Operations Center Power Outage Exercise
- November 20th and 21st – Recovery Tabletop

118

Palo Verde Nuclear Generating Station

- January 16th – Government Orientation
- February 6th – Rehearsal Exercise
- March 6th – Federally Evaluated Exercise
- June 26th - 2014 Exercise Planning Meeting

Arizona Department of Health Services 2013 Strategic National Stockpile

- February 27– Full-scale Exercise (ADOT coordinated with AZDPS and US Marshals Service)

Others
- February 13th and 14th – Propane Industry Conference
- February 20th – Logistics Capability Assessment Tool Workshop
- March 26th and 27th – sessions of Highway Incident Command Overview at the ADOT Equipment Safety Roadeo
- April 2nd – Arizona Wildland Fire Season Briefing and Tabletop
- April 23rd – Mt. Graham U.S. Forest Service Fire Readiness Stakeholders meeting
- May 5th – Communications Keynote Panel on US89 Landslide Response

In 2011 a total of 9,000 participants participated in a statewide exercise focusing on an improvised explosive device explosion. ADOT personnel included M&O, Emergency Preparedness and Management, and Communications. In 2012, each of ADOT's nine (9) districts did a tabletop exercise on the 2011 improvised explosive device scenario focused on M&O personnel.

Coordination with Other Agencies or Organizations

ADOT's primary coordination is with ADEM and AZDPS. ADOT also works closely with the county emergency managers and some local entities for coordination of specific training and exercises. ADOT has worked directly with other agencies in the past, such as Arizona Department of Corrections and Arizona Fish and Game, to assist with their exercises and training.

Exercise Evaluation

In terms of exercise evaluations, ADOT follows the Homeland Security Exercise and Evaluation Program (HSEEP). Evaluation forms are distributed, and after-action reports are created. For state exercises, ADOT is evaluated based on ADOT's responsibilities in the state plan.

Training and Exercise Implementation Costs and Issues

Distance issues make training and exercise delivery particularly challenging for training and exercising M&O field personnel. Arizona is a large state, and some locations are difficult to reach. Because resources tend to concentrate in the urban areas, it is important for the trainers to reach out to the other districts as well. This requires ADOT's two trainers to travel frequently.

ADOT does not pay for training and exercises for local public agencies.

Contractors

Hazmat contractors for routine and non-routine response are required by state contract to take IS-100 and IS-700 training in addition to the appropriate hazmat training.

While ADOT does not typically pay for contractor training and exercises, ADOT does include contractor or vendor partners in training and exercises if possible. For example, ADOT planners worked with a tow company to develop a hazmat scenario for the November 2013 statewide exercise.

Scenarios

In choosing scenarios, ADOT attempts to select scenarios that enhance an all-hazards approach. ADOT also participates in exercises hosted by other organizations. Some scenarios have been functional, focusing on communications, organization, and so on. Others have been hazard specific, focusing on wildfire, hazmat, traffic, terrorism, power outage, and so on.

Train-the-Trainer

In the first rollout of the NIMS/ICS training in 2007 ADOT trained a cadre of about 10 instructors to teach the classroom ICS 100 and NIMS 700 to district personnel. However, both are now available as self-paced online training as IS-100 and IS-700 in the FEMA ISP catalog.

Traffic Incident Management for Responders (TIM)

TIM training started in 2013 and it includes a strong ICS element, as well as one section devoted entirely to incident command. The training promotes a shared understanding of the requirements for quick clearance and safeguards between responders and motorists. The training is conducted by AZDPS and ADOT using the SHRP2 course materials. The 2-day train-the-trainer course that facilitates widespread use of the multi-disciplinary training was given in Arizona in August 2012. Ten of the 70 instructors in Arizona are from ADOT. ADOT and AZDPS are using the SHRP2 4-hour format to deliver the training to first responders throughout Arizona from federal, state, county, and local agencies, as well as private companies such as tow truck operators and cleanup contractors. Over 60 sessions were held by ADOT and AZDPS in 2013.

ADDITIONAL INFORMATION

Some of the courses offered through ADEM are taught by TEEX, though most of the NIMS and ICS training and exercises are taught by the ADEM adjunct faculty. In order to request a course, the request must be put through a county's emergency manager. For instance, in May 2012, ADOT requested an ICS 300 course through a county's emergency manager. ADEM then staffs the course and provides materials and event registration.

ADOT does not use LTAP for its emergency operations and hazards awareness training needs. LTAP's focus is on meeting the needs of county and local (rather than state) functions.

For facility emergency preparedness, ADOT must comply with the following codes, standards, and guidelines (ADOT Emergency Preparedness and Management, Oct. 2012):

- ADOT Emergency Preparedness and Management's *EPM-3.01: Internal Emergency Actions*
- The National Fire Protection Association's *NFPA 101: Life Safety Code*
- OSHA Regulations on Emergency Action Plans in the *Code of Federal Regulations,* Title 23, Part 1910, Section 38 (i.e., 23 CFR 1910.38, "Emergency Action Plans")
- The Arizona State Fire Marshal's Regulations on Emergency Planning and Preparedness (Section R4-36-306 of the *Arizona Administrative Code*)
- The Phoenix Fire Code's section on fire evacuation plans (Section 404.3.1 of the *Phoenix Fire Code*)
- The Arizona Department of Administration's guidance on Emergency Planning (Program Element R2-10-207.4 of the Arizona Department of Administration's *Emergency Action Plan*)

Emergency Action Guidelines cover the general actions employees can take in emergencies. Emergency plans cover specific information for individual facilities. ADOT's Emergency Action Guidelines contain the following items presented in FIGURE 1:
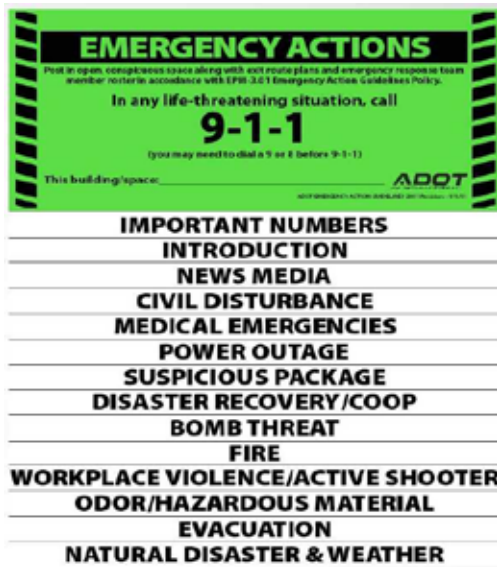
120

FIGURE 1 ADOT's Emergency Action Guidelines
("Emergency Action Guidelines," ADOT 2012).

ARIZONA DIVISION OF EMERGENCY MANAGEMENT

The mission of the ADEM Preparedness Section is to prepare state agencies and local emergency management organizations to prevent, respond to, recover from, and mitigate against disasters through planning, training, and exercise activities.

Courses and Training

The Arizona Division of Emergency Management (ADEM) Training and Exercise Office offers a wide variety of courses in five major areas: emergency management, hazardous materials, multi-hazard emergency planning for schools, Community Emergency Response Team (CERT), and weapons of mass destruction/homeland security. Within each of these areas are a wide range of courses that cover emergency planning, mitigation, awareness, operations, incident command, and domestic preparedness.

FEMA's Emergency Management Institute allows ADEM to provide their G-Level programs through ADOT's State Adjunct Instructor Program. ADEM contracts with over 150 adjunct instructors to provide emergency management training throughout Arizona.

Exercises

Exercises can cover a broad range of scenarios and must be compliant with HSEEP. Exercises are a practical, efficient, and cost-effective way for a community to prepare for disasters. The purpose is to provide competence in all emergency functions. All exercises conducted by ADEM follow the Homeland Security Exercise and Evaluation Program guidelines. A request for an exercise must be made through the county emergency manager.

The Palo Verde Nuclear Generating Station (PVNGS) is located approximately 55 miles west of downtown Phoenix in Maricopa County. It is located on 4,050 acres of land near the town of Wintersburg, Arizona. PVNGS's three identical pressurized water reactors provide electric power to the southwest. Training is offered to state, local, and volunteer agencies to prepare them to respond to an unlikely accident at the PVNGS. Drills and exercises are conducted several times each year to evaluate plans, emergency response capabilities, and related protocol. A plume exposure pathway exercise is conducted once a year. Ingestion exposure pathway exercises are conducted every 6 years. Every other year the plume exercise is evaluated by the Federal Emergency Management Agency (FEMA) and the Nuclear Regulatory Commission (NRC), and once every 6 years they evaluate the ingestion pathway exercise.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

121

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS) CASE STUDY

State	California
Population	36,756,666 persons
Size	155,959 sq. miles
Density	217.2 persons/sq. mile
DOT Size	22,000 employees
DOT Field Personnel	4,500 employees
Headquarters	Sacramento
District Offices	12 offices
Roadway or Highway Mileage	50,000 miles
Bridges	Over 12,000 bridges

California has one of the largest DOTs in the United States, Caltrans. Caltrans has 12 district offices and 22,000 employees, of which 6,000 are maintenance personnel. Of these six thousand, 4,500 are field personnel. Caltrans has an in-house Maintenance Training Academy in Sacramento with 9 or 10 full-time trainers and support personnel. The Academy was established in 1979 and also brings in trainers from district offices for various classes. At times the Academy will travel to the district offices to provide training.

Caltrans field personnel are busy with their projects and perform essential duties such as repairing roads and moving debris. Consequently, Caltrans' field personnel are encouraged (but not required) to participate in full-scale, functional, or tabletop exercises when their work schedules allow. Superintendents or managers normally represent field maintenance during exercises.

It should also be noted that the normal duties for field maintenance personnel may be similar to duties performed during emergencies. In terms of disaster assessment, field personnel are critical for rapid assessment. One method for rapid assessment is by windshield assessment. This helps determine the priorities for assessments by engineers. Engineers do the actual disaster assessments.

Current field personnel are highly encouraged (but not required) to take IS-100 training, which is offered at the Academy and at some of the district offices in a classroom setting or online through FEMA EMI's Independent Study Program (ISP). Caltrans recommends that IS-100 be retaken every 3 years. New employees, however, are required to take the IS-100 training.

Standard Emergency Management System (SEMS) training is also mandated. It is very similar to NIMS and is a multi-tiered organization which represents the emergency management community in California. SEMS includes key components of NIMS, including ICS at the field level, mutual aid, and the operational area. SEMS has also been enhanced to include and integrate additional NIMS components. The State of California self-certifies NIMS compliance (*California Implementation Guidelines for the NIMS: Workbook and User Manual,* Cal OES 2006).

California-specific NIMS guidance and manuals relevant for Caltrans and local public agencies are provided via Cal OES's website ("Standardized Emergency Management System," Cal OES 2011).

ICS field training for field personnel is being developed in conjunction with MTI at San Jose State University due to the recognition that interactive field training would be helpful. MTI has performed other training (NIMS, ICS, SEMS, EOC, COOP) in the past and has traveled to Caltrans district offices to do the training. They have also used VTC technology to facilitate the training.

TIM train-the-trainer training from SHRP 2 is being developed and will be implemented for all field personnel.

Tailgate meetings are held every 10 days at Caltrans maintenance yards. These meetings are used to share information and train on new procedures, technologies, equipment, and safety issues.

122

NEW EMPLOYEE MAINTENANCE ORIENTATION (NEMO)

New employees receive a 2-week-long training program, New Employee Maintenance Orientation (NEMO) at the Academy. They undergo both pre- and posttests. They must pass the posttest; otherwise they must repeat the training. A sample schedule for new employees is presented below:

First Week

- NIMS
- Standard First Aid and CPR
- Chapter 8 Training
- Hearing Protection
- Heat Stress
- Ladder Safety
- Diversity Training
- Stormwater Management
- Temporary Traffic Control Training
- Defensive Driver Training
- Sexual Harassment and Violence in Workplace, and the Employee Assistance Program
- Human Resources Overview
- First Responder Awareness
- Hazard Communication
- Caltrans Overview
- Career Development
- International Union of Operating Engineers

Second Week

- Batteries
- Backing Course
- Brake Lab
- Decs and Dust
- Equipment Responsibility
- Pre-Ops
- Radio Communications
- Temporary Traffic Control Training – Field Activities
  - Way Traffic Control
  - Lane Closures
  - Shoulder Closures
  - Driving Test
- Tires
- Trailers and Chain ID
- Transmissions
- Trucks
- Turbos
- Substance Abuse

Of the courses above, the courses in TABLE 3 are mandated for new employees.

TABLE 3
MANDATED COURSES FOR NEW EMPLOYEE MAINTENANCE ORIENTATION
(NEMO)

Course Titles	Day of the Wk	Hours
Maintenance Employee Safety Orientation	Monday	3
Standard First Aid (14 students each group)	Tuesday	4
CPR Refressher (14 students each group)	Tuesday	3
Protection of Workers – Chapter 8	Tuesday	4
Defensive Drivers Training	Wednesday	3.5
Heat Stress	Wednesday	0.5
Sexual Harrassment Prevention (Rank & File)	Wednesday	3
Hazardous Substance First Responder Awareness Level	Wednesday	4
Haz Mat Comm Prog	Thursday	2
Hearing Protection Program	Thursday	1
Temporary Traffic Control (2 Part Class-Thurs. & 2nd Monday)	Thursday/2nd Monday	8
Storm Water Magmt 4 New Mtce Employee	Friday	6
NIMS Compliance for Field	Friday	2
Vendor Workplace Safety and Personal Responsibility 2010-11	Friday	3
Diversity Awareness Trng-Rank & File - MEET on Common Grnd	2nd Tuesday	2

The train-the-trainer method is used to train field personnel on equipment. As they undergo training, they will be evaluated. If the trainer determines that the trainee cannot use the equipment, they will not continue with the training – the trainee will need to take additional training before getting the hands-on training. Bridge crews receive specialized bridge crew training that is one week long at the Academy.

Safety and hazards training is provided by a safety officer from headquarters who travels to each district office. It includes the following topics: hazmat communications, confined spaces, SEMS, hazardous waste generation, first responder awareness, first responder operational (for supervisors), and hazmat manager for hazmat specialists.

A few local agencies are allowed to sit in on the 2-week new staff training at the Academy. Training is not provided to contractors. Caltrans, through Cal OES, works with various state departments, including Forestry and Water Resources.

ISSUES

Issues include lack of PCs in the field. Each supervisor has one PC which can be provided to his three or four field personnel. However, the supervisor may need to use the PC for much of the day, leaving little time for his field personnel.

Budget is typically *not* an issue. The annual training budget is about $600,000 a year. Districts spend a portion of their allocated maintenance funds for training.

ICS COURSE WITH MINETA TRANSPORTATION INSTITUTE

A contract under development would allow MTI to create and deliver ICS Training to field personnel, including field supervisors. Field supervisors would also then be able to provide training once they have undergone it. The need for this course stems from the belief that content retention could be improved beyond the levels achieved by the FEMA EMI ISP training. More information, especially from an operational perspective, needs to be delivered to field personnel. Also, ICS is important, because without it the field personnel would not know how to integrate themselves into other units. Furthermore, the agency

124

could be liable if personnel are injured during a disaster or emergency and adequate training had not been provided. This course is expected to be 3 ½–4 hours long, and up to 15 percent of the field personnel can take it at one time. Therefore, it may take up to 1 year for all Caltrans' field personnel to be trained (Dr. Frances Edwards and Daniel Goodrich, Mineta Transportation Institute, personal communications, March 5, 2013).

IOWA DEPARTMENT OF TRANSPORTATION CASE STUDY

State	Iowa
Population	3,002,555 persons
Size	55,869 sq. miles
Density	52.4 persons/sq. mile
DOT Size	2522 employees
DOT Field Personnel	1378 employees
Headquarters	Ames
District Offices	6 offices
Highway Mileage	9,000 miles
Bridges	4,000 bridges

As noted in Iowa's Emergency Response Plan, the state of Iowa is mainly farmland; only 5 percent is forested. Iowa's leading industries are agricultural (*Iowa Emergency Response Plan,* Iowa HSEMD 2010). Iowa DOT has two major interstates: Interstate 80 runs east-west, and Interstate 35 runs north-south across the state. Iowa DOT has six districts, and its primary weather-related hazards are winter weather events and flooding. Iowa DOT is the lead for transportation (ESF-1). Its responsibilities are listed in the ESF-1 portion of the *Iowa Emergency Response Plan* (Iowa HSEMD 2010):

1.2.1. Restoring and maintaining the primary road systems needed for the support of response activities during and immediately following an emergency or disaster.

1.2.2. Restoring and maintaining other public transportation systems needed for the support of response activities during and immediately following an emergency or disaster.

1.2.3. When necessary, assisting with the restoration and maintenance of non-public transportation systems, such as railroad and aviation, needed for the support of response activities during and immediately following an emergency or disaster.

1.2.4. Coordinating requests for transportation system repair and restoration assistance from local emergency response organizations, local governments, and state agencies.

1.2.5. Whenever practical, meeting the minimum transportation needs of the general public in emergency/disaster-affected areas.

1.2.6. Gathering data for emergency response and for general public use about the effects of an emergency/disaster on transportation systems and associated infrastructure.

1.2.7. Tracking transportation system restoration activities on a statewide basis.

1.2.8. Restricting the use of transportation systems and associated infrastructure by the general public to facilitate emergency response activities and/or address public safety concerns.

Iowa DOT, along with the Department of Natural Resources, is the co-lead for Public Works and Engineering (ESF-3). ESF-3 has been organized into sub-functions, as shown in TABLE 4. Iowa DOT is the sub-function lead for debris removal and co-lead for engineering and technical services.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

125

TABLE 4
SUB-FUNCTIONS FOR ESF 3 PUBLIC WORKS AND ENGINEERING

Sub-function	Category
Disaster Assessment	Iowa Homeland Security and Emergency Management
Debris Removal	Iowa Department of Transportation
Engineering and Technical Services	Iowa Department of Transportation Iowa Department of Commerce - Utilities Division Iowa Department of Natural Resources
Water and Waste Water Treatment	Iowa Department of Natural Resources
Air Quality and Solid Waste Disposal	Iowa Department of Natural Resources
Food Safety	Iowa Department of Inspection and Appeals

Iowa Emergency Response Plan (Iowa HSEMD 2010).

Iowa's Emergency Response Plan requires state agencies, including Iowa DOT, to develop and test standard operating procedures, be prepared to deploy resources, request needed resources, provide requested personnel to staff the Emergency Operations Center, attend emergency or disaster-related briefings and surge training, coordinate with other agencies, maintain good records, and maintain communications with personnel. The counties, which are part of Iowa's six emergency management planning districts, have an important role in emergency management and shoulder emergency planning responsibilities through state legislation (*Iowa Code,* Chapter 29C). Furthermore, Iowa considers public works agencies to be first responders.

HAZMAT TRAINING

About 10 years ago Iowa DOT's operations division began offering OSHA's hazmat courses. Train-the-trainer courses for the hazmat courses were developed using a consultant. The 8-hour-long courses were provided in a classroom setting to Iowa DOT's trainers from each of its six districts. They have trained over 1,500 field personnel on hazmat response. These hazmat courses are also provided to new employees during their new employee training sessions. Refresher courses on one of the 12 OSHA hazmat courses are provided at the shop level on site at each garage once a year.

ICS TRAINING

The push for ICS training began when the Director of Iowa DOT directed its implementation.

In the spring of 2012, ICS train-the-trainer courses on IS-100 (Introduction to ICS) and IS-200 (ICS for Single Resources and Initial Action Incidents) were provided to district office and motor vehicle enforcement trainers. They then trained more than 1,600 personnel over the course of the year. The classroom setting provided trainers the ability to interact intensively with field personnel and other Iowa DOT trainees. Break-out teams were established to discuss and respond to a variety of scenarios.

ICS 300 (Intermediate ICS) and ICS 400 (Advanced Incident Command and Executive System) were provided to field personnel supervisors and management executive-level employees. Additionally, an executive course was provided to the department's executive management.

Obstacles to training implementation included the lack of sufficient number of staff qualified to perform the training. That is one of the reasons the train-the-trainer strategy is being used by Iowa DOT. It is cost-effective and does not require the hiring of additional personnel.

126

EXERCISES

Iowa DOT plans three to four regional tabletop exercises per year. In spring of 2013, two regional tabletop exercises were held with 50–60 personnel. Participants included DOT personnel and the State Patrol staff. The exercises were focused on winter weather with multiple crashes. The exercise included communications and resource movement scenarios. The 2013 exercise was held on April 10th and was also focused on winter weather. A future exercise will likely be focused on flooding. In the future, these tabletop exercises may be converted into functional exercises.

IOWA HOMELAND SECURITY AND EMERGENCY MANAGEMENT DEPARTMENT

The Iowa Homeland Security and Emergency Management Department (HSEMD) is the coordinating body for homeland security and emergency management activities across the state. These activities include training and exercises. For more information, please visit the following sites:

- "Iowa Homeland Security and Emergency Management," Johnston, IA, http://homelandsecurity.iowa.gov (This is Iowa HSEMD's home site)
- "IowaTrainingNow: Training Now for Tomorrow's Challenges," IowaTrainingNow.com, Homeland Security Training Center, Iowa Central Community College, Fort Dodge, IA (IowaTrainingNow.com lists available training and exercise sessions, including TTXs and full-scale exercises by region)

References

Iowa Homeland Security and Emergency Management Division (HSEMD), *Iowa Emergency Response Plan: Basic Plan PLUS 15 Emergency Support Functions (ESFs), Special Needs Support Annex,* Johnston, Iowa, Oct. 2010.

Iowa Legislature, *Iowa Code,* Title I "State Sovereignty and Management," Chapter 29C, "Emergency Management and Security," updated 2014.

MISSOURI DOT (MODOT) CASE STUDY

State	Missouri
Population	5,911,605 persons
Size	68,885.93 sq. miles
Density	81.2 persons/sq. mile
DOT Size	5,100 employees
DOT Field Personnel	2,500 employees
Headquarters	Jefferson City
District Offices	7 offices
Highway Mileage	33,845 miles
Bridges	10,000 bridges

The state of Missouri experiences frequent natural disasters such as ice storms, tornadoes, severe storms, and flooding. Missouri has had over 30 federal major disaster declarations since 1990 ("Declared Disasters in Missouri," Missouri SEMA n.d.).

MoDOT has about 5,100 employees and 2,500 M&O field personnel, not including contractors. The number of contractors is minimal. MoDOT has seven district offices, of which two are urban and five are rural. MoDOT does not have a specific training budget – the training costs are absorbed by the operating costs. MoDOT has 10 trainers, and none of them are dedicated trainers; that is, their delivery of training constitutes only one part of their other professional responsibilities.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

127

TRAINING AND EXERCISE PRACTICES

MoDOT has developed a Training Plan for Overall Emergency Response, which is attached with this case study. MoDOT's Training Plan contains course descriptions and recommendations for those with incident response responsibilities. MoDOT's philosophy for exercises is to participate in as many state and local exercises as possible. MoDOT has a "Tracker Measure" for Involvement in Emergency and Disaster Response that tracks involvement in exercises. The latest version is attached. In 2010 and 2012 MoDOT participated in 25 exercises statewide. In 2013, MoDOT participated in 30 exercises.

The primary emergency training need for field staff is task-based training and safety training. For middle-level staff the biggest need is NIMS training.

Field crew meetings are used to train field personnel for field-oriented task-type training. Historically, no just-in-time training has been used, but MoDOT is developing a new training program with more just-in-time training. This type of training is intended to instruct field personnel on their responsibilities and job duties as they expand.

TRAINING SOURCES

Training sources include MoDOT [in-house; Missouri State Emergency Management Agency (SEMA)]; other federal, state, and local agencies; and some contract training. Missouri SEMA has a very good training program and offers many classes at no cost to MoDOT. Training frequency varies by position from a few hours a year to many hours a month.

The courses included in the Training Plan (which is attached in this case study) are:

- Adult CPR
- Advanced Workzone Training
- Air Bag and Hybrid Vehicle Safety Training
- Amateur Radio (Ham) Operator
- Basic First Aid
- Bloodborne Pathogens
- Child and Infant CPR
- District Incident Response Plan Training (where available)
- Dump Truck Operations
- Fire Extinguisher Training
- Flagger and Workzone Training
- ont-End Loader Operations
- Hazardous Material Recognition Introduction
- Hazardous Waste Operation and Emergency Response (HAZWOPER-40 HR)
- Highway Watch (Missouri)
- Post-Incident Bridge Inspection Training
- System Security Awareness for Transportation Employees

The Incident Command Training Suite provides MoDOT's NIMS training recommendations. MoDOT's NIMS training recommendations are also presented in appendices H and I.

MoDOT recommends that all emergency responders take IS-100 and IS-700 and that first-line response supervisors take IS-100, IS-200, and IS-700. Emergency responders include the following personnel:

- Motorist assist and emergency response field staff, both urban and rural
- Urban or rural field staff with any involvement in emergency response.
- TMC operators.

First-line response supervisors are:

- All immediate supervisors of above.
- All first-line maintenance and traffic field supervisors.
- Other appropriate district support staff.

128

Descriptions of the IS-100, IS-200, and IS-700 courses can be found both in the FEMA Emergency Management Institute's catalog and in the two MoDOT documents attached with this case study (the MoDOT Training Plan and the MoDOT NIMS Training Recommendations).

EXERCISES

Most of MoDOT's exercises are multi-agency exercises and most are hosted by other agencies. MoDOT occasionally holds MoDOT-only exercises. M&O field personnel participate in at least half of the exercises. The percentage varies from exercise to exercise. About once a year MoDOT has a large-scale exercise with about 10 percent or more of the field staff involved. Every district is typically involved in a few exercises a year.

MoDOT varies the exercise types and scenarios to provide training on a large range of scenarios. About half of the exercises are tabletop exercises, while the other half is mostly functional exercises. There is typically about one full-scale exercise a year. Over the last few years MoDOT has had earthquake exercises, severe weather exercises (snow, ice, tornado, etc.), nuclear power plant scenarios, terrorism-based exercises, and others. Also note that MoDOT includes the number of real events in its TrackerMeasure. MoDOT has several a year, and these real incidents provide the best opportunity to facilitate learning and preparation for disasters. MoDOT coordinates with other agencies and organizations on its exercises.

TRAINING AND EXERCISE EVALUATION

In most cases, exercise evaluations are a simple after-action review process. Trainees perform self-evaluations. HSEEP guidance is followed for the larger multi-agency exercises that are facilitated by SEMA or FEMA.

CONTRACTORS/LPAS

MoDOT does not typically pay for contractor training and exercises; nor does MoDOT require contractors to undergo training and exercises. MoDOT does not require LPAs to undergo training/exercises.

ISSUES

MoDOT believes that while online training is less effective, it is sometimes the only practical option. Because the Traffic and Highway Department has been downsized by 20 percent, lack of time is a major challenge. MoDOT's field personnel are busy and stretched thin. The lack of a dedicated training fund is another major challenge in training provision. Consequently, MoDOT needs to use operating funds for training. Fortunately, Missouri's SEMA offers a training program which is provided at no cost to MoDOT.

TRAIN-THE-TRAINER

MoDOT reports limited success with train-the-trainer programs. Field staff does not have time to deliver complex or time-consuming training such as IS-300 or 400. In short, Train-the-trainer has been most successful in simple training that is given to a large percentage of employees (e.g., two-way radio training and much of the task-based training).

PERFORMANCE METRIC

MoDOT has some training that is "required" by title and is tracked in the MoDOT "Learning Management System."

The following tracker measure performance metric is used to track Involvement in emergency and disaster response:

Purpose of the Measure

The measure tracks the number of disaster and emergency responses and the number of related exercises in which MoDOT is involved. Some of the exercises are limited to Central Office staff only – for example, State Emergency Operations Center tabletop exercises. However, many events involve district staff and have a local component to them. MoDOT also includes the monthly emergency communications testing in this measure, since they are an important part of MoDOT's disaster preparedness efforts.

Major Events and Significant Exercises

The measure also tracks the number of "major" events or significant exercises in which central office and/or district staff is involved. A "major" event is one that creates a lot of damage and/or affects a large area and typically involves the activation of the Central Office EOC and/or the State Emergency Operations Center. By nature, these events are multi-agency events.

Improvement Status

The Tracker Measure for the years 2008–2012 is given in FIGURE 2. The year 2009 showed an increase over 2008 in the number of exercises. The year 2010 featured a similar number of exercises, but all of these exercises involved districts. The year 2011 was a year of historic disasters, including a record snow storm, historic flooding in Southeast Missouri, the Joplin Tornado, and historic Missouri River flooding. The number of exercises was down in 2011, because MoDOT and many other agencies were involved in these real-world responses. The number of exercises in the year 2012 returned to the number in 2010.

MoDOT has become more involved in emergency management at the state and local levels. MoDOT's continuing goal is to improve their working relationships with responder and emergency management agencies and to improve their emergency response at all levels. MoDOT's goal across the entire organization is to improve preparedness and the ability to respond to major disasters. While MoDOT has no control over the occurrence of real emergencies, these emergencies serve as the best "exercise" opportunities for emergency and disaster preparation.
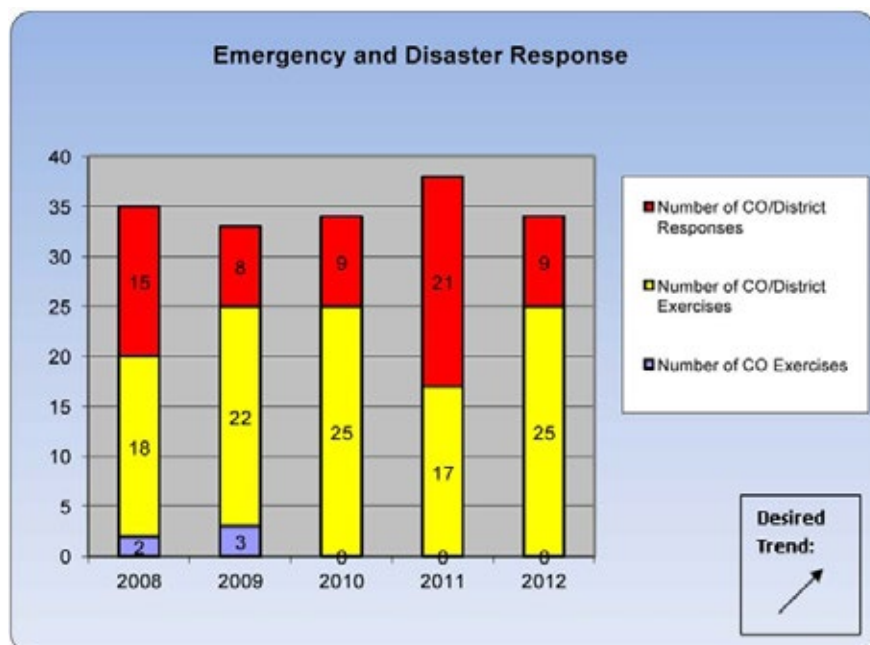

FIGURE 2 Emergency and Disaster Response Tracker Measure (*Courtesy:* MoDOT January 2013–14 TS Division Tracker).

MISSOURI SEMA

The Missouri State Emergency Management Agency (SEMA) offers an Emergency Management Training (EMT) curriculum which includes All Hazards Incident Management Team, Multiagency Coordination System (MACS), Hazmat Incident

130

Response, ICS 300, and web EOC training. Missouri SEMA also holds an annual Missouri Severe Weather Awareness Week in conjunction with the National Weather Service and Missouri's local emergency management offices. The 2013 week was March 4–9, 2013, during which a statewide tornado drill was held.

The After Action Report/Improvement Plan (AAR/IP) template used by Missouri SEMA complies with HSEEP. TABLE 5 shows the content of this template.

TABLE 5
MISSOURI SEMA AFTER-ACTION REPORT/IMPROVEMENT PLAN (AAR/IP) TEMPLATE
(*Courtesy:* MoDOT)

CONTENTS

ATTACHMENTS FROM MODOT

MoDOT has permitted this case study to attach the following documents:

- MoDOT Training Plan (see Synthesis Appendix H)
- MoDOT NIMS Training Guide (see Synthesis Appendix I)

Reference

Missouri State Emergency Management Agency, "Declared Disasters in Missouri," Missouri Department of Public Safety, Jefferson City, n.d. [Online]. Available: http://sema.dps.mo.gov/maps_and_disasters/disasters/.

RHODE ISLAND DOT (RIDOT) CASE STUDY

State	Rhode Island
Population	1,050,788 persons
Size	1,045 sq. miles
Density	1003 persons/sq. mile
DOT Size	780 employees
DOT Field Personnel	224 employees
Headquarters (city)	Providence
District Offices	N/A
Roadway or Highway Mileage	1,100 miles
Bridges	800 bridges

Rhode Island has 1,100 miles of roadway and 800 bridges. Snowstorms are frequent in the state, and severe winter weather has been a major challenge for the DOT. The major disasters faced by Rhode Island in recent years have been two hurricanes (Irene in 2011 and Sandy in 2012), flooding in 2010, and a massive blizzard (Nemo) in 2013.

The head of the Maintenance Division, Administrator Joseph Baker, is responsible for design and construction, planning, finance, and administration. He is also the designated Incident Commander during all incidents.

ICS-100 (Introduction to ICS) and ICS-200 (ICS for Single Resources and Initial Action Incidents) are recommended for all field personnel. In addition, mid-level managers typically take ICS-300 and 400. Upper-level managers also take the IS-700 course (Introduction to NIMS).

These courses are provided by the Rhode Island Emergency Management Agency at their facilities. Training is paid for by Rhode Island DOT. Because Rhode Island is a small state, it is relatively easy for their personnel to travel to the State EMA for training. The State EMA provides the ICS and NIMS courses as well as tabletop exercises – the exercises are in a classroom setting and are interactive.

In terms of other training needs, personal safety and hazards awareness courses are provided by the RIDOT Safety Office. The office has recently purchased and distributed a CD on safety training created by ARTBA, OSHA, and the U.S. Department of Labor. The office considers online training to be just-in-time training, because it can be given whenever the need arises.

TRAFFIC INCIDENT MANAGEMENT (TIM)

TIM training was recently introduced by the SHRP 2 program. It is being provided to DOT field personnel and other agencies and organizations by the State Fire Academy and State Police. The TIM training contains an ICS component which is useful during any incident, large or small.

UNIVERSITY OF RHODE ISLAND TRANSPORTATION CENTER

RIDOT has entered into a formal partnership with the University of Rhode Island Transportation Center to train RIDOT field personnel in a wide range of topics.

EXERCISES

Ten percent of RIDOT's field personnel have started participating in full-scale exercises organized by the State EMA. This level of participation is expected to continue.

132

TENNESSEE DEPARTMENT OF TRANSPORTATION (TDOT) CASE STUDY

State	Tennessee
Population	6,495,978 persons
Size	42,146 sq. miles
Density	154.1 persons/sq. mile
DOT Size	3,900 employees
DOT Field Personnel	2,600 employees
Headquarters (city)	Nashville
Super District Offices	12
District Offices	22
Roadway or Highway Mileage	13,896 state-maintained centerline miles
Bridges	19,650, of which 17,060 are over-water bridges

TDOT is divided into four regions, 22 districts, and 12 super districts. In the state of Tennessee, TDOT responds to more emergencies than any other entity in the state and is also the last incident commander for most incidents. TDOT originated the ESF-1 concept and is recognized as a first responder by the state.

Senior management is very supportive of TDOT's training and exercise initiatives, and, as a result, TDOT personnel, including field personnel, are well-trained in their emergency roles and responsibilities and participate in relevant exercises.

The emergency training and exercise program is developed at the TDOT main office and then implemented at the regional level. Currently, TDOT is in the process of revising its EOP, which will contain an Emergency Training and Exercise annex. In its regional offices TDOT has four full-time training staff, one for each of its four regions, and multiple other personnel with various qualifications to teach specific classes. TDOT's Training Division keeps track of training and exercises taken by field personnel. Note that TDOT does not have a specified emergency operations training budget. Time expended by field personnel for training and exercises is accounted for in the budgets of each region.

TRAINING NEEDS

TDOT is meeting all of its emergency training and exercise needs which emanate from the TDOT EOP and from ESF-1 and ESF-3 responsibilities, as well as from the job-specific requirements of the field personnel. TDOT personnel also understand their emergency roles and coordination responsibilities with FEMA ESF-1, ESF-3, the state EMA, and the Tennessee Emergency Management Agency (TEMA).

The training and exercise needs of district field personnel vary depending on the region and on the requirements and equipment that must be used for the job function.

Each region faces different hazards which dictate hazard-specific training and exercise needs. East Tennessee has two nuclear power plants, four other nuclear facilities, and snowstorms; West Tennessee has earthquakes and flooding; and Middle Tennessee has floods and tornadoes. Flood, rain, and seismic events are the most concerning with respect to highway bridges. Of the 820 scour critical bridges, 75 percent are in West Tennessee.

Training needs for TDOT field personnel in Eastern Tennessee emanate from Department of Energy (DOE) and Tennessee Valley Authority regulations governing the nuclear power plants. The emergency response plans for DOE and the Tennessee Valley Authority plants include TDOT and its field personnel. Emergency worker training is provided by the Tennessee Valley Authority and the DOE.

Field personnel involved in damage assessment and emergency response receive comprehensive training on the FHWA Emergency Relief program and the FEMA Public Assistance program.

The training provided by TDOT includes details of both programs, including purpose; administration; damage assessment process, forms, and documentation; eligibility criteria; identification and definition of eligible routes; damage assessment team composition and necessary equipment; and definition of emergency repairs, permanent restoration, and betterments. The TDOT personnel that successfully complete the program receive credentials issued by TEMA.

NIMS AND ICS TRAINING

TDOT is NIMS compliant and delivers required NIMS and ICS training to its employees. All TDOT field personnel are required to take IS-100 and IS-700, which are delivered online. If the region prefers the classroom method, IS-100 and IS-700 may be delivered in a classroom format. Supervisors are required to take IS-200 and IS-800 delivered in a classroom format. This requirement is in addition to the IS-100 and IS-700 requirements. Managers are required to take ICS-300 and ICS-400, also delivered via a classroom format. This requirement is in addition to the IS-100, IS-700, IS-200, and IS-800 requirements.

OTHER TRAINING

Other training that is required of some of the field personnel and their supervisors include: radio communications, hazmat, emergency vehicle operations, traffic incident management, and first responder life-saving.

STRIKE TEAM TRAINING

Strike teams respond to disasters and emergencies and are self-sufficient. Personnel from each region selected to be part of a strike team receive special training and participate in full-scale exercises so that they can operate during any disaster or emergency without logistical support and without outside food or water. They are trained for all types of hazards and incidents and can operate specialized equipment. This training is helpful when they are requested by other states to provide assistance during a disaster.

TRAINING DELIVERY METHOD

TDOT relies heavily on train-the-trainer to meet its emergency training needs. The Emergency services coordinator at the main office holds training sessions for trainers at each of TDOT's four regions. The coordinator coordinates to bring in adjunct instructors to do train-the-trainer sessions for specific topics when necessary. Each training officer coordinates training for all of TDOT's field personnel. Train-the-trainer is used to deliver IS-100, IS-700, IS-200, IS-800, radio communications, and traffic incident management training.

New hires will be sent to other agencies—TEMA, law enforcement, fire department, or emergency medical services – for emergency training in order to increase their familiarity with partner agencies. The training is provided by the agencies free of charge. TDOT also coordinates training activities with wildlife agencies, U.S. Army Corps of Engineers, and utilities, as well as with state, county, and city agencies.

TDOT has an arrangement with TEMA in which they "exchange" training—the training delivered by TEMA is complimentary to TDOT personnel and training delivered by TDOT is complimentary to TEMA personnel. TEMA's Hazmat Institute delivers a 1-day hazmat awareness course and a 1-week hazmat operations course at TDOT for TDOT personnel (including field personnel). Course participants, in addition to TDOT personnel, include local emergency management, fire, and police.

Other training delivery methods used by TDOT include the following:

- The just-in-time training method is also used to train field personnel for the specific skills or knowledge required for exercises immediately prior to an exercise.
- Interdisciplinary training with the Civil Air Patrol is organized at least once a year.
- Incident management task forces have quarterly meetings for field personnel. Various emergency management agencies and TDOT personnel participate in these meetings.
- Field crew meetings are also used as a training delivery method.

134

REFRESHER TRAINING

For NIMS and ICS courses, field personnel are required to take a 4-hour refresher course every 5 years. The refresher training is provided by the Emergency Service Coordinator at monthly field crew meetings.

EXERCISES

In all incident response activities, TDOT field personnel use NIMS and ICS and thereby have extensive practice implementing the concepts.

For each of the years from 2011 to 2013, TDOT has organized one full-scale exercise for its field personnel. About 15 percent of its field personnel participate in this exercise. Districts hold drills on various pieces of equipment such as snow plows, chainsaws, and salt trucks for their field personnel. Field personnel also participate in numerous exercises held by other agencies and organizations. By participating in exercises they gain familiarity with other agencies (such as Highway Patrol, Department of Health, Human Services, National Guard, local EMAs, and local fire and police) and their personnel and procedures. Because the state has accepted TDOT personnel as emergency responders, TDOT is generally invited to participate in 20–30 different exercises held by different entities in different jurisdictions. Every 5 years, all of TDOT's field personnel that wish to do so will have participated in an exercise. While currently no emergency exercises are done in conjunction with universities or colleges, other exercises and training involve the state's educational institutions.

TDOT and the Tennessee Highway Patrol are constructing a training and exercise tool that spans 4 acres and includes a 600-ft.-long interstate replica where drills, functional exercises, and full-scale exercises may be held with other responding agencies.

EVALUATIONS

In terms of training and exercise evaluations, participants are asked for their input in terms of what worked and what did not work. If any time changes are made to a plan, the changes are incorporated into the subsequent exercise scenario so that the updated plan can be tested.

Scenarios used have included the ones most likely to occur in the state: catastrophic flooding, severe ice storm, and catastrophic earthquake. For example, in 2014 the scenario is a catastrophic tornado.

CONTRACTORS

TDOT requires its contractors to have taken NIMS IS-100 and IS-700 and have the appropriate equipment licenses. Contractors who are supervisors must have also taken NIMS IS-200 and IS-800. In addition, TDOT requires contractors to participate in tabletop exercises or functional exercises.

PUBLIC WORKS AGENCIES

TDOT provides training for public works agencies—occasionally, the agencies conduct training for TDOT personnel as well.

TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT) CASE STUDY

State	Texas
Population	24,326,974 persons
Size	261,231 sq. miles
Density	96.3 persons/sq. mile
DOT Size	12,120 full -time employees
DOT Field Personnel	5,000 employees
Headquarters	Austin
District Offices	25 districts, 246 maintenance sections
Roadway or Highway Mileage	79,000 miles
Bridges	51,808

The Governor of Texas is responsible for homeland security and for managing disasters and disruptions affecting the state. The Texas Department of Public Safety's Division of Emergency Management (TDEM) is responsible for developing a comprehensive all-hazard emergency management program for Texas and assisting local public agencies in deploying their emergency management programs. More specifically, TDEM's responsibilities include the following:

1. Emergency Planning: TDEM maintains the State of Texas Emergency Management Plan and adopts standards for local emergency management plans.

2. Training: TDEM conducts an extensive emergency management-training program for local and state officials and emergency responders.

3. Public Education & Information: TDEM provides educational materials on threat awareness and preparedness for the public, and on emergency information during disasters.

4. Hazard Mitigation: TDEM administers pre- and post-disaster programs to eliminate or reduce the impact of known hazards.

5. Response: TDEM coordinates mobilization and deployment of state resources to respond to major emergencies and disasters.

6. Disaster Recovery: TDEM administers disaster recovery programs.

In the past 5 years Texas has had three major disaster declarations for hurricanes, two for wildland fires, and one for an explosion. Many tropical disturbances develop in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico; some increase in intensity becoming tropical storms, and a few may turn into hurricanes (Roth 2010).

Droughts are another natural hazard for Texas. A drought began in October 2010, and 2011 became the driest year for the state. Records for low rainfall were set in March–May 2011 and June–August 2011. The state's temperatures have been rising over the years and have caused increased evaporation of any water received from rainfall. While conditions improved by the spring of 2012, droughts were again experienced in the fall of 2012 in some parts of the state ("Everything You Need to Know about the Texas Drought," n.d.). These droughts have sparked disastrous wildland fires (see FIGURE 3 for one example). These fires have not only endangered the lives of firefighters but also those of TxDOT field personnel working to clear debris, along with dead and dying trees, and repair damaged roadways and bridges.
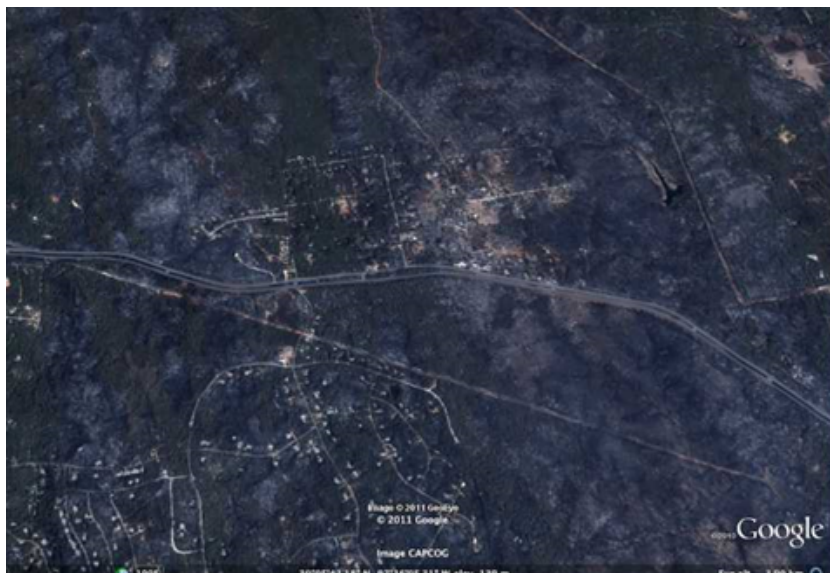
136

FIGURE 3 Bastrop, Texas, following a wildland fire (*Source:* "Texas Drought and Wildfires," *Huffington Post* 2011).

Additional hazards and threats are snowstorms and terrorism.

TxDOT has more than 5,000 maintenance employees and 246 maintenance sections; the average section has 10–30 person-nel. Four regional support centers provide operational and project delivery support for the agency's 25 geographical districts.

TRAINING NEEDS AND SOURCES

According to the State Agency Matrix of Responsibilities in Appendix 3 of the State of *Texas Emergency Management Plan,* TxDOT is the primary agency for ESF-3 Public Works and Engineering (Texas Department of Public Safety, 2012, page 3-1). TxDOT is also the support agency for:

- Communications
- Direction and control
- Evacuation
- Firefighting
- Hazard mitigation
- Hazardous materials and oil spill response
- Public information
- Recovery
- Terrorism incident response
- Transportation

The Texas Department of Criminal Justice is the primary agency for ESF-1 Transportation.

TxDOT's primary emergency training and exercise needs emanate from its primary role for ESF-3 responsibilities and from its support role for ESF-1 and other areas.

All maintenance personnel are required to take FEMA EMI's IS-100 (ICS) and IS-700 (NIMS) courses. Supervisors are also required to take the IS-200. This training is available to their employees through their emergency management website. ICS 300 and 400 are required for senior managers – these courses are taught in a classroom setting by various entities, including TDEM, Council of Governments, local fire departments, local police departments, and qualified instructors. The Division Office sends training information and reminders to district offices. Note that TDEM receives grants from the federal government for training and exercises; therefore, TxDOT employees are able to receive TDEM training free of charge. TDEM's training catalog and calendar are available through the Texas Emergency Management Preparedness Website (www.preparingtexas.org).

Training on communications during emergencies and web EOC training are also provided but are not required for field personnel.

For wildland fires, TxDOT field personnel are responsible for traffic control and incident response, providing water to firefighters, providing fuel to volunteer fire departments, debris removal, and repairs to their facilities. TxDOT field personnel also need to know how to use supplemental personal protective equipment (PPE) to prevent personal injury from fires.

In-house training on wildland fires and wildland fire response is being developed with the assistance of Texas Tech. Wildland fires in East Central Texas were especially destructive in 2011. The 2011 fire season included around 27,976 fires which burned a record 3,959,040 acres. Thousands of homes and structures, along with vegetation and trees, were destroyed. The Bastrop County fires started on Sept. 4, 2011, near Bastrop State Park. High winds fueled the fires, and numerous homes and trees became engulfed. Texas State Highway 71 runs through this area. Numerous dead trees had to be cleared from the highway. In addition, there were dead and dying trees which were still standing near the highway. During the wildland fires TxDOT personnel were at risk as they worked without interruption to clear the highway and other roads of debris, to control traffic, and to make necessary repairs. After the Bastrop fires it became clear that TxDOT personnel not only needed additional PPE but required training on how to use it. Two trailers with PPEs, helmets, and fire shelters were purchased by TxDOT. The 6-hour training started in May 2013 and included fire safety information, training on TxDOT's role during wildland fires, and demonstrations on how to don the PPE and deploy the fire shelters.

For hurricanes, TxDOT field personnel are responsible for traffic control and incident response, debris removal, and repairs to their facilities. Hurricane training in the form of a workshop is provided once a year. The day-long workshop was held on April 23, 2013, and covered evacuation, reentry, cleanup, and response techniques. Protocols concerning the suspension of construction schedules were also presented. In addition, radio communications and interoperability issues were discussed. Debris and environmental contracts, issues related to the Moving Ahead for Progress in the 21st Century Act (MAP-21), and FWHA Emergency Relief and FEMA Public Assistance reimbursement issues were also covered. In addition, the data that needs to be input into the maintenance management system was discussed. Volunteer management guidance was also provided. Typically, approximately 90-100 TxDOT personnel attend and participate in the workshops. Key district staff members (including district engineers and directors of operations and maintenance) are in attendance. Coastal leadership also participates in regional hurricane conferences and the Texas Emergency Management conference, which is held yearly.

Information on FHWA and FEMA reimbursement procedures are also disseminated at meetings of district engineers and key maintenance staff. TxDOT also provides just-in-time training (JITT) to local governments on Federal Highway Administration Reimbursement Eligibility. This training was provided to the county of Bastrop immediately following their major wildland fire in 2011.

A 4-hour homeland security course required of all TxDOT personnel, including field personnel, is provided through the TxDOT learning center.

EXERCISES

TxDOT organizes and holds one full-scale exercise a year. The exercise typically focuses on contraflow evacuation. In 2012 TxDOT, the Texas Department of Public Safety, and local law enforcement agencies participated in a contraflow exercise spanning from Corpus Christi to San Antonio. About 100 TxDOT personnel participated, and during the exercise personnel and equipment were mobilized at each ramp in the exercise scenario. While the ramps were not actually closed, the personnel actually transported the equipment to the ramps and deployed them. This process was timed and evaluated.

The May 2013 exercise was a larger contraflow exercise and involved the I-10 and the I-45. More districts and a larger portion of field personnel participated in this exercise.

Most district level emergency response personnel (including the emergency management coordinator) participate in exercises held throughout the state – full-scale exercises, functional, drills, tabletop exercises, seminars, and workshops.

138

ISSUES

Personnel turnover makes training a challenge. Training and exercise gaps may occur when there is leadership turnover, especially in coastal areas. Experiences and lessons learned are often lost when employees retire or leave. Another issue in providing training and exercises for field personnel is the difficulty in scheduling them, due to their day-to-day work priorities.

References

Texas Department of Public Safety, *State of Texas Emergency Management Plan,* Austin, May 2012.

"Texas Drought and Wildfires: Before and After the Severe Weather," *Huffington Post,* Nov. 12, 2011 [Online]. Available: http://www.huffingtonpost.com/2011/09/12/texas-wildfire_n_958780.html.

VERMONT AGENCY OF TRANSPORTATION (VTRANS) CASE STUDY

State	Vermont
Population	621,270
Size	9,249.56 sq. miles
Density	65.8 persons/sq. mile
DOT Size	1,300 employees
DOT Field Personnel	400 employees
Headquarters	Montpelier
District Offices	9
Roadway Miles	2,700 miles
Bridges	4,000 bridges

Vermont has nine district offices (garages). Headquarters arranges most of the training for the 400 or so field personnel, but each district also provides additional training as needed. Vermont hires contractors for various tasks (approximately 30 percent of the work is outsourced) but does not currently provide them with training.

Vermont's primary hazards are snowstorms and flooding. A recent focus has been hurricanes after the 2011 Tropical Storm Irene that devastated parts of the state. Because Vermont also has a nuclear reactor in the city of Vernon, the district field personnel in the area undergo periodic training and scenario-based drills in radiological emergency response.

VTrans is the lead for State Support Function One (Transportation, SSF-1) and is responsible for the development and maintenance of the State of Vermont EOP SSF-1 Annex. The mission of the SSF-1 is:

> "To provide assistance to state and local governmental entities and voluntary organizations requiring transportation capacity to perform response missions following a catastrophic or major disaster or emergency. Support includes, but is not limited to: coordinating assessment of the transportation system to support emergency operations; making the necessary emergency repairs to the state transportation system; assisting local jurisdictions with emergency repairs to their transportation system when resources are available; identifying and obtaining (from state agencies, the federal government, or by donation, lease, or purchase) appropriate transportation assets and/or transportation support capabilities to meet response and recovery operational requirements; coordinating establishment of emergency refueling and maintenance facilities; identifying evacuation routes along the state and federal highway systems; and, with the assistance of SSF13 (law enforcement), coordinate evacuations along those routes should the emergency require" ("SSF-1 Annex," Vermont DEMHS, 2013, page 1).

The SSF-1 Annex notes that all primary and support agencies must maintain inventories and procedures to obtain the following transportation assets:

1. Buses of various types and sizes, with drivers, including non-emergency patient transportation carriers, to be used for evacuations and other transportation missions.

2. Passenger and utility vans of various types and sizes, with and without drivers, including non-emergency patient transportation carriers, to be used for evacuation and other transportation missions.

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

139

3. Trucks and/or trailers of various types, sizes, and combinations with drivers/operators to be used for various transportation missions.

4. Aircraft, aircrews, and ground and operations personnel and communications for transportation of emergency officials, personnel, light-load cargo, and for various aerial surveillance and reconnaissance flights.

5. Boats of various types and sizes, powered and non-powered, for various transportation missions.

6. Cars of various sizes to be used for various transportation missions.

7. Vehicle repair facilities, equipment, and personnel to be used for repairs to various types of emergency vehicles.

8. Fleet parking and storage areas to be used for the staging, parking, and storage of various types of emergency vehicles.

9. Motor pool and vehicle service facilities and personnel to be used for refueling and servicing various types of emergency vehicles.

10. Parking and storage areas to be used for staging, categorizing, storing, and distributing resources in coordination with SSF-7 (Resource Support) throughout the state.

11. Material handling equipment, including forklifts.

12. Locomotives and rail lines. ("SSF-1 Annex," Vermont DEMHS 2013, p. 5)

The specific SSF-1 responsibilities of VTrans are stated as the following:

1. Identify, train, and assign VTrans personnel to staff SSF-1 in the SEOC.

2. Provide all transportation assets listed in paragraph A2 thru A3 and A6 thru A10 above.

3. Monitor status of all road networks and provide continuous updates to SEOC.

4. Assist Vermont Division of Emergency Management and Homeland Security (DEMHS) and VSP with the development of evacuation routes to include physical identification of routes.

5. Provide required barrier material, signage, and manpower to support evacuation operations.

6. Conduct route reconnaissance to ensure structural integrity of road network; suspend and clear all construction along evacuation routes.

7. Provide SEOC and SEOC-deployed teams with maps for all modes of transportation.

8. Maintain database of all state-owned civil aviation assets.

9. Identify and maintain lists of all public and private airports, heliports, and hospital helispot data including location, elevation, navigation and communications aids, runways, maximum aircraft size and weight, aviation fuel availability, and owner-operator points of contact.

10. Evaluate and coordinate requests for temporary flight restrictions, including low-level flights, with the Federal Aviation Agency (FAA).

11. Monitor status of all facilities in paragraph V.A. 7 - 10 above and provide regular updates to SEOC.

12. Assess airport damage, report to the SEOC, and assist in restoration of airports.

13. Identify and maintain railroad transportation systems data and points of contact.

14. Monitor status of rail infrastructure during emergencies and provide updates to the SEOC. ("SSF-1 Annex," Vermont DEMHS 2013, p. 6)

VTrans is the co-lead for SSF-3 Public Works and Engineering along with the Vermont Division of Fire Safety ("SSF-3 Annex," Vermont DEMHS, 2013, page 1). The mission of SSF-3 is:

to provide technical advice and evaluation, engineering services, contracting for or providing construction management and inspection, contracting for the emergency repair of water and wastewater treatment facilities when resources are available, potable water and ice, emergency power and real estate support to assist the State in meeting goals related to lifesaving and life-sustaining actions, damage mitigation, and recovery activities following a major disaster or emergency. ("SSF-3 Annex," Vermont DEMHS 2013, p. 1)

140

VTrans is also the lead agency for the Infrastructure and Environmental Restoration Task Force ("Appendix III," Vermont DEMHS 2013, p. 11). In addition, VTrans develops, plans, and trains based on internal policies and procedures to meet the EOP preparedness, mitigation, response, and recovery needs ("Agency Annex H," Vermont DEMHS 2013, p. 1). This training will also include "multi-level, interagency training and exercises" ("Agency Annex H," Vermont DEMHS 2013, p.1).

ACTUAL EVENT—LESSONS LEARNED

After Tropical Storm Irene, VTrans sought to identify lessons learned and strategies for enhancing response in future disasters. To this end, the Irene Innovation Task Team was established after the recovery phase had been completed. The Task Team was comprised of four members: one with an emergency response background, the VTrans contract administration chief, a former VTrans local transportation facilities program manager, and an organizational development consultant. The Task Team sought to identify lessons learned and determine whether they were applicable for future disaster preparedness or for ongoing operations or both. To this end, the Task Team organized and held eight focus groups, along with a survey, and also reviewed debriefing surveys, meeting notes, and after-action reports (AARs); over 60 response participants were interviewed (*Irene Innovation Task Force Report,* VTrans 2012, p. 4).

Many significant insights and lessons learned were captured through this process. One of the key training-related lessons learned was "the need for ongoing training and preparedness in emergency response and also in the ICS" (*Irene Innovation Task Force Report,* VTrans 2012, page 13). The report stated that "the use of the ICS was essential to the successful response. However, a lack of planning, practice, and a 3-day delay in implementation initially limited the ICS's effectiveness" (*Irene Innovation Task Force Report,* VTrans 2012, p. 4). In other words, the on-the-job, just-in-time training in ICS that took place during Irene was not optimal, and that prior training would be useful for future disasters. This finding prompted a senior-level mandate for all VTrans personnel to take ICS training. All M&O field personnel are now required to take both the instructor-led ICS 100 course offered by the Vermont State Police Academy and the FEMA IS-100 course at VTrans training facility, and they are paid for their time. Vermont Agency of Transportation has a training facility with classrooms, PCs, internet connection, and learning materials. Supervisors and managers are required to take additional courses, including ICS 200, 300, and/or 400, based on their job responsibilities.

Additional training-related recommendations contained in the Irene Innovation Task Force Report included the following:

- Conduct an annual training in disaster response for staff at all levels. While pre-identified leaders need the most training, those at the front lines also need to better understand roles. Training should include checklists and emergency standard operating procedures (SOPs), especially with regards to how finances are handled. A manual should be developed, possibly with the help of other states that have already written them. Clarity regarding Detailed Damage Incident Reports (DDIRs) should also be included in the training manual (short-term).

- Use ongoing mini-disasters as a chance to practice and evaluate the skills of potential leaders (ongoing).

- Train staff in the use of new technology used in the response such as smart phones, tablets, laptops, Wi-Fi, mifi (mobile Wi-Fi___33), and satcards was also identified as an important short-term objective. While embedding IT staff in the Incident Command Centers has mitigated this need, the report recommends that VTrans incorporate new technology into daily operations in order to familiarize personnel with the technology before another disaster or emergency occurs. Accordingly, the report recommends that if new technology is not incorporated into ongoing operations, a plan should be developed to support technology used in emergency response.

- Develop pocket manuals for use by section heads in Incident Command Center units – Logistics, Planning, Operation, Finance— in order to record "who responds, what they do, where they go, and when they do it, as well as FAQs addressing Incident Command Center operations." The development of these pocket manuals are seen as a mid-term endeavor.

- Clarify the role of VTrans in training key stakeholders, including contractors, towns, regional planning commissions, the Director of Public Works, and subcontractors. The Task Team concluded that they would have benefited from additional knowledge about VTrans' procedures during the emergency including response protocols and contracting methods. The lack of understanding of its procedures contributed to issues in completing project worksheets and DDIRs required for the FHWA Emergency Relief and FEMA Public Assistance programs, and caused VTrans to incur additional expenses and time in addressing these issues.

- Incorporate river management principles into VTrans Operation's training institute as one method of institutionalizing river engineering into infrastructure engineering. This final training-related recommendation has a mid-term focus. (*Irene Innovation Task Force Report,* VTrans 2012, pp. 13–15)

A maintenance emergency plan/manual is under development. Field testing of this plan/manual is expected, and the training of field personnel on this plan/manual is planned as well.

EXERCISES

The State Emergency Operations Center organizes full-scale exercises. All field personnel undergo 4- to 5-day full-scale exercise in hurricanes and weapons of mass destruction (WMDs). Drills are voluntary and are held quarterly. Field personnel typically attend four operations-based exercises, including the drills and the full-scale exercise, and six discussion-based exercises (seminars) a year. The seminars are on hazards and threats pertinent to Vermont and VTrans' transportation facilities and are held in various locations and venues.

VERMONT AGENCY OF TRANSPORTATION TRAINING CENTER (VTTC)

The Vermont Agency of Transportation Training Center (VTTC) is comprised of seven full-time staff members. The VTTC has adopted AASHTO Transportation Curriculum Coordination Council's training competencies. The most current catalog ("Catalog of Learning Opportunities") can be found on the VTTC website (VTrans Training Center, http://vtransoperations. vermont.gov/training_center).

The courses offered are classroom-based training and include the following topics:

- Workzone safety
- Outdoor safety
- First aid
- Personal safety
- Chemical safety
- Respect in the workplace policies
- Construction safety
- Fire safety.
  ("Catalog of Learning Opportunities," VTrans 2013–2014)

Other safety and health training courses offered at the VTTC or other VTrans locations include:

- Bloodborne Pathogens
- Chain Saw
- Confined Space
- Defensive Driving
- Electrical Safety
- Fall Protection
- First Aid/CPR
- Forklift
- HazMat
- Lockout/Tagout
- Meth Lab
- Mine Safety and Health Administration
- Power Tools
- Securing and Transporting Loads
- Snow and Ice Control
- Trenching and Shoring Safety
  ("Catalog of Learning Opportunities," VTrans 2013–2014)

Supervisory Courses

VTTC offers a course titled "Advancing Towards Supervision" which provides an overview of needed skills for supervisors ("Catalog of Learning Opportunities," VTrans 2013–2014).

VTrans has a 6-day Fundamentals of Supervision course for supervisors, team and crew leaders, and specialists. The course covers supervisory roles and expectations, motivation and communication techniques, and the development of an individual development project plan. The course includes the following three segments:

142

1. Supervisory roles and expectations, how to foster an environment that motivates employees to excel and communicate effectively.

2. Focuses on legal and contractual responsibilities.

3. Focuses on supervisory skills needed to succeed.

   ("Catalog of Learning Opportunities," VTrans 2013–2014)

 The Fundamentals of Supervision course also requires participants to attend and complete other courses:

- Managing Under the Contract, Parts I–IV
- Interviewing & Hiring for Success
- Mandatory Equal Employment Opportunity for Agency Supervisors and Managers
- Ethics
  ("Catalog of Learning Opportunities," VTrans 2013–2014)

The objectives of the Fundamentals of Supervision course are:

- Participants will identify the roles and expectations of supervisors.
- Learn the tools to motivate and coach employees.
- Understand communication styles.
- Learn the processes involving discipline, corrective action, and grievance handling.
- Understand how to identify sexual harassment and create a workplace of respect (including generational and cultural differences).
- Learn conflict management methods and understand employee behavior.
- Learn the performance management cycle. ("Catalog of Learning Opportunities," VTrans 2013–2014)

NEEDS ASSESSMENT TOOL

Attached with this case study is the Manager/Supervisory Needs Assessment Tool. VTTC uses this Needs Assessment Tool to help determine whether a particular training course is needed.

VERMONT DIVISION OF HOMELAND SECURITY AND HOMELAND SECURITY (DEMHS)

The Division of Homeland Security and Homeland Security (DEMHS) of the Department of Public Safety is the Vermont state EMA. Although the Vermont DEMHS has its own website (http://dps.vermont.gov/demhs), there are also separate portal websites for Vermont Emergency Management (http://vem.vermont.gov/ and Vermont Homeland Security http://hsu.vermont.gov/).

In 2013, DEMHS offered 120 training courses on NIMS and ICS, emergency management, terrorism awareness, fire incident response support, responder safety and health, and on other related topics. Field courses, including hazmat training, are offered at various locations in the state. While transportation to the training site is not covered, the course, course materials, lodging, and meals are provided by DEMHS.

The state's exercise officer supports the exercise needs of VTrans and other agencies in Vermont. DEMHS is developing a new training program for state and local emergency management personnel using existing resources and qualified training contractors. Field training and training on ICS and EMAC will be included in the new program. Personnel from other states will be invited to participate. In addition, the program will be packaged so that it will be usable by other states.

References

Vermont Agency of Transportation (VTrans), "Catalog of Learning Opportunities," Vermont Agency of Transportation Training Center, Berlin, 2013–2014.

Vermont Division of Emergency Management and Homeland Security (DEMHS), "Agency Annex H: Agency of Transportation," *State of Vermont Emergency Operations Plan,* Department of Public Safety, Waterbury, 2013.

Vermont Division of Emergency Management and Homeland Security (DEMHS), "Appendix III: State Support Functions Summary," *State of Vermont Emergency Operations Plan,* Department of Public Safety, Waterbury, 2013.

Vermont Division of Emergency Management and Homeland Security (DEMHS), "State Support Function (SSF) Annex 1: Transportation (SSF-1 Annex)," *State of Vermont Emergency Operations Plan,* Department of Public Safety, Waterbury, 2013.

Vermont Division of Emergency Management and Homeland Security (DEMHS), "State Support Function (SSF) Annex 3: Public Works and Engineering (SSF-3 Annex)," *State of Vermont Emergency Operations Plan,* Department of Public Safety, Waterbury, 2013.

144

Needs Assessment Questionnaire

Name:

Title:

Date:

Division:

What is the need?

1. Describe the need in general.

2. How has this arisen as a need?

3. Who is driving the request?

What is the agency/division/section impact?

4. What is the impact on the agency or your functional area if training was not provided?

Who is involved?

5. Who is the targeted audience(s)?
    a. Division(s):
    b. Functional area(s):
    c. Job level(s):
    d. Approximate number of employees:

6. What other functional areas will be impacted or need to be involved and how?   (stakeholders)

7. Who has experience or knowledge that we could leverage (e.g., internal customers, external customers, suppliers)?

8. Should the employees who are responsible for achieving the desired outcomes be involved in the design process? If so, how? If so, will we have access to them to discuss training solutions so there will be collaboration and shared under-standing of the goal?

9. What do they know about the initiative?

10. What support has been secured for the training (budget, supplies, people, commitment, etc.)?

What is the scope of work for the VTTC?

11. Has this project been proposed before?

12. How was the initiative been approached in the past? What worked about past solutions? What didn't work?

13. What type of solution do you envision?
    a. Solution description:
    b. Delivery method and strategy: Needs Assessment Questionnaire

14. What ways can we document and measure progress after the initiative is implemented?

15. What constraints do you anticipate?

16. Will any policies or procedures be impacted?

17. Are there any compliance or re-certification requirements?

New Skills, Knowledge, Behaviors

18. In broad terms, what do employees need to know about the topic?

19. What will employees need to be able to do differently as a result of the training?

20. Why is this information important to them?

21. How will supervisors of participants coach pre- and post-training to ensure transference?

22. How will this impact the employees' jobs?

    a. Incentives?

    b. Disincentives?

    c. Barriers?

Development

23. What materials have already been developed to assist in development of the training?

24. Do you suggest a pilot of the materials to test the approach? If so, will we be able to make adjustments after the pilot?

25. What evaluation methods will be expected/allowed?

26. What metrics could we use to measure impact (i.e., evaluations, audits, reports)?

Communication

27. Who will champion and advocate the training?

28. What means of communication do you feel would be appropriate?

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) CASE STUDY

State	Washington
Population	6,882,400
Size	71,362 sq. miles
Density	103 persons/sq. mile
DOT Size	More than 6,800 employees
DOT Field Personnel	1,600 employees
Headquarters	Olympia
Districts	6 regions, 24 maintenance areas
Highway Miles	20,677 miles
Bridges	3,500+ bridges
Ferries	23 ferries

146

Washington State is subject to many human-caused, technological, and natural hazards. WSDOT has identified the following hazards that pose the greatest potential to adversely affect the state transportation system:

- Earthquake
- Flood
- Severe storms
- Tsunami
- Wildland Fire
- Civil disturbance
- Volcano
- Tornado
- Pandemic influenza
- Mudslide and/or landslide
- Hazardous materials spill/release
- Major accident
- Terrorism
- Radioactive materials release
- Infrastructure failure

WSDOT undertakes the building block approach to training and exercises. WSDOT delivers increasing levels of knowledge to their personnel and, when feasible, provides them with the opportunities to apply what they have learned.

According to the WSDOT training manager, all WSDOT field personnel that come in contact with emergency situations should have a basic understanding of:

- The incident command system and the part they play in it
- How to conduct or adjust the portions of their job that are applicable and appropriate to emergencies
- How to integrate with outside agencies, locals, and private enterprise when the need exists for all to pull together
- The importance of documentation (photos, notes/logs)
- How to move information to the people who need to have it and knowing who those people are
- How to ensure that safety of themselves and others comes before any actions they might take

WSDOT's emergency training and exercise needs emanate from WSDOT's role as the primary agency on ESFF #1 (Transportation), as the joint primary agency on ESF#9 (Search & Rescue), and as a support agency on the majority of other ESFs, including ESF#3 (Public Works and Engineering) ("Annex C," *Washington State Emergency Operations Plan,* Washington Military Department 2008, p. C-3).

In addition to the *Washington State Emergency Operations Plan,* WSDOT has its own EOP (*Emergency Operations Plan M 54-11.01, WSDOT 2011*). Appendix C of WSDOT EOP M 54-11.01 is a training and exercise plan.

TRAINING AND EXERCISE ELEMENTS OF THE WSDOT EOP

Appendix C of WSDOT EOP 54-11.01 describes training and exercise requirements of WSDOT personnel. IS-100 and IS-700 are required training for all field personnel. However, due to scheduling, budget, and related constraints, not all field personnel have been trained in them yet. Traffic incident management is also a requirement and is taught in-house.

WSDOT Emergency Responder Training

WSDOT personnel who respond to emergencies need to understand the actions they must take during emergencies (*Emergency Operations Plan M 54-11.01,* WSDOT 2011, p. 3). This requires training that may include, but is not limited to, classroom instruction, required reading, and participation in drills and exercises. Emergency response training and the determination of who must attend will be developed and coordinated by the WSDOT Emergency Management Working Group, with oversight from the WSDOT Office of Emergency Management (*Emergency Operations Plan M 54-11.01,* WSDOT 2011, p. 3).

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

147

National Incident Management System (NIMS) and Incident Command System (ICS) Training

WSDOT employees who have a role in emergency response shall receive training on the National Incident Management System and the Incident Command System (*Emergency Operations Plan M 54-11.01,* WSDOT 2011, p. 3). Information concerning whether or not a position requires NIMS and/or ICS training is located in the training matrix in found in Appendix C of the WSDOT EOP 54-11.01 (2011, p. C-3). The WSDOT Office of Emergency Management can also be contacted for this information.

TABLE 6 shows the categories of WSDOT employees who are required to take the IS-100, IS-200, and IS-700 courses. NIMS and ICS training is conducted by the WSDOT Office of Emergency Management and can be taken online through self-study courses or through other local sources. WSDOT must report that all staff have completed training annually as required by Homeland Security Presidential Directive Five (HSPD-5).

TABLE 6
EXCERPTS FROM THE ICS REQUIRED TRAINING MATRIX FOR IS-100, IS-200, AND IS-700 (*Source: Emergency Operations Plan M 54-11.01,* WSDOT 2011, P. C-3)

Category	IS 100 (cc: CX7)
01	First responders (*Disaster Teams, IRT*)
02	First Line Supervisors (*Maintenance Superintendents*)
03	Middle Management
04	Command and General Staff (*HQ OEM staff*)
05	Other (*TMC, EOC*)

Category	IS 200 (cc: CY4)
02	First Line Supervisors (**Maintenance Superintendents**)
03	Middle Management
04	Command and General Staff (**HQ OEM staff**)
05	Other (**IRT, TMC, PIO**)

Category	IS 700 (cc: CY5)
01	Entry Level first responders and disaster workers (**Disaster Teams, IRT**)
02	First Line Supervisors (**Maintenance Superintendents**)
03	Middle Management
04	Command and General Staff (**HQ OEM staff**)
05	Other (**Exec Team, TMC, EOC, RA/ME**)

WebEOC & SharePoint Training

WSDOT personnel who are assigned to work in an EOC should be provided with WebEOC and SharePoint training (*Emergency Operations Plan M 54-11.01,* WSDOT 2011, p. 3). This training is designed to familiarize personnel with WSDOT's Common Operating Picture during emergency/disaster operations.

148

TRAINING METHODS

Most training is done in-house using WSDOT trainers and qualified staff because the training is WSDOT-specific. In-house methods use regional safety/maintenance trainers, WSDOT Office of Emergency Management staff, and online classes. During district-level crew meetings, information on skills and safety are covered in brief. WSDOT has one maintenance trainer per district. The trainer has also considered going out to the field to drill staff about their response to hypothetical situations that could be occurring at that very moment.

EXERCISES

Ideally, WSDOT believes that all field personnel should participate in all levels of emergency exercises (tabletops, drills, functional, and full-scale) on a regular basis. Realistically, this is not possible.

WSDOT's exercise program approach is all hazards. Therefore, any hazard that exists in the region may be used. Examples are: earthquake, fire, tsunami, dam failure, lahar, and winter storms (wind, flooding, snow). The WSDOT Office of Emergency Management Exercise Coordinator is responsible for creating scenarios around situations, incidents, and hazards identified through needs assessments. The exercise coordinator accomplishes this responsibility either individually or in conjunction with regional representation. Additional details are included in the Training and Exercise Plan (Appendix C) of WSDOT *Emergency Operations Plan M 54-11.01* (2011).

The WSDOT Office of Emergency Management Exercise Coordinator currently creates exercises based on need or executive request. WSDOT field personnel are included as determined appropriate by exercise design and the approval of regional supervisors. If involved, field personnel would partake in these exercises no more than one or two times a year.

Many WSDOT exercises are organized and held in conjunction with other state and/or local agencies and the State Emergency Management Division, although very few if any field personnel are involved in them. When WSDOT participates in them, they are designed and run through collaborative planning meetings with all involved entities. Overall exercise objectives are created and then each entity will also have their own objectives that they are focusing on as well. The exercise is then designed to have each participant respond as they normally would. The exercise is evaluated against the pre-determined objectives.

A TTX was developed based on an actual disaster that occurred on February 28, 2007, at Snoqualmie Pass in Washington. Due to winter weather conditions, including snow and ice, 50 vehicles of various types, including tractor trailers, collided at the Snoqualmie Pass near exit 47 on westbound I-90. A fuel spill also occurred. Tractor trailers were stuck in the eastbound lanes, which caused the closing of all lanes in both directions. Emergency responders, including field personnel, were involved in this TTX, which took place at WSDOT on May 9, 2007.

WSDOT notes the importance of exercise evaluations and that the success of training and exercises is determined by improvement in its response during an exercise or real event. Subject matter experts are utilized as evaluators. In large exercises, the HSEEP Exercise Evaluation Guides are used; however, in smaller exercises or drills, less in-depth evaluations (including performance metrics) are used. In these cases, evaluation takes place by comparing the actions of players to the exercise objectives, and corrective actions are determined based on the evaluation results.

ISSUES

Scheduling is difficult because WSDOT supervision and management face significant scheduling and budgetary challenges. WSDOT already schedules mandatory safety training and other required training for their field personnel. In order to provide emergency training and exercises to field personnel, it would require pulling them off of their jobs or interrupting them on site and using their paid time to deliver the training. Therefore the department as a whole does not strongly support it. Also, online training is a challenge in some of the district offices that do not have good access to the internet.

WSDOT has considered the development of interactive, computerized emergency training classes and exercises that contain WSDOT-specific situations. Ultimately, WSDOT decided that the cost to create them in the current budget climate was excessive.

CONTRACTORS

There is no WSDOT emergency training program given to contractors other than safety briefings each morning prior to beginning work. While there would be benefits to including contractors and PWs in WSDOT emergency exercises, this is not done at this time. Currently, WSDOT is financially challenged and without a resilient agency program already in place for their own staff moving forward, integrating locals or contractors in their emergency training and exercise initiatives or placing requirements or expectations on locals or contractors is premature.

CITY OF KEENE, NEW HAMPSHIRE, CASE STUDY

The City of Keene's public works department has 68 employees whose responsibilities encompass the following:

- Engineering
- Forestry management
- Maintenance and repair of the city's vehicles and equipment
- Maintenance of the water and wastewater distribution and collection systems
- Solid waste management, including recycling
- Street and bridge design and maintenance, including sweeping, paving, snow removal, line painting and general upkeep
- Street and traffic sign maintenance
- Stormwater management
- Wastewater collection and treatment
- Water supply treatment , protection, and distribution

If a disaster should occur, counties and cities are responsible for repairing local routes and must apply to FEMA's Public Assistance program for assistance. Damages to federal-aid routes are the responsibility of the state DOT.

The public works director for the City of Keene cites three key obstacles in providing NIMS and ICS training to personnel: support from senior management, scheduling, and budget issues. Firstly, he believes that additional support from senior management to provide this training is needed. Without adequate support, it is difficult to implement the training. A second obstacle is scheduling. The city's M&O field personnel are required to take specific licensing and certification training and refresher training to maintain their licenses. Scheduling this training for them already requires considerable time, efforts, and expenditure of limited resources. Consequently, adding any additional training is difficult both from a scheduling and a budgetary perspective.

The public works director noted that his perspectives are shared by other local public works agencies, especially smaller agencies. Providing adequate training is especially challenging if direction and support are not provided from senior management.

Training would be beneficial on the FEMA public assistance reimbursement process, which can be difficult to navigate. While FEMA does provide training on the process at the EMI facility in Virginia, small communities usually do not have the ability to release staff or the resources to send their personnel to the training. This training needs to be brought to the local communities and public works agencies.

PLANT CITY, FLORIDA, CASE STUDY

The Traffic and Street Stormwater Superintendent of Plant City, Florida, was interviewed for this case study. The Superintendent manages three divisions – traffic signal, storm water and street – and is responsible for training the 50 field personnel in his divisions.

Plant City considers hurricanes to be a primary hazard for the city, as they are for the state of Florida. In addition, Plant City is at higher risk for hazmat emergencies due to industrial and chemical plants located in and around the city. Also, a corridor (I-4) which has heavy truck and freight traffic and rail lines passes through the city.

150

NIMS TRAINING

All field personnel are given training on the basic IS-700 NIMS course through FEMA's online independent study program training.

HURRICANE TRAINING

Once a year in-house training on various hurricane-related scenarios is provided prior to the start of the hurricane season (in May). These include hazards awareness, emergency operations, safety issues (electrical lines, downed trees, debris management), and communications.

OTHER TRAINING

In addition, hazmat cleanup and water resource management training are provided once a year on site.

MEETINGS

Weekly safety meetings are often held during lunch on various topics, including hazards awareness and emergency operations. These meetings are a combination of training, discussions, and information sharing. Plant City's four divisions each have up to nine employees, and these divisions hold weekly safety meetings.

A superintendent prepares training content and trains workers during the meetings. At some meetings, workers themselves may do some preparatory research or readings and lead a discussion. An incident may also become a focal point for a discussion.

DRILLS

Drills are held periodically on certain topics such as chain saw usage or debris management on an as-needed basis. These drills allow personnel to receive hands-on training in a specific area or process. Approximately 10 to 20 employees undergo the drills, depending upon staff availability.

SAFETY COMMITTEE

Also, there is a safety committee comprised of management and personnel from each division which reviews accidents and their causes. This information may be used as one of the topics for the weekly safety meetings.

LTAP CENTER AND THE PUBLIC WORKS ACADEMY

Various training is also provided by the Florida Transportation Technology Transfer Center at the University of Florida (which is an LTAP Center) and the Public Works Academy in St. Petersburg, Florida. They offer safety training and specific classes related to hazards awareness, hazmat, and emergency management.

INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION (IMSA) TRAINING

Florida law requires certification of personnel who design work zones for intermediate traffic certification. The P.E. license is acceptable as well. Independent/private companies also offer this certification. Plant City uses International Municipal Signal Association (IMSA) for this type of certification and training. Sixty to seventy percent (60–70 percent) of Plant City field personnel have undergone state-required IMSA training based on their job responsibilities. This percentage is generally applicable to other municipalities within the state of Florida as well.

151

IMSA is a nationally recognized professional organization which was established in 1896. It offers educational and certification programs in traffic signals, signs and markings, work zone traffic control, municipal and interior fire alarm systems, and public safety dispatcher and flagging and has issued more than 100,000 certificates. The training and certification of field personnel in these areas are often required by states and municipalities. In 1982, the IMSA and the IMSA Educational Foundation began certification of individuals involved with various public safety activities including DOT and public works personnel. IMSA notes on its website that "certification can also provide an entry into many job assignments that otherwise would be difficult to obtain, since employers recognize certification as an indication of the individual's ability to do specific job tasks without the need for on-the-job training."

IMSA currently offers certification in the following fields:

- Electronics in traffic signals
- Fiber optics for ITS
- Fire alarm monitoring
- Flagging and basic traffic control
- Interior fire alarm
- Microprocessors in traffic signals
- Municipal fire alarm
- Roadway lighting
- Signs and markings
- Telecommunicator / public safety dispatch
- Traffic signals
- Traffic signal inspection
- Work zone traffic control safety

The certification process involves the purchase of a manual and the taking of a proctored examination. Moderated review programs are also offered by IMSA in various locations.

152

APPENDIX F

Washington DOT Emergency Operations Plan Training and Exercises

Washington State DOT Office of Emergency Management Emergency Operations Plan M 54-11.01, May 2011

Portions of WSDOT's Emergency Operations Plan relevant to training and exercises are presented below:

Concept of Operations

It is vital that WSDOT regions, divisions, programs, and employees understand their roles during a disaster. The following section describes the all-hazards framework for WSDOT staff to follow during a disaster.

Preparedness Phase

The preparedness phase consists of building and maintaining emergency plans and conducting emergency training and exercises. It is a primary goal of the WSDOT Emergency Management Program to maintain a constant state of readiness and the ability to respond and recover from any hazard that threatens the state transportation system.

Training and Exercises

WSDOT Emergency Responder Training – WSDOT personnel who respond to emergencies need to understand the actions they must take during emergencies. This requires training that may include, but is not limited to, classroom instruction, required reading, and participation in drills and exercises. Emergency response training and the determination of who must attend will be developed and coordinated by the WSDOT Emergency Management Working Group with oversight from the WSDOT Office of Emergency Management. Further details can be found in Appendix C Training and Exercise Plan. Training records for emergency management-related training are maintained by WSDOT Staff Development.

   National Incident Management System (NIMS) and Incident Command System (ICS) Training – WSDOT employees who have a role in emergency response shall receive training on the National Incident Management System and the Incident Command System. Information concerning whether or not a position requires NIMS and/or ICS training is located in the Training Matrix found in Appendix C or can be found by contacting the WSDOT Office of Emergency Management. NIMS and ICS training is conducted by the WSDOT Office of Emergency Management and can be taken online through self-study courses or through other local sources. The Training and Exercise training matrix shown below outlines position-specific training requirements for NIMS/ICS classes. WSDOT must report that all staff have completed training annually as required by Homeland Security Presidential Directive Five (HSPD-5).

Category	IS 100 (cc: CX7)
01	First responders *(Disaster Teams, IRT)*
02	First Line Supervisors *(Maintenance Superintendents)*
03	Middle Management
04	Command and General Staff *(HQ OEM staff)*
05	Other *(TMC, EOC)*

Category	IS 200 (cc: CY4)
02	First Line Supervisors **(Maintenance Superintendents)**
03	Middle Management
04	Command and General Staff **(HQ OEM staff)**
05	Other **(TMC, EOC)**

Category	IS 300 (cc: C3U)
03	Middle Management
04	Command and General Staff **(HQ OEM staff)**
05	Other

Category	IS 400 (cc: C3V)
04	Command and General Staff **(HQ OEM staff)**
05	Other

Category	IS 700 (cc: CY5)
01	Entry Level first responders and disaster workers **(Disaster Teams, IRT)**
02	First Line Supervisors **(Maintenance Superintendents)**
03	Middle Management
04	Command and General Staff **(HQ OEM staff)**
05	Other **(Exec Team, TMC, EOC, RA/ME)**

Category	IS 800 (cc: CY6)
03	Emergency Management personnel in middle management
04	Emergency Management personnel in Command and General Staff **(HQ OEM staff)**
05	Other

(WSDOT 2011, Appendix C)

WebEOC & SharePoint Training – WSDOT personnel who are assigned to work in an EOC shall receive WebEOC and SharePoint training. This training is designed to familiarize personnel with WSDOT's Common Operating Picture (COP) during emergency/disaster operations.

Exercises – To ensure that WSDOT is ready to respond to and recover from any major emergency, EOC staff routinely take part in drills and exercises. Drills and exercises provide an opportunity to assess WSDOTs emergency operations preparedness and personnel and equipment readiness. WSDOT should, when staff availability and the situation allows, take part in statewide and federal exercises or drills. WSDOT also conducts its own drills or exercises as needed. The WSDOT Emergency Management Working Group will coordinate all internal exercises.

Appendix C Training and Exercise Plan

Introduction

Planning, Training, and Exercises – A Continuous Cycle

Emergency preparedness is a continuous, cyclical process with three key functions: planning, training, and exercising. Each function depends on the other two and does not stand alone. The process begins with an assessment that leads to planning actions. Once plans are in place, training for those plans takes place. Exercises are then created and evaluated to ensure the plans and resulting actions are in place and function correctly. The content of that evaluation leads to further improvement planning and outlining corrective actions to be resolved, and the cycle begins again. The WSDOT Emergency Management Program has three sections that correspond to the base functions. They are the Emergency Operations Plan (that this is an appendix to), emergency response training, and emergency exercises (that ultimately include identifying needed improvements and creating strategies to address those issues). Each part is equally important to reaching the goal of agency emergency preparedness.

154

1. **WSDOT Emergency Operations Plan (EOP)** – The EOP tells what should be done in an emergency, who is responsible, and by what authority. The standard operating guidelines within the regions and divisions define how they will carry out the response.

2. **Training** – Policy training on the EOP or other guiding plans (e.g., Bridge Inspection Plan, Continuity of Operations Plan), FEMA-mandated classes (i.e., Incident Command System and National Incident Management System), and familiarization with local standard operating guidelines, as well as hands-on skills training, are critical.

3. **Exercises** – Exercises are designed to test knowledge and skill in responding to and managing emergencies. They are based on the plans written, the training received on them (as outlined above), and the response actions of participants. By utilizing this system the WSDOT Emergency Management Program is able to determine the effectiveness of the current response to emergencies and determine what changes should be made to the program to enhance it and move it forward.

Training

Training involves a process that allows for learning new information, while an exercise is a simulated scenario that gives emergency responders an opportunity to practice their knowledge, skills, and plans. All WSDOT employees should receive training on actions they should take during emergencies in conjunction with their facility emergency actions plan. This includes items such as drop-cover-hold and evacuation and assembly procedures. Additional training should be provided for WSDOT personnel who will implement the emergency operations plan. This should cover emergency response roles for everyone, including field responders, specialized teams, and EOC staff. Headquarters EOC conducts regularly scheduled training sessions with staff, and the regions are encouraged to do the same (minimum of twice per year). Emergency training required by specific job classes (e.g., ICS/NIMS, IRT, building evaluation) is managed and tracked by staff development. The current FEMA requirements for NIMS training are followed as determined by the Office of Emergency Management for the specific position held. Following an actual emergency or an emergency exercise, the after-action analysis might show that additional emergency training is needed. The indication of the need for additional training will be forwarded to the involved area or persons, along with the recommendation of the type of training that should be conducted or taken. The training should be provided as soon as possible to take the best advantage of the learning opportunity that the recent response exercise provided.

General Exercise Information

An exercise is a simulated emergency that gives emergency responders an opportunity to practice their knowledge, skills, and plans in response to the given scenario.

Exercises can help:

1. Assess how ready the department is to handle an emergency.

2. Identify procedures that can't be accomplished as outlined or are ineffective during a response to an emergency.

3. Provide a forum for WSDOT employees to practice their skills and improve performance under varying degrees of stress.

4. Give responders from different agencies an opportunity to work together as a team before an emergency occurs.

5. Identify improvements that are needed in emergency plans, guidelines, and training.

6. Identify resources that are lacking or needed to improve response.

7. Provide a way to educate and involve the public, the news media, and key community organizations in WSDOT's emergency planning efforts.

Evidence shows that exercises had a substantial impact on improving performance during an actual emergency for all the reasons listed above.

Organization of an Exercise

Some training and exercises are organized by the office, region, or division involved and some are organized by the WSDOT Office of Emergency Management (OEM), while others are organized through a collaborative process between both and/or an outside agency or jurisdiction. WSDOT exercises held for WSDOT employees are organized completely within WSDOT. Other collaborative exercises involving outside entities (e.g., another state, local jurisdiction, FEMA, or the U.S. Coast Guard) are usually created and organized by the lead agency.

WSDOT in Exercises Involving Outside Entities

Most emergencies involve many different types of responders, and WSDOT is often among them. Although WSDOT is not usually the lead agency in large-scale emergencies, nearly every emergency situation depends on a functioning transportation infrastructure to allow for response. This means that WSDOT is highly involved and a valuable responder. Executive management, affected regions and divisions, involved or nearby field crews, and any outside agencies that might participate in or observe the actions of the responders should be notified in advance (in particular during a full-scale exercise in which resources are actually moved and/or utilized). Smaller drills, tabletops, or functional exercises that only affect a few people in a specific location will not need this level of notification but should be shared with local leadership.

Types of Exercises – Definitions

Drills – A drill is a coordinated, supervised exercise activity normally used to test a single specific operation or function. With a drill, there is no attempt to coordinate organizations or fully activate the EOC. Its role in an exercise program is to practice and perfect one small part of the response plan and help prepare for more extensive exercises, in which several functions will be coordinated and tested.

   Fire Drills – In order to ensure a safe and quick evacuation of WSDOT facilities during a fire, ALL WSDOT facilities should conduct a fire drill, including full building evacuation and personnel accountability, twice per year. For planning purposes fire drills dates and times should be annotated in the Facility Emergency Action Plan.

   Drop-Cover-Hold Drills – During an earthquake the standard practice for WSDOT personnel is to "drop-cover and hold." Drop-cover-hold drills should be conducted in ALL WSDOT facilities twice per year.

   Tabletop Exercises (TTX) – A tabletop exercise is a facilitated analysis of a major emergency or disaster situation in an informal, stress-free environment. It is designed to elicit constructive discussion as participants examine and resolve problems based on existing operational plans and identify where those plans need to be refined.

   Functional Exercises – A functional exercise is a fully simulated, interactive exercise that tests the capability of an organization to respond to an event. The exercise tests multiple functions of the organization's operational plan. It is a coordinated response to a situation in a time-pressured, realistic simulation.

   Full-Scale Exercises – A full-scale exercise simulates a real event as closely as possible. It is an exercise designed to evaluate the operational capability of emergency and disaster management systems in a highly stressful environment that simulates actual response conditions. To accomplish this realism, it requires the mobilization and actual movement of personnel, equipment, and resources. Ideally, the full-scale exercise should test and evaluate most functions of the emergency plan or operational plan. Full-scale exercises will be conducted at a minimum ONE time annually. In the event of a Level II or Level III Activation the annual full-scale exercise requirement can be waived.

Exercise Planning

Exercise Planning Team

Exercise design is a complex task. It is best done by a team consisting of persons who have expertise. Depending on the scope of the exercise, the team may consist of agencies outside of the department, WSDOT regions or divisions, the Washington Emergency Management Division, and the WSDOT Office of Emergency Management. Smaller exercises will need less input, so only a few representatives might be needed. Rarely should a single person create an exercise if it affects more than just a single office or function. The person who organizes an exercise – for example, a local jurisdiction emergency manager

156

– will put together an exercise planning team. For WSDOT-only exercises the persons on the team should be representatives from the level of participation and/or from the involved portion of the department (e.g., region, area, division).

The Emergency Management Working Group (EMWG) shall coordinate WSDOT in-house exercises and participate on the exercise planning teams and/or will provide subject matter experts for use by the team. The Office of Emergency Management will assist in exercise creation and coordination of statewide in-house exercises and will assist as requested with region and division exercises. It will also provide initial representation on exercise planning teams for exercises being coordinated by outside entities. If additional expertise is needed, OEM staff will contact the EMWG staff who will coordinate and provide them.

The Exercise Planning Team is the backbone of exercises, and a high level of interest, cooperation, and commitment by the members will be the difference between a successful and unsuccessful exercise.

This team begins its process by determining what capabilities are lacking or need to be improved (staff, equipment, communications, plans, training, etc.) for the body that is being exercised. Once that has been completed, the type of exercise and the objectives for it can be created. These will then help determine what type of scenario to exercise and the scope of involvement. The exercise planning teams design, develop, conduct, and evaluate exercises. They determine objectives, create scenarios, and develop documentation that will assist in creation of after-action reports, improvement plans, and corrective action plans. These items are crucial to an ever-improving emergency management program.

Exercises require a great amount of planning, creativity, and preparation, and the exercise planning team must use the hard work, experience, and energy of all members to create and conduct an effective exercise.

Exercise planning teams also develop and distribute the pre-exercise materials, develop agendas, send invitations, and provide information for the media as points of contact for exercise participants, among other responsibilities. The members often conduct exercise briefings and training sessions prior to an exercise and may be used as exercise controllers, facilitators, and evaluators. If additional persons outside of the team are used to fill those roles, the exercise planning team members are responsible to recruit and train them.

The Homeland Security Exercise and Evaluation Program (HSEEP)

The Homeland Security Exercise and Evaluation Program is the model that is used to create the WSDOT Training and Exercise Program. This program is the national standard and is required to meet federal mandates for compliance with the National Incident Management System.

HSEEP contains a modular system that structures the way in which an agency can determine deficiencies, address them, and exercise on them, and then capture the results and incorporate them into the next cycle. This system uses a building-block approach to allow for a gradual increase in knowledge and skills. This approach builds on exercise successes, boosts confidence, and gains management support. This is done by beginning with smaller exercises, building on what was learned, and moving into larger types of exercises. This helps to alleviate the frustration of moving directly into a full-scale exercise in which the participants are overwhelmed, most often ending in poor results.

Exercise Objectives

Exercise objectives are created to test particular capabilities that have been deficient in the past or to verify those that have been successful. By creating specifics monitored and evaluated during the exercise, the review of these items can be focused to determine if they are being met.

Objectives are a description of what is to be tested during the exercise. They should define specific goals, provide a framework for scenario development, and drive the formulation of the events injected to create response and to provide evaluation criteria.

Due to all of that, objectives are the cornerstone of exercise design and development. The number of objectives should, however, be limited but should adequately support successful completion of exercise intent.

Exercise Scenarios

It is important to exercise on a variety of hazards and actions, from preparedness to response to recovery. However, the type of hazard should not be the starting point for exercise development. Determination of the capabilities that need to be tested and the objectives written from them should always come first, and then the type, hazard, and scope should follow.

Exercise Documents and Presentations

To follow the HSEEP program there are several documents to create prior to an exercise. These will vary depending on if it is a smaller seminar, a tabletop exercise (discussion-based exercise), or a large, full-scale exercise (operations-based exercise) in which field resources are being deployed. In addition to the basic documentation, there may be a desire to create multimedia presentations and audio visual elements, have actors play the parts of victims or outside persons, and even have actual involvement and/or participation by the media. All of these things must be created, coordinated, and managed to ensure all involved receive needed information that is current and accurate.

Exercise Conduct

Safety of the exercise participants, facilitators, controllers, and evaluators (and, if in the area, volunteers and the public) take precedent over exercise events. All persons share in the basic responsibility for ensuring a safe environment for all involved. Articulated safety requirements are part of the exercise plan.

Follow-up

After exercises are complete and input gathered from all involved, an after-action report (AAR) with a corrective action plan (CAP) is created to rectify found deficiencies. These documents should also be shared with the persons within the department who were notified that the exercise was being planned and conducted. Completion of these documents and sharing them is vital to improving the emergency training and exercise plan and overall department preparedness. They allow for capability assessments, which lead to creation of an improvement plan to guide future training, exercises, and updated plans and procedures. All items listed in the CAP shall be assigned out to a particular person for coordination by an assigned completion date. A region or division person should be placed in charge of managing the completion of all CAP items. A copy of all CAPs with regular updates shall be sent to the OEM where statewide trend analysis on deficiencies will be done. If statewide issues occur, the OEM will share those issues and assist in seeking answers that will help everyone.

The follow-up documents used in the HSEEP process should also be used following significant emergency events. This allows for a consistent procedure for capturing what occurred and how the deficiencies found are tracked to resolution.

APPENDIX G

Arizona DOT Emergency Planning, Management, and Maintenance Training Matrices

MAINTENANCE ROADWAY/SIGNING/STRIPING ADOT TRAINING MATRIX

Highway Ops Worker (S1)			Tech I (S4)	Tech II (S5)	Tech III (S6)	Tech IV (S7)	Supervisor (S9)	Superintendent (S10)
Pecos Contributor TCH3163 (8)	EOTEP Attenuator TCH4870 (4) (8)	Risk Management GEN5237 (4)	Replace with TIM! Response to Roadway Incidents GEN5243 (3)	Intermediate Maintenance Math II (8) TCH3016	Intro to Partnering GEN5180W (2)	Loss Prevention Academy GEN5060 (36)	Managing Resources Effectively GEN5231 (8)	MSLT Performance Measurement GEN5235 (8)
Flagger ATSSA Cert. TCH1114 (4)	EOTEP Powered Industrial Trucks (SS) TCH1130 (5) (1)	Basic Work Zone Traffic TCH3004 (8)	Introductory Maintenance Math I TCH3015 (8)	Maintaining Roadside Safety Devices (R) (8) TCH3082	Permit Process and Inspection GEN5236 (8)	Understanding Contract Develop / Admin GEN5240 (8)	Advantage EPS 2nd Lvl GEN1204 (8)	Teach 2 MSLT Classes GEN5249 (16)
Bluestake Dig Safely TCH1155 (8)	EOTEP Loader (R) TCH4880 (8) (40)	Large Trk-Trailer Dump Truck TCH4820 (8) (40)	Work Zone Traffic Control Advanced TCH3005 (8)	Maintenance Materials (R) TCH3117 (8)	Incident Reporting and Investigation GEN5050 (4)	Managing Employee Performance GEN5233 (16)	Pecos ORG Tactical Planner TCH3166 (16)	Pecos Strategic Planning TCH3167 (4)
Intro to Outlook CSA2300W GEN1335T (.5)	Preventing Inappropriate Behavior LAW1006W (.5)	Conduct in State Employment PHI1001W (.5)	Maintenance Communication TCH3061 (8)	Highway Plans Reading TCH3002 (12)	Servant Leadership GEN5238 (2)	Procurement Fundamentals MDT1065 (4)	ICS for Expanding Incidents IS-200 EPM0200 (3)	Intermediate Incident Command G300 EPM0300 (24)
PPE TCH1104W (2)	First Aid RMPA100 (4)	General Storm Water Awareness TCH3070W (2)	EOTEP Message Board (4) (4) TCH4890	Coaching OJT GEN5195 (12)	Cost Estimating Maintenance (NEW)	START for Supervisors TCH1175 (8)	National Response Framework IS-800 EPM0800 (3)	Advanced Incident Command G400 EPM0400 (16)
CDL w/Tanker Endorse (Outside Cert.)	Driver Orientation GEN5025W (1)	401 / 404 Awareness TCH3071W (2)	EOTEP Selective I (R)	Pecos Basic Reporting TCH3165 (4)	EEO/AA/ADA MDT1041 (4)	Negotiating Skills TCH5254 (8)	Supervisor Academy Interviewing and Selection MGT1002 (.5)	NHI Maintenance Leadership Academy (2 Week Academy) (120)
Basic Incident Command System IS-100 EPM0100 (3)	Fire Safety MDT1075W (1)	Fall Prevention TCH1115 (3)	Pavement Preserv (R) (16) GEN5242 Signing Stripe I (SS) (8) TCH3140	CWR Tactical Manager TCH3164 (8)	EOTEP Selective OR EOTEP Instructor Development TCH4990 (4)	Supervisor Academy Ethics in the Workplace MDT1051 (4)	Supervisor Academy On Boarding New Employees MGT1003 (.5)	Elective from Course Catalog (8)
National Incident Management System IS-700 EPM0700 (3)	Computer Security Awareness GEN1353W (1)	Hazard Communication TCH1111W (2)	Electrical Safety TCH1127 (4)	Environmental Awareness GEN5244 (8)	FIS Data Mngt. Roadway R) Sign Data (SS) NEW	Supervisor Academy Intro to Supervision MGT1000 (.5)	Supervisor Academy Managing Performance MGT1004 (.5)	Elective from Course Catalog (8)
2 Way Radio TCH4800 (4)	Intro to State GOV ADOR1100W (.5)	Exposure Control TCH1143 (2)	Control of Hazardous Energy TCH1113 (2)	Trenching / Shoring (R) (8) Sign / Stripe II (SS) (R) TCH1122 / TCH3141	HCRS - TOC NEW	Supervisor Academy Americans with Disabilities Act LAW1007 (.5)	Supervisor Academy Day to Day Supervision MGT1008 (.5)	
Basic Computer Skills Word CSA2320 (W) Excel CSA2330 (W) PowerPoint CSA2350 (W)	Diversity LAW1006W (.5)	OSHA/DOT Hazardous Materials TCH1112 (3)	Materials Handling and Storage TCH1125 (2)	Basic Surveying Concepts TCH3154W (3)		Supervisor Academy Family and Medical Leave Act LAW1003 (.5)	Supervisor Academy Corrective and Disciplinary Action MGT1006 (.5)	
Effective Email Tech. COM2015 (W) (2)	Fair Employment LAW1002 (.5)	Hearing Conservation TCH1102W (2)	Hand and Power Tool Safety TCH118W (2)			Supervisor Academy Fair Labors Standards Act LAW1004 (.5)	Supervisor Academy Off Boarding Employees MGT1007 (.5)	
Chain Saw Safety (R) TCH1119 (4)	CPR RMCPR100 (6)	Back Safety Proper lifting GEN5010W (2)				Supervisor Academy Filling Vacancies MGT1001 (.5)		
START for Employees TCH1176 (2)	Hot Work TCH1164 (2)	Confined Space Awareness TCH1120 (8)				Intro to Pecos Inventory Management NEW		
Conflict Management COM 2002 (W)	Intro to Pecos (NEW) (W) TCH3162W	Traffic Incident Management EPM0078 (4)						
Managing Interpersonal Relationships TCH	Intro Environmental Awareness NEW (W)			Courses Not Yet Available	( ) = Course Hours			
106 TI Classes	R / SS 801 hrs.	44	265 hrs.	11	89 hrs.	10	83 hrs.	9	82 hrs.	13	95 hrs.	11	41 hrs.	8	196 hrs.
113 TI Classes	L /NR 850 hrs.	48	248 hrs.	14	116 hrs.	10	87 hrs.	11	66 hrs.	14	95 hrs.	11	41 hrs.	8	196 hrs.

LANDSCAPE/NATURAL RESOURCES ADOT TRAINING MATRIX

Highway OPS Worker (S1)			Tech I (S4)	Tech II (S5)	Tech III (S6)	Tech IV (S7)	Supervisior (S9)	Superintendent(S10)
Bluestake Dig Safety TCH1185 (8)	EOTEP Attenuator TCH4870 (4) (8)	Basic Work Zone Traffic TCH3004 (8)	Replace with TIM! Response to Roadway Incidents GEN5243 (3)	Intermediate Maintenance Math II TCH3016 (8)	EOTEP Selective OR EOTEP Instructor Development TCH4995 (4)	Procurement Fundamentals MGT1065 (4)	Managing Resources Effectively GEN5331 (8)	MSLT Performance Measurement GEN5335 (8)
Flagger ATSSA Cert. TCH1114 (4)	EOTEP Mowers Tractors TCH4838 (4) (16)	Risk Management GEN5237 (4)	Introductory Maintenance Math I TCH3015 (8)	Maintenance Materials (8) TCH3117	Permit Process and Inspection GEN5226 (8)	Understanding Contract Develop. / Admin GEN5240 (8)	Advantage EPS 2nd Lvl GEN1204 (8)	Teach 2 MSLT Classes GEN5349 (16)
Pecos Contributor TCH3163 (8)	EOTEP Large Trk-Trailer Dump Truck TCH4820 (8) (48)	Intro to Outlook CSA2300W GEN1335T (.5)	Work Zone Traffic Control Advanced TCH3005 (8)	Irrigation I (L) TCH3330 (8)	Incident Reporting and Investigation GEN5050 (4)	Managing Employee Performance GEN5233 (16)	Pecos ORG Tactical Planner TCH3166 (16)	Pecos Strategic Planning TCH3167 (4)
Preventing Inappropriate Behavior LAW1006W (.5)	Conduct in State Employment PHR1001W (.5)	Basic Computer Skills Word CSA2320 (W) Excel CSA2330 (W) PowerPoint CSA2350 (W)	EOTEP Skid Steer (8) (24) (NR) TCH4945 Loader (8) (40) (L) TCH4990	Highway Plans Reading TCH3003 (12)	Irrigation II (L) TCH3331 (8)	START for Supervisiors TCH1175 (8)	ICS for Expanding Incidents IS-200 EPM0200 (3)	Intermediate Incident Command G300 EPM0300 (20)
CDL w/Tanker Endorse (Outside Cert.)	EOTEP Brush Chipper TCH4940 (4) (8)	General Storm Water Awareness TCH3070W (2)	EOTEP Message Board (4) (4) TCH4890	Coaching OJT GEN5195 (12)	Intro to Partnering GEN5180W (2)	Loss Prevention Academy GEN5260 (36)	National Response Framework IS-600 EPM0600 (3)	Advanced Incident Command G400 EPM0400 (12)
PPE TCH1104W (2)	Driver Orientation GEN5025W (1)	401 / 404 Awareness TCH3071W (2)	EOTEP Herbicide / Spray Truck TCH4825 (8) (40)	Pecos Basic Reporting TCH3166 (4)	Powered Industrial Trucks TCH1130 (.5) (1)	Negotiating Skills TCH5234 (8)	Supervisior Academy Interviewing and Selection MGT1002 (.5)	Mill Maintenance Leadership Academy (2 Week Academy) (120)
Basic Incident Command System IS-100 EPM0100 (3)	Fire Safety MDT1075W (1)	Fall Prevention TCH1115 (3)	Introduction Chainsaw Training (Outside Cert.) Maintenance Comm (L) TCH3081 (8)	CWR Tactical Manager TCH3184 (8)	Servant Leadership GEN5236 (2)	Supervisior Academy Ethics in the Workplace MDT1051 (4)	Supervisior Academy On Boarding New Employees MGT1003 (.5)	Elective from Course Catalog (8)
National Incident Management System IS-700 EPM0700 (3)	Computer Security Awareness GEN1202W (1)	Hazard Communication TCH1111W (2)	EOTEP Selective I (8)	Environmental Awareness GEN5244 (8)	Cost Estimating Maintenance (NEW)	Supervisior Academy Intro to Supervision MGT1000 (.5)	Supervisior Academy Managing Performance MGT1004 (.5)	Elective from Course Catalog (8)
2 Way Radio TCH4808 (4)	Welcome to State GOV ADOR1100W (1)	Exposure Control TCH1143 (2)	Control of Hazardous Energy TCH1113 (2)	Advanced Chainsaw Training (NR) (Outside Cert.) Seeding (L) (8) TCH3145W	EEO/AA/ADA MDT1041 (4)	Supervisior Academy Americans with Disabilities Act LAW1007 (.5)	Supervisior Academy Day to Day Supervision MGT1005 (.5)	
Pesticide Applicator License (Outside Cert.)	Diversity LAW1005W (.5)	OSHA/DOT Hazardous Materials TCH1112 (3)	Materials Handling and Storage TCH1125 (2)	Basic Surveying Concepts TCH3134W (3)	Wildland Firefighting (NR) Crew Boss S290/S334	Supervisior Academy Family and Medical Leave Act LAW1003 (.5)	Supervisior Academy Corrective and Disciplinary Action MGT1006 (.5)	
Effective Email Tech. COM3015 (W) (2)	Fair Employment LAW1002W (.5)	Hearing Conservation TCH1102W (2)	Intro to Wildland Firefighting EPM5130 (NR) Landscape Planting (L) (8) TCH3330		FIS Data Mngt. (L) Roadway (New) (8)	Supervisior Academy Fair Labors Standards Act LAW1004 (.5)	Supervisior Academy Off Boarding Employees MGT1007 (.5)	
Chain Saw Safety TCH1119 (2)	CPR RMCPR100 (8)	Back Safety Proper lifting GEN5012W (2)	Hand and Power Tool Safety TCH118W (2)			Supervisior Academy Filling Vacancies MGT1001 (.5)		
START for Employers TCH1176 (2)	First Aid RMFA100 (4)	Confined Space Awareness TCH1120 (8)	Electrical Safety TCH1127 (2)			HCRS-TOC (New)		
Conflict Management COM 3003 (W)	Intro Environmental Awareness NEW (W)	Hot Work TCH1144 (2)	Pesticide E-Form Review (Pecos - NEW)			Intro to Pecos Inventory Management NEW		
Managing Interpersonal Relationships TCH...	Traffic Incident Management EPM0075 (4)	Intro to Pecos (NEW) (W) TCH3162W		Courses Not Yet Available	( ) = course hours			

113 TI. Classes	L /NR 550 hrs.	45	246 hrs.	14	116 hrs.	12	87 hrs.	11	66 hrs.	14	95 hrs.	11	41 hrs.	8	196 hrs.
108 TI. Classes	R / SS 501 hrs.	44	365 hrs.	11	69 hrs.	10	83 hrs.	9	52 hrs.	13	95 hrs.	11	41 hrs.	8	196 hrs.

ADOT Emergency Planning and Management Training Matrix
As of: February 4th, 2013

Please Note:
IS-100.b can be satisfied with:
- IS-100.PWb IS-100 for Public Works,
- IS-100.LEb IS-100 for Law Enforcement, or

- IS-100.b Introduction to Incident Command System, and ***Changes made since last publication:***
  - Addition of other matrixes and change of original matrix to operational level

ADOT Level	Required Training	ADOT Employees / Job Descriptions	FEMA Audience Applicable to ADOT

Operations #1 - 100, 700	Available on-line.
	1. IS-700.a: National Incident Management System (NIMS), An Introduction
	2. ICS 100: Introduction to Incident Command System:
	  • IS-100.b Introduction to Incident Command System,
	  • IS-100.PWb Intro to ICS for Public Works, or
	  • IS-100.LEb Intro to ICS for Law Enforcement
		• Equipment Services Shop Personnel, Fuels Management Personnel, Supervisors, and Managers
		• Facilities Supervisors and Managers
		• Accounts Payable Supervisors and Managers
		• Human Resources Managers and Supervisors
		• Risk Management Staff and Supervisors
		• Maintenance/Operations Personnel (field and office)
		• Safety & Health Staff
		• Grand Canyon National Park Airport personnel
		• Construction Inspectors and Support Staff
		• Office of Environmental Services personnel
		• MVD Customer Service Managers and Supervisors
		• Procurement Managers and Specialists
		• Building Emergency Coordinators
		• Floor Wardens
			Entry Level First Responders & Disaster Workers
			• Firefighters
			• Law Enforcement
			• Public Works personnel
			• Skilled support personnel
			• Other emergency management related personnel

Operations #2 - 100, 200, 700, 800	Available on-line.
	1. IS-700.a: National Incident Management System (NIMS), An Introduction
	2. ICS 100: Introduction to Incident Command System:
	  • IS-100.b Introduction to Incident Command System,
	  • IS-100.PWb Intro to ICS for Public Works, or
	  • IS-100.LEb Intro to ICS for Law Enforcement
	3. IS-200.b: (ICS 200) ICS for Single Resources and Initial Action Incidents
	4. IS-800.b: National Response Framework, An Introduction
		• State Engineer
		• Deputy and Assistant State Engineers
		• Construction Resident Engineers
		• Bridge Engineers / Inspectors
		• Chief Procurement Officer
		• Chief Financial Officer
		• Physical Plant Operations Administrator
		• Manager Budget and Strategic Planning
		• Fiscal Operations Controller
		• Safety & Risk Management Director
		• Safety & Risk Deputy Directors
		• Public Information Officers – District and Divisional
		• Traffic Operations Center personnel
		• Maintenance Supervisors
		• Natural Resources Technicians
		• Maintenance Analysts
			First Line Supervisors
			• Single resource leaders
			• Field supervisors
			• Other emergency management / response personnel that require a higher level of training

Operations #3 - 100, 200, 300, 700, 800	Available on-line.
	1. IS-700.a: National Incident Management System (NIMS), An Introduction
	2. ICS 100: Introduction to Incident Command System:
	  • IS-100.b Introduction to Incident Command System,
	  • IS-100.PWb Intro to ICS for Public Works, or
	  • IS-100.LEb Intro to ICS for Law Enforcement
	3. IS-200.b: (ICS 200) ICS for Single Resources and Initial Action Incidents
	4. IS-800.b: National Response Framework, An Introduction
	Available in classroom format only through ERMA:
	5. IS-300: Intermediate Incident Command System
		• Grand Canyon National Park Airport Manager
		• Grand Canyon Airport Fire Chief
		• Traffic Operations Center Supervisors and Managers
		• District Engineers
		• Maintenance Engineers
		• Maintenance Superintendents
		• Fleet Services/Equipment Services Manager
		• Enforcement and Compliance Director
		• Enforcement and Compliance Assistant Division Director – Enforcement
			Middle Management
			• Division / Group Supervisors
			• Unit Leaders
			• Emergency Operations Staff

Operations #4 - 100, 200, 300, 400, 700, 800	Available on-line.
	1. IS-700.a: National Incident Management System (NIMS), An Introduction
	2. ICS 100: Introduction to Incident Command System:
	  • IS-100.b Introduction to Incident Command System,
	  • IS-100.PWb Intro to ICS for Public Works, or
	  • IS-100.LEb Intro to ICS for Law Enforcement
	3. IS-200.b: (ICS 200) ICS for Single Resources and Initial Action Incidents
	4. IS-800.b: National Response Framework, An Introduction
	Available in classroom format only through ERMA:
	5. IS-300: Intermediate Incident Command System
	6. IS-400: Advanced Incident Command System
		• Emergency Manager, Emergency Planner, and Continuity of Operations Manager
		• Agency Representatives (assigned by Emergency Preparedness and Management)
		• State Maintenance/Operations Engineer
		• Emergency Response Specialists/Hazardous Materials Technicians
			Command and General Staff
			• Department and Division Heads
			• Emergency Managers
			• Emergency Operations Center Managers

BERT Members	1. EPM0050 – Emergency Action Guidelines and Plans
	2. EPM0052 – Emergency Plans Development
	3. EPM0053 – Emergency Response Team
	3. IS-700.a: National Incident Management System (NIMS), An Introduction
	4. ICS 100: Introduction to Incident Command System:
	  • IS-100.b Introduction to Incident Command System,
	  • IS-100.PWb Intro to ICS for Public Works, or
	  • IS-100.LEb Intro to ICS for Law Enforcement
	5. IS-906: Workplace Security Awareness
	6. IS-907: Active Shooter: What You Can Do
		• Building Emergency Response Team Members
		  • Building Emergency Coordinators and alternates
		  • Floor Wardens and alternates
		  • (add the others)
			•

Natural Resources Techs			

Office of Environmental Services	Operations Level #3 plus:
	• 552
	• 554
	• 632a
	• 810
	• 130/190 optional
	• 775 for DOC Staff
		• Only if responding to the field for assistance during incidents in groups, such as:
		  • Compliance Group personnel and Manager
		  • Mitigation personnel
		• S130/S190 only if responding to wildfire or participating/inspecting prescribed burn operations
		• 775 for DOC staff only
			•

Executives	• Operations Level #1 above • EPM0402: ICS for Executives/Senior Officials, or • IS-908 (EPM0908): Emergency Management for Senior Officials	• Director • Deputy Directors • Assistant Directors	• Elected officials, • Senior executives, • Senior managers, and • Agency administrators
Enforcement and Compliance	• Operations Level #4 above • EPM0050: Emergency Action Guidelines and Plans • EPM0052: Emergency Plans Development • EPM0053: Emergency Response Team • EPM0075: Traffic Incident Management Responder Course • IS-906 (EPM0906): Workplace Security Awareness • IS-907 (EPM0907): Active Shooter: What You Can Do	• Lieutenants and above	N/A
Enforcement and Compliance	• Operations Level #3 above • EPM0050: Emergency Action Guidelines and Plans • EPM0075: Traffic Incident Management Responder Course • IS-906 (EPM0906): Workplace Security Awareness • IS-907 (EPM0907): Active Shooter: What You Can Do	• All officers	N/A
Enforcement and Compliance	• Operations Level #1 above • EPM0050: Emergency Action Guidelines and Plans • IS-906 (EPM0906): Workplace Security Awareness • IS-907 (EPM0907): Active Shooter: What You Can Do	• CSR's/ADV38811	N/A

162

APPENDIX H

Missouri DOT Training Plan

TRAINING RECOMMENDATIONS

To ensure that all MoDOT employees with incident response responsibilities are prepared and trained to perform their roles in MoDOT's Incident Response Plan, it is recommended that the following courses be completed as deemed necessary in addition to the usual employee training requirements. All training should be tracked in MoDOT's LMS system.

Adult CPR

Course Description: Participants will learn basic life-saving techniques such as CPR, rescue breathing, choking conscious victim, and choking unconscious victim. In order to maintain certification for Adult CPR, this class must be taken each year. In order to pass this class, participants must score 80 percent on written exam.

Prerequisite: None.

Eligible Employees: This class is eligible to all MoDOT employees and mandatory for Bridge Maintenance employees.

Advanced Work Zone Training

Course Description: With MoDOT's commitment to providing safe and mobile work zones, it is imperative department staff be trained in the development, design, implementation, operation, inspection, and enforcement of temporary traffic control to a level appropriate to the job decisions each employee is required to make. MoDOT's Flagger Training and Work Zone Technician courses provide the basic level of this training to those implementing and operating work zones. However, course content does not address the information needed by those responsible for making work zone decisions. To provide this guidance, the Advanced Work Zone course was developed.

Prerequisite: Flagger and Work Zone Training.

Eligible Employees: Anyone who will be in charge of a work zone, including: all full-time district maintenance, construction, design, and traffic personnel (pay grades 7 and higher). Training other personnel would be optional at the district's discretion.

Air Bag and Hybrid Vehicle Safety Training

Course Description: This course provides the safest way to respond to crashes involving hybrid electric vehicles and vehicles with advanced air bag systems. In the past this course has been sponsored by the Missouri Coalition for Roadway Safety. The course is led by Mr. Dave Long and is conducted periodically. Employees are encouraged to attend the course when offered.

Prerequisites: None.

Eligible Employees: All MoDOT employees are eligible to attend this class.

Amateur Radio (Ham) Operator

Course Description: Amateur radio is regulated by the Federal Communications Commission (FCC) under the Communications Act of 1934. It is also subject to numerous international agreements. All amateur radio operators must be licensed. In the U.S. there are three license classes. Each successive level of license comes with an expansion of privileges.

Entry into amateur radio begins with a Technician Class License. An entry level Amateur Radio Technician License is earned by passing a 35-question, multiple-choice examination. No Morse code test is required. The exam covers basic regulations, operating practices, and electronics theory, with a focus on VHF and UHF applications. U.S. licenses are good for 10 years before renewal, and anyone may hold one except a representative of a foreign government.

Technician Class operators are authorized to use all amateur VHF and UHF frequencies (all frequencies above 50 MHz). Technicians also may operate on the 80-, 40-, and 15-meter HF bands using Morse code and on the 10 meter

band using Morse code, voice, and digital modes. Please contact a local amateur radio organization or www. ARRL. org for more information.

Prerequisites: None.

Eligible Employees: All MoDOT employees are eligible to attend this class.

Basic First Aid

Course Description: Basic techniques used to treat illness and injuries while waiting for medical personnel. This class must be taken every 3 years to maintain certification for Standard First Aid.

Prerequisites: None.

Eligible Employees: All MoDOT employees are eligible to attend this class, and it is mandatory for Bridge Maintenance employees.

Blood-Borne Pathogens

Course Description: This course focuses on a growing workplace concern: the transmission of blood-borne pathogens such as HIV and Hepatitis B and C. OSHA estimates that nearly 5.6 million workers are at risk of exposure to blood-borne pathogens. This course is designed for emergency respondents or employees who respond to emergencies before medical professionals arrive on the scene. It is essential that these respondents know the associated risks and safeguards when coming into contact with blood and other bodily fluids that may contain blood-borne pathogens. Topics in this course include information on epidemiology, symptoms, and transmission of HIV and Hepatitis B and C. The course also covers easy-to-use strategies for preventing or limiting exposure to blood-borne pathogens. Such methods include engineering controls, work practice controls, universal precautions, personal protection equipment, and vaccination. This course addresses regulation Title 29 CFR 1910.1030. This SkillSoft Corporation training course has been reviewed by attorneys from the law firm of Sheehan Phinney Bass + Green, Professional Association of Manchester, New Hampshire. The content of this training course is an accurate statement of federal law and attendant regulations on the matters covered as of the date reviewed. Due to the rapidly changing nature of the law, information in this course may become outdated.

Prerequisites: None.

Eligible Employees: Emergency response supervisors, emergency response staff, and motorist assist staff.

Child and Infant CPR

Course Description: Basic life saving techniques for children and infants, including choking. This class must be taken each year to maintain certification for Infant and Child CPR.

Prerequisite: Standard First Aid is a prerequisite for this class.

Eligible Employees: All MoDOT employees are eligible to take this class.

District Incident Response Plan Training (where available)

Dump Truck Operations

Course Description: Participants will learn general guidelines and instructions for proper, safe, and efficient operation of dump trucks. Format is instruction and hands-on training. It provides beginner and experienced operators with the fundamental concepts and practices for operating MoDOT's dump trucks with:

- improved efficiency,
- greater safety,
- reduced maintenance and repair costs through preventative maintenance,
- fewer breakdowns, and
- greater job satisfaction.

This class is part of the Equipment Usage curriculum. At General Headquarters classes are usually scheduled in conjunction with Front-End Loader Operations and Radio Operations.

164

Prerequisites: None.

Eligible Employees: All field employees are eligible, but employees in maintenance units, up to and including maintenance superintendents, are required to complete the course.

Fire Extinguisher Training

Course Description: This course covers basic instruction on inspection and use of fire extinguishers. The course is developed by and may be trained by local fire departments or by District Risk Management personnel.

Prerequisites: None.

Eligible Employees: All MoDOT staff.

Flagger and Work Zone Training

Course Description: This module gives participants the general guidelines and instructions for the proper techniques of flagging and basic work zone information with reference to the MoDOT Traffic Control for Field Operations and the Manual on Uniform Traffic Control Devices (MUTCD). This course consists of both instruction and hands-on exercises.

Prerequisite: None.

Eligible Employees: Any MoDOT employee is eligible to complete this course. However, some employees are required to complete the course, because it is a part of the Work Zone curriculums that have been added to their development plan.

Front-End Loader Operations

Course Description: This module gives participants the general guidelines and instructions for proper, safe, and efficient operation of front-end loaders. Format is instruction and hands-on training.

The training provides beginner and experienced operators with the fundamental concepts and practices for operating MoDOT's loaders with:

- improved efficiency,
- greater safety,
- reduced maintenance and repair costs through preventative maintenance,
- fewer breakdowns, and
- greater job satisfaction.

This class is part of the Equipment Usage curriculum. At General Headquarters classes are usually scheduled in conjunction with Dump Truck Operations and Radio Operations.

Prerequisites: Dump Truck Operations.

Eligible Employees: Headquarter and District Maintenance and Operations employees. All field employees are eligible, but employees in maintenance units, up to and including maintenance superintendents, are required to complete this course.

Hazardous Material Recognition Introduction

Course Description: This course is designed to introduce employees to hazardous materials spilled or lost on state highways and right-of-ways. It is oriented toward raising the employees' awareness of what to look for in the event of a hazardous material spill or release. The course teaches how to use the emergency response guidebook, who to identify, how to identify other signs of hazardous materials, and what MoDOT can do, if anything, to prevent the spread of a hazardous material. Employees are also taught to identify methamphetamine-related materials and are instructed in what to do when they find these materials.

Prerequisites: None.

Eligible Employees: Everyone who works or travels on the highway should attend this course. This is required training under 40 CFR 112 for anyone working at a maintenance facility with a Spill Prevention Control Countermeasure (SPCC) Plan.

Hazardous Waste Operation and Emergency Response (HAZWOPER-40 HR)

Course Description: This course covers broad issues pertaining to hazard recognition at work sites. OSHA has developed the HAZWOPER program to protect the workers working at hazardous sites and has devised extensive regulations to ensure their safety and health. This course, while identifying different types of hazards, also suggests possible precautions and protective measures to reduce or eliminate hazards at the work place. It is specifically designed for workers who are involved in clean-up operations, voluntary clean-up operations, emergency response operations, and storage, disposal, or treatment of hazardous substances or uncontrolled hazardous waste sites.

Prerequisites: None.

Eligible Employees: Emergency response supervisors, emergency response staff, and motorist assist staff.

Highway Watch (Missouri)

Course Description: The voluntary Highway Watch program complements MoDOT's System Security Awareness for Transportation Employees course and is designed to certify personnel as Missouri Highway Watch participants. Participants in Missouri Highway Watch will be members of a nationwide initiative to protect our transportation system from terrorism.

Participation in Missouri Highway Watch is strictly voluntary and is supported by the American Trucking Association, the Missouri Motor Carriers Association, and the Missouri Department of Transportation. However, MoDOT is not requiring its employees to participate.

Once personnel have completed the training and have decided to participate in the Highway Watch program, each will receive a personal identification number (PIN) and a certificate of training. Personnel will use their PINs to identify themselves to the Highway Watch Call Center staff when reporting suspicious activity that may be terrorism related.

Prerequisite: None.

Eligible Employees: Any MoDOT employee can complete this course.

INCIDENT COMMAND TRAINING SUITE – See MoDOT's NIMS Training Recommendations

ICS–100 Introduction to the Incident Command System (Online Training Location)

Course Description: ICS 100, Introduction to the Incident Command System, introduces the Incident Command System (ICS) and provides the foundation for higher-level ICS training. This course describes the history, features and principles, and organizational structure of the Incident Command System. It also explains the relationship between ICS and the National Incident Management System (NIMS).

Prerequisites: None.

Eligible Employees: All MoDOT staff.

ICS-200 ICS for Single Resources and Initial Action Incidents (Online Training Location)

Course Description: ICS 200 is designed to enable personnel to operate efficiently during an incident or event within the Incident Command System (ICS). ICS-200 provides training and resources for personnel who are likely to assume a supervisory position within the ICS.

Prerequisites: IS–100 and IS-700.

Eligible Employees: First-line response supervisors, mid-level response supervisors, and senior-level response managers and executives.

ICS-300 Intermediate ICS for Expanding Incidents

Course Description: This course provides training and resources for personnel who require advanced application of the Incident Command System (ICS). The target audience for this course is individuals who may assume a

166

supervisory role in expanding incidents, including command staff, section chiefs, strike team leaders, task force leaders, unit leaders, division and group supervisors, and branch directors.

Prerequisites: IS-700, ICS-100, ICS-200, and IS-800.

Eligible Employees: Mid-level response supervisors, and senior-level response managers and executives.

ICS-400 Advanced ICS Command and General Staff—Complex Incidents

Course Description: This course provides training and resources for personnel who require advanced application of the Incident Command System (ICS). The target audience for this course is senior personnel who are expected to perform in a management capacity in an Area Command or Multi-agency Coordination Entity. This course expands on information covered in ICS-100 through ICS-300 courses. This course will include, but not be limited to: major and/or complex incident/event management, area command, and multi-agency coordination.

Prerequisites: ICS-100, ICS-200, ICS-300, IS-700, and IS-800.

Eligible Employees: Senior-level response managers and executives.

IS-700 National Incident Management System (NIMS): An Introduction (Online Training Location)

Course Description: On February 28, 2003, President Bush issued Homeland Security Presidential Directive-5. HSPD-5 directed the Secretary of Homeland Security to develop and administer a National Incident Management System (NIMS). NIMS provides a consistent nationwide template to enable all government, private-sector, and nongovernmental organizations to work together during domestic incidents. Information about NIMS can also be found at http://www.fema.gov/nims/.

This course introduces NIMS and takes approximately 3 hours to complete. It explains the purpose, principles, key components, and benefits of NIMS. The course also contains "Planning Activity" screens, giving personnel an opportunity to complete some planning tasks during this course. The planning activity screens are printable so personnel can use them after completing the course.

Prerequisites: None.

Eligible Employees: All MoDOT staff.

IS-800.B National Response Framework: An Introduction (Online Training Location)

Course Description: The course introduces participants to the concepts and principles of the National Response Framework and describes how the Federal Government will work in concert with state, local, and tribal governments and the private sector to respond to disasters. This course is targeted toward persons who will be in mid-level or higher supervision roles in ICS.

Prerequisites: None.

Eligible Employees: Mid-level response supervisors, senior-level response managers and executives, and elected and appointed officials.

Post-Incident Bridge Inspection Training

Course Description: This course focuses on structural elements specific to MoDOT bridges, including using a simple checklist and laminated bridge card during the inspection process. The step-by-step inspection process is shown on a video.

Emergency bridge inspectors are expected to assess the condition of bridges and report their findings on simple checklists. If a bridge passes inspection, the bridge will be marked with a green tag – meaning the bridge is safe for travel. If any problems are found, the bridge will be red flagged – meaning the bridge is closed until a certified bridge inspector is able to conduct a thorough inspection of the bridge.

Staging and communication following a major incident will be a small component of this training. The training includes information on:

- the process for call outs,

- how and when staff should report for work,
- route assignments, and
- the process for reporting damage.

Employees are expected to review the video component every 2 years for a refresher.

Prerequisite: None.

Eligible Employees: Any MoDOT employee is eligible to take this course, but it is required for all who work in Maintenance, Construction and Materials, and Public Information.

System Security Awareness for Transportation Employees

Course Description: The System Security Awareness for Transportation Employees course was developed in response to a need for basic awareness training on security and terrorism. Front-line transportation department employees and their immediate supervisors are positioned to be the "eyes and ears" of the community and are very often the most effective means for preventing and responding to security-related incidents. In order to effectively observe and report suspicious activity or security incidents, employees need training that gives them the basic skill sets regarding where to look, what to look for, and what to report. Their decisions and actions may determine the severity and scope of an incident. Knowledge of what to do and, more importantly, what not to do is vital to a safe and effective response. The course is primarily designed for employees who inspect, service, and maintain the nation's vehicle transportation infrastructure. However, it can be easily adapted for the larger universe of employees.

Prerequisites: None.

Eligible Employees: All MoDOT employees.

168

APPENDIX I

Missouri DOT NIMS Training Guide

NIMS TRAINING RECOMMENDATIONS

MoDOT NIMS Training Recommendations

Below is a summary of the people who need NIMS training in MoDOT, along with course information. We are and will be working alongside Public Safety personnel, who are also adopting this same standard, and Incident Command System (ICS) is already in use in much of the responder community.

Following the Missouri SEMA recommendations, here are our recommendations for who should be trained at what level:

"All Emergency Responders" – IS700, IS100

- All Motorist Assist and Emergency Response (ER) field staff, urban and rural.
- We recommend urban or rural field staff with any involvement in emergency response take this level of training.
- TMC operators.

"First-Line Response Supervisors" – IS700, IS100, IS200

- All immediate supervisors of above.
- We recommend all first-line maintenance and traffic field supervisors to take this level of training.
- Other appropriate district support staff.

"Mid-Level Response Supervisors" – IS700, IS100, IS200, ICS300, IS800

- Maintenance superintendents, area engineers, and so forth who have ER staff under them.
- Recommended for all maintenance superintendents and area engineers.
- Other appropriate district support staff.

"Senior-Level Response Managers and Executives" – IS700, IS100, IS200, ICS300, ICS400, IS800

- District lead staff for ER and disaster response.
- Other district MT and TR engineers involved in ER.
- Statewide IM coordinators.
- Lead staff in CO traffic and maintenance.
- District engineers.
- Directors of system management.

"Elected and Appointed Officials" – IS700, IS100, IS800

- Chief engineers.
- Chief financial/executive officers.
- Directors.
- Recommended for all senior management.

"Support Staff" – IS700, IS100

- Support staff who would assist in functions such as:
  - Public information
  - Resources/supplies/materials
  - Contracting/procurement
  - Communications/IT support
  - Facilities

Interactive Training for All-Hazards Emergency Planning, Preparation, and Response for Maintenance and Operations Field Personnel

169

    – Safety
    – Finance
    – GIS

NIMS Course Information

IS 700, National Incident Management System (NIMS): An Introduction

Description: On February 28, 2003, President Bush issued Homeland Security Presidential Directive-5. HSPD-5 directed the Secretary of Homeland Security to develop and administer a National Incident Management System (NIMS). NIMS provides a consistent nationwide template to enable all government, private-sector, and nongovernmental organizations to work together during domestic incidents. Information about NIMS can also be found at http://www.fema.gov/nims/. This course introduces NIMS and takes approximately 3 hours to complete. It explains the purpose, principles, key components, and benefits of NIMS. The course also contains "Planning Activity" screens giving participants an opportunity to complete some planning tasks during this course. The planning activity screens are printable so participants can use them after completing the course. This course is targeted toward all personnel who will be part of emergency preparedness, incident management, or response.

Length of Course: Approximately 3 hours.

Prerequisites: None.

How to Take This Course: This course is available online at http://training.fema.gov/emiweb/is/is700a.asp.

ICS 100, Introduction to the Incident Command System

Description: ICS 100, Introduction to the Incident Command System, introduces the Incident Command System (ICS) and provides the foundation for higher-level ICS training. This course describes the history, features and principles, and organizational structure of the Incident Command System. It also explains the relationship between ICS and the National Incident Management System (NIMS). This course is targeted toward all personnel who will be part of Incident Command.

Length of Course: Approximately 3 hours.

Prerequisites: IS-700.

How to Take This Course: This course is available online at http://training.fema.gov/emiweb/is/is100b.asp.

ICS 200, ICS for Single Resources and Initial Action Incidents

Description: ICS 200 is designed to enable personnel to operate efficiently during an incident or event within the Incident Command System (ICS). ICS-200 provides training and resources for personnel who are likely to assume a supervisory position within the ICS.

Length of Course: Approximately 3 hours.

Prerequisites: IS-700, ICS-100.

How to Take This Course: This course is available online at http://training.fema.gov/emiweb/is/is200b.asp. Occasionally there are opportunities to take this course in the classroom.

ICS-300, Intermediate ICS for Expanding Incidents

Description: This course provides training and resources for personnel who require advanced application of the Incident Command System (ICS). The target audience for this course is individuals who may assume a supervisory role in expanding incidents, including command staff, section chiefs, strike team leaders, task force leaders, unit leaders, division/group supervisors, and branch directors.

Length of Course: Approximately 18 Hours.

Prerequisites: IS-700, ICS-100, ICS-200, IS-800.

How to Take This Course: This course may only be taken in the classroom. We will provide notifications as course opportunities become available.

170

ICS-400: Advanced ICS Command and General Staff—Complex Incidents

Description: This course provides training and resources for personnel who require advanced application of the Incident Command System (ICS). The target audience for this course is senior personnel who are expected to perform in a management capacity in an area command or multi-agency coordination entity or persons who will serve as command or general staff in the ICS organization.

Length of Course: Approximately 14 Hours.

Prerequisites: IS-700, ICS-100, ICS-200, ICS-300, IS-800.

How to Take This Course: This course may only be taken in the classroom. We will provide notifications as course opportunities become available.

IS 800, National Response Plan: An Introduction

Description: The National Response Plan (NRP) describes how the Federal Government will work in concert with state, local, and tribal governments and the private sector to respond to disasters. This course is targeted toward persons who will be in mid-level or higher supervision roles in ICS.

Length of Course: Approximately 3 hours.

Prerequisites: None.

How to Take This Course: This course is available online at http://training.fema.gov/emiweb/is/is800a.asp.

Hosting Courses

If a district or division is interested in hosting any of the NIMS courses in classroom format, please contact CO Traffic, and we can assist in arrangements.

Learning Management System

All of these courses are in the Learning Management System (LMS). All MoDOT staff completing these courses need to submit certificates to their local LMS coordinator for entry. CO Traffic is tracking NIMS training in the Traffic D-Tracker.

Abbreviations used without definitions in TRB publications:

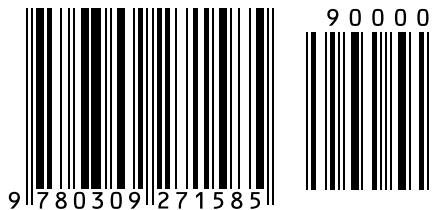|	
A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA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

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