Emergency Transportation Operations: Resources Guide for NCHRP Report 525, Volume 6

Prepared for:

National Cooperative Highway Research Program

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

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Developing Your Agency's Emergency Transportation Operations

NCHRP Report 525: Surface Transportation Security—Volume 6: Guide for Emergency Transportation Operations *is designed to support the development of a formal program for the improved management of traffic incidents, natural disasters, security events, and other emergencies on the highway system. It outlines a coordinated, performance-oriented, all-hazard approach called "Emergency Transportation Operations" (ETO). The guide focuses on an enhanced role for state departments of transportation (DOTs) as participants with the public safety community in an interagency process.*

NCHRP Web-Only Document 73 *is a resources guide on ETO containing bibliographical material that may be useful to readers of* NCHRP Report 525, Volume 6.

OVERVIEW OF RESOURCES

This material in this resources guide is organized into two areas:

- Methods of Practice and Reference – Annotated bibliography citations are organized into three broad categories (Guides, Best Practices, and Standards; Examples (Plans, Memoranda of Understanding, Legislation, and Training); and Studies, Reports, Presentations, and Articles) and by the five strategies presented in *NCHRP Report 525, Volume 6*. Each reference is identified by a unique letter/number combination for ease of searching through the annotated bibliography.

- Annotated Bibliography – A list of more than 100 references is provided to assist practitioners in implementing the guidance in this publication. All are associated in some way to improving the efficiency and effectiveness of highway-related emergency operations and incident management. Many materials were located online and the citations include web addresses so they can be easily located.

METHODS OF PRACTICE AND REFERENCE

A list of references is provided to assist practitioners in implementing the guidance in *NCHRP Report 525, Volume 6*. More than 100 references and methods of practice are included in this list. All are associated in some way with improving the efficiency and effectiveness of highway-related emergency operations and incident management.

The references are organized into three broad categories and each reference is identified by a unique letter/number combination for ease of searching: (A) Guides, Best Practices, and Standards; (B) Examples (Plans, Memoranda of Understanding, Legislation, and Training); and (C) Studies, Reports, Presentations, and Articles. Many materials were located online and the citations include web addresses so they can be easily located.

The matrix on the following pages cross-references the resources with the basic, implied strategies presented in *NCHRP Report 525, Volume 6*.

Table 1. Cross-Reference of Basic Strategies for ETO with Resource Categorization

BASIC STRATEGY IMPLIED	RESOURCE CATEGORIZATION
Develop an approach to ETO on an integrated, comprehensive, all-emergency/hazard/discipline basis.	All-Emergency/All-Hazard Approach
Develop a structured ETO process with joint protocols and procedures with full regard to the range of objectives while minimizing traffic disruptions.	Protocols and Procedures
Examine technology opportunities and cost-effectiveness to introduce new technology and improve efficiency, effectiveness, and safety.	Technology Integration
Measure performance in the field to provide the basis for continuous improvement.	Performance Measurement
Formalize ETO as a program with appropriate policies, authorization, organization, structure, and resources.	Formalized Program

A casual observation indicates a majority of the practices and references concentrate on (1) Protocols and Procedures, (2) Technology Integration, or (3) Formalized Programs.

Table 2. Matrix of ETO Resources

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Measurement	Formalized Program
A. Guides, Best Practices, and Standards						
A1	Incident Management: Challenges, Strategies, and Solutions for Advancing Safety and Roadway Efficiency					✓
A2	The Public Transportation System Security and Emergency Preparedness Planning Guide	✓		✓		✓
A3	Guide to Developing an Effective Security Plan for the Highway Transportation of Hazardous Materials		✓			
A4	A Governor's Guide to Emergency Management, Volume One: Natural Disasters	✓	✓			✓
A5	A Governor's Guide to Emergency Management, Volume Two: Homeland Security	✓	✓			✓
A6	Best Practices in Road Weather Management		✓	✓		
A7	Organizing for Regional Transportation Operations: An Executive Guide		✓			
A8	Weather-Responsive Traffic Management Concept of Operations		✓			
A9	Draft Incident Management Model Procedures Guide for Highway Incidents		✓			
A10	Emergency Response Guidebook		✓			
A11	Fire and Emergency Services Preparedness Guide for the Homeland Security Advisory System		✓			

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Measurement	Formalized Program
A12	Guide for the Selection of Communication Equipment for Emergency First Responders, Volumes I and II			✓		
A13	Emerging Partnerships Between Emergency Management Agencies and Transportation Management Centers		✓			✓
A14	Homeland Security Presidential Directive/HSPD-5: Management of Domestic Incidents		✓	✓		
A15	Homeland Security Presidential Directive/HSPD-7: Critical Infrastructure Identification, Prioritization, and Protection		✓			
A16	Homeland Security Presidential Directive/HSPD-8: National Preparedness	✓	✓	✓	✓	
A17	IEEE 1512 Incident Management Standards Frequently Asked Questions (FAQ)			✓		
A18	IEEE Standard for Common Incident Management Message Sets for Use by Emergency Management Centers			✓		
A19	If a Disaster Strikes Today, Are You Ready to Lead? A Governor's Primer on All-Hazards Emergency Management	✓	✓			✓
A20	Understanding Wireless Communications in Public Safety			✓		
A21	Incident Management Successful Practices: A Cross-Cutting Study		✓	✓		✓
A22	Initial National Response Plan	✓	✓			✓
A23	A Study of Best Practices in Information Integration Projects, Version 1.2		✓	✓		

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Measurement	Formalized Program
A24	Traffic Safety in the New Millennium: Strategies for Law Enforcement, A Planning Guide for Law Enforcement Executives Administrators, and Managers		✓	✓		✓
A25	Introduction to the Illinois Department of Transportation Emergency Traffic Patrol		✓			✓
A26	Managing Travel for Planned Special Events		✓	✓		
A27	Manual on Uniform Traffic Control Devices		✓			
A28	The Role of the Metropolitan Planning Organization (MPO) in Preparing for Security Incidents and Transportation System Response, White Paper: Draft	✓	✓	✓		
A29	Military Deployment Coordination Procedures for State Agencies (Interim Guide)		✓	✓		
A30	Designing the Successful Technology Project			✓		
A31	National Incident Management System		✓	✓		✓
A32	National Model for the Statewide Application of Data Collection and Management Technology			✓	✓	
A33	National Mutual Aid and Resource Management Initiative Glossary of Terms and Definitions	✓				
A34	NFPA 1561 Standard on Emergency Services Incident Management Systems		✓			
A35	NFPA 1600 Standard on Disaster/Emergency Management and Business Continuity Programs	✓	✓	✓		

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Measurement	Formalized Program
A36	A Guide to Updating Highway Emergency Response Plans for Terrorist Incidents	✓	✓			
A37	Guidelines for Developing Traffic Incident Management Plans for Work Zones		✓			
A38	Highway Traffic Operations and Freeway Management State-of-the Practice Final Report		✓			
A39	Quick Clearance and 'Move-It' Best Practices		✓	✓	✓	✓
A40	Traffic Incident Management Handbook		✓	✓		
A41	Public Safety Wireless Communications Standards Awareness Guide			✓		
A42	Public Safety Coordination and Partnership Awareness Guide		✓	✓		
A43	Regional Traffic Incident Management Program Implementation Guide		✓		✓	✓
A44	Regional Transportation Operations Collaboration and Coordination		✓	✓		
A45	Safe Operation of Fire Tankers		✓			
A46	A Guide to Highway Vulnerability Assessment for Critical Asset Identification and Protection		✓			
A47	Incident Analysis Toolkit: Extracting Information from Incident Databases		✓		✓	
A48	Staffing Options for Incident Management Programs (Field Operations) – Utilizing Public/Private Partnerships		✓			
A49	Standards for Wireless Interoperability and Information Sharing			✓		

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Measurement	Formalized Program
A50	Standards Primer			✓		
A51	Traffic Incident Management Tow Operators Workplan (TIMTOW) Guide		✓			✓
A52	Traffic Incident Management (TIM) Self-Assessment Guide		✓	✓	✓	✓
A53	Best Practices White Paper: Transportation Management and Public Safety Integration			✓		
A54	Work Zone Mobility and Safety Self Assessment Guide and Self Assessment Tool		✓		✓	

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Management	Formalized Program
B. Examples (Plans, Memoranda of Understanding, Legislation, and Training)						
B1	Incident Management: Challenges, Strategies, and Solutions for Advancing Safety and Roadway Efficiency					✓
B2	Case Based Tutorials on Shared System Development – Coordination and Partnership			✓		
B3	Draft Incident Management Model Procedures Guide for Highway Incidents		✓			
B4	Safe and Quick Clearance of Traffic Incidents: A Synthesis of Highway Practice		✓		✓	
B5	Transportation Incident and Event Management Plan		✓			✓
B6	IS 700 – National Incident Management System (NIMS), An Introduction	✓	✓	✓		✓
B7	Introduction to the Illinois Department of Transportation Emergency Traffic Patrol		✓			✓
B8	Joint Operations Policy Statement (Washington State Patrol and Washington State Department of Transportation)		✓	✓	✓	✓
B9	Managing Traffic Incidents and Roadway Emergencies		✓	✓	✓	✓
B10	North Carolina's Quick Clearance Act		✓			
B11	Open Roads Policy: Quick Clearance for Safety and Mobility		✓			✓
B12	Arizona Statewide Incident Management Plan		✓			✓

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Management	Formalized Program
B13	Incident Management Executive Overview: Safety, Mobility, Performance		✓	✓	✓	✓
B14	Fire Commissioner Ed Mann Announces Availability of Highway Safety Training Courses for Emergency Responders		✓			
B15	Safe Positioning While Operating In or Near Moving Traffic Standard Operating Procedure		✓			
B16	Strategic Plan for Highway Incident Management in Tennessee		✓	✓	✓	✓
B17	TMC Master Plan		✓	✓		✓
B18	State DOT's Transportation Security Training Needs	✓	✓			

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Management	Formalized Program
C. Studies, Reports, Presentations, and Articles						
C1	511 - America's Traveler Information Number Deployment Assistance Report #1: Business Models and Cost Considerations			✓		
C2	511 - America's Traveler Information Number Deployment Assistance Report #3: 511 and Homeland Security." 511 Deployment Coalition			✓		
C3	Initial Lessons Learned in Testing and Deploying the ACU-1000			✓		
C4	Transportation, Emergency Communications, and Homeland Security			✓		
C5	Assessment of Sharing Information Between Public Safety and Transportation Agencies for Traffic Incident Management		✓	✓		✓
C6	Traffic Incident Management Expert Focus Groups: Final Report		✓			✓
C7	Assessment of Tennessee's Freeway Service Patrols (HELP) by Police Officers in Chattanooga, Knoxville, Memphis, and Nashville: Results of a Survey		✓			
C8	Creating a Trusted Network for Homeland Security			✓		
C9	Incident Management Performance Measures				✓	
C10	Intelligent Transportation Systems Field Operational Test Cross-Cutting Study - Incident Management: Detection, Verification, and Traffic Management		✓	✓		
C11	Organizing for Regional Transportation Operations Conference Proceedings		✓			
C12	Proceedings of the National Summit on Transportation Operations		✓			

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Management	Formalized Program
C13	Feasibility of an Integrated Traffic Management and Emergency Communications System for Birmingham, Alabama			✓		
C14	Integrated Traffic Management and Emergency Response: Success Factors		✓		✓	
C15	Incident Management		✓			✓
C16	The Urgent Need for Operational Partnerships Between Transportation and Public Safety Agencies		✓	✓	✓	✓
C17	Capital Region Integrated Wireless Network for Incident Management (CapWIN) Commercial Wireless Data Technology Survey			✓		
C18	Performance Evaluation of CHART 1999		✓	✓	✓	
C19	An Overview of Incident Management Systems		✓	✓		✓
C20	Protecting Emergency Responders on the Highway		✓	✓		
C21	CHART Incident Response Evaluation Final Report		✓		✓	✓
C22	Wisconsin Partnerships in Transportation and Public Safety			✓		
C23	Traffic Incident Management Planning: The Case for Mainstreaming					✓
C24	Crisis Information Management Software (CIMS) Feature Comparison Report			✓		
C25	Traffic Incident Management – Rebuilding the Marquette Interchange		✓			✓
C26	Wisconsin Manages Traffic Intelligently		✓	✓	✓	

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Management	Formalized Program
C27	Sharing Emergency Communications Across Agency Lines			✓		
C28	Emerging Public Safety Wireless Communication Systems			✓		
C29	Transportation Security: Post-September 11th Initiatives and Long-Term Challenges		✓			✓
C30	Integrated Public Safety and Highway Operations: A Policy Framework and Analysis		✓			✓
C31	What is the Role of Public Safety Agencies in Highway Operations		✓			✓
C32	Safe and Quick Clearance of Traffic Incidents: A Synthesis of Highway Practice		✓		✓	
C33	Fire Service Emergency Vehicle Safety Initiative		✓			
C34	Public Safety Operation and Traffic Management – A Force for the Future			✓		
C35	Governor's Hurricane Evacuation Task Force		✓			
C36	Transportation Security: Federal Action Needed to Enhance Security Efforts		✓			
C37	National Needs Assessment for Ensuring Transportation Infrastructure Security		✓	✓		
C38	Incident Detection via Commuter Cellular Phone Calls			✓		
C39	Transportation Actions to Reduce Highway Evacuation Times Under Natural Disasters		✓			
C40	Homeland Security and ITS: Using Intelligent Transportation Systems to Improve and Support Homeland Security Supplement to the National ITS Program Plan: a Ten-Year Vision		✓	✓		

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Management	Formalized Program
C41	Homeland Security: Efforts to Improve Information Sharing Need to be Strengthened		✓	✓		
C42	Homeland Security White Paper		✓	✓		
C43	An Assessment: Virginia's Response to Hurricane Isabel		✓		✓	
C44	Integrated Communications System Speeds Traffic Recovery After Crashes on New York City Streets		✓	✓		
C45	Intelligent Transportation Systems in Work Zones: A Cross-Cutting Study		✓	✓		
C46	A Study of Best Practices in Information Integration Projects, Version 1.2		✓	✓		
C47	Intelligent Transportation Systems at the 2002 Salt Lake City Olympics Games: Event Study –Traffic Management and Traveler Information			✓		
C48	Intelligent Transportation Systems at the 2002 Salt Lake City Olympic Games: Traffic Management and Traveler Case Study			✓		
C49	Protecting Emergency Responders: Lessons Learned from Terrorist Attacks		✓			
C50	Homeland Security: Challenges in Achieving Interoperable Communications for First Responders			✓		
C51	Bioterrorism Issues in Transportation: Considerations for Evacuation and Quarantine Workshop Consensus Items Summary Report		✓			
C52	Effects of Catastrophic Events on Transportation System Management and Operation: Cross Cutting Study	✓	✓	✓		
C53	Regional Effort Forges Emergency Coordination System		✓	✓		

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Management	Formalized Program
C54	Protecting Emergency Responders Volume II: Community Views of Safety and Health Risks and Personal Protection Needs		✓			
C55	A Systems Management Approach to Transportation Operations Management		✓	✓	✓	✓
C56	Developing Freeway and Incident Management Systems Using the National ITS Architecture		✓	✓		
C57	"Project SAFECOM: Wireless Public SAFEty Interoperable COMmunications Program		✓	✓		
C58	Reducing the Burden of Nonincident Traffic Calls Through 511			✓		
C59	Mainstreaming Incident Management in Design-Build: The T-REX Experience		✓			✓
C60	Service Patrol Study: Greater Puget Sound Freeway System		✓	✓		
C61	I-81 ITS Program Level of Investment and Technology Analysis		✓	✓		
C62	Improving Surface Transportation Operations in Emergency Situations		✓			
C63	Security Considerations in Transportation Planning: A White Paper		✓	✓		✓
C64	Public Safety and Wireless Communications Interoperability			✓		
C65	Recommendations for ITS Technology in Emergency Medical Services			✓		
C66	Regional Concept of Operations for Transportation Systems Management and Operations, Discussion Draft 2.1		✓			✓
C67	Research on Non-Blinding Emergency Vehicle Warning Lighting Systems		✓	✓		

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Management	Formalized Program
C68	Regional Operating Organizations		✓	✓		✓
C69	Effects of Catastrophic Events on Transportation System Management and Operations: Howard Street Tunnel Fire, Baltimore City, MD		✓	✓		
C70	Proceedings from the National Conference on Traffic Incident Management: A Road Map to the Future	✓	✓	✓	✓	✓
C71	A Study of the Impact of Nine Transportation Management Projects on Hurricane Evacuation Preparedness		✓			
C72	Summary of Regional Hurricane Traffic Operations Workshops (Held January – February 2002)		✓	✓		
C73	Security and Emergency Response Survey of State Transportation Agencies, Preliminary Results		✓	✓		✓
C74	Advanced Transportation Technology: How It Helps Police, Fire, and EMS Operations			✓		
C75	Staffing Options for Incident Management Programs (Field Operations) – Utilizing Public/Private Partnerships		✓			
C76	Public Safety and Transportation Agencies Need to Evolve Toward Regional, Integrated Operations		✓	✓		✓
C77	Traffic Congestion: Issues and Options		✓			
C78	Traffic Incident Management (TIM) Self Assessment: National Detail Summary Report		✓	✓	✓	✓
C79	Traffic Incident Management (TIM) Self-Assessment: National Executive Summary Report		✓	✓	✓	✓

		All-Emergency/ All-Hazard Approach	Protocols and Procedures	Technology Integration	Performance Management	Formalized Program
C80	Washington's Incident Response Team Program Evaluation		✓		✓	✓
C81	Planning for the Evacuation of New Orleans		✓			✓
C82	Emergency Evacuation: Ensuring Safe and Efficient Transportation Out of Endangered Areas		✓	✓		
C83	National Review of Hurricane Evacuation Plans and Policies		✓	✓		

ANNOTATED BIBLIOGRAPHY

A. GUIDES, BEST PRACTICES, AND STANDARDS

A1. ATA Foundation in association with Cambridge Systematics, Inc., "Incident Management: Challenges, Strategies, and Solutions for Advancing Safety and Roadway Efficiency." National Incident Management Coalition, Alexandria, VA (February 1997).

This report provides guidance on developing or expanding incident management programs. It covers mandates, organizational structure, and availability of resources. Through case studies, it identifies common barriers to the development of incident management programs and recommends strategies to overcome these barriers. Appendices include an inventory of incident management programs benefit/cost analyses, model agreements, funding sources, information on the National Incident Management Coalition, and a list of expert focus group participants.

A2. Balog, J. N., Boyd, A., and Caton, J. E., "The Public Transportation System Security and Emergency Preparedness Planning Guide." Federal Transit Administration, Washington, DC (January 2003).

This guide was developed to support the activities of public transportation systems to plan for and respond to major security threats and emergencies. The guide identifies the challenges of security and preparedness in the public transportation industry. It provides guidance on developing a Security and Emergency Preparedness Program, evaluating current level of security and emergency preparedness, conducting a threat and vulnerability assessment, and managing threats. The guide also addresses training and exercising in heightened threat conditions and explains available design strategies and technologies to support improved security and to enhance normal and emergency operations.

A3. Battelle and TotalSecurity.US, "Guide to Developing an Effective Security Plan for the Highway Transportation of Hazardous Materials." Federal Motor Carrier Safety Administration, Washington, DC, <http://www.fmcsa.dot.gov/safetyprogs/hm/Security_Plan_Guide.pdf> (December 2003, Downloaded on: December 31, 2003).

The Federal Motor Carrier Safety Administration has created a tool to assist hazardous materials motor carriers and shippers in the development of their security plan. The guide is designed to provide the hazardous materials industry with information to understand the nature of the threats against hazardous materials transportation, identify the vulnerabilities to those threats that exist in a facility, and address actions to reduce the vulnerabilities identified at a facility.

A4. Beauchesne, A. M., "A Governor's Guide to Emergency Management, Volume One: Natural Disasters." National Governor's Association Center for Best Practices, Washington, DC (2001).

This resource is intended to provide governors and their staffs with policies, procedures, and general information regarding emergency management. The guide outlines basic steps for disaster preparedness; describes tools and programs for states to assess their emergency management capabilities; and explains the importance of an aggressive pre-disaster mitigation strategy. The document also describes a governor's authority and powers during a declared emergency or disaster; provides an overview of the emergency management assistance compact; lays out a step-by-step process for declaring a major disaster; explains how to obtain federal assistance and what assistance is available, and identifies issues that governors must be aware of to facilitate the long-term recovery process.

A5. Beauchesne, A. M., Shanley, K., McIlroy, C., and Lee, E., "A Governor's Guide to Emergency Management, Volume Two: Homeland Security." National Governor's Association Center for Best Practices, Washington, DC (2002).

This guide addresses the major homeland security issues a governor and his/her staff need to understand and prepare for. The guide is divided into to topical chapters. Chapter 1 outlines the interaction needed among the governor's office, the homeland security director, the state emergency management agency and other state and federal agencies. Chapter 2 focuses on implementing an effective public communications strategy. Chapter 3 describes the challenges many states face as they develop state-of-the-art radio communications networks for emergency first responders. Chapter 4 recommends a comprehensive and proactive process to identify and assess the vulnerability of their critical infrastructure. Chapters 5 through 9 describe actions states should take to prepare for and respond to bioterrorism, agroterrorism, a chemical weapons attack, nuclear and radiological terrorism, and cyberterrorism. Chapter 10 summarizes the federal government's response to a terrorist incident and outlines the Federal Response Plan as well as other available federal resources.

A6. "Best Practices in Road Weather Management." Federal Highway Administration, Washington, DC (August 2002).

While there is a perception that little can be done about weather, three types of mitigation measures – control, treatment, and advisory strategies – may be employed in response to environmental threats and impacts. These management practices are used in response to various threats including fog, high winds, snow, rain, ice, flooding, tornadoes, hurricanes, and avalanches. This best practices guide, produced on interactive CD, contains case studies of systems and applications employed by traffic, emergency, and winter maintenance managers to improve roadway operations under inclement weather conditions. Each case study demonstrates the entire information thread, from environmental information to system performance information. The CD also contains online resources and a listing of road weather publications.

A7. Booz-Allen & Hamilton, "Organizing for Regional Transportation Operations: An Executive Guide." Federal Highway Administration and the Institute of Transportation Engineers, Washington, DC (July 2001).

This guide provides an overview of the key features and critical elements impacting the development and long-term sustainability of regional operating organizations. It is intended to serve as a resource for transportation management and operations leaders and decision makers. The guide highlights the findings and lessons learned from six case studies developed in conjunction with the National Dialogue on Transportation Operations: TRANSCOM (NY/NJ/CT); TransLink (Vancouver, BC); Metropolitan Transportation Commission (San Francisco Bay Area); ITS Priority Corridor (Southern California); TranStar (Houston); AZTech (Phoenix). Although these case studies focus primarily on large metropolitan areas, many findings are broadly applicable to regions of all sizes.

A8. Cambridge Systematics, Inc., "Weather-Responsive Traffic Management Concept of Operations." Federal Highway Administration, Washington, DC (January 10, 2003).

This paper provides a concise summary of a concept of operations and associated research needs pertaining to weather-responsive transportation management. Its primary focus is on the needs and activities of freeway and arterial transportation managers, and how these needs change or differ during adverse weather. It also involves the transportation-related activities of others including public transportation managers, public safety personnel, highway maintenance personnel, and emergency response personnel. The critical elements of the concept of operations activity flow are: basic operational objectives; information gathering and impact assessment; operational strategies; transportation outcomes. The document describes each of these elements with a focus on the information required and resources need to successfully develop and implement the concept of operations.

A9. "Draft Incident Management Model Procedures Guide for Highway Incidents." National Fire Service Incident Management System Consortium, Washington, DC (March 2003).

The Incident Management System Consortium, formed by fire service professionals to merge the country's two most popular fire incident command systems, has published model procedures for structural firefighting, high-rise firefighting, hazardous materials (HAZMAT), wildland fires, emergency medical incidents, and structural collapse-search and rescue. The Model Procedures Guide proposes using the Incident Management System (IMS) to enable all responders to highway incidents (emergency, non-emergency, routine activities, highway maintenance, landslides, snowstorms, and other disasters) to organize their collective efforts for best use of their marshaled resources. It is intended to provide for the effective management of personnel and resources for the safety and welfare of everyone of the highway. The goal of this document is provide guidance for responder safety at the highway incident while mitigating the incident and maintaining traffic flow around the incident. The guide is organized around the following topics: command procedures, organization and command structures, unified command, safety, basic organizational approach for highway incidents, and highway IMS applications.

A10. "Emergency Response Guidebook." U.S. Department of Transportation, Transport Canada, and the Secretariat of Communications and Transportation of Mexico, <http://hazmat.dot.gov/gydebook.htm> (2000, Downloaded on: March 29, 2003).

The Emergency Response Guidebook (ERG) was developed jointly by the U.S. Department of Transportation (DOT), Transport Canada, and the Secretariat of Communications and Transportation of Mexico for use by firefighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation incident involving hazardous material. DOT's goal is to place one ERG in each emergency service vehicle, nationwide, through distribution to state and local public safety authorities. The ERG is primarily a guide to aid first responders in (1) quickly identifying the specific or generic classification of the material(s) involved in the incident, and (2) protecting themselves and the general public during the initial response phase of the incident. The ERG is updated every three to four years to accommodate new products and technology. The next version is scheduled for 2004.

A11. "Fire and Emergency Services Preparedness Guide for the Homeland Security Advisory System." U.S. Fire Administration, Federal Emergency Management Agency, Emmitsburg, MD, <http://www.usfa.fema.gov/inside-usfa/media/2004releases/012804.shtm> (January 2004, Downloaded on: February 11, 2004).

Prepared by the U.S. Fire Administration's (USFA) Emergency Management and Response-Information Sharing and Analysis Center (EMR-ISAC) to promote critical infrastructure protection, the Fire and Emergency Services Preparedness Guide for the Homeland Security Advisory System provides suggestions for activities that may be appropriate for the five Homeland Security Advisory System (HSAS) Levels. Within this guide, the emergency response leadership will find some recommended preparedness measures for each Threat Condition. The contents of this document should assist the heads of fire and Emergency Medical Service (EMS) agencies with the development and implementation of appropriate agency-specific preparedness measures.

A12. "Guide for the Selection of Communication Equipment for Emergency First Responders, Volumes I and II." U.S. Department of Justice, Office of Justice Programs, National Institute of Justice, Washington, DC <www.ojp.usdoj.gov/nij/pubs.htm> (February 2002, Downloaded on: April 9, 2003).

This two-volume National Institute of Justice (NIJ) Guide provides emergency first responders with information they can assess when selecting communication equipment for use with chemical and biological protective clothing and respiratory equipment. Volume I presents an overview of communications systems and discusses equipment characteristics and performance parameters. Volume II lists manufacturer-supplied details for the 181 items referenced in the first volume.

A13. Hedden, C. and Witzke, E., "Emerging Partnerships Between Emergency Management Agencies and Transportation Management Centers." 9th ITS Word Congress, Chicago, IL,

<http://security.transportation.org/community/security/studies.html> (2002, Downloaded on: March 29, 2003).

This paper documents two efforts in the U.S. by local and regional emergency management agencies (EMA) in their efforts to coordinate with and collocate within Transportation Management Centers (TMCs) – Columbus, OH and Chicago, IL. This paper explains each approach, assesses some of the advantages of these partnerships, and looks at some of the obstacles partners are working to overcome in achieving their respective goals. Benefits include: improved access to better/additional information; more efficient incident management; improved cross-agency planning; "people" integration; and the opportunity to work with media outlets more effectively. Obstacles include: differences in funding sources; funding disparity; and differing political control.

A14. "Homeland Security Presidential Directive/HSPD-5: Management of Domestic Incidents." The Executive Office of the President, Washington, DC, <www.whitehouse.gov/news/releases/2003/02/20030228-9.html> (February 28, 2003, Downloaded on: April 9, 2003).

This Presidential Directive instructs the Secretary of the Department of Homeland Security (DHS) to develop, submit for review to the Homeland Security Council, and administer a National Incident Management System (NIMS). This system is to provide a consistent nationwide approach for Federal, State, and local governments to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. To provide for interoperability and compatibility among Federal, State, and local capabilities, the NIMS will include a core set of concepts, principles, terminology, and technologies covering the incident command system; multi-agency coordination systems; unified command; training; identification and management of resources (including systems for classifying types of resources); qualifications and certification; and the collection, tracking, and reporting of incident information and incident resources. DHS is instructed to develop a national system of standards, guidelines, and protocols to implement the NIMS; and establish a mechanism for ensuring ongoing management and maintenance of the NIMS by June 1, 2003.

A15. "Homeland Security Presidential Directive/HSPD-7: Critical Infrastructure Identification, Prioritization, and Protection." The Executive Office of the President, Washington, DC, <www.whitehouse.gov/news/releases/2003/12/print/20031217-5.html> (December 17, 2003, Downloaded on: January 2, 2003).

This directive establishes a national policy for Federal departments and agencies to identify and prioritize United States critical infrastructure and key resources and to protect them from terrorist attacks. This directive discusses the policy, roles and responsibilities of the Secretary for the Department of Homeland Security, roles and responsibilities of other departments, agencies, and other organizations, coordination with the private sector, and implementation.

A16. "Homeland Security Presidential Directive/HSPD-8: National Preparedness." The Executive Office of the President, Washington, DC,

<www.whitehouse.gov/news/releases/2003/12/print/20031217-6.html> (December 17, 2003, Downloaded on: January 2, 2003).

A companion to HSPD-5, this directive establishes policies to strengthen the preparedness of the United States to prevent and respond to threatened or actual domestic terrorist attacks, major disasters, and other emergencies by requiring a national domestic all-hazards preparedness goal, establishing mechanisms for improved delivery of Federal preparedness assistance to State and local governments, and outlining actions to strengthen preparedness capabilities of Federal, State, and local entities. The directive discusses developing a national preparedness goal, federal preparedness assistance, equipment, training and exercises, federal department and agency preparedness, citizen participation, public communication, and assessment and evaluation.

A17. "IEEE 1512 Incident Management Standards Frequently Asked Questions (FAQ)." ITS Cooperative Development Network (ICDN) Newsletter, <http://www.nawgits.com/ieee/ 1512faq.html> (September 30, 2003, Downloaded on: October 1, 2003).

This article presents 15 frequently asked questions related to the Institute of Electrical and Electronics Engineers (IEEE) 1512 Incident Management Standards. Topics include: development responsibility, stakeholders, agency involvement, functions of the standard, potential operational problems, data types, possible users, compatibility with XML data and web services industry standards, implementation, balloting status, current use, future project commitments, and relationship to other existing ITS standards.

A18. "IEEE Standard for Common Incident Management Message Sets for Use by Emergency Management Centers." Institute of Electrical and Electronics Engineers, Piscataway, NJ (2000).

This Institute of Electrical and Electronics Engineers (IEEE) standard is a base standard for incident management message sets, which will standardize the exchange of information for response and dispatch centers. It is intended to reduce the duplication of messages among various subsystems and increases effective response time resulting in consistent standardized communications among the emergency management subsystem, other subsystems and incident management providers.

A19. "If a Disaster Strikes Today Are You Ready to Lead? A Governor's Primer on All-Hazards Emergency Management." National Emergency Management Association, Lexington, KY <http://nemaweb.org/docs/Gov_Primer.pdf> (2003, Downloaded on: October 24, 2003).

This primer on all-hazards emergency management is intended to highlight for new governors, and their staff, the importance of maintaining a viable emergency management program. It will also provide an overview of the roles and responsibilities of the state emergency management agency and the resources and capabilities that exist to maintain a coordinated, statewide, emergency preparedness, response, and recovery system. The primer covers the following topics: all-hazards emergency management, role of the state emergency

management agency, crisis communication, the existing state emergency management system, homeland security and the all-hazards approach, interagency coordination, thinking regionally, lessons learned, the price of preparedness, states helping states, and the National Emergency Management Association (NEMA) as resource.

A20. Imel, K. J., and Hart, J. W. "Understanding Wireless Communications in Public Safety." The National Law Enforcement and Corrections Technology Center, Rockville, MD <http://www.nlectc.org/pdffiles/wireless2003.pdf> (January 2003, Downloaded on: July 15, 2003).

The intention of this National Law Enforcement and Corrections Technology Center (NLECTC) guidebook is to help unravel the confusing issues, terms, and options surrounding wireless communications, particularly as it involves commercially available communications services. Originally published in 2000, the guidebook was updated in 2003 and is now available on this web site in electronic format. The guidebook is divided into four parts: 1) Planning and Managing a Communications Project, 2) Wireless Communications Technology, 3) Wireless Communications Issues, and 4) Wireless Communications Options.

A21. "Incident Management Successful Practices: A Cross-Cutting Study." Federal Highway Administration, Washington, DC (April 2000).

This overview of successful practices in traffic incident management describes who the partners are in traffic incident management and lists some benefits obtained in various traffic incident management programs. It also lists issues and lessons learned for incident detection and verification, response, site management, clearance, interagency coordination, training and leadership, and strategic program planning for traffic incident management.

A22. "Initial National Response Plan." Department of Homeland Security, Washington, DC (September 30, 2003).

This document implements, on an interim basis, the domestic incident management authorities, roles, and responsibilities of the Secretary of Homeland Security as defined in Homeland Security Presidential Directive-5 (HSPD-5), Management of Domestic Incidents. This document also provides interim guidance on Federal coordinating structures and processes for domestic incident management pending the development, coordination, validation, and implementation of a full National Response Plan (NRP) and National Incident Management System (NIMS), as required by HSPD-5. It is applicable to domestic incident management in the context of terrorist attacks, major disasters, and other emergencies.

A23. The International Association of Chiefs of Police, "A Study of Best Practices in Information Integration Projects, Version 1.2." Capital Wireless Integrated Network (CapWIN) Project, <www.capwinproject.com/documents.html> (July 7, 2000, Downloaded on: March 28, 2003).

This document is the result of a literature review and study of integrated information projects within the law enforcement community nationwide. The study focuses mainly on administrative procedures for information integration

projects and includes a five-site study conducted by the International Association of Chiefs of Police (IACP) and a synopsis of thirteen information integration projects throughout the country. As a result of its study, the IACP provide recommendations for the CapWIN Project in several areas: Planning the System (bringing stakeholders together, developing project goals, determining a project scope, and completing a needs assessment); Guiding the Process (developing governance structure, principles of governance, critical functions of the governance team, private management group alternatives, and developing a decision-making process); and Building the System (designing the project, assessing cost and securing funding, implementing the system, informing and educating the community, and evaluating and maintaining the system).

A24. The International Association of Chiefs of Police Highway Safety Committee, "Traffic Safety in the New Millennium: Strategies for Law Enforcement, A Planning Guide for Law Enforcement Executives, Administrators, and Managers." National Highway Traffic Safety Administration, Washington, DC (August 2001).

Traffic safety programs form an integral component of the effective, comprehensive law enforcement operation. This document is a guidebook for law enforcement executives and their organizations; it catalogues effective strategies and addresses promising practices for the future. This guide promotes strategies to become involved in the community, initiate public education on traffic safety, improve performance and public image, and gain additional public trust; to develop selective traffic enforcement programs to enhance efficiency and operations; and for the support of specific technology application adoption. It also offers wide-ranging recommendations for research or support for research in all strategy areas: management, human resources, and technology.

A25. "Introduction to the Illinois Department of Transportation Emergency Traffic Patrol." Illinois Department of Transportation, Chicago, Il (2001).

The emergency traffic patrol "minutemen" provide surveillance and respond to freeway incidents in the Chicago area 24 hours a day, seven days a week. The primary objective of the emergency traffic patrol is prompt detection of any disruptive incident on the Chicago expressway and initiation of quick clearance procedures to restore the normal traffic flow. This document provides information on the emergency traffic patrol's services, fleet, assignments, training, duties, equipment, and operational procedures.

A26. Latoski, S. P., Dunn, W. M., Wagenblast, B., Randall, J., and Walker, M. D., "Managing Travel for Planned Special Events." Federal Highway Administration, Washington, DC, <http://tmcpfs.ops.fhwa.dot.gov/cfprojects/uploaded_files/Managing%20Travel%20for%20Planned%20Special%20Events%20Handbook.pdf> (September 2003, Downloaded on: February 12, 2004).

This handbook presents and recommends policies, regulations, planning and operations processes, impact mitigation strategies, equipment and personnel resources, and technology applications used in the advance planning, management, and monitoring of travel for planned special events. This handbook was written to

assist responsible agencies in managing the ever-increasing number of planned special events impacting transportation system operations in rural, urban, and metropolitan areas. It communicates to a wide audience, assisting readers that possess the following backgrounds: (1) novice planned special event practitioner, (2) experienced planned special event practitioner, (3) local, single-jurisdiction event planning and management, and (4) regional, multi-jurisdiction event planning and management.

A27. "Manual on Uniform Traffic Control Devices." Federal Highway Administration, Washington, DC (December 28, 2001).

The Manual on Uniform Traffic Control Devices, or MUTCD, defines the standards used by road managers nationwide to install and maintain traffic control devices on all streets and highways. The MUTCD is published by the Federal Highway Administration (FHWA) under 23 Code of Federal Regulations (CFR), Part 655, Subpart F. Section 6G.19 sets guidance and standards for control of traffic through incident areas.

A28. Meyer, M.D., "The Role of the Metropolitan Planning Organization (MPO) in Preparing for Security Incidents and Transportation System Response, White Paper: Draft." Federal Highway Administration Metropolitan Capacity Building Program, Washington, DC, <www.mcb.fhwa.dot.gov/technical.html> (Downloaded on: March 29, 2003).

This paper outlines roles for MPOs in the context of a regional strategy for handling security and disaster incidents. Theses roles – traditional, convener, champion, developer, and operator – are plotted against the six phases of an incident. Because of the widely varying political and institutional climates that exist and the capabilities of the MPO staff, no one role/model will fit all MPOs. However, given a typical MPO's strengths, the following roles are called out by the paper's author as potentially appropriate: conducting vulnerability analyses on regional facilities and services; analyzing for network redundancies and strategic gaps in emergency route planning; funding regional transportation surveillance systems, communications systems, and recovery strategies; coordinating drills and exercise, public information dissemination, and changes to multi-agency actions; providing a forum for discussion; and fulfilling an institutional learning role by after-incident data collection and analysis.

A29. "Military Deployment Coordination Procedures for State Agencies (Interim Guide)." Federal Highway Administration, Washington, DC (September 2002).

This guide assists states in developing and/or updating their emergency operations plans or Emergency Highway Transportation Regulations (EHTR) Plans, where applicable. The guide provides information regarding military deployment concepts, state/local roles and responsibilities, recommended coordination procedures, and a number of special considerations such as communications, Intelligent Transportation System (ITS) technologies, and force protection. The guide offers "generic" procedures for states to adopt in whole or in part when revising their existing emergency operations plans. Moreover, while the focus of this guide is military deployments (forts to ports), the information may also assist

state agencies in preparing for and coordinating requirements during other national security events and emergency situations.

A30. Mulholland, D. J., "Designing the Successful Technology Project." The Police Chief, International Association of Chiefs of Police, Alexandria, VA, <www.iacptechnology.org/Library/ TechTalkIndex.htm/> (October 2002, Downloaded on: April 9, 2003).

This article lays out seven steps to designing and implementing a technology project in a law enforcement organization. The steps include: having a strategic plan, identifying and incorporating key stakeholders, identifying the projects of local agencies and other partners, studying successful projects, determining the true cost of the project, using a team approach, and checking references.

A31. "National Incident Management System." Department of Homeland Security, Washington, DC, <www.dhs.gov/interweb/assetlibraby/NIMS-90-web.pdf> (March 1, 2004, Downloaded on April 23, 2004).

The National Incident Management System (NIMS) incorporates existing best practices into a nation-wide, standardized domestic incident management system applicable to all levels of government and functional disciplines in an all-hazards context. NIMS is based on a mix of flexibility and standardization. NIMS provides a national framework within which all levels of government and private entities can work together to manage domestic incidents, regardless of their cause, size, location, or complexity. NIMS is also a set of standardized organizational structures and procedures designed to improve interoperability among jurisdictions and disciplines. Six major components provide a systems approach to domestic incident management: command and management; preparedness; resource management; communications and information; supporting technologies; and ongoing management and maintenance.

A32. "National Model for the Statewide Application of Data Collection and Management Technology." Iowa Department of Transportation, Motor Vehicle Division, Des Moines, IA <www.dot.sate.ia.us/natmodel/> (Downloaded on: March 28, 2003).

The National Model for the Statewide Application of Data Collection & Management Technology to Improve Highway Safety is a nationally-recognized program for sharing information, resources, and technologies to improve highway safety. The focus of the National Model is improving data collection for roadway incidents, leveraging proven technology for law enforcement, streamlining the communication of safety information to key stakeholders, and extending the use of this information for short- and long-range safety and law enforcement programs. The Traffic and Criminal Software (TraCS) is the foundation of the field data collection. TraCS is a sophisticated, yet simple to use, data collection and reporting tool. Electronic data facilitates linking to roadway, vehicle, driver, emergency, criminal, and other related data to improve highway safety. A national Steering Committee comprised of 19 states licensed to implement TraCS meets periodically to review and prioritize software enhancements and to share challenges and successes.

A33. "National Mutual Aid and Resource Management Initiative Glossary of Terms and Definitions." Federal Emergency Management Agency, Washington, DC <http://www.fema.gov/preparedness/mutual_aid.shtm#1> (December 2003, Downloaded on: May 17, 2004).

This glossary of terms and definitions provides a basic understanding of the resources commonly used and/or exchanged during a disaster and form the basis for the resource typing initiative. An annex of 11 Federal assets is also included in the glossary to provide a snapshot of the Federal capabilities available to State and local entities. The glossary is a living document, and will continuously be updated and revised.

A34. "NFPA 1561 Standard on Emergency Services Incident Management Systems." National Fire Protection Association, Quincy, MA (2002).

The purpose of this standard is to define and describe the essential elements of an incident management system. It applies to organizations and other agencies that provide rescue, fire suppression, emergency medical care, special operations, and law enforcement. It also applies to other emergency services, such as public, military, or private fire departments; fire brigades; and other assisting and cooperating agencies. The standard provides information on system structure (implementation, communications, multi-agency incidents, command structure, training and qualifications, resource accountability, personal accountability, incident scene rehabilitation) and system components (incident commander, command staff, information officer, liaison officer, incident safety officer, incident scene safety, fire suppression, emergency medical service operations, hazardous materials and special operations, accident investigation and review, post incident analysis, operational, staging, planning, and logistics functions, finance/administration, supervisory personnel).

A35. "NFPA 1600 Standard on Disaster/Emergency Management and Business Continuity Programs." National Fire Protection Association, Quincy, MA (2000).

This standard of the National Fire Protection Association establishes a common set of criteria for disaster management, emergency management, and business continuity programs. The purpose of this standard is to provide those with the responsibility for the disaster and emergency management and business continuity programs the criteria to assess a current program or to develop, implement, and maintain a program to mitigate, prepare for, respond to, and recover from disasters and emergencies. Program elements in the standard include: laws and authorities; hazard identification and risk assessment; hazard mitigation; resource management; planning; direction, control, and coordination; communications and warning; operations and procedures; logistics and facilities; training, exercises, evaluations, and corrective actions; crisis communication, public education, and information; and finance and administration.

A36. Parsons Brinckerhoff - PB Farradyne, "A Guide to Updating Highway Emergency Response Plans for Terrorist Incidents." AASHTO Security Task Force, NCHRP Project 20-7/Task 151A, Transportation Research Board, Washington, DC (May 2002).

This guide provides guidelines for planning for enhanced emergency response to terrorist incidents, especially those involving weapons of mass destruction (WMD). This guide is built on existing emergency management practice and is divided into two main parts. Part I, Background and Context, provides information on current emergency management and the new terrorist threats faced by the United States. Part II, Guidance for Updating State Plans, provides specific process guidance for updating existing Department of Transportation (DOT) plans, procedures, roles, and activities in a checklist format. It suggests the most critical issues, indicates the key considerations to pursue with external entities, and identifies the areas in which the existing plans and procedures may require modification in light of the characteristics of terrorism scenarios.

A37. Pat Noyes and Associates. "Guidelines for Developing Traffic Incident Management Plans for Work Zones." The Colorado Department of Transportation, Safety and Traffic Engineering Branch, Denver, CO, <http://www.trafficincident.org/papers/index.html> (September 2003, Downloaded on February 13, 2004).

This report provides details about Colorado Department of Transportation's (DOT) efforts to provide guidelines for traffic incident management in work zones, which builds on successful practices already in place in Colorado and other states. Major sections include: considerations for developing traffic incident management programs in work zones, the planning process, key components of a traffic incident management program, and program implementation and management.

A38. PB Farradyne, "Highway Traffic Operations and Freeway Management State-of-the Practice Final Report." Federal Highway Administration, Washington, DC (March 2003).

This document provides guidance on how to manage and operate the freeway transportation system assets to get the most out of them. It defines the state-of-the-art and summarizes the state-of-the-practice in freeway management and operations in order to provide a basis for recommending actions that will address gaps between the state-of-the-practice and state-of-the-art. State-of-the-art, state-of-the-practice, and gaps are discussed in terms of institutional arrangements, organizational aspects (funding, organizational culture, procurement, and staffing), and system functions (freeway management systems, corridor traffic management, electronic toll and traffic management, decision-support systems, traveler information, traffic incident management, special events management, and communications systems). It also provides recommended research, educational, and outreach actions. This white paper is inter-related to, and can be considered a companion document with, the Freeway Management and Operations Handbook (FMOH).

A39. PB Farradyne, "Quick Clearance and 'Move-It' Best Practices." I-95 Corridor Coalition, <http://144.202.240.28/pman/ViewProject.asp?pid=128> (September 2003, Downloaded on: February 4, 2004).

The purpose of this project is to examine the quick clearance and move-it policies implemented in the I-95 Corridor and around the United States and to document the best practices found. There are a number of areas that can be examined such as

the actual processes used by the cognizant agencies, the language of the enabling legislation, how institutional support was obtained, and how the public was educated about the new policies and/or laws. The specific study objectives included investigating how a coordinated policy might be implemented across the Corridor, including any barriers to implementing a uniform policy; identifying changes in laws that would be required; and determining how public information campaigns might be used to alert drivers to the new policies. Simultaneous with, but independently of, this I-95 Corridor Coalition effort, the National Cooperative Highway Research Program (NCHRP) initiated a national survey on this topic. (The results of this study can be found in NCHRP Synthesis 318, "Safe and Quick Clearance of Traffic Incident Management," also referenced in this bibliography.) The I-95 Corridor Coalition conjoined with the NCHRP study to maximize resources and avoid duplication. This report contains extensive references to, and excerpts from, the NCHRP synthesis report. While there is some overlap between the reports, both reports stand by themselves.

A40. PB Farradyne, "Traffic Incident Management Handbook." Federal Highway Administration, Washington, DC (November 2000).

This handbook is a revision of the Freeway Incident Management Handbook (1991), updating and expanding material contained in the old handbook. This document is divided into three main sections: Introduction to Incident Management; Organizing, Planning, and Designing an Incident Management Program; and Operational and Technical Approaches to Improving the Incident Management Process. This handbook is designed to assist transportation and public safety agencies responsible for managing traffic incidents in improving their programs and operations. Its target audiences are: (1) managers who are responsible for traffic incident management program development and support, and (2) field practitioners who are responsible for providing program services on a day-to-day basis.

A41. "Public Safety Wireless Communications Standards Awareness Guide." Public Safety Wireless Network (PSWN) Program, Washington, DC, <www.publicsafetywins.gov/Resources/ Resources.cfm> (Downloaded on: April 9, 2003).

This guide advocates for the adoption and implementation of open standards to facilitate information sharing among public safety organizations, regardless of the equipment that is used by each organization. It describes several activities focused on voice/radio/wireless data standards, including Project 25, the European Telecommunications Standards Institute's TRErrestrial Trunked Radio Access (TETRA), the State of Michigan, the PSWN program, and the Federal Law Enforcement Wireless Users Group (FLEWUG). The guide offers the following as outstanding needs in this area: the design, manufacture, and marketing of standards-compliant radio infrastructure; awareness raising in the public safety community about the importance of its involvement in the standards development effort; and the guarding against the public safety community engaging in more standards development activities than it has resources to support.

A42. "Public Safety Coordination and Partnership Awareness Guide." Public Safety Wireless Network (PSWN) Program, Washington, DC, <www.publicsafetywins.gov/Resources/Resources.cfm> (Downloaded on: April 9, 2003).

Emergency incidents increasingly require a high level of multi-agency and multifunctional response by emergency service providers. The problems associated with the lack of coordination and partnership in the public safety community cross all jurisdictional boundaries. These boundaries and unique organizational missions often create perceived barriers that hinder cooperation and collaboration in situations where they are necessary. Stovepiped systems serve the mission of a single agency or jurisdiction at the expense of interoperability. This guide provides information on how agencies are taking action to improve coordination and partnerships and facilitate multi-jurisdictional interoperability. This includes: membership agreements and fee-for-service arrangements; obtaining community buy-in in shared system development at the local level; sponsorship of interoperability efforts by senior-level leadership; FCC authorization of state licenses for public safety services in the 800 MHz band; and federal agency initiative to lead coordination and partnership efforts.

A43. "Regional Traffic Incident Management Program Implementation Guide." Federal Highway Administration, Washington, DC (May 2001).

The purpose of this document is to assist organizations and their leaders in implementing and sustaining regional traffic incident management programs, both by examining successful models and by considering some of the lessons learned by early implementers. This document presents a framework for developing a formal, multi-agency traffic incident management program, with endorsement by, participation from, and coordination by senior agency management. Formalizing the program transitions incident management from a reliance on the cooperative relationships existing between responders and middle management of the participating agencies to an official recognition and endorsement of incident management as a core agency activity at senior executive levels. The guide also discusses the importance of program monitoring, evaluation and reporting, as well as the need for strategic planning throughout the process. The intended audience for this document is mid- and upper-level managers in police, fire, and emergency medical service departments, as well as transit and transportation agencies.

A44. "Regional Transportation Operations Collaboration and Coordination." Federal Highway Administration, Washington DC (2003).

This primer was written for transportation professionals and public safety officials from cities, counties, and States who are responsible for day-to-day management and operations within a metropolitan region. It is intended to help agencies and organizations understand the importance of regional collaboration and coordination, how it happens, and how to get started. The document is divided into four sections. The practice of Regional Transportation Operations Collaboration and Coordination (RTOCC) provides a framework and associated steps for successfully moving from theory to practice. RTOCC and the ITS Architecture Development Process describes the synergistic interplay of these two areas in

improving regional operations. A Self-Assessment – Where Are You in Regional Collaboration and Coordination? is a tool for agencies to use to determine if they are starting from the beginning or building upon existing efforts to create and sustain effective collaboration and coordination within their regions. Applications of RTOCC presents examples of how some regions are already benefiting from greater collaboration and better coordination.

A45. "Safe Operations of Fire Tankers." U.S. Fire Administration, Federal Emergency Management Agency, Emmitsburg, MD <http://www.usfa.fema.gov/inside-usfa/research/vehicle.shtm> (May 2003, Downloaded on February 17, 2004).

This manual provides information related to human performance (driver training, operations, etc) and technology (vehicle design) to enhance the safety of fire tanker operations. It also examines past incidents of crashes involving fire tankers that have killed firefighters with a focus on how these fatalities could have been prevented. It includes information related to the current and applicable Federal standards and regulations as well as national-level consensus standards and guidelines. As part of this project effort, a panel of technical experts in the areas of fire service emergency vehicle operations, emergency vehicle maintenance, fire tanker design, and tanker water shuttle operations provided detailed recommendations on how to enhance the safety of fire tanker operations that were incorporated into the manual.

A46. SAIC, "A Guide to Highway Vulnerability Assessment for Critical Asset Identification and Protection." AASHTO Security Task Force, NCHRP Project 20-7/Task 151B, Transportation Research Board, Washington, DC (May 2002).

This guide was developed as a tool for state Departments of Transportation (DOT) to assess the vulnerabilities of their physical assets; develop possible countermeasures to deter, detect, and delay the consequence of terrorist threats; estimate the capital and operating costs of such countermeasures; and improve security operational planning for better protection against future acts of terrorism. For states just beginning the process, the guide provides a roadmap of issues to consider and actions to take during each phase of the vulnerability assessment. For states that have already begun the processes, the guide may provide alternate methods used by other states and federal agencies that could help validate the previous work.

A47. Smith, B., Smith, K. W. and Medley, S. B., "Incident Analysis Toolkit: Extracting Information from Incident Databases." ITS America 11th Annual Meeting and Exposition, Miami Beach, FL (June 2001).

Congestion due to incidents on highways throughout the United States is a growing problem. An incident is an unplanned event that reduces the capacity of a freeway. A way to address the problem of congestion caused by incidents is through incident management. Incident management refers to the series of actions by traffic and public safety officials to return a highway to its normal operating capacity after an incident has occurred. An effective incident management system seeks to have a well-coordinated incident response plan that reduces the time of delay caused by

the incident. The prototype Incident Analysis Toolkit described in this paper is intended to provide techniques to analyze past incidents in order to learn about current and future incidents, and aid in devising a well-organized incident management system. For one specific test case, this toolkit is being applied to the region monitored by the Hampton Roads Smart Traffic Center.

A48. "Staffing Options for Incident Management Programs (Field Operations) – Utilizing Public/Private Partnerships." Maryland State Highway Administration, Baltimore, MD (1997).

In the field operations arena of incident management programs throughout the country, there are several examples of staffing and operations options – state police, consultants, private companies, and a combination of agencies. This paper looks at six programs to determine how the operations manage and staff their incident management programs. The paper concludes that the public/private incident management partnership should be approached one step at a time. It recommends that a report on how to improve towing response and clearance times be completed prior to determining the best course of action to enhance the CHART program.

A49. "Standards for Wireless Interoperability and Information Sharing." Advanced Generation of Interoperability for Law Enforcement (AGILE) Program, Washington, DC <www.agileprogram.org/standards/justnet.html> (Downloaded on: March 28, 2003).

The purpose of the Standards Project within the AGILE Program is to effectively and efficiently provide the mechanisms to allow interoperability and information sharing among heterogeneous public safety wireless (radio) and information technology (IT) systems. The AGILE Standards Project will identify a suite of relevant standards developed by standards development organizations (like the Telecommunications Industry Association (TIA), the Institute of Electrical and Electronics Engineers (IEEE), etc.) and adopt them as National Institute of Justice (NIJ) interoperability standards. In rare cases, new standards may need to be developed. Before NIJ Standards can be identified/developed and adopted, however, a great deal of preparatory work has to be completed. The results of this work will be incorporated into a Strategic Plan that will guide the standards selection and adoption process.

A50. "Standards Primer." Public Safety Wireless Network (PSWN) Program, Washington, DC, <www.publicsafetywins.gov/Resources/ Resources.cfm> (Downloaded on: April 9, 2003).

This document focuses on the land mobile radio (LMR) system standards development process. It describes the current state of affairs and the rationale for standardization. The document also provides an overview of standards bodies, the standards process, and the Project 25 process and status. The benefits of standardization and steps for becoming involved in the standards process are also described.

A51. "Traffic Incident Management Tow Operators Workplan (TIMTOW) Guide." Towing and Recovery Association of America, Alexandria, VA, (2003).

Towers have been valuable players in the traffic incident management concept from the beginning. However, they have rarely been recognized as such by responding agencies or themselves. The purpose of this Traffic Incident Management Guide for Tow Truck Operators is to uniformly educate the towing industry and partners as to their pertinent roles in TIM and confirm their legitimacy as valued team members.

A52. "Traffic Incident Management (TIM) Self-Assessment Guide." Federal Highway Administration, Washington, DC, <http://ops.fhwa.dot.gov/Travel/IncidentMgmt/timsa.htm> (November 22, 2002).

The Traffic Incident Management Self-Assessment is a tool to be used by state and regional program managers to assess their achievement of a successful multi-agency program to manage traffic incidents effectively and safely. The tool also provides a method to assess gaps and needs in existing multi-agency regional and statewide efforts to mitigate congestion caused by traffic incidents.

A53. University of Virginia Smart Travel Laboratory Center for Transportation Studies, "Best Practices White Paper: Transportation Management and Public Safety Integration." Capital Wireless Integrated Network (CapWIN) Project, <www.capwinproject.com/documents.html> (June 9, 2000, Downloaded on: March 28, 2003).

This white paper documents and synthesizes national resources and experiences in transportation and public safety integration. It calls out two national-level resources that are significant to CapWIN's implementation: (1) Department of Transportation's (DOT) National Intelligent Transportation Systems (ITS) Architecture provides a sound framework to describe joint transportation and public safety integration for regional ITS deployment and management; (2) IEEE Common Incident Management Message Sets for Use by Emergency Management Centers provides specific detail into incident management information exchange protocols. The white paper notes that while there is no single program that integrates transportation management and public safety, CapWIN will be able to draw upon select experience developing nationally in ITS applications. In addition, as CapWIN progresses, it will be able to track national experiences that are gaining insight into control center unification, database integration and operation, mobile wireless integration and operation, extensive use of internet-related technologies, and multi-organization cooperation.

A54. "Work Zone Mobility and Safety Self Assessment Guide and Self Assessment Tool." Federal Highway Administration, Washington, DC (October 30, 2002).

The Federal Highway Administration (FHWA) has developed an updated version of the 1998 Work Zone Mobility and Safety Self Assessment tool. This latest self assessment will establish a new work zone baseline to identify the gaps and successes that transportation agencies have had since the 1998 assessment. All of the strategies, policies, techniques, and tools identified in the self assessment were gathered from the best practices currently being done by state Departments of Transportation (DOT), Metropolitan Planning Organizations, and local municipalities. Many of the items can be found in the Work Zone Best Practices

Guidebook available on the Work Zone Mobility and Safety Team's website. The self assessment consists of a number of questions designed to allow those with work zone management responsibilities to measure their program, procedures, and practices against many of the best practices in use today. This self assessment will serves three roles: (1) raising the level of awareness of practices and strategies used in mitigating work zone congestion and crashes; (2) facilitating communication and sharing of best practices among transportation professionals, and (3) establishing a working tool to identify areas of congestion and safety management strategies that need more investigation and performance evaluation.

B. EXAMPLES (PLANS, MEMORANDA OF UNDERSTANDING, LEGISLATION, AND TRAINING)

B1. ATA Foundation in association with Cambridge Systematics, Inc., "Incident Management: Challenges, Strategies, and Solutions for Advancing Safety and Roadway Efficiency." National Incident Management Coalition, Alexandria, VA (February 1997).

This report provides guidance on developing or expanding incident management programs. It covers mandates, organizational structure, and availability of resources. Through case studies, it identifies common barriers to the development of incident management programs and recommends strategies to overcome these barriers. Appendices include an inventory of incident management programs benefit/cost analyses, model agreements, funding sources, information on the National Incident Management Coalition, and a list of expert focus group participants.

B2. "Case Based Tutorials on Shared System Development – Coordination and Partnership." Public Safety Wireless Network (PSWN) Program, Washington, DC, <www.publicsafetywins.gov/ Resources/Resources.cfm> (December, 2001, Downloaded on: April 9, 2003).

The PSWN Program developed this case to educate the public safety community on the need for coordination and partnerships to foster improvements to communications interoperability. The case in intended to be delivered in a "classroom-style" environment. The case follows the efforts of a police captain to address issues of communication, coordination, and partnership. The case topics include: assessing the problem, creating a coalition, estimating single system replacement costs, addressing the need for early executive support, setting the stage for agency partnerships, building a case for a statewide radio system, working to secure executive support and coordination, forming an executive working group, coordinating with partners agencies, inviting local participation, elevating the need for appropriation, sharing state resources, and developing control structures.

B3. "Draft Incident Management Model Procedures Guide for Highway Incidents." National Fire Service Incident Management System Consortium, Washington, DC (March 2003).

The Incident Management System Consortium, formed by fire service professionals to merge the country's two most popular fire incident command systems, has published model procedures for structural firefighting, high-rise firefighting, hazardous materials (HAZMAT), wildland fires, emergency medical incidents, and structural collapse-search and rescue. The Model Procedures Guide proposes using the Incident Management System (IMS) to enable all responders to highway incidents (emergency, non-emergency, routine activities, highway maintenance, landslides, snowstorms, and other disasters) to organize their collective efforts for best use of their marshaled resources. It is intended to provide for the effective management of personnel and resources for the safety and welfare of everyone of the highway. The goal of this document is provide guidance for

responder safety at the highway incident while mitigating the incident and maintaining traffic flow around the incident. The guide is organized around the following topics: command procedures, organization and command structures, unified command, safety, basic organizational approach for highway incidents, and highway IMS applications.

B4. Dunn, W.M. and Latoski, S. P., "Safe and Quick Clearance of Traffic Incidents: A Synthesis of Highway Practice." NCHRP Synthesis 318, Transportation Research Board, Washington, DC, <http://gulliver.trb.org/publications/nchrp/nchrp_syn_318.pdf> (2003, Downloaded on: October 3, 2003).

The report profiles laws, policies, and procedures for facilitating clearance of traffic incidents, primarily those initially blocking travel lanes and attended to by the vehicle operator, on highways in urban and rural areas. In recognizing the unique challenges faced by jurisdictions across the country, the study also reports on successful specific-site traffic incident clearance and investigative activities employed to quickly mitigate incidents of varying severity. The report discusses the following: quick clearance legislation; hold harmless laws; policies governing the removal of accident victims; the duties of private tow companies; various policies governing the rapid clearance of overturned semi-tractor trailers; appropriate actions to take when there is an accompanying fuel spill; and technologies used to provide for continual, uninterrupted flow of communications between agencies participating in incident clearance activities.

B5. Edwards and Kelcey, Inc., "Transportation Incident and Event Management Plan." Delaware Department of Transportation, Dover, DE (February 2003).

This document has three stated purposes. The first is to define communication, response, resource, and responsibility procedures and guidelines of the Transportation Management Teams (TMT) for response to any incident that impacts the transportation system. The second is to establish the TMT concept that will maximize the safe movement of persons and vehicles from the affected area(s) and give emergency personnel access to the affected area(s). The third is establishing the TMT's responsibility for the prompt, safe, and orderly re-entry of evacuees into an evacuated area one the indent of event no longer exists. The document is organized as follows: situations and assumptions, mitigation and preparedness, concept of operations, assignment of responsibilities, and administration and support.

B6. Emergency Management Institute, "IS 700 – National Incident Management System (NIMS), An Introduction." Federal Emergency Management Agency, Washington, DC, <http://training.fema.gov/EMIWeb/IS/is700.asp> (Downloaded on: May 17, 2004).

This course introduces the National Incident Management System (NIMS) and takes approximately three hours to complete. It explains the purpose, principles, key components and benefits of NIMS. The course also contains "Planning Activity" screens, giving trainees an opportunity to complete some planning tasks during this course. The planning activity screens are printable so that trainees can

use them after completion of the course. Participants will be able to do the following when finished with this course: describe the key concepts and principles underlying NIMS; identify the benefits of using the Incident Command System (ICS) as the national incident management model; describe when it is appropriate to institute an Area Command; describe when it is appropriate to institute a Multiagency Coordination System; describe the benefits of using a Joint Information System (JIS) for public information; identify the ways in which NIMS affects preparedness; describe how NIMS affects how resources are managed; describe the advantages of common communication and information management systems; explain how NIMS influences technology and technology systems; and describe the purpose of the NIMS Integration Center

B7. "Introduction to the Illinois Department of Transportation Emergency Traffic Patrol." Illinois Department of Transportation, Chicago, Il (2001).

The emergency traffic patrol "minutemen" provide surveillance and respond to freeway incidents in the Chicago area 24 hours a day, seven days a week. The primary objective of the emergency traffic patrol is prompt detection of any disruptive incident on the Chicago expressway and initiation of quick clearance procedures to restore the normal traffic flow. This document provides information on the emergency traffic patrol's services, fleet, assignments, training, duties, equipment, and operational procedures.

B8. "Joint Operations Policy Statement." Washington State Patrol and Washington State Department of Transportation, Olympia, WA (February 13, 2002).

The purpose of this policy statement is to document the joint policy positions between the Washington State Patrol (WSP) and the Washington State Department of Transportation (WSDOT) regarding issues of mutual interest in the operations of Washington State Highways. Policies, roles, and actions are defined in the following areas: data sharing, traffic management, work zone safety, commercial vehicles, joint facilities, wireless communication, Washington State ferries, transportation system security, and safety rest areas. Specific policies in the traffic management area are stated on coordinated public communication, service patrols, enforcement processes, incident response, disaster response, and winter driving. The document states that WSDOT and WSP will coordinate the development of performance measurements that involve activities reported on by both agencies before submittal to the Office of Financial Management and the Legislature. Both agencies will work collaboratively to develop joint measures for incident response and clearance times.

B9. "Managing Traffic Incidents and Roadway Emergencies." National Highway Institute (NHI) Course No. 133048, Federal Highway Administration, Washington, DC (2003).

This workshop addresses many on-scene operations and communications issues, as well as organizational issues. It is presented to mid- and upper-level transportation, public safety, and private sector incident management partners. The course materials are currently being revised and are expected to be completed in mid-2003.

B10. "North Carolina's Quick Clearance Act." General Assembly of North Carolina, Raleigh, NC, <www.ncleg.net/html2003/bills/currentversion/ratified/house/hbill1140.full.html > (October 2003, Downloaded on January 5, 2004).

This act authorizes the quick removal of vehicles, cargo, or other personal property from controlled-access highways and to allow drivers to remove vehicles from travel lanes of a highway following minor accidents, if the vehicles can be safely moved.

B11. "Open Roads Policy: Quick Clearance for Safety and Mobility." Florida Department of Transportation and Florida Highway Patrol (November 2002).

This agreement by and between the Florida Highway Patrol (FHP) and the Florida Department of Transportation (FDOT) establishes a policy for FHP and FDOT personnel to expedite the removal of vehicles, cargo, and debris from roadways on the State Highway System and to restore, in an urgent manner, the safe and orderly flow of traffic following a motor vehicle crash or incident on Florida's roadways.

B12. O'Laughlin, J. B. "Arizona Statewide Incident Management Plan." Arizona Department of Transportation, Phoenix, AZ (July 2000).

The objective of the plan is to reduce injuries, deaths, and delays caused by roadway incidents. The project work plan brought together experienced incident responders and stakeholders across Arizona to give their insights, and participate in the development and prioritization of the recommendations. A review of other programs was presented in a series of eight Focus Group meetings across the state. The meetings drew over 250 individuals from city, county, and state police, fire, transportation and public works agencies, as well as towing companies, media, and federal agencies. A preliminary report with the initial results of all the Focus Groups was provided to all who attended, and a second set of eight follow-up meetings were then held to discuss comments, seek approval and prioritize the recommendations. The resulting final plan contains 18 categories with 61 recommendations. The plan also defines recommendations for action by individual agencies, those requiring multiple agency effort, and those requiring legislative or budget action. This project resulted in a comprehensive Statewide Roadway Incident Management Plan with clear recommendations and strong support from the stakeholders.

B13. O'Laughlin, J. B. and Smith, A., "Incident Management Executive Overview: Safety, Mobility, Performance." Parsons Brinckerhoff, Seattle, WA (December 2001).

This presentation is used in briefings with senior agency leadership groups. It describes the goals of incident management, defines effective incident management elements, and identifies examples of best practice and barriers to improvement. The final message of the presentation is that communications, coordination, and cooperation are key to successful incident management.

B14. Reichenbach. P. E., "Fire Commissioner Ed Mann Announces Availability of Highway Safety Training Courses for Emergency Responders."

respondersafety.com, <www.respondersafety.com/news/2002/june/13_mann.html> (June 2002, Downloaded on: February 22, 2003).

The State Fire Academy in cooperation with other Pennsylvania agencies involved in emergency incidents on the Commonwealth's streets, roads, and highways, announce that two innovative training courses are being made available to responders to address the issue of highway safety. The first course, Pennsylvania Highway Incident Management - A Multi-Agency Approach is a joint venture of Office of the State Fire Commissioner, the Pennsylvania State Police, the Pennsylvania Department of Transportation (PENNDOT) and the Pennsylvania Turnpike Commission. It facilitates interagency cooperation by teaching management and command-level persons the use of the Unified Incident Command (UIC) mode of the Incident Command System in the management of highway incidents. The perceptions, capabilities, and limitations of law enforcement, fire, rescue, Emergency Management Services (EMS), and transportation agencies are reviewed and discussed. Areas of potential interagency conflict are examined and potential solutions devised. In order to give participants real-world "face time" with their colleagues from other agencies, each class's students are recruited so that representatives of all response agencies are present. The second course, Highway Incident Scene Safety and Traffic Control (HSTC) teaches both command and operations personnel the knowledge and skills needed to recognize the hazards, make effective risk versus benefits assessments, and use a 'no frills' sign and warning device package easily transportable on one or two existing emergency vehicles to provide early warning to motorists and high visibility to responders and their activities. Procedures are taught that will allow responders to work in close proximity to controlled moving traffic with an acceptable degree of safety.

B15. "Safe Positioning While Operating In or Near Moving Traffic Standard Operating Procedure." The Emergency Responder Safety Institute, <www.respondersafety.com> (Downloaded on: March 29, 2003).

This procedure identifies parking practices for fire department apparatus and vehicles that will provide maximum protection and safety for personnel operating in or near moving vehicle traffic. The procedure covers terminology; benchmarks for safety, apparatus and emergency vehicles, incident command, and emergency crew personnel; and high-volume, limited access highway operations. This procedure also provides an officer safety parking "cue card" for on-scene use.

B16. "Strategic Plan for Highway Incident Management In Tennessee." Office of Incident Management, Tennessee Department of Transportation, Nashville, TN, <http://www.tdot.state.tn.us/Chief_Engineer/assistant_engineer_operations/mainte~1/IncidentManagement/Complete%20IM%20Plan.pdf> (August 2003, Downloaded on: February 12, 2004).

This plan establishes the framework for a systematic, multi-agency effort to improve the management of highway incidents. The plan is a joint effort by government and private organizations that have responsibilities for highway incident management and public safety and is part of the foundation for ongoing planning and collaboration. It is divided into six chapters: (1) definitions,

stakeholders, overview of incident management components; (2) Tennessee-specific information on stakeholders, frequency and severity of incidents, and problems; (3) recent accomplishments and progress made toward more effective highway incident management; (4) ongoing process for planning and coordination; (5) recommended strategic plan with 10 goals and 150 action items; and (6) suggestions for implementation, costs, and possible funding sources.

B17. "TMC Master Plan." California Department of Transportation Traffic Operations Program in cooperation with Department of California State Highway Patrol Office of Special Projects, Sacramento, CA, (December 1997).

Growing traffic congestion has highlighted the need for continued innovative and cooperative efforts by the Department of California Highway Patrol (CHP) and the California Department of Transportation (Caltrans). The state Transportation Management Centers (TMCs) were established as part of this effort and are co-managed by CHP and Caltrans. To ensure optimal use of limited resources and promote partnership development, the TMC Master Plan is issued as the standard policy document for all California state-managed TMCs. It provides guidance for partnerships, management structure, operations, Intelligent Transportation Systems (ITS) and the national architecture, and deployment milestones.

B18. TransTech Management, Inc., "State DOT's Transportation Security Training Needs." American Association of State Highway and Transportation Officials (AASHTO) Transportation Security Task Force, Washington, DC, <http://security.transportation.org/community/security/studies.html> (August 2002, Downloaded on: March 29, 2003).

A subcommittee of AASHTO's Security Task Force conducted a telephone and e-mail survey of 28 AASHTO member Departments of Transportation (DOT) to address in detail the issue of training as a gap in state transportation agencies' enhanced security activities. The survey found that about 70% of DOTs surveyed provide in-house security training to their employees, but most address handling hazardous materials situations and/or emergency responses to disaster situations. A majority of DOTs surveyed (about 80%) have not made major changes to their in-house training activities since September 11th to include broader security-related training initiatives. Most DOTs surveyed want federal input and support on how to develop security-related training. A handful of state DOTs (California, Georgia, Oregon, Pennsylvania, Utah, and Washington) are developing or providing security training that is more advanced than most DOTs. Finally, a significant number of DOTs are using external resources, especially state emergency management agencies, to provide security training.

C. STUDIES, REPORTS, PRESENTATIONS, AND ARTICLES

C1. "511 - America's Traveler Information Number Deployment Assistance Report #1: Business Models and Cost Considerations." 511 Deployment Coalition, <www.deploy511.org/minutereports.htm> (January 2002, Downloaded on: March 29, 2003).

Business models and cost recovery are the critical factors for determining the sustainability of the travel information service and 511. In the context of 511, the service will be regarded as new from the perspective of callers who previously haven't been exposed to traveler information services. The paper presents six models to address 511 and the entire advanced traveler information system (ATIS) program – public sector funded, subscription, pay-per-call, advertising and sponsorship, loss-leader or franchise, and hybrid business. These models are presented in terms of how they have been applied to ATIS to date and a qualitative evaluation of effectiveness. Cost issues and elements are also addressed.

C2. "511 - America's Traveler Information Number Deployment Assistance Report #3: 511 and Homeland Security." 511 Deployment Coalition, <www.deploy511.org/minutereports.htm> (June 2002, Downloaded on: March 29, 2003).

This white paper discusses the challenges and opportunities for 511 systems, their designers, and their operators arising from the September 11, 2001 terrorist attacks on the World Trade Center and the Pentagon. It is organized around three topics and their sub-issues – customers (message content; accuracy, timeliness, and reliability of travel information; focus of travel information), institutional/organizational (public/private roles and responsibilities; resources; inter-agency coordination), and system performance (capacity considerations; response times/quality of service; system redundancy). The paper authors make six recommendations to the 511 Deployment Coalition. These include: opening the dialogue with the homeland security community; working closely with the transportation and emergency management community to pool knowledge and resources; and conducing a post-games case study of the Salt Lake City 511 system during the 2002 Winter Olympics.

C3. AGILE NLECTC Project Team, "Initial Lessons Learned in Testing and Deploying the ACU-1000." Advanced Generation of Interoperability for Law Enforcement (AGILE) Program, Washington, DC <www.agileprogram.org/program_reports/justnet.html> (June 15, 2001, Downloaded on: April 9, 2003).

This memorandum documents specific lessons learned during the technical and operational evaluation of the ACU-1000 communication switch in order to share information with agencies planning to use this technology for interoperability purposes. The ACU-1000 is a communications switch that allows wireless communication systems to be combined at the audio baseband by using the received audio from one radio system as the source audio for one or more transmitters of differing technologies. The ACU-1000 met the manufacturer's

electrical performance specifications, did not impair the audio quality of the voice communications (beyond the impairments already encountered due to the radios themselves), and was easy to configure and operate. When fielded, it met the functional requirement of allowing officers from one agency using their own agency's radio system to directly communicate with officers of another agency using a radio system operating on a different frequency band. However, there are many options that may need to be "fine-tuned" to a given situation and/or equipment complement. The testing experience shows that careful planning and operational exercises involving potential users are strongly recommended prior to deploying an ACU-1000 in an emergency situation.

C4. Allred, K. C., Michael, J., "Transportation, Emergency Communications, and Homeland Security." U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, ITS Public Safety Program, Washington, DC, <www.itspublicsafety.net/articles.htm> (Downloaded on: March 29, 2003).

This document describes the Department of Transportation's (DOT) history of partnership with the 9-1-1 and emergency response communities. It also outlines DOT's recent activities and initiatives to support the development of the next generation 9-1-1 system, support the wireless E 9-1-1 infrastructure, and involve the dispatch and Emergency Medical Services (EMS) communities long before technology in introduced into the marketplace.

C5. "Assessment of Sharing Information Between Public Safety and Transportation Agencies for Traffic Incident Management." NCHRP Project 3-63, Transportation Research Board, Washington, DC, <http://rip.trb.org/browse/dproject.asp?n=6083> (June 2003, Downloaded on: March 29, 2003).

The objective of this research is to assess methods, issues, benefits, and costs associated with sharing information between public safety and transportation agencies in traffic incident management. The project is scheduled to be completed in June 2003.

C6. ATA Foundation, "Traffic Incident Management Expert Focus Groups: Final Report." Federal Highway Administration, Washington, DC (September 2001).

This report summarizes two traffic incident management expert focus groups conducted by the ATA Foundation for the Federal Highway Administration (FHWA). The purpose of the focus groups were to: develop a benchmark of the current state-of-practice in traffic incident management; identify challenges to successful traffic incident management; identify what traffic incident management will and should be in the future; quantify ways to mitigate the challenges faced; identify traffic incident management performance measures; and identify an appropriate role for FHWA in advancing traffic incident management. The report includes the following recommendations for FHWA: establish a federal-level traffic incident management (TIM) program to elevate it as a program with funding to state Departments of Transportation (DOT); develop a national TIM organization to conduct research, provide training, and disseminate information; support pre-qualification and selection programs for tow operators; develop public

information and education materials to focus on what TIM program accomplish and how the public can participate; lead the standardization of TIM performance measures; use a national traffic incident management organization to conduct, or manage the conduct of, needed research on traffic incident management.

C7. Baird, M.E. and Jacobs, B., "Assessment of Tennessee's Freeway Service Patrols (HELP) by Police Officers in Chattanooga, Knoxville, Memphis, and Nashville: Results of a Survey." 82nd Annual Meeting of the Transportation Research Board, Washington, DC (January, 2003).

The Tennessee Department of Transportation (TDOT) operates freeway service patrols (HELP) in the state's four largest cities. The HELP program works closely with all incident responders, but especially with the local police departments. In 2001, TDOT surveyed police officers in the four cities to (1) determine the officers' opinions of the program while the service was still relatively new (2) establish a baseline to measure customer satisfaction among officers in future years, (3) compensate for the dearth of hard data on benefits of the program, and (4) solicit comments and suggestions for improvement. The survey responses, from 121 officers, indicate a high level of approval among the local police officers and provide useful information about the benefits of the program. From the officers' perspective, the most significant benefits include improved safety at incident scenes, more effective removal of disabled and damaged vehicles from travel lanes, and reduction of the time required for crash investigations. Also, the officers believe that HELP complements services provided by other agencies and that the program has reduced congestion and improved safety.

C8. Baird, Z. and Vatis, M. A. "Creating a Trusted Network for Homeland Security." The Markle Foundation Task Force on National Security and the Information Age, New York, NY, <http://www.markletaskforce.org> (December 2, 2003, Downloaded on: February 12, 2004).

In this report the task force catalogs current gaps in the nation's system for analyzing and sharing intelligence and details the elements of a proposed System-wide Homeland Analysis and Resource Exchange (SHARE) Network that would more effectively combat terrorism while protecting privacy and other civil liberties. The task force calls on the President to set the goal of creating the network; issue clear government-wide policy guidelines for the government's collection and use of domestic information, including private sector information about U.S. persons; and clarify the respective roles of the Department of Homeland Security (DHS), the Terrorist Threat Integration Center (TTIC), the FBI and other federal agencies involved with collection and analysis of domestic terrorism information. The task force concluded that until the government gives priority to breaking down its institutional barriers to cooperation and presents the public with a cohesive plan for the network, the public will not understand how private sector information is a critical part of the network. Further, government-wide guidelines are needed that clearly define the security interests in research into data mining of private sector information and that provide controls to address the privacy implications of such programs in order to establish public trust in these programs.

C9. Balke, K. N., Fenno, D. W., Ullman, B. “Incident Management Performance Measures.” Texas Transportation Institute, College Station, TX, (November 2002).

The objectives of this work were to provide a better understanding of how agencies measure their performance in organized traffic incident management and to identify the difference in the definitions of relevant measures of performance in incident management. A two-pronged approach was used to examine the issues of incident management performance measures. The first was to review the available transportation and emergency services literature related to measuring the performance of incident management systems in the United States. The second was a survey of representatives from the traffic, law enforcement, and emergency services providers with active incident management programs. Recommendations and suggested future research dealing with performance measures are presented.

C10. Booz-Allen & Hamilton, “Intelligent Transportation Systems Field Operational Test Cross-Cutting Study - Incident Management: Detection, Verification, and Traffic Management.” U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, Washington, DC (September 1998).

This report summarizes and interprets findings from Intelligent Transportation Systems (ITS) Field Operational Test (FOT) projects in the field of incident management. It highlights the successes and problems these tests encountered while attempting to develop the technologies and systems to support incident management. The FOTs discussed in this report involved a significant degree of partnership or teaming, often between public and private organizations. The analysis and response presented in this report are categorized as impacts, user response, technical lessons learned, institutional challenges, and resolutions and costs to implement.

C11. Booz-Allen & Hamilton, “Organizing for Regional Transportation Operations Conference Proceedings.” Federal Highway Administration, Transportation Research Board, Intelligent Transportation Society of America, Association of Metropolitan Planning Organizations, and the Institute of Transportation Engineers, and American Association of State Highway and Transportation Officials, Washington, DC (January 27, 2003).

The purpose of the conference was to discuss the challenges of multi-jurisdictional partnerships for metropolitan regional transportation operations and to establish potential next steps for support and advancing these partnerships nationwide. Key themes included: the need to advance transportation operations on a regional scale is driving cooperation efforts among jurisdictions; partnerships depend on the development of trust among partners through working together to achieve common goals; an individual leader is key to the success of many partnerships; and the same tools and relationships used in a crisis situation are used in everyday transportation management. Participants agreed that ongoing research and education is necessary to continue to enhance awareness of the benefits of cooperative partnerships for transportation operations and to share best practices and lessons learned nation wide.

C12. Booz-Allen & Hamilton, "Proceedings of the National Summit on Transportation Operations." Federal Highway Administration, Washington, DC, <www.ops.fhwa.dot.gov/nat_dialogue.htm> (December 2001, Downloaded on: March 29, 2003).

The National Summit on Transportation Operations was held in October 2001 to identify and discuss key strategies to advance operations in both reauthorization of the Transportation Equity Act for the 21st Century and future operational programs. The majority of options and actions generated at the summit support and clarify eight broad themes: (1) increase focus on transportation operations at all levels in response to customer needs; (2) define transportation operations in a way that is meaningful to the public, public safety officials, and professionals; (3) enhance performance of the transportation system through performance-based decision-mailing and increased focus on safety, reliability, and security; (4) create linkages between traditional capital planning processes and planning for operations; (5) support and assist homeland security initiatives; (6) facilitate accelerated evolution of cultural change within transportation agencies to adopt policies and procedures that support operations; (7) enhance interagency coordination and cooperation; and (8) continue funding and support for operations programs and policies at the federal level, and encourage greater participating at state, regional, and local levels.

C13. Bunn, M. D. and Savage, G. T., "Feasibility of an Integrated Traffic Management and Emergency Communications System for Birmingham, Alabama." University Transportation Center for Alabama, Tuscaloosa, AL, <http://utca.eng.ua.edu/projects/final_reports/00110report.pdf> (December 31, 2003, Downloaded on: January 9, 2004).

This research project examined the feasibility of an integrated traffic management and emergency communication system for Birmingham and surrounding counties in Alabama. The research focused on (1) creating a coalition of stakeholders to develop a deployment plan for the location data platform, and (2) identifying opportunities for the development and marketing of applications to stimulate both public and private sector investment.

C14. Bunn, M. D. and Savage, G. T., "Integrated Traffic Management and Emergency Response: Success Factors." University Transportation Center for Alabama, Tuscaloosa, AL, <http://utca.eng.ua.edu/projects/final_reports/Bunn-01101-fnl.pdf> (September 30, 2003, Downloaded on: February 2, 2004).

This project developed and conducted a quantitative survey of stakeholder relations in the deployment of integrated traffic management and emergency response systems. The purpose was two-fold: 1) to develop generalized metrics of stakeholder perceptions and relationships and 2) to calibrate important success factors of integrated programs. The report provides detailed descriptions of the various metrics for measuring project characteristics and stakeholder relationships. The findings indicate that seven factors influence the success of the project: 1) the stage of the project; 2) the efficacy of the project; 3) the uncertainty surrounding the project; 4) the stakeholder's involvement in the project; 5) the stakeholder's perceived power to influence the project; 6) the public benefit derived from the

project; and 7) the sense of equality among stakeholders. In addition, the findings show some significant differences in the way stakeholder groups view one another.

C15. Cambridge Systematics, Inc. in association with JHK & Associates, Transmode Consultants, Inc., and Sydec, Inc. "Incident Management." Trucking Research Institute, ATA Foundation, Alexandria, VA (October 1990).

This study looks at what is being done to deal with incident congestion and recommends actions to reduce the time lost to highway incidents. The primary focus of the study is on incident management, not incident prevention. The study reviews incident management programs nationally and presents case studies of exemplary incident management programs in Chicago, Los Angeles, Fort Worth, Minneapolis, and New York/New Jersey. A cost-benefit analysis of the Chicago program is included. The study concludes that the major impediments to development of comprehensive metropolitan incident management programs are organizational and institutional. Incident management programs lack a clear mandate. In addition, responsibility is divided among many agencies, but often duties overlap, authority is fragmented, and actions are inconsistent. The study recommends that states mandate the development of comprehensive metropolitan incident management programs; assign responsibility for implementing these programs; and establish clear lines of authority for managing incidents.

C16. Canby, A. P., "The Urgent Need for Operational Partnerships Between Transportation and Public Safety Agencies." U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, ITS Public Safety Program, Washington, DC, <www.itspublicsafety.net/articles.htm> (Downloaded on: March 29, 2003).

As transportation agencies strive to manage soaring levels of traffic congestion, public safety is at stake. Traffic congestion is not only frustrating; it can be life-threatening. While public safety agencies must deal with the consequences of congestion, their policies and procedures in responding to highway incidents also play a role in causing congestion. Public safety and transportation agencies need to work together to: collect comprehensive, real-time, accurate data and provide immediate incident detection; speed emergency dispatch and improve fleet utilization; provide faster emergency response; enable data-sharing among managers and users; and provide current and predicted weather and road condition information.

C17. "Capital Region Integrated Wireless Network for Incident Management (CapWIN) Commercial Wireless Data Technology Survey." The CapWIN Project, <www.capwinproject.com/documents.html> (Downloaded on: March 28, 2003).

The purpose of this paper is to address the use of current and emerging commercial wireless mobile data networks available to transportation and law-enforcement agencies and inform the participating agencies on what technology choices are currently available now and in the near future. This information will aid in developing a set of requirements and will help the agencies determine the criteria to use to select systems. The paper also provides a brief summary of existing and

emerging commercial data communications available in the Washington DC area, and includes a broad discussion of a new public safety frequency band.

C18. Chang, G., Hjoon, C. and Point-du-jour, J. Y., "Performance Evaluation of CHART 1999." Maryland State Highway Administration, Baltimore, MD (February 1, 2001).

This presentation summarizes the evaluation of performance of CHART based on 1999 incident reports. This data was provided by incident report forms from traffic operations centers and the statewide operation center and Maryland State Police accident reports. The presenters provide the following recommendations: provide training for operations and field personnel in data collection; develop a standardized short form for incident response; develop standardized categories for driver assistance; and perform data collection and entry through real-time wireless Internet access.

C19. Christen, H., Maniscalco, P., Vickery, A., and Winslow, F., "An Overview of Incident Management Systems." Perspectives on Preparedness, No. 4, The John F. Kennedy School of Government, Harvard University, Cambridge, MA (September 2001).

One solution to the potential problems of divided leadership, parallel chains of command, operational conflicts, competing resource demands, and unfamiliar professional terminology is an Incident Management System (IMS). An IMS is designed to manage complex or multi-site emergency events. This paper provides an overview of the purposes and principles in IMS. It is focused on discussing the history and development of IMS, unified management, span of control, IMS organizational levels, and staffing and training issues.

C20. Cohen, H. S., Austin, S., and Brenner, J., "Protecting Emergency Responders on the Highway." Cumberland Valley Volunteer Firemen's Association, <www.cvvfa.org> (Downloaded on: March 29, 2003).

This white paper provides recommendations to educate the public about hazards near emergency scenes through public education campaigns, updates to driver's education programs and driving manuals, defensive driver programs, and remedial driver education programs; to develop standard operating procedures for vehicle positioning, standard highly visible reflective apparel, and better understanding of decommiting resources and expeditiously reopening roadways; to adopt intelligent transportation solutions, such as automatic signal changers, remote cameras, highway advisory message boards, and radio advisory warnings, when feasible; and for continued research and development to assess performance and physiological effects of the color and intensity of warning lights on emergency vehicles while operating at the scene, especially for night-time incidents.

C21. COMSIS Corporation, "CHART Incident Response Evaluation Final Report." Maryland State Highway Administration, Silver Spring, MD (May 1996).

The CHART program consists of four components: traffic monitoring, incident response, traveler information, and traffic management. The most significant finding of this evaluation was that the benefits of the CHART incident response

program exceed the system's operating capital, operating, and maintenance costs by a ration of over 7 to 1 in terms of the estimated reduction in delay, fuel consumption, and secondary incidents. In addition, incident management patrols are being used where they are needed most. There appears to be more delay reduction benefits from servicing an incident past the location of recurring congestion. Finally, increasing the number of incidents serviced by the freeway service patrols would have a direct impact on the annual delay and fuel savings. Recommendations provided in the report include: continue to improve the utilization of existing freeway service patrols; develop a simplified incident recording form; issue a motorist mail-in survey to those served by freeway service patrols; and use CHART assets and resources to monitor other aspects of transportation efficiency.

C22. Corbin, J. "Wisconsin Partnerships in Transportation and Public Safety." ITE Spring Conference and Exhibit – Improving Transportation Systems Safety and Performance, Monterey, CA (March 2001).

Wisconsin's transportation operations has the emerging vision as a seamless communications system supporting integrated transportation management and public safety services. The vision has been developed by the evolution of a statewide Intelligent Transportation Systems (ITS) program. Early freeway traffic management and transportation management strategies in southeastern Wisconsin have led to the development of an interstate ITS Priority Corridor Program located in the Gary-Chicago-Milwaukee (GCM) Corridor. Regional and local traffic incident management programs in southeastern Wisconsin, Dane County, and the Fox Valley Cities, including Green Bay have expanded and institutionally enabled the growth of ITS in Wisconsin. ITS is enabling transportation operations along inter-regional corridors that extend along I-39 up the middle of Wisconsin and I-90/94 that reach from southern Wisconsin to the Twin Cities in Minnesota. A key element to all of these ITS initiatives are focusing on the development of integrated and coordinated communications systems for transportation, public safety, and emergency services.

C23. Corbin, J. and Noyes, P. B., "Traffic Incident Management Planning: The Case for Mainstreaming." ITE Journal, Vol. 73, No. 2 (February 2003), pp. 38-41.

Effective traffic incident management requires a comprehensive, integrated planning process that involves all potentially affected stakeholders who play a role in incidents and emergencies on highways. This article discusses the further development and implementation of traffic incident management by making it a priority in planning efforts and in road construction and maintenance projects. Opportunities for mainstreaming include: statewide planning, regional planning, local and agency-level planning, capital projects, and corridor operations plans.

C24. "Crisis Information Management Software (CIMS) Feature Comparison Report." U.S. Department of Justice, Office of Justice Programs, National Institute of Justice, Washington, DC <www.ojp.usdoj.gov/nij/pubs.htm> (October 2002, Downloaded on: April 9, 2003).

CIMS, the software found in emergency management operation centers, supports the management of crisis information and the corresponding response by public safety agencies. The purpose of this report is to compare and contrast commercially available CIMS software. Software was identified through a survey of members of the National Emergency Managers Association; 10 vendors participated in the final comparison. In addition, users of the software products were surveyed to establish criteria for the feature comparison. These included: affordability; user-friendliness; easy to maintain; easy to tailor; allows for remote access; complies with the provisions and standards for Incident Command System; complies with the provisions of the Emergency Support Functions; integrates with other systems; integrates public health; operates within a variety of network configurations; has features consistent with the four phases of emergency management operations; and has 24/7 help desk support. The report does not contain summary recommendations to certify or recommend a particular product.

C25. Cyra, S. J., "Traffic Incident Management – Rebuilding the Marquette Interchange." ITE Conference – Today's Transportation Challenge: Meeting Out Customer's Expectations, Palm Harbor, FL (March 2002).

In Wisconsin's largest transportation project in history, beginning in 2003, the Marquette Interchange will undergo a five-year major modernization effort to improve the safety, efficiency and reliability of the interchange. While efforts are being made to minimize traffic impacts during reconstruction, some lane, shoulder, and ramp closures will be necessary to complete the project in a timely and cost-effective manner. As a result, capacity during reconstruction will be reduced, which will impact travelers, trucking operators, local communities, public safety agencies, and others who regularly use the interchange. Traffic impacts are being minimized by creating a construction staging plan and traffic control plan that minimizes diversion off the freeway while balancing the need for a timely and cost-effective construction sequence. But perhaps more importantly, four additional special areas are being emphasized to help ease the strain on the local/regional transportation system: 1. Freeway Operations and Traffic Incident Management; 2. Public Information; 3. Transit and Demand Management; and, 4. Local Road Operations. This paper focuses on the initial preparatory freeway operations activities, with specific focus on Traffic Incident Management (TIM).

C26. Cyra, S. J., "Wisconsin Manages Traffic Intelligently." Better Roads, Vol. 71, No. 10 (October 2001), pp. 26-30.

This article describes the Wisconsin Department of Transportation's (DOT) incident management program that cuts response time to traffic incidents. Incidents are responsible for as much as 50% of all traffic congestion. A key element is cooperative consultation and development of data flow and communications systems among all the agencies that handle an incident.

C27. Dean, B., "Sharing Emergency Communications Across Agency Lines." The Police Chief, International Association of Chiefs of Police, Alexandria, VA, <www.iacptechnology.org/Library/TechTalkIndex.htm/> (November 2002, Downloaded on: April 9, 2003).

This article discusses Minneapolis' 800-megahertz two-way radio implementation. This system is discussed under the following topics: advanced technology, expandable and scalable, disaster-resistant, improved interoperability, broader and deeper coverage, faster response, and Internet protocol. It article notes that future goals for the project include: full participation in the system by all public agencies and Emergency Medical Services (EMS) providers in the metropolitan area; extension and expansion to greater Minnesota; and inclusion of federal agencies and the National Guard in the interoperability network.

C28. Desourdis, Jr., R. I., Smith, D. R., Speights, W. D., Dewey, R. J., DiSalvo, J. R., "Emerging Public Safety Wireless Communication Systems." Artech House, Inc., Norwood, MA (2001).

This book describes shared radio networks in the United States and Europe, not only in terms of the technologies and the standards they employ, but also the complexities of implementing these shared networks in the face of traditional independent systems. Case histories representing a full range of development, implementation, and operating approaches are presented. In addition, innovations in the new shared-systems philosophy, development from the U.S. government's Public Safety Wireless Network (PSWN) initiative, and corresponding efforts in Europe are discussed. The role of commercial wireless networks for public safety communications is also considered and compared to more traditional private land mobile radio communications.

C29. Dillingham, G. L., "Transportation Security: Post-September 11th Initiatives and Long-Term Challenges." (Testimony before the National Commission on Terrorist Attacks Upon the United States.) U.S. General Accounting Office, Washington, DC (April 1, 2003).

Since September 2001, securing the nation's transportation systems from terrorist attacks have assumed great urgency. While there have been efforts to enhance security without unduly inhibiting the movement of goods and people, air cargo shipments, general aviation airports, and mass transit systems remain vulnerable to attack, and an effective port security environment may be years away. The Departments of Transportation and Homeland Security face long-term transportation security challenges that include: (1) developing a comprehensive transportation risk management approach; (2) ensuring that transportation security funding needs are identified and prioritized and that costs are controlled; (3) establishing effective coordination among the many public and private entities responsible for transportation security; (4) ensuring adequate workforce competence and staffing levels; and (5) implementing security standards for transportation facilities, workers, and security equipment.

C30. Dopart, K., "Integrated Public Safety and Highway Operations: A Policy Framework and Analysis." Federal Highway Administration's National Dialogue on Transportation Operations, Washington, DC, <www.ops.fhwa.dot.gov/nat_dialogue.htm> (August 2001, Downloaded on: March 29, 2003).

This paper assesses highway operations from various perspectives and identifies federal policy strategies to better engage the public safety community in

transportation operations. Transportation agencies must ensure that highways are accessible when incidents occur, and incident information is conveyed accurately to public safety organizations. Federal transportation policies need to change the willingness and capability of the public safety community to embrace highway mobility objectives. Two options are proposed. One is to work within the public safety community to gain its "buy-in" by demonstrating that transportation can be a trusted partner. The other option is to impose accountability through external performance mandates, possibly using incentives to help bring about change.

C31. Dopart, K., "What is the Role of Public Safety Agencies in Highway Operations?" U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, ITS Public Safety Program, Washington, DC, <www.itspublicsafety.net/articles.htm> (Downloaded on: March 29, 2003).

The roles that public safety agencies (law enforcement, fire and rescue, and emergency medical services) play in highway operations can be categorized into four areas: crash mitigation, congestion mitigation, crash prevention, and congestion prevention. New policies are needed to foster greater integration of public safety and transportation operations to provide enhanced emergency service, improved traffic incident management, and more effective crash prevention. A more coordinated and expanded approach to transportation and public safety operations will save lies, reduce the pain and suffering of the injured, and relieve the growing traffic congestion caused by highway incidents.

C32. Dunn, W. M and Latoski, S. P.., "Safe and Quick Clearance of Traffic Incidents: A Synthesis of Highway Practice." NCHRP Synthesis 318, Transportation Research Board, Washington, DC, <http://gulliver.trb.org/publications/nchrp/nchrp_syn_318.pdf> (2003, Downloaded on October 3, 2003).

The report profiles laws, policies, and procedures for facilitating clearance of traffic incidents, primarily those initially blocking travel lanes and attended to by the vehicle operator, on highways in urban and rural areas. In recognizing the unique challenges faced by jurisdictions across the country, the study also reports on successful specific-site traffic incident clearance and investigative activities employed to quickly mitigate incidents of varying severity. The report discusses the following: quick clearance legislation; hold harmless laws; policies governing the removal of accident victims; the duties of private tow companies; various policies governing the rapid clearance of overturned semi-tractor trailers; appropriate actions to take when there is an accompanying fuel spill; and technologies used to provide for continual, uninterrupted flow of communications between agencies participating in incident clearance activities.

C33. "Fire Service Emergency Vehicle Safety Initiative." U.S. Fire Administration, Federal Emergency Management Agency, Emmitsburg, MD <http://www.usfa.fema.gov/inside-usfa/research/vehicle.shtm> (2004).

The Fire Service Emergency Vehicle Safety Initiative is a partnership effort of the USFA and the U.S. Department of Transportation (DOT)/National Highway Traffic Safety Administration (NHTSA) and the DOT/Intelligent Transportation Systems Joint Program Office. The long-term goal of this project is to reduce the

number of firefighters killed responding to and returning from emergencies. The specific objectives of this research initiative are: (1) to examine collisions involving fire apparatus, personal vehicles, and falls from fire apparatus that kill and injure firefighters; (2) to conduct a National Forum on Emergency Vehicle Safety; (3) to study the effect/disorientation of motorists caused by the day and nighttime use of emergency warning lights, headlights, spotlights, and light towers; (4) to develop draft "best practices" guidelines; (5) to conduct a series of pilot tests of the "best practices"; and (6) to finalize and obtain consensus endorsement of "best practices" guidelines. The intent of this project effort is to develop a comprehensive endorsed effort to change behavior and support the development of technology to mitigate emergency vehicle crashes and subsequent loss of firefighters lives.

C34. Franklin, R. B., "Public Safety Operation and Traffic Management – A Force for the Future." ComCARE Alliance, Washington, DC, <www.comcare.org/research/topics/integrated/ franklin.html> (Downloaded on: March 29, 2003).

There are a number of converging forces that will allow an improved and even more efficient interconnect between public safety operations and those management systems used by the traffic management community to address incident management and traffic congestion. These forces include Automatic Crash Notification and the everyday use of cell phones. If the Intelligent Transportation Systems (ITS) user community is to benefit from emerging and enhanced technologies, it must make its needs known to the wireless industry now before the commitment to a specific technology development path is too far advanced. ITS America is leading this effort by monitoring technology development and sponsoring initiatives to forge the bond with public safety as quickly as possible by working with the national public safety associations.

C35. "Governor's Hurricane Evacuation Task Force Report." Florida Department of Transportation, <www11.myflorida.com/publicinformationoffice/EvacuationStudy/report.htm> (Downloaded on: March 28, 2003).

Hurricane Floyd was the cause of the largest evacuation in Florida's history. The long evacuation travel times that resulted sparked questions as to the need and feasibility of reverse laning limited access facilities to reduce these times. A task force was created by the Florida Governor to address this issue. The report focuses on four main areas that can assist in making improvements to the overall evacuation process in Florida: (1) decision making, (2) traffic management, (3) sheltering, and (4) emergency public information. As a result of the task force's work, seven limited access routes were identified as potential "need to reverse lanes" to enhance regional evacuations. In addition, the task force made 22 other recommendations, including developing decision-making criteria to invoke a reverse lane plan; providing highway patrol traffic control training to state Department of Transportation (DOT) employees, law enforcement officers, and the Florida National Guard; testing reverse lane operations during a field exercise; establishing Florida Highway Patrol as the incident commander for any reverse

lane operation; and enhancing emergency lanes on the reverse lane routes to be used as a third lane to increase evacuation clearance times.

C36. Guerrero, P. "Transportation Security: Federal Action Needed to Enhance Security Efforts." (Testimony before the Committee on Commerce, Science, and Transportation, United States Senate.) U.S. General Accounting Office, Washington, DC, <http://www.gao.gov/new.items/d031154t.pdf> (September 9, 2003, Downloaded on: February 12, 2004).

This report examines the challenges in securing the transportation system and the federal role and actions in transportation security. Securing the nation's transportation system is fraught with challenges. The transportation system crisscrosses the nation and extends beyond our borders to move millions of passengers and tons of freight each day. The extensiveness of the system as well as the sheer volume of passengers and freight moved makes it both an attractive target and difficult to secure. Addressing the security concerns of the transportation system is further complicated by the number of transportation stakeholders that are involved in security decisions, including government agencies at the federal, state, and local levels and thousands of private sector companies. Further exacerbating these challenges are the financial pressures confronting transportation stakeholders. At the federal level, the Transportation Security Administration (TSA) primarily focused on meeting aviation security deadlines during its first year of existence and the Department of Transportation (DOT) launched a variety of security initiatives to enhance the other modes of transportation. TSA has recently focused more on the security of the maritime and land transportation modes and is planning to issue security standards for all modes of transportation. DOT is also continuing their security efforts. However, the roles and responsibilities of TSA and DOT in securing the transportation system have not been clearly defined, which creates the potential for overlap, duplication, and confusion as both entities move forward with their security efforts.

C37. Ham, D. B. and Lockwood, S., "National Needs Assessment for Ensuring Transportation Infrastructure Security." American Association of State Highway and Transportation Officials Transportation Security Task Force, Washington, DC (October 2002).

Terrorists with weapons of mass destruction establish a new context for transportation security policy and planning. This context includes not only an expanded threat matrix but also the potential of a variety of delivery mechanisms, combinations, and environmental settings. While the nation's highway infrastructure is relatively robust and redundant, the consequences of an attack on critical links could be significant. This study examines three key security planning program areas: (1) protecting critical mobility assets; (2) enhancing traffic management capabilities; and (3) improving state Department of Transportation (DOT) emergency response capabilities. Total costs for the proposed initiatives, including capital investment and operations and maintenance expenses during the TEA-21 six-year reauthorization period, are estimated at $10.5 billion. In addition to the national security benefits offered by the prospective program, investment in the initiatives is expected to yield important non-security gains, including (1) safety improvements to bridges and tunnels; (2) enhanced operational capabilities of the

surface transportation network; and (3) upgraded emergency response and management capabilities for state DOTs.

C38. Hellinga, B., "Incident Detection via Commuter Cellular Phone Calls." ITE Annual Meeting, Toronto, Ontario, Canada (1998).

Rapid and reliable incident detection is a critical component of a traffic management strategy. Traditional automatic incident detection methodologies rely on the interpretation of spot measurements of selected traffic characteristics (i.e. speed, volume, and occupancy). However, it is generally agreed that the current best algorithms still do not achieve the desired performance levels. Recent advances in wireless communication technologies have resulted in high levels of market penetration of wireless phones, providing the opportunity to detect incidents on the basis of commuter reports. This paper examines the potential of driver-based incident detection. A methodology for quantitatively assessing the performance characteristics of driver-based incident detection is presented, and the data required to support this method are identified. Potential data sources within the Greater Toronto Area are identified and evaluated. It is determined that existing data sources do not appear to be sufficient for directly determining the performance characteristics of driver-based incident detection within the Toronto Region. As a result, it is recommended that the use of traffic simulation modeling and statistical inference approaches be examined.

C39. Hobeika, A., Radwan, A.E., Jamei, B., Sivasailam, D., "Transportation Actions to Reduce Highway Evacuation Times Under Natural Disasters." National Science Foundation, Washington, DC (August 1985).

This document reviews the literature on emergency management and focuses on evacuation planning and operation. Two simulation modes – an urban model and a rural model – are presented to test and evaluate highway evacuation plans. Both models take as inputs the area and disaster type characteristics, the demographic conditions, and the highway network typology and traffic control operations. Both determine the optimum route for people to follow from a disaster area to shelters, the expected traffic bottlenecks, and the total evacuation time needed for all evacuees to clear the threatened area.

C40. "Homeland Security and ITS: Using Intelligent Transportation Systems to Improve and Support Homeland Security Supplement to the National ITS Program Plan: a Ten-Year Vision." Intelligent Transportation Society of America in cooperation with the U.S. Department of Transportation, Washington, DC (September 2002).

This is a supplement to a document published in January 2002, entitled, "National ITS Program Plan: A Ten-Year Vision". The new theme of homeland security incorporates current status of the 10-year plan; needed research, institutional and program actions; benefits and challenges of the plan. Goals for the transportation system include energy efficiency and environmental friendliness, transportation safety and security, optimal mobility and access, and economic soundness.

C41. "Homeland Security: Efforts to Improve Information Sharing Need to be Strengthened." U.S. General Accounting Office, Washington, DC,

<http://www.gao.gov/new.items/d03760.pdf> (August 2003, Downloaded on: January 28, 2004).

The sharing of information by federal authorities to state and city governments is critical to effectively execute and unify homeland security efforts. This report examines (1) what initiatives have been undertaken to improve information sharing and (2) whether federal, state, and city officials believe that the current information-sharing process is effective. The U.S. General Accounting Office (GAO) surveyed federal, state, and city government officials on their perceptions of the effectiveness of the current information-sharing process. Overall, no level of government perceived the process as effective, particularly when sharing information with federal agencies. Information on threats, methods, and techniques of terrorists is not routinely shared; and the information that is shared is not perceived as timely, accurate, or relevant. Moreover, federal officials have not yet established comprehensive processes and procedures to promote sharing. Federal respondents cited the inability of state and city officials to secure and protect classified information, the lack of federal security clearances, and a lack of integrated databases as restricting their ability to share information. The Department of Homeland Security (DHS) needs to strengthen efforts to improve the information sharing process so that the nation's ability to detect or prepare for attacks is strengthened.

C42. "Homeland Security White Paper." Association of Public-Safety Communications Officials (APCO), Daytona Beach, FL <http://www.apco911.org/about/gov/HSTFWP.pdf> (Downloaded on: February 17, 2004).

The purpose of this white paper is to begin a process that leads to dramatically improving homeland security by improving public safety communications infrastructure, including the equipment, the procedures, and the training of public safety professionals throughout the U.S. The primary goal of this white paper is to identify the current homeland security challenges faced by public safety communicators and to highlight some of the activities undertaken by APCO members to meet these challenges. This white paper is meant to create dialogue out of which an APCO Homeland Security guidance document can be formulated. The paper covers six broad topics: radio spectrum, interoperability, planning, survivability/redundancy, security, and personnel/training.

C43. Hurricane Isabel Assessment Team. "An Assessment: Virginia's Response to Hurricane Isabel." Office of the Governor of the Commonwealth of Virginia, Richmond, VA, <http://pub.sysplan.com/Hurricane_Isabel_Assessment.pdf> (December 2003, Downloaded on: December 31, 2003).

Hurricane Isabel caused extensive damage from wind and rain and left many communities without electricity for a week or more in September 2003. This category one storm left an impact closer to that of a category two because of preexisting conditions including a period of drought followed by a period of record-breaking precipitation. Governor Mark Warner appointed the Hurricane Isabel Assessment Team to help the Commonwealth and local governments identify the problems that occurred in responding to the hurricane. The Team's

goal was to reach as many jurisdictions as possible among the 99 affected by the hurricane, and to meet with Commonwealth staff and officials to understand how key departments and agencies addressed preparedness, response, and recovery. The Team found that some aspects of response and recovery went well. For example, with the Governor's early declaration of disaster, low-lying communities began evacuating residents; power crews worked around the clock to repair downed lines; and state police and the Virginia Department of Transportation pre-positioned personnel and equipment in the areas they expected to be hardest hit. The team also identified some serious problems in Virginia's response to the hurricane, including: (1) emergency planning and preparedness needs to be improved; (2) local preparedness to accommodate 72-hours of self-sufficiency is far from uniform; (3) the Commonwealth's system for handling resource requests failed; (4) without power, local governments faced difficulties communicating with the public; (5) volunteers and federal disaster employees were not organized; (6) citizens with special medical or accessibility needs encountered problems at shelters; and (7) the public's expectations of government during disasters can be unrealistic. Based on their findings, the Team's report issues 19 main recommendations.

C44. "Integrated Communications System Speeds Traffic Recovery After Crashes on New York City Streets." U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, ITS Public Safety Program, Washington, DC, <www.itspublicsafety.net/law_itsmanagement.htm> (Downloaded on: March 29, 2003).

The integrated Incident Management System (IIMS) is being tested by the New York State Department of Transportation, the New York City Police Department, the New York City Department of Transportation, and several other agencies to manage roadway incidents. It began operating in 2001, and is the only public safety/transportation incident information system currently in operation that transmits and shares real-time location, photographic, and text information between and among field units and operations centers. Building on the National Intelligent Transportation Systems (ITS) Architecture and conforming to ITS Standards, this system is intended to reduce roadway clearance times; offer reliable location information through GPS; facilitate congestion mitigation, improved safety, and enhanced emergency response; and support interagency coordination. This document provides an overview of IIMS benefits, partnerships, and technology. The Department of Transportation (DOT) is providing funding for IIMS in the form of a field operational test (FOT). DOT's evaluation of IIMS will look at its effectiveness in reducing the time traffic is disrupted by incidents and in reducing the dispatch of unneeded resources. The evaluation of the initial ITS FOT portion of IIMS will be completed in June 2003.

C45. "Intelligent Transportation Systems in Work Zones: A Cross-Cutting Study." Federal Highway Administration, Washington, DC (November 2002).

The purpose of this document is to raise awareness among maintenance and construction engineers and managers of the applications and benefits of Intelligent transportation systems (ITS) in work zones. ITS technology can be applied in work zones for: traffic monitoring and management, providing traveler information,

incident management, enhancing safety of both the road user and worker, increasing capacity, enforcement, tracking and evaluation of contract incentives/disincentives (performance-based contracting), and work zone planning. This report documents the findings from site visits to work zones utilizing ITS.

C46. The International Association of Chiefs of Police, "A Study of Best Practices in Information Integration Projects, Version 1.2." Capital Wireless Integrated Network (CapWIN) Project, <www.capwinproject.com/documents.html> (July 7, 2000, Downloaded on: March 28, 2003).

This document is the result of a literature review and study of integrated information projects within the law enforcement community nationwide. The study focuses mainly on administrative procedures for information integration projects and includes a five-site study conducted by the International Association of Chiefs of Police (IACP) and a synopsis of thirteen information integration projects throughout the country. As a result of its study, the IACP provide recommendations for the CapWIN Project in several areas: Planning the System (bringing stakeholders together, developing project goals, determining a project scope, and completing a needs assessment); Guiding the Process (developing governance structure, principles of governance, critical functions of the governance team, private management group alternatives, and developing a decision-making process); and Building the System (designing the project, assessing cost and securing funding, implementing the system, informing and educating the community, and evaluating and maintaining the system).

C47. Iteris, Inc. "Intelligent Transportation Systems at the 2002 Salt Lake City Olympic Games: Event Study – Traffic Management and Traveler Information." Utah Department of Transportation, Salt Lake City, UT, <http://www.itsdocs.fhwa.dot.gov//JPODOCS/REPTS_TE//13850.html> (April 29, 2003, Downloaded on November 7, 2003).

The purpose of the study is to document and assess the performance of the Utah Department of Transportation (UDOT) advanced traffic management system (ATMS) and advanced traveler information system (ATIS) during the 2002 Winter Olympic Games. An additional purpose is to document and assess the results of the Travel Demand Management (TDM) program created and implemented for the Games. This study did not examine the advanced public transportation systems (APTS) operating during the Games, except where they interfaced with the ATMS. This assessment study is written for two audiences: (1) local readers – this includes UDOT staff and other Salt Lake City transportation professionals, who were present during the Games and are familiar with the region and the ITS elements; and (2) national and world readers – this includes other cities hosting future Olympics or other major events that generate large transportation requirements, as well as other Intelligent Transportation Systems (ITS) professionals who are planning or operating similar traffic-management or traveler-information systems.

C48. Iteris, Inc. "Intelligent Transportation Systems at the 2002 Salt Lake City Olympic Games: Traffic Management and Traveler Information Case Study." Utah Department of Transportation, Salt Lake City, UT,

<http://www.itsdocs.fhwa.dot.gov//JPODOCS/REPTS_TE//13851.html> (April 1, 2003, Downloaded on November 7, 2003).

The CommuterLink Case Study was performed to examine the Utah Department of Transportation's (UDOT) procurement and deployment efforts related to the ITS capability in the region. UDOT followed a unique approach to contracting this deployment and the Case Study provides an overview of the successes and lessons-learned that arise from that effort. This report is written for UDOT staff and also for other agencies contemplating deployment of similar Intelligent Transportation Systems (ITS) elements. This report provides the reader with findings from the ITS "Case Study" which primarily focuses upon the deployment efforts before the 2002 Winter Olympic Games. A companion document – the Olympics "Event Study" – assesses how the CommuterLink system was used during the Olympic Games, for traffic management and traveler information.

C49. Jackson, B., Peterson, D. J., Bartis, J., LaTourette, T., Brahmakulam, I., Houser, A., and Sollinger, J. "Protecting Emergency Responders: Lessons Learned from Terrorist Attacks." RAND Corporation, Santa Monica, CA, <http://www.rand.org/publications/CF/CF176/index.html> (2002, Downloaded on: February 12, 2004).

This report presents a summary of a December 2001 working conference, sponsored by the National Institute for Occupational Safety and Health. Attending were emergency workers who responded to the bombing of the Murrah Building in Oklahoma City, the September 11 attacks on the World Trade Center and the anthrax incidents that occurred during autumn 2001. The report addresses the equipment, training, and information required to protect emergency responders as they meet the challenge of protecting their communities.

C50. Jenkins, W. O., "Homeland Security: Challenges in Achieving Interoperable Communications for First Responders." (Testimony before the Subcommittees of the Government Reform Committee, House of Representatives.) U.S. General Accounting Office, Washington, DC, <http://www.gao.gov/new.items/d04231t.pdf> (November 6, 2003, Downloaded on: February 13 2004).

The inability of first responders – police officers, firemen, hazardous materials teams, emergency medical service personnel, and others – to communicate effectively with one another as needed during an emergency is a long-standing and widely recognized problem in many areas across the country. This report examines the barriers to improved interoperability and the roles that federal, state, and local governments can play in improving wireless interoperability communications. The interoperability issues that the nation faces today did not arise overnight and they will not be successfully addressed overnight. Federal, state, and local governments face several major challenges in addressing interoperability in their wireless communications: (1) clearly identifying and defining the problem; (2) determining whether and how to establish national interoperability performance goals and standards and balance them with the flexibility needed to address differences in state, regional, and local needs and conditions; (3) defining the roles of federal, state, and local governments and other entities in defining the problem, implementing any national goals and standards, and assessing alternative means of

achieving those goals and standards. The fundamental barrier to successfully addressing these challenges has been the lack of effective, collaborative, interdisciplinary and intergovernmental planning. "Fixing" the interoperability problems that face our nation will require the partnership, leadership, and coordinated planning of everyone involved.

C51. The John A. Volpe National Transportation Systems Center, "Bioterrorism Issues in Transportation: Considerations for Evacuation and Quarantine Workshop Consensus Items Summary Report." U.S. Department of Transportation, Research and Special Projects Administration, Office of Emergency Transportation, Washington, DC (January 13, 2003).

This workshop generated six consensus issues as key issues affecting, or affected by, bioterrorism in transportation that require further research/action. These are: (1) develop a matrix of the impacts of human and animal diseases and transportation options to minimize them; (2) prepare a national transportation biological incident plan and supporting incident protocols; (3) provide transportation operators with appropriate emergency response training; (4) cultivate and maintain relationships with key agencies and associations at local, state, regional, and national levels; (5) develop models for major transportation networks, to determine the spread of biological agencies through transportation means; and (6) develop a public communication strategy and participate in a joint information center.

C52. The John A. Volpe National Transportation Systems Center, "Effects of Catastrophic Events on Transportation System Management and Operation: Cross Cutting Study"." U.S. Department of Transportation, ITS Joint Program Office, Washington, DC <http://www.itsdocs.fhwa.dot.gov//JPODOCS/REPTS_TE//13780.html> (January 2003, Downloaded on: April 18, 2003).

In order to provide a better understanding of how transportation is both affected and utilized in an emergency situation, the Federal Highway Administration (FHWA) commissioned a series of four case studies examining the effects of catastrophic events on transportation system management and operations. Each of the case studies examined a specific event and the regional response. The events included terrorist attacks in New York City and Washington, DC, on September 11, 2001; an earthquake in the Los Angeles region; and a rail tunnel fire in Baltimore. This cross cutting study summarizes the surface transportation activities associated with four catastrophic events and the lessons learned from each. Each of the events resulted in substantial, immediate, and adverse impacts on the transportation system, and each has had a varying degree of influence on the longer-term operation of transportation facilities and services in its respective region. The case studies have provided material for a series of Transportation Response and Recovery Workshops developed by the FHWA and held in major metropolitan areas around the country.

C53. Kenyon, H. "Regional Effort Forges Emergency Coordination System." SIGNAL Magazine, Armed Forces Communications and Electronics Association, Fairfax, VA, <http://us.net/signal/CurrentIssue/Feb04/regional-feb.html> (February, 2004, Downloaded on: February 17, 2004).

The Port Authority of New York and New Jersey has launched an initiative to enhance interoperability between area command centers during an emergency. The effort will create a common communications architecture to enhance participating organizations' situational awareness in a crisis. The goal of the Port Authority's regional information and joint awareness network (RIJAN) is to test and showcase command, control, communications, computers and information systems for interagency data sharing and coordination. RIJAN is a multi-agency collaboration hosted by the Port Authority to provide consequence management planning, training, response management and exercises across the region.

C54. LaTourette, T., Peterson, D. J., Bartis, J. T., Jackson, B. A., and Houser, A. "Protecting Emergency Responders Volume II: Community Views of Safety and Health Risks and Personal Protection Needs." RAND Corporation, Santa Monica, CA, < http://www.rand.org/publications/MR/MR1646/index.html> (2003, Downloaded on: February 12, 2004).

Firefighters, law enforcement officers, and emergency medical service responders play a critical role in protecting people and property in the event of fires, medical emergencies, terrorist acts, and numerous other emergencies. The authors examine the hazards that responders face and the personal protective technology needed to contend with those hazards. The findings are based on in-depth discussions with 190 members of the emergency responder community and are intended to help define the protective technology needs of responders and develop a comprehensive personal protective technology research agenda.

C55. Lockwood, S., "A Systems Management Approach to Transportation Operations Management." U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, ITS Public Safety Program, Washington, DC, <www.itspublicsafety.net/articles.htm> (Downloaded on: March 29, 2003).

Agency stovepipes can be bridged through cross-cutting, performance-oriented policies and programs, and common information monitoring and performance measurement within transportation agencies. Extending these concepts between transportation and public safety agencies is the next step. In addition, shared use of communications infrastructure and other technology will assist in real-time integration of transportation and public safety operations activities.

C56. Mitretek Systems and PB Farradyne, "Developing Freeway and Incident Management Systems Using the National ITS Architecture." U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, Washington, DC (August 1998).

This is one of a series of documents providing support for deploying Intelligent Transportation Systems (ITS). This document focuses on freeway and incident management systems and aims to provide practical help for the transportation community with deploying freeway and incident management systems in an integrated, multimodal environment using the National ITS Architecture. The basics of freeway and incident management ITS applications, the role the National ITS Architecture can play in freeway and incident management system project development, the development process for a regional architecture, some challenges

faced by transportation management agencies, and some best practices and lessons learned for developing and deploying advanced freeway and incident management systems are covered.

C57. Moore, S., "Project SAFECOM: Wireless Public SAFEty Interoperable COMmunications Program." The Emergency Information Infrastructure Project (EIIP) Virtual Forum, <www.emforum.org/ vforum/lc030205.htm> (February 5, 2003, Downloaded on: March 29, 2003).

This document is an edited transcript of the EIIP's virtual forum presentation on Project SAFECOM, one of the federal government's 24 e-gov initiatives. The vision for Project SAFECOM is that federal, state, and local agencies will continue to acquire, development, operate, and maintain their own networks as directed by their individual oversight bodies and as funding permits. SAFECOM deliverables include recommended standards, solution models, and grants for integrating disparate networks. SAFECOM's role is to provide public safety agencies with the knowledge, leadership, and guidance needed to help them achieve short term interoperability and long-term compatibility. The Federal Emergency Management Agency (FEMA) is the managing partner for Project SAFECOM. Contributing partners include the Departments of Justice, Treasury, Agriculture, and Defense.

C58. Mulholland, D. J., "Reducing the Burden of Nonincident Traffic Calls Through 511." The Police Chief, International Association of Chiefs of Police, Alexandria, VA, <www.iacptechnology.org/Library/ TechTalkIndex.htm/> (February 2002, Downloaded on: April 9, 2003).

This article describes the development of 511 and notes the benefits for the law enforcement community. Law enforcement can play a role in providing real-time data to the 511 informational databases. In addition, a law enforcement agency can use 511 information to help manage traffic conditions during traffic-related incidents, major events, or sever weather conditions. Partnerships with 511 programs will allow law enforcement to advise the traveling public of roadway congestion or unsafe conditions and suggest alternate routes with an eye toward reducing backups and secondary incidents.

C59. Noyes, P. B., "Mainstreaming Incident Management in Design-Build: The T-REX Experience." ITE Annual Meeting and Exhibit, Philadelphia, PA (August 2002).

The Colorado Department of Transportation began a design-build project on I-25 and I-225 in the Denver metropolitan area in June 2001. One of the contract requirements for the project was the development of a traffic management program prior to the start of construction. This paper presents the planning process, the approaches used to work with multiple agencies and disciplines, and the resulting program. It also discusses how traffic incident management helped drive the design and implementation of numerous operational and Intelligent Transportation Systems (ITS) features in the design and construction of the Transportation Reconstruction and Expansion (T-REX) project, and identifies issues associated with implementation and mainstreaming within the context of design-build.

C60. Parsons Brinckerhoff, "Service Patrol Study: Greater Puget Sound Freeway System." Washington State Department of Transportation, Washington State Patrol, and Washington Tow Truck Association, Seattle, WA (November 20, 1997).

This report is the result of the work of a committee of the Washington State Department of Transportation, the Washington State Patrol, the Washington State Tow Truck Association, members of the insurance industry, the American Automobile Association, and state employee organizations. The committee made the following recommendations: implement an "expedited" tow program; deploy roving service patrols in congested areas to help with roadway clearance, assist motorists, remove debris, and direct traffic at incident scenes; expand the tow zones to other highly congested areas; support the use of additional private assistance vehicles; review use of emergency lights at incident scenes; and support mandatory road clearance laws.

C61. PB Farradyne, "I-81 ITS Program Level of Investment and Technology Analysis." I-81 ITS Program Policy Committee, Virginia Department of Transportation, Richmond, VA (March 27, 2002).

The objectives of this project are to demonstrate the need to fund Intelligent Transportation Systems (ITS) deployment in the I-81 Corridor as a comprehensive, integrated program, and to provide policy makers with an analysis of ITS impacts along the I-81 Corridor at several levels of funding. Through the course of the project, the following needs emerged: the need for better information from the road concerning the state of traffic; the need for more weather information to assist in operations; and the requirement for better electronic communications between the various residents, districts, police, and other parties involved. As a result of these needs, the following recommendations were presented: develop an operations system based on cellular phone monitoring together with a series of weather stations; monitor the weather station data in each of the Smart Traffic Centers; keep real-time weather and incident data on one shared central server on the Internet; disseminate information through Virginia's 511 Travel Information Service; and fully instrument (variable message signs (VMS) and closed circuit television (CCTV)) high-accident intersections.

C62. Pearce, V., "Improving Surface Transportation Operations in Emergency Situations." 9th ITS Word Congress, Chicago, IL, <http://security.transportation.org/community/security/studies.html> (2002, Downloaded on: March 29, 2003).

In the months following the terrorist acts of September 11, 2001, intense effort has been focused on understanding the state of security of travel on the nation's roadway, and on improving the existing level of security. Progress has been significant, but not particularly visible. This paper describes efforts that have been undertaken at the federal level in the six phases of an emergency – detection, preparedness, prevention, protection, response, and recovery.

C63. Polzin, S. S., "Security Considerations in Transportation Planning: A White Paper." Center for Urban Transportation Research, University of South

Florida, Tampa, FL, <http://www.cutr.usf.edu/index2.htm> (Downloaded on: March 29, 2003).

This white paper focuses on the implications of enhanced security concerns on transportation planning activities. It discusses the impact of security concerns on land use, transportation behavior, transportation system performance, and investment priorities. It also proposes ways for security issues to be accommodated in each step of the long-range transportation planning process. The paper draws a parallel between security planning for transportation agencies and the planning for emergency preparedness and incident management, especially in the areas of interagency coordination, interoperable communication, and role definition. The response to security concerns will cross jurisdictional and functional lines and will be among the most complex and important challenge to the transportation planning professionals. The author notes that to be successful, transportation planning professionals will have to apply lessons learned in dealing with travel safety concerns to incorporating security considerations into the planning process.

C64. "Public Safety and Wireless Communications Interoperability." Public Safety Wireless Network (PSWN) Program, Washington, DC, <www.publicsafetywins.gov/Resources/Resources.cfm> (Downloaded on: April 9, 2003).

This short publication describes interoperability as "the ability of public safety personnel to communicate by radio with staff from other agencies, on demand and in real time" and states that three distinct types of interoperability are required – day-to-day, mutual aid, and task force. Two 1998 surveys of more than 2,000 public safety agencies identified the following obstacles to interoperability – spectrum limitations, funding limitations, incompatible technologies, and lack of systems planning. The document states that improving interoperability is a multidimensional challenge, requiring a long-term regulatory focus; continued push at all governmental levels for funding; the coordinated planning of shared systems; and active information sharing and constant coordination among public safety officials and politicians from all levels of government.

C65. "Recommendations for ITS Technology in Emergency Medical Services." The Medical Subcommittee of the ITS America Public Safety Advisory Group, Washington, DC, <www.itspublicsafety.net/ its_americapublicsafety_ems.htm> (August 2002, Downloaded on: March 29, 2003).

In the Emergency Medical Services (EMS) community, the "chain of survival" concept describes the sequence of events that must occur to ensure the best possible outcome for the victim or patient. This document discusses opportunities and concerns presented by Intelligent Transportation System (ITS) technologies, the implications of medical community involvement, and recommendations for actions for each element in the "chain of survival" – (1) public assess to 9-1-1 and prompt incident notification; (2) prompt dispatch and on-scene arrival of EMS resources; (3) effective bystander and self-care delivery; (4) appropriate medical care and on-scene in-transit; (5) improved public health, safety, and security. Some of the overall recommendations include: develop information protocols, including

privacy protocols; provide resources to acquire information and communications equipment; raise awareness in the medical community of the potential benefits of new information and communications technologies to emergency patient care; evaluate the performance of integrated ITS to assess their efficiency and effectiveness for disease and injury control; use evidence-based outcome studies to support further integration of ITS technologies into the EMS system; form ongoing partnerships with all emergency responders; define emergency command procedures in advance; and encourage use of shared data to support improved information-based EMS policy development and decision making.

C66. "Regional Concept of Operations for Transportation Systems Management and Operations, Discussion Draft 2.1." Federal Highway Administration, Washington, DC (February 6, 2003).

This paper presents the idea of a regional concept of operations as a strategic management tool used to guide the expectations for how actions and activities of regional significance must be developed and operated to ensure the safety, reliability, and security of the transportation system. These regional operations actions and activities may include, for example, traffic incident management, emergency management, homeland security, congestion relief, work zone traffic management, traveler information services, response to weather and special events, and electronic payment services. In each case, for these actions and activities to be effective and beneficial to those that use or depend upon the transportation system and services, agencies and jurisdictions must collaborate and coordinate to define a shared set of expectations that cross-traditional boundaries.

C67. "Research on Non-Blinding Emergency Vehicle Warning Lighting Systems." U.S. Fire Administration, Federal Emergency Management Agency, Emmitsburg, MD <http://www.usfa.fema.gov/inside-usfa/research/vehicle.shtm> (2004).

The U.S. Fire Administration (USFA), with funding from the Department of Transportation (DOT) Intelligent Transportation Systems (ITS) Joint Program Office, initiated a partnership with the Society of Automotive Engineers (SAE) to research the effect and effective mitigation of the disorientation of motorists caused by the day and nighttime use of emergency warning lights, including the effects on normal, impaired and drowsy drivers (also known as the "moth effect"). All emergency lighting systems will be examined as part of this effort including incandescent, halogen, strobe and light-emitting diode (LED) systems. Part of this research involves examining collisions between fire apparatus and related emergency vehicles, as well as incidents where firefighters have been struck and killed while operating at emergency incidents where the use of emergency lighting may have been a factor. Technological, i.e., lighting design and flash rate, as well as operational mitigation, i.e., reducing amount of lighting used, shall be research as well.

C68. Roberts, D. C., "Regional Operating Organizations." U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, ITS Public Safety Program, Washington, DC, <www.itspublicsafety.net/articles.htm> (Downloaded on: March 29, 2003).

The key to regionally coordinated operations is for the management decisions and actions undertaken by each agency to be informed by real-time conditions in the region, and by the decisions and actions of other agencies. While each regional operating organization is unique in services, organization, and how it performs its work, there are several key characteristics that define these organizations. They have been created for one of three purposes – to solve operational problems, to coordinate operational planning for a special event or to conduct operational tests or model deployment. They involve interagency participation and are driven by the vision of one or more champions operating at both the executive or managerial levels. They tend to have their own names, acronyms, or logos, allowing joint ownership among participating agencies. To sustain these organizations, the paper author suggests that portions of federal highway and transit state apportionments be set aside to provide ongoing support for regional operations or integrating organizations, to invest in information and communications infrastructure, and to support systems operations, management activities, costs.

C69. SAIC, "Effects of Catastrophic Events on Transportation System Management and Operations: Howard Street Tunnel Fire, Baltimore City, MD." U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, Washington, DC (July 2002).

This report documents the actions taken by emergency response and transportation agencies in response to the July 18, 2001 CSX freight train derailment and fire in the Howard Street Tunnel in Baltimore, Maryland. It is part of a larger effort to examine the impacts of catastrophic events on transportation system facilities and services. The creation of a detailed chronology of events in Baltimore, MD, a literature search, and interviews of key personnel involved in transportation operations decision-making on July 18 produced the findings documented in this report. As part of a larger effort, four case studies will be formed: New York City, September 11, 2001; Washington, DC, September 11, 2001; Baltimore, Maryland, rail tunnel fire, July 18, 2001; Northridge, California, earthquake, January 17, 1994. Each of these events resulted in substantial, immediate, and adverse impacts on transportation – each has had varying degrees of influence on the longer-term operation of transportation facilities and services in their respective region. Each event revealed important information about the response of the transportation system to major stress. Information on the ability of operating agencies and their public safety and emergency management partners' effective response to a crisis was included in the documentation. This report emphasizes the transportation aspects of this catastrophic event and lessons learned that could be incorporated into future emergency response planning.

C70. SAIC, "Proceedings from the National Conference on Traffic Incident Management: A Road Map to the Future." American Association of State Highway and Transportation Officials, Intelligent Transportation Society of America, the Federal Highway Administration, and the Transportation Research Board, Washington, DC (June 2002).

The National Conference on Traffic Incident Management, jointly sponsored the American Association of State Highway and Transportation Officials, ITS America, and the Federal Highway Administration, was held to identify issues and

actions as a roadmap to the future to improve traffic incident management program planning, field operations, and inter-agency communications. More than 150 professionals and policy makers from law enforcement agencies, fire departments, the emergency medical services community, state and local transportation organizations, the towing and recovery community, and technology providers attended the conference. Over 100 action ideas were generated in eighteen breakout sessions covering three categories of issues for traffic incident management: (1) program and institutional issues, (2) on-scene operational issues, and (3) communications and technology issues. The top seven issues identified were: professionalize incident management; national program models and guidelines; creation of standards and guidelines for performance data; recognize regional focus in developing, operating, funding traffic incident management (TIM) technologies; develop regional/cross-agency systems architectures (based on standards); establish a clearinghouse for incident management data; and integrate TIM needs into highway planning and design.

C71. SAIC, "A Study of the Impact of Nine Transportation Management Projects on Hurricane Evacuation Preparedness." Federal Highway Administration, Washington, DC, <http://www.itsdocs.fhwa.dot.gov/JPODOCS/REPTS_TE/13940_files/13940.pdf> (November 2003, Downloaded on: February 2, 2004).

The purpose of this evaluation report is to draw on some lessons learned from the activities pursued using Federal grants that were received by the nine southeastern states. Two approaches were pursued for doing so. The first was a review of activities that traffic and emergency management officials are pursuing to gain insight into the areas that the states deem important for supporting hurricane evacuations. The second approach focused on the Louisiana partnership with the U.S. Geological Survey to develop Hydrowatch stations that also monitor traffic. It is believed that this type of partnership may be a cost-effective approach for deploying traffic count stations at remote locations in many states.

C72. SAIC, "Summary of Regional Hurricane Traffic Operations Workshops (Held January – February 2002)." Federal Highway Administration, Washington, DC, <http://www.itsdocs.fhwa.dot.gov//JPODOCS/ REPTS_TE//13788.html> (Downloaded on: April 18, 2003).

Three regional workshops, sponsored by the Federal Highway Administration (FHWA), were held in the southeastern United States to give representatives from transportation, law enforcement, and emergency response organizations the opportunity to exchange ideas on traffic operations during hurricane evacuations and recovery. The objectives of the workshops were to: (1) share updates on plans, Intelligent Transportation Systems (ITS) deployments, and institutional arrangements; (2) brainstorm simple solutions for improving traffic flow across jurisdictional boundaries; (3) work with agency representatives to plan and fund improvement projects (institutional, operational, technological); (4) develop next steps; and (5) share information about upcoming activities and conferences supportive of transportation operations (TRB, ITE, NHC, and others). In the past several years, Departments of Transportation in the southeastern states have increased their multi-state and multi-agency coordination in response to hurricanes. The effects of these coordination efforts include the following. All southeastern

states have used or are prepared to use some form of ITS to support evacuations and recovery operations due to hurricanes. ITS network coverage is uneven throughout most states, with traffic management information available mainly from the metropolitan areas. Integration or sharing of traffic management/traffic volume data within and across agencies is increasing. Planning for evacuations in some areas has complemented other traffic operation needs such as work zone management practices. Contraflow plans have been developed in coastal states, with activities ranging from sketch planning to detailed simulation and selected field tests of ITS devices and traffic management procedures. In addition, all state agencies expressed a continued need to improve and share real-time traffic count data, congestion predictions, and clearance time estimates.

C73. "Security and Emergency Response Survey of State Transportation Agencies, Preliminary Results." American Association of Highway and Transportation Officials and the Transportation Research Board, Washington, DC, <http://security.transportation.org/community/ security/studies.html> (January 2002, Downloaded on: March 29, 2003).

This presentation provides preliminary results of a November/December 2001 survey of state Departments of Transportation (DOT). The objectives of this survey were to share information, draw a baseline for preparedness and emergency response, identify security-related research priorities, and identify technical assistance needs. The presentation covers the following topics: states' coordination with USDOT, other federal agencies, state and local agencies, and industry partners on emergency response plans; focus on terrorist response; existence of mutual aid pacts for repairing/replacing transportation facilities after emergencies; status of vulnerability assessments; and importance of critical factors used in the identification and protection of transportation assets. The presentation also highlights state DOT concerns that should be researched and shared among the states in the following topic areas: infrastructure, analytical tools/information, technology, operations, readiness, protection and restoration, and communication.

C74. Schuman, R. and Meyer, M. D., "Advanced Transportation Technology: How It Helps Police, Fire, and EMS Operations." U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, ITS Public Safety Program, Washington, DC, <www.itspublicsafety.net/articles.htm> (Downloaded on: March 29, 2003).

Public safety and transportation officials are challenged to work together in new ways, to operate new systems, and to share both resources and responsibilities. The public safety community can benefit by getting involved with key transportation initiatives. One example is working to improve operations by charting times over various routes while measuring the effects of various traffic management techniques over time. Another example is participating in the design of regional information and communication systems to serve the broadest public interest, sharing vital incident management information in real time, while preserving the privacy of non-pubic information on proprietary networks.

C75. "Staffing Options for Incident Management Programs (Field Operations) – Utilizing Public/Private Partnerships." Maryland State Highway Administration, Baltimore, MD (1997).

In the field operations arena of incident management programs throughout the country, there are several examples of staffing and operations options – state police, consultants, private companies, and a combination of agencies. This papers look at six programs to determine how the operations manage and staff their incident management programs. The paper concludes that the public/private incident management partnership should be approached one step at a time. It recommends that a report on how to improve towing response and clearance times be completed prior to determining the best course of action to enhance the CHART program.

C76. Sussman, J. M., "Public Safety and Transportation Agencies Need to Evolve Toward Regional, Integrated Operations." U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office, ITS Public Safety Program, Washington, DC, <www.itspublicsafety.net/articles.htm> (Downloaded on: March 29, 2003).

To achieve the potential of new information-sharing technologies, public safety and transportation agencies must work together in new ways. There are three levels at which change is required. The first is the individual level, where new professional skills and professional values are required. The second is within the agencies, where organizational change is needed to place greater emphasis on joint operations. The third is among agencies, where mission coordination and new regional, integrated operational structures are necessary.

C77. "Traffic Congestion: Issues and Options." UCLA Extension Public Policy Program and Institute for Transportation Studies, Los Angeles, CA, <http://www.uclsaextension.edu/publicpolicy> (June 2003, Downloaded on: February 13, 2004).

This two-day conference examined the causes and consequences of traffic congestion throughout the U.S., and the various strategies for tackling the problem. A major conclusion is that there is no "silver bullet" for solving congestion; it will require the application of multiple strategies, and some strategies will work better in some places than in others. This report is intended to contribute to more informed decision-making in the reauthorization of federal surface transportation legislation.

C78. "Traffic Incident Management (TIM) Self Assessment: National Detail Summary Report." Federal Highway Administration, Washington, DC, <http://www.ops.fhwa.dot.gov/Travel/ IncidentMgmt/IncidentMgmt.htm> (October 2003, Downloaded on: February 4, 2004).

The "TIM Self Assessment" is a tool used by states and regional program managers to assess their achievement of a successful multi-agency program to manage traffic incidents safely and effectively. In its first implementation, the Federal Highway Administration (FHWA) planned for TIM Self Assessments to be conducted in the top 75 metropolitan areas. Assessments were completed in 70 out of 75 of these areas. The assessments contained 34 questions in three program

areas: program and institutional issues; operational issues; and communication and technology issues. Conducted as a group exercise, the assessments allowed for discussion among the group members with resulting ratings being consensus views. The results will be used by FHWA to determine gaps nationally that need attention and to direct future years' FHWA program activities. The results of the TIM Self Assessments are detailed in this full report.

C79. "Traffic Incident Management (TIM) Self Assessment: National Executive Summary Report." Federal Highway Administration, Washington, DC, <http://www.ops.fhwa.dot.gov/Travel/IncidentMgmt/IncidentMgmt.htm> (October 2003, Downloaded on: February 4, 2004).

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C80. Washington State Transportation Center, University of Washington, "Washington's Incident Response Team Program Evaluation." Washington State Transportation Commission, Department of Transportation in cooperation with the Federal Highway Administration, Olympia, WA (May 1997).

The purpose of this report is to document the benefits and drawbacks related to the Incident Response Team (IRT) program operations in Washington. A significant amount of inconsistency was noted not only at the Department of Transportation (DOT) maintenance area, but also among individual IRT members. Inconsistency in operations makes it difficult (1) to determine the effectiveness of different operating styles; (2) for other response personnel to work effectively with DOT IRT members; (3) to build consensus among the motoring public for continued program support; and (3) for IRT members to be confident in their actions. Recommendations to improve the effectiveness of the IRT program include improving call-out procedures, developing minimum guidelines for on-site service and equipment, standardizing documentation methods, and increasing awareness of the IRT program within and outside of Washington DOT.

C81. Wolshon, B., "Planning for the Evacuation of New Orleans." ITE Journal, Vol. 72, No. 2 (February 2002), pp. 44-49.

Natural disaster planning for cities in the U.S. usually falls under the jurisdiction of emergency planning and law enforcement agencies. Historically, engineers have played critical supporting roles to these agencies by providing expertise in flood modeling and mapping and structural survivability. However, engineers have

provided relatively little input to disaster preparedness in transportation planning and evacuation traffic management. In the past, evacuations were managed at a local level by emergency management agencies, and transportation professionals rarely incorporated evacuation needs into their day-to-day traffic planning, design, and analysis activities. The result of this lack of involvement was evident in several recent evacuations where the transportation infrastructure was not fully utilized when the need arose. Emergency management officials in the New Orleans metro area are now working to overcome this problem by teaming with the Louisiana Department of Transportation and Development to develop a comprehensive regional plan to evacuate the city in the event of a hurricane. This article describes this plan, and highlights the problems particular to evacuating New Orleans and the creative methods being considered to solve them.

C82. Wolshon, B. and Meehan, B. H., "Emergency Evacuation: Ensuring Safe and Efficient Transportation Out of Endangered Areas." TR News, No. 224 (January 2003), pp. 3-9.

Two recent events have demonstrated the critical need to improve the efficiency and management of evacuations: Hurricane Floyd along the coastal areas of the southeastern United States in 1999 and the terrorist attacks in New York City and Washington, DC, on September 11, 2001. Programs are under way to improve transportation operations during the evacuation of an area under threat of natural or man-made disaster. This article reviews the initiatives, strategies, techniques, and technologies to keep the transportation infrastructure from being overwhelmed by evacuation-level traffic demand.

C83. Wolshon, B., Urbina, E. and Levitan, M., "National Review of Hurricane Evacuation Plans and Policies." Louisiana State University Hurricane Center, Baton Rouge, LA (2001).

A national review of evacuation plans and practices was conducted to determine what the latest evacuation policies and strategies are and how they differ from one location to another, and to increase the level of knowledge and awareness of these new evacuation practices. The study was carried out from a transportation perspective and included both a review of transportation literature and a survey of Department of Transportation (DOT) and emergency management officials in coastal states threatened by hurricanes. The results of the survey highlight many of the current needs and important issues in the field: limited involvement from and awareness within the professional transportation community in the field of evacuation; limited interagency coordination; limited consistency between states in the authority structure and planning/design processes; less than adequate use of available transportation infrastructure during evacuation, and need to better coordinate work zone activities on hurricane evacuation routes. The survey also showed that transportation organizations have recognized many of these issues and are working to address them through increased involvement; enhanced ability to communicate vital traffic flow and route condition information; development of contraflow evacuation plans; and searching for ways to apply Intelligent Transportation Systems (ITS) to improve the safety, efficiency, and speed of evacuations.