OUTLINE OF RESEARCH FOCUS AREA WRITE-UP
TRAFFIC SIGNAL SYSTEMS COMMITTEE
FEB 2006

Description: Up to ½ p general description of the focus area, key issues & challenges.

State-of-Practice & Art: Up to ½ p summary of status.

Gaps and Trends: General description of needs, and current developments.

Research / Technology Transfer Needs: Specific research needs or topics that need to be more widely disseminated. Will be expanded into initial research problem statements including initial cost estimate. If possible, group by the following headings: research, demonstration projects or operational tests, technology transfer, and training. Identify the projects (titles only) appropriate to meet the identified needs for each focus area.

Research Priorities and Proposed Projects: LATER, will Identify 5-6 high priority projects from this list and include a brief description (1-2 paragraphs) that will include:
- Title, purpose, objective & expected influence on practice
- Intended audience, product to be developed & expected outcome(s)
- Problem &/or gap in practice being addressed
- Previous &/or related research justifying project
- List of key topics & issues to be covered & addressed in project
- Approach to pursue project & develop products
- Costs, potential sponsors & duration

References Specific citations throughout the above, e.g.:


Attached is a sample write-up about Traffic Incident Management. Entire write-up not to exceed 5 pages.
**Description:** A traffic incident is a non-recurring event that causes a reduction of roadway capacity or an abnormal increase in demand. In addition to traveler delay, increased fuel consumption, and reduced air quality, a related problem is the occurrence of secondary crashes. Another issue is the danger posed by traffic incidents to response personnel serving the public at the scene (1). Effective traffic incident management (TIM) features structured, interjurisdictional, multi-disciplinary and fully documented procedures. More than an assemblage of technologies and activities, successful TIM must be fully integrated into the culture of the stakeholder institutions.

TIM is the systematic, planned, and coordinated use of human, institutional, mechanical, and technical resources to reduce the duration and impact of traffic incidents, and improve the safety of motorists, crash victims, and traffic incident responders. Effectively using these resources can increase the operating efficiency, safety, and mobility of the highway. Although the emphasis here is on freeway TIM, the perspective applies to all types of roadways. A TIM program covers an integrated set of management activities tailored to a specific geographic region. The program needs to recognize the region’s existing assignment of traffic incident management activities, and then address gaps and overlaps in those assignments.

TIM is closely related to both Special Event Management and (Freeway) Management during Emergencies and Evacuations; the three focus areas vary mainly in depth and breadth, and the degree of advance notice. In the recently passed SAFETEA-LU legislation, Subtitle C - Intelligent Transportation System Research (Sec. 5310), it states, “The term ‘incident’ means a crash, a natural disaster, workzone activity, special event, or other emergency road user occurrence that adversely affects or impedes the normal flow of traffic.” In at least this context, incident encompasses all three focus areas. Terrorist action is not mentioned, though that may be an oversight.

**State-of-Practice & Art:** Especially in the last few years, a large number of publications and reference materials have become available on TIM. The *Traffic Incident Management Handbook* (2) treats traffic incident management in depth and is a primary reference. The National Traffic Incident Management Coalition (NTIMC) is a relatively new assembly of associated agencies and stakeholders, and their Web site provides a wealth of materials (3). A comprehensive NTIMC bibliography listing about 100 references is provided in (4). Also, see (5-7).

The U.S. Dept. of Homeland Security in 2004 published an overview of related activities in the *National Incident Management System (NIMS, 8)*, advocating many of the concepts of the National ITS Architecture such as interoperability, coordination and technology advancement, while emphasizing concepts such as incident command, comprehensive communications and information dissemination. The *NIMS* title, however, co-opts the transportation meaning of “incident management,” changing it from traffic accidents/flow disruptions to broader security activities. This largely explains the current use of the term traffic incident management in recent transportation publications.

The SAFETEA-LU legislation includes several references to incidents and related topics (9). These include: Sec. 1201 Real-time system management information program; Sec. 2014 First responder vehicle safety program; Sec. 5204 Training and education; Sec. 5306 (ITS) Research and development and; Sec. 7132 National first responder transportation incident response system.
Gaps and Trends: TIM can be considered in three activity areas: Strategic for planning and institutional issues; Tactical, covering on-site management and; Technical and Communications, dealing with critical support components. Overlap between these naturally occurs. Following are gaps and trends by area.

Strategic

- Interagency Coordination. The key players are law enforcement, fire and rescue, emergency medical services, towing and recovery, environmental protection (i.e., for hazmat), and transportation agencies, and they need to work together closely.
- International Practices and Lessons (10). Innovative practices should be investigated, recognizing institutional and cultural differences.

Tactical

- Incident Command System (ICS). With emerging NIMS and SAFETEA-LU requirements, a greater emphasis on the ICS can be expected, and transportation agencies need to play an active role in its development and hierarchy.
- Real-Time Performance Measurement. Not only for planning future TIM, real-time monitoring of volumes and speeds is needed to manage on-going incidents.
- Secondary Incidents. Efforts continue to minimize their occurrence and severity.
- Quick Clearance Policies and “Move It” Laws. These have the goal of minimizing impact on the traveling public not involved in the incident.
- Clearinghouse of TIM Experience. The NTIMC intends to develop an on-line reference site.

Technical and Communications

- Interoperability and Communications among First Responders. While steadily improving, further advances are needed (e.g., 11).
- Information Dissemination. Advanced Traveler Information Systems are constantly improving for normal traffic operations, but incidents require especially quick and accurate pre-trip information and in-vehicle information during travel. In addition to highway advisory radio and dynamic message signs, commercial AM and FM radio are aggressively utilized.
- Software Evolution. Development continues on preparing for and managing incidents. One prime area is the integration of computer-aided dispatch (CAD) systems for emergency responders with traffic management center (TMC) software for freeway management.

Research / Technology Transfer Needs: Potential TRB research efforts include the following. Many of the needs lie in synthesis of best practices in use across the nation and world.

Strategic

- Goal definition addressing at least safety and travel time. Create national models and guidelines. Relative importance of: 1) ensuring responder safety (through reflective garments, positioning and lighting); 2) rescue/triage of accident victims and stranded motorists; 3) traffic safety directions to approaching traffic and; 4) salvage of cargo and load.
- Performance measurement, with standard and commonly understood metrics, but applied in scale to the affected area, e.g., urban vs. rural, flat land vs. mountainous terrain (12).
- Organizational and institutional issues to integrate TIM with Special Event Management and Management of Evacuations and Emergencies. Refinement of Intergovernmental Agreements, defined role of TMCs.
Public outreach and education regarding “move it” laws, prudent incident site behavior.

TIM support in planning and design, including crash investigation sites and the need for a regional perspective.

**Tactical**

- Pre-planned responses and assignments, including towing and recovery practices.
- Standard operating procedures covering vehicle positioning, lighting (on-site and approach warning), high visibility garments, crash investigation procedures and on-site role based on order of first-responder arrival. Needs to consider state law changes and NIMS mandates.
- Routine use of on-site camera images, e.g., from cell phones and CCTV where available, to assist in triage assessment.
- Potential changes to the *Manual on Uniform Traffic Control Devices* in support of site management.
- Potentially greater authority for transportation agencies on site.
- Possible greater role of auto clubs, e.g., providing roving courtesy patrols. Consider other foreign practices as well.

**Technical and Communications**

- Evolution of traffic simulation and travel demand models covering 1) pre-planning scenarios, 2) real-time TIM, and 3) post-incident evaluation. Includes detection links to measure volume and saturation flow rates on both freeways and arterials. Ideally, dispatchers or automatic systems would advise first responders on the quickest route to an incident site.
- Improved data fusion covering incident detection and impacts, including quick synthesis of cell phone calls. Is detector-based incident detection only applicable to tunnels? Travel time prediction under dynamic incident conditions.
- Media and content of traveler information and control strategies, including dynamic message signs (permanent and portable), ramp metering and Web site information, plus television and radio. To what degree can approaching demand be managed?
- Detector and performance monitoring in support of TIM: technology, extent, communications and data archiving; potential use of portable detection and cameras.
- Full integration of responder CAD and TMC software, plus cross-agency system architectures.
- In-vehicle information dissemination: new technology and best practices.
- Added risks, challenges and best responder practices for new “hi-tech” vehicles: e.g., high voltage hybrid batteries, front and side airbags, reinforced steel cages.
- Quick clearance devices, such as collapsible trailers easily moved to the incident site by motorcycle (10).
- Further advances and integration of on-site responder communications.
- Capacity reductions due to “rubber neckers” (both travel directions) and potential mitigation.
References