Emergency Responder Safety Institute

Cumberland Valley Volunteer Firemen's Association

Task Analysis for Emergency Responders at Roadway Incidents

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The Emergency Responder Safety Institute has conducted a review of typical functions performed by emergency responders at roadway incidents. This effort was funded as part of a grant from the Department of Homeland Security Assistance to Firefighters Grant Program (EMW-2007-FP-01749). To assist in the development process, the ERSI established a panel of experts to conduct the initial analysis and review the materials as they were developed. This report discusses the process utilized, outlines the specific job performance requirements for critical positions assigned to emergency responders and provided guidance on the use of the requirements by potential users and training organizations.

Background

Protecting Emergency Responders on the Highways a White Paper developed by the Cumberland Valley Volunteer Firemen's Association (CVVFA) in 1999 identified two key issues related to responder safety at roadway incidents. The first issue identified related directly to the work detailed in this report. The problem statement from the White Paper stated:

> There is lack of consistency, agreement, and understanding of the minimum competencies (knowledge, skills, and abilities) necessary for all emergency services personnel operating in or near moving traffic.

Since the White Paper was issued there have been numerous efforts to improve on responder safety at roadway incidents. One of the first initiatives was the establishment of the Emergency Responder Safety Institute (ERSI) as the CVVFA's focal point for roadway safety efforts. Since the White Paper was issued a number of job related materials related to responder safety at roadway operations have been developed by organizations including the National Fire Protection Association (NFPA), the National Traffic Incident Management Coalition and the I-95 Corridor Coalition. These materials were review as part of this study.

Positions

The purpose of this project was to develop a set of job performance requirements for the job functions critical to safe emergency operations at roadway incidents. The job performance requirements included in this report are based on the requirements in NFPA Professional Qualifications standards, the *Manual on Uniform Traffic Control Devices for Streets and Highway* 2003 edition (MUTCD) and the input provided by an expert panel assembled by CVVFA/ERSI.

Several levels of performance for emergency responders to roadway incidents were defined based the classification of traffic incidents of found in Chapter 6I of the 2003 MUTCD. These classes are:

A. Major—expected duration of more than 2 hours;

B. Intermediate—expected duration of 30 minutes to 2 hours; and

C. Minor—expected duration under 30 minutes.

Each of these classes have unique traffic control characteristics and needs. The primary functions of temporary traffic control (TTC) measures at a traffic incident management area are to move road users reasonably safely and expeditiously past or around the traffic incident, to reduce the likelihood of secondary traffic crashes, and to preclude unnecessary use of the surrounding local road system. Examples include a stalled vehicle blocking a lane, a traffic crash blocking the traveled way, a hazardous material spill along a highway, and natural disasters such as floods and severe storm damage.

The MUTCD expects that responders arriving at a traffic incident should, within 15 minutes of arrival on-scene, estimate the magnitude of the traffic incident, the expected time duration of the traffic incident, and the expected vehicle queue length, and then establish appropriate temporary traffic controls for these estimates.

Based on the MUTCD classifications and the input of the expert panel, JPRs for the following positions were developed:

Operations Level – Emergency responders at roadway incidents including:

Responder
Driver/Apparatus Operator
First Line Supervisor/Company Officer

Temporary Traffic Control Technician

The levels and tasks are tied to the three classes of traffic incident identified in the MUTCD as well as the guidance on the time that initial responders have to size-up the incident and estimate the class based on the anticipated time for clearance[1].

The operations level tasks are intended to apply to the initial responders to roadway incidents, as well as those who are assigned to task level functions at incidents under the direction of Incident Command. Operations level personnel are responsible for the initial size-up and implementation of TTC measures using the basic equipment carried on the first responding units.

The position of an Operations Level Responder would typically be held by a police officer, a fire police officer, a firefighter or EMT assigned to a roadway incident. The functions could also apply to DOT or public works personnel assigned to respond to roadway incidents in a jurisdiction. In many jurisdictions the responder level requirements will also apply to tow and recovery personnel.

The position of Driver/Apparatus Operator includes personnel assigned to drive the various responding units the emergency scene and then operate any equipment or systems provided on those units. In the case of a single person unit the responder would also be responsible for the driver/operator related tasks.

[1] *Manual on Uniform Traffic Control Devices for Streets and Highway* 2003 edition, Section 6I.01 General.

The position of first line supervisor/Company Officer includes supervisory personnel assigned to the initial responding units. Examples would be a patrol supervisor in law enforcement, a company officer assigned to fire/rescue apparatus assigned to the incident or the senior person assigned to an assigned EMS unit. In some jurisdictions these tasks may also be performed by DOT or Public Works supervisors.

The position of Temporary Traffic Control Technician (TTCT) applies to personnel qualified to provide advanced input to command as part of an expanded incident management system at an Intermediate or Major roadway incident. This function may be assigned to a fire officer, a law enforcement official, a fire police officer, a rescue squad officer or DOT responder. The TTCT is responsible for the establishment of a temporary traffic control zone for Intermediate and Major incidents. The TTCT would be typically assigned to manage the Traffic Control Group or Branch for an incident.

The need for the TTCT is identified in Strategy 12 of the *National Unified Goal for Traffic Incident Management*[2] (NUG) which addresses the need for around the clock availability of TIM personnel. The lack of the 24/7 availability of trained DOT personnel in many jurisdictions requires that firefighters and/or other emergency responders manage major incidents when DOT responders are not available. This issue is discussed in a 2007 article in the FHA's *Public Roads* magazine:

> "To ensure safe, quick clearance, all organizations that are part of traffic incident response need to have 24/7 — or round-the-clock, every day — capacity. Although fire, law enforcement, EMS, and towing responders already are available 24/7, transportation agencies often do not have response capabilities or service patrols available outside of regular business hours. Consequently, incident responders must manage traffic incidents without the transportation agency's resources and capabilities, or they need to wait for transportation personnel who are off duty but on call to report to the scene. FHWA and NTIMC recognize the resource challenges facing State transportation agencies as they move toward providing 24/7 traffic incident response. Staffing and outfitting service patrol vehicles will need to be implemented incrementally over time.
>
> "A serious commitment to responder safety and a true partnership between first responders and transportation organizations addressing roadway incidents implies 24/7 availability of on scene traffic control and motorist assistance," says FHWA's Paniati. FHWA and State DOT officials are building a strong case for this 24/7 availability on interstates and other high-volume transportation facilities. Traffic control during nighttime work zone operations is particularly important. Many State and local highway authorities are conducting their work zone operations overnight to reduce the impacts of construction on motorists. But nighttime operations can increase the danger to construction workers due to reduced visibility, speeding, and drunk driving. As a result, full-function service patrols and emergency services increasingly are being called to work zones to address incidents at night." [3]

At emergency incidents on our roadways, if trained DOT personnel are not readily available, the TIM function will either be accomplished by the responders available at the incident or completely ignored. The objective of this phase of the current CVVFA/ERSI grant project is to develop a framework that can be used by existing emergency service training organizations to prepare personnel to assume the critical function early in the incident to insure the safety of the scene and emergency responders working at the incident.

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[2] *National Unified Goal for Traffic Incident Management: Detailed Explanation*, National Traffic Incident Management Coalition, November 2007.
[3] *Unifying Incident Response*, Public Roads, September/October 2007.

Job Performance Requirements

Operations Level – Responder

Task 1: Establish a temporary traffic control work zone at a roadway incident, given protective equipment, traffic and scene control devices, so that protective equipment is worn, a protected work area is established using traffic and scene control devices, and the measures are taken to provide a safe work area for emergency responders at the incident.

Task 2: Operate in the temporary traffic control work zone at a roadway incident, given protective equipment, and an assignment, so that protective equipment is worn, apparatus is dismounted with due regard for moving traffic and the assigned tasks are performed in a protected work area.

Requisite Knowledge:

- Potential hazards involved in operating on emergency scenes including: vehicle traffic, utilities, and environmental conditions
- Proper procedures for dismounting apparatus in traffic
- Procedures for safe operation at emergency scenes
- Protective equipment available for members' safety on emergency scenes
- Work zone designations

Requisite Skills:

- Don and doff personal protective clothing including high visibility garments
- Dismount apparatus
- Operate in the protected work areas as directed
- Deploy TTC devices
- Direct vehicular traffic using hand signals and assigned traffic control equipment
- Identify potential hazards to responders operating in the protected area
- Communicate threats to personnel operating in the protected area using equipment provided

NOTE: This material is adapted from the requirements of Section 5.3.3, NFPA 1001, 2008. The JPR has been divided into two individual tasks and the requisite skills and knowledge list expanded upon based on current good practice.

Operations Level – Driver Operator

Task 3: Position apparatus to provide a temporary traffic control work zone at a roadway incident, given apparatus, a roadway incident, and traffic and scene control devices, so that the apparatus is positioned to provide for safe egress of personnel, a protected work area for responders is established, and systems and equipment on the apparatus can be accessed with minimal exposure to personnel.

Task 4: Deploy temporary traffic and scene control devices, given protective equipment; traffic and scene control devices, so that the operator positions devices to provide advanced warning to drivers approaching apparatus positioned at a roadway incident.

Requisite Knowledge:

- Potential hazards involved in operating on emergency scenes including: vehicle traffic, utilities, and environmental conditions
- The advantages and disadvantages of typical blocking positions for emergency vehicles at roadway incidents
- Proper procedures for dismounting apparatus in traffic
- Procedures for safe operation at emergency scenes
- Protective equipment available for members' safety on emergency scenes
- Work zone designations

Requisite Skills:

- Apparatus positioning for maximum protection at roadway incidents
- Don and doff personal protective clothing including high visibility garments
- Dismount apparatus
- Operate in the protected work areas as directed
- Deploy TTC devices
- Direct vehicular traffic using hand signals and assigned traffic control equipment
- Identify potential hazards to responders operating in the protected area
- Communicate threats to personnel operating in the protected area using equipment provided

Operations Level – Company Officer/First Line Supervisor

Task 5: Conduct an initial size-up a roadway incident, given observation on arrival at a roadway incident, so that potential hazards are identified, the location of the incident is communicated to responders and dispatch, initial response apparatus is positioned to protect the incident scene, and the time required for incident mitigation is estimated.

Task 6: Develop an initial action plan, given initial size-up information for a roadway incident and assigned emergency response resources, so that resources can be deployed to control the incident and scene safety is maximized.

Task 7: Implement an action plan for a roadway incident, given assigned resources, a roadway incident, and a preliminary action plan for the incident, so that resources are deployed to maximize personnel safety and mitigate the situation.

Task 8: Implement a scene safety plan, given assigned resources, a roadway incident, and a preliminary action plan for the incident, so that personnel operate in protected zones, an accountability system is used and all personnel operating at the incident utilize assigned PPE.

Requisite Knowledge:

- Elements of a roadway incident size-up
- Standard operating procedures for roadway operations
- Resources available for the mitigation of fire and other emergency incidents
- Incident management system

Requisite Skills:

- Analyze emergency scene conditions
- Work within the incident management system utilized by the jurisdiction
- Allocate assigned resources
- Communicate orally
- Supervise and account for assigned personnel

Task 9: Conduct a size-up of an ongoing roadway incident, given observations and an initial action plan for an ongoing roadway incident, so that the impact of the incident on traffic flow, the safety of responders operating at the scene, existing temporary traffic control measures and requirements for additional resources are assessed.

Task 10: Develop a temporary traffic control plan for a roadway incident that will be active for more than 30 minutes, given an intermediate or major roadway incident, so that a temporary traffic control zone is developed for incident and resources to implement the plan are requested.

Task 11: Implement temporary traffic control measures for and incident that will require emergency operations for more than 30 minutes, given an intermediate or major roadway incident and assigned resources, so that a temporary traffic control zone is established for incident, responders assigned to the incident are provided with a safe work zone, traffic is moved through or around the incident safely and expeditiously, and the likelihood of secondary crashes is reduced.

Task 12: Assess the effectiveness of temporary traffic control measures that have been implemented at a roadway incident, given a temporary traffic control zone for an intermediate or major roadway incident and observations regarding traffic flow through and around the incident, so that modifications to the temporary traffic control zone for the incident can be made to improve safety and traffic flow if necessary.

Task 13: Work within a unified incident command structure at a roadway incident, given an intermediate or major roadway incident and an incident management assignment, so that the assignment is accomplished and responding agencies are coordinated with through out the incident.

Task 14: Coordinate the demobilization of temporary traffic control measures implemented at a roadway incident, given an intermediate or major roadway incident, assigned resources and ongoing temporary traffic control measures, so that traffic is allowed to flow at normal capacity as the emergency operations are completed and responding units are released.

Task 15: Analyze roadway incident operations, given observations and scene documentation for an intermediate or major roadway incident, so that input is provided to responding units and agencies and improvements to existing agency operating procedures are recommended as necessary.

Requisite Knowledge:

- Temporary traffic control methods
  - ✓ Advanced warning
  - ✓ Use of devices to identify work zones
  - ✓ Use of “flaggers” in the temporary traffic control zone
- Requirements of MUTCD Chapter 6I
- SOP’s established by the jurisdiction
- Available traffic control resources
- Hazards associated with roadway incidents
  - ✓ Limited access highways
  - ✓ Multi-lane roads
  - ✓ Urban streets
  - ✓ Rural roads
- Risk management for roadway incidents
- TTC Terminology
- NIMS – Incident Management system and roadway incidents
- Working in a “unified” command system
- Selection of PPE
- Types of equipment used for TTC
- Established traffic management plans for the jurisdiction

Requisite Skills:

- Communication
- Donning and doffing of PPE
- Deployment of traffic control devices
- Incident size-up
- Developing action plans
- Implementing temporary traffic control measures
  - ✓ Limited access highways
  - ✓ Multi-lane roads
  - ✓ Urban streets
  - ✓ Rural roads
- Demobilizing an incident
- Evaluate impact of incident on traffic flow

Using JPRs To Develop Educational Objectives

The format used for the requirements found in this report is that used for NFPA Professional Qualification standards. In that system there are three major components to each Job Performance Requirement (JPR); a *Task*, a *Given* statement and a *Standard*. The task is what the individual is expected to be able to accomplish on the job. The given statement provides the framework that the task will be performed in including special tools that might be required and the type of situation. The Standard is the measurement of when the task is successfully completed.

Using the operation of a fire extinguisher as an example the components of the JPR would be:

Task: Extinguish incipient Class A, Class B, and Class C fires

Given: given a selection of portable fire extinguishers

Standard: so that the correct extinguisher is chosen, the fire is completely extinguished, and correct extinguisher handling techniques are followed

The completed Job Performance Requirement from NFPA 1001 for fire extinguisher operation reads:

5.3.16* Extinguish incipient Class A, Class B, and Class C fires, given a selection of portable fire extinguishers, so that the correct extinguisher is chosen, the fire is completely extinguished, and correct extinguisher-handling techniques are followed.

(A) Requisite Knowledge: The classifications of fire; the types of, rating systems for, and risks associated with each class of fire; and the operating methods of, and limitations of portable extinguishers.

(B) Requisite Skills: The ability to operate portable fire extinguishers, approach fire with portable fire extinguishers, select an appropriate extinguisher based on the size and type of fire, and safely carry portable fire extinguishers.

A.5.3.16 The Fire Fighter I should be able to extinguish incipient Class A fires such as wastebaskets, small piles of pallets, wood, or hay; Class B fires of approximately 9 ft^2 (0.84 m^2); and Class C fires where the electrical equipment is energized.

The requisite knowledge and skills components are designed to identify what the individual must know and be able to do in order to complete the task. The appendix item associated with the JPR provides guidance to the user on what the committee has identified as an incipient fire.

Once the JPRs are established for a given position, they can be used to evaluate the competency of individuals related to a specific job. It is also an easy step to convert the requirements into training objectives to bring personnel up to the level that they can complete the tasks on the job.

Using the operation of a fire extinguisher as an example the components of the JPR would be:

Task: Extinguish incipient Class A, Class B, and Class C fires

Given: given a selection of portable fire extinguishers

Standard: so that the correct extinguisher is chosen, the fire is completely extinguished, and correct extinguisher handling techniques are followed

The completed Job Performance Requirement from NFPA 1001 for fire extinguisher operation reads:

> 5.3.16* Extinguish incipient Class A, Class B, and Class C fires, given a selection of portable fire extinguishers, so that the correct extinguisher is chosen, the fire is completely extinguished, and correct extinguisher-handling techniques are followed.
>
> (A) Requisite Knowledge: The classifications of fire; the types of, rating systems for, and risks associated with each class of fire; and the operating methods of, and limitations of portable extinguishers.
>
> (B) Requisite Skills: The ability to operate portable fire extinguishers, approach fire with portable fire extinguishers, select an appropriate extinguisher based on the size and type of fire, and safely carry portable fire extinguishers.
>
> A.5.3.16 The Fire Fighter I should be able to extinguish incipient Class A fires such as wastebaskets, small piles of pallets, wood, or hay; Class B fires of approximately 9 ft^2 (0.84 m^2); and Class C fires where the electrical equipment is energized.

The requisite knowledge and skills components are designed to identify what the individual must know and be able to do in order to complete the task. The appendix item associated with the JPR provides guidance to the user on what the committee has identified as an incipient fire.

Once the JPRs are established for a given position, they can be used to evaluate the competency of individuals related to a specific job. It is also an easy step to convert the requirements into training objectives to bring personnel up to the level that they can complete the tasks on the job.

To use the JPRs to define training the developer would convert the JPR into a lesson or module objective with behaviors, conditions and standards that can be measured within the teaching environment. Using the fire extinguisher example from above the following lesson objective could be written:

> The fire fighter will select and use an appropriate fire extinguisher to extinguish a Class A, B or C fire.

The requisite skills and knowledge lists would then be converted to enabling objectives to help to define course content. Each item in the requisite knowledge list becomes an objective. For example the item *classifications of fire* an objective related to a cognitive behavior might be written:

> Given a description of a fire, the student will identify the classification with 100% accuracy.

Each item in the requisite skills list becomes an objective describing a psychomotor behavior. For example the item *operate* an objective related to a cognitive behavior might be written:

> Given a description of a fire, the student will identify the classification with 100% accuracy.

References

I-95 Corridor Coalition

NFPA

Standards with roadway incident requirements:

NFPA 1001, *Standard for Fire Fighter Professional Qualifications*

NFPA 1006, Standard for Technical Rescuer Professional Qualifications

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*

National Traffic Incident Management Coalition (NTIMC)

Expert Panel

The Expert Panel assembled for this effort was selected based on expertise in areas critical to the safe management of roadway incidents. The panel included:

Stephen Austin – CVVFA/ERSI
Allen Baldwin – PA Turnpike/ERSI
Joe Bukowski – CVVFA/ERSI
Jerry Daniels – CVVFA/ERSI
Robert Hill – PA Fire Police Instructor
Rory Howe – Law Enforcement
Alvin Marquess – Maryland State Highway Administration Chart
Gary Millsaps – Georgia Department of Transportation HEROES
Ron Moore – Fire Service/ERSI
Angela Roper – Towing Industry
Joe Sagal – Maryland State Highway Administration Chart
Jack Sullivan – ERSI
Marc Wise – Fire Service
Jon Jones – ERSI Project Coordinator