Volunteer Fire Fighter Killed When Struck While Operating at Scene of Multiple Vehicle Crash on Interstate Highway – Illinois

Executive Summary

On March 5, 2013, a 39-year old male volunteer fire fighter was struck and killed by an enclosed car hauler with trailer (used to haul luxury vehicles) on an interstate highway. The fire department was operating at the scene of a multiple vehicle crash when a fire department pumper, a fire department utility vehicle, and an Illinois State Police vehicle were struck by a car hauler. The fire department was preparing to clear the original incident when this incident occurred. Utility 105 (fire department utility vehicle) was initially positioned approximately ½ - ¾ mile from the incident blocking the left lane of the interstate. The Incident Commander radioed Utility 105 to move behind the state police vehicle. The car hauler was approaching the scene in the left lane and failed to stop for the initial incident. The victim was leaning against the rear passenger seat on the driver's side of Utility 105 with the door open. Members of the fire department were in the median of the interstate and witnessed the car hauler approaching the crash scene at a rate of speed that was excessive for road conditions. Realizing the car hauler was not going to be able to stop, members yelled for everyone to get out of the way of the car hauler. The victim moved away from the utility vehicle. He was struck by the car hauler and pushed onto the shoulder of the interstate. After striking the victim and the utility vehicle, the car hauler struck the state police vehicle and then struck Engine 102. After the crash scene was secured, the Incident Commander initiated a personnel accountability report. Utility 105

Utility 105 after the crash with the commercial car hauler, state police vehicle, and Engine 102. The victim was leaning against the left rear passenger seat when the crash occurred. Two fire fighters were inside the vehicle at the time of the crash and had to be extricated.
(Photo courtesy of the fire department)

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was located in the median between a trailer from the initial crash and the car hauler. The victim was located by a state trooper and was unresponsive. Despite receiving cardiopulmonary resuscitation (CPR) and basic life support (BLS) at the scene, and advanced life support (ALS) in the ambulance and in the local hospital's emergency department, the victim died.

Contributing Factors

- *Actions of the driver of the commercial car carrier*
- *Weather*
- *Grade of the interstate highway*
- *Inadequate protection of the highway/roadway work area*
- *Inadequate traffic management*

Key Recommendations

- *Develop pre-incident plans regarding deployment to traffic incidents, scene safety, situational awareness, and traffic control for highway/roadway emergency work zones*
- *Ensure that all members receive training for conducting emergency operations at highway/roadway incidents*
- *Ensure that a continuous scene size-up is conducted and risks are continuously assessed and managed throughout a highway/roadway incident*

Additionally, the Illinois State Fire Marshal's Office should consider:

- *Developing and implementing curriculum for the fire service on traffic incident management (awareness level).*

For further information, visit the program Web site at www.cdc.gov/niosh/fire or call toll free 1-800-CDC-INFO (1-800-232-4636).

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Introduction

On March 5, 2013, a 39-year-old male volunteer fire fighter (victim) was struck and killed by an enclosed car hauler with trailer on an interstate highway. On March 7, 2013, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On April 8 – 11, 2013, an investigator from the NIOSH Fire Fighter Fatality Investigation and Prevention Program traveled to Illinois to investigate this incident. The NIOSH investigator met with representatives of the victim's volunteer fire department, the victim's career department (see ***Note*** below), and state law enforcement involved with this incident. During the investigation, witness statements were reviewed and interviews were conducted with the fire fighters, fire officers, and state law enforcement personnel who responded to this incident. The NIOSH investigator also reviewed the fire department's standard operating guidelines (SOGs), department and state training requirements, and the training records of the victim and the Incident Commander (IC). The victim's turnout gear was inspected and photographed; the incident scene was visited and photographed; and the investigator reviewed incident scene photographs, videos, fire ground dispatch tapes, and area maps. The NIOSH investigator traveled to the Illinois Fire Service Institute to discuss the state fire training requirements.

Fire Department

The victim was a member of a volunteer fire department for 3 years. The volunteer fire department, serves a population of approximately 2,200 residents within an area of about 54 square miles has 2 stations with 29 uniformed members. The department consists of the fire chief, 2 assistant chiefs – 1 EMS and 1 Fire, 3 captains, 4 lieutenants, 14 fire fighters, and 5 paid emergency medical technicians – basic (EMT-B). With the exception of the five paid EMT-Basic members, the uniform members of the department are volunteers. The volunteer fire department provides a paid basic life support (BLS) ambulance staffed daily by two career emergency medical technicians – basic. The fire department currently operates 3 engines, 1 tender, 1 basic life support ambulance, 1 dive unit, a MABAS (Illinois Mutual Aid Box Alarm System) "Air Supply" vehicle, and 2 dive boats.

In 2011, the fire department responded to 185 incidents; in 2012, the fire department responded to 187 incidents; and through April 2013, the fire department had responded to 53 incidents.

Note: *The victim also served as a career fire fighter/EMT-Intermediate (EMT-I) with a fully paid fire department since 2001 which was located in the same county. The fire department is a fully paid department, which has been operational since 1868. The department has 106 full-time firefighters, consisting of the Fire Chief, Deputy Chief of Operations, Training Officer, Public Information / Education Officer, 100 fire officers and fire fighters assigned to the Operations Division, 6 on-shift Fire Investigators - who are also full-time firefighters,1Maintenance Coordinator, and 2 clerical support staff who are civilian employees. The department operates 5 fire stations. One of the fire stations provides aircraft rescue fire-fighting (ARFF) for the commercial airport which was located in the municipality.*

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Training and Education

The State of Illinois does not have any mandatory state training requirements for volunteer fire fighters or fire officers. Each fire department or authority having jurisdiction is responsible for the implementation of training requirements of department fire fighters and fire officers. The Illinois State Fire Marshal's Office is responsible for the certification of fire fighters and fire officers.

The volunteer fire department's *Standard Operating Guidelines* (SOG) requires the following training to become or remain an active member of the fire department.

- **Fire and EMS members:** Must have minimum *Fire Fighting Essentials I* certificate, and meet NIMS (National Incident Management System) IS-100, *Introduction to ICS* requirements within the first year of membership, and have minimum of First Responder or EMT-Basic certification. Certifications must be maintained while an active member of the department. ***Note:*** *The Fire Fighting Essentials I course consists of 16 hours of instruction. This is the first class of a series laying the foundation for basic fire-fighting skills and "hands on" activities of a first responder, beginning with personal safety, fire behavior, the "hands-on" fundamentals of using self-contained breathing apparatus (SCBA), ladder raising, and climbing skills as well as hose loads and advances. A portion of the class deals with the rudimentary principles of pumping apparatus for the purpose of maintaining an adequate fire stream. Although thorough in its scope, this should be considered a starting point for fire departments with a young and inexperienced roster. This course is offered through the Illinois Fire Service Institute's "Cornerstone Program".*
- **Fire only members:** Must have minimum *Fire Fighting Essentials I* certificate and complete NIMS (National Incident Management System) IS-100, *Introduction to ICS* and IS-700, *National Incident Management System* requirements within first year of membership. Certifications must be maintained while an active member of the department.
- **EMS only members:** Must have minimum EMT-Basic certification and complete NIMS (National Incident Management System) IS-100, *Introduction to ICS* and IS-700, *National Incident Management System* within first year of membership. Certifications must be maintained while an active member of the department.
- **Line officers (lieutenant):** Must meet the "Fire" requirements and complete IS-200, *Basic ICS* and IS-800B, *National Response Framework, An Introduction* within the first year of appointment.
- **All other Officers:** Must meet "Fire" requirements and complete IS-200, *Basic ICS*; IS-300, *Intermediate ICS*; IS-400, *Advanced ICS*; IS-800B, *National Response Framework, An Introduction;* and IS-804, *Emergency Support Function (ESF) #4 – Firefighting* within the first year of appointment.

The victim had successfully completed the following certifications for a career fire fighter as required by the Illinois State Fire Marshal's Office:

- Fire Fighter II and Fire Fighter III; ***Note:*** *The State of Illinois Fire Fighter II certification is equivalent to the National Fire Protection Association (NFPA) Fire Fighter I and the State of Illinois Fire Fighter III certification is equivalent to the NFPA Fire Fighter II as specified in NFPA*

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1001 Standard for Fire Fighter Professional Qualifications.[1] *NFPA Fire Fighter I reflects minimum training standards for a fire fighter who is always working under supervision. NFPA Fire Fighter II addresses the assumption of command and transfer of command but does not contain specific job performance requirements to illustrate the required skills.*

- Hazardous Materials Awareness and Hazardous Materials Operations;
- Hazardous Materials Technician "A"; Hazardous Materials Technician "B"; and Hazardous Materials Incident Command;
- Fire Apparatus Engineer;
- Airport Rescue Fire-Fighting through the University of Missouri;
- Airport Fire Fighter, NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications* - International Fire Service Accreditation Congress through the South Carolina Fire Academy;

The victim had also completed the following classes:

- Emergency Response to Terrorism - Basic Concepts; Technical Rescue Awareness; Fire Service Instructor I; Fire Officer I – Fire Prevention Principles;

The victim was certified by the State of Illinois Department of Health as an Emergency Medical Technician, Intermediate (EMT-I);

Equipment and Personnel

The following units responded to the initial multi-vehicle incident on the first alarm or were special called.

Resource Designation	Staffing	Time Dispatched	Time On-Scene	Alarm
Car 100	Fire Chief	2142	2150	1st Alarm
Engine 102	Assistant Chief, Lieutenant, Engineer, 3 Fire Fighters	2142	2158	1st Alarm
3N85 (Ambulance)	2 EMTs	2142	2154	1st Alarm
Utility 105 (SUV)	1 Captain/PM 3 Fire Fighters	2155	2206	Special Called

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Illinois State Police Unit 6-32	1 Trooper	2142	2152	Initial Dispatch
Mutual Aid 3N68 (Medic Unit)	1 EMT, 1 Paramedic	2230	2245	Special Called
Mutual Aid 3N23 (Ambulance)	2 EMTs	2232	2245	Special Called
Mutual Aid 1V26 (Ambulance)	2 EMTs	2233	2255	Special Called
Engine 103	2 Fire Fighters	2230	2244	Special Called
Squad 106	2 Fire Fighters	2318	2324	Special Called

Timeline

This timeline is provided to set out, to the extent possible, the sequence of events according to recorded radio transmissions. Times are approximate and were obtained from review of the dispatch records, witness interviews, and other available information. Times have been rounded to the nearest minute. NIOSH investigators have attempted to include all radio transmissions. This timeline is not intended, nor should it be used, as a formal record of events.

Incident Conditions	Time	Response & Incident Operations
March 5, 2013		
Incident received by 911 at the County Communication Center.	**2140 Hours**	

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Incident Conditions	Time	Response & Incident Operations
Updated information from the County Communication Center; "2 trucks involved, one is a semi-trailer; one truck is on its side, which was northbound; the other truck which was southbound, is on its side."	2141 Hours	
Fire Department dispatched for "Accident with Injuries" on the interstate.	2142 Hours	
	2144 Hours	Ambulance 3N85 enroute.
	2145 Hours	Car 100 enroute.
	2149 Hours	Engine 102 enroute.
	2150 Hours	Car 100 on scene and assuming "Command".
"Command" advises that 3 semi-trucks are involved; checking for injuries; location of the incident is I39 southbound at Mile Marker 6;	2151 Hours	
	2154 Hours	Ambulance 3N85 on scene.
	2155 Hours	Utility 105 enroute.
	2158 Hours	Engine 102 on scene.
	2206 Hours	Utility 105 on scene; parked in the left southbound lane located approximately ¾ - 1 mile from incident, blocking traffic.
	2217 Hours	Ambulance 3N85 transported one patient (pick-up driver) to the regional medical center from the initial incident.

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Incident Conditions	Time	Response & Incident Operations
	2221 Hours	"Command" is beginning to clear units from the initial incident; "Command" moves Utility 105 to the incident scene behind an Illinois State Police vehicle (ISP Unit 6-32) in the left southbound lane.
"Command" advises the County Communication Center that fire department vehicles have been hit by a semi-trailer.	2229 Hours	
County Communication Center dispatches Medic Unit 3N68 and Ambulance 3N23.	2230 Hours	"Command" initiated a PAR of all fire department units of scene.
"Command" requested 3rd ALS Unit.	2233 Hours	Medic Unit 3N68 and Ambulance 3N23 enroute to incident scene.
	2239 Hours	Ambulance 3N85 arrived at regional medical center.
	2241 Hours	Ambulance 1V26 was enroute to incident scene.
"Command" advises Utility 105 has one fire fighter in critical condition and two other fire fighters injured.	2244 Hours	All southbound lanes of I39 are closed per "Command".
"Command" requests that the County Communications Center notify the local hospital of the trauma patients being transported to their location.	2245 Hours	Medic Unit 3N68 and Ambulance 3N23 on scene.
	2253 Hours	Medic Unit 3N68 transporting victim to the regional medical center.
	2255 Hours	Ambulance 1V26 on scene.
	2259 Hours	Ambulance 3N23 enroute to the regional medical center and transported 1 fire fighter from Utility 105.

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Incident Conditions	Time	Response & Incident Operations
	2306 Hours	Ambulance 1V26 enroute to regional medical center transported 1 fire fighter from Utility 105.
	2318 Hours	Car 100 transferred "Command" to Engine 102"B"; Car 100 enroute to regional medical center.
	2322 Hours	Medic Unit 3N68 and Ambulance 3N23 arrived at regional medical center.
	2325 Hours	Ambulance 1V26 arrived at regional medical center.
MARCH 6, 2013	0000 Hours	Ambulance 3N85 dispatched back to the incident scene.
	0005 Hours	Ambulance 3N85 on scene.
	0010 Hours	Car 100 at regional medical center.
	0025 Hours	Ambulance 3N85 transported 3fire fighters from Engine 102 to regional medical center.
	0038 Hours	Ambulance 3N85 arrived at regional medical center.
"Command" is terminated; all units clearing the incident scene.	0202 Hours	
Car100 is available; incident closed.	0407 Hours	

Personal Protective Equipment

At the time of the incident, the victim was wearing full turnout gear which included turnout coat, turnout pants, structural fire-fighting boots, flame retardant hood, structural fire-fighting gloves, and helmet. The only personal protective equipment inspected was the turnout coat, which was viewed at the county coroner's office. No other turnout gear was available for inspection. ***Note:*** *The personal protective equipment worn by the victim was not considered to be a contributing factor to this incident.*

Weather and Road Conditions

The weather at the time of the crash with the car hauler and Utility 105 (2229 hours CST) was light snow with a temperature of 26 degrees Fahrenheit (26°F) with a wind chill factor of approximately 11

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degrees Fahrenheit (11°F). The wind was NNW at 24 mph with gusts between 32 – 34 mph. The barometric pressure was 29.97 inches. Visibility was approximately 2 miles.[2]

The roadway was concrete surfaced interstate highway with 2 lanes in each direction (northbound and southbound). The Federal-Aid Highway Act of 1956 called for uniform geometric and construction standards for the interstate system. The standards were developed by the state highway agencies, acting through the American Association of State Highway and Transportation Officials (AASHTO) and adopted by the Federal Highway Administration. The standards are included in the AASHTO publication - *A Policy on Design Standards -- Interstate System* available from the AASHTO web site. This interstate highway meets the standards for the interstate system which include full control of access, design speeds of 50 to 70 miles per hour (depending on type of terrain), a minimum of two travel lanes in each direction, 12-foot lane widths, 10-foot right paved shoulder, and 4-foot left paved shoulder.[3] The posted speed limit for the section of the interstate where the crash occurred was 65 mph. The minimum median width is 36 feet (11 m) in rural areas, and 10 feet (3.0 m) in urban or mountainous areas. In accordance with the current edition of AASHTO's *Roadside Design Guide*, to prevent median-crossing accidents, guardrails or Jersey barriers should be installed in medians based on traffic, median width, and crash history. When possible, median openings between parallel bridges less than 30 feet (9.14 m) in width should be decked over; otherwise barriers or guardrails should be installed to exclude vehicles from the gap. Currently, cable median barriers are being installed on busier Interstate Highways in rural areas regardless of median width.[3]

The road conditions at 2229 hours were ice and snow on the highway.

Investigation

On March 5, 2013 at 2140 hours, a County Communication Center received a 911 call reporting a motor vehicle crash on an interstate highway. At 2142 hours, the local fire department was dispatched to the incident which was reported to be located at Mile Marker 6 in the southbound lane of the interstate. Two trucks were reported to be involved in the motor vehicle crash with one of the trucks being a tractor trailer. The initial response from the fire department included Ambulance 3N85, Car 100 - who responded from his home, and Engine 102. This incident resulted when a tractor trailer, which was headed southbound, struck a pick-up truck pulling a gooseneck trailer containing car parts. The pickup and the gooseneck trailer were going northbound when the driver of the pick-up lost control, the trailer separated from the pick-up truck, and the trailer overturned in the median. The pickup truck was struck by the tractor trailer and stopped on the right shoulder of the southbound lane.

Car 100 responded from his home and was the first fire department resource on scene. Car 100 arrived on scene and assumed “Command”. Car 100 advised the County Communication Center that a tractor trailer had jackknifed in the median of the interstate. The gooseneck trailer was in the median and the pick-up truck was off the interstate on the right side of the southbound lane. “Command” advised the dispatcher that there were minor injuries at this incident. Ambulance 3N85 and Engine 102 arrived on scene as well as an Illinois State Police (ISP) trooper. (**See Diagram 1.)**

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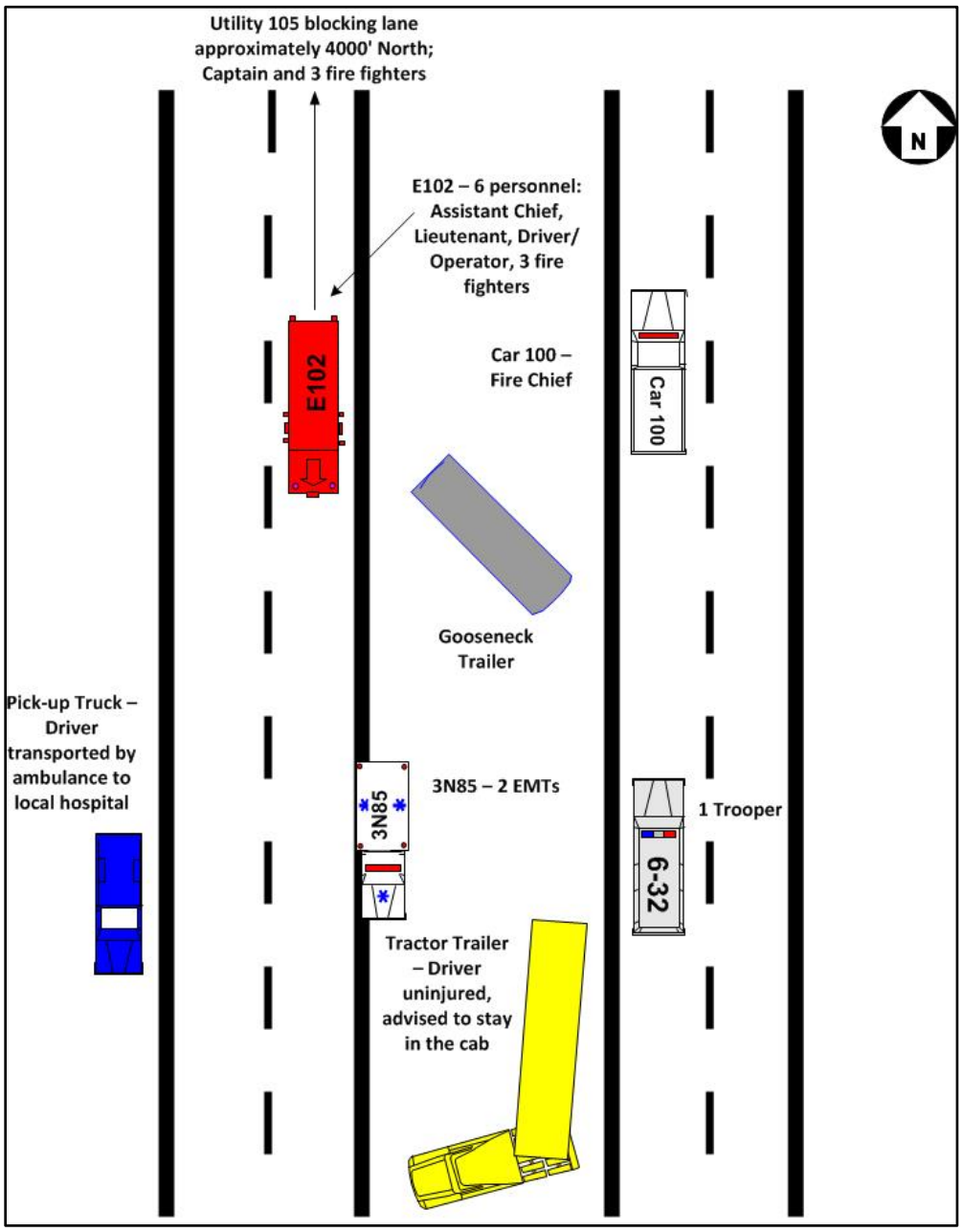

Diagram 1. The initial crash scene involving a tractor trailer and a pick-up truck pulling a gooseneck trailer full of car parts. The approximate time was 2210 Hours.

Utility 105 responded to the incident at 2155 hours and arrived on scene at 2206. Utility 105 responded northbound through town and entered onto the interstate at the next exit north of the crash scene. Utility 105 headed southbound. "Command" requested Utility 105 be parked in the left southbound lane approximately ¾ of a mile from the incident scene to slow traffic approaching the

crash scene due to the grade of the highway. Due to a sloping grad, the accident scene would be visible until after starting down the slight grade. Utility 105 was a sports utility vehicle (SUV) that was staffed with a captain and 3 fire fighters. The victim was riding in the left rear seat of vehicle. All personnel exited Utility 105 and stood in the median. Members of Utility 105 described the weather as blowing snow with a wind speed of approximately 25 mph. They also stated the highway was very slick.

At 2217 hours, the driver of the pick-up was transported to the regional medical center by Ambulance 3N85. The driver of the tractor trailer was uninjured and advised to stay in the cab of his truck. After discussion with the Illinois State Police trooper and the officer of Engine 102, "Command" began to demobilize resources. The plan was to clear all units except Engine 102. "Command" called Utility 105 and asked them to pull up to the incident scene behind the Illinois State Police vehicle (ISP Unit 6-32). The state trooper had moved his vehicle from the northbound lane to the southbound earlier in the incident. The officer (captain) got everyone back in Utility 105 and moved up to the incident scene. Utility 105 was parked behind the Illinois State Police trooper's vehicle in the left lane of the southbound lane of the interstate. This allowed on-coming traffic to see the warning lights of Utility 105. The officer of Utility 105 got out of the vehicle and went to meet "Command" who was standing in the median of the interstate near Engine 102 with the assistant chief of the fire department. The assistant chief was riding the right front seat of Engine 102. They were discussing the incident as the lieutenant riding on Engine 102 (right jump seat) was getting information from both trucks for insurance purposes. (**See Diagram 2.**)

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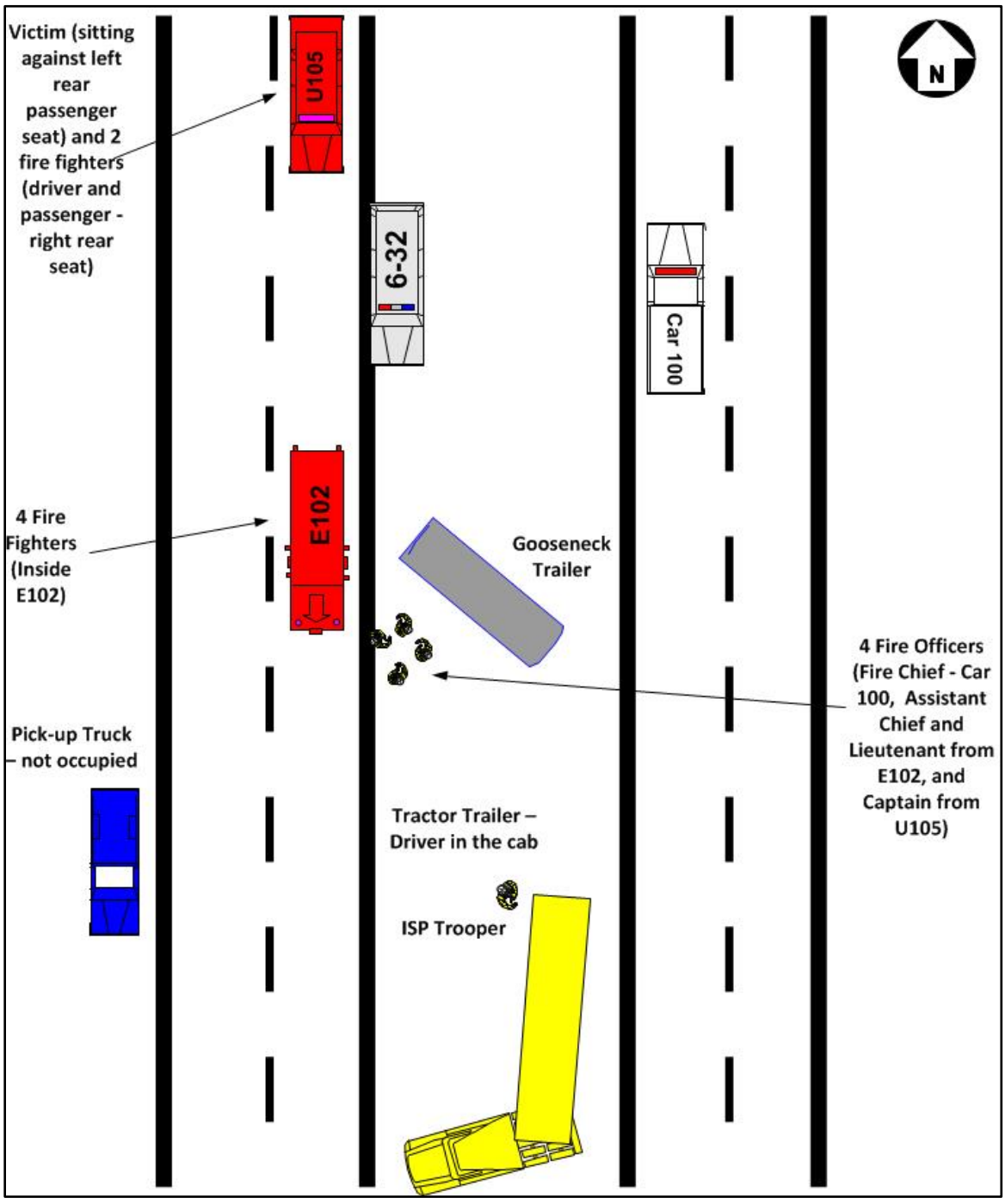

Diagram 2. The incident scene after "Command" moved Utility 105 to the scene and the location of the fire fighters. The approximate time was 2226 Hours.

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Once this task was completed, the lieutenant went into the median to meet with "Command", the assistant chief, and the officer of Utility 105. At approximately 2228 hours, the assistant chief looked at the traffic approaching southbound on the interstate. He shouted for everyone to run as a trailer truck (the car hauler) was sliding towards them, unable to stop. (**See Photo 1.**)

Photo 1. Car hauler similar to the type that struck Utility 105, the Illinois State Police vehicle, and Engine 102 on the interstate.
(**Source: World Wide Web**)

At this time, two fire fighters were seated inside Utility 105. The victim was leaning against the rear passenger seat on the driver's side of Utility 105 with the door open. There were four fire fighters

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inside the cab of Engine 102. The remaining members of the fire department were standing in the median and started to run south.

As the car hauler struck Utility 105, the victim stood up. The members in the median witnessed four distinct crashes: the car hauler struck Utility 105, the car hauler struck the Illinois State Police vehicle, Utility 105 crashed into E102, and then the car hauler struck E102. (**See Photo 2 and Photo 3.**)

Photo 2. The extensive damage to Engine 102 after being struck by the car hauler on the interstate. This picture was taken the next day at the towing company where Engine 102 was stored.
(Photo courtesy of the fire department)

At 2229 hours, "Command" contacted the County Communications Center and advised them that the fire department vehicles had been struck by a tractor trailer (car hauler) and requested two ALS medic units. At 2230 hours, The County Communications Center dispatched Medic Unit 3N68 and Ambulance 3N23. "Command" initiated a personnel accountability report (PAR). The assistant chief went to Engine 102 to check on the four fire fighters. The crash had moved Engine 102 about 25 - 35 feet. All four fire fighters were conscious and alert. The driver/operator of Engine 102 had been wearing his seatbelt.

The other three fire fighters were not belted. All four fire fighters got out of Engine 102 to search for the crew of Utility 105. Utility 105 was pushed into the median between the gooseneck trailer and the car hauler. "Command" was trying to locate the victim. The victim was located by a state trooper and

was unresponsive. The victim was found on the left shoulder of the left southbound lane lying face down where Utility 105 had been parked before the crash. (**See Diagram 3**.)

Photo 3. The damage to Utility 105 caused by the crash and the extrication of the two fire fighters.
(Photo courtesy of the fire department)

The lieutenant from Engine 102 and an Illinois State Police trooper started CPR on the victim. The officer from Utility 105, who was also a paramedic, initiated advanced life support. The victim was transferred to Medic Unit 3N68, which arrived on scene at 2245 hours, and then transported to the regional medical center at 2253 hours. Medic Unit 3N68 arrived at the regional medical center at 2322 hours. Despite advanced life support performed for over 70 minutes, the victim was unable to be revived. He was pronounced dead at 2338 hours by the attending physician and resuscitation efforts were stopped.

The four fire fighters from Engine 102 extricated the two fire fighters from Utility 105. "Command" had requested two ambulances to transport the fire fighters from U105. Ambulance 1V26 and Ambulance 3N23 responded to the scene. One fire fighter was transported by Ambulance 3N23 and the other fire fighter by Ambulance 1V26. Both fire fighters were transported to the regional medical center. The four fire fighters from Engine 102 were eventually transported to the regional medical center for medical evaluation.

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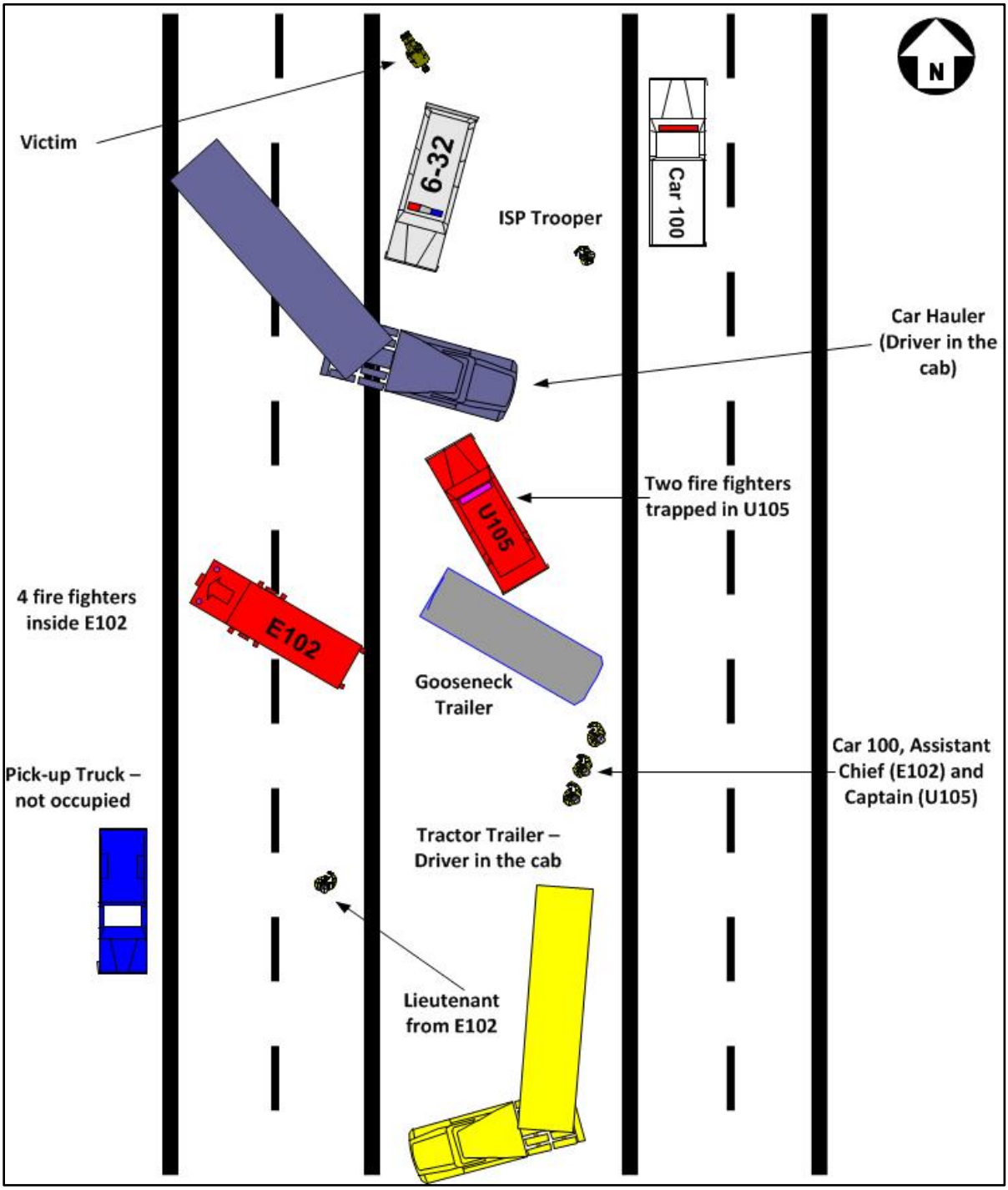

Diagram 3. The location of the victim and vehicles after the car hauler struck Utility 105, the ISP vehicle, and Engine 102. The approximate time was 2230 Hours.

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Car 100 transferred "Command" to Engine 102B when he went to the regional medical center to check on the status of the injured fire fighters. "Command" was terminated at 0202 hours on March 6, 2013.

Contributing Factors
Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. NIOSH investigators identified the following items as key contributing factors in this incident that ultimately led to the fatalities:

- Actions of the driver of the commercial car carrier
- Weather
- Grade of the interstate highway
- Inadequate protection of the highway/roadway work area
- Inadequate traffic management

Cause of Death
According to the autopsy report, the medical examiner listed the victim's cause of death as multiple blunt force injuries due to being struck by a tractor trailer truck.

Recommendations
Recommendation #1: Develop pre-incident plans regarding deployment to traffic incidents, scene safety, situational awareness, and traffic control for highway/roadway emergency work zones.

Discussion: Highway/Roadway incidents are high risk events regardless of the frequency in which they occur. When responding to an incident on any type of highway/roadway, fire fighters and other first responders must ensure their personal safety as well as the safety of others including the individuals they are trying to assist and help. Complacency, redundancy, and lack of situational awareness are issues that all responders must avoid when dealing with highway/roadway incidents. Safety of the emergency responders, care of the injured, protection of the public, protection of the environment, and clearance of the traffic lanes should all be the priority concerns of the Incident Commander operating at the scene of a highway/roadway incident.[4]

Fire departments respond to various types of highways/roadways in their response areas. Examples can be a city street (2 or 4 lanes), a county road (2 or 4 lanes), a divided highway (4 lanes), an expressway, a freeway, a turnpike, or an interstate which are commonly known as limited access highways or controlled access highways. Fire departments should plan how and what resources to deploy to these various types of highways/roadways.

From a pre-incident planning process, fire departments should consider the type of responses that may occur on these various highways/roadways such as motor vehicle crashes, vehicle fires, brush fires,

hazardous materials incidents, and any other conceivable type of incident. The intent is to plan on what resources will respond in order to mitigate the problem that has occurred and how to safely protect fire fighters and other first responders.[5]

The primary objectives for any operation at the scene of a highway incident are to:

- establish a safe operating area to prevent injuries to emergency workers,
- provide emergency care and transportation of the sick or injured,
- establish water supply, as needed,
- protect the environment,
- restore normal traffic flow, as soon as possible,
- keep as many traffic lanes open as possible, but **ONLY** if it is safe for first responders to do so,
- preserve evidence for investigators,
- utilize the Incident Command System to manage the incident.[6]

These objectives also are included in the National Unified Goal (NUG) for Traffic Incident Management, which was developed by the National Traffic Incident Management Coalition.[7]
The primary objective is to protect the first responders in order to allow them to safely operate at the incident scene. This process starts with the first arriving officer making the decision as to what lanes to close or if the highway/roadway needs to be completely closed. This is based upon the risk assessment for ensuring that first responders have a safe work area to operate.

All responders should understand and appreciate the high risk they are exposed to when operating in or near moving vehicle traffic. At every highway/roadway-related emergency scene, personnel are exposed to passing motorists of varying driving abilities. Situational awareness can be defined as genuinely heightened consciousness or cognizance of what is currently developing or occurring around you. It is crucial that first responders maintain good situational awareness during all emergencies, especially highway/roadway incidents, to better protect themselves and those around them.

All responders operating at highway/roadway incident should be wearing hi-visibility vest even with turnout gear. The use of the turnout gear (coat and pants) and a hi-visibility vest provide responders with additional hi-visibility retro-reflective striping and trim. To meet minimum requirements for high visibility apparel, responders should only use vests that meet a Class II requirement of ANSI/ISEA 107-2010 (or subsequent revisions) or the requirements of ANSI/ISEA 207-2006 for Public Safety Vests. These minimum requirements include:
1) use of fluorescent background material,
2) the fluorescent material may be yellow-green, orange-red, or red,
3) retro-reflective material arranged for 360 degree visibility,

4) the garments should be labeled as compliant with ANSI/ISEA 107-2010 or ANSI/ISEA 207-2006. *Federal Regulation 23 CFR 634* states, "The purpose of the regulations in this part is to decrease the likelihood of worker fatalities or injuries caused by motor vehicles while working within the right-of-way on Federal-aid highways."

NFPA 1500, Chapter 8.7.10 states, "When members are operating at a traffic incident and their assignment places them in potential conflict with motor vehicle traffic, they shall wear a garment with fluorescent and retro-reflective material visible from all directions". [8] All responders who are not involved in fire suppression activities should be wearing ANSI compliant high visibility garments when working near moving traffic and don the retro-reflective vests during scene clean-up following extinguishment.

Fire fighters and other first responders need to be constantly reminded to use caution while operating on highways/roadways. Company officers need to remind fire fighters to exit the apparatus safely and, above all else, to keep an eye out for any potential hazards. In some cases, additional officers may be needed to provide sufficient supervision of tasks, scene safety, and scene management.

Approaching vehicles may be driven at speeds from a creeping pace to well beyond the posted speed limit. Some of these vehicle operators may be vision impaired, under the influence of alcohol and/or drugs, or have a medical condition that affects their judgment or abilities. In addition, motorists may be completely oblivious to first responders' presence due to distractions caused by cell phone use, loud music, conversation, inclement weather, and terrain or building obstructions. Approaching motorists will often be looking at the scene and not the roadway in front of them. Nighttime incidents requiring personnel to work in or near moving traffic are particularly hazardous. Visibility is reduced and driver reaction time to hazards in the roadway is slowed.[6]

To ensure that first responders maintain situational awareness, they must understand the strategy and Incident Action Plan which must be communicated from the Incident Commander at the beginning of the incident and maintained throughout duration of the incident. This ensures for effective strategic, tactical, and task level management, plus all tasks being conducted are moving towards a successful outcome for the incident. At highway/roadway incidents, maintaining situational awareness is essential due to the potential for something to go wrong very quickly. Each first responder is responsible for their safety plus the personnel they are working with at an incident. Situational awareness protects against complacency and tunnel vision. The operations at a highway/roadway incident must be reassessed continuously, especially as incident objectives are met, additional resources arrive, and resources are released from the incident.[4]

Safety Benchmarks

Emergency personnel are at great risk while operating in or around moving traffic. The following approaches can be taken to protect yourself and all crewmembers:

- never trust the traffic;

- engage in proper blocking procedures (which means using the positioning of fire apparatus as a protection barrier for fire fighters and other first responders when working on a highway/roadway);
- wear high visibility reflective vests including turnout gear (as necessary);
- reducing white lights and warning lights at nighttime (to prevent possible motorist vision impairment);
- use traffic cones and flares.[6]

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, Paragraph 8.7.7 states, "the first arriving officer shall ensure that traffic is controlled before addressing the emergency operations".[8] The first arriving officer must conduct a complete and thorough scene size-up to determine the risk to the fire fighters, police officers, and other first responders working at an incident.

Additionally, all emergency vehicles need to be located on one side of the highway/roadway versus both sides. Having all emergency vehicles on both sides of the highway increases the chances of a secondary collision involving these vehicles.

This incident happened during a very vulnerable time for the fire department – when resources were being demobilized. The Incident Commander established an Incident Action Plan that enabled the incident to be stabilized in a very short time frame. Two key factors in the process were the weather and highway conditions. Some options for the Incident Action Plan would have been to leave the two vehicles involved in the initial crash in place until weather and road conditions improved or close the interstate until both vehicles were removed.

Recommendation #2: Ensure that all members receive training for conducting emergency operations at highway/roadway incidents.

Discussion: With the development and implementation of any new policy, standard operating procedure, or regulation, one of the essential elements is to ensure that training occurs. The intent is to provide a comprehensive training program for all members to understand the policy, standard operating procedure, or regulation and to alleviate any confusion, misinterpretation, or misunderstanding. Most importantly, the training program will detail how to safely operate at a highway/roadway incident.

The Emergency Responder Safety Institute/Cumberland Valley Volunteer Firemen's Association, offers a curriculum titled "Managing Emergency Incidents on the Roadway".[9] This is an eight-hour course that covers the following topics: fire fighter fatality and injury statistics related to highway/roadway incidents; case studies dealing with fire fighter fatalities, injuries, and near misses; types and use of personal protective equipment; federal regulations (e.g., Section 6I, "*Control of Traffic through Traffic Incident Management Areas*" of the Manual on Uniform Traffic Control Devices);[10] positioning of apparatus and emergency vehicles; safety procedures for operations on highway/roadways; use of traffic signs and warning devices; use of the Incident Command System

including Unified Command; pre-incident planning with law enforcement, state/local department of transportation, emergency medical services, tow and recovery operators, and product recovery contractors; and table top exercises. This training program is available at no cost through ResponderSafety.com which is located at http://www.respondersafety.com.

All fire fighters must understand the risks involved when conducting emergency operations on any highway/roadway. The intent is to identify the risks and reduce the hazards encountered by fire fighters and first responders at highway/roadway incidents. The critical factors that influence the outcome of an incident include scene size-up, continuous risk assessment, an estimate of the duration of the incident, determination to close lanes of traffic, the necessary support to safely operate on the highway/roadway during inclement weather, and proper warning devices to effectively control traffic. The training process will allow for members to determine the correct course of action at an incident scene including the proper staffing, appropriate agencies needed to respond, a proper strategy and Incident Action Plan (tactical priorities), and deployment of resources to effectively control traffic until the situation has been completely mitigated.

Training is essential element to the successful outcome of any emergency incident, especially those dealing with highway/roadway incidents. As the fire department conducts training on highway incident management, all the components of the tactical priorities must be included in the training. The tactical priorities are:

- Establish Command and Communications
- Establish a Safe Work Zone
  - ✓ Responder Safety
  - ✓ Scene Safety
  - ✓ Traffic Safety
- Incident Mitigation
- Facilitate Investigation/Evidence Protection
- Vehicle/Debris/Cargo Removal
- Incident Demobilization/Termination[11]

At this incident, additional factors that contributed to this fatality included inclement weather and poor highway driving conditions, the grade of the highway prior to reaching the incident scene, and the inattention of the driver of the car hauler. ***Note:*** *The driver of the car hauler was cited by the Illinois State Police. The Illinois State Police are continuing their investigation*. One option would have been to keep Utility 105 in its original position to maintain an advanced warning area for the work area (incident scene). The advanced warning area is essential to prevent traffic from coming upon an incident scene. (**See Appendix 1**).

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Recommendation #3: Fire departments should ensure that a continuous scene size-up is conducted and risks are continuously assessed and managed throughout a highway/roadway incident.

Discussion: It's important for all emergency responders to remember that things can go very wrong very quickly at roadway emergency incidents. Fire departments need to ensure that multiple prevention strategies are in place and emergency responders must maintain an awareness to what is going on around them at all times. Fire departments should train members on how to identify and pre-plan an escape strategy should they encounter a dangerous situation such as an errant vehicle entering the emergency work zone.

Situational awareness can be described as a genuinely heightened consciousness or cognizance of what is currently developing or occurring. Being alert to what is going on around a roadway emergency incident is extremely critical because roadway incidents are always high risk events. Complacency, redundancy, and lack of situational awareness are issues that all responders must avoid. When responding to a roadway emergency incident, fire fighters and other first responders must ensure their personal safety, as well as the safety of individuals they are trying to assist. Emergency personnel need to develop a heightened sense of awareness to detect impending dangerous situations and recognize warning signals such as screeching tires, horns, smoke or dust, and the sound of a crash or impact. Responders need to do a quick survey of the location where they are working and mentally prepare an escape strategy.[11]

The speed of approaching traffic may be anywhere from a creeping pace to well beyond the posted speed limit. Some of these drivers may be vision impaired, be under the influence of alcohol and/or drugs, or have a medical condition that affects their judgment or abilities. Also, motorists may be completely oblivious to your presence due to distractions caused by cell phone use, loud music, conversation, inclement weather, terrain, and/or building obstructions. Approaching motorists will often be looking at the scene and not the roadway in front of them. Nighttime incidents requiring personnel to work in or near moving traffic are particularly hazardous. Visibility is reduced and driver reaction time to hazards in the roadway is slowed.[11]

At this incident, the defined tactical priorities of the incident confirmed each fire department company or unit that a continuous size-up was conducted and the risks continuously assessed. Utility 105 was located in the left southbound lane of the highway approximately ½ - ¾ mile from the incident to warn motorists of the crash scene. The officer and fire fighters of Utility 105 exited the vehicle and moved to the median. This allowed them to conduct a continuous assessment of the oncoming traffic. Engine 102 was blocking traffic in the left southbound lane also protecting the incident scene and Ambulance 3N85. The Incident Commander and the assistant chief were in the median monitoring traffic approaching the incident scene. Once the Incident Commander started to demobilize the incident, Utility 105 was moved to the original crash scene. The officer of Utility 105 went to meet with the Incident Commander. Two fire fighters stayed in Utility 105 and the victim was leaning against the rear passenger seat on the driver's side of Utility 105 with the door open. One option

could have been for the three fire fighters to have moved to the median, away from Utility 105 until they were leaving the incident scene.

Recommendation #4: Fire departments should ensure that SOPs/SOGs include guidance on how to properly demobilize highway/roadway emergency incidents.

Discussion: The Manual on Uniform Traffic Control Devices (MUTCD) provides direction for establishing a protected work area for persons working along roadways, including emergency work zone responders. Chapter 6I provides instruction on the "Control of Traffic through Traffic Incident Management Areas" which is defined as "an area of a highway where temporary traffic controls are installed, as authorized by a public authority or the official having jurisdiction of the roadway, in response to a road user incident, natural disaster, hazardous material spill, or other unplanned incident." Traffic incidents are divided into three general classes – major, intermediate, or minor according to the duration, with each having unique traffic control characteristics and needs. A minor traffic incident has an expected duration of 30 minutes or less and typically results in lane closure of less than thirty minutes. MUTCD Section 6I.04.02 states, "Diversion of traffic into other lanes is often not needed or is needed only briefly. It is not generally possible or practical to set up a lane closure with traffic control devices for a minor traffic incident".[10]

MUTCD Chapter 6G discusses temporary traffic control (TTC) zone activities which are organized according to duration, location, type of work, and highway type. Work duration is a major factor in determining the number and types of devices used in short duration." The guidelines for operations of short duration explains, "Appropriately colored or marked vehicles with rotating/strobe lights may be used in place of signs and channelizing devices for short duration. According to the MUTCD, short-duration work often takes longer to set up and remove the TTC zone than to perform the work. Workers face hazards in setting up and taking down the TTC zone. Also, since the work time is short, delays affecting drivers are significantly increased when additional devices are installed and removed. Considering these factors, simplified control procedures may be warranted for short-duration work. A reduction in the number of devices may be offset by the use of other more dominant devices such as high-intensity rotating, flashing, oscillating, or strobe lights on work vehicles".[10]

Equally important to properly establishing or setting up a TTC zone and associated traffic control is safely releasing resources and demobilizing the scene. This activity includes demobilizing and releasing equipment, personnel, and response vehicles. All responders must exercise care when demobilizing, particularly if other responders remain present. In order to maintain safety, the Incident Commander must be notified of any responders departing the scene and the equipment or response vehicles that will be removed with them. Once any victims, crashed vehicles, spills, and associated debris have been removed, the Incident Commander must also monitor and control scene demobilization while recognizing the dangers of changing conditions and traffic returning to normal flow, oftentimes at high speeds. This is especially important for scene demobilization during nighttime or reduced visibility conditions. ***It is very important to demobilize the scene from the termination area backwards to the advance warning area***.[12]

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Other important scene demobilizing considerations:

- Temporary traffic control or blocking may be required for responder departure (e.g., ambulances, towing and recovery).
- As responders depart, be aware that other responders may still be present.
- Blocking vehicles (e.g., fire apparatus, law enforcement vehicles, department of transportation vehicles) may no longer be present and the "safe" area may no longer be intact. Never turn your back to traffic and always watch for errant vehicles entering the scene.
- Frustrated motorists who have been delayed by the incident may be particularly aggressive and drive at higher speeds or weave into lanes that appear to be open.
- If possible, position a vehicle with its emergency vehicle lighting activated upstream of responders who are removing traffic control devices.

At the completion of any incident, the Incident Commander must ensure for the safety of the responders who remain on scene. When an incident scene has been fully cleared and all on-scene response is complete, the Incident Commander should ensure that the appropriate agencies (including communications/dispatch centers) have been notified that the roadway is open.[12] **(See Appendix 2).**

At this incident, the Incident Commander started the demobilization process after conferring with law enforcement officers and other fire officers. This occurred once Ambulance 3N85 transported the pickup driver to the hospital. The demobilization plan was to leave Engine 102 on scene until the pickup truck, gooseneck trailer, and the tractor trailer could be removed from the scene.
At this incident, one option would have been to keep Utility 105 in its original position to maintain an advanced warning area for the work area (incident scene). The advanced warning area is essential to prevent traffic from coming upon an incident scene. Once the crash scene was cleared, the demobilization could have started from the work area (incident scene) backwards to the advance warning area.[12]

Additionally,
Recommendation #5: The Illinois State Fire Marshal's Office should consider developing and implementing curriculum for the fire service on traffic incident management (awareness level).

Discussion: The Illinois State Fire Marshal's Office is responsible for developing and implementing curriculum for the fire service in the state of Illinois. Since the operations on a roadway/highway are high risk events regardless of the frequency, a standard curriculum should be developed and implemented which addresses traffic incident management at the awareness level. This curriculum should be required for completion by all fire fighters and fire officers in every fire department in the state of Illinois.

The curriculum should include scene size-up and continuous assessment, the appropriate use of personal protective equipment, appropriate use of high visibility reflective vests, warning signals, temporary traffic control devices, vehicle lighting, apparatus and vehicle placement to ensure a safe

working environment while operating on a roadway/highway and the demobilization process. Most importantly, the fire fighters and fire officers clearly understand that these operations are managed and controlled using the Incident Command System.

Regardless of the severity of the incident, fire departments are encouraged to continuously critique or evaluate their operations when operating on a roadway/highway. The goal of any response is to ensure that everyone goes home the same way they arrived.

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Investigator Information

This incident was investigated by Murrey E. Loflin, Investigator, with the Fire Fighter Fatality Investigation and Prevention Program, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH located in Morgantown, WV. An expert technical review was provided by Brad Sprague, a Sergeant with the Illinois State Police and a Captain with the Minooka, IL Fire Protection District. A technical review was also provided by the National Fire Protection Association, Public Fire Protection Division.

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Additional Information

Emergency Responder Safety Institute http://www.respondersafety.com/

International Association of Fire Fighters Best Practices for Emergency Vehicle and Roadway *Operations Safety in the Emergency Services* http://www.iaff.org/hs/EVSP/guides.html

Manual on Uniform Traffic Control Devices (MUTCD) http://mutcd.fhwa.dot.gov/

National Fire Service Incident Management System, *Model Procedures Guide for Highway Incidents*, available from IFSTA/Fire Protection Publications at (800) 654-4055 or **www.ifsta.org**.

National Traffic Incident Management Coalition
http://ntimc.transportation.org/Pages/default.aspx

United States Department of Transportation, Federal Highway Administration
http://ops.fhwa.dot.gov/eto_tim_pse/about/tim.htm

United States Fire Administration, *Traffic Incident Management System*, FA-330, March 2012, **http://www.usfa.fema.gov/downloads/pdf/publications/fa_330.pdf**

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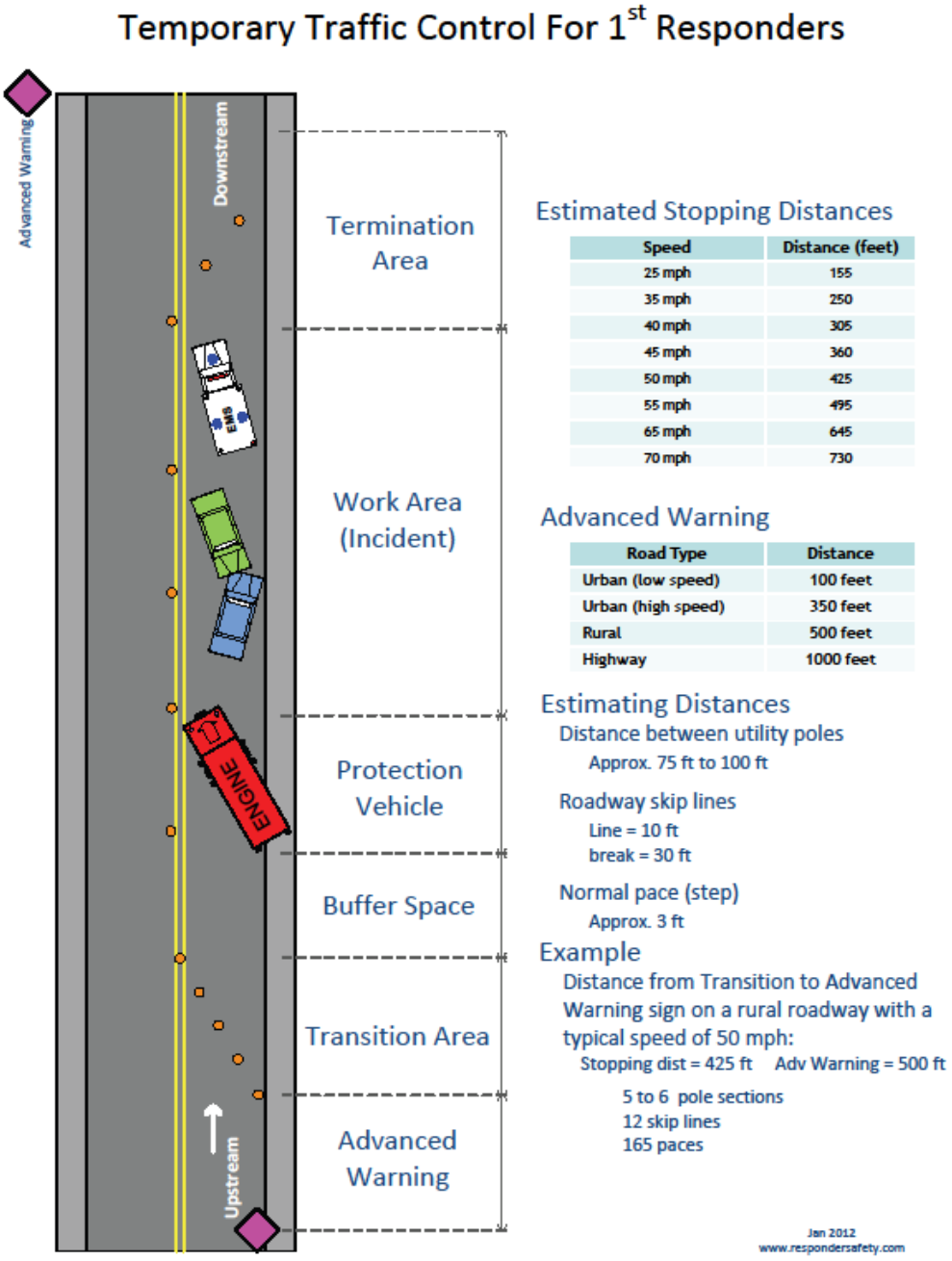
Appendix 1
Sample Traffic Control Scenario[13]



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Appendix 2
Sample Standard Operating Guideline[14]

Operations for Highway/Roadway Incidents and Safe Positioning of Fire Apparatus and Vehicles

Purpose: To provide a systematic method of conducting emergency operations at highway/roadway incidents.

Scope: These operations shall apply to, and be used by, all fire department members involved in emergency and non-emergency operations on highway/roadway incidents and by those agencies that respond to support fire department operations.

Overview: This standard operating guideline (SOG) identifies the necessary actions needed to be taken while operating at the scene of an incident on a highway/roadway. Additionally, this SOG covers vehicle positioning practices for XYZ Fire Department apparatus and emergency vehicles that provides maximum protection and safety for personnel operating in or near moving vehicle traffic.

This guideline emphasizes efforts to maintain lanes of moving traffic around the incident scene to minimize the traffic queue and the inherent probability of secondary collisions. Efforts to complete safe and efficient clearance of the incident scene in as short a timeframe as possible are recommended.

It shall be the policy of the **XYZ Fire Department** to initially position apparatus and other emergency vehicles at an incident on any street, road, highway, or expressway in a manner that best protects the incident scene while at the same time providing for traffic movement past the incident scene as much as reasonably possible. Such positioning shall afford protection to fire department personnel, law enforcement officers, tow or recovery service operators, and other emergency personnel while working in or near moving traffic.

All personnel should understand and appreciate the significant risk that personnel are exposed to when operating *in* or *near* moving vehicle traffic. First responders should always operate within a protected environment at any roadway incident.

Always consider moving vehicles as a threat to your safety. At every roadway emergency scene, personnel are exposed to passing motorists of varying driving abilities. First responders must accept that motorists approaching the incident scene on the roadway may be a “D” driver; drunk, drugged, drowsy, distracted, or just plain dumb. It is the “D” driver that may be completely oblivious to your presence due to distractions or impairments. Distracted motorists will often be looking at the scene and not the roadway in front of them where you might be operating. Assume that all approaching traffic is a “D” driver and is out to get you until proven otherwise.

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Nighttime incidents and inclement weather conditions are particularly hazardous. Visibility is reduced and driver reaction time to hazards in the roadway is slowed. Adjust operations accordingly.

Terminology

Advance Warning: notification procedures that advise approaching motorists to transition from normal driving status to that required by the temporary emergency traffic control measures ahead of them.

Block: positioning a fire department apparatus on an angle to the lanes of traffic creating a physical barrier between upstream traffic and the work area, which includes "block to the right" or" block to the left."

Buffer Zone: the distance or space between personnel and vehicles in the protected work zone and nearby moving traffic.

Downstream: the direction traffic is moving as it travels away from the incident scene.

Flagger: fire department member assigned to monitor or direct approaching traffic and activate an emergency signal if the actions of a motorist do not conform to established traffic control measures in place at the highway scene

Linear: positioning a fire department apparatus parallel to or within a travel lane or shoulder of a roadway, linear positioning only creates a physical barrier within that lane or shoulder of the roadway.

Taper: the action of merging lanes of moving traffic into fewer moving lanes.

Temporary Traffic Control Zone: the physical area of a roadway within which emergency personnel perform their fire, EMS and rescue tasks at a vehicle-related incident.

Transition Zone: the lanes of a roadway within which approaching motorists change their speed and position to comply with the traffic control measures established at an incident scene.

Upstream: the direction traffic is traveling from as the vehicles approach the incident scene.

"Move It" Incidents

All emergency personnel are at great risk of injury or death while operating in or near moving traffic. There are several specific *tactical procedures* that should be taken to protect all responders and emergency service personnel at the incident scene:

- Consider all approaching drivers are "D" drivers.
- Establish an initial "block" with the first arriving emergency vehicle or fire apparatus while the initial size-up survey is complete.
- Always wear high visibility, florescent and reflective garments (vest or jacket) during roadway operations. When full protective NFPA-compliant clothing is required by department SOP, high-visibility vests must be worn over structural turnout gear except for members combatting a fire situation or dealing directly with hazardous materials.

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- All fire department members must wear structural fire-fighting helmet with chinstrap donned properly.
- Operators of emergency vehicles at the scene should complete "light shedding"; Turn off all lights such as vehicle headlights, forward-facing warning lights, or spotlights that might create vision impairment to approaching motorists at nighttime incidents.
- Employ the 'Move It' or 'Work It' strategy. Determine if vehicles involved can be moved out of the travel lanes to an off-roadway location. Moving to an off-roadway location improves responder, safety, minimizes congestion, and assists with safe, quick clearance.
- If vehicles can be moved out of the travel lanes of the roadway, attempt to clear the travel lanes in less than 30 minutes; (Minor duration incident).

"Work It" Incidents

The following are benchmarks for safe positioning of **apparatus** and **emergency vehicles** when the crash-damaged vehicle cannot be moved out of the travel lanes of the roadway and crews must work the incident at the location found upon arrival. If incident is a 'Work It' situation, establish "Command" according to the Incident Command System protocols, employ upstream advance warning and temporary traffic control transition measures to warn approaching motorists, and attempt to reduce their vehicle speed. When the incident duration is anticipated to exceed 30 minutes, the process should be as follows:

- Position first-arriving apparatus to protect the scene, patients, and emergency personnel.
  - ✓ Initial apparatus placement should create an initial incident area protected from traffic approaching in at least one direction. Intersections or where the incident may be near the middle lanes of a multi-lane roadway require two or more sides of the incident to be protected.
  - ✓ Angle apparatus on the roadway with a "block to the left" or a "block to the right" to create a physical barrier between the crash scene and approaching traffic. Block at least one additional traffic lane more than those already obstructed by the crashed vehicle(s); obstructed lane + 1 strategy. The shoulder of the highway can be counted as a lane.
  - ✓ The front wheels of blocking vehicles should be turned away from the downstream work area;
  - ✓ For first arriving fire department units where a charged hoseline may be needed, block so that the pump panel is downstream, on the opposite side of on-coming traffic. This will protect the pump operator.
- Ambulances should be positioned within the protected work area and have their rear patient loading area angled away from the nearest lanes of moving traffic.
- Additional responder vehicles and personnel working the incident should either support advanced warning efforts or be positioned within the protected area created by the blocking apparatus.

- "Command" shall stage unneeded emergency vehicles off the roadway, place them in a staging area on the downstream side of the incident, or return these units to service.
- Lanes of traffic shall be identified numerically as "Lane 1", "Lane 2", etc., beginning from the left to the right when considered from the motorist's point of view driving in those lanes.
- Traffic cones or cones with flares alongside should be deployed upstream to increase the advance warning for approaching motorists. Cones and flares identify but only suggest the transition and tapering actions that are requested of the approaching motorist.
- Personnel shall place cones and flares as well as retrieve cones while facing oncoming traffic. A Buddy system is recommended for deployment and retrieval.
- Adequate advance warning to approaching motorists should be put in place using flares or traffic cones deployed at intervals of no greater than 40 feet apart and upstream of the blocking apparatus. The furthest traffic cone that begins the taper and closing of a travel lane should be positioned upstream along the edge or shoulder of the roadway.
- Additional personnel may extend the advanced warning area by placing additional emergency vehicles, traffic cones, flares, deployable signs, and arrow boards to build upon initial traffic control measures as the incident duration exceeds 30 minutes. Placing flares, where safe to do so, adjacent to and in combination with traffic cones for nighttime operations greatly enhances motorist warning and scene safety.
- Progressively open lanes of traffic as safely and efficiently as practical as the incident is dealt with. Once cleared of vehicles, patients and debris, opening of a traffic lane will reduce the queue and minimize the chances of secondary collisions.

Incident Command Benchmarks

The initial-arriving company officer and/or the Incident Commander must complete critical benchmarks to ensure that a safe and protected work environment for emergency scene personnel is established and maintained:

- *Ensure* that the first-arriving apparatus establishes an initial block to create an initial safe work area;
- Determine if the incident is a *"Move It"* situation where vehicles can be relocated out of the normal travel lanes thereby reducing responder exposure to moving traffic and improving incident clearance time.
- Determine if the incident is a "*Work It"* situation in which the vehicles involved must remain in their present location as fire, rescue, and medical activities take place.
- *Ensure* that all ambulances on-scene are placed within the downstream, protected work area of the larger apparatus.

  ✓ *Ensure* that all patient-loading into ambulances is done from within a protected work area.

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- The initial company officer and/or Incident Commander must operate as the *safety officer* until this assignment is delegated.
- Command shall assure that *light-shedding* protocols including "Opticom™", strobe systems, and high-beam headlights are turned **OFF** and that other emergency lighting remains **ON** as necessary.

Emergency Crew Personnel Benchmarks

Listed below are benchmarks for safe actions of individual personnel when operating in or near moving vehicle traffic.

- Always maintain an acute *awareness* of the high risk of working in or near moving traffic. They are out to get you!
- Never trust the "D" driver in the moving traffic that is approaching you.
- Always look before you move!
- Avoid turning your back to moving traffic.
- Personnel arriving in crew cabs of fire apparatus should exit and enter the apparatus from the protected, downstream side, away from moving traffic.
- Officers, apparatus operators, crew members in apparatus with individual jump seat configurations and all ambulance personnel must exit and enter their units with extreme caution remaining alert to moving traffic at all times.
- Protective clothing, high-visibility safety garment, and helmet with chin strap in position should be donned prior to exiting the emergency vehicle.
  - ✓ During normal daylight conditions, don helmet and high visibility garment or NFPA-compliant turnout PPE and high-visibility vest when operating *in* or *near* moving traffic.
  - ✓ During dusk to dawn operations or when ambient lighting is reduced due to inclement weather conditions, don helmet, full NFPA-compliant protective clothing and high-visibility vest.
  - ✓ All staff personnel and any other personnel arriving on an apparatus or emergency vehicle should don assigned helmet and high-visibility garment prior to exiting their vehicle.
- Always look before opening doors and stepping out of apparatus or emergency vehicle into any moving traffic areas. When walking around fire apparatus or emergency vehicle, be alert to your proximity to moving traffic.
  - ✓ Stop at the corner of a blocking position unit, check for moving traffic, and then proceed along the unit remaining as close to the emergency vehicle as possible.
  - ✓ Maintain a 'reduced profile' when moving through any area where a minimum 'buffer zone' condition exists.

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High-Volume, Limited Access Highway Operations

High-volume, limited access divided highways include expressways, turnpikes, freeways, toll ways, and other multi-lane roadways within the response area. A desire to keep the traffic moving on these high-volume thoroughfares is inherent in all operations. When in the judgment of Command (or Unified Command), it becomes essential for the safety of operating personnel and the patients involved, any or all lanes, shoulders, and entry/exit ramps of these limited access highways can be completely shut down. This, however, should rarely occur and should be for as short a period of time as practical.

Unique Safe Positioning procedures at locations such as expressway, freeway, and limited-access, high- volume multi-lane roadway incidents include the following:

- Travel lanes are typically 12 feet in width. First-arriving engine company apparatus should establish an initial lane +1 block position.
- A large and heavy second fire apparatus such as a ladder truck shall be automatically dispatched to all incidents on all limited-access, high-volume expressways, toll ways, freeways, turnpikes, and highways.
- The primary assignment of this second unit shall be to:
  - ✓ Establish an upstream block occupying a minimum of two 12-foot lanes plus the paved shoulder of the highway or blockage of three 12-foot driving lanes of traffic upstream of the initial block provided by the first-due apparatus.
  - ✓ The position of this apparatus shall take into consideration all conditions that might limit sight distance of the approaching traffic including ambient lighting conditions, weather-related conditions, road conditions, curves, bridges, hills, and over-passes, or underpasses.
  - ✓ Traffic cones and/or cones illuminated by flares and the NFPA-compliant retro-reflective pink “Emergency Scene Ahead” deployable sign should be placed upstream of the second vehicle by its crew at the direction of the company officer.
  - ✓ Traffic cones on limited-access, high-volume roadways can be placed at 40-foot intervals with the furthest cone and or flare approximately 200-feet “upstream”, to allow adequate warning to drivers. When incident duration exceeds two hours, advance warning efforts should be as compliant with the Manual of Uniform Traffic Control Devices (MUTCD) requirements as possible.
  - ✓ A flagger/spotter person should be positioned, if available, to monitor the response of approaching motorists as they are directed to transition to a slower speed and taper into merged lanes of traffic.
  - ✓ Command should be notified by this flagger/spotter on the incident operating channel of any approaching traffic that is not responding to the speed changes, transition, tapering and merging directions.

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- ✓ Flagger/spotter should have the capability of activating a pre-determined audible warning (e.g. air horn (can)) to alert operating personnel of a non-compliant motorist approaching.

- Vehicles from law enforcement and transportation departments can be used to provide additional blocking of additional traffic lanes as needed as incident duration exceeds 30 minutes (defined by the MUTCD as "minor duration incident".) **Note:** *Regardless of the time or duration of the incident, the faster channeling devices are deployed, the safer the work area becomes.*
- When the incident duration exceeds 30 minutes, it becomes an "intermediate duration incident" as defined by the MUTCD. During this period of time, efforts should evolve around clearing the scene as expeditiously as possible. For extended duration incidents such as hazardous materials situations, Command should request appropriate traffic incident management personnel and resources. When the lane or road closure exceeds 2 hours in duration, MUTCD-compliant traffic control measures should be in place. This can include traffic control center protocols, transportation department arrow board trucks, road detours, changeable message sign notifications, media contacts, etc., as appropriate.
- Fire department Incident Commander should establish a liaison with law enforcement supervising officer as soon as possible. This Unified Command team will jointly coordinate activities and determine how to most efficiently resolve the extended duration incident and clear the obstructed travel lanes in as safe and efficient manner as practical.
- Termination of the incident should be managed with the same aggressiveness as initial actions. Crews, apparatus, and equipment must be removed from the highway in a coordinated process to reduce exposure to moving traffic and minimize traffic congestion.

Officer's Safe Parking "Cue Card"

- **"Block"** with first-arriving apparatus to protect the scene, patients, and emergency personnel.
  - ✓ "Block" one additional lane if it is required to ensure a safe working area. If the incident is completely on the shoulder and off the travelled portion of the road it may not be necessary to close the adjacent lane. This decision should always be made based on where the responders will be working to mitigate the incident and if a protected work area can be maintained so moving traffic will not enter.
  - ✓ "Block" so pump panel is "downstream"
  - ✓ "Block" *most critical* or *highest traffic volume* direction first
  - ✓ Consider requesting additional law enforcement assistance

- **Crews wear proper PPE with helmet**
  - ✓ High-visibility garments at all times
  - ✓ Helmet at all times
  - ✓ Full PPE plus high-visibility vest between dusk and dawn or inclement weather
  - ✓ NFPA-compliant turnout gear is appropriate PPE whenever the crew is directly exposed to fire, heat, flame and/or hazardous materials.

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- **Establish more than adequate advance warning**
  - ✓ Deploy a minimum of 5 traffic cones upstream at up to 40-foot intervals.
  - ✓ Cones only "suggest" they don't "block"!
  - ✓ Expand initial safe work zone as temporary traffic control devices are available

- **Direct placement of ambulances**
  - ✓ Ensure ambulances park within shadow of blocking apparatus as directed
  - ✓ Lane 1 is the lane furthest from the left from approaching motorist's point of view. Moving to the right of Lane 1 is Lane 2, Lane 3, etc.
  - ✓ Direct ambulance to "block to the right" or "block to the left," placing ambulance patient loading area facing away from closest lane of moving traffic.
  - ✓ All patient loading into ambulances is done from within a protected work zone

- **Limited access, high-volume highway incidents**
  - ✓ Establish initial block: minimum two lanes.
  - ✓ Ladder truck establishes upstream block.
    - o two lanes plus paved shoulder or
    - o three driving lanes
  - ✓ Place cones and/or cones illuminated by flares upstream of larger upstream blocking vehicle with the furthest cone approximately 200 feet "upstream" of apparatus.
  - ✓ Establish flagger position.
    - o monitor approaching traffic
    - o sound emergency signal as necessary
  - ✓ Use police department and/or transportation department vehicles for additional blocking, advance warning, and traffic incident management.
  - ✓ Stage additional companies off highway.
  - ✓ Establish liaison with Police Department to form Unified Command at scene.
  - ✓ Terminate incident aggressively with safe, quick clearance strategies.

- **You are the Safety Officer**
  - ✓ Consider assigning fire fighters as upstream "Spotter" as necessary for approaching traffic;

- **Night or Reduced Light Conditions**
  - ✓ Turn **OFF** vehicle headlights.
  - ✓ Turn **OFF "**Opticom™".
  - ✓ Provide overall scene lighting.
  - ✓ All personnel wear appropriate PPE with helmets.
  - ✓ Illuminate cones with flares.
  - ✓ Consider an additional truck company for additional upstream "block".

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Safety Consideration: Responders, who have completed their work assignment or who are waiting for another assignment, should never congregate in an area where moving traffic might enter and endanger them. This is especially important when responders are waiting for additional resources such as a utility company or towing and recovery when there can be a delay in response.

Studies indicate that for each minute on the scene, responders are subject to an increasing likelihood of being involved in a secondary incident. Often these incidents are much more serious than the initial incident that generated the emergency response.

The Incident Commander should move these responders to a staging area away from moving traffic or an area that might endanger them.