# Emergency Vehicle and Roadway Scene Safety The International Association of Fire Fighters Division of Occupational Health, Safety & Medicine in conjunction with the U.S. Department of Homeland Security United States Fire Administration Homeland Security The processor Agents (EK-2004-CA18) Sentence And Pagement of Homeland Security

#### **Course Objective**

After completing this course, the fire fighter should have a greater awareness of the issues affecting fire fighter safety relative to riding on fire apparatus and operating at roadway emergency scenes. The fire fighter will also understand basic strategies for improving safety during vehicle and roadway incident operations.

### **IAFF** Objective

The IAFF believes that all of our members must have a greater awareness of the issues affecting fire fighter safety relative to riding on fire apparatus and operating at roadway emergency scenes. Our members and local leadership must have basic strategies for improving safety during vehicle and roadway incident operations.

# Section 1: Introduction After completing this section, the fire fighter will be able to: 1. Identify the approximate percentage of U.S. fire fighters who die in vehicle-related incidents each year. 2. List the three primary areas that will be covered in this program. 3. Discuss the cultural change that is needed by the fire service to reduce injuries and deaths and discuss some of the basic changes that are needed.

### Why Is This Program Needed?

- 20% to 25% of fire fighter fatalities are vehicle-related
- This is the 2<sup>nd</sup> leading cause of fire fighter deaths
- These are among the most preventable deaths

### University of Michigan Study In 1998

- 2,472 fire apparatus collisions per year
- 6 occupants of fire apparatus killed per year
- · 413 occupants of fire apparatus injured per year
- 21 civilians killed by fire apparatus per year
- 642 civilians injured by fire apparatus per year

### The USFA Focuses On Vehicle and Roadway Scene Safety • Published the Emergency Vehicle Safety Initiative in 2004

 Commissioned the IAFF and other organizations to study the issues more in depth



### The IAFF Program's Focus

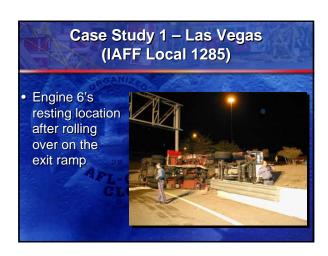
- 1. Apparatus occupant safety procedures
- 2. Fire department response policies
- 3. Roadway scene safety procedures



### A Cultural Change...

- Injuries and deaths are not "part of the business"
- The only acceptable level of injury and death is zero
- Given the hazards we face, this is not realistic, but substantial improvements can be made

### What We Need To Do Fire departments and unions must develop and enforce applicable SOPs Each fire fighter must take responsibility for their own actions We must watch out for each other and stop unsafe actions when we see them **Section 2: Apparatus Occupant Safety** After completing this section, the fire fighter will be able to: 1. List the driver/operator's responsibilities towards ensuring apparatus occupant safety. 2. List the company officer's responsibilities towards ensuring apparatus occupant safety. **Section 2: Apparatus Occupant Safety** 3. List the fire fighter's responsibilities towards ensuring apparatus occupant safety. 4. List the fire department's responsibilities towards ensuring apparatus occupant safety.







### Case Study 1 – Lessons Learned

- All apparatus occupants must wear their seat belts at all times when the vehicle is in motion.
- Operate the apparatus at a safe and prudent speed at all times.

### Perform an operational and safety inspection at the beginning of each tour of duty

- Make sure that all systems are operating as designed and that the apparatus is safe
- Correct minor problems, if the department policies allow it
- Refer major problems to the department mechanic

Do not operate an apparatus found to have serious maintenance or safety issues!





Kansas City, MO Local 42

#### **Wear Your Seatbelts**

- NFPA 1500 places responsibility for everyone
- wearing seatbelts on the driver
- >80% of fire fighters killed in collisions are not wearing seatbelts
- Do not move the rig until <u>everyone</u> is seated and belted!



McKinney, TX Local 4017

### **Driver/Operator Training**

- All driver/operators must meet the requirements of NFPA 1002
- Must be a formal training program on the exact types of apparatus that will be driven in the field
- Departments should consider requiring CDLs to ensure at least a minimal level of training

### **Benefits of Obtaining A CDL**

- Requires the driver to pass a written, driving skills, and pre-trip inspection test
- Most fire department driver training programs already cover the info on the CDL test
- Provides additional credibility to fire apparatus drivers
- Ensures drivers get regular physicals and drug testing







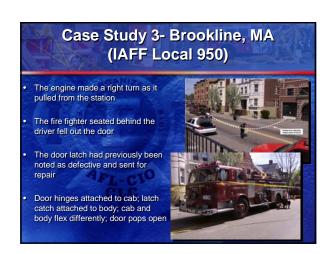
# Case Study 2 – Texas City (IAFF Local 1259) • Damage to Texas City E-33 indicating point of impact • Note lack of damage to officer's seating area

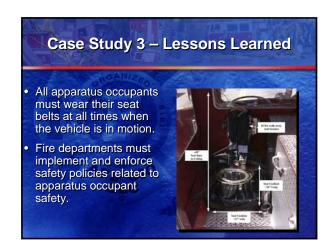
### Case Study 2 – Lessons Learned

- All apparatus occupants must wear their seat belts at all times when the vehicle is in motion.
- Bring the apparatus to a complete stop at all red lights and stop signs.

### The Company Officer's Role: • Supervises the driver/operator and crew • Acts as a "co-pilot" • May tell the driver/operator to slow down, but never to speed up • Ensure all members are seated and belted at all times







### The Fire Fighter's Role:

- Take responsibility for your own safety and wear the seatbelt
- Do not loosen or remove the seatbelt during the response
- Do not ride an apparatus that doesn't have proper seating and working seatbelts! To do otherwise is an unsafe act!!

### NFPA 1500 Exceptions to the Seated and Belted Rule:

- 1. Hose loading operations
- 2. Tiller training
- 3. Giving complex patient care in the back of an ambulance



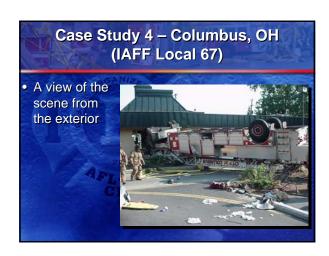
Frisco, TX Local 3732

### Additional Protective Equipment May Be Needed

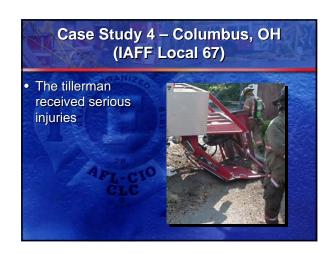
- Wear helmet and eye protection when in unenclosed cabs
- Wear hearing protection if exposed to noise above
   dB



McKinney, TX Local 4017







### Case Study 4 – Lessons Learned

- Fire departments must maintain apparatus in a safe, operable condition.
- Fire departments should adopt alternative response policies for calls that have a high probability of being non-emergency in nature.

### The Fire Department's Responsibility:

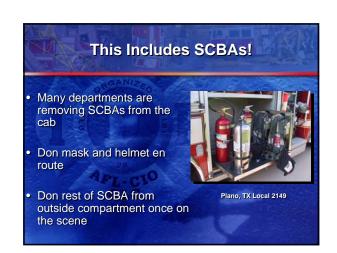
- Develop <u>and enforce</u> SOPs for safe response procedures
- Educate all personnel on the SOPs
- Ensure all applicable laws and standards are followed

### **Apparatus Maintenance**

- Develop a program that meets the requirements of NFPA 1915
- Determine defects that warrant repair and removal from service
- Do not allow defective apparatus to remain in service!

### Conditions That Warrant Removal From Service: • Excessive leakage of vehicle fluids • Braking or steering defects • Missing or inoperable seatbelts • Inoperable wiper blades • Poor tire condition • Others as determined by the department





### **Ambulance Occupant Safety**

- 45% of EMS Providers in U.S. are fire departments
- 300,000 fire department members in U.S. provide EMS services
- 82 ambulance occupants were killed between 1991 and 2000

### Ambulance Occupant Safety



- 58.5% of fatalities occurred in the patient compartment
- Use restraint systems whenever possible
- Always use shoulder straps on litter patients

### Section 3: Fire Department Response Policies

After completing this section, the fire fighter will be

- 1. List the five common areas that account for the majority of fire apparatus collisions.
- 2. Explain the safety hazards associated with driving through intersections and corrective actions that can be taken to lessen the hazard level.
- 3. List the nine situations in which NFPA 1500 requires the apparatus to come to a complete stop before proceeding.

### Section 3: Fire Department Response Policies

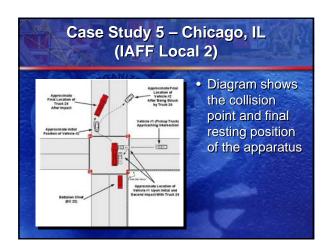
- Explain the safety hazards associated with backing the apparatus and corrective actions that can be taken to lessen the hazard level.
- 5. List at least five ways in which excessive speed is manifested during an apparatus response.
- Explain the hazards that occur when an apparatus' wheels leave the roadway and safe procedures for bring the apparatus back onto the road surface.

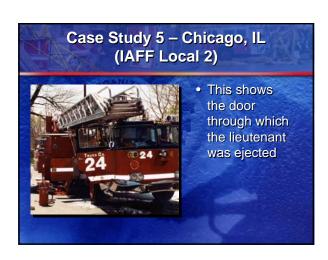
### Section 3: Fire Department Response Policies

- 7. Discuss the hazards associated with driving the apparatus on curves in the roadway and how these hazards can be reduced.
- 8. Discuss the benefits of fire departments establishing alternative response policies.
- List at least five types of incidents that may warrant the response of apparatus under non-emergency conditions.

### The Five Common Causes of Fire Apparatus Collisions

- A. Failure to safely traverse intersections
- B. Apparatus backing operations
- C. Excessive speed
- D. Failure to keep apparatus wheels on the road surface
- E. Failure to negotiate curves





### Case Study 5 – Lessons Learned Bring the apparatus to a complete stop at all red lights and stop signs. Fire departments must maintain apparatus in a safe, operable condition. Fire departments should adopt alternative response policies for calls that have a high probability of being non-emergency in nature.

# Intersection Hazards • The most likely location to be involved in a collision Jersey City, NJ Locals 1064/1066

### Safely Negotiating Intersections

- Ensure the apparatus has the right-of-way before entering intersection
- The driver/operator and company officer must work together
- Complete stops add only 2-3 seconds per intersection on the response

### Safely Negotiating Intersections

- Do not exceed the posted speed limit, even if you have a green light.
- Remove foot from throttle and place on brake pedal when approaching/negotiating the intersection.

## When moving to the opposing lane of traffic... Slow the apparatus to a safe speed; no more than 20 mph Ensure no oncoming vehicles are in the opposing lane Use all available warning devices

### Traffic Control Devices

- May be operated by strobe lights on the apparatus, the apparatus siren, or GPS devices
- Do not guarantee the right-of-way
- If the signal does not change in your direction, apparatus may be approaching from another direction



### Case Study 8 – Northlake/Stone Park, IL (Northlake IAFF Local 3863) • Engines from both departments approached the same

 Northlake's engine captured the preemption signal

intersection.

 Stone Park's engine proceeded into the intersection against the red signal (without stopping).



### Case Study 8 – Northlake/Stone Park, IL (Northlake IAFF Local 3863)



- Stone Park's engine struck Northlake's engine by the rear tire.
- The right front passenger was ejected from Stone Park's engine and fatally injured.

### Case Study 8 – Lessons Learned

- All apparatus occupants must wear their seat belts at all times when the vehicle is in motion.
- Bring the apparatus to a complete stop at all red lights and stop signs.



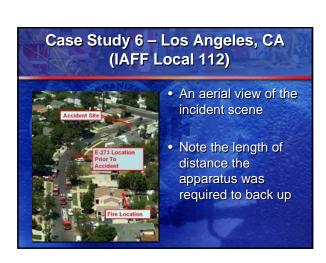
# NFPA 1500 Requires A Complete Stop... • When directed to stop by a law enforcement officer • At red traffic signals • At stop signs NFPA 1500 Requires A Complete Stop... • At negative right-of-way intersections

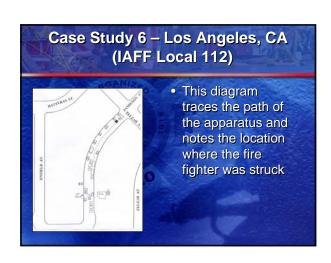
NFPA 1500 Require Stop.	
When encountering a sto with activated warning lig	
<ul> <li>When any other intersect</li> </ul>	ion
hazards are present	NA NA
<ul> <li>Unguarded or activated</li> </ul>	
railroad crossings	

 When the driver/operator cannot account for all lanes of traffic in an intersection

At blind intersections

# NFPA 1500 Requires A Complete Stop... • An apparatus incident involves a civilian fatality • Local unions reiterate official response policy • The Fire Department complains about increased response times





### Case Study 6 – Lessons Learned

- Fire departments must adopt and enforce safe procedures for apparatus backing operations.
- Fire fighters must be prohibited from riding on the outside of a moving apparatus.
- Initially, the LAFD refused to change their backing policy after this incident.

#### Case Study 6 – Lessons Learned

Local 112 pushed for and won a change in this policy.

JUNE 23, 2005

SPECIAL NOTICE

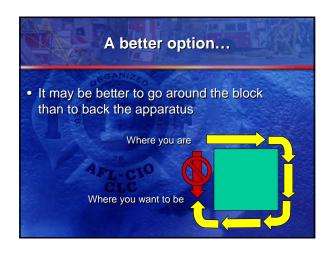
SUBJECT: REVISED LAFD HEAVY APPARATUS BACKING POLICY

- EFFECTIVE IMMEDIATELY, ALL MEMBERS SHALL ENSURE DEPARTMENTWIDE IMPLEMENTATION AND ADHERENCE TO THE FOLLOWING LAFD HEAVY APPARATUS SAFE BACKING POLICIES:
  - NO MEMBER SHALL RIDE ON THE TAILBOARD OR ANY RUNNING BOARD OF AN APPARATUS WHEN THE APPARATUS IS IN MOTION.

### **Apparatus Backing Collisions**

- The most common type of apparatus crash.
- Typically do not involve injuries and deaths (although some have occurred)
- Responsible for a significant percentage of apparatus damage and dollar losses

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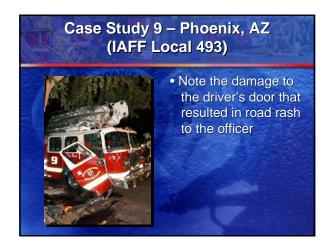














Case Study 9 – Le	ssons Learned
All apparatus occupants r belts at all times when the	
<ul> <li>Operate the apparatus at speed at all times.</li> </ul>	a safe and prudent

### **Hazards of Excessive Speed**

- Fail to negotiate a curve
- Fail to stop before hitting another vehicle or stationary object (like a house)
- Fail to stop before entering an intersection or railroad crossing
- Weight shift causes loss of vehicle control



Fairfax Co., VA Local 2068

### **Hazards of Excessive Speed**

- Lose vehicle control after hitting driving surface defect (like a pothole)
- Lose vehicle control because of swaying/rocking
- Lose vehicle control on wet/snowy/icy roads

### Case Study 7 – Charlotte, NC (IAFF Local 660)

 The painted orange arrow shows where the vehicle's wheels left the paved surface



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### Case Study 7 – Lessons Learned Operate the apparatus at a safe and prudent speed at all times. Keep all apparatus wheels on the road surface at all times. All apparatus occupants must wear their seat belts at all times when the vehicle is in motion.

### What Happens When The Right-Side Wheels Leave The Road?

- May sink into soft soil, causing vehicle to be pulled further off the road
- May strike an object or overturn
- Problems as a result of overcorrection may occur when trying to bring the wheels back onto the road surface

#### **Results of Overcorrection**

- May cause the vehicle to roll over
- May strike another vehicle head-on
- May exit the roadway on the opposite side of the road and overturn or strike an object



Fairfax Co., VA Local 2068

### Tips for Keeping the Entire Vehicle on the Road



- Memphis, TN Local 1784
- Operate the vehicle at a safe and reasonable speed.
- Drivers must not operate warning devices, read map books or computer monitors, etc.
- Use <u>extreme caution</u> when passing vehicles on their right side.

### Safely Bringing The Wheels Back Onto The Road Surface

- When possible, come to a complete stop and then creep back onto the road surface.
- If a complete stop is not possible/practical, slow to 20 mph or less before bringing the wheels back up on the road surface.

### Roadway Curve Collision Factors

- Excessive Speed
- Failure to keep all wheels on the road surface



### **Posted Speeds for Curves**



- Speed is calculated for a passenger vehicle on dry roads
- Too fast for fire apparatus in the best of conditions

### Why Consider Alternative Response Policies?

- Apparatus are most likely to be involved in a collision when running "Code 3"
- Realistically, every response is not a true emergency
- By reducing emergency rate responses, we reduce the risk of collision

### **Low Priority Calls**

- Activated fire alarm, without an additional call reporting fire conditions
- Trash fire
- Small brush fire inside the city limits
- Wires down/hanging
- Smoke/gas odor in the vicinity

#### **Low Priority Calls**

- Carbon monoxide detector activation without reported patient symptoms
- Basic life support EMS calls
- Company relocations
- Water leaks
- Investigating a controlled burn

<u> </u>	

### **Alternative Response Policies**

- Respond all units at a nonemergency rate to low priority calls
- Respond the closest unit Code 3 and all other units nonemergency until the first unit determines is a true emergency exists

### **Modified Code 3 Response**

- Needed in congested, urban locations
- Reduces excessive out-of-service times
- Use warning devices to move traffic
- Do not operate the apparatus with the same sense of urgency as you would responding to a working fire

#### Section 4: Roadway Scene Safety

After completing this section, the fire fighter will be able to:

- Explain the hazards associated with working on roadway incident scenes.
- 2. Describe the terms "surface streets" and "highways."
- 3. List the three primary concerns when determining where to park the apparatus on a roadway emergency scene.

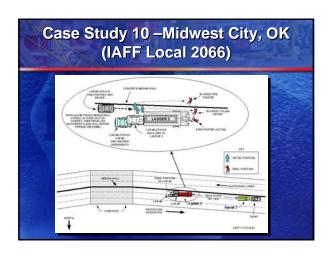
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# Section 4: Roadway Scene Safety 4. Describe the safety principles for positioning fire apparatus on surface streets. 5. Describe the safety principles for positioning fire apparatus on highways. 6. Describe the purpose of the MUTCD and how it applies to emergency responders. 7. List the three main goals of emergency traffic control (ETC) as outlined in the MUTCD.

### 8. Explain the five main parts of Section 6i of the MUTCD. 9. Explain the MUTCD requirements for performing size-up at a roadway incident scene. 10. Describe the main parts of a traffic incident management area as outlined in the MUTCD. 11. Explain the effective use of emergency vehicle lighting at roadway incident scenes.

### Section 4: Roadway Scene Safety List the requirements for proper protective clothing to be worn at roadway incident scenes. List at least 6 agencies, other than the fire service, that may have official duties at a roadway incident scene. Describe how the various agencies that respond to roadway incidents can work together

effectively.



### Case Study 10 – Lessons Learned

- Fire apparatus should be positioned in a manner that makes them highly visible to approaching traffic and which protects the incident scene and personnel from being struck by oncoming vehicles.
- Fire departments must implement and enforce effective policies for operating as safely as possible at roadway emergency scenes.

### Roadway Scene Hazards Careless or impaired drivers Hazardous road conditions Large volumes of traffic Altered traffic patterns Midwest City, OK Local 2066





# Concerns for Parking Apparatus At Roadway Scenes 1. Park in a manner that reduces the chance of being struck by oncoming traffic. 2. Park in a manner that shields fire fighters and the work area from oncoming traffic, 3. Park in a location that allows for effective deployment of equipment and resources to handle the incident.

### Parking Position Will Vary Depending On: The type of incident The type of road The surroundings at which the emergency scene is located

# Basic Surface Street Positioning Principles Park off the roadway when possible Close the roadway to moving traffic when possible Do not block the access for later arriving emergency vehicles



### Case Study 11 – Chicago, IL (IAFF Local 2)

- Truck 27 dispatched for assistance/blocking at an MVC on an expressway
- Two police cars provide additional blocking downstream
- Lieutenant checks left side of apparatus to ensure all tools are stowed at conclusion of original incident

### Case Study 11 – Chicago, IL (IAFF Local 2)

- DUI driver attempts to slip by stopped traffic
- Vehicle strikes tractor-trailer and spins out of control
- Lieutenant struck and pinned between vehicle and Truck 27
- Lieutenant is fatally injured

### Case Study 11 – Chicago, IL (IAFF Local 2)

#### Lessons learned:

 Fire fighters operating at roadway incident scenes should not place themselves between apparatus or other barriers and oncoming traffic.

## Highway Scene Difficulties Stopped traffic Long distances between exits or turnarounds Beavercreek, OH Local 2857 May need to proceed against the normal flow of traffic

### Use of Warning Devices During Highway Responses

- Many departments turn warning devices off when driving on highways
- Apparatus may be slower than the other vehicles
- Lights and sirens may cause other vehicles to slow and impede or endanger the response
- Turn appropriate lights back on once the scene is reached









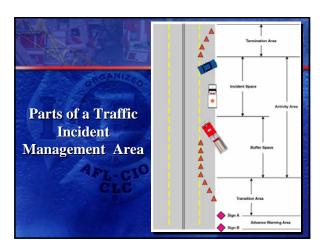
# The 3 Main Goals Of Emergency Traffic Control 1. Improving responder safety on the incident scene. 2. Keeping traffic flowing as smoothly as possible. 3. Preventing the occurrence of secondary crashes.

### MUTCD Section 6I 1. General 2. Major Traffic Incidents 3. Intermediate Traffic Incidents 4. Minor Traffic Incidents 5. Use of Emergency Vehicle Lighting

### Mutco Size-Up Requirements Must be performed within 15 minutes of arrival of first emergency responder Determine the magnitude of the incident Determine the estimated time duration that the roadway will be blocked or affected Determine the expected length of the vehicle queue (back-up) that will occur

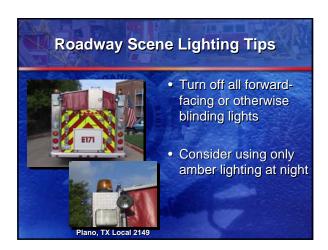
### The 4 Parts of a TIMA

- 1. The advance warning area that tells motorists of the situation ahead
- 2. The *transition area* where lane changes/closures are made
- 3. The *activity area* where responders are operating
- 4. The *incident termination area* where normal flow of traffic resumes.

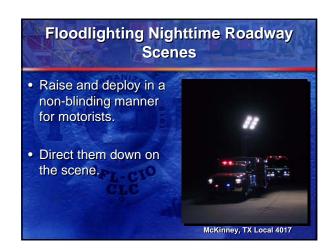


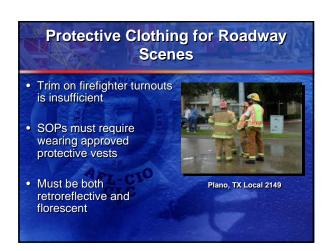
# Emergency Lighting at Roadway Incidents Intended for the safety of responders and motorists Provides only warning, but no traffic control May be confusing/blinding to motorists, especially at night

















# Pre-Incident Planning for Roadway Incidents • Makes incident operations more predictable • Must include all participating agencies • May lead to discovering previously unknown resources

#### Phoenix FD/Arizona DPS Incident

- Engine 41 is dispatched to an injury collision on a freeway shoulder
- Engine 41 blocks shoulder and first lane to protect scene and patient loading area
- DPS officer orders apparatus moved to shoulder
- After refusing the order, Engine 41 Captain is arrested

#### Phoenix FD/Arizona DPS Incident

- After Engineer refuses to move apparatus, the police officer enters Engine 41 and moves it to the shoulder
- Command officers are requested to the scene
- E-41 Captain is released at the scene
- Officials meet later to resolve differences

# DOT Resources • Increase scene safety • Free emergency responders to handle incident details






# Program Summary Our cultural attitudes relative to response and roadway safety must change Every individual is responsible for operating safely and following SOPs Make sure apparatus are properly designed and maintained

### **Program Summary**

- Seat belt compliance must be 100%; no excuses!
- Operate apparatus at a safe and responsible speed
- Use caution on curves and keep all wheels on the road surface all of the time

### **Program Summary**

- Adopt alternative response policies for low-risk calls
- Respect roadway scene hazards; act like everyone is out to hit you!
- Use proper roadway scene protection and management procedures
- Use all available roadway scene safety resources

### This Program Developed and Provided By:



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