Lesson 2-1: Emergency Response Driving Considerations
Student Performance Objective

• After completing this lesson, the student shall be able to identify safety considerations for operating emergency vehicles. In addition, students will be able to demonstrate skills in safely operating and driving an apparatus.
Overview

• Emergency Response Driving Considerations
• Warning Devices
• Traffic Control Devices
• Intersections
• Passing Other Vehicles
Emergency Response Driving Considerations

- In most jurisdictions civilian drivers that encounter emergency vehicles must do the following until the emergency vehicle has passed:
  - Pull to the right
  - Stop
  - Clear the intersection
  - Remain motionless
On the immediate approach of an emergency vehicle using **audible and visual signals:**

- Drivers and pedestrians shall *yield the right-of-way*.
- Drivers shall drive immediately to *a position parallel to and as close as possible to the edge or curb of the roadway*, clear of any intersection.
- Drivers shall stop and stay in this position until the emergency vehicle has passed.
(a) If a school vehicle has stopped on a roadway and is operating the alternately flashing red lights, the driver of any other vehicle meeting or overtaking the school vehicle shall stop at least 20 feet from the front or rear of the school vehicle.

(b) If a school vehicle has stopped on a roadway and is operating the alternately flashing red lights, the driver of any other vehicle meeting or overtaking the school vehicle may not proceed until the school vehicle resumes motion or the alternately flashing red lights are deactivated.

(c) Exceptions. -- This section does not apply to the driver of a vehicle on a divided highway, if the school vehicle is on a different roadway.
Emergency Response Driving Considerations

- Driver/operators must never assume that civilian drivers will react appropriately when encountering emergency vehicles.

**Appropriate reactions**
- Pull to the right
- Stop
- Clear intersections
- Remain motionless

**Other possible reactions**
- Pull over for first apparatus and pull out in front of next apparatus
- Panic at approaching apparatus
- Abruptly stop in intersection
- Fail to hear apparatus approaching
Emergency Response Driving Considerations

• Driver/operators should anticipate responses and plan to avoid collisions.

- Aim high in steering
- Get the big picture
- Keep your eyes moving
- Leave yourself an “out”
- Maintain distance
- Make sure others can see and hear you
Smith System

Aim High in Steering

Keep your eyes moving

Get the Big Picture

Allow an Out

Keep your vehicle visible

Smith System
“Street Smart” DVD
Aim High
Smith System

• Look at the area 8 to 12 seconds ahead of your vehicle
• Center your vehicle in the driving lane
• Find the path of least resistance
• Adjust your following distance
• Blend into the flow of traffic
GET THE BIG PICTURE
SMITH SYSTEM

- Know what is ahead, beside, and behind you
- Predict other drivers’ actions
- Hear the radio traffic
  - What other units are enroute?
  - Are there other calls in the same area?
  - Is there a true emergency?
- Listen for other sirens
- Find trouble before it finds you

The “big picture” is vital to safe driving
Beside and Behind You
The Big Picture

- Always know what’s happening beside you
- Check mirrors before slowing down, stopping, decelerating
- Check mirrors on long or steep hills
- Convex mirrors tell a bigger story
- Depth perception can be altered by mirrors
  - Know landmarks on the apparatus to aid with depth perception
Keep Your Eyes Moving
Smith System

- Do not fixate on one area or object
- Key to remaining alert and engaged
- Check the mirrors frequently
- Becomes difficult at night or when fatigued
- Random eye movement is bad
- Staring at an object also leads to drifting toward the object
ALLOW AN OUT
SMITH SYSTEM

• Maintain adequate following distance
  o “Decision Space”
• Be prepared to yield
• Don’t get boxed in
• Time your passing moves
• When stopped in traffic, keep a gap ahead of you to allow a lane change
Cushion to other objects

Impossible in the DC Metro area?
**Decision Space**

Allow an Out

**Perception Time + Reaction Time + Braking Time = Stopping Distance**

- **Perception** $\frac{3}{8}$ to $\frac{3}{4}$ second
- **Reaction** $\frac{3}{4}$ second
- **Braking** $2\frac{1}{2}$ seconds
- **Stopping Time** 5 seconds

Based upon 40 mph on wet roads.
**Stopping Distance Allow an Out**

Dry road; 25mph = 38 ft/sec

- Perception: 28 ½ feet
- Reaction: 66 ½ feet
- Braking: 32 feet
- Stopping Distance: 127 feet

Wet road; 25mph = 38 ft/sec

- Perception: 28 ½ feet
- Reaction: 66 ½ feet
- Braking: 56 feet
- Stopping Distance: 151 feet

Dry road; 40mph = 59 ft/sec

- Perception: 44 ¼ feet
- Reaction: 103 ¼ feet
- Braking: 78 feet
- Stopping Distance: 225.5 feet
## Stopping Time – Air Brake Unit

ALLOW AN OUT

### Vehicle Speed

<table>
<thead>
<tr>
<th>Vehicle Speed</th>
<th>Dry Pavement Coefficient of Friction = 0.7</th>
<th>Wet Pavement Coefficient of Friction = 0.4</th>
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</thead>
<tbody>
<tr>
<td>MPH</td>
<td>Ft/S</td>
<td>Stopping Distance</td>
</tr>
<tr>
<td>60</td>
<td>90</td>
<td>407 ft</td>
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<tr>
<td>45</td>
<td>66</td>
<td>262 ft</td>
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<tr>
<td>35</td>
<td>51</td>
<td>185 ft</td>
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<tr>
<td>25</td>
<td>38</td>
<td>127 ft</td>
</tr>
</tbody>
</table>

How do you measure your decision space?
## Decision Space – 4 Second Rule
Allow an Out

<table>
<thead>
<tr>
<th>Condition</th>
<th>Time Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40 mph</td>
<td>4 seconds</td>
</tr>
<tr>
<td>Each additional 10 mph</td>
<td>1 second</td>
</tr>
<tr>
<td>Poor Road Conditions</td>
<td>1 second</td>
</tr>
</tbody>
</table>

**Apparatus traveling on wet pavement at 60 mph**

<table>
<thead>
<tr>
<th>Time Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 seconds</td>
</tr>
<tr>
<td>1 second</td>
</tr>
<tr>
<td>1 second</td>
</tr>
<tr>
<td>1 second</td>
</tr>
</tbody>
</table>

= 7 seconds
### Vehicle Speed

<table>
<thead>
<tr>
<th>Vehicle Speed</th>
<th>Dry Pavement</th>
<th>4-Second Rule</th>
<th>Wet Pavement</th>
<th>4-Second Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPH</td>
<td>Stopping Time</td>
<td>Interval Time</td>
<td>Stopping Time</td>
<td>Interval Time</td>
</tr>
<tr>
<td>60</td>
<td>4.5 sec</td>
<td>4+1+1 = 6 sec</td>
<td>6 sec</td>
<td>4+1+1+1 = 7 sec</td>
</tr>
<tr>
<td>45</td>
<td>4 sec</td>
<td>4+1 = 5 sec</td>
<td>5 sec</td>
<td>4+1+1 = 6 sec</td>
</tr>
<tr>
<td>35</td>
<td>3.6 sec</td>
<td>4 sec</td>
<td>4.5 sec</td>
<td>4+1 = 5 sec</td>
</tr>
<tr>
<td>25</td>
<td>3.4 sec</td>
<td>4 sec</td>
<td>4 sec</td>
<td>4+1 = 5 sec</td>
</tr>
</tbody>
</table>

In each situation you have enough time to perceive the hazard, react, and stop.
Even when stopped, leave sufficient space between your vehicle and the vehicle ahead:

- Vehicle in front starts to roll back
- Car behind needs more space to stop
- Car ahead becomes disabled
- You get a call!

“safety wedge”
KEEP YOUR VEHICLE VISIBLE
SMITH SYSTEM

• Know where you are going
• Pick a lane early and stick with it
• Signal your intentions
• Make eye contact
• Pay attention
• Slow down ahead of gridlock
SIPDE
PROACTIVE DRIVING FORMULA

• Sense
  o You need to see/hear/smell/feel it

• Identify
  o Your brain needs to recognize it

• Predict
  o Your brain needs to figure out what is going to happen

• Decide
  o What are your options based upon your prediction?

• Execute
  o Make it happen
DECISION MAKING

Seeing
Hearing
Feeling

Knowledge - Training
Experience - Attitude

DECISIONS
Warning Devices

• Fire apparatus are equipped with audible and visual warning devices.

- Warning devices are used to make the public aware of approaching emergency vehicles.
- Use of warning devices should be limited to true emergencies.
- Some departments require warning devices to be turned off on limited access highways.
- Warning devices are used to help negotiate passage in slow traffic.
Every emergency vehicle, in addition to any other equipment and distinctive markings required, shall be equipped with a siren, exhaust whistle, or bell capable of giving an audible signal.

Every emergency vehicle, in addition to any other equipment and distinctive markings required by the Maryland Vehicle Law, shall be equipped with signal lamps mounted as high as practicable, which shall be capable of displaying to the front and to the rear a flashing red light or lights. These lights shall have sufficient intensity to be visible at 500 feet in normal sunlight.

Fire Apparatus and Ambulances may be equipped with or display red and/or white lights or signal devices.
MARYLAND CODE – TRANSPORTATION
§ 21-106 - EMERGENCY RESPONSE

• Privileges are granted when:
  o Responding to an emergency call;
  o Responding to, but not while returning from, a fire alarm

• Privileges granted to fire department drivers are:
  (1) Park or stand without regard to the other provisions of this title;
  (2) Pass a red or stop signal, a stop sign, or a yield sign, but only after slowing down as necessary for safety;
  (3) Exceed any maximum speed limit, but only so long as the driver does not endanger life or property;
  (4) Disregard any traffic control device or regulation governing direction of movement or turning in a specified direction (no left turn, no u-turn, etc.)
Warning Devices

• Audible warning devices may include sirens or air horns.

The emergency vehicle may outrun the effective range of the audible warning device if it is traveling at speeds over 50 mph (80 km/h)

Multiple emergency vehicles travel at least 300 to 500 feet (90 to 150 m) apart
Warning Devices

• Visual warning devices
  – A combination of lights may be used as visual warning devices on apparatus.

- White lights
- Colored lights
- Warning lights
- Headlights
Traffic Control Devices

- Driver/operators must continue to use defensive driving techniques, even if a traffic control device is present.

**Green light**
- Maintain speed that allows for quick stop or safe evasive maneuver

**Red light**
- Approach with extreme caution
- Bring apparatus to a complete stop before proceeding
Traffic Control Devices

- Traffic signals in front of the station allow apparatus to more safely enter the roadway.

**Controlled**

- By a button in the station
- Remotely by a dispatcher
- By a station alerting system
Traffic Control Devices

• Traffic signals along the route of travel may be controlled by the fire department.

Strobe Light Activated Preemption Devices

Traffic Signal Preemption Devices

GPS Based Traffic Signal Preemption
Intersections

• Intersections are the most likely place for a collision to occur involving an emergency vehicle.
  – Know statutes and department policies regarding intersections
  – Many jurisdictions and NFPA® require:
    • Full stop
    • Accounting for vehicles in all lanes before proceeding
  – Be cautious on multilane roads
    • The driver/operator may have to place apparatus in unconventional places.
    • If all lanes are blocked, it may be allowable to drive in opposing lane of traffic.
INTERSECTION BEHAVIORS

• Approaching
• Entering
• Jumping
• Other units

*Most likely location for an apparatus crash.*
INTERSECTIONS
APPROACHING

• One of the best proactive driving tactics is to reduce speed
• Adjust your speed to the available space cushion
  o Intersections are fixed object that as you close the gap you need to also reduce the stopping distance
• Reducing your speed gives other vehicles time to react to your approach
  o Let the play develop
• Change your siren cadence
INTERSECTIONS APPROACHING

• Search ahead and identify potential hazards
  o Other vehicles
  o Pedestrians
  o Bicycles
  o Blind spots – buses, trees, buildings
  o Status of control devices – traffic lights, pedestrian crossing signals

• Identify the path of least resistance
  o Lane patterns
  o Avoid opposing traffic

• Cover the brake
Traffic Control Devices

- Stale green
- Stale yellow
- Flashing yellow means proceed with caution
- Flashing red means stop before proceeding
- Yield sign
- Stop sign
- Four-way stops
INTERSECTIONS
SEARCH & IDENTIFY

#1

#2
INTERSECTIONS
SEARCH & IDENTIFY

#1

#2
INTERSECTIONS
ENTERING

• Entry occurs as soon as your front bumper crosses into cross-traffic

• If you cannot positively identify that right-of-way has been yielded to you, you must stop
  o Must do this for each individual lane

• Make eye contact with other drivers
  o Are other cars “acting” like they see you?

• Even when entering with the green light remain vigilant of other vehicles entering the intersection

• Avoid using the apparatus as a moving roadblock – this is aggressive driving
INTERSECTIONS
THE OPEN LANE

• Be especially wary of lanes that are not blocked by vehicles that have yielded to you.
  o Open lanes are an opportunity to accelerate through the intersection to bypass the stopped vehicles
  o Open lane enables traffic to approach at higher rates of speed
  o Traffic that is already stopped obscures visibility to the oncoming vehicle or the oncoming vehicle’s view of you
  o People see a green light and want to GO.

• Account for all lanes, including turn lanes, before fully committing to an intersection. Recognize that civilian drivers may not always do the right thing, such as using a turn lane to circumvent stopped cars, running a yellow or red light, or simply electing to not yield the right-of-way to you.
INTERSECTIONS
JUMPING

• Operator depresses the accelerator hard from stopped position
• Vehicle jerks or jumps forward
• Hard on the apparatus
• Jumps before other vehicle moves forward is a common low speed, at-fault collision
• Smooth starts allow for decision space
INTERSECTIONS
PROCESSION RESPONSE

• Travel single file with largest vehicle leading to create a path
• Maintain space cushions
  o Expect the leading unit to stop
• Each vehicle must use the normal precautions
  o Proceed as though no other units already entered
• Use contrasting siren tones
  o electronic siren with alternating or pulsing tone.
Tanker 17 – Fatal Collision
June 22, 2000

- Multiple responding units
- Zone of confusion
- Evasive maneuver
Passing Other Vehicles

• It is best to avoid passing vehicles that do not pull over to yield to apparatus.
  – Travel on innermost lane and wait for vehicles to move to the right before passing
  – Avoid passing on the right side
  – Be certain opposing lanes are clear before crossing center line
  – Avoid passing other emergency vehicles
    • Smaller vehicles may pass larger apparatus
    • Coordinate maneuvers by radio
ARRIVING ON SCENE
STRUCTURE FIRES

• EMS transport units are NOT primary units
  o Engines, aerials, rescue squads

• Hold your radio traffic to allow primary units to have air time
  o No initial on-scene report is required by EMS units

• Park for egress to allow patient transport

• Gather equipment and recon the scene
  o Conduct a 360° survey
  o Focus on life safety hazard/occupant status
  o Identify hazards to initial operations, i.e. downed wires, animals, hoarding conditions
Student Performance Objective

• After completing this lesson, the student shall be able to identify safety considerations for operating emergency vehicles. In addition, students will be able to demonstrate skills in safely operating and driving an apparatus.
Review

- Emergency Response Driving Considerations
- Warning Devices
- Traffic Control Devices
- Intersections
- Passing Other Vehicles