SAFE DRIVING PRINCIPLES

PHILOSOPHY

We have adopted a philosophy concerning Emergency Vehicle Driving that will guide policy, procedures, training and accountability: *We drive our vehicles with the mindset that the other driver will make a mistake in the path of our vehicle. Our operators will drive proactively by adjusting their driving to avoid collisions triggered by other drivers, traffic, and environmental conditions.* The days of blaming the other driver, the traffic, the environment, or the need to speed in the name of emergency response are gone. Our operators will drive professionally, which means proactively. We will add twenty seconds to our response time to arrive on the scene safely. We will add a minute to safely deliver a patient to the hospital. Professional operators will be valued over fast operators.

RESPONSIBILITY OF OPERATING AN EMERGENCY VEHICLE

There is a great deal of responsibility placed on the operator of an emergency vehicle, both legal and moral. You have a legal responsibility to exercise "due regard" for the public when operating the apparatus. This means keeping the safety of others in mind when carrying out your duties. If you do not exercise due regard, you could be found guilty of negligence. Negligence is defined as "failure to use a reasonable amount of care when such failure results in injury to another." An example of negligence would be possibly driving too fast for conditions, thus leading to a collision. Gross negligence is reckless disregard of the consequences of acts to another person. Passing a red light at a high rate of speed and expecting the public to stop could be considered gross negligence.

A lawsuit against the fire department, or you personally could have a devastating effect not only monetarily but in terms of loss of confidence and public respect. A lawsuit could have an adverse impact on how the community views its fire department and how willing it is to support it. The elected officials who are ultimately responsible for the various city agencies will also not look kindly at defending a lawsuit for negligent driving.

Some of the moral implications of a negligent collision are just as important as the legal aspects. If the apparatus is involved in a serious collision, the response must be terminated. Consider the following ramifications:

- Will a citizen perish in the fire to which you were responding and should have arrived at safely?
- Will fellow firefighters be injured, disabled, or possible killed because of your negligence?
- Will members of the driving public suffer injury at your hand?
- How long will the community suffer the loss of a valuable piece of apparatus while it is being repaired or replaced, and at what cost?

- If you are in a career department, what is the possibility that you may be suspended or dismissed if a violation of departmental regulations was found to be the cause of a collision?
- If a monetary damage award is made against you personally, what will the financial impact be on your family?

These are some of the serious questions to consider when you climb behind the wheel of an emergency vehicle. THINK, and be responsible for your actions!

EMERGENCY VEHICLE DRIVING TECHNIQUES

Certain exceptions to the driving laws are afforded to emergency vehicle operators to expedite their response. Although they vary from state to state, generally they include exceeding the posted speed limit, the ability to travel against the flow of traffic, passing traffic control devices, and the use of lights and sirens to request the right of way. All of these privileges are only to be exercised with due regard for the safety of the driving public.

Exceeding the speed limit

The first consideration when determining a safe speed is the road conditions. In some situations the posted limit might be too fast for conditions. MCFRS Policy states that 15 miles per hour over the limit should be the maximum allowed under the best conditions. It is reckless and irresponsible to respond at 50mph in a 25mph posted residential neighborhood or school zone.

Rate of closure

When approaching traffic ahead, the emergency vehicle operator must leave sufficient room to safely react and compensate for the actions of the civilian drivers. Rate of closure refers to the relative speed of both vehicles. For example, if the car ahead is traveling at 25mph and the apparatus at 35mph, the rate of closure is 10mph. If the car ahead is stopped, the rate of closure is a full 35mph. The apparatus operator should avoid closing this gap too rapidly and overtaking the vehicle ahead. Allow time for the other driver to perceive your presence and take the appropriate actions. When an emergency vehicle operator “tailgates” the cars ahead, trying to push them out of the way, there is no time to react to unexpected situations!

Travel against the flow of traffic

This is a high-hazard practice that is sometimes deemed necessary to expedite the response. When responding opposing oncoming traffic, your first responsibility is to ensure that it is clear of traffic. Remember that other drivers are not expecting to meet another oncoming vehicle in their lane. When it is safe to proceed, you should proceed slowly and cautiously around the stopped vehicles. Be ready to stop!

Stopping at controlled intersections

Exercising due regard requires that the operator of an emergency vehicle be able to yield the right of way at a red light or stop sign to avoid a collision and proceed only

when the right of way is clear. Often as we approach an intersection civilian vehicles don't know if they should slam on the brakes and risk a rear-end collision or rapidly pass to clear the intersection. This is where the emergency vehicle driver must exercise great caution and patience. Move cautiously into intersections, making eye contact with the other drivers whenever possible and predicting their action by the motion of their vehicle. Don't assume that they see you and are willing to yield. Proceed only after you are given the right of way. Using the body of your vehicle to bully your way through the intersection could have disastrous results for you and for other drivers. When crossing a multi-lane roadway approach *each lane* individually in the above manner. Multi-lane roadways provide opportunities for drivers to switch lanes to pass vehicles that are already yielding to you. Beware of empty lanes that offer a free path to the intersection.

Use of warning devices

An emergency vehicle operator relays his request for right of way to the driving public using visual and audible warning devices. When the apparatus is on a bona fide emergency response, use these devices from the time the unit leaves the station until it arrives on-scene. Even at 2a.m. you must legally request the right of way to avoid liability. Sometimes a late night/early morning run could be your most dangerous response. Party-goers returning home after an evening of socializing, overnight delivery people who are used to roads being clear, and fatigued drivers who might not be as alert as in the daytime are your driving companions. They all deserve to be properly warned.

Emergency vehicle operators should also avoid sounding warning devices *only* at intersections. This most likely will startle motorists, causing them to stop in your path. If you're on a response, put your lights and sirens on, and leave them on!

If you are cancelled while enroute or the incident is downgraded, turn off the warning devices and drive like the rest of the public. There are no special privileges afforded to apparatus driving in routine mode.

Focus your attention

As the operator of an emergency vehicle, your job is to drive the apparatus to the destination (be it an emergency or the grocery store) and operate it properly. This should be your complete focus of attention. One of the first things you should be doing is mentally planning your route, considering impending traffic conditions, and the response of other apparatus to the scene. Use other crew members as a resource when uncertain of your route, the next turn, or positioning upon arrival. Avoid engaging in radio communication and casual conversation with other passengers. If activities in the cab are distracting you, express your concern to the rest of the crew. Full concentration should be devoted to driving.

Avoid removing your hands from the steering wheel to operate the siren, air horn, cell phone or radio microphone. It may also be best to avoid using your left foot to engage the foot pedals for warning devices if you find that distracting. Leave these duties to the person riding in the right front seat.

Physical Preparations

When an apparatus operator prepares to drive, several considerations first must be addressed. This should be done *before an alarm is received*, not while the apparatus is responding. The position of the seat and steering wheel are extremely important to the safe and comfortable operation of the apparatus. The driver should be able to sit erect with his back against the seat, knees slightly bent, and able to comfortable reach the brake and accelerator. He should adjust the seat accordingly.

Many apparatus have steering wheels that telescope and tilt to customize the position for the comfort of the operator. Make these adjustments before starting out as well. Adjusting the side-view mirrors is most important. A good operator's eyes are constantly moving from the road ahead to the left and right mirrors and to the gauge panel while driving. The operator should adjust the mirrors so he can determine what is next to him by glancing from side to side without excessive head movement. Although some apparatus are equipped with remote-controlled mirrors, it can be very dangerous to adjust the rear-view mirrors while driving forward. It's best to make these adjustments prior to the trip when the apparatus is standing still.

Finally, all members riding should have their seat belts securely fastened. In a collision or rollover, the belts will prevent the firefighters from being ejected from the apparatus. Position the waist belt low around the hips, not up over the stomach.

Driving Tasks

Starting includes all pre-trip activities, as well as leaving the station, scene or parked position. Starting includes the daily apparatus check conducted at shift change, the pre-motion circle check, the cab adjustments, seat belt check and a visual scan of the field of view and departure path.

Daily Apparatus Check

- Preventive maintenance process
- Occurs at shift change/driver change
- Identifies defects
- Treats small problems
- Mirror & seat adjustments
- Documentation
- Mark of a professional operator

Cab Adjustments

- Passenger mirror
- Driver mirror
- Steering wheel height and angle
- Seat height
- Clean windshield
- Clean windows
- Clean mirrors

Adjust mirrors so blind spot mirrors provide a view of the two blind spots.

Circle Check

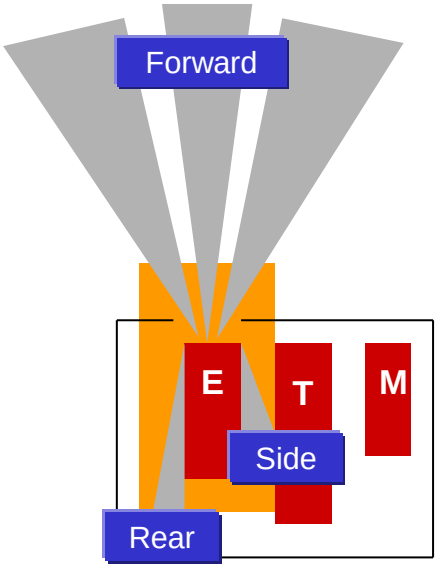
Rapid 360-degree vehicle scan

- Sides
  - Compartments
  - Ladders, tools, lights, and equipment
- Rear
  - LDH and hose
  - Appliances and loose equipment
- Underneath
  - Obstructions or forgotten equipment
  - Wheel chock
- Mark of a professional operator

Performed each time the vehicle is moved after personnel have dismounted or when leaving the station.

Visual Scan

- Operator completes a visual scan of the field of vision before moving
  - Forward
  - Sides
  - Rear
- Remain parked until the overhead door is 100% open
- Proceed slowly through the door opening and hazard zone



Fire Station

Seat Belts

- All crew members seated and restrained
- Insurer's hot button
- Patient care providers must use their judgment during patient transport
- EMS unit driver must adjust speed and space cushions when crew member is unrestrained
- Zero Tolerance. Consequences imposed for failing to wear a seat belt

Zero Tolerance

In-motion includes items such as space cushion, visual lead time, eye movement, “cover the brake”, safe speed, railroad crossing, hands free, steering, signaling and traffic signs and signals. EMS units and heavy apparatus are larger and weigh more. Turning radiuses change – pivot points are different. Stopping distances are longer. These skills have to be mastered to safely operate the larger and heavier emergency vehicles. These skills become critically important.

AUTOMATIC TRANSMISSIONS

Most fire apparatus produced today are equipped with automatic transmissions. Some models have an overdrive gear, which allows the transmission to turn the drive shaft faster than the normal 1:1 direct drive. In direct drive, the drive shaft is turning the differential at or close to the governed engine rpm. In overdrive, the transmission gearing turns the drive shaft faster than the engine rpm. This feature allows the differential to be geared for a more powerful low-end performance while not limiting the high-end top speed.

Follow the instructions in the operator’s manual carefully; however, must indicate that placing the shifter in the “D” drive mode and allowing the transmission to shift through the gears result in the most efficient means of operation. The ability to lock the transmission in a lower range will provide greater engine braking when going down grades (unless the governed rpm is exceeded) or to prevent up-shifting when pulling out of mud or snow.

Automatic transmissions enhance operational safety, since the driver does not have to concentrate on complicate clutch-and-shift procedures. It also allows the driver to keep both hands on the steering wheel at all times, which is extremely important if executing an evasive maneuver.

AIR BRAKE SYSTEMS

Most modern fire apparatus are equipped with a dual air brake system for safety. It has two separate air brake systems, primary and secondary, that use a single set of brake controls. One system typically operates the air brakes on the rear axle, and other on the front.

The vehicle’s air compressor will normally maintain between 110 and 120 psi in the air tanks. Before moving a vehicle with air brakes, you must allow time for the compressor to build up a minimum of 100 psi in both the primary and secondary systems. The apparatus might have two separate air gauges to indicate the pressure in the primary and secondary systems or possible a dual gauge with two needles (red and green). When the air in either system is below 60psi, the low air warning light and buzzer should come on. As the air begins to build and the buzzer stops, it is still not safe to move the vehicle until both systems are up to 100psi or more.

If you are driving and the low air warning buzzer and light come on, this is an indication that one of the systems has dropped to 60psi. If one air system is low on pressure, the front or rear brakes will not be fully operational. This is a dangerous condition that will

increase stopping distance significantly. If this happens, the driver should safely stop and park the apparatus until the nature of the problem is determined.

The rear axle brakes on straight trucks and tractors are “dual chamber” units and are applied in two ways. First, the regular “service” brakes, when applied (controlled by the foot pedal), supply air to a chamber that provides force to the brake linkage at the wheels, stopping the vehicle. A second air chamber is mounted to the first and contains a powerful spring held in a compressed state by air pressure when the parking brake is released. When the parking brake is applied, the air is exhausted from the spring brake chamber and the mechanical force of the springs applies the brakes. A leak in the air system, which causes pressure to drop, will have the same result of applying the spring brakes and activating the parking brake control knob. The parking brakes will not release unless there is sufficient air pressure in the system to overcome the spring pressure.

Apparatus manufactured since the 1991 apparatus standard took effect are equipped with an air pressure protection valve, which stops supplying air pressure to accessories such as air horns if the system pressure falls below 80 psi. This helps ensure that sufficient air pressure is maintained in the system to stop the vehicle and to prevent premature application of the spring brakes.

Some apparatus are equipped with a special emergency spring brake release system. This system maintains an isolated air tank that does not supply air to the braking system under normal conditions. If a leak in the air system causes the spring brake to apply, there is a possibility that the compressor will not be able to overcome the leak and the vehicle will be unable to move from the location where the brake was applied. If this occurs, the driver can press and hold the emergency release valve and the parking brake control at the same time to release the spring brake and move the vehicle out of traffic and off to the side of the road. This emergency release is only able to provide air for a short duration and should be used only to move the apparatus to a safe position.

AUXILIARY BRAKING DEVICES

Auxiliary braking devices in the form of transmission retarders, driveline retarders, and engine brakes, when activated by the driver, apply a retarding force to the drive wheels of the vehicle without the use of friction. These devices increase safety as well as economy when used properly.

Some are activated by pressure on the brake pedal; others are programmed to apply a predetermined percent of retardation when the accelerator is release and apply the remainder when the brake pedal is depressed.

A word of caution: Each system has specific operating instructions that the apparatus operator should read and understand. Some of these instructions are particularly important and include disabling the device on slippery or wet road surfaces.

Although it is important to turn some of these devices off in slippery weather, they should remain operational when the road is clear. Some apparatus operators routinely disable auxiliary braking systems because they don’t like the deceleration effect when the accelerator is released during a response. These individuals should be taught that

in a panic-stop situation, the auxiliary braking device helps stop the vehicle safely by bridging the reaction time it takes to move the foot from the accelerator to the brake. In addition the reducing the stopping distance, auxiliary braking devices help keep the service brakes cool, which increases their efficiency and reliability.

COLLISION AVOIDANCE

Most collisions are caused by operator error. The error might be yours or it could very well be the other driver's. By driving defensively, you can reduce the probability of being involved in a collision. Keep in mind the following four concepts as you drive:

1. **Be alert.** Never think that the other driver will not make a driving error.
2. **Be prepared.** Learn what to do in any case when you have to act fast. Anticipate a problem before it happens.
3. **Act quickly.** Don't panic. Know what to do if something happens suddenly.
4. **Obey traffic laws.** The operator of an emergency vehicle is often exempt from certain traffic regulations while responding, but always with due regard for the safety of the driving public. When in a "no response" mode *always* obey *all* traffic laws.

Proactive Driving Formula

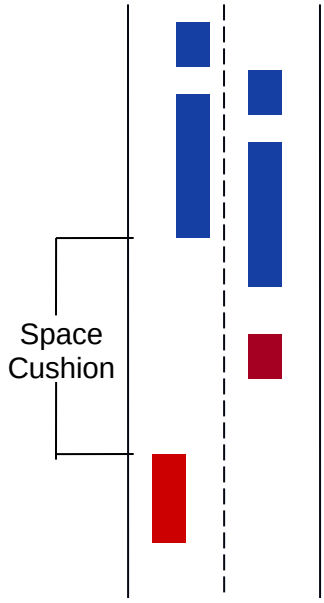
The vast majority of collisions are preventable! The Proactive Driving Formula is:

1. Sense the conditions.
2. Identify the hazard.
3. Predict the outcome.
4. Decide an action to take.
5. Execute the maneuver.

Defensive Driving

The word "defensive" in this context means "preventing". Just as a defensive fire operation prevents the fire from spreading to the exposures or the defense of a sports team prevents the opponents from scoring, defensive driving techniques help prevent collisions.

The first lesson of defensive driving – and one of the most important – is to keep a space cushion around your vehicle when driving. To avoid a collision, you will need as much time as possible to react. By keeping as much space as possible between your apparatus and other vehicles of all sides, and leaving an out, you'll be able to maneuver out of trouble. Avoid "tailgating" (following the vehicle ahead too closely), thus making sure that there is enough time to stop. This includes other responding apparatus. It's terribly embarrassing when one apparatus hits another!



Space Cushion

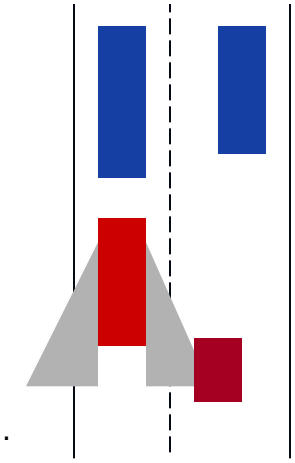
How the space cushion works:

- Provides adequate space for braking
- Provides space for offensive or aggressive drivers

A space cushion is a safety margin or extra space that you leave between your vehicle and the vehicle in front of you. This space provides you with two key advantages. First, when you see the other vehicle in front of you begin braking, your vehicle will have adequate space to stop without rear-ending the other vehicle. Your vehicle needs considerable space and distance to safely stop. Second, it provides space for aggressive drivers to maneuver in front of you.

Having others travel in the space next to you presents two dangers. First, the other driver might change lanes suddenly and turn into you. Second, you may be trapped when you need to change lanes to avoid a collision. When a vehicle is driving next to you on the side, either adjust your speed or pass the other vehicle.

Side Field of Vision



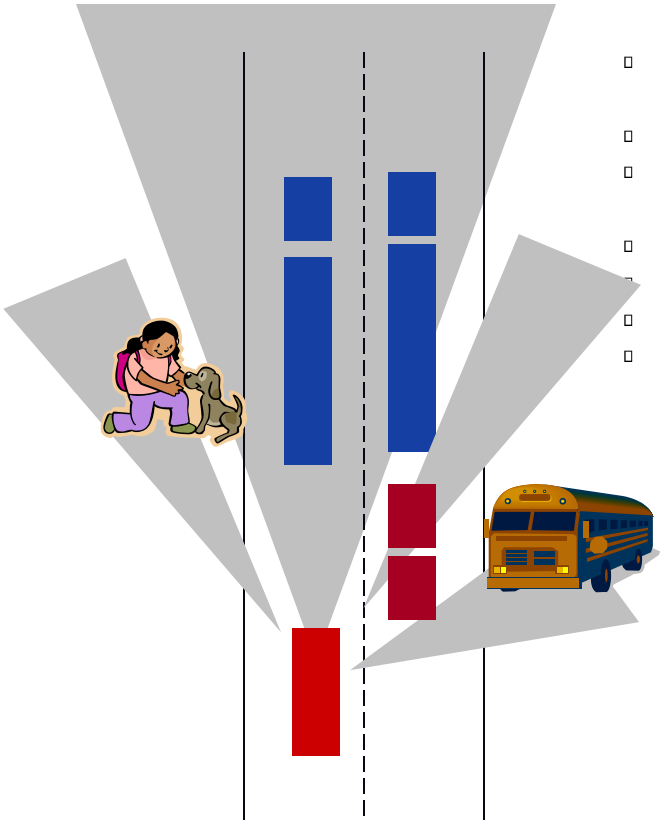
- See what is happening to your sides
- Use blind spot mirrors
- Monitor left and side lanes
- See what is about to enter your peripheral vision
- See aggressive drivers before they cut in front you

When passing other vehicles, keep the apparatus in the center of the lane to allow enough side clearance to pass safely. The best way to accomplish this is to look ahead down the road. You will naturally center the vehicle. Avoid trying to gauge the clearance by looking side to side.

"Talk" to other drivers by using your signals. Signal turns far in advance; if you anticipate braking, tap your brake pedal a few times to flash your brake lights before the actual stop is necessary. If possible, make eye contact with the other driver as a form silent communication.

Look far enough ahead. Because stopping or changing lanes can require a lot of distance, you need to look well ahead to make sure that you have the room to make these moves safely. Most good drivers look 12 to 15 seconds ahead. At lower speeds, that is about one block. At highway speeds, it's about a quarter of a mile. A good driver will shift his attention back and forth, near and far.

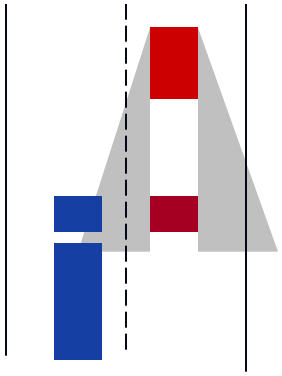
Visual Lead Time (Forward)



- Scan the horizon and look over the vehicles in front of you
- Scan ahead and scan street sides
- Try to see what you will encounter 12 -15 seconds from now
- Helps vehicle stay in a straight line
- Identify hazards and still have time to react
- Intersections, crosswalks, RR crossings
- Playgrounds, schools, construction, parking lots, shopping centers

You should scan ahead 12-15 seconds. This will help keep your vehicle moving in a straight line and will allow you to take in the entire scene, including the side of the road. Watch for activities occurring on the side of the road.

Rear Field of Vision

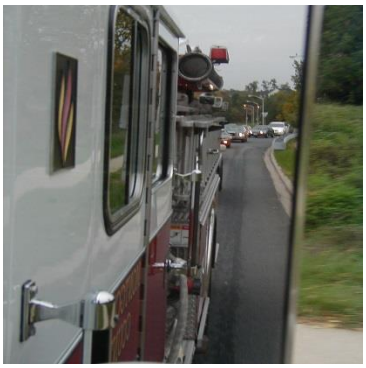


- Check your mirrors every 5 to 10 seconds
- You may see a vehicle approaching too fast or following too close
- You may still have time to react
- Check mirrors before slowing or changing your path

Mirrors

Other Times to Check Mirrors

- Check mirrors before slowing down, stopping, decelerating
- Check mirrors on long or steep hills
- Mirrors distort the real image
- Objects appear to be smaller and farther away than they really are



Another area of “space” to consider is overhead space. The driver of the apparatus, especially a taller unit equipped with an aerial device or a high rescue body, must constantly be aware of the vehicle’s overall height. Some departments routinely mark height information on the dashboard or windshield to serve as a reminder. NFPA 1901 has required a placard with the height of the apparatus for a number of years.

A problem sometimes encountered is that height marking on bridges and overpasses can be incorrect because of repaving or heavy packed snow. If you have any doubt about an overhead clearance, STOP and have a member of the crew check for adequate room. This is also true when apparatus “relocate” or “cover” other fire stations. Many times, especially in older fire stations, there is not adequate overhead clearance for modern, larger apparatus.

Low-hanging tree limbs can also cause serious damage to apparatus. On the rear-mount type of aerial unit, the driver must not only watch for the aerial or platform in the front to clear but must also be aware of the operating pedestal at the turntable, which usually is quite high. In an area where trees are routinely encountered, the driver should cautiously try to stay in the center of the road to avoid such hazards.

Speed Control and Stopping Distances

Driving too fast is a major cause of fatal crashes. It is important to respond to emergencies in a prompt manner, but it is even more important to arrive safely. Adjust apparatus speed according to driving conditions. Conditions include traction of the road surface, curves, traffic, visibility, and hills.

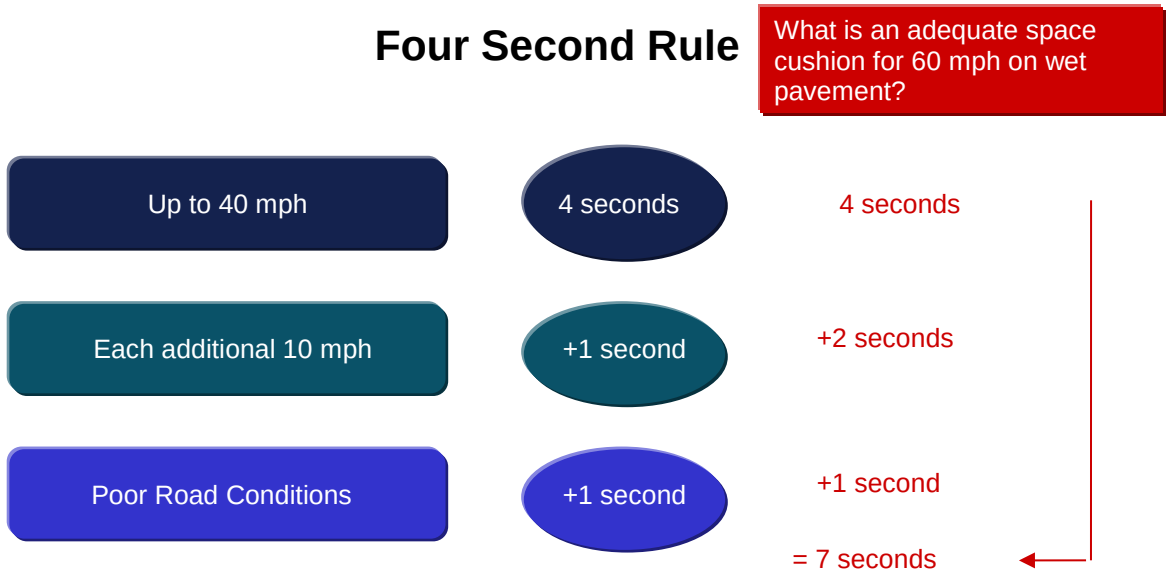
Total stopping distance = perception distance +
reaction distance +
braking distance.

Perception distance is the distance your vehicle travels from the time your eyes see a hazard until your brain recognizes it. The perception time for an alert driver is about three-quarters of a second. At 55mph, you travel about 60 feet in this period.

Reaction distance is the distance traveled from the time your brain tells your foot to move from the accelerator until your foot actually applies the brakes. The average driver has a reaction time of three-quarters of a second, which accounts for another 60 feet at 55mph.

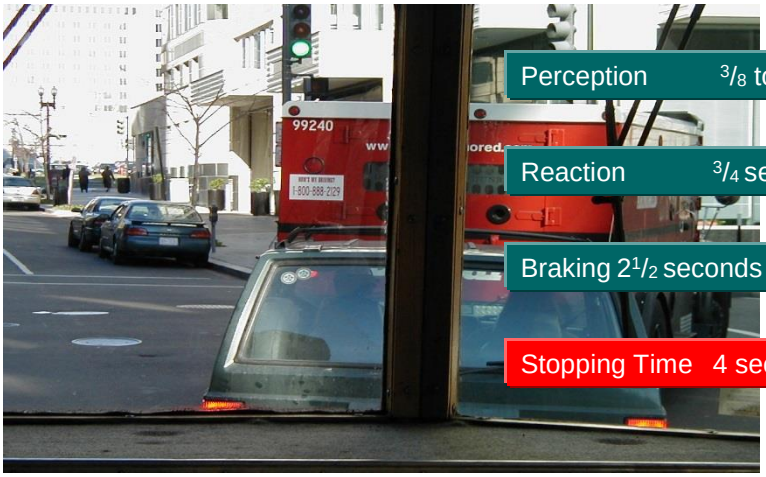
Braking distance is the distance it takes to stop once the brakes are applied. A heavy two-axle truck at 55mph on dry pavement with good brakes can take approximately 300 feet to stop.

Total stopping distance at 55mph will be approximately 420 feet (60+60+300 = 420 feet). Your vehicle will travel more than 1 ½ football fields before stopping!



Heavy apparatus and EMS units must use the Four Second Rule when traveling less than 40mph and under favorable conditions. If traveling over 40mph, then increase your space cushion by one second for each additional 10mph of speed over 40mph. In unfavorable conditions such as a wet road, add an additional 1 second to your space cushion.

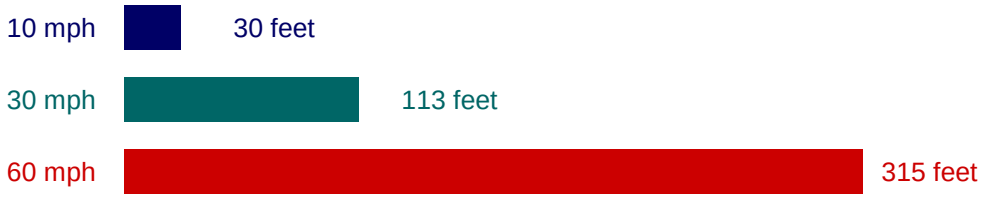
Stopping Time



Based upon 40 mph on wet roads.

Stopping Distance

How much distance do you need to stop on a dry road?



An adequate space cushion is critical. If you have an adequate space cushion using the Four Second Rule, then it is likely that you will have enough space to bring your vehicle to a complete stop. If you do not leave an adequate space cushion then you are at risk for a collision.

Stopping Distance

Actual stopping distance on dry road (COF=0.70)

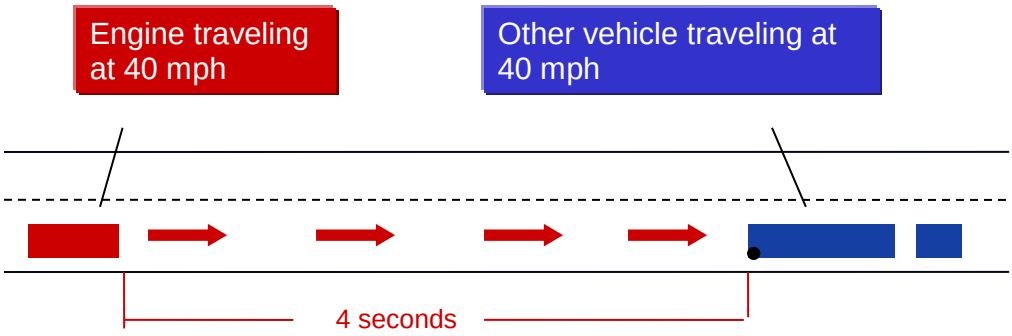
Miles/Hour	Feet/Second	Stopping Time (sec.)	Actual Stopping Distance (ft.)
60	90	3.5	315
40	60	3.0	180
20	30	2.5	75
10	15	2.0	30

Stopping Distance

Actual stopping distance on wet road (COF=0.40)

Miles/Hour	Feet/Second	Stopping Time (sec.)	Actual Stopping Distance (ft.)
60	90	5.0	450
40	60	4.0	240
20	30	3.0	90
10	15	2.5	40

Four Second Rule



- It should take the engine 4 seconds to pass the light pole.
- Add 1 second for each 10 mph over 40 mph.
- Add extra 1 second for poor conditions

To avoid collisions, you need to see what is happening in front of you, to your sides, and to your rear. A common at-risk tendency of emergency vehicle operators is eyes fixed on the forward path staring no more than 20-30 yards ahead. This is called tunnel vision and leaves the operator oblivious to the driving environment and leaves them little reaction time.

Understanding the effect of speed on stopping distance is extremely important. Whenever you double your speed, it takes about four times as much distance to stop, and your vehicle will have four times the destructive power if it crashes. By slowing down a little, you can reduce your braking distance significantly.

Weight is another important factor in stopping distances. The heavier a vehicle is, the more work the brakes must do to stop it. The combination of weight, speed, and frequency of brake application will cause the brakes to heat up.

The braking duty cycle of fire apparatus on a response is such that the friction in the braking system causes heat to rapidly build up in the brake block and drums. This excessive heat can cause a major loss of efficiency in the braking system by affecting the friction surface of the brakes and expanding the drum. Some estimate that brakes that heat more than 520°F lost 60 percent of their efficiency. This, of course, increases stopping distance dramatically. On a long downgrade, this results in brake fade. Disc brakes are somewhat less prone to fading, since they dissipate heat better than drum brakes.

Matching Speed to Road Conditions

Traction between the vehicle tires and the road provides the means to steer and stop the apparatus. A driver must be aware of road conditions that reduce this traction and require special adjustments in speed and handling. For example, it will take longer to stop and be more difficult to steer without skidding when the road is slippery. To compensate, you obviously must drive more slowly to stop in the same distance as on dry pavement. A wet road will require slowing down by about one-third; on packed

snow, speed should be reduced by one-half of more. If the road surface is icy, speed should be reduced to a crawl.

Posted speed limits are for ideal conditions

- Do not go faster than the speed shown
- Slow your speed for less than ideal conditions
- Slow and smooth acceleration and stops
- Maintain adequate space cushions
- Your best defense is to SLOW DOWN

Sometimes the majority of the road will have adequate traction but certain areas will be extremely hazardous. The cautious driver will learn to identify these hazards in advance and prepare to compensate for them. Sometimes it's hard to know if the road is slippery.

The following are signs of possibly slippery conditions as well as other hazards that warrant speed reduction:

Shaded areas. Shady parts of the road will remain icy and slippery long after the sun has melted the open areas.

Bridges. When temperatures drop, bridges will freeze before the general roadway because of air circulating under the bridges and the earth retaining heat under the main portion of the roadway.

Melting ice. Slight melting will make ice wet. Wet ice is much more slippery than ice that is not wet.

Beginning of rain. Right after it starts to rain, the water mixes with the accumulated oil from other vehicles that is on the roadway. This causes the road surface to become very slippery. As the rain continues, the oil tends to wash away, becoming somewhat less of a hazard.

Hydroplaning. When water collects on the road surface, hydroplaning – a thin film of water forms under the tires, causing contact with the road to be lost – can occur. When the friction surface is eliminated, you may not be able to steer or brake. You can gain control by releasing the accelerator to slow the vehicle down and reestablish the friction surface. Avoid applying the brakes if the apparatus is hydroplaning. Hydroplaning is more likely to occur if tire pressure is low or the tire tread is worn. One of the functions of the grooves in the tire tread is to carry water away from the tire surface. If the tires are worn, they will not perform efficiently.

Reduced visibility. Fog, rain, smoke, and dark reduce visibility and require a reduction in speed. You should always be able to stop within the distance that you can see ahead. In fog and rain, use low-beam headlights day and night. Avoid "overdriving" the headlights (requiring more stopping distance than the headlights illuminate).

Glare. Glare from driving into the bright sun or from drivers in the oncoming land with high-beam headlights on can cause temporary blindness. Avoid looking directly into the light. Slow down and look at the right side of the road until the hazard passes. Note that dirty windshields can add significantly to the glare problem.

Curves. Apparatus drivers must adjust their speed for curves in the road. If you take a curve too fast, two things can happen. First, the tires can lose their traction with the road surface, and inertia will cause the vehicle to continue on a straight path and run off the road. Second, if the wheels retain their traction, the high center of gravity can cause the apparatus to roll over. This is especially true of water tankers and tall aerial apparatus.

When approaching a curve, slow down to a safe speed before entering the curve and gently accelerate out. This will help you maintain control. Avoid braking while on a curve, as it is easier to lock the wheels and cause a skid when turning.

Downgrades. On steep downgrades, gravity plays a major role in causing the apparatus to gain speed. The driver must select the appropriate transmission gear before descending the grade to allow the engine to provide a braking effect and work with the vehicle brakes. Continuously applying the apparatus brakes will cause heating and brake fade. If steep grades are a routing part of your response area, the proper use of an auxiliary braking device such as a driveline retarder or engine brake is essential.

To avoid collisions, you need to see what is happening in front of you, to your sides, and to your rear. A common at-risk tendency of emergency vehicle operators is eyes fixed on the forward path staring no more than 20-30 yards ahead. This is called tunnel vision and leaves the operator oblivious to the driving environment and leaves them little reaction time.

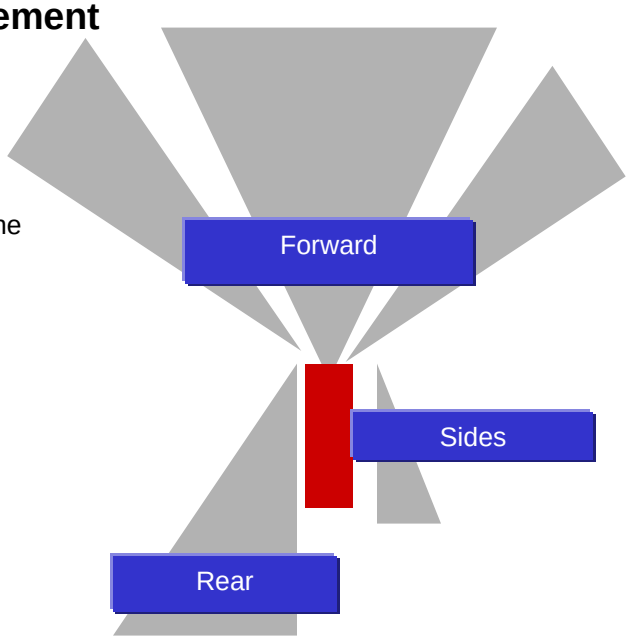
Eye Movement

Eye Movement means keeping your eyes moving to see the fields of vision. Scan the entire field every 10 seconds.

Tunnel Vision places your vehicle at-risk for a collision.

You need to monitor 3 fields of vision:

- **Front** – at least ¼ mile ahead and street sides
- **Sides** – lanes right and left next to vehicle
- **Rear** – lanes right and left behind vehicle



Railroad Crossings

Railroad crossings pose a serious threat to responding apparatus. There have been several cases in which apparatus were struck and firefighters were killed while crossing railroad tracks, especially at rural, unprotected crossings. Trains often approach at high speeds and are unable to stop for a vehicle on the tracks. They are required to sound their horn when approaching a grade crossing, but it might be impossible to hear it with the apparatus warning devices operating.

Another problem could be the grade of the roadway at the crossing. If the crossing has a steep approach and the angle of approach or departure on the apparatus (front and rear overhang) or underbody clearance is not sufficient, the vehicle could get hung up on the tracks.

When approaching a railroad crossing, DFRS Policy 808 requires you to stop, shut off all audible warning devices, look and listen, especially at unguarded crossings. You should not rely solely on the presence of warning gates or signals to warn of approaching trains. Be aware of double tracks, where a train passing in one direction might hide a train on the other track. When you are sure that it is safe, proceed all the way across the tracks. Never permit traffic to trap you into having to stop on the tracks.

Never attempt to race a train to a crossing or pass lowered gates; it is extremely difficult to judge the speed of an approaching train.

Railroad Crossing

- 808 requires you to stop at unguarded crossings.
- Stop and look in both directions.
- Assume that guarded signals are not working.
- Trains travel in both directions
- Wait a moment to proceed after a train passes.
- Assure the tracks are clear in both directions.

Stop for all railroad crossings

City Driving

Speeds are usually much lower in city driving situations, but there are many more things to watch for and more driving tasks to attend to. The operator must constantly watch for the movement of others. Pedestrians, motorcycles, and small children are more likely to create a problem in city driving situations. When traffic is heavy, you'll need extra time to react. By keeping speeds low, you can gain valuable time.

Intersections are undoubtedly the most hazardous locations during an emergency response. When approaching an intersection, there are several considerations for the driver:

1. Is there a traffic light or stop sign that controls the intersection? What is the signal that controls my approach? Uncontrolled intersections, where there are no lights or signs, can be especially dangerous.
2. Reduce speed when approaching the intersection, even if you have a green light or the right of way at a stop sign intersection. "Cover" the brake pedal – rest your foot on it – ready to apply the brakes, if necessary. This greatly reduces reaction time if a brake application is necessary.
3. If you have a red light or stop sign, STOP. Do not "roll through" an intersection where the controls are not in your favor.
4. Look left, right and left again before proceeding. Look for other apparatus or other emergency vehicles that might be approaching from another direction. Cross one lane at a time and only after all lanes of traffic can be identified.
5. Look for pedestrians in the crosswalks, especially small children who may be difficult to see near parked cars and who might not be paying attention.
6. Avoid relying completely on traffic pre-emption devices. These units change the traffic signals in favor of the responding apparatus. Often, a motorist will the see the green traffic signal he waited for change quickly back to red and think that the traffic light control is malfunctioning. An impatient person might proceed anyway.
7. Change the pitch and tone of your siren before you approach the intersection. Going from wail to yelp and sporadically sounding the air horn might attract the attention of other motorists who might be in relatively soundproof cars.
8. If turning at an intersection, be aware of the space necessary to safely clear parked and oncoming vehicles. Signal your intentions as you approach. When turning left across traffic, allow all oncoming traffic to come to a stop. Try to make eye contact with the other drivers. When turning right, stay in your lane to prevent another motorist from trying to pass on the right. As you enter the intersection, go far enough past the corner to safely make the right turn without contacting the parked cars. If this maneuver takes you into the cross street traffic lane, stop and wait for clearance to proceed.
9. Avoid reliance of well-intentioned civilians "directing traffic" at intersections. Approaching traffic may not obey the person's commands, which will create a serious hazard for the apparatus operator who think that the intersection is secure.
10. The apparatus operator must come to a complete stop when encountering a stopped school bus with warning lights flashing. Also, observe reduced speed zones around schools.

Highway Driving

While the potential for collisions is great in city driving, many traffic collisions and fatalities occur on the highways when the weather is good and the roads are dry. In most cases, speed is a major cause and often results in fatal collisions. The open spaces of the highway often lead to the driver's relaxing his attention. You must stay alert, keep your eyes moving, and be ready to react to the unexpected.

When entering a highway or freeway, attempt to match your speed to that of the traffic flow and blend in. Avoid slowing down quickly in traffic lanes. Drive at the speed of traffic, and keep a safe following distance.

At highway speeds, it is often impossible for a driver ahead to hear apparatus warning signals. In this case, a greater reliance is placed on visual warning devices. This sometimes takes longer, as the driver is not likely to notice the apparatus – and take appropriate action – until he checks his rear-view mirror. The apparatus operator must be aware of this and void "chasing" the vehicle in front. If drivers suddenly see a large fire apparatus directly behind them they may panic and apply the brakes. At highway speeds, this could easily result in a rear-end collision. Always leave that "cushion" of space around your vehicle.

Signaling

- Signal before any change of direction
- Signal early
- 3 blinks before lane change
- Assure that your turn signal is off after the turn

Signal early

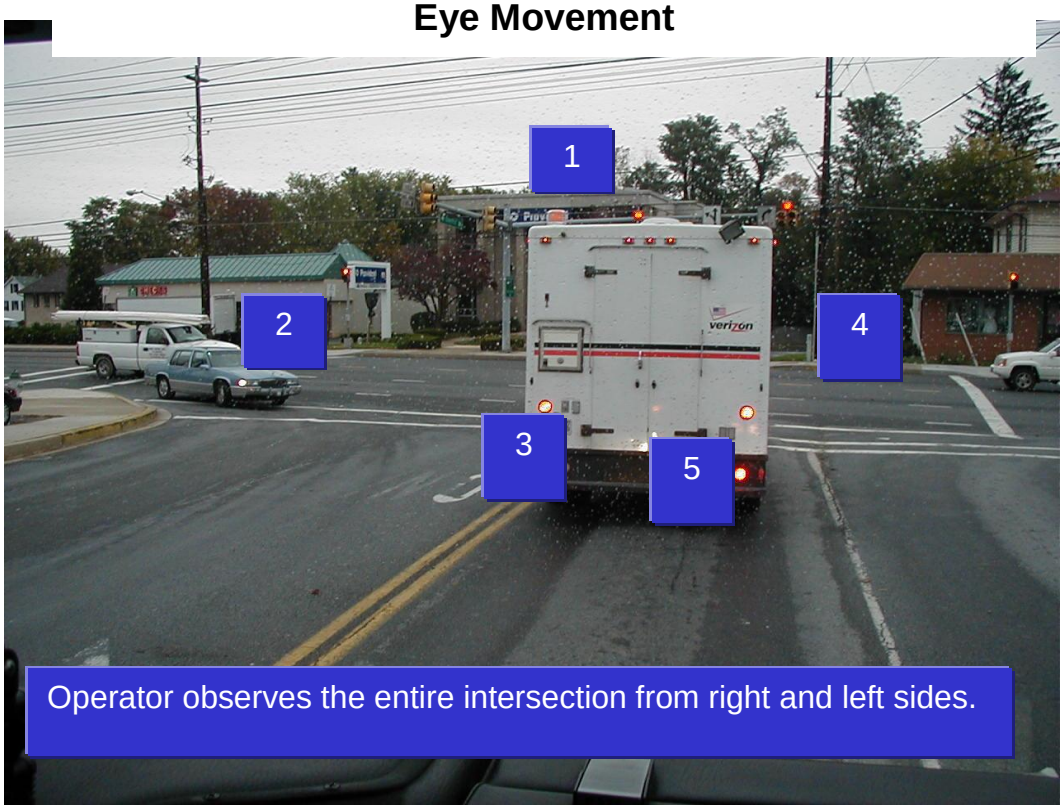
Cover the Brake

Covering the brake is an excellent proactive driving technique for approaching, entering, and traveling through intersections. Covering the brake means that you remove your right foot from the accelerator pedal then shift your foot to the brake pedal placing it in braking position thus reducing your reaction time in the event of an emergency stop.

- Cover the brake when you identify a probable hazard
- Approaching, entering, or traversing intersections
- Remove foot from accelerator and prepare to brake
- Advantages
  - Immediately decreases speed
  - Braking distance decreases
  - Reduces reaction & braking times
  - Resume speed without losing momentum

Eye movement is critical while traversing intersections, especially during responses and patient transports. Your eye movement should follow the sequence in the photo below. What hazards exist? Who has the right-of-way according to the traffic light? What path should the operator take?

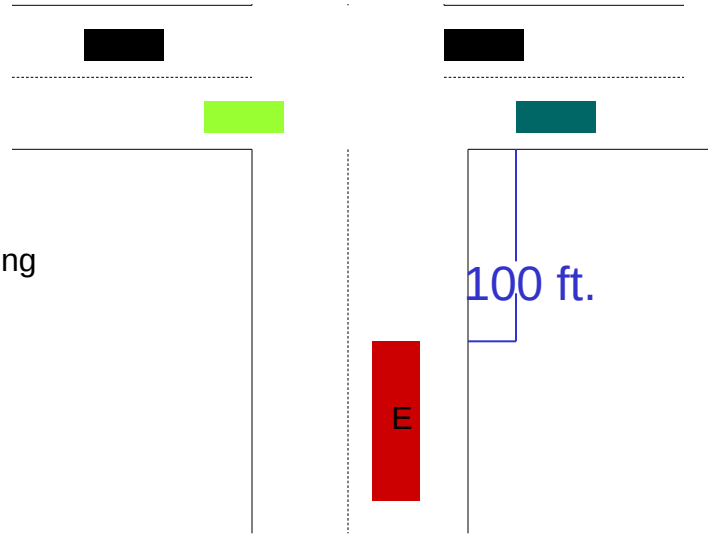
Eye Movement



Stopping at a Controlled Intersection

Reduce Speed

- One of the best proactive driving tactics is to reduce speed
- Reduces stopping distance needed
- First gear or 10 mph no less than 100 feet before the intersection
- Achieves stopping distance < space cushion



Reduce speed to 10 mph.

Most collisions do not occur when vehicles are traveling in the same direction at similar speeds. Most collisions do occur when the vehicles are traveling in different directions at different speeds. Intersections are high-risk areas because both of these hazards are present.

Intersection

- Must be prepared to stop at a red light, stop sign, or other intersection when you are against the right of way
- Account for each lane as a separate intersection
- Avoid using the apparatus as a moving roadblock – this is aggressive driving

You must be prepared to stop at intersections against the right of way.

Jumping

- Operator depresses the accelerator hard from stopped position
- Vehicle jerks or jumps forward
- Hard on the apparatus
- At-risk for rear-end collision
- Jumps before other vehicle moves forward is a common low speed, at-fault collision
- Smooth starts

Avoid “Jumping” – a common cause of slow speed, rear-end collisions. “Jumping” is when the operator depresses the accelerator hard from a stopped position causing the apparatus to jerk or jump forward. “Jumping” is an at-risk behavior and in addition, can be very hard on the apparatus.

Clear Space

- Space cushion left while stopped
- Clear space equals one-half of your vehicle length
- Helps prevent low speed rear-end collisions
- Adequate room to change lanes

Clear space left for maneuvering.

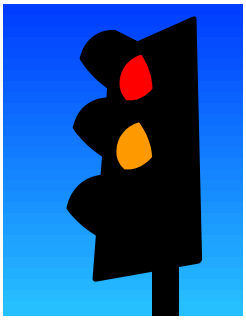
Too close. No room to maneuver right or left.

Leaving a Clear Space is another proactive driving technique for intersections. A Clear Space is simply a space cushion that you leave when you are not in motion. An adequate Clear Space is measured from your front bumper to the rear of the vehicle in front of you.

Traffic Lights

Pay attention to traffic lights

- Stale green
- Stop for yellow
- Flashing yellow means proceed with caution
- Flashing red means stop before proceeding



Traffic Emergencies

A traffic emergency occurs when a vehicle is about to collide with a fixed object or another vehicle. Your chances of avoiding a crash depend on how quickly and effectively you act.

Stopping is not always the safest thing to do in an emergency. When you don't have enough room to stop, you may have to steer away from what's ahead. You can almost always turn to miss an obstacle more quickly than you can stop.

Evasive maneuver. To exercise an evasive maneuver, you must firmly grip the steering wheel with both hands. Most authorities agree that the best hand position is between 9 and 10 o'clock for the left hand and between 2 and 3 o'clock for the right. The best way to be prepared for an emergency is to have your hands in this position the whole time you are driving. Avoid gripping the spokes of the steering wheel or "palming" (steering with the palm of the hand) the wheel with one hand.

You can make a quick turn safely if you perform it properly.

- Do not apply the brakes while you are turning. This could cause wheel lockup and the vehicle could skid out of control.
- Do not turn any more than needed to clear whatever is in your way. The more sharply you turn, the greater the chances of a skid or rollover.
- Be prepared to "counter-steer" – that is, to turn the wheel back in the other direction once you've passed whatever was in your path. Unless you prepare to counter-steer, you won't be able to do it quickly enough. You should think of emergency steering and counter-steering as two parts of one section.
- Keep both hands on the wheel. You can make a very aggressive turn if the steering wheel is rotated 180° (when your forearms are crossed and touching). Returning requires that you aggressively pull back the wheel as well.

Deciding in which direction to steer is determined by the hazard you are trying to avoid and whether the cushion of space is present around your vehicle. If an oncoming driver has drifted into your lane, going to the right would be the best decision. If the other driver realizes what has happened, his natural response would be to return to his own lane.

If something is blocking your path, such as an object's falling off the vehicle in front of you, the move could be to the left or right if the lanes are empty. If you are properly using your mirrors and keeping the space next to you clear, you should know which way to steer. If you are driving in the right lane on a road with a shoulder, going to the right would probably be the best move. It is unlikely that anyone would be driving on the shoulder next to you.

Leaving the road. In some emergencies, it might be a better decision to drive off the road rather than face a collision with another vehicle, especially head-on. If you do leave the road, try to avoid braking until your speed has slowed down. Brake gently to avoid skidding on the loose surface. Keeping one set of wheels on the pavement will help maintain control. After coming to a complete stop, check your mirrors, signal your intentions, and pull back on the road.

If one set of wheels drops off the pavement unexpectedly and you must return to the road before you are able to stop, use the following procedure:

- Always wear your seatbelt.
- Do not panic.
- Get control of your speed.
- Maintain control of the steering wheel.
- Steer straight ahead and slow down.

- Take your foot off the accelerator, but do not brake.
- Allow the vehicle to slow down on its own.
- When you reach a slow, safe speed, turn the steering wheel to the left and gently steer the vehicle back onto the highway one wheel at a time.
- Do not jerk your steering wheel.

Controlling steering while braking. When someone suddenly pulls out in front of you, your natural response is probably to rapidly apply the brakes. This is a good response if you have left enough space in the front of you for the brakes to stop the vehicle safely!

When braking, you should be able to slow the vehicle down while keeping it in a straight line and still maintain steering control. With conventional brakes, there are two techniques to accomplish this: controlled braking and stab braking. Controlled braking is applying the brakes as hard as you can without locking the wheels. If lockup is detected, release the brakes to regain control, and apply again. Stab braking is applying the brakes all the way, then releasing them when they lock, then fully applying them again – basically "pumping" the brakes.

Simply jamming on the brakes of a vehicle that is not equipped with an anti-lock braking system (ABS) will cause the wheels to lock up and result in a skid. If the apparatus is in a skid, there is no rolling friction between the front tires and the road, and you cannot steer the vehicle.

Steering

- Hold steering wheel firmly
- Two hand skill
- Hands positioned at 3:00 and 9:00
- At-Risk Behaviors to avoid:
  - One-handed steering
  - 360 heel turning
  - Elbow steering
  - Finger steering

Hands grip steering wheel at 3:00 and 9:00

Anti-lock braking systems automatically apply and release the brakes (up to five times per second) when wheel sensors tell the computer that a wheel lockup has occurred. On an ABS-equipped vehicle, apply FIRM STEADY PRESSURE TO THE BRAKE PEDAL and allow the computer to "pump" the brakes as necessary. The driver's pumping the brakes only confuses the ABS computer and increases stopping distance.

Skid control. A skid happens whenever the tires lose their grip on the road surface. This can be caused in one of four ways:

- *Overbraking* – braking too hard on a non-ABS-equipped vehicle, causing the wheels to lock up. This situation can also occur when an auxiliary braking device (engine brake or retarder) applies stopping power under slippery conditions.
- *Oversteering* – rapidly turning the wheels more sharply than the vehicle can turn.
- *Overacceleration* – supplying too much power to the drive wheels, causing them to spin.
- *Driving too fast* – the reason for most serious skids.

The most common type of skid is one in which the rear wheels lose traction because of excessive acceleration or braking. Excessive acceleration skidding causes "fishtailing" – the rear of the apparatus moves side-to-side – and is easily corrected by reducing acceleration.

Rear-wheel braking skids occur when the rolling traction of the rear wheels is lost because of brake lockup. The rear wheels then slide sideways in an attempt to "catch up" with the front, causing the apparatus to spin out or swap ends. To correct this condition, stop braking immediately to regain the rolling friction. Quickly steer in the direction that the rear is sliding toward. As soon as the vehicle is back on course, counter-steer in the opposite direction to bring it under control. This, like the evasive maneuver, must be done as one action, steer/counter-steer. ABS can help eliminate skids caused by excessive braking or the action of an auxiliary braking device.

Front-wheel skids are usually caused by driving too fast for conditions, worn tread on front tires, or brake lockup. In a front-wheel skid, the front wheels tend to go in a straight line regardless of how much you turn the steering wheel. On a very slippery surface such as ice, you may not even be able to steer around a curve. The way to deal with a front-wheel skid is to allow the apparatus to slow down without excessive braking or turning. The tires must be able to continue turning to regain the rolling friction necessary to steer and maintain control.

It should be obvious that most skids are caused by operator error. When the road surface is slippery, slow down; exercise due caution; and avoid making abrupt steering, braking, or acceleration maneuvers.

Tire failure. In the event of a tire failure, do the following:

- Be aware that a tire has failed.
- Hold the steering wheel firmly.
- Do not apply the brakes.
- After stopping, check all tires.

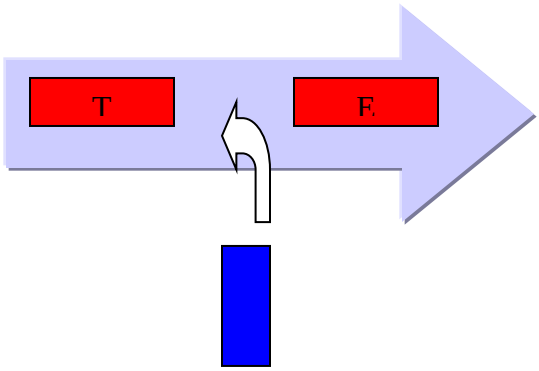
You can recognize several signs of tire failure and have time to properly react; the loud "bang" of a blowout, sudden vibration or "thumping", and "heavy" steering, to name a few. When any of these indicators are present, hold the steering wheel firmly with both hands. A front-tire failure can twist the steering wheel out of your hands.

Avoid braking unless you are about to hit something. It's a natural reaction to brake in an emergency; however, sudden braking with a failed tire could cause loss of control. Allow the vehicle to slow down, apply the brakes gently, and pull off the road.

After you have come to a stop, check all tires for signs of failure. The inside tire of rear "duals" might have to be bumped with a solid object to detect a flat. If the result is a sharp bounce, the tire is probably okay. If it is a dull "thud", the tire is flat.

Zone of Confusion

- Created by two or more emergency vehicles responding together
- Civilian driver sees one emergency vehicle, but hears a different one at the same time
- Civilian driver thinks the coast is clear but pulls into your path
- Elderly and teenagers
- High-risk situation
- Anticipate other vehicles to make mistakes



Confused driver sees the Engine and hears the Truck. Driver's mind thinks there is only one emergency vehicle so driver pulls into the path of the trailing vehicle.

- Anticipate other drivers to make mistakes
- Demonstrate care for other vehicles
- Driving tactics for procession style response:
  - Travel single file. A larger vehicle leads. Leading vehicle creates a path.
  - Increase space cushions. NEVER travel nose to tail.
  - Each vehicle must traverse intersections alone and make eye contact with other drivers. Trailing vehicles NEVER bust the intersection.
  - Use contrasting siren tones. Switch to electronic siren with alternating or pulsing tone.

A "Zone of Confusion" can be created when two or more emergency vehicles are responding with lights and sirens. This confusion is created from a civilian seeing one emergency vehicle but hearing another. They may see one piece of apparatus go through an intersection and assume it is then clear to proceed through the intersection.

This "Zone of Confusion" is often created when an apparatus procession is traveling together or different emergency vehicles approach the same intersection from different directions. Anticipate that other drivers may make mistakes in your path. Adjust your space cushion and speed for the other drivers' mistakes.

Deceleration

- Important skill for heavy apparatus and EMS unit operators
- Hard stops
  - Harsh on apparatus, equipment, crew, patient
  - Indicates operator was not scanning ahead
- Smooth deceleration stops
  - Plan ahead
  - Good visual lead time – ¼ mile ahead
  - Pick your stopping point on horizon
  - Decelerate early

Stop at the Address

- Common at-risk driving behavior is passing the address
  - U-Turns in traffic
  - Backing against traffic
  - Operator gets frustrated
- Preplan & teamwork
- Know block numbers
- Know the cross street before the target block
- Reduce speed on the target block
- Use spot lights
- Stop and read the map book

Spotting

Consider these good habits when positioning or parking

- Approach the final spot slowly
- Spot for tactical advantage
- Leave clear space around vehicle
  - Compartment doors
  - Walking paths
  - Outriggers
- Drive out instead of back out
- Leave access for incoming companies

Parking Brake

Set the parking brake before personnel dismount the vehicle.
It is good practice to set the parking brake when the vehicle is stopped for 10 seconds or longer in a non-driving situation.

Wheel Chock

- Redundant parking brake
- Downhill side
- Required for parked vehicles either attended and unattended
- Light vehicles can use parking brake
- Turn wheels toward curb
- Mark of a professional operator

Chock a wheel

Backing Up

One of the most hazardous times while driving is when backing up, because the driver cannot see where he intends to go. The mirrors can only give the driver a view of what is next to the apparatus and not directly behind**.** Many "first-due" police cars have been damaged when parked directly behind apparatus at fire scenes!

DFRS Policy 808 requires that spotters who maintain eye contact with the driver be positioned behind the apparatus before attempting to back up the unit. If guides are unavailable, the driver must set the parking brake, dismount the apparatus, and walk around to be sure that there are no obstructions behind. Circling the apparatus clockwise and returning to the driver's seat will ensure that there are no obstructions of any side of the vehicle.

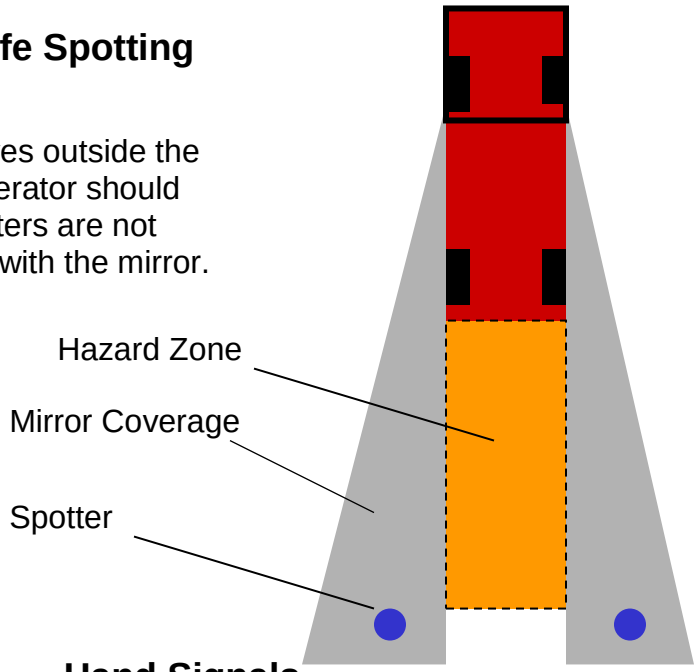
If possible, back the rear of the apparatus toward the drivers' side. It is much easier to see obstructions than when attempting to back in on the (right) "blind side". A better option, if possible, is to avoid backing up altogether and drive forward around the block.

Safe Backing Tips

- Avoid backing.
- Back up when you first arrive at your location.
- Back up in a straight line.
- Always use a spotter.
- Stop immediately if you lose eye contact with your spotter.

Safe Spotting

Spotters position themselves outside the rear hazard zone. The operator should stop the vehicle if the spotters are not visible or lack eye contact with the mirror.



Hand Signals

Stop

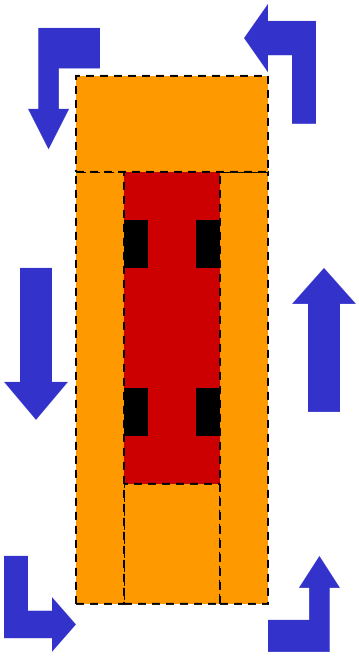
Turn

Diminishing Clearance

These standard hand signals should be used to communicate with the driver.

Circle Check

- 360 degree inspection around the vehicle
- Observe the rear blind spot
- Observe the vehicle sides
- Note object positions
- Check overhead clearance
- Check underneath the vehicle



Remember….

The easiest way to prevent a backing collision is to back with a spotter. If a spotter is unavailable, then complete a circle check.