

PROACTIVE DRIVING SYSTEM



Montgomery County Fire & Rescue Service

December 2002



OVERVIEW

- MCFRS Fleet Losses
- Starting
- In-Motion
- Intersections
- Arriving on Scene or Stopping
- Backing

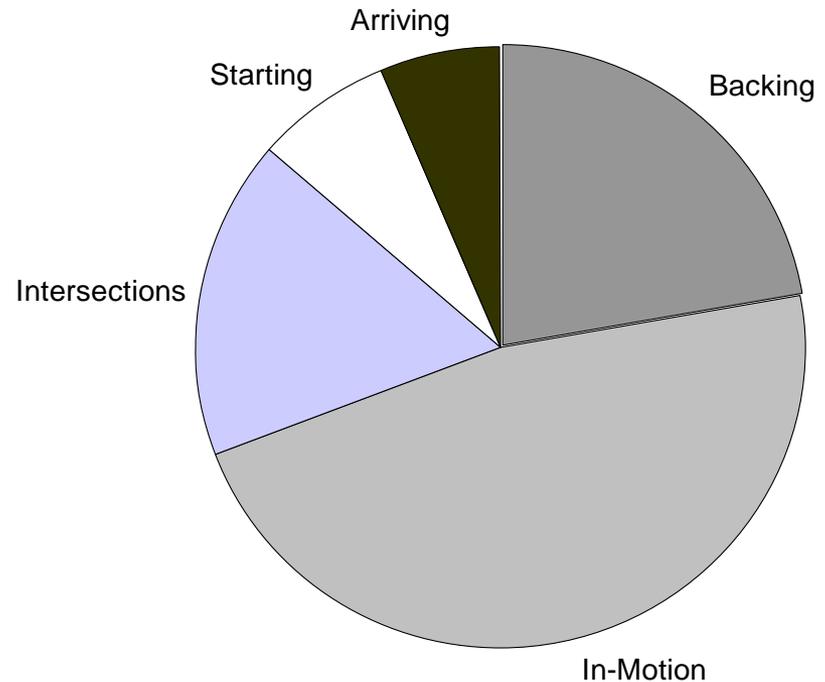




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MCFRS LOSS ANALYSIS

- Insurance
- Special Causes
- Driving Tasks
- At-Risk Behaviors
- New Philosophy



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INSURANCE

- Our collision loss experience is poor
- Spending money for premium increases that could be spent for more worthwhile things
- Pledged to the insurer that we would improve
- Insightful loss study completed
- We changed the way we understand collisions
- Our driving is the loss source
- Our drivers are the solution





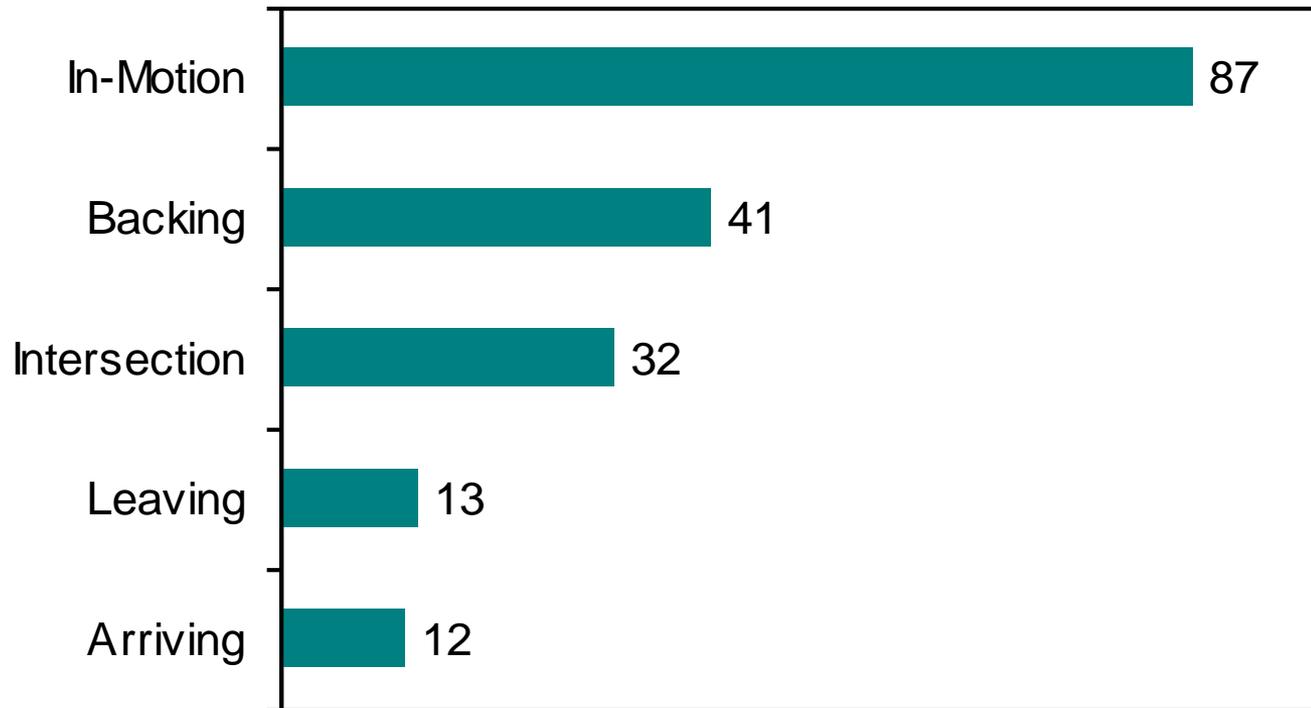
SPECIAL CAUSES

These Loss Factors Are Not Root Causes Of Our Fleet Losses

- Apparatus Type
- Emergency vs. Non-Emergency Driving
- Preventability (the other driver)
- Shifts
- Districts
- Stations
- Assigned Station vs. Detail
- Location of Vehicle Damage
- Driving Experience
- Multiple Collisions
- Time of Day
- Road Conditions



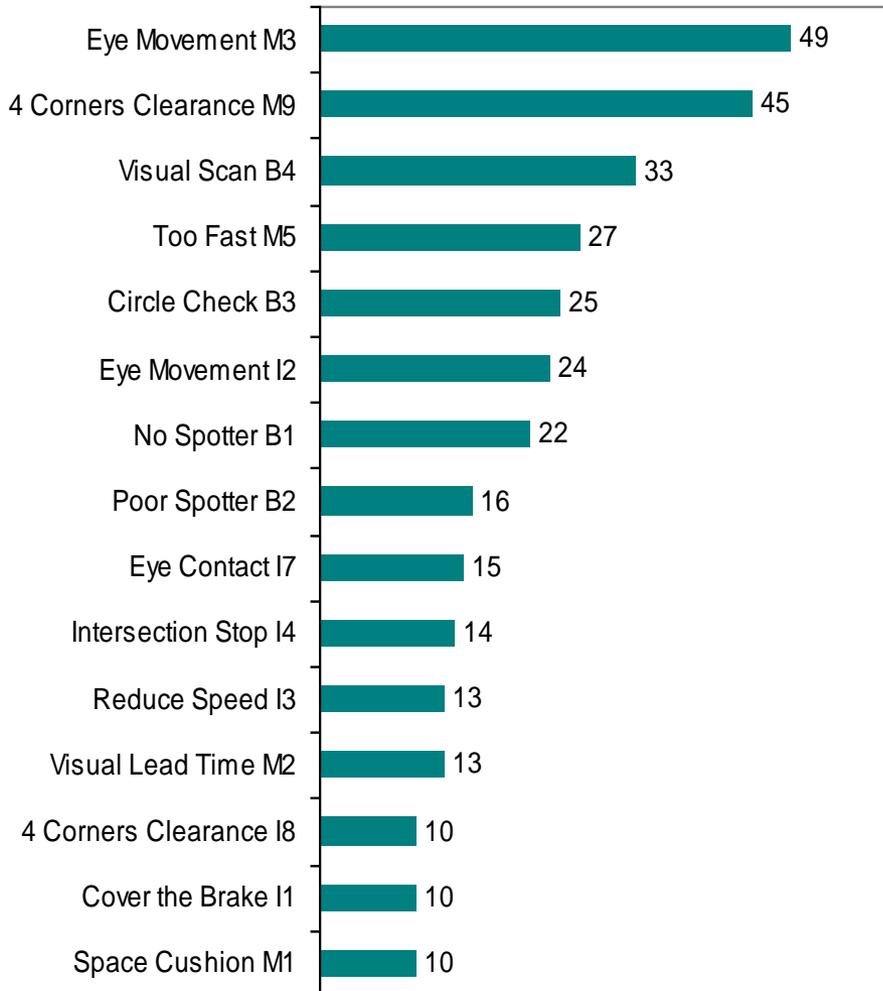
DRIVING TASKS



Five common driving tasks were related to DFRS collisions. Collision reduction will occur by mastering these driving tasks.



AT-RISK DRIVING BEHAVIORS



At-risk behaviors are simply actions that place the vehicle in harms way. The loss analysis revealed a distinct set of at-risk behaviors for each driving task. We have not made this connection in the past.

Collision reduction will occur as more operators master the driving behaviors.



NEW PHILOSOPHY

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.



PROACTIVE DRIVING FORMULA

Identify The Hazard

Predict Outcome

Decide Action

Execute Maneuver

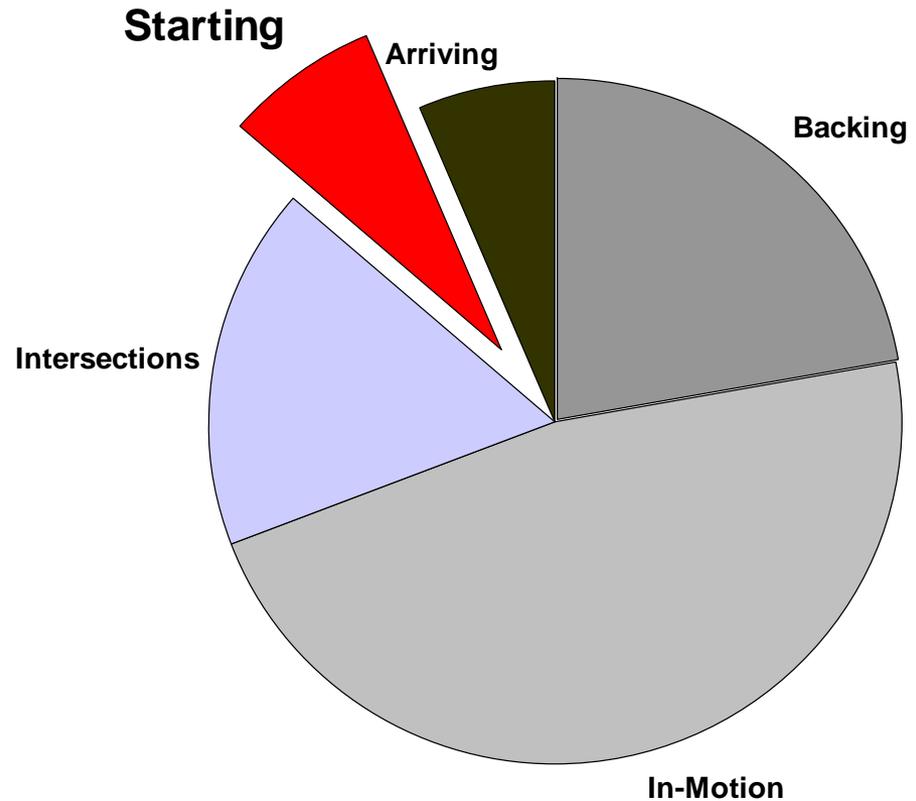
This formula will help you avoid collisions



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STARTING

- Daily Apparatus Check
- Circle Check
- Adjustments
- Seat Belts
- Visual Scan



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DAILY APPARATUS CHECK

- Preventive maintenance process
- Occurs at shift 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
- Rear spot lights



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

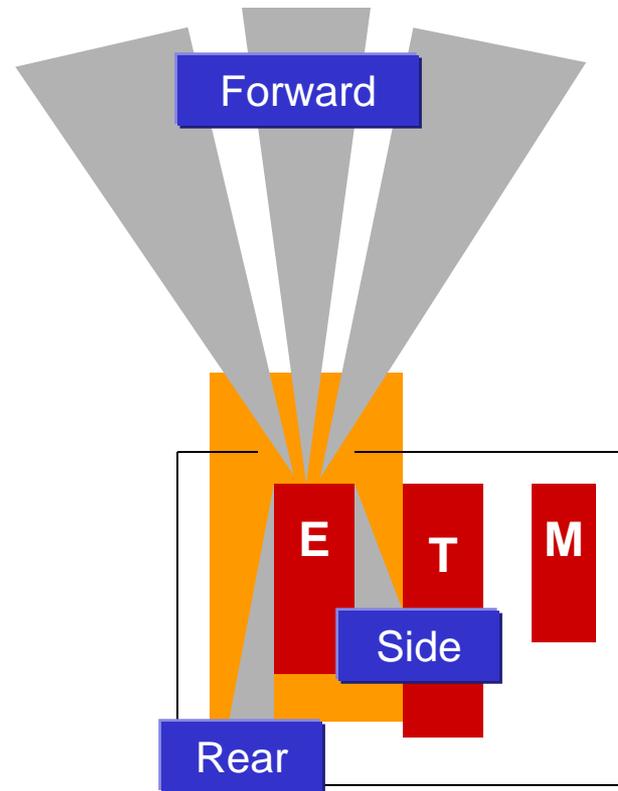


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VISUAL SCAN

- 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



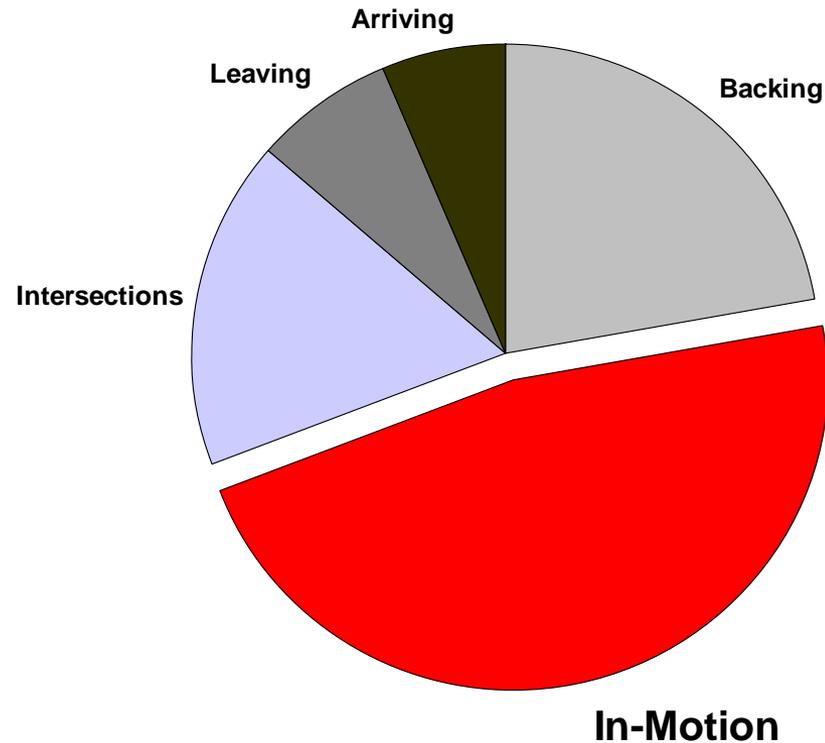
Zero Tolerance



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IN-MOTION

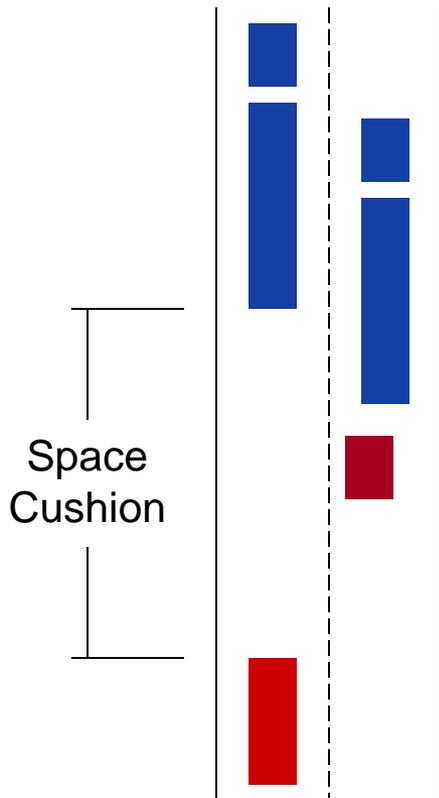
- Space Cushion
- Visual Lead Time
- Eye Movement
- Cover the Brake
- Safe Speed
- Railroad Crossings
- Hands Free
- Steering
- Signaling
- Traffic Signs & Signals



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SPACE CUSHION



How the space cushion works:

- ① Provides adequate space for braking
- ② Provides space for offensive or aggressive drivers



FOUR SECOND RULE

What is an adequate space cushion for 60 mph on wet pavement?

Up to 40 mph

4 seconds

4 seconds

Each additional 10 mph

+1 second

+2 seconds

Poor Road Conditions

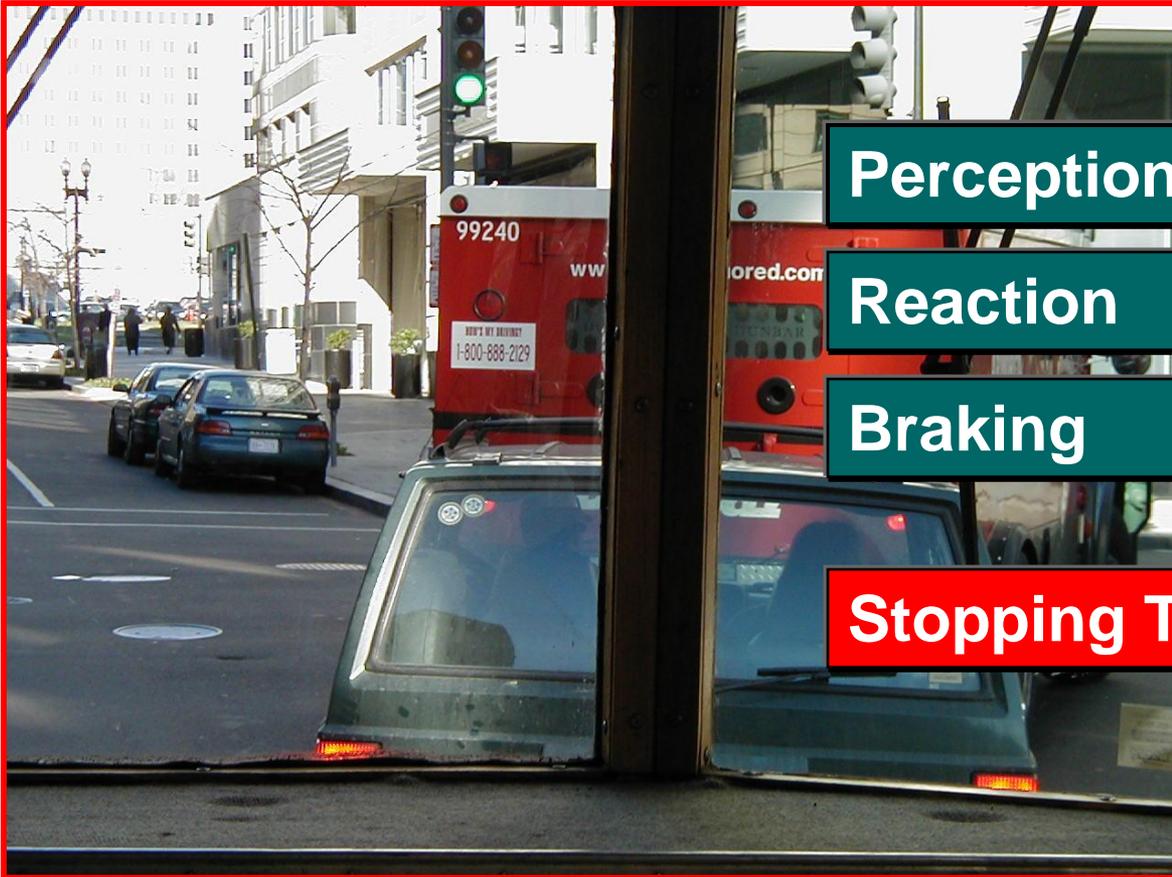
+1 second

+1 second

= 7 seconds ←



STOPPING TIME



Perception $\frac{3}{8}$ to $\frac{3}{4}$ second

Reaction $\frac{3}{4}$ second

Braking $2\frac{1}{2}$ seconds

Stopping Time 4 seconds

Based upon 40 mph on wet roads.



STOPPING DISTANCE

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

10 mph ■ 30 feet

30 mph ■ 113 feet

60 mph ■ 315 feet



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



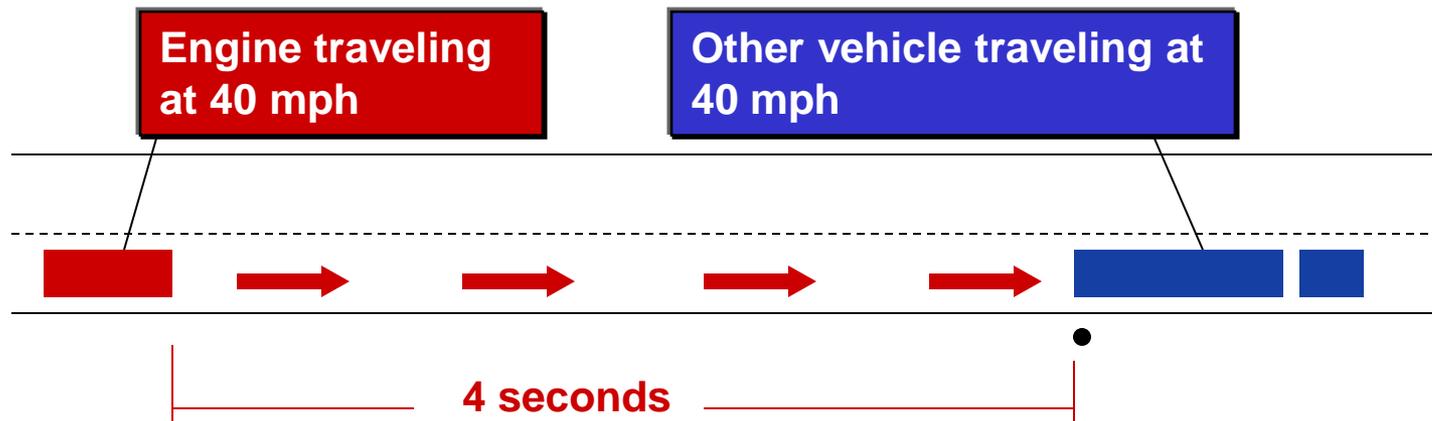
STOPPING DISTANCE

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



EYE MOVEMENT

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

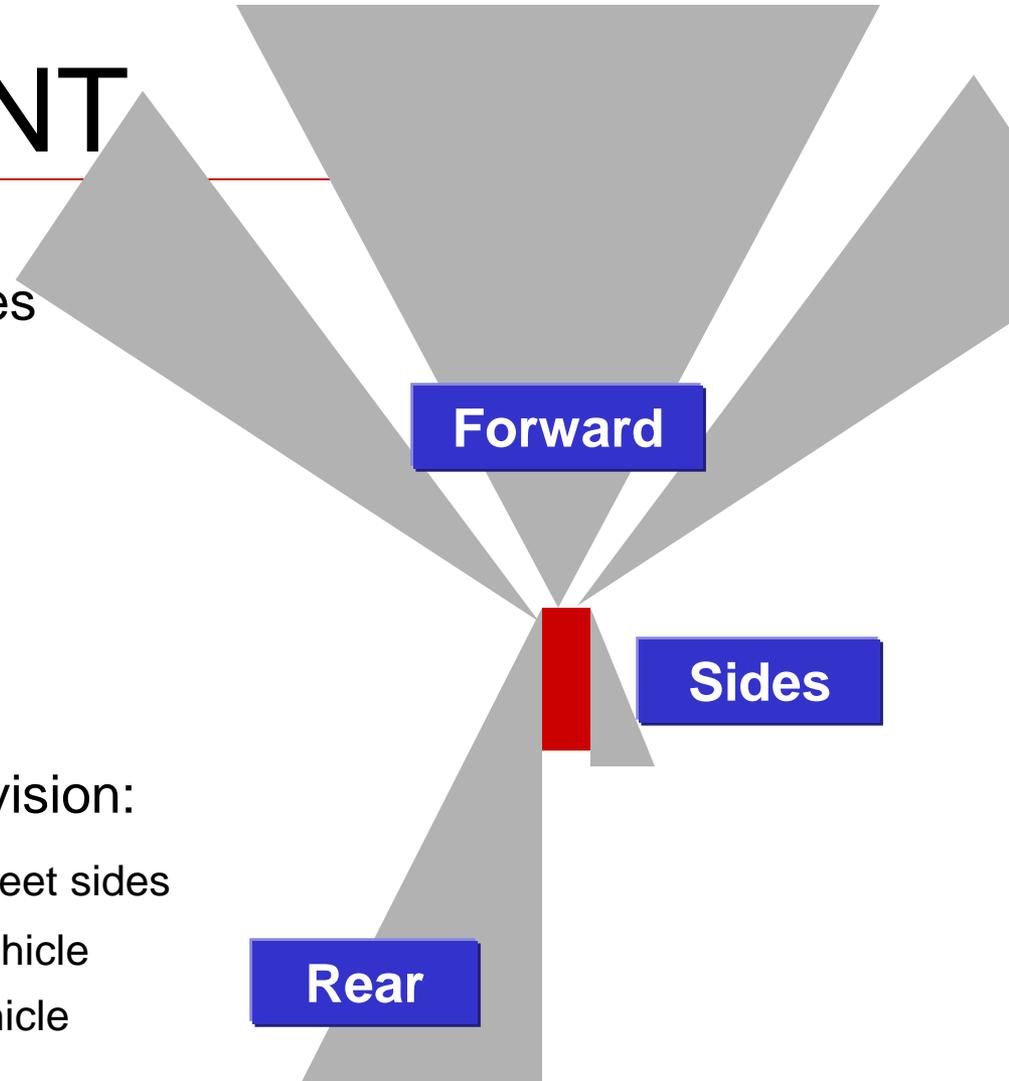
Tunnel Vision places your vehicle at-risk for a collision.

You need to monitor 3 fields of vision:

Front – at least $\frac{1}{4}$ mile ahead and street sides

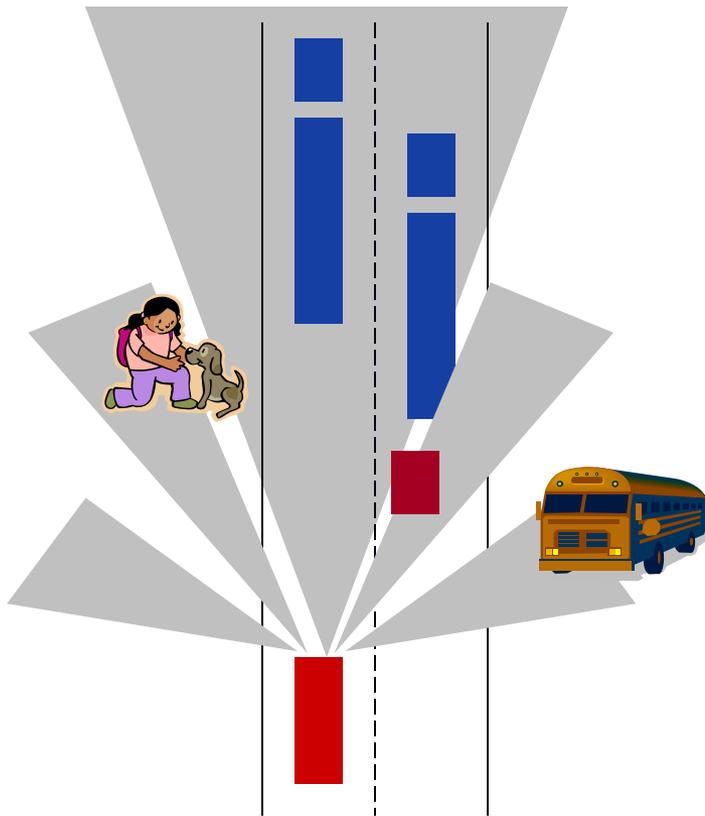
Sides – lanes right and left next to vehicle

Rear – lanes right and left behind vehicle





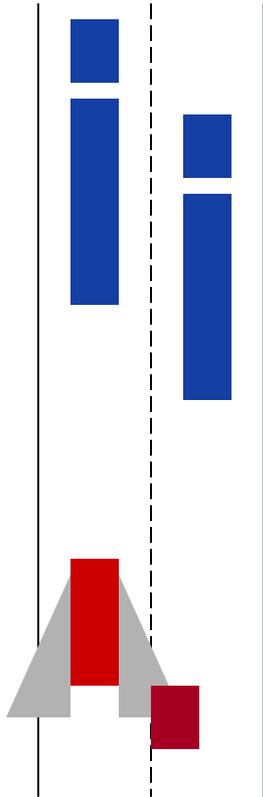
VISUAL LEAD TIME (FORWARD)



- 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



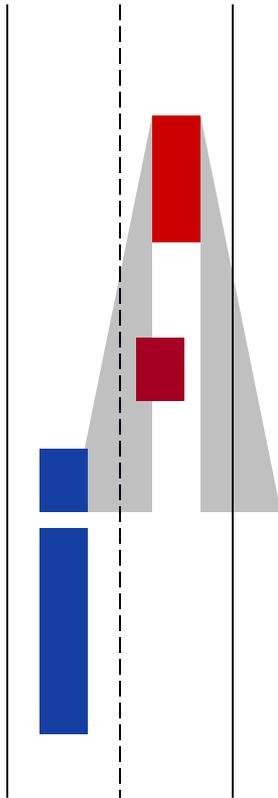
SIDE FIELD OF VISION



- 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



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 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





RAILROAD CROSSINGS

- 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

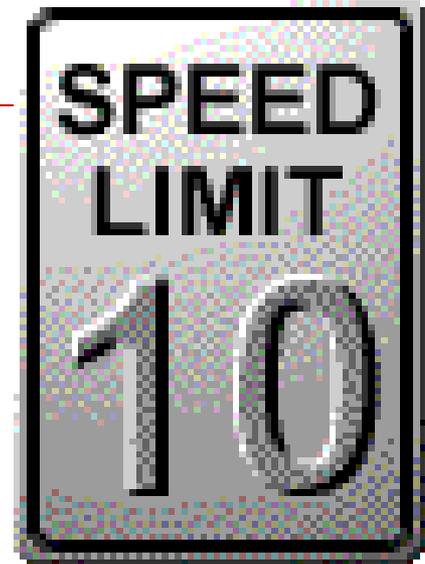
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SAFE SPEED

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**





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



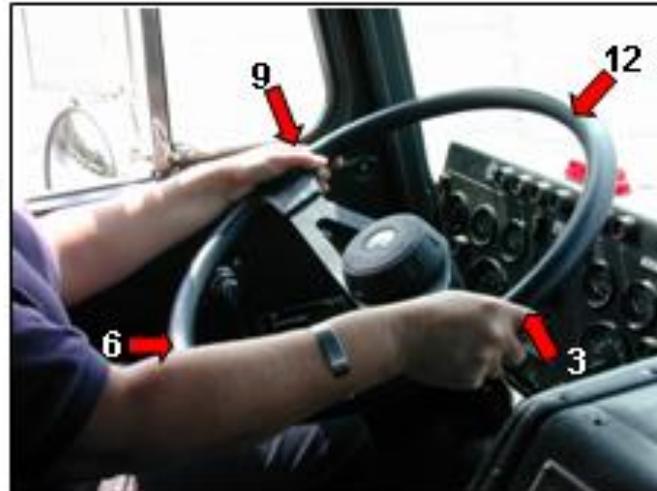
Hands grip steering wheel at 3:00 and 9:00



STEERING

SAFE DRIVING BEHAVIORS

- Steering
9-3 hand position
- Shuffle steering





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

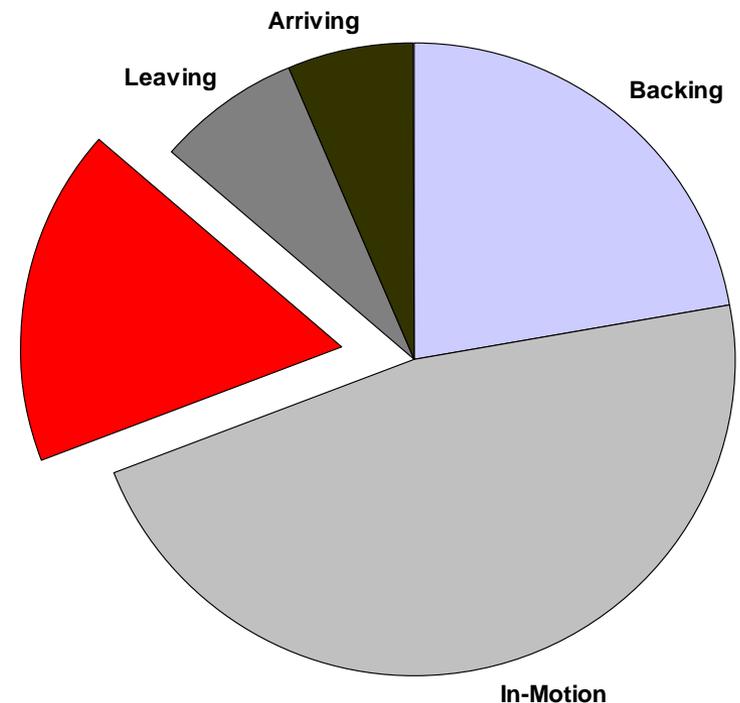


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INTERSECTIONS

- Cover the Brake
- Eye Movement
- Reduce Speed
- Intersection Stop
- Jumping
- Clear Space

Intersections



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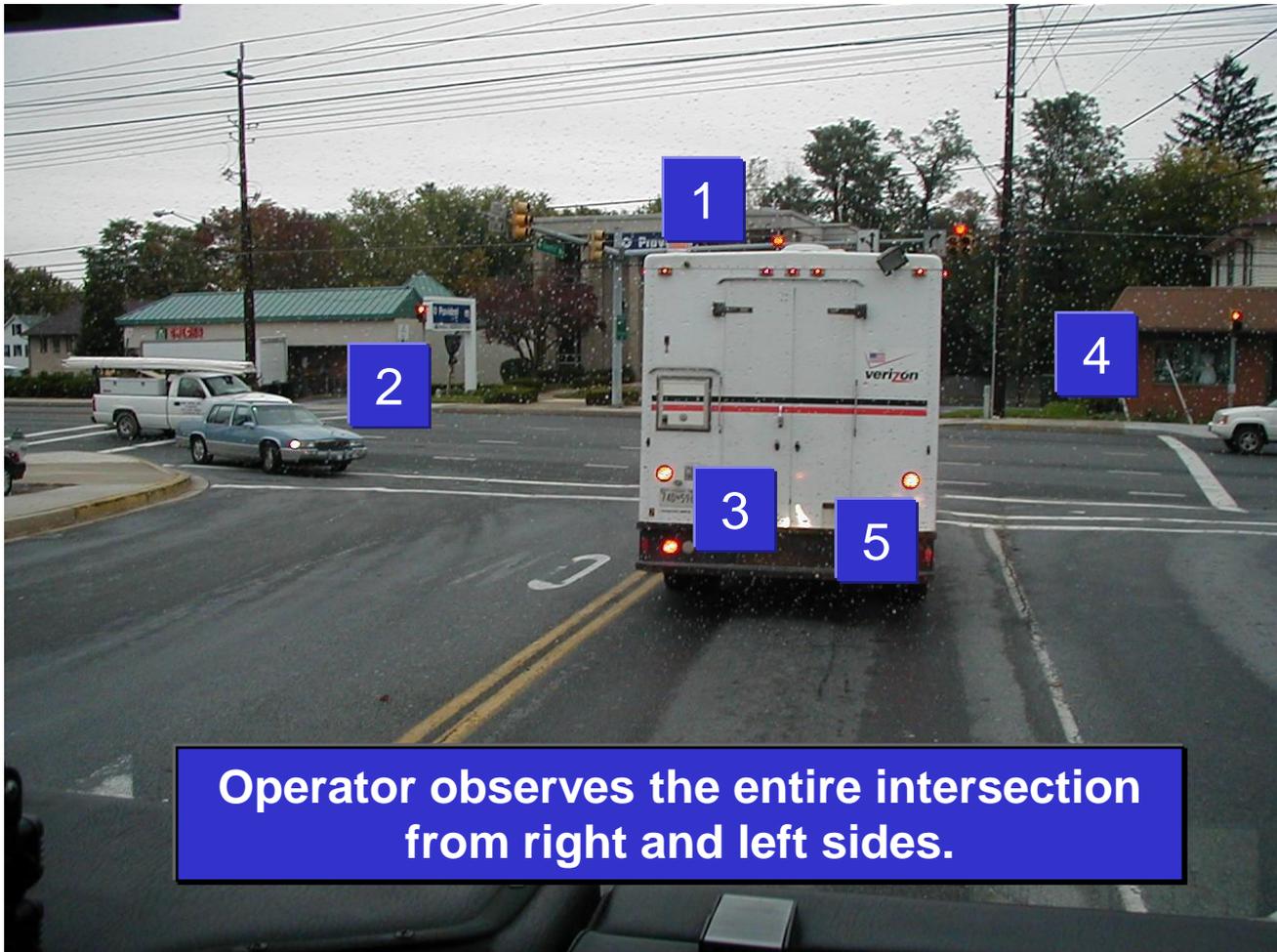


COVER THE BRAKE

- 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



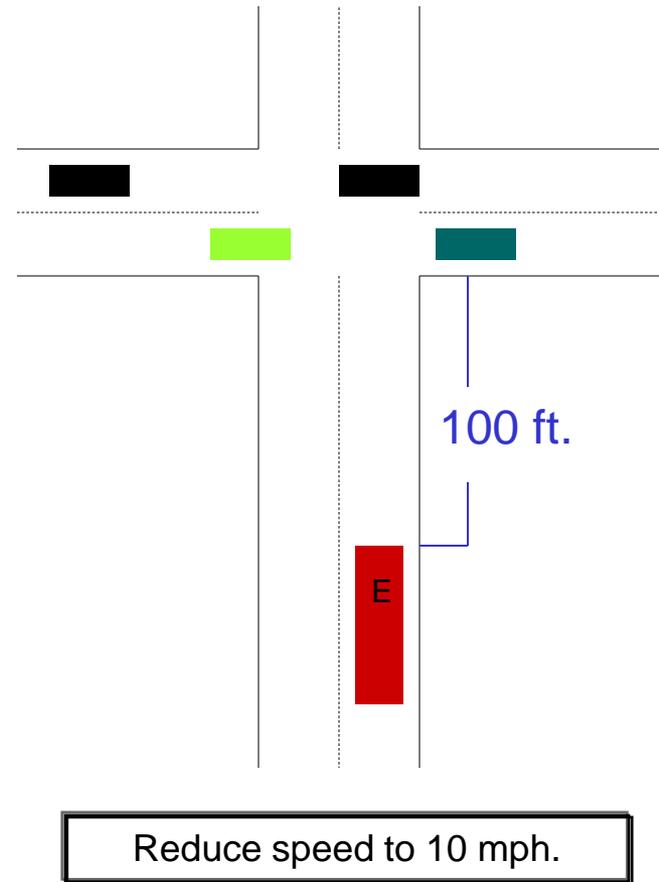
EYE MOVEMENT





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





INTERSECTION STOP

- The Intersection Stop applies to emergency driving
- Must stop at a red light, stop sign, or other intersection when you are against the right of way
- Only proceed when you make eye contact with other drivers
- Avoid using the apparatus as a moving roadblock – this is aggressive driving



You must 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



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



Too close. No room to maneuver right or left.



Perfect. Clear space left for maneuvering.

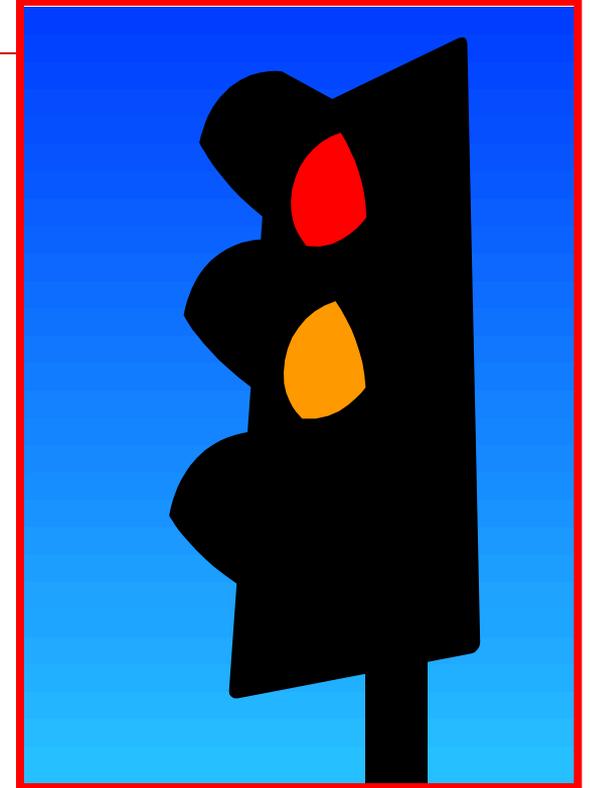
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TRAFFIC LIGHTS

Pay attention to traffic lights

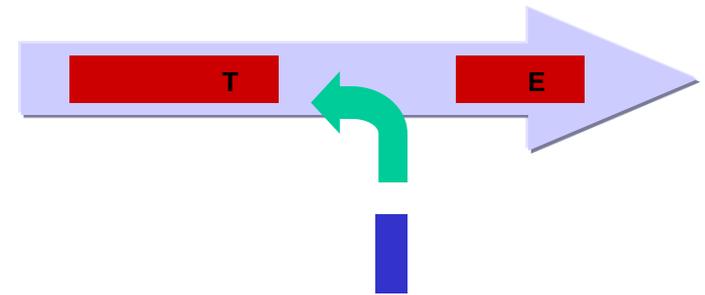
- Stale green
- Stop for yellow
- Flashing yellow means proceed with caution
- Flashing red means stop before proceeding





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.



ZONE OF CONFUSION

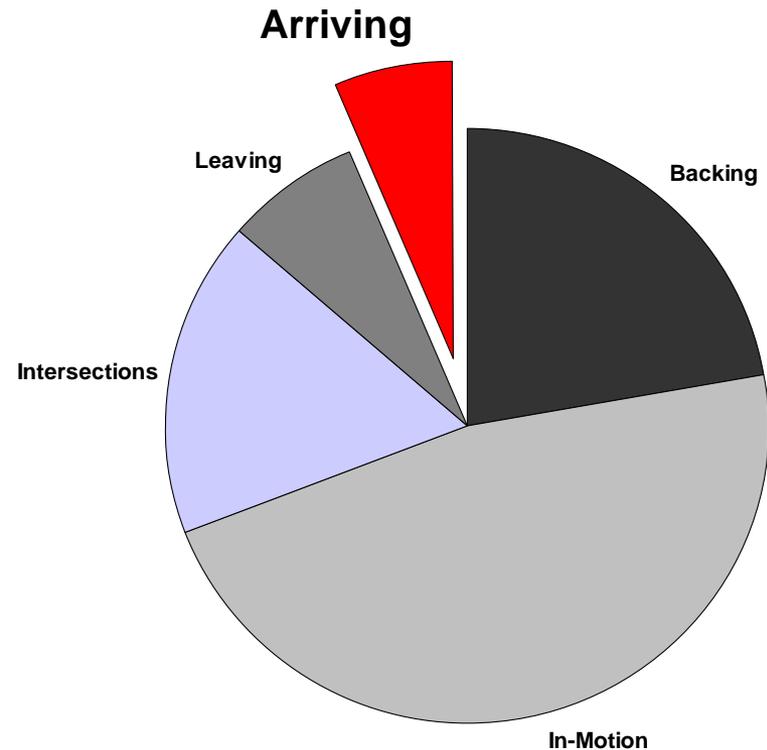
- Anticipate other drivers to make mistakes
- Demonstrate care for other vehicles
- Driving tactics for procession style response:
 - Travel single file. A larger vehicle leads. Leading vehicle creates a path.
 - Increase space cushions. NEVER travel nose to tail.
 - Each vehicle must traverse intersections 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.



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ARRIVING ON SCENE/STOPPING

- Deceleration
- Pass the Address
- Spotting
- Parking Brake
- Wheel Chock



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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 – $\frac{1}{4}$ 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
- Downgrade 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



WHEEL CHOCK

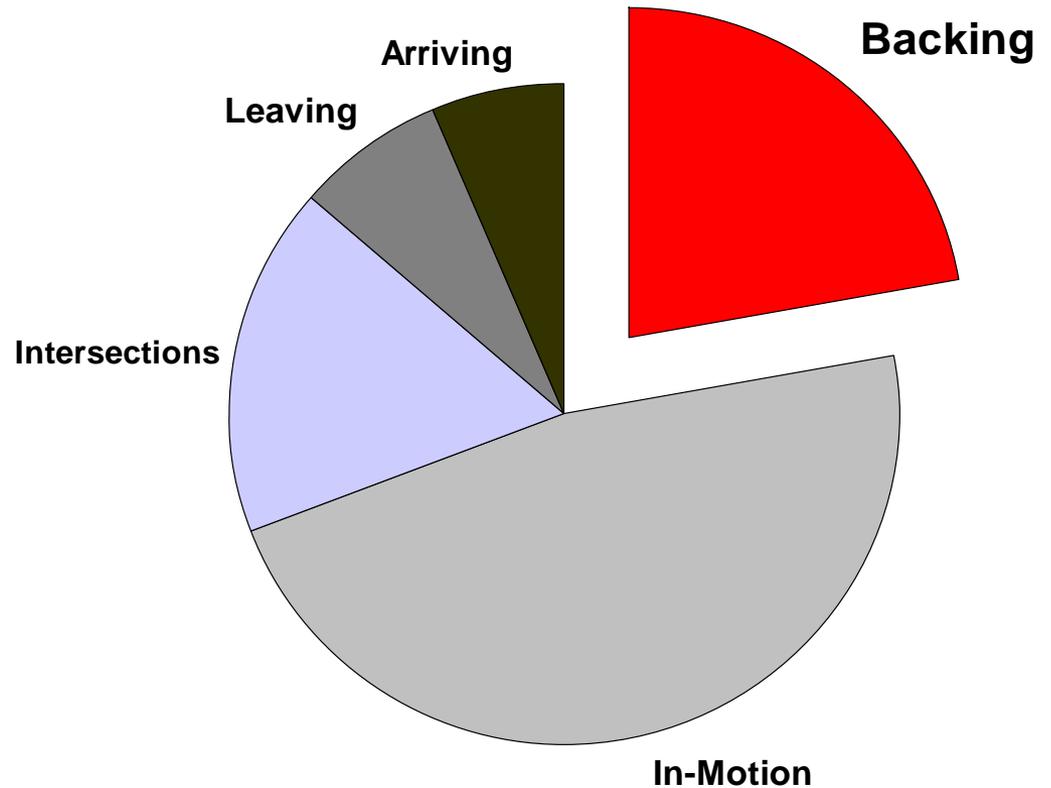
- Examples of Why we should use wheel chocks



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BACKING

- Safe Spotting
- Hand Signals
- Circle Check



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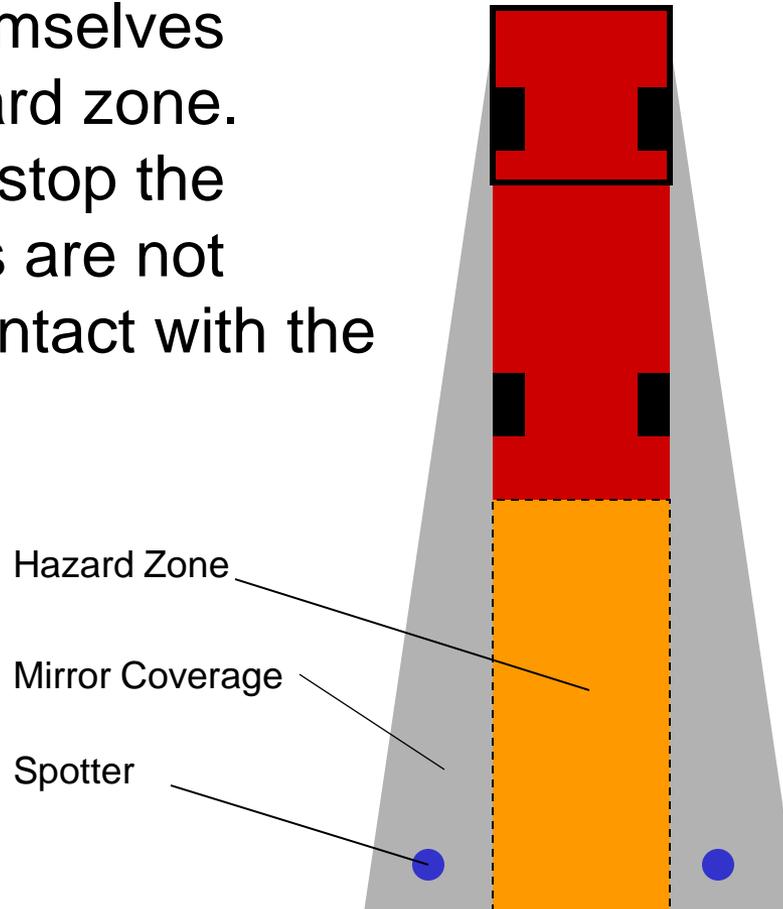
BACKING POLICY CHANGES

- Fire Chief wants backing collisions eliminated
- Zero tolerance
- Minimum - Unit officer must dismount & spot
- Driver must complete circle check if alone
- EMS units must use spotters when patient care is not compromised



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

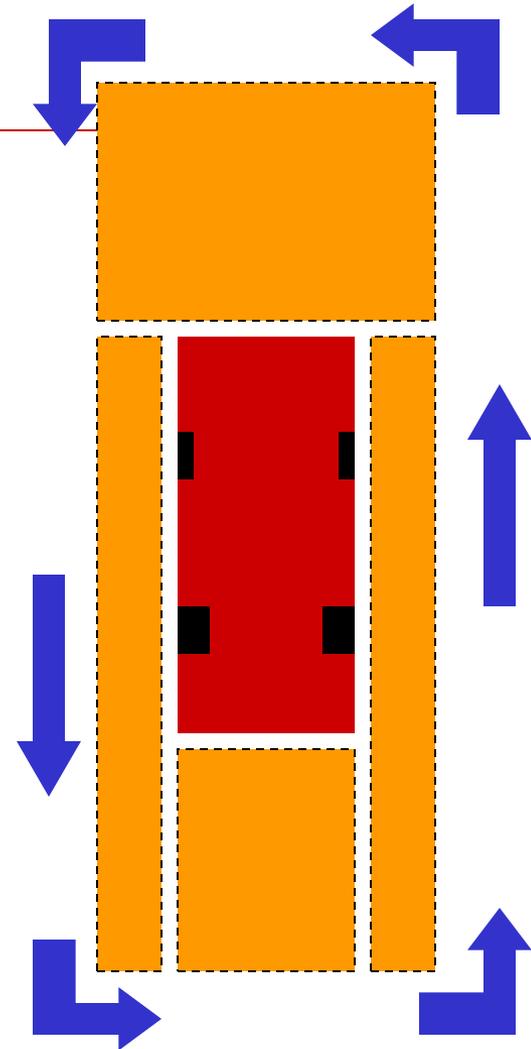


These standard hand signals should be used to communicate with the driver.



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



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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.