

Location _____ Trainer _____ Date _____

SPEED AND SPACE MANAGEMENT

Proper speed management means operating at the appropriate speed for all road conditions. Proper space management means maintaining enough space around your vehicle to operate safely. This article focuses on the importance of managing vehicle speed and space in order to deal with the ever-changing conditions on the road.

Speed & Stopping Distance

There are four factors involved in stopping a vehicle — perception distance, reaction distance, brake lag distance, and braking distance.

Perception Distance — Perception distance is the distance a vehicle travels from the time you see a hazard until your brain recognizes it. The perception time for an alert driver is approximately $\frac{3}{4}$ of a second. At 55 mph a vehicle travels about 60 feet in $\frac{3}{4}$ of a second.

Reaction Distance — Reaction distance is the distance a vehicle travels from the time your brain tells your foot to move from the accelerator until your foot hits the brake pedal. The average driver has a reaction time of $\frac{3}{4}$ of a second. At 55 mph that accounts for another $\frac{3}{4}$ of a second and another 60 feet traveled.

Brake Lag Distance — When operating a vehicle with air brakes, it takes about $\frac{1}{2}$ of a second for the mechanical operation to take place.

Braking Distance — Braking distance is the distance it takes a vehicle to stop once the brakes are applied. Braking distance is affected by weight, length, and speed of the vehicle as well as road condition. A heavy vehicle's components (brakes, tires, springs, etc.) are designed to work best when a vehicle is fully loaded. At 55 mph on dry pavement with good brakes, a heavy vehicle travels about 170 feet and can take about 5 seconds to stop.

When you add together the perception, reaction, brake lag, and braking distance, at 55 mph it will take between 6 and 7 seconds to stop and the vehicle will travel about 290 feet (almost the length of one football field) in ideal conditions. Higher speeds increase stopping distance greatly.

Speed & Road Conditions

Traction is necessary for vehicle control. The less friction between a vehicle's tire and the road, the less traction. Certain road conditions reduce traction and lower speeds are necessary.

Rain — Rain can affect a vehicle's traction. As rain begins to fall, it mixes with oils on the road, causing the oils to rise to the road's surface. Until additional rain breaks down and washes away these oils, there is a layer of slippery oil between a vehicle's tires and the road. This condition can last anywhere from a few minutes to a few hours.

New pavement is more slippery when wet than old pavement. New pavement has a greater concentration of oils that have yet to be washed away by years of rain. White foam on the road is an indication of oil and water mixing, a clue that the road surface is slippery.

A heavy rain that causes water to stand on the road can cause a vehicle to hydroplane. The faster a vehicle travels on standing water, the greater the chance of hydroplaning. This is due to the fact that traction is only present when a vehicle's tires have contact with the road. If the tires are riding on a wall of water, they lose traction.

When it rains, vehicle speeds should be reduced by about ?.

Snow — Snow causes reduced traction and limited visibility. Slowing down is required for visibility and vehicle control purposes.

A light, powdery snow often blows off the road causing few problems. If there is enough powder to cover the road, it will form a slick, smooth surface. A heavier, slushy snow can affect vehicle control. If the snow becomes hard packed, it can cause an ice hazard.

Vehicle speeds should be reduced by at least $\frac{1}{2}$ in snowy conditions. Remember, when determining vehicle speed in snowy conditions, you must be confident that you can safely stop and maneuver based on road conditions.

Ice — An icy road can present more dangers than a snowy road. When temperatures are near freezing, a driver has to be alert to the potential for black ice.

Black ice forms when temperatures drop rapidly and moisture on the road freezes into a smooth, nearly invisible, slippery surface. In black ice conditions, the road appears to be wet, when actually it is icy.

To check for ice formation, a driver can feel the front of the vehicle's mirrors or antenna. If ice is forming there, it is also forming on the road. The driver should also watch the spray off of other vehicles. If the spray stops, ice may be forming.

A driver's actions will depend on road conditions. At the very least, a driver should slow his/her vehicle by $\frac{1}{2}$ in icy conditions. As with snowy conditions, when determining vehicle speed, you must be confident that you can safely stop and maneuver based on road conditions. If the road is very slippery the driver should get off the road as soon as safely possible.

Shady portions of the road can remain slippery for a long time after ice on sunny areas of the road has melted and the pavement is dry. Slow down on shade-covered roads.

When the temperature drops, bridges can freeze before the road does. If slippery conditions are likely, avoid any change (acceleration, shifting, or braking) in driving habits while crossing the bridge. Maintain a smooth and steady speed.

Speed & Road Shape

Curves — Remember that posted speed limits on curves are designed with cars in mind. Driving through a curve too fast (at or above the posted speed limit) can cause several problems including skidding off the road or vehicle roll over.

Slow to a safe speed before entering a curve, at least 5 mph below the posted speed limit. Slow down as needed, but keep in mind that braking in a curve can be dangerous. It is easier to lock your vehicle's wheels and cause a skid. Never exceed the posted speed limit in a curve. Also be in a gear that will let you accelerate slightly through the curve. This will help you maintain vehicle control.

Grades — Gravity and vehicle weight play a part in speed management when driving on upgrades and downgrades.

On an upgrade, your vehicle has to work harder to fight the pull of gravity and maintain its speed.

On a downgrade, your vehicle is working with gravity, resulting in an increase in speed. Vehicle weight

also has an impact on truck speeds going down a grade. Heavier trucks want to accelerate faster than lighter ones. You must use care in maintaining a safe and even speed.

Space Management

Space management includes taking into account the space ahead, behind, to the sides, above, and below your vehicle. There must be enough space to allow you to adjust when traffic conditions change.

Space Ahead — The space ahead of your vehicle is the most important, and one of the easier to monitor and adjust when needed.

The amount of space ahead of your vehicle that you should allow for depends on the speed of your vehicle and road conditions. One rule of thumb to follow (in good driving conditions) is to allow at least one second for each 10 feet of vehicle length at speeds below 40 mph. At greater speeds add an additional second. In poor driving conditions (rain, ice, snow, fog, etc.) allow for a greater stopping distance.

Space Behind — It is impossible to keep other drivers from following too closely, but there are some things that can be done to make it safer. Stay to the right, slow down, and give the tailgater plenty of chances to pass.

Steps you can take to help prevent an accident if you find that you are being tailgated include:

- Avoiding quick changes
- Increasing your following distance
- Not speeding up

Space to the Sides — Commercial motor vehicles often take up most of a lane. There are several things you should try to avoid to ensure that there is plenty of space between your vehicle and other road users including:

- Not hugging the center line
- Not hugging the right side of the road
- Avoiding traveling alongside other vehicles

Space Above — Adequate space above is needed to clear bridges, overpasses, trees, and wires. Never assume the heights posted on bridges and overpasses are correct. Repaving or packed snow may reduce the clearances since the heights were posted.

The weight of a vehicle's cargo can also change its height. An empty vehicle is higher than a loaded one.

Be aware of how a road is graded. Road grade can cause a high vehicle to tilt, which can be a clearance problem.

If you have doubts about whether there is enough overhead space to proceed, take another route.

Space Below — It's very easy to forget the space under your vehicle. That space can be very small when the vehicle is heavily loaded.

Driveways, railroad tracks, dirt roads, and unpaved lots can be a challenge. Slow and steady is the rule in these cases.