



**HUMAN PERFORMANCE FACTORS ATTACHMENT**

**Pennsylvania Commercial Driver's Manual,**

**Section 2: Driving Safely, Controlling Speed**

**HWY20MH002**

(4 pages)

## 2.6 – CONTROLLING SPEED

Driving too fast is a major cause of fatal crashes. You must adjust your speed depending on driving conditions. These include traction, curves, visibility, traffic and hills.

### 2.6.1 – Stopping Distance

Perception Distance + Reaction Distance + Braking Distance = Total Stopping Distance

**Perception Distance.** This 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 3/4 second. At 55 mph, you travel 60 feet in 3/4 second or about 81 feet per second.

**Reaction Distance.** The distance traveled from the time your brain tells your foot to move from the accelerator until your foot is actually pushing the brake pedal. The average driver has a reaction time of 3/4 second. This accounts for about an additional 60 feet traveled at 55 mph.

**Braking Distance.** The distance it takes to stop once the brakes are put on. At 55 mph on dry pavement with good brakes, it can take a heavy vehicle about 390 feet to stop. It takes about 4 1/2 seconds. At 45mph, it takes 310 feet, the length of a football field, to stop your vehicle.

**Total Stopping Distance.** At 55 mph, it will take about six seconds to stop and your vehicle will travel about 450 feet.

**The Effect of Speed on Stopping Distance.** 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. High speeds increase stopping distances greatly. By slowing down a little, you can gain a lot in reduced braking distance. See Figure 2.11

**Figure 2.11**

Stopping Distance Chart				
Miles Per Hour	How Far The Rig Will Travel in One Second	Driver Reaction Distance	Vehicle Braking Distance	Total Stopping Distance
15 mph	22 ft.	17 ft.	29 ft.	46 ft.
30 mph	44 ft.	33 ft.	115 ft.	148 ft.
45 mph	66 ft.	50 ft.	260 ft.	310 ft.
50 mph	73 ft.	55 ft.	320 ft.	375 ft.
55 mph	81 ft.	61 ft.	390 ft.	451 ft.

**The Effect of Vehicle Weight on Stopping Distance.** The heavier the vehicle, the more work the brakes must do to stop it, and the more heat they absorb. But the brakes, tires, springs, and shock absorbers on heavy vehicles are designed to work best when the vehicle is fully loaded. Empty trucks require greater stopping distances because an empty vehicle has less traction. It can bounce and lock up its wheels, giving much poorer braking. (This is not usually the case with buses.)

### 2.6.2 – Matching Speed to the Road Surface

You cannot steer or brake a vehicle unless you have traction. Traction is friction between the tires and the road. There are some road conditions that reduce traction and call for lower speeds.

**Slippery Surfaces.** It will take longer to stop, and it will be harder to turn without skidding, when the road is slippery. Wet roads can double stopping distance. You must drive slower to be able to stop in the same distance as on a dry road. Reduce speed by about one-third (e.g., slow from 55 to about 35 mph) on a wet road. On packed snow, reduce speed by a half, or more. If the surface is icy, reduce speed to a crawl and stop driving as soon as you can safely do so.

**Identifying Slippery Surfaces.** Sometimes it is hard to know if the road is slippery. Here are some signs of slippery roads:

- **Shaded Areas.** Shady parts of the road will remain icy and slippery long after open areas have melted.
- **Bridges.** When the temperature drops, bridges will freeze before the road will. Be especially careful when the temperature is close to 32 degrees Fahrenheit.
- **Melting Ice.** Slight melting will make ice wet. Wet ice is much more slippery than ice that is not wet.
- **Black Ice.** Black ice is a thin layer that is clear enough that you can see the road underneath it. It makes the road look wet. Any time the temperature is below freezing and the road looks wet, watch out for black ice.
- **Vehicle Icing.** An easy way to check for ice is to open the window and feel the front of the mirror, mirror support, or antenna. If there is ice on these, the road surface is probably starting to ice up.
- **Just After Rain Begins.** Right after it starts to rain, the water mixes with oil left on the road by vehicles. This makes the road very slippery. If the rain continues, it will wash the oil away.
- **Hydroplaning.** In some weather, water or slush collects on the road. When this happens, your vehicle can hydroplane. It is like water skiing--the tires lose their contact with the road and have little or no traction. You may not be able to steer or brake. You can regain control by releasing the accelerator and pushing in the clutch. This will slow your vehicle and let the wheels turn freely. If the vehicle is hydroplaning, do not use the brakes to slow down. If the drive wheels start to skid, push in the clutch to let them turn freely.

It does not take a lot of water to cause hydroplaning. Hydroplaning can occur at speeds as low as 30 mph if there is a lot of water. Hydroplaning is more likely if tire pressure is low, or the tread is worn. (The grooves in a tire carry away the water; if they are not deep, they do not work well.)

Road surfaces where water can collect can create conditions that cause a vehicle to hydroplane. Watch for clear reflections, tire splashes, and raindrops on the road. These are indications of standing water. Be especially careful driving through puddles. The water is often deep enough to cause hydroplaning.

### **2.6.3 – Speed and Curves**

Drivers must adjust their speed for curves in the road. If you take a curve too fast, two things can happen. The tires can lose their traction and continue straight ahead, so you skid off the road. Or, the tires may keep their traction and the vehicle rolls over. Tests have shown that trucks with a high center of gravity can roll over at the posted speed limit for a curve.

Slow to a safe speed before you enter a curve. Braking in a curve is dangerous because it is easier to lock the wheels and cause a skid. Slow down as needed. Do not ever exceed the posted speed limit for the curve. Be in a gear that will let you accelerate slightly in the curve. This will help you keep control.

### **2.6.4 – Speed and Distance Ahead**

You should always be able to stop within the distance you can see ahead. Fog, rain, or other conditions may require that you slow down to be able to stop in the distance you can see. At night, you cannot see as far with low beams as you can with high beams. When you must use low beams, slow down.

### **2.6.5 – Speed and Traffic Flow**

When you are driving in heavy traffic, the safest speed is the speed of other vehicles. Vehicles going the same direction at the same speed are not likely to run into one another. In many states, speed limits are lower for trucks and buses than for cars. It can vary as much as 15 mph. Use extra caution when you change lanes or pass on these roadways. Drive at the speed of the traffic, if you can without going at an illegal or unsafe speed. Keep a safe following distance.

The main reason drivers exceed speed limits is to save time. But, anyone trying to drive faster than the speed of traffic will not be able to save much time. The risks involved are not worth it. If you go faster than the speed of other traffic, you will have to keep passing other vehicles. This increases the chance of a crash, and it is more tiring. Fatigue increases the chance of a crash. Going with the flow of traffic is safer and easier.

### **2.6.6 – Speed on Downgrades**

Your vehicle's speed will increase on downgrades because of gravity. Your most important objective is to select and maintain a speed that is not too fast for the:

- Total weight of the vehicle and cargo.
- Length of the grade.
- Steepness of the grade.
- Road conditions.
- Weather.

If a speed limit is posted, or there is a sign indicating "Maximum Safe Speed," never exceed the speed shown. Also, look for and heed warning signs indicating the length and steepness of the grade. You must use the braking effect of the engine as the principal way of controlling your speed on downgrades. The braking effect of the engine is greatest when it is near the governed rpms and the transmission is in the lower gears. Save your brakes so you will be able to slow or stop as required by road and traffic conditions. Shift your transmission to a low gear before starting down the grade and use the proper braking techniques. Please read carefully the section on going down long, steep downgrades safely in "Mountain Driving".

### **2.6.7 – Roadway Work Zones**

Speeding traffic is the number one cause of injury and death in roadway work zones. Observe the posted speed limits at all times when approaching and driving through a work zone. Watch your speedometer, and do not allow your speed to creep up as you drive through long sections of road construction. Decrease your speed for adverse weather or road conditions. Decrease your speed even further when a worker is close to the roadway.

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## **Subsections 2.4, 2.5, and 2.6 Test Your Knowledge**

1. How far ahead does the manual say you should look?
2. What are two main things to look for ahead?
3. What is your most important way to see the sides and rear of your vehicle?
4. What does "communicating" mean in safe driving?
5. Where should your reflectors be placed when stopped on a divided highway?
6. What three things add up to total stopping distance?
7. If you go twice as fast, will your stopping distance increase by two or four times?
8. Empty trucks have the best braking. True or False?
9. What is hydroplaning?
10. What is "black ice"?

These questions may be on the test. If you cannot answer them all, re-read subsections 2.4, 2.5, and 2.6.

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## **2.7 – MANAGING SPACE**

To be a safe driver, you need space all around your vehicle. When things go wrong, space gives you time to think and to take action.

To have space available when something goes wrong, you need to manage space. While this is true for all drivers, it is very important for large vehicles. They take up more space and they require more space for stopping and turning.

### **2.7.1 – Space Ahead**

Of all the space around your vehicle, it is the area ahead of the vehicle--the space you are driving into --that is most important.