

Unit G - Detecting Hazards



Unit G - Detecting Hazards

Learning Objectives

After completing this unit the trainee will be able to:

1. Describe and perform various techniques in detecting hazards.
2. Describe and perform observation techniques.
3. Perform and respond to emergencies caused by road hazards.

Suggested Time: 2-3 hours

I. Introduction – Potential Hazards

G.1

More and more drivers are becoming aware that just about every driving situation has potential hazards. It is not enough for a driver to know their own course of action; the driver also must know what other individuals may do. Some hazards are obvious; some are not. Some are foreseeable, like a sharp curve. Some are unexpected, depending on changing traffic and weather conditions.

In this unit, the driver will examine techniques for detecting hazards and for picking up clues that indicate potential and actual dangers. She/he will also be looking at the following categories of hazards so that she/he will be better able

to respond to them in the driving environment.

- On-road hazards
- Off-road hazards
- Single vehicle hazards
- Multiple vehicle hazards
- Hazards involving other road users
- Combination of hazards – road/vehicle

Discussion: Discuss examples of hazardous situations in your division.

II. Techniques for Detecting Hazards

G.2, G.3

A school bus driver must be constantly prepared to cope with expected and, too often, unexpected hazards. If the driver can anticipate a hazard, she/he may be better able to control the situation and avoid a collision. Expert drivers find the hazards before the hazards find them and usually prevent accidents in spite of the incorrect actions of others or adverse weather conditions. The best way to be prepared for continuously changing driving conditions is to have a strategy or plan for driving. The strategy for driving must include searching for hazards and preparing the driver to cope with the hazard. Developing a driving strategy is the basic concept of defensive driving. To help the driver become an effective defensive driver, practice the S.I.P.D.E. system. S.I.P.D.E. is an acronym for

Unit G - Detecting Hazards



search, identify, predict, decide, and execute. Let us take a closer look at each of these components.

- a. **Search.** This is the initial step in the S.I.P.D.E system. It is essential that the driver continuously search and scan the driving environment for potentially dangerous situations. To get the most out of searching and scanning, the driver should follow the five steps of expert seeing.

The SMITH system, stated below, can help the driver to recognize potential dangers or conflicts.

1. Aim high in steering. Aim vision at least 12 –15 seconds ahead of the vehicle. A visual lead time of 15 seconds at 30 mph is approximately 660 feet, and at 45 mph it's roughly 990 feet.
 2. Get the big picture.
 3. Keep the eyes moving, this includes checking mirrors.
 4. Leave yourself an out.
 5. Make sure the vehicle is being seen.
- b. **Identify.** During the searching process, the driver is looking for potential problems. Once she/he has spotted a possible hazard, the

driver must move into the identification phase. The driver is now focusing their attention on one or more aspects of the driving environment that may be dangerous.

- c. **Predict.** It is at this step the driver predicts how the event that has been identified may produce conflict, and what is likely to occur in the situation. The experience as a driver and the knowledge of the capabilities of managing the bus and other vehicles will contribute to the accuracy of a prediction.
- d. **Decide.** The driver must now decide upon a course of action that minimizes the risk of conflict. The decision depends on the amount and quality of information the driver has had and on past driving experiences. Thus, accurate identification and prediction are essential for making a good decision about driving action.
- e. **Execute.** The final step in the S.I.P.D.E. process is to execute, or carry out, the course of action selected in the decision phase. Execution involves good judgment and the skills drivers have developed. Proper performance depends on how well the driver times the placement of the bus and how skillfully the driver integrates

Unit G - Detecting Hazards



his/her driving ability with the capabilities of the vehicle.

- Am I prepared to carry out the necessary action to avoid a collision?

S.I.P.D.E Checklist

The following checklist may help the driver follow through the S.I.P.D.E. system.

G.4

Drivers must ask themselves the following:

- Have I chosen a reference point 12 seconds ahead of my vehicle in the center of my path?
- Am I scanning and searching from that reference point for potential problems?
- Am I scanning 360 degrees and checking my mirrors for potential problems?
- Have I returned to another reference point 12 seconds ahead of my vehicle in the center of my path and continued my searching process?

G.5

- Have I found and isolated any potential problems or hazards in my path?
- Have I determined the likelihood of the potential problem becoming a real problem?
- Have I decided what action I will take if the situation becomes a real problem?

III. General Perceptual Considerations

G.6

Instruct the driver to perform the following.

1. Avoid the tendency of fixing the eyes on the road directly in front of the bus – REMEMBER to give 12 seconds of visual lead time: at 30 mph approximately 660 feet and at 45 mph approximately 990 feet.
2. Be alert to obstructions to vision. Roadside features that obscure vision at intersections should be treated as if they were traffic signs requiring a stop.
3. Observe other vehicles and their drivers.
4. The more intently the driver fixes their vision on a particular object, the less she/he will observe from their peripheral field of vision.
5. The driver must recognize the special demands of driving in urban or congested areas. There is greater need for surveillance in the city because of the greater concentration of vehicles, traffic controls and pedestrians.
6. The driver must know when to anticipate trouble, and be prepared for sudden actions by others, for example

Unit G - Detecting Hazards



anticipate the movement of parked vehicles by looking for the following:

- Exhaust fumes – indicating that the engine is running
- Back-up lights – indicating that the ignition has been turned on and that the gearshift lever is in reverse
- Brake lights – indicating depression of the brake pedal prior to shifting to forward gear
- Front wheel direction – indicating whether the vehicle is ready to leave the space or is still maneuvering into a parking position
- Signal lights – indicating that the vehicle is turning

G.7

- Pedestrians, cyclists, and animals darting between parked vehicles
- A parked vehicle suddenly moving in the path of the bus
- Occupants of parked vehicles opening doors to get out without first checking traffic

IV. On-Road Hazards

G.8

Curves, hills, narrow bridges, and dips on the roadway will limit sight distance. To help cope with these possible problems, remember the following:

1. Curves

- a. Watch the road ahead for indications of a curve; slow down before entering a curve
- b. When approaching a curve, estimate a safe speed (if not posted) from the degree of curvature and banking
- c. Be alert for oncoming vehicles which may have crossed the center of the road
- d. Stay on the right-hand side of the road

2. Hills, Dips and Steep Grades

- a. When approaching a downgrade, decide whether it is steep enough to require downshifting
- b. Identify dips that may obscure other vehicles

Maneuverability of the bus may be limited by the following:

- a. Narrow lanes
- b. Road construction that is difficult to detect
- c. Ruts in gravel roads or dirt roads

Condition of the road surface affects the ability to control the bus. Be observant of the following roadway conditions:

- a. Potholes and cracked pavement

Unit G - Detecting Hazards



- b. High crowns on roads
 - c. Cracks, holes, and nails on wooden surfaces
 - d. Traffic polished concrete or asphalt road surfaces, especially at intersections
 - e. Areas of the road that are covered with mud or soaked with oil, grease, or other liquid
 - f. The depth and extent of water, which partially or totally covers the road (do not cross roads which are totally covered with water). Only proceed when driver can see the road.
 - g. When driving on snow or ice, watch for:
 - Vehicles sliding into the bus's path from side streets
 - Unexpected patches of ice on bridges, overpasses, and in shaded areas
 - h. Gravel, soft sand (especially after a winter snow) or wet leaves on the road.
- Erratic driving from drivers whose attention may be diverted while handling money
 - For drivers accelerating rapidly and cutting in to get into the traffic flow
 - b. When driving on entrance and exit ramps, be aware of vehicles that have stopped or are slowing down
 - c. Watch for sudden deceleration of lead vehicles at uncontrolled intersections, entrances to and exits from major highways, and at divergence points like forks in the road
 - d. Other hazards can involve railroad crossings, bridges, tunnels, underpass height, busy intersections and areas frequently used by pedestrians.

V. Off-Road Hazards

G.9

1. In rural areas roadside structures, trees, or dense vegetation can conceal traffic, pedestrians and animals. In urban areas, buildings, parked vehicles, or pedestrian traffic on sidewalks can obscure vehicles emerging from driveways, alleys, and streets.
2. Shoulders can present a hazard if the bus runs off the road or must maneuver off the road to avoid

The driver must be aware of the many situations in the driving environment that present conflict. Look for the following particularly troublesome situations.

- a. When approaching and leaving toll plazas:

Unit G - Detecting Hazards



another hazard. Be observant of the following shoulder characteristics:

- a. Width
 - b. Surface condition
 - c. Alignment with pavement
 - d. Presence of obstructions such as signs, guardrails, culverts, and mailboxes
3. Points at which vehicles and pedestrians enter the roadway are particularly hazardous.
- a. Always be looking ahead for these points and anticipate a problem.
 - b. Driveways, intersections, alleys, ramps, and parking lots
 - c. Bus stops – watch for pedestrians crossing the street to board the bus or leaving the bus
 - d. Playgrounds, residential areas and schools – watch for children darting into the path of the bus from behind vehicles, structures or trees; and sledding into the path of the bus while playing on snow and ice

G.10

- e. Adverse conditions such as heat, cold, rain, wind, snow, flooding, ice and fog can intensify hazardous conditions. Adverse situations such as glare and sudden darkness may also pose a potential problem.

VI. Single Vehicle Hazards

G.11

1. Poor driving habits - When in traffic, watch for the following poor driving habits of other road users.
 - a. Frequent lane changes or weaving
 - b. Frequent changes in speed
 - c. Inconsistent use of signals or brake lights
 - d. Unnecessary sudden stops

Note: Be on the lookout for erratic drivers.

2. Be alert to the following situations that could result in another driver losing control of his or her vehicle and involving the bus:

G.12

- a. Road surface conditions might adversely affect oncoming traffic
- b. Driver turning rapidly (swerving) to avoid an obstacle in the roadway
- c. Vehicles approaching too fast from the rear
- d. Drivers over steering
- e. Loss of control due to tire blowout

G.13

3. Lack of communication by other drivers. Look for clues or situations in which the driver of another vehicle may execute a maneuver without signaling.

Unit G - Detecting Hazards



- a. An oncoming car may suddenly turn left across the path of the bus, particularly when the vehicle is slowing or the driver is not paying attention to the oncoming bus
 - b. When a stopped vehicle offers an indication of moving (turned wheels, person sitting in driver's seat)
 - c. When a driver's action could be misleading (moving to the left near an intersection when the driver intends to turn right)
4. Failure of the other driver to observe. Look for clues indicating that another driver may not have observed the bus and therefore may not be prepared to yield the right-of-way.
- a. Driver not responding (approaching intersection from the side without slowing or showing some sign, like head motion, that approaching traffic is being observed)
 - b. Driver's vision obscured (posts, windows)
 - c. Driver's view restricted (vehicle partially hidden by trees, glare from the sun)
- G.14**
5. Inadequate adjustment by other drivers. Impatience causes many improper actions. Look for indications that another driver is not adjusting properly to situations that may cause a hazard to the driver. The following conditions may cause abrupt and improper actions by other drivers:
- a. Obstructions (potholes or barriers)
 - b. Surface conditions (ice or snow)
 - c. Pedestrian traffic (turning a corner onto a street blocked by pedestrians)
 - d. Movement of other vehicles (passing vehicles forced to cut back abruptly)
6. Slow moving or stopping vehicles. Watch for indications that another vehicle is slowing or may stop suddenly.
- a. Slow moving vehicles such as farm vehicles, under-powered vehicles, and trucks on hills
 - b. Vehicles frequently stopped such as other school buses, buses and trucks carrying inflammables and stopping at railroad crossings, and postal delivery vehicles
 - c. Vehicles engaged in turning, exiting or entering the roadway, merging with other vehicles and approaching controlled intersection or railroad crossings

Unit G - Detecting Hazards



VII. Multiple Vehicle Hazards

G.15

1. Traffic convergence - Look for circumstances where converging on a stream of traffic may force the bus into a collision with other vehicles.
2. Vehicular obstruction - Be on the look-out for situations such as:
 - a. Sudden slowing or stopping of one vehicle may cause another vehicle to drive around it, causing a collision.
 - b. One vehicle may obstruct another's visibility, resulting in a collision (following a large truck limits the ability to see adequately ahead in the environment).

VIII. Road User Hazards

G.16

The driver should be alert to possibilities of collision with other road users, including pedestrians, cyclists, and animals. Be particularly watchful of the following:

1. Proximity of road users to the road. Be aware of joggers/runners on the road and cyclists on the roadway, especially in adverse weather conditions.
2. Motion of the road user. Pedestrians running toward the roadway, children at play and cyclists moving toward the roadway.

3. Road user's ability to see. The road users may have obstructed vision (pedestrian blinded by glare or line of sight may be limited).
4. Road user attentiveness. They may be occupied with other thoughts or using a cell phone. Watch for children playing ball or other sports activities that may cause an unexpected sudden stop.

IX. Combination Hazards - Roadway/Vehicle

G.17

The driver should be able to identify potential hazards arising from the interaction between vehicles and roads.

1. Decision points cause conflict. Any point in the road at which drivers are confronted with decisions represents a potential point of conflict.
 - A vehicle starting to exit from the interstate may suddenly return to the interstate.
 - Drivers unfamiliar with route signs may be in the wrong lane for their destination and change lanes suddenly as two major routes split.
2. Compression points cause conflict. Any point at which the road narrows represents a potential source of conflict.

Unit G - Detecting Hazards



- A vehicle approaching may suddenly change lanes at a point where four lanes become two lanes.
- Other sources of conflict include tollbooths and acceleration and deceleration lanes.

G.18

Note: Expert drivers may use their skills to get them out of tight spots, but they depend more on their judgment to avoid the tight spots in the first place. It is a lot easier to stay out of tight spots than to get out of them. However, the driver may still find his/herself confronted with one of the following situations.

- Skidding
- Tire blowout
- Brake loss
- Loss of engine power
- Obstruction in the path of the bus
- Run off the pavement
- Other emergencies

Under these circumstances, the driver must know what emergency driving techniques to draw upon. The response must be automatic, because there will be little time to think about what to do. Obviously, the student cannot practice an emergency-driving situation while sitting in a classroom. Therefore, the next best thing is to develop the skills and expertise for coping with emergencies beforehand – in the mind.

The following procedures are “last-ditch” measures to avoid an accident if possible. Since it is impossible to eliminate human error in the performance of routine driving tasks, the skills and abilities to take appropriate and immediate actions under emergency conditions are critical.

X. Skidding

G.19

Many things can cause a school bus to skid. Skidding occurs when the tires lose traction with the road surface. Skidding reduces the effectiveness of steering, braking, deceleration, and acceleration.

The driver must be able to detect a loss of traction in time to maintain or regain control of the bus. There are four basic types of skids: braking skids, power skids, cornering skids, and blowout skids.

1. Braking skids are the result of braking too hard (jam on the brakes); the bus may go into a skid. In a braking skid one or all of the brakes lock. If all the brakes lock the driver will have no steering control over the vehicle. If the front wheels lock and the rear do not, the vehicle will begin to rotate.

Note: Buses are now being equipped with an Anti-Lock Braking System (ABS). ABS brakes prevent the wheels from locking up if the driver jams on the brakes, therefore

Unit G - Detecting Hazards



maintaining steering control during a skid and preventing the vehicle from rotating. If the bus is equipped with ABS brakes, maintain a constant pressure (do not pump) on the brakes. The ABS brakes will automatically send a pulse to the brakes.

2. Power skids result from accelerating too suddenly. Power skids produce vehicle rotation and usually occur on a slippery or gravel surface.
3. Cornering skids result from over steering or attempting to take a turn or a curve too fast. In a cornering skid the vehicle begins to rotate and it resists all attempts at steering.
4. Blowout skids happen when a tire loses air suddenly. If a front tire blows out, the vehicle will pull sharply toward the side of the blowout. If a rear tire blows out, the vehicle may begin to fishtail which is accented with steering input.

Note: Loss of traction may result from the following:

- Poor tire maintenance
- Excessive acceleration in curves
- Excessive steering in curves
- “Panic Braking”
- Excessive speed on water covered surface
- Slippery roadways, including film on the surface minutes after the beginning of rain

Note: Skids on snow-covered/icy downgrades (black ice) may be prevented by shifting into the lowest gear and accelerating slightly while going down the hill. This forces the wheels to keep turning and gives better traction than she/he would get by braking or not accelerating in a higher gear. Also, downshift before reaching spots where skids are likely.

G.20

5. Skid Recovery

When the bus loses traction and goes into a skid, the driver must be able to regain directional control. To do this requires the proper application of steering, braking, deceleration, and acceleration.

Instruct the driver to perform the following:

- a. Steering - Immediately apply controlled steering, turning in the direction you want the front of the bus to go. Follow-up with controlled counter steering to prevent fishtailing. Continue this sequence of steering until control is re-established.
- b. Braking - Apply no brake pressure or only gentle, intermittent braking, as appropriate, until steering control is re-established.
- c. Deceleration - Remove pressure from the accelerator smoothly (not

Unit G - Detecting Hazards



suddenly) and do not accelerate again until steering control is re-established.

- d. Acceleration - Once steering control is re-established, shift to a lower gear and accelerate gradually to maintain traction.

XI. Tire Blowout

G.21

When a tire blows out or the air pressure decreases suddenly, steering is affected. If a front tire blows out, the front wheels tend to be pulled in the direction of the blowout.

Instruct the driver to perform the following:

1. To keep control of the vehicle when a front tire blows out:
 - a. Grip the steering wheel firmly and steer the bus straight down the center of the driving lane
 - b. Immediately press down on the accelerator because of the need of a greater force going forward
 - c. Steer the vehicle in the opposite direction of the deflated tire, as necessary
 - d. When the vehicle is stabilized, slowly let off the accelerator and bring the vehicle to a smooth stop
 - e. Turn on the hazard lights
 - f. Evacuate the bus, if necessary

- g. Notify appropriate personnel

2. The bus is not affected as severely with a rear tire blowout because of the presence (in most cases) of dual-wheels. Follow these guidelines if the vehicle has a rear blowout, especially if it does not have dual-wheels.

- a. Grip the steering wheel firmly with a 9 – 3 position and steer the bus straight down the center of the travel lane. Avoid steering input – rear tire blowouts on single wheeled vehicles are susceptible to over steering
- b. Immediately press down on the accelerator
- c. When the vehicle is stabilized, slowly let off the accelerator and bring the vehicle to a smooth stop
- d. Turn on hazard lights
- e. Evacuate the bus, if necessary
- f. Notify appropriate personnel

XII. Brake Loss or Failure

G.22

1. Some causes of brake failure
 - a. A leak in any part of the brake system
 - b. Loss of friction between the drum and the lining because of overheating, poor adjustment, defective components or excessive moisture

Unit G - Detecting Hazards



- c. Air trapped in the hydraulic brake lines
- d. Twisted or worn brake hose
- e. Breakdown of some mechanical linkage within the system.

G.23

2. Signs of brake problems

- a. Drop in air pressure, or vacuum. There will be an alert when the air pressure falls below 60 psi
- b. Low brake pedal (hydraulic or vacuum hydraulic brakes)
- c. Spongy pedal
- d. Smell or sight of brake fluid
- e. Hot brake drums
- f. Swerving or pulling when the brakes are applied

G.24

3. Procedures to consider when confronted with partial or total loss of hydraulic brakes:

- a. Downshift transmission to the lowest gear possible.
- b. Pump the brake pedal, sound the horn, and flash the head lights. Usually this is third gear because it is hard to shift into second at speeds over 30 mph.
- c. If necessary, apply the parking brake gradually.
- d. Find an escape route: Select a path for leaving the road that will minimize the possibility of injuries and property damage. If the driver

must go into an embankment or hedge-row to slow the bus down, turn into it at an angle; otherwise, the bus could flip over.

Caution: Never hit any object head-on to slow the bus down. If the road ahead is clear and free of potential hazards or downgrades, stay on the road and let the bus slow until it can safely leave the roadway. If there is an upgrade within the assured clear distance ahead, stay on the road and let the upgrade help slow the bus.

4. Considerations when loss of air occurs in an air brake system:

- a. Partial loss of air allows the driver time to slow the vehicle and gently pull to the side of the roadway. The bus should not be used to transport passengers until the system is functioning properly.
- b. Sudden, full air loss should be treated differently. In a dual air system, when the air supply drops below 60 psi (20-40 psi), the spring brakes will set. The driver should know at what psi the spring brakes will set on the vehicle. This knowledge will allow the driver the opportunity to secure the bus in the quickest and safest area after she/he hears the low pressure warning at 60 psi.

Unit G - Detecting Hazards



XIII. Obstruction in the Path of the Bus

G.25

1. If the driver suddenly sees an obstruction in the path of the bus, evasive action should be taken to avoid impact. She/he must decide which of the following actions should be taken to avoid a collision:
 - a. Controlled braking
 - b. Quick steering to the right with or without braking
 - c. Leaving the paved portion of the road whether or not roadside hazards are present

Note: The driver must be cautious not to “slam on” the brakes. Even though this is sometimes effective, sudden braking can also lock the wheels and cause loss of steering control, making it impossible to steer away from a collision. A preferred braking technique is “Controlled braking.” In controlled braking the driver applies the brakes as firmly as she/he can without locking the wheels. If the wheels happen to lock, release the brake and then use them again as soon as possible.

2. The sudden appearance of an obstruction doesn’t leave the driver time to make lengthy calculations. If the driver has any doubt about the correct course of action, she/he should

steer the bus into an alternate path. To do this the driver should be able to recognize the best “escape route” and at a glance, decide whether:

- a. The escape route is free of obstacles
 - b. The escape route can accommodate passage of the bus
 - c. The off-road surface will permit steering control
3. The size and weight of the bus limits its capability to swerve sharply to avoid an object or to leave the road with any great degree of control. Overturning is always a danger. Steer firmly and as gradually as possible to clear the obstruction. Use only controlled braking.

Remember these points:

- a. If the bus is traveling as fast as 40 mph, the obstruction has to be at least 200 feet away for the bus to stop safely (two-thirds of a football field).
 - b. If a ball rolls in front of the vehicle, more than likely a child will be following.
4. In cases where a collision is unavoidable, try to:

Unit G - Detecting Hazards



- a. Angle the bus to reduce the force of impact; for example, try to have the impact to the side not the front.
- b. Avoid hitting human beings at all costs.

Remember: The driver is more likely to avoid hitting the obstruction in the path of the bus if she/he anticipates the unusual.

XIV. Running off the Road

G.26

The driver may encounter an emergency situation that requires them to steer part or all the way off the road to avoid a collision. Returning from the shoulder (off-road recovery), however, can be a hazardous maneuver.

One factor that will influence the technique used for off-road recovery is whether the shoulder is even with the pavement or is lower than the pavement. In either case remaining calm will enable good judgment and skill to direct the action.

1. Off-road recovery on even pavement and shoulder
 - a. Firmly grip the steering wheel at the 9 and 3 o'clock positions
 - b. If the way is clear, ease off the accelerator
 - c. Brake very gently or not at all

- d. Continue to straddle the pavement edge until it is safe to return to the road.

2. Off-road recovery on uneven pavement and shoulder

- a. Firmly grasp the steering wheel in the 9 and 3 o'clock positions
- b. Decrease speed by easing off the accelerator and gently braking (if at all)
- c. Bring the bus to a point where the right wheel is approximately one to two feet from the edge of the pavement; hold that course
- d. Choose a spot where the shoulder and pavement are least uneven
- e. Steer sharply left about a quarter of a turn (90 degrees) until the right front tire hits the edge of the pavement.
- f. Quickly counter steer to the right to avoid entering the oncoming lane.

Remember: When the pavement and shoulder are uneven, the driver must:

- Steer sharply back onto the road;
- Counter-steer to control lane position;
- Brake gently, if at all.

Caution: Beware of culverts, signposts, etc.

Unit G - Detecting Hazards



XV. Other Emergencies

G.27

The driver should be able to respond quickly and appropriately to other emergencies.

1. Stuck accelerator pedal
 - a. Place transmission in neutral
 - b. Apply brakes and leave the road as soon as possible
 - c. When the bus is stopped push the accelerator hard two or three times or attempt to pull it up with the foot
 - d. If the accelerator remains stuck, turn the engine off

Do not attempt to free the accelerator while the bus is in motion. Remember: when the engine is running the vehicle should still have normal braking and steering capacity, so don't turn the engine off until the bus is stopped in a safe location.

2. Visual Hazards

Loss of visibility can result for several reasons such as: an object flying into windshield, headlight failure, or windshield wiper failure. It is important that she/he remains calm under any of these conditions so good judgment and skill can prevail.

If the driver loses visibility, keep the bus under control until normal visibility is regained, or the bus is safely off the road. The following are some suggestions for handling these types of emergencies.

- a. Visual obstruction/object on windshield
 - Decrease speed
 - Look out the door and passenger side window
 - Apply the brakes
 - Activate the four-way hazard warning lights
 - Steer out of the traffic lane and stop in a safe location off the road
- b. If the headlights fail
 - Decrease speed
 - Depress dimmer switch to see if the other beam (high or low) is operational
 - Activate four-way hazard warning lights
 - Use available (ambient) light to keep a sense of direction
 - Apply brakes and steer out of the traffic and stop in a safe location off the road

Unit G - Detecting Hazards



c. If windshield wipers fail to operate

- Decrease speed and look out the side window to keep sight of the road
- Activate right turn signal
- Steer out of the traffic and stop in a safe location off the road
- Activate four-way hazard warning lights

Each of the emergency techniques discussed in this unit requires precise, controlled use of the vehicle's brakes. In some instances, emergencies are produced by improper use of brakes. Keep in mind that when wheels are locked and sliding, the bus is not stopping efficiently and can't be steered. It will continue in the direction it was traveling at the time the wheels locked. Braking even becomes more critical as the road surface becomes slippery and as the vehicle's speed increases.

Note: Here are some other things to keep in mind regarding braking:

- A slight pumping action of the brake pedal serves to test the proper functioning of the brakes, and provides a brake light warning to traffic behind the vehicle.
- Avoid braking when steering into a curve or turn. Slow down in advance of a curve and keep the wheels freely

rotating (not decelerating) in the curve.

- When the vehicle must stop quickly, practice controlled braking. Apply the brakes as hard as possible without locking the wheels. If the wheels lock, release the brakes. Use brakes again as soon as possible.
- When stopping on slippery surfaces, begin the braking sequence early and use a pumping action. Wheels will lock up more quickly with less brake pressure on slippery surfaces. If the driver locks the wheels she/he will have no steering control.
- If the bus comes to a long, steep downgrade, select a lower gear before starting downward. This will give the engine braking power, which will take some strain off the brake lining and may help prevent brake fade-out.
- Light, smooth pumping instead of heavy pumping, is preferable on a long downgrade.

XVI. Driving under Adverse Weather and Road Conditions

G.28

During the school year, a bus driver will face many hazardous driving conditions caused by the weather. Conditions such as ice, snow, mud on the roadway, rain and fog will demand alert and skillful driving.

Unit G - Detecting Hazards



Road conditions also change rapidly. Potholes develop overnight; loose gravel appears; slick spots develop through accumulations of snow, ice and oil deposits. Highway conditions may vary from day to day, and the driver must be alert to these changes.

A school bus may have a roof mounted strobe light. If equipped, the strobe shall be lighted while the bus is transporting school children during periods of reduced visibility caused by atmospheric conditions other than darkness. These warning lights may also be lighted at other times while the bus is transporting school children, **Code of Virginia (§46.2-1090.1. Warning lights on school buses)**.

1. General Driving Precautions

Rain, snow, sleet, fog, or icy pavements make driving more hazardous and drivers must adjust to these conditions. Accidents blamed on skidding or weather conditions are classed as “preventable.” The following suggestions will help the driver drive more safely under adverse conditions.

- a. Reduce the speed of the bus
- b. Drive on the right-hand side of the road

- c. Watch side roads closely for vehicles sliding into the path of the bus
- d. Beware of patches of wet leaves, sand on the road, and traffic polished road surfaces
- e. Never look directly at the lights of approaching vehicles
- f. Use windshield wipers and defrosters continually in fog
- g. In fog, haze, or rain, drive with headlights on low beam, and marker lights on
- h. Avoid sudden stops. In advance of stopping, gently tap the brake pedal to warn those following of the impending stop.

REMEMBER

The four “musts” in driving in bad weather and road conditions!

- Must be able to see
- Must be able to stop
- Must be able to turn
- Must be able to control the vehicle

2. Driving on Ice and Snow

G.29

Ice on highways significantly affects the driver’s ability to control the vehicle. On completely ice covered roadways the driver has little control over the vehicle, especially during braking and turning.

Unit G - Detecting Hazards



When snow is present on the road, a vehicle's stopping distance is greatly increased. This increase is particularly significant during emergency braking. Since there is potential for a significant increase in stopping distance, following distances must be increased.

If icing and/or snowy conditions exist, the driver should:

Pre-Trip

- a. If chains are used, make sure they are securely locked on the tires.
- b. Clean off lights, mirrors, and front and rear windows.
- c. Check to see if the entrance and emergency doors of the bus are frozen (more pre-departure time may be needed).
- d. Warm up the vehicle for several minutes.
- e. Check the heater and window defroster.
- f. Start trip slightly earlier than usual to compensate for slower driving time.

On-the-Road

- a. When pulling onto the highway, allow for greater stopping distance and maintain greater distance from other vehicles.

- b. When stopping at intersections, modulate the brakes. Pressure on both hydraulic and air brakes should be proportioned to prevent the wheels of the bus from locking on the slippery snow or ice.
- c. To avoid skidding, disengage the clutch (manual transmission) when the bus is nearly stopped.
- d. Make turns smoothly without applying the brakes.
- e. If view becomes obstructed with snow or ice accumulating on the windows, or headlights, stop the bus and clear it off.

Post-Trip

- a. Sweep water and snow out of the bus and off the steps.
- b. Clear excess snow from the windows.

3. Driving in Rain

G.30

When it rains the road becomes slippery and dangerous. Oil on the highway, mixed with rain, can create a driving hazard worse than snow. Wet roads can double stopping distance – reduce speed and increase following distance.

Rain also increases the possibility of “hydroplaning,” when the vehicle's tires ride on a cushion of water. It occurs when the vehicle is driven through

Unit G - Detecting Hazards



standing water that is deeper than the grooves in the tire. “Hydroplaning” is accentuated by speed. Standing water is always possible during and after a rain – reduce speed, avoid the standing water if possible, and increase following distance.

During raining conditions the driver should:

Pre-Trip

- a. Clear windows, lights, and mirrors of mud and dirt.
- b. Make sure the windshield wipers are working adequately. Plan to compensate for slower driving time by starting slightly earlier.

On-the-Road

- a. Drive slower if necessary.
- b. Maintain a greater following distance.
- c. Make turns slowly, avoiding use of the brakes as much as possible.
- d. Be prepared for slippery roadways due to oil film and watch for water puddles and standing water during heavy rains. Deep water is to be avoided if at all possible.
- e. Drive with the low beam headlights and marker lights on when using windshield wipers.

Post-Trip

- a. Sweep water off the floor and steps of the bus.
- b. Clean mud off all lights.

4. Driving during Flooding Conditions

G.31

Flooding can occur almost anywhere and often very quickly. If the driver encounters flooding conditions, keep in mind the following:

- a. Try to keep the brakes dry. This can be done by driving with the foot lightly on the brake pedal while driving through standing water and for a short time after having passed through the water. Always check the brakes after passing through water.
- b. Never drive through standing water that is high enough to obscure the road. If the driver can't see the road it may have washed out. Never drive through standing water high enough to stall the engine. This may strand the driver and occupants in a flooding area.
- c. Never cross a bridge that is covered with water. Keep in mind there may be times when bridges cannot be crossed due simply to high water. Never attempt to cross a bridge during high water if there

Unit G - Detecting Hazards



is any danger involved. Rerouting the bus may take more time, but it could prevent a disaster.

Sand on the road acts like ball bearings after the snow is gone and increases its slipperiness.

5. Driving in Fog

G.32

Visibility can be considerably reduced by fog. When foggy conditions exist, the driver should proceed with caution and at a slower rate of speed. The driver should also:

- a. Activate the clearance lights and use the low-beam headlights
- b. Turn on the windshield wipers
- c. Since moisture is often associated with fog, the vehicle's stopping distance is going to be increased.
- d. The driver should increase following distance as well as reduce speed under these conditions.
- e. If the fog is dense the driver should find a safe place to park off the roadway until the fog has lifted, then complete the run.

Fall is particularly hazardous because of leaves on the roadway. Wet leaves can greatly increase the slipperiness of the roadway; slippery conditions increase stopping distance. Begin braking earlier, pump the brakes, reduce speed, and increase following distance. Also, be alert to the other drivers who are encountering the same hazardous driving conditions.

Strong wind can make it more difficult to control the vehicle, particularly if it is a crosswind. Wind is especially dangerous for school buses because of their size. To gain more control over the vehicle in a strong wind:

- a. Slow down
- b. Be alert for crosswinds, especially on bridges
- c. Be prepared to make steering corrections

6. Driving with other hazards

Be alert to other situations that may affect the ability to control the school bus.

Practice caution entering and exiting intersections after a snow that results in sanding by the highway department.

Unit G - Detecting Hazards



Unit Review

1. S.I.P.D.E. is an acronym for _____, _____, _____, _____ and _____.
2. _____ wheel direction is an indicator whether a vehicle is ready to leave the space or is still maneuvering into a parking position.
3. Curves, hills, narrow bridges, and dips on the roadway will limit _____.
4. Playgrounds, residential areas and schools – watch for _____.
5. _____ causes many improper actions.
6. The driver should be alert to possibilities of collision with other _____.
7. _____ occurs when the tires lose traction with the road surface.
8. When a tire blows out or the air pressure decreases suddenly, _____ is affected.
9. There will be an alert when the air pressure falls below _____ psi.
10. If the driver loses visibility, keep the bus under _____ until normal visibility is regained, or the bus is safely off the road.
11. Keep in mind that when wheels are locked and sliding, the bus is not stopping efficiently and can't be _____.
12. During the school year, a bus driver will face many hazardous driving conditions caused by the _____.
13. In fog, haze, or rain, drive with headlights on _____ beam.
14. Rain also increases the possibility of _____, when the vehicle's tires ride on a cushion of water.

Unit G - Detecting Hazards



Answers

1. search, identify, predict, decide, and execute
2. Front
3. sight distance
4. children
5. Impatience
6. road users
7. Skidding
8. steering
9. 60
10. control
11. steered
12. weather
13. low
14. hydroplaning