Adverse Conditions

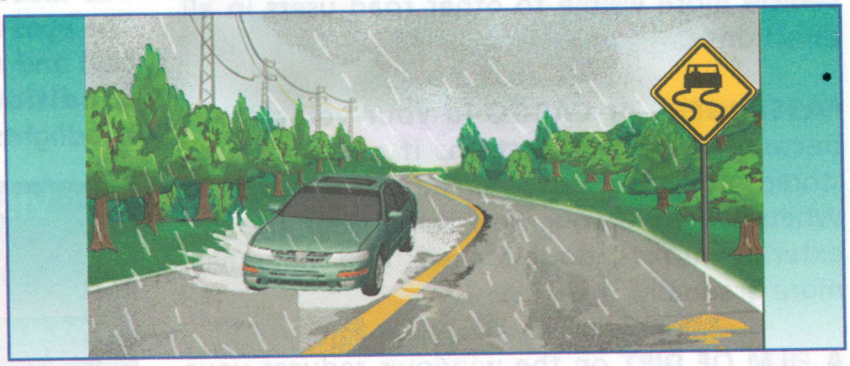
20

Contents

Foresight is a characteristic of the good driver. Ensuring your vehicle is adequately prepared to overcome the potential dangers is essential. From small details, such as windshield wiper blades, to major details, such as proper tires, there are many items to be considered in order to prepare your vehicle.

Foresight also relates to mental preparation. Fleet operators who prepare their drivers for changing driving conditions with meetings or memoranda have cut vehicle "downtime" due to collisions/mechanical mishaps. You can achieve the same results. Prepare yourself mentally for the hazards of the ever-changing seasons and driving environments.

Don't leave it to chance; your safety depends on proper preparation of your vehicle and yourself.



AFTER COMPLETING THIS CHAPTER, THE STUDENT MUST BE ABLE TO RECOGNIZE VISIBILITY PROBLEMS AND LIMITATIONS, AS WELL AS HOW TO ADAPT SAFELY TO:

- **reduced-visibility driving conditions.**
- **extreme weather conditions.**
- **changes in traction due to unusual environmental conditions.**

ADVERSE CONDITIONS

The good driver knows how to adapt his or her driving to the driving conditions in order to drive safely. This ability comes with lots of experience and practice.

As a novice driver, you must learn to recognize variables in road conditions, traction, visual conditions, etc. that require you to adapt your driving - reducing speed and increasing space are the first and most important changes.

Although techniques do not change, you must learn to be cautious. It is much better to approach a maneuver more cautiously rather than too aggressively. In some cases, the decision to stop driving may be the intelligent choice.

Visibility in Adverse Conditions

Anything that reduces your ability to see reduces your ability to control your vehicle. Automotive engineers have done their utmost to design vehicles and accessories to assist your vision. You must learn to use them to your advantage and to minimize any obstructions.

The headlights should be turned on whenever you drive. Daytime automatic headlight laws are being considered. If they become law, the parking, side marker and taillights may not come on automatically. The intensity of the headlights may be reduced. Drive with your normal headlights on at all times to make your vehicle more visible to other road users in all directions.

PASSENGERS or **CARGO** in your vehicle can become visual obstructions if not seated or stored properly. Try to minimize the blockage. When driving, if your view is not clear, use the exterior mirrors, double check and maneuver more gradually.

A FILM OF DIRT on the windows reduces your ability to see through the glass, reflects light, and causes glare. Keep windows clean (inside and out) to eliminate this danger, and realize that the lights and taillights also require cleaning so that you can see and be seen to full advantage.

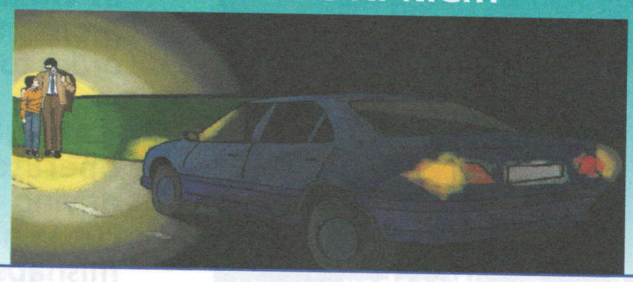
NIGHT VISION

Reduced lighting at night affects your ability to see and makes driving more difficult and dangerous.

The effects on your vision are:

- reduced visual acuity,
- judgment of distance and depth perception decrease,
- colors and contrasts are less distinct,
- eyes must constantly adjust to changes in light intensity (oncoming lights, trailing vehicles, area lighting), and also
- visual fatigue and cranial fatigue, and their affects on vision.

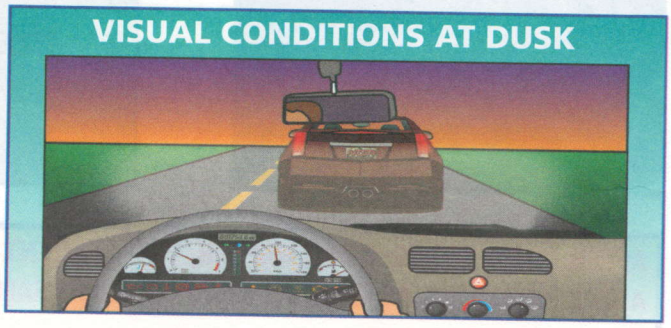
HEADLIGHTS AT NIGHT



Your field of vision is more or less restricted to the narrow beam of light provided by the headlights.

The most dangerous time to drive is at dusk. The eyes are subjected to a bright horizon (and sky) and a dark road and sky. The partial light condition reduces the effectiveness of headlights as an aid to your vision.

VISUAL CONDITIONS AT DUSK



To drive safely at night

- Reduce your speed in accordance with the range of your headlights (about 150 feet for low beams).
- Increase your following distance.
- Allow a larger safety margin, as all maneuvers take longer, and your ability to judge distance is diminished in reduced-visibility conditions.
- Use your high beams on unlit roads (see 350 feet, dim to low beams when meeting or following vehicles).
- Search beyond the range of the headlights to identify hazards as early as possible.
- Adjust the dash lights to the exterior lighting conditions (dash glare inhibits eye adjustment to the dark roadway ahead).

- Clean windows and lights.
- Avoid interior glare (lighter, matches, dome light, etc.).
- Communicate to make sure you are seen (flash your high beams, flash your brake lights then brake, use the hazard lights, use the turn signals).
- Activate defroster and defogger as needed.

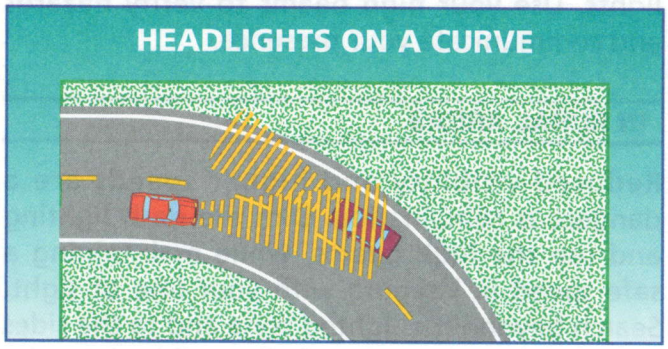
Eyes that are exposed to glare over an extended period of time develop a diminished capacity to adjust to the dark, and to recover from exposure to glare. You must protect your eyes (wearing sunglasses during the day, using the sun visor, sitting as high in the driver's seat as possible, etc.) in order to retain the ability to adapt to night driving conditions.

OVER-DRIVING YOUR HEADLIGHTS

When driving at night, if your speed requires a total stopping distance that exceeds the range of your headlights, **you are over-driving your headlights**. ***No matter how good of a driver you are, you will not be able to stop your vehicle before reaching the hazard.***

In the instant you identify the hazard (low beams - 150 feet, high beams - 350 feet, with properly aligned headlights), **you are already too close**. You will not be able to stop your vehicle in time; you will have to perform an emergency evasive maneuver to avoid the danger. If such an emergency maneuver is not possible, you will crash into the hazard, or into something else in an attempt to avoid it.

Instead of creating this high-risk situation (defensive driving), reduce speed so that you can stop within the range of your headlights (stop within assured, clear distance ahead).



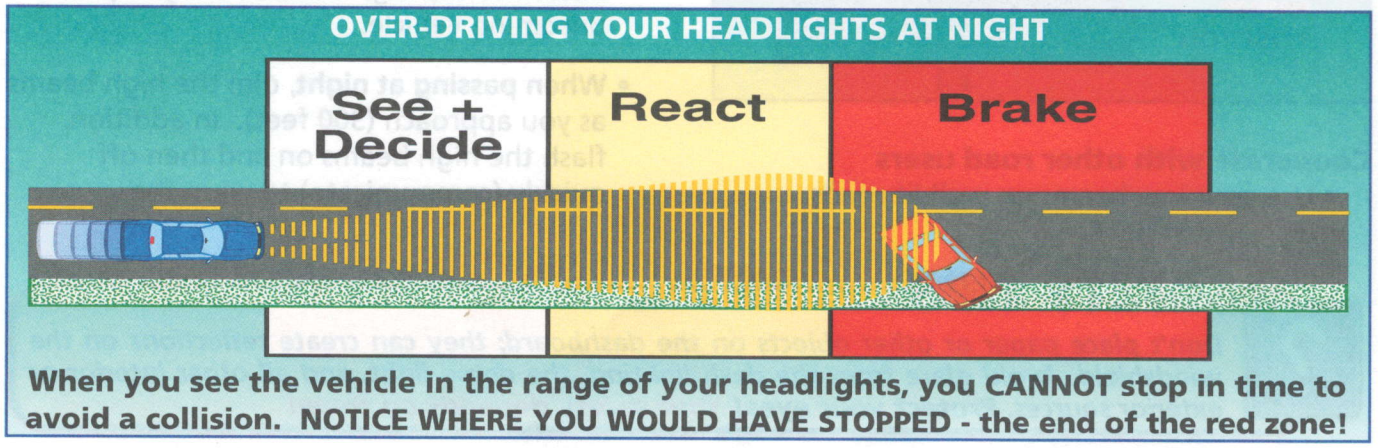
In curves and turns, the headlights of your vehicle are aimed straight ahead. You must search into the curve or turn, beyond the path that is illuminated by the lights, and reduce speed more than usual.

Cooperate with other road users on right curves (your headlights are aimed into the driver's eyes), dim the high beams to minimize the glare from the headlights.

IN URBAN AREAS

On most major arteries, the eyes are bombarded by stimuli (neon signs, street lighting, advertisements, etc.). Utilize your selective vision to identify the data needed to drive safely. Increase the intensity of the dash lighting in order to easily see the information displayed.

On quiet dark residential streets, lower the intensity of the dash lighting to reduce glare



When you see the vehicle in the range of your headlights, you CANNOT stop in time to avoid a collision. NOTICE WHERE YOU WOULD HAVE STOPPED - the end of the red zone!

and allow the eyes to better adapt to the exterior darkness. Search ahead and to the sides of the road beyond the narrow beam of your lights. Use your high beams to verify hazards and communicate your presence.

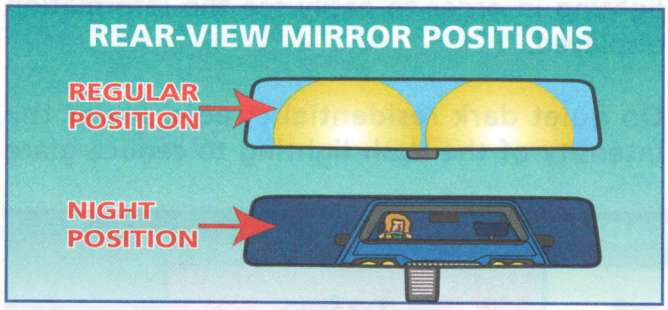
IN RURAL AREAS

Reduced-visibility and higher speeds are a dangerous combination. Dim the dash lighting and use the high beams, while maintaining a safe speed in keeping with your line of sight. Search beyond the lighted zone and to the sides ahead. Take advantage of all possible data, the line of utility poles, the tree tops, the reflection of oncoming lights, etc.

GLARE

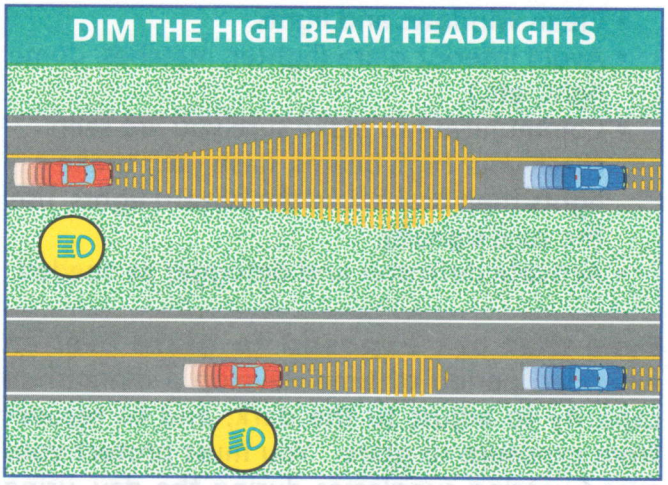
Glare is a problem caused by too much light, the reflection of bright light, or the sudden change from darkness to light. At night, glare can cause temporary blindness while the eyes re-adjust to the dark.

When the lights of a vehicle following you are blinding you in the rear view mirror, set the mirror to the night position. Return to the daylight position as soon as the offending headlights are gone. The new "BGE Setting" (Page 7.10-11) of the exterior rear view mirrors will prevent glare from affecting the driver.

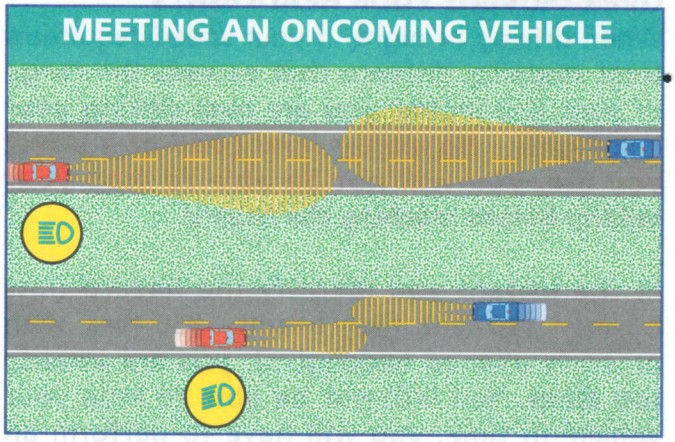


Cooperate with other road users

- Use your low beams on well-lit roads.



- Dim to your low beams **when you approach another vehicle from the rear** as soon as the range of the lights nears the rear of the other vehicle (300 feet).



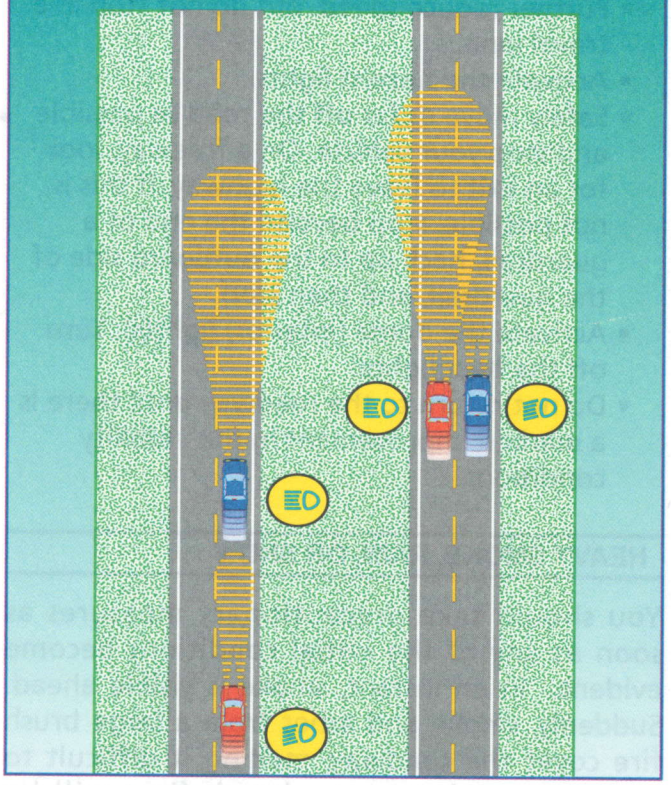
- Dim to your low beams **when you meet an oncoming vehicle** (500 feet). Don't dim the lights too soon and leave a large unlit area between the vehicles. Dim the lights before oncoming lights irritate you. Return to the high beams once you pass the oncoming vehicle.

- **When passing at night**, dim the high beams as you approach (300 feet). In addition, flash the high beams on and then off quickly (communicate) to warn the

SAFETY TIPS

Don't place paper or other objects on the dashboard; they can create reflections on the windshield. Avoid glare from the dash lighting, the dome light, and all other interior or exterior sources. Protect your eyes! Your safety depends on them!

PASSING ANOTHER VEHICLE



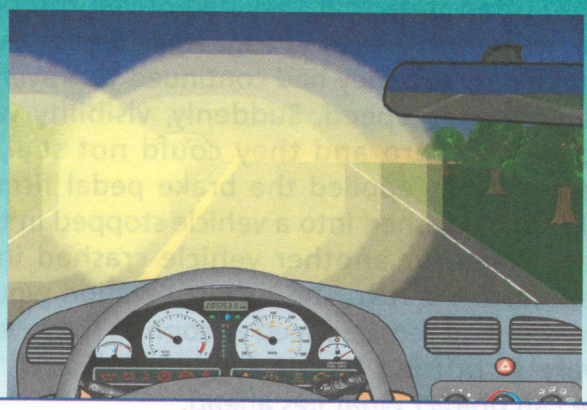
preceding driver, honk the horn as well (Texas law), and then use the low beams as you begin to pass. Return to the high beams when your vehicle is abreast of the vehicle you are passing (see above).

- **When another vehicle is passing you,** maintain the high beams to light the way for both of you until the other vehicle is abreast of yours. Dim the high beams, and then reactivate them when the other vehicle is far enough ahead (300 feet) so that the range of your high beams will not reach this vehicle.
- **When approaching curves and climbing hills,** flash to your low beams and back to the high beams. Look for a return signal from an oncoming vehicle. Be prepared to dim your lights.

FACED WITH ONCOMING BLINDING LIGHTS

- Flash the high beams, on and off again quickly, to communicate with the driver.
- Check the rear-view mirror.
- Look ahead towards the right edge of the pavement.
- Reduce your speed.

ONCOMING BLINDING HEADLIGHTS



Never leave your high beams on to "get even," as this merely increases the glare and the possibility of a collision. Look towards the right side of the road ahead, in order to minimize the effect of the oncoming glare. ***Cooperate! If you blind other oncoming drivers with the glare of your high beams, you put yourself at greater risk of a head-on collision!***

After checking the rear view mirror, if there is no danger from the rear, reduce your speed quickly. After you have passed the source of the glare, maintain your reduced speed until your eyes recover from the glare. Then, resume speed.

FACED WITH GLARE FROM BOTH SIDES

- Flash your high beams.
- Check your rear view mirror.
- Reduce your speed considerably.
- Close one eye and look ahead to the center of your lane.

Re-open the eye once you have passed the multiple sources of glare. This eye has not been blinded, and can be used to guide your vehicle at the reduced speed until the other eye recovers. Leave a longer following distance, as your depth perception is not functioning.

FOG AND SMOG

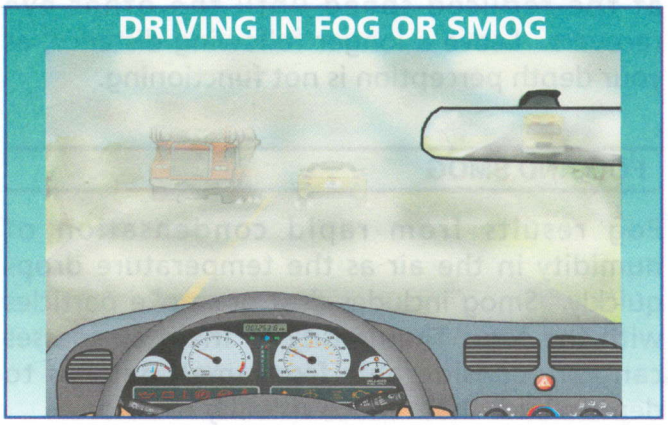
Fog results from rapid condensation of humidity in the air as the temperature drops quickly. Smog includes dust or smoke particles with the fog. The density of these air masses can vary considerably from small patches to dense clouds that reduce visibility to zero.

Many drivers involved in multi-vehicle collisions in fog often state that they had driven through patches of light, drifting fog. The situation was not serious, and they had continued to travel at the prevailing speed. Suddenly, visibility was reduced to zero and they could not see. In reaction, they applied the brake pedal firmly. Either they crashed into a vehicle stopped in the road ahead, or another vehicle crashed into them from the rear. The correct reaction would have been to reduce speed as soon as they were aware of drifting fog. In foggy conditions, no one can predict what lies ahead.

When faced with patches of fog/smog

- Slow your speed in relation to the density.
- Drive at a steady speed.
- Use your low beams (high beams reflect back at you).
- Increase your following distance.
- Use the lane markings as a guide (following taillights may be a case of "the blind leading the blind").
- Use the defroster, defogger, HVAC, and windshield wipers, as needed.
- Avoid passing.
- Be alert to possible faster vehicles approaching from the rear.
- Use hazard lights or flash brake lights to warn of imminent danger.

If you drive in foggy areas consistently, you should consider having special fog lights (which penetrate the fog) installed. They should be mounted as low as possible (below the level of the head lights), so they will be most effective. These special lights should be used only when driving in the fog.



In very dense fog (zero visibility)

- Further reduce speed, but do not stop in a travel lane.
- Activate the hazard lights.
- Safely move as far off the road as possible and stop your vehicle. On a freeway, look for an exit to leave the highway. If this is not possible, stop beyond the end of a guardrail, back up to the outboard side of the guardrail, and then stop.
- Activate the dome (interior) light(s). Turn off the headlights.
- Do not return to the roadway until there is a marked improvement in the visibility conditions.

HEAVY SMOKE, RAIN, OR SNOW

You should take precautionary measures as soon as any of the initial conditions become evident. In an instant, smoke is visible ahead. Suddenly, smoke and ashes from a large brush fire cover the roadway, making it difficult to see. In most instances, brush fires will be restricted to a limited area.

While driving, it starts to sprinkle. A few moments later, rain is falling in a solid sheet, slashing across the road. Usually, torrential rains are of a short duration.

Snow is falling in large lazy flakes. Two miles down the road, it suddenly turns into a whiteout. You can barely see the front of your vehicle. The snow storm could cover a much larger area than the two former examples.

In all three situations, you should

- Reduce speed to the limits imposed by the reduced visibility. Do not stop in a travel lane or on the shoulder near the roadway.
- Make sure that you are driving using the low beam headlights.
- Activate the hazard signals.
- Center your vehicle in the lane (lane position 1).
- Activate the windshield wipers (use the windshield washer as needed).
- Be alert for vehicles stopped in the roadway or on the shoulder.
- Be prepared for effects of gusting or strong

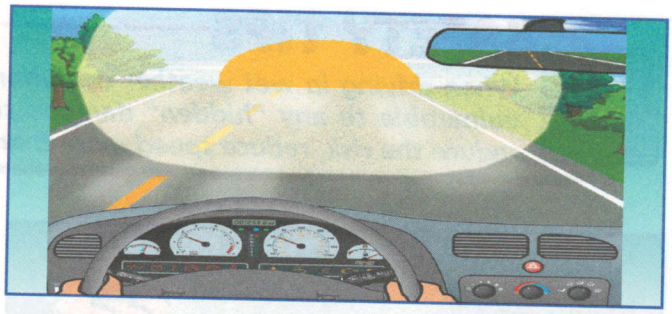
steady crosswinds.
- Input steering, acceleration, and braking actions gently and smoothly.

For heavy snow and whiteouts, look for an exit from the highway. Turn on the radio for a weather or road condition report. If impossible to exit a freeway, stop beyond outboard end of a guardrail, as mentioned earlier. If possible, once stopped, use a cell phone to check road conditions, or call for assistance.

SUN GLARE

When the sun is low on the horizon, the glare from the sun and the reflection off the roadway reduces visibility. The cleanliness of the windshield can further deteriorate the visual situation.

If you are driving into the sun, wear polarized sunglasses and adjust the sun visor to block the glare without restricting your view ahead. Oncoming vehicles will be difficult to identify,



especially if driving without using their headlights. Reduce speed and search the environment more often than normal.

The brake lights and turn signals of preceding vehicles will be less visible than normal. Increase your following distance.

If you are driving with the sun behind you, oncoming vehicles have the glare problem and will have difficulty seeing you. Your headlights should be turned on whenever you are driving and, in this situation, it is essential in order to be seen properly. Communicate your intentions early and monitor traffic ahead and behind to ensure that you have been understood.

SAFETY TIPS

At night, be alert for shining eyes at or near the roadside. (Animals may enter the roadway.) Slow down. Be ready to stop. Try to avoid swerving, if possible. If one animal is present, others may be nearby! If you hit a deer or other animal, report it to the local police, sheriff's department, or state trooper.

20-B

Extreme Weather Conditions

Drivers in Texas must be able to adapt to extreme weather conditions that are not necessarily specific to a particular time of year. These conditions can be very hazardous to drivers and their vehicles.

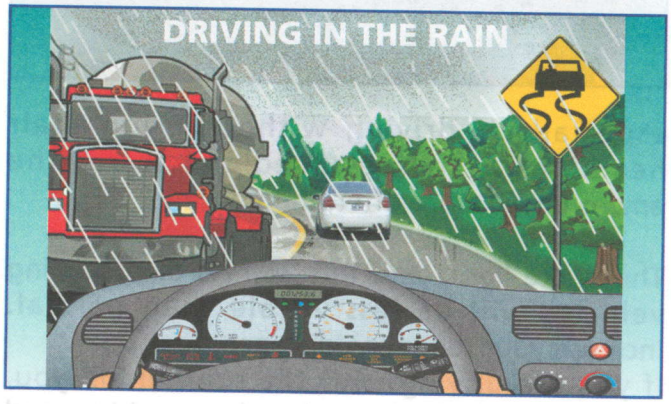
RAIN

Rainfall reduces traction as well as visibility. Roads become especially slippery during the beginning of a rainfall (even more so after a hot dry spell). The water causes the oil and dust on the pavement to float, creating an oily film that will wash away as the rain continues. (Professional drivers call this a "sudsy" condition and reduce speed considerably.) The lighter the rain, the longer the washing-away process takes.

As the rain continues, water may accumulate on the road. Puddles, sheets of water and, in extreme cases, flooded pavement, become possible hazards. (Wet snow and slush also reduce traction, hide potholes, and clog the tire treads.)

SAFETY TIPS

When driving in wet weather conditions at night, since visibility is limited, you are more vulnerable to any "hidden" dangers such as potholes, puddles, and standing water. To reduce the risk, reduce speed more than normal for night driving!



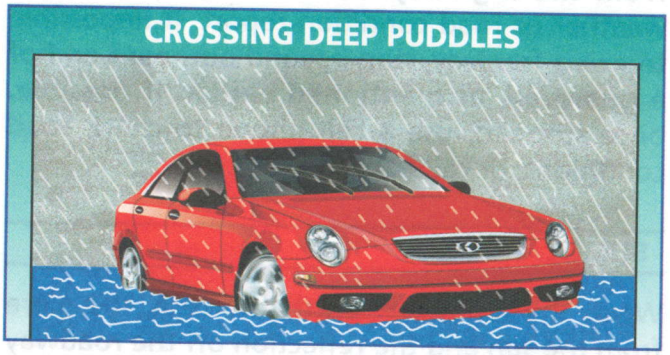
To counteract these water hazards:

- Reduce speed.
- Lengthen your following distance.
- Drive in the tracks of other vehicles.
- Brake sooner and more gently (if tires skid, ease up, re-apply gently).
- Accelerate more gradually.
- Steer with smooth gentle motions.
- Use windshield wipers (blades in good condition; full fluid reservoir).
- Activate the defroster, HVAC, and rear window defogger to prevent fogging or condensation (keep a window slightly open).
- Make sure the tires have good tread and are properly inflated.

When approaching puddles and sheets of water, they may be deeper than they seem, or they may hide potholes. Avoid them if possible. Be aware of, and try to minimize, the splashing that will ensue for your vehicle and also for pedestrians.

When you cannot avoid the situation:

- Check traffic behind you.
- Reduce speed as much as possible.
- Activate the hazard lights.
- Hold the steering wheel firmly (water resistance varies with depth and may pull the wheels off course).
- Release the brakes and coast through the water slowly. (in deep water, accelerate gently to maintain the slow speed).



After crossing, **check your brakes** by applying the pedal gently (check the rear-view mirror first). If the brakes respond normally, turn off the hazard lights and proceed on your way.

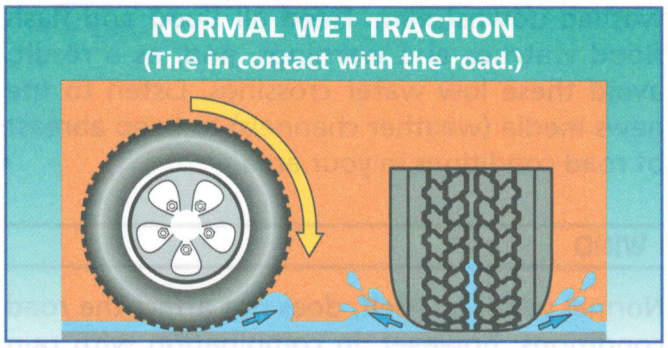
If the brakes are wet, the vehicle will not reduce speed. If this is the case, continue (right foot on the accelerator) and apply the brakes simultaneously (using your left foot). The friction produced by braking steadily will dry the brakes. As soon as they respond normally, release the brakes and turn off the hazard lights.

When you approach a stop (stop, light, blockage in traffic), begin braking earlier than normal and check the rear-view mirror (space area 6). The driver behind you may not have checked his/her brakes and is only now discovering that the brakes are wet. By anticipating this problem, you can avoid a rear-end collision before you bring your vehicle to a complete stop.

HYDROPLANING can occur when a combination of speed, tire wear, tire inflation, or the depth of the water on the pavement causes the tires to lose traction. In wet weather (water, wet snow, or slush), the tires cut through and maintain contact with the pavement at speeds of less than 30 mph.

To prevent hydroplaning:

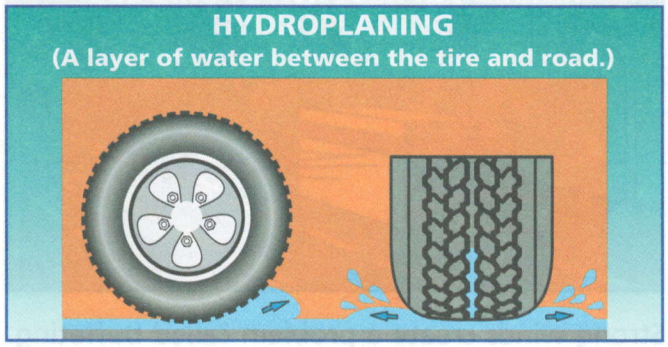
- Check the tires and tire inflation regularly.
- Reduce your speed and, even more so,



when approaching standing water and puddles.

- Drive in the tracks of preceding vehicles on wet surfaces.

At higher speeds (40 mph and higher), the wedge of water in front of the tires may pass under the tires and the tires will ride on the cushion of water. Traction will be lost completely. (The higher the speed; the more likely this will happen.)



Should your vehicle hydroplane:

- Shift to neutral (depress the clutch).
- Activate the hazard lights.
- Grip the steering wheel firmly.
- Avoid braking or accelerating.
- Check your rear view mirror.

The water resistance will slow your vehicle. As soon as the tires regain contact, check your rear-view mirror, then brake gently to reduce your speed (if there is no hazard to the rear). Re-engage the transmission, resume driving at a slower speed (to prevent hydroplaning again), and turn off the hazard lights.

FLASH FLOODS

Several factors contribute to flash flooding. The two key elements are rainfall intensity (the rate of rainfall) and the duration (how long the rain lasts). Topography, soil conditions, and ground cover also play an important role.

Flash floods occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. This fast moving water, which can reach heights of 30 feet or more, can roll boulders, tear out trees, destroy buildings and bridges, and scour out new channels. Catastrophic mud slides are often triggered by the type of rain that creates flash floods.

Most flash flooding is caused by slow-moving thunderstorms, thunderstorms repeatedly passing over the same area, or torrential rain from hurricanes and tropical storms. Occasionally, floating debris or ice can accumulate at a natural or man-made obstruction and restrict the flow of water. Water held back by the blockage can cause flooding upstream. If the obstruction should suddenly release, a flash flood can occur downstream.

Floods can also occur, as a natural and inevitable part of nature, along rivers (winter or spring rain coupled with melting snow), in coastal areas (ocean water moving inland due to wind, offshore air pressure, or tsunamis), or in urban areas (inability to absorb rainfall compared to natural terrain).

WHAT YOU CAN DO:

- Know your flood risk and elevation above flood stage.
- Be prepared to move to a safer area. Know your evacuation routes.
- Keep your vehicle filled with gasoline (if their is a power failure, the pumps at the gas stations may not work for several days).
- Store a supply of drinking water (water service may be interrupted).
- Keep extra food supplies that require little cooking and no refrigeration (electric power may be interrupted).
- Keep a properly stocked first aid kit.
- Purchase an NOAA Weather Radio, a battery-powered portable radio, and

flashlights (in working order).
- Keep emergency cooking equipment with extra fuel on hand.
- Install check valves in the sewer traps of your home (prevent flood water from backing up into your home).

Most flood deaths are due to flash floods, and almost half of all flash flood deaths are vehicle related. A few inches of water can cause you to lose control of your vehicle (hydroplaning); as little as two feet of moving water will carry most automobiles away. (Each foot of water applies a lateral force of 500 lbs. and a buoyancy factor of 1,500 lbs. to the vehicle. Two feet will cause most vehicles to float and be carried downstream.)

To reduce the risk, avoid driving through fast flowing water, especially when you are not sure of the depth of the water.

LOW WATER CROSSINGS

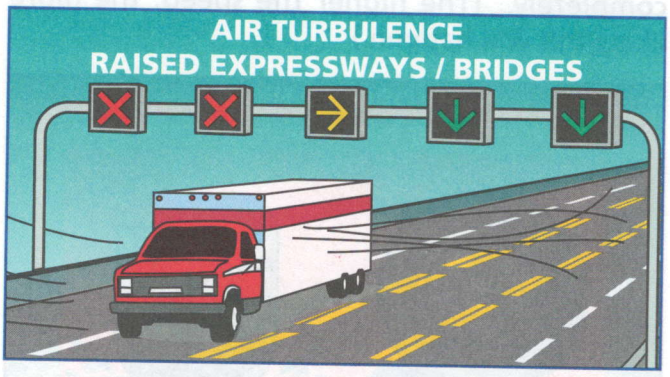
A hidden danger awaits most drivers when a road without a bridge dips across a creek bed or arroyo (a water carved gully or normally dry creek bed). They can fill with fast-moving water very quickly (in Arizona, a flash flood developed in an arroyo in 58 seconds).

It is easy to develop a false sense of security when you drive over low-water crossings frequently. These crossings are often scoured or even washed away during flooding, creating unsafe driving conditions. Moreover, you might fail to recognize the increased risk when some moving water is present, or there is a small increase in the water level.

Driving too fast through low water will cause your vehicle to hydroplane. If the water is deeper and fast-moving, your vehicle can be washed downstream. Heed all flood and flash flood watches and warnings, and, as a result, avoid these low water crossings. Listen to the news media (weather channels) to keep abreast of road conditions in your area.

WIND

Normal wind, by itself, does not affect the road conditions; however, in combination with rain or wet snow and cold temperatures, the wind can create icy patches. Handle this hazard in the same fashion as sand or gravel on the roadway. Slow before the danger, coast over the icy area and proceed. Search the pavement ahead for other patches, especially when nearing or driving on raised expressways, bridges, tunnels, wide open areas, or between tall buildings.



Strong winds create a problem called buffeting. These conditions occur on bridges (such as the Galveston Bay Bridge), through mountain passes and ravines, and when being passed by large trucks. Gusty or high winds (side winds) can push at your vehicle, making it difficult to remain in your lane. This effect is even greater on large boxy vehicles, vehicles towing trailers, and vehicles with a higher center of gravity (i.e. vehicles with a roof-top carrier or 4 wheel drive).

Strong, persistent winds, as are often

More deaths occur due to flooding each year than from any other hurricane or thunderstorm related hazard. Many of these casualties are a result of careless or unsuspecting motorists who attempt to navigate flooded roads.
The National Weather Service now warns anyone who comes to a flooded roadway,
"Turn around... don't drown!"™

www.srh.weather.gov
FLASH FEDERAL ALLIANCE FOR SAFE HOMES www.flash.org

experienced on the Galveston Bay Bridge, may require that restrictions be placed on the types of vehicles that may cross and on the speed of travel. Safety officials on site monitor the wind velocity and as a result of their findings, control traffic flow over the bridge.

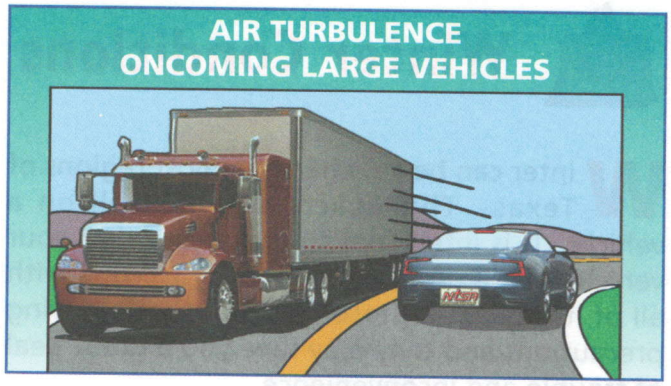
On I-10 between Presidio and El Paso, a 200 mile stretch of open highway that travels over gorges and rivers, and passes through cuts in high hills, the wind conditions are notorious. Wind-socks, like those found at airports, have been installed in the median or at the side of the highway. These are intended to warn drivers of the direction and intensity of the prevailing winds, by the direction and angle the wind-sock is blowing.

To maintain control, you should:

- Reduce your speed.
- Grip the steering wheel firmly.
- Check for oncoming and following traffic.
- Compensate gently for the wind gusts as soon as the vehicle moves off course even slightly.
- Be prepared to countersteer.
- Avoid passing.
- Increase your following distance.
- Keep away from other vehicles on either side (multi-lane road).
- Position your vehicle close to the right in your lane (on roads with one lane in each direction).

When driving out of a protected area (wooded area, behind a long ridge, an underpass, etc.) into a gusty area, you should adjust your lane position away from the gust (leeward side), and then, as you are exposed to the sidewind, steer windward to the opposite lane position.

Besides the wind, large heavy vehicles (trucks, tractor trailers, buses, etc.) generate air turbulence as they drive at high speeds. Passing or meeting an oncoming vehicle of this type can affect your vehicle control. Compensate by reducing speed and changing your position within the lane to leave as much space as possible from these vehicles.



EXTREME HEAT - DESERTS

Desert areas are also stressful for drivers and vehicles; they are larger and hotter than most people realize. Prepare your vehicle. Put heavier oil in the engine (at least S.A.E. 50 grade). Have the engine cooling system and HVAC double checked.

Drive at night, when it is cooler, if at all possible. If not, plan rest stops every few hours or change drivers frequently. Check all fluid levels every time you stop. Never open the radiator cap when the engine is hot. Carry a water supply for the occupants as well as for the vehicle, just in case. Check the tire pressure every morning when the tires are cool.

Wear a good quality pair of sunglasses to protect your eyes from the glare of the sun. If strong winds are forecasted, delay your departure, since dust or sand storms could cause a lot of problems, in addition to damaging the paint of your vehicle.

Storms, though rare, cause flash floods. If a storm occurs, drive to higher ground and avoid stopping in natural drainage areas. Wait for the water level to return to normal before continuing on your way.

SAFETY TIPS

Special attention must be given to the tires and tire inflation. Extended high speed driving in hot weather can cause the tire temperature to rise and the inflation pressure to increase. This could result in a blowout!

Winter Conditions

Winter can be very harsh in most regions of Texas. This exacts a heavy toll on a vehicle. It is intelligent to make sure that your vehicle is well prepared and ready to cope with all of its rigors. Protocol requires the following precautions and they may save you a great deal of trouble and inconvenience.

VEHICLE MAINTENANCE

AN ENGINE TUNE-UP will ensure that the fuel and ignition systems will perform in all conditions. The engine oil should be replaced with an engine oil of the correct viscosity for cold-weather. A block heater is a good investment to ensure starting in extreme cold.

THE FUEL SYSTEM should be protected from gas line freezing by keeping the fuel level as full as possible. Allow at least fifteen minutes of driving time to elapse after a fill-up before turning off the engine. This ensures moisture will pass through the system rather than collect at the bottom of the tank and in the fuel lines and freeze. In extreme cold, add gas line antifreeze at each fill-up.

THE ELECTRICAL SYSTEM should be checked to make sure that the battery is charged and operates at maximum strength. The terminals should be cleaned. The alternator should be tested and the V-belt checked for cracks and wear (possible breakage) and adjusted to ensure maximum efficiency.

THE TIRES should be of the correct type for the winter conditions in your area. Snow tires are recommended for extreme winter conditions and should be installed before the onset of winter. The inflation pressure must conform to manufacturer's specifications and should be checked regularly.

THE COOLING/HEATING SYSTEM should be tested (anti-freeze concentration and level) and the coolant added to as needed. The system should be flushed every third year. The air ducts and fan should perform properly. Keep outlets clear.

THE BRAKE SYSTEM should be verified, adjusted, and repaired as needed. It must respond effectively and precisely to pedal pressure to ensure control in critical winter driving conditions. The parking brake is part of the system and must also function properly.

THE WINDSHIELD WIPER/WASHER SYSTEM should have special winter wiper blades installed. The wiper arms should be checked to make sure they will last the season. Make sure that the washer fluid in the reservoir and in your trunk is appropriate for winter temperatures.

THE EXHAUST SYSTEM should be checked for leaks and looseness all the way to the tailpipe. Winter conditions test the exhaust system severely.

THE LOCKS AND SEALS should be prepared for the rigors of winter. The locks should be lubricated with a product recommended by the manufacturer. The rubber seals around the doors and the trunk (hatchback) should also be treated with an appropriate product to prevent sticking and freezing.

INDISPENSABLE WINTER ACCESSORIES

- Brush and scraper
- Snow shovel
- Traction aids (anti-skid grids or mats)
- Sand or salt
- Lock de-icer fluid (carry it with you).

IN CASE OF A MECHANICAL FAILURE

Booster cables; flares or reflectors; a flashlight; a small tool kit; and spare fuses and bulbs. It is a good idea to have these on hand at all times; however, winter requires a few extra items.

SURVIVAL KIT

In case of an out of town trip, a breakdown or a long, unplanned stop will necessitate the following items to combat the cold:

- Candles, matches and/or lighter, and a metal candle holder. A lit candle will provide light and heat thus reducing engine operation.
- Non-perishable food with a high caloric content.
- A thermos of hot, sweet, non-alcoholic beverage.
- Space-saver blankets, warm clothes, gloves and plastic bags.
- A first aid kit.

APPROACH TO THE VEHICLE

Besides the normal pre-drive procedures, start the engine and activate the defroster and defogger. Then clear the snow from your vehicle - windows, roof, hood and trunk lid, all lights, and license plate. Scrape all the windows to remove ice accumulation, If necessary.

Unstick and clean the wiper blades. Remove any packed snow or ice in the wheel wells that may inhibit tire movement. (This will also permit the engine to warm up before starting off.) When re-entering, kick the snow from your footwear to ensure that your soles will make firm contact with the pedals.

After performing the preliminaries, in older vehicles you must tap the accelerator pedal to disengage the automatic choke before shifting into gear. In all vehicles, remember to drive slowly for the first few minutes to allow the entire power train to become lubricated and warm up.

WINTER DRIVING

To get your vehicle moving, follow the normal steps and then add the following:

- Straighten the front wheels.
- **AUTOMATIC** - release the brake pedal and apply a gentle pressure (if needed) on the accelerator pedal.
  STANDARD - raise the clutch to the friction point and gently engage; add a slight pressure on the accelerator, if necessary.
- Once in motion, press more firmly on the accelerator as needed to gradually increase speed and steer in the desired direction.
  Should your vehicle get stuck, reverse in the path already created and try again. Avoid spinning your tires - they sink in the snow and melt the snow forming a layer of ice under the wheels.

While driving, **test the traction from time to time** by lightly applying the brake pedal. On slippery surfaces, drive more slowly. Look further ahead and to the rear more often, and keep a longer safety margin both in front and to the rear.

Be gentle with the accelerator, the brakes and the steering. Sudden or quick maneuvers are the most common cause of loss of control on slippery surfaces.

Plan your maneuvers sooner so that you may reduce your speed more than usual in "good time". When turning or rounding a curve, start at a much slower speed, and accelerate later than usual and more gently.

While driving, activate the windshield wipers (if not already operating) before meeting oncoming vehicles, passing or being passed by another vehicle. Avoid passing, unless it is absolutely necessary. Make sure that the driver ahead is in no danger of steering off course and

the space available for passing is much longer than normal.

In snow or blowing snow, travel in the lane with the least snow or ice. In fact, follow the path of the preceding vehicles, even though it may not coincide with the center of a lane, if this can be done safely. Avoid driving in ruts; do not attempt to get out of them while driving at high speeds.

Wet roadways are especially slippery as the temperature nears the freezing point. Extra caution should be exercised on bridges, elevated expressways and shaded areas, as these surfaces freeze more quickly.

SLOWING OR STOPPING

- Allow a **longer braking distance.**
- **Ease off the accelerator gradually.** A sudden release of the gas may cause an un-balancing effect on the drive wheels and differential. Should the vehicle deviate from its course, shift to neutral and steer where you wish to go. Normally, when still in gear, the engine compression will slow your vehicle.
- **Apply the brake pedal gently.** If one or more of the wheels skid, release the brakes and re-apply more gently.

PARKING

In heavy snow, create a path for your tires by driving past the parking space and then reversing. Leave your vehicle in the middle of the tire tracks, thus facilitating your departure. It is always safer to park your vehicle (parking lots, driveways, etc.) so that you can exit the space by driving forward. In winter, this is even more important.

The parking brake can stick in freezing temperatures. To disengage when this occurs, reverse slowly while releasing the lock mechanism.

WHEN STUCK ON ICE OR SNOW

- Make sure the front tires are straight.
- Drive slowly. Spinning tires dig deeper, melt the snow and create ice.
- Limit your movement forward and backward to the range attainable without spinning.
- Accelerate gently when the tires grip, then coast. Brake when you reach the limit of travel, even if it is only a few inches. Repeat in the opposite direction. You will slowly rock your way out (no power train damage).

USING TRACTION AIDS

- Place mats/grids against the drive wheels (spikes towards ground). To move forward, put in front of the wheels, and vice versa.
- Advance or reverse cautiously onto the grids, and maintain momentum (don't spin wheels).
- Ensure no one is standing nearby (aid may be expelled forcefully).

WHEN STALLED OR SNOWBOUND

- If possible, drive onto the shoulder.
- Activate the hazard lights.
- Window slightly open (ventilation).
- Get your survival kit from the trunk.
- Turn off the engine to conserve fuel. Use electrical accessories sparingly while the engine is not operating.
- Run the engine for ten minutes every hour to charge the battery and warm the interior; check that the exhaust pipe is clear (carbon monoxide gas).
- Use the plastic bags to encase your feet and legs to retain body heat.
- Use the blankets and clothing to further insulate against the cold.
- Keep awake. If accompanied, take turns sleeping for short periods.
- Unless you are CERTAIN that you can reach help nearby, do not leave your vehicle. It provides shelter and is more visible.
- Use candles, food, and beverages sparingly.

Follow these procedures, you and your passengers can wait out any situation until help arrives.