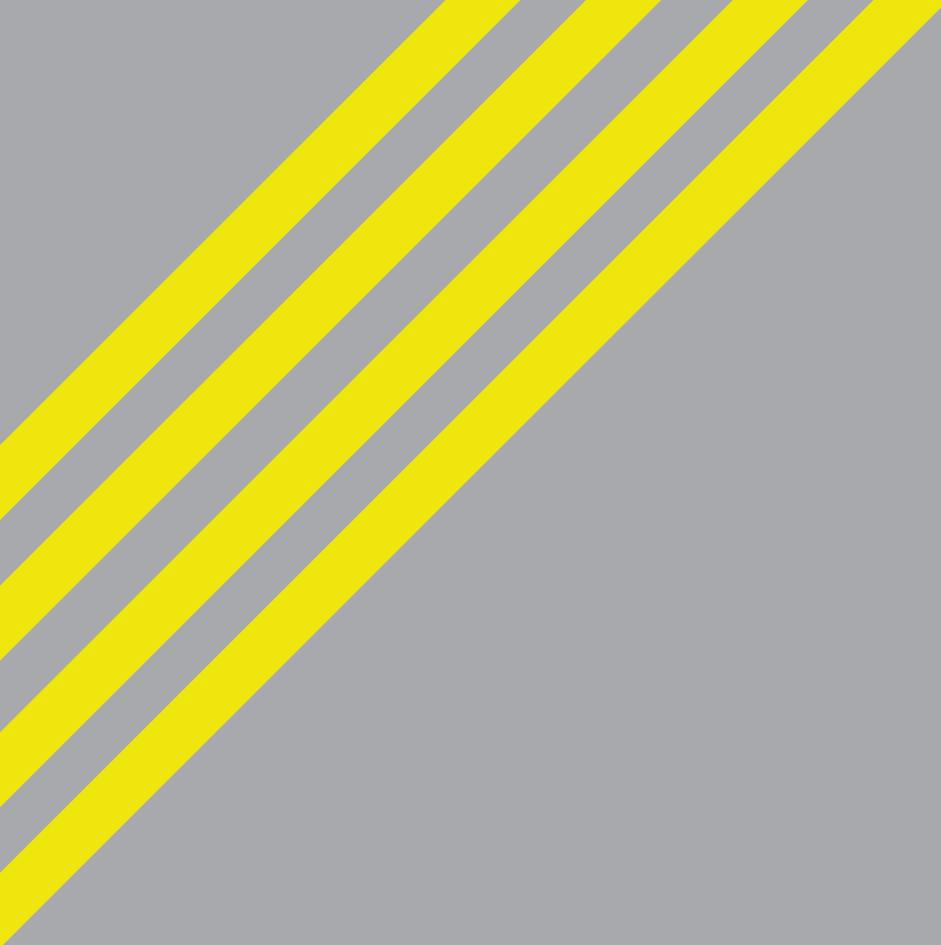


# Oilfield Driver Awareness

**PARTICIPANT MANUAL**  
VERSION 24.1

The logo for Energy Safety Canada, featuring the words "ENERGY", "SAFETY", and "CANADA" stacked vertically in a bold, yellow, sans-serif font. The text is contained within a blue square with a yellow and black diagonal hazard stripe border on the right and bottom edges.

**ENERGY  
SAFETY  
CANADA**



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## **ACKNOWLEDGEMENTS**

The Oilfield Driver Awareness course was developed by Energy Safety Canada through a collaboration of industry professionals representing CAGC, CAODC, CAPP, CEPA, EPAC and PSAC. Thank you to everyone who dedicated time and resources to creating this outstanding product.



# SAFETY DOESN'T CLOCK IN AND IT DOESN'T PUNCH OUT. IT'S 24/7.

The creation of the Petroleum Industry Training Service in 1949 signaled a new day for safety in the industry. Today—recognizing that training is just one path to safety—Energy Safety Canada is advancing the work of its legacy organizations to act as a hub for safety expertise. We are continually evolving with a constant goal: zero injuries, zero incidents.

As the national voice for oil and gas safety, Energy Safety Canada advocates for those working in the industry and supports companies in their efforts to improve safe work performance.

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- » Ensure workers have the training they need to get home safe at the end of each day.
- » Help employers by providing leading-edge data and customized support for their health and safety programs.
- » Reinvest training revenues, as a not-for-profit organization, back into safety for the oil and gas industry.

## FOR WORKERS, WE:

- » Make it easier to get safety training
- » Reduce duplication of safety training
- » Make safety standards more alike from site to site
- » Make training certifications easy to access

## FOR COMPANIES, WE HELP:

- » Reduce injuries and incidents
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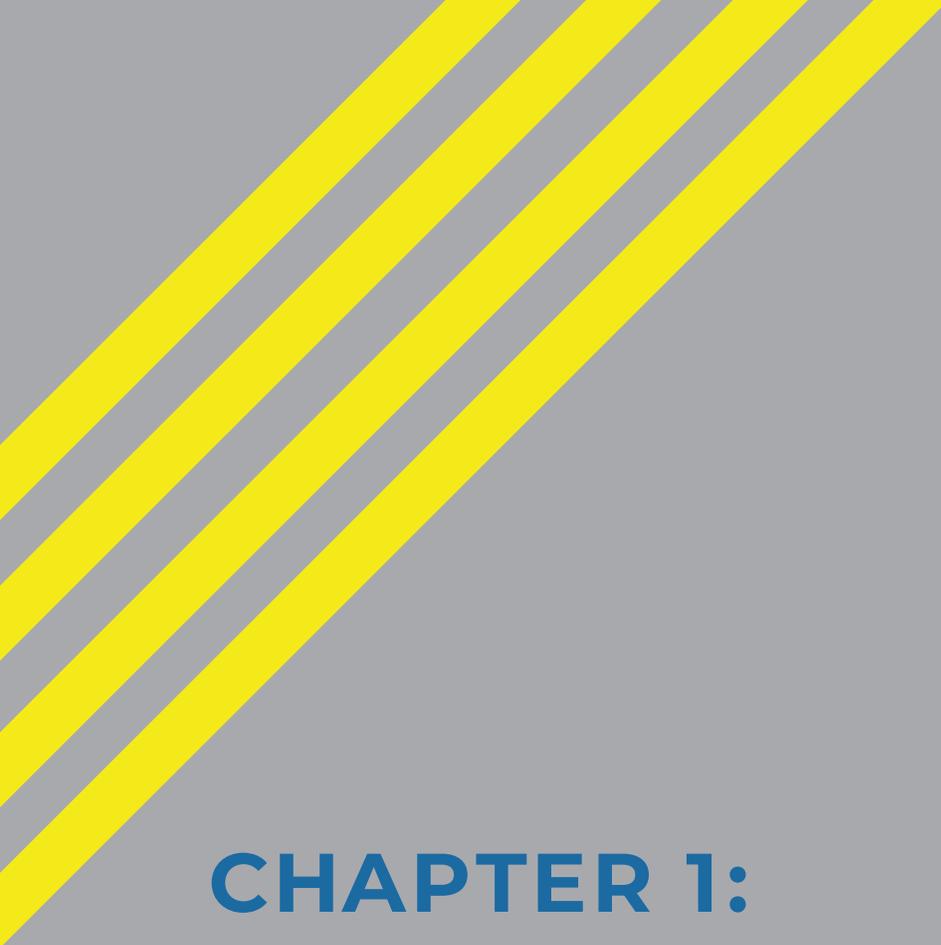
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# **CHAPTER 1:**

# **Driver Attitude and Behaviours**



## OUTCOME

Apply the knowledge, skills, and attitudes of a safe driver when operating a motor vehicle.



## OBJECTIVES

Upon completion of this chapter, you should be able to:

1. Describe elements of a professional driving attitude.
2. Explain the effects of fatigue on driving performance.
3. Develop strategies to manage fatigue.
4. Outline the human factors that influence driver errors.

## INTRODUCTION

Motor vehicle collisions are the most common cause of death within the oil and gas industry. The most important factor contributing to vehicle crashes is human error. In order of frequency, these include:

- » following too closely,
- » running off the road, and
- » left turns across the path of oncoming traffic.

(Alberta Transportation, *Alberta Traffic Collision Statistics, 2021*)

With a professional driving attitude and behaviour, these types of driver errors can be reduced sharply, leading to fewer deaths and injuries.

## PROFESSIONAL DRIVER ATTITUDE AND BEHAVIOUR

Professional driver attitude and behaviour reduce the likelihood of driver error and lead to safer journeys.

### Learning and Developing Proper Habits

Professional drivers are willing to learn and develop new and proper habits to help them become safer, more courteous drivers. It takes six days to start a habit, six weeks to form a habit, six months to break a habit and six years to lose a habit. Some habits are easy to form but hard to break. Bad habits and shortcuts that result in complacency can be countered with positive routine.

### Using Passenger Restraints

Seat belt use is mandatory in all Canadian jurisdictions. Ensure that your seat belt is always snug and properly fastened. An improperly fastened seat belt is not going to protect you from being thrown around inside the vehicle or from being ejected. Air bags are an added safety feature designed with seat belt usage in mind. Air bags are not an alternative to wearing a seat belt. Air bags will help prevent injury while restraining the driver and passenger.

#### ATTENTION

Collisions involving seat belt users had a much lower injury rate (7.4%) than those not using restraints (14.5%) (Alberta Transportation, Alberta Traffic Collision Statistics, 2021).

Seat belts worn correctly can reduce the chances of death in a collision by 47% (Stewart et al., 1997).

A car in a collision stops in the first tenth of a second, but you keep moving the same rate until something stops you, such as the steering wheel, dashboard or windshield. At 50 kilometres per hour you hit “the wall” four times as hard as you would at 25 kilometres per hour. In other words, it is the same impact as falling three stories. A properly worn seat belt keeps that second collision – the human collision – from happening.

A properly worn seat belt means that both the lap and shoulder straps are snugly fit to transfer the impact of the collision to the parts of your body that can absorb it – your hip bones and shoulder bones.

All safety features in a vehicle are designed to work together to create a survivable, engineered life space and reduce or eliminate injury for drivers and passengers alike. For example:

- » Crumple zones
- » Crush-resistant roofs
- » Side impact protection beams
- » Laminated windshields and tempered glass
- » Seat belts, air bags
- » Properly adjusted head restraints

### Knowing Your Personal Limitations

A professional driving attitude includes understanding and operating your vehicle within your personal limitations.

#### Physical Limitations

Physical limitations commonly encountered by drivers include:

- » Eyesight: The ability to:
  - See fine detail
  - Perceive and distinguish colour
  - Perceive the distance to an object, even if approaching it at highway speed (Depth Perception)
  - See in low light conditions
  - Recover from glare (from sunlight or headlight high beams)
  - Understand the limits of peripheral vision and what is hiding in your blind spots
- » Hearing: The ability to hear horns, sirens, vehicle noise and pedestrians.
- » Strength: The ability to properly control a moving vehicle with your arms and legs, especially in difficult driving conditions or when reacting to an emergency.
- » Coordination and Reaction Time: The ability to quickly and appropriately collect and process information while controlling a vehicle as dictated by the situation.

## Mental and Psychological Limitations

Mental and psychological capabilities are limiting factors when driving. Stress and excitement can impact your judgement and how you assess risk.

**Risk Tolerance:** Different drivers tolerate different levels of risk. It is very important to know your training and skill level, and how your knowledge and experience in a variety of driving conditions affect your driving skills. As your driving experience grows, so does your confidence and ability in operating a vehicle in a wide range of conditions and situations. Risk tolerance can also be affected by fatigue.

## Fatigue

Fatigue is a common condition that every driver encounters. Studies indicate there is a significant increase in driver drowsiness between 10 pm and 6 am. Continuing to drive when you are tired puts you and other road users in danger. As rest is the only remedy for drowsiness, ensure you get enough sleep between shifts so you are alert and refreshed for your next trip.

Being rested and fit for duty is your responsibility as a professional.

**Hours of Service:** Hours of service rules were developed as a control requiring commercial drivers to take time off and get proper rest. Although the provinces have adapted their own hours of service rules, carriers that cross borders are subjected to harmonized hours of service rules found in National Safety Code Standard 9.

See Appendix for provincial hours of service resources.

In Canada, federal Hours of Service rules require drivers of regulated vehicles to take 10 hours off each day, 8 of which must be consecutive. Drivers shall not drive after accumulating 13 hours of driving time, 14 hours of on-duty time or after 16 hours has elapsed since the start of their work shift. The 8 hour rest period resets these daily limits and the remaining 2 hours are for breaks.

It is your responsibility to know and understand the hours of service rules that apply to your situation.

## Driver Courtesy

Remember, you are representing the industry, your company and yourself. Always drive in a professional manner, and be courteous to all road users. Be tolerant. Never retaliate against or engage an aggressive driver.

## RESPECTING YOUR VEHICLE

Creating, maintaining, and following a daily vehicle inspection protocol is not only a regulatory requirement, but it makes good business sense as well. Vehicles are your tools, and maintaining your vehicle properly will make it easier for you to do your work effectively and efficiently. The daily vehicle trip inspection is designed to ensure early identification of mechanical problems and defects. It is also meant to safeguard against conditions that may cause or contribute to a collision or vehicle breakdown.

Drivers should respect their vehicles and look after them properly. This respect results in lower maintenance and operating costs, a stronger bottom line for the company and a better image for the industry.

Poorly maintained vehicles result in higher repair bills, reduced efficiency, reduced service life and may pose a hazard to you and others.

## DRIVER ERRORS INFLUENCED BY HUMAN FACTORS

Human error is the leading cause of crashes. These errors can be categorized into two basic categories (Thiffault, 2011):

- » Recognition Errors (fail to identify)
  - Driver distraction
  - Driver fatigue
- » Decision Errors (high risk choice)
  - Aggressive driving
  - Sensation seeking
  - Impaired driving

## Recognition Errors

Recognition errors occur when a driver fails to properly assess the driving situation. Inattention and distraction are two types of recognition errors.

Distraction and fatigue are two major factors that affect a person's ability to properly perceive a situation. Distraction-based recognition errors are associated with divided attention and multitasking, while fatigue-related inattention is caused by lowered alertness. Research confirms that, despite known effects, drivers often choose to work beyond safe limits of fatigue and distraction.

## Distractions

When humans try to perform two tasks at the same time, we become distracted. On the road, even just a second or two of distraction can prove critical, even fatal. 93 per cent of rear-end collisions involve the driver of the following vehicle looking away within three seconds of the crash. Drivers must not let their attention drift to the point they lose awareness of the road and their vehicle.

The following table lists common sources of distractions.



DISTRACTIONS	DESCRIPTION
Route Problems	<ul style="list-style-type: none"> <li>» Focusing on the destination without regard for other road users</li> <li>» Complacency from knowing the route very well</li> <li>» Not paying attention when leaving a parking space, entering traffic, or looking for a street address</li> </ul>
Mental Disturbances	<ul style="list-style-type: none"> <li>» Hurrying</li> <li>» Worrying</li> <li>» Boredom</li> <li>» Health</li> </ul>
Scenery	<ul style="list-style-type: none"> <li>» Collision scenes</li> <li>» Window shopping</li> <li>» Roadside lights at night</li> <li>» Natural landscape/wildlife</li> </ul>
In-Vehicle	<ul style="list-style-type: none"> <li>» Eating or drinking</li> <li>» Lighting a cigarette</li> <li>» Radios, cell phones, GPS, electronic devices</li> <li>» Reading maps</li> <li>» Checking gauges at the wrong time</li> <li>» Diminished windshield clarity caused by insects, dirt, salt spray, frost, or condensation</li> <li>» Being unfamiliar with vehicle</li> </ul>
Unfamiliar Driving Conditions	<ul style="list-style-type: none"> <li>» Road types (highway, urban, paved, or unpaved)</li> <li>» Road conditions (wet, muddy, icy, or snow-covered)</li> <li>» Light conditions (daytime, night time, or dawn/dusk)</li> <li>» Environmental conditions (temperature and humidity)</li> </ul>

As in most jurisdictions, there is distracted driving legislation in Alberta that restricts drivers from:

- » Using hand-held cell phones or other electronic devices
- » Entering information on navigation systems
- » Reading printed materials in the vehicle
- » Writing, printing or sketching, and
- » Personal grooming

The penalty for distracted driving in Alberta is a \$300 fine and three demerit points (Alberta Transportation, *Distracted Driving Legislation*, 2024).

In your role you may be required to use 2-way radios. Ensure you are doing so in accordance with regulation and company policy.

### Careless Driving

If you drive a vehicle on a roadway without care and attention, or without reasonable consideration for others using the road, you could be found guilty of careless driving.

Careless driving in Alberta is a violation that can lead to fines ranging from \$400 to \$2,000 for a first offense, with subsequent offenses incurring higher fines. Additionally, a conviction typically results in 6 demerit points being added to your driving record and may lead to a driver's license suspension, particularly for severe or repeat offenses.

### Driver Fatigue

Fatigue lowers a driver's ability to pay attention to the surrounding environment and reduces driving performance.

There are many reasons why drivers experience fatigue. These factors can be classified as either originating within the person or the task:

- » Related to the person: sleep problems, time-of-day, time-on-task, time awake, personality, age, gender, and using substances that affect the mind or mental processes
- » Related to the task: monotony, heavy workload

The following sections describe some of the main causes of driver fatigue.

### The Time-of-Day Effect

Human beings are more alert during the day than at night. Driving at night and sleeping during the day goes against a human being's natural biological cycle. Driving after a night shift to commute home is also linked with acute sleepiness at the wheel. Scheduling practices in the motor carrier industry can disrupt sleep, performance, and the natural sleep cycles due to:

- » Switching between day and night work shifts
- » Changing start times
- » Irregular work cycles
- » Time zone changes

### Time Awake and Time-on-Task

The total amount of continuous time awake in a day and the uninterrupted amount of time spent on a task both lead to decreased performance, particularly if the task is monotonous. Of these two, the total amount of time awake is likely more important than the total time on one task.

### Acute and Cumulative Sleep Loss

Humans need around eight hours of sleep. If acute sleep loss occurs over consecutive nights, it tends to add up and creates a significant sleep debt that needs to be "reimbursed" by sleep. The bigger the sleep debt, the greater the reduction in performance.

While tiredness, fatigue and exhaustion are all varying levels of the same lack of rest, it's important to understand that humans are designed to get tired, rest and awake refreshed. The cumulative debt that results from shorting yourself on proper rest is fatigue.

### OSA (Obstructive Sleep Apnea Syndrome)

Obstructive Sleep Apnea Syndrome (OSA) is a common sleep disorder in which breathing frequently stops or is substantially reduced on a regular basis throughout the night. The condition is associated with:

- » Increased daytime sleepiness
- » Memory and concentration problems
- » Irritability
- » Impaired vigilance and reaction time

The crash rate for drivers with untreated sleep apnea is two to three times higher than other drivers. However, sleep apnea can easily be diagnosed and treated.

- » “Lost miles” (i.e. no memory of the last few kilometres travelled)
- » Difficulty maintaining a constant speed
- » Reduced eye movement
- » Failure to check mirrors
- » Missing an exit

### Recognizing Symptoms of Fatigue

In addition to the obvious signs of fatigue (such as yawning, drowsiness, and nodding off), your ability to perform physical tasks and/or your ability to think or reason can be impaired. Signs to look for include:

- » Slowed physical & mental reaction
- » Frequent mistakes in otherwise normal tasks
- » Lack of motivation or inability to concentrate
- » Forgetfulness
- » Restlessness
- » Unusual risk-taking
- » Driving errors
- » Involuntary lane changes
- » Delayed braking

### Micro-sleep

It is possible for a person to be asleep for a few seconds and never realize it (micro-sleeps). If you have ever been driving when you were really tired and felt your head jerk, chances are you were just asleep. As soon as you feel any signs of drowsiness, like heavy eyelids, pull over for a nap. It could save your life and the lives of others.

### Fatigue Myths

Fatigue myths are common misconceptions about performance and maintaining alertness. The table below outlines common myths.

MYTH	TRUE OR FALSE?
I can tell when I'm about to fall asleep	False
I'm a safe driver/operator so it doesn't matter if I'm sleepy	False
Alcohol makes me sleepy	True: Alcohol is a depressant, and can actually make you sleepy. It slows down your motor skills that control the way you think, speak, move and react.
I don't need much sleep	False
Being tired leads to mistakes	True
If I open my window while driving I will avoid falling asleep	False
Playing music while driving will prevent me from falling asleep	True: Music is also a good short-term method to stay awake. Nevertheless, it is still possible to have the music playing loudly and still nod off. Singing is a good way to keep awake while listening to music. This also increases the blood flow, and the oxygen levels in the body. Choose your music carefully to maintain alertness but avoid distraction. Do not use music as a substitution for pulling over and taking a nap.
A 20-minute nap on the side of the road may help me stay awake for the remainder of the drive.	True

## Importance of Sleep to Alertness and Safety

Although it varies from person to person, on average eight hours of proper sleep are required each day. Even a small amount of sleep loss – one or two hours per day – can have an effect on a worker. Research that tested a fatigued state from continuous hours of wakefulness against blood alcohol levels concluded that:

- » 17 hours awake is equivalent to a blood alcohol content of 0.05 per cent.
- » 21 hours awake is equivalent to a blood alcohol content of 0.08 per cent (the legal limit in Canada).
- » 24-25 hours awake is equivalent to a blood alcohol content of 0.10 per cent.

Getting enough quality sleep on a regular basis is probably the easiest and most effective cure for fatigue. Here are other strategies:

- » If you are unable to get a full night's rest, get four to five hours of core sleep and supplement with strategically timed naps.
- » Know the timing of your night time and daytime circadian rhythms and compensate for them with naps, coffee or a half-hour break.
- » Plan your trips to optimize rest and performance.
- » Learn to recognize the onset of fatigue and stop to deal with it.
- » Understand how caffeine affects you and use it strategically.
- » Don't take stimulants stronger than caffeine. They mask fatigue but do not get rid of it. When stimulants wear off – often suddenly – fatigue can be deadly.
- » Develop strategies to stay alert for short periods, such as getting to the next rest stop.
- » Discuss unrealistic performance expectations with your supervisor, refuse work if necessary.
- » See a doctor if you have signs of a sleep disorder, such as excessive snoring or waking after a complete sleep without feeling refreshed.
- » Know and follow minimum standards such as hours of service and work rules (see Appendix for more).

## DISCUSSION

- » How can professional drivers better manage fatigue? Do you have any good strategies for getting enough sleep so you can stay alert and drive safely? What are some ways drivers can cope with long stretches of driving yet still be alert and aware of their driving environment?
- » There are many obvious signs of fatigue. For example, yawning, drowsiness and nodding off. What are some other signs of fatigue a professional driver may experience?

## Decision Errors

Decision errors are the largest contributor to crashes involving commercial vehicles. The most common decision errors are:

- » Aggressive driving behaviours (such as following too closely)
- » Illegal driving maneuvers
- » Driving too fast for conditions

## Aggressive Driving

The more aggressive, hostile and competitive you are as a driver, the greater the risk of a crash. “Road rage” incidents, which can result in physical assaults and other criminal acts, stem from aggressive driving behaviour. Aggressive driving behaviour is often associated with crashes and road rage incidents and is a significant risk factor for road fatalities and injuries.

Aggressive driving maneuvers include:

- » Tailgating
- » Weaving in traffic
- » Unsafe passing
- » Road racing
- » Failure to yield or stop
- » Failure to signal

Strong negative or positive emotions can cause even excellent drivers to:

- » Experience dimmed or otherwise impaired observation and reaction times
- » Fail to recognize situations, such as an abrupt slowing of traffic or debris in the road
- » Get to the point that they are unable to predict or to determine what the other drivers around us are doing
- » Execute risky maneuvers and changes, such as cutting across several lanes of traffic to take an off-ramp, suddenly changing lanes, or even driving on the freeway shoulder
- » Lose their ability to perform driving skills that require precise timing or other subtle skills
- » Make a driver feel as though they are detached from other drivers, vehicles, and road conditions
- » Lose patience and become intolerant of other motorists

Here is some advice to help drivers manage their emotions:

- » If you are driving and you are angry or upset, pull over or pull off the road.
- » Put space between you and the driver or situation that caused the stress.
- » Allow extra time to deal with the problems you may encounter. Stress levels are always higher when you're late.

## Sensation Seekers

High sensation seekers tend to take risks because of their need for novelty, sensations and thrills. Sensation seekers are not well suited to be professional drivers due to their risky and erratic driving behaviour in monotonous road environments or boring driving conditions.

Risky driving behaviours include driving while intoxicated, excessive speeding, following too closely, and overtaking when unsafe. Sensation seekers are more likely to underestimate their own vulnerability while driving and overestimate their driving ability. Sensation seekers also choose to drive while under the influence of alcohol more frequently than other drivers.

## Impairment

Professional drivers must report to work fit for duty. To work safely and effectively, a driver needs to be well rested, mentally alert and in good health. It is both a legal and moral requirement to never drive or work while under the influence of alcohol or drugs.

The use of drugs, alcohol, or other substances that could impair your ability to drive and work safely is illegal. This shows respect for yourself, your coworkers, your employer and the public.

## Impaired Driving

Both prescribed and illegal drugs can interfere with your ability to operate a vehicle. These substances may cause drowsiness, slow reaction times, decrease eye-hand co-ordination, impact decision making and hinder your ability to handle a vehicle properly.

Tell your supervisor if you are taking any substance that could affect your driving.

In addition, you must report medical conditions that can impact your ability to work safely to your supervisor. If necessary, your duties will be changed to accommodate your situation.

Cognitive impairments, neurological conditions, and even minor illnesses like a cold and the flu can have a significant impact on your fitness for duty.

### Impaired Driving due to Alcohol Use

Impaired driving is the most frequent criminal cause of death and injury in Canada and a serious offence covered by federal and provincial legislation.

When an officer has reasonable grounds to believe that a driver has committed an impaired offence with a blood alcohol/drug level 0.08 and over, the driver will:

- » Be issued an administrative penalty called the **Immediate Roadside Sanction (IRS) FAIL**.
- » Receive an immediate 15-month driver's licence suspension.
- » Receive a 30-day vehicle seizure.
- » Be issued a \$1,000 fine plus victim surcharge of 20 percent.
- » Be required to complete a mandatory impaired driving education.
- » If a repeat offender, or there is bodily harm or injury, they receive an escalating administrative penalty and will be criminally charged with an impaired offence.
- » A driver can drive again after 3 months if they install an ignition interlock (IIP) device.
- » If a driver chooses not to participate in IIP, they will remain suspended with no ability to drive for the full suspension term.

When an officer has reasonable grounds to believe that a driver has operated a motor vehicle with a blood alcohol/drug concentration of 0.05 mg to 0.079 mg, the driver will:

- » Be issued an administrative penalty called the **IRS WARN**:
  - **1st occurrence:** 3-day immediate driver's licence suspension, 3-day vehicle seizure,

and \$300 fine plus victim fine surcharge of 20 percent.

- **2nd occurrence:** 15-day immediate driver's licence suspension, 7-day vehicle seizure, requirement to complete the Crossroads or Planning Ahead course, and \$600 fine plus victim fine surcharge of 20 percent.
- **3rd occurrence:** 30-day immediate driver's licence suspension, 7-day vehicle seizure, requirement to complete the IMPACT Program, and \$1200 fine plus victim fine surcharge of 20 percent.

For new drivers, regardless of age, with a class 7 learner's license or licensed under the Graduated Driver Licensing (GDL) Program with a blood alcohol/drug level over .00, the driver will:

- » Be issued an administrative penalty under the **IRS ZERO: Novice Program**.
- » Receive an immediate 30-day licence suspension and a 7-day vehicle seizure.
- » Be issued a \$200 fine plus victim surcharge of 20 percent.

Similar to criminal liability for impaired driving, in cases of injury or death, criminal liability can extend to driver negligence related to work direction, safe driving behaviours, vehicle/equipment operation or inspection of equipment.

Alberta Government, Impaired driving penalties, (<https://www.alberta.ca/impaired-driving-penalties>)

## PREVENTABILITY, AND DRIVER FAULT VERSUS DRIVER RESPONSIBILITY

Preventability is the effort to do everything reasonable to avoid a collision. Regardless of fault, most situations allow drivers the opportunity to prevent collisions.

### Driver Fault and Responsibility

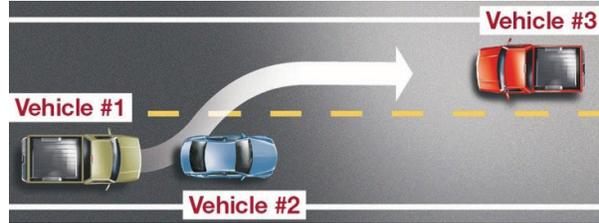
Fault and responsibility are joint concepts. The driver responsible to prevent a collision will generally be deemed at fault in the event of a collision. Fault is generally assigned to the driver whose violation of traffic rules contributes to a collision.

Insurance companies and courts determine fault or shared responsibility based on various laws, policies, and internal review processes.

## SCENARIOS

The following examples illustrate why a particular driver is found at fault in a collision.

### Scenario 1-1:



Vehicle #1 is following Vehicle #2 on a two-lane highway and begins to pass Vehicle #2. The driver of Vehicle #1 saw Vehicle #3 coming in the opposite direction before starting the pass but thought there was enough time and distance. The driver of Vehicle #1 misjudged the time and distance required to safely complete the pass and collided with Vehicle #3 and Vehicle #2.

### Scenario 1-2:



Vehicle #1 is in an urban area and stopped at a red light behind the stop line in the dedicated left turning lane on a two-way multi-lane road. The driver of vehicle #1 wants to make a U-turn and begins to make the U-turn when the priority left turn green arrow flashes. Due to the width of the turn, Vehicle #1 turns into the right lane (closest to the curb). Vehicle #1 collides with Vehicle #2 that is turning right on a red light.



## EXERCISE

1. Fatigue and distraction are considered to be recognition errors. T/F
2. Errors resulting from poor choices are defined as \_\_\_\_\_ errors.
3. List three strategies to manage fatigue.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. According to Federal Hours of Service Regulations, a driver is required to have \_\_\_\_\_ hours off duty each day.
5. Who determines and assigns fault in a collision?  
\_\_\_\_\_  
\_\_\_\_\_
6. Regardless of fault, professional drivers have a responsibility to \_\_\_\_\_ collisions.
7. Who should be notified in the case you are not fit for duty due to medication, illness or other circumstances?  
\_\_\_\_\_  
\_\_\_\_\_

## NOTES

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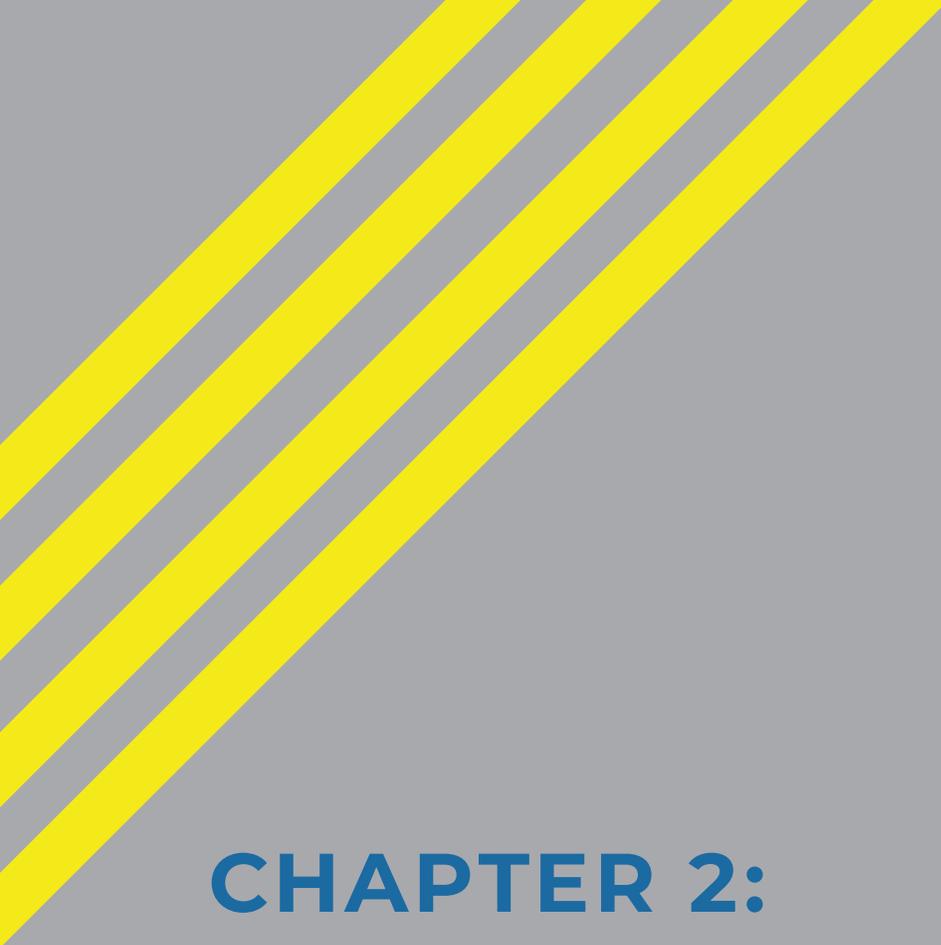
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## **CHAPTER 2:**

# **Driver Skills and Knowledge**



## OUTCOME

To apply defensive driving techniques to anticipate, avoid and react to hazards.



## OBJECTIVES

Upon completion of this chapter, you should be able to:

1. Define defensive driving.
2. Explain methods to anticipate and react to potential hazards.
3. Explain how to use proactive vision habits.
4. Describe basic driving skills.
5. Explain vehicle handling characteristics.

## INTRODUCTION DEFENSIVE DRIVING

Defensive driving is based on the proactive concepts of:

- » Visibility - positioning your vehicle so you can see and be seen
- » Space - surrounding your vehicle with a cushion of space to prevent collisions and maintain an escape route
- » Time - to react and communicate

You must be able to see situations developing and respond accordingly.

Defensive drivers save lives, time and money in spite of the conditions around them and the actions of others. Defensive driving skills must be learned and practiced to build and maintain routine and good habits.

## VISUAL AND CONCENTRATION HABITS FOR DRIVING

Humans are not designed to naturally see and process information at the speed vehicles travel. Knowing this, we must compensate by looking farther into the future and moving our eyes to fully understand what is around us.

### Hazard Recognition and Avoidance

Drivers process hundreds of pieces of information in each minute behind the wheel. You must be able to efficiently determine what is of concern and what is not while simultaneously planning a defense strategy.

### Visibility

A defensive driver scans the driving environment, paying attention to the action zone, seeing zone and planning zone (see Figure 2-1: Zones). Forcing your eyes to landmarks that are far into the horizon and moving your eyes help establish this circle of full awareness. Whether brought on by fatigue or distraction, a fixed stare has the result of blocking critical information from being processed and acted upon. Combined with moving your eyes every couple of seconds and sweeping across your mirrors every 8-12 seconds or so, eye movement expands the effective coverage of your peripheral vision. Even at low speeds, continue to scan the entire area. Many collisions take place while parking and maneuvering at low speeds due to lack of eye movement. A full scan of a parking area will better enable you to position your vehicle for a safe departure rather than taking a space out of convenience that is difficult to exit safely.

### Space

Just as important when parking or positioning vehicles or equipment, if you're surrounded by space 100% of the time, you're in a collision 0% of the time – a simple concept. Adjusting following distance, changing lane position and changing speed establishes the cushion of space around your vehicle while maintaining an escape route. Sometimes it's just as important to occupy a space to make yourself visible as it is to vacate it. As you position yourself to see and be seen, be aware that every other driver has at least the same blind spots that you have. Using your lights, horn and body language to seek and confirm visibility and communication with others is an effective strategy.

### Time

Time will be the successful result of surrounding yourself with space and positioning your vehicle with optimal visibility in mind. Allowing yourself additional commute time will improve your ability to react to the events in your driving environment; thereby resulting in fewer delays and a smoother journey'

### Eye Contact

Communicate with other road users to make sure they see you and know what you are doing. Look for eye contact at intersections and other points of interaction. Use your lights, horn and body language to seek visibility and acknowledgement from pedestrians, cyclists, and drivers.

### Visual Lead-time

Your visual lead-time provides you with time to respond to hazards ahead of you. As you adjust your vehicle's speed to optimize visual lead time, look for:

- » Sight lines and road design
- » Obstructions
- » Moving and parked vehicles
- » Intersections, alleys and driveways
- » Traffic lights and signs
- » Pedestrians
- » Cyclists
- » Animals

The faster we travel, the less information we can absorb because of the greater distance covered in a given time span. Visual lead time can be adjusted by looking farther ahead or reducing speed. By spending most of your time in the Planning Zone, you will have much less to deal with in the Seeing and Action Zones.

- » Action Zone (4-6 seconds ahead)
- » Seeing Zone (12-15 seconds ahead)
- » Planning Zone (30 seconds to the horizon/120 seconds ahead)

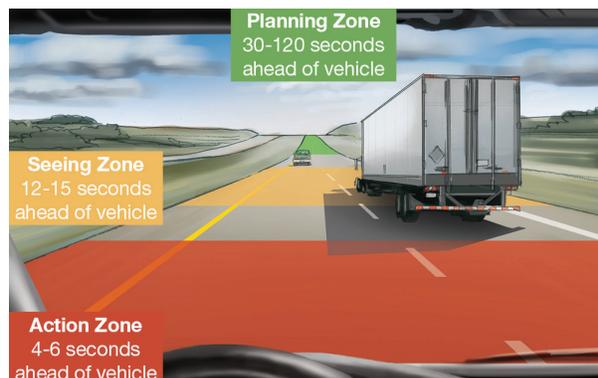


Figure 2-1: Zones

## Lights

Your vehicle's lights provide illumination so you can see and identify the area you're operating in, as well as identify your vehicle to other road users while communicating your intentions.

### Daytime Running Lights

Daytime running lights and headlights that switch on automatically during darkness are not sufficient when traveling in reduced visibility conditions like dust, smoke, fog and rain. Ensure your lights are on so your vehicle is identifiable by other road users.

### Dawn, Dusk and Night

Night driving decreases a driver's ability to see properly due to darkness and difficulty distinguishing objects in low light.

Making sure your headlights and fog lamps are properly aimed and clean is essential to their effectiveness.

During darkness, calculate your visual lead time on the area illuminated by your headlights. Driving at a speed that doesn't allow you to stop in the area illuminated by your headlights is referred to as "overdriving" your headlights. Snow, smoke, rain and fog can reduce this further during darkness. Ensure your speed is appropriate for the visibility conditions.

In situations where you can use high beam headlights, ensure they are dimmed when oncoming traffic is within 300 metres and at 150 metres when approaching a vehicle from behind.



## Communication and Identification

Communication using lights is established in several ways. A flash of the headlights, proper use of signals, horn, hazard lights, brake and tail lights all send a signal to others. Communication with other road users is critical when:

- » Moving away from the curb or parking lane
- » Turning left or right
- » Changing lanes
- » Braking
- » A vehicle is stopped or broken down
- » Reversing

Proper timing makes the use of all these systems more effective.

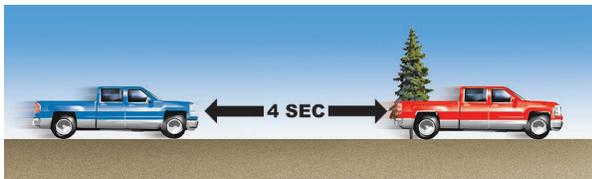
Additional lighting is often used in special circumstances such as emergency vehicles, maintenance equipment, over dimension cargo and escort vehicles. Overhangs and protrusions on cargo may also use lighting, signage and flags to enhance their visibility.

## Following Distance

Following distance is a critical part of the space cushion around your vehicle. Just as you can control your speed and adjust for reduced visibility, following distance must be adjusted according to conditions and the size of your vehicle. While 4 seconds is a safe following distance in most circumstances, as conditions or visibility deteriorate, this must be increased. Consider how a vehicle's size and weight will impact braking. This too must be considered when maintaining a safe following distance. If safe to do so, you might also find situations where you can accelerate to establish space between your vehicle and one behind you. In some cases, you may have to pull off the road to allow vehicles following to pass.

Following a vehicle too closely accounts for almost 30% of non-fatal injury collisions for drivers (Alberta Transportation, Alberta Traffic Collision Statistics, 2021).

When stopped in traffic and at intersections, additional space in front protects you in the event you are struck from behind. Even when parked, additional space or selecting a space that is isolated is good practice.



## Overtaking Another Vehicle

Overtaking safely is the responsibility of the driver of the passing vehicle. High risk or unlawful scenarios for overtaking include:

- » Oncoming two way traffic
- » Hills and curves
- » Reduced visibility
- » When prohibited by markings and signage
- » On unpaved roads
- » At intersections or rail crossings
- » Near school and playground zones
- » Around stopped vehicles

When overtaking parked vehicles, be sure to give extra space. Blind spots around vehicles can hide pedestrians and other hazards. Watch for signs that a vehicle may move or a door may open. For parked vehicles at the roadside or stopped emergency vehicles, give extra space or reduce speed as required by law.



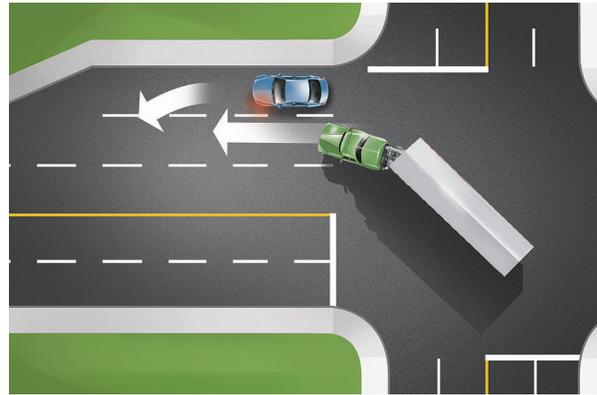
## Intersections

Intersection collisions often involve the transfer of energy through opposing forces. Anticipate and plan for other driver's errors.

- » Check both directions before pulling into an intersection.
- » Be certain all traffic has cleared the intersection before entering and do not enter an intersection unless you are able to clear it completely.
- » Check blind spots for pedestrians and other vulnerable road users.
- » Shoulder check when changing lanes and making turns.
- » Be conscious of other vehicles' blind spots.
- » Anticipate turns and maneuvers of larger vehicles, understanding vehicle dynamics and off-tracking.
- » Monitor cues from other road users that may indicate their next move.
- » At uncontrolled intersections, drivers must yield right of way to the vehicle on their right.
- » At an intersection with stop signs at all corners, you must yield the right-of-way to the first vehicle to come to a complete stop. If two vehicles stop at the same time, the vehicle on the left must yield to the vehicle on the right.
- » Drivers approaching an intersection with a solid yellow traffic light must come to a complete stop before the stop line or crosswalk, unless a point has been reached at the intersection where stopping cannot be done safely.
- » Drivers already in the intersection and facing a yellow light must safely clear the intersection.
- » If there is no stop line or crosswalk, vehicles must stop before the intersection.

The following sections describe various situations related to operating a motor vehicle. Determine fault, responsibility and what could have been done to prevent the situation.

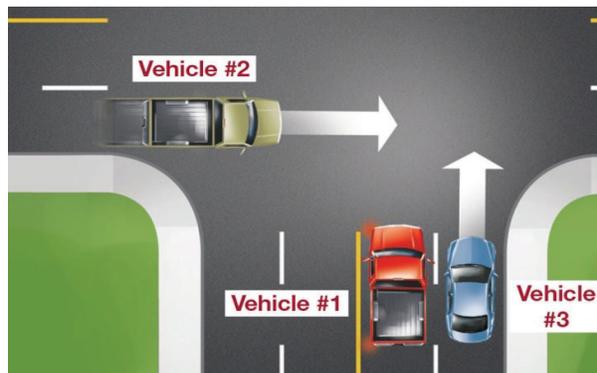
## Left Turns at Intersections Scenario 1



On a two-way multi-lane street the driver of a truck with attached trailer turns on his signal and prepares to turn left at an intersection, and eventually enter the right lane. A car approaches the right lane from a merge and tries to cut-off the truck in the same lane. The car collides with the truck.

**Question:** Who is at fault? Was the other person, who was found not to be at fault, being responsible and prudent for the situation?

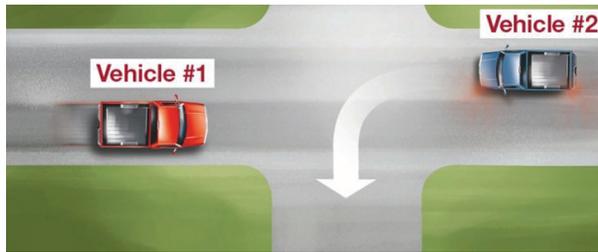
## Scenario 2



Vehicle #1 is driving northbound. The vehicle slows at the intersection to make a left turn. Thinking there is enough time to cross safely, Vehicle #2 proceeds through the intersection. The driver of Vehicle #3 does not see Vehicle #2 and collides with it.

**Question:** Who is at fault? Was the other person, who was found not to be at fault, being responsible and prudent for the situation?

### Uncontrolled Four-Way Intersections Scenario 3



Vehicle #1 is travelling west and approaching an uncontrolled intersection. Vehicle #2 is travelling east and also approaching the intersection. Vehicle #2 turns on its left signal light and turns left at the intersection. Vehicle #1 collides with Vehicle #2.

**Question:** Who is at fault?

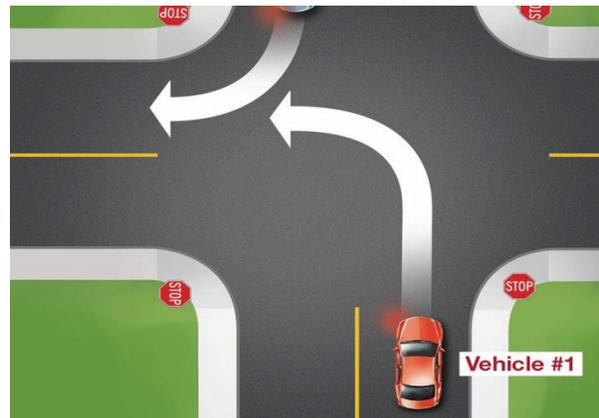
### Uncontrolled 'T' Intersections Scenario 4



Vehicle #2 is travelling northbound and approaches an uncontrolled T intersection with its right turn signal on. Vehicle #1 is travelling eastbound and also approaching the intersection. Vehicle #2 turns right at the intersection. Vehicle #1 collides with Vehicle #2.

**Question:** Who is at fault?

### Controlled Intersections (Stop Sign Violations) Scenario 5



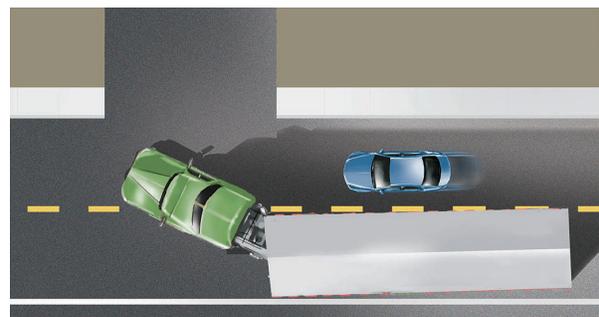
Vehicle #1 is travelling northbound and stops at a four-way stop. Vehicle #2 is travelling southbound and comes to a stop shortly after Vehicle #1. Vehicle #2 enters the intersection after Vehicle #1 has already proceeded into the turn and they collide.

**Question:** Who is at fault? Was the other person, who was found not to be at fault, being responsible and prudent for the situation?

### Scenario 6

A tractor-trailer is travelling on a road with two-way traffic. The driver must make a right turn into an alley. To direct the long vehicle into the narrow opening the driver turns into a portion of the left lane. The driver signals and makes sure it is clear. As the truck is part way through the turn, a car attempts to pass through on the right lane and strikes the right side of the truck.

**Question:** Who is at fault? What is off-tracking and did it contribute to the above example?



## Collision Avoidance

### When a Vehicle is in your Lane

Monitor oncoming traffic and traffic around intersections for cues that they may be entering into your lane or encroaching your space.

Reduce speed and use space to the right to avoid a collision. If necessary, you may have to leave the road.

### When a Collision is Imminent

You may face a situation where you have to choose between:

- » Leaving the road
- » Hitting a fixed object over an oncoming vehicle
- » Colliding at a different angle to reduce the collision forces
- » Hitting a vehicle instead of a person

Your considerations should include:

- » Are there people in the line of fire?
- » Can I minimize injury by striking an object instead of a person? By hitting something stationary instead of a vehicle?
- » Can the passenger compartment of a vehicle be avoided?
- » Can I strike wheels/axles or cargo compartments? These can absorb a great deal of energy in a collision.
- » The terrain: can I leave the road safely? Can the angle or slope be adjusted to minimize harm?

Be mindful of the speed at which you are driving and the size and weight of your vehicle. By increasing your speed and vehicle weight, you will:

- » Increase your vehicle's stopping distance
- » Reduce your control of the vehicle
- » Increase the force of impact in a collision

Other common ways to avoid collisions would be to:

- » Plot an escape route
- » Reduce speed as soon as possible
- » Steer to avoid hazards
- » Communicate your presence to warn other drivers or road users

## Reducing the Impact of a Collision

In many collisions, actions can be taken to reduce the severity of injury and damage to vehicles. Any actions to reduce your vehicle's momentum will reduce the final impact. In some cases, the point of impact or impact angles can be changed to allow collision forces to be absorbed by the vehicle design.

- » Read-end collisions can be changed to corner-on-corner impact to reduce forces.



- » In a side impact (T-bone) collision, direct forces away from passenger compartments to axles and the trunk so suspension and body panels absorb the impact.



- » Head-on collisions can be changed to sideswipe or corner impacts to reduce impact.



## Accidents and Breakdowns

In minor collisions and breakdowns, move the vehicles to a safe area away from traffic to ensure your own safety. If a vehicle cannot be moved, turn off the ignition and use warning flashers and cones or reflectors to warn other traffic. Position warning devices so approaching traffic has adequate time to respond, generally 30 metres in each direction in daylight and 75 metres at night.

In more serious collisions, check the condition of vehicle occupants and administer first aid as necessary.

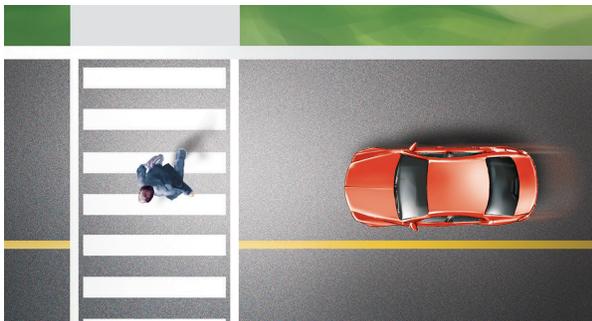
Notify police and stay in a safe area when exchanging information or waiting for emergency services to arrive.

When safe to do so, exchange documentation and information with other motorists, make notes and capture photos that may assist with the investigation. Your employer and law enforcement may ask that you help assemble the details of the incident.

## Pedestrians and Other Vulnerable Road Users

The following sections describe various situations related to operating a motor vehicle. Determine fault, responsibility and what could have been done to prevent the situation.

### Scenario 1



A pedestrian in a marked crosswalk is struck by a car.

**Question:** Who is at fault?

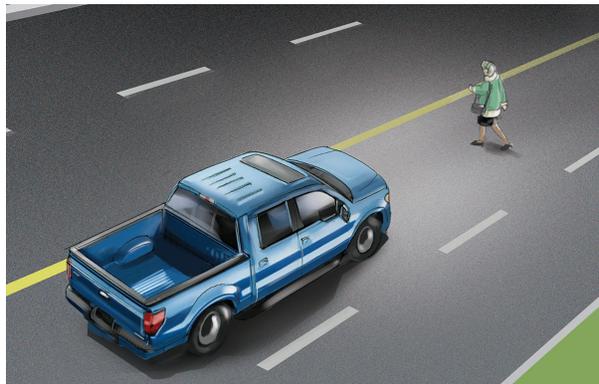
### Scenario 2



A pedestrian walking on the shoulder of a highway is struck by the overhanging portion of an over-dimension load.

**Question:** Who is at fault? Was this preventable?

### Scenario 3



A pedestrian is crossing the road where there is no crosswalk and is struck by a pickup truck.

**Question:** Who is at fault? Was this preventable?

## Matching Speed to Road Conditions

Posted speeds are designed with near ideal conditions in mind. Operating within safe limits requires continual proactive assessments and adjustments by the driver.

With speed playing a role in 24% of collisions, it's no surprise that speed is closely regulated. Likewise, matching speed to conditions is a powerful and effective method of controlling the hazard (Alberta Transportation, Traffic Collision Statistics, 2021).

And remember, driving too fast for conditions is illegal regardless of the posted speed limit.

The most effective methods of speed control are proactive and don't require use of brakes. These include:

- » Reducing speed with the accelerator
- » Downshifting to a lower gear
- » Use of engine brakes

Situations where speed adjustments may be required are:

- » Ascending/descending hills
- » Reduced traction
- » Reduced visibility
- » Adjusting following distance
- » Rugged road conditions or terrain
- » Transitions in the road surface
- » Bridge decks
- » Accommodating the pace of traffic or convoy



## Navigating Curves

Regardless of the type of vehicle, as you carry speed into a curve your steering effort redirects the force through the curve. Centrifugal force is the strong outward pull you feel as you navigate curves at higher speeds – enough speed can throw you off the road if traction is compromised. If you're towing a trailer, it can also cause the trailer to drift outward – the opposite of off-track at low speeds. Maintaining the correct speed for the contour of the road and traction conditions is important.

Enter a curve at a speed that does not require braking, but does allow you to gradually accelerate while in the curve.



## Braking and Accelerating

Regardless of how they are done, speed adjustments require safe execution. When traction is broken, your vehicle's momentum remains, but the vehicle is in a skid because its contact with the road has been reduced or compromised.

Braking is the conversion of kinetic energy (motion) into heat through friction. Your vehicle's traction footprint is the sum of all the tires touching the road. On heavy vehicles, the traction footprint is large and the added weight enhances the tire to road friction. On light vehicles, it is the size of a smartphone and on motorcycles it is as small as the size of a coin.

In emergency braking situations, the key is to stop the vehicle as quickly as possible while keeping the wheels rolling:

- » An Anti-Lock Braking system (ABS) is common on most new vehicles and is only activated under hard braking. The ABS brakes will automatically regulate braking effort to keep the wheels rolling. Drivers with ABS-equipped vehicles can brake as hard as they need to, without losing their ability to steer.
- » To brake in an emergency situation, apply steady and firm pressure to the brake pedal. Look and steer in the direction you want to go. Do not pump or release the brake pedal. (Alberta Transportation, *A Driver's Guide to Operation, Safety, and Licensing*, 2016, p. 76)
- » Conventional brakes require the driver to brake to the threshold of a skid and release slightly if a wheel locks. Continue and repeat as necessary.

### Preventing Skids

A skid usually occurs on a slippery surface where there is not enough traction to keep the tires rolling in the intended direction. You can go into a skid where it is wet or icy, such as on or under bridges, on exit ramps, or in shaded areas. You can also skid if you brake or accelerate too hard or turn too sharply. Most skids occur as a result of driver error, such as:

- » Turning too sharply or at unsafe speeds
- » Braking too hard
- » Accelerating too quickly

In skid situations, the wheels that have lost traction will take the lead. As noted earlier, the vehicle has momentum but is no longer stuck to the road.

### Skid Control

You can control and recover from a skid by using the steering wheel, accelerator, and brakes. Drivers must also understand the traction control systems of their vehicle.

Skid situations will require a quick response and based on the type of skid may include:

- » Removing power (foot off throttle, depress clutch)
- » Shifting to neutral (automatic transmission)
- » Counter steering

In some cases when towing a trailer, accelerating gently to pull the combination straight may be an appropriate response.



### Hydroplaning

Just like skipping a rock on a pond, your tires can lift off the road when they strike standing water. Water in wheel ruts or pooled on the road presents this type of hazard.

When hydroplaning occurs, the tires lose contact with the road surface resulting in a situation similar to a skid. You still have momentum but lack the traction to control it.

Once you reduce speed to regain traction and regain control, the response will be very similar to that of a skid situation.



## Controlling a Vehicle on a Soft Shoulder

Soft shoulder is an unpaved strip of land at the side of the road and are common in off-highway environments; particularly during periods of wet weather and during a thaw. Sharp drop offs on paved roads present similar situations. If you drop off onto a soft shoulder, take the following steps:

1. Grip the steering wheel firmly with both hands.
2. Resist the urge to turn the steering wheel to bring the vehicle back onto the pavement.
3. Ease off the accelerator and let the vehicle slow down.
4. Look well ahead along the intended path of travel (if you are distracted, you may over-steer).
5. Avoid braking firmly, but use gradual pressure on the brake pedal to maintain control of the vehicle.
6. Stop or bring the vehicle to a safe speed to re-enter the roadway.
7. Ensure it is safe before re-entering the roadway

Depending on the nature of the road and type of vehicle, driving off the road might be the only safe option.

## Reversing and Congested Areas

Reversing and low speed incidents represent a large portion of most fleet incidents. Driving in reverse and positioning vehicles is risky, and it is not as commonly practiced as normal driving. There is limited visibility, and it requires drivers to continually scan the area while moving.

To prevent reversing accidents, plan vehicle movements to avoid reversing whenever possible.

To prevent reversing and low speed collisions:

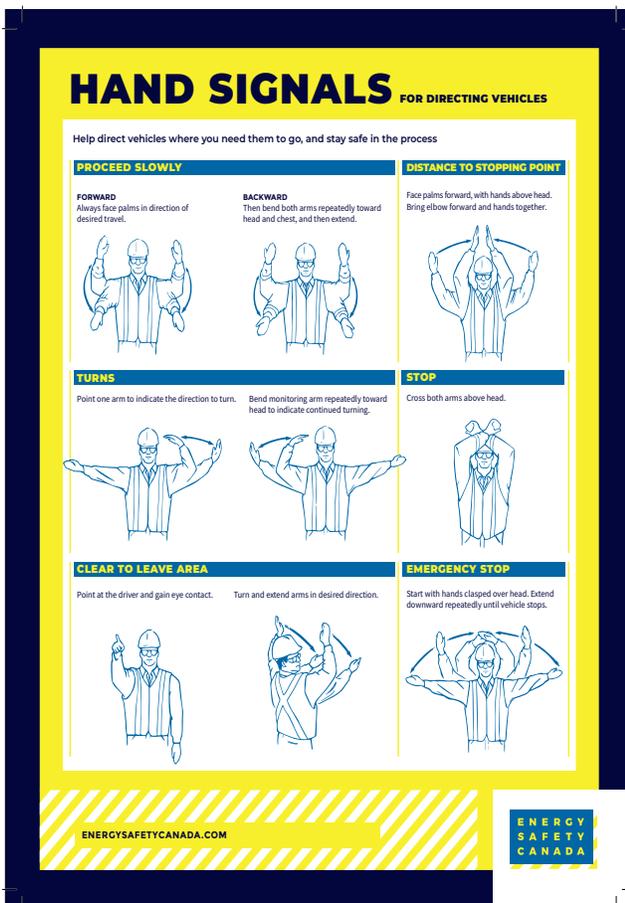
- » Inspect the area for hazards and obstructions.
- » Use a guide if possible.
- » Move at a slow speed, walking pace.
- » Align the vehicle so you can reverse or move in a straight line.
- » Where a complex maneuver is required, break it down into smaller pieces and execute them separately (e.g. reverse up to a trailer then reverse to couple a hitch, reversing into a dark shop bay, etc.).
- » Place a cone or block to use as a visual reference.
- » When reversing with a trailer, try placing your hand at the bottom of the steering wheel to make the trailer action match the steering input.

## Hand Signals for Directing Vehicles

Working around moving equipment poses hazards to workers in the area. This generally results from a lack of clear communication between the driver and a designated guide, especially in congested work areas.

Key points:

- » The driver is responsible for all vehicle movements.
- » Do not permit riders on the vehicle.
- » The guide position should be visible to the driver and have a view of the vehicle path.
- » If the guide is not visible, stop movement until communication is re-established.
- » Don't walk backwards when guiding; this poses a serious slip and fall or pinch point hazard.
- » Wear high-visibility clothing; use additional lighting to enhance signals.
- » Use an understood and clear set of signals.
- » Stop for the emergency stop signal from anyone.



## Trailer and Towing Safety

Towing a trailer requires a high-level of knowledge and skill. All trailers affect the performance of the towing vehicle's acceleration, braking, and maneuverability. Be mindful of the following safety warnings and precautions when driving and going through your pre-trip checklist:

- » Take time to understand the required turning radius and off-track of the unit.
- » Use special care when reversing – low speed and gentle movements are critical.
- » Do not overload the trailer – Overloading can cause serious injury or equipment damage.
- » Do not let tongue weight exceed coupler and hitch rating.
- » Ensure towing vehicle hitch is correct type, size, and rating to match coupler.
- » Follow proper coupling and uncoupling procedures.
- » Ensure safety chains are properly attached.
- » Perform proper inspections to ensure the trailer is road worthy.

## Tire Safety and Performance

The tire footprint is the only contact your vehicle has with the road. Proper tire selection, inspection and maintenance are critical to maintaining control.

Inspection of your tires should include:

- » Suitability for the terrain
- » Tread depth
- » Inflation
- » Wheels and fasteners

In the event a flat or blowout:

1. Grip the steering wheel firmly with both hands and drive straight.
2. Do not touch the brakes.
3. Ease off the accelerator, allowing the vehicle to slow down.
4. Apply the brake with a gentle but steady pressure after the vehicle starts to slow down.
5. Look for a safe place to stop and park, entirely off the road if possible.
6. Turn on the vehicle's four-way hazard warning lights.

Gradually bring the vehicle to a safe stop, understanding that your traction footprint is compromised. It is also very important to understand the individual handling characteristics and safety features of the vehicle you are operating.

### **Tire Chains, Winter Tires and 4-Wheel Drive**

Tire chains are often required as a traction control in muddy or icy conditions.

Tire chains improve traction, control and stopping distances. Conditions and indicators that would indicate the use of tire chains include:

- » Lights or signs directing chains are required
- » Instructions from supervisors or clients
- » Directives on dispatch documentation
- » Well used chain-up areas
- » Visible tire tracks that indicate others have chained up

Don't hesitate to call ahead or ask other drivers for guidance on what to expect in areas you are traveling in.

When installing tire chains, ensure the vehicle is in a safe area and stable. Chains must be sized and installed correctly to prevent damage to suspension and braking components. Once installed, drive at a controlled speed and stop periodically to check the tension and condition of chains.



### **Winter Tires**

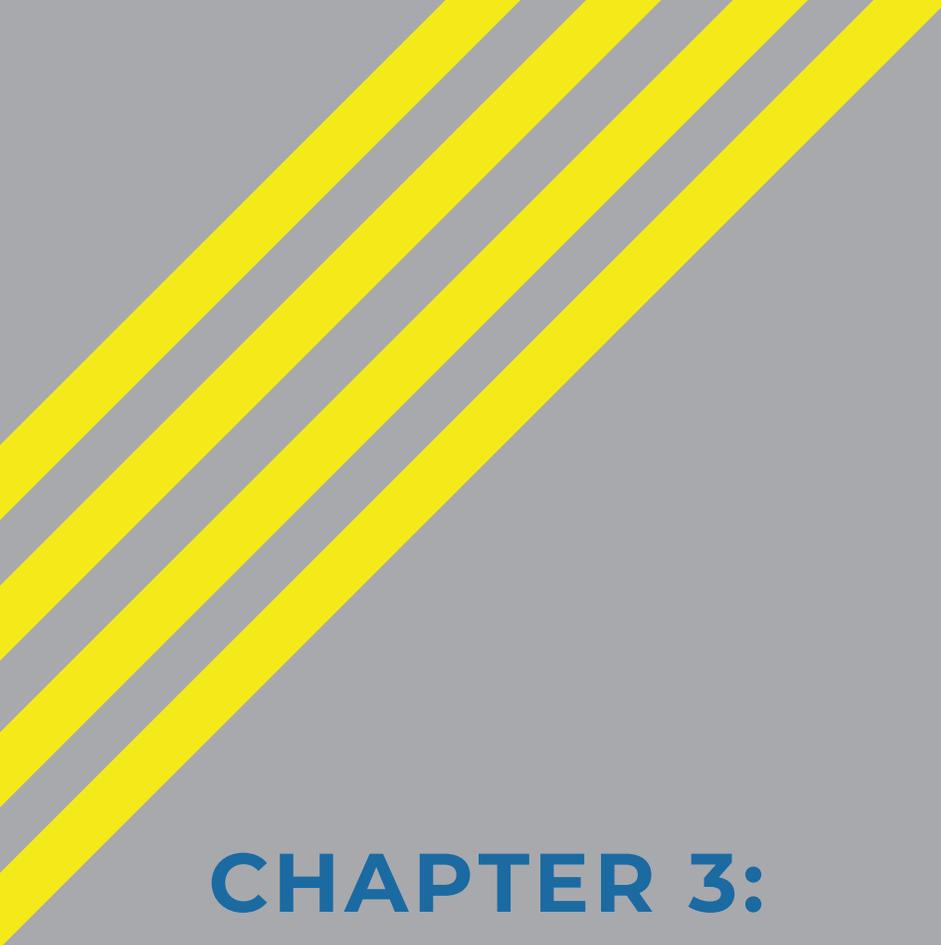
Winter tires are designed to remain flexible in cold conditions and provide a firm grip on ice and snow. Their tread designs improve power transfer and clear snow and slush from the tread grooves. Tire markings identify purpose and design, which will assist with proper selection.

### **All-Wheel Drive (AWD), 4-Wheel Drive (4WD) and Traction Control**

Unlike tire chains and winter tires, AWD and 4WD drive aid traction by providing power to all four wheels. AWD and 4WD are basically the same in that they provide greater traction control but do little to enhance braking. AWD is "always on" and applies torque to each wheel as needed to maintain traction. To preserve momentum, 4WD can be selected while in motion when navigating rugged terrain or towing. Traction control systems utilize systems that sense traction loss and enhance traction or stability by applying braking to wheels that are losing traction.







## **CHAPTER 3:**

# **Driving Environment**



## OUTCOME

Use safe and effective driving techniques in different driving environments.



## OBJECTIVES

Upon completion of this chapter, you should be able to:

1. Describe different types of roads.
2. Explain road conditions that impact driving.
3. Identify hazards specific to off-road driving.

## INTRODUCTION

No matter how well you know a stretch of road, travelling conditions can change depending on what is happening in the environment. The following factors can affect your driving:

- » Type of road
- » Road condition
- » Visibility
- » Natural environment and surroundings
- » Traffic conditions
- » Local environment
- » Construction and other delays

## TYPES OF ROADS

Public and private roads designed for vehicle traffic can sometimes be difficult, even treacherous, to drive on. Almost all road environments can be a challenge at one time or another.

### Paved Roads

Paved roads can undergo significant changes due to precipitation and temperature changes. Frost heaves and potholes are often the result of these changes. Paved roads generally have better traction and visibility and are designed to engineered standards.

In some conditions, like freezing rain, the condition of paved roads can deteriorate quickly.



### Unpaved Roads



Unpaved roads can range from a hard-packed dirt surface to loose gravel or crushed stone. While well-maintained gravel roads maintain good traction in a broad range of conditions, loose gravel presents a skidding hazard when traveling too fast for conditions. To combat skidding, you must drive slower than on paved roads. Various factors can quicken the deterioration of an unpaved road.

### Hazards on Unpaved Roads

- » Loss of traction and control
- » Becoming stuck
- » Reduced visibility due to dust or sight lines
- » Mechanical damage
- » Windshield damage

Driving on loose gravel and dirt roads can be as dangerous as driving on ice. A professional driver anticipates conditions and adjusts speed accordingly.

Extra caution is required when driving on rural or country roads. Rural roads are not designed for efficient high-speed travel like urban roadways. Expect to find:

- » Lack of signs or accurate maps
- » Blind curves
- » Narrow roads
- » No shoulder or guard rails
- » Soft surface
- » Rough or damaged road surface, water, mud, ruts and snow

- » Obstacles on road
- » Unusually steep hills or sharp curves
- » Lack of contour and banking that engineered roads typically have

Drivers need to concentrate more when travelling on an unpaved road. They must carefully control their speed. Speed on unpaved roads must not exceed the posted speed limit or 80 km/h, whichever is lower. In most cases, due to conditions and the situation, the appropriate speed will be significantly less than the posted speed. Drivers must monitor conditions and adjust accordingly.

## Winter Roads

Muskeg roads and ice roads are only used in winter due to special construction and being impassable during other times of the year.

### Muskeg Winter Roads

Muskeg, also known as a bog, is a type of spongy wetland composed of moss and organic material. Temporary winter roads are built on top of muskeg with matting, or with special vehicles that pack the snow and spray the surface with water to form ice.

Muskeg roads can be dangerous due to the slick surfaces and the potential to break through ice into the muskeg. Whether on ice cover or on matting, maintaining traction is a challenge.

Consider the following points before driving on a muskeg road:

- » Always stay within the marked route
- » Drive slowly and never overtake another vehicle
- » Yield to larger loads and use turnouts where available
- » Watch for changing weather and road conditions
- » Avoid soft spots and obstructions
- » Use extra caution when driving onto/off of or traveling on swamp mats

Matting can be very slick, making the transition on and off matting particularly hazardous. Control speed while using appropriate journey management and traction controls in accordance with client requirements.

## Matting

Matting provides a safe, strong and stable working platform over virtually any type of terrain. Mats may be interlocking boards or steel and wood frame structures laid over soft ground or sensitive areas to build temporary roads and well sites. When the job is done, the mats are pulled up. With very little disturbance to the local environment, the area can be quickly and efficiently reclaimed.

Besides protecting environmentally sensitive terrain and increasing access to remote areas, matting also protects workers. Matting increases traction for vehicles and equipment, and supports the heavy loads common in the oil and gas industry. Entire well sites can be built of mats.

## Ice Roads

Ice roads and ice crossings are frozen, man-made structures on the surface of bays, rivers, and lakes. Ice roads allow temporary transportation to areas with no permanent road access.

Ice roads have unique safety hazards - mainly, insufficient ice thickness and reduced traction. To reduce this risk strict attention must be paid to testing the ice. Ice integrity is tested to ensure that it is capable of supporting heavy loads.

Ice is generally unpredictable; its thickness or consistency should never be taken for granted. Air temperature, water currents, snow cover, and traffic volumes can affect ice thickness and consistency.

The deflection of the ice cover and the resulting impact on the water beneath is of particular concern when encountering oncoming traffic or transitioning to land. Space between vehicles and reduced speeds are prescribed controls for these hazards.

Drivers need to know and observe ice road speed limits and traffic rules. They should not follow other vehicles too closely, allowing at least 800 metres between vehicles. Follow client requirements for traction controls, speed/load limits and convoy travel.

Working on ice covers will generally require special training, equipment and orientations from your employer.

## Narrow Roads and Bridges

Narrow roads and bridges are common in the oil and gas industry. Coupled with sharp drops off road edges, shoulders that are unpaved, soft or don't exist, there is little margin for error.

- » Often, narrow roads and bridges only accommodate traffic in a single direction. Using good vision habits to detect signs of approaching vehicles is critical in these situations. Approach these areas carefully to ensure that:
  - There are no other vehicles on the bridge,
  - There are no other vehicles approaching the bridge,
  - Other traffic has stopped to allow safe passage on narrow roads, and
  - Width, height and under clearance is sufficient.

Reduced speed and the use of two-way radios are common controls in these circumstances.

Off-highway bridges often have rough transitions and speed must be monitored to maintain control and prevent damage to both the bridge and your vehicle. These bridges usually cross a creek or river at the bottom of a hill. Control your speed on the descent and onto the bridge deck to prevent bridge and equipment damage.

## ROAD CHARACTERISTICS AND CONDITIONS

If the road surface is wet, snowy, icy, or visibility is reduced by fog or blowing snow, reduce your speed accordingly. Winter driving conditions dictate that you drive even slower than usual because of the longer braking distance needed in these conditions. It is the driver's responsibility to adjust to the prevailing conditions.

The following are some road characteristics and conditions that require special attention when driving.

### Steep Hills

As a professional driver, special care and consideration is required when going up or down steep hills. Traction, speed, braking, and visibility are all important factors when climbing or descending hills.



Controlling the vehicle using momentum, traction, gear selection and speed is a delicate balance.

Maintaining a safe space when climbing or descending hills is important. While climbing hills, sight lines are restricted and you cannot see oncoming hazards. In addition, you must provide enough space for vehicles ascending steep hills to complete the climb. When trucks lose traction or become stopped on a hill, vehicles following behind can be trapped in a dangerous spot.

Proper gear selection when climbing and descending hills is critical to let the vehicle's engine efficiently complete the task, as well as provide resistance when descending a grade. Utilizing this method preserves the vehicle's braking capacity and prevents brake failure due to overheating.

Although off-highway grades are rarely marked, engineered roads provide guidance with grade markings expressed in percent. Grade percentage is the rise/run calculation that is commonly used in roof construction. Eight units of rise per 100 units of run is an 8% grade.



Reduced traction on hills often comes in the form of mud, ice, snow and even washboard that causes vibration serious enough to impact the tire contact with the road. Tire chains and reduced speed are effective controls, but in some cases, tow vehicles and even push equipment is utilized.

## Icy Roads

Icy conditions directly impact your vehicle's traction. Your ability to predict these conditions is important. Simple methods of predicting these include assessing weather conditions and reports, checking traffic maps or cameras and evaluating the hazards as part of your journey management plan.



During travel, ongoing assessments can be conducted by monitoring temperatures, sun/shade conditions, precipitation, elevation and even monitoring the road spray off of other vehicles. Pay close attention to walking conditions when you're outside the vehicle; this is a good hint as to the condition of the road surface. Black ice often appears as a road surface that appears wet but is actually frozen.

Controls include proper tire selection, speed control, added distance for following and stopping, traction controls and trip scheduling. Testing braking and acceleration conditions prior to critical maneuvers and while starting out is another method of gathering intelligence for your hazard assessment.

## Snowy Roads

While packed snow conditions are very similar to ice covered roads, deep, falling and loose snow present other hazards.

Snow-covered roads may be hiding icy conditions beneath and travel will stir up clouds of snow, reducing visibility.



In very deep snow conditions, traction and vehicle handling is a concern. Deep snow can impact your vehicle's systems by icing up brakes, air brake systems, engine air intakes, suspension components and even steering or shift linkage, causing interference with your vehicle's safe operation. Blowing snow also bridges up and becomes lodged on your vehicle's head and tail lights, licence plates, and even on top of cargo, decks and inside of the vehicle's chassis, creating hazards when pieces dislodge and fall from the vehicle.

Controls for the above include periodic stops to clear snow and ice accumulation, speed and following distance control and testing the brakes to warm them and dry them off after navigating areas with deep snow.

## Muddy Roads

Muddy debris on paved roads is common in rural areas. Additionally, unpaved roads and resource roads can become very muddy during thaws and wet conditions. Traction and handling affected by deep ruts, standing water and heavy accumulation of mud in vehicle components can become hazardous for safe vehicle operation.

Traction controls already discussed provide control in these conditions, with additional help available in the form of towing equipment or even rugged off-road equipment called into service. Likewise, additional time and space will create the necessary cushion around your vehicle to safely navigate these conditions.

Use caution when operating in deep mud. Buried obstructions and the forces of pushing heavy mud can cause vehicle damage. Mud and debris also accumulates in the vehicle's chassis, on deck surfaces and cargo. Stop after traveling in these conditions to check your vehicle's condition and clear away debris that will interfere with safe operation or become dislodged while driving.

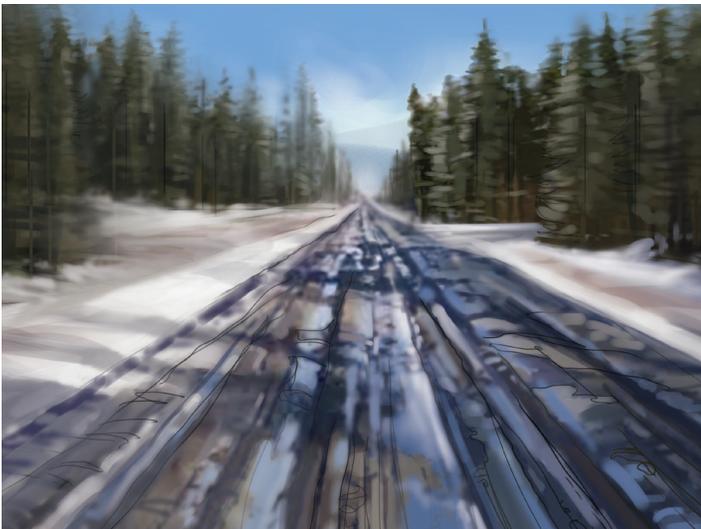
## Wet Roads

Wet road conditions immediately impact traction, resulting in increased stopping distances and compromised vehicle handling. These grey, misty conditions often reduce visibility, making other road users difficult to see. The resulting road spray can add to the visibility challenges. High humidity can cause condensation to form on windows and contaminants on the road surface can make very slick conditions when rain begins to fall.



Common controls include:

- » Keeping your windshield clean and wipers in good condition,
- » Using your headlights and tail lights,
- » Checking and use your vehicle's defroster to keep windows clear,
- » Leaving additional following distance to compensate for longer stopping distances,
- » Reducing speed,
- » Watching for pooling water or standing water in wheel ruts, and
- » Monitoring the travel area for flooding, soft shoulders or washouts.



## Washboard



Washboard is typically found where power is applied to the unpaved road surface through acceleration or braking. In extreme cases, even paved roads can experience washboard. Hills, curves, intersections, up and down hills and transitions in the road surface are the most common areas. This repeated wear causes a rippled effect that becomes worse as vehicles travel over the washboard surface. Traveling over washboard can shake your vehicle and load violently, causing loss of traction, compromised handling, vehicle damage and cargo shifting. In these conditions:

- » Reduce to a safe speed,
- » Add traction controls as necessary, and
- » Stop periodically to check the security of your vehicle and cargo.

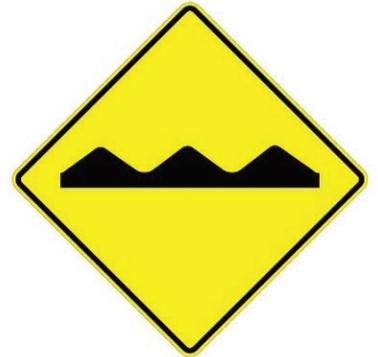
## Washouts



Isolated areas often don't have regular road maintenance that monitors for washouts. When traveling in these areas during or after heavy rains or runoff, watch for signs of washouts. These include slide areas off the edge of road surfaces, damage around culverts and bridges and erosion. Washout areas are sometimes hidden by paved surfaces that have had soil and structure washed out from beneath them.

## Frost Heaves

Frost heaves or hummocks are the result of freeze/thaw cycles. These heaves in the road surface are often marked by maintenance crews; particularly in areas prone to experiencing them. They can also be detected by watching for visual cues as other traffic travels over them.



As frost heaves can throw your vehicle out of control and cause damage, speed must be reduced to maintain control.

## Potholes



Potholes are created during freeze and thaw cycles and can cause wheel and suspension damage. Avoid potholes by looking well ahead, controlling speed and steering around the hazard.

## Blind Corners



Many roads have many blind corners. When approaching blind corners, be prepared to meet large vehicles or even vehicles stopped on the road. Signs of approaching vehicles include headlight illumination reflecting off other objects, dust clouds, tracks and noise.

## Ruts



Ruts in paved and unpaved roads are the result of heavy traffic. Ruts can hold water, creating the risk of hydroplane. Deep ruts in road surfaces and off-road situations can impact vehicle control and cause damage.

Reduce speed and carefully select a path that will minimize the impact of ruts as you drive.

## Uncontrolled Railway Crossings

Many off-highway railway crossings are uncontrolled. This means they have no lights, bells, or other signals. Trains need a very long distance to stop. Always yield to a train!



Trains normally sound their horn when approaching a crossing; look both ways for oncoming trains at crossings. In locations where visibility is obscured by vegetation or other objects, it may be necessary to stop and check for oncoming trains. Watch for signs indicating multiple tracks and understand the correct actions and escape route should your vehicle ever be disabled while on the tracks. Keep in mind that buses and many commercial vehicles are required to stop at all railway crossings.

Other indicators include:

- Tracks
- Open water
- Forest or woods close to the road
- Time of day (dawn/dusk)
- Seasonal influences (hibernation, mating, hunting)
- Visible wildlife - if you see one, there are more

## Wildlife



Collisions between wildlife and vehicles are a serious problem in North America. Every year, these collisions:

- » Cause serious injuries and fatalities
- » Cost millions of dollars in damages and insurance claims
- » Injure and kill wildlife

### ATTENTION

Animal-vehicle collisions are a significant safety concern and in 2020, they accounted for 60% of all reported collisions on Alberta's rural highways. (AB Wildlife Watch, An animal-vehicle safety program, AB Government, Oct 26, 2023)

### ATTENTION

The highest risk period for wildlife collisions is October through January, between 7 p.m. and 11 p.m. (AMA Wildlife Road Safety Tips, 2024 Alberta Motor Association).

Reducing speed, planning travel times and looking well ahead for indicators are all effective controls. In an animal collision, reduce speed and attempt avoidance while keeping your vehicle under control. You may be able to aim where the animal came from rather than where it is going while making a glancing impact.



## Construction Zones

The speed limit in construction zones must be obeyed at all times, even when people and equipment are not working. Watch for hazards like bumps, fresh oil, and loose gravel while driving through a construction zone.

Ensure you obey the flag person's signal and be prepared to slow down and stop. Collisions and injuries in construction zones are common due to inattention, congestion and excessive speed. Higher fines are in place to discourage speeding in construction zones.

Watch for signage that indicates high wildlife activity.

## Off-Road Driving



The nature of the oil and gas industry often requires off-road operation of vehicles. In these environments, we encounter both wildlife in their natural habitat as well as other industrial and recreational road users.

Off-road operation requires thoughtful consideration and control over hazards that may impact safe navigation of the terrain and the well-being of the environment.

Hazards related to these operations are aggravated by other factors, including:

- » Working alone
- » Distance from help
- » Lack of services and maintenance
- » Limited communication
- » Rugged terrain

One of the main controls related to traveling off-road is operating within the vehicle's dynamic capability. The delicate balance of maintaining vehicle control and using momentum to your advantage at the same time requires a high level of skill. It is important that you operate your vehicle within your capabilities.

## Environmentally Sensitive Areas

The oil and gas industry requires travel through a broad variety of sensitive environments. Areas with sensitive environments will require special controls including:

- » Curfews related to freeze thaw or wildlife migration
- » Identified travel areas to protect vegetation
- » Permits and inspections
- » Journey management provisions
- » Specific fuelling procedures
- » Spill mitigation and response

## Pipeline Rights-of-Way



Rights-of-way under construction and in normal operation present hazards including:

- » Personnel and equipment
- » Open excavations
- » Stored materials
- » Unstable ground and slopes
- » Backfilled areas
- » Obstructions overhead and beneath, including buried infrastructure and power lines
- » Vegetation, roots, rocks and stumps
- » Wildlife

## Cut Lines



Whether for access or fire breaks, cut lines present unique hazards including:

- » Hunters and trappers
- » Wildlife
- » Vegetation, roots, rocks and stumps
- » Excavations, ruts and uneven ground
- » Risers
- » Expansion loops on pipelines

## Power Lines



Power line incidents are of serious concern in the oil and gas industry, yet there are several popular beliefs about power lines that are simply incorrect.

For example:

**Myth:** Overhead power lines don't carry enough power to hurt you.

**Fact:** Overhead power lines can carry voltages ranging from 120 volts to over 700,000 volts. When electricity enters our body the electric current heats up and burns body tissues.

**Myth:** Overhead power lines are well-insulated and cannot harm you.

**Fact:** Overhead power lines are not insulated. Any covering you see on a power line is usually for weather protection, not insulation. If you touch a power line, whether covered or bare, you could be seriously injured or die.

All contact with power lines must be reported.

To prevent injury, death and property damage, hazard assessments for work around overhead and buried power lines must consider:

- » Location and height/depth of power lines
- » Vehicle/cargo height and required turning radius
- » Ground conditions around buried infrastructure
- » Adequate hazard controls

Controls include:

- » Conducting work away from power lines
- » Notifying utility when work is planned close to lines
- » Understanding and following the rules for safe limits of approach around lines
- » Limiting work around power lines to daytime hours whenever possible
- » Assigning a guide or monitor to watch from alternate positions as equipment approaches a power line
- » Placing warning signs, flags or structures to make the hazards more visible
- » Using care when raising or lowering cranes, pickers or gin poles to ensure there is no contact with overhead power lines
- » Maintaining limits of approach

If you survive contact with a power line while operating a vehicle, remain in your seat. Do not get out of your vehicle.

## Private and Public Property

Many tasks and jobs require travel through privately held or public property. These areas include:

- » Farm and rangeland
- » Private resource roads
- » Forested areas
- » Mills, plants and refineries
- » Military bases
- » Rural settlements
- » First Nation settlements

Controls for work in these areas often include gates, check in processes, seasonal or time curfews, orientations, work permits, speed limits, dust control and marked routes. Be sure you close gates that you open and use caution crossing Texas gates.

To prevent fires, check your vehicle at stops to be sure hot surfaces on your vehicle are not in contact with crops or vegetation.

## Side Hills



Navigating side hills presents a significant rollover hazard. The potential for rollover is influenced by:

- » Vehicle centre of gravity
  - Higher vehicles/cargo
  - Fluid loads/fuel tanks
  - Modified suspension
- » Approach angle vs. grade of the slope
  - The straighter the approach angle the better
- » The stability of the side hill
  - Soil structure and composition
  - Type and amount of vegetative cover
  - Moisture content
  - Slope of the hill

Controls include:

- » Roll-over protective structures
- » Traction aids (4-wheel drive, tire chains)
- » Controlled speed
- » Use of seat belts
- » Secured cargo
- » Secured items in the operator compartment

## Rivers

In some circumstances, you may be required to cross a river or stream. This requires a hazard assessment and proper regulatory notification.

When crossing rivers or streams, consider the depth of the water and inspect the crossing for hidden obstructions. While axle-deep water is generally safe, during periods of precipitation or thawing, water levels can rise quickly, making a return crossing more dangerous. Crossing slowly reduces the potential to stall your vehicle in the water. Avoid working alone in these situations.

After fording a river or stream, test and ride the brakes to create heat that will dry friction surfaces, ensuring safe operation.

## Visibility

Driving in poor visibility requires that you slow down and match your speed to the distance that you can effectively see in front of you. To make your vehicle easier to see, drive with your headlights and taillights on.



Seating height in a heavy vehicle sometimes offers a better perspective but can also lead one to misread the road conditions. Reduced visibility conditions are not all the same, but how we deal with them usually is. Reduced visibility caused by white-out snow, fog or smoke from fires is often static and does not change. Other conditions, like dust or snow clouds stirred up by traffic, usually pass in a short period of time. Add darkness to these conditions and the circumstances usually get worse.

Controls for these conditions include:

- » Keeping mirrors, lights, reflectors and windows clear.
- » Using low-beam headlights and fog lights if available.
- » Reducing speed and staying to the right when encountering oncoming traffic.



- » Looking for road contour and reference marks to help maintain a line when you lose visibility.
- » Not overtaking other vehicles until it is completely safe to do so.
- » Increasing following distances, monitoring trailing edges of dust clouds and calculating safe following distances (remain at least 4 seconds from the trailing edge of the dust cloud).

If you must leave the road, find an area safely off the road, but keep in mind that in these conditions lights on parked vehicles may be seen as traffic by other road users. Be patient with other road users; everyone has a slightly different perspective on how bad the conditions actually are. Rushing or pressuring others to speed up will likely result in an incident.

## Traffic Conditions

The amount and flow of traffic provides its own challenges and potential hazards. Here are some traffic conditions you may encounter:

### Slow Moving Vehicles



Slow moving vehicles can be a traffic hazard since they go much slower than the normal pace of traffic. They include oilfield service units, farm vehicles, road construction equipment, or oversized loads. A dangerous situation can develop if:

- » Slow moving vehicles are not clearly identified.
- » Slow moving vehicles make unexpected maneuvers.
- » Drivers misjudge how quickly they are approaching slow moving vehicles.
- » Drivers are tempted to overtake slow moving vehicles

Give slow moving vehicles plenty of space until you can safely overtake them.

### Escort Vehicles



Escort vehicles are part of a team doing the important job of safely moving over-dimensional loads. Escort vehicle drivers provide additional warning, visibility and control in the space around an over-dimension vehicle.

When you encounter an escort vehicle or over-dimension load, give plenty of space. Pilot vehicles are generally 300-1000 metres ahead of the over-dimension load with trail vehicles about 100-300 metres behind. Special lights and signage identify these vehicles.

Watch for directions and signals as they escort the over-dimension load. Escort vehicles will regularly stop traffic, block lanes and position themselves to protect the public and provide the necessary space for over-dimension loads to maneuver.

## Convoys



Convoy travel enables a fleet of equipment to travel together and depart/arrive in sequential order, verifying everyone arrives safely. Convoy travel requires:

- » A hazard assessment, communication and controls
- » Proper route assessment
- » Consideration for the impact the convoy will have on other traffic
- » Adherence to the agreed controls
  - Safe following distances
  - Your place in the convoy
  - Avoiding unnecessarily overtaking another vehicle
  - Allowing other traffic to safely pass

Be aware of regulatory restrictions and requirements for convoy travel before you depart.

When you encounter a convoy, give plenty of space and following distance. Even when space permits, you should avoid overtaking a convoy.

## Off-Road Vehicles

In rural areas, it is not uncommon that you will encounter workers and outdoor enthusiasts on everything from off-road vehicles and snowmobiles to horseback. You may encounter these individuals crossing roadways and areas we work. Often they are preoccupied with other activities and are not watching out for others. Use extra caution and look for cues that they are present while you slow down and give them plenty of space.

## Local Environments

Some sections of roads have specific speed and travel restrictions in defined geographic areas. It speaks to the industry when drivers are respectful and courteous when driving through these localized driving environments.

## School and Playground Zones



Although people are unpredictable, school and playground zones are not. They are well identified and we can expect children and related traffic to be abundant.

The following are school and playground zone safety tips for motorists:

- » Reduce speed and don't overtake other vehicles; blind areas are particularly hazardous as they restrict visibility and sight lines for children.
- » A child's peripheral vision is about one-third narrower than that of an adult. As a result, children cannot see a motorist approaching from the right or left as quickly as an adult.
- » Children have difficulty judging a car's speed and distance. They often think that if they can see the driver, then the driver can see them.
- » Know the speed limits and when they are in effect for school and playground zones even in rural or isolated areas.

## **Restricted Roads and Road Bans**

Heavy precipitation and thaw periods regularly result in weight restrictions to protect both public and private road infrastructure. While these are often weight restrictions, expressed in percentage of primary axle weights, they may also be time or size curfews that move traffic while ground is frozen at night or during periods of low traffic.

Provinces, municipalities and prime contractors use electronic notifications and signage to ensure industry is aware of where and when these restrictions are in effect.

You must understand how these road restrictions will affect you and ensure road restrictions are part of your journey management plan.

## **Residential Areas**

Our work often requires that we travel in close proximity to where people live. Our activity in these areas is closely scrutinized because it has a direct and immediate impact on residents' quality of life.

These areas might be urban or rural and include First Nation reserves, colonies and other settlements. Whatever the case, follow all rules, restrictions and use courtesy.

Restrictions often include speed limits, curfews, dust and noise controls.



## EXERCISE

1. What is the best reaction to driving in smoke and fog?

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2. List 3 hazards common while driving off-road.

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3. Explain how to calculate following distance in dusty conditions.

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4. What are two hazards associated with soft shoulders?

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5. List two types of road surfaces commonly found in the oil and gas industry, and identify two hazards commonly associated with each.

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## NOTES

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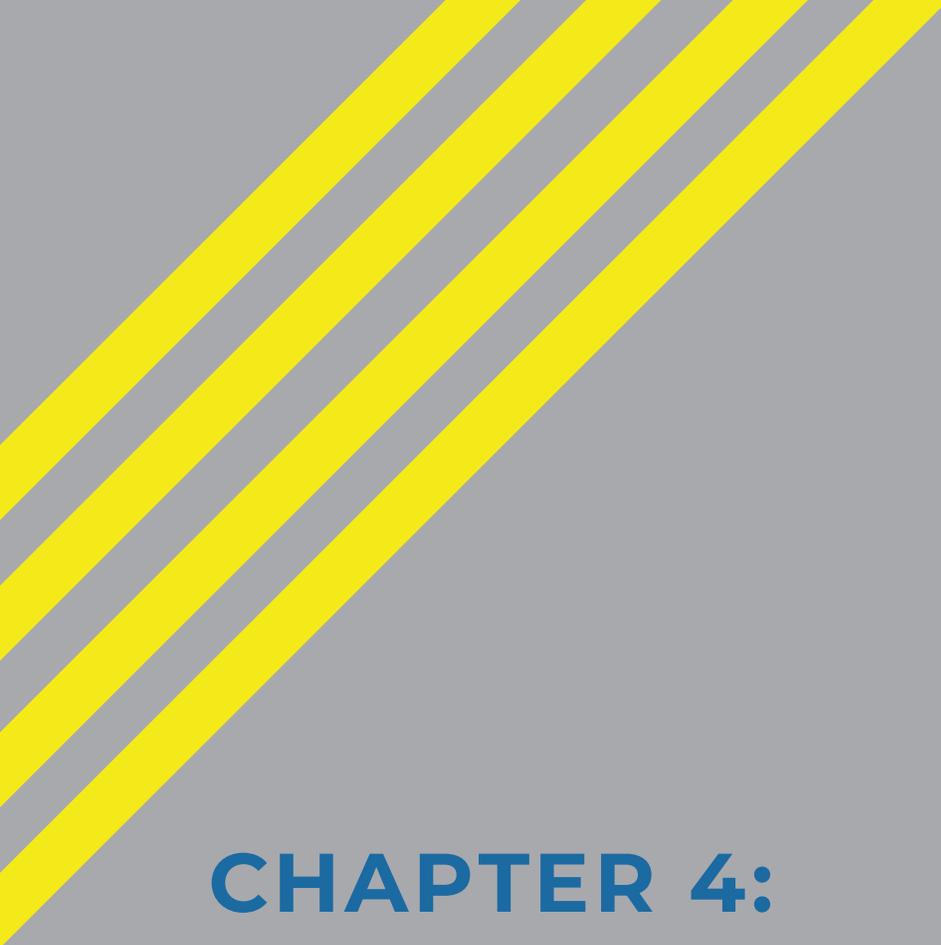
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## **CHAPTER 4:**

# **Non-Driving Skills**



## OUTCOME

Utilize appropriate management strategies when undertaking a journey.



## OBJECTIVES

Upon completion of this chapter, you should be able to:

1. Identify and describe the non-driving skills necessary in the role of a professional oilfield driver.
2. Outline the controls to hazards commonly encountered in the oil and gas industry.

## INTRODUCTION

Non-driving skills for oilfield drivers include administrative tasks such as trip planning, securing cargo, and completing vehicle inspections. Many injuries sustained by drivers are directly related to non-driving tasks. Identifying, prioritizing and controlling hazards while doing these tasks efficiently is an important part of your job.

Hazard assessments help to prevent injury, illness, death and property loss. They help people identify worksite hazards and keep everyone safe. It is your responsibility to take reasonable care to protect your own health and safety, and the health and safety of other people at the worksite.

The oil and gas industry has a social and moral responsibility as well as regulatory and reputational commitment to:

- » Clients
- » Employers
- » Workers and their families
- » Regulators
- » The public

Each person must understand their rights and responsibilities as they relate to working alone and refusing unsafe work.

## HAZARD ASSESSMENTS

A hazard is any situation, condition or object that has the potential to cause injury, illness, death or property loss. In other words, a hazard is an accident waiting to happen.

A hazard assessment is the process used to identify and evaluate hazards in the workplace. Control measures can then be put in place to reduce the risk of exposure.

### Why are Hazard Assessments Important?

Hazard assessments help to prevent injury, illness, death, and property loss. They help people identify and understand worksite hazards and keep everyone safe. It is your responsibility to take reasonable care to protect your health and safety and the health and safety of others at the worksite.

### Who is Responsible for Hazard Assessments?

The simple answer to that question is you. All drivers should continually assess for hazards while at work.

Employers are responsible for:

- » Identifying hazards and explaining how hazards are controlled;
- » Ensuring workers have the necessary qualifications to perform their roles safely;
- » Providing required personal protective equipment (PPE); and
- » Investigating injuries and near misses.

Workers are responsible for:

- » Following all job-related health and safety procedures;
- » Asking for training if they do not know how to do something safely;
- » Using all required personal protective equipment (PPE);
- » Immediately reporting unsafe conditions;
- » Informing their supervisor if they have a physical, mental or emotional issue that could affect their ability to work safely; and
- » Refusing work that is unsafe to perform.

Accidents, injuries, and property loss can happen to any worker, new or seasoned. New workers may not recognize hazards because they lack experience. Seasoned workers may not recognize hazards because they have come to think of them as a normal part of the job.

### When is a Hazard Assessment Required?

Hazard assessments are necessary in the following situations:

- » Before starting work
- » At practicable intervals during work
- » When there is a change to the work process or worksite
- » When a new work process is introduced

## CONDUCTING A HAZARD ASSESSMENT

Hazard assessments consist of four steps:

1. Identify the hazards.
2. Evaluate the risk of exposure to the hazards.
3. Apply control measures to reduce the risk of exposure.
4. Monitor the effectiveness of the control measures.

## Hazard Sources

There are four sources of hazards:

### People

People's actions may create a hazard. Their actions may be due to a lack of training, poor communication or other factors.

### Equipment

All of the tools, machines and systems that people come into contact with at a worksite. Examples range from hand tools and PPE to mud pumps and flare systems. Some equipment is inherently hazardous. Other equipment may become hazardous over time due to inadequate maintenance, storage or disposal.

### Materials

All types of cargo or any chemical substance you may come into contact with.

### Environment

The environment you drive in and the worksite itself may also present hazards due to layout, ventilation, lighting, temperature, walking surfaces and similar concerns. The environment may cause hazardous gases to be released, present dangerous conditions due to severe weather, or be infused with biological hazards such as molds and fungi.

## Scenario

The driver of a 1-ton pickup towing a trailer is outside the vehicle guiding a forklift operator loading a skid of drilling mud into position on the deck. The forklift has faulty brakes and the forklift operator is inexperienced. The ground is icy around the pickup and trailer.

HAZARD SOURCE	HAZARDS
People	
Equipment	
Material	
Environment	

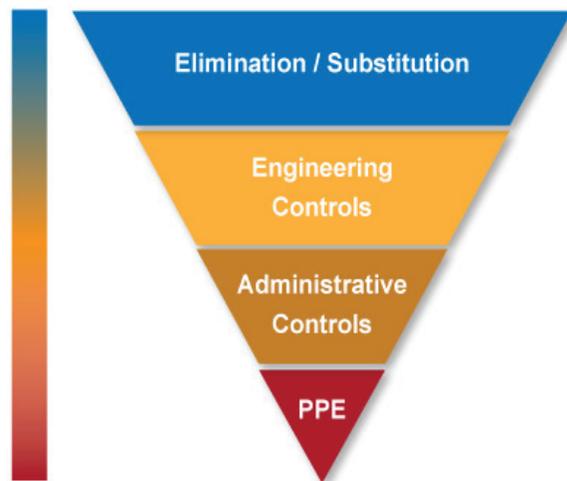
## CONTROL MEASURES

The method of control selected should be based on the following hierarchy:

- » Elimination or substitution
- » Engineering controls
- » Administrative controls
- » Personal protective equipment (PPE)

If the hazard cannot be adequately controlled by a single method, a combination of methods may be required.

Most effective



Least effective

Figure 4.2  
Hierarchy of  
Hazard Controls

## Elimination or Substitution

First, try to eliminate the hazard completely or substitute it with a safer alternative.

Examples of elimination or substitution include:

- » Automating the process to reduce the need for people being present;
- » Lowering equipment to the ground to avoid the risk of falls;
- » Switching from a toxic to a non-toxic chemical; and
- » Replacing a light fixture with a skylight.

## Engineering Controls

If it is not possible to eliminate or substitute the hazard with a safer alternative, engineering controls should be considered.

Engineering controls involve installing or modifying facilities and equipment in order to control the hazard at its source. This is typically done during the design of a worksite or process. Although workers may not be directly involved in engineering controls, it is important they understand them.

**NOTE:** As a worker you may not create the engineering solution, but you are responsible for ensuring the engineering controls are working properly and reporting any concerns to your supervisor.

Examples of engineering controls include:

- » Guards on tools and equipment;
- » Pressure regulators;
- » Closed handling systems;
- » Mechanical ventilation systems;
- » Backup equipment for high-risk processes; and
- » Systems that automatically lock out or disable equipment

## Administrative Controls

Administrative controls focus on the work process and the worker. They control the hazard by managing how the work is performed and are often used in conjunction with other types of controls.

Administrative controls include the following:

- » Company policies
- » Safe work processes
- » Training
- » Work rotation
- » Signage

## Personal Protective Equipment (PPE)

PPE is the last line of defence. It is used when other controls are not possible or additional protection is needed. It is important to remember that PPE does not remove the hazard; it only inserts a barrier between the worker and the hazard. Workers must be trained in the proper usage, maintenance, and storage of their PPE. They must also use the right type of PPE for the task and environment, make sure the PPE fits properly, and be comfortable using the PPE under working conditions.

## Selecting Hazard Control Methods

Activity: Determine the best control method or combination of methods for controlling the risk of exposure to the hazards associated with the following scenarios.

HAZARD (SCENARIO)	CONTROL METHOD	SHORT DESCRIPTION OF CONTROLS
<p><b>1.</b></p> <p>Traveling to a client's location on a gravel road.</p>	<input type="checkbox"/> Elimination/Substitution <input type="checkbox"/> Engineering Controls <input type="checkbox"/> Administrative Controls <input type="checkbox"/> PPE	
<p><b>2.</b></p> <p>Working alone in an isolated area.</p>	<input type="checkbox"/> Elimination/Substitution <input type="checkbox"/> Engineering Controls <input type="checkbox"/> Administrative Controls <input type="checkbox"/> PPE	
<p><b>3.</b></p> <p>Securing cargo in the back of a pickup bed.</p>	<input type="checkbox"/> Elimination/Substitution <input type="checkbox"/> Engineering Controls <input type="checkbox"/> Administrative Controls <input type="checkbox"/> PPE	
<p><b>4.</b></p> <p>Climbing a storage tank to take a fluid sample.</p>	<input type="checkbox"/> Elimination/Substitution <input type="checkbox"/> Engineering Controls <input type="checkbox"/> Administrative Controls <input type="checkbox"/> PPE	
<p><b>5.</b></p> <p>Recovering a stuck vehicle from a ditch with a recovery strap.</p>	<input type="checkbox"/> Elimination/Substitution <input type="checkbox"/> Engineering Controls <input type="checkbox"/> Administrative Controls <input type="checkbox"/> PPE	
<p><b>6.</b></p> <p>Navigating a steep side hill in a pickup truck.</p>	<input type="checkbox"/> Elimination/Substitution <input type="checkbox"/> Engineering Controls <input type="checkbox"/> Administrative Controls <input type="checkbox"/> PPE	

## COMMUNICATION

Communication systems may consist of:

- » Two-way radios
- » Cell phones
- » Check-in processes
- » Satellite or GPS systems

Regardless of the communication method, ensure it is functioning properly and will work in the area you are working.

Communications and Emergency Support

- » Will the provided communication devices work properly in these areas?
- » Where is the nearest assistance?
- » Is there an emergency response plan (ERP)?

## Emergency Response Plan (ERP)

An 'emergency' means any situation of a serious nature, developing suddenly and unexpectedly, and demanding immediate attention. Emergencies on the road can include a collision, a vehicle breakdown, or a severe storm. They may also include commercial vehicle emergencies such as a spill or a leak that occurs during the transport of dangerous goods.

An emergency response plan protects people, property and the environment in the event of an incident. The following are critical points to remember in case of an emergency:

- » If your vehicle is broken down, do not leave the vehicle. Call for help and remain where you are.
- » Refer to the ERP for a list of emergency phone numbers in your area.
- » Know where you are so your location can be relayed to others.
- » Your ERP should contain your destination, route and estimated time of arrival, as well as a notification/response protocol if you do not check-in at the designated time.

## MAPS

In addition to provided directions, addresses and numbered highways, you may utilize a variety of mapping systems as you travel. Always confirm your directions prior to travel and seek clarification where necessary.

Regardless of the mapping system, beware that GPS and electronic mapping systems are not perfect; they may not select the appropriate route for the type of vehicle you are operating and cannot identify hazards en-route.

In addition, map data is often used to identify job specifics like downhole well coordinates. Ensure you are referencing accurate information as you plan your journey.

## Dominion Land Survey (DLS)

Land in Manitoba, Saskatchewan, Alberta or the Peace River Block of British Columbia can be located by its legal land description. Based on a Township System, this system uses a simple grid network to divide the Prairies into equal-sized parcels of land.

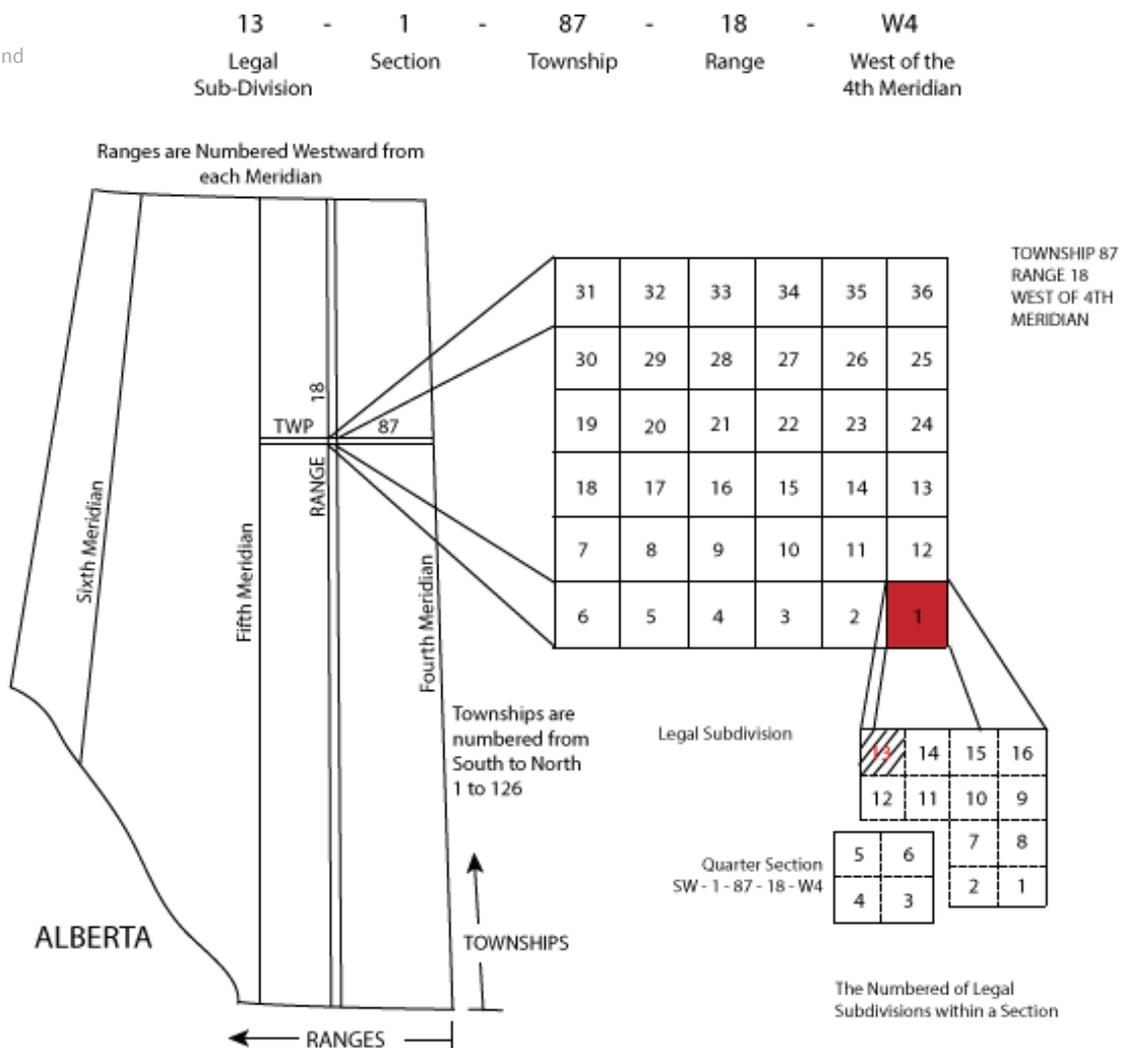
Under the DLS, land is described in reference to established points called Meridians which run parallel with the lines of longitude on the globe. The Meridians are located as follows:

- » 1st Meridian (98° west longitude) runs north-south just west of Winnipeg, Manitoba.
- » 2nd Meridian (102° west longitude) runs through eastern Saskatchewan.
- » 3rd Meridian (106° west longitude) runs through the centre of Saskatchewan.
- » 4th Meridian (110° west longitude) forms the Alberta-Saskatchewan border.
- » 5th Meridian (114° west longitude) runs through the centre of Alberta.
- » 6th Meridian (118° west longitude) is east of Grande Prairie, Alberta.

Ranges are six-mile (9.6 kilometres) wide columns between Meridians. They are numbered from east to west, starting with Range 1, west of each Meridian.

Townships are six-mile wide rows running parallel with the lines of latitude on the globe. They are numbered from Township 1 at the Canada-United States border to Township 126 at the Northwest Territories border.

Figure 4-3:  
Dominion Land  
Survey



The 36 square mile square (6x6 miles) created where the Township and Range intersect is also referred to as a Township. Each square mile within a Township is referred to as a Section. Sections are numbered in a zigzag manner, starting from the bottom right corner of the Township.

For the purpose of land title, each Section is divided into four Quarters; northeast, northwest, southeast and southwest.

For further subdivision, sections are also divided into 16 Legal Sub-Divisions (LSDs); with four LSDs per quarter Section. They are numbered in the same manner as Sections.

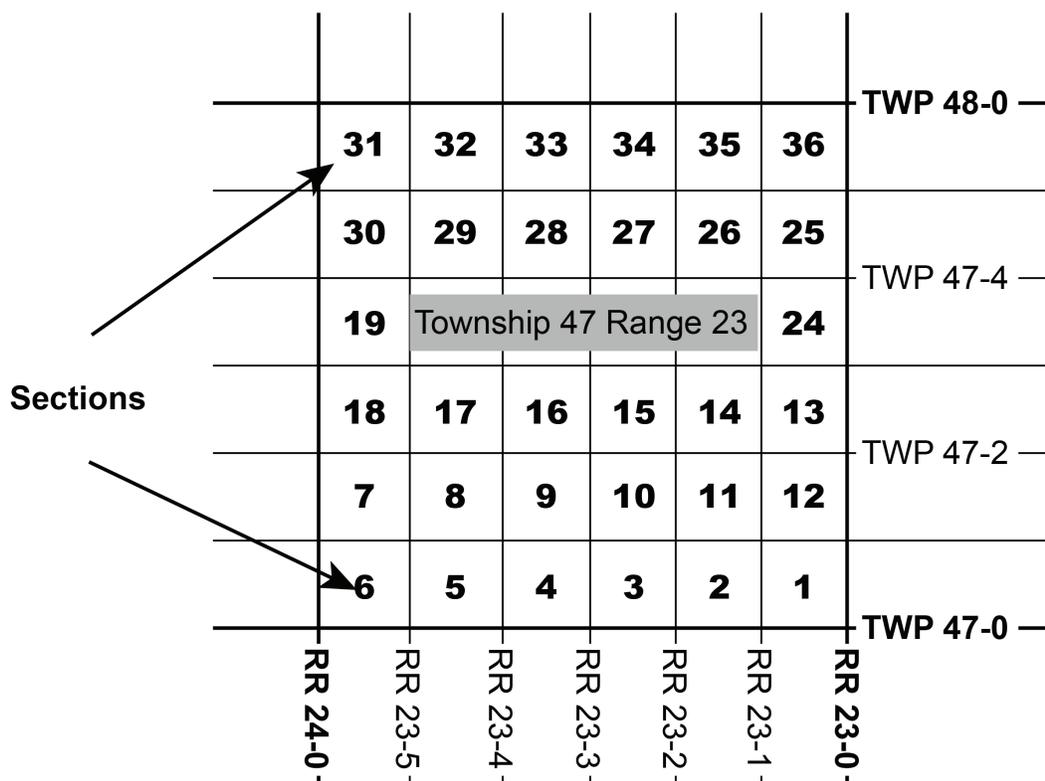
### Exercise

You are asked to travel to a site that is located at 13-1-87-18-W4.

Recall that the first number on the left is the LSD, followed by the Section, Township, Range and the Meridian, in that order. This means the location is LSD 13, Section 1, Township 87, Range 18, west of the 4th Meridian.

- Using Figure 4-3 on the previous page, locate the 4th Meridian (the right end of the land description).
- West of the 4th Meridian, find where the Range 18 and Township 87 lines intersect.
- This intersection forms the southeast corner of the Township where we will find the Section. Now, locate Section 1 of this Township, starting in the southeast. The first section, Section 1, is the one we are looking for!
- Using the same zigzag search as before, you will find LSD 13 in the upper left, or northwest, corner of the Section.

Figure 4-4: Typical DLS Road Numbering System



## National Topographical Survey (NTS)

The NTS system is similar to the prairie system, with a few differences. A location is given by map number, unit, sheet, zone, centizone and unit, as follows:

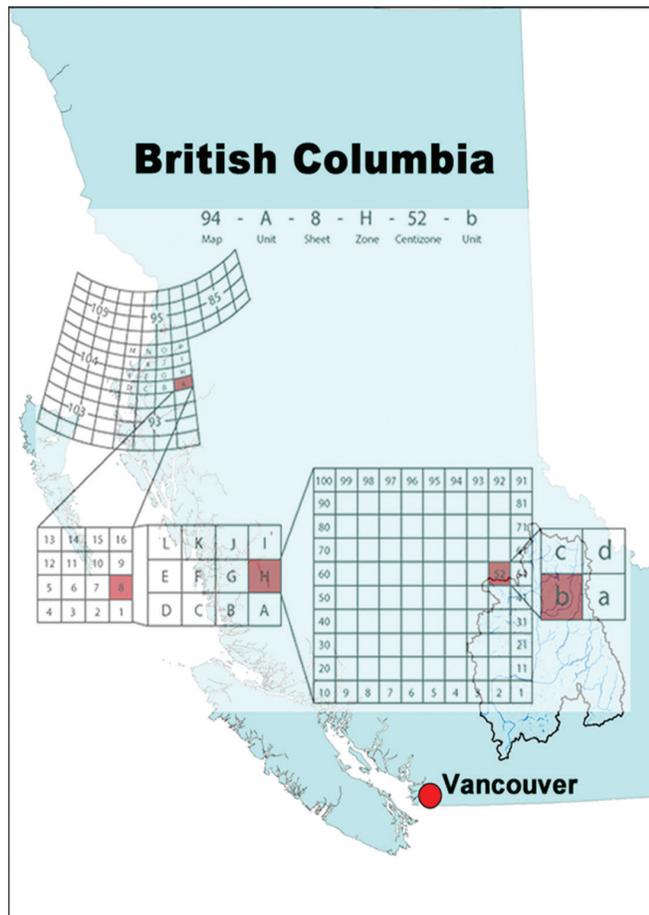
- » Canada is divided into numbered maps, running from south to north.
- » Maps are divided into 16 units, A to P, zigzagging from the lower right corner.
- » Units are divided into 16 sheets, 1 to 16, zigzagging from the lower right corner.
- » Sheets are divided into 12 zones, A to L, zigzagging from the lower right corner.
- » Zones are divided into 100 centizones, zigzagging from the lower right corner.
- » Centizones are divided into four units (a,b,c,d), clock-wise from the lower right corner.
- » Where the Dominion Land Survey is a strict grid requiring correction lines, NTS simply “stretches” in scale as you move from north to south.

## Exercise

You are asked to find a location at 94-A-8-H-52-b.

1. Recall that the first number on the left is the Map, followed by the Unit, Sheet, Zone, Centizone and Unit, in order. So, the location is Map 94, Unit A, sheet 8, Zone H, Centizone 52 and Unit b.
2. Using Figure 4-5, locate Unit A in Map 94. It is in the bottom right hand corner.
3. Starting at the bottom right of Unit A, find Sheet 8.
4. Starting at the bottom right of Unit A, find find Zone H and Centizone 52.
5. Starting at the bottom right, find Part b, the one you are looking for.

Figure 4-5: National Topographical Survey (NTS)



## Tips for Getting There

- » With legal land descriptions, you can plan your route using a regular road map, oil company maps, customer-provided directions or route information from your dispatcher.
- » Do not deviate from the route assigned. This is critical because it has been planned with road bans and bridge capacities in mind.
- » If you get off the route, you might damage a road or a bridge and your company will be responsible for paying for the repairs.
- » Get specific landmarks that you can use to help find your off-highway destination. It can be difficult to locate well sites even if you have the legal description.
- » Pay attention to your location and odometer as you pass by intersections and landmarks
- » Ask for directions if you are not sure where you are.

## VEHICLE CONDITIONS AND MAINTENANCE

A safe journey begins with a reliable and well maintained vehicle that is adequate and used as designed for the job.

### Vehicle Selection

Your driving strategy will be specific to the vehicle you are driving. Vehicle length, turning radius, and braking distance are all factors that affect your driving strategy. The type of cargo, as well as its weight and size, will also determine how you prepare for your journey.

For example, if your cargo is extra wide, then you must ensure that any bridges you cross will be wide enough to allow your vehicle to cross safely. If you are hauling very heavy cargo, you must consider your vehicle's braking distance and its handling capability.

The risks surrounding vehicle use should be carefully examined. A vehicle assessment should include:

- » Ensuring the vehicle is suitable for the job and type of driving that will be done.
- » Accessories and equipment required to haul or secure cargo are present.
- » Safety and survival equipment are accounted for.

## CARGO SECUREMENT

The consequences of loose cargo are serious and include property damage, injury, vehicle instability and fines. As the driver, you are responsible for making sure your cargo is properly loaded and secured; this includes any loose objects in the interior of your vehicle.

While all vehicles are required to transport cargo securely, commercially regulated vehicles in particular are held to standards found in the National Safety Code (NSC). Provinces have enacted legislation in accordance with this standard that outlines minimum tie-down requirements and dynamic performance of securement systems. It is the driver's responsibility to understand unique securement requirements for specific cargo, which includes any loose objects in the interior of your vehicle.

### Load Limits and Securing Devices

To properly secure cargo, you must be sufficiently equipped. The integrity of cargo securement depends on not only tie-downs, chains and nylon webbing, but also anchor points, deck surfaces and dunnage the cargo rests on.

Securement devices and attachments must be permanently marked with manufacturer's Working Load Limit (WLL) or grade markings. Strength is dependent on both external dimensions and internal construction.

## Tie-Down Practices

Proper cargo securement requires knowledge in proper procedures, cargo length, weight and working load limit (WLL) of tie-downs. In addition, irregular shaped cargo must be blocked or stabilized to prevent movement.

Consider both load positioning and load distribution when securing a load. Improper positioning and distribution can lead to cargo damage or loss, a shift in vehicle stability and a threat to other road users. Loads should generally be positioned so as to maintain a low centre of gravity and against the front of a truck's box or deck.

To avoid loss of control of a load, inspect the equipment for:

- » Rusted, worn or damaged chains and boomers
- » Knotted, nicked, cut or split chain, wire rope or webbing
- » Spread or disturbed grab hooks and other end fasteners
- » Weakened or damaged anchor points
- » Split lumber used as dunnage
- » Damaged sideboards, stakes and end gates
- » Crushable loads not secured by tie-downs and not protected by dunnage

## Cargo Checks

Drivers of commercial vehicles must inspect the cargo and its securing devices within the first 80 kilometres after beginning a trip. Drivers must re-inspect when any one of the following occurs:

- » A change of duty status (e.g. from “driving” to “on-duty not driving”)
- » After driving for three hours
- » After driving 240 kilometres

You should also stop and recheck cargo after traveling over rough roads and when road debris may be accumulating on decks and cargo surfaces.

## Vehicle Interior

Loose objects inside your vehicles must also be secured. Even lightweight electronic devices such as phones, tablets, and laptops can cause serious injury and damage.

- » Make a habit of doing a visual scan for loose objects any time you get into your car.
- » Be organized. Make sure that everything inside your vehicle has a safe place
- » Check passenger areas
- » Try to keep fewer items in your vehicle, in general.

## VEHICLE INSPECTIONS

Employers are required to conduct periodic mechanical inspections to ensure commercial vehicles are safe to drive and are operating within specifications. If requested by roadside enforcement, you may be required to produce inspection certificates from the latest periodic mechanical inspection.

Workers are also responsible for the condition of vehicles they drive, and should not operate any vehicle that has a defect or is not properly maintained. As part of their routine, every driver must conduct vehicle trip inspections to check for defects.

The size and weight of your vehicle can affect the type and frequency of inspections you do. Check with your employer to see what types of inspections are necessary for your equipment.

It is important to use all of your senses when conducting trip inspections. Some defects are easy to spot with your eyes, while you may be alerted to others through your senses of smell or hearing, or what you feel with your hands. There are three types of trip inspections:

- » Pre-trip inspections
- » En-route inspections
- » Post-trip inspections



## Pre-Trip Inspection

Similar to any other pre-use equipment inspection, pre-trip inspections verify that your equipment is ready to work. A strong inspection routine will enable you to conduct efficient inspections and spot defects. Coupled with an understanding of vehicle systems, these inspections allow drivers to deal with defects appropriately.

Many commercial vehicles require documented inspections. Documentation provides a checklist and/or response instruction that may assist drivers prioritizing appropriate responses ranging from “no go/remove from service” to “low priority/repair at the end of the trip”.

In addition to vehicle systems and cargo, you must have a valid operator’s licence, registration and proof of insurance for the vehicle. Drivers should consult with their carrier to ensure that all applicable documentation is available.

## En-Route Inspection

Drivers need to monitor risks throughout the trip. Cargo and equipment should be inspected at all rest stops and at regularly scheduled check stops.

Vehicle checks should be part of your en-route inspections and should be completed to ensure that:

- » All lights are clean and in working order
- » All wheels are secure, and tires are properly inflated and are not hot
- » Service and emergency braking systems are working properly
- » There are no broken or loose items on the vehicle
- » The cargo is secure
- » Signs, placards and licence plate are clean and secure (where applicable)
- » Trailer coupling devices are secure and in good condition

## Post-Trip Inspection

A post-trip inspection will enable you to obtain service or repairs, if required, before the next trip. This report should include any problems discovered during the trip. Vehicles should be clean, fueled and ready to return to work.

## Basic Vehicle Equipment

When working in remote areas, spare parts, supplies and tools may be as important as safety and survival equipment and can include:

### Basic Tools and Spare Parts

- » A hammer, open-ended wrenches and screw drivers
- » Tire chain repair kit
- » Shovel
- » Electrical tape and duct tape
- » Flashlight
- » Booster cables
- » Hoses and belts
- » Bulbs, lights and fuses
- » Oil and coolant
- » Fuel filter
- » Windshield wipers and washer fluid

### Jacks and Spare Tires

Use jacks as specified in your vehicle’s manual. Proper lifting points, stability and level ground is critical. You may need to use blocks to provide the necessary stability when jacking your vehicle.

Check the spare tires for condition, proper storage and air pressure regularly.

### Vehicle Recovery Devices and Winches

Vehicle recovery devices include winches, cables and tow ropes. Check with your company policy before towing or being towed. These components are under incredible stress when under tension. Safe work practices must be followed.



## JOURNEY MANAGEMENT

Depending on the size of the organization, journey management may be the sole responsibility of individual drivers or other people in the chain of command.

### Planning the Trip

Journey management is simply applying risk management methods to travel through proper planning and preparation. While the process is often streamlined through classification (routine vs. non-routine trips), both may require the development of a plan. Trip plans document the following details.

### Necessity of the Trip

- » Can/should this trip be avoided?
- » Are there other alternatives?
- » Travel time - can the trip be completed during daylight?
- » Can it be combined with another trip?

### Hazard Assessment

- » Include trip details (time/date, destination, travel deadline, curfew)
- » Has anything changed since the assessment?
- » Personnel and equipment involved
- » Start/end point and route
- » Communication methods and contact information
- » Vehicles/passengers
- » Will I be working alone?  
How close is help if needed?
- » Planned and potential places to stop (en-route inspections, fuel, meals, rest, and/or breakdowns)
- » Hazard detail/location, ranking and control
- » Driver considerations (fit for duty, qualifications, competency, experience)
- » Vehicle considerations, weather and road conditions

## Controls

Eliminate, substitute, or reduce the risk according to regulatory requirements and best practice. This may include:

- » Eliminating risks by re-evaluation to determine if the trip is necessary, combining it with another operation, or contracting the service to a specialized provider.
- » Substituting personnel/equipment from a closer location in order to better service the trip.
- » Engineering equipment with roll-over protective structures, guards, screens, shields, etc.
- » Implementing administrative controls such as adjusting the timing of the trip, having a journey management plan, training, and securing proper supervisor or management approval to execute the journey prior to travel. Approval levels may become more stringent where the journey complexity increases or hazards are more severe.

### Planning the Route

After first determining that a trip is required, the best overall route should be researched and established.

### Researching and Establishing the Route

Depending on the load and the vehicle involved, various factors should be considered when choosing the route to your destination.

### Choosing a Route

- » How far am I traveling?
- » Are there rest stops?
- » What types of roads will be traveled?
- » Are there any obstructions?
- » Is there sufficient time to complete the journey?
- » Will curfews or time restrictions impact this journey?
- » Are there risks related to time of day?

## Preparing for the Journey

With the planning phase of the journey complete, the next step is organizing the tasks required to prepare for the journey. This stage involves such important tasks as ensuring the vehicle is prepared and properly equipped.

## Undertaking the Journey

After properly preparing for the planned journey you should be mentally prepared and fit for duty.

### Periodic Rest Stops

- » Take a break from the task of driving to refresh and reset.
- » Conduct en-route inspections and cargo checks.

## Completing the Journey

Once you have safely arrived at your destination, it is important to complete the journey with a post-trip inspection and close out any required documentation. This will help begin the process of safely preparing for the next journey. Ensure vehicles are parked in a secure area ready for the next trip. Communicate any issues related to the trip to your supervisor so these can be passed on to the next shift.

## FALLS AND FALL PROTECTION

Even at the end of your trip you must remain vigilant to prevent slips and falls:

- » Wear protective footwear with good treads and ankle support, supplement traction with ice treads, etc. where applicable.
- » Ensure footwear is in good condition and suitable for the task and conditions.
- » Keep work areas and walking surfaces clear of obstacles.
- » Clean up spills promptly.
- » Cover slippery areas with slip-resistant material (i.e. sand, ice thawing material, etc.).
- » Familiarize yourself and be aware of the area including uneven ground, ice, snow, mud, obstacles such as holes and/or larger rocks, etc.
- » Wear appropriate personal fall protection where the risk of falling from heights exists.
- » Inspect and service step-boards, handles and contact points as required.
- » Use hand rails and hand grips when entering or exiting truck cabs and getting on or off truck decks or other elevated work areas. Use the three-point contact and never jump from the vehicle.
- » Maintain grip surfaces on step boards and walking decks.





## EXERCISE

1. List 2 controls for workers who are working alone in isolated areas.

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2. From the hierarchy of hazard controls, which one is the most effective?

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3. What province is NTS map 94 located in?

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4. What province are you traveling to if you are at a site located at 13-1-87-18-W4?

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5. What term is used to describe six-mile (9.6 kilometre) wide columns running north-south between Meridians?

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6. List 3 points you would consider when evaluating risk associated with a trip.

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## NOTES

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# APPENDICES

## GLOSSARY

**Bill of Lading** – A document issued by a carrier detailing a shipment of merchandise. It requires the carrier to deliver the merchandise to the appropriate party.

**Blind Spots** – The areas that cannot be seen in a driver's forward vision or rear and side-view mirrors.

**Cargo Securement** – Making sure the load or cargo is evenly balanced and properly secured against shifting.

**Centrifugal Force** – The force that pulls out from the centre on a body in circular motion. When driving a vehicle this force increases with acceleration.

**Defensive Driving** – Driving to save lives, time, and money, in spite of the conditions around you and the actions of others.

**Distacted Driving** – The practice of driving a motor vehicle while engaged in another activity.

**Visual Lead Time** – The time to respond to possible hazards ahead of you while driving (e.g. blind spots, moving vehicles, intersections, etc.).

**Frost Heave** – The uplift of a road surface due to a combination of freezing temperatures and soil defrosting (also known as "hummocks").

**Hydroplaning** – A loss of steering or brake control caused by tires of a moving vehicle riding on the water surface on the roadway.

**Impaired Driving** – Operating or having care or control of a motor vehicle while under the influence of alcohol and/or drugs to the degree that mental and motor skills are impaired.

**Micro-sleep** – A temporary episode of sleep which may last for a fraction of a second or up to thirty seconds without an individual being aware of it.

**OSA (Obstructive Sleep Apnea Syndrome)** – A type of sleep disorder characterized by pauses in breathing or instances of shallow or infrequent breathing during sleep. Each pause in breathing, called an apnea, can last from at least ten seconds to several minutes, and may occur 5 to 30 times or more an hour.

**Preventable Collision** – A collision in which the driver failed to do everything that they reasonably could have done to avoid it.

**Proactive Driving** – Driving with the aim of anticipating possible hazards and taking action to reduce, minimize, or avoid danger before it occurs.

**Reactive Driving** – Reacting immediately to a hazard while driving and creating sudden, severe and urgent hazard avoidance manoeuvres.

**Sensation Seeking** – A personality trait defined by the need for varied, novel and complex sensations and experiences. Sensation seekers are not well suited to be professional drivers due to their risky and erratic driving behaviour.

**Transport of Dangerous Goods Act** – Federal legislation designed to regulate the movement of dangerous goods relating to pressure, flammability, toxicity, biohazard, or corrosiveness.

**Washboard** – A corrugated surface on a gravel or dirt road which consists of regular bumps with short spacing.

## Alberta Traffic Collisions 2017-2021

Table 1.1. Albert Traffic Collisions

SEVERITY OF COLLISION	2021	2020	2019	2018	2017
Fatal Collisions	233	207	215	246	259
Non-Fatal Injury Collisions	10,022	9,092	11,738	12,852	13,082
Property Damage	89,976	85,702	120,119	129,498	129,126
<b>Total Reportable Collisions</b>	<b>100,231</b>	<b>95,001</b>	<b>132,072</b>	<b>142,596</b>	<b>142,467</b>
INJURY SEVERITY	2021	2020	2019	2018	2017
Number Killed	254	235	233	289	290
Number Injured	13,097	11,844	15,364	17,055	17,186
<b>Total Number of Casualties</b>	<b>13,351</b>	<b>12,079</b>	<b>15,597</b>	<b>17,344</b>	<b>17,476</b>

### Observations:

In 2021, the overall number of collisions increased 5.5% when compared to 2020. In 2021, injury collisions increased by 10.2% and fatal collisions increased by 12.6%. The number of fatalities increased by 8.1% from 2020 to 2021 and the number of injuries increased by 10.6%. In terms of the past five years, overall collisions were lowest in 2020 and highest in 2018.

### When the collisions occurred

#### Month

The month of July experienced more fatal collisions than other months. The highest number of reported injury collisions was in December. December also reported more property damage collisions than any other month.

#### Day of week

The daily distribution of collisions indicated that Friday was the most collision-prone day of the week.

#### Time

The afternoon rush hour period (3:00 p.m. - 6:59 p.m.) accounted for the highest proportion of collisions. The least collision-prone time period was the late night/early morning period (11:00 p.m. - 2:59 a.m.).

#### Holidays

The Thanksgiving Long Weekend recorded the highest number of fatalities. The Christmas Season recorded the highest number of injuries. The Christmas Season also recorded the highest total number of collisions.

## Injuries and fatalities by road user class 2021

Table 3.1. Injuries and Fatalities by Road User Class

ROAD USER CLASS	PERSONS KILLED		PERSONS INJURED		TOTAL CASUALTIES	
	N	%	N	%	N	%
Drivers	133	52.4	8,720	66.6	8,853	66.3
Passengers	32	12.6	2,371	18.1	2,403	18.0
Pedestrians	34	13.4	732	5.6	766	5.7
Motorcyclists	29	11.4	465	3.6	494	3.7
Bicyclists	3	1.2	441	3.4	444	3.3
Other	14	5.5	183	1.4	197	1.5
Unspecified	9	25	185	1.4	194	1.5
<b>Total Casualties</b>	<b>254</b>	<b>100</b>	<b>13,097</b>	<b>100</b>	<b>13,351</b>	<b>100</b>

### Observations:

The majority of traffic victims were drivers (66.3%) and passengers (18.0%) of vehicles. Pedestrians and motorcyclists accounted for 5.7% and 3.7% of the total casualties, respectively.

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# LIFE SAVING RULES



## CONFINED SPACE

### Obtain authorization before entering a confined space

- I confirm energy sources are isolated
- I confirm the atmosphere has been tested and is monitored
- I check and use my breathing apparatus when required
- I confirm there is an attendant standing by
- I confirm a rescue plan is in place
- I obtain authorization to enter



## WORKING AT HEIGHT

### Protect yourself against a fall when working at height

- I inspect my fall protection equipment before use
- I secure tools and work materials to prevent dropped objects
- I tie off 100% to approved anchor points while outside a protected area



## WORK AUTHORIZATION

### Work with a valid permit when required

- I have confirmed if a permit is required
- I am authorized to perform the work
- I understand the permit
- I have confirmed that hazards are controlled and it is safe to start
- I stop and reassess if conditions change



## ENERGY ISOLATION

### Verify isolation and zero energy before work begins

- I have identified all energy sources
- I confirm that hazardous energy sources have been isolated, locked, and tagged
- I have checked there is zero energy and tested for residual or stored energy



## LINE OF FIRE

### Keep yourself and others out of the line of fire

- I position myself to avoid:
  - Moving objects
  - Vehicles
  - Pressure releases
  - Dropped objects
- I establish and obey barriers and exclusion zones
- I take action to secure loose objects and report potential dropped objects



## BYPASSING SAFETY CONTROLS

### Obtain authorization before overriding or disabling safety controls

- I understand and use safety-critical equipment and procedures which apply to my task
- I obtain authorization before:
  - Disabling or overriding safety equipment
  - Deviating from procedures
  - Crossing a barrier



## DRIVING

### Follow safe driving rules

- I always wear a seatbelt
- I do not exceed the speed limit, and reduce my speed for road conditions
- I do not use phones or operate devices while driving
- I am fit, rested and fully alert while driving
- I follow journey management requirements



## HOT WORK

### Control flammables and ignition sources

- I identify and control ignition sources
- Before starting any hot work:
  - I confirm flammable material has been removed or isolated
  - I obtain authorization
- Before starting hot work in a hazardous area I confirm:
  - A gas test has been completed
  - Gas will be monitored continually



## SAFE MECHANICAL LIFTING

### Plan lifting operations and control the area

- I confirm that the equipment and load have been inspected and are fit for purpose
- I only operate equipment that I am qualified to use
- I establish and obey barriers and exclusion zones
- I never walk under a suspended load



## FIT FOR DUTY

### Be in a state to perform work safely

- I will be physically and mentally in a state to perform my assigned duties
- I commit to not being under the influence of alcohol or drugs
- I will inform a supervisor immediately if I or a co-worker may be unfit for work



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