



Winter Works

A Best Practices Guideline

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Winter Work Best Practice

Winter conditions in Alberta can start as early as October and continue through to April. Weather and environmental conditions during this time create hazards. If uncontrolled, these hazards can increase the risk of loss to people, equipment, materials, production and the environment.

1.0 Purpose

The purpose of this best practice is to provide guidelines to follow when developing a winter preparedness program specific to the company or site requirements.

This best practice will:

- Raise awareness and provide mitigation strategies to reduce the risks associated with working in winter conditions
- Provide a comprehensive guide on winter work preparedness, awareness and implementation
- Propose a schedule for pre-season, in-season and post-season activities
- Promote continuous improvement through post-season review, carrying lessons learned forward to the next year
- Provide a tool kit that contractors can use when developing their own winter work program including templates for Winter Work Plans, schedules, forms, checklists, posters and training materials

2.0 Scope

This document will cover pre-season planning, in-season work execution and, post season de-winterization and review. This document will provide guidance to minimize the impact on people, environment, materials, production and equipment by focusing on three main topics:

- Site Preparation and planning
- Winter driving and equipment operation
- Winter PPE

By focusing on these three areas, companies will have the best chance to eliminate or mitigate the risks associated with winter hazards, ultimately reducing loss.

3.0 Project Planning and Site mobilization

Winter preparations should start during project planning and site mobilization.

3.1 Project Planning

During the initial bid and contract preparation phases, winter condition requirements must be accounted for. Minimizing the impact of winter hazards will require more resources including people, materials and equipment. Production during winter conditions may also be lower due to cold temperatures and heavy snowfall. Initial planning will help to mitigate the impacts winter weather and environmental conditions may have on the project.

Some work may be more difficult to complete during winter conditions such as earthworks. Consider these job tasks when determining the work schedule. Also consider limitations of required equipment. For example, some equipment can not operate at low temperatures. If equipment will be affected by winter conditions, arrangements can be made, such as selection of different equipment, during the planning phases. Taking this into consideration can prevent future incidents and production delays.

Planning for winter conditions should also be considered when obtaining bids and awarding work to subcontractors. Winter condition requirements must be communicated to the subcontractor by the prime contractor. Responsibilities must be established before the subcontractor begins work. Responsibilities may include but aren't limited to work area and equipment winterization, snow removal and grit application and supplying PPE.

3.2 Site mobilization

During site mobilization, the configuration of the site should accommodate winter requirements. If possible, the site configuration should place offices, lunchrooms, laydown areas and work areas on higher ground than snow storage locations. Drainage should direct snow melt away from roadways and walkways. This will help to eliminate ice formations during freeze thaw cycles. Many incidents occur due to not planning for water accumulation.

During the initial set up of the site, roadways, walkways and parking areas should be designed to minimize human machine interface to reduce the risk of vehicles and equipment contacting pedestrians. Elevating roadways, walkways and parking areas will prevent water from accumulating. If elevation is not possible, drainage, ditching or berming should be in place to prevent water accumulation in low lying work areas, laydowns, roads and parking areas. Water accumulation can freeze creating a slippery ice hazard. When determining speed limits for roadways, keep in mind these may need to be adjusted for winter conditions.

4.0 Schedule of Activities

Various activities must be completed throughout the year to prepare for and handle winter conditions. Having a planning schedule will help to ensure all activities are completed in time to enable safe work execution.

Activities may vary depending on the site. Appendix 1 shows a calendar of events for sites that have completed a winter season. Appendix 2 shows the calendar of events for new sites that will be preparing and entering the winter season for the first time.

5.0 Pre-Season Planning

The following sections provide pre-season planning activities to assist in shifting from summer work to winter conditions on both new and existing sites.

5.1 Winter Safety Kick-off Meeting

To commence planning for the winter season, a Winter Safety Kickoff Meeting should be held to discuss pre-winter activities that will be completed prior to winter conditions arriving. This meeting should take place in August and should involve parties responsible for the following:

- Construction management/ Client
- Safety
- Equipment and vehicle maintenance
- Snow removal and road maintenance
- Building maintenance
- Dewatering
- Procurement
- Preservation
- Lighting
- Heating and hoarding
- Subcontractors

When creating the meeting agenda, all parties should be provided the opportunity to review and update the agenda to ensure no items are missed. Meeting minutes should be documented and should include required actions, parties responsible and completion dates (see Appendix 3 for an agenda template).

5.2 Hazard Assessment Tools

It is important to update written hazard assessment tools with winter hazards.

The production schedule will identify what work activities will be performed during the winter months. From this schedule, jobs that require written job hazard analysis, job safety analysis or safe work practices and procedures can be updated to include any winter hazards that may impact these work tasks. These updated documents should be reviewed with the work force prior to work commencing during winter conditions.

Planning is the best way to ensure risks associated with winter hazards are minimized. When completing hazard assessment documents, use the hazard control hierarchy as you would for any other hazard. For example, cold temperatures are one of the main hazards presenting risk of injury to workers during the winter season. Minimizing cold exposure and protecting from the wind are the most effective ways in preventing cold injuries. Warm up breaks should be used in combination with winter PPE. Appendix 4: Wind Chill Chart and Appendix 5: Cold-Exposure Guidelines for Outside workers can be used when determining warm up break schedules.

Other than the cold, hazards that present a risk of injury to workers or damage to property and equipment may include:

- Slippery ice or compact snow leading to slips or reduced traction
- Poor driving conditions and unclear roadside delineation.
- Falling snow and ice from overhead (ie. roof tops)
- Blowing snow reducing visibility
- Inadequate lighting for the task

Winter hazards should also be included on the field level hazard assessment (FLHA). Winter awareness campaigns for the work force will inform workers of winter hazards and controls required to mitigate the risk. Campaigns will provide workers the information needed to implement controls and create thorough FLHA cards. Winter awareness campaigns are discussed below.

5.3 Site Planning and Preparation

The sections above discussed initial site design and set up. The following sections provide guidance on preparing work sites for winter conditions after the initial site set up is complete.

5.3.1 Roadways, Walkways, Parking Areas and Work Surfaces

Prior to the winter season, roadways and parking areas should be maintained so they are free of pot holes and uneven surfaces. Once the ground is frozen, road maintenance will be more difficult. Also, starting with a well maintained road will make snow removal and road maintenance easier once winter conditions arrive. Any holes, excavations or ditching that can not be filled in should be delineated using barricades or berms and marked.

5.3.2 Snow Removal, Sanding and De-icing

As part of the pre-season planning process, areas where snow removal will be required, snow removal methods and, snow removal crews must be determined. On multi-prime contractor sites it is important to define areas of responsibility. Creating a map that indicates each prime contractor's assigned areas will ensure no areas are missed. Areas to consider for snow removal are:

- Roadways
- Parking areas
- Pedestrian walkways
- Stairs and ladders
- Access/egress to building's utilities, temporary power, heating and lighting for maintenance and fueling
- Elevated work locations

These areas should be prioritized to ensure critical areas such as emergency response routes and high traffic areas are cleared and maintained first during heavy snowfall. To minimize the impact of snow accumulation, snow clearing should be completed as the snow falls and prior to work commencing. Night shift snow removal crews may be required to avoid production delays on day shift.

Equipment should be available for snow removal prior to the winter conditions arriving. When selecting equipment for snow removal also determine safe zones for all mobile equipment. This safe zone will indicate the proximity each specific piece of equipment can come to structures, buildings and other equipment. Safe zones can be indicated with barricading around buildings and structures or with an indicator placed on the equipment itself. This will minimize the risk of equipment contact. All snow required to be

removed inside the safe zone must be removed by smaller equipment with a smaller safe zone or manually with shovels.

Using competent spotters will help to mitigate the risk of equipment coming in contact with personnel, equipment or structures during snow removal in congested areas. A traffic management plan may be required for snow removal in high traffic areas.

Where manual snow removal is required, worker selection and ergonomics should be considered. Manual snow removal is strenuous, repetitive work that can lead to musculoskeletal injuries.

All workers required to perform snow removal activities, manual or by mechanical means, should be trained and deemed competent prior to performing their tasks. To ensure crews are prepared for the winter season, training and competency checks should occur in September to early October. Also, spotter training and competencies should be completed at this time for any workers that will be required to assist with spotting snow removal activities.

It is important to identify what tools and equipment will be required for snow removal and compare that to inventories on site before first snow fall. To determine what stock may be required for new sites, compare to similar sized projects on other sites. Procurement of required tools and equipment can take time. Also, supplies may be limited as many companies may need to acquire the same supplies. To ensure supplies arrive prior to first snow fall, procurement should take place early, September at the latest. Tools and equipment that may be needed are:

- Grader
- Front end loader
- Skid steer or bobcat
- Snow blower
- Leaf blowers
- Shovels
- Brooms (strong enough to move snow)
- Ice scrapers or chippers

Snow removal equipment creates extremely slippery surfaces after snow has been removed. To mitigate this, grit should be placed soon after the equipment has completed snow removal. Prior to winter conditions arriving, the amount of grit that will be needed for the duration of winter, where the grit will be obtained from and how long it will take to obtain the grit must be determined. Storage requirements of grit stock need to consider location, temperature and environmental.

When deicer will be used, site environmental requirements must be met. Some sites prohibit the use of deicers that are salt based as they can change the pH and conductivity of ground water. Grit and deicer as well as the equipment and tools

required to apply both should be ordered and onsite prior to first snow fall, usually in September.

Small amounts of grit and deicer should be stored throughout the work areas for convenience. This can be placed in a box to keep the material from freezing and free of snow. Pairing a shovel with the box will allow for easy application of the material. Keeping boxes filled with stock must be an assigned task to ensure it is completed. For large sites a refill schedule may be helpful to maintain stock.

Snow dump locations for roadways, walkways and parking areas should be selected so they are convenient but not situated so visibility in the area is inhibited. Temporary snow storage areas may be created where snow can be compiled and transported to a centralized snow dump. If temporary snow storage areas are used, it is important to determine who will transport the snow from the contractor's snow dumps to the centralized site dump. When determining the location of snow disposal areas, site requirements must be considered. To avoid flooding during spring melt, snow disposal areas should not be placed on high ground.

5.3.3 Building and Trailer Winterization

It should be established which buildings will be used throughout the winter and which, if any, will be unoccupied until spring. Even buildings that will be used continually during winter conditions may require winterization as freezing temperatures can cause damage to building utilities. Preparation must address both the interior and the exterior of the buildings.

Exterior considerations include:

- Snow removal requirements on decks, walkways and stairs
- Storage locations for deicer and grit
- "No slip" material on stairs and walkways.
- Hand rails on stairs
- Access/egress coverings to prevent snow build up and overhead snow and ice hazards in front of doors. Slope of the cover should be perpendicular to path of travel.
- Lighting
- Boot cleaners and brushes placed at entrances
- All doors and windows latch securely

Interior considerations include:

- Furnace cleaning and maintenance
- Piping systems
 - Heat trace with insulation or an anti-freeze treatment may be required to prevent freezing
- Floor mats and wet floors.

- Floor mats can assist in keeping wet surfaces at the entry way. Mats should have an anti-slip backing. Wet floor signs should be available to be placed at entry ways.

For buildings that will not be used continually throughout the winter season see the Holiday Shut Down section below.

5.3.4 Heating and Hoardings

Hoardings are used to provide warm, dry work locations. They may be required to preserve equipment and materials or enable work that can only be conducted at warmer temperatures, such as curing concrete. When workers are required to work outdoors, hoardings can be used as warm up locations. When planning for hoardings, consider:

- Hoarding requirements including locations / work areas to be hoarded
- Materials needed: scaffolding, wood, tarps, insulation
- Heating demands to achieve temperature requirements. Use of indirect fire heaters will help prevent build up of carbon monoxide. Tiger torches **must not** be used as a heating source.
- Interior ventilation and air quality requirements. When combustion heaters may affect air quality, electric heaters must be used.
- Air movement within the hoarding.
- Number of workers required to use space for warm-up. Ensure hoardings will be appropriate size for all workers that will use the hoarding
- Potential fire hazards. Place heaters downwind of hoardings and use heater socks long enough that heaters are not in direct contact with any combustible or flammable material.
- Hoarding inspection frequency to monitor for snow build up and stability

Fuel requirements must be established if diesel or propane heaters will be used. When determining fuel requirements also consider supplier delivery frequency and quantities that will be required to be stored on site. Storage must meet or exceed WHMIS and TDG as well as site and regulatory environmental requirements.

5.3.5 Lighting

Daylight hours are reduced in winter months. Depending on your geographic location, daylight hours can be as short as 9 hours in southern Alberta to 7 hours in Northern Alberta. To mitigate the risk associated with low light levels, the following should be considered:

- Light level required to complete work
- Tasks to be conducted during non-daylight hours. Critical tasks, such as critical lifts, are to be scheduled for daylight hours
- Type of lighting that will be installed. In permanent work areas such as laydowns and office areas permanent lighting maybe more practical. In temporary work areas, portable lighting may be suitable.

- Light placement. Pay particular attention to illuminating walkways and pedestrian crossing. Watch for the creation of shadows
- Barricading around light installation

When light plants are used as a temporary light source, it is important that the workers required to set up the light plant are trained and competent. Severe injuries can occur when setting up light plants, especially when raising and lowering the mast. To reduce the environmental impact, a schedule should be created and implemented indicating times the light plants can be shut off. Areas around light plants should be maintained to allow for safe access and egress for fueling and service. Light plants must only be used according to manufacturer's specifications.

It is important to ensure areas that do not require a light source have hazards identified with reflective barricades or marking. Also, signage in these areas should be made of a retro-reflective material. This is especially important for traffic signs. If the signage can't be made of retro-reflective materials, consider placing blinking lights to increase visibility.

5.3.6 Excavations

Snow cover can hide leading edges of excavations causing deep holes to look like shallow depressions. Snow and ice causes access/egress routes into excavations to become slippery. Before the winter season arrives, any unnecessary excavations should be filled.

The best way to prepare excavations for winter conditions is during the initial construction. When determining where spoil piles will be placed, also consider snow that will be removed from the excavation. Dewatering of ground water should be ongoing to prevent water accumulations that can freeze. If enough space is available, all excavations should be bermed. Berming creates a physical barrier preventing vehicles and equipment from entering the excavation. Berming should be marked with high visibility markers or blinking lights. When berming is not possible high visibility barricades should be placed far enough from the excavation to prevent vehicles and equipment from entering.

To prevent damage to excavating equipment, ground thaw units can be used for excavating required to be completed during the winter.

5.3.7 Pre-Season Hazard Identification

To prepare for typical winter conditions in Alberta, a formal inspection starting in September of each year should take place to ensure the work areas are ready for winter conditions. This inspection should be conducted on all active worksites or worksites that will become active during winter conditions. This inspection should still occur on newly mobilized sites. Table 1 below identifies the ideal state and recommended controls for site hazards. A sample Hazard Assessment document can be found in Appendix 6.

Table 1: Guide for conducting pre-season hazard inspection.

Item	Ideal state
Roadways, walkways and parking areas	<p>Constructed with adequate drainage to avoid water accumulation. Existing roads, pathways and parking areas should be free of areas where water can accumulate and form ice slicks</p> <p>Marked so they are easily identifiable during heavy snowfall</p> <p>Clear delineation between walkways and roadways to minimize human machine interface. This can be accomplished with snow fence, handrail or rope railing.</p> <p>Established pedestrian crossings identified with reflective, high visibility signage. Blinking lights can be used to increase visibility.</p> <p>Delineated, using hard barricading, to protect buildings and other assets</p> <p>Snow storage areas, temporary or permanent, are not positioned so water must flow through roadways, pathways or parking areas to get to drainage systems</p> <p>Permanent or immovable objects are marked with reflective barricades or stakes to allow for visibility during low light hours.</p> <p>Road signage is reflective. Blinking lights placed on critical signage to increase visibility during heavy snowfall or darkness</p> <p>Hitch rail outlets to plug in engine block heaters are present and operational. Review manufacturer's specifications if block heaters are recommended for vehicles and equipment.</p>
Buried and above ground utility installations (Power lines, gas lines, etc.)	Marked with high visibility markings indicating location and depth

	<p>Guarded from vehicles and equipment taking special consideration for snow removal equipment. Ensure guarding will be appropriate for equipment used to remove snow.</p> <p>Insulated if carrying a product that can freeze during the coldest winter conditions</p>
<p>Lighting, heating and temporary power</p>	<p>Temporary light plants or permanent light standards placed in work areas, bus staging areas and around trailers that will be accessed during hours of low daylight</p> <p>Gas powered lighting, heaters and generators are placed to allow for safe refueling without spills</p> <p>Gas Powered lighting, heaters and generators are placed so the exhaust will not enter buildings, hoardings or other enclosed spaces</p> <p>Equipment is grounded according to manufacturers and site specifications prior to ground freezing. As ground freezes, grounding rods will be more difficult to install.</p> <p>All equipment maintained and used according to manufacturer's specifications</p> <p>Fire extinguishers placed within 25 ft. of all ignition sources. Extinguishers stored off the ground in a wooden box or on a stand to prevent freezing to the ground.</p>
<p>Material Storage Laydowns</p>	<p>Materials are raised on dunnage to prevent materials from freezing into the ground enabling safe lifting</p> <p>Materials are marked with high visibility stakes or barricaded for easy recognition after heavy snowfall. Ensure stakes or barricades are high enough that they will not be buried by winter snowfall</p>

	<p>Materials are positioned away from roadways, walkways and parking areas to avoid contact with vehicles and equipment</p> <p>Areas where new materials will be stored are designated and allow for snow removal</p> <p>Fluids that are susceptible to freeze and materials that could be damaged by cold temperatures are stored in heated buildings or hoardings. Special precautions for flammable products should be made to ensure interior storage area temperatures don't exceed the flash point of the product.</p>
Buildings exteriors	<p>Roofs that need to be accessed for snow removal have a fall protection system in place prior to winter weather conditions arriving. Travel restraint systems should be considered before fall arrest systems.</p> <p>Downspouts are positioned so water from snow melt will not create a slip hazard in high traffic areas during freeze/ thaw cycles</p> <p>Controls in place to prevent overhead ice and snow hazards from developing over building access/egress routes.</p>
Work areas	<p>Where snow drifts can occur, such as areas that are not protected from the wind, snow fence is installed. Snow fence will be more difficult to install once ground is frozen, installation prior to first freeze is recommended.</p> <p>Grit or sand boxes placed to enable easy re-stocking as well as in centralized locations for easy access which will encourage use.</p> <p>Grit boxes are equipped with shovels and ice picks</p> <p>Permanent or immovable objects are</p>

	<p>marked with reflective barricades or stakes to allow for visibility during low light hours. Markings are high enough that they will not become snow covered during heavy snowfall</p> <p>Cords and cables are raised off the ground on stands or buried, if possible. If not possible, cords and cables should be out of walkways and marked so they can be identified after snow fall</p> <p>All tools and materials are stored in designated storage locations</p> <p>Waste and debris removed from work and laydown areas are disposed of according to the site's waste segregation requirements</p>
<p>Water bodies (tailings ponds, ditches, natural ponds or sloughs)</p>	<p>Perimeter is hard barricaded with high visibility reflective markings that will stop vehicles, equipment and people from accessing the water's edge</p> <p>Signage is placed to indicate the hazards of the water body in the area and the precautions that need to be taken</p>
<p>Environmental</p>	<p>Secondary containment placed under all stationary equipment and mobile equipment not in use</p> <p>Spill kits on all mobile and stationary equipment</p> <p>No soil staining on any ground. Any stains or spills should be cleaned prior to being covered by snow</p> <p>Doors, windows and openings to interior areas such as buildings, sea cans, and hoardings, are sealed to prevent animals from entering</p>

When preparing the pre-season hazard assessment, pictures can be added to the assessment. Once snow falls, the pictures can assist in locating materials and structures.

On active sites in which the work areas are continually changing, the pre-season hazard assessment may need to be continuous until it is replaced by the in-season surveillance process. This will occur after first snow.

5.3.8 Holiday Shut down and Return to Site

Some operations completely shut down over the holiday season while others stop all production work and keep a skeleton crew to perform preservation and snow clearing activities. A written plan for any holiday shut downs should be developed and should include:

- Duration of the shut down including dates
- Roles that will need to be filled during the shut down and responsible parties
- Equipment and supplies required for the duration of the shut down
- Pre-shut down activities

Creating a shutdown checklist will ensure that no items are missed (see Appendix 7). A pre-shut down meeting should be held with responsible parties and management representatives to establish the expectations and requirements during the shut down. Keep in mind; heating equipment required for preservation will require monitoring 24 hours a day, 7 days a week. If deliveries wont be needed during the shut down, it is also important to notify vendors and suppliers of shut down dates.

When preparing the shut down plan, the following activities will allow for a smooth shut down and re-opening:

- Schedule a general site clean up to prevent the creation of hidden hazards during snowfall
- Trailer and wash car preparation, including:
 - All appliances cleaned and unplugged
 - Food stored indoors, raised off the floor, in a clean, dry location to prevent wildlife attraction
 - Water coolers drained
 - Piping systems drained or treated with an anti-freeze product that is approved by site to prevent freezing.
 - Furnaces cleaned and serviced. Any furnaces, heaters or other ignition sources left operational during the shut down must be monitored for fire
 - Fuel and propane stocks are sufficient to supply all required equipment for the duration of the shutdown as deliveries may not be available over the holiday season.
- Vehicle preparation including:
 - Parking available with plug-ins to prevent damage. All vehicles that will not be operational for an extended period of time should be equipped with a block heater that is plugged in. The need for this will be dependent on temperature
 - Cabs cleaned out
 - Coolant and window washer fluid used is rated for the coldest possible temperatures for the region

- Pictures of material laydowns to assist in finding materials if heavy snowfall occurs over the shutdown as heavy snow fall is common over the holiday season.

The level of shut down will determine to what extent the above activities must be completed.

Before work can commence on site after a holiday shut-down, some critical activities may need to take place to ensure worker safety. These may include.

- Snow removal
- Re-instating power, heat and other utilities in trailers and wash cars
- Stocking up water, fuel and other supplies

Arrange for restocking of resources that will be needed for start up prior to the shut-down as procurement may not be possible over the holidays.

If pre-season site preparations are thorough, risks from winter hazards can be minimized and in-season operations will run as smoothly as possible.

5.4 Emergency Preparedness

Emergency response plans should include potential impacts from winter conditions. Emergency communications, response times, evacuation procedures, and the ability to shelter in place or muster may be affected by winter conditions. All possible emergency types that have been identified in the emergency response plan need to be considered. During pre-season planning, any changes to emergency response plans can be made to include winter impacts.

5.4.1 Emergency Response

On site and external emergency response times may be delayed due to road conditions. On site emergency response teams may need to be repositioned closer to work locations to minimize the impact of potential delays. More emergency response teams may be required to allow for positioning closer to work locations. Severe winter conditions may limit site access which could delay or inhibit external emergency response via roadways. Air transportation may also be inhibited during severe weather conditions. Alternate arrangements should be made in advance in the event emergency response can not access the site.

Emergency routes must be identified and be top priority for snow removal. Responsibility for snow removal of these routes should be clearly defined. A secondary contractor is important to also assign to remove snow from emergency response routes in the event the primary contractor can not complete the task.

5.4.2 Evacuation, Shelter-in-place and Muster

In the event that evacuation is required during winter conditions, it is important to plan how the evacuation will be completed during the most extreme weather conditions the region may experience. When severe weather conditions will prevent an evacuation, arrangements need to be made to ensure the safety of all workers while they are stranded at the work location. Removing workers from the work location prior to conditions arriving that will prevent safe evacuation may be the best way to handle this situation. If shelter-in-place methods are to be used to protect workers, shelter-in-place

locations must have a heat source. During cold temperatures, interior locations that are not heated can present a risk of hypothermia to workers.

Adjustments to muster locations may be needed in preparation for winter conditions. If workers will be required to stay in the muster location for an extended period of time, the muster location should be indoors and have a heat source. If muster locations will only be used for a head count and workers will quickly be removed from the muster point to an alternate location, these can remain outdoors. Access and egress to muster locations should be high priority for snow removal activities.

5.4.3 Severe Weather Warnings / Alert System

Some organizations may use a severe weather warning system to inform workers of current conditions and precautions as well as shutdowns and closures. It is important to determine if a weather warning and alert system is required for your organization.

Two types of communication systems may be used depending on the needs of the organization; to address workers at work or workers who are travelling to work. During work hours, communication systems such as radio all-calls, PA system announcements, phone calls or emails may be effective to notify employees. Notifications should provide specific direction of actions workers are to take during the severe weather conditions.

Workers who are not at work at the time of severe weather conditions may need to be notified of shut downs and closures. Communication of this information can be completed by telephone or email. For workers who are transported to work by the employer, notifications can be conducted through the transport service provider.

All employees should be provided with protocols for severe weather conditions during initial orientation. Information should also be posted in offices and lunchrooms as a reference.

Maximum acceptable working limits should be developed to determine when warnings and alerts need to be provided to the workforce. Once the maximum acceptable working limits are reached, all non-emergency work must stop. Conditions over these limits present increased risk of cold injury to workers. This may include, but is not limited to, temperature, precipitation, wind speed, local visibility, road conditions and ambient illumination. Two sets of limits may be established: the limit at which precautionary alerts are provided and the limit that work will stop. Appendix 4 and 5 can be used to help develop maximum acceptable working limits. A thermometer should be available on site to help monitor current conditions.

Development of severe weather protocols will help to limit worker exposure during severe weather conditions.

5.5 Vehicle and Equipment Maintenance and Operation

Vehicle and equipment maintenance and operation is also impacted by winter conditions. Driving and equipment operation policies, practices and procedures must include precautions for winter conditions. Vehicles and equipment require winterization to prevent damage and allow for optimal operation during cold conditions. Ensuring that your vehicles and equipment are ready for the winter months is imperative in preventing injury to people and damage to equipment.

5.5.1 Winter Driving and Equipment Operation Policies, Practices and Procedures

To help prevent incidents caused or impacted by winter conditions involving driving and equipment operation, policies, practices and procedures should be updated to include winter driving and operating best practices. Policies, practices and procedures to consider for review are:

- Driving and light duty vehicle operation
- Equipment maintenance and set up
- Pre-use/ pre-trip inspections

Road maintenance and snow removal is the best way to mitigate the risks associated with winter driving. However, conditions can change quickly and it may not be possible to keep all roads maintained and clear of snow and ice to prevent incident or injury. Driving practices must adapt to road conditions. Adding desired winter driving practices to relevant policies, practices and procedures and reviewing these with the work force will help to mitigate the risk of incident. Desired winter driving practices are:

- Allowing vehicles adequate time to warm up prior to operation
- Ensuring all windows and mirrors are clean and free of debris for optimal visibility
- Using handles or steering wheel to maintain three point contact during accessing and egressing vehicles and equipment
- Decreasing speed of travel on icy or snow covered roads
- Increase stopping and following distances by approximately 3 times. Increase further for heavier vehicles as they take more time to stop.
- Checking weather and road conditions prior to starting journey. Current conditions can be found at www.weathernetwork.com and www.amaroadreports.ca
- Taking only necessary journeys. Do not travel in severe conditions except during emergency situations
- Allowing more time to complete your journey
- Fueling vehicles prior to the trip
- Planning quantity of fuel required for the trip and location of fuel stops if required
- Ensuring the vehicle is ready for operation by completing winter pre-trip checklist
- Avoiding use of cruise control in winter conditions
- Driving defensively and being aware of other vehicles on the road
- Applying solid pressure and continuing to steer while braking

These practices can be added to any company or site specific driving requirements.

Equipment winterization and operating procedures must be developed in accordance with the manufacturer's specifications. Each piece of equipment or vehicle is only required to be winterized once a year. Although this may be completed for several pieces of equipment and vehicles, it should be treated as any other infrequent task. Hazard assessments must be completed and reviewed by workers prior to the job tasks being completed.

Other equipment and vehicle maintenance and set up procedures that may need to be developed or updated include:

- Towing
 - Vehicles and equipment can become stuck in deep snow or mud
- Boosting equipment

- Cold weather may result in equipment needing a boost to start
- Fueling
 - More equipment to fuel because of more generators, light plants and heaters
- Heater set up and maintenance
- Light plant maintenance and set up

Preparation and review of practices and procedures should take place before they are needed during the winter season. This should be conducted in late September to ensure workers have adequate time to review and ask questions and documents can be revised if needed.

Pre-use or pre-trip inspections are common practice for equipment and vehicles. Often, a checklist is used to ensure a thorough inspection is completed. Winter season items can be added to the checklist to ensure vehicles and equipment will be prepared for winter conditions. Additions may include but aren't limited to:

- Heater/defrost function is operational
- Tire tread is appropriate for road conditions
- Tire pressure meets manufacturer's specifications
- An ice scraper, snow brush and shovel are in good condition and in the vehicle
- Lights are operational (Head, brake, signal and hazard lights)
- Emergency Supplies are available
- Fluid levels are full
- Snow is cleared from the entire vehicle exterior

Ensure equipment and vehicle pre-use or pre-trip inspection checklists are completed on a daily basis prior to use.

5.5.2 Vehicle and Equipment Winterization and Inspections

In mid-October, schedule all vehicles for a pre-season preventative maintenance inspection and servicing that meets or exceeds manufacturer's specifications. A winterization checklist should be completed by a competent worker for each vehicle and piece of equipment. In addition to regular preventative maintenance, the winterization checklist should ensure:

- All fluids, such as windshield washer, engine oil, antifreeze, and other lubricants, are winter grade and rated for the coldest operating temperatures. Fluids that are not winter grade should be replaced. Stocks of winter grade lubricants should be ordered in September.
- Windshield wipers are operational. Blades are in good condition and strong enough to clear heavy snow accumulation. If older than six months consider replacement
- Each vehicle is equipped with an ice scraper, snow brush and a shovel. Ordering these supplies should take place in September to ensure stocks are available when needed
- Interior heaters provide sufficient heat and defrost functions are operational
- Engine block heaters are installed and operational

- Each vehicle that is used for driving off site is equipped with emergency supplies such as a first aid kit, fire extinguisher and road triangles. In addition to supplies that may be in the kit year round, winter seasons additions should include:
 - Emergency blanket
 - Winter gloves
 - Booster cables
 - Flashlight with batteries
 - Emergency heat source, such as a candle with matches
 - Cell phone or other means of communication
- Glycol and Hydraulic lines should be inspected for breaks, cracks, or leaks.
- Tires are good quality and appropriate for the road conditions the vehicle or equipment will operate on. It is important that each vehicle be equipped with the correct size and type of tire that is recommended by manufacturer's specifications. Many types and ratings of tires are available, see Appendix 8.

5.6 Environmental Considerations

Winter conditions and activities can negatively impact the environment. Impacts can affect water, soil, air and wildlife. Planning for these environmental impacts during the pre-season is the best way to prevent an environmental incident.

5.6.1 Water

Two concerns need to be considered to ensure the care of water. The first is erosion and sedimentation control and the second is spills to water. Dewatering of ground water and snow melt from work locations may be required. During dewatering large amount of sedimentation can be deposited when the water is moved. It is important to consider the site's water management requirements prior to the winter season. The water management plan may include important specifications such as locations water can be dewatered to, dewatering methods, water test requirements and any equipment that may need to be ordered prior to the winter season. Materials and equipment needs may include:

- Hoses and pumps
- Silt fencing materials
- Water diffusers
- Water testing equipment

Site requirements may have limitations on the amount of sedimentation, conductivity or dissolved substances that can be present in water that may enter ponds and streams. Water testing may be required to ensure the water is not over any limits before being released.

Site and environmental requirements must be considered when selecting de-icing products, locations of snow dumps and flow of melt water. Salt used as ice melt is commonly prohibited as high concentrations of salt can change the pH and conductivity of ground water. Sedimentation control may be needed for melt from snow dumps. Planning for care of water during the pre-season can prevent harmful impacts to water systems and save expensive in-season and post-season clean-up activities.

To prevent spills to water it is important to control activities that could lead to spills around water bodies. These activities could include fueling, fuel storage, and waste storage. Avoid any fueling or storage of fuel and hazardous materials close enough to water that a spill would enter the water body. Fueling that must occur near water should only be done if spill containment is used to collect any drops or spills from over fueling. If storage must be placed near water, berming should be placed to contain any spills. Consultation of local and federal environmental legislation will ensure compliance.

During spring run off, larger volumes of water may be located in areas that do not typically have water. Spill prevent and response must take into account water accumulation and movement during spring run off.

5.6.2 Soil

Care of soil focuses on spills. Spills can occur during fueling, handling chemicals and hazardous materials or due to mechanical failure of equipment. During the pre-season hazard assessment, any spills can be identified and cleaned prior to being covered with snow. Monitoring for staining can be added to the in-season inspection checklist. Spill trays should be used when refueling equipment as any drips or spills can be masked by the snow. It is important to ensure enough spill kits and secondary containment will be available for all equipment on site. When ordering heaters, lighting, generators and snow removal equipment, ensure secondary containment is ordered for each piece of equipment. The secondary containment must hold 10% more than the maximum volume of fluid the equipment can hold.

Bulk fuel and lubricant storage should be in compliance with WHMIS, regulatory and site environmental requirements. Storage areas must be continuously monitored for spills and staining.

5.6.3 Air

Exhaust emissions during the winter season increase due to combustion heaters, lighting, generators and idling vehicles. Site air quality requirements should be consulted during the pre-season planning process. A vehicle idling policy may be required. Typically, idling should be avoided at temperatures above -20°C.

5.6.4 Wildlife

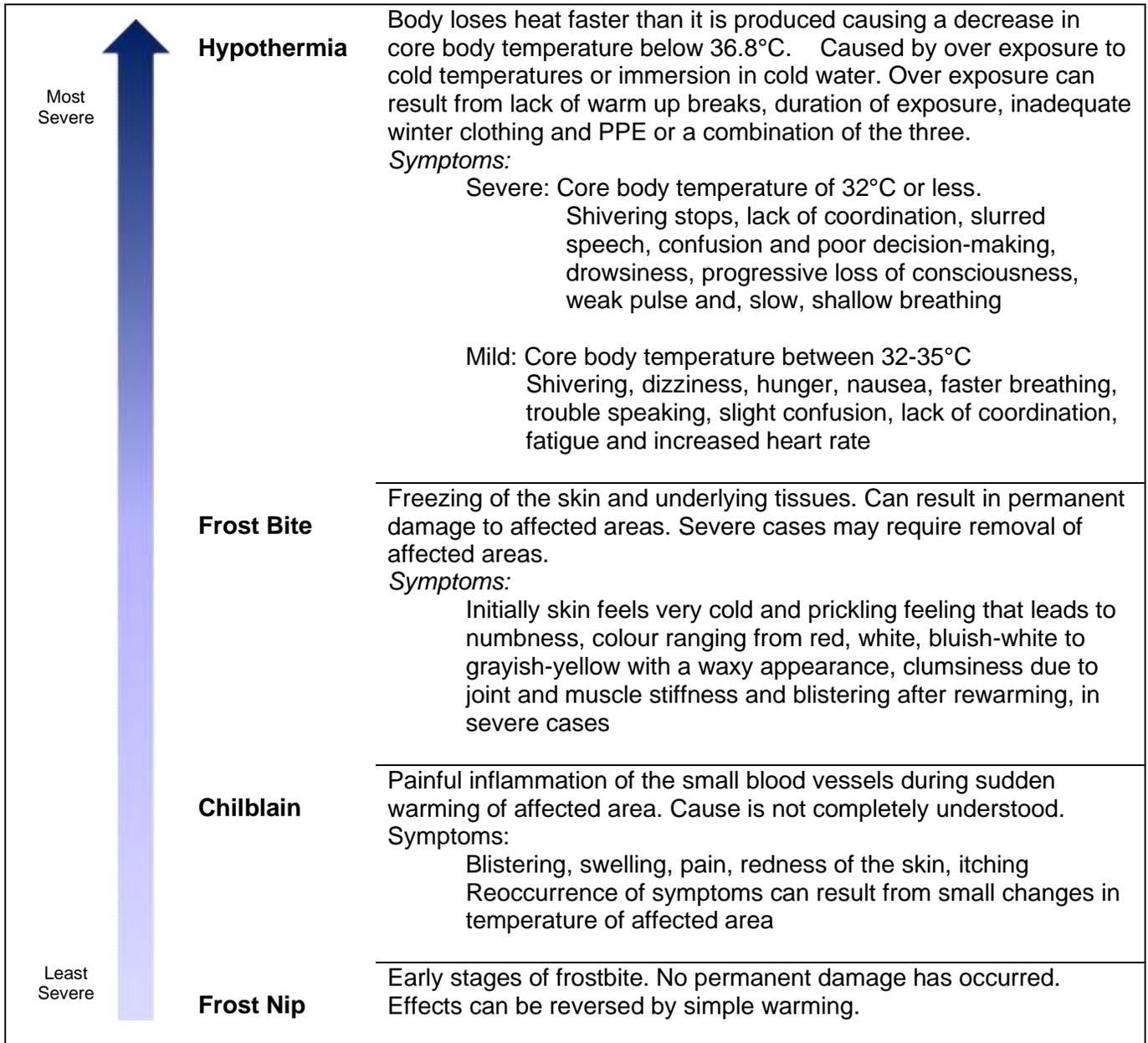
Wildlife will be preparing for one of three activities: migration, hibernation or preparing for the cold season. All of these activities require animals to search out large amounts of food. All food and food waste must be stored to not attract wildlife in wildlife proof containment. During preparation for the winter season, it is important to ensure all interior areas are sealed tightly to avoid animals from seeking shelter inside when the temperatures start to drop.

5.7 Winter PPE Selection

When completing the hazard assessments for winter work, it is important to use the control hierarchy to mitigate winter hazards and worker cold exposures. As for any PPE, winter PPE is the last line of defense in controlling worker's exposure to the cold. If used correctly, winter PPE can be very effective at mitigating cold exposure when elimination, engineering and administrative controls do not completely mitigate the risk of cold injury.

To assist in selecting the best winter PPE, it is important to understand the consequences of cold exposure. Understanding cold injuries will help to ensure PPE

selected will prevent the most severe outcome. Cold exposure can vary in severity as shown in the figure below.



Selecting the correct PPE will help prevent the occurrence of the above cold related injuries.

When selecting winter PPE, environmental factors such as ambient temperature, precipitation and wind, activity level of the work and other hazards of the task the PPE will also have to protect against must be considered. The figure below shows the relation between temperature, activity level and required insulation. Required insulation, or IREQ, is measured in clo. The insulating value of clothes selected should be based on ambient temperature of the work environment and the anticipated metabolic rate of work activity.

Activity Levels:

Resting: No activity

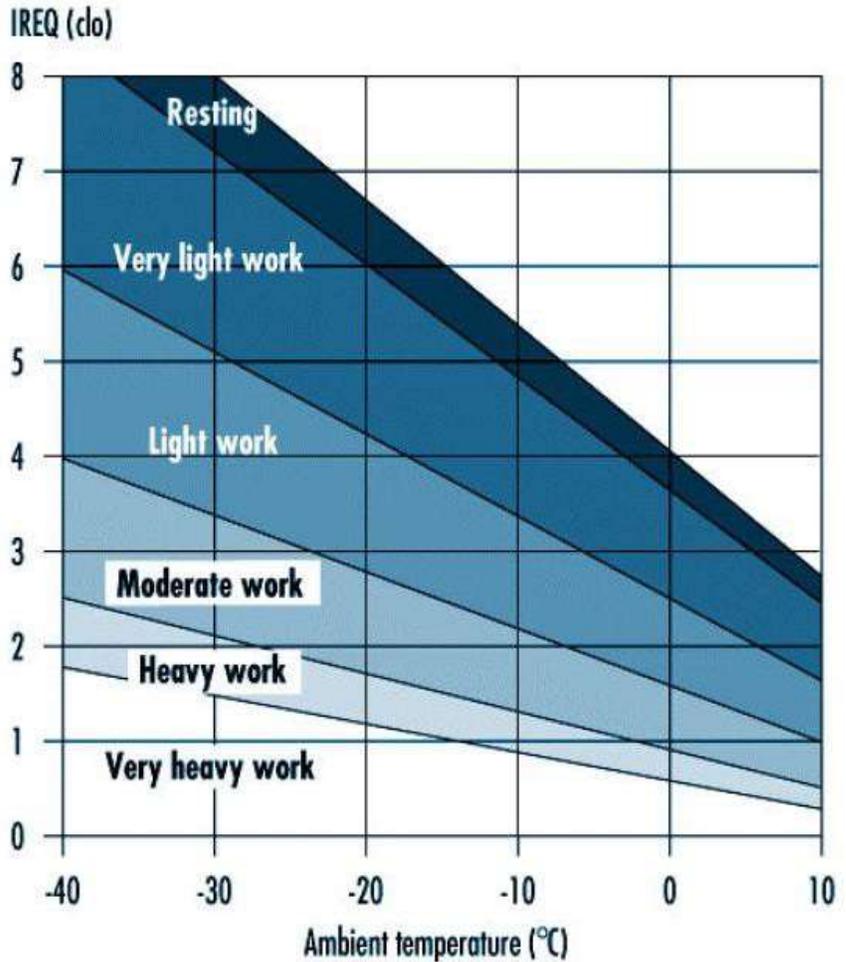
Very Light: Sitting at ease, completing light hand, arm or leg work such as typing or driving, standing in one position, walking at ease

Light: Sitting or standing with moderate hand and arm work. Casual walking, light infrequent lifting

Moderate: Repetitive arm or leg work, moderate pushing and pulling, quick walking, frequent light lifting

Heavy: Heavy arm and leg work, fast walking or jogging, heavy pushing and pulling, frequent heavy lifting

Very Heavy: Running, maximum paced work, continuous climbing, and quick heavy lifting



For example: A worker is completing light wheelbarrow work, at an ambient temperature of -20°C. Reading off the chart where the moderate work region crosses with the -20°C mark, an IREQ value of about 2-3 clo. is obtained.

Required insulation levels may vary depending on the individual worker. Required insulation values will provide a guideline when selecting winter clothing to prevent core body temperature from decreasing. Clothing with higher insulation values may be required to prevent other cold injuries such as frostbite or protect from wind or other environmental conditions.

Many insulated garment manufacturers provide guidance for recommended temperature and level of work activity. The table in Appendix 9 shows the general IREQ (clo) values for common winter garments. This table can be used for garments from manufacturers that do not provide guidelines for their product.

Work activity and temperature may vary throughout the day. Dressing in layers allows the worker to add or remove layers as needed. Adjustments to layers should be made prior to work rate or exposure changing to prevent sweating and cooling effects. Generally, three types of layers can be used to increase effectiveness of winter work wear. These are:

Layer	Purpose	Examples
Inner	<i>Absorb moisture and keep it away from the skin.</i>	<ul style="list-style-type: none"> • Thermal underwear (top and pants) • Wool or thermal socks • Glove liners
Insulating	<i>Helps keep a layer of warm air trapped around the body.</i>	<ul style="list-style-type: none"> • Fleece mid-layer (top and pants) • Boot liners
Outer	<i>Keeps dust, dirt, wind, and moisture away from the previous layer. Easily removed to prevent the buildup of body heat.</i>	<ul style="list-style-type: none"> • Balaclava / face mask • Arctic-type parka • Outer wind-block pants • Insulated gloves or mittens • Insulated work boots

Winter PPE can be bulky and limit mobility. Over protection may result in unnecessary hazards to workers. Once the level of insulation is determined, it is important to select PPE based on the work to be completed. PPE must protect against the cold and the hazards of the job task but still allow enough mobility and dexterity to complete the task.

Other than inadequate protection from cold exposure, selecting PPE that is not correct for the task or the conditions can create the following hazards:

- Blocked vision or loss of peripheral vision
- Layering around ears preventing hearing
- Eyewear fogging
- Snow glare
- Decreased dexterity
- Cuts, scraps and abrasions to hands
- Lack of mobility
- Inadequate traction for ground conditions causing slips, trips and falls.

Selecting PPE that best suits the task and the conditions will ensure the risk of injury is mitigated to a level as low as possible but still allows the work to be completed. Each piece of PPE has specific characteristics to consider. These are provided in the following sections.

5.7.1 Base Layers

Base layers paired with outer layers are the best method to protect the skin from cold and moisture. Base layers include inner and insulating layers. The purpose of these layers is to draw moisture away from the body and provide the insulation required for the cold exposure of the work environment.

Often the work environment requires outer layers to meet certain specifications. Two common requirements are chemically resistant or fire retardant (FR). Base layers also need to be compatible with the work environment. Incompatibility of base layers with the work environment can increase the risk of injury to the worker. For FR requirements, base layers must be made of FR fabrics or natural fibers. Serious injury can result if the wearer has non-FR base layers under FR outer layers during a fire or flash over. The base layers can fuse with the wearer's skin resulting in serious burns and tissue damage.

Inner base layers should fit tight to the skin, be breathable, moisture wicking and comfortable. These include undergarments, long underwear and under shirts. Natural fibers such as cotton and wool will allow the greatest amount of breathability and moisture control. Some advanced technology synthetic fibers also exist that provide good breathability and moisture control but these may not be FR.

Insulating base layers will provide the majority of insulation required for the specific cold exposure. Using multiple layers to achieve the appropriate level of insulation will allow for adjustments to be made as conditions and activity levels change. Insulating base layers include hoodies or sweaters and pants. When selecting hoodies or sweaters consider site requirements as some site may not allow hoodies. Hoods limit peripheral vision and should never be worn while driving or working around equipment. If hoodies are permitted, consider using hoods that can detach using Velcro or snaps and removing strings to avoid the wearer from being caught and pulled into moving parts.

Keep inner and insulating base layers clean of dirt and dry to maximize protective capabilities.

5.7.2 Outerwear

Outerwear may provide some insulation but its main purpose is to provide protection from wind, moisture and non-winter hazards that are present due to the job task or work environment. Other hazards may include fire/explosion, sharp or abrasive materials, chemicals, or steam.

Outerwear that is the correct fit will help prevent loss of body heat. This is best accomplished with outerwear that has fitted sleeves and pant legs. Avoid short jackets that may rise up during work exposing the torso. Outerwear should be loose enough that it is comfortable to work in but not so loose that cold drafts can access the body allowing for heat loss.

Outerwear selection should consider:

- Moisture repellency: waterproof or water resistant
- Wind repellency
- Reflectivity and color requirements
- Other environmental hazards such as chemical exposure or fire
- Unmitigated risks of work task hazards

Selecting the right combination of base and outer layers for the work and environment will help mitigate the risk of heat loss preventing hypothermia.

5.7.3 Head and Face Protection

During cold conditions any skin that is uncovered is susceptible to heat loss and cold exposure. Heat loss will occur from your head proportionate to the percentage of body surface area your head, face and neck comprise. Also frostbite of the nose, ears and cheeks is very common. To prevent frostbite and heat loss, the head, face and neck can be protected using balaclavas, hard hat liners, neck warmers and toques.

Balaclavas, hard hat liners, neck warmers and toques must:

- Fit tightly and not bunch
- Not inhibit the protective capabilities of the hardhat
- Provide adequate thermal protection for the work environment

- Not limit vision or mobility
- Overlap to avoid gaps in insulation
- Be constructed out of FR material if required by the work environment

Hoodies and toques worn under hardhats may affect the fit of the hard hat. Hard hat liners and neck warmers should be considered first.

5.7.4 Eye Protection

When selecting protective eyewear, winter conditions may also present risk of injury and should be considered as well as job task hazards. Cold injuries can occur to the eyes during extreme cold conditions and high winds. Eyewear should be fitted to prevent cold air from contacting the eye. Styles of goggles are available for extreme weather conditions that provide superior insulation

Moisture from breathing and perspiration can cause eyewear to fog. To prevent glasses from fogging use those that have anti-fog qualities. Anti-fog lenses may have an anti-fog coating on the inner lens, have a double pane lens design or have venting. Effectiveness of each style will be dependent on the wearer’s facial features. Several styles may need to be available to accommodate all workers. Eyewear can also be treated with anti-fog sprays or wipes.

Illumination levels of the work area will help to determine lens shading or colour required. The table below describes the different lens colours that should be used:

Dark tint	Shouldn't be used during low light levels or indoors
50/50	Convenient for workers frequently changing from interior to exterior areas
Clear	Used during low light levels
Colored- typically yellow	Used during all light levels Best option to prevent snow glare

Protective eyewear should improve worker’s visibility and be comfortable to wear while protecting against the hazards presented by the work environment. Any eyewear selected must also meet any site requirements and CSA Z94.3.

5.7.5 Gloves

Gloves must be made of material that is suitable for the highest severity job hazard and cold exposure while allowing for enough dexterity to perform the task. Two options may be used to protect against job hazards and the cold: insulated gloves or non-insulated gloves paired with liners. Layering increases warmth of fingers and improves dexterity. Liners used for layering must be compatible with the protection requirement of the glove. For example, if gloves need to be FR, liners should be made of natural fibers such as cotton. The figure below depicts how gloves and liners can be paired for varying levels of insulation.



Mittens provide the highest level of insulation but may not provide enough dexterity to complete the work. If mittens have been determined to be required to provide enough insulation, gloves can be used in these conditions as long as warm up breaks are permitted to allow the workers hands to fully warm up before returning to the cold. To minimize exposed skin, use a gauntlet style glove or mitten that overlaps with the sleeve of the jacket.

Wet gloves may lose their insulating properties. Water resistant gloves should be considered if gloves may become wet. If water resistant models aren't available, multiple pairs of gloves should be available to allow for change out.

Any gloves selected for use must meet site requirements.

5.7.6 Boots and Traction Aids

Winter footwear must provide enough insulation to prevent cold exposure injuries, enough traction for the surface they will be used on and protect against other hazards that may be present due the work task or environment. Common winter conditions that footwear must be able to protect against are:

- Wet conditions- Boots are made of waterproof or water resistant material such as rubber, polyurethane or leather. Soft rubber soles will offer the best slip resistance on slippery conditions. A 15 inch rise will allow for lower leg protection and prevent water from falling into the boot.
- Cold Conditions- Boots have thermal polyurethane sole that doesn't become brittle in cold temperatures. Insulating liners can be removed if it becomes wet.
- Snow and ice conditions- Boots have an aggressive tread and sole pattern for increased traction. Can be paired with a traction aid to improve traction.

Depending on the work environment, footwear may need to be suitable for all of the above conditions. Several styles and fits of boots are available. Ensure that all boots are CSA approved and meet all site requirements.

The best method to mitigate the risk of injury due to slips, trips and falls on icy surfaces is to clear snow and ice from the surface and apply grit. This method is not always

possible. For situations that the risk of slips, trips and falls on icy surfaces remains, traction aids can help mitigate the risk.

Various styles of traction aids are available each with varying characteristics suitable for different environments. When selecting the best traction aid for the worker to wear consider:

- Surface traction aid will be used on
- Boot styles and sizes traction aid will need to fit
- Tasks to be completed while wearing traction aids
- On/off frequency
- Hazards the traction aid may add to the work and possible controls

Traction aids may have various characteristics each with advantages and disadvantages. Appendix 10 explains the advantages and disadvantages of these characteristics. This table should be used to select the best traction aid for the job task and work environment.

5.8 Ordering and Stock Inventory

Appendix 11 provides an inventory and ordering log of possible equipment, materials and PPE that may be needed prior to the winter season. This log can help in determining inventory onsite and stocks that need to be ordered.

5.8.1 Site Preparation

A variety of equipment and material are available to control winter conditions. Each site will have different needs and different equipment will be the best fit. Using information from years prior will help in the selection of equipment and materials. On new sites, using information from other sites and contractors can help.

5.8.2 PPE

Once the PPE that will best suit the work environment, job tasks and workers required to wear it has been selected, the items will need to be ordered in a variety of sizes. Various models with the same characteristics may also be required to ensure PPE fits all workers

If the site has existing stock, an inventory of current stock will help prevent over ordering. When determining stock requirements, determine what items will be supplied at the site, and what items the workers will supply themselves. Number of workers and replacement frequency will help to determine quantities required. Items such as gloves and eyewear may need to be replaced several times over the winter season whereas base layers, outerwear and boots should last the entire season.

Winter PPE stock should be ordered in September to ensure items are available when winter conditions set in.

In addition to PPE, some other personal items that can assist workers in mitigating the risks of winter hazards are heat packs and headlamps. The necessity of these items should be considered when conducting the job hazard assessment. If determined necessary, these items should be ordered at the same time as the PPE stock.

Appendix 11 provides an inventory and ordering log of possible equipment, materials and PPE that may be needed prior to the winter season. This log can help in determining inventory onsite and stocks that need to be ordered.

5.9 Winter preparedness Campaigns

Preparing the site, winterizing vehicles and equipment and selecting and ordering winter PPE are important parts in mitigating the risk of incident or injury caused by winter conditions. Informing and training workers is the final part of pre-season preparations.

Pre-season winter preparedness campaigns should ensure workers have all the information they require to work safely during the winter season. A campaign planner can help to ensure a smooth roll out. A campaign planner can be found in Appendix 12. Campaign topics should include but are not limited to:

- Basic winter orientation for workers who may be experiencing winter conditions for the first time
- Slip, trip and fall hazards
- Cold Injuries
- Stretching and warm up routines
- Winter driving
- Vehicle and equipment maintenance and operation including idling and vehicle warm up policies
- Buddy system for monitoring for cold injuries
- PPE selection, use and maintenance
- Winter walking precautions including use of traction aids
- Review of Policies, JHA, JSA, and SWP that are relevant to winter work
- Ergonomics for task such as manual snow shoveling
- Cold and flu prevention

Winter preparedness campaigns can be conducted through numerous different delivery methods such as training sessions, safety meetings, tool box talks, flyers and posters. Information can be found from the following sources when developing materials:

- Working in Heat and Cold (AB OHS Guideline)
- Cold Weather Workers Safety Guide (Canadian Centre for Occupational Health & Safety)
- Musculoskeletal Prevention Guidance Sheet: Risk Factor Cold Temperature (WorkSafe BC)

Sample posters, bulletins and tool box talks can be found in Appendix 13. Preparation of campaign materials should begin in September.

6.0 In-Season Work Execution

During the winter season the main goal is to execute the plan that was created during the pre-season. Thorough pre-season planning will make in-season work execution run smoothly.

Pre-season planning aims to prepare the site and workers for the winter season to prevent injury and incident. In-season monitoring and continual worker education and training will help to mitigating the risks associated with winter hazards.

6.1 Continual Monitoring

It can be difficult to create a fully comprehensive winter work plan. Continual monitoring will further help to ensure the plan has not missed anything and is being executed as intended.

Continual monitoring can be accomplished in various formats including inspections, audits and surveys. All parts of the plan that are being executed should be checked. Important items to monitor are:

- PPE effectiveness
- PPE use
- Road condition and maintenance
- Access/egress routes
- Buildings and overhead ice and snow hazards
- Weather conditions
- Slip, trip and fall hazards or potential problem areas
- Staining under stationary equipment
- Presence of wildlife attraction around lunchrooms or interior work locations

Checklists and inspection forms can be created to ensure nothing is missed. Topics can be combined in a variety of formats to best suit the site's needs. Sample forms can be found in Appendix 14.

The frequency of inspections and monitoring will depend on the site but should be completed after major changes in weather conditions, site configuration or when working in new or infrequently used areas. Some sites may determine that daily or weekly checks will be completed. Frequency of continual monitoring should be determined during pre-season planning.

6.2 Continual Training and Education

Any pre-season training and education topics should be continually provided to workers throughout the winter season. This will ensure workers have the information and training required to protect them from winter conditions while performing their work tasks. New workers to the site that missed pre-season training should be trained prior to commencing work.

Refreshers and reviews can be delivered through safety meetings, tool box talks or formal training sessions. Most formal training sessions will take place in the pre-season. The same materials that were used in the pre-season may still be appropriate or materials may need to be updated to make them relevant to the current conditions and in-season requirements.

Topics that should be reviewed during the in-season work execution include but aren't limited to:

- PPE use and maintenance
- Cold exposure and cold injuries
- Stretching and warm up breaks
- Buddy system
- Winter driving and vehicle maintenance
- Slip, trip and fall prevention

- Ergonomics for snow removal

6.3 Preparation for spring melt

Near the end of the winter season it will be time to prepare for spring melt. Good site preparation during pre-season planning will ensure that preparations for spring melt are already in place. At the end of the winter season equipment and materials may need to be ordered that will be needed for spring melt such as pumps and hoses for dewatering.

Prior to spring melt, review the plan and ensure that planned water run-off areas are still appropriate. Also, determine if ditching systems will be able to handle the amount of water that may accumulate based on the amount of snow. Assume the worst case scenario and that all the snow will melt very quickly. If supplementary ditching or berming needs to be constructed this can be done before melt starts to prevent flooding. Remember to consider site environmental conditions when planning for water movement.

7.0 Post-season De-winterization and Program Review

Once the winter season is over, de-winterization and clean-up of work areas must commence. In addition to de-winterization, review of the winter works program should be conducted so improvements can be made for the upcoming seasons.

7.1 De-winterization

Both the site and equipment will require de-winterization. As snow melts, debris and materials will begin to appear that was covered in snow. A general site clean up should be conducted in the post season. Before all areas are accessed for cleaning a thorough hazard assessment should be conducted. This is especially important if the area was not accessed regularly during the winter season. The ground below any equipment that remained stationary throughout the winter season should be checked for ground staining that was masked by the snow.

Equipment and vehicle de-winterization should occur when it is certain winter conditions are over. During spring melt, muddy road conditions can cause mud build up on the under side of vehicles and equipment. All equipment should be scheduled for cleaning and a preventative maintenance check to ensure no damage occurred that was hidden by the mud. Fluids can be swapped out for summer grade fluids during de-winterization.

Accumulations of road grit will begin to be apparent as snow dump locations melt. Recycling the grit is possible but the grit may need to be filtered to remove debris.

7.2 Program Review

To assess the effectiveness of the winter works program, it is important to conduct a review during the post season. This will allow for continual improvement of the program and help to further mitigate risks from winter hazards for the upcoming seasons.

When conducting the review ensure to include:

- Worker feedback on PPE fit and effectiveness

- Corrective actions from any incidents where winter conditions were a contributing factor
- Lessons learned during the season that could enable safer work execution, higher production or few environmental impacts
- Trends from in-season hazard identification programs, audits and inspections
- New best practices, lessons learned or changes to legislation from other sites and contractors
- Impacts program execution had on people, production, environment and materials

Program review should include all parties that were involved in program execution including management, front line supervision, workers and safety. A post season review meeting can be held to gather information from all parties. Information collected should be used to update the program for the upcoming season.

8.0 Appendix

Below is a list of appendices and the sections each appendix is referenced in.

#	Title	Sections
1	Schedule for Existing Sites	4.0 Schedule of Events
2	Schedule for New Sites	4.0 Schedule of Events
3	Winter Work Kick Off Meeting Action Plan	5.1 Winter Safety Kick-off Meeting
4	Wind Chill Chart	5.2 Hazard Assessment Tools 5.4.3 Severe Weather Warning/ Alert Systems
5	Cold-Exposure Guidelines for Outside Workers	5.2 Hazard Assessment Tools 5.4.3 Severe Weather Warning/ Alert Systems
6	Site Pre-season Hazard assessment checklist	5.3.7 Pre-Season hazard assessment
7	Holiday Shut down Checklist	5.3.8 Holiday Shutdown and Return to Site
8	Winter Season Tires	5.5.2 Vehicle and Equipment Winterization and Inspections
9	Insulating Value of Clothes	5.7 Winter PPE Selection
10	Traction Aid Characteristics	5.7.6 Boots and Traction Aids
11	Inventory and Ordering Log	5.8 Ordering and Stock Inventory
12	Campaign Planner	5.9 Winter Preparedness Campaign
13	Sample Winter Campaign Materials	5.9 Winter Preparedness Campaign
14	In-Season Checklist	6.1 Continual Monitoring

8.3 Appendix 3: Winter Work Kick-off Meeting Action Plan

Winter Work Kick-Off Meeting

Company: _____

Date: _____

Location/Facility: _____

The purpose of the kick off meeting is for all involved parties to meet to discuss pre-winter activities and site requirements in preparation for winter conditions. The meeting will accomplish two goals:

1. Review the Winter Work Plan and Schedule
2. Assign personnel/sub-committee to complete each activity

Pre-Season Activity	Description of Activity/Task	Person Responsible for Completing Activity	Date activity is to be completed
Winter PPE	Determine requirements and inventory needs. Start ordering process		
Winter Safety Readiness Review	Set meeting with contractors and sub-contractors to complete the pre-season hazard assessment. Review Winter Works Plans with contractors.		
Winter Safety Campaign Development	Ensure all campaign materials and supporting documentation is ready for the campaign roll out.		
Site Hazard Assessments	Complete the pre-season hazard assessment/checklist		
Site Preparation	Prepare the site based on the findings from the Site Hazard Assessment. Ensure controls are in place.		

Additional comments/ Actions:

8.4 Appendix 4: Wind Chill Chart

Environment Canada Wind Chill Chart

Actual Air Temperature T_{air} (°C)

Wind Speed $V_{10\text{ m}}$ (km/h)	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47	-53	-58
10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51	-57	-63
15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54	-60	-66
20	1	-5	-12	-18	-24	-30	-37	-43	-49	-56	-62	-68
25	1	-6	-12	-19	-25	-32	-38	-44	-51	-57	-64	-70
30	0	-6	-13	-20	-26	-33	-39	-46	-52	-59	-65	-72
35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60	-66	-73
40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61	-68	-74
45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62	-69	-75
50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63	-69	-76
55	-2	-8	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77
60	-2	-9	-16	-23	-30	-36	-43	-50	-57	-64	-71	-78
65	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
70	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-80
75	-3	-10	-17	-24	-31	-38	-45	-52	-59	-66	-73	-80
80	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81

where

T_{air} = Actual Air Temperature in °C

$V_{10\text{ m}}$ = Wind Speed at 10 metres in km/h (as reported in weather observations)

Notes:

1. For a given combination of temperature and wind speed, the wind chill index corresponds roughly to the temperature that one would feel in a very light wind. For example, a temperature of -25°C and a wind speed of 20 km/h give a wind chill index of -37. This means that, with a wind of 20 km/h and a temperature of -25°C, one would feel as if it were -37°C in a very light wind.
2. Wind chill does *not* affect objects and does *not* lower the actual temperature. It only describe how a human being would feel in the wind at the ambient temperature.
3. The wind chill index does *not* take into account the effect of sunshine. Bright sunshine may reduce the effect of wind chill (make it feel warmer) by 6 to 10 units.

Frostbite Guide
Low risk of frostbite for most people
Increasing risk of frostbite for most people within 30 minutes of exposure
High risk for most people in 5 to 10 minutes of exposure
High risk for most people in 2 to 5 minutes of exposure
High risk for most people in 2 minutes of exposure or less

8.5 Appendix 5: Cold Exposure Guidelines for Outside Workers

Work/warm-up schedule for a 4-hour shift

Air temperature – Sunny sky		No noticeable wind		8 km/h wind		16 km/h wind		25 km/h wind		30 km/h wind	
°C (approx.)	°F (approx.)	Max. work period	No. of breaks								
-26° to -28°	-15° to -19°	(Norm. breaks) 1		(Norm. breaks) 1		75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	(Norm. breaks) 1		75 min	2	55 min	3	40 min	4	30 min	5
-32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease		Non-emergency work should cease			
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease			
-43° & below	-45° & below	Non-emergency work should cease									

NOTES:

- Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up periods of 10 minutes in a warm location and with an extended break (e.g., lunch) at the end of the 4-hour work period in a warm location. For light-to-moderate work (limited physical movement), apply the schedule one step lower in the table. For example, at -35° C (-30° F) with no noticeable wind (Step 4), a worker in a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
- The following is suggested as a guide for estimating wind velocity if accurate information is not available:
8 km/h – light flag moves; 16 km/h – light flag fully extended; 25 km/h – raises newspaper sheet; 30 km/h – blowing and drifting snow.
- If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factor given above would be: (1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/m²; (2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m². In general, the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart over-compensates for the actual temperatures in the colder ranges because windy conditions rarely prevail at extremely low temperatures.
- TLVs apply only to workers in dry clothing.

Refer to the "Cold Stress" section of the current *Threshold Limit Values and Biological Exposure Indices* publication for further information.

8.6 Appendix 6: Site Pre-Season Hazard Assessment Checklist

The following two templates can be adapted to fit the needs of the specific site. Use the table in section 5.3.7 to update the templates as necessary to suit the site requirements for a thorough Pre-Season Hazard Assessment checklist.

Item No.	Description	Responsible Party	Required Date	Date Completed	Comments
A	Safety				
1	Review SWP for Cold Weather Work at a safety meeting				
2	Prepare Tool Box Topics on Winter Precautions and Present to Workers				
3	Slips & Trips campaign				
B	Eliminate Hazards				
1	Inspect and Remove / Elevate Temporary Electrical Cables				
2	House keeping- all items / trip hazards cleaned up.				
3	Boot cleaners at all doors				

4	Lighting assessment ensuring high mast lighting and light plants are placed and all in good operating condition				
5	Determine snow fence requirements				
6	Provide Clear Access Ways for Equipment to Work				
8	Ensure all low laying objects are highlighted in the event of heavy snow fall (pylons)				
10	Cone lay out around material laydowns				
c	Material Storage				
1	Clear Out Lay Down Areas Prior to Winter removing unnecessary materials				
2	Prepare & Store Material in Lay Down Areas for Winter Conditions. Raise materials on dunnage				
3	Barricade and indicate material storage to identify trip hazards				
4	Provide Heated Storage for Temperature Sensitive Materials. No Flammable Materials to be Stored in Trailers.				

D	Snow Removal/Sanding				
1	Prepare snow dump and grit and deicer storage areas on site				
2	Supply grit for spreading on Slippery Areas in work areas. Grit is stored in boxes				
6	Service / order snow blowers				
7	Shovels / brooms ordered and accessible				
E	Heat & Hoard				
1	Hoardings are built so they can withstand weight from snow accumulations				
2	Identify areas where heaters will be required and what type of heater will be suitable				
G	Equipment / Fuel				
1	All equipment is equipped with a spill tray and spill kit				

2	Winterize all equipment				
3	Fuel and lubricant storage is away from water sources and stored in accordance with WHMIS and TDG				
4	Order Light Plants / Portable lighting				
H	Miscellaneous				
1	Winterize fire hydrants				
2	Check power at hitching stations for block heaters				
3	Tool cribs have a supply of winter PPE				
8	Winterize buildings and trailers				

PROJECT / SITE WINTER READINESS TOOL
PART 2 - WINTER WORK

Project:	Date:
location / Facility:	
Inspection Team Lead(s)	1 (2)
Contractor	1 (2)

Item	Comment / Status	Due Date	Done
People:			
Implement winter work orientation and awareness programs			
Implement the workplace safety Personal Availability policy			
Proper PPE made available when needed to suit weather conditions			
Mandatory winter PPE implemented and enforced (e.g.: boot tread audits, non-skid footwear accessories, proper helmet liners, appropriate gloves, etc)			
Work plans developed/adjusted to accommodate reduced productivity, and subsequent adoption of short cuts			
Project/site leadership aware of potential of shortcuts to maintain productivity in the face of bad weather			
Workplace Fatigue Management monitoring system in place			
Equipment (if these activities have not been conducted pre-season):			
Cold temperature rated equipment in place on site			
Preventive maintenance schedules planned and implemented			
Heat Tracing materials and combustion heaters/trucking available as needed. Policy/procedures in place/understood			
Suitable mechanical and manual snow removal equipment on site			
Wind Wall and Hoarding materials available and policy/procedure for use is in place/understood			
Implement Winter -version of engine idling policy (vehicles and equipment) and safety electrical signs			
Implement cold temperature equipment and vehicle refueling procedures (vapour cloud, static spark).			

8.7 Appendix 7: Holiday Shut-down Checklist

Winter Shut-down			
Site:		Contractor:	
Date of Shut-down:		Completed by:	
Action	Date due	Responsible party	Date Completed
Prepare contact list including: <ul style="list-style-type: none"> • Client or Management • Service companies such as trailer, road maintenance or equipment • Fuel and other supply companies • Emergency services including Medical, fire, environmental and Security • Safety 			
Prepare and document Shut-down Plan			
Determine staffing levels, shifts that will be required and roles that will be required during shut-down			
Determine work activities that will be completed during the shut-down			
Prepare information packages for those who will work over the shut-down which includes Emergency contact info and procedures, maps, roles and responsibilities, work procedures			
Determine and complete pre-shut-down activities			
Order equipment, materials and supplies that will be required for the length of the shut-down			

Additional Notes: _____

8.8 Appendix 8: Winter Season Tires

Tire type	Characteristics
All Season	All season tires are designed to provide enough traction for safe driving over a wide range of conditions. All season tires are made of a harder rubber compound to promote longer tread life. Harder compounds lose traction when the temperature drops below -7 to -10 °C. The tight, closed tread design provides poor traction in snow and slush when the tread face becomes packed with snow.
M + S or M&S	Mud and Snow. These are all-season tires with a self-cleaning tread. They have above-average traction in muddy or very light snow accumulation as well as better traction at low ambient temperatures.
M+SE	Mud and snow tires equipped with studs
Winter or Snow (Mountain peak/snowflake pictograph) 	Winter tires are designed for use in snow and lower ambient temperatures. They have a more aggressive and open tread design to prevent snow build-up which results in superior grip. They are constructed of soft rubber that doesn't lose traction at lower temperatures
Studs or chains	Can be applied to any type of tire if permitted by the manufacturer.

8.9 Appendix 9: Insulating Value of Clothes

Basic clothing ensemble: 1.0 clo			
This is the clothing ensemble to be comfortable at room temperature, 20°C: under garments, short sleeved shirt and shorts or light pants			
Base Layers		Outer Layers	
Insulating socks	0.06	Boots	0.10
Long underwear: top	0.20	Thin jacket (not lined, rain coat or wind breaker)	0.36
Long underwear: bottoms	0.15	Lined jacket	0.48
Sweater	0.25	Bib overalls	0.30
Insulating shirt (Sweatshirt or flannel)	0.36	Coveralls	0.49
Insulating pants (sweatpants)	0.28	Knee length insulated jacket	0.69

These are a general values for a typical garment. Actual insulating values of the specific garments in use will be dependent on the material the garment is made of

8.10 Appendix 10: Traction Aid Characteristics

Characteristic	Advantages	Disadvantages
Over shoe or galosh style 	Adds a waterproof outer to the boots	Some styles can be heavy Can collect snow and water between the boot and the traction aid. Once on the boot, may be difficult to remove Doesn't fit all boot styles
Full foot cleats 	Provides full foot traction Provides maximum amount of traction Comes in a variety of styles to fit most boot types. Easy to apply and remove.	Can't be worn on all surfaces specifically indoors or on metal.
Heel Cleats 	Can be worn to operate equipment and vehicles without becoming caught Fits all boot styles Easy to apply and remove.	Only traction on the heels. Wearer's heel is raised possibly causing ergonomic issues.
Screw in cleats 	Attaches directly to boot allowing for use on any type of winter footwear suitable for the task. No straps, or extra soles to become caught. Provides excellent traction on hard packed snow and ice.	Not easily removed for walking on hard surfaces, metal or concrete. May damage sole of boot Can create sparks on metal surfaces. Replacement needed as they can fall out easily.
Full foot sand paper 	Safe to wear indoors, or on hard surfaces. Non-sparking material. Easy to apply and remove	Not suitable on hard packed, icy surfaces. Frequent replacement needed as abrasive material falls of or become smooth. Only provide traction on toe and heel.
Wire or spring 	Provides excellent traction on hard packed snow and ice Don't lose shape or elasticity. Easy to apply and remove	Prone to becoming caught on stairs and loose ground material. Extremely slippery on hard surfaces such as metal Not suitable for driving
Center foot spikes 	Easy to apply and remove Convenient for frequent indoor/outdoor work or driving	Do not provide full foot traction Alter way in which boot contacts ground

<p>Velcro fasteners</p> 	<p>Provide secure, snug fit Adjustable to many boot sizes Can be attached to a variety of traction aid styles</p>	<p>Velcro prone to wear and tear in wet, snowy or muddy conditions. Replacement required</p>
<p>Rubber or flexible upper</p> 	<p>Stretches over boot Fits variety of boot styles</p>	<p>Loses elasticity in the cold. Prone to stretching out and falling off. May not fit winter boots with large toe boxes.</p>
<p>Flexible rubber sole</p> 	<p>Stretch to fit a variety of boot styles and sizes</p>	<p>Loses elasticity in the cold. Prone to stretching out and falling off. Can become caught on loose ground surfaces. Not suitable for driving.</p>
<p>Hard plastic sole</p> 	<p>Aggressive tread and traction</p>	<p>Heavy. Hard plastic sole can become stiff in cold conditions. Difficult to fit all boot shapes.</p>

The above images are to depict traction aid types not to brand endorsement

8.11 Appendix 11: Inventory and Ordering Log

Material	Needed	On site	To be Ordered	Ordered by and date
Roadways and Parking Areas				
Barricades				
Signage				
Portable blinking lights				
Snow Removal and Grit Application				
Grader				
Loader				
Bobcat				
Sand truck				
Snow blower				
Leaf blower				
Shovels				
Brooms				
Ice scraper or chipper				
Grit				
Deicer				
Buildings and Trailers				
Glycol or piping antifreeze				
Anti-slip material for stairs				
Wet floor signs				
Boot brushes				
Floor mats				
Hoarding and Heating				
Tarps				
Wood				
Scaffolding				
Indirect fire heaters				
Heater hoses				
Air movers				
Fire Extinguishers				

Lighting				
Permanent lights				
Light plants				
Light bulbs				
Work and Laydown Areas				
Dunnage				
Delineators				
Snow Fence				
Grit boxes				
Cord stands				
Vehicle Winterization				
Winter grade lubricants				
Winter grade windshield washer fluid				
Winter tires				
Snow brush and ice scraper				
Windshield wipers				
Extension cords for block heaters				
Emergency kits				
Spill kits				
Spill trays				
Dewatering				
Pumps				
Hoses				
Silt fence				
Diffusers				
PPE				
Hard hat liners				
Toques				
Balaclavas				
Safety eyewear				
Gloves				
Traction aids				

Winter Preparedness Campaign				
Posters				
Training materials				

8.12 Appendix 12: Campaign Planner

Name of Campaign:	Winter Work		
Topic:	(Message to be broadcast)		
Time of Campaign:	Date/Week of...		
Details		Due Date	Complete (Y/N)
Target Audience (Focused) :	<i>(Identify the group(s) that the campaign is focused on sites, locations, contractors, working group, etc.)</i>		
Deliverables:	<i>(what is being produced)</i> <ul style="list-style-type: none"> • Merchandise (stickers, magnets, key chains, hats, cups, etc.) • Bulletins/Alerts • Client communications • Safety meeting material • Handouts 		
Delivered by:	<i>(Who is involved in the delivery?)</i> <ul style="list-style-type: none"> • Health and Safety • Supervisors • Line Management • Contractors • Sub-Contractors • Client Reps 		
Plan/Timelines:	<i>(HOW.....is there steps that need to be followed)</i> <ul style="list-style-type: none"> • Hold meeting by this date • Contact external/internal resource • Order merchandise • Gather stats if applicable • Additional research • Prepare materials • Lead time for materials, approvals • Is there conflict with other initiatives? 		
Training:	<i>(is additional training required/offered)</i>		

	<ul style="list-style-type: none"> • <i>Is there a link to existing training available or should there be?</i> 		
Media to be Used:	<ul style="list-style-type: none"> • <i>PowerPoint</i> • <i>Posters</i> • <i>Handouts</i> • <i>Videos</i> 		
Budget:	<p><i>(What is the estimated budget for this activity, if applicable)</i></p> <ul style="list-style-type: none"> • <i>Line items</i> 		
Risks/mitigation:	<ul style="list-style-type: none"> • <i>What can derail/impact this?</i> • <i>Shutdowns/unplanned outages</i> • <i>Workloads</i> • <i>External conflicts.</i> • <i>Who can deliver if you can't?</i> 		

8.13 Appendix 13: Sample Winter Campaign Materials

The following links will provide sample Tool Box Talks, Safety Meetings and Posters to be adapted and used.

1. Exposure to Cold (PowerPoint)
2. Frostbite and Hypothermia (Word)
3. Winter Driving (PowerPoint)
4. Winter Prep Safety Meeting (PowerPoint)
5. Winter Preparedness Presentation (PowerPoint)
6. Winter Working Conditions Poster (PDF)
7. Winter Slips, Trips and Falls poster 1 (Word)
8. Winter Slips, Trips and Falls poster 2 (PDF)
9. Winter Slips, Trips and Falls pamphlet (PDF)

Winter Surveillance Report

Surveillance Focus Area	Activity Remarks	Score*
*Scoring: 0-Not in place; 1-Poor; 2-Satisfactory; 3-Good; 4-Excellent; x-Not Applicable		
Winterization Supplies (ex. Sand bins stocked)		
Housekeeping		
Waste Materials		
Winter PPE		
Footwear/ Traction Aids		
Maintenance Construction Safeguards		
Overhead Snow/Ice		
Safety Signage/Barriers		
Policy/Procedure Compliance		
Training Practices Followed		
Pre-task Planning/ Analysis		
Ladders and platforms free of Ice/Snow		
Warm Up Shelters Provided		
Roads/Walkways Established/Delineated and Maintained		
Heat Tracing		
Combustion Heaters		
Hoarding/Wind Walls		
Area Lighting/Task Illumination		
Roads and parking plowed and maintained		
Additional Comments:		

EXPOSURE TO THE COLD

November 6, 2013



FORWARD
TOGETHER

WHAT IS COLD STRESS

Cold stress is the transfer of body heat out to a colder environment

When you are exposed to a cold environment, most of your body's energy is used to keep your internal temperature warm

A cold environment forces the body to work harder to maintain its temperature



DID YOU KNOW..??



At -55 °C the skin will freeze in less than two minutes of being exposed

Cold stress is usually the result of being improperly prepared for changes in weather conditions and a lack of knowledge about exposure to the cold

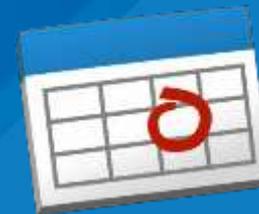
It is important to remember that cold stress isn't just a result of working in extreme weather conditions

FACTORS THAT INFLUENCE HEAT LOSS

There are several factors that can influence how we gain and lose heat



- Air temperature
- Wind speed
- Humidity / moisture
- Direct contact with cold surfaces
- Physical activity
- Work / rest cycle

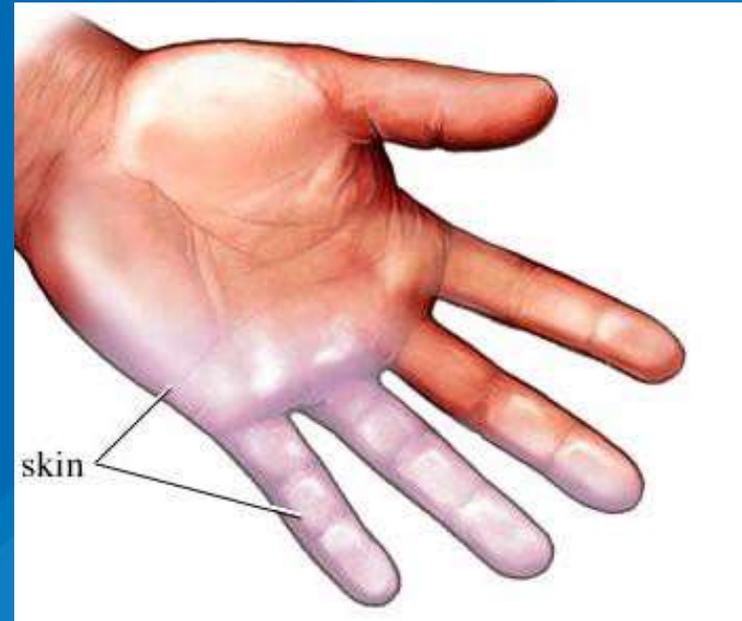


COLD INJURIES

- Exposure to the cold can be hazardous or even life-threatening
- Your body's extremities, such as the ears, nose, fingers and toes, lose heat the fastest
 - The more skin that is exposed to the air, the faster the body will lose heat because a greater surface area is exposed
 - Once the skin senses cold, the blood travels back to the body core to protect the major organs
- The three most common injuries that result from exposure to the cold are:
 - Frost nip
 - Frost bite
 - Hypothermia

FROST NIP

- Mildest form of an injury from exposure to the cold
- Occurs when only the top layer of skin freezes from exposure to the cold
 - Ear lobes, nose, cheeks, fingers or toes
- Skin appears to be white or yellow in colour
- Top layer of skin feels hard, but the deeper tissue still feels soft
- May experience painful tingling or burning sensation
- After the first signs of frost nip,
frost bite will develop within 60 seconds



FROST BITE

- More severe than frost nip
- The skin loses water and other tissue (fat / muscle / bone) is frozen in addition to the skin being frozen
- Skin appears white, waxy, and it feels hard to the touched
- Sensations in affected area; cold, stinging, tingling, or aching followed by numbness
- Most likely to occur in the extremities (toes / fingers / ears / nose / face)

OR

- Large areas of skin exposed to cold conditions

HYPOTHERMIA

- Occurs when body heat is lost faster than it can be produced
- Exposure to cold over a long period of time, without using adequate controls, may cause the core temperature of the body to drop below normal temperature (37 °C)
- Core body temperatures below 37 °C can cause serious damage to vital organs and if left untreated, may lead to death
- Signs of hypothermia include:
 - Shivering; the body's natural reaction to try and increase the core temperature
 - Confusion; unable to process information as quickly / loss of focus
 - Loss of muscle control; may find walking difficult / “drunken stagger”
 - Increased breathing rate;
- Having clothing against the body that is wet or damp will increase the rate at which hypothermia sets in
- It is critical to seek treatment immediately if you feel that you or one of coworkers are suffering from sign of hypothermia

TREATING COLD STRESS INJURIES

When dealing with cold injuries, follow these steps to ensure you do not cause more damage to your body:

- Notify your supervisor immediately if you think you may have signs of exposure to the cold
- Remove all wet / sweaty / damp clothing immediately
- Never rub or massage the area or apply direct heat
- Do not apply direct heat to the area because you may burn the skin
- Warm the area gradually with body heat or warm water
- Once the area is warm, DO NOT re-expose it to the cold
- Seek medical attention ASAP

PREVENTING COLD STRESS

Education —

Workers should be coached to recognize the signs of cold induced illnesses and injuries. Also, you should assess the environmental and worksite conditions that may lead to cold stress each day before beginning your work tasks



Working conditions —

Be sure to monitor the length of time you are exposed to cold conditions. Take micro breaks as needed to warm up and stay hydrated

Buddy system—

Communicate with your crew about how to recognize the signs of cold stress in others. Most times we can't identify the early signs ourselves, so watch out for your co-workers and others around you



Stretch and Flex —

When blood flow decreases, muscle function also decreases. This can cause muscle reaction time to become slower. Stretch and flex through the day to increase blood flow to the major muscle groups, and keep your body warm

PREVENTION CONT.

Layer your clothing —

It is better to wear several thin layers of clothing instead of wearing fewer layers of thick clothing. Base layers are very important

Choose synthetic fabrics (rayon / polyester / acrylic) or wool as your base layer to absorb moisture. A middle layer could also be wool or synthetic to provide insulation

Choose fabrics made of waterproof and wind resistant material for your outer layer of clothing to create a barrier against the elements while allowing ventilation to prevent overheating

Cover your face and head with a balaclava or a toque. Up to 40% of heat can be lost when the head is left exposed

Keep a change of dry clothing available in case work clothes become wet



PERSONAL PROTECTIVE EQUIPMENT

In addition to layering your clothing, you must ensure that your PPE fits correctly over top of your winter wear

- CSA approved winter gloves
- Steel toed boots (rated for cold temperatures) with the appropriate traction aids
- CSA approved eyewear
- High visibility striping on your outermost layer



***Remember, if you choose to take layers off throughout the day, you **MUST** put your stripes back on

- Proper ear covering / toque / balaclava

Be sure to check with your supervisor with regards to any additional items you may need

WIND CHILL CHART

Actual Air Temperature T_{air} (°C)

	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47	-53	-58
10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51	-57	-63
15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54	-60	-66
20	1	-5	-12	-18	-24	-30	-37	-43	-49	-56	-62	-68
25	1	-6	-12	-19	-25	-32	-38	-44	-51	-57	-64	-70
30	0	-6	-13	-20	-26	-33	-39	-46	-52	-59	-65	-72
35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60	-66	-73
40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61	-68	-74
45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62	-69	-75
50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63	-69	-76
55	-2	-8	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77
60	-2	-9	-16	-23	-30	-36	-43	-50	-57	-64	-71	-78
65	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
70	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-80
75	-3	-10	-17	-24	-31	-38	-45	-52	-59	-66	-73	-80
80	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81

Wind Speed V_{10m} (km/h)

Use a wind chill chart to determine the actual outdoor temperature when getting dressed for work in the morning

**Questions
Comments
Concerns**

**THINK SAFETY
WORK SAFELY**

Avoiding Frostbite and Hypothermia

With extreme winter weather chilling much of the country, the Red Cross cautions all Canadians to take a few extra steps to avoid frostbite and hypothermia. Whether participating in outdoor winter activities or traveling, it is important to be prepared and know what to do should something go wrong.

"In weather like this, it is crucial that people prepare adequately before heading outside," says Rick Caissie, National First Aid Manager for Canadian Red Cross. "A little extra thought can make the difference between a safe, enjoyable experience or severe discomfort that may result in injury."

Prevent frostbite and hypothermia

- Wear a hat and clothing made of tightly woven fibers, such as wool, which trap warm air against your body. A few lighter layers protect better than one heavy garment.
- Protect vulnerable areas such as fingers, toes, ears and nose.
- Drink plenty of warm fluids to help the body maintain its temperature.
- If hot drinks are not available, drink plenty of plain water. Avoid caffeine and alcohol, which hinder the body's heat-producing mechanisms and will actually cause the body's core temperature to drop.
- Take frequent breaks from the cold to let your body warm up.

Signs & symptoms of frostbite

- Numbness
- Tingling
- Pain and swelling

As the condition worsens...

- Total loss of sensation
- Pale waxy skin will become dark bluish
- In severe cases, the skin will look burnt and charred.

Do you know what to do for frostbite?

- Cover the affected area.
- Never rub the skin as this may cause further damage.
- Warm the area gently by immersing the affected part in water that is warm and comfortable to the touch. Continue until affected area is warm and looks red.
- Bandage the affected area with a dry sterile dressing.
- Ensure that the affected part does not become frozen again.
- Get the person to a doctor as soon as possible.

Signs & symptoms of hypothermia

- Feeling cold
- Shivering (which will stop as the condition worsens)
- Slurred speech
- Pale skin, bluish lips
- Slow pulse
- Lethargic
- Mood swings
- Unable to think clearly
- Unconsciousness

What should you do for hypothermia?

- Remove wet or cold clothing and replace with warm dry clothing.
- Keep the person warm by wrapping him or her in blankets and moving them to a warm place. Remember to be very gentle in handling the person.
- Never rub the surface of the person's body; this could cause further damage if they are also suffering from frostbite.
- If the person is dry use hot water bottles or heating pads to warm them. Make sure there is a blanket, clothing or towel between the heat source and the person's skin.
- If the person is awake, give warm liquids to drink. Avoid alcohol and caffeine as they can hinder the body's heat-producing mechanisms.



Slips Trips & Falls



With the change in the weather, comes a change in the working surfaces. In Canada, every year, workers are injured due to slips, trips and falls. These injuries can result in pain and suffering and sometimes even death. It is important to remember that injuries caused from slips and trips are preventable!

Slips & Trips Incidents

Slips and trips are often regarded as non-fatal or minor injuries. In fact, slips and trips may not only lead to bruises and sprains, but more serious injuries may also result.



SLIPS

Slips happen where there is too little friction or traction between the footwear and the walking surface.

Common causes of slips are:

- wet or oily surfaces
- occasional spills
- weather hazards - such as snow, ice, and mud
- loose or unanchored mats
- flooring or other walking surfaces that do not have same degree of traction in all areas



TRIPS

Trips happen when your foot or leg collides with an object, causing you to lose your balance and eventually fall.

Common causes of trips are:

- obstructed view
- poor lighting
- poor housekeeping (i.e. clutter)
- uncovered cables
- uneven walking surfaces
- cord protrusion
- distraction or inattention to walking path

Slip and Trip Prevention in the Work Place

Both slips and trips result from some kind of unintended or unexpected change in the contact between the feet and the ground or walking surface. Good housekeeping, quality of walking surfaces, selection of proper footwear, and appropriate pace of walking are critical for preventing falls.

-- Housekeeping --

Good housekeeping is the first and the most important level of preventing falls due to slips and trips.

This includes:

- marking or monitoring spills and wet areas
- mopping or sweeping debris from floors
- removing obstacles from walkways and always keeping them free of clutter
- covering cables that cross walkways
- keeping working areas and walkways well lit
- replacing used light bulbs and faulty switches
- coiling stray cords, or securing them with tape or appropriate covering

- Walking Surfaces-

Changing or modifying walking surfaces is the next level of preventing slips and trips. Recoating or replacing floors, installing mats, pressure-sensitive abrasive strips or abrasive-filled paint-on coating and metal or synthetic decking can further improve safety and reduce risk of falling. However, it is critical to remember that high-tech flooring requires good housekeeping as much as any other flooring. In addition, resilient, non-slippery flooring prevents or reduces foot fatigue and contributes to slip prevention measures.

-- Footwear - -

In workplaces where floors may be oily or wet or where workers spend considerable time outdoors, prevention of falls should focus on selecting proper footwear. Since there is no footwear with anti-slip properties for every condition, consultation with manufacturers is highly recommended. Properly fitting and maintained (*i.e. not having exposed toe caps, worn out soles, holes, etc*) footwear increases comfort and prevents fatigue which, in turn, improves safety for the employee.

Personal Responsibility in Slip & Trip Prevention

It is important to remember that safety is everyone's business. While it is the employers' responsibility to provide a safe work environment for all employees, employees can improve their own safety too.

To prevent slips, trips, and falls you should:

- walk carefully on wet and waxed floors
- clean up or report all spills
- wipe your feet when coming in from the rain or snow
- remove obstacles from walkways and always keep them free of clutter
- don't carry a stack of objects too tall to see over
- use a safe stepladder, not a box, chair, or countertop, to reach tall objects
- keep cords away from pathways
- as you walk, check your path for anything sticking out - drawers, supplies, trash cans, brooms, and mops
- watch out for uneven floors and changes in floor level
- keep your hands at your sides, not in your pockets
- taking your time and paying attention to where you are going
- adjust your stride to a pace that is suitable for the walking surface and the tasks you are doing
- walk with the feet pointed slightly outward
- make wide turns at corners
- use installed light sources that provide sufficient light for your tasks
- use a flashlight if you enter a dark room where there is no light
- ensure that things you are carrying or pushing do not prevent you from seeing any obstructions, spills, etc.

Falls on Stairs

Stairwells should be well lit, with sturdy handrails on both sides. Persons using the stairwell should have one hand free to be able to use the handrail.

All the steps should have the same rise and depth, with visible edges. They must be kept free of grease, oil and obstacles which could cause slips and trips. Whenever possible, avoid carrying heavy or bulky objects which obscure your vision and/or require the use of both hands, or better yet, use the elevator. Carry smaller, lighter loads and make more trips, or obtain help with the load.



Stairway Safety Do's and Don'ts

DO:

- use handrails
- watch out for loose or worn decking
- report burned-out bulbs or poor lighting
- pick up any foreign objects
- clean up all spills immediately
- watch where you're going

DON'T:

- store or throw anything on steps or stairways
- **RUN!**

Summary

1. Slips, trips and falls are preventable
2. Prevention involves not only workplace conditions/ hazards, but the behavior or individuals
3. Everyone needs to work together to identify and correct hazards
4. Everyone needs to observe each other, and commend and correct in a positive

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Winter Driving



Preparing Your Vehicle

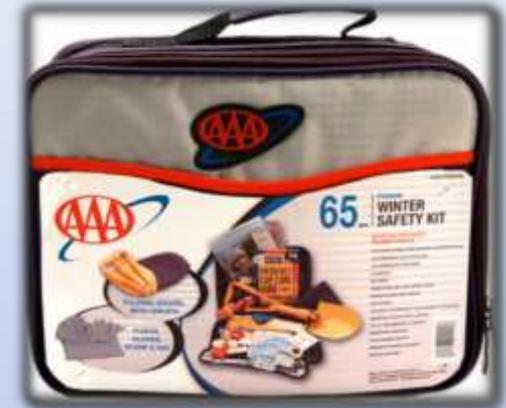
Preventative maintenance is essential to ensuring you are prepared for winter driving – get your car winter ready by performing a winter maintenance check up:

- Check battery and belt condition, cooling and heating systems, tire pressure and tread condition, and electrical and exhaust systems
- Check/replace the antifreeze (coolant) – the cooling system should be filled with 50% water and 50% antifreeze to prevent the engine from freezing
- Replace your windshield wipers with winter blades – these are heavier, push the snow and ice more easily, and have a longer life in the harsh winter months
- Keep an extra bottle of windshield washer fluid in your vehicle in case you run out while on the road
- Check tire pressure frequently – it decreases faster in cold weather
- Have an extra pair of sunglasses in the glove box to protect from the glare of the winter sun
- Prepare/buy a winter emergency road kit

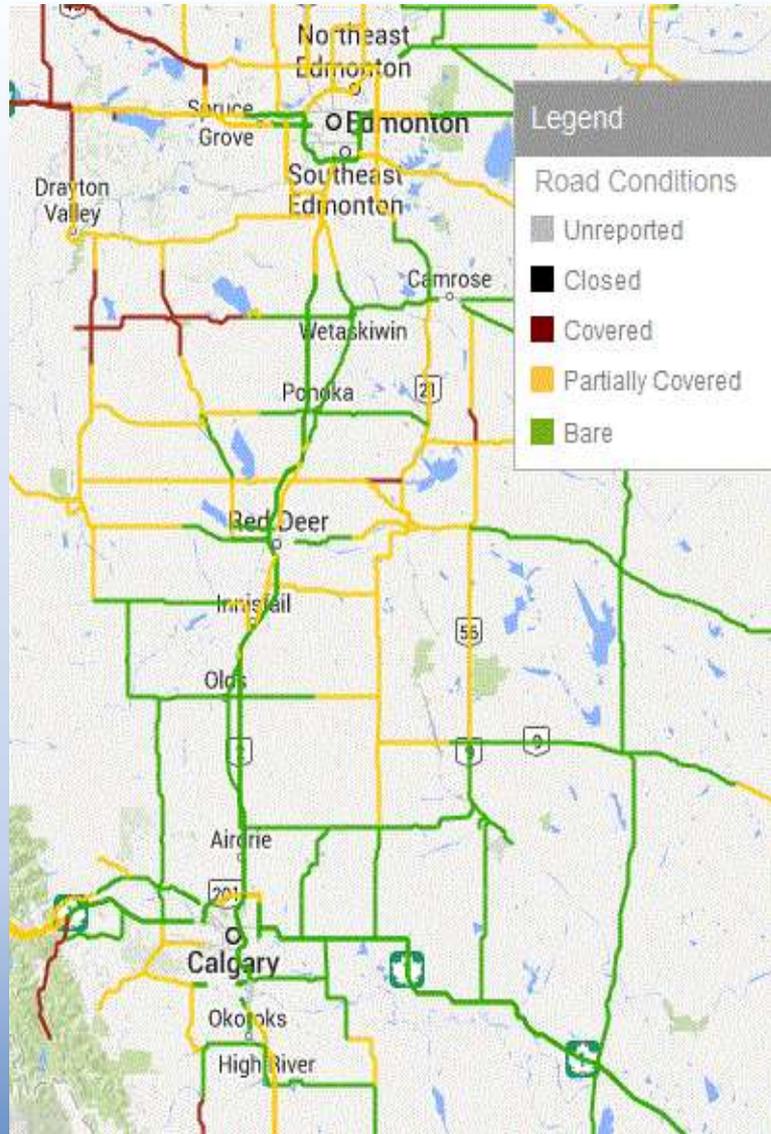
“By failing to prepare, you are preparing to fail” – Benjamin Franklin

Winter Emergency Road Kit

- Keep a winter emergency road kit available in your vehicle at all times throughout the winter season
- Pre-packed kits are available at department stores (Canadian Tire, Wal-Mart, etc.) or you can make your own
- Recommended items to include:
 - Small shovel
 - Ice scraper
 - Small bag of salt/ice-melt
 - Blanket
 - First-aid kit
 - Extra gloves/socks
 - Non-perishable food
 - Jumper cables
 - Flashlight
 - Hand/foot warmers
 - Flares
 - Pylons
 - Bottled water



Preparing to Hit the Road



- Check road conditions prior to departure and plan your route accordingly – avoid partially covered roads when possible and always avoid covered roads (visit www.amaroadreports.ca for real-time road conditions)
- Check the current and hourly weather forecast prior to departure to be aware of changing conditions that can present new hazards:
 - Visit www.theweathernetwork.ca for real-time weather updates
- Clear snow and ice from all windows, mirrors, lights, and the hood and roof
- Always fill the gasoline tank before hitting the open road
- Measure the tire pressure frequently – all-season tires will freeze more quickly and subsequently lose tire pressure faster than winter tires
- Ensure your cell phone is charged before extended trips

Winter Driving Tips

- Drive cautiously and take your time! Do not drive in severe conditions unless absolutely necessary - consider if your destination can wait until the weather passes
- Allow at least three times more space between you and the vehicle ahead of you and decrease your speed, leaving plenty of room to stop – remember that the posted speed limits are meant for dry pavement
- If your car is equipped with anti-lock brakes, apply steady pressure and do not pump the brakes – the pulsing of the brakes will be normal
- Avoid using cruise control – winter driving needs your full attention all the time!
- Drive defensively! Stay on the lookout for other vehicles that may be out of control
- Use extra caution on overpasses, bridges, and infrequently used roads – these will freeze first even if the adjoining pavement is in good condition
- Do not pass maintenance vehicles or snow plows and follow the recommended distance posted on the rear of the vehicle – road conditions in front of these vehicles will often be much worse
- Always allow extra time to get to your destination and remain patient in the event of delays



Safe Access/Egress



- An unbalanced weight transfer around sharp, hard corners and surfaces while entering and exiting vehicles requires extreme caution
 - Before entering or exiting your vehicle, assess the surrounding ground conditions for freshly fallen snow that may cover rocks, slippery, and uneven surfaces
 - Always follow the “three point rule” – use handles and edges to keep your balance and pay close attention to your footing... lightly check the surface condition with one foot before transferring your full weight to the ground
-
- Remove as much snow and ice from your footwear before entering vehicle
 - When exiting your vehicle, remember that your footwear is warm and the surrounding surface is cold, increasing the risk of slipping
 - Pay attention! It is easy to get distracted when we are arriving home after a long day



- Is my vehicle equipped for the weather?
- What could go wrong?
- Is this trip necessary under the given conditions?
- What do I need to do to address all of the hazards?
- Have I taken precautions for changing conditions?
- Am I prepared for emergencies?

*Getting
Ready for
Winter*

FORWARD
TOGETHER



- Although we are experiencing a heat wave right now, winter conditions are just around the corner
- Last year temperatures were below zero in early October and snow was quick to follow.
- Now is the time to prepare for winter conditions.

Vehicles

Frost and snow on windows can restrict visibility, thus making us unaware of hazards, people or other trucks and equipment in the area.

The following will help eliminate or reduce the risk:

- ✓ Using a Window scraper with brush to remove snow and ice
- ✓ Carrying extra window washer fluid in trucks
- ✓ Ensuring vehicle heaters are in good working order
- ✓ Allowing for ample time for windows to defrost before travel

During freeze/ thaw conditions, be aware of mud build up on the undersides of vehicles and ensure vehicles are adequately maintained to prevent damage.

Keep truck running boards and equipment accesses free from snow, ice or mud build up to reduce the risk of slips and falls when mounting

Winter Driving



Snow and ice build up on and around roadways can be very dangerous. Not only can it make the roadway slippery, but it can also cause hidden hazards and areas where vehicles can become stuck. Reduce the risk by:

- ✓ Increasing travelling distance between you and any vehicle or equipment you may be following
- ✓ Delineating ditches and other hazards that may be hidden by snow drifts with barricades
- ✓ Using caution on freshly back bladed roadways
- ✓ Be Aware of potential black ice
- ✓ Reduce travelling speeds

Walkways and access/ egress

Designated walkways clear of debris and materials should be established in work areas prior to snow fall. This allows for easy maintenance of walkways when winter conditions arrive.

Eliminate goat trails and short cuts in and around excavations. Also ensure that access/ egress paths into excavations are a reasonable grade. A steeper grade will increase the risk of slips and falls once the path is snow covered. Barricading and berming should be used to delienate walkways and prevent access to leading edges from pedestrians, vehicles and equipment.

Sand boxes will be placed in work locations so that access/ egress paths can be properly maintained.

If you notice a location that may require a sand stockpile, inform your supervisor.

Slip Prevention

- ✓ Always walk, never run
 - ✓ Remove ice and snow build up from walkways
 - ✓ Use sand to increase traction
 - ✓ Ensure your winter footwear has soft rubber soles and is kept clean
 - ✓ Traction aids will allow for a better grip when walking on snow and ice. Traction aids will be supplied by Ledcor and use will be mandatory.
 - ✓ Take short steps to maintain your center of balance over your feet.
 - ✓ When exiting your vehicle use three point contact
 - ✓ Only walk in designated areas and on designated surfaces
 - ✓ Ruts, holes and uneven ground should be leveled out if possible or identified to prevent hidden trip hazards.
- ✓ During summer conditions we lose focus on hazards presented to us while walking. We may become complacent. In summer, quickly jumping in the truck or walking quickly may not cause injury. Winter conditions require that we plan our path of travel and maintain focus to prevent typical early season injuries from summer behaviours. Be mindful, slow down and step cautiously.

Housekeeping

Small items such as plastic bags, excess flagging tape or small piles of lumber may seem like insignificant hazards but once these become snow covered the hazards become hidden and the risk of injury increases.

Plastics when frozen or covered with even small amounts of snow can be extremely slippery. Ensure when placing flagging, loose ends are removed and all flagging is disposed of once no longer needed. Plastic debris should be placed in construction waste bins as soon as possible.

Ensure all tools and materials are stored at the end of the shift and all cords are hung or indicated in case of over night snow fall.

Now is the time to continue to keep clean and tidy work areas so hidden hazards are eliminated.

Material and tool storage

- Store tools in job boxes or tool cribs at the end of shift. Avoid leaving tools out in the work areas overnight
- Avoid leaving tools in truck boxes. Keep truck boxes clean.
- Materials should be raised off the ground and stored on dunnage to reduce the amount of manual material handling required. This will also prevent materials from freezing to the ground.
- All laydown areas should be properly barricaded and identified to increase awareness of hidden hazards.
- Well organized laydown areas will also allow for easy snow removal in and around stored materials.
-

Heating and Hoarding

Heating and hoardings will be required in certain areas around site. Some hazards and prevention include but are not limited to:

- × Ice Build Up
- × Fire
- × Melted Tarps
- × Carbon Monoxide
- × Fuel Spill
- × Equipment Damage
- ✓ Clear Icicles on an ongoing basis
- ✓ Keep a fire extinguisher within 20'
- ✓ Keep heaters away from hoardings and avoid piling combustible materials, like cardboard, near heaters
- ✓ Avoid Carbon Monoxide build up by using exhaust ducts when required
- ✓ Ensure spill trays are used
- ✓ Place in a suitable locations for fueling access

Environmental

Spill Remediation

- Manage / clean spills as they happen to prevent snow cover
- Place spill kits in convenient locations that are easy to access

Equipment Preparation

- Check all hoses and lines when servicing equipment for winter
- Replenish spill kits and place in all heavy equipment and trucks
- Clean and reinstall spill containment pans on all portable equipment
- Capture antifreeze and lubricants when changing and adding to reduce spills

Wildlife

- Wildlife will be looking for warm locations to hibernate or call home for the cold winter. Sea-cans doors must remain closed when not in use to prevent wildlife from seeking shelter in these locations. Ensure all sea can doors are closed at the end of shift.



Shorter Days

- Daylight hours are already reduced and will only be getting shorter.
- Ensure work locations have adequate lighting for early morning work
- If your area is not illuminated properly contact your supervisor.
- Light plants present several hazards during use and set up. Be aware of the following:
 - Only trained workers will set up light plants
 - Outriggers should be extended with leg pins secured. Be aware that freeze/thaw conditions may lead to unstable ground conditions. Check outriggers frequently for stability
 - Before working with light plants, identify all pinch points

Dressing for Winter Weather

- Chances are when you return from your next turn around you will require warmer clothes.
- When choosing warmer clothes think of the following:
 - Dress in layers
 - Choose fabrics that are breathable and wicking that allow body heat produced by increase activity to escape while still maintaining warmth
 - Fall rains are common so take into account wet conditions
 - Winter gloves and balaclavas will be available from the tool crib
-

Winter conditions present specific hazards but proper preparation can ensure the risk is eliminated or controlled.

Identifying winter hazards on your FLHA cards and including these during stop and think moments will help to reduce injuries and incidents.

Winter Preparedness

STAY TOGETHER



Winter Work Focus Areas

- **Excavations**

- **Locations:** create plans for excavation locations to avoid double handling stored construction materials
- **Spoil Piles:** should be placed with regard to areas needed for snow storage. Limited ground.
- **Maintenance:** ensure berms are neatly constructed, barricades are placed appropriately, and slopes are cut back. Barricade open holes for future use, and backfill holes that are not needed.

- **Utilities**

- **Mark Permanent Facilities:** Mark the locations of utility lines both above ground and below ground.
- **Protect Temporary Facilities:** Identification and potential relocation if necessary. Cover, raise, heat tape or clad gas and water lines.
- **Plan Winter Access:** to service utilities and facilities.

Winter Work Focus Areas

- **Winter Clothing & Warm-up Exercises**

- Lengthen the time for “Stretch and Flex” in the morning following toolbox, and stretch frequently throughout the day to enhance blood flow to the muscles
- Bring the appropriate winter wear to work and dress for weather conditions. Ensure to warm up at appropriate times after working in the elements
- Dress in layers so that you can adjust the amount of clothing you need as temperatures fluctuate throughout the day

- **Heating Buildings**

- Weatherproof check outlets, panel boxes, electrical cords and connections
- Apply heat tape and insulation to lines and ducts as needed
- Service all furnaces and change filters regularly

- **Working at Heights**

- Reduce slips, trips, and falls at landings by applying sand for traction, and using brooms and shovels to clear paths of travel. Have scrapers available to remove snow and mud from work boots.
- Prepare for snow removal from the tops of buildings and containers. Install restraint lines, tie-off points, and secure access ladders in appropriate locations.
- Determination and implementation of preventive measures

Winter Work Focus Areas

- **Survey all Laydown and Material Storage Areas**
 - Lift materials off ground and stack neatly on dunnage or pallets.
 - Organize and consolidate stock
 - Mark ends with flags or barricades for visibility. Ensure all buried hazards are identified
 - Designate areas between sea cans as either storage areas or walkways to prevent workers from entering areas with hazards buried beneath the snow. Install signs and barricades as necessary
- **Roadways – Maintenance and Upkeep**
 - Smooth out and grade to drain. Ensure sloped areas are sanded to increase traction for vehicles
 - Identify and barricade designated walkways, roadways, and establish traffic patterns. Ensure adequate room for snow removal.
 - Service barricades, open ditches, and establish berms as needed
 - Install flashing construction lights on critical signage
- **Stockpile Winter Gear, Materials and Road Grit**
 - Ensure the above are readily accessible and ordered in sufficient quantities. Store in a dry location to prevent wear and deterioration.
 - Secure delivery sources of materials

Winter Work Focus Areas

- **Environmental**

- Watch for staining beneath equipment, machinery and vehicles during demobilization.
- When fueling, be mindful of small drops of fuels on the ground as they can accumulate to large quantities over time, and are not visible beneath snow
- Ensure all garbage is put in the correct waste bin and not left out to be covered by snow
- Be aware of transient wildlife in the area and report all sightings. Ensure all trailer doors and sea cans are closed when not in use to discourage denning behaviours.

- **Footwear & Traction Control Aids**

- All personnel must wear traction aids on their boots while working outdoors to prevent slips, trips, and falls from icy conditions
- When applicable, traction aids can be removed (ie. indoor locations like e-houses / pump houses, working on bare concrete, and when working on rebar, etc) as long as the hazards associated with not wearing traction aids are documented on all FLHA cards

Materials Storage and Preservation

Reorganize lay down areas to accommodate receiving new materials, equipment, and storing materials needed for future work.



To avoid loss of materials by low exterior temperatures or water damage, ensure that all materials are preserved and stored properly.



Designate laydown areas with hard barricades. Ensure housekeeping practices in these areas are adequately maintained throughout the winter season.



Raise materials off the ground with dunnage to reduce materials becoming frozen to the ground, reduce the need for manual material handling during cold weather, and ease snow clearing.

Sea Can Alley

Designate areas between sea cans as either a footpath or a storage area.



Storage areas between sea cans are not to be used as paths of travel. Ensure these areas are clearly marked and communicated to all personnel.



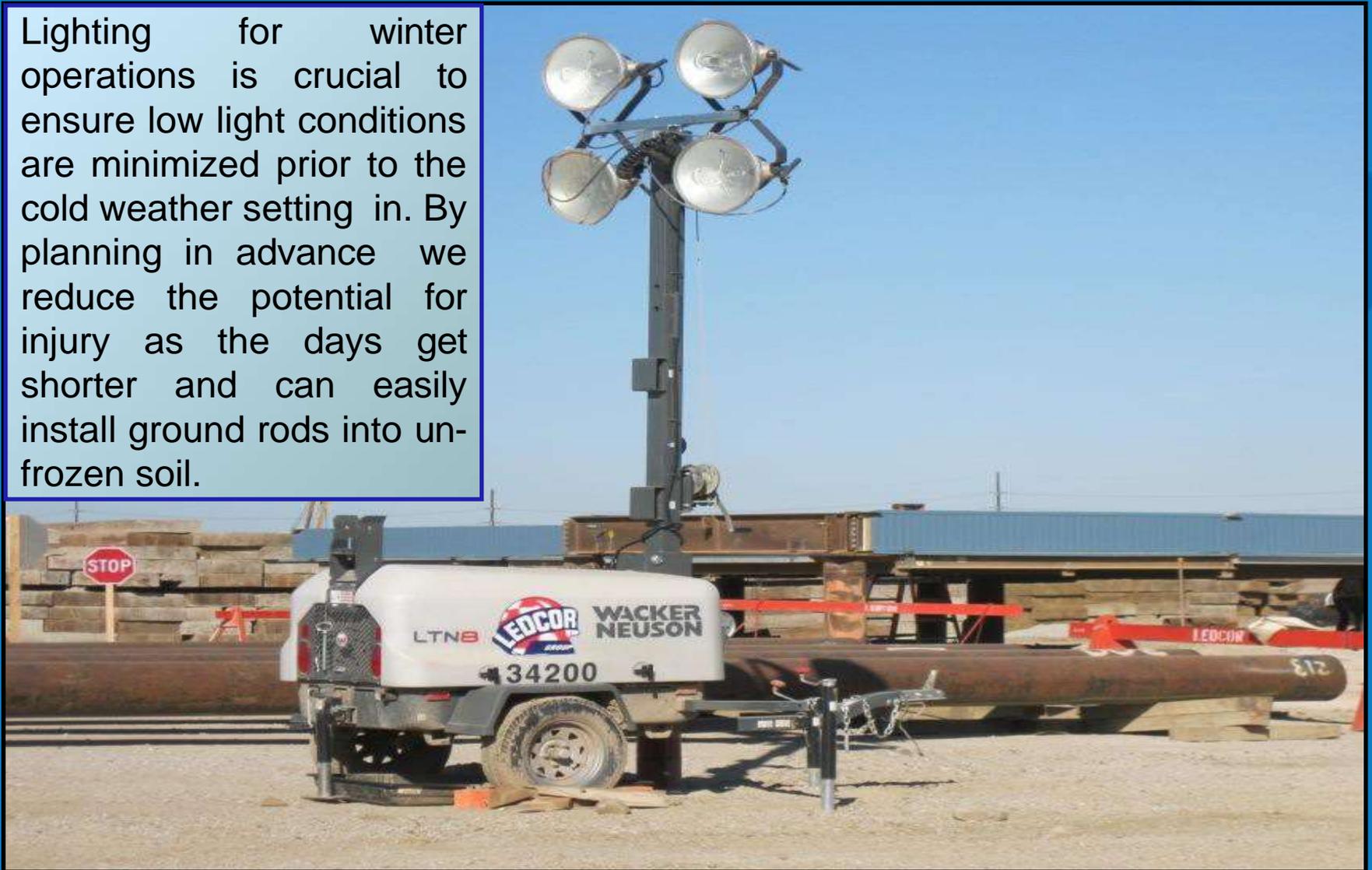
Areas between sea cans that are used as paths of travel must be free of hazards that pose a slip, trip, or fall risk to worker, such as ends of dunnage buried beneath the snow.

Materials between sea cans that may be buried causing a tripping hazard, should be moved and stored in another location prior to the first snowfall.



Portable Lighting

Lighting for winter operations is crucial to ensure low light conditions are minimized prior to the cold weather setting in. By planning in advance we reduce the potential for injury as the days get shorter and can easily install ground rods into unfrozen soil.



Power Sources

Generators and temporary power sources should be installed as needed across the job site. This will assist in eliminating the need for power cords to be run across roadways and access points, which may cause them to become buried in the snow and damaged.



Preserving Utilities: Temporary and Permanent



Snow removal often results in utility strikes because equipment and utilities are unidentified or covered with snow. Manholes, wells, gas service, valves and electrical connections all need to be marked with signs, posted, and flagged.

Critical equipment at a risk of being damaged during snow removal should be flagged, marked, and identified by snow fence or barricades along outer boundaries.



Prepare gas lines by raising them above personnel height or other means of protection like seen in the photo below. Always make sure gas lines and propane tanks are barricaded off and safe from the possibility of vehicle access.



Build exits from trailers to keep employees at grade to reduce slips, trips, and falls



Electrical run neatly, buried, and marked.



Electrical systems well guarded from impact by equipment and pushed snow by using barricades



Air hoses, water hoses, temporary power, and welding services are susceptible to damage by snow removal and freezing into the ground during winter months.



Makeshift wooden style supports may be satisfactory for lighter cables but heavier runs of cable need heavy duty stands to withstand the winter months.



Use cones and tripods to keep electrical wires and hoses up off the ground.

Dedicated Work Area Access

Identify designated walkways and stair access points routinely used by personnel as paths of travel. Avoid using areas that are not designated walkways to. Do not take shortcuts. All walkways must be accompanied by adequate lighting to increase visibility and the use of sand boxes.

Ensure that open holes and ruts where people could fall or twist their body are eliminated.



Place hard barricades around excavations and depressions that are to remain over the winter.

Paths of Travel: Roadways & Walkways



Traffic patterns including roadways and pedestrian walkways must be clearly marked. Place signs and barricades as necessary to designate paths of travel. Allow adequate space for snow removal operations to minimize and reduce the risk to both ground personnel and operators.



Drive to road conditions. Obey all posted traffic signs and site speed limits.

Ensuring roads remain clear of debris will assist in reducing property damage from snow removal, strikes on infrastructure, and waste materials being deposited in snow dump areas.



Buried Hazards



Identify ALL potential buried hazards near pedestrian walkways, roadways, and approved vehicle routes. Ensure they are adequately marked with signage and flags.



Mark openings / holes that will be used throughout the winter. Backfill all holes that will not be in use. Identify excavations with berms, hard barricades, and signs, to prevent unplanned entry by employees and vehicles.



Heating equipment should arrive on site in advance of the cold weather, hang heater hoses to prevent them from freezing into the ground and resulting in a slipping hazard.

Additional equipment required are things like spill pans and fire extinguishers in Orange colour boxes.

Plan appropriately for your needs.



Environmental Preparedness

Spill Remediation

- Manage / clean spills as they happen to prevent snow cover
- Place spill kits upside down in locations that are easy to access
- Check all wash cars and facilities for leaky pipes and working heat trace



Equipment Preparation

- Check all hoses and lines when servicing equipment for winter,
- Replenish spill kits and place in all heavy equipment and trucks
- Clean and reinstall spill containment pans on all portable equipment
- Capture antifreeze and lubricants when changing and adding to reduce spills

Management of Snow Dump

- Remove debris from collected snow before taking snow to dump locations
- Berm dump areas to capture any debris or waste from entering into the spring runoff



Environmental Preparedness

Wildlife

- Secure all waste bins
- Secure openings under trailers to discourage animals from denning behaviors
- Do not feed, approach, or harass the wildlife. Report all sightings on a “Critter Card”.
- Ensure to close all doors to structures to keep out wildlife.



Traction Control / De-icing

- Use treated sand instead of road salt to minimize the risk of slips, trips, and falls due to icy ground conditions
- Exercise caution when walking on sloped access / egress points
- Always wear traction aids when working in winter weather conditions

Ice and Snow Buildup

Heated mods and buildings cause snow to melt and freeze. The result is a buildup of ice, or icicles hanging from edges.



Remove snow and break away ice before it builds up causing a greater hazard and posing a risk to others.



Wind chill Chart

- The wind plays a big part in the temperature outside. The chart below can be used to determine the temperature when both actual air temperature and wind speed are a factor.

		Actual Air Temperature T_{air} (°C)											
		5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
Wind Speed V_{10m} (km/h)	5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47	-53	-58
	10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51	-57	-63
	15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54	-60	-66
	20	1	-5	-12	-18	-24	-30	-37	-43	-49	-56	-62	-68
	25	1	-6	-12	-19	-25	-32	-38	-44	-51	-57	-64	-70
	30	0	-6	-13	-20	-26	-33	-39	-46	-52	-59	-65	-72
	35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60	-66	-73
	40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61	-68	-74
	45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62	-69	-75
	50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63	-69	-76
	55	-2	-8	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77
	60	-2	-9	-16	-23	-30	-36	-43	-50	-57	-64	-71	-78
	65	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
	70	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-80
	75	-3	-10	-17	-24	-31	-38	-45	-52	-59	-66	-73	-80
	80	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81

Silo Winter Readiness

Are your areas prepared?

Work with your construction managers to assure the areas are ready for winter.

WINTER CONDITIONS INCREASE THE CHANCES OF SLIPS, TRIPS & FALLS



Even the most experienced ice walkers can still go ass over tea kettle. If you find a slip or trip hazard, fix it immediately. Putting tools and materials away, placing barricades, removing snow and sanding areas will help to ensure no one gets hurt!

FIX THE SLIP BEFORE SOMEONE TRIPS

Winter Working Conditions

& Think

- What could go wrong? What do I need to do to address the hazards? Has snow and ice hazards been identified?
- Has it been reviewed on the JSA?
- Do I have the proper PPE for the weather?
- Is my vehicle equipped for the weather?

Air Temperature (F/C)	No. of Wind		11kPa WIM		20km/h		W. P. Od		C&R I/Wmd	
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29 (10-51)	H	(e 1)	75 m: 1 W	2	56 =		40m 1111 UH		3, ... 1e	
J20	7: ar: m: 101		SSmr. 1, .	3			Xlmmir. 11e			
JSte. J7	55 mruw	3	Omn: JZ							
J3m bGb...	J. Omr. 1. 1		30 m: ...	5						
J3m bGb...	J. Omr. 1. 1		N: n Q" 11 r: 19 n: ywcr: d: odd							

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Winter is an exciting time of year, making it easy to get distracted from the wide array of hazards we will face throughout the winter months. Freezing temperatures

and hazardous surfaces will expose us to serious risks everyday. Early autumn as well as daily preparations are essential to ensuring safe and successful execution of the job at hand - we must constantly be aware of changing conditions and adjust our job planning accordingly.

Don't leave safety out in the cold!



Winter PPE

- Wear insulated winter work boots with aggressive soles - supplement traction with traction aids
- Choose base-layers that are tight to the skin, breathable, and made of natural or fire resistant materials (e.g. Kennel or Marino Wool)
- Wear gloves suitable to the job's greatest hazard - heavily insulated mittens may be required in extreme cold

Winter Walking

- Get a Grip... Wear proper footwear such as insulated work boots and traction aids
- Walk slowly and take smaller steps
- Avoid cruise control when walking - it needs your full attention at all times
- Be aware of hidden hazards under freshly fallen snow
- Practice safe egress - steps slowly in and out of vehicles and equipment, use the 3-point rule of contact, and always use handrails when available



Winter Driving

- Check road conditions prior to departure and plan your route accordingly
- Clear snow and ice from all windows, mirrors, fenders, hood, and roof
- Avoid cruise control - winter driving needs your full attention at all times
- Use extra caution on overpasses, bridges, and shaded areas - these freeze first
- Allow at least three times more space between you and the vehicle ahead - posted speed limits are for dry pavement
- Offensive defense! Slow down and be aware of other vehicles and wildlife

Snow and Ice Control

- Repon hazards on commonly used walkways in regular work areas and take risk reduction actions as necessary
- Do a Stop and Think about the route to the worksite, considering ice and snow conditions
- Inspect work area for snow and ice hazards
- Spread sand, salt, or ice melt
- Wear traction aids
- Barricade hazardous areas



Winter Slips, Trips, and Falls



Watch your step!
Beware of winter slip,
trip, and fall hazards

THINK SAFETY
WORK SAFELY