



# Outdoor Walking Surfaces

Slip and Fall Prevention



Outdoor walking surfaces may present many more slip, trip and fall hazards than interior walking surfaces. Environmental conditions result in the deterioration of the exterior surfaces, along with weather-related slippery conditions, such as snow and ice. Outdoor falls are both a general liability and workers' compensation concern. Parking lots, sidewalks, and steps need to have specific programs in place to prevent falls.

### Legal Considerations

In general, property owners are responsible for providing reasonably safe access to their businesses. However, this basic principle is subject to varying interpretations on a jurisdictional basis. Be sure to know your jurisdictional requirements and walkway safety responsibilities for the general public.

From a worker safety standpoint, poor outdoor walking surfaces can be hazardous. Employers who do not provide workers with a place of employment free from recognized hazards that could potentially cause physical harm can be in violation of provincial occupational and health and safety legislation.

In Canada provinces have Occupational Health and Safety Act. The US article as is referring to the US OSHA.

### Inspection and Maintenance

To ensure that walking surfaces are in good repair and present minimal hazards, periodic and documented inspections should be conducted. These inspections should identify conditions that can likely lead to a trip, slip or fall. As deterioration occurs, or as inspection results necessitate, prompt repairs should be completed to walking surfaces. Periodic cleaning of walking surfaces should also be performed to remove trash and debris that become slick when wet. Many of these conditions and suggested practices are found in Table 1.

### Establish Snow and Ice Maintenance Program

Prevention is the key to reducing slip and falls, beginning with a commitment to keeping outside walks and parking lots clear of ice and snow. A program should include strategies such as:

- Assignment of responsibility
- Tools and equipment
- Ice melt or other de-icing chemicals
- Hiring of a snow maintenance contractor
- Inspection and monitoring of conditions during a winter weather event and after for any possible refreeze (See Snow and Ice Maintenance section of this guide)

### Pedestrian Awareness and Responsible Walking

A property owner has more control over physical walking surface conditions than over the way people walk since walking is a behavioral function that responds to external stimuli. See the Pedestrian Awareness and Responsible Walking section for more information.

Everyone has a duty to watch where they are walking and to wear shoes that are appropriate for the current weather conditions. Refer to the Slip Resistant Footwear section for examples.

### Sidewalks and Patios

The majority of sidewalks, steps, ramps and patios are concrete. The slip resistance level of concrete starts with the finish established during installation. Some are "broomed" for a more abrasive finish and higher level of slip resistance. Some are smoothed for a shiny appearance but are very slippery during wet or snowy conditions. When installing new concrete for walking surfaces always consider a more abrasive texture.

Patios or walkways constructed of natural stone may be rough and have a raised surface presenting tripping hazards. Consider building patios of a smooth, level, material that has good surface traction.

### Stairs and Steps

Falls on stairs and steps can be quite serious. Stairs and steps are constructed of various materials, including concrete, wood, polished stone, tile and metal. Slips, trips and falls on stairs or steps can happen due to both human behavior and physical conditions, such as:

- Using stairs while vision is obstructed
- Using stairs while carrying materials
- Rushing up or down
- Not using the handrail
- Non-uniform stair or step rise and run
- Worn tread nose and other damage to the stairs
- Inadequate slip resistance
- Foreign materials or debris

Metal stairs generally found in industrial operations can be slippery, even when dry. Those that have a raised grip surface (see Table 1) are less hazardous. While a diamond plate has a raised surface and is not the best for providing traction.

### Ramps & Accessibility

Ramps should always be constructed in accordance with applicable local and provincial/territorial regulations. Top of mind should always be design, slope and width of the ramp.

As with any surface, ramps should be free of cracks or damage and should provide adequate slip resistance. The actual layout of the ramp can vary, especially the sides, which is where tripping hazards can appear. If the sides of the ramp are not visible because the color blends into the curb or parking lot, it's easy to trip on the edge. See Table 1 below.

### Curbs

Curbs are very similar to access ramps as they generally have similar colors as the sidewalk and parking lot. Low contrast between the two surfaces hides the change in elevation that can contribute to a trip or stumble. Contrast between the elevations is particularly necessary for aging pedestrians as their visual acuity has diminished with age. See Table 1. It is important to repair any damages that could be the source of a trip. See Figure 1.



Figure 1

### Decks

Decks, often found at restaurants and other small businesses, are composed of treated, stained and/or sealed wood or manufactured decking (plastic) – which can be slick when wet. The slippery conditions may be compounded by access steps or stairs that are worn. The presence of leaves or mildew and algae in shaded or moist areas can also exacerbate the slipperiness.

### Parking Lots

Prevention of slips and falls in parking lots is commonly overlooked when it should be a primary focal point. Workers walking from their cars to their place of work, and the general public visiting businesses, are exposed to a variety of walking surface hazards that can include:







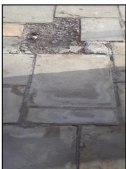


- Slippery surfaces during rain, snow and ice
- Slick painted surfaces
- Slick areas from vehicle oil and antifreeze leaks
- Smoothly sealed, coated asphalt when wet
- Low, settled areas
- Ponding water
- Pavement deterioration, cracks, heaves, potholes, storm drain grates, etc.
- Parking blocks or speed bumps
- Sand left from ice traction
- All of the above conditions combined with poor lighting






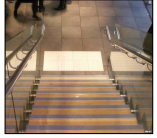

One factor to consider is the roughness of the lot surface. Some asphalt lots have a larger aggregate (rock) giving more traction in wet and frosty conditions. As the size of aggregate decreases, the traction also decreases. On the other hand, asphalt pavements may be heavily seal coated with a coal tar emulsion which includes sand in the mixture for traction.


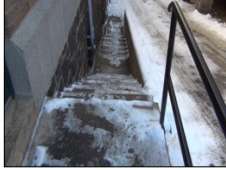


Parking blocks are necessary to prevent vehicles from extending on to sidewalks, but also present a tripping hazard as walkers maneuver over and around them when walking between cars. These wheel stops should not be placed in a foreseeable pedestrian path. In fact, they are not needed at all where vehicles park nose-to-nose, or where bollard posts can be used instead. Guidelines for the safe design and construction of parking lots can be found in the American Society for Testing Materials (ASTM).

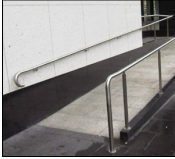
Predominately, slips and falls in parking lots happen in the winter weather months from snow and ice. These controls are outlined in the Snow and Ice Maintenance Section.






Table 1- Hazards and Controls









Sidewalks, Curbs, and Patios	
Hazards	Suggested Practices and Improvements
<p>Trip - Cracks or bumps due to settlement or heaving from tree roots.</p> 	<ul style="list-style-type: none"> <li>Remove and repair.</li> <li>Grind raised areas to taper.</li> <li>Fill cracks.</li> <li>Patch holes.</li> <li>Call a contractor for concrete leveling options.</li> <li>Replace or relevel raised pavers.</li> </ul> 
<p>Trip - Raised utility caps and drainage grates.</p> 	<ul style="list-style-type: none"> <li>Repair.</li> <li>Paint with a highly visible color.</li> </ul>
<p>Trip - Elevated inside corners of sidewalks.</p> 	<ul style="list-style-type: none"> <li>Raise the level of the soil to eliminate the inside edge.</li> <li>Install decorative corner post, planting to redirect them away from the corner.</li> </ul> 
<p>Trip - Landscaping/shrubbery extending onto the walk.</p> 	<ul style="list-style-type: none"> <li>Keep plants trimmed back.</li> </ul>
<p>Trip - Irregular stone walkways with naturally uneven surfaces.</p> 	<ul style="list-style-type: none"> <li>Replace with more level stone.</li> <li>Avoid large spaces between stones.</li> </ul>
<p>Trip - Location of bike racks, potted plants, benches, displays etc., on the walk reducing the width of the walking path.</p> 	<ul style="list-style-type: none"> <li>Relocate items creating hazards to areas that do not infringe on the walking path width.</li> <li>Benches should be mounted outside of the paved walking surface.</li> </ul>
<p>Trip - Vegetation growing between pavers or stones.</p> 	<ul style="list-style-type: none"> <li>Keep grass and other vegetation cut no higher than level of the stones.</li> <li>Avoid vegetation growth by using mortar concrete or sand filler between stones.</li> </ul>

Sidewalks, Curbs, and Patios	
Hazards	Suggested Practices and Improvements
<p>Slip - Leaves, pinecones, and other tree materials.</p> 	<ul style="list-style-type: none"> <li>Frequent cleaning of the sidewalks.</li> </ul>
<p>Slip - Settled or low spots.</p> 	<ul style="list-style-type: none"> <li>Level low spots with self-leveling compound or call a contractor for concrete leveling options.</li> <li>Regrade and replace the hard surface.</li> </ul>
<p>Trips - Lack of contrast between changes in elevations.</p>  <p>Triangular edges need to be highlighted</p>	<ul style="list-style-type: none"> <li>Curbs should be highlighted with a highly visible paint color in accordance to local regulations. Typically, safety yellow is used.</li> <li>Concrete dye to color curb or sidewalk separately to create a visual distinction between sidewalk and curb.</li> <li>If both curb and parking lot are concrete, painting the curb would be the best approach.</li> </ul> 
<p>Trip - Pedestrian short-cutting through landscaping not intended for normal foot traffic.</p>	<ul style="list-style-type: none"> <li>Install decorative structure, fencing or shrubbery to deter foot traffic.</li> <li>Redesign landscaping with decorative non-slip natural or fabricated stone to accommodate a walking path.</li> </ul>
<p>Slips - Snow and ice.</p> 	<ul style="list-style-type: none"> <li>Implement snow and ice maintenance programs. (See <a href="#">Snow and Ice Maintenance section</a>)</li> </ul>
Stairs and Steps	
Hazards	Suggested Practices and Improvements
<p>Slips and Trips - Steps and stairs with minimal slip resistance or contrast.</p>	<ul style="list-style-type: none"> <li>Replace or repair.</li> <li>Provide handrails per regulations (30-34" above the leading edge of the stair tread).</li> <li>Highlight top and front of the nose of each step with yellow paint or reflective strips.</li> <li>Apply abrasive epoxy coatings.</li> <li>Grind or etch surface for more traction.</li> <li>Cover with outdoor all-weather carpet. Avoid patterned carpet as it interferes with depth perception.</li> <li>Use tread nose traction covers.</li> <li>Improve visibility by installing lighting.</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Slip Resistant Nose Treads</p> </div> <div style="text-align: center;">  <p>Contrasting Nose Treads</p> </div> </div>

Stairs and Steps	
Hazards	Suggested Practices and Improvements
<p>Trips - Deteriorated concrete</p>  <p>Nose of treads have traction edges</p>	<ul style="list-style-type: none"> <li>• Repair or replace.</li> </ul>
<p>Slip - Slippery when wet or dry.</p> 	<ul style="list-style-type: none"> <li>• New installations should have some form of raised gripping surface.</li> <li>• Install non-slip step tread noses or tread grippers.</li> <li>• Adhere non-slip strips on tread nose.</li> <li>• Appropriately design handrails.</li> <li>• Keep clear of snow and ice.</li> </ul>
<p>Fall - Single step down to lower level.</p> 	<ul style="list-style-type: none"> <li>• Highlight front and top of nose of the step with yellow safety paint, reflective strips or yellow and black cross-hatching.</li> <li>• Use contrasting color on lower level to identify a change in elevation.</li> </ul>
<p>Fall – Stairs are too steep.</p>	<ul style="list-style-type: none"> <li>• Replace with proper slope as indicated by local jurisdiction or building code.</li> <li>• Provide handrails per regulations (30-34" above the leading edge of the stair tread).</li> <li>• Until replaced, temporarily improve traction.</li> </ul>
<p>Slip - Stairs are composed of metal and are slippery when dry or wet.</p>	<ul style="list-style-type: none"> <li>• New installations should have some form of raised, textured surface.</li> <li>• Install non-slip step tread noses or tread grippers.</li> <li>• Appropriately design handrails.</li> <li>• Keep clear of snow and ice.</li> </ul>
Ramps	
Hazards	Suggested Practices and Improvements
<p>Slips - Inadequate slip-resistance surfaces, such as smooth-painted ramps, can be slippery when wet.</p>	<ul style="list-style-type: none"> <li>• Apply abrasive epoxy coatings.</li> <li>• Grind, etch or groove surface for more traction.</li> <li>• Apply an adhesive backed abrasive, non-slip matting or other product.</li> <li>• Cover with outdoor all-weather carpet.</li> </ul>  <p style="text-align: center;">Epoxy coating with aggregate</p>
<p>Trips - Surface defects, cracks, heaves, etc.</p>	<ul style="list-style-type: none"> <li>• Replace surface.</li> <li>• Grind raised areas to taper.</li> <li>• Fill cracks.</li> </ul>

Ramps	
Hazards	Suggested Practices and Improvements
Slip - Slope angle is too steep.	<ul style="list-style-type: none"> <li>• Replace to proper slope as indicated by local jurisdiction or building code.</li> <li>• Until replaced, temporarily improve traction (slip resistance).</li> <li>• Must have handrails.</li> </ul>
Falls - Elevated ramps with open sides higher than 30" above the lower adjacent level.	<ul style="list-style-type: none"> <li>• Must have side guardrails.</li> <li>• Handrails help pedestrians maintain balance.</li> </ul> 
Trip - Low visibility of change in elevations such as sides.	<ul style="list-style-type: none"> <li>• Beginning and end of ramp should have highlighted color change to create visible surface change.</li> </ul>
Slips - Snow and ice-covered surfaces.	<ul style="list-style-type: none"> <li>• Maintain a surface free of ice and snow and provide adequate traction.</li> </ul>

Parking Lots	
Hazards	Suggested Practices and Improvements
Trip - Cracks, heaves and potholes are present. 	<ul style="list-style-type: none"> <li>• Repair, patch or replace.</li> <li>• Mark major hazards with cones to visualize the hazard.</li> </ul> 
Trips/Slips - Worn or settled tire spots, which hold water and are not highly visible. These depressed areas make snow and ice maintenance less effective. 	<ul style="list-style-type: none"> <li>• Patch or replace.</li> <li>• Barricade from pedestrian traffic until the condition is eliminated.</li> <li>• Install drainage where applicable.</li> </ul>
Trip – Parking blocks (wheel stops), broken blocks and rebar extending above the blocks. 	<ul style="list-style-type: none"> <li>• Should only be used if it prevents the vehicle from extending into walkways.</li> <li>• Vehicle nose to nose parking or pull-into-curb parking could utilize bollard posts instead (height of 4-5' above the parking surface).</li> <li>• Blocks should be no more than 36" long.</li> <li>• Should not extend beyond the width of the vehicle.</li> <li>• Should have a highly visible contrast to the pavement or curb. Blocks should be black with yellow striping, white, or safety yellow if on black pavement.</li> <li>• Broken and moved blocks should be replaced.</li> <li>• No stakes or rebar should extend above the surface of the block.</li> <li>• Consider use of recycled rubber wheel stops as they deteriorate slower than concrete blocks.</li> </ul> 

Parking Lots	
Hazards	Suggested Practices and Improvements
<p>Trip - Visibility of speed bumps.</p> 	<ul style="list-style-type: none"> <li>High contrasting color for visibility.</li> <li>No speed bumps should be placed in pedestrian traffic areas.</li> </ul> 
<p>Trip - Elevated drainage grates and elevated utility and fuel fill lids at gas stations.</p>   	<ul style="list-style-type: none"> <li>Have asphalt contractor substantially taper asphalt from elevated lid.</li> <li>Highlight with highly visible paint color.</li> </ul>
<p>Slips - Painted areas when wet or frosty.</p>	<ul style="list-style-type: none"> <li>Striping and lot marking contractor could embed large painted areas with grit in the paint to provide slip resistance.</li> </ul> 
<p>Slips - Water from building downspouts directed onto pavement can result in slick surface and ice in the winter.</p> 	<ul style="list-style-type: none"> <li>Redirect down spouts to underground piping or into landscaping and away from pedestrian walking areas.</li> </ul>
<p>Slips – Presence of snow and ice.</p> 	<ul style="list-style-type: none"> <li>Implement snow and ice maintenance programs. (See <a href="#">Snow and Ice Maintenance section</a>)</li> </ul>
<p>Trips and Slips - Inadequate lighting/damaged lighting.</p>	<ul style="list-style-type: none"> <li>Ensure that pedestrian walkways and parking lots are sufficiently lighted to provide visual recognition of the potential walking surface conditions.</li> </ul>



Decks	
Hazards	Suggested Practices and Improvements
Slip Falls - Loss of balance.	<ul style="list-style-type: none"> <li>• Provide sturdy handrails per applicable codes.</li> <li>• Deck must have guardrails.</li> </ul>
Slips and Trips - Steps and stairs can become worn with rounded tread noses. When wet, the smoothed surface provides less of a defined edge for the arch of the foot to grip.	<ul style="list-style-type: none"> <li>• Replace and repair.</li> <li>• Apply non-slip tread nosing or adhered non-slip tread strips.</li> </ul>
Slips - Wet wood or manufactured deck planks and/or the accumulation of mildew or algae in shaded moist areas. Wet leaves can increase the potential for a slip or fall.	<ul style="list-style-type: none"> <li>• Decks should be power washed on a regular basis to remove slippery contaminants, i.e., algae, leaves, food, etc.</li> </ul>
Trips and Falls - A fall can occur when a deteriorated step splits or step run has splintered.	<ul style="list-style-type: none"> <li>• Replace the stair tread when there are signs of deterioration.</li> </ul>
Trips - Raised or splintered decking boards, protruding nails or screws.	<ul style="list-style-type: none"> <li>• Replace damaged boards.</li> <li>• Reset and countersink screws and nails.</li> </ul>

Learn more about managing slip and fall risks at [cna.com/riskcontrol](https://cna.com/riskcontrol) (US) or [cnacanada.ca](https://cnacanada.ca) (Canada).

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