Outdoor Falls

Slips, trips, and falls in outdoor environments can be caused by rain, sleet, ice and snow, and particulate soil that cause surfaces to become slippery or produce poor traction. While we cannot control environmental conditions that increase slipperiness of outdoor walkway surfaces, we can certainly reduce the likelihood of falls through improved design of exterior sidewalks, curbs, parking areas, improved lighting, and improved maintenance to increase awareness and eliminate hazards.

Sidewalks, Curbs, and Parking Lots

A business owner may not be responsible for injuries resulting from a fall on a public sidewalk located outside his or her property. However, some courts may impose liability for injuries on a sidewalk used exclusively by customers coming to and from the business. Consult with legal counsel if you have questions on liability.
A parking lot owner however can be responsible for maintaining the parking lot in a manner such that it is reasonably safe for people using it. This includes:

- Fill and patch cracks and holes.
- Repair and eliminate raised areas due to tree roots, settling, cold weather (frost heaves), and ordinary wear and tear.
- Reduce surface water by directing roof drainage away from sidewalks and parking areas.
- Clear sidewalks/parking areas of snow/ice before employees and guests arrive.
- Center and secure parking stoppers.
- Paint or stain parking stoppers near entrances Safety Yellow to improve visibility.

Curb Ramps and Handicap Ramps

State, local and national codes specify guidelines/requirements for curb ramps and handicap ramp design. For example, ramp slopes 1:15 minimum to 1:12 maximum with “slip-resistant” surfaces is often cited. There are no specific guidelines on what “slip-resistant” means but some codes specify grooving or other alterations of the curb ramp to improve slip-resistance. Check with your state and local codes for requirements on ramp slip-resistance guidelines. Handicap ramps and curbs are colored Safety Yellow (see below). In some state or local codes, curbs or fire lanes in front of buildings are required to be painted red so be familiar with code requirements before giving recommendations..

Entrances

Entrances represent unique slips and fall issues and are addressed in LP 5408, Preventing Slips and Falls: Selecting The Right Matting System. For outdoor walkways at entrances

exposed to the elements, consider installing a canopy to reduce snow, ice and water from being tracked into the building.

Color, Contrast, and Visible Warnings

Recent U.S. Access Board Research recommends Safety Yellow as the preferred color for persons having very low vision. Yellow or yellow-orange warning surfaces are preferred over black warning surfaces. Safety Yellow therefore is a color most ofter used for visible warning in the pedestrian/highway environment.

Ice, Snow, Water

Slips and falls from snow, rain and ice are common in northern climates. Causes of falls can be due to inadvertent accumulation of ice and snow due to misapplication. Misapplication can be selection of less efficient deicing chemical(s) and friction additives (sand) and inadequately managed application schedules. Effectiveness of ice removal often occurs during the day with full sun but full sun will melt adjacent snow or ice placing water on the de-iced walking surface. This will dilute the solution and tend to refreeze at night. At night with dropping temperatures, ice can re-form with falls occurring first thing in the morning.

Selection of Ice Melting Chemicals

- Rock Salt (Sodium Chloride) is the least expensive but is somewhat corrosive and can damage concrete, interior surfaces, and vegetation. It may need a wetting agent for application at low temperatures.
- Calcium Chloride and Magnesium Chloride are more effective than Rock Salt, and most effective at lower temperatures. Magnesium Chloride is somewhat less corrosive than Calcium Chloride, which is about as corrosive as Rock Salt.
- Calcium Magnesium Acetate is the most environmentally friendly, but is more expensive and is least effective at lower temperatures.

De-Icing Chemicals	Use	Advantages	Disadvantages
Sodium Chloride (rock salt) NaCl	Plain or wetted with $CaCl_2$	Cost	Corrosive, damages vegetation, environment issues
Calcium Magnesium Acetate (CMA)	Liquid mixed w/salt or sand	Less corrosive than salt	Wet pavement Need twice as much as salt
Magnesium Chloride, $MgCl_2$	Sprayed on, mixed with sand and other de-icers	Attracts moisture, dissolves & melts snow as it hits pavement	Road stays wet
Calcium Chloride, $CaCl_2$	Mix with salt. Pre-wets salt	Releases heat, helps snow melt. Saves on salt	Cost

Adapted from the Iowa Transprotation Center, Iowa State University

Guidelines for Managing Slips and Falls from Snow, Ice, and Water

- Plow, shovel and use deicing, salting or ice melting chemicals to remove ice and snow.
- Pre-apply deicing chemicals before a storm followed by snow/ice removal during and after the storm. Use plenty of deicing materials as using "barely enough" will leave patches of ice.
- Check the surface regularly. For parking areas, that can be time consuming, but is well worth the effort.
- Aim for evaporation. If the water can drain (e.g. drains aren't blocked) and there is full sun or even reasonable wind, the water (even ice) will evaporate. A dry pavement is clear indication there's no ice.
- Use a friction additive. Sand is the most popular (it's cheap). Use a lot of it. Make certain that anyone walking on the surface has a lot of traction. You can clean up the mess once the bad weather is over.
- Check and treat every morning, especially around snow piles where melting may have created new. Re-evaluate during the day and retreat as needed.
- Remember that a clean looking surface is only “safe” if it’s dry. A wet surface can contain ice, and can also turn to ice in the shade or at nightfall.
- Hold facility managers, custodians, grounds maintenance staff, and contracted snow removal personnel responsible for snow and ice removal.
- Train those responsible in procedures for safely maintaining walkway surfaces including location of equipment and supplies.

Outdoor Lighting

Inadequate lighting may also lead to accidents involving falls in parking lots, trips over curbing, falls on a step or stairs from a parking lot to a store, and trips and falls due to holes, cracks, and uneven surfaces.

Recommended outdoor lighting levels for general parking, ramps and corners, pedestrian areas and entrances are given in LP 628, Lighting for Safety and Performance.

In summary, fall prevention programs need to be proactively managed. Analyzing existing hazard data and past injury data is a good place to start. Prevention strategies include selecting the right floor surface, maintaining the floor through good housekeeping programs, and conducting periodic inspections for defects. A slip and fall prevention strategy includes proper installation and design of matting systems and providing/enforcing proper slip-resistant footwear. Like other safety and health systems, preventing slips and falls requires an integrated approach with everyone in the organization a major stakeholder. Communication among all stakeholders is essential for success.

References

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For further review, please see:

- LP 5413, Preventing Slips and Falls - Floor Surfaces and Treatments
- LP 5410, Preventing Slips and Falls - Floor Cleaning and Maintenance
- LP 5407, Preventing Slips and Falls - Slip-Resistant Footwear
- LP 5408, Preventing Slips and Falls - Selecting the Right Matting System

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