

PHYSICAL ASPECTS OF SLIPS & FALLS

Traffic Flow

- High traffic flow areas are especially susceptible to trip/falls. These areas should be observed closely and traffic flows should be determined for various times of the day;
- Wear & tear on floor surfaces creating depressions & worn carpet surfaces;
- Weather conditions which may affect interior areas (e.g. lobbies, vestibules);
- Controls in place to guide large crowds safely through the walking area; use of fences for outside conditions or other forms of guide rails in place;
- Analyze losses according to time of day, day of the week, or similar criteria to determine if congestion related to traffic flow is a factor in the slip/fall incidents. Analyze measures taken to control the large crowds.

Behavioral Design

- Sidewalks and other pedestrian routes should be designed to use the most efficient path. This will reduce or eliminate the potential for pedestrians to short cut into unintended and possibly dangerous areas. It is optimal to determine where and how people tend to walk and design to that behavior.

Level Walking Surfaces (Ramps, walkways, sidewalks)

- Usually, an uneven surface of $\frac{1}{8}$ " or more will be sufficient to prove negligence. In reality, $\frac{1}{8}$ " to $\frac{1}{4}$ " on some smooth surfaces will cause a problem;
- Identify surfaces with cracks, potholes or other conditions which could contribute to a fall. Settlement of asphalt surfaces often create these conditions;
- Curbing leading to sidewalks and entrances should be painted white or red;
- Walking surfaces should be free of debris and other slippery material, such as gravel, mud, and other materials;
- Grading and drainage should be designed to prohibit the accumulation of water in walking areas and in/around building areas;
- There should be no evidence of drain and gutter leakage, air conditioning system condensation or lawn sprinkler overspray on smooth walking surfaces.

Tire Stops

- Parking lots can be designed without the use of tire stops. Tire stops must be maintained, are often damaged by snowplows and are a common tripping hazard;
- Where tire stops are present, they should not protrude beyond the width of tires, and should be of a contrasting color.

Speed Bumps

- Like tire stops, speed bumps are unnecessary in properly designed parking lots. The layout of the lot should make it impractical to drive at high speeds. They are a tripping hazard, they can cause damage to vehicles and can be damaged by snowplows. In fact, heavy automobiles can more smoothly pass over them at 35 mph than at slower speeds;
- Where speed bumps exist, they should be painted white or yellow to contrast with the pavement.

Other Parking Area Conditions

- Any junction boxes and any similar access covers (such as gas and sewers) in parking lots should have flush covers;
- Drain gradings often have excessively wide openings, as wide as 3 inches;
- Bicycle racks should be placed away from vehicle and pedestrian traffic. It is also helpful if they are painted a bright color such as yellow or white.

Changes In Levels

- This exposure includes conditions from recessed seating, to a subtle height change from one room to another, to a quick step down as you walk out of a door. Controls can include the use of contrasting colors, special lighting features, and warning signs.

Stairs

- 70% of all stair accidents occur on the top and bottom three steps. Maintenance and code variations are the main items to evaluate for stairs and landings. Stairs should be uniform in tread width and riser height. NFPA 101 (Section 5-2.2.3 & applicable occupancy chapter);
- Stair riser height should be between 7" to 8", with no deviation between risers exceeding 3/16";
- Stair tread depth should range from 9" to 11", with no deviation exceeding 3/16";
- Stair width at least 44" clear width, 36" if serving less than 50 occupants;
- Nosing should not protrude out more than 1/2" and should be beveled to reduce trip potential. The surface of treads should be of non-slip material;
- Handrails should be accessible within 30" of all portions of stair width;
- Handrail height should be between 34" and 42" in height;
- Handrail supports should not permit passage of a 4" sphere;
- Guardrails should be provided at stairs where the height 30" or more above the floor level;
- Guardrails should be between 36" and 42" in height.

Ramps

- Ramps should provide a slope of no less than 4 degrees, since slopes less than 4 degrees are difficult to detect and could present a fall hazard. Ramp slopes are calculated by rise (vertical distance) over run (the length of the ramp);
- Handrails should be provided for all ramps;
- A clear width of at least 36" should be present, and no projections should extend into that space;
- The slope should be no greater than one (vertical) by 8 (horizontal);
- Ramps used for individuals with disabilities should have a slope no greater than one (vertical) by 12 (horizontal), with slopes between 1:16 and 1:20 being optimal.

Entrances & Exits

- Identify surfaces with excessive smoothness and other defects;
- Observe the door sills for height and the door closure mechanisms to see that the doors do not close with too much force to knock someone over;
- Consider the impact of transitions between different types of floor surfaces;
- Entrances/Exits should be designed to minimize slip & fall potential due to tracking in ice and snow on visitor's footwear;

Elevators

- Elevators need to be adjusted to be even and level with the floor surface;
- Space between the elevator car and the floor should be minimal;
- Changes in floor surfaces in the elevator/lobby area should be minimal, and if present, clearly marked.

Escalators

- Child guards should be provided at the entrance points of each escalator;
- Warning signs should be provided prohibiting the use of strollers, cautioning on high-heeled shoes, and advising users to hold onto the handrail;

Carpet

- In terms of slips, carpet is one of the best walking surfaces that can be employed;
- Carpets should be checked for wear and looseness and repaired as necessary; Optimally, such conditions should not be permitted to develop. It appears that using red carpet on steps (especially in low light) inhibits depth perception, resulting in a increased risk of falls;
- Busy carpet patterns should be avoided as they tend to take away from an individual's ability to judge stair heights and other changes in walking surfaces.

Snow/Ice Removal

- Establish the criteria used to determine at what point ice/snow removal is necessary and steps taken to ensure the needed equipment and materials are available;
- Non-skid mats & warning signs should be used promptly for rain/ice/snow conditions.

Lighting

The following are general guidelines on lighting levels. Requirements vary based on occupancy and site conditions:

- Interior Lighting Standards: The IESNA specifies the following "absolute minimums for safety alone": **2.0 footcandles for areas where there is a low level of activity, and 5.0 footcandles for areas where there is a high level of activity;**
- Exterior Lighting Standards: In general, **exterior areas of high pedestrian usage should be at least 0.9 footcandles, and 0.2 footcandles should be provided in areas of less use.**

Signage

- Property owners often go to great expense to provide signs that blend into the environment, which negates their effectiveness;
- Signs must be understandable, legible, visible and in compliance with legal standards. Consideration should be given to the likelihood of multi-lingual and illiterate individuals.
- Special consideration should also be given to those areas where guests need special warnings. For example, use of strollers or wearing high heel shoes may be prohibited.

The information contained herein is not intended as a substitute for advice from a safety expert or legal counsel you may retain for your own purposes. It is not intended to supplant any legal duty you may have to provide a safe operation, product, workplace or premises.

LIGHTING CONSIDERATIONS OF SLIPS AND FALLS

Human Factors

It's a fact that most people lose visual acuity with age. This loss is more pronounced under low-light conditions, such as theaters. Color perception also decreases as one grows older. The lens becomes more yellow, filtering out greens, blues, and violets. Obviously, these are colors to avoid for calling attention to changes in floor covering or elevation. Depth perception also deteriorates between the ages of 40-50. This condition lessens the ability to recognize and adapt to non-standard stair and ramp systems.

Awareness of these facts, combined with knowledge about lighting standards, maintenance & design options, can help you to provide adequate illumination to minimize the potential slips and falls.

Lighting Standards

Experts refer to the standards published by the Illuminating Engineering Society of North America (IESNA), which provides footcandle guidelines for most occupancies. If a light meter is not available, lighting contractors are usually amenable to providing an illumination survey free of charge. The following are general guidelines on lighting levels. The requirements will vary based upon the occupancy and site conditions:

- **Interior Lighting Standards:** Interior lighting standards are relative to the hazard. The IESNA specifies the following "absolute minimums for safety alone": *2.0 footcandles for areas where there is a low level of activity, and 5.0 footcandles for areas where there is a high level of activity.*
- **Exterior Lighting Standards & Guidelines:** Exterior light meter readings must be done at night. In general, *exterior areas of high pedestrian usage should be at least 0.9 footcandles, and 0.2 footcandles should be provided in areas of less use.* Enclosed garages should be provided with at least 5.0 footcandles.

Maintenance & Design

- The extent and frequency of maintenance should be consistent with the manufacturer's specifications. Cleaning luminaires (casing & reflector) and replacing bulbs is essential to achieving the design efficiency and brightness.
- Where possible, weekly inspections of lighting should be performed, especially where logs show a trend of outages. An alternative is to provide monitoring by a computerized environmental control system that indicates when maintenance is required.
- It is also important that lighting is 'overdesigned' for the area. The provision of supplemental or additional lights and/or bulbs will help assure sufficient lighting is available even if one or two bulbs burn out or are vandalized.

- If lighting is controlled by timers rather than photoelectric sensors, procedures should be in place to adjust them to be consistent with seasonal time and light changes.
- Often underestimated are transitions between well-lit and low light areas, and vice-versa. Since it takes time for eyes to adjust to new light levels, such transitions should be as gradual as possible. Slowing traffic flow can provide additional time for this to occur.
- Consider providing visual cues for changes in elevation and floor covering. Such visual cues can include runner lighting, louvered stair tread lighting, carpeting which provides sharp contrast for changes in elevation, and signage to call attention to stairs or ramps with non-standard geometry.

The information contained herein is not intended as a substitute for advice from a safety expert or legal counsel you may retain for your own purposes. It is not intended to supplant any legal duty you may have to provide a safe operation, product, workplace or premises.