

California Institute of Technology

WALKING/WORKING SURFACES GUIDELINES



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PURPOSE

The purpose of these Guidelines is to reduce slip, trip, and fall (STF) hazards throughout the Caltech campus. This includes raising awareness of STF hazards, methods of controlling any hazards, and what the Facilities department is doing to minimize these hazards.

SCOPE

These Guidelines follow, and are in compliance with regulatory requirements, including:

[California Occupational Safety and Health Administration \(Cal/OSHA\), Title 8, California Code of Regulations \(CCR\), General Industry Safety Orders \(GISO\), §3231, Stairways.](#)

[Cal/OSHA, Title 8, CCR, GISO, §3232, Ramps.](#)

[Cal/OSHA, Title 8, CCR, GISO, §3272, Aisles, Walkways, and Crawlways.](#)

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OVERVIEW

One of the most common safety hazards at Caltech are slips, trips, and falls (STF). Although many people think of falls as occurring from one level to another level (e.g., falling off a ladder or roof), the majority of STF occur on the same level. As a result, the guidelines in these *Walking/Working Surfaces Guidelines* document focus primarily on the prevention of STF's on the same level, such as public sidewalks, on campus and work platforms, in addition to stairways and ramps.

Incidents involving (STF) can frequently result in serious disabling and costly injuries. After ergonomics or overexertion injuries (e.g., strains and sprains), STF's are the second most common cause of injuries in the workplace, with the lower extremities (e.g., knees and ankles) being the body parts most commonly injured. However, many STF's result in injury to multiple body parts.

The lighting levels in working areas, walkways, stairways, and parking lots/garages, measured in foot-candles (fc), are compared to the regulatory requirements of Cal/OSHA Section 3317, the recommended guidelines of the American National Standards Institute (ANSI), and the Illuminating Engineering Society (IES) in their standards: ANSI/IES RP-7-1991, Practice for Industrial Lighting; and ANSI/IES RP-1-1993, Practice for Office Lighting.

Trip hazards are classified as those walking/working surface transitions with a change in elevation of greater than ½-inch.

Slip hazards are classified as those walking/working surfaces with a static coefficient of friction of less than 0.60 dry or 0.42 wet, or those situations where the person performing the survey demonstrates a slippery unsafe condition.

The Environmental Health and Safety Office have a digital American Slip Meter, Model ASM 825, which is designed to measure the static coefficient of friction of various walking/working surfaces. (e.g. to investigate an incident resulting in a slip, trip, and/or fall injury).

The following are some of the top causes of STF on walking/working surfaces:

- Contaminants on the floor or ground (e.g., water, grease, oil, fluids, food).
- Poor drainage of water and/or other liquids from walking/working surfaces.
- Irregularities in walking/working surfaces (e.g., uneven floor or ground).
- Projections, obstructions, cracks, and holes in walkways or grassy areas.
- Debris, stones, rocks, wet leaves, and tree droppings in walkways.
- Inadequate lighting in walkways, stairways, and parking lots/garages.
- Loose cords, cables, wires, and hoses in walkways.
- Improper selection and use of floor mats, runners, and rugs.
- Improper use of portable ladders and step stools.

These STF hazards can be controlled in several different ways, such as:

- Good housekeeping/cleaning practices, and use of “Wet Floor” signs.
- Wearing slip-resistant shoes in wet areas (e.g., kitchens, boiler rooms).
- Use of non-slip, beveled-edge, rubber floor mats in wet areas (e.g., kitchens).
- Provision of absorbent floor mats at building entrances during rainy season.
- Provision of umbrella bags and spill pads at building entrances.
- Keeping floor drains and roof down spouts clear of debris (e.g., leaves).
- Repair water sprinkler system breaks and leaks immediately.
- Repair and maintenance of loose or damaged metal floor grating.
- Repair and maintenance of holes and cracks greater than ½-inch in walkways.
- Repair and maintenance of stairways, ramps, carpets, and floor tiles.
- Repair and maintenance of uneven walking/working surface transitions with a change in elevation of greater than ½-inch.
- Highlight tripping hazards or changes in walkway elevations with yellow paint.
- Install rough-surface flooring materials in areas with slipping hazards.
- Replace burnt-out lights immediately, and keep light fixtures clean.
- Provision of step-over ramps or platforms over pipes and other tripping hazards.
- Use of handrails when going up or down stairways or steps.
- Replace any damaged or defective portable ladders and step stools.
- Use of tie wraps or plastic outer sleeves to bundle cords, cables, wires, etc.
- Use of beveled cord covers on floor.
- Use of retractable cord holders, hose reels or spools.
- Organize storage areas to eliminate clutter.

Caltech performs multiple activities for the protection of students, faculty, employees, and visitors from slips, trips, and falls (STF) incidents.

RESPONSIBILITIES

Environmental Health and Safety

- Conduct a periodic survey of campus walkways, including exterior stairways.
- Periodically review employee (workers' compensation) and public (general liability) claims resulting from slips, trips, and falls incidents to identify trends in the types and locations of injuries (e.g. injury hot spots) so that future efforts can focus on those problem areas and commonalities.

Security

- Conduct periodic evening (after dark/dusk) outdoor safety and lighting surveys to identify inadequate or burnt-out lighting, and STF hazards.
- Security Officers have been instructed to report any lighting issues or STF hazards during their rounds, so that the issues may be corrected in a timely manner.

Grounds

- The Grounds Department employees are assigned quadrants on campus and are responsible for reporting any STF hazards in their assigned areas. Each team knows and is very familiar with the day-to-day conditions of their respective quadrants.