

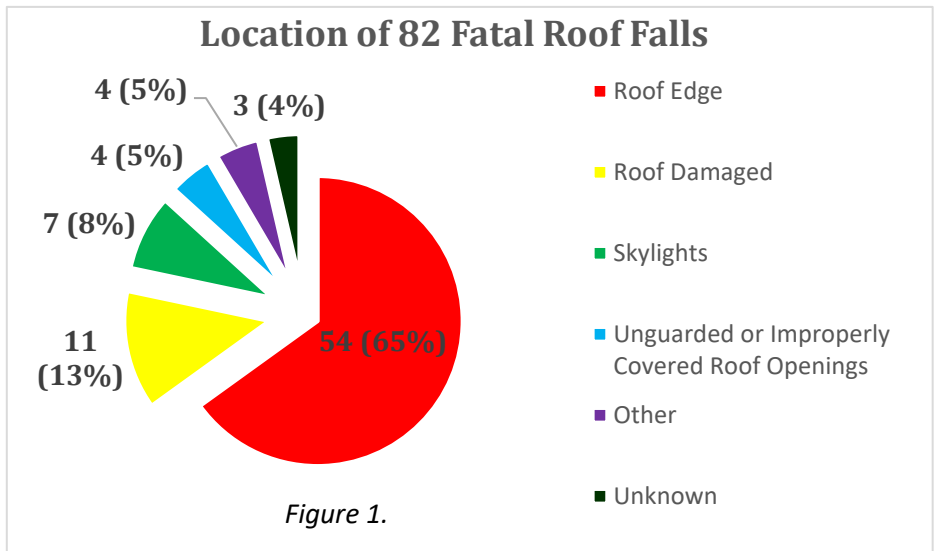


MICHIGAN STATE UNIVERSITY: Prevention of work-related injuries & illnesses through research & investigation

ROOF SAFETY – PREVENT FATAL FALLS

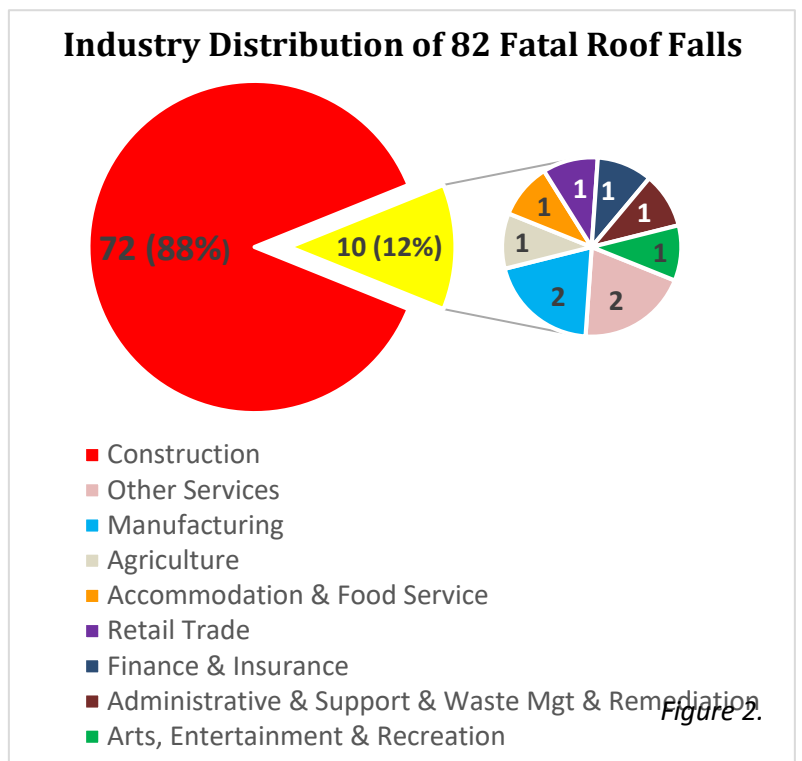
Hazard Alert Roof Fall Prevention 7/29/20

From 2001-2018, 82 workers died in Michigan after falling from a roof, roof decking, or the roof trusses. These falls were the cause of 21.2% of all work-related fatal falls. Figure 1 shows the location of the 82 fatal roof falls. Half of the fatal roof falls occurred at a commercial building and half at a residential building. **No worker who died was wearing fall protection.** Falls from ladders and/or scaffolds are the next leading cause of worker deaths from falls from a height (75 falls). Two hazard alerts, [Work-Related Fatalities and Injuries from Using Ladders in Michigan](#) and [Falls from Scaffolds Can Be Deadly](#) identify fall prevention strategies for ladder and scaffold falls. Figure 2 shows the number of fatal roof-related falls in the industry where the fatal fall occurred.



Causes in Michigan of fatal falls from a roof:

- **Near an unprotected edge** (e.g., roof edge, holes, roof curbs, skylights, low parapet heights, or other standing surfaces without guardrails or similar barriers);
- **Lack of awareness of an opening or an unprotected edge** (e.g., hidden edge or opening (corrugated fiberglass skylights installed in line with metal roof panels), loss of situational awareness (e.g., stepping backward while performing a task));
- **Performing a task** (e.g., roof slope, building design, roof material, forceful exertions and long reaches that result in instability; limited foot positions that do not accommodate movement to maintain balance; ice or materials that affect footing; unstable movements to enhance lines of sight or visual acuity, fatigue, footwear, work experience, worksite housekeeping, weather); and
- **Failure of a supporting structure** (e.g., supporting surface failed or when the worker misjudged the supportive capacity of a surface (e.g. skylight dome)).



PREVENTING WORK-RELATED FALL FATALITIES FROM ROOFS

- **Employers must provide fall protection when employees work on a roof with unprotected sides and edges six (6) or more feet above a lower level.**
 - Low-slope roofs (slope less than or equal to 4 in 12): must utilize guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, warning line system and personal fall arrest system (PFAS), or warning line system and safety monitoring system. When roofs are 50-feet (15.25 m) or less in width the use of a safety monitoring system alone [i.e. without the warning line system] is permitted.
 - Steep roofs (slope greater than 4 in 12): must have guardrail systems with toeboards, safety net systems, or personal fall arrest systems.
 - If a roof has holes (a gap or void 2 inches (5.1 cm) or more in its least dimension), it must have a guardrail or a cover capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on it, appropriately secured, and color coded or marked with the word "HOLE" or "COVER".
 - Skylights must have appropriately designed and installed skylight guard, guardrails, or a PFAS must be used.
 - **NOTE:** If the employer can demonstrate that it is infeasible or creates a greater hazard to use guardrail systems, a safety net system, or personal fall arrest system when employees are working six or more feet above a lower level during leading edge work, precast concrete erection or residential construction activities, the employer must develop and implement a fall protection plan which meets the requirements of paragraph (k) of Part 45. *Regulators presume that fall protection systems are feasible and will not create a greater hazard.*
- **Inspect and analyze the roof for potential physical hazards, including the condition and strength of structural items.** Damage may be caused by UV radiation, physical strike damage, wind, snow and water/ice loads, temperature extremes, new roof structures without commensurate structural upgrades, etc.)
 - Look for roof deck holes by physically accessing the attic or below-roof area. If access is unavailable, try "sounding" the roof surface to determine if damaged: drop the flat surface of a sledge head 6 inches onto the roof area ahead to approximate the impact area and force of a foot fall. If a "dead zone" is sounded, further inspection should be performed.
- **Develop a site-specific, task-specific, worker-specific job safety analysis** before work begins.
 - When performing a pre-task analysis, consider weather, building type, tasks being performed, materials and equipment in use, and training and experience of workers.
- **Provide and document fall protection training to employees.**
 - Provide communication training to foremen in addition to site-specific training to improve their abilities to influence the safety behaviors of workers on site.
 - Worker training should address, but not be limited to, Part 2 or Part 45 requirements (as appropriate): fall hazards, fall protection systems erecting, inspecting, etc., personal protection equipment, including personal fall arrest system use, inspection, etc., preventative measures (e.g. housekeeping), and "risk compensation" behaviors (e.g. workers should not engage in greater risk-taking behaviors just because fall protection is in place).

DID YOU KNOW?

- A [NIOSH study](#) demonstrated that shoes with a tight fit, good motion control of the rear, high flexibility of the front, moderate torsional stiffness, and a very flexible high-cut upper are a better choice than casual shoes to minimize the risk of a loss of balance when working on elevated and narrow surfaces.
- Roofing slide guards are not considered fall protection.
- Employers need to have a plan for rescuing workers in the event of a fall.
- Nationally, nearly 20% of all fatal falls occur when the worker falls 11- to 15-feet.

Resources

MIFACE: www.oem.msu.edu

MIOSHA

- General Industry Safety Standard Part 2: [Walking Working Surfaces](#)
- Construction Safety Standard Part 45: [Fall Protection](#)
- A-Z Topic Index: [Fall Protection](#)

NIOSH FACE: www.cdc.gov/niosh/face/

OSHA [Fall Protection](#) webpage

CPWR [Stop Construction Falls](#) webpage.

Resources in English and Spanish

- [Roofs Resource](#) webpage