FACE/WA
Fatality Assessment & Control Evaluation

Fatal Facts

SHARP

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Fall Hazards in the Construction Industry

Falls killed more workers in the construction industry than any other type of incident in Washington State during the years 1998-2005. They accounted for 40 out of 114, or 35% of construction fatalities.

The victims fell from ladders, scaffolding, roofs, unguarded building edges, and through roof and floor openings and skylights. They were employed as carpenters, laborers, roofers, painters, ironworkers, and other construction related occupations. Just over half of the victims were fatally injured from a fall of less than 20 feet. Over three quarters of those who died were employed in either the residential building construction or specialty trade contractors' industry sectors.

These are brief case descriptions of selected fall from elevation fatalities in the construction industry that happened in Washington State during the years 1998-2005

Case 1	On September 24, 2004, a carpenter was fatally injured when he fell from a roof through an unguarded skylight opening and landed on an interior stairway 15 feet below.
Case 2	On June 24, 2004, a carpenter attempting to set a beam on a post died when he fell from a stepladder and landed on concrete 7 feet below.
Case 3	On December 22, 2003, a siding installer was putting siding on an apartment building when the pump jack scaffolding on which he was standing failed and he fell 27 feet to an asphalt driveway.
Case 4	On December 27, 2005, a carpenter fell 8 feet from the top plate of a house under construction. The victim received fatal head injuries.
Case 5	On November 22, 2002, a carpenter went on a roof to cover a skylight opening with plastic to keep the rain from getting into a residential room addition below. He fell 9 feet 10 inches through the skylight opening and landed on the concrete floor below.

The years 1998 and 1999 had the highest number of fatal construction falls. The average was 5 per year over the 8-year period, with the most (8) in 1999 and the least (2) in 2005.

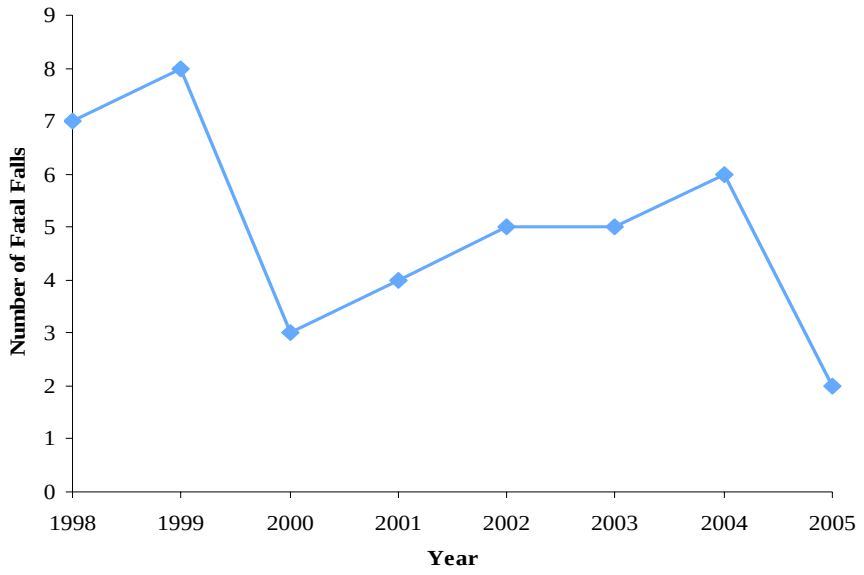

Figure 1. Fatal construction falls from elevation in Washington State, 1998-2005.

Ladders were the number one location of fatal falls with 13 incidents. Scaffolding, roofs, and roof/floor/skylight openings all had 7 incidents each.

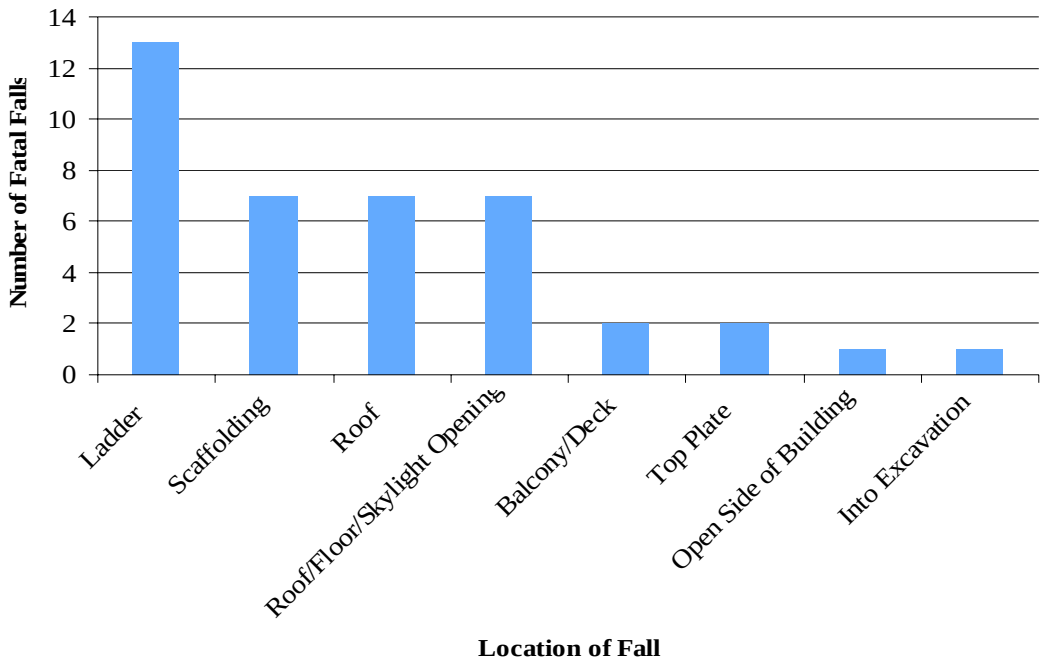

Figure 2. Number of fatal falls in construction by location of incident in Washington State, 1998-2005.

The majority of fatal falls have occurred from heights of less than 20 feet. Of those falls from a height of under 10 feet, two were from ladders and the others were from the top plate of a house, from a scaffold, and through a skylight opening. The three non-ladder fall incidents happened to workers in the residential building construction industry sector.

Table 1. Distribution of Fatal Construction Falls by Height of Fall in Washington State, 1998-2005

Distance of Fall (feet)	Fatalities
1 – 9	5
10 – 19	16
20 – 29	12
30 – 39	4
Over 39	2
Unknown	1

Fatal falls in construction occur in all building trades. New Single Family Housing, Commercial and Institutional Building, and Roofing had the highest numbers of incidents between 1998-2005.

Table 2. Number of Fatal Construction Falls in Washington State by 6-Digit NAICS Industry Description, 1998-2005

NAICS	Description	Number of fatalities
236115	New Single Family Housing Construction (Except Operative Builders)	7
236220	Commercial and Institutional Building Construction	6
238160	Roofing Contractors	6
238130	Framing Contractors	4
238990	All Other Specialty Trade Contractors	3
238120	Structural Steel and Concrete Contractors	2
238320	Painting and Wall Covering Contractors	2
236118	Residential Remodelers	2
238220	Plumbing, Heating and Air Conditioning Contractors	2
236210	Industrial Building Construction	1
236116	New Multifamily Housing Construction (Except Operative Builders)	1
237110	Water, Sewer line and Related Structures Construction	1
238110	Poured Concrete Foundation	1
238140	Masonry Contractors	1
238310	Drywall and Insulation Contractors	1

How to Prevent Falls in the Construction Industry

- **Identify fall hazards.** All tasks that expose workers to a potential fall should be identified.
- **Perform risk assessment/job hazard analysis.** Assess the risk level of falls to employees. For example, for a given task consider the height at which work will be done, type of surface, experience and knowledge of workers, and nature of task.
- **Train employees.** Train employees to recognize and avoid unsafe conditions.
- **Control the risk.** Where workers are exposed to a fall hazard from elevation, implement measures to ensure their safety.

Controlling the Risks of Falls

1. **Eliminate the fall hazard**. During the design stage of a new building a design professional would take into consideration the life cycle of a building from construction through expected activities such as maintenance by designing out risk of falls. Do work on ground when possible. For example, construct wall frames on ground and tilt-up.

2. **Substitute with safer surface**. Use a passive fall prevention device such as temporary work platforms which would include scaffolds and elevating work platforms.

3. **Isolate hazard/Engineering controls.** Create physical barriers. Install guardrails around the perimeter of a roof, make sure floor and roof openings are guarded, and safety nets and catch platforms are installed where necessary. Use work positioning systems (for example, travel restraint systems or rope access systems). Portable ladders should be used sparingly (consider using mobile elevating work platforms or scaffolds to minimize fall exposure).

4. **Administrative controls.** These may include employer mandated safe work practices and the use of signs (such as writing on a temporary covering of a floor opening to warn workers not to step on it).

5. **Personal protective equipment.** Use individual fall arrest or restraint systems.

Problem Areas

The top four locations for construction falls in Washington State are:

1. **Ladders**
2. **Scaffolds**
3. **Roofs**
4. **Roof/Floor/Skylight Openings**

The following are recommendations for preventing falls from ladders, scaffolds, and roofs. This list is by no means comprehensive, but following these recommendations could reduce your risk of suffering serious falls.

Ladders

Consider whether there is a safer alternative to using a ladder:

- Can the work be done from the ground using an extension tool?
- Can an elevating work platform, such as a cherry picker or scissor lift be used?
- Can the building component or equipment be relocated to the ground, either temporarily or permanently?

The risk of falls from portable ladders can be reduced by using safe work techniques that include:

- Use the type and length of ladder that provides the safest application for the work being done.
- Set up straight ladders and extension ladders using the "4 to 1" rise to run rule to obtain the most stable working position.
- Ensure that the ladder remains stable by appropriately using ladder footings, stabilization and site preparation.
- When straight ladders are used to access an upper landing, secure the ladder at the top and bottom.
- Ladders should extend at least 3 feet above the upper landing surface.
- Maintain 3-points of contact with a ladder while climbing.
- Do not stand on the top two steps of a stepladder.
- Follow manufacturer's recommendations.

Improper use of ladders resulted in 13 construction worker deaths in Washington State, 1998-2005

Scaffolds

There are many types of scaffold systems. These are some general recommendations for preventing falls from scaffolds.

- Scaffolds must be erected, moved, or dismantled under the direct supervision of a competent person.
- Manufacturer's instructions must be followed when erecting scaffolds.
- Footings or anchorages for scaffolds must be sound, rigid and capable of carrying the maximum intended load without settling or displacement.
- Anyone working on or from a scaffold needs to be protected from falling by using guardrails or personal fall restraint or fall prevention systems.
- Investigate new and innovative options and resources that can help address fall protection needs while using scaffolding.

A construction laborer carrying an armload of roofing debris fell 9 feet to his death from this 20-foot long 14-inch wide scaffolding plank.

Roofs

- Appropriate fall protection must be used by all persons working on roofs.
- A competent person should evaluate potential tie-off points and determine if the available safety equipment can work as designed.
- Proper training in hazard identification and the use of harnesses, lanyards, other equipment and fall protection strategies should be provided to all workers.

Roof/Floor/Skylight Openings

- When working in the vicinity of temporary roof openings, precautions must be taken to protect the worker, such as using guardrails, safety nets, or a fall prevention/arrest system.
- Temporary roof openings must be securely covered and labeled with a warning sign.
- Guardrails or covers over skylights must be installed before construction work begins and remain in place until work is completed.
- Skylights should never be stepped on or leaned against, as they may not be strong enough to support the weight of a person.

A carpenter was killed after he fell through this unguarded skylight opening.

Getting Help

DOSH Consultation Program
Washington State Department of Labor and Industries
http://www.LNI.wa.gov/Safety/KeepSafe/Assistance/Consultation

Everett (Region 1, Northwest Washington): 425-290-1300

Seattle (Region 2, King County): 206-515-2800

Tacoma (Region 3, Pierce, Kitsap, Clallam, and Jefferson Counties): 253-596-3800

Olympia (Region 4, Southwest Washington): 360-902-5799

East Wenatchee (Region 5, Central and Southeastern Washington): 509-886-6500

Spokane (Region 6, Eastern Washington): 509-324-2600

DOSH Policy & Technical Services

Tumwater Central Office – Dan McMurdie, (360) 902-5460

Other Resources

- NIOSH ALERT: Preventing Falls of Workers through Skylights and Roof and Floor Openings, DHHS (NIOSH) Publication No. 2004-156 http://www.cdc.gov/niosh/docs/2004-156/
- NIOSH ALERT: Preventing Injuries and Deaths from Falls during Construction and Maintenance of Telecommunications Towers, DHHS (NIOSH) Publication No. 2001-156 http://www.cdc.gov/niosh/2001156.html
- NIOSH ALERT: Preventing Worker Injuries and Deaths Caused by Falls from Suspension Scaffolds, DHHS (NIOSH) Publication No. 92-108 http://www.cdc.gov/niosh/92-108.html
- Worker Deaths by Falls: A Summary of Surveillance Findings and Investigation Case Reports, DHHS (NIOSH) http://www.cdc.gov/niosh/00-116pd.html
- eLCOSH, Electronic Library of Construction Safety and Health, Centers for Disease Control and Prevention (CDC), (collection of electronic documents about fall prevention and protection) http://www.cdc.gov/elcosh/docs/hazard/safety_falls.html

FACE Fatal Facts

Produced by the **Washington State Fatality Assessment & Control Evaluation (FACE) Program**, which is managed by the Safety and Health Assessment and Research for Prevention (SHARP) Program.

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