

Working at Heights:

breaking the fall

On December 24, 2009, six migrant workers were working on a 40-foot swing-stage at a Toronto high-rise building when the scaffolding broke in half and collapsed, plunging the men 13 stories to the ground. Four of the workers were killed and one seriously injured. The sixth worker—the only one wearing fall arrest protection—was able to reach a nearby balcony unharmed.

Employed by Metron Construction Corporation of Toronto, the workers were conducting balcony restoration on an apartment building. Metron plead guilty to one count of criminal negligence causing death and was fined \$750,000. The project manager was sentenced to 3.5 years in prison after being found guilty of four counts of criminal negligence causing death and one count of criminal negligence causing harm. Convictions and significant fines under the *Occupational Health and Safety Act* and its regulations were also handed down in the matter.

This workplace tragedy caused shockwaves throughout the province, prompting a year-long review of Ontario's health and safety system and recommendations for amendments to the *Occupational Health and Safety Act* and its regulations. Some are pending and some have been implemented including mandatory *Working at Heights* training which came into force April 1, 2015.

Sadly though, workers continue to be critically injured or killed while working at heights on construction sites across the province. Falls from heights lead all other causes of traumatic deaths and critical injuries in this industry.

What are the hazards associated with working at heights?

Falling from one level to another level is the most critical consequence of working at heights.

Work positioning systems

Work positioning systems used to raise or lower workers to the desired height are a major cause of falling incidents. Examples of these systems are: ladders, scaffolds, elevating work platforms, vehicle-mounted aerial devices, suspended access equipment (swing stage), boatswain's chairs and mast-climbing work platforms. Given space limitations the following details some although not all factors associated with hazardous working at height conditions.

Ladders

Ladders are either fixed or portable. Varying by length and load rating, they are made of materials such as wood, aluminum, or fiberglass. The two types of portable ladders—step and straight or extension ladders can be as hazardous as work platforms for causing falls.

Factors contributing to falls from a ladder are:

- Overreaching to side or overhead;
- Handling bulky or heavy material overhead;
- Losing balance while working;
- Working on unsecured ladder;
- Failing to ensure three-point contact with ladder (one hand and two feet);
- Using a defective ladder;
- Supplying or selecting improper ladder for given task; and
- Muscle fatigue from working long periods from a ladder.

Ladders should only be used to perform light tasks such as changing lights, minor repairs and installations. A scaffold is a better alternative as it allows workers more lateral movement. In construction, ladders should not be used at all. Workers should use elevating work platforms instead.

Scaffolds

Scaffolds are temporary elevated platforms and their substructures, used for supporting workers, work materials or both. They can be as simple as a one level scaffold on wheels to complicated multi-level systems equipped with stairs and other components. Scaffolds are required by law when work is done above ground level. They must be erected properly and their weight capacities must be adhered to.

Factors associated with falls from scaffolds include:

- Improper maintenance, erection or dismantling;
- Incorrect mounting/dismounting;
- Absence of guardrails;
- Overloading;
- Scaffold component failures;
- Absence or improper use of personal protective equipment (PPE); and
- Moving rolling scaffolds with workers on the platform.

Elevating work platforms

Elevating work platforms (EWP) are used in all work sectors. There are various types of EWPs including: elevating rolling work platforms, self-propelled elevating work platforms, boom-type elevating work platforms and vehicle-mounted aerial devices.

Each type of elevating work platform has unique manufacturer's designs and require additional training to ensure safe use of the equipment. While working on EWPs in some instances, particularly those where the equipment is being moved with the workers still on the platform, workers must be tied off using a body harness with a shock absorbing lanyard attached to the anchor point on the EWP.

Factors associated with falls from EWPs include:

- Overhead power lines;
- Uneven terrain;
- Soft soil;
- Drop off and pedestrian traffic under the bucket;
- Anchoring outside the EWP;
- Loads beyond the equipment capacity; and
- Equipment failure.

Falls from buildings

Aspects of buildings and other structures can also pose a hazard resulting in falls. Included in this group are the following:

- Openings in floors and roofs;
- Unprotected roof and floor edges;
- Unguarded stairwells or work access ramps;
- Wall openings such as windows or doors;
- Skylight fixtures; and
- Elevator shafts and platforms.

What are some other contributing risk factors?

Although working at heights is in itself dangerous, many contributing hazards can make it even more treacherous. These hazards include:

- Weather conditions (wind, rain, lightning, ice, snow);
- Poor housekeeping (e.g. obstructed walking surfaces);
- Temporary fall hazards (e.g. newly excavated ditches/holes not yet protected);
- Noise (e.g. sudden noise can startle);
- Electrical contact (e.g. touching a power line with a ladder);
- Toxic substances (can cause dizziness, blurred vision);
- Working alone;
- Improperly maintained or missing equipment; and
- Lack of worker training on operation and maintenance of equipment.



Information Bulletins for health, safety and environmental representatives

RESOURCE LINES

What are the legislated requirements?

The *Regulations for Construction Projects* (Ontario Regulation 213/91) sets out the specific requirements for worker protection on construction sites. For instance, sections 26.1 to 26.9 outline clothing, equipment and devices for workers who are at risk of the following:

1. Falling more than 3 metres.
2. Falling more than 1.2 metres, if the work area is used as a path for a wheelbarrow or similar equipment.
3. Falling into operating machinery.
4. Falling into water or another liquid.
5. Falling into or onto a hazardous substance or object.
6. Falling through an opening on a work surface.

Section 26.1 states that a worker exposed to falling hazards (listed above) must be adequately protected by a guardrail system that is designed by a professional engineer in accordance with good engineering practices.

If it is not reasonably possible to install a guardrail system as stated in section 26.1, a worker must be adequately protected by at least one of the following methods of protection: a travel restraint system; fall restricting system; fall arrest system (other than a restricting system designed for use in wood pole climbing) and a safety net.

Suspended platforms, and scaffolds must all be designed by a professional engineer. Several elevating devices listed in the *Regulation* must also meet CSA standards. A notable exception is the increasingly popular mast-climbing platform which is not listed and is yet to be specifically covered in the legislation.

Working at heights training

Since April 1, 2015, Regulations in Ontario require employers to ensure untrained or inadequately trained construction workers complete a Ministry of Labour-approved, working at heights training program before they work at heights and use fall protection equipment and systems. Fall protection includes travel restraint systems; fall restricting systems; fall arrest systems; safety nets; and work belts or safety belts. MOL-approved training is valid for three years from the date of successful completion. Employers must also maintain detailed records of training.

The Ministry is allowing a transition period for workers whose training already meets the existing fall protection training requirements set out in section 26.2 of the *Construction Regulations*. In these circumstances, and as of April 1, 2017, employers must ensure workers are enrolled immediately in a MOL-approved working at heights training program and successfully complete the program no later than October 1, 2017. Employers must also be prepared to show a MOL inspector proof of enrollment upon request.

According to the MOL, employers will also still be required to meet site-specific working at heights training requirements for workers.

How can working at heights hazards be controlled?

Employers can minimize the hazards associated with working at heights by taking steps to control the hazard at its source, along the path between the hazard and the worker, or as a last resort at the worker.

At the source

The most effective method of protecting workers from working at heights hazards is to eliminate the need to work at heights whenever possible. For example, building roof framing or related construction at ground level and then lifting the assembled sections into position with a crane eliminates some of the need to work at heights.

Along the path

A control along the path keeps workers away from the hazard. This type of control includes barriers, guardrails, slide guard systems, and warning signs.

Guardrails are a barrier that prevents workers from falling from the edge of a surface. Guardrails should be used along the open side of any area where a worker may fall 2.4 metres (eight feet) or more or into water, operating machinery, or hazardous substances. They should be used around the following: floors and floor openings; balconies; slab formwork; roof tops; scaffolds and other work platforms; runways and ramps and bridge surfaces.

Guardrails must have a top rail, mid rail and toeboard secured to vertical posts or supports. They must be capable of resisting any load likely to be applied and they should be installed as close to the edge as possible. Toeboards must be installed on all open sides of a scaffold or work platform. Guardrails must be checked for cracks in the lumber, nails pulling out, broken or defective lumber and missing parts before and during use.

In situations where guardrails are not practical to prevent falls near floor and roof openings, securely fastened covers (planks, plywood, steel plates etc.) may be the best alternative. Opening covers should be made to stand out with bright paint. This should include a warning message such as **Danger Opening—Do Not Remove**.

Travel-restraint system prevents falls by restricting the worker's movements near open edges on a work surface and preventing them from reaching a location such as the edge of a roof from which they could fall. A travel-restraint usually consists of safety belt or full body harness (CSA-certified); lanyard; rope grab; lifeline and lifeline anchor.

At the Worker

Controls at the worker are the least effective or desirable. However, when a fall cannot be avoided it is important to provide workers with PPE to reduce the consequences in the event of a fall. Fall protection equipment should be provided and worn when workers are at **risk of falling three metres or more** in the workplace.

There are three main systems of fall protection, *fall arrest*, *travel restraint* and *safety net*. Even though a travel restraint system is worn by the worker it is considered a control along the path because it prevents a worker from reaching the edge of the roof where he/she could fall.

Fall arrest system is an assembly of components joined together that when connected to a fixed support, is capable of arresting a worker's fall. It should stop a fall within 0.6 metres of the worker's original position. A fall arrest system consists of a full body harness (CSA-certified); lanyard (with locking snap hooks or D-rings); shock absorber; rope grab; lifeline and lifeline anchor. Full body harnesses should be checked before use for flaws such as damage to webbing, bent or broken grommets, loose stitching and missing parts. Fall restricting systems, a type of fall arrest system, includes a harness and retractable device that restricts the distance a worker will fall.

Safety net system protects workers from falling from a surface of more than three metres. It must be located and supported in such a way that it arrests the fall of workers who may fall into it without endangering them.

Fall protection devices and equipment must be **inspected daily** by a competent worker before each use and annually by someone—other than the user—who has received advanced training by the manufacturer.

Fall protection program whenever fall protection is required, a complete written fall protection program should be established, if one does not already exist.

NOTE: The Workers Health & Safety Centre offers a comprehensive, one-day, MOL-approved *Working at Heights* training course. To learn more visit our website or call our toll-free line and ask to speak to a training services representative (see below).



RESOURCE LINES

Published by the
Workers Health & Safety Centre
675 Cochrane Drive
Suite 710, East Tower
Markham, Ontario L3R 0B8
Tel: 416-441-1939
Fax: 416-441-1043
Toll free (Toronto): 1-888-869-7950
Web site: www.whsc.on.ca

Executive Director: **Dave Killham**

Director, Information Services:
Loretta Michaud

Editor: **Ellen Simmons**

Submissions are encouraged.
Reproduction is permitted, provided the source is acknowledged and a copy sent to the Director, Information Services.

Regional Offices:

Central Ontario	(Toronto)
Tel: 416-441-1939	
Eastern Ontario	(Ottawa)
Tel: 613-232-7866	
South Central Ontario	(Hamilton)
Tel: 905-545-5433	
South Western Ontario	(Sarnia)
Tel: 519-541-9333	
North Eastern Ontario	(Sudbury)
Tel: 705-522-8200	
North Western Ontario	(Thunder Bay)
Tel: 855-281-3634	

cope:343