

# Fall Protection

Guide

Office of Risk Management

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## SCOPE

This document applies to all University of Ottawa employees, professors, students, volunteers, and visitors who **regularly or occasionally work at heights** and are exposed to a hazard of falling. Everyone who carries out work at a height or who is exposed to the risk of falling from a height of more than 3 meters must receive specialized training. Working at heights includes work on sloped or flat roofs in circumstances when adequate railings are not provided and may also include working on ladders or other elevated surfaces.

## OBJECTIVE

This document serves to provide an overview of applicable legislation and prevention strategies to eliminate accidents and reduce the number (and severity) of fall-related accidents.

## LEGISLATION AND REQUIREMENTS

Ontario Regulation 851 (Industrial Establishments) section 85, under the Occupational Health and Safety Act specifies that a worker who is exposed to a risk of falling from a height of more than 3 meters must wear full body harness and lifeline adequately secured to a fixed support so that the worker cannot fall freely for a vertical distance of more than 1.5 meters (the type of system and fall protection must be adequate and CSA recognized).

As an example, a worker who is working on a ladder or a step-ladder and who is situated at a height of more than 3 meters from the ground must use adequate fall protection measures; such as a full-body harness and lifeline secured to a fixed support.

In addition, section 207, Construction Regulation (Ontario regulation 213/91) indicates that when a built-up roof is being constructed, repaired or resurfaced, a barrier shall be placed in the immediate work area at least two meters from the perimeter of the roof.

In accordance with the Ontario Regulations 213/91 and 851, the University of Ottawa requires that persons working at height must receive training (working at heights) and implement proper fall prevention methods if they are exposed to:

- a potential free-fall greater than 3 meters/10 feet, or
- a fall more than 1.2 meters/4 feet if the work area is used as a path for a wheelbarrow or similar equipment, or
- if work at a height includes the work on roofs at an angle, or
- if work at a height occurs on a flat roof in circumstances where adequate railings are not provided.

Persons should never be required nor allowed to perform any duties which require the person to get closer than 2 meters to an unprotected edge, platform or walkway of any building, nor to utilize elevated equipment unless the employee is properly trained and secured from falling. Special considerations must be implemented if employees are exposed to falling through any openings in a surface or into operating machinery, water or another liquid.

**Note:** Everyone, even those who don't usually work at heights, must have fall prevention training and wear protective equipment if they are to perform activities described previously.

For detailed information consult the [Industrial Establishments, Construction Projects](#) and [Occupational Health and Safety Awareness and Training](#) Regulations under the [Ontario Occupational Health and Safety Act](#).

In circumstances when a worker cannot be secured to a fixed support, another work method must be used, for example, a lifting device (“off-slab powered platforms”). As a reminder, the use of a lifting device also requires mandatory, specialized training.

## **RESPONSABILITIES**

In accordance with the Ontario Occupational Health and Safety Act and its regulations, as well as [Policy 77](#) (Occupational Health and Safety):

### **Supervisors**

1. Select the most appropriate method of fall prevention and fall protection to protect the employee;
2. Acquire the necessary equipment;
3. Train the employee in proper equipment use and keep records of training;
4. Develop a rescue plan; and
5. Ensure that the program is followed and employees accept their obligation to follow the rules to protect themselves.

### **Workers**

1. Follow the rules to protect themselves;
2. Use proper equipment and personal protective equipment, as required; and
3. Take all training provided and implement it.

### **Facilities**

1. Ensure the proper and regular certification of all anchor points located on the University of Ottawa premises.
2. Provide Protection Services with an updated version of the binders entitled “Roof Anchor Point Location by Building”.

## **HAZARD CONTROL**

There are two ways to ensure the safety of the worker who may be exposed to the hazard of falling, namely:

- Fall prevention
- Fall protection

Fall preventative measures shall always be the primary consideration. In either case, a worker shall be adequately trained.

### **Fall Prevention**

The best protection is to prevent falls from happening. Fall prevention uses physical means to keep workers away from situations where they might fall. Fall prevention includes:

1. Proper use of worksite access such as ladders and scaffolds. Please refer to Appendix 1 “*Safety Sheet #2 – Ladders and Stepladders*”
2. Protective covers over floor and roof openings. Protective covers must be:
  - a. Secured in place, and
  - b. Constructed to meet the structural requirements for loads due to the use of floors and roofs as set out in the Building Code
3. Visual Warnings – signs or tape, cones or boulders, paint or chalk
4. Physical Barriers – warning barriers and bump lines, handrails, fencing, guardrail systems, travel restraints

Guardrails must be installed in the following areas:

- i. Around the perimeter of an uncovered opening in a floor, roof or other surface to which a worker has access;
- ii. At an open side of,
  - a. A raised floor, mezzanines, balcony, gallery, landing, platform, walkway, stile, ramp or other surface, or
  - b. A vat, bin or tank, the top of which is less than 107 centimeters above the surrounding floor, ground, platform or other surface; and
- iii. Around a machine, electrical installation, place or thing that is likely to endanger the safety of any worker.

A guardrail shall:

- a. Have a top rail located not less than 91 and not more than 107 centimeters above the surface to be guarded;
- b. Have a mid-rail;
- c. If tools or other objects may fall on a worker, have a toe board that extends from the surface to be guarded to a height of at least 125 millimeters, and
- d. Be free of splinters and protruding nails.
- e. A guardrail shall be constructed to meet the structural requirements for guards as set out in the Building Code.

**Note:** When preventative measures are not feasible, such as when work places are a rooftop or mobile scaffold, adequate fall protection must be provided for each exposed worker.

### **Fall Protection**

1. *Fall restriction.* A fall-restricting system is designed to limit a worker’s free fall distance to 0.6 meters (2 feet). One type uses a harness that attaches to a safety rail on a fixed ladder.
2. *Travel-restraint systems.* Where work must be done within 2 meters (6 feet) of an open, unprotected edge that presents a fall hazard, travel-restraint systems do not permit a worker to approach the hazard zone.
  - A travel restraint system shall consist of a full body harness with adequate attachment points.

- The full body harness shall be attached by lanyard to a fixed support that meets the requirements of the Building Code.
  - The travel restraint system shall be inspected by a competent worker before each use.
  - If a component of the travel restraint system is found to be defective on inspection, the defective component shall immediately be taken out of service.
3. *Fall arrest system* prevents a falling worker from hitting the ground or any object or level below the work. Please refer to Appendix 2 “Safety Sheet #5 – Fall Arrest Equipment” and to the Personal Protective Equipment Guideline.

The location of fixed anchor points generally can be found on the building plan located in the mechanical room at the entrance to the roof. If the plan is not present, please contact Facilities.

4. *Safety nets*. A safety net system must be designed by a professional engineer. The system is installed below a work surface to protect any location where a fall hazard exists. This system is rarely used in the Ontario construction industry.

**Note:** As part of a fall arrest system, the University of Ottawa requires the use of body harness systems rather than body belts.

## Inspection

All components of a fall protection system must be regularly inspected by the user, prior to use. An inspection serves to identify potential deficiencies, damages or defects in the equipment. An inspection must include:

### Full-Body Harness

- Stitching
- Buckles
- Webbing
- Dorsal “D” ring
- Crossover plate

### Lanyard

- Fraying, kinking, loose / broken stitching
- Check hardware for damage, rust, cracks, torn stitching, fall indicators, etc.

### Lifeline

- Inspect fibre rope for fraying, burns, kinking, cuts, tears, etc.
- Check retractable lifelines for smooth operation and functionality.

## EDUCATION AND TRAINING

A training program for working at heights must be established for every employee exposed to fall hazards, even for rare or occasional situations.

As of April 1, 2015, employers must ensure that certain workers complete a working at heights training program that has been approved by the Chief Prevention Officer and delivered by an approved training provider before they can work at heights.

The training requirement is for workers on construction projects who use any of the following methods of fall protection:

- travel restraint systems
- fall restricting systems
- fall arrest systems
- safety nets
- work belts or safety belts

A list of qualified trainers is maintained by the Office of Risk Management and can be obtained upon request.

Additionally, the Office of Risk Management also offers [basic training for work conducted from ladders and step stools at nominal heights](#) (i.e. < 10 feet).

### Training Records

Supervisors must ensure that:

- A worker who may use a fall protection system is adequately trained in its use and given adequate oral and written instructions by a competent person.
- The person who provides the training and instruction prepares a written training and instruction record for each worker and signs the record.
- The training and instruction record shall include the worker's name and the dates on which training and instruction took place.
- The employer shall make the training and instruction record for each worker available to an inspector on request.

If you have questions or concerns about whether you should complete [Working at Heights](#) or [Basics of Ladder Safety](#) training please contact the [Office of Risk Management](#).

### PROCEDURES FOR HIGH ELEVATION RESCUE

These procedures are meant to inform members of the University community of the proper action to take in situations involving high-elevation rescues on University premises. The Technical Rope Rescue Team (TRRT) of the Ottawa Fire Department is trained to carry out rescues. This team will assume command of the situation and direct the rescue. The type of response and rescue procedure will depend on the nature of the accident/incident.

Please note that the Technical Rope Rescue Team will take a minimum of 5-10 minutes to arrive on site. It is critical that the actions outlined be followed to ensure a safe rescue and prevent further injury or worsening of the situation.

Refer to Appendix 3 for a generic rescue plan that can be further customized by the supervisor. A rescue plan that is appropriate in one circumstance may not be suitable in another. Ensure that all unique hazards to the work and work environment have been considered.

## **Working Together**

Because of the potential danger associated with working at heights, it is recommended to implement a buddy-system for locations where work at heights will occur. The second worker is intended to act as a call person and summon assistance in the event of an emergency.

## **LOCATION OF ROOF ANCHOR POINTS**

Facilities Service maintains binders entitled “Roof Anchor Point Location”; these show the location of roof anchor points on each building. A copy of this binder is available in the Housekeeping Office at Facilities.

In addition, a plan is posted showing the location of roof anchor points in mechanical rooms / penthouses located at the top of University buildings.



## **APPENDIX 1 – SAFETY SHEET 2 – LADDERS AND STEPLADDERS**

## LADDERS AND STEPLADDERS

Consult the Ontario Occupational Health and Safety Act and its regulations for detailed information.

1. All ladders must be properly suited for the task.
2. All ladders must be in good working condition. Check all parts before each use.
3. All ladders must be CSA (or equivalent) approved, especially for construction purposes.
4. It is recommended to use a heavy duty or grade 1 ladder.
5. Ensure to verify the rating load and respect limitations.
6. All ladders must have non-slip feet.
7. All ladders must be on a firm footing and secure against slipping.
8. Avoid twisting or turning.
9. Do not stand on the top two rungs.
10. Face the ladder, use both hands to climb up or down, and maintain three-point contact at all times. To keep your hand free, use a tool belt, or hoist tools and materials up after you reach the top.
11. Do not overreach; keep your centre of gravity between the side rails. A general rule is that if your buckle is in line with the uprights you are leaning too far.
12. Never paint or coat a wooden ladder with an opaque material.
13. Never use aluminium ladders, or conductive materials, where electrical contact is possible.
14. Ensure areas surrounding the base and top of the ladder are clear of obstructions.
15. Never use a ladder horizontally.
16. If work is conducted at more than 3 metres with a hazard of falling, workers must have proper training, wear a safety harness and tie the lanyard to the structure, or to a lifeline, before beginning work.
17. Ensure you are wearing slip-resistant footwear.

### **Additional requirements if using an extension ladder:**

18. Follow the 4 to 1 rule. Ladders should be inclined so there is one rung length out from the wall for every four rungs height to the point the ladder touches the wall (not less than 1/4 and no greater than 1/3).

19. The top of the ladder should extend at least one metre above the edge of the working surface.
20. Have someone hold the bottom of a tall ladder until it can be tied off to a firm anchoring point.
21. Do not use in high winds.
22. An extension ladder which exceeds 6 metres in length must be held in place while in use by one or more workers if it is not securely fastened or is likely to be endangered by traffic.
23. Never erect ladders near power lines unless you are a competent electrician and follow restricted rules.

**Additional requirements if using a stepladder:**

24. Ensure to lock the stepladder in place by spreading the legs to their limit and locking the spreader.
25. Never stand on the top or use the pail shelf as a step.
26. Verify the age of the ladder (should be imprinted into the ladder).
27. Maintain 3 points of contact with the ladder.

More information: [Infrastructure Health and Safety Association](#)

## **APPENDIX 2 – SAFETY SHEET 5 – FALL ARREST EQUIPMENT**

## FALL ARREST EQUIPMENT

Consult the Ontario *Occupational Health and Safety Act* and its regulations for detailed information.

1. Any worker required to use fall protection must be trained in its safe use and proper maintenance. Refer to uOttawa *Fall Protection Guidelines* for further details.
2. Equipment must be properly suited for the task.
3. Equipment must be in good working condition. Inspect all parts of the equipment for damage, wear, and obvious defects before each use.
4. Replace defective equipment. If there is any doubt about the safety of the equipment, do not use it.
5. Replace any equipment, including ropes, involved in a fall. A trained inspector must confirm the equipment can be used safely if a potential defect is found.
6. Always refer to manufacturer's instructions regarding the use and care of the equipment.
7. A trained inspector should examine equipment at least yearly.
8. Equipment must include a CSA-approved full body harness.
9. Equipment must include a lanyard equipped with a shock absorber unless the shock absorber could cause a falling worker to hit the ground or an object or level below the work.
10. Equipment must be attached to a CSA approved lifeline or by the lanyard to an adequate fixed support (fixed anchor).
11. Fall arrest equipment shall bear manufacturer identification marks.
12. Equipment must prevent a falling worker from hitting the ground or any object or next level below the work area.
13. Must not subject a falling worker to a peak fall-arrest force greater than 8 kilonewtons (1800 pounds).
14. The minimum strength of all components including lifeline and lifeline anchorage (in systems **without** shock absorber) must be able to support a static load of 8 kilonewtons (1800 pounds) without exceeding the allowable unit stress of the materials used for each component.
15. The minimum strength of all components including lifeline and lifeline anchorage (in systems **with** shock absorber), must be able to support a static load of 6 kilonewtons (1350 pounds) without exceeding the allowable unit stress of the materials used for each component.
16. Anchor points must be inspected yearly and must be identified with a seal of approval by a professional engineer.
17. The location of fixed anchor points generally can be found on the building plan located in the mechanical room at the top of the roof. If not please contact Facilities.
18. For additional information, consult the [User's Guide for Basics of Fall Protection, Ladders, and Construction](#) produced by the Infrastructure Health and Safety Association.

For additional information on personal protective equipment, please refer to the University of Ottawa *Personal Protective Equipment Guidelines* and the *Fall Protection Guidelines*.

## **APPENDIX 3 – GENERIC RESCUE PLAN**

### Working at Heights Rescue Plan

The University of Ottawa (uOttawa) strongly encourages measures of fall prevention, rather than fall protection; however in situations where fall protection (i.e. a fall arrest harness) is required, a rescue plan is mandatory prior to the initiation of work. All users must be familiar with the rescue plan applicable to the work. This rescue plan below may require modification based on the individual situation. It is the supervisor's responsibility to ensure that the rescue plan is appropriate and communicated for the individual situation.

It is recommended that harnesses be equipped with orthostatic intolerance (suspension trauma) relief straps and that users be aware of their purpose and trained on their use.

### PURPOSE

A rescue plan is intended to quickly and efficiently rescue a worker who has fallen and is suspended in a fall arrest harness. The rescue must be undertaken promptly as the worker:

- May have sustained an injury as a result of the fall.
- May sustain orthostatic intolerance (suspension trauma; pooling of blood in lower limbs / parts of the body).
- May become agitated / panicked as a result of the situation.
- May still be in danger as a result of risks created / giving rise to the incident.

### PRIMARY EMERGENCY PLAN

In the event that a worker is suspended by a fall arrest harness and lifeline:

1. Contact Protection Services at ext. 5411 or 613-562-5411.
2. Caller indicates that a worker is suspended in a fall arrest harness and requires immediate assistance. The caller should include:
  - a. The location of the suspended worker, including the name of the building and estimated location (i.e. west side of building near XYZ), approximate distance from the ground and position relative to the building).
  - b. Whether the suspended worker is inside or outside the building.
  - c. The type of work the worker was performing (if known).
  - d. The worker's condition (i.e. responsive / unresponsive, visibly injured, etc.).
  - e. The length of time the person has been in the situation (if known).
  - f. The additional risks associated with the area (i.e. mechanical, physical, etc.).
3. Protection Services will immediately contact 911 and inform the dispatcher that a worker is suspended via a fall arrest harness. Assistance from civic authorities is required (including fire and ambulance). Protection will request assistance from the Technical Rope Rescue Team (TRRT) from the Ottawa Fire Department. Note that the TRRT will take approximately 5-10 minutes to arrive on campus. **It is critical that immediate actions be taken to minimize further injury to the suspended worker and ensure a safe rescue. Refer to *Secondary Rescue Procedures*.** Provide information obtained in section 2 to the 911 dispatch.



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4. Maintain communication with the suspended worker.
5. Protection Officers will:
  - a. Secure area, including access to the incident scene and the area below the suspended worker. All non-essential personnel will be cleared from the area.
  - b. Escort emergency personnel to the incident scene.
  - c. Advise emergency personnel of the actual / potential risks at the incident scene or direct them to the proper individuals (i.e. supervisor, facility manager, etc.).
  - d. Facilitate access for emergency personnel.
  - e. Advise and request that Facilities personnel shut down equipment / processes (if / where necessary).
  - f. Make available to emergency personnel the “Roof Anchor Point Location by Building” binder. The binder shows the location of the roof anchor points and is available in the from the Architectural Trades workshop and Housekeeping Office at Facilities. Additionally, most mechanical rooms providing access to a roof have a roof plan showing the location of the roof anchor points.
  - g. Provide additional support to worker, emergency personnel, and other campus departments during the emergency plan.
  - h. Notify the Office of Risk Management of the situation. Risk Management will advise the Facilities Health and Safety Officer.
6. If the worker is conscious and equipped with suspension trauma relief devices, the worker will deploy the relief device(s).

### **SECONDARY RESCUE PROCEDURES**

The following procedures have been provided as potential rescue methods for a suspended worker. Persons executing a rescue must be properly trained in the use of any of the below methods. Protection Services must still be contacted in any instance; refer to the action in the *Primary Emergency Plan*. The site supervisor (or person witnessing a suspended worker) assumes primary control of the situation until arrival of Protection Services.

The following rescue procedures are presented in hierarchal order.

#### **Elevating Work Platform Rescue**

If an elevating work platform (i.e. a scissor lift, articulating (genie) boom, etc.):

- Is available on site;
  - Is capable of reaching the suspended worker;
  - Is of sufficient capacity, and;
  - Personnel have appropriate training to operate the elevating work platform:
1. Bring the elevating work platform to the incident scene.





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2. If the worker is conscious, raise the platform to reach the suspended worker. If the worker is unconscious, a second trained worker will don a harness, tie off to the platform and provide assistance to the suspended worker.
3. Position the platform of the elevating work platform below the worker. Raise the platform so as to provide slack to the suspended worker's lanyard. Disconnect the suspended worker's lanyard when safe to do so. When the suspended worker is safely on the platform, re-attach the lanyard to an appropriate anchor point on the platform of the lift.
4. Lower the worker to a safe location and administer first aid. Treat the worker for suspension trauma and any other injury.
5. Emergency services (fire, ambulance, etc.) should have arrived on scene; provide account of the situation, including a summary of information provided to Protection Services.

### Alternate Rescue Procedure

If the above noted rescue procedures are not suitable or available in the event of a suspended worker situation, the supervisor of the worker is responsible for developing, communicating to, and training workers on a rescue procedure appropriate for the work. If assistance is required, please consult with the Facilities Health and Safety Officer and/or the Office of Risk Management.

## **ORTHOSTATIC INTOLERANCE (SUSPENSION TRAUMA)**

Orthostatic intolerance occurs when blood from the body pools in the lower limbs and can lead to dizziness, unconsciousness and death; it is commonly referred to as suspension trauma and can affect workers suspended in fall arrest harness for short periods of time. It is possible for suspension trauma to occur in as little as 3 minutes; if action is not initiated, the risk of injury is significantly increased.

### Signs and Symptoms

The following signs and symptoms are associated with suspension trauma:

- Feelings of faintness / nausea
- Shortness of breath
- Sweating
- Paleness
- Hot flashes
- Increased / decreased heart rate
- Low blood pressure
- Blurry / loss of vision

It is vital that emergency personnel are immediately contacted for any situation that involves a worker suspended from a fall. In the event of suspected suspension trauma:

- Do not allow the rescued worker to lie down; place them instead in a semi-sitting position until paramedics arrive.
- Check ABCs (airway, breathing and circulation).
- Verify for additional injuries.



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- Provide oxygen (if possible).
- Transfer care of worker to paramedics / ambulance. Advise that the worker sustained a fall in fall arrest harness and may have suspension trauma.

## **POST-RESCUE PROCEDURE**

All non-essential personnel are to remain available in a designated safe zone until otherwise notified by Protection Services.

- Protection Services secures the scene. The scene is not to be further disturbed unless for:
  - Saving life or relieving human suffering;
  - Maintaining an essential public utility service or a public transportation system; or
  - Preventing unnecessary damage to equipment or other property.
- The supervisor of the worker initiates an investigation of the incident. Facilities Health and Safety Officer and Risk Manager and Office of Risk Management will provide assistance. Persons witnessing the incident may be asked to provide a statement or witness account of the incident.
- All material (i.e. lifelines, harnesses, rope grabs, anchor points, etc.) involved in the incident are to be quarantined. The equipment will be thoroughly inspected following the incident and will be removed from service.
- Debrief from the incident and rescue procedure. What can be improved / modified?
- Supervisor writes investigation report of the incident and provides the report to Facilities Health and Safety Officer and Office of Risk Management. The report shall include all related documented statements from impacted workers and witnesses, photographs related to the incident, as well as all key information such as dates, time, weather, general site conditions, and specific accident locales including sketches of the immediate incident area, complete with measurements (if applicable).