



Recommended Practices in Health + Safety

A guide for

BUILDING OWNERS + MANAGERS

Building Envelope Safety Supplement

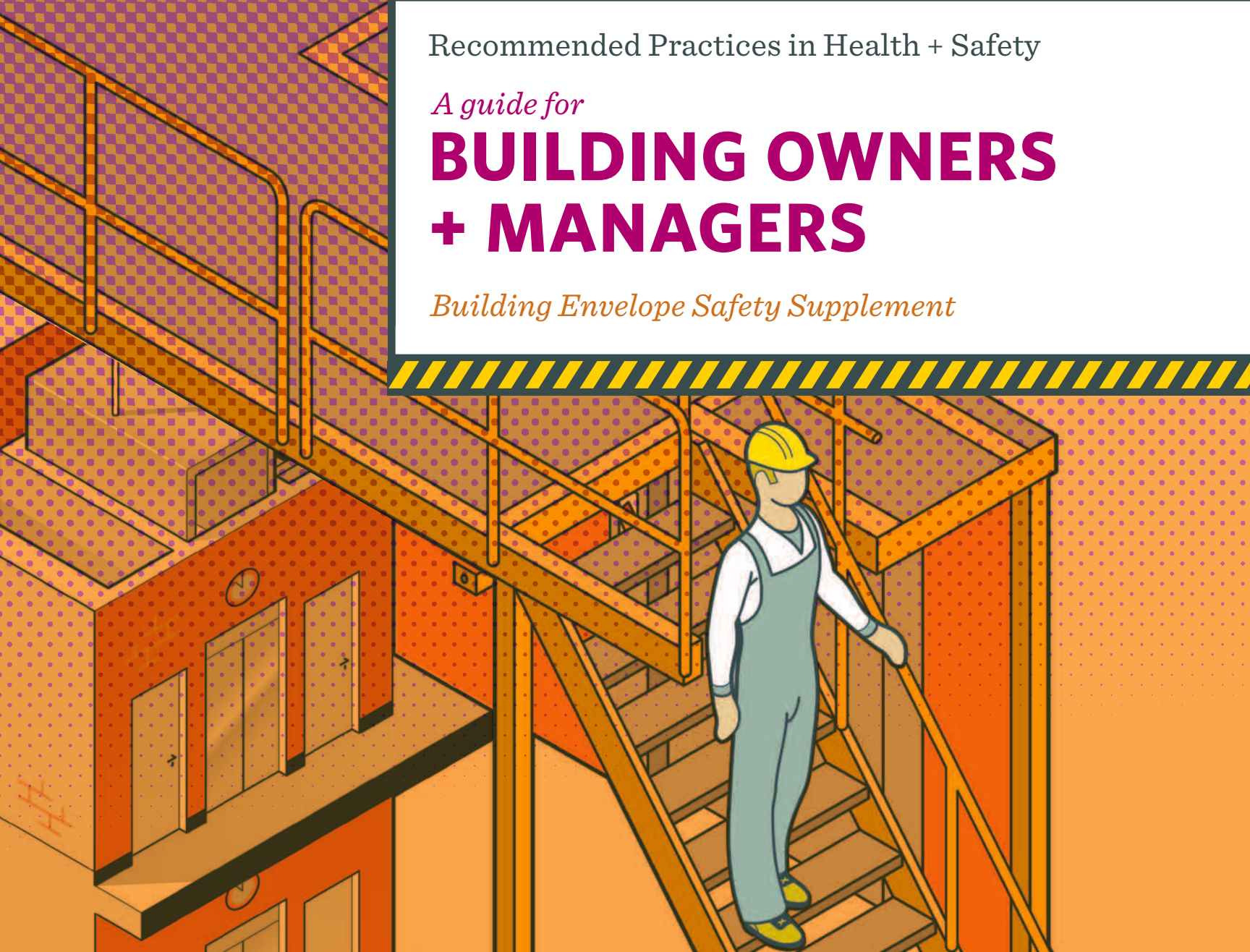


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The following guide reflects the (Building Owners and Managers Association) BOMA Calgary recommended practices. The following statements are recommendations only, and unless otherwise stated in the legislation, are not mandatory.

1

ROOF SAFETY

Most buildings are designed and constructed to resist the effects of strong winds; however wind that exceeds the original design specifications may lead to material and equipment damage. This damage may occur because of inadequate design specifications, material deterioration, deferred or poor maintenance, or improper application. Historically, roof covering damage has been the most prevalent source of incident and should be given special attention. Wind-induced failures typically propagate from perimeter or penetration flashing failures. **Take into account these critical components when conducting reviews.**

Each building has a unique wind pattern affected by location, height and type of structure; consider the specific characteristics of a building during a review of a roof. The overall conditions may vary; however a thorough roof safety program could address the following items.

- Exterior mounted equipment such as exhaust fans, HVAC units, boiler stacks, electrical and communication equipment, light fixtures, antennae and satellite dishes are often damaged during high winds. Damaged equipment can disrupt the use of the building and the equipment itself has the potential to become dislodged and damage adjacent buildings or property. Problems usually relate to inadequate anchorage, strength or corrosion of the equipment or its mounting structure.
- When lightning protection systems are not adequately integrated into a roof system, they can become detached from a roof during high winds. The detached system can damage a roof covering, and will no longer provide lightning protection

It is important to note that a person should never go onto a roof during a high wind event.

Please refer to the Alberta Building Code for more information on the requirements for building design and materials :
http://www.municipalaffairs.alberta.ca/cp_building_codes_standards.cfm



RESOURCES

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Annual Inspection and Reporting — Roofs

Annual roof inspections are conducted by consultants experienced in roof system design, installation techniques, failure analysis, maintenance management and renewal (membership in the Roof Consultants Institute (RCI) is an asset). The consultant provides a written report which outlines the current physical condition of the roof; the sundry attached and adjacent components; identifies changes to components since the previous review; and identifies observed maintenance or failure mechanisms that pose a safety hazard and provides recommended corrective action.

Annual Inspections may include the following:

- visible roof system components that, depending on the type of system, may include stone ballast, pavers, membrane and insulation (may require an initial base line system composition test cores)
- perimeter flashing type and securement
- cladding type and securement for all penthouse mechanical rooms, stairs, etc.
- HVAC equipment housing, curbs, support framing, flashing and securement
- exhaust fans, and other mechanical exterior systems
- antenna and exterior mounted communications equipment, support framing, cable trays, flashing, ballast and/or securement
- lightning grounding equipment attachment only (review of system continuity on grounding requires an electrician)
- signage, both roof mounted and wall mounted, including housing, curbs, support framing, flashing and securement
- access hatches and doors that may lead to rooms and equipment
- swing stage, davit arms, roof anchors and other exterior window washing equipment. (Review is limited to flashings and on-roof storage safety. Equipment usability to be reviewed and certified separately and annually; the role of the roof inspector does not include this certification, unless they have been contracted to complete it as well)
- skylights and windows
- exterior mounted electrical equipment.

Every four months conduct an inspection of the roof to check for potential hazards created by work, weather conditions or wear and tear.

Personnel conducting the roof inspections need to be trained to look for items that may have come loose or that a contractor may have left behind.

The inspection should also consider the risk to contractors and by contractors who have gained access from another building and are using a building as a staging area to do work on the neighbouring building.

In addition to the daily inspections, the roof is inspected with contractors prior to commencing work, and prior to full completion and relinquishment of the site.

This will prevent any disputes about the condition of the roof or presence of materials.

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RESTRICTED ACCESS

The restricted access to a building's roof is controlled by keys and/or cards that only open the roof access hatch or doors. A hazard analysis is conducted by the contractor and the Property Manager Representative before commencing work on a roof.

Any persons accessing the roof sign a roof access waiver that includes the following safety rules:

- having and using proper PPE,
- regulations for the property and current safety legislation,
- site phone numbers of the Property Manager or Control office at the site.

Log sheets are to be available at each roof access point. Log sheets are signed and show the entry and exit times of all persons accessing the roof. Security is notified each time a contractor is accessing the roof area. Signage posted on the all exit doors is used to indicate that access is restricted as well as providing the worker or contractor with specific entry instructions. An example of such signage is found in Appendix A.

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FALL PROTECTION

Fall protection consists of both personal fall arrest systems and guardrail systems. This is especially critical with suspended scaffolds, such as swing stages, as they are often operated at extreme elevations. Individual building owners or property managers must have a fall protection plan in place to address this hazard. The OHS Explanation Guide provides a sample Fall Protection Plan template.

The Alberta OHS Code provides a minimum level of protection required and is described in the OHS Code Explanation Guide as “Where At fall heights of 3 metres or more, at lesser heights if there is an unusual possibility of injury, or if the fall is through an opening in a work surface, subsection 139(1) requires that workers be protected from falling, regardless of whether the work area is a temporary or permanent work area.”

Subsection 139(3) states the most general case for fall protection — that workers need to be protected from falling by the use of an engineering control such as a guardrail. Engineering controls eliminate the hazard of falling rather than control the hazard. Examples of other engineering controls include eliminating the need to work at height by making equipment, lighting, controls, valves, etc. accessible from ground level or from a location where there is no hazard of falling.

Reference: *OHS Code, Explanation Guide, section 139(3)*



LEGISLATED REQUIREMENTS

Other means of hazard mitigation can be considered when engineering controls are not practical. The hierarchy of fall protection is represented in Figure 1 below:

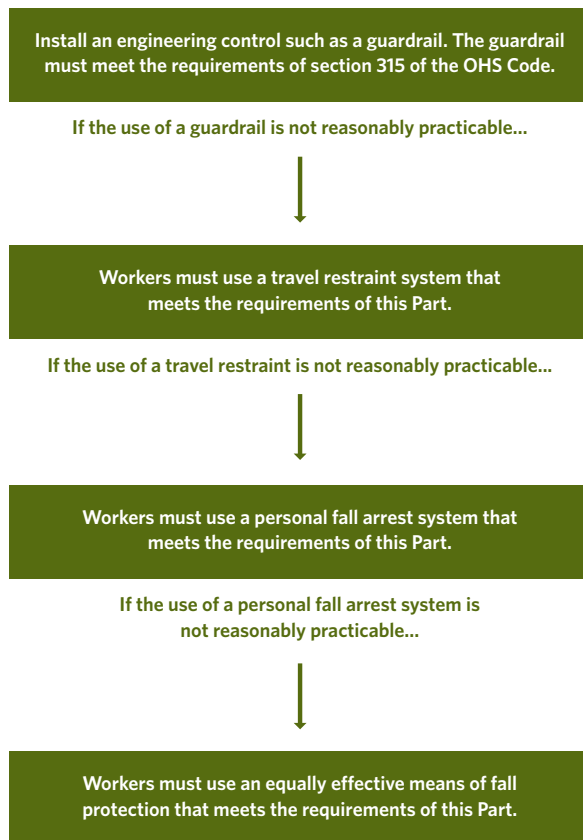


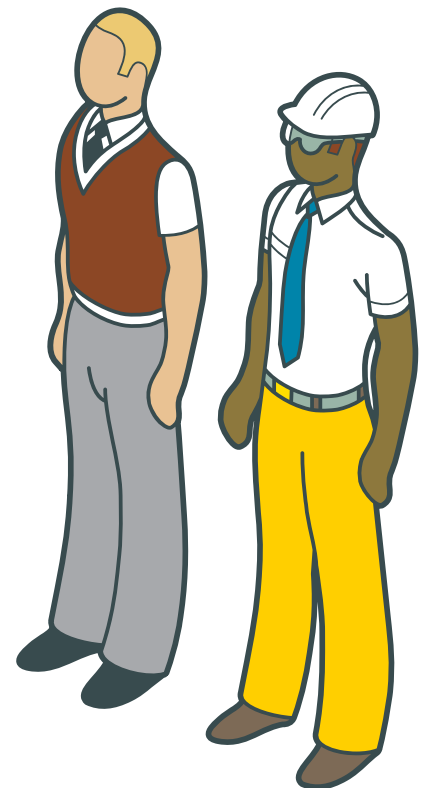
Figure 1. Hierarchy of fall protection

Source: *Occupational Health and Safety Code 2009, Explanation Guide, Part 9*

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STORAGE OF TOOLS AND MATERIALS

Materials and tools are not to be stored on the exterior roof area; these materials and tools should be removed to an inside location. Roof storage is only be granted in exceptional circumstances, and only after a full hazard assessment is conducted with proper containment, such as, at least two ratchet straps around the whole load, and secured to the building structure. If storage is permitted on the roof, the storage directions are documented and signed off by the contractor and building representative.



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MOVABLE WORK PLATFORMS / DAVIT ARMS / ROOF ANCHORS

For the purposes of this guideline “Movable Work Platforms” refers to any of the following:

- elevated work platform
- swing stage
- permanent powered platform
- boatswain’s chair
- portable powered platform
- scaffold
- boom supported device.

All of these devices have to be certified by a qualified contractor, consultant, or engineer, including the swing stage tracks on the sides of the buildings. It is recommended that a safety plan be in place for persons using the swing stage. All documents are to be filed and stored by the property manager.

Scaffolds and Temporary Work Platforms

CSA Standard CAN/CSA-S269.2-M87 (R2003), *Access Scaffolding for Construction Purposes*, provides rules and requirements for the design, fabrication, erection, inspection, testing, maintenance and use of scaffolding equipment, materials and equipment where scaffolds are erected to provide working platforms for workers and materials during the construction, alteration, repair or demolition of buildings and other structures.

Reference: *OHS Code, Explanation Guide, section 323*



LEGISLATED REQUIREMENTS

It is advisable that the contractor have a cell phone available while on the swing stage in order to call building management for assistance if there is an issue. The cell phone and tools are secured by lanyards to prevent them being dropped on persons passing below.

The safe use of any suspended scaffold begins with secure anchorage. The suspension structure should support the weight of the scaffold itself, as well as its occupants and all scaffold components that make up the anchorage system, including roof anchors, tie backs, and davit arms.

Work platforms are designed to be raised and lowered while occupied by materials and workers, and if maintained and used correctly, are capable of bearing their load whether stationary or in motion.

The platform of the suspended scaffold is the work area, and as a result, an inspection requires safety checks of both the platform structure and also how the platform will be used by the workers.

Extreme weather, excessive loads, or damage to the structural components can all affect the stability of a work platform.





CLADDING SAFETY

It is recommended that an experienced Building Envelope Consultant (P.Eng. minimum with RCI membership preferred) review the cladding every two years. The initial baseline review offers sufficient detail to define the nature and adequacy of the cladding anchorage and support systems. On older buildings this may require that a test of openings be completed to expose those details for review. Bi-annual follow-up reviews are recommended, including at least one drop on each elevation to check for visible deviations or changes to the cladding system. Additional reviews may be required after severe storm events; wind damage must be addressed promptly. A maintenance program should be implemented to repair and secure any issues which could cause a failure of the cladding system. The property management team should look for possible water penetration to the sub-structure on the inside of the cladding, which can weaken the sub-structure and cause failure, and keep track of any occurrences in order to assist the consultant in defining issues during their regular cladding reviews.

Where applicable, review the following components:

- glass panels
- spandrel panels
- mullion caps
- air intake grills
- metal cladding and associated flashings
- stone facades
- brick facades
- wooden window mullions
- mortar and grout.

It is recommended that an experienced consultant completes a full review of all elevations of all components on the cladding system every five years.



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SIGNAGE SAFETY

All signs on the roof or affixed to the building envelope are reviewed annually to make sure the signage structures are secure. Additional inspections may be required after a high wind event or as determined by the City of Calgary Emergency Management Agency (CEMA). Review each sign for secure components including:

- face
- structure
- power feeds
- lights.

In particular, signs and their structures which are above the sidewalk or Plus 15 level need to be reviewed annually.



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SIDEWALK SAFETY

Provide sidewalk area signs when there is any overhead work, such as window cleaning, testing or window replacement.

During the winter months keep the sidewalks free of ice and snow. If there is a potential for snow or ice to fall off the building, provide adequate signage and barricades prior to the daily occupancy of the building.

Assess the sidewalk daily to identify any tripping hazards, garbage and graffiti. If tripping hazards are present place high visibility warning barricades or cones on, or around, the hazard.



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EMERGENCY RESPONSE

An employer must have an emergency response plan for an emergency that may require the rescue or evacuation of workers (Section 8 of the OHS Regulation requires the plan to be in writing and available to workers). The plan establishes what the employer must do until emergency services personnel arrive.

The response plan must address the emergencies identified in the work site hazard assessment required by Part 2 of the OHS Code. The plan is to be developed by the employer with the involvement of affected workers. The procedures to be followed and the personnel involved in emergency response must be specified in the plan. All affected workers must be aware of the plan and familiar with the procedures.

Reference: *OHS Code, Explanation Guide, section 115*



LEGISLATED REQUIREMENTS

Ideally, this document would include consultants' names and after-hour contact numbers in order to facilitate quick response and assessment times. Additionally, it is recommended to include a list of contractors who may assist with safety and site cleanup. There must be safety equipment, ropes, harnesses, restraints and equipment, ready on site, along with directions on where they are to be attached. To prepare staff for an emergency, provide training on the use of the safety equipment. Employee contact information, including home phone numbers and a call out procedure, should also be available. A plan allows staff, consultants and contractors to access the site in case the surrounding area (as in the downtown core) is shut down. To further prepare for an emergency, conduct a mock crisis drill every four months with employees.

Numerous resources are available to assist with emergency response planning.

To find a list of some of these resources as well as an outline of legislated requirements as prescribed in the OHS Code and the Alberta Fire Code, see Section 10 of the main BOMA Best practice document, *Recommended Practices in Health and Safety: A Guide for Building Owners and Managers*.



RESOURCES

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CONSULTANTS REPORTS

Have a copy of the consulting reports available at all times, and review annually to make sure the repairs have been completed. The list of items reviewed covers all aspects of the cladding and roof assembly, including the structure. Budget for these cladding, roof and exterior consulting reports and keep in mind the potential seasonal weather extremes and the estimated time to complete.

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SNOW AND ICE

Snow and ice buildup on surfaces varies greatly between buildings. The weather conditions, such as wind, humidity, and the freeze-thaw cycle affect each building differently. Any surface can hold snow and ice. During the winter months, the building owner or manager reviews all ledges, over-hangs, metal cladding, window ledges, parapets, awnings, slope glazing, and roofs for ice and snow build-up that may potentially blow off, or in the freeze-thaw cycle, become a potential hazard to persons and property below.

There are a number of ways to limit the snow and ice from forming. Heat trace cabling, gutters, snow retention items and snow and ice size reduction items are all available. The snow and ice retention items stop or break up the snow and ice into small pieces before it can slide off the building. The reduction items are products that reduce the size of the area that can hold snow and ice. These devices are attached to roof top, ledge top, slope metal roof and glass slopes to reduce or stop the snow and ice buildup from sliding off or reducing the size before it comes off the buildings. These can be purchased commercially or suppliers can manufacture such items and have contractors attach them to the parapets. Icicles sometimes form when the weather moderates; proactively tour the outside of the building during weather extremes.

If snow or ice has the potential to drop a long distance, dynamic loads may be imposed on a lower roof, or on an object located below. Snow and ice sliding off a sloped roof can damage property and injure people as far as 30 feet away from a two storey building.

Watching the weather and build up on buildings is critical. The weather in can change rapidly, further highlighting the necessity of prevention. The Government of Canada website offers radar images to help determine the current and pending conditions (www.weatheroffice.gc.ca/canada). In addition, there are small weather stations that can be installed on rooftops to provide detailed information on weather patterns and systems.

Recommended Risk Control for Snow and Ice

- monitor weather conditions
- monitor roof conditions by monitoring snow and ice accumulation across the building roof and by monitoring the amount of snow drifting
- be aware of drifting snow potential that could result from new additions at varied heights, such as HVAC equipment or large roof-mounted signs
- drifting snow can affect the operation of HVAC equipment
- be aware that wet snow and ice are far heavier than fresh light snow and that the visible depth of the snow may be deceiving
- regularly inspect roof drains and remove any debris and clear to allow run-off of melting snow
- if the roof is pitched without drains ensure there are open paths to ensure drainage and prevent water pooling.



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APPENDIX A, ROOF ACCESS SIGNAGE

Restricted Access

This door is to be kept closed at all times.

No access if wind speed is higher than 30 KM/HR

All Contractors Must

- Sign in at the security control centre prior to entering the site.
- Enter their names and company details on the door entry log and show the time in and out.
- Contact the security control centre prior to leaving the work area to arrange a site inspection by a security guard.
- Sign out at the security control centre prior to leaving the site.

All Employees Must

- Notify the security control centre room before accessing the roof.
- Enter their details on the roof entry log and show time in and out.
- Notify the security control room on exiting the roof.

No tools, implements or other items are to be stored on the roof without written permission from [Management Company].