HEALTH, SAFETY & ENVIRONMENTAL MANUAL	11.11 Working at Heights Program				
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WORKING AT HEIGHTS

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All work at heights must be completed in a safe manner. J-AAR recognizes that training, planning, and the proper equipment are fundamental in completing work at heights safely. J-AAR will ensure workers have adequate training on the equipment and devices used while working at heights, and that the work has been assessed for hazards and controls have been put in place. A rescue plan will be developed where fall arrest may occur.

SCOPE

Fall Protection is the means or measures taken to ensure work is completed safely while working at heights. This can include, but not limited to, the use of guardrails, travel restraint, fall restricting or fall arrest systems.

According to the Construction Regulations:

Fall protection is required where a worker may be exposed to any of the following hazards:

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.

Note: In some jurisdictions and client workplaces, fall protection is required at a height of 1.8 metres (6 feet). Consult with the health and safety team for further information and instruction.
Typically workers operating powered elevated work platforms also require fall protection.

All workers using fall protection devices on a construction project are required to complete a “Working at Heights” course approved in Ontario. This training will ensure that they understand the regulations and procedures for working at heights and are capable of inspecting, using and maintaining all fall protection equipment, including harnesses and self-retracting lifelines. Some workers may complete the course for knowledge purposes, even though they may not use fall protection devices.

RESPONSIBILITIES

Employer

- Develop and implement working at heights programs and procedures.
- Schedule competent supervisors at projects or worksites where working at heights is required
- Ensure workers are trained in work at heights accordingly.
- Ensure all required fall protection devices and PPE is available to workers as needed.
- Enforce all legislative requirements and procedures related to work at heights.

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Supervisors

- Ensure the Fall Protection Plan and Fall Arrest Rescue Plan are current and specific to actual operations.
- All workers that are performing work that requires a plan, are instructed in proper execution of the plan.
- All workers performing work at heights have the proper training
- All fall protection equipment has been inspected as required.

Workers

- Receive instruction and adhere to the Fall Protection Plan and Fall Arrest Rescue Plan
- Report to the supervisor any non-compliance of the plans.
- Report falls resulting in the worker's fall being arrested.
- Ensure all inspections are completed as required.
- Complete work at heights training as needed.

Subcontractors

- Ensure all workers under their authority receive work at heights training.
- Ensure training documentation is forwarded as requested.
- Ensure that the required fall protection equipment is inspected and available.
- Ensure all workers under their authority adhere to the project plans.

Fall Protection Information

Fall protection equipment must be CSA approved. Instruction and implementation of procedures shall be enforced by site supervision.

Guardrails

- Guardrails shall be constructed around any open-sided floor, working platform, runway, walkway, or other surface to which a worker has access.
- Guardrails must be between 0.96 - 1.1m (38"-42") high.
- Guardrails shall have a top rail, intermediate rail and toe boards.
- Railings must be attached to the inside of posts.
- Posts must be spaced less than 2.4m (8') apart.
- When guardrails are temporarily removed to facilitate work, workers exposed to a fall hazard must be protected by other fall protection systems. The guardrails must be replaced when the unguarded area is left unattended and after the work is completed (if still required)
- Guardrails shall be designed to withstand all loads likely to be applied in any direction.

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If it is not practicable to install a guardrail system, a worker shall be adequately protected by the highest ranked method that is practicable from the following ranking of fall protection methods:

1. A travel restraint system
2. A fall restricting system
3. A fall arrest system
4. A safety net

Travel restraint system- means an assembly of components capable of restricting a worker's movement on a work surface and preventing the worker from reaching a location from which they could fall.

Fall restricting system- means a type of fall arrest system that has been designed to limit a worker's fall to a specified distance.

Fall arrest system- means an assembly of components joined together so that when the assembly is connected to a fixed support, it is capable of arresting a worker's fall.

Fixed support- means a permanent or temporary structure or a component of such a structure that can withstand all loads and forces the structure, or component is intended to support or resist and is sufficient to protect a worker's health and safety and includes equipment or devices that are securely fastened to the structure or component.

Full-body harness- means a device that can arrest an accidental vertical or near vertical fall of a worker and which can guide and distribute the impact forces of the fall by means of leg and shoulder strap supports and an upper dorsal suspension assembly which, after the arrest, will not by itself permit the release or further lowering of the worker.

Safety net- means a safety net that complies with section 26.8 of the regulation and is located and supported in such a way that it arrests the fall of a worker who may fall into it without endangering the worker.

- Workers must inspect all device components before use. J-AAR shall ensure that a worker who may use a fall protection system is trained in its use.
- If a device is found to be defective, it shall be immediately removed from service and shall not be used again by a worker unless all components of the system have been certified by a qualified technician.
- Before any use of a fall arrest system or a safety net by a worker at a project, J-AAR shall develop written procedures for rescuing the worker after his or her fall has been arrested.

<u>Travel Restraint System</u>

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Travel restraint lets a worker travel just far enough to reach the edge but not far enough to fall over. A typical travel restraint system consists of the following CSA-approved equipment attached to adequate anchorage:

- Full-body harness
- Lanyard
- Lifeline
- Rope grab to attach harness or lanyard to lifeline.

Adequate anchorage for a travel restraint system means that it is capable of supporting a static load of 2 kilonewtons (kN) (450 lb) with a recommended safety factor of at least 2 (i.e., 4 kN or 900 lb).

Fall Restricting System

A fall restricting system is designed to limit a worker's free-fall distance to 0.6 m (2 ft). This means that less force will be exerted on the body when the fall is arrested. It also means there is less chance that the person will hit the ground or an object below. Temporary fixed supports used for anchorage with a fall restricting system must support at least 6 kN (1,350 lb) without exceeding the allowable unit stress for each material used. A safety factor of two must be applied (i.e., 12 kN or 2,700 lb).

Fall Arrest System

A fall arrest system must prevent a falling worker from hitting the ground or any object or level below the work. It must include the following:

- A CSA-approved full-body harness
- A lanyard equipped with an energy absorber (unless the energy absorber could cause a falling worker to hit the ground or an object below)
- An adequate fixed support

A fall arrest system must not subject a falling worker to a peak fall-arrest force greater than 8 kN (1,800 lb) with a safety factor of two (i.e., 16 kN or 3,600 lb).

Safety Net

A safety net system is installed below a work surface where a fall hazard exists to prevent workers from hitting the ground or another level below if they fall. A safety net must be designed by a professional engineer. It must also be inspected and tested by a professional engineer or supervised by them.

Fall Protection and Working Alone

J-AAR requires a minimum of 2 people to be present at all times when the use of a travel restraint, fall restricting or fall arrest system is required (buddy system).

Trenching and Excavations

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During trenching and excavation tasks, even though workers may have Work at Heights training, work at heights shall be avoided if possible. The following scenarios can be controlled for fall hazards:

- Trenches- all trenches or excavations that are not graded to the appropriate slope must be protected by a trench box barrier or other suitable guardrail that is 1.1 metres high.
- Ladders- setup all ladders according to proper procedures including safe angle and tie-offs. Do not work from a ladder. It is used only as access and egress.
- Shoring- all shoring must have a suitable barrier or guardrail installed at the top of the excavation.
- Manholes- manholes must not be constructed so that their height becomes a fall hazard. Install a section and backfill before installing another section. Remember to also cover openings if they become a fall hazard.
- Equipment or machines- do not work on top of equipment or machinery if the height becomes a fall hazard. An example would include walking on top of the hood of an excavator that is higher than 3 metres from the ground. Perform maintenance or inspections using the recommended procedures.

If any situation or scenario at a project becomes a fall hazard and it cannot be eliminated or controlled, stop work, and discuss the issue with the supervisor so that a safe work plan can be developed.

Power Elevating Working Platforms (PEWP) & Logs

Workers using elevating working platforms will be trained in the safe and proper use by the manufacturer or other qualified person. The PEWP operator will have proof of training for the class of equipment used.
100% fall protection is required on elevating work platforms. A full body harness and lanyard will be used while on an elevating work platform. The system used will be arranged so that the worker is not capable of striking the ground in the event of a fall.

- PEWPs shall be equipped with a top rail, mid-rail, and a toe board.
- PEWPs shall be used only on smooth level surfaces. EWPs used on uneven surfaces must be rated accordingly and used as per the manufacturer instructions.
- PEWPs are to raise workers and light tools, not materials beyond its rated capacity.
- Workers on PEWPs must be protected from falling. Protection will include a full body harness and the appropriate lanyard to prevent the worker from striking the ground in the event of a fall.
- Workers wearing a full body harness on an PEWP will tie-off to the engineered anchor point identified by the manufacturer.

Ladders

All work involving the use of ladders will be in compliance with the standards detailed in the J-AAR program for ladder use.

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Scaffolds
All work involving the use of scaffolding will be in compliance with the standards detailed in the J-AAR program for scaffold use. Scaffolding shall be erected by qualified workers and shall be erected as designed by the manufacturer.

Training
All workers required to use fall protection on a construction project must be trained in a "Working at Heights" approved training program in Ontario.
In addition to the training described, a worker must be made aware of fall hazards particular to a worksite and the steps being taken to eliminate or control those hazards.

Fall Protection Plan
Where workers are required to wear fall protection devices, the work will be reviewed for potential hazards and the appropriate controls identified. The fall protection plan will incorporate the use of rescue planning, fall clearance calculations or other details as required.

The procedures for working at heights with the use of a fall protection devices must be available at the worksite and reviewed with workers before work with a risk of falling begins.

Calculating Fall Clearance
Calculating the fall clearance will help determine if the selected fall arrest system will prevent the worker from striking the ground or objects below:

The minimum fall clearance required using a shock absorbing lanyard is calculated by using the information below.

Note: This calculation reflects the fall clearance required from the anchor point. The use of vertical lifelines will need to consider additional distance for potential stretch of the lifeline in relation to the components of the selected system.

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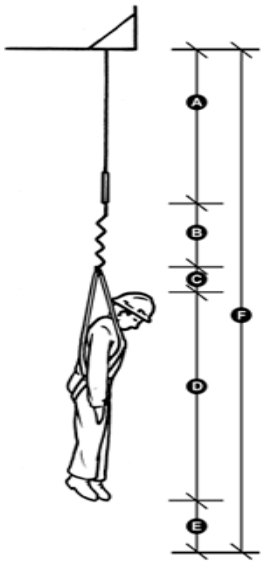
A	Length of lanyard	=
B	Extension of shock absorber	=
C	D-ring slippage	= 1.5 ft
D	Height of worker to D-ring	
E	Safety Factor	= 3 ft.
F	Fall Clearance required (F = A+B+C+D+E)	=



Rescue Planning

Where workers are required to use fall arrest devices, the project supervisor will ensure that a rescue plan is in place prior to the use of such equipment.

The rescue plan is to consider the types of fall arrest used, application and potential emergency situations.

Additional rescue planning may be necessary for unique situations and will be developed as part of the fall protection plan.

Items that can be considered as part of rescue planning:

- The use of elevating work platforms to reach workers at height.
- Ladders on site that are capable of reaching a suspended worker.
- Equipping sites with rescue devices such as the “Rollgliss” that allows self-rescue or assisted rescue.

WAH Rescue Plan

The WAH Rescue Plan is an additional procedure. See section in HSE Manual. It will be used to determine the rescue plan and rescue team members when fall arrest equipment is in use. Additional planning may be required for scenarios not covered by the WAH Rescue Plan.

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Tower Crane Rescue Planning Purpose

Where tower cranes are being erected, used, altered, maintained, inspected, thoroughly examined or dismantled, the evacuation and rescue of persons from height, although required infrequently, must be planned for. This section's primary purpose is to provide guidance on the planning of the rescue of persons from height on tower cranes.

Circumstances Requiring Rescue from a Tower Crane

The following table summarizes the activities during which persons may require rescue from a tower crane, the persons who may require rescue and the types of emergency that may precipitate the need for rescue:

	Person requiring rescue					*Type of emergency*			
Activity	**Erector**	**Operator**	**Maintenance Persons**	**Competent Person**	**Visitors**	**Suspension from fall arrest system**	**Equipment failure**	**Medical emergency/ injury**	**Partial collapse of tower crane structure**
Erection	✓					✓	✓	✓	✓
Use		✓					✓	✓	✓
Alteration	✓					✓	✓	✓	✓
Maintenance			✓			✓	✓	✓	✓
Thorough Examination				✓		✓	✓	✓	✓
Dismantling	✓					✓	✓	✓	✓
Other					✓	✓	✓	✓	✓

The table above indicates that the circumstances requiring rescue from height, fall into two categories:

- During erection, alteration and dismantling of the crane when the people who may require rescue are members of the crane erection team.

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- During use, maintenance and thorough examination of the crane when those that may require rescue are the operator, visitors to the crane (e.g. safety advisors, inspectors, managers, etc.), maintenance persons and 'competent persons' carrying out thorough examinations.

Recovery from suspension during erection, alteration and dismantling
The tower crane erection or maintenance teams must have a fall rescue plan prior to work being performed. If they are suppliers or subcontractors, they are responsible for their employees, recure team and rescue equipment. Typically, a Rollgliss or similar device would be used for rescue.
J-AAR operators are trained in self-rescue using a Rollgliss device.

Selection and Training of Rescue Persons
It is essential that all rescue from height on tower cranes is carried out by adequately trained (competent) persons who must be available on site at all times when rescue may be required. Authorized training on the 3M Rollgliss rescue device is completed for all J-AAR tower crane operators and members of rescue teams at each project where a Rollgliss device is available.

Inspection and Maintenance of Rescue Equipment
All equipment used for the rescue of persons from height on tower cranes must have a pre- use check before each use. Damaged equipment must be taken out of service immediately.

Rescue equipment is only to be used in rescue situations or in training. Rescue equipment is not to be used to lift equipment, tools, etc.

In addition to pre-use checks, equipment will be subjected to periodic detailed inspection (and/or thorough examination) by a competent person in accordance with a schedule specified by the equipment manufacturer.

Furthermore, rescue equipment will be inspected after use and, if damaged, taken out of service immediately.

Equipment must be kept clean and dry and will be properly stored, in a secure place. Wet equipment must be thoroughly dried before storage. Equipment shall not be altered or repaired, unless this has been authorized by the manufacturer.

EQUIPMENT

Harness
Care, Use and Maintenance

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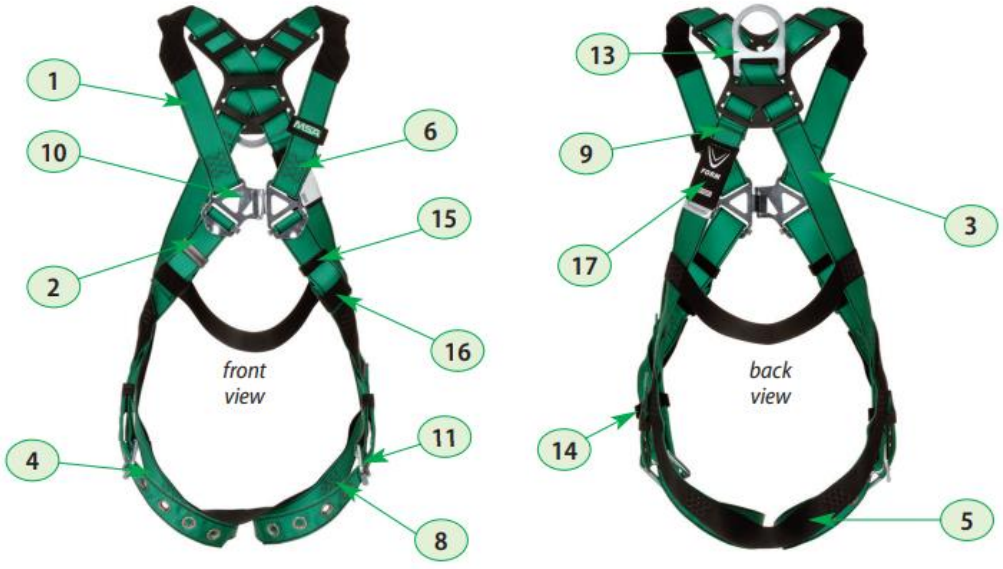
Copies of users manuals can be found at the office in the yard or online at: Johnaartsgroup.com/h-s

The harness must be inspected before each use. To inspect the harness, follow the manufacturers instructions, however some general guidelines are as follows:

1. Inspect all fabric components for cuts, fraying, abrasion, pulled or ripped threads, UV damage, heat damage, chemical damage/exposure.
2. Inspect all metal components for deformations, cracks, corrosion, heat damage, chemical damage/exposure, sharp edges, chips, knicks.
3. Inspect all plastic components for deformation, cracks, heat damage, chemical damage/exposure, sharp edges, chips, knicks.
4. Ensure all buckles/tangs/d-rings function properly.
5. Inspect all labels. All labels must be present and legible.



<u>Inspect each element listed</u>.

1. Shoulder straps
2. Torso Straps (front)
3. Torso Straps (back)
4. Leg straps
5. Rear Strap

6. Chest stitches
7. Leg stitches
8. Rear strap stitches
9. Load indicators (location may vary depending on make/model of harness)
10. Chest buckle/D-ring
11. Leg buckle/D-ring/Tongue
12. Back D-ring
13. Leg web finials
14. Chest web finials
15. Lanyard keepers (if applicable)
16. Labels (location may vary depending on make/model of harness)

Log the inspection as completed on the permit.

IF ANY ITEM FAILS REPORT, IT IMMEDIATELY TO YOUR SUPERVISOR. THE HARNESS MUST BE REMOVED FROM SERVICE.

Self Retracting Lifelines
Care, Use and Maintenance

Copies of users manuals can be found at the office in the yard or online at: johnaartsgroup.com/h-s

Before use inspect the SRL for obvious defects. Follow all manufacturer instructions, however some general guidelines are as follows:

SRL

- Inspect for loose bolts and bent or damaged parts.
- Inspect Housing for distortion, cracks, or other damage.
- Inspect the swivel eye for distortion, cracks, or other damage. The swivel eye must be attached securely to the SRL but should pivot freely.
- The lifeline must pull out and retract fully without hesitation or creating a slack line condition.
- Ensure device locks up when lifeline is jerked sharply. Lockup must be positive with no slipping.
- The labels must be present and fully legible.
- Look for signs of corrosion on the entire unit.
- Inspect the swivel snap hook for signs of damage, corrosion, and working condition. Swivel should rotate freely. Inspect the impact indicator. If the Red Band is displayed (Indicated Mode), impact

loading has occurred, and the SRL must be removed from service and inspected. Do not attempt to reset the Impact Indicator. Return the SRL to J-AAR Stores for service.

NOTE: The swivel will not turn freely when the impact indicator is in Indicated Mode.

Wire Rope Lifeline

Inspect wire rope for cuts, kinks, broken wires, bird-caging, welding splatter, corrosion, chemical contact areas, or severely abraded areas. Slide the cable bumper up and inspect ferrules for cracks or damage and inspect the wire rope for corrosion and broken wires. Replace the wire rope assembly if there are six or more randomly distributed broken wires in one lay, or three or more broken wires in one strand in one lay. A “lay” of wire rope is the length of wire rope it takes for a strand (the larger groups of wires) to complete one revolution or twist along the rope. Replace the wire rope assembly if there are any broken wires within 1 inch (25 mm) of the ferrules.

On Self-Retracting Devices with Leading Edge capability (SRD-LEs) verify that the integral Energy Absorber has not been activated. There will be no webbing pulled out of the cover (A). The cover will be secure and free of tears (B) or other damage.

Rollgliss R550- Rescue & Escape Device

- Inspect the system before each use and at least annually. Inspect in accordance with the User Instructions.
- If inspection reveals an unsafe or defective condition in the device or a component of the device, remove the device from service and repair or replace according to the User Instructions.
- Label the system ‘UNUSABLE’ and immediately remove the system from service if it has been subjected to fall arrest or impact force.
- Inspect and handle the system according to the User Instructions.
- Ensure the rescue system and lifeline are kept free from all obstructions including, but not limited to, entanglement with other workers, yourself, and surrounding objects.
- Follow all manufacturer recommendations when connecting a lifeline.
- When performing rescue operations, always utilize fall protection safety measures as determined by your workplace rescue plan.
- Do not touch parts of devices exposed to high friction during or after long descents, as these parts may get hot and cause burns.
- Ensure proper edge protection is used if the lifeline may contact sharp edges or corners.
- Ensure a clear descent path, and that the landing area is clear of any obstructions or hazards that you may contact.

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Inspection Frequency:
The R550 Rescue Device shall be inspected by the user before each use and, additionally, by a competent person. Inspection procedures are described in the *"Inspection and Maintenance Log".*

After a fall:
If the R550 Rescue Device is subjected to the forces of arresting a fall, it must be removed from service immediately, clearly marked "DO NOT USE", and forwarded to 3M for replacement or repair.