

Safe Work Procedures – Work Procedure



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This SWP will be reviewed annually, or sooner if required.	

APPROVALS

Roles	Name	MM/DD/YYYY
		November 2025

DOCUMENT REVISION HISTORY

Version Number	MM/DD/YYYY	Revision Description
1.0		

System Overview

The Metro Safety Rail includes:

- Engineered steel posts embedded into slab sockets
- Horizontal tensioned cables (top and mid) serving as guardrail and anchorage
- Design that allows full-perimeter slab protection and controlled access to leading edges

Used correctly, the MSR can provide:

- Passive Fall Protection (guardrail) inside the boundary
- Travel Restraint at or near the edge
- Fall Arrest anchorage when setback conditions and clearance distances are met

As passive fall protection

Inside the MSR perimeter, workers **do not** require active fall protection.

Exceptions include:

- Elevator shafts
- Stair openings
- Mechanical/electrical floor penetrations
- Any opening not enclosed by MSR

These must be barricaded using MSR or equivalent systems with proper setbacks.

1.0 PURPOSE

To ensure workers using the Metro Safety Rail (MSR) system for travel restraint or fall arrest can do so safely, consistently, and in compliance with applicable regulations and manufacturer requirements.

2.0 SCOPE

This procedure applies to all workers operating between the MSR and an unprotected slab edge, and all supervisors responsible for ensuring safe work around leading edges where the MSR is installed.

3.0 ROLES & RESPONSIBILITIES

3.1 Employer / General Contractor

- Ensure MSR installation meets engineering specifications
- Ensure all engineered drawings are available onsite.
- Maintain system integrity and conduct regular inspections
- Ensure workers receive training and authorization

3.2 Workers / Users

- Follow all procedures in this manual
- Conduct pre-use inspections of system and ppe
- Use only approved PPE and lanyards

3.3 Qualified / Competent Person

- May modify procedures only after reviewing site-specific details
- Approves alternative lanyard lengths or unique configurations

4.0 HAZARDS

The following hazards exist when using the MSR system:

4.1 Fall-Related Hazards

- Falling from the unprotected slab edge.
- Incorrect setback distance resulting in inadequate restraint.
- Lanyard length allowing a worker to reach or cross the slab edge.
- Insufficient fall clearance during fall arrest use.
- Transitioning between MSR panels without maintaining 100% tie-off.

4.2 Equipment Hazards

- Damaged or incompatible harness components.
- Worn or unserviceable Y-lanyards or snaphooks.
- Snaphooks connected to non-rated anchorage points.
- Large snaphooks not compatible with harness side D-rings.

4.3 Structural Hazards

- Cracked concrete around post sockets.
- Posts not properly embedded or leaning.
- Cables loose, improperly tensioned, or not parallel to slab edge.

4.4 Environmental Hazards

- Wind, rain, ice, or frost increasing slip or fall potential.
- Poor footing conditions or tripping hazards inside the MSR zone.
- Low visibility due to lighting conditions.

4.5 Human Factors

- Rushing steps, distractions, or bypassing tie-off requirements.
- Inadequate training or misunderstanding of transitions between panels.
- Fatigue or impaired judgment.

4.6 Psychological / Psychosocial Hazards

- Anxiety or fear near slab edges affecting concentration.
- High production pressure leading to rushing or skipped steps.
- Mental fatigue reducing hazard recognition.
- Emotional stress from prior incidents or falls.
- Isolation when working away from the crew.
- Interpersonal conflict or poor communication increasing stress.
- Chaotic environments elevating cognitive load.
- Personal stressors (sleep, finances, family) affecting focus.

5.0 REQUIRED TRAINING & COMPETENCY

Workers must receive training that includes:

- Understanding MSR purpose, limits, and safe zones
- Demonstrated ability to inspect PPE & MSR components
- Hands-on practice performing panel transitions

- Knowledge of emergency procedures and fall rescue requirements

6.0 REQUIRED EQUIPMENT

Each worker must use:

1. Full Body Harness

- Meets ANSI Z359.11, CSA Z259.10, EN361 or ISO 10333-1.
- Includes dorsal D-ring and hip D-rings for backward-pull restraint.
- Includes tear-away parking ring for unused snaphooks.

2. 1.8 m Energy-Absorbing Y-Lanyard

- Meets ANSI Z359.13, CSA Z259.11, EN355 or ISO 10333-2.
- Must support weight of worker and at least a 6 ft free fall.
- Snaphooks must be compatible with harness D-rings.

Other equipment requires written approval from Metro Safety Rail, a Qualified Fall Protection Engineer, or a Competent Person familiar with site conditions.

7.0 SETBACK REQUIREMENTS

MSR setback distances must be confirmed before work begins:

- **2.0m** minimum for **At or Near Edge Travel Restraint**
- **0.6m** minimum for **Fall Arrest**

Reduced setbacks require engineering verification and possibly shorter lanyard lengths.

8.0 PRE-USE INSPECTIONS

All inspections must be done **from inside the MSR perimeter**, in a safe location.

1. Inspect full-body harness and Y-lanyard.
2. Don harness and perform a buddy check when possible.
3. Inspect MSR section:
 - Posts vertical and secure.
 - No cracks around sockets.
 - Cables properly tensioned and parallel to slab edge.

- Setback distance appropriate for intended use.

Workers may NOT enter the “work zone” until all checks are complete.

9.0 SAFE WORK PROCEDURE – AT or NEAR EDGE TRAVEL RESTRAINT ($\geq$ m setback)

1. Connect stem snaphook of Y-lanyard to dorsal D-ring.
2. Park one leg on the tear-away ring.
3. Connect the active leg to the **top cable**.
4. Climb through or over top/middle cables.
5. Approach the edge and confirm you cannot reach it.
6. Stay within the panel between posts.
7. To move panels:
 - Approach the next post.
 - Connect free snaphook to next panel.
 - Then transfer the second snaphook.
 - Maintain **100% tie-off** at all times.
8. Exit by climbing back inside the MSR and disconnecting.

10.0 SAFE WORK PROCEDURE – FALL ARREST ($\geq$ m setback)

If setback < 0.6 m, **DO NOT USE** the MSR engineering review required. A maximum of one worker, weighing up to 140 kg (310 lb) may connect to the top cable of the Metro Safety Rail system between any pair of posts. The required clearance below the edge of the slab is:

- **5.3 m** when MSR is 0.6 m from edge
- **4.2 m** when MSR is 1.5 m from edge
- **3.4 m** when MSR is 2.0 m from edge

Procedure:

1. Connect stem snaphook to dorsal D-ring.
2. Park one leg on tear-away ring.
3. Connect active leg to top cable.

4. Enter work zone.
5. Stay within the panel.
6. Transition using 100% tie-off technique as described above.
7. Exit and disconnect only once inside the safe zone.

Maximum: **(2) worker per panel, secured at mid rail.**

11.0 TOOL SECUREMENT & LANYARD USE

To prevent dropped-object incidents while working between the MSR and the slab edge, all tools used in the MSR work zone must be properly secured using approved tool lanyards.

Purpose of Tool Securement

Working near or at slab edges increases the potential for tools to fall to levels below, creating severe injury risks to workers and the public. Tool securement is mandatory when performing any task inside the MSR-controlled zone.

Approved Tool Lanyards

Only tool lanyards meeting the following criteria may be used:

- Rated for the weight of the tool
- Designed with **energy absorption** or **shock-reducing** properties
- Equipped with locking carabiners or fixed loops
- Designed **only for tools**, not for tying off workers

Homemade tool lanyards are not permitted.

Tool Attachment Requirements

Workers must ensure:

- Tools under **2 kg (5 lbs)** are attached using manufacturer-approved lanyard points
- Tools over **2 kg (5 lbs)** require secondary tethering or holstered storage
- Sharp tools (chisels, rebar ties, knives) use fully enclosed holsters
- Battery-operated tools have a secure tether point or holster with retention strap

Tools must never be tied off to:

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- MSR cables
- MSR posts
- Harness structural components (other than dedicated tool loops)
- Lanyard D-rings intended for fall protection

Worker Harness Requirements for Tool Use

Harnesses must include:

- **Approved tool loops or rings** (rated for tools only)
- A holster or belt suitable for the work task

Workers must ensure tools do not interfere with:

- Lanyard connection to MSR cables
- Movement during panel transitions
- Access to dorsal or hip D-rings

Tool Use While Connected to the MSR

While working in the MSR zone:

- Maintain **100% tool retention** at all times
- Do not overextend or swing tools beyond the slab edge
- Do not store unsecured tools on MSR components or slab edges
- Ensure tools are removed from service if dropped or damaged

During panel transitions:

- Tools must remain secured to the worker
- Tools must not be carried by hand unless tethered

Inspections & Maintenance

Workers must inspect tool lanyards daily for:

- Frayed webbing
- Damaged stitching

- Bent or malfunctioning clips/carabiners
- Wear at tool-attachment points

Defective tool lanyards must be **tagged out immediately**.

Prohibited Tool Practices

Workers must never:

- Use MSR cables as tool hangers
- Use fall protection lanyards as tool tethers
- Use tape, zip ties, wire, or rope to secure tools
- Place loose tools on the edge, top of MSR, or elevated surfaces

12.0 EMERGENCY RESPONSE REQUIREMENTS

Before work begins, supervisor must ensure:

- A site-specific **Fall Rescue Plan** is in place
- Workers know rescue roles and procedures
- Required rescue equipment is available and functional

Following any fall event:

- MSR section must be removed from service
- A qualified engineer must inspect before re-use

13.0 POST-USE REQUIREMENTS

- Remove harness and lanyard and store properly.
- Report any damage or near misses immediately.
- MSR section must be taken out of service if damage or shifting is observed.

14.0 REFERENCES

- ANSI Z359.11 / CSA Z259.10 / EN361 / ISO 10333-1
- ANSI Z359.13 / CSA Z259.11 / EN355 / ISO 10333-2

CROSBY® CLIPS WARNINGS AND APPLICATION INSTRUCTIONS



G-450
(Red-U-Bolt®)



SS-450
(316 Stainless Steel)

⚠ WARNING

- Failure to read, understand, and follow these instructions may cause death or serious injury.
- Read and understand these instructions before using clips.
- Match the same size clip to the same size wire rope.
- Prepare wire rope end termination only as instructed.
- Do not use with plastic coated wire rope.
- Apply first load to test the assembly. This load should be of equal or greater weight than loads expected in use. Next, check and retighten nuts to recommended torque (See Table 1).

Efficiency ratings for wire rope end terminations are based upon the minimum breaking force of wire rope. The efficiency rating of a properly prepared loop or thimble-eye termination for clip sizes 1/8" through 7/8" is 80%, and for sizes 1" through 3-1/2" is 90%.

The number of clips shown (see Table 1) is based upon using RRL or RLL wire rope, 6 x 19 or 6 x 36 Class, FC or IWRC; IPS or XIP, XXIP. If Seale construction or similar large outer wire type construction in the 6 x 19 Class is to be used for sizes 1 inch and larger, add one additional clip. If a pulley (sheave) is used for turning back the wire rope, add one additional clip.

The number of clips shown also applies to rotation-resistant RRL wire rope, 8 x 19 Class, IPS, XIP, XXIP sizes 1-1/2 inch and smaller; and to rotation-resistant RLL wire rope, 19 x 7 Class, IPS, XIP, XXIP sizes 1-3/4 inch and smaller.

For other classes of wire rope not mentioned above, we recommend contacting Crosby Engineering to ensure the desired efficiency rating.

For elevator, personnel hoist, and scaffold applications, refer to ANSI A17.1 and ANSI A10.4. These standards do not recommend U-Bolt style wire rope clip terminations. The style wire rope termination used for any application is the obligation of the user.

For OSHA (Construction) applications, see OSHA 1926.251.

1. Refer to Table 1 in following these instructions. Turn back specified amount of rope from thimble or loop.



Figure 1

Apply first clip one base width from dead end of rope. Apply U-Bolt over dead end of wire rope – live end rests in saddle (Never saddle a dead horse!). Use torque wrench to tighten nuts evenly, alternate from one nut to the other until reaching the recommended torque. (See Figure 1)

2. When two clips are required, apply the second clip as near the loop or thimble as possible. Use torque wrench to tighten



Figure 2

nuts evenly, alternating until reaching the recommended torque. When more than two clips are required, apply the second clip as near the loop or thimble as possible, turn nuts on second clip firmly, but do not tighten. (See Figure 2)

3. When three or more clips are required, space additional clips equally between first two – take up rope slack – use torque wrench to tighten nuts on each U-Bolt evenly, alternating from one nut to the other until reaching recommended torque. (See Figure 3)



Figure 3

4. If a pulley (sheave) is used in place of a thimble, add one additional clip. Clip spacing should be as shown. (See Figure 4)

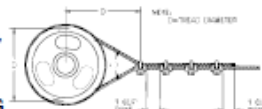


Figure 4

5. WIRE ROPE SPLICING PROCEDURES:

The preferred method of splicing two wire ropes together is to use inter-locking turnback eyes with thimbles using the recommended number of clips on each eye (See Figure 5).

An alternate method is to use twice the



Figure 5

number of clips as used for a turnback termination. The rope ends are placed parallel to each other, overlapping by twice



Figure 6

the turnback amount shown in the application instructions. The minimum number of clips should be installed on each dead end (See Figure 6). Spacing, installation torque, and other instructions still apply.

6. IMPORTANT

Apply first load to test the assembly. This load should be of equal or greater weight than loads expected in use. Next, check and use torque wrench to retighten nuts to recommended torque. In accordance with good rigging and maintenance practices, the wire rope end termination should be inspected periodically for wear, abuse, and general adequacy.

Clip Size (in.)	Rope Size (in.)	Minimum No. of Clips	Amount of Rope to Turn Back in Inches	* Torque in Ft.Lbs.
1/8	1/8	2	3-1/4	4.5
3/16	3/16	2	3-3/4	7.5
1/4	1/4	2	4-3/4	15
5/16	5/16	2	5-1/4	30
3/8	3/8	2	6-1/2	45
7/16	7/16	2	7	65
1/2	1/2	3	11-1/2	65
9/16	9/16	3	12	95
5/8	5/8	3	12	95
3/4	3/4	4	18	130
7/8	7/8	4	19	225
1	1	5	26	225
1-1/8	1-1/8	6	34	225
1-1/4	1-1/4	7	44	360
1-3/8	1-3/8	7	44	360
1-1/2	1-1/2	8	54	360
1-5/8	1-5/8	8	58	430
1-3/4	1-3/4	8	61	590
2	2	8	71	750
2-1/4	2-1/4	8	73	750
2-1/2	2-1/2	9	84	750
2-3/4	2-3/4	10	100	750
3	3	10	106	1200
3-1/2	3-1/2	12	149	1200

If a pulley (sheave) is used for turning back the wire rope, add one additional clip. See Figure 4.

If a greater number of clips are used than shown in the table, the amount of turnback should be increased proportionately.

* The tightening torque values shown are based upon the threads being clean, dry, and free of lubrication.