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Metrolinx
Safety Division
Hierarchy of Control Work Force Protection Standard

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Record of Revisions

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List of Acronyms

Acronym	Meaning
ATWS	Automatic Train Warning System
CROR	Canadian Rail Operating Rules
CWZ	Continuous Work Zone
GEI	General Engineering Instructions
HOC	Hierarchy of Control
OHSA	Ontario Health and Safety Act
PDT	Project Delivery Team
TOP	Track Occupancy Permit

Applicable Terms

Term	Definition
Audit	A systematic, independent, and documented method for obtaining evidence and evaluating it objectively to determine the extent to which the audit criteria is fulfilled. Audits cover a broad scope and assess the effectiveness of the overall system or process(es).
Constructor	A person who undertakes a project for an owner and includes an owner who undertakes all or part of a project by himself or by more than one employer.
Contractor	External organization providing services to the organization in accordance with agreed specifications, terms, and conditions.
Document	Information created for the organization to operate.
Document ID	The unique Identification (ID) of each controlled document. The ID will be created by the Safety Standards Team before a document is published.

Green Zone	An area of protection for workers that separates work on the railway from train movements. One way of arranging such a zone is to stop movements of all trains on all lines at the location concerned. Green Zone finds a balance of worker's safety and efficiency.
Inspection	The process of examining an individual product, asset and/or process, to ensure specified requirements are met, at a specified moment in time.
Live Track	Any track that is open to rail traffic and is not otherwise closed.
Metrolinx Property	Real estate, owned or leased, including but not limited to the USRC, Rail Corridors, train and bus facilities, train and bus stations and parking lots.
Positive Protection	The track(s) is protected in accordance with CROR Protection of Track Work (Rules 41, 42, 841, 842) or Track Occupancy Permit (Rules 849 to 864 inclusive).
Procedure	A written set of instructions that describe the approved and recommended steps of a particular act or sequence of events.
Protecting Foreman	An Employee named in the track authority and in possession of Positive Protection and the Employee In Charge (EIC) of a work project protecting Employees/Workers, Visual Work Groups, Separated Work Groups, and Track Units.
Rail Corridor / Railway Corridor	Refers to the Metrolinx owned and operated on subdivisions of railway infrastructure, rail/maintenance/layover yards, and all property between property fences, or if no fences, everywhere within 30 feet from the outermost rails.
Red Zone	Any work that does not meet the requirements of Green Zone. This is generally where workers are protected by administrative controls or where efficiency of workforce utilization is low.
Separated Working	A distance as defined in the Metrolinx General Engineering Instructions is provided between the site of work and nearest Live Track.
Safe System of Work	A structured process designed to reduce the risk of harm when employees face avoidable hazards at work.
Separated Working with a Visual Temporary Delineation Barrier	Green Zone Working where distance from live track is far enough that Positive Protection is not required.
Track Occupancy Permit	Authority issued for the protection of track units and track work.

White Space or White Period	The period between the end of service on one day and the start of service on the next where no service trains are scheduled. There is still the potential for rail movements on the network.
Work	Any activities that may render the infrastructure unsafe for movements at normal speed or where protection against movements may be required for employees and machines involved in construction and repairs.
Worker	As defined by *OHSA, R.S.O. 1990*
Work Force	Staff carrying out work.
Worksite	A specific site under a contract for Construction where a Constructor undertakes Construction.

Legislation and Reference Documentation

Document(s)
The National Institute for Occupational Safety and Health. https://www.cdc.gov/niosh/topics/hierarchy/default.html
SD-008-MAN-0002 - Metrolinx General Engineering Instructions
SD-008-STD-0006 – Worksite Protection Planning with Temporary Automatic Track Warning Systems

1.0 Purpose

This standard identifies the Hierarchy of Control (HOC) to be used when planning works that will take place on Metrolinx rail corridors.

Current Canadian Rail Operating Rules (CROR) and the Metrolinx General Engineering Instructions (GEI) must still be always adhered to, and these controls support those documents.

The objectives of this Standard are:

- To increase worker safety.
- To support the planning of work activities and create Safe Systems of Work used to protect track workforce.
- To equip work planners and planning teams with a hierarchical list of options available to implement safe system of workforce protection on site.

This standard defines that when planning works an engineered safe system of work force protection must be the first option considered before using administrative controls while working adjacent to Live Tracks.

The standard also provides instruction on the use and erection of barriers on Metrolinx Rail Corridors when carrying out work.

2.0 Scope

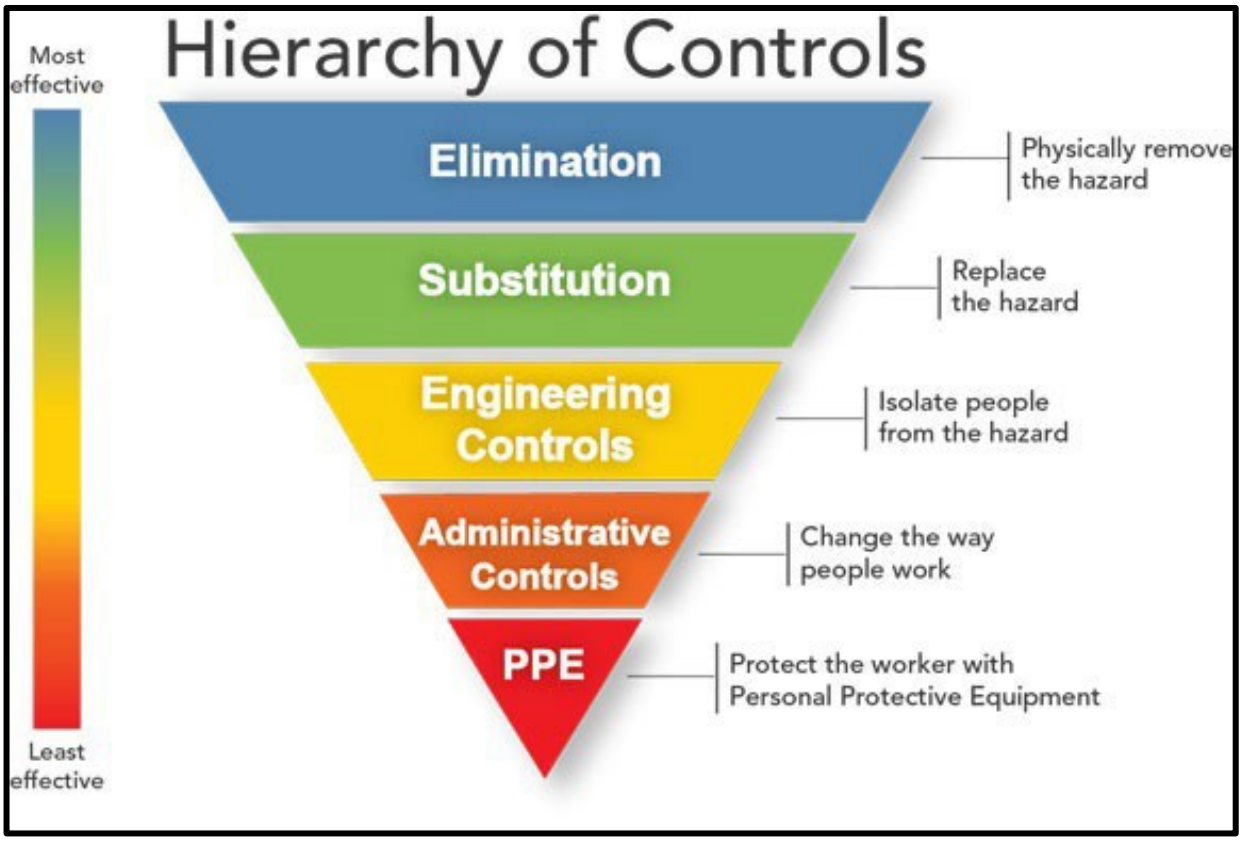
The standard applies to any Metrolinx employed individual or contractor who performs work in the Metrolinx Rail Corridors. This standard does not apply to non-main track.

3.0 Process

Hazards in the workplace must be recognized, assessed, and controlled.

Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective measures to protect workers from occupational hazards through risk assessments and implementing hazard controls.

TABLE 1 – Hierarchy of Controls. The National Institute for Occupational Safety and Health https://www.cdc.gov/niosh/topics/hierarchy/default.html



Metrolinx General Engineering Instructions (GEI) provides guidance on the types of protection needed for staff working in proximity to Rail Corridors.

The current forms of workforce protection specified in the Metrolinx General Engineering Instructions (GEI) rely mainly on administrative controls which are less effective than other control measures.

The Hierarchy of Control is a principal rule for safely carrying out work on track and forms part of the Safe Systems of Work suite.

The Metrolinx Hierarchy of Control for planning work mandates that Green Zone working is always the first choice. Only when it can be demonstrated that Green Zone working cannot be practically achieved should Red Zone working be considered. Where Green Zone is achieved there is no requirement for work to stop when trains pass on adjacent Live Tracks. Safety is always the priority.

At the work planning stage Contractors and Project Delivery Teams (PDT), in coordination with Rail Corridor Access and Control, are required to assess work for the appropriate method of protection required during access.

The chart below outlines the hierarchy of control, with the numerical order indicating the priority of each option, starting with option One as the highest priority.

Engineering controls (work taking place behind barriers or Positive Protection by the Metrolinx Train Control System – Green Zone working) must always be used where possible.

Hierarchy of Control

Option	Safe System of Work
One	Track Closure
Two	Continuous Work Zone (CWZ)
Three	Track Occupancy Permit (TOP)
Four	842 with Prescriptive Routing Arrangements
Five	Separated Working with a Visual Temporary Delineation Barrier

Option One – Track Closure

Track Closure is defined as a period in which no train service is scheduled to operate through Metrolinx territory, as outlined in the Engineering Access Statement. This includes any scheduled movements by foreign railways, but is not limited to CN, VIA, CPKC, and The Ontario Northlander. All work within a Track Closure must be protected as per the Metrolinx GEI.

Option Two – Continuous Work Zone (CWZ)

A Continuous Work Zone allows for work to continue without interruption as all work is performed behind a barrier. The requirements to establish and maintain a CWZ are outlined in the GEI.

Option Three – Track Occupancy Permit (TOP)

A Track Occupancy Permit uses the signaling system and switches to ensure track is inaccessible to passing movements. The TOP can be used to both protect the work being performed, or by separating off-track work from the nearest live rail by creating additional space to keep workers safe.

Option Four – 842 with Prescriptive Routing Arrangements

An 842 with Prescriptive Routing Arrangements is where 842 protection is supplemented by the signaling system to lock out movements for the track where work is taking place or to create a distance buffer for off-track work.

Option Five – Separated Working with a Visual Temporary Delineation Barrier

Work taking place more than four feet from the nearest live rail using only hand tools or work more than thirteen feet from the nearest live rail with equipment must have barriers in alignment with GEI Module 4 to be considered Green Zone.

At no point are Employees/contractors or machinery permitted to foul the tracks while working under Separated Working with a Visual Temporary Delineation Barrier. Separated Working with a Visual Temporary Delineation Barrier is not a form of Track Protection. It requires a Protecting Foreman to oversee the work. The Protecting Foreman must be positioned to ensure no one passes it and any accidental contact does not move the barriers.

The work must meet all other requirements for working in the right of way, such as permits, ground disturbance requirements, those outlined in the GEI, contractual requirements, and other applicable standards and documents.

Red Zone Working

All other forms of protecting work are considered Red Zone working and must only be utilized if Green Zone working is not possible.

4.0 Considerations to Mitigate Risk

Automatic Train Warning Systems (ATWS)
The temporary ATWS system provides a supplementary form of protection to work sites by identifying the approach of a movement through an audible and visual notification. This is used as either a failsafe if communication breaks down, or in the case of working behind a visual barrier, notification to the workers to be cautious as the train passes their work area.

It is important to note that the installation of an ATWS requires a separate work plan to install. Once installed the system can stay in place for the length of the worksites timeline.

Details on the ATWS system and its use can be found in the Worksite Protection Planning with Temporary Automatic Track Warning Systems (SD-008-STD-0006).

White Space

White Space is the period between the end of scheduled service on one day and the start of scheduled service on the next. The White Space requires a separate form of protection as work trains, shunting or other rail movements may still be operating.

During White Space both on-track and off-track work require a form of protection or control. However, with less train service running the site may be safer and result in more available time to complete work.

Risk Assessments

When conducting a risk assessment for your work in the right-of-way, consider the adoption of Automatic Train Warning Systems and/or the use of White Space to enhance the safety and efficiency of your work site.

5.0 Roles and Responsibilities

Document Owner – Vice President Safety
The owner of this document is responsible for:

- Establishing and maintaining the contents of this document, making changes when and where necessary and advising document users of any changes.
- Review and approval of revisions.

Duties of Constructor
In addition to duties prescribed in the OHSA, the Constructor must also ensure on any project undertaken that the measures and procedures prescribed by this document are carried out on the project by:

- Reviewing that Constructor documentation is in line with Metrolinx plannings standards.
- Undertaking Audits of Contractors against the contents of this document on a regular basis through the project lifecycle.

Duties of Contractor
The Contractor shall ensure:

- This document is adhered to and applied to all works within Metrolinx properties while undertaking working operations.
- All employees and Workers are briefed and trained on the requirement of this Standard and undertake regular audits to demonstrate compliance; and
- The equipment, materials and protective devices prescribed by this document are supplied, installed, and maintained in good condition, and tested and confirmed as operable.

Duties of Protecting Foreman
The Protecting Foreman shall ensure that:

- This document is applied in all circumstances while working on Metrolinx Property.
- All members of the Workforce have been briefed on the safe system of work that has been applied and implemented on-site.

Duties of Rail Corridor Access Control (RCAC)
RCAC shall:

- Confirm the planning process has been followed.
- Confirm the Hierarchy of Control has been followed and the highest Green Zone option achieved.
- Perform inspections to verify implementation and effectiveness of Workforce Protection controls at worksites.
- Support the briefing of this document to all parties that could or will use this system of work.

Duties of the Project Delivery Team

The Project Delivery Team shall:

- Confirm that in the development of projects that the highest level of Green Zone option is made available to projects.
- Confirm the planning process has been followed.
- Confirm the Hierarchy of Control has been followed and the highest Green Zone option achieved.
- Perform inspections to verify implementation and effectiveness of Workforce Protection controls at worksites withing the limits of the contract.
- Support the briefing of this Document to all parties that could or will use this system of work.

6.0 Establishing a Visual Barrier in a Green Zone

A barrier/fence protected Green Zone is created by erecting temporary barriers, barriers may be used to separate off-track machinery and Workers from live tracks.

All types of barriers and locations for the barriers must be supported through a site-specific risk assessment carried out by the contractor and available for review by Metrolinx Rail Corridor Access and Control or Project Delivery Teams during the work planning stage.

Depending on the type of barrier or fencing and the installation method, the installation of barriers may require Positive Protection or may be permitted under Red Zone working.

This must be captured as part of the work planning process.

Four types of barrier/fenced protection are permitted:

- **Rigid Barrier**: Rigid aluminum or fiberglass reinforced plastic (GRP) upright stands with rigid horizontal rails connected to the uprights.
- **Plastic Netting**: Continuous length of plastic netting, also known as snow netting, affixed to posts driven into the ballast or ground or set in timber or concrete blocks.
- **Water-Filled or Concrete Traffic Barriers**: These are large plastic water-filled or concrete traffic barriers that link together to create a continuous fence line.
- **Barrel or Cone Traffic Barriers:** Plastic traffic barrels or cones with weighted bases and rigid barricades or barricade tape that link traffic barrels or cones together.

The choice of Barrier depends on:

- Maximum permitted track speed on any adjacent track
- Duration of the work
- Surface conditions
- Weather conditions

The GEI must always be used for barrier requirements, distances required and, other requirements

when placing barriers.

7.0 Escalation Process Considerations

For information regarding deviations or non-compliances with this standard, please visit the internal Prohibition of Open Line working Safety Central landing page.

8.0 Record Retention

Hierarchy of Control Workforce Standard related documentation shall be retained in accordance with Metrolinx Records Retention Schedule unless otherwise specified and be provided for audit upon request.

All records and supporting documentation related to this standard are to be kept for a minimum of six (6) years after the date of creation. Records will be retained by the Rail Corridor Access and Control on Metrolinx's internal SharePoint site.

9.0 Review and Monitoring

This procedure will be reviewed annually by Safety Standards and Practices in consultation with relevant stakeholders and shall be updated as required. Safety Standards and Practices reserves the right to audit conformance to this procedure.

10.0 Training

This Standard is applicable to all individuals requesting access to the Metrolinx Right of way.