# Metrolinx Adjacent Development Guidelines GO Transit Heavy Rail Corridors

## Third Party Projects Review (TPPR)

**Version 5.0 – February 2023**

METROLINX

# PREAMBLE

This document is an interim update to the original Metrolinx *Adjacent Development Guidelines* (dated April 2013) and presents an overview of current Metrolinx practices in this context. It is acknowledged that further revisions will be required to reflect content that will be presented in the forthcoming update to the RAC/FCM *Guidelines for New Development in Proximity to Railway Operations* (expected in late 2023) as well as other modifications to Metrolinx policies and practices, related to the RAC/FCM update and otherwise. As such, it is anticipated that another update to the *Adjacent Development Guidelines* will be released in early 2024. Until that time, please refer to the present document and contact the Metrolinx Third Party Projects Review team (development.coordinator@metrolinx.com) with any comments or questions in this regard.

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# Definitions & Abbreviations

"As-Built Drawings" has the meaning given by the Professional Engineers of Ontario as those drawings prepared and sealed by the reviewing engineer after verifying in detail the actual conditions of the completed Project.

"Authority Having Jurisdiction" means any federal, provincial, territorial, regional, municipal, or local governmental authority, quasi-governmental authority, or other agency having legal jurisdiction and that has or performs legislative, judicial, regulatory, administrative, or other functions within its jurisdiction.

"Developer" means owners of development and infrastructure Projects adjacent to the Rail Corridor lands. Any landowner who plans work adjacent to the Rail Corridor lands is also considered a Developer in this guideline. A proponent as defined in Bill 171 (as in the Consolidated Hearings Act), is also a Developer in this guideline.

"Developer Infrastructure" means all permanent infrastructure constructed by the Developer.

"Metrolinx Asset Protection Package Guideline" or **"MAPP"** is a Metrolinx document that governs Metrolinx led Transit-Oriented Communities (TOC) projects.

"Metrolinx Infrastructure" means all temporary and/or permanent infrastructure owned by or to be owned by Metrolinx and forms part of Metrolinx transit facilities, e.g., tracks, stations and elevated structures.

"Metrolinx Standards Deviation Process" is a review process developed by the Metrolinx Engineering team to review and approve, based on a risk assessment, any design proposals that deviate from established Metrolinx design standards.

"Project" means, collectively, Developer Infrastructure and any Third Party infrastructure included in the development.

"Rail Corridor" means Metrolinx owned property for the exclusive operation, maintenance, and construction of Metrolinx railway services – in this case pertaining to GO Transit.

**"Sensitive Use"** is any land use that is located immediately adjacent to a Metrolinx Rail Corridor and which is occupied for the better part of a day – including residential, commercial, industrial, institutional and intensively used grounds (programmed parks and other places of assembly).

"Transit Oriented Communities" or "TOC" is a Metrolinx team that pursues higher density, mixed-use development Projects that are connected, next to or within a short walk of transit stations and stops. The TOC approach goes beyond the traditional Transit Oriented Development (TOD) model, which typically concentrates on a single development.

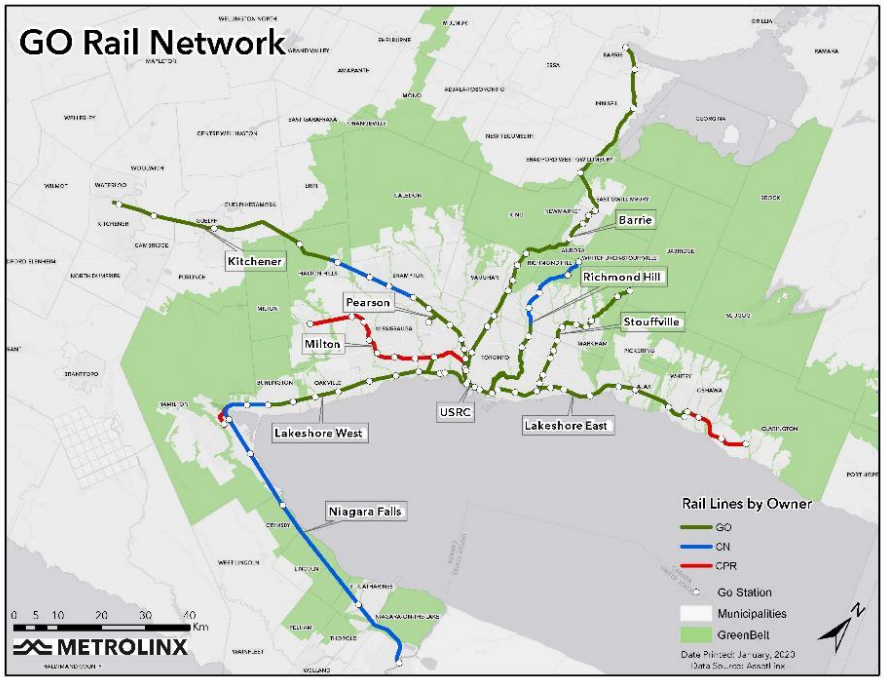
**"Track Zone of Influence"** means the zone in the ground in which any intrusion from Developer Infrastructure will impact Metrolinx Infrastructure, as described in section 7.1.1.

"Works" means the activities associated with provision of the Developer Infrastructure and Third Party infrastructure required in connection with the Project.

# 1.0 Introduction

Metrolinx owns, operates, and maintains a heavy Rail Corridor network that is utilized by GO Transit and UP Express services and which connect diverse communities across the Greater Toronto and Hamilton Area (GTHA), helping people to get where they need to go in a timely and convenient manner. To ensure that safe and efficient transit infrastructure and operations are maintained both now and into the future, as well as to contribute to the growth of strong and healthy communities, coordination and collaboration of planning and development activities along these transit corridors is of vital importance.

Metrolinx has an established history of reviewing and commenting on applications for development sites along its respective corridors and has adopted a set of standards and "best practices" intended to enhance safety and compatibility between railway operations and adjacent development activities.




The Metrolinx Third Party Projects Review (TPPR) team was established to oversee the development review process and is the first point of contact for proponents seeking to pursue development projects within the 300-metre zone- of-influence around any Metrolinx-owned corridor. TPPR provides direct support to the planning and development community to ensure that Project plans and construction activities incorporate appropriate requirements, do not unduly impact safety, and suitably consider/protect the integrity of both existing and future transit infrastructure and operations.

The purpose of these guidelines is to communicate relevant information to parties interested in undertaking development Projects within Metrolinx's Rail Corridor zone-of-influence. The document identifies key considerations from Project initiation through to construction.

Metrolinx is committed to providing advice and support to proponents planning development activities that interface with Metrolinx managed railway corridors, and we encourage engagement with Metrolinx early in the planning process to discuss how these guidelines may be applicable and, ultimately, to contribute to seamless Project delivery.

# 2.0 Planning Context

The responsibility for land use planning in Ontario is shared between the Province and municipalities. The Province sets the ground rules and directions for land use planning through the *Provincial Policy Statement* (PPS) and the *Planning Act*. The 2020 *Provincial Policy Statement* provides policy direction on matters of Provincial interest related to land use planning and development and sets the policy foundation for regulating the development and use of land. The policies aim to strike a balance between providing for appropriate development and protection of resources of provincial interest, public health and safety, and the quality of the natural and built environment. Altogether the intent is to contribute to a more effective and efficient land use planning system. Several policies in the PPS (specifically 1.2.6.1, 1.6.8.3 and 1.6.9.1) are particularly relevant in the context of the Metrolinx Adjacent Development Guidelines as they aim to enhance compatibility and mitigate impacts between rail facilities and Sensitive Uses.

Pursuant to the Ontario *Planning Act* and Regulations 543/06, 545/06 and 544/06, municipalities must notify railway operators – through the development application circulation process - of proposed Official Plan Amendments, Zoning By-law Amendments, Plans of Subdivision and Vacant Land Condominiums that are within 300 metres of a Rail Corridor. Municipalities also circulate minor variance and consent applications to Metrolinx pursuant to prescribed notification requirements, as well as site plan applications for sites that are in close proximity to Rail Corridors.

Municipalities implement the Province's land use planning policy framework through official plans and make land use planning decisions to achieve their communities' economic, social and environmental objectives, while remaining consistent with Provincial policy direction.

Development Projects located adjacent to Rail Corridors entail a unique set of considerations, and municipalities engage with rail operators through the planning process to ensure relevant requirements are satisfied. The *Guidelines for New Development in Proximity to Railway Operations*, prepared in 2013 as a joint effort between the Railway Association of Canada (RAC) and the Federation of Canadian Municipalities (FCM), has become a key reference document to support the municipal review of adjacent development matters. This document defines a standard set of mitigation measures specifically for new residential development along railway corridors, and also identifies conflict resolution strategies for use when issues arise during the development approval process. Some jurisdictions have further leveraged this material to develop their own customized approach to rail safety issues. The City of Toronto, for example, has taken a particular interest in this subject, first engaging IBI Group in 2019 to prepare a *Development in Proximity to Rail Operations* land use study and then implementing a Zoning By-Law Amendment (#536) to require submission of a Rail Safety and Risk Mitigation Report for development Projects within the area of influence of a railway corridor.

Rail operators like Metrolinx participate in the planning process and can appeal, pursuant to the Planning Act, any potential land use and/or design incompatibility issue to the Ontario Lands Tribunal (or OLT, formerly the Local Planning Appeal Tribunal (LPAT)). They do not have jurisdiction over land use decisions, however. Ultimately, it is the Authority Having Jurisdiction (typically the municipality or OLT) that holds the land use approval authority and as such must ensure that issues of rail safety and liability (among others) are suitably addressed.

# 3.0 Using These Guidelines

## 3.1 Scope of Use

The information presented in these guidelines is intended to inform and influence municipal land development planning and approval processes and provide a framework for land use decisions made in proximity to Metrolinx owned and operated railway corridors. The content will be of interest to any party engaged with planning and development activities for lands within 300 metres of Metrolinx heavy rail (GO Transit) corridors, including Developers, consultants, contractors, landowners, and municipal staff. Note that separate Metrolinx guideline documents are also available for Projects located adjacent to Light Rail Transit (LRT) and Subway/Priority Transit Project corridors.

These guidelines should be referenced in the conceptual stage of any development Project and frequently reviewed throughout the development process (planning, design, construction). The standards, practices and process referenced in this document have been refined through years of technical analyses and operational experience. In addition, the content presented herein is also consistent with and, in some cases, builds upon the RAC/FCM *Guidelines for New Development in Proximity to Railway Operations*, with additional information provided to reflect circumstances specific to Metrolinx.

It is acknowledged that past planning decisions and administrative practices have resulted in a multitude of development circumstances on properties adjacent to Metrolinx railway corridors, some of which are not consistent with the practices set out in this document. These guidelines are to be used to inform modern planning activities such that new development incorporates the measures identified herein; conditions on properties adjacent to development sites should not be referenced as justification for action in the present.

In any event, it should be noted that, while these guidelines aim to reflect established 'industry practice,' Metrolinx is aware of the need for, and committed to delivering, a flexible review process that reflects the specific parameters of a given development site. As such the information set out these guidelines should therefore be considered as a starting point for the development review discussion. Additional feedback and support will be provided by Metrolinx staff throughout the process.

Many of the practices noted herein have also been implemented by other rail operators such as Canadian National (CN) and Canadian Pacific (CP) Railways. While Metrolinx reviews applications along corridors owned by CN or CP where Metrolinx passenger train service operates, the corridor owners are the primary commenting agencies for those lines and development-oriented feedback must be obtained directly from those entities.

## 3.2 Basis of Interest in Adjacent Development

As established through Provincial policy documents, any new development within close proximity to GO Transit heavy Rail Corridors - whether it be adjacent, physically connected, or built within the air space above - is of interest to Metrolinx. Key considerations in this context include:

- Safety – ensuring, through appropriate design, mitigation, buffering and/or separation of uses, and construction management, that rail personnel, transit passengers, and occupants of adjacent buildings are suitably protected against adverse impacts

- Asset Protection – protecting existing infrastructure/operations as well as future transit expansion plans in concert with land use planning and development activities
- Sustainability - enhancing connections between transit services and surrounding communities (otherwise referred to as Transit Oriented Development)

## 3.3 Type of Adjacent Development Considered

These guidelines are primarily focused on development within the 300-metre zone of influence and particularly those Projects that are immediately adjacent to GO Transit Rail Corridors. This development may take a variety of forms - from a major high density multi-use Project to infill re-development of a single residential lot.

Transit-Oriented Development (TOD) can involve development adjacent to the Rail Corridor and may also be comprised of an entrance connection, be integrated with an existing GO Station, or constructed jointly with a new GO Station to promote enhanced access to transit services. Given the direct involvement of Metrolinx interests, the developments will be considered as a commercial transaction and managed in consultation with the Metrolinx Transit-Oriented Communities (TOC) group. Development components physically connected to transit infrastructure (e.g., station entrance building, pedestrian tunnel connection, etc.), shall proceed through a Metrolinx Asset Protection Package (MAPP) process. That being said, TOD Project teams should make reference to these guidelines and incorporate key considerations as appropriate.

Overbuild Projects may involve development beside the corridor but also include building components that extend fully or partially into the airspace over a Metrolinx Rail Corridor. These developments may or may not be physically connected to other transit infrastructure (e.g., station entrance building). They are subject to certain requirements that will vary depending on their physical characteristics and which are detailed in the Metrolinx Overbuild Development Guidelines.

The various types of adjacent development are illustrated in Figure 3.1.

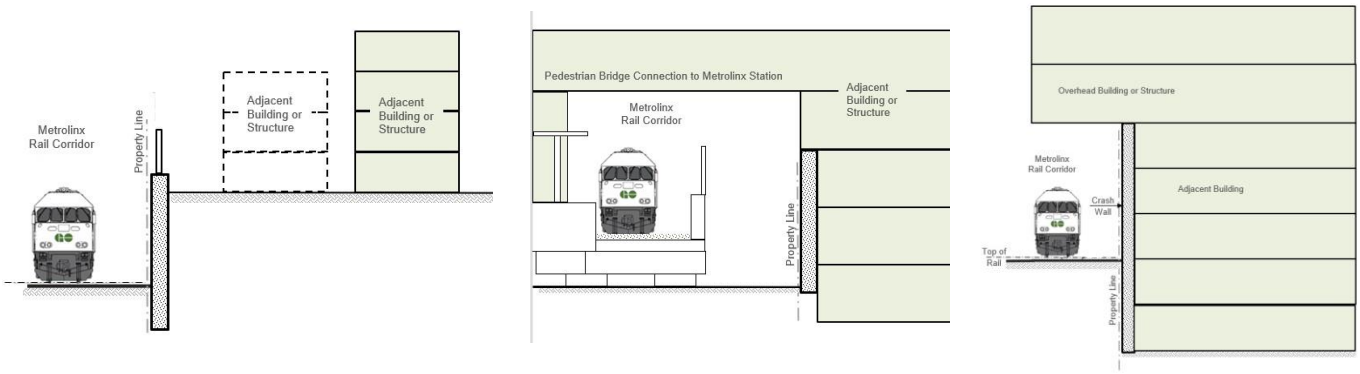



Figure 3.1 Types of Adjacent Development – Typical, TOD/TOC, and Overbuild (left to right)

While the form of development is an important consideration, specific rail-oriented requirements are assessed on the basis of the proposed land use(s) contemplated for a given Project – and more specifically, on the 'sensitivity' of those uses in relation to rail oriented impacts. 'Sensitivity' is assessed largely on the level of

occupancy associated with the land use in question. In the past 'Sensitive Uses' were limited primarily to residential-oriented Projects, given the potential for extended occupancy as well as ownership interests. Today, the list of Sensitive Uses has expanded significantly to include any use where there is occupancy for the better part of a day – including commercial, industrial and institutional uses. Non-Sensitive (low occupancy) Uses typically involve passively used spaces with no programmed activities and, given their characteristics, the list of rail-oriented requirements for such Projects is significantly reduced.

# 4.0 Project Review Process

## 4.1 Overview

The Metrolinx Third Party Projects Review team is engaged with the review of adjacent development Projects from early concept development through to construction. Key components of the Project review process are identified in the flow diagram below (Figure 4.1).

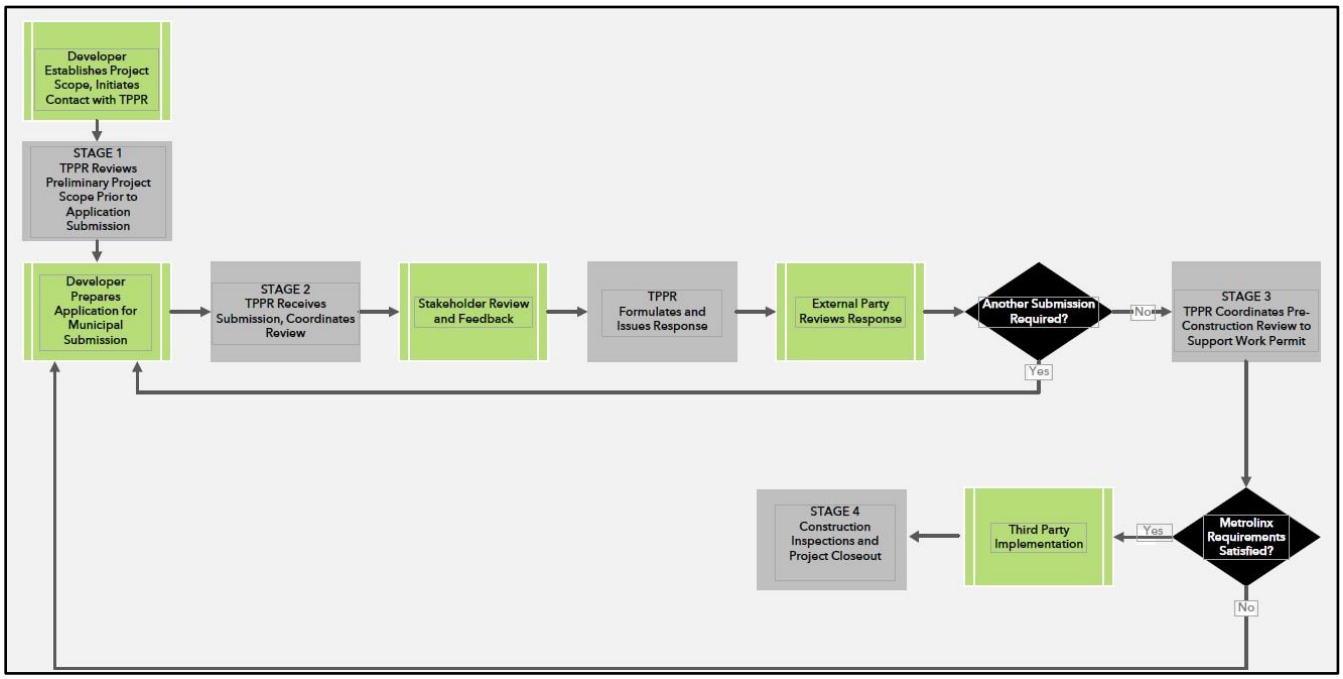



Figure 4.1: Metrolinx TPPR Project Review Process Flow Diagram

## 4.2 Stage 1: Pre-Application Engagement

Early engagement between the development Project team and TPPR is strongly recommended prior to municipal development application submission, particularly for those Projects that are immediately adjacent to GO Rail Corridors. The intent is to identify, and ideally address, rail-oriented concerns so that the municipal review process becomes only an administrative matter. This is also an opportunity to look forward to identify key considerations for Project construction, and to also consider potential TOC opportunities.

During the initial meeting(s) the development team must provide key Project plans and/or reports. TPPR will review Project specifics, provide an initial determination of issues to be addressed, and work with the development team to address technical issues. Proposed construction methodology will also be discussed, and key requirements reviewed. Engagement with key internal Metrolinx stakeholders and/or TPPR's Technical Advisor (TA) may be necessary, depending on the issues identified (refer to section 4.4.1).
The intent of this preliminary review is to ensure 'compatibility' between rail operations and the subject development – through the planning, construction, and on-going occupancy of the Project. It is the Developer's responsibility to demonstrate that any potential impacts will be adequately mitigated, to the

satisfaction of Metrolinx. Some of the key considerations for review during early engagement may include the following:

- Rail Safety measures (setbacks, safety barriers)
- Environmental mitigation (noise, vibration and other impact studies)
- Technical review requirements
- Rail Corridor encroachment and associated requirements (construction management, Rail Corridor Access parameters, flagging protection)
- Administrative matters – such as legal agreements, easements and warning clauses

A comprehensive overview of key considerations for development Project design is set out in section 5.0. Note that the specific factors considered for any given Project will vary and, as such, some of the measures that are identified may not apply.

Duration of the pre-application review phase will depend on the complexity of the issues considered and may vary between a single meeting to several months of technical discussion. Any fees associated with this consultation (e.g., associated with the TA's technical review) shall be the responsibility of the Developer.

## 4.3 Stage 2: Municipal Planning Review

Once the pre-application review is complete, the development team should have a level of comfort with Metrolinx requirements, and Project documentation will be modified to reflect those requirements as applicable, to an extent that plan submission may proceed as part of the municipal planning review process as mandated under the Planning Act (refer to section 2.0).

It is acknowledged that not every Project will be submitted for consideration under the pre-application review process. As such, more detailed review will be initiated upon package submission and more comprehensive plan revisions may ultimately be required. In order to ensure timely review, all materials identified as part of the complete application checklist should be included with the submission.

Under the municipal planning process, application materials will be circulated to Metrolinx for review. TPPR will review the Developer's application submission and perform a completeness check. If the package is found to be incomplete, TPPR will immediately request additional documentation as required. If the application is complete, TPPR will initiate the review with reference to the design considerations as outlined in section 5.0. Engagement of TPPR's TA may be necessary, depending on the issues identified (refer to section 4.4.1) and TPPR may also consult with internal stakeholders, for feedback on pertinent issues, including the following groups:

- Sponsor Office – provides direction on issues pertaining to GO Transit Service expansion plans.
- Interface Team / Delivery Teams / Capital Projects Group – provides direction to ensure that existing and planned GO Transit infrastructure projects are coordinated with and not adversely affected by adjacent development activities.
- Engineering – provides technical advice regarding rail infrastructure matters – including structures, track, and signals.
- Real Estate Management – provides direction on all property-related issues and is the primary business lead for utility crossing agreements, easements and other land transactions (e.g., sale of property) as required.

- Transit-Oriented Communities – provides direction on all property-related issues, specifically, higher density, mixed-use development that is connected, next to or within a short walk of transit stations and stops.
- Legal Services – facilitates the execution of all legal matters including new and amended development agreements, crossing agreements, temporary use agreements (e.g., crane swing or shoring agreements) and land transactions.
- Risk Management – provides direction for all liability and insurance requirements.

Once all relevant feedback is assembled, Metrolinx will provide comments to the municipality on the basis of the timelines prescribed through the application process. Sign-off on planning comments will be issued when Metrolinx is satisfied that all associated concerns are suitably addressed. Ultimate approval of the subject application is a function of the municipality having jurisdiction. This process may repeat several times (through Official Plan Amendment, Zoning Bylaw Amendment, Site Plan Control, for example) as applicable until all requisite approvals are granted.

Additional technical discussions and reviews may continue in parallel to the municipal planning review process as necessary. This can include consideration of administrative considerations such as warning clauses and legal agreements (refer to section 6.0), engineering design and construction methodologies (refer to section 7.0), and Work Permit requirements (refer to section 4.4.2) as applicable. It should be noted that certain arrangements, such as Rail Corridor access, have long lead times, so it is prudent to initiate such discussions early in the process.

It's important to note that some construction-oriented work, such as demolition to prepare the subject lands for re-development, may occur at an earlier stage in the process – including in tandem with the municipal planning review. In such cases, the technical review / Work Permit process set out under section 4.4 may apply, depending on the scope, method and/or location of the demolition work.

## 4.4 Stage 3: Pre-Construction Technical Review and Work Permit Issuance

Once the municipal planning review is complete, the Developer may choose to move forward with construction. Projects that are immediately adjacent to the Rail Corridor and that involve any level of encroachment into the Rail Corridor will be subject to further technical review and will conclude with execution of applicable agreements and issuance of a Metrolinx Work Permit. No construction within 10 metres (30 feet) of active rail may proceed without a Metrolinx Work Permit. Notwithstanding, it is recommended that proponents also confirm associated requirements with Metrolinx for work that is located outside of the 10-metre limit. Projects located within the 300-metre zone of influence but that are not immediately adjacent to the Rail Corridor may proceed as long as associated Metrolinx concerns (and other applicable planning approvals) are satisfied.

### 4.4.1 Technical Review Process

Project-related construction activities that are located immediately adjacent to (generally within 10 metres – as illustrated in Figure 4.2) or within the Metrolinx Rail Corridor will be subject to a Metrolinx Third Party technical review process that examines the detailed design and Work Plan for each of the proposed Works. The focus of the technical review is to confirm compliance with applicable requirements in order to mitigate, and ideally eliminate, any potential impacts on the Metrolinx Rail Corridor. The Developer shall be responsible for submission of all associated plans, reports and other materials required to support the subject review.

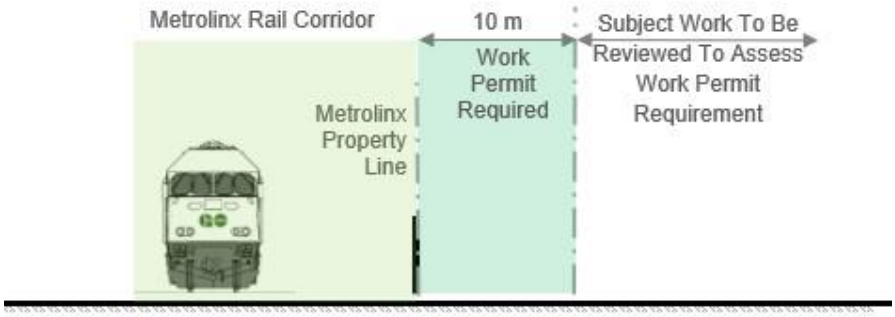



Figure 4.2: Metrolinx Rail Corridor Work Permit Zone of Influence

TPPR will oversee the technical review process and will engage internal stakeholders to review submissions and provide feedback as required. Subject matter that extends outside of internal expertise will require more advanced technical review by the Metrolinx Third Party TA. The TA will provide feedback to the Developer regarding technical considerations (including but not limited to the subject matter set out in section 7.1) within fifteen (15) business days per individual submission unless otherwise specified, and the review period will re-start with each subsequent revision. All fees associated with this process are the responsibility of the proponent and will be identified in a "Level of Effort" quote to be provided by the TA at commencement of the process. Receipt of payment must be confirmed prior to initiation of the review. The quote shall include the facilitation of access for work within the Metrolinx Rail Corridor, as well as ongoing coordination, support, and construction oversight in accordance with conditions set out in the Metrolinx Work Permit (refer to section 4.4.2).

The Technical Review will be conducted with reference to applicable policies, standards and protocols. The Technical Review must be fully completed prior to the issuance of a Work Permit. Where the subject Project proposes to physically integrate with public facing transit facilities, this guideline will not apply, and rather, the proponent shall engage with the Metrolinx TOC department and follow the Metrolinx Asset Protection Package (MAPP) process accordingly.

### 4.4.2 Work Permit Issuance

Upon successful completion of the technical review process as identified in section 4.4.1, TPPR, in consultation with their Third Party TA, shall determine if conditions have been satisfied to support Work Permit issuance. A Work Permit is a document that identifies proponent roles and responsibilities with respect to the subject work and allows the Developer to proceed with their construction, subject to satisfaction of certain conditions/obligations that are to be confirmed by TPPR's TA.

Beyond the technical review, the Work Permit shall not be issued until the Developer confirms satisfaction of other conditions including:

- ✓ Railway utility locates (Metrolinx and CN) have been obtained
- ✓ Railway flagging protection arrangements have been confirmed
- ✓ Rail Corridor Access parameters such as workblocks are understood and arrangements are confirmed
- ✓ Appropriate insurance has been obtained
- ✓ WSIB requirements have been satisfied
- ✓ Appropriate personnel have completed Personal Track Safety (PTS) training

Additional information regarding these matters is documented in the Work Permit and TPPR and their Third Party TA will provide advice and assistance as required. It should be noted that some of these requirements (such as Rail Corridor Access permissions) have long lead times and it is prudent to initiate related discussions during the municipal planning review stage (refer to section 4.3).

Upon issuance of the Work Permit, the Developer and their contractors shall be obligated to satisfy all applicable requirements as set out in the document. The issuance of a Work Permit by Metrolinx does not exempt the Developer from other applicable codes, standards, by-laws, statutes, regulations, or any other conditions required by Metrolinx or other entities involved in the development review and approval process.

### 4.4.3 Field Oversight

During the construction of the development, TPPR staff and/or their Third Party TA may perform inspections of the Works to ensure general compliance with the approved Work Plan and the terms and conditions set out in the Work Permit. Other construction-related documentation, as identified in section 7.2, may also be referenced.

## 4.5 Stage 4: Project Close-Out

The Developer shall advise Metrolinx in writing once all engineering/field support, interface functions, and Project construction impacting Metrolinx is complete. Where the Project includes a permanent change/modification to Metrolinx Infrastructure, the Developer shall provide As-Built Drawings in AutoCAD or MicroStation and PDF formats, within 30 calendar days. Engineering Certificates of Completion (as identified in the Metrolinx Adjacent Development Agreement) may also be required depending on the circumstances.

# 5.0 Project Design Considerations

A comprehensive overview of key considerations for development Project planning is set out in the sections below. Note that the specific factors considered for any given Project will vary and, as such, some of the measures identified herein may not apply. As noted in section 3.1, it is acknowledged that flexibility is required during the review process given the unique characteristics of any given site. The information presented herein should therefore be regarded as a starting point, and each Project will be assessed on a case-by-case basis to determine the final package of requirements. Metrolinx staff will provide advice in this regard and will work with proponents to adjust requirements as appropriate. Any significant departure from established practice will be subject to the Metrolinx Standards Deviation Process.

It should be noted that Metrolinx is in the early stages of establishing a risk-based approach, particularly for the review of rail safety matters. It is anticipated that this process will be further refined in coordination with updates to the RAC/FCM *Guidelines for New Development in Proximity to Railway Operations*, and additional direction in this regard will be provided through an update to the *Adjacent Development Guidelines* in early 2024.

## 5.1 Rail Safety Measures – Setbacks and Safety Barriers

Setbacks and safety barriers are typically required for development located immediately adjacent to Rail Corridors but may also be relevant considerations for those sites that are not adjacent yet have exposure to the corridor (due to the presence of vacant intervening land, for example). As illustrated in Figure 5.1, established industry practice suggests a 30 metre setback in combination with a safety barrier (most basic form being a 2.5 metre high earthen berm) as the standard mitigation for 'Sensitive Uses' (occupied for the better part of a day – refer to section 3.3) including residential, commercial, industrial, institutional and programmed open space. It is acknowledged, however, that such measures may not be practical or even possible depending on the characteristics of the site plan. As such Metrolinx will evaluate these requirements on a case-by-case basis, together with the development team, to arrive at a rail safety package, to be detailed in the Rail Safety Report, that is deemed through analyses to be appropriate for the Project in question. The information set out in this section should therefore be regarded as a starting point for the review process.

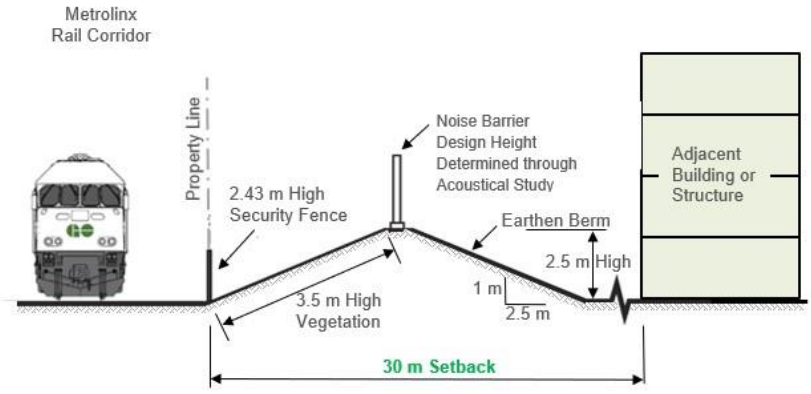



Figure 5.1: Typical Setback and Safety Barrier Requirements

When considering re-development proposals for existing buildings that are already non-compliant with respect to current Metrolinx rail safety standards, the existing rights will be deemed as acceptable for the new proposal as long as there is no additional setback encroachment and the proposed use is not modified. Further intensification beyond the established limits and/or a change of use shall not be permitted without the implementation of appropriate mitigation measures, however.

### 5.1.1 Building Setbacks

Building setback requirements are established to provide a buffer zone that contains the impacts associated with a potential train derailment; allows for fire separation; permits dissipation of rail-oriented noise, vibration, and emissions; provides for emergency and maintenance access; and accommodates a safety barrier. Setback distances vary by land use and occupancy status. The following provides an overview of typical building setback requirements by land use:

Residential, Commercial, Institutional, Industrial (high occupancy), Programmed Open Space: 30 metres

Industrial (low occupancy): 15 metres

Limited occupancy/passively used spaces (including parking garages, storage facilities, passive (non-programed) open space (incl. road rights-of-way and paths)): No setback required and are acceptable uses within the setback area of Sensitive Uses.

Key considerations regarding setbacks are set out below:

- The minimum building setback distance is measured from the mutual property line (i.e., between the Rail Corridor and the private property) to the building face where the Sensitive Use is located.

- The mutual property line may be redefined in cases where Rail Corridor expansion is required or there is intervening Metrolinx-owned land outside of the active Rail Corridor (such as a station building or parking lot); in such cases, the minimum setback distance would be measured from the 'adjusted' property line.

- In its most basic form, the setback is assumed to be measured as a straight-line horizontal distance. Where circumstances dictate (e.g., spatially constrained urban sites), the building setback distance may be measured as a combination of horizontal and vertical distances, as long as the horizontal and vertical values satisfy the total setback requirement in combination (refer to Figure 5.2). In this context, a minimum horizontal setback of up to five (5) metres is recommended to accommodate building maintenance requirements.

- The setback may be reduced depending on the characteristics of the safety barrier. For example, a minimum setback reduction in the order of five (5) metres is justified when a crash wall is to be constructed. An alternative setback configuration shall require a Rail Safety and Risk Assessment Study (refer to section 5.1.2.4).

- When the adjacent rail line is located in a cut measuring in the order of four (4) metres deep or greater, the height of the slope may be included as part of the building setback (measured from the toe of the slope – refer to Figure 5.3).

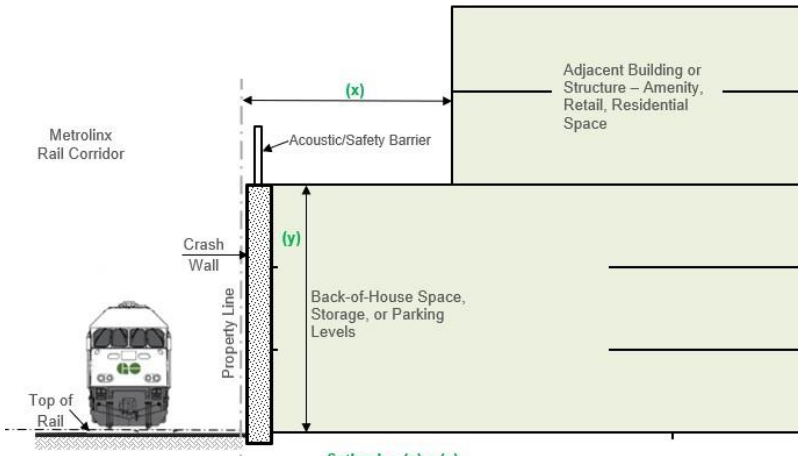



Figure 5.2: Horizontal/Vertical Setback with Crash Wall

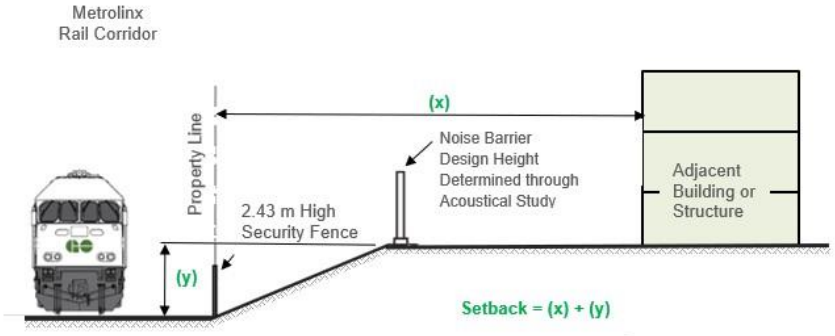



Figure 5.3: Setback when Tracks are in a Cut

- When the adjacent rail line is located on an elevated structure, the setback may be measured from the edge of the guideway and include the vertical height of the guideway (refer to Figure 5.4).

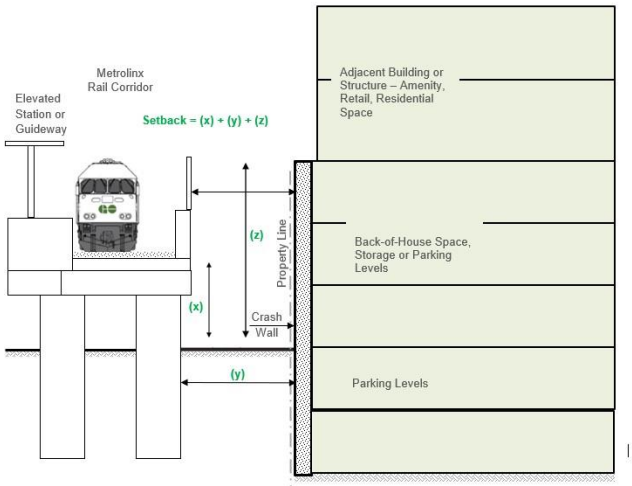



Figure 5.4: Setback Adjacent to Elevated Rail Corridor

### 5.1.2 Safety Barriers

Safety barriers are typically provided together with a building setback to absorb the impacts of a possible train derailment as well as to provide physical protection for adjacent properties. These barriers may take a number of forms, with selection of preferred approach based on the characteristics of the development site.

In the majority of cases the development sites, and their associated barriers, are located at the same or similar elevation as the Rail Corridor. For developments where the adjacent Rail Corridor is elevated above the mutual property line, an appropriate barrier will be required on the development lands, to be considered in combination with in-corridor measures such as guard rails (designed to reduce the severity of, but not eliminate the potential for, a train derailment). Additional engineering evaluation may be required to ensure that the selected barrier design will suitably accommodate the impact of a train derailment.

The following sections provide an overview of safety barrier configuration options and associated key considerations.

Note that low occupancy uses (such as parking, storage facilities, passive parks) do not typically require a safety barrier, but the proponent or area municipality may wish to provide such protection for insurance or other purposes.

#### 5.1.2.1 Earthen Berms

- Earthen berms are comprised of highly compacted earthen materials, to be compacted to 95% modified proctor (in-situ dry unit weight of the material as a percentage of the known maximum dry unit weight of that material).
- The typical berm height is 2.5 metres for Sensitive Uses and 2.0 metres for low occupancy uses (e.g., industrial), constructed at a slope of 2.5:1 with a one (1) metre crest.
- Safety berms are required for lands within up to 120 metres from the railway corridor, with the required barrier height diminishing with distance and determined through calculation.
- Berms are to be located adjoining and parallel to the railway property line, entirely on the adjacent private property.
- Returns are to be provided at the ends of the berms, with placement subject to site specific conditions, such that buildings with direct exposure to the Rail Corridor are suitably protected.
- When the rail line is located in a cut measuring in the order of four (4) metres or deeper, the slope is deemed equivalent to an earthen berm and no supplemental modification is required.

A ditch (also referred to as an 'inverted berm') adjacent to the Rail Corridor may also be provide a level of protection equivalent to a standard berm – to be confirmed through an engineering review.

#### 5.1.2.2 Deflection or Crash Walls

- A deflection or crash wall may be used as an alternative to an earthen berm for spatially constrained urban sites (as they generally occupy less space) and where a setback reduction would be beneficial.

- Crash wall specifications are set out in the *Submission Guidelines for Crash Walls* document prepared by AECOM (refer to Appendix A), which is regarded as the Metrolinx design standard for these structures.

- An alternate design configuration may be considered – such as structurally reinforced columns – if a solid wall is not desirable (e.g., in cases where pedestrian permeability is required).

- Where barriers are integrated into the building face, they must be structurally separated from the building to ensure that integrity is maintained in the event of a derailment.

- In cases where the subject development is not located immediately adjacent but has direct exposure to the Rail Corridor (due to the presence of vacant intervening lands, for example), an alternate barrier design approach may be considered – such as structural reinforcement within the building on the rail-facing frontage.

- Openings through the barrier structure (e.g., windows, passageways) may be considered subject to confirmation that the barrier integrity will not be compromised.

- Barrier returns are to be provided, with placement subject to site specific conditions, such that buildings with direct exposure to the Rail Corridor are suitably protected.

- TPPR will provide Metrolinx-specific inputs (such as train speed) to support development of the barrier design.

- The proponent's engineer shall demonstrate through calculations that the subject deflection/crash wall will afford a level of protection and energy absorption as required by relevant standards and Metrolinx requirements and shall submit a Rail Safety and Risk Mitigation Study that includes key design details (refer to section 5.1.2.4). Such designs and studies shall be subject to review and approval by TPPR's Third Party TA (refer to section 4.4.1).

### 5.1.2.3 Safety Barrier Alternatives

Where the proponent proposes alternatives to the safety barriers outlined in sections 5.1.2.1 and 5.1.2.2, such as an earthen berm in combinations with a retaining wall, a deflection wall, or a crash wall that diverts from standard design approaches, the proponent's engineer shall demonstrate through calculations that the alternate safety barrier will afford a level of protection and energy absorption that is equivalent to that established by relevant standards and Metrolinx requirements, and shall submit a Rail Safety and Risk Mitigation Study that includes key design details (refer to section 5.1.2.4). Such designs and studies shall subject to review and approval by TPPR's Third Party TA (refer to section 4.4.1). Any significant departure from established practice/equivalency will be subject to the Metrolinx Standards Deviation Process.

### 5.1.2.4 Rail Safety and Risk Mitigation Study

Applicants with sites that are located immediately adjacent (or with direct exposure to) a Rail Corridor and where the proposed rail safety (setback and safety barrier) package entails a diversion away from the standard (e.g., 30 metre setback and a 2.5 metre high earthen berm) will be required to submit a Rail Safety and Risk Mitigation Report which details key components of their proposal. The intent is to demonstrate that the proposed measures will provide a level of protection for the site that is equivalent to or even exceeding that of the established industry standards. The report shall be subject to review and approval by TPPR's Third Party TA.

The Rail Safety and Mitigation Study shall, at a minimum, include the following components:

- Overview of the proposed development (including use(s) and floor plan details) and its relationship to the Rail Corridor
- Profile of existing and future rail operations in the adjacent corridor
- Assessment of all potential rail-oriented risks based on the development characteristics and corridor profile
- Identification of the proposed rail safety mitigation measures required to address the established risks – including detailed technical engineering information
- Documentation of other relevant rail-oriented considerations and associated actions.

## 5.2 Other Project Design Considerations

### 5.2.1 Anti-Trespassing Measures

Fencing is installed to define railway property and discourage trespassing onto the railway corridor. New fencing installations are required irrespective of the land use and occupancy status in any location where direct access to the Rail Corridor is afforded. The following sections provide an overview of key fencing (and other anti-trespassing) considerations.

- The current Metrolinx minimum fencing standard is a 2.4 metre high security/anti-trespass (non-cuttable/non-climbable) fence.

- Private fencing is to be installed at a distance of four (4) inches (pending confirmation of suitability based on locates) from the property line to ensure all associated material is located on private property.

- All costs for fencing associated with new developments, including on-going maintenance, are to be paid by the property Developer.

- Noise barriers and crash barriers are acceptable substitutes for standard fencing installations, although additional standard fencing may be required in any location with direct exposure to the Rail Corridor.

- If the selected fencing is comprised of a solid surface, Metrolinx requires an anti-graffiti silicone coating be applied to the railway side of the barrier to discourage and manage graffiti. Developers are also encouraged to use visually appealing landscaping/planting (such as vines) to prevent direct access to the barrier face.

- Developer Infrastructure facing or located adjacent to the Rail Corridor shall be designed to prevent trespassing activity and other encroachments. Adjacent property owners shall:

- Maintain landscaping within the limits of private property and not encroach beyond the mutual property line.

- Not be permitted to access the Rail Corridor to maintain the private development without sufficient approvals.

- Design buildings such that balconies do not provide direct access to the Rail Corridor – including installation of screening where required/appropriate.

- Municipal planning activities should consider the nature of land uses on opposite sides of the Rail Corridor in an effort to discourage the creation of new pedestrian desire lines – and hence, trespassing. In situations where pedestrian desire lines become apparent and standard fencing is not sufficient to discourage trespassing, more robust barriers should be considered. Alternate formal (grade separated) connections may also be pursued to ensure that safe conditions are maintained, rail activity is not interrupted, and transit services are easily accessible.

### 5.2.2 Vegetation Requirements

A 3.5 metre low-vegetation buffer has been established as part of the Metrolinx GO Expansion program (specifically relating to electrification infrastructure clearances). The buffer is measured from the mutual property line. Only low-lying vegetation, such as shrubs and grasses, are permitted in this area. Proponents will be required to submit a final Landscaping Plan identifying planting details for review and satisfaction of Metrolinx.

## 5.3 Technical Studies and Reports

Technical studies and reports may be required depending on the characteristics of the subject Project as well as its location in relation to Metrolinx Infrastructure. An overview of typical subject matter is set out below. Some studies may be subject to review and approval by TPPR's Third Party TA (refer to section 4.4.1) depending on the subject matter.

### 5.3.1 Noise and Vibration

Noise and vibration studies may be required to ensure, through an analysis of the surrounding environment, that suitable measures are introduced to mitigate rail-oriented noise and vibration impacts. Noise and vibration study requirements vary by land use and occupancy status. Key considerations for noise and vibration studies are set out below.

- Noise standards are to be applied to residential development within 300 metres of the Rail Corridor.

- Acoustical analysis is required for other non-residential uses where there may be sensitivity to noise (e.g., day care centres, offices with sensitive equipment etc.).

- Noise attenuation or noise barriers may be required for Projects (primarily residential) that include outdoor amenity areas. These barriers shall be located adjacent and parallel to the rail corridor, shall be designed in accordance to required studies and assessments, and shall include barrier-returns at the ends as required. Opportunities to replicate the noise attenuation function through use of other barrier formats (e.g., crash wall, Metrolinx noise barrier) can be explored. The noise barriers may also suitably provide for an anti-trespassing function.

- Other mitigation measures (e.g., provision of air conditioning, enhanced windows and/or building materials, etc.) to be incorporated as part of the development may also be recommended by a qualified acoustical consultant.

- Trees and standard fencing are not acceptable substitutes for noise barriers.

- Warning Clauses are mandatory for residential units within 300 metres of the Rail Corridor and may suitably address noise concerns for some (non-residential) forms of development. Refer to section 6.1 for additional information in this regard.

- Special considerations may apply at locations (such as the Union Station Rail Corridor) where trains are stored, operate at reduced speed/idle and/or where unique operating characteristics (e.g., use of snow blowers, specialized machinery, etc.) are common.

- A comprehensive acoustical review will be required for development within 300 metres of major Metrolinx rail maintenance facilities – including Willowbrook and Whitby. These facilities are integral for the current and future operations of the Metrolinx heavy rail network and involve unique operating characteristics and associated noise that may be generated 24 hours a day, seven days a week. The study shall include a detailed analysis of the facility operations to ensure appropriate mitigation measures are incorporated into the final development design.

- TPPR shall provide forecast rail traffic volumes, speed and other operational information to support the completion of the noise study.

- Vibration standards are to be applied to development within 75 metres of the Rail Corridor and measured at the location of the closest Sensitive Use area.

- Appropriate isolation measures will be required where vibration levels exceed the established standards.

### 5.3.2 Drainage and Storm Water Management

Any proposed alterations to the existing Rail Corridor drainage pattern (i.e., into and/or out of) must be substantiated by a drainage report completed by a qualified Engineer that demonstrates that the Rail Corridor will not be adversely impacted. This report may be reviewed by TPPR's TA.

Any development-related changes to drainage patterns should ideally be addressed using infrastructure and/or other means located entirely within the development lands. Coordination with Metrolinx to make use of existing Rail Corridor infrastructure (e.g., ditches, culverts) may be considered if the impact is demonstrated to be minor and will be subject to Metrolinx review/approval.

### 5.3.3 Air Quality

Where the Developer's Project is located adjacent to the Rail Corridor (and particularly when in close proximity to busy locations such as the Union Station Rail Corridor) an assessment will be required to demonstrate that indoor air quality conditions can be maintained at acceptable levels. Appropriate mitigation measures (such as air intake filters, for example) must be identified as required to achieve such conditions. The air quality study may include an emission dispersion analysis depending on the characteristics of the location (e.g., if in close proximity to a station platform or tunnel).

### 5.3.4 Microclimate

Where the development Project may create localized changes to microclimate that have the potential to negatively impact Metrolinx operations and/or infrastructure, a microclimate study shall be submitted to identify impacts and associated mitigation measures related to wind, snow accumulation, and solar exposure.

### 5.3.5 Traffic Management

Where the development is located in close proximity to Metrolinx Infrastructure such as a station and/or parking lot, a traffic management study shall be provided which identifies temporary and permanent access considerations for vehicles and pedestrians as applicable. The study shall also consider emergency response access requirements. At-grade rail crossings within the vicinity of the proposed development shall also be identified as part of the analysis. The impact of the new development on pedestrian, cycling and vehicle volumes at the crossings should be identified and assessed, with mitigation measures identified as required and submitted for review as part of the application.

### 5.3.6 Structural/Geotechnical

Where the development construction has the potential to temporarily or permanently affect loading conditions on Metrolinx Infrastructure, a structural and geotechnical engineering report shall be submitted, to be prepared and stamped by a Professional Engineer, that demonstrates that any imposed loading is mitigated to the extent that there will be no impact to the Metrolinx Infrastructure.

# 6.0 Project Administrative Considerations

## 6.1 Warning Clauses

Warning Clauses, which are typically identified as mitigative measures within the subject Noise and Vibration Study, are intended to advise new or prospective property owners/occupants of the potential adverse impacts resulting from the adjacent railway operations.

The applicable Warning Clause(s) are to be inserted in all Development Agreements, Offers to Purchase, and Agreements of Purchase and Sale or Lease for any new residential dwelling unit or commercial office building within 300 metres of the railway corridor (as well as for any other non-residential development Projects where noise-related issues are identified). Selection of the appropriate warning clause will depend on the location of the development and the nature of the Rail Corridor operations. Examples of typical Metrolinx Warning Clauses are set out below. Other customized Warning Clauses may be applied depending on prevailing circumstances.

Metrolinx Rail Corridor – General
Warning: Metrolinx and its assigns and successors in interest has or have a right-of-way within 300 metres from the subject land. There may be alterations to or expansions of the rail or other transit facilities on such right-of-way in the future including the possibility that Metrolinx or any railway entering into an agreement with Metrolinx to use the right-of-way or their assigns or successors as aforesaid may expand or alter their operations, which expansion or alteration may affect the environment of the occupants in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual lots, blocks or units.

Metrolinx Rail Corridor – Within Union Station Rail Corridor
Warning: Metrolinx owns and operates the Union Station Railway Corridor (the "USRC"), the busiest rail corridor in Canada, that is located within 300 metres from the subject land. Rail corridor or other transit operations occur on a continuous basis, 24 hours a day every day of the year. Said operations include: the operation and idling of diesel locomotives that generate diesel fumes and odours; artificial lighting of the USRC may illuminate the sky; the loading, unloading and switching of passenger rail cars; and the operation of various processes for the maintenance of rail and other transit equipment. Noise and vibration originating from a number of different sources, including normal train movements (including bells and whistles), train idling, rail corridor construction, and snow removal (including switch blowers) activities will emanate from the USRC.

Metrolinx Willowbrook Rail Maintenance Facility
Warning: Metrolinx and its assigns and successors in interest has or have a right-of-way and an interest in land within 300 metres from the subject land. There may be alterations to or expansions of the rail or other transit facilities on such right-of-way and/or to the Willowbrook Rail Maintenance Facility in the future including the possibility that Metrolinx or any railway entering into an agreement with Metrolinx to use the right-of-way and/or Willowbrook Rail Maintenance Facility or their assigns or successors as aforesaid may expand or alter their operations, which expansion or alteration may affect the environment of the occupants in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual lots, blocks or units.

## 6.2 Development Agreements

Depending on the Project circumstances, development agreements may be required to specify requirements, roles and responsibilities. These agreements must make reference to final Project plans (with content depending on the nature of the agreement) and, as such, finalization of these documents usually occurs in the latter stages of the Project planning process. Metrolinx has developed and refined (based on Subject Matter Expert feedback) template agreements that can be provided to the Project team for reference in the early stages of engagement. Review and refinement of associated details can begin at any time, although it should be noted that modifications to the standard templates are discouraged.

### 6.2.1 Adjacent Development Agreement

In cases where a new development is located immediately adjacent to a railway corridor, the property owner will be required to enter into an Adjacent Development Agreement stipulating how Metrolinx interests will be protected throughout the lifetime of the Project (from construction start to on-going building occupation). A key focus for these documents is ensuring that the applicable safety and impact mitigation measures are suitably provided and maintained. The Adjacent Development Agreement also includes an Easement for Operational Emissions, to be registered on title over all associated development property within 300 metres of the Rail Corridor. In the event that the subject property is not located immediately adjacent to the Rail Corridor, the easement can be registered through the use of an abbreviated agreement document.

### 6.2.2 Other Agreements

Additional agreements may be necessary on a short-term (e.g., during construction) or on an ongoing basis depending on the Project requirements and characteristics. Examples of such agreements are set out below. Other customized agreements may be required depending on the Project parameters.

- Non-Disclosure Agreement – used when the development team requires access to sensitive and confidential Metrolinx information such as plans and reports to inform their own Project planning and design activities.

- Infill Development Agreement – employed for infill development Projects of four (4) units or less. While integration of appropriate mitigation measures will be pursued, a full complement may not be possible for these typically constrained sites, and this agreement addresses associated liability considerations.

- Crane Swing Agreement – identifies roles and responsibilities with respect to the installation and use of a construction crane that swings into Metrolinx airspace.

- Shoring System and Permission to Enter Agreement – identifies roles and responsibilities with respect to the installation, monitoring, and de-commissioning of development shorting and tiebacks.

- Construction Agreement - necessary when there are particular Developer obligations for protection of Metrolinx interests that go beyond the terms of a Work Permit; sets out specific parameters for construction and may identify communication protocols and/or restrictions on the nature, timing and/or duration of construction activity.

- Long Term Maintenance Agreement - will define the obligations of both parties to allow for ongoing maintenance and repairs of both Metrolinx Infrastructure and the development infrastructure in circumstances where conditions dictate that one impacts the other.

# 7.0 Rail Corridor Construction Considerations

Construction work within or in close proximity to an active Rail Corridor entails a number of unique and critical factors that must be considered to ensure that personnel, the public, infrastructure and transit service are suitably protected. Some key construction-oriented considerations are set out below. This and other material will be considered as part of the technical review process as described in section 4.4, with the specific scope to be defined by the Project characteristics. TPPR and their Third Party TA will provide further direction regarding specific information to be provided. It should be noted that certain arrangements, such as Rail Corridor access, have long lead times, so it is prudent to initiate construction-related discussions early in the Metrolinx engagement process.

## 7.1 Typical Development Construction Activities

### 7.1.1 Excavations, Shoring, and Tie-Back Installation

Any work that entails excavation within 10 metres of an active track – and particularly within the Track Zone of Influence (as illustrated in Figure 7.1) poses a potential risk to Metrolinx Infrastructure and will require detailed review of relevant plans and reports (including structural calculations), to be prepared by a qualified Professional Engineer.

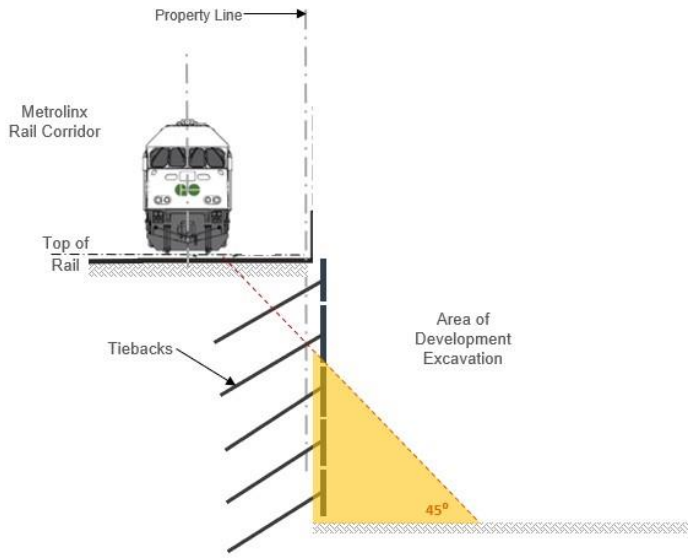



Figure 7.1: Developer Excavation within Metrolinx Track Zone of Influence

A common activity in this context is building shoring work – that may or may not involve the installation of tiebacks. It is recommended that proponents consider an alternate shoring method (e.g., use of rakers) that does not involve tiebacks in order to avoid the associated technical review, protocols, and the Shoring System Agreement as described in section 6.2.2.

With any excavation (and including tieback installation) monitoring of Metrolinx Infrastructure is required to ensure that structural or functional inadequacy does not develop as a result of the Developer's construction and to ensure the Developer's construction support of excavation system is functioning as designed and the loads on Metrolinx Infrastructure remain within design limits. The monitoring program is to be developed and delivered by a licensed Land Surveyor or a Professional Engineer registered in the jurisdiction of the Developer Project. Program parameters shall be established through a Ground Monitoring Plan, which identifies established monitoring thresholds/limiting values, procedures to ascertain settlement activity, and contingency measures for immediate remedial action to be taken in the event movement reaches the established threshold limits and/or damage is observed.

The Developer's Geotechnical Engineer shall provide monitoring reports to Metrolinx during the subject construction at an interval as established in the applicable Metrolinx Track and Structure monitoring standards. If acceptable settlement levels are exceeded, a Stop-Work-Order will be issued by Metrolinx or its TA and the Developer's Geotechnical Engineer shall be responsible for determining the root cause of the readings and for implementing immediate mitigating measures as outlined in the *Metrolinx Shoring Monitoring Alert Level Exceedance Procedure/Protocol* (refer to Appendix B).

### 7.1.2 Crane Usage

Any cranes being utilized, including mobile and stationary cranes, as part of a development Project that are located adjacent to the Metrolinx Rail Corridor will require Metrolinx approval. A Crane Swing Plan (sample illustrated in Figure 7.2) shall be provided by the development team to illustrate the swing radius and proximity to Metrolinx property. Any cranes that require encroachment of the boom within the airspace above the Metrolinx Rail Corridor shall trigger execution of a Crane Swing Agreement prior to erection of the crane on site. The Crane Swing Agreement identifies roles and responsibilities with respect to the use of the crane, including consideration of crane certifications, operator credentials, insurance requirements, and operational restrictions (active loads may not be moved within Metrolinx airspace without additional protection, for example).

It is recommended that proponents consider an alternate crane configuration that does not involve Rail Corridor airspace encroachment in order to avoid the associated technical review, protocols, and the Crane Swing Agreement as described in section 6.2.2.

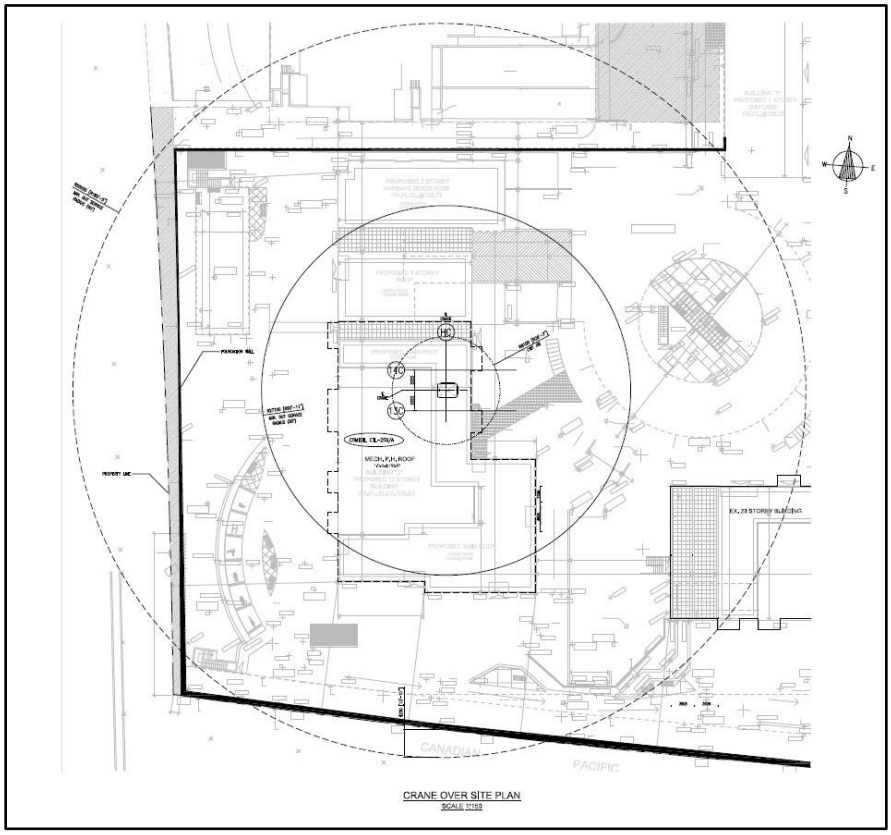



Figure 7.2: Sample Crane Swing Plan

## 7.2 Construction Management

### 7.2.1 Pre/Post-Construction Condition Survey

A pre-construction survey of existing Metrolinx Infrastructure is required to establish baseline conditions prior to the start of Developer construction. Likewise, a post-construction survey is required as a means of identifying any new structural or non-structural deficiencies / damage to Metrolinx Infrastructure arising as a result of the subject construction and shall be performed upon substantial completion of the Project. The condition surveys shall be comprised of both plans and photographic components, as appropriate, with survey limits extending up to 30 metres beyond the proposed Project limits within the Metrolinx Rail Corridor. Any damage to Metrolinx Infrastructure due to the development construction shall be the Developer's responsibility and cost to correct.

### 7.2.2 Construction Management Plan

A Construction Management Plan will identify key aspects of the proposed Project scope of work and will include descriptions of the following considerations as they are to exist within or in close proximity to the Rail Corridor:

- ✓ Type of construction activity and anticipated schedule
- ✓ Site access requirements
- ✓ Traffic management considerations – including definition of vehicular and pedestrian routes
- ✓ Positioning of construction machinery and equipment including stationary and movable cranes
- ✓ Location of and specifications for protective barriers/fencing including hoarding and overhead protection
- ✓ Location of staging, material stockpiles and laydown areas

### 7.2.3 Demolition Work Plan

A Demolition Work Plan shall be required for any proposed demolition of structures in close proximity to the Metrolinx Rail Corridor. These reports, to be prepared and stamped by a Professional Engineer, may include: a detailed narrative describing the demolition procedure – including hour-by-hour schedule; arrangement of work blocks and other protection; identification of practices and measures to protect Metrolinx Infrastructure from dust and debris; a pre- and post track inspection; a ground monitoring plan; crane/equipment/machinery swing/location plans with supporting documentation; hoarding locations; material stockpiling locations; structural calculations supporting proposed demolition Works; and a contingency plan to protect transit operation service commitments – all as applicable depending on the Project circumstances.

It should be noted that, while most construction-oriented activities tend to occur in the latter stages of a Project process, demolition work may occur before or in conjunction with the earlier planning and design phases, thereby requiring advance implementation of the technical review and Work Permit process described in section 4.4.

# Appendix A – AECOM Submission Guidelines for Crash Walls

# Submission Guidelines for Crash Walls

Crash walls may be required for the protection of overhead structures, and in some cases the Railway may consider a crash wall as an alternative to an earthen berm for the protection of structures or facilities adjacent to the track. When proposing or designing such a structure, the following components should be in the submission. Where there is a discrepancy between the requirements here and those provided by the client Railway or AREMA, the more stringent shall govern.

1. Covering Letter

- Summary of items enclosed,
- Location and date of previous, approved, similar designs by this designer, if any,
- Where the crash wall is proposed as an alternative to an earthen berm: alternative materials / configurations considered and benefits of this design,
- A Location or Key Plan. This will be used to identify the mileage and subdivision, the classification of the rail line, and the maximum speed for freight and passenger rail traffic, all obtained from AECOM Canada for CP and CN-owned corridors or from GO Transit for GO-owned corridors.
- Name, phone, fax and e-mail address of your contact.

2. Geotechnical Report - (2 copies)

- Soil properties used in design, and how determined,
- Borehole logs including location plan, if required to support these properties,
- Narrative report describing soil and ground water conditions, if required as above.

3. Design of Crash Walls

- One of the following methods may be chosen, or an alternative design load may be selected and if it can be justified by the engineer responsible for the design. The simplified approach of Method 1 may be used in most cases. Method 2 may be used to optimize the design, or where factors such as distance from the track to the wall, track speeds, side slopes along the track, consequences of collision or others may justify a different load.
- **Method 1**: The wall may be designed for a minimum point load of 600 kip (2700 kN) applied horizontally and normal to the face at any point along the wall
    - The point load shall be applied at a height of 6 feet (1.8 m) *above the top of rail* for walls up to 25 feet (7.6 m) from the centerline of track, or a height of 6 feet (1.8 m) *above the groundline* for walls farther than 25 feet (7.6 m) from the centerline of track.

  - This method may be applied where track speeds do not exceed 50 mph (80 km/hr) for freight or 70 mph (112 km/hr) for passenger trains; where speeds exceed these limits, Method 2 shall be used.

- **Method 2**: an energy balance approach considering collision by glancing blow and single car rotation may be used to determine the design load. The following four cases must be considered:

  - Freight Train Load Case 1 - Glancing Blow: nine cars weighing 143 tons (129 700 kg) each, impacting the wall at an angle, $\theta_G$. The angle of impact will be a function of track curvature, and for tangent track may be taken as 3.5 degrees.

  - Freight Train Load Case 2 - Single Car Impact: single car weighing 143 tons (129 700 kg) impacting the wall as it undergoes rotation about its center. The angle of rotation at impact is:

    $$\theta_f = \text{asin}\left(\frac{d_{CL}}{8.5}\right) \quad [1]$$

    where $d_{CL}$ is the distance from the crash wall to the centerline of track in m. The closest existing or future track is to be used. Where $d_{CL}$ is greater than 8.5 m, this load case need not be considered.

  - Passenger Train Load Case 3 - Glancing Blow: eight cars weighing 74 tons (67120 kg) each impacting the wall at an angle, $\theta_G$. The angle of impact will be a function of track curvature, and for tangent track may be taken as 3.5 degrees.

  - Passenger Train Load Case 4 - Single Car Impact: single car weighing 74 tons (67120 kg) impacting the wall as it undergoes rotation about its center. The angle of rotation at impact is:

    $$\theta_f = asin\left(\frac{d_{CL}}{13}\right) \quad [2]$$

    Where $d_{CL}$ is greater than 13 m, this load case need not be considered.

  - The analysis should reflect the specified track speeds for passenger and/or freight trains applicable within the subject corridor.

  - To assist in designing the structure for the above load cases, use:

    - For the glancing blow load cases, the speed of derailed equipment impacting the wall is reduced from the track speed, $v_o$, to

      $$v_G = \sqrt{v_o^2 + 2a\left(\frac{d_{CL}-1.625}{\sin\theta_G}\right)} \text{ [m/s]} \quad [3]$$

      Where $d_{CL}$ is the distance from the crash wall to the centerline of track in m.

      $v_o$ is the track speed in m/s

      $\theta_G$ is the angle of impact

a is the acceleration in m/s, calculated as $-9.8(.25 + \mathrm{G})$

G is the grade in decimal unit of the groundline in the direction of travel defined by the angle of impact relative to the centerline of track; calculated as $\frac{Groundline\ at\ wall - Base\ of\ Rail}{d_{CL}/_{sin\theta_G}}$.

- For the single car load cases, the speed of derailed equipment impacting the wall is

$$v_A = \frac{2.3\theta_f}{\sqrt{1-cos\,\theta_f}}\left[\frac{m}{s}\right] for\ freight\ cars \quad [4]$$

$$v_A = \frac{2.9\theta_f}{\sqrt{1-cos\,\theta_f}}\left[\frac{m}{s}\right] for\ passenger\ cars \quad [5]$$

Where $\theta_f$ is the angle of impact, in radians, defined in [1] and [2].

- For energy dissipation, assume:
  - Contact with the wall stops all movement in the direction perpendicular to the wall, but not along its length
  - Plastic deformation of individual car due to direct impact is 1 foot (.3048 m) maximum,
  - Total compression of linkages and equipment of the 8 or 9 car consist is 10 feet (3.048 m) maximum,
  - Deflection of wall is considered negligible in equations [6] to [9]. Where the designer wishes to include it, those equations may be modified.
  - In lieu of more rigorous analysis, these energy balance equations may be used to determine the design load perpendicular to the wall. The design load acts along the given length of wall.
    - For the glancing blow load cases

$$F_G = \frac{\frac{1}{2}m(v_G \sin\theta_G)^2}{d_G} \quad [6]$$

And the load is considered to act along the length $l_G$ in m:

$$l_G = \frac{3.048}{\cos\theta_G} \quad [7]$$

Where $m$ is the mass of the derailed cars in kg.

$v_G$ is the impact speed in m/s, defined in [3]

$\theta_G$is the angle of impact

$d_G$ is the deformation of the consist in the direction of the applied force, and $d_G = 3.048 \sin \theta_G$ , in m

- For the single car impact

$$F_A = \frac{\frac{1}{2} m (v_A \cos \theta_f)^2}{d_A} \quad [8]$$

And the load is considered to act along the length $l_A$ in m:

$$l_A = \frac{.3048}{\sin \theta_f} \quad [9]$$

Where $m$ is the mass of the derailed cars in kg.

$v_A$ is the impact speed in m/s, defined in [4] or [5]

$\theta_f$ is the angle of rotation at impact defined in [1] or [2]

$d_A$ is the deformation of the consist in the direction of the applied force, and $d_A = .3048 \cos \theta_f$, in m

Where the influence areas of two sequential cars in an accordion style of derailment overlap, the wall must be designed for the simultaneous impact of both cars.

- Regardless of the method selected, the following guidelines must be followed:
    - The minimum thickness for walls up to 25 feet (7.6 m) from the centerline of track shall be 2'-6" (.760 m); minimum thickness for walls farther than 25 feet (7.6 m) from the centerline of track shall be 18 inches (.45 m).
    - Crash walls less than 12 feet (3.6 m) from the centerline of track shall be a minimum of 12 feet (3.6 m) above the top of rail. Crash walls between 12 feet (3.6 m) and 25 feet (7.6 m) from the centerline of track shall be a minimum of 7 feet (2.135 m) *above the top of rail*. Crash walls greater than 25 feet (7.6 m) from the centerline of track shall be a minimum of 7 feet (2.135 m) *above the adjacent groundline*.
    - The face of the crash wall shall be smooth and continuous, and shall extend a minimum of 6 inches (0.15 m) beyond the face of the structure (such as a building column or bridge pier) parallel to the track.
    - The design must incorporate horizontal and vertical continuity to distribute the loads from the derailed train.
    - The wall must be of solid, heavy construction, and separate precast blocks or stones will not be permitted.

4. Drawings - (2 hard copies as well as .pdf format)

- Site plan clearly showing property line, location of wall structure, centerline and elevation of nearest rail track,
- Layout and structural details of proposed structure, including all material notes and specs and construction procedures/phasing. All drawings signed and sealed by a professional engineer registered in the province having jurisdiction at the project location.
- Extent and treatment of any temporary excavations on railway property.

5. Cheque

- A cheque payable to AECOM will be required for the cost of this review. Please contact AECOM for current pricing. Cost will take into consideration number of submissions, site visits, meetings, and alternative or unusually complex designs.

6. Post-Construction Certificate - (1 copy)

- Engineer's certificate of completion describing actual construction, and certifying that the structure was built as per approved drawings,
- Copy of as-built drawings, as part of the engineer's certification of completion.

## Access to Railway Operating Rights-of-Way

Permits **MUST** be obtained before entering into any Railway Operating right-of-way.

Some or all of the following may also be required: - proper railway flagging protection, cable locates, liability insurance, release of liability, safety training.

AECOM Canada Ltd. will provide guidance as to the proper process to be followed in this regard. Fees will be established based on the nature and extent of the work being proposed.

## Communication for Submissions

All correspondence during the review process should be directed to AECOM Canada Ltd.

Upon completion of our review, a confidential report on our findings will be made to the railway company, who will subsequently contact the applicant.

The applicant will be notified when the report has been submitted to the railway.

## Liability and Responsibility

The review will be undertaken with the understanding that neither the railway nor AECOM Canada Ltd. shall have any responsibility nor liability whatsoever for the design or adequacy of the crash wall, notwithstanding that any plans or specifications may have been reviewed by the railway nor AECOM Canada Ltd. No such review shall be deemed to limit the applicant's full responsibility for the design and construction adequacy of the works.

AECOM Canada Ltd.

Mississauga, Ont.

July 2005 Revised July 29, 2014

# Appendix B – Metrolinx Shoring Monitoring Alert Level Exceedance Protocol/Procedure

1. For any project that entails excavation or shoring work adjacent to a Metrolinx rail corridor, the proponent shall be furnished with a list of all parties (the "Parties to be Notified") to be contacted should Track Monitoring Alert Levels be triggered (or any other issue(s) of concern arise) – See Notification List.

2. Upon an Alert Level exceedance at any time, the proponent shall immediately cease all work and notify the flagman (if available), followed by the interested parties via phone first, then email (See Notification List), with the Metrolinx Project Manager as the primary contact, to confirm that all associated excavation / shoring work has ceased. The Geotechnical engineer shall identify if the exceedance impacts the Track Zone of Influence.

3. WEEKEND / HOLIDAY AND OVERNIGHT / AFTER HOUR MONITORING:

   A list of "Emergency Contacts" shall be provided and included on the Notification List to provide coverage in the event that an Alert Level is triggered on a weekend, holiday or overnight / after hours (outside of typical weekday business hours of 8:00am – 5:00pm). These individuals shall ensure they are available during their assigned periods and are to be notified via the medium indicated.

   NOTE: These contacts may vary through the course of a project depending on availability. Assignment periods should be established prior to project initiation and may be revisited at regular intervals (including as a holiday period approaches, for example) as the project proceeds. Individuals must report if they will be unavailable during their assigned period so that alternate contacts can be assigned.

4. EXCEEDANCE IMPACTS TRACK ZONE OF INFLUENCE:

   a. All work shall cease, and the Metrolinx PM and Track COE shall meet immediately to discuss and determine if a call regarding the incident into the Network Operations Centre "NOC" is required. NOC Procedure to be followed.

      - Dependent on the emergency as determined above, the Director of Asset Management Track and Director Maintenance Delivery of Track will be notified, if required, to take out emergency protection in the event of the track being compromised.

      - Additionally, should Tracks need to be shut down a DCN / Safety Alert will be distributed by the NOC and an Operations Situational Assessment Call will be scheduled as per the emergency broadcast.

   b. The proponent shall arrange for immediate repairs to track, to undertake all necessary emergency work at their sole cost, in order to secure an "In-service Certificate" for the track(s) in question.

      Should for any reason the associated remedies require work to be completed by Metrolinx and / or its contractors, all such cost for said remedies shall be borne by the proponent /

developer. Any emergency access and flagging / protection will be determined through the Action Plan and arranged accordingly on an emergency basis, where required.

c. In addition to any emergency work above, the proponent shall provide as soon as possible, but no later than 24 hours, a Geotechnical Engineer's report, which shall address, but will not be limited to, the following minimum requirements:

    i. Visual and Site Conditions documentation (including photographs as appropriate) in particular, noting any stability concerns including:

        a) Track / Site Settlement
        b) Distress
        c) Ground surface deformation

    ii. Rationale and Root Cause of the emergency.

    iii. Conclusion from Geotechnical Engineer as to Root Cause and confirmation of appropriate Action Plan to address outstanding concerns.

d. Upon receipt of the Geotechnical Engineers Report and Action Plan, Metrolinx Stakeholders and the Metrolinx Technical Advisor, shall have 24 hours to review and comment on the Geotechnical Report and Action Plan.

e. Concurrent to this review, the Metrolinx Project Manager shall schedule a meeting, including the proponent, Metrolinx stakeholders and the Metrolinx Technical Advisor, to review the Geotechnical Report, Action Plan, and any corresponding comments, within two (2) days from receipt of Geotechnical Report (i.e., within 24 hours following issuance of the Metrolinx Technical Advisor comments).

    The intent of the meeting shall be to confirm steps required to address the prevailing issues of concern related to the subject excavation / shoring works.

f. Based on the outcome of the consensus meeting, the Metrolinx Project Manager shall issue meeting minutes documenting the confirmed Action Plan as approved by Metrolinx Stakeholders and Metrolinx Technical Advisor, for which the proponent shall at their cost, take the necessary action as deemed appropriate to address any remaining issues of concern.

    Bi-weekly meetings shall be scheduled going forward to ensure compliance with the action plan and to review reports, as required.

g. Work cannot resume until such time as Track COE have performed a track inspection and authorized the resumption of work via Action Plan.

5. EXCEEDANCE DOES NOT IMPACT TRACK ZONE OF INFLUENCE:

    a. The Metrolinx Project Manager shall confirm receipt of exceedance notice and cessation of work by phone first, then email and shall advise proponent of requirements for a Geotechnical Engineer's report and Action Plan per item 4 below.

For weekend / holiday or overnight / after hours notice requirements see Section 3 above.

b. For work to resume where there is no impact to the Track Zone of Influence, the proponent shall provide as soon as possible, but no later than 24 hours from receipt of the Metrolinx Confirmation email, - a Geotechnical Engineer's report.

   The Geotechnical Engineer's report shall address, but will not be limited to, the following minimum requirements:

   i. Visual and Site Conditions documentation (including photographs as appropriate) in particular, noting any stability concerns including:

      a) Track / Site Settlement
      b) Distress
      c) Ground surface deformation

   ii. Rationale and Root Cause for the Alert Level notification.

   iii. Conclusion from Geotechnical Engineer as to Root Cause and confirmation of appropriate Action Plan to address outstanding concerns.

c. Upon receipt of the Geotechnical Engineers Report and Action Plan, the Metrolinx Technical Advisor and Internal MX Stakeholders shall have 24 hours to review and comment on the Geotechnical Report and Action Plan.

d. Concurrent to this review, the Metrolinx Project Manager shall schedule a meeting, including the proponent, Metrolinx Stakeholders and the Metrolinx Technical Advisor, to review the Geotechnical Report, Action Plan, and any corresponding comments, within two (2) days from receipt of Geotechnical Report (i.e., within 24 hours following issuance of the Metrolinx Technical Advisor comments).

   The intent of the meeting shall be to confirm steps required to address the prevailing issues of concern related to the subject excavation / shoring works.

e. Based on the outcome of the consensus meeting, the Metrolinx Project Manager shall issue meeting minutes documenting the confirmed Action Plan and steps towards resumption of work, as approved by Metrolinx Stakeholders and Metrolinx Technical Advisor.

   The proponent shall take the necessary action as deemed appropriate, at their cost, in order to address the prevailing issue(s) of concern such that the Alert Level is ceased and there is no further risk to the rail corridor at which time work may resume. Where required, a final inspection will be performed by AECOM and any necessary MX Stakeholders prior to resumption of work.

   Bi-weekly meetings shall be scheduled going forward to ensure compliance with the action plan and to review reports, as required.

*NOTE:*
*Should for any reason the associated remedies require work to be completed by Metrolinx and / or its contractors, all such cost for said remedies shall be borne by the proponent / developer. Any emergency access and flagging / protection will be determined through the Action Plan and arranged accordingly on an emergency basis, where required.*

Monitoring Report Notification List and Emergency Contacts

All Monitoring Reports will be submitted within 24 hours of observations to the following individuals along with a Synopsis of Observations (See Sample Below):

For weekend / holiday or overnight / after hours notice requirements see Section 3 above.

| Parties to be Notified: | Attention To: | Email / Phone for Monitoring Submissions and Alert Exceedance within Working Hours | Emergency Contact (Weekend / Holiday & Overnight / After Hours) |
|---|---|---|---|
| Third Party Project Review (TPPR) | Select Staff Person | Select Contact Information | Direct to NOC |
| | Adam Snow | Adam.snow@metrolinx.com<br>(416) 528-4864 | |
| | Alvin Chan | Alvin.chan@metroinx.com<br>(437) 324-2112 | |
| | | Enforcement Officer | |
| AECOM | Rab Nawaz | Rab.Nawaz@aecom.com | - |
| | Mustafa Alkiki | Mustafa.Alkiki@aecom.com | - |
| | Haider Jafar | Haider.jafar@aecom.com<br>(647) 234-2034 | Email and Call |
| | Manan Raval | Manan.Raval@aecom.com<br>(647) 339 0215 | Email and Call |
| *Bridges and Structures *(General Email TBD – Q1 2023)* | Input B&S Specialist Name | Input B&S Specialist Contact Info | TBD |
| | Jessie Li | Jessie.li@metrolinx.com | |
| Track COE | General Email | track.coe.dept@gotransit.com | Email |
| | Weekend On-Call # | (416) 202-7823 | Call |
| | Mark Austin | (416) 529- 0804 (Emergencies) | Call |
| Third Party Capital Infrastructure Coordination (CIC) | Input CIC PM Name | Input CIC PM Contact Info | Direct to NOC |
| | Syed Quli | syed.quli@metrolinx.com<br>(647) 449-4655 | Direct to NOC |

**Sample Synopsis of Observations:**

Sample Synopsis.xlsx

## Document Revision History

| Version # | Date | Revised By | Description |
|---|---|---|---|
| 1.0 | 10 January 2013 | Jeff Bateman | Final |
| 2.0 | 01 April 2013 | Jeff Bateman | Updated - new corridor purchase |
| 3.0 | 22 April 2013 | Adam Snow | Content revisions |
| 4.0 | December 2022 | Adam Snow | Comprehensive Update |
| 5.0 | February 2024 | Adam Snow | Shoring Monitoring Update |

## Document Details

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**END OF DOCUMENT**