ENTUITIVE

30 QUEEN ST. EAST
RAIL SAFETY REPORT
FEBRUARY 2022

For Edenshaw Queen Developments Limited

Authored by:

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Our Project Number:

EN021.02336

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2022/02/03
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PROVINCE OF ONTARIO

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INTRODUCTION

Entuitive was retained by Edenshaw Queen Developments Limited to review the site-specific safety of the development being proposed. The site is located west of Hurontario (west of the proposed LRT station) on the north side of Park Street East, east of Ann Street. Directly to the north of the site is the Metrolinx rail corridor.

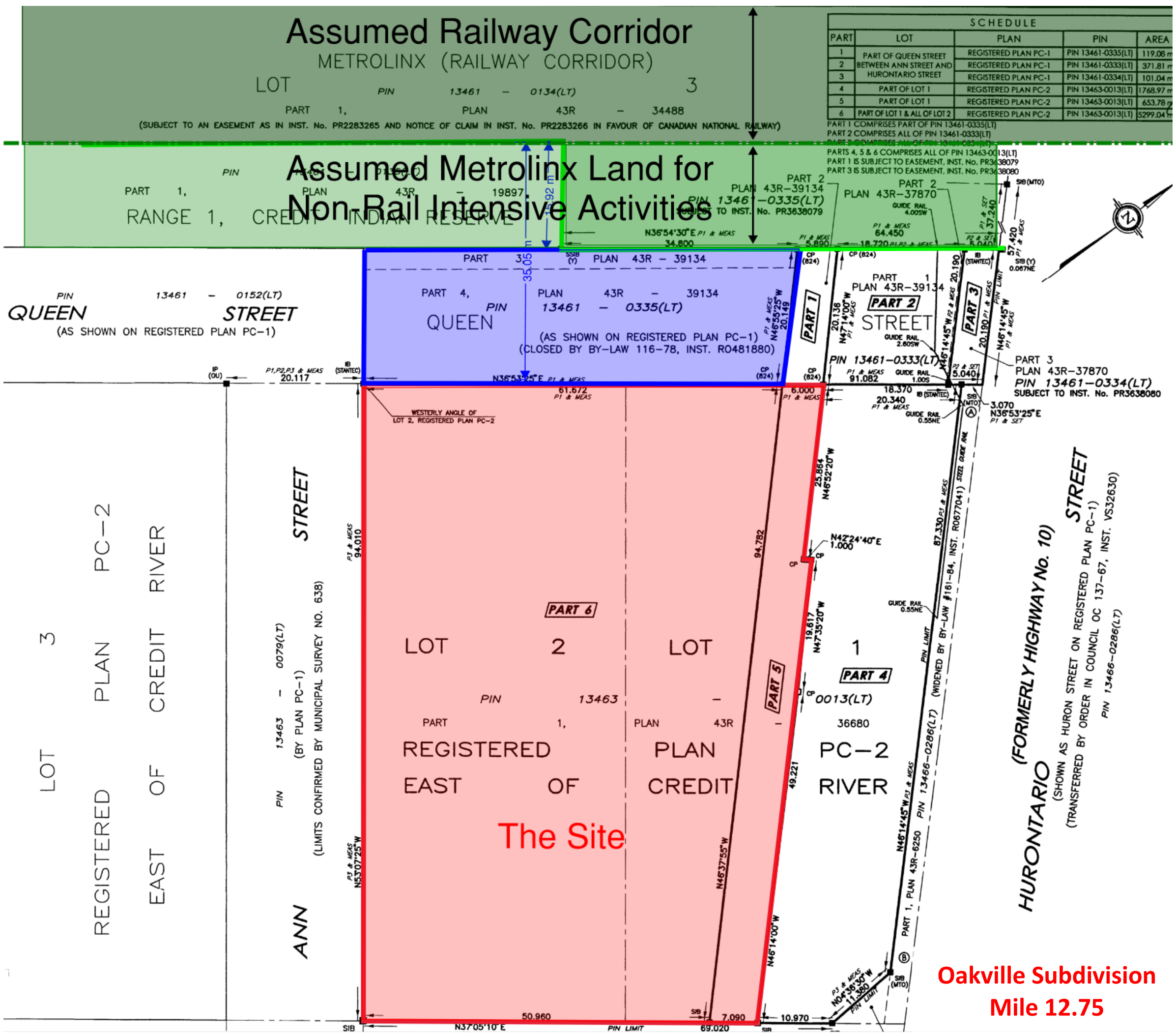
This rail safety report reviews the site-specific safety risks for the development associated with the nearby rail corridor along with mitigating measures. The report is limited to the safety aspects associated with the proximity of the development to rail activity and does not address ground-borne and/or airborne vibration and groundwater which are all dealt with separately.

Focus Area

SITE

The site of the proposed development lies immediately south of the Port Credit GO Station and west of the proposed LRT station. The development is planned to include two towers (Tower A 40 storeys and Tower B 42 storeys). The development has a planned total gross constructed area of approximately 1,138,000sft of mixed-use primarily residential occupancy (1139 units).

The site location is shown in the figure below. To the north of the proposed site is Metrolinx Land. We have assumed that the rail corridor is limited to the dark green and the light green area is owned by Metrolinx and will be used for activities other than rail. There is approximately 20m between the site property line and Metrolinx property line.



Site Plan

Relationship to the Rail

The site is located adjacent to a Class A track. There are no rail yards within 300m of the property. All rail information is shown in Appendix A.

Rail	
Rail Corridor	Oakville Subdivision
Classification	Principal Main Line
Mileage at Site Location	12.75
No of Tracks	3 mainline tracks all continuous welded
Speed	Max Passenger: 95mph at site Max Freight: 60mph at site
Alignment	Straight in the immediate vicinity
Elevation	Negligible difference between rail and site
Proposed Development	- Mixed-use with majority residential - Direct adjacency between site and rail corridor - Port Credit GO Station immediately west

Safety Record of Rail Corridor:

Based on data published by the Transportation Safety Board of Canada between the years of 2011-2021 and mileage 2.75-22.75 the frequency of derailment across Canada is as follows:

Period Start		2011
Period End		2021
Total Number of Events		10
Total Number of Incidents		2
Total Number of Accidents		8
Breakdown:		
	TRESPASSER	7
	CROSSING	0
	MAIN-TRACK TRAIN DERAILMENT	0
	MOVEMENT EXCEEDS LIMITS OF AUTHORITY	2
	MAIN-TRACK TRAIN COLLISION	0
	COLLISION INVOLVING TRACK UNIT	0
	ROLLING STOCK COLLISION WITH OBJECT	0
	ROLLING STOCK DAMAGE WITHOUT DERAILMENT/COLLISION	1
	FIRE	0
	UNCONTROLLED MOVEMENT OF ROLLING STOCK	0

Metrolinx has no recorded derailment accident or incident since its inception. It has reported three collisions with pedestrians at a crossing, with two located outside the Greater Toronto Area (GTA).

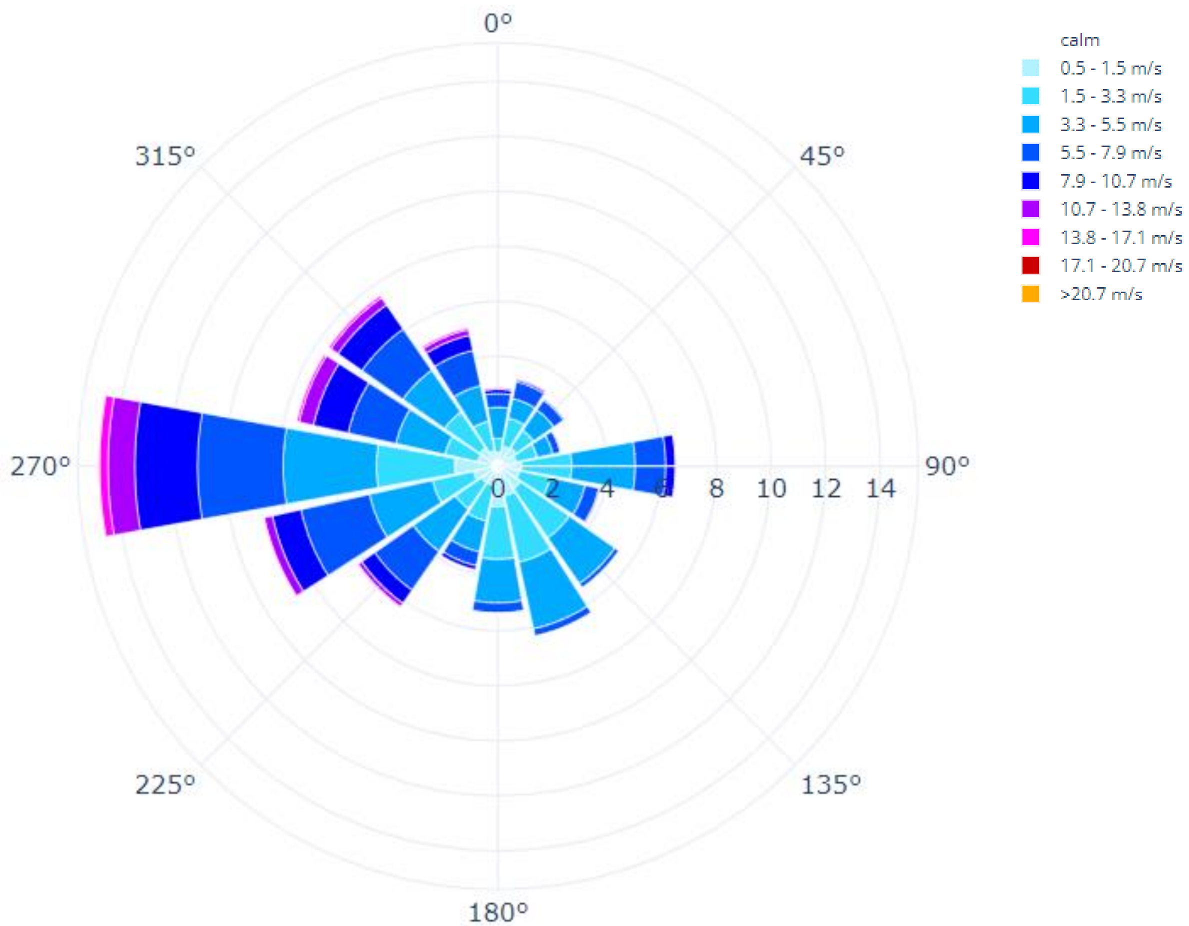
All the above mainline derailments in the GTA were contained within the railway corridor and resulted in no damage to adjacent infrastructure or buildings.

Electrification

The long-term plan for Metrolinx is to install positive train control to the GO network to have automatic speed/stop control depending on the track conditions ahead of the train. This would reduce the risks associated with excess speed and collisions.

Weather

Based on the Wind Rose diagram for the years 2004-2018 shown below, the site location has experiences winds generally from the west to the east direction. The data shown below was collected at Toronto Pearson Airport.



Wind Rose Diagram for Site Location

FCM/ RAC PROXIMITY BASELINE REQUIREMENTS

New developments along the rail corridor should be designed and built to provide reasonable protection to the development against rail activities and accidents. The FCM (Federation of Canadian Municipalities)/ RAC (Railway Association of Canada) guidelines set out requirements for:

- Safety: Impact from a derailed train, fire, projectile elements, smoke
- Comfort: Noise and Vibration

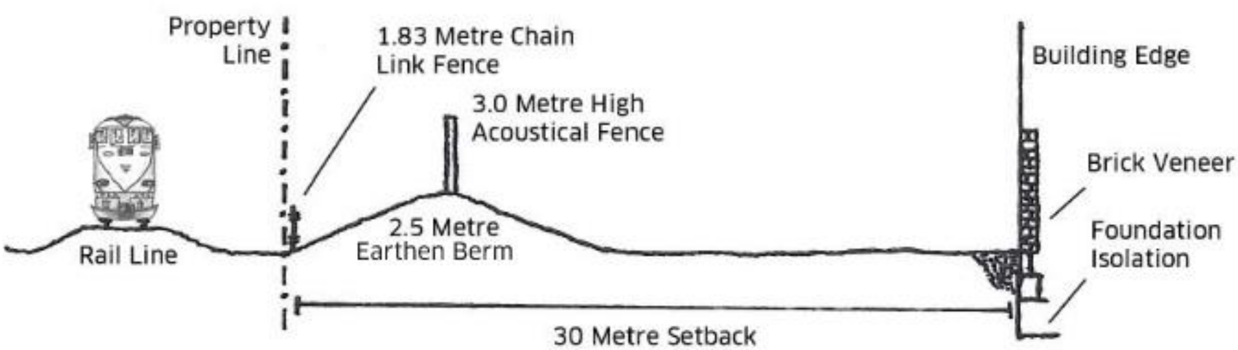
This report deals primarily with Safety Issues.

The FCM guidelines recommend the following setbacks:

Classification of line	Setback	Berm Height	Berm Slope
Freight Rail Yard	300m		
Principal Main Line	30m	2.5m	<= 2.5:1
Secondary Main Line	30m	2.0m	<= 2.5:1
Principal Branch Line	15m	2.0m	<= 2.5:1
Secondary Branch Line	15m	2.0m	<= 2.5:1
Spur Line	15m	0	

"Setback distances must be measured from the mutual property line to the building face. This will ensure that the entire railway right-of-way is protected for potential rail expansion in the future."

In addition to the horizontal setback, the FCM guidelines recommend a 2.5m high berm and a 1.85m (6'-0") high chain link fence to reduce the threat of trespassing accidents.



FCM Baseline Guideline

The guideline indicates that "Appropriate uses within the setback area include public and private roads; parkland and other outdoor recreational space including backyards, swimming pools, and tennis courts; unenclosed gazebos; garages and other parking structures; and storage sheds."

Chain Link Fence:

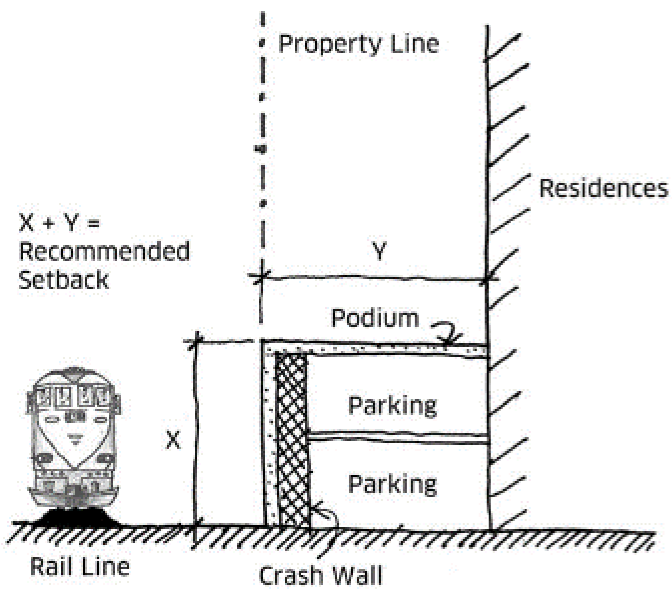
To mitigate against the threat of trespasser incidents on the rail corridor the FCM guidelines recommend a 2.43m (8'-0") high chain-link fence along the mutual property line entirely on the private side of the property line running continuously for the full width of the property. Note that Metrolinx has enhanced requirements for non-cut and non-climb anti-trespassing fence.

Crash Wall to Protect Development

The FCM guidelines note that the "Horizontal setback requirements may be substantially reduced with the construction of a crash wall". So, if the site-specific conditions do not allow for both a 30m setback and 2.5m high berm adjacent to a principal mainline the development can be protected instead by a robust crash wall.

As the proposed site is adjacent to a principal mainline the required setback would be 30m and the existing setback does not meet this requirement. Discounting an existing ditch on the rail corridor lands there is no possibility for a berm due to the proximity of the site location.

With a crash wall "the setback distance may be measured as a combination of horizontal and vertical distances, as long as the horizontal and vertical value add up to the recommended setback" FCM Guideline



Crash Wall Requirements:

Crash walls are robust concrete structures designed to provide similar energy absorption capacities as the standard berm. The wall is to be designed to the standards established by AECOM looking at 4 derailment scenarios. Freight train glancing blow (multiple car impact at deflection angle), Freight train Direct Impact (a single or pair of cars impacting the wall directly due to an accordion-type of derailment), Passenger train glancing blow and Passenger train direct impact.

In addition to being designed for the derailment scenarios set out above the crash wall shall have the following characteristics:

- Thickness of
  - 760mm if the wall is less than 7.6m from the centreline of the closest track
  - 450mm if the wall is greater than or equal to 7.6m from the centreline of the track.
- Height of:
  - 3.6m from top of rail if the wall is less than 3.6m from the centreline of track
  - 2.135m from top of rail if the wall is greater than or equal to 3.6m and less than 7.6m from the track
  - 2.135m from top of grade if the wall is greater than or equal to 7.6m from the centreline of rail
- The face of the crash wall shall be smooth and continuous and shall extend a minimum of 150mm beyond the face of the structure (such as a building column or bridge pier) parallel to the track
- Construction shall be solid and heavy, with separate precast blocks or stones not acceptable.

Importantly there is a reasonableness criterion in the FCM suggesting that the risk-mitigating measures need not be disproportional to the development. The 3rd Principle for mitigation design is “All mitigation measures should be designed to the highest possible urban design standards. Mitigation solutions, as developed through the Development Viability Assessment process, should not create an onerous, highly engineered condition that overwhelms the aesthetic quality of an environment.”

ANALYSIS: ENERGY BALANCE METHOD

As per the AECOM guidelines an energy balance was performed to study the travelling length in case of derailment there are four loading cases as shown below:

1. Freight Train Load Case #1: derailment of nine freight train cars. For clear distances between the centerline of track equal to or greater than 2.6m for tangent tracks the impact angle can be taken as 3.5 degrees, which is the case for the site.

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

2. Freight Single Car Load Case #2: assuming only one car is derailed weighing 129,700 kg.

   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 defined in [9]:

   $$\theta_f = \operatorname{asin}\left(\frac{d_{CL}}{8.5}\right) \qquad \text{(metric)}$$

   Where d_{CL} is in feet (m). Where d_{CL} is greater than 28 feet (8.5 m), this load case need not be considered.

   This loading case assumes a single car will be rotating around its center and should the clear distance d_{CL} exceed 8.5m then there is no need to include this loading case as the train car will not make contact with the safety barrier in this derailment scenario

3. GO-train Load Case #3: derailment of one locomotive weighing 133,740 kg and seven bilevel coaches weighing 79,510 each.

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

   The AECOM guideline assumes eight cars; however, we have assumed seven passenger cars and one MP40 Locomotive to be conservative.

4. GO-train Single Car Load Case #4: assuming one fully loaded bilevel coach is derailed weighing 79,510 kg.

   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 defined in [10]:

   Where d_{CL} is in feet (m). Where d_{CL} is greater than 42'-6" (13 m), this load case need not be considered.

Similarly, this load case assumes a single car rotates around its center and should the clear distance d_{CL} exceed 13m then there is no need to include this loading case as the train car will not make contact with the safety barrier in this derailment scenario.

The angle of impact can be calculated as shown:

$$\theta_f = \text{asin}\left(\frac{d_{CL}}{13.0}\right) \qquad \text{(metric)}$$

Where d_{CL} is in feet (m). Where d_{CL} is greater than 42'-6" (13 m), this load case need not be considered.

Changing the train weight due to different rail services is permissible as per the AECOM Guideline.

Where a track is designed for dedicated service by a particular train consist, variations to the design trains may be permitted by the Railway.

The speed after derailment for glancing blow load cases can be calculated as shown:

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

Where d_{CL} is the distance from the crash wall to the centerline of track in feet (m).
v_o is the track speed in ft/s (m/s)
a is the acceleration in ft/s², calculated as $-32(.25 + G)$
(in metric, acceleration is in m/s², calculated as $-9.8(.25 + G)$)
θ_G is the angle of impact defined in [4] or [5]
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 $\frac{\text{Groundline at wall} - \text{Base of Rail}}{d_{CL}/\sin\theta_G}$.

G can be taken at zero as the tracks and property are along the same elevation.

obtained from the above equation with $R = 0.25$. The grade, G, can be generally taken as zero, as the short distances involved and the common presence of a ditch along the tracks will minimize the effect of this factor.

The design force for the glancing blow load cases is:

$$F_G = \frac{\frac{1}{2}m(v_G \sin\theta_G)^2}{d_G} \qquad \text{(metric)}$$

Where m is the mass of the derailed cars in lbm (kg).
v_G is the impact speed in ft/s (m/s), defined in [3]
θ_G is the angle of impact defined in [4] or [5]
d_G is the deformation of the consist in the direction of the applied force, and $d_G = 10\sin\theta_G$, in feet ($d_G = 3.048\sin\theta_G$, in m)

Results of the Energy Balance Method Evaluation of Derailment Scenarios:

The table below shows, for each of the derailment scenarios set out in the guidelines, the maximum distance from the centreline of track where derailed passenger trains running at a speed of 95mph and a derailed freight train running at a speed of 60mph comes to an at-rest state:

Scenario	Max distance perpendicular to the track at which the train comes to rest
1. Freight Train Multi-Car Glancing Blow	< 11m
2. Freight Train Single Car Direct Impact	< 8.5m
3. Passenger Train Multi-Car Glancing Blow	< 25m
4. Passenger Train Single Car Direct Impact	< 13m

Due to the distance of the site relative to the Metrolinx property line, none of the derailment scenarios would impact the crash wall.

The governing impact force was used in the design of the crash wall and based on AECOM design guidelines, equation 6 the impact force was applied over 3.1m horizontal length as shown below:

3.1.3 Length of action of impact force

The length of wall, l_G, along which the impact force should act was calculated from the length of deformation specified by the 2011 AECOM guidelines and the angle of impact as shown in Figure 4:

$$l_G = \frac{10}{\cos\theta_G} \quad [6]$$

$$l_G = \frac{3.048}{\cos\theta_G} \quad [6M]$$

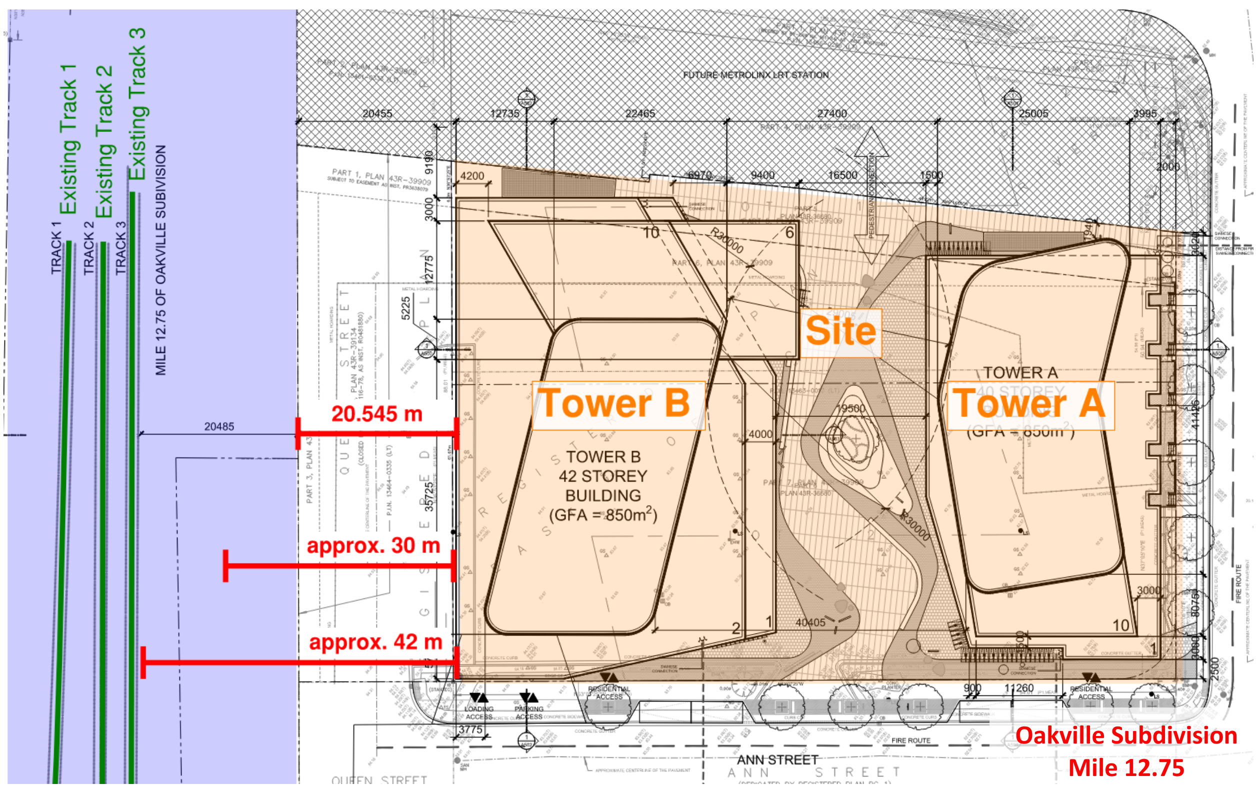
where l_G is in feet (m). For an angle of 3.5 degrees, the length along which the force acts is 10 feet (3.1 m). Due to the forward momentum of the train, it is likely that the length of impact along the wall is still being conservatively estimated.

EVALUATION AND MITIGATING MEASURES

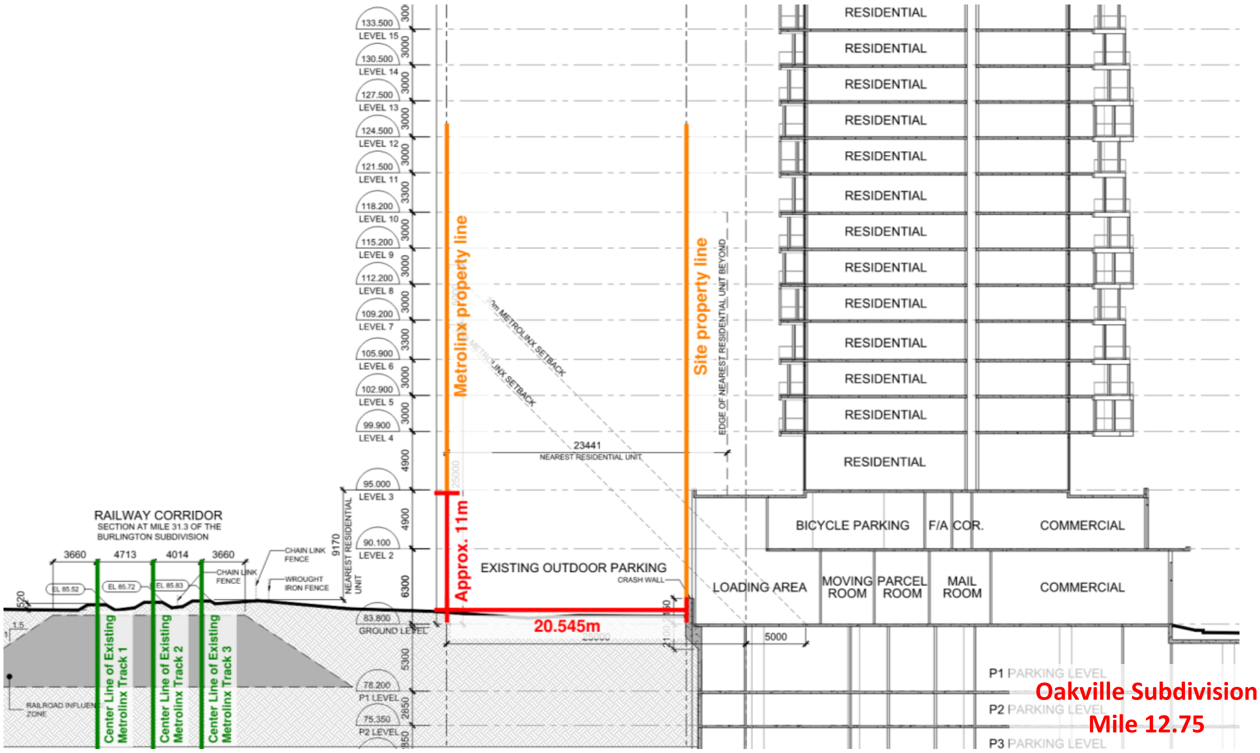
Setbacks

The setbacks for this site have been measured and are shown in the table and images below:

Setback	Distance
Horizontal setback to closest existing track	Approx. 42m
Horizontal setback to rail corridor	Approx. 30m
Horizontal setback to Metrolinx Land	20.545m
Vertical setback to closest residential unit	Approx. 11m
Combined horizontal and vertical setback from closest residential unit to closest existing track	Approx. 53m
Combined horizontal and vertical setback from closest residential unit to rail corridor	Approx. 41m
Combined horizontal and vertical setback from closest residential unit to Metrolinx Land	Approx. 31.545m



Site Plan



Section at Tower B

The towers' residential floors meet the minimum setback requirement of 30m from the rail corridor. This meets the recommendations of the FCM/RAC (2013) guidelines for setbacks. However, the distance from the Metrolinx corridor to the site property line is less than 30m, and this site does not have enough space available for a berm, a crash wall is recommended to be constructed along the north property line of the site.

By analysing the current Metrolinx track locations and the four derailment scenarios, a train derailment would be mitigated by a crash wall. In future scenarios, if Metrolinx were to build an additional track within the rail corridor, the distance from the site to the rail corridor is approximately 30m which means the site would continue to be protected from a train derailment with a crash wall. Even in the extremely conservative scenario where a future track is placed at 4m from the Metrolinx property line (assuming that the GO Station is demolished and the grade separation at Hurontario and the adjacent rail corridor is expanded) the passenger train multicar derailment scenario (AECOM scenario 3) comes to a rest at the wall and would not ingress into the site.

Crash wall

It is our recommendation, that a crash wall be constructed along the north property line of the development site meeting the FCM guidelines and the AECOM design procedures for the 4 scenarios of derailment of trains from the rail corridor. The crash wall in combination with the setback distance from the rail corridor provides a reasonable solution to mitigating the risks associated with the development's proximity to the rail corridor.

Since the wall will be greater than or equal to 7.6m from the centreline of rail, and the use of double-decker cars on the tracks, we recommend a crash wall with the following requirements:

- Height of 2.135m above grade, which exceeds the minimum requirements of the FCM/AECOM guidelines,
- The wall shall be a minimum of 450mm thick and be smooth and continuous,
- The applied impact load resulting from derailment will be at 1.8m from the top of rail, as per AECOM design guidelines,
- The wall shall be designed to incorporate both horizontal and vertical continuity reinforcement to distribute the impact loads of a derailed train.

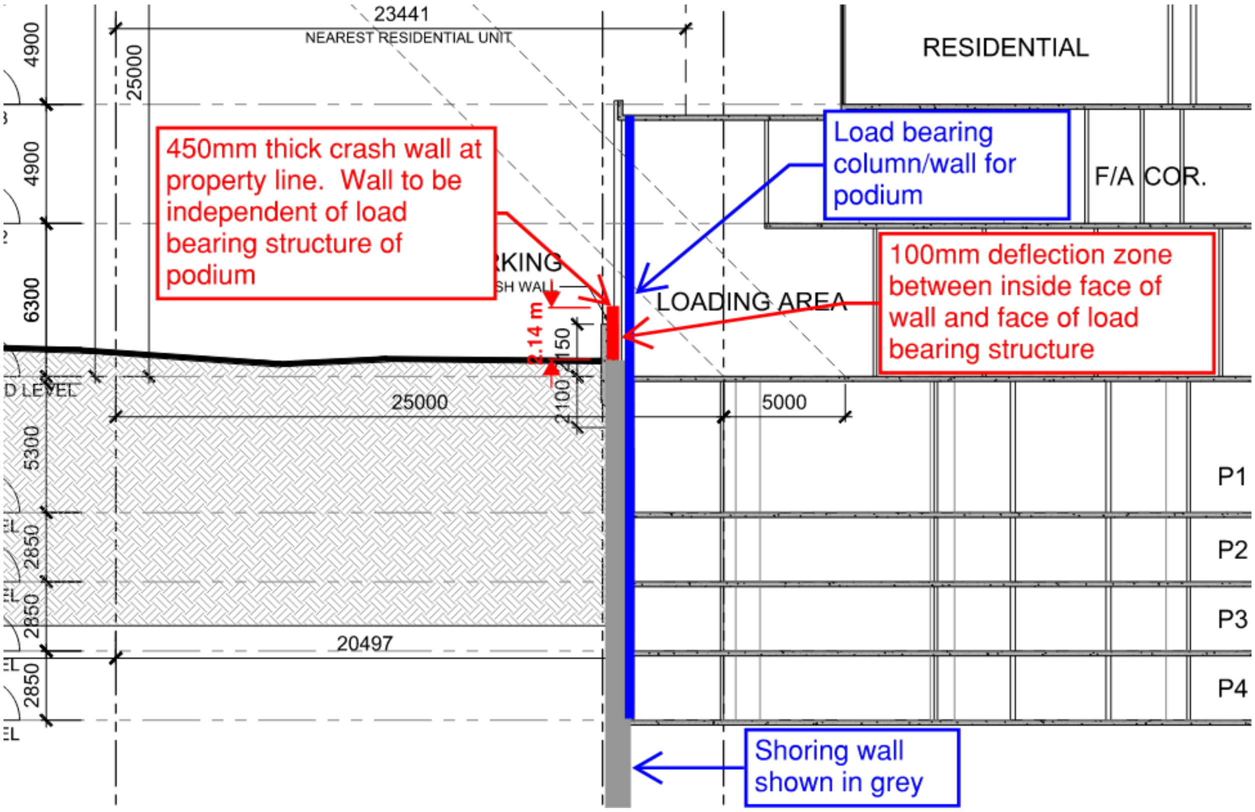
Structure Supporting the Building:

The crash wall makes up the north wall of the loading bay. No floor area of the loading bay is supported by the crash wall, having independent columns inboard of the wall for support. The crash wall is integrated and located on top of the building foundation wall. The crash wall is designed to be dependent on the building foundation wall, but the foundation wall is NOT dependent on the crash wall. Should the crash wall be removed or destroyed the structural integrity of the foundation wall and the building superstructure shall not be compromised. The foundation wall shall be designed locally for the capacity of the crash wall (i.e., in an extreme ULS condition, a hinge would form at the base of the wall and not in the building basement or superstructure).

Similarly, the wall is propped by the concrete slabs of the podium which have been designed to safely accommodate these propping loads. In the event of a train impact, the floor slabs provide horizontal support to the crash wall. The crash wall is dependent on the floor slabs for horizontal support, but the slabs are NOT dependent on the crash wall. Should the crash wall be removed or destroyed the structural integrity of the foundation wall and the building superstructure shall not be compromised.

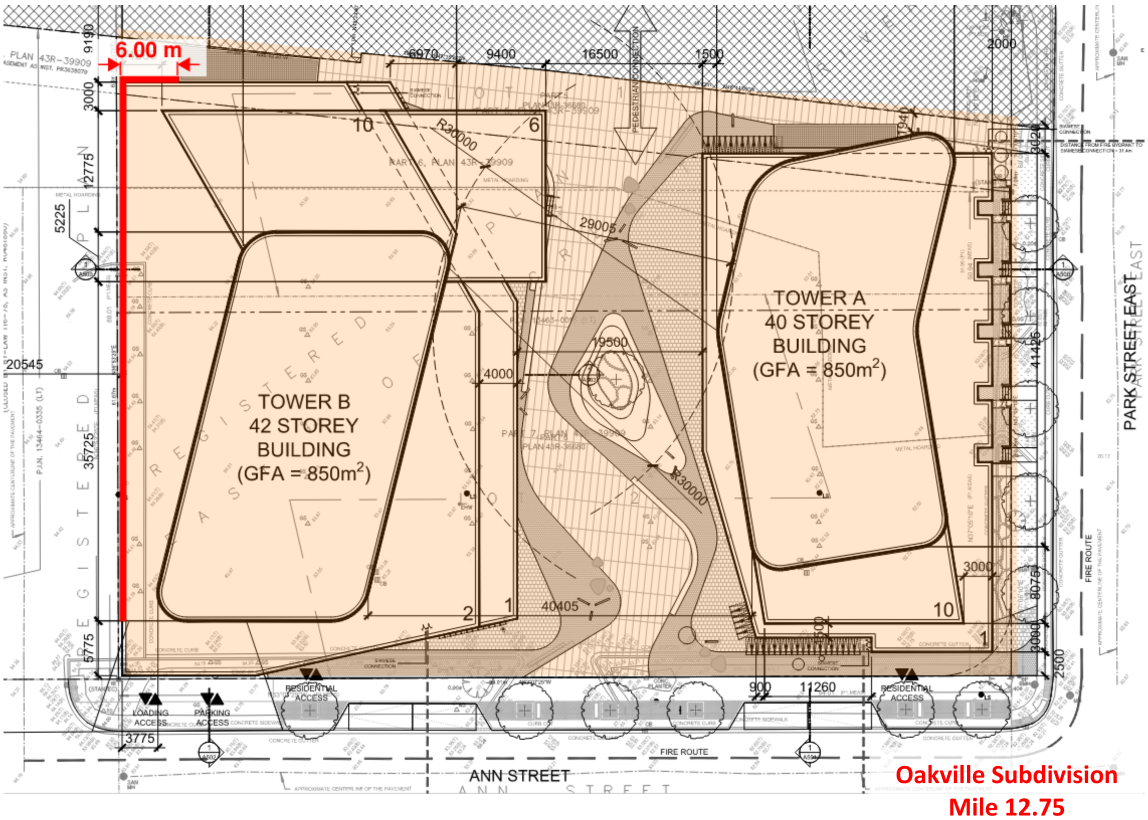
The structural elements supporting the building (columns and walls) should be sufficiently set back from the inside face of the crash wall to avoid contact between the wall deflected under impact loading and the elements supporting the building. Such a setback ensures that in the event of train impact the crash wall can be deflected without compromising the structural integrity of the building structure.

An example of the suggested crash wall is shown below:



Crash wall Extent:

The crash wall runs the entire length of the north face of Tower B. The crash wall shall have a 6m return at the east end of the loading bay; the west end will remain open for vehicle use, as it is the only location available for the loading bay entrance/exit.



Debris

Based on the derailment scenarios investigated per the guidelines, the trains do not ingress into the site beyond the crash wall under the considered derailment conditions. The height of the crash wall at 2.135m above grade, reduces the risk of projectile debris entering the site to a tolerable level and mitigates the risk from low flying debris. With the provision of the setback and the crash wall extent and height, the risk of debris is sufficiently mitigated to reasonable levels.

Fire

Given the extended height of the crash wall and the low occupancy podium above and adjacent to the wall, there are no additional restrictions to the development beyond code requirements associated with the construction materials or detailing for fire.

Smoke

Due to the prevailing winds moving west to east and the site location being south of the rail corridor, we do not foresee smoke being an issue. However, given the height of the crash wall and the proximity of the loading bay to the rail corridor, we would recommend no air intakes on the north wall of the loading bay to avoid the potential ingestion of smoke or diesel exhaust into the mechanical HVAC systems serving the building.

Trespassing/fence requirements:

Adequate provisions to prevent the public from entering the rail corridor lands are recommended.

Where there is a crash wall along the property line that rises more than 2.43 above finished grade this anti-trespassing requirement is fulfilled with no additional fence element. For the extent of the property line where there is no crash wall, or in phases of construction prior to the crash wall being built, a fence meeting the following recommendations is to be provided.

Metrolinx has an enhanced Fence standard High-Security Fencing:

The height of the fence is to be 2.4m. The fence construction shall be anti-trespass and tamperproof:

a. The high-security fence height above ground shall be 2.4 m
b. The panel mesh shall consist of a minimum 4mm diameter high tensile wire, with aperture sizes (openings) 76.2 x 12.7 mm centers or smaller fastened to suitable posts that allow for a minimum foundation depth of 1200 mm
c. The fence panels shall be strengthened with factory-formed undulations within each mesh panel. Mechanical Fasteners – Shall be tamper-proof and mechanically galvanized. Fastening Hardware shall be concealed from the non-rail side of each panel and post
d. Mesh to be galvanized with an exterior finish coating capable of withstanding typical climate variances within Southern Ontario
e. Specification sheets and breach testing results for any proposed alternate products and materials shall be submitted to Metrolinx staff for approval
f. Mechanical Fasteners shall be tamperproof and factory galvanized. Fastening hardware shall be concealed from the face of each panel and post.

g. The mesh, posts, clamps and associated hardware are to be galvanized with an exterior finish coating capable of withstanding repeat climate variances within Southern Ontario
h. A list of approved High-Security fencing manufacturers include:
    a. Cochrane–ClearVu
    b. BETAFENCE- Securifor 3D
    c. CLD- Securus Profiled
    d. Bear Mountain – Bear Securi Mesh Barrier

<u>Construction</u>
With approximately 20m between the site property line and Metrolinx property line, we do not expect construction equipment or activities encroaching upon the rail corridor.

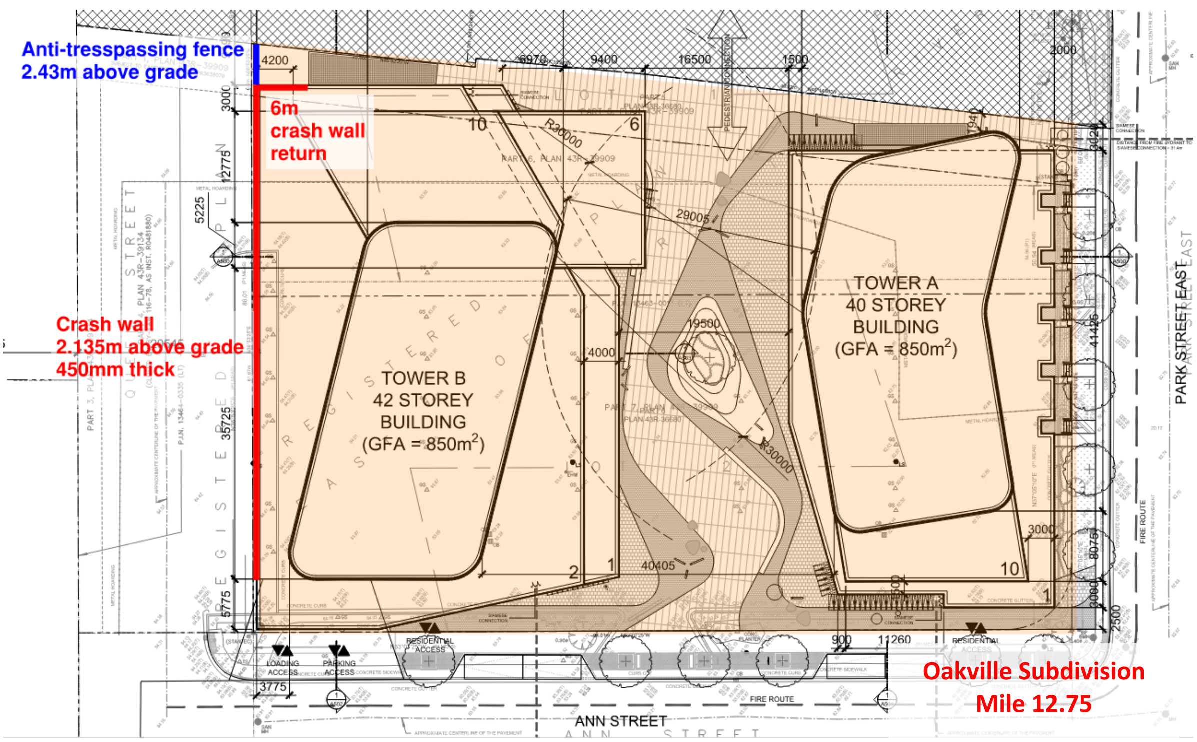
<u>Land Use Compatibility</u>
The proposed development will feature two residential towers with commercial spaces on the lower levels and a low occupancy podium with a loading bay closest to the tracks. There are no planned residential spaces on the north portion of the site. The sensitivity of the occupancy for the loading area does not represent a measurable change in sensitivity from the original occupancy parking lot. It is our opinion that the approximately 20m setback from Metrolinx property line to site property line along with the crash wall at the site boundary is compliant with the intent of FCM guidelines.

CONCLUSION

We have reviewed the site-specific safety aspects relating to the development's proximity to the existing rail corridor and believe that the measures proposed above reasonably mitigate the risks. The risk-mitigating measures include:

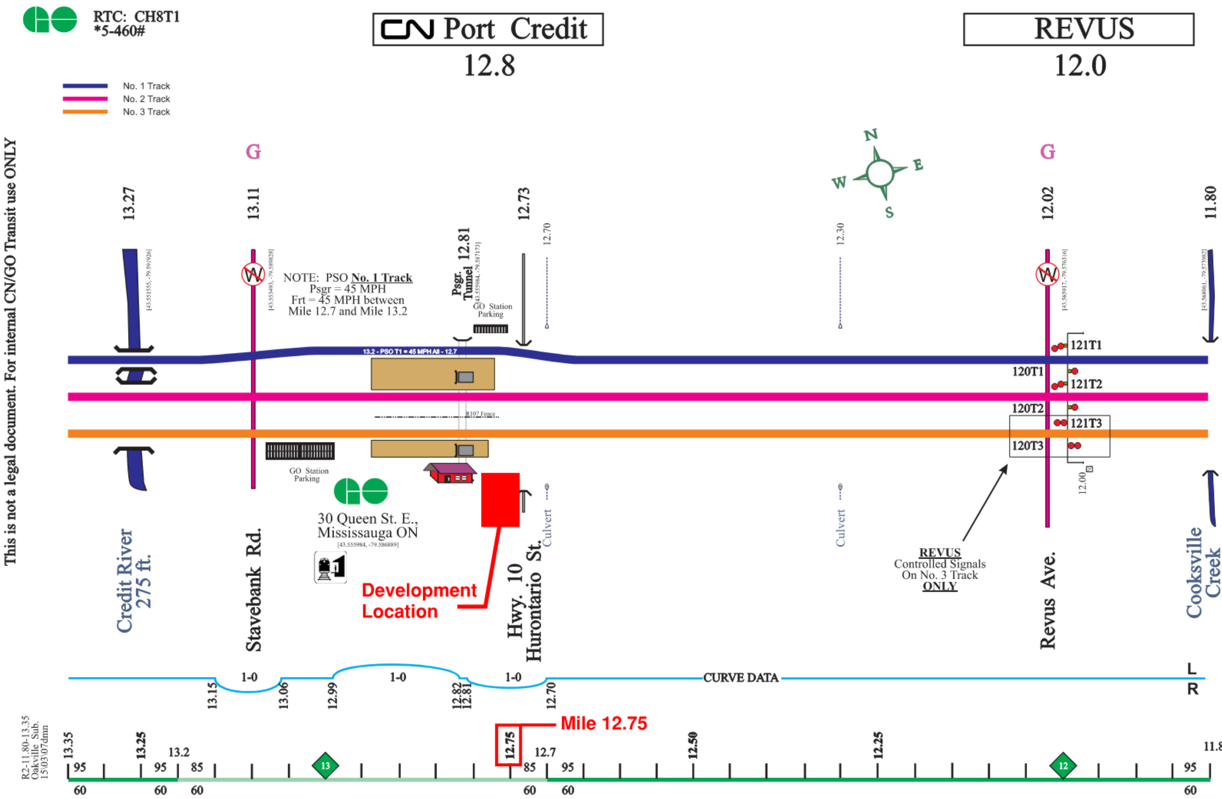
- Combined vertical and horizontal setback is 31.545m to the Metrolinx property, approximately 41m to the rail corridor and approximately 53m to the closest track.
- Crash wall with a minimum height of 2.135m above grade and a minimum thickness of 450mm per the FCM/RAC and AECOM requirements. The structural design of the crash wall and details will be completed for the detailed submission.
- The crash wall shall extend along the full length of the loading bay on the north face of the development, with a 6m return on the east end.
- While the crash wall is integrated with the loading bay's foundation wall and relies on propping from the loading bay's floor slab, the podium's structure is not structurally dependent on the wall. The podium's structural adequacy remains uncompromised if the crash wall is removed or destroyed.
- Crash wall to be built entirely on the development site.
- Anti-trespassing measures: a crash wall extending a minimum of 2.43m from the finished grade on the north side of the site property line or a fence meeting the anti-cut and anti-climb requirements from Metrolinx with a minimum height of 2.43m. The fence will also extend along the northern property line which is not occupied by the crash wall.

An example of the proposed mitigating measures is shown below:

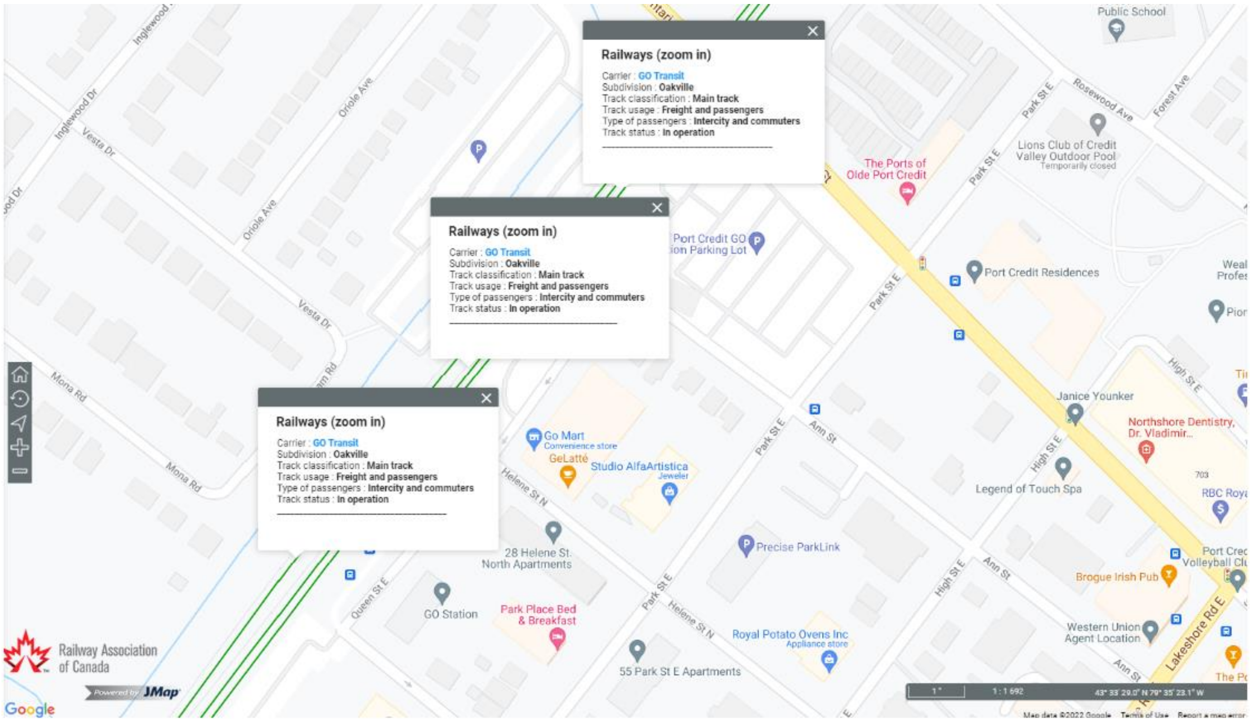


APPENDIX A: RAIL INFORMATION

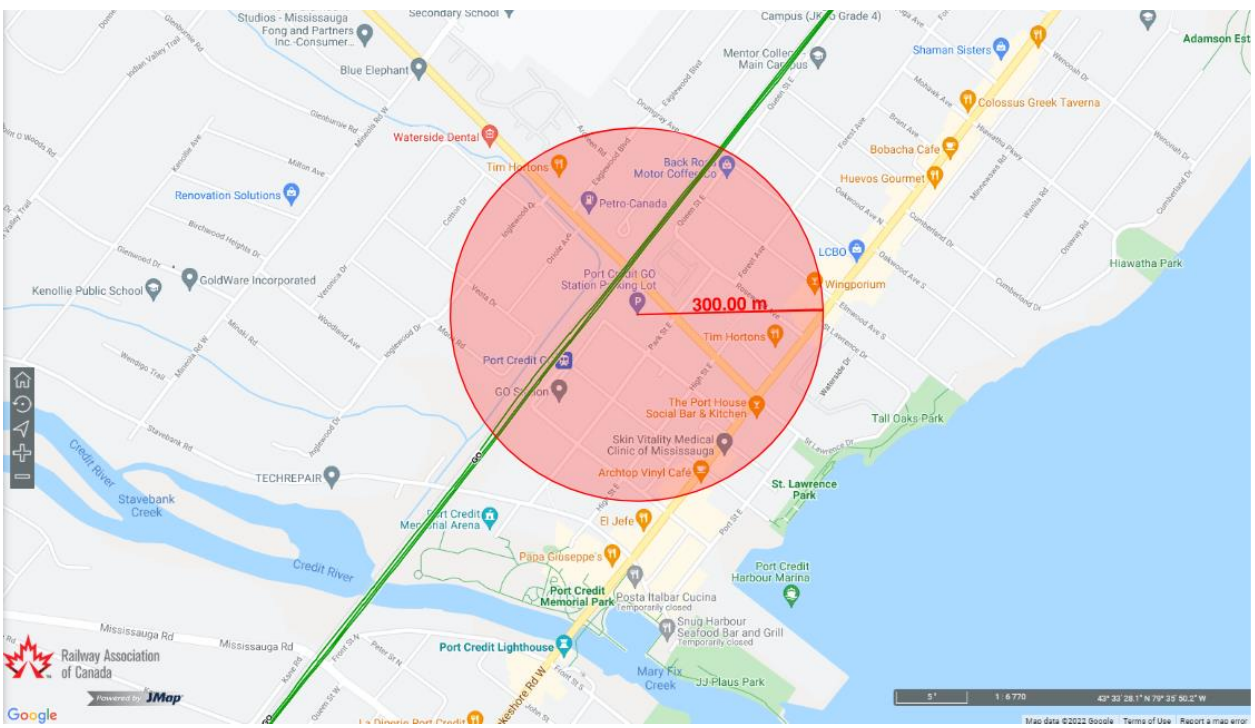
Track Diagram:



Railway Association of Canada Track Information:



No rail yards within 300m radius of site location:



APPENDIX B: CORRESPONDANCE

Received December 16, 2021

Good afternoon Julia,

Further to your request dated December 13, 2021, the subject lands (30 Queen Street East, Mississauga) are located within 300 metres of the Metrolinx Oakville Subdivision (which carries Lakeshore West GO rail service).

It's anticipated that GO rail service on this Subdivision will be comprised of diesel and electric trains. The GO rail fleet combination on this Subdivision will consist of up to 2 locomotives and 12 passenger cars. The typical GO rail weekday train volume forecast near the subject lands, including both revenue and equipment trips is in the order of 225 trains. The planned detailed trip breakdown is listed below:

	1 Diesel Locomotive	2 Diesel Locomotives	1 Electric Locomotive	2 Electric Locomotives		1 Diesel Locomotive	2 Diesel Locomotives	1 Electric Locomotive	2 Electric Locomotives
Day (0700-2300)	60	11	101	42	Night (2300-0700)	8	4	21	8

The current track design speed near the subject lands is 95 mph (153 km/h).

There are *anti-whistling by-laws* in affect at Stavebank Road and Revus Avenue at-grade crossing.

In addition to the data provided above, I would request that the following info is provided to the developer as well:

With respect to future electrified rail service, Metrolinx is committed to finding the most sustainable solution for electrifying the GO rail network and we are currently working towards the next phase.

Options have been studied as part of the Transit Project Assessment Process (TPAP) for the GO Expansion program, currently in the procurement phase. The successful proponent team will be responsible for selecting and delivering the right trains and infrastructure to unlock the benefits of GO Expansion. The contract is in a multi-year procurement process and teams are currently completing the bids that will close in 2021. GO Expansion construction will get underway in 2022.

However, we can advise that train noise is dominated by the powertrain at lower speeds and by the wheel- track interaction at higher speeds. Hence, the noise level and spectrum of electric trains is expected to be very similar at higher speeds, if not identical, to those of equivalent diesel trains.

Given the above considerations, it would be prudent at this time, for the purposes of acoustical analyses for development in proximity to Metrolinx corridors, to assume that the acoustical characteristics of electrified and diesel trains are equivalent. In light of the aforementioned information, acoustical models should employ diesel train parameters as the basis for analyses. We anticipate that additional information regarding specific operational parameters for electrified trains will become available in the future once the proponent team is selected.

Operational information is subject to change and may be influenced by, among other factors, service planning priorities, operational considerations, funding availability and passenger demand.

It should be noted that this information only pertains to Metrolinx rail service. It would be prudent to contact other rail operators in the area directly for rail traffic information pertaining to non-Metrolinx rail service.

Best regards,

Harrison Rong

Project Coordinator, Third Party Projects Review

Metrolinx

20 Bay Street | Suite 600 | Toronto | Ontario | M5J 2W3

From: Julia Pannolino <julia.pannolino@entuitive.com>

Sent: December 14, 2021 8:51 AM

To: Rail Data Requests <RailDataRequests@metrolinx.com>

Cc: Jonathan Hendricks <jonathan.hendricks@entuitive.com>

Subject: 30 Queen St E, Mississauga

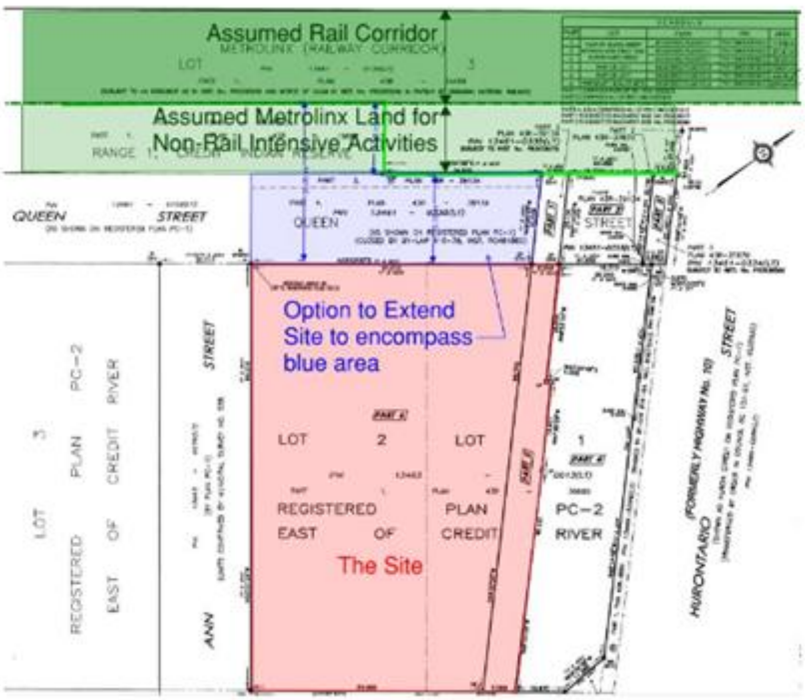
Hi,

Entuitive has been retained by Edenshaw Developments Limited to prepare a rail safety report for the proposed development at 30 Queen St E, Mississauga (site image below). The site is located at approximately Mile 12.75 of the Metrolinx Oakville Subdivision, immediately east of Port Credit Station.

To properly review the safety aspects of the development, can you let us know any information Metrolinx can share on the following:

1. Number of current Metrolinx trains per day,
2. Number of current GO cars per train,
3. Number of current GO locomotives per train,
4. Current design speed for GO trains,
5. Typology of operation (Type A, B, C, D or E),
6. Physical characteristics of Type (elevated, at grade, below grade; straight vs. curved alignment),
7. Primary rail operation (freight, passenger, both),

8. Other operators with ownership rights to track (CN, CP, Via, etc.),
9. Operating characteristics (presence of switches, signals, track type (continuously welded, jointed), proximity to nearest station),
10. Rail corridor service expansion plans by all operators (10-Year Forecast),
11. Planned changes – any known upcoming planned changes to the above information?
12. Any other information relevant for rail safety.



Thank you,
Julia

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Entuitive is celebrating our 10th birthday. We couldn't have done it without partners and clients like you. Read more about how we're celebrating on our birthday microsite here.

APPENDIX C: RISK ASSESSMENT MATRIX

Rail Safety Risk Assessment

No.	Hazard	Without Mitigating Measures: Frequency	Severity	Residual Risk	Risk Classification	With Proposed Mitigating Measures: Frequency	Severity	Residual Risk	Risk Classification	Net change of Risk Classification	Comments
1	Derailment Freight - Flammable or Hazardous materials *Derailment of frieght train transporting flammable/hazardous material*	1	5	5	Tolerable	1	4	4	Acceptable	-1	Crashwall partially protects development from fire and explosion
2	Derailment Freight - Inert Glancing Blow *Multicar derailment of freight train adjacent to site*	2	2	4	Acceptable	2	2	4	Acceptable	0	Train will not ingress into site
3	Derailment Freight - Inert Direct Impact *Single freight car impact due to accordian style derailment*	2	2	4	Acceptable	2	2	4	Acceptable	0	Train will not ingress into site
4	Derailment Passenger - Glancing Blow *Multicar derailment of passenger train adjacent to site*	2	2	4	Acceptable	2	2	4	Acceptable	0	Train will not ingress into site
5	Derailment Passenger - Direct Impact *Single freight car impact due to accordian style derailment*	2	2	4	Acceptable	2	2	4	Acceptable	0	Train will not ingress into site
6	Excess Speed - Freight *Derailment of freight train travelling at speed in excess of track design speed*	2	5	10	Intolerable	1	3	3	Acceptable	-7	Crashwall mitigates train ingress into site
7	Excess Speed - Passenger *Derailment of passenger train travelling at speed in excess of track design speed*	2	5	10	Intolerable	1	3	3	Acceptable	-7	Crashwall mitigates train ingress into site
8	Airborn Debris - Freight *Top level sea-can of a double stacked intermodal freight car is launched due to a derailment*	2	4	8	Tolerable	2	4	8	Tolerable	0	While crash wall will prevent impact from low flying debris, there still possibility of debris over the wall
9	Groundborn Debris - Freight *As a result of derailment a sea-can or a part of the freight train become rolling or sliding debris along the ground*	2	4	8	Tolerable	2	2	4	Acceptable	-4	Crashwall protects development from low flying debris
10	Airborn Debris - Passenger *During a derailment, parts of the passenger train become airborn projectiles*	2	4	8	Tolerable	2	4	8	Tolerable	0	While crash wall will prevent impact from low flying debris, there still possibility of debris over the wall
11	Groundborn Debris - Passenger *As a result of derailment a part of the passenger train become rolling or sliding debris along the ground*	2	4	8	Tolerable	2	2	4	Acceptable	-4	Crashwall protects development from low flying debris
12	Smoke/Exhaust *Ingestion of smoke or diesel exhaust into a building's HVAC systems*	1	3	3	Acceptable	1	3	3	Acceptable	0	Since the site is south of the rail corridor, and the prevailing winds blow west to east, we do not believe smoke/exhaust to be an issue.
13	Trespassing *Ingress of non-authorised personel onto railway*	3	3	9	Tolerable	1	3	3	Acceptable	-6	Crashwall or anti-traspassing fence extends the full length of the development site preventing trespassing opportunity from the site
	Total Assessed Risk Score			85				56			

Risk Event Classification

Frequency of Event	Class	Severity of Event: Negligible	Marginal	Serious	Critical	Catastrophic
		1	2	3	4	5
Improbable	1	1	2	3	4	5
Remote	2	2	4	6	8	10
Occasional	3	3	6	9	12	15
Probable	4	4	8	12	16	20
Frequent	5	5	10	15	20	25

Risk Category

Risk	*(Frequency Class x Severity Class)*	Risk Assessment Category	Mitigation Measures Approach
Low	1 to 4	Acceptable	No further mitigation is required
Medium	6 to 9	Tolerable	Tolerable if ALARP* - mitigate to level that is reasonable
High	10 to 25	Intolerable	Risk shall be eliminated / reduced

*ALARP = As Low As Reasonably Practicable

Definition of Frequency Criteria

Fraquency Rating	Description
1. Improbable	Extremely unlikely to occur
2. Remote	Unlikely to occur in rail lifecycle
3. Occasional	Likley to occur several times in rail lifecycle
4. Probable	Expected to occur
5. Frequent	Expected to occur continuous

Definition of Severity Criteria

Severity Rating	Consequence to Person/Public	Consequence to Environment
1. Negligible	Non-reportable injury	None
2. Marginal	Single minor injury	Reversible minor environmental impact
3. Serious	Single permanent partial or tempory total disabling injury; multiple minor injury	Reversible moderate environmental impact
4. Critical	Single fatality; Single permanent total disability; Multiple permanent partial or temporay total disabling injury	Reversible significant environmental impact
5. Catastrophic	Multiple fatalities: Multiple permanent total disabling injuries	rreversible significant environmental impac