

Noise and Vibration Feasibility Study

Proposed Residential Development

Bistro 6 West

Barrie, ON

Prepared for:


The Pratt Hansen Group Inc.
301 King Street
Barrie, Ontario
L4N 6B5

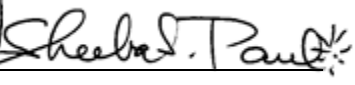
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February 12, 2021

HGC Project No: 02000736

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1 Introduction and Summary

HGC Engineering was retained by The Pratt Hansen Group Inc. to conduct a noise and vibration feasibility study for a proposed residential development (Bistro 6 West) located south of Mapleview Drive and east of the Metrolinx GO Transit railway in the City of Barrie, Ontario. The residential development will consist of three 6-storey residential buildings. This report focuses on the Bistro 6 West building. The study is required as part of the draft plan condition.

The primary sources of noise are rail traffic noise from the GO Transit railway and road traffic on Mapleview Drive East. A secondary source of noise is road traffic noise on Yonge Street. Rail traffic data was obtained from Metrolinx personnel, and road traffic data was obtained from the City of Barrie. Rail and road traffic data was used to predict future traffic sound levels at the proposed building façades and outdoor living areas. The predicted sound levels were compared to the guidelines of the Ministry of Environment, Conservation and Parks (MECP) and Metrolinx to develop noise control recommendations.

The results of the study indicate that the proposed buildings are feasible with the noise control measures described in this report. The predicted future daytime and nighttime sound levels at the proposed buildings will exceed MECP and GO Transit guideline sound levels and will require noise control measures. Central air conditioning is required for all dwelling units. Upgraded exterior wall construction is required for all proposed buildings, and upgraded glazing constructions are required for the north, west, and south façades of Bistro 6 West. An acoustic barrier is required along the railway to protect outdoor amenity areas. Noise warning clauses are also required for the dwelling units to inform future occupants of the traffic noise impacts, to address sound level excesses, and proximity to nearby commercial uses.

Vibration measurements were conducted on October 28, 2020. The measured ground-borne vibration levels do not exceed the GO Transit guidelines at the closest proposed dwelling façade at approximately 30 m from the railway right of way. No vibration mitigation measures are required for the development site.

2 Site Description and Noise Sources

Figure 1 is a key plan indicating the location of the proposed site. The site is located at south side of Maplevue Drive East and east of the GO Transit railway carrying the Barrie line, in the City of Barrie, Ontario. Figure 2 shows a site plan prepared by Jones Consulting Group Ltd., dated February 12, 2021. The proposed development will consist of three 6-storey residential buildings with above and underground parking.

HGC Engineering personnel visited the site on October 28, 2020 to make observations of the acoustical environment and to perform vibration measurements of the adjacent GO Transit railway during rail passbys. During the site visit, it was noted that the primary sources of noise impacting the site was rail traffic on the Barrie GO Transit railway line and road traffic on Maplevue Drive East. The site is currently vacant. There are existing single detached residences west of the site. There is an auto shop (Paul's Auto Body) approximately 170 m to the west of the site, across the railway tracks and an intervening cemetery. Although sound emissions from the auto shop was found to be negligible at the site area, it is recommended that a noise warning clause to identify that such commercial uses may be audible at times be included in the property and tenancy agreements.

3 Noise Level Criteria

3.1 Road and Rail Traffic Noise

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are given in the MECP publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", release date October 21, 2013, and are listed in Table I below. The values in Table I are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MECP Road and Rail Traffic Noise Criteria (dBA)

Area	Daytime L_{EQ} (16 hour) Road / Rail	Nighttime L_{EQ} (8 hour) Road / Rail
Outdoor Living Area	55 dBA	--
Inside Living/Dining Rooms	45 dBA / 40 dBA	45 dBA / 40 dBA
Inside Bedrooms	45 dBA / 40 dBA	40 dBA / 35 dBA

Daytime refers to the period between 07:00 and 23:00. Nighttime refers to the time period between 23:00 and 07:00. The term “Outdoor Living Area” (OLA) is used in reference to an outdoor patio, a backyard, a terrace, or other area where passive recreation is expected to occur. Small balconies are not considered OLAs for the purposes of assessment. Terraces greater than 4 m in depth (measured perpendicular to the building façade) are considered to be OLAs.

The guidelines in the MECP publication allow the daytime sound levels in an Outdoor Living Area to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is required to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically, and administratively practical.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom or living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom or living/dining room windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning is required when nighttime sound levels at bedroom or living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom or living/dining room windows are in the range of 56 to 65 dBA.

Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of window nighttime sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise.

Indoor guidelines are 5 dBA more stringent for rail noise than for road noise to account for the low frequency (rumbling) character of locomotive sound, and its greater potential to transmit through exterior wall/window assemblies. Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of window nighttime sound level is greater than 55 dBA or the daytime sound level is greater than 60 dBA due to rail traffic noise.

Warning clauses to notify future residents of possible noise excesses are also required when nighttime sound levels exceed 50 dBA at the plane of a bedroom/living/dining room window and when daytime sound levels exceed 55 dBA at the plane of a bedroom/living/dining room window due to traffic noise.

MECP guidelines recommend exterior walls built with a brick or masonry veneer from foundation to rafters as a minimum construction for any dwellings with a 24 hour L_{EQ} that is greater than 60 dBA, and which are within 100 m of the right of way of the railway. The railways also provide minimum requirements for safety as well as sound and vibration for proposed residential developments located adjacent to their rights-of-way. These include minimum required setbacks, berms, fencing and warning clauses. Appendix A provides the GO Transit requirements for residential developments adjacent to a railway right of way.

3.2 Ground-borne Vibration from Rail Traffic

GO Transit guidelines require measurements of ground-borne vibration when residential dwelling units are to be located within 75 metres of a principal mainline.

Vibration is typically measured in terms of oscillatory velocity or acceleration. The GO Transit vibration guidelines are given in terms of ground-borne velocity. In this report, vibration levels are quoted in terms of RMS velocity levels (L_v) in mm/s. The GO Transit guideline limit is 0.14 mm/s. These criteria are included on the plots of the measured vibration levels (Figure 4 to 8).

4 Traffic Sound Level Assessment

4.1 Rail Traffic Data

Rail traffic data for the GO Transit Barrie Line was obtained from previous HGC Engineering project files, originally obtained from GO Transit personnel and is attached in Appendix B. This line is used for passenger operations only. The maximum permissible train speed in the area of the site is 80 km/h (50 mi/h). The maximum speeds, maximum number of cars and locomotives per train were used in the traffic noise analysis to yield a worst-case estimate of train noise. The data was projected to the year 2031 using a 2.5% per year growth rate. Table II summarises the GO Transit rail traffic data used in the analysis.

Table II: Rail Traffic Data Projected to Year 2031

Type of Train	Number of Trains Day/ Night	Number of locomotives	Number of cars	Max Speed (KPH)
Passenger GO Trains	38 / 6	1	12	129

+All GO Trains were modelled as diesel trains.

4.2 Road Traffic Data

Traffic data for Mapleview Drive East and Yonge Street were obtained from the City of Barrie in the form of ultimate Average Annual Daily Traffic (AADT) traffic values projected to the year 2031, and is provided in Appendix C. For Mapleview Drive East, a projected volume of 10 000 vehicles per day at with commercial vehicle percentage of 4 %, split into 1 % for medium trucks and 3 % for heavy trucks, was applied. For Yonge Street, a projected volume of 12 500 vehicles per day with a commercial vehicle percentage of 3 %, split into 1 % for medium trucks and 2 % for heavy trucks, was applied. For both roadways, a posted speed limit of 60 km/h and a day/night split of 90 % / 10 % were used.

Table III summarizes the traffic volume data used in this study.

Table III: Projected Road Traffic Data to Year 2031

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Mapleview Rd E	Daytime	8 640	90	270	9 000
	Nighttime	960	10	30	1 000
	Total	9 600	100	300	10 000
Yonge St	Daytime	10 913	113	225	12 250
	Nighttime	1 212	13	25	1 250
	Total	12 125	125	250	12 500

4.3 Road and Rail Traffic Noise Predictions

To assess the levels of road and rail traffic noise which will impact the study area in the future, sound level predictions were made using STAMSON version 5.04, a computer algorithm developed by the MECP. Sample STAMSON output is included in Appendix D.

Predictions of the traffic sound levels were chosen around the proposed residential buildings to obtain an appropriate representation of future sound levels at various façades. Sound levels were predicted at the plane of the 6th storey bedroom and/or living/dining room windows during daytime and nighttime hours to investigate ventilation and façade construction requirements. Train whistle noise was included in the total sound level predictions at the building façades since occasional whistling was observed on site at the Lockhart Road crossing. Figure 2 shows the site plan with prediction locations. The results of these predictions are summarized in Table IV and V

Table IV: Daytime Predicted Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Daytime – at the Façade $L_{EQ-16\text{ hr}}$		Daytime at Total* $L_{EQ-16\text{ hr}}$
		Road	Rail	
[A]	Building A, façade facing Mapleview Dr	63	62	66
[B]	Building A, façade facing railway	60	65	67
[C]	Building A, façade flanking Mapleview Dr	59	--	59
[D]	Building B, façade facing Mapleview Dr	<55	61	62
[E]	Building B, façade facing railway	55	65	66
[F]	Building B, façade flanking railway	<55	61	61
[G]	Building C, façade facing railway	<55	65	66
[H]	Building C, façade flanking railway	<55	62	64
[I_OLA]	Ground level amenity Area	<55	63	63

Note: * Façade sound levels include train whistle noise

Table V: Nighttime Predicted Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Nighttime – at the Façade $L_{EQ-8\text{ hr}}$		Nighttime at Total* $L_{EQ-8\text{ hr}}$
		Road	Rail	
[A]	Building A, façade facing Mapleview Dr	56	57	61
[B]	Building A, façade facing railway	54	60	61
[C]	Building A, façade flanking Mapleview Dr	53	--	53
[D]	Building B, façade facing Mapleview Dr	<50	56	57
[E]	Building B, façade facing railway	<50	60	61
[F]	Building B, façade flanking railway	<50	56	56
[G]	Building C, façade facing railway	<50	60	61
[H]	Building C, façade flanking railway	<50	57	59

Note: * Façade sound levels include train whistle noise

5 Discussions and Recommendations

The sound level predictions indicate that the future traffic sound levels will exceed MECP guidelines at the proposed development. The following discussion outlines the recommendations for acoustic barrier requirements, ventilation requirements, upgraded building façade construction, and warning clauses to achieve the noise criteria stated in Table I.

5.1 Outdoor Living Areas

Typically for residential developments adjacent to a GO Transit railway, an acoustic barrier totalling 5.5 m (2.5 m safety berm and 3.0 m acoustic wall on top), as indicated in Appendix A, is required along the railway right-of-way. A 2.5 m safety berm is typically required as a minimum.

The predicted sound level at the ground level amenity area, designated by prediction location [I_OLA], will be up to 63 dBA in the daytime, which is in excess of MECP guideline level of 55 dBA.

An acoustic barrier 5.5 m in height, comprised of a 2.5 m high safety berm with a 3.0 m high acoustic wall on top, along the western property parallel to the GO Transit railway will reduce sound levels to 55 dBA in the outdoor amenity area. A noise warning clause is also required in the property and tenancy agreements. Future analysis is required when grading information is available to refine the acoustic barrier heights.

The acoustic barrier can be any combination of an earth berm and acoustical wall on top. The wall component of the barrier should be of a solid construction with a surface density of no less than 20 kg/m². The walls may be constructed from a variety of materials such as wood, brick, pre-cast concrete or other concrete/wood composite systems provided that it is free of gaps or cracks within or below its extent.

The dwelling units in the proposed residential building have balconies that are less than 4 m in depth. These areas are not considered to be outdoor living areas under the MECP guidelines, and therefore are exempt from traffic noise assessment.

5.2 Minimum Setback Distance

GO Transit guidelines stipulates a minimum setback distance of 30 m between new dwellings and the principal line right of way. The proposed development plans conform to the setback requirement as the nearest proposed dwelling façade is located more than 30 m way from the rail right-of-way.

5.3 Indoor Living Areas and Ventilation Requirements

Air Conditioning

The predicted future sound levels outside the top storey windows of Building A, B, and C with exposure to the railway will be greater than 60 dBA during nighttime hours and/or 65 dBA during daytime hours. To address these excesses, these units need to be equipped with central air conditioning systems so that windows may remain closed. These units are indicated in Figure 3. Window or through-the-wall air conditioning units are not recommended because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall sound insulating properties of the envelope. Acceptable units are those housed in their own closet with an access door for maintenance. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MECP publication NPC-300, as applicable.

5.4 Building Façade Constructions

The predicted sound levels at the façades with direct or flanking exposure to the railway for all buildings will exceed 60 dBA during daytime and/or 55 dBA during nighttime due to rail traffic noise. MECP guidelines stipulate that in such cases, building components including windows, walls, and doors be designed so that the indoor sound levels comply with the noise criteria in Table I.

Calculations were performed to determine the acoustical insulation factors to maintain indoor sound levels within MECP guidelines. The calculation methods were developed by the National Research Council (NRC). They are based on the predicted future sound levels at the building façades, and the calculated area ratios of the facade components (walls, windows and doors) and the floor area of the adjacent room.

Exterior Wall Construction

The residential buildings will have sound levels exceeding 60 dBA during both nighttime and daytime hours at the façades exposed to the railway line and are within 100 m of the right of way. For the proposed buildings, GO Transit guidelines require brick veneer, masonry construction or an acoustical equivalent. A typical brick veneer wall, with an insulated gypsum board partition on the inside, has an estimated sound transmission class (STC) rating of 54 or better. An equivalent to brick veneer construction for those portions of building façades in an urban environment near rail lines is typically achieved by using two layers of 16 mm type X gypsum board on separate framing behind

the spandrel panels, with batt insulation in the wall cavity. Further input regarding the sound insulating design of the exterior walls should be provided in the detailed traffic noise studies.

Exterior Doors

There may be glazed exterior doors (sliding or swing) for entry onto the balconies from living/dining rooms and some bedrooms. The glazing areas of the doors should be counted as part of the total window glazing area. All exterior doors should include good weather seals to reduce air infiltration to the minimum achievable levels.

Acoustical Requirements for Glazing

A summary of the STC requirements is given in Table VI for the building façades, based on the possibility of sound entering the building through walls, windows and doors for all of the dwellings. A window to floor ratio of up to 35% for living/dining rooms and 25% for bedrooms were calculated from the floor plans and elevation drawings by ISM Architects Inc., floor plans dated February 1, 2021 and elevations dated January 20, 2021, to determine preliminary window STC ratings required to mitigate road and rail traffic noise levels.

Table VI: Minimum STC Requirements

Prediction Location	Description	Space	Minimum STC Glazing Requirements
[A], [B], [D] to [F]	Building A, B, & C: north, west, and south façades with direct and flanking exposure to railway	*Living/Dining	STC-30
		*Bedroom	STC-30
[C]	Building A, B & C: Façades facing east	*Living/Dining	OBC
		*Bedroom	OBC

Notes: OBC – Ontario Building Code
 * Sound entering through windows only since the exterior wall is required to be brick or masonry equivalent

The glazing requirements can be met using fairly standard sealed units. Operable sections, including doors and operable windows, must be well-fitted and weather-stripped in order to achieve the upper range of target STC values.

Sample window assemblies which may achieve the STC requirements are summarized in Table VII below. Note that acoustic performance varies with manufacture’s construction details, and these are

only guidelines to provide some indication of the type of glazing likely to be required; the STC requirements in Table VI are provided as a guideline based on the preliminary drawings. Acoustical test data for the selected assemblies should be requested from the supplier, to ensure that the stated acoustic performance levels will be achieved by their assemblies.

Table VII: Glazing Assemblies for STC Requirements

STC Requirement	Glazing Configuration (STC)
28 – 29	Any double glazed unit
30 – 31	3(13)3

In Table VII, the number outside parentheses indicate minimum pane thicknesses in millimeters and the number in parentheses indicates the minimum inter-pane gap in millimeters.

Alternative assemblies may be required for operable windows and doors to achieve the required performance values, depending on the nature of seals.

If floor plans and building elevations are changed significantly, an acoustical consultant should provide revised glazing recommendations.

5.5 Assessment of Ground-borne Vibration from Rail Traffic

GO Transit requires an assessment of ground-borne vibration through measurement if buildings are to be located with 75 m of the railway right-of-way. Measurements were performed on the site at approximately 30 m from the railway right-of-way. Ground-borne vibration measurements were measured for 4 train pass-bys using a HP 3569A Real Time Frequency Analyzer outfitted with a Wilcoxon Research type 793V velocity transducer correctly field calibrated before the measurement. The results of the measurements are presented in Table VIII showing the maximum vibration level measurements during each of the train pass-bys. Figures 4 to 7 show the pass-bys of the trains.

Table VIII: Maximum RMS Vibration Velocity Measurements of GO Transit Passenger

Train Pass-bys

Train Pass-by	30 m from right of way (mm/s)	Criteria (mm/s)
1	0.02	0.14
2	0.01	
3	0.02	
4	0.01	

The results indicate that vibration levels are below the Metrolinx criteria of 0.14 mm/s and vibration mitigation measures are not required for this proposed development.

6 Warning Clauses

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all dwelling units with anticipated traffic sound level excesses. The following noise warning clauses are required for specific dwellings as indicated in Table IX.

Suggested wording for future dwellings with sound levels exceeding the MECP criteria is given below.

- A) Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality’s and the Ministry of the Environment, Conservation and Parks noise criteria.

Suggested wording for future dwellings which will have central air conditioning units to be installed is given below.

- B) This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suggested wording for future dwelling units in close proximity to commercial buildings is given below.

- C) Purchasers are advised that due to the proximity of the existing commercial buildings, sound levels from the facilities may be at times be audible.

Suggested wording for future dwellings which have physical noise mitigation provided on site is given below.

- D) That the acoustical berm and/or barrier as installed, shall be maintained, repaired or replaced by the owner. Any maintenance, repair or replacement shall be with the same material, or to the same standards, and having the same colour and appearance of the original.

These sample clauses are provided by the MECP as examples, and can be modified by the Municipality as required.

GO Transit's standard warning clause for residential developments located within 300 m of a railway right-of-way (principal main line) is given below.

- E) Warning: Metrolinx, carrying on business as GO Transit, and its assigns and successors in interest are the owners of lands within 300 metres from the land which is the subject hereof. In addition to the current use of the lands owned by Metrolinx, there may be alterations to or expansions of the rail and other facilities on such lands in the future including the possibility that GO Transit or any railway entering into an agreement with GO Transit to use the Metrolinx lands or Metrolinx and their respective assigns or successors as aforesaid may expand their operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwellings. Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under its lands.

7 Impact of the Development on Itself

Section 5.8.1.1 of the Ontario Building Code (OBC), released on January 1, 2020, specifies the minimum required sound insulation characteristics for demising partitions, in terms of Sound Transmission Class (STC) or Apparent Sound Transmission Class (ASTC) values. In order to maintain adequate acoustical privacy between separate suites in a multi-tenant building, inter-suite walls must meet or exceed STC-50 or ASTC-47. Suite separation from a refuse chute or elevator shaft must meet or exceed STC-55. In addition, it is recommended that the floor/ceiling constructions separating suites from any amenity or commercial spaces also meet or exceed STC-55. Tables 1 and

2 in Section SB-3 of the Supplementary Guideline to the OBC provide a comprehensive list of constructions that will meet the above requirements.

Tarion's Builder Bulletin B19R requires the internal design of condominium projects to integrate suitable acoustic features to insulate the suites from noise from each other and amenities in accordance with the OBC, and limit the potential intrusions of mechanical and electrical services of the buildings on its residents. If B19R certification is needed, an acoustical consultant is required to review the mechanical and electrical drawings and details of demising constructions and mechanical/electrical equipment, when available, to help ensure that the noise impact of the development on itself is maintained within acceptable levels.

8 Summary and Recommendations

The following list and Table IX summarize the recommendations made in this report. The reader is referred the previous sections of the report where these recommendations are applied and discussed in more detail.

1. An acoustic barrier, 5.5 m in height, along the GO Transit railway is required for the ground level outdoor amenity area.
2. Central air conditioning will be required for all residential buildings.
3. Upgraded building constructions (brick exterior wall construction or an acoustical equivalent, and glazing constructions) are required for the proposed buildings.
4. The use of warning clauses in the property and tenancy agreements is recommended to inform future residents of traffic noise issues.

Table IX: Summary of Noise Control Requirements and Noise Warning Clauses

Building	Façade	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Brick Exterior Wall Construction+	Upgraded Glazing Constructions
A, B, C	North, west, and south	--	Central A/C	A, B, C, D, E	✓	LR/DR: STC-30 BR: STC-30
	East					OBC
Ground Level Amenity Area		✓	--	--	--	--

Notes:

* The location, installation and sound rating of the air conditioning condensers must be compliant with MECP Guideline NPC-300, as applicable.

✓ Outdoor amenity area requires an acoustic barrier 5.5 m in height. See Section 5.1

+ Or masonry equivalent for non-brick portions

OBC – Ontario Building Code

LR/DR – Living Room/Dining Room

BR – Bedroom

8.1 Implementation

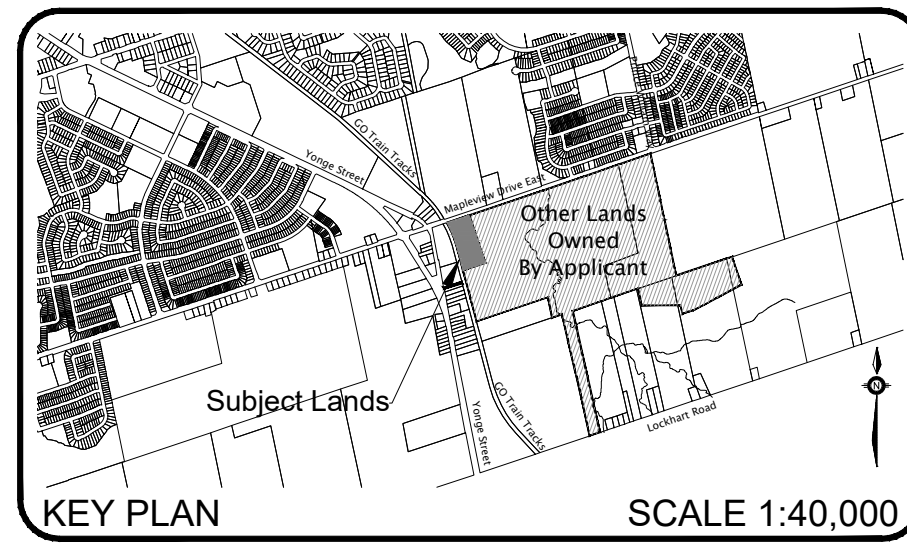
To ensure that the noise control recommendations outlined above are properly implemented, it is recommended that:

1. Prior to the issuance of occupancy permits for this development, the Municipality’s building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been properly incorporated, installed, and constructed.



Figure 1: Key Plan

(PROPOSED BLOCK 597 & RESIDENTIAL LOTS ON HEWITT'S GATE DRAFT PLAN OF SUBDIVISION)



Site Plan

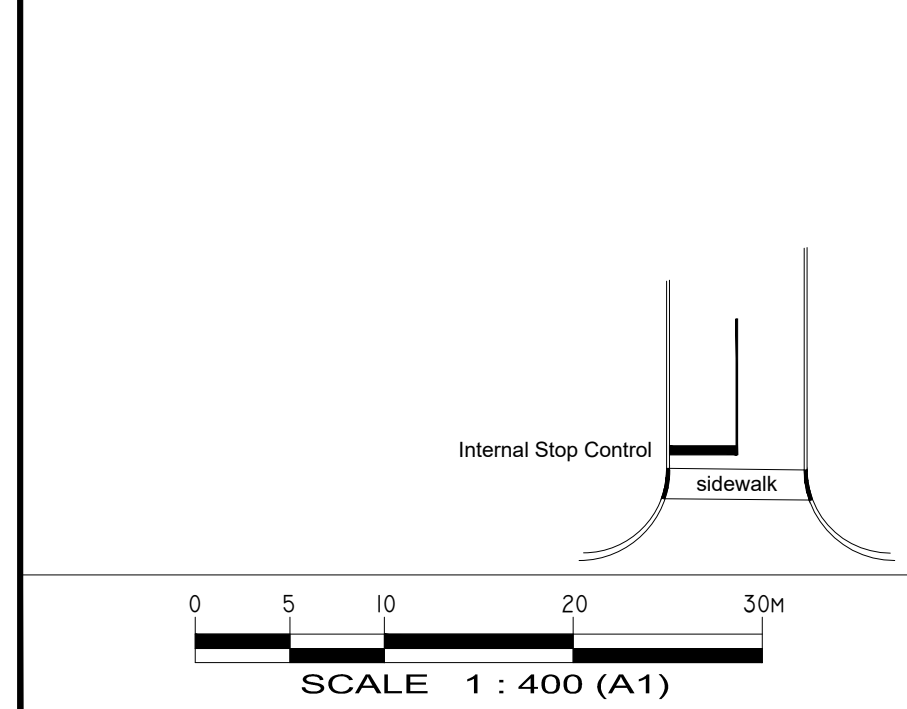
(Proposed Block 598 on Hewitt's Gate Draft Plan)
Part of Lot 16, Concession 12
City of Barrie, County of Simcoe, 2021

SITE PLAN STATISTICS

Site Plan Area	3.15 ha.
Unit Count:	
2 @ 96 Unit Apartment (6 Storey 'A' & 'C')	192 Units
1 @ 156 Unit Apartment (6 Storey 'B')	156 Units
Total	348 Units (110 uph)
Total Holdings	
Site Plan Area	3.15 ha.
Lot Frontage	24.0 m
Front Yard	15.6 m
Interior Side Yard	5.0 m
Exterior Side Yard	2.0 m
Rear Yard	5.0 m
Lot Coverage	max 50 % (1.57 ha.) 18 % (0.57 ha.)
Accessory Structures	max 10 % (0.31 ha.) 0.00 % (0.00 ha.)
Landscape Open Space	min 25 % (0.79 ha.) 54 % (1.70 ha.)
Parking Coverage	max 40 % (1.26 ha.) 25 % (0.79 ha.)
Gross Floor Area	max 200 % (6.30 ha.) 110 % (3.43 ha.)

Building A	• GFA	9,468.24 m ²
• Height in Stories	6	
• Units	96	
Building B	• GFA	15,398.28 m ²
• Height in Stories	6	
• Units	156	
Building C	• GFA	9,468.24 m ²
• Height in Stories	6	
• Units	96	
Parking Calculations	Required Parking (348 x 1.2)	418 Spaces
	Provided	*420 Spaces
*Parking Breakdown		
Typical Surface Parking Spaces		228 Spaces
Tandem Parking Spaces		6 Spaces
Surface Barrier Free Parking Spaces		8 Spaces
Typical Underground Parking Spaces		175 Spaces
Underground Barrier Free Parking Spaces		3 Spaces
Total		420 Spaces
Barrier Free spaces calculated at 1+ (418 x 3%) = 13 required (3.4 + 1.5 + 3.1 + 1.5 per barrier free space/shared aisle)		
Bicycle Rack Storage (2 x 312)	62 Required	64 Provided
General Amenity Area (10m ² /unit)	3,480 m ²	*4,619.90 m ²
**Amenity Area Breakdown		
Shared Surface Amenity Area		550.7 m ²
Private Balcony Area:		
- Building A		1,141.20 m ²
- Building B		1,865.40 m ²
- Building C		1,062.60 m ²
- Private Balcony Area Total		4,069.20 m ²
Combined General Amenity Area Total		4,619.9 m ²

Fire Route - - - - -
Retaining Walls - - - - -
Light Standard (nts) ☆
EV Charger Station (nts) ⊕



PRATT HANSEN GROUP - BISTRO 6 WEST - SITE PLAN

Date Issued:	APRIL 30, 2020
Checked By:	RD
Project No.:	PRA-19078
Drawn By:	m.c.r.
Drawing Name:	PRA-19078-HD-W-SP-2.dwg

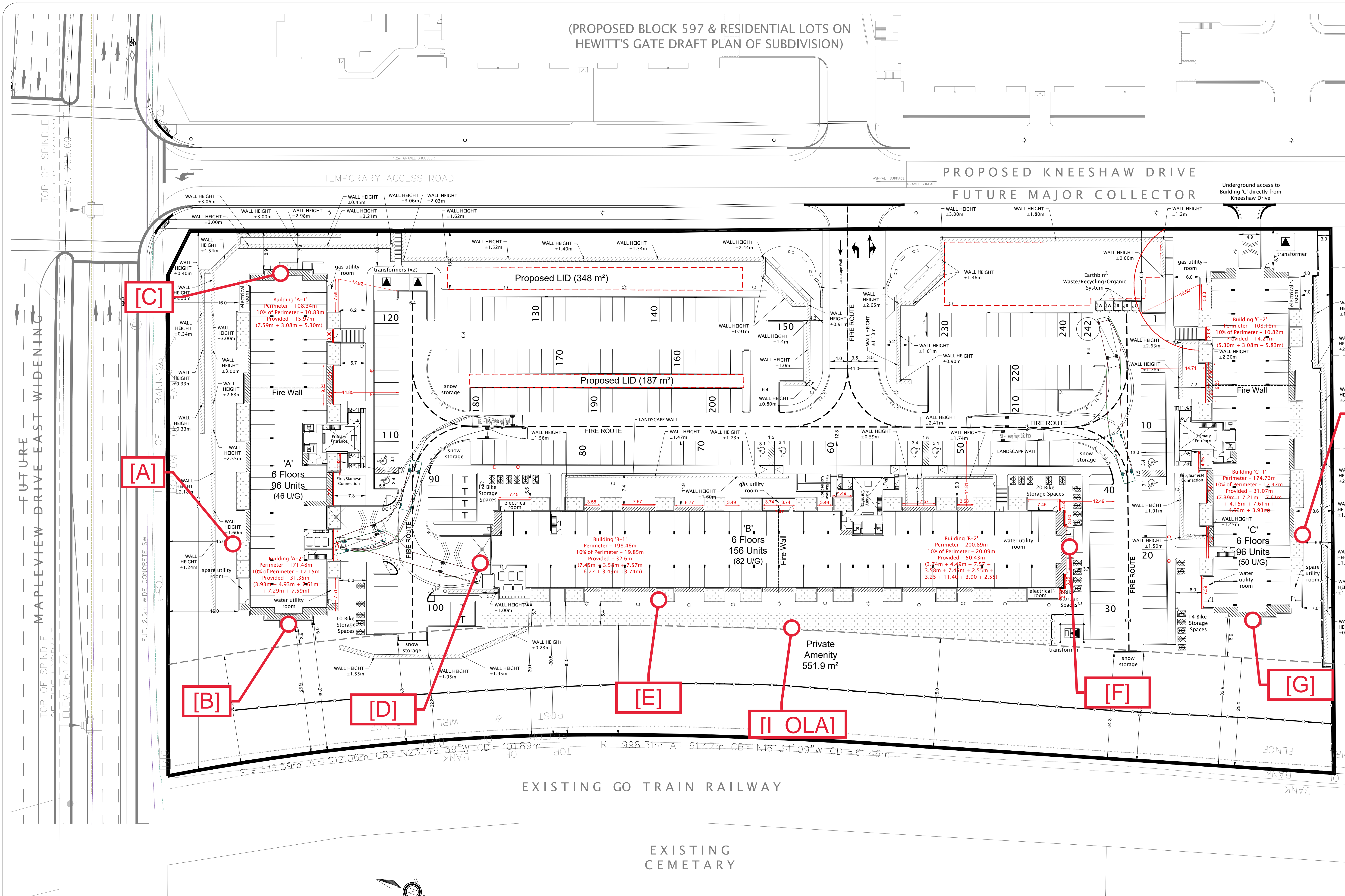


Figure 2: Site Plan Showing Prediction Locations

DATE	SCHEDULE OF REVISIONS	DRAWN
FEB. 12, 2021	DESCRIPTION SITE PLAN SUBMISSION	m.c.r.

G:\Planning Drawings\PRA-19078-BE-West\Submitted\Feb2021\PRA-19078-HD-W-SP-2.dwg Layout.SP Plotted Feb 11, 2021 @ 12:45pm by marichards The Jones Consulting Group Ltd.

LEGEND

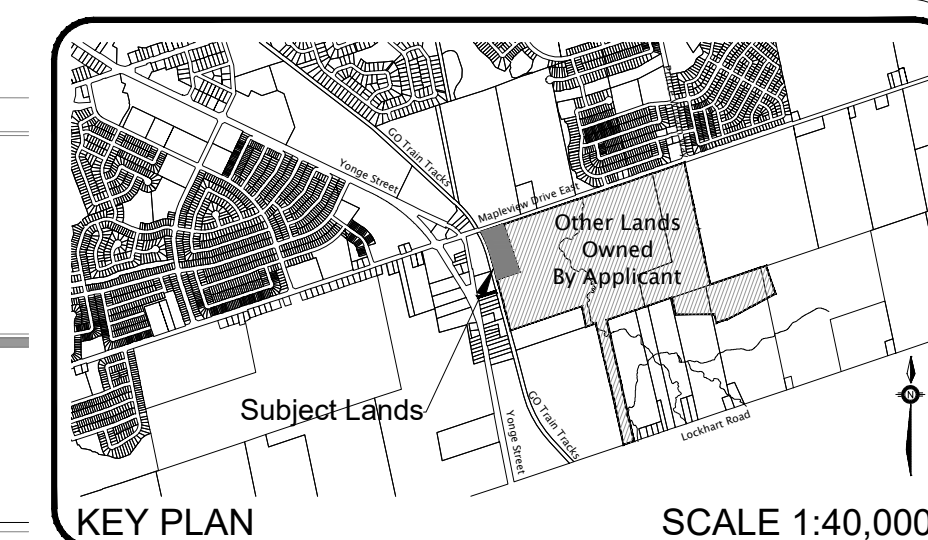


Central Air Conditioning is Required



Acoustic Barrier is Required. See Section 5.1

(PROPOSED BLOCK 597 & RESIDENTIAL LOTS ON HEWITT'S GATE DRAFT PLAN OF SUBDIVISION)



Site Plan
(Proposed Block 598 on Hewitt's Gate Draft Plan)
Part of Lot 16, Concession 12
City of Barrie, County of Simcoe, 2021

SITE PLAN STATISTICS
Site Plan Area 3.15 ha.

Unit Count:
2 @ 96 Unit Apartment (6 Storey 'A' & 'C') 192 Units
1 @ 156 Unit Apartment (6 Storey 'B') 156 Units
Total 348 Units (110 uph)

	REQUIRED RM3	PROPOSED RM3
Total Holdings		
Site Plan Area	3.15 ha.	3.15 ha.
Lot Frontage	24.0 m	123.2 m
Front Yard	3.0 m	15.6 m
Interior Side Yard	5.0 m	30.0 m
Rear Yard	2.0 m	7.3 m
Lot Coverage	max 50 % (1.57 ha.)	18 % (0.57 ha.)
Accessory Structures	max 10 % (0.31 ha.)	0.00 % (0.00 ha.)
Landscape Open Space	min 25 % (0.79 ha.)	54 % (1.70 ha.)
Parking Coverage	max 40 % (1.26 ha.)	25 % (0.79 ha.)
Gross Floor Area	max 200 % (6.30 ha.)	110 % (3.43 ha.)

Building	GFA	Height in Stories	Units
Building A	9,468.24 m ²	6	96
Building B	15,398.28 m ²	6	156
Building C	9,468.24 m ²	6	96

Parking Calculations
Required Parking (348 x 1.2) 418 Spaces *420 Spaces

*Parking Breakdown	Typical Surface Parking Spaces	Surface Barrier Free Parking Spaces	Typical Underground Parking Spaces	Underground Barrier Free Parking Spaces	Total
	228 Spaces	6 Spaces	8 Spaces	175 Spaces	420 Spaces

Barrier Free spaces calculated at 1+ (418 x 3%) = 13 required (3.4 + 1.5 + 3.1 + 1.5 per barrier free space/shared aisle)

Bicycle Rack Storage (2 x 312) 62 Required 64 Provided

General Amenity Area (10m²/unit) 3,480 m² *4,619.90 m²

****Amenity Area Breakdown**

Shared Surface Amenity Area	Private Balcony Area:
550.7 m ²	- Building A 1,141.20 m ²
	- Building B 1,865.40 m ²
	- Building C 1,062.60 m ²
	- Private Balcony Area Total 4,069.20 m ²

Combined General Amenity Area Total 4,619.9 m²

Fire Route - - - - -
Retaining Walls - - - - -
Light Standard (nts) ☆
EV Charger Station (nts) ⊕



SCALE 1 : 400 (A1)
PRATT HANSEN GROUP - BISTRO 6 WEST - SITE PLAN

DATE	SCHEDULE OF REVISIONS	DRAWN
FEB. 12, 2021	DESCRIPTION SITE PLAN SUBMISSION	m.c.r.

Date Issued: APRIL 30, 2020
Checked By: RD
Project No.: PRA-19078
Drawn By: m.c.r.
Drawing Name: PRA-19078-HD-W-SP-2.dwg



JONES CONSULTING GROUP LTD.
PLANNERS & ENGINEERS
229 Mapleview Drive East, Unit 1, Barrie, Ontario, L4N 0W5
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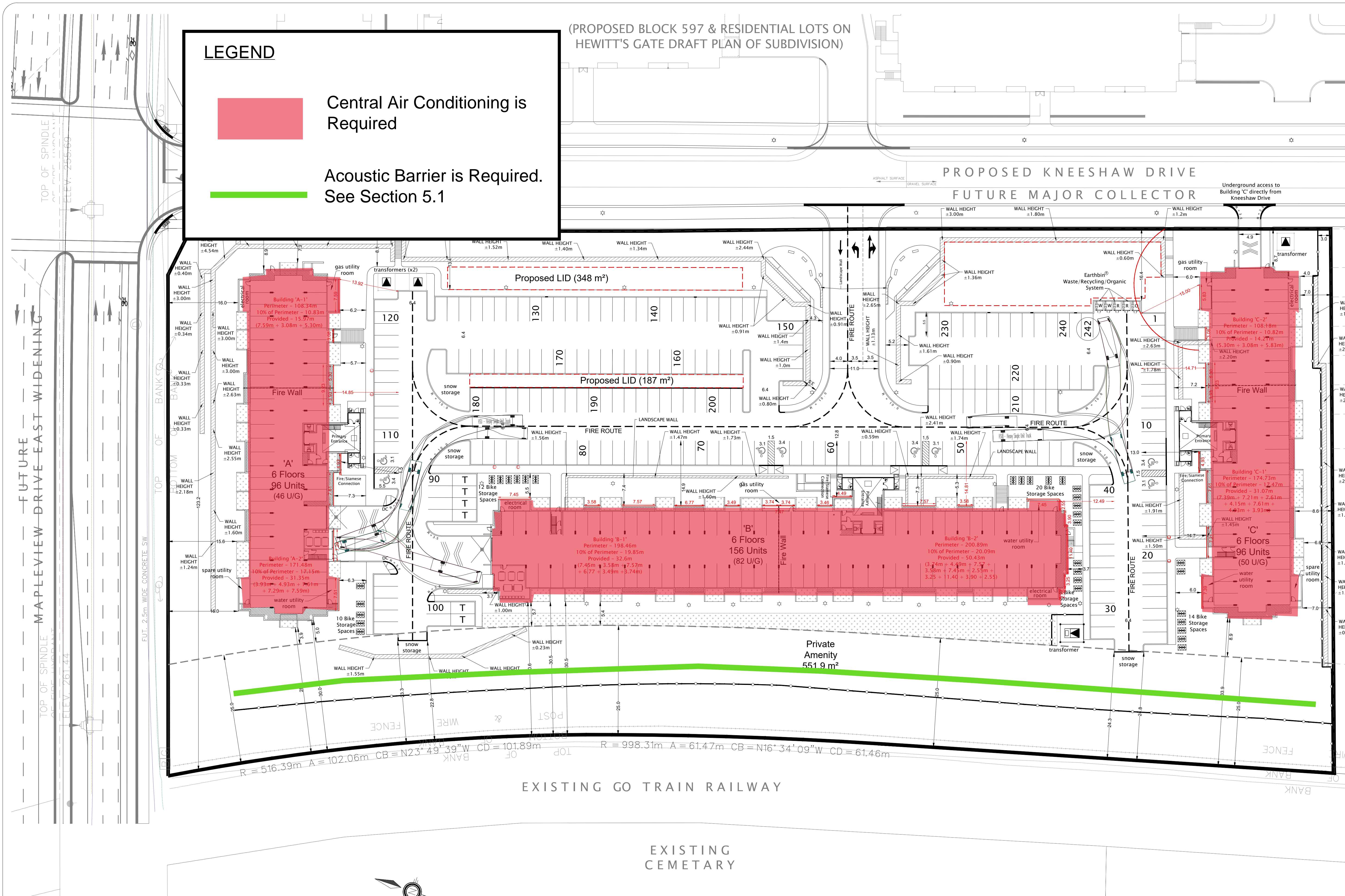
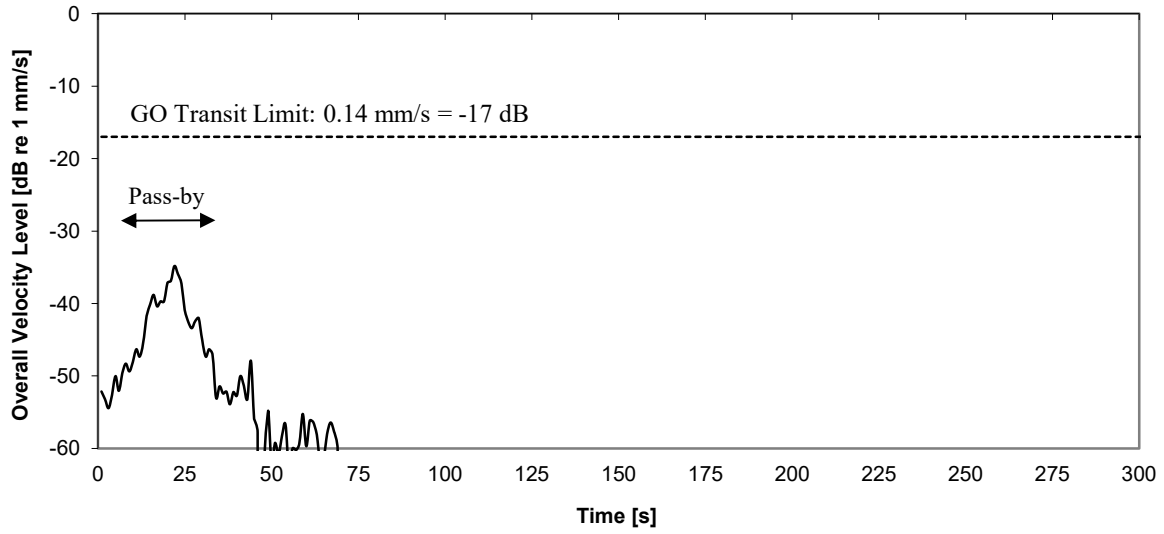


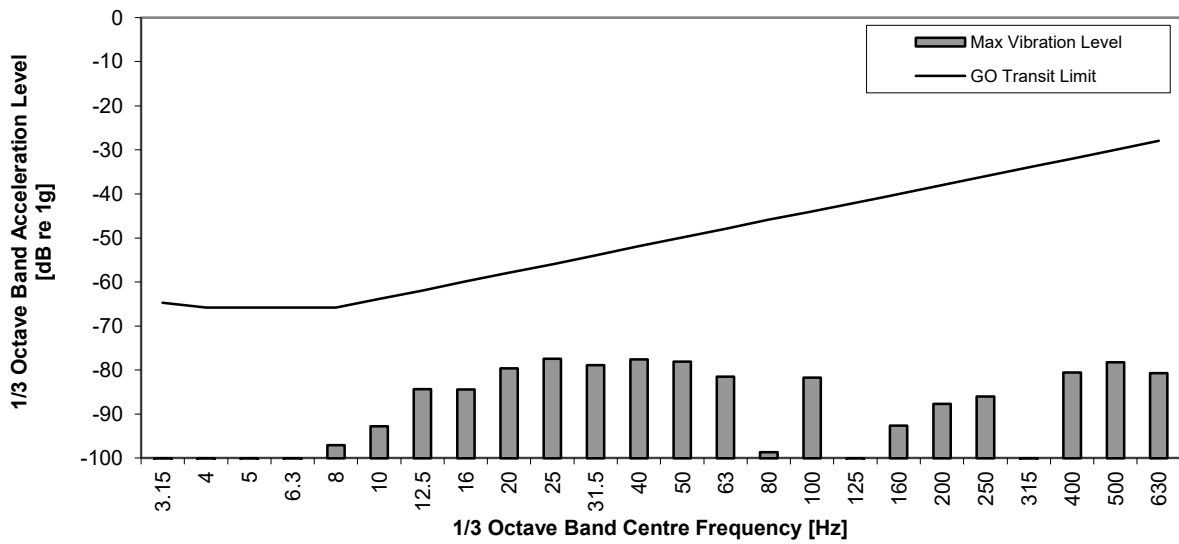
Figure 3: Site Plan Showing Barrier and Ventilation Requirements

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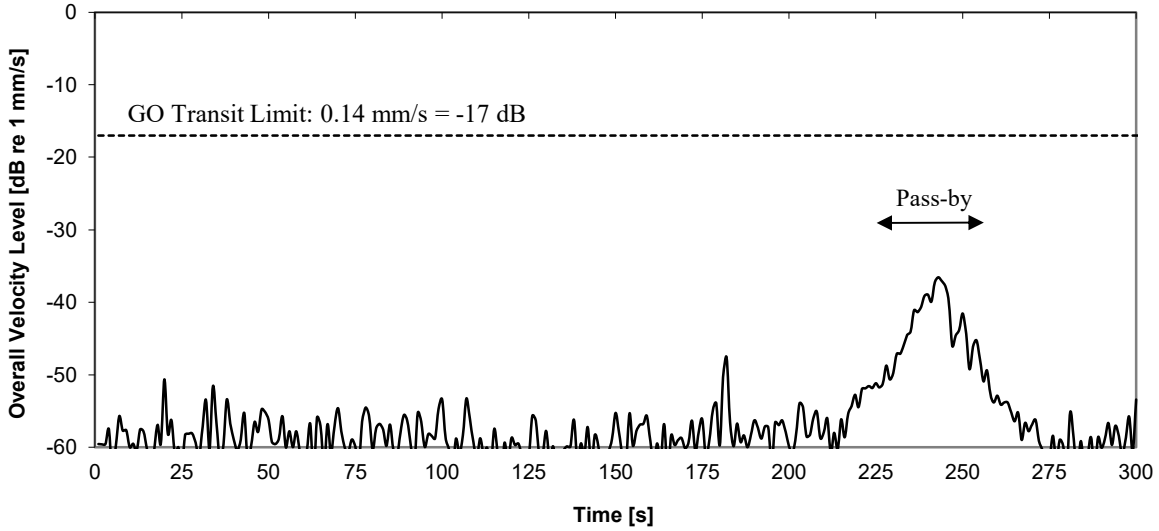
**Figure 4a: Pass-by 1, 30 m from right-of-way
Measured Vibratory Velocity Level**



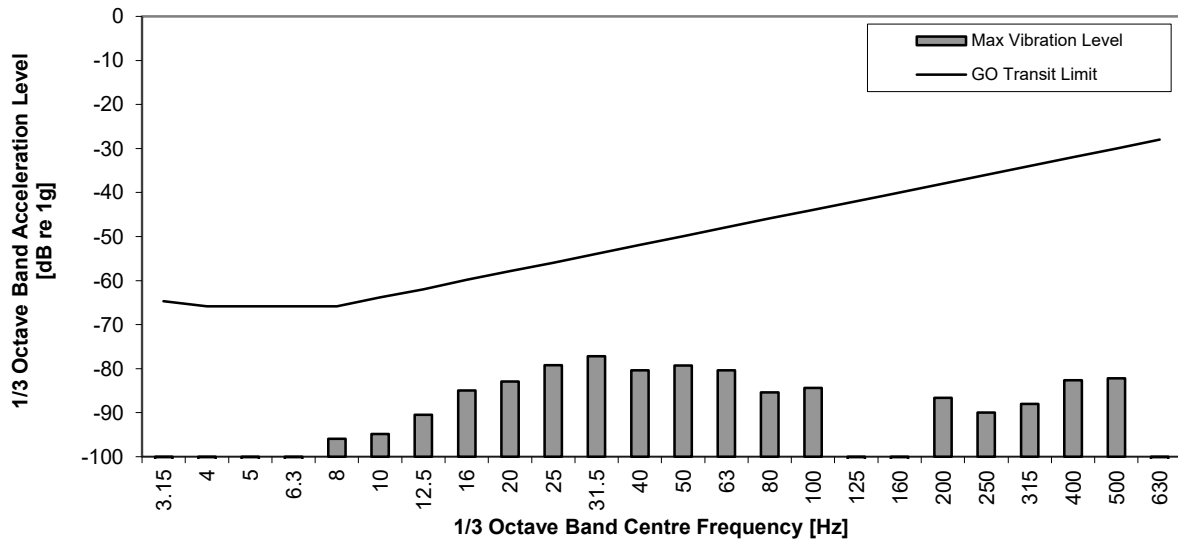
**Figure 4b: Pass-by 1, 30 m from right-of-way
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



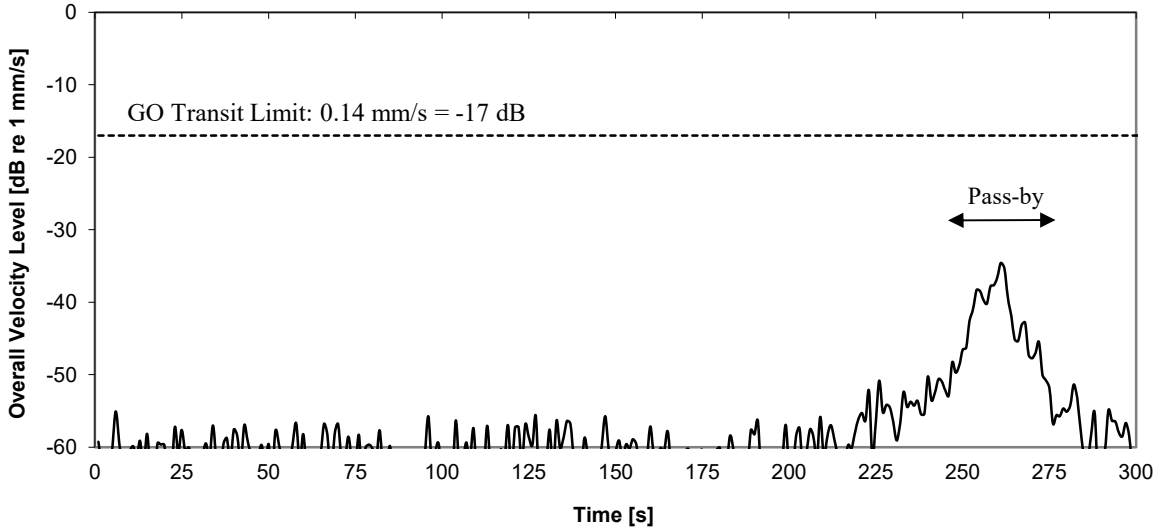
**Figure 5a: Pass-by 2, 30 m from right-of-way
Measured Vibratory Velocity Level**



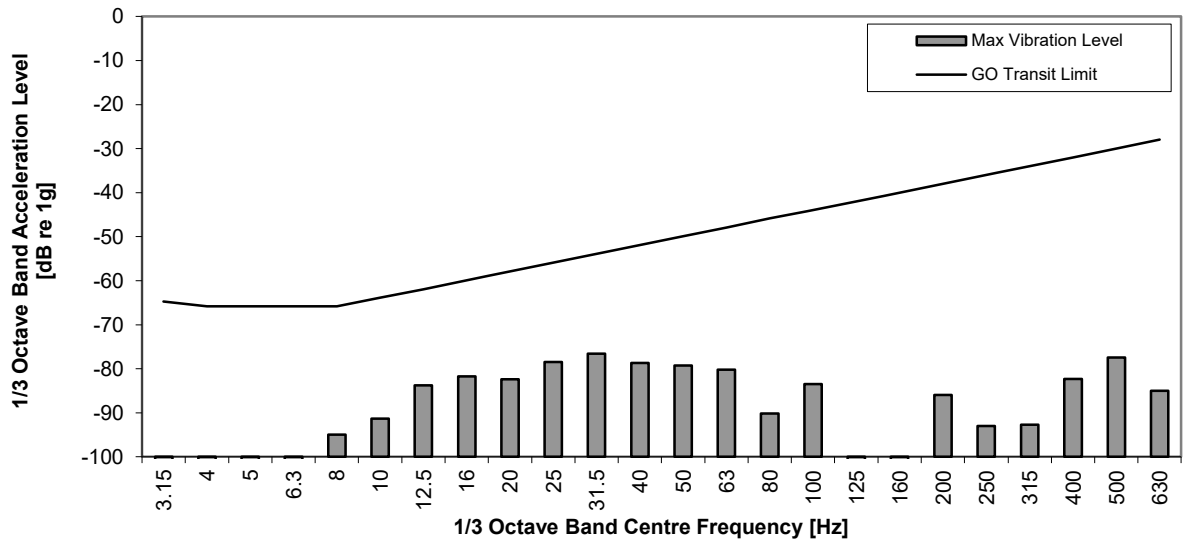
**Figure 5b: Pass-by 2, 30 m from right-of-way
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



**Figure 6a: Pass-by 3, 30 m from right-of-way
Measured Vibratory Velocity Level**



**Figure 6b: Pass-by 3, 30 m from right-of-way
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



ACOUSTICS

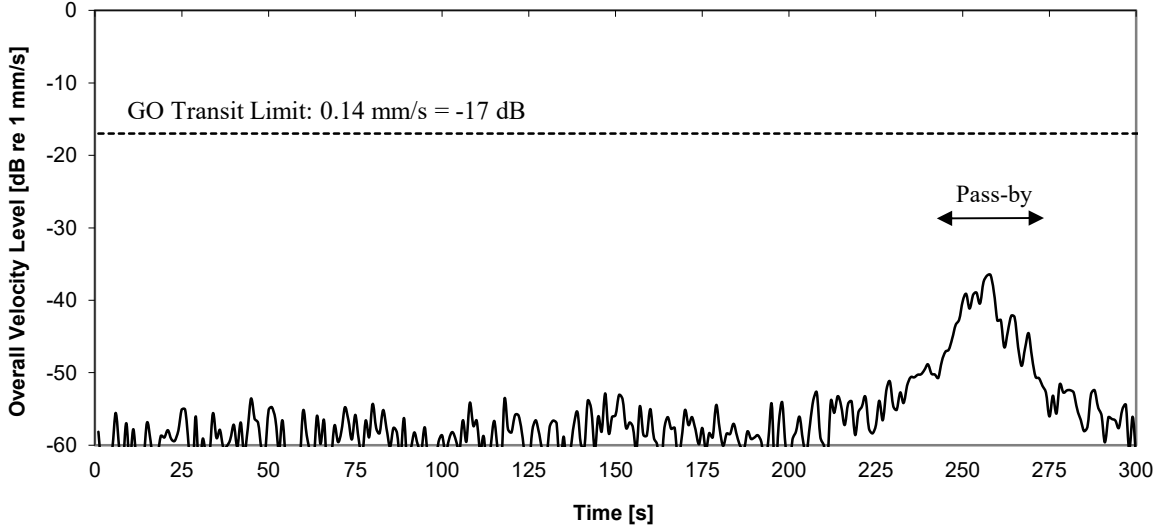


NOISE

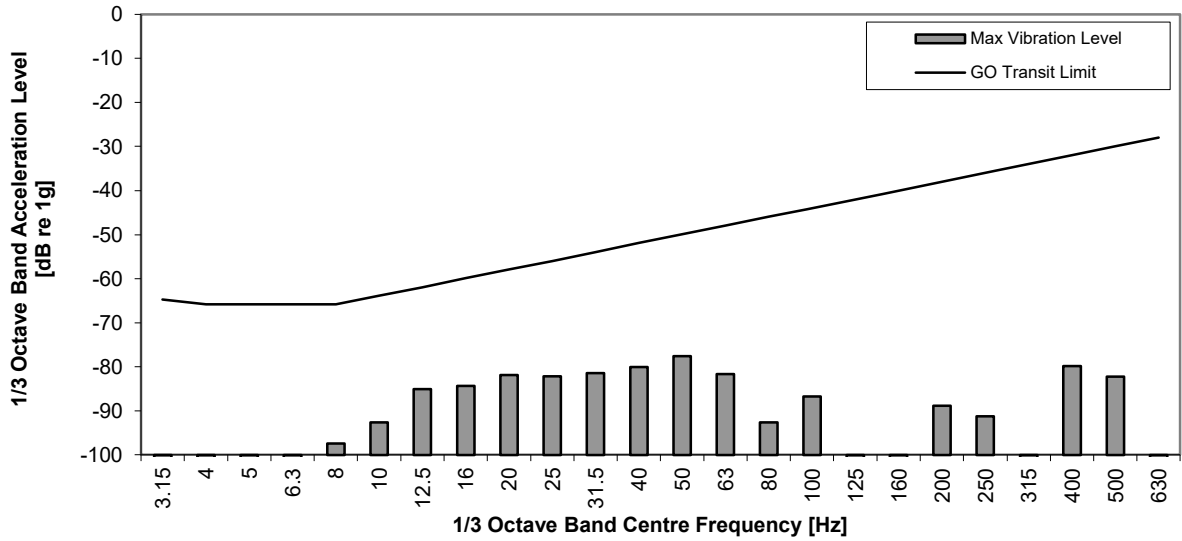


VIBRATION

**Figure 7a: Pass-by 4, 30 m from right-of-way
Measured Vibratory Velocity Level**



**Figure 7b: Pass-by 4, 30 m from right-of-way
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



Appendix A

GO Transit Requirements



ACOUSTICS



NOISE



VIBRATION



PRINCIPAL MAIN LINE REQUIREMENTS FOR NEW DEVELOPMENT

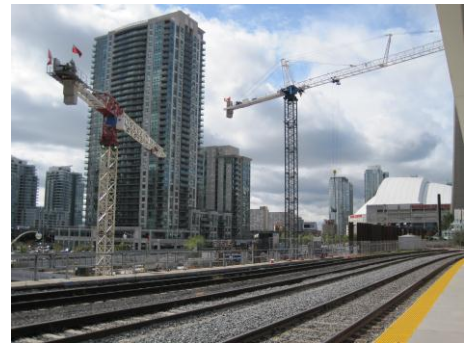
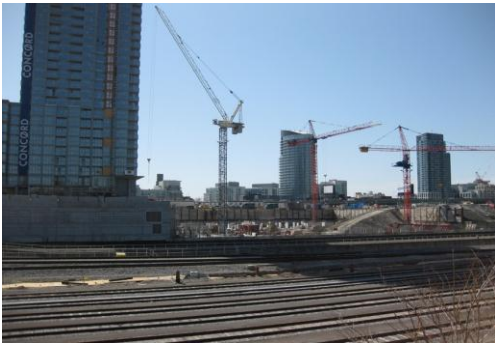
- A. Safety setback of dwellings from the railway rights-of-way to be a minimum of 30 metres in conjunction with a safety berm. The safety berm shall be adjoining and parallel to the railway rights-of-way with returns at the ends, 2.5 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.
- B. Noise attenuation barrier shall be adjoining and parallel to the railway rights-of-way, having returns at the ends, and a minimum total height of 5.5 metres above top-of-rail. Acoustic fence to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre of surface area. Subject to the review of the noise report, GO Transit may consider other measures recommended by an approved Noise Consultant.
- C. Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec RMS between 4 Hz and 200 Hz. The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, ± 3 dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.
- D. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.
- E. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way.

Warning: Metrolinx, carrying on business as GO Transit, and its assigns and successors in interest has or have a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future including the possibility that GO Transit or any railway entering into an agreement with GO Transit to use the right-of-way or their assigns or successors as aforesaid may expand their operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way.

- F. Any proposed alterations to the existing drainage pattern affecting the railway right-of-way must receive prior concurrence from GO Transit and be substantiated by a drainage report to the satisfaction of GO Transit.
- G. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the safety berm, fencing and vibration isolation measures implemented are not to be tampered with or altered and further that the Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of GO Transit.
- H. The Owner enter into an Agreement stipulating how GO Transit's concerns will be resolved and will pay GO Transit's reasonable costs in preparing and negotiating the agreement.
- I. The Owner may be required to grant GO Transit an environmental easement for operational emissions, registered on title against the subject property in favour of GO.

Metrolinx - GO Transit

Adjacent Development Guidelines



Document Approval Information

Document	Effective Date	Approved By
Adjacent Development Guidelines	01 April 2013	Grant Bailie

Section Proximity Guidelines	Subject Adjacent Development Guidelines	Issue Date January 21, 2013	Page 2 of 15
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Document Approval History

Version #	Date	Approved By	Description
1.0	10 January 2013	Grant Bailie	

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

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Review Cycle	Five-Year
File Name	Railway Corridor Management Office Adjacent Development Guidelines
File Location	Railway Corridors

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1. Introduction

GO Transit manages approximately 288 kilometres of Metrolinx-owned railway corridors, corresponding to about 68 per cent of the total railway network that GO Trains regularly operate over. By properly managing and maintaining these corridors and the nearly 535 kilometres of track they contain, GO Transit's Railway Corridors division helps to ensure that, every week, approximately one million train passengers travel to their destinations, safely and reliably.

The Railway Corridors Management Office (RCMO) resides within the GO Transit, Railway Corridors Division.

The RCMO supports safe and reliable train service through a variety of initiatives that include, but are not limited to, trespassing prevention, vegetation management (siteline preservation), anti-whistling initiatives, and general landlord responsibilities, such as debris and graffiti management. To achieve these goals, the RCMO oversees the railway right-of-way maintenance contractor and liaises with the municipalities our corridors pass through and other government agencies such as Transport Canada.

In addition, the RCMO reviews and provides comments on various development related applications for projects located within 300 metres of GO Transit managed railway corridors (including railway yards), to ensure a safe and reliable system and to minimize conflicts between proposed developments and current or planned GO Transit rail services.

2. Purpose

One of the key objectives of this document is to communicate relevant information to interested parties so that they may understand the implications of undertaking a development project in proximity to a GO Transit managed rail corridor and, as necessary, incorporate appropriate standards and "best practices" into their development plans.

The GO Transit adjacent development review process is in place in order to safeguard the integrity of the railway corridor and ensure that all development proceeds in a safe manner and that construction activities do not interfere with the maintenance or operations of GO Transit, nor obstruct future expansion of rail facilities.

GO Transit is committed to providing advice and support to proponents who are planning activities that interface with GO Transit managed railway corridors. As such, the RCMO is the first point of contact for all parties wishing to carry out new construction, repairs, and maintenance or demolition activities on any property adjacent to the railway corridor. Proponents are encouraged to contact GO Transit early in the development approvals process to discuss how these guidelines may be applicable to their project.

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GO Transit’s rail corridors are a critical component of the Greater Toronto and Hamilton Area’s (GTHA) urban fabric and pass through a diverse range of communities comprised of residential, commercial/industrial, and agricultural uses, as well as vacant lands. GO Transit 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 corridors and adjacent development activities.

3. Planning Framework

Land use decisions along railway corridors are generally fragmented and no single level of government has sole jurisdiction to address adjacent development issues.

Under the Provincial Planning Act (RSO2006 – through Ontario Regulations 543/06, 544/06 and 545/06), municipal planning departments must notify railway companies regarding proposed development activity within a 300 metres zone of influence adjacent to railway corridors. Through this process GO Transit has provided comments on a wide range of municipal land development matters including:

- Official Plan Amendments;
- Zoning By-Law Amendments;
- Plans of Subdivision;
- Site Plan Control Applications; and
- Minor Variance or Consent Applications.

The standards or “best practices” referenced in this document are intended to inform and influence municipal land development approval processes and provide a consistent framework for land use decisions made in proximity to GO Transit operated railway corridors. The measures have been developed through years of technical analyses and operational experience, and have been implemented by other rail operators such as CN and CP Rail.

While GO Transit’s railway corridors play a critical role from a commuter transportation perspective, they can also serve as physical barriers within a land development context. As communities mature on opposite sides of the corridor, pedestrian desire lines may be created (e.g., between a residential community on one side of the corridor and a school on the other side) and informal connections arise when holes are cut in fencing and pedestrians become trespassers on railway lands.

As such, GO Transit will also provide comments on various land development applications to discourage the creation of new desire lines across rail corridors and pursue formal (grade separated) connections to ensure that safe conditions are maintained, rail activity is not interrupted, and transit services are easily accessible. This approach complements the wider Metrolinx strategy of creating integrated mobility, as well as contributing to the development of higher quality infrastructure for pedestrians and cyclists and providing safer and more pleasant environments.

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It is acknowledged that past planning decisions and administrative practices have resulted in a multitude of development circumstances on properties adjacent to GO corridors, some of which are not consistent with the practices set out in this document and which may consequently be regarded as 'legal non-conforming' development. GO Transit's intent is to ensure that all new development incorporates the measures identified herein. When considering re-development proposals for non-conforming properties, the existing rights will be considered, but any modifications extending beyond the established rights will not be permitted without the implementation of appropriate mitigation measures.

GO Transit may appeal any potential land use compatibility issue to the Ontario Municipal Board, within the legislative appeal period, for Official Plan and Zoning By-law Amendments, Plans of Subdivision, and Minor Variance of Consent applications. Site Plan applications not associated with the above-noted planning applications are not subject to appeal.

4. GO Transit Operated Corridors Map

Figure 1 provides an overview of all GO Transit managed railway corridors. It should be noted that some of these corridors are currently owned by other operators, such as CN and CP Rail and as such, they are the primary commenting agencies for adjacent development activities along their lines. The principles set out in this document are also upheld by these operators.

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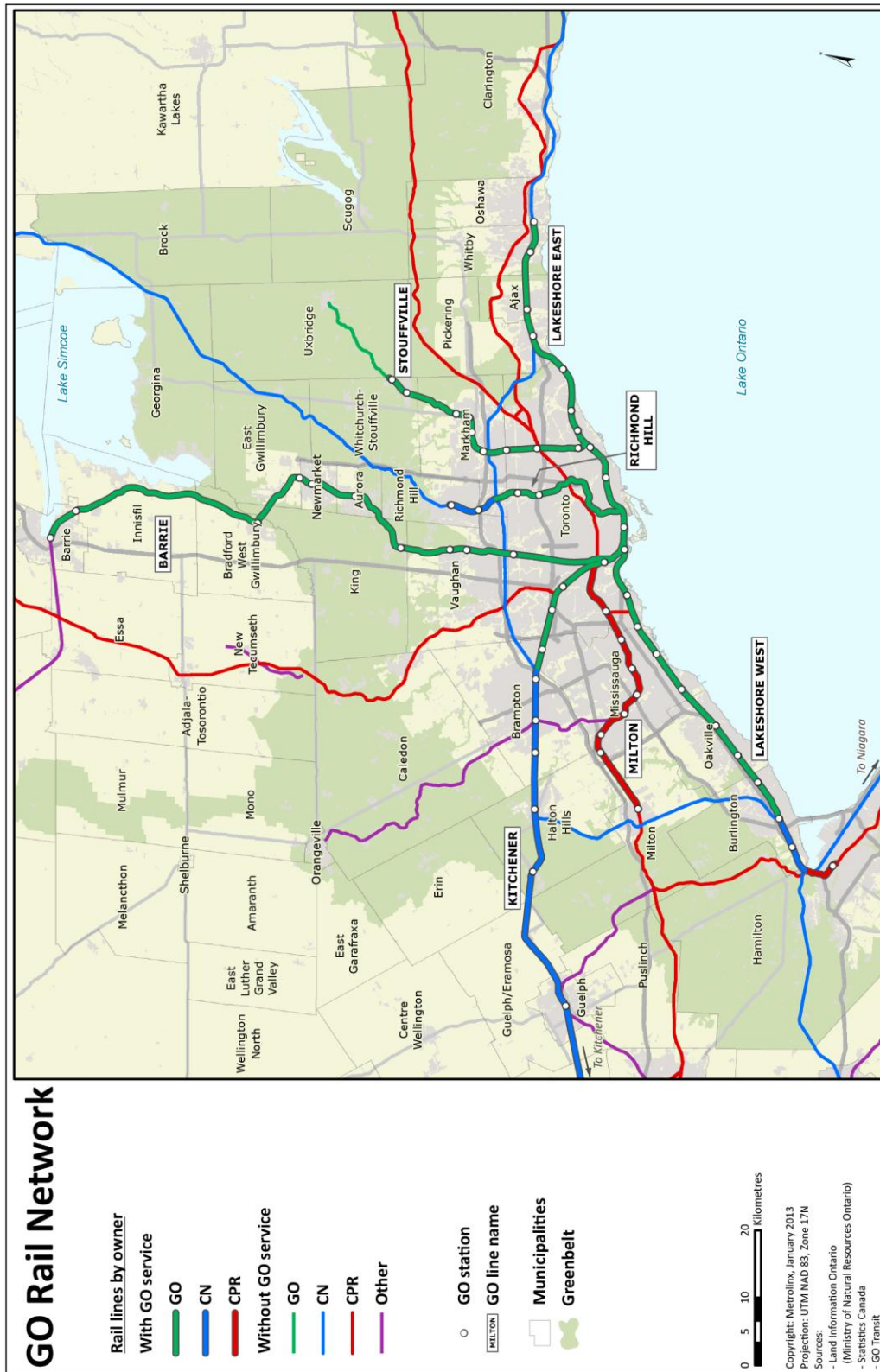


Figure 1: GO Transit Managed Railway Corridors

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5. GO Transit Land Use Guidelines

A list of general safety measures, technical studies, and legal agreements typically considered for developments adjacent to the rail corridor are presented in **Table 1**, with each organized on the basis of the applicable land use.

The majority of these measures are to be considered for development located immediately adjacent (with direct exposure) to rail corridors. However, certain measures (such as noise studies and environmental easements) are applied within a zone extending 300 metres from the rail corridor. These measures are also primarily directed at Principal Main Line applications, where train volumes generally exceed 5 trains per day, higher train speeds may be observed, and crossings, gradients and other factors may increase normal railway noise and vibration. All GO Transit corridors are considered Principal Main Lines.

GO Transit considers the measures identified for *residential* development to be mandatory and may refer cases that fail to incorporate these requirements to the Ontario Municipal Board. Measures identified for other (*non-residential*) land uses are recommended and final decisions regarding their applicability are to be established by the local municipal staff together with the proponent. In a case where the proposed development incorporates mixed uses, including residential, the more stringent (residential) requirements would apply.

The general safety measures identified in Table 1 are discussed in section 6 of this report; technical studies are identified in section 7, and warning clause and legal agreements are reviewed in section 8.

Land Use	General Safety Measures			General Technical Studies			Dev. Agreement / Env. Easement
	Setback	Berm	Fencing	Drainage	Noise	Vibration	
Residential	Mandatory 30 Metres	Mandatory 2.5 Metres	As Required 1.83 Metres	As Required	Mandatory	Mandatory	Mandatory
Commercial	Recommended 30 Metres	Recommended 2.5 Metres	As Required 1.83 Metres	As Required	Recommended	Recommended	Not required
Industrial	Recommended 15 Metres	Recommended 2.0 Metres	As Required 1.83 Metres	As Required	Recommended	Recommended	Not required
Institutional	Recommended 30 Metres	Recommended 2.5 Metres	As Required 1.83 Metres	As Required	Recommended	Recommended	Not required
Intensively Used Grounds	Recommended 30 Metres	Recommended 2.5 Metres	As Required 1.83 Metres	As Required	Recommended	Recommended	Not required
Low Occupancy Land Uses	Not Required*	Not Required*	As Required 1.83 Metres	As Required	Not Required	Not Required	Not required
Zone of Influence	Immediately Adjacent Sites (up to 120 Metres)				Sites within 300 Metres	Sites within 75 Metres	Sites within 300 Metres

Table 1: GO Transit Land Use Guidelines - Standard Measures and Studies for Adjacent Development

*Protection for certain uses (e.g., parking garages) may be desirable – to be determined at the discretion of the proponent/municipality.

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6. General Safety Measures

6.1 Building Setback Requirements

Building setback requirements are established to provide a buffer zone that contains the impacts associated with a potential train derailment; permits dissipation of rail-oriented emissions, vibration, and noise; and accommodates a safety barrier. As indicated in Table 1, setback distances vary by land use and occupancy status. The following provides an overview of building setback requirements and conditions:

- The minimum building setback distance is measured from the mutual property line to the building face. The mutual property line is always the reference point for building setbacks, regardless of area conditions.
- Under typical conditions, the setback is measured as a straight-line horizontal distance. **Figure 2** below provides an illustration of a typical setback and berm installation for residential construction.

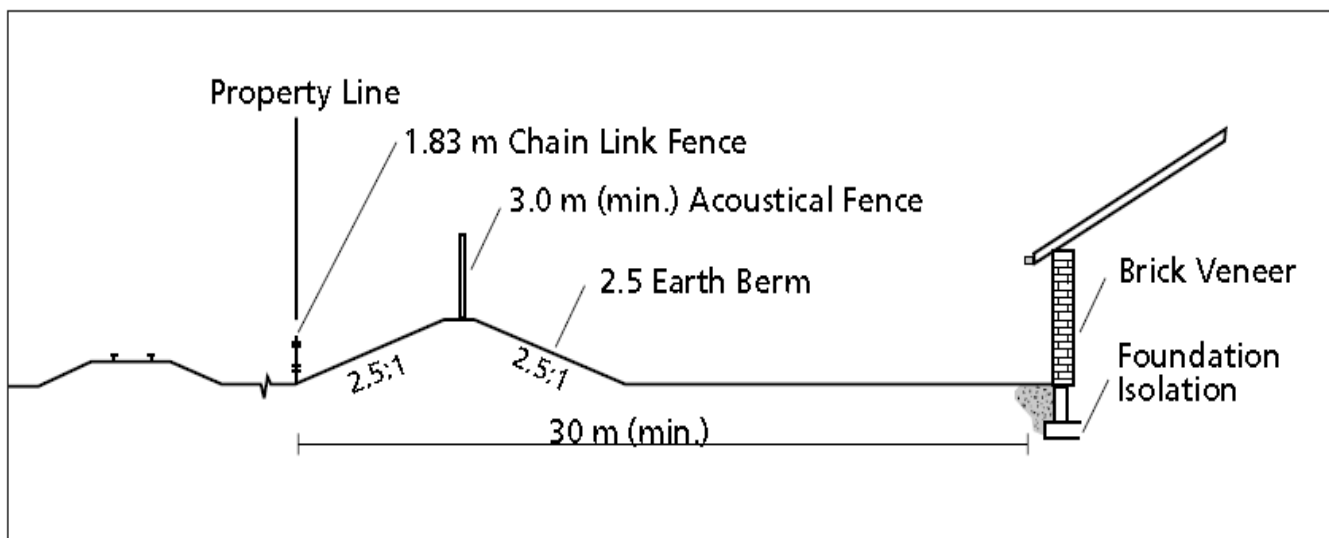


Figure 2: Typical Building Setback and Berm for Residential Construction

Source: Earthtech Canada, "Final Report; Proximity Guidelines and Best Practices", RAC/FCM Proximity Guidelines

- 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 value add up to meet the 30m requirement (illustrated in **Figure 3**).

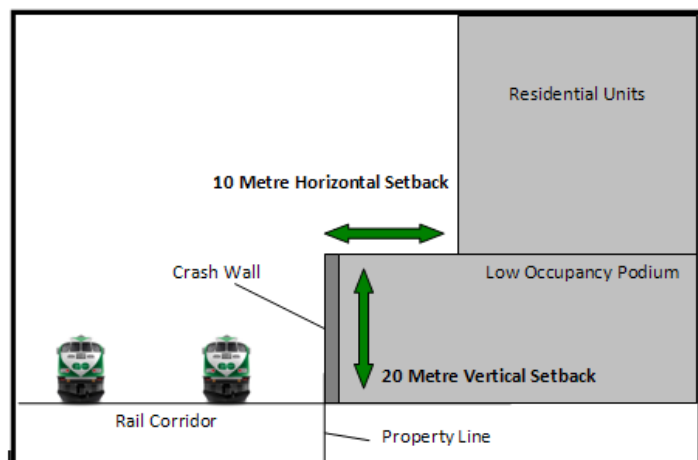


Figure 3: Building Setback - Spatially Constrained Site

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- When the adjacent rail line is located in a cut measuring in the order of 4.0 metres deep or greater, the slope may be included as part of the building setback (measured from the toe of the slope).
- Low occupancy land uses (such as parking, storage, open space) do not require a specific setback and are acceptable uses within the setback zone of another use.
- The mutual property line may be redefined in cases where rail corridor expansion is required and the minimum setback distance would be measured from the new property line.
- Existing building setbacks may vary by location and do not set the precedent for new development.

6.2 Safety Barrier Requirements

Safety Barriers in the form of a berm or crash wall are required to absorb the impacts of a possible derailment and provide physical protection for adjacent properties. As indicated in Table 1, safety barrier requirements vary by land use and occupancy status. The following provides an overview safety barrier requirements and conditions:

Berm:

- Where full building setbacks can be provided, safety barriers are constructed as *berms*. Setbacks and berms are to be provided together in order to afford a maximum level of mitigation (refer to Figure 2).
- In the absence of intervening uses, safety barriers are required for lands within up to 120 metres from the railway corridor, with the required barrier height diminishing with distance.
- Berm heights (measured from the property line elevation) may vary by land use (refer to Table 1).
- Alternate berm designs (e.g., using retaining walls) may be considered for spatially constrained locations. The intent is to provide a level of energy absorption equivalent to that of a standard berm. Such designs will be subject to review/approval by GO Transit's Third Party Project consultant (refer to Section 9.0)
- 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 adjacent rail line is located in a cut measuring in the order of 4.0 metres or deeper, no supplemental safety barrier is required.

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Crash Wall:

- Where circumstances dictate (e.g. for spatially constrained urban sites), a crash wall may be required (refer to Figure 3).
- Crash wall specifications are set out in the *Crash Wall Guidelines* document prepared by GO Transit's Third Party project consultant. The proponents engineer must demonstrate that the crash wall will afford a level of protection at least equivalent to a standard berm (with a higher level of protection if no setback will be provided and the subject land use involves a high level of human occupancy). Such designs will be subject to review and approval by GO Transit's Third Party Project consultant (refer to Section 9.0).
- Low occupancy uses (such as parking, storage, passive parks) may not require a safety barrier, although the proponent/area municipality may wish to provide such protection for insurance or other purposes.

6.3 Fencing Requirements

Fencing is established to define railway property and discourage trespassing onto the railway corridor. As indicated in Table 1, new fencing installations are required irrespective of the land use and occupancy status. The following provides an overview of fencing requirements and conditions:

- For all new developments adjacent to the rail corridor, an appropriate fencing type along the boundary line is required to be installed by the property developer as a condition of subdivision/site plan approval.
- The current minimum standard is a 1.83 m high chain link fence. GO Transit also reserves the right to advise the developer whether a higher security fencing type is required. All costs for fencing associated with new developments are paid in full by the property developer.
- In the case of private fencing (residential, commercial, industrial, institutional etc.), the adjacent landowner is responsible for the continued maintenance and upkeep of fencing systems along the mutual property line.
- Noise attenuation 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.



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- If the selected fencing is comprised of a solid surface, efforts should be made to discourage graffiti – for example, through the use of visually appealing landscaping that prevents direct access to the barrier face.

7. General Technical Studies

7.1 *Noise and Vibration Studies*

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. As indicated in Table 1, noise and vibration study requirements vary by land use and occupancy status. The following provides an overview of noise and vibration study requirements and conditions:

- Noise standards are to be applied to residential development within 300 metres of the rail corridor.
- Acoustical analysis is recommended for other non-residential uses where there may be sensitivity to noise (e.g., day care centres, offices with sensitive equipment etc.).
- Noise attenuation barriers may be required for projects (primarily residential) that include outdoor amenity areas. These barriers shall be located adjoining and parallel to the railway right-of-way, having returns at the ends and a minimum total height of 5.5 metres above top-of-rail.
- Other measures (e.g. provision of air conditioning, enhanced windows and building materials, etc.) 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 other non-residential forms of development.
- Special considerations may apply at locations where trains are stored and/or operate at reduced speed/idle, as well as in areas with unique operating characteristics (e.g. use of snow blowers, specialized machinery, etc.).
- Vibration standards are to be applied to development within 75 metres of the rail corridor.
- Isolation measures will be required where vibration levels exceed the established standards.

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7.2 Drainage and Other Technical Studies

Drainage and other studies may be required to ensure, through an analysis of the surrounding environment, that the rail corridor is not adversely affected by, or does not adversely affect area development.

The following provides an overview of drainage and other study requirements and conditions:



- Any proposed alterations to the existing rail corridor drainage pattern (i.e., into and/or out of) must receive approval by GO Transit and be substantiated by a drainage report completed by a Geotechnical Engineer.
- Any development related changes to drainage patterns must be addressed using infrastructure and/or other means located entirely within the confines of the subject development site.
- Other technical studies may be required depending on the characteristics and location of the subject project. For example, additional studies are typically required for properties within the vicinity of the Union Station Rail Corridor (USRC) due to the heavy rail traffic volumes and spatial constraints in that area. Typical studies may include:
 - ✓ Air Quality Study;
 - ✓ Micro Climate (Wind/Snow Accumulation) Study;
 - ✓ Structural Engineering Report; and
 - ✓ Pedestrian Management Plan

Drainage studies and other technical studies may be subject to review and approval by GO Transit's Third Party Project consultant (refer to section 9) depending on the prevailing circumstances.

8.0 Warning Clause and Development Agreements

A Warning Clause is required and may be delivered together with other legal agreements to formalize owner rights and responsibilities with respect to the purchase and development of lands in the vicinity of railway corridors. The need for and nature of development agreements will vary depending on the characteristics and location of the subject project.

The proponent is responsible for all costs related to the preparation and negotiation of the agreements.

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8.1 Warning Clause

To advise new or prospective property owners of the potential adverse impacts resulting from the adjacent railway operations, a Warning Clause will be pursued by GO Transit.

The Warning Clause will be inserted in all Development Agreements, Offers to Purchase, and Agreements of Purchase and Sale or Lease for any new residential dwelling unit within 300 metres of the railway corridor (as well as for other non-residential development projects with noise-related issues). The following is the current version of the warning clause:

Warning: Metrolinx, carrying on business as GO Transit, and its assigns and successors in interest has or have a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future including the possibility that GO Transit or any railway entering into an agreement with GO Transit to use the right-of-way or their assigns or successors as aforesaid may expand their operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way.

Other warning clauses may be applied depending on prevailing circumstances.

8.2 Development Agreements

In cases where a new development is located immediately adjacent to a railway corridor, the property owner will be required to enter into a Development Agreement with Metrolinx stipulating how GO Transit's interests will be protected throughout the lifetime of the project (from construction start to on-going building occupation). GO Transit's interests typically focus on ensuring that the applicable safety and noise/vibration mitigation measures are suitably provided and maintained.

The Development Agreement will also include 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 does not extend to the rail corridor, the easement can be registered through the use of an abbreviated agreement document.

Additional Development Agreements may be necessary on a short-term (e.g. during construction) or on an ongoing basis depending on the nature of the project and the proximity to the rail corridor. Examples of such agreements include:

- ✓ Crane Swing Agreement;
- ✓ Temporary Hording or Fencing Agreement;
- ✓ Tiebacks/Shoring Agreement;
- ✓ Required Maintenance Agreement; and
- ✓ Access Easements

Section	Subject	Issue Date	Page
Proximity Guidelines	Adjacent Development Guidelines	January 21, 2013	14 of 15

9.0 Third Party Project Approval

The Third Party Project approval process is in place to safeguard the integrity of the railway corridor and ensure that all work proceeds in a safe manner and that does not interfere with the maintenance or operations of GO Transit, nor obstruct future expansion of rail facilities. What may appear to be a corridor of land with rail lines running along it may in fact be a corridor of complex, tightly packed, high-tech communication and other public and private infrastructure that must be carefully managed.

Proponents of Adjacent Developments should also reference the GO Transit Third Party Approval Process Guidelines for more information.

9.1 Role of Third Party Consultant

In October 2012, GO Transit/Metrolinx awarded a new contract for management of all Third Party Projects to AECOM Canada Ltd. (RQQ-2012-RCM-019). Under the terms of this contract, it is AECOM's responsibility, under the direction of the RCMO, to protect the interests of GO Transit for all proposed works within and, in some cases, immediately adjacent to the railway corridor. Funding is obtained through the proponent to cover AECOM's review and coordination of services. There are different types and levels of analysis, approvals, consultation and timelines that can be expected depending on the nature of the project(s) in question. An overview of the types of projects and activities that will require AECOM's services as part of the approval process for adjacent development, as well as details pertaining to AECOM's typical role in relation to each case, is provided below.

Drainage Review: AECOM's role typically includes:

- reviewing drainage and grading plans/reports to ensure that post development flows do not increase and adversely impact the integrity of the railway corridor and that suitable infrastructure is in place to accommodate site-related drainage;

Crash Wall Analysis: AECOM's role typically includes:

- providing applicable guidelines to the proponent for reference (refer to Appendix A); and
- reviewing crash wall designs and plans to ensure compliance with railway standards and structural guidelines.

Structural Analysis: AECOM's role typically includes:

- reviewing structural (shoring/tieback) plans for any proposed structure(s) that could impact GO Transit facilities or infrastructure.

Access for Working within or Adjacent to the Railway Right-Of-Way: AECOM's role typically includes:

- reviewing and commenting on the scope of work proposed including type of construction activity and machinery to be utilized in order to protect the integrity of the railway and ensure that all operational and safety requirements of GO Transit are strictly followed;

Section	Subject	Issue Date	Page
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- ensuring there are no objections or conflicts to the proposed work;
- issuing a “Work Permit” on behalf of GO Transit when all requirements are satisfied.

Railway Orientation/Security Awareness Course - Right-Of-Way Work: AECOM's role typically includes:

- ensuring all persons performing work at track level have the necessary training to do such work: personnel must display the appropriate hard hat sticker or carry proof of training such as a wallet card and adhere to applicable rules and regulations at all times while within the rail corridor. AECOM also arranges for appropriate flagging protection for the subject work.

AECOM may also be required to review various studies including air quality and micro climate (wind/snow accumulation) studies or pedestrian management plans.

10. Role of Other GO Transit / Metrolinx Departments

RCMO coordinates internal GO Transit/Metrolinx review, comments and approvals as well as coordinating the execution of any required agreements or real estate related issues (e.g. easements, sale of property) as required. The following internal stakeholders may be consulted as part of the adjacent development review process:

Realty Services – 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.

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 tieback/shoring agreements) and land transactions.

Risk Management – provides direction for all liability and insurance requirements.

Construction Management Office (CMO) – conducts reviews and provides approvals for any construction or access requirements where GO Transit is the Constructor to ensure that work proceeds in accordance with Occupational Health and Safety best practices. CMO will also provide training to all construction personnel accessing the GO construction zone and coordinate with other contractors working in GO construction zones, and advise of conflicts if any.

Corporate Infrastructure – provides direction to ensure that existing and planned GO Transit infrastructure projects are coordinated with and, most importantly, not adversely affected by adjacent development activities.

Policy Planning and Innovation – provides direction on issues pertaining to GO Transit Service expansion plans and Mobility Hub development initiatives.

Appendix B

Rail Traffic Data



ACOUSTICS



NOISE



VIBRATION

Sheeba Paul

From: Rail Data Requests <RailDataRequests@metrolinx.com>
Sent: April-22-19 8:33 AM
To: Sheeba Paul
Cc: Brandon Gaffoor; Adam Snow
Subject: RE: rail data request

Follow Up Flag: FollowUp
Flag Status: Flagged

Good Morning Sheeba,

Further to your request dated April 17, 2019, the subject site (in proximity to Killarney Beach Road and 20th Side Road, Innisfil) is located within 300 metres of Metrolinx's Newmarket Subdivision, which carries Barrie GO train service.

It's anticipated that GO service on this subdivision will be comprised of electric trains within (at least) a 10-year time horizon. The combined preliminary midterm weekday train volume forecast at this location, including both revenue and equipment trips is in the order of 42 (36 day, 6 night). Trains will be comprised of a single locomotive and up to 12 passenger cars.

The current maximum design speed on this corridor is 80 mph (129 km/h).

With respect to future electrified rail service, Metrolinx is committed to finding the most sustainable solution for electrifying the GO and UP Express rail network and we are currently working towards the next phase. Metrolinx has not made a final decision regarding the electric train technology or technologies to be deployed. We can, however, provide the following interim information which may be helpful;

1. At lower speeds, train noise is dominated by the powertrain. At higher speeds, train noise is dominated by the wheel-track interaction. Hence, at higher speeds, the noise level and spectrum of electric trains is expected to be very similar, if not identical, to those of equivalent diesel trains.
2. Along with electrification, Metrolinx will intensify service levels along all of its corridors to deliver the promised GO Expansion service. Everything else being equal, this will likely result in an overall increase in train noise emissions.

Given the above considerations, it would be prudent, for the purposes of acoustical analyses, 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.

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

I trust this information is useful. Should you have any questions or concerns, please do not hesitate to contact me.

Best Regards,

IVAN CHEUNG

Intern | Third Party Projects Review
Pre-Construction Services | Capital Projects Group
Metrolinx
20 Bay Street, Suite 600 | Toronto | Ontario | M5J 2W3
T: 416-202-5920



From: Sheeba Paul [mailto:spaul@hgcengineering.com]
Sent: April-17-19 12:56 PM
To: Rail Data Requests
Cc: Brandon Gaffoor; Adam Snow
Subject: RE: rail data request

Hello,

HGC Engineering is performing a noise study update for a proposed residential development in Innisfil. A google map is provided in the link below.

<https://www.google.com/maps/place/Innisfil,+ON/@44.261426,-79.5636411,1494m/data=!3m1!1e3!4m5!3m4!1s0x882ab00dc176ce35:0xf7066f5ec40dbd0a!8m2!3d44.3008813!4d-79.6114973>

We are requesting rail data for the railway line near the subject site. I have attached rail data from another site along the same railway line for your reference.

- Rail data including number of trains per day/night, speed, number of cars and locomotives

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Associate

HGC Engineering NOISE / VIBRATION / ACOUSTICS
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2000 Argentia Road, Plaza One, Suite 203, Mississauga, Ontario, Canada L5N 1P7
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Victor Garcia

From: Adam Snow <Adam.Snow@gotransit.com>
Sent: November-18-16 10:58 AM
To: Sheeba Paul
Subject: RE: GO Transit/Metrolinx rail data, Barrie, ON

Hi Sheeba – The data provided by Brandon and the site you mention (Mapleview Drive) are two different places. At Mapleview the speed limit through the station area is 80 kph (50 mph). Does that help?

Adam

Adam Snow

Third Party Projects Officer, Rail Corridor Management Office, Rail Corridors, GO Transit
Metrolinx | 335 Judson Street | Toronto | Ontario | M8Z 1B2
***NEW* T: 416-202-0134 C: 416-528-4864 F: 416-354-7731**

From: Sheeba Paul [mailto:spaul@hgcengineering.com]
Sent: October-10-16 3:56 PM
To: Adam Snow
Cc: zdep_Brandon Gaffoor
Subject: RE: GO Transit/Metrolinx rail data, Barrie, ON

Hello Adam

Our client on this project (Mapleview Drive, east of Yonge Street and the GO railway line in Barrie, Ontario) is objecting to the extent of the recommended noise mitigation measures based on their understanding that the train will never be able to achieve 128 kph in practice due to the proximity of the stations.

Could you please review the data for this section of the railway line and let us know if we can utilize lower speeds in our modelling due to the proximity of the stations?

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Associate

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From: Brandon Gaffoor [mailto:Brandon.Gaffoor@gotransit.com]
Sent: June-16-16 10:07 AM

To: Sheeba Paul <spaul@hgcengineering.com>
Cc: Adam Snow <Adam.Snow@gotransit.com>
Subject: RE: GO Transit/Metrolinx rail data, Innisfil, ON

Hello Sheeba,

Further to your request of June 3, 2016, it's anticipated that GO Service on the adjacent Barrie Line will be comprised of electric trains (with power supplied by overhead catenaries) within (at least) a 10 year time horizon. The preliminary midterm (2025) weekday train volume forecast at this location, including both revenue and equipment trips, is in the order of 44 trains (Electric: 33 day, 11 night). Trains will be comprised of a single locomotive and up to 12 passenger cars.

The maximum design speed on the Barrie line, adjacent to the subject site, is 128 kph (80 mph).

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

With respect to future electrified rail service, it should be noted that Metrolinx has not made a final decision regarding the electric train technology or technologies to be deployed. Similarly, we are only beginning to understand potential noise and vibration implications associated with electrification. We can, however, provide the following interim information which may be helpful:

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

2. Along with electrification, Metrolinx will intensify service levels along all of its corridors to deliver the promised Regional Express Rail (RER) service. Everything else being equal, this will likely result in an overall increase in train noise emissions.

Given the above considerations, it would be prudent, at this time, to not expect any improvement in noise impacts due to electrification. Additional information regarding specific operational parameters will become available in the near future. General information about the program can be found here:
http://www.gotransit.com/electrification/en/info/fact_sheets.aspx.

I trust that this information is useful. Please feel free to contact me should you have any additional questions. Please keep us informed as this process moves forward.

Kind Regards,

Brandon Gaffoor

Co-op Student | Rail Corridor Management Office | Rail Corridors
Metrolinx | 335 Judson Street | Toronto | Ontario | M8Z 1B2
✉ | Brandon.Gaffoor@GoTransit.com
☎ | 416.354.7739



From: Sheeba Paul [<mailto:spaul@hgcengineering.com>]
Sent: June-03-16 11:21 AM
To: Adam Snow
Cc: Zdor_Vasya Jeyakanthan; Christine Fandrich; Brandon Gaffoor
Subject: RE: GO Transit/Metrolinx rail data, Innisfil, ON

Hello Adam,

HGC Engineering is performing a noise study update for a proposed residential development in Innisfil, Ontario. The site is located on the south side of Killarney Beach Road and east of the railway line.

Please find attached a Google link for your reference.

<https://www.google.ca/maps/place/Killarney+Beach+Rd+%26+Corner+Ave,+Innisfil,+ON+L0L+1W0/@44.2622938,-79.5562897,17z/data=!3m1!4b1!4m5!3m4!1s0x882ab7792f95cfa5:0x7140046944237c3b!8m2!3d44.26229!4d-79.554101>

We would like to request rail traffic data for the railway line that runs north/south. The client also asked if the tracks are going to be twinned in this area.

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Associate

HGC Engineering NOISE / VIBRATION / ACOUSTICS
Howe Gastmeier Chapnik Limited

2000 Argentia Road, Plaza One, Suite 203, Mississauga, Ontario, Canada L5N 1P7

t: 905.826.4044 e: spaul@hgcengineering.com

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Appendix C

Road Traffic Data



ACOUSTICS



NOISE



VIBRATION

Sheeba Paul

From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: October-16-20 9:51 AM
To: Sheeba Paul
Subject: Re: Road Traffic Data Request - Mapleview Drive East & Yonge Street

Good morning Sheeba,

I have updated the numbers to reflect the 2019 Transportation Master Plan.

Yonge Street 12,5000 vehicles per day with 3% commercial and 2% heavy; with a growth of 4% per year compounded annually to a horizon year of 2031.

Mapleview Drive 10,000 vehicles per day with 4% commercial and 3; with a growth of 6% per year compounded annually to a horizon year of 2031.

Thanks,

Justin MacDonald

From: Sheeba Paul <spaul@hgcengineering.com>
Sent: Thursday, October 15, 2020 2:31 PM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Subject: RE: Road Traffic Data Request - Mapleview Drive East & Yonge Street

Hello Justin,

We are updating the noise study for the proposed mid-rise development and require new traffic forecasts.

The site is located on the south side of Mapleview Drive East, on the east side of the railway in Barrie, Ontario. A google link is included in your reference:

<https://www.google.com/maps/place/Mapleview+Dr+E+%26+Yonge+St,+Barrie,+ON/@44.3486415,-79.627924,15.75z/data=!4m5!3m4!1s0x882abb0d2eca50eb:0xbaf222aad43551fc!8m2!3d44.348442!4d-79.627305>

We require road traffic data for Mapleview Drive East and Yonge Street (typically AADT counts) and commercial vehicle percentages.

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Associate

HGC Engineering NOISE / VIBRATION / ACOUSTICS
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From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: August-31-16 11:25 AM
To: Victor Garcia <vgarcia@hgcengineering.com>
Subject: RE: Road Traffic Data Request - Mapleview Drive East & Yonge Street

Good morning Victor,

Sorry for the delay I was collecting the required information.

Yonge Street 11,000 vehicles per day with 3% commercial and 2% heavy; with a growth of 4% per year compounded annually to a horizon year of 2031.

Mapleview Drive 6,000 vehicles per day with 4% commercial and 3; ; with a growth of 4% per year compounded annually to a horizon year of 2031.

Hopefully this helps, should you have any questions please let me know.

Thanks,

Justin MacDonald, C.E.T.
Transportation Technologist
(705) 739-4220 ext. 5178

From: Victor Garcia [<mailto:vgarcia@hgcengineering.com>]
Sent: Wednesday, August 31, 2016 8:55 AM
To: Justin MacDonald
Subject: FW: Road Traffic Data Request - Mapleview Drive East & Yonge Street

Can you please give me an update on the request below?

Thanks,

Victor Garcia, P.Eng
HGC Engineering NOISE / VIBRATION / ACOUSTICS
Howe Gastmeier Chapnik Limited
t: 905.826.4044

From: Victor Garcia
Sent: August-22-16 12:30 PM
To: 'justin.macdonald@barrie.ca' <justin.macdonald@barrie.ca>
Subject: Road Traffic Data Request - Mapleview Drive East & Yonge Street

Good afternoon,

We are conducting a noise feasibility study for a proposed residential development located on Mapleview Drive East, on the east side of the railway in Barrie, Ontario. A google link is included in your reference:

<https://www.google.com/maps/place/Yonge+St+%26+Mapleview+Dr+E,+Barrie,+ON,+Canada/@44.3482655,-79.6256528,18z/data=!3m1!1e3!4m2!3m1!1s0x882abb0d2eca50eb:0xbaf222aad43551fc>

We require road traffic data for Mapleview Drive East and Yonge Street (typically AADT counts) and commercial vehicle percentages. Is this data available?

Regards,

Victor Garcia, P.Eng
Project Engineer

HGC Engineering [NOISE / VIBRATION / ACOUSTICS](#)

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Appendix D

Sample STAMSON 5.04 Output



ACOUSTICS



NOISE



VIBRATION

Filename: a.te Time Period: Day/Night 16/8 hours
 Description: Pred. Loc. [A], Building A facing Mapleview Dr

Rail data, segment # 1: GO Transit (day/night)

Train Type	! Trains (Left)	! Trains (Right)	! Speed (km/h)	!# loc /!Train	!# Cars /!Train	! Eng type	!Cont !weld
1. Passenger	19.0/3.0	19.0/3.0	80.0	1.0	12.0	!Diesel	No

Data for Segment # 1: GO Transit (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 45.00 / 45.00 m
 Receiver height : 16.50 / 16.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Whistle Angle : 85 deg Track 1
 Reference angle : 0.00

Results segment # 1: GO Transit (day)

LOCOMOTIVE (0.00 + 60.45 + 0.00) = 60.45 dBA

Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 90 0.14 69.25 -5.42 -3.39 0.00 0.00 0.00 60.45

WHEEL (0.00 + 55.12 + 0.00) = 55.12 dBA

Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 90 0.24 64.68 -5.92 -3.64 0.00 0.00 0.00 55.12

LEFT WHISTLE (0.00 + 58.72 + 0.00) = 58.72 dBA

Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

69 85 0.14 75.42 -5.42 -11.29 0.00 0.00 0.00 58.72

RIGHT WHISTLE (0.00 + 49.26 + 0.00) = 49.26 dBA

Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

85 87 0.14 75.42 -5.42 -20.74 0.00 0.00 0.00 49.26

Segment Leq : 63.55 dBA

Total Leq All Segments: 63.55 dBA

Results segment # 1: GO Transit (night)

LOCOMOTIVE (0.00 + 55.44 + 0.00) = 55.44 dBA

Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 90 0.14 64.24 -5.42 -3.39 0.00 0.00 0.00 55.44

WHEEL (0.00 + 50.11 + 0.00) = 50.11 dBA

Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 90 0.24 59.67 -5.92 -3.64 0.00 0.00 0.00 50.11

LEFT WHISTLE (0.00 + 53.71 + 0.00) = 53.71 dBA

Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

69 85 0.14 70.41 -5.42 -11.29 0.00 0.00 0.00 53.71

RIGHT WHISTLE (0.00 + 44.25 + 0.00) = 44.25 dBA

Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

85 87 0.14 70.41 -5.42 -20.74 0.00 0.00 0.00 44.25

Segment Leq : 58.54 dBA

Total Leq All Segments: 58.54 dBA

Road data, segment # 1: Yonge (day/night)

Car traffic volume : 10913/1213 veh/TimePeriod *

Medium truck volume : 113/13 veh/TimePeriod *

Heavy truck volume : 225/25 veh/TimePeriod *

Posted speed limit : 60 km/h

Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 12500

Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00

Medium Truck % of Total Volume : 1.00

Heavy Truck % of Total Volume : 2.00



ACOUSTICS



NOISE



VIBRATION

Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Yonge (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 263.00 / 263.00 m
Receiver height : 16.50 / 16.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Mapleview (day/night)

Car traffic volume : 8640/960 veh/TimePeriod *
Medium truck volume : 90/10 veh/TimePeriod *
Heavy truck volume : 270/30 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 10000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Mapleview (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 16.50 / 16.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Yonge (day)

Source height = 1.19 m

ROAD (0.00 + 47.23 + 0.00) = 47.23 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 90 0.22 65.99 0.00 -15.17 -3.60 0.00 0.00 0.00 47.23



ACOUSTICS



NOISE



VIBRATION

Segment Leq : 47.23 dBA

Results segment # 2: Mapleview (day)

Source height = 1.32 m

ROAD (0.00 + 62.65 + 0.00) = 62.65 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.22 65.92 0.00 -2.70 -0.57 0.00 0.00 0.00 62.65

Segment Leq : 62.65 dBA

Total Leq All Segments: 62.77 dBA

Results segment # 1: Yonge (night)

Source height = 1.19 m

ROAD (0.00 + 40.70 + 0.00) = 40.70 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 90 0.22 59.47 0.00 -15.17 -3.60 0.00 0.00 0.00 40.70

Segment Leq : 40.70 dBA

Results segment # 2: Mapleview (night)

Source height = 1.32 m

ROAD (0.00 + 56.11 + 0.00) = 56.11 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.22 59.38 0.00 -2.70 -0.57 0.00 0.00 0.00 56.11

Segment Leq : 56.11 dBA

Total Leq All Segments: 56.23 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.19

(NIGHT): 60.55



ACOUSTICS



NOISE



VIBRATION