

Noise and Vibration Feasibility Study

51, 57 Tannery Street and 208 Emby Drive


City of Mississauga, Ontario

Prepared for:

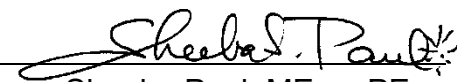
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June 24, 2019

Project Number: 01700190

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1 Introduction and Summary

HGC Engineering was retained by Nyx Tannery LP to conduct a noise and vibration feasibility study for their proposed residential development to be located at 51, 57 Tannery Street and 208 Emby Drive in the City of Mississauga, Ontario. There is a railway line located to the northeast of the site. The study is required by the municipality as part of their planning and approvals process.

This report has been updated to reflect the latest site plan prepared by Kirkor Architects dated April 15, 2019, latest rail traffic volumes from Metrolinx and CP. This report has also been updated to reflect the latest comments from the City. The relevant comments for noise and vibration and HGC Engineering's responses are provided in Appendix D.

Rail traffic data was obtained from HGC Engineering projects files and originally obtained from Canadian Pacific (CP) railway and Metrolinx personnel. Road traffic data was obtained from the City of Mississauga. The data was used to predict future traffic sound levels at the locations of the proposed dwelling facades and in the interior amenity area. The predicted sound levels were compared to the guidelines of the Ministry of the Environment, Conservation and Parks (MECP), CP and the municipality.

The sound level predictions indicate that the future rail traffic sound levels will exceed MECP guidelines at the dwelling units in the proposed development. A 6.0 m high crash wall and 3.0 m earth berm are proposed along and in parallel to a portion of the railway line. Central air conditioning is required for all of the townhouse blocks. Brick exterior construction is required for all of the townhouse blocks closest to the railway. Upgraded glazing constructions are required for the townhouse blocks in the development. When detailed floor plans and building elevations are available, the glazing constructions should be revised based on actual window to floor area ratios and the exterior wall constructions should be reviewed at the site plan approval stage. Warning clauses are recommended to inform future residents of the traffic noise impacts and the surrounding commercial/industrial uses.

Ground-borne vibration measurements were performed and measured vibration levels were below CP railway guidelines for train passbys at the location of the closest residential dwelling facades. Vibration mitigation is not required for this residential development.

2 Site Description and Sources of Sound

Figure 1 is a key plan showing the location of the site. The site is located at 51, 57 Tannery Street and 208 Emby Drive in the City of Mississauga, Ontario. Figure 2a is a proposed site plan prepared by Kirkor Architects + Planners dated April 15, 2019 and shows prediction locations. A preliminary derailment protection plan and sections prepared by JSW + Associates dated February 2018 were also used in the analysis and is attached as Figures 2b and 2c.

The proposed residential development will consist of seven blocks of stacked back-to-back townhouses with a central shielded amenity area/play area and underground parking. A site visit was made by HGC Engineering personnel on May 3, 10 and 12, 2017, to make observations of the acoustical environment and to perform ground-borne vibration measurements. During the site visits, it was observed that the railway is the dominant source of noise. Road traffic on Tannery Street and the future Emby Drive extension are secondary sources of noise and have been considered in the analysis.

The railway is located directly to the northeast of the site. The closest dwelling façade is approximately 25 m from the railway right-of-way. Lands to the north and west are primarily residential. To the northwest of the site is the Credit River Retirement Residence. Further to the northwest is the Streetsville Secondary School. On the northeast side of the railway and to the southeast are commercial uses including: Natalie's Hairstylist; Canine Coiffur; JJ's Auto; Hertz Truck Rental; and a Krown facility among other facilities to the south of the subject site. Garage doors for Krown are facing away from the development. To the west of the subject site are auto repair facilities with services for salt and landscaping equipment. These facilities are open during the daytime hours only and there are existing homes in close proximity to these uses. Sound from these sources were not audible during the time of the site visit. These lands to the west of the subject site are proposed to be converted to residential uses consistent with the Official Plan. There are no other significant sources of stationary noise within 500 m of the subject site. Nevertheless, due to the proximity of the current existing commercial uses, a noise warning clause is recommended in Section 5.5. Since the proposed development is located within 75 m of the railway right-of-way, a vibration study has been conducted (Section 5.4).

3 Criteria for Acceptable Sound Levels

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are outlined in the MECP publication NPC-300 “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning”, Part C release date October 21, 2013 and are listed in Table 1 below. The values in Table 1 are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table 1: Road and Rail Traffic Noise Criteria

	Daytime $L_{EQ}(16 \text{ hour})$ Road / Rail	Night time $L_{EQ}(8 \text{ hour})$ Road / Rail
Outdoor Living Areas	55 dBA	--
Inside Living/Dining Rooms	45 dBA / 40 dBA	45 dBA / 40 dBA
Inside Bedrooms	45 dBA / 40 dBA	40 dBA / 35 dBA

These criteria apply to road and rail traffic operating on railway rights of way, vehicular traffic, including intercity transit busses operating on Municipal Streets. Daytime refers to the period between 07:00 and 23:00, while nighttime refers to the 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. Balconies that are less than 4 m in depth are not considered to be outdoor living areas under MECP guidelines.

The guidelines in the MECP publication allow the sound level in an OLA to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the property and tenancy agreements and offers of purchase and sale. 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 feasible.

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. A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where future nighttime sound levels outside bedroom/living/dining room windows will exceed 60 dBA and future daytime sound levels exceed

65 dBA. The provision for the future installation of central air conditioning is required when nighttime sound levels at the façade are in the range of 51 to 60 dBA or when daytime sound levels at the façade are in the range of 56 to 65 dBA. Sound attenuating building constructions and the use of warning clauses to notify future residents of possible excesses are also required when nighttime sound levels exceed 55 dBA at the façade due to rail traffic noise and exceed 60 dBA at the façade due to road traffic noise.

Warning clauses to notify future residents of possible excesses are also required when nighttime sound levels exceed 50 dBA at the façade and daytime sound levels exceed 55 dBA in the outdoor living area and at the façade due to road and rail traffic.

MECP guidelines recommend brick exterior walls from foundation to rafters as a minimum construction for any dwellings which are within 100 m of the right of way of the railway, where the 24-hour L_{EQ} is greater than 60 dBA. CP typically requires brick for the first row of dwellings regardless of setback and sound level.

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 refer to minimum required setbacks, berms, fencing and warning clauses. The reader is referred to a copy of CP requirements for a new development adjacent to a principal main line, which is located in Appendix A.

3.1 Ground-borne Vibration from Rail Traffic

CP and GO Transit guidelines require measurements of ground-borne vibration when dwelling units are to be located within 75 metres of a principal mainline such as the Galt Subdivision.

Vibration is typically measured in terms of oscillatory velocity or acceleration. The CP 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 CP guideline limit is 0.14 mm/s. These criteria are included on the plots of the measured vibration levels.

4 Rail Traffic Assessment

4.1 Rail Traffic Data

Rail traffic data for typical operations of the railway, was obtained from CP and Metrolinx personnel and are provided in Appendix B. The Galt Subdivision is used for freight and passenger operations. The maximum train speed of 97 kph (60 mph) for freight trains, a maximum of 80 kph (50 mph) for GO trains was used in the analysis. In conformance with CP railway assessment requirements, these maximum speeds, number of cars and maximum 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 2029 using a 2.5% per year growth rate. Table 2 summarises the rail traffic data used in the analysis.

Table 2: Rail Traffic Data Projected to Year 2029

Type of Train	Number of Trains Day/ Night	Number of locomotives	Number of cars	Max Speed (KPH)
Freight	11.8 / 10.5	4	151	97
GO	19.0 / 1.0	1	12	80

4.2 Road Traffic Data

Traffic data for Tannery Street was obtained from the City of Mississauga in the form of ultimate AADT, and is provided in Appendix B. A commercial vehicle percentage of 4% was assumed and split into 1.8% heavy trucks and 2.2% medium trucks. A day/night split of 90%/10% was used. The speed limit is 50 km/h provided in the data and this was used in the analysis.

Traffic data for Emby Drive was obtained from the City of Mississauga in the form of ultimate AADT, and is provided in Appendix B. A commercial vehicle percentage of 1% was assumed and split into 0.45% heavy trucks and 0.55% medium trucks. A day/night split of 90%/10% was used. The speed limit is 50 km/h provided in the data and this was used in the analysis.

Table 3: Ultimate Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Tannery Street	Daytime	4 320	99	81	4 500
	Night time	480	11	9	500
	Total	4 800	110	90	5 000
Emby Drive Extension	Daytime	891	5	4	900
	Night time	99	1	0	100
	Total	990	6	4	1 000

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 sample STAMSON output is included in Appendix C.

Sound levels were predicted at the plane of the top storey bedroom and/or living/dining room windows during daytime and nighttime hours to investigate ventilation requirements. Prediction locations were chosen around the residential site to obtain a representation of the future sound levels at various dwellings as shown in Figure 2. The results of these predictions are summarized in Tables 4 and 5.

The distance setbacks of the dwellings indicated on the site plan were used in the analysis, along with an aerial photo to determine the distance of the blocks to the railway. The acoustic recommendations may be subject to modifications if the site plan is changed significantly.

Table 4: Daytime Predicted Future Sound Levels, Without Mitigation, [dBA]

Prediction Location	Block No.	Description	Daytime – at the Façade L _{EQ} -16 hr		Daytime at Façade Total L _{EQ} - 16 hr
			Road	Rail	
[A]	D	Townhouses with flanking exposure to railway	56	69	69
[B]	A, B, C	Townhouses with fronting exposure to railway	<55	70	70
[C]	E, F	2 nd row of townhouses with exposure to railway	<55	60	60
[D]	G	2 nd row of townhouses with exposure to railway	<55	63	63
[E]	--	Interior amenity space	--	--	<55

Note: The above noted sound levels do not include the proposed 6.0 m crash wall or 3.0 m earth berm.

Table 5: Nighttime Predicted Future Sound Levels, Without Mitigation, [dBA]

Prediction Location	Block No.	Description	Nighttime – at the Façade L _{EQ} -8 hr		Nighttime at Façade Total L _{EQ} -8 hr
			Road	Rail	
[A]	D	Townhouses with flanking exposure to railway	<50	71	71
[B]	A, B, C	Townhouses with fronting exposure to railway	<50	72	72
[C]	E, F	2 nd row of townhouses with exposure to railway	<50	62	62
[D]	G	2 nd row of townhouses with exposure to railway	<50	65	65

Note: The above noted sound levels do not include the proposed 6.0 m crash wall or 3.0 m earth berm.

5 Recommendations

With no mitigation, there are sound level excesses at the facades of the proposed with exposure to the railway line. Recommendations to meet MECP and CP railway guidelines are described.

5.1 Outdoor Living Areas

Typically for residential developments adjacent to CP principal mainlines, a 5.5 m barrier (2.5 m berm and 3.0 m acoustic wall on top) is required as a minimum. The total height of the barrier is taken in reference to the top of rail elevation in the area.

A crash wall is proposed along the railway right-of-way and a 3.0 m earth berm as indicated in the site grading plan and the derailment plan and sections attached as Figure 2b and 2c. There are no outdoor amenity areas directly adjacent to the railway line and therefore an acoustical wall on top of the crash wall is not required.

The predicted sound level in the interior amenity area located in the middle of the development is expected to be less than 55 dBA, meeting the limits of the MECP. The amenity area is shielded by the stacked townhouses themselves.

The front yards are not outdoor living areas. The common interior amenity space is accessible to all residents. Any rooftop terraces will be kept to less than 4 m in depth to reduce the need for high acoustic barriers as per MECP guidelines. Alternatively, the stairwell may be used as a partial barrier with the amenity on the shielded side, for example. The requirements for the acoustic barriers or parapets on rooftop terraces should be investigated further at the time of site plan approval, when detailed roof plans are available.

5.2 Indoor Living Areas

Central Air Conditioning

The predicted sound levels outside the top storey windows of all of the townhouse blocks will be greater than 65 dBA during the daytime hours and/or greater than 60 dBA during nighttime hours. Central air conditioning systems are required for these dwellings so that windows may remain closed. The guidelines also recommend warning clauses for these units. 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.

Figure 3 shows the ventilation requirements for the proposed development.

5.3 Building Façade Constructions

Future traffic sound levels at the façades of the closest dwelling units with exposure to the railway will exceed 60 dBA during the day and 55 dBA at night. MECP guidelines recommend that the windows and walls be designed so that the indoor sound levels comply with MECP noise criteria.

Preliminary calculations have been performed to determine the building envelope constructions likely to be required to maintain indoor sound levels within MECP guidelines. The required building components are selected based on the AIF value for road and rail traffic. To do so, 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 facades, and the anticipated area ratios of the facade components and the floor area of the adjacent room.

Based on preliminary calculations, windows and walls can be designed such that indoor sound levels comply with MECP requirements. These details are to be verified at the site plan approval stage.

5.3.1 Exterior Wall Construction

According to CP railway guidelines, the dwellings in the first row will require brick or masonry exterior walls and will have sound levels exceeding 60 dBA during daytime hours and exceeding 55 dBA during nighttime hours.

5.3.2 Glazing Construction

Window to floor area ratios were assumed to be up to 40% for the living/dining rooms (10% operable) and 20% for bedrooms (5% operable). The minimum acoustical requirement for the basic window glazing, including glass in fixed sections, sliding doors, and operable windows, is shown in Table 6 for the townhouses.

Table 6: STC Requirements

Prediction Location	Space	Glazing STC*
[A]	Living/Dining	¹ STC-34
	Bedroom	¹ STC-38
[B]	Living/Dining	¹ STC-35
	Bedroom	¹ STC-39
[C]	Living/Dining	² STC-30
	Bedroom	² STC-32
[D]	Living/Dining	² STC-32
	Bedroom	² STC-36

Note: * Based on window to floor area ratios of 40% for living/dining rooms and 20% for bedrooms

¹ Sound entering through windows only.

² Sound entering through windows and walls.

Note that window glazing and frame constructions can achieve these ratings, but vendor submittals with test data for the specific units proposed will be required to verify acceptable glazing products.

Further Analysis

When detailed floor plans and building elevations are available for the dwellings, a review should be conducted to determine the required glazing and building façade constructions based on actual window to floor area ratios.

5.4 Vibration Measurements

CP requires an assessment of ground-borne vibration through measurement if building foundations are to be located within 75 metres of the right-of-way. Measurements were performed at the anticipated location of the closest dwelling, approximately 21 m from the railway right of way. The results of the measurements are presented in Figures 4 to 8. Table 6 shows the maximum RMS vibration velocity measurements during each of the train pass-bys.

Table 7: Peak Vibration Measurements of Train Pass-bys

Train Pass-by	Type of Train	Measured Vibration Level (mm/s)	Criteria (mm/s)
1	Freight	0.12	0.14
2	Freight	0.11	0.14
3	Passenger	0.06	0.14
4	Freight	0.11	0.14
5	Passenger	0.06	0.14

Vibration levels are below the CP limit of 0.14 mm/s. Vibration mitigation measures are not required for the proposed development.

5.5 Warning Clauses

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements for all units with anticipated traffic sound level excess. Examples are provided below.

Suggested wording for buildings with sound level excesses the MECP criteria is given below:

Type 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 rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the noise criteria of the Municipality and the Ministry of the Environment, Conservation and Parks.

A suggested wording for future dwellings requiring central air conditioning systems is given below.

Type 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 dwelling units near existing commercial facilities is as follows:

Type C:

Purchasers/tenants are advised that due to the proximity of the adjacent existing commercial uses, noise from these facilities at times be audible.

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

CP's standard warning clause for residential developments located near a principal branch line is provided below. The following sample clause is typical of those included in agreements of purchase and sale or lease on the Lands that are within 300 meters of the railway right-of-way.

Type D:

Warning: Canadian Pacific Railways Company or its assigns or successors in interest has or have a rights-of-way within 300 meters from the land subject hereof. There may be alteration to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its 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. CPR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way.

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.

Type 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.



6 Impact of the Development on the Environment

It is expected that any increase in local traffic associated with the development will not be substantial enough to affect noise levels significantly.

MECP Publication NPC-300 stipulate sound level limits for new stationary (non-traffic) sources of noise. The sound level limit for a stationary source which operates in a Class 1 urban environment is related to the minimum one-hour L_{EQ} ambient (background) sound level, at any potentially impacted residential point of reception. HGC Engineering has not performed monitoring of the background sound levels in the area during all daytime and nighttime hours, but experience indicates that, for a typical urban environment, a minimum daytime sound level of 50 dBA and a minimum nighttime sound level of 45 dBA can be assumed during the quietest hours. These criteria apply to equipment such as rooftop air-conditioners, cooling towers, exhaust fans, standby generators, etc.

Provided that air-conditioning equipment is selected and placed appropriately so as not to impact the existing residential and proposed residential dwellings, noise impacts are not expected. An acoustical consultant should review the design of the mechanical building systems and the equipment selections when they have been determined, to help ensure that the noise levels emitted by the development to the environment are likely to meet the bylaw requirements.

7 Impact of the Development on Itself

The impact of the development on itself can be categorized into noise intrusions transmitted between adjacent spaces, and noise generated by mechanical systems or other equipment within the buildings.

Section 9.11.1 of the Ontario Building Code (OBC) specifies the minimum required sound insulation characteristics for demising partitions, in terms of Sound Transmission Class (STC) values. In order to maintain adequate acoustical privacy between separate suites in a multi-tenant building, inter-suite walls should meet or exceed STC-50. Walls separating a suite from a noisy space such as a refuse chute, or elevator shaft, should 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. It is recommended that partitions be selected 3 to 4 points above the STC listed in Tables 1 and 2 so that performance in the field meets these minimum specifications.

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 results of the study indicate that the proposed residential development is feasible. Future rail traffic sound levels will exceed CP railway guidelines, but feasible means exist to reduce the impact to within acceptable limits. The following recommendations are provided in regard to noise mitigation.

1. A 6.0 m high crash wall and 3.0 m earth berm are proposed along and in parallel to a portion of the railway right-of-way but it not required for noise.
2. Central air conditioning is required for all of the townhouse blocks. The location installation and sound rating of the air conditioning devices should comply with NPC-300, as applicable.
3. Brick exterior walls are required for the townhouse blocks closest to the railway. When the exterior wall details are available, an acoustical consultant should review the details for compliance with this noise report.
4. Upgraded glazing constructions are required for all dwellings in the development. When detailed floor plans and building elevations are available, an acoustical consultant should provide revised recommendations based on actual window to floor area ratios.
5. Noise warning clauses should be included in the Development Agreements registered on titles, and in purchase, sale and lease agreements, to inform future owners of noise concerns and the proximity to existing commercial uses.

The reader is referred to the above sections of the report where these recommendations are discussed in more detail.

Table 8, below, summarizes the recommendations for the buildings in the proposed development.

Table 8: Summary of Noise Control Requirements and Noise Warning Clauses

Prediction Location	Block No.	+Acoustic Barrier	Ventilation Requirements	Type of Warning Clause	Exterior Wall Construction	Upgraded Glazing Construction
[A]	D	--	Central A/C	A, B, C, D, E	*Brick	¹ LRDR: STC-34 ¹ BR: STC-38
[B]	A, B, C	--	Central A/C	A, B, C, D, E	*Brick	¹ LRDR: STC-35 ¹ BR: STC-39
[C]	E, F	--	Central A/C	A, B, C, D, E	OBC	² LRDR: STC-30 ² BR: STC-32
[D]	G	--	Central A/C	A, B, C, D, E	OBC	² LRDR: STC-32 ² BR: STC-36

Notes:

-- no specific requirement

+ A 6.0 m high crash wall is proposed along and is parallel to a portion of the railway right-of-way but is not required for noise.

OBC – meeting the minimum requirements of the Ontario Building Code

* Brick exterior construction required for south, east and west façades. When detailed floor plans and building elevations are available, an acoustical consultant should provide revised glazing constructions based on actual window to floor area ratios.

LRDR – Living room/dining room

BR – Bedroom

¹ Sound entering through windows only.

² Sound entering through windows and walls.

8.1 Implementation

To ensure that the sound control recommendations outlined above are properly implemented in the site design, it is recommended that:

1. A detailed noise study is required at the SPA stage to refine the acoustic requirements reviewing detailed floor plans, roof plans and building elevations.
2. Prior to an application for a building permit, the Municipality's Building Department or a Professional Engineer qualified to provide acoustical engineering services in Ontario shall review the unit plans (floor plans and building elevations) for future dwellings directly adjacent to the CP railway to ensure that the windows and building constructions are adequately designed to ensure acceptable indoor noise levels.
3. Prior to assumption for this development, the Municipality's building inspector or a Professional Engineer qualified to provide acoustical engineering services in the Province of Ontario shall certify that the noise control measures for the dwelling units have been properly installed and constructed.



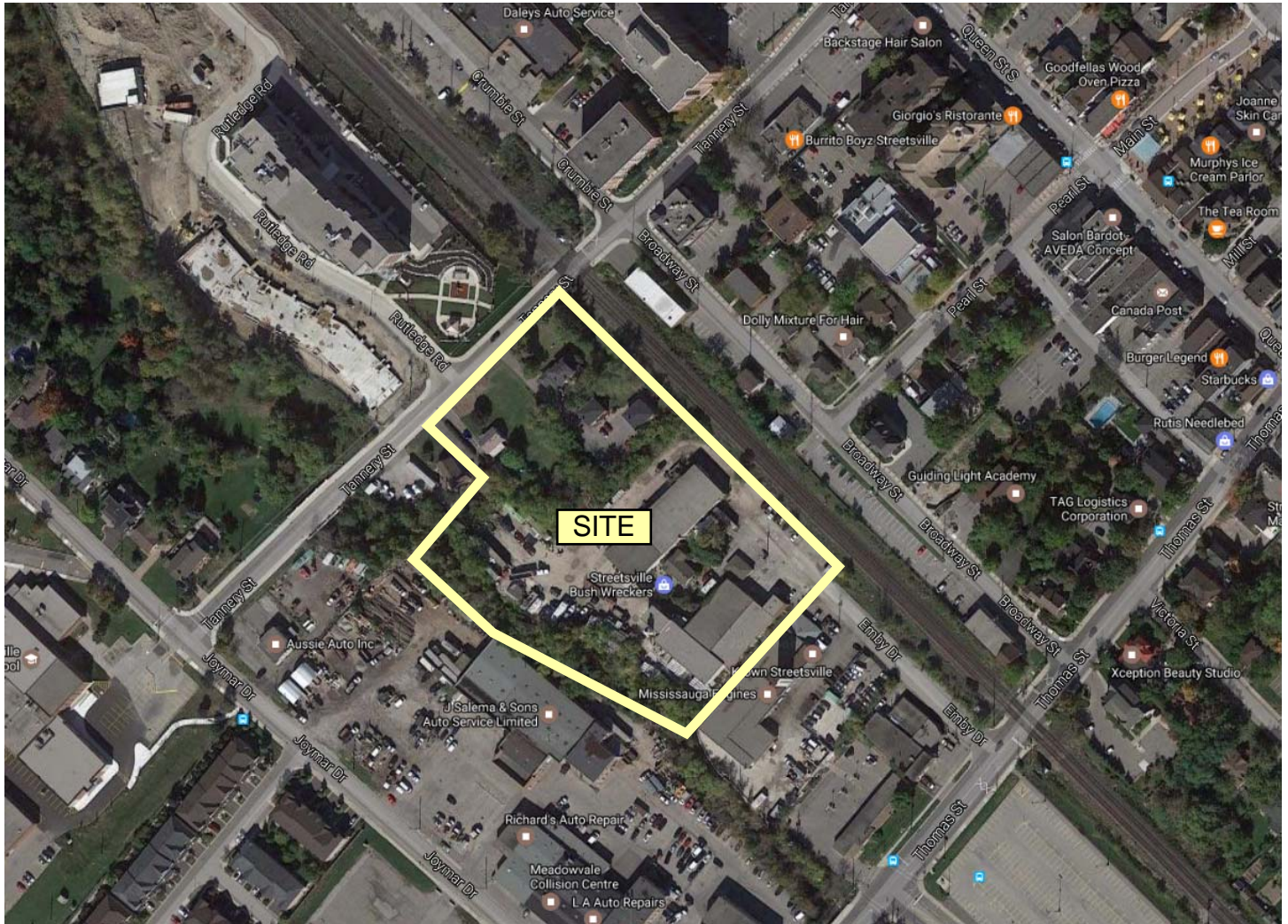


Figure 1 - Key Plan



ACOUSTICS



NOISE



VIBRATION

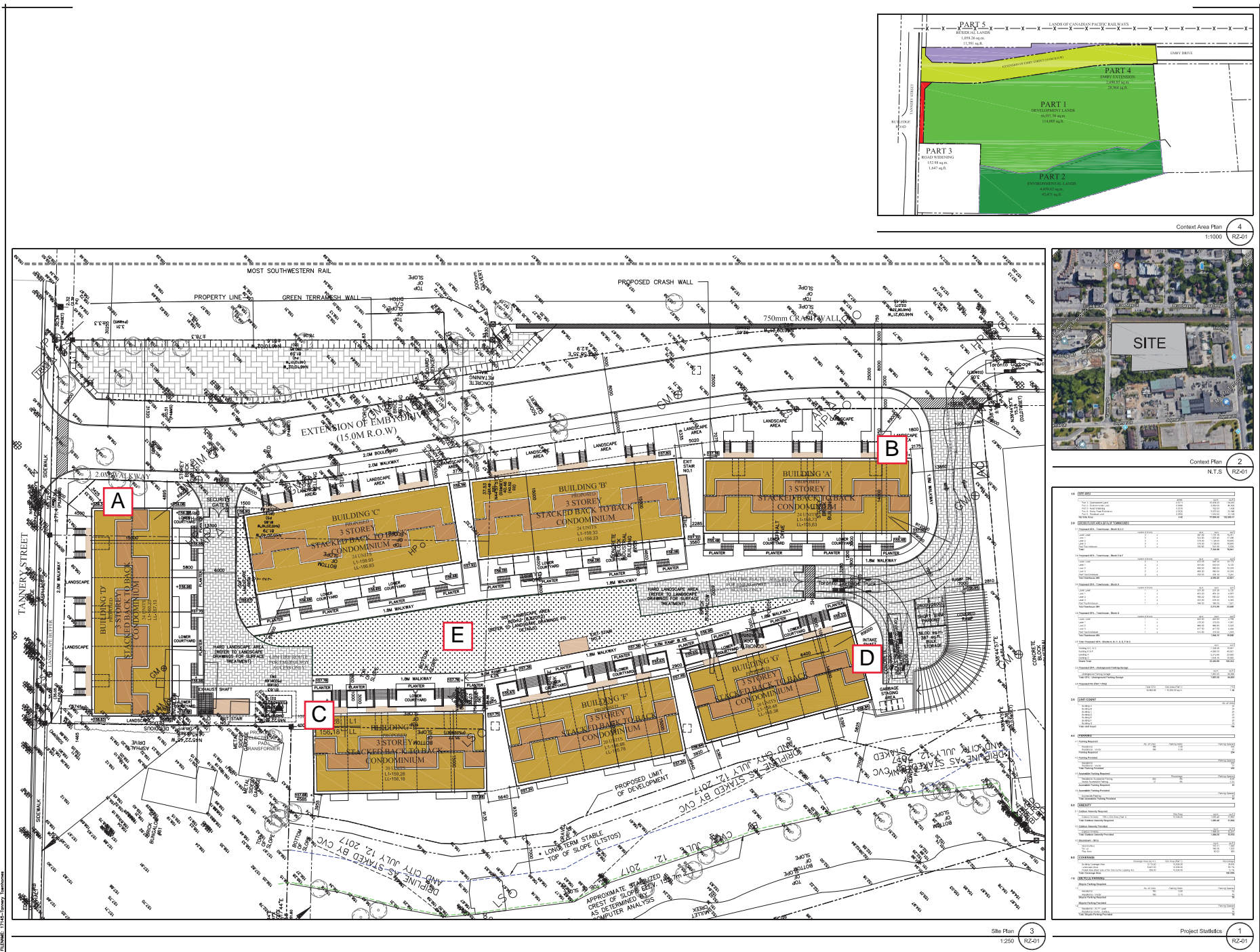


Figure 2a - Proposed Site Plan Showing Prediction Locations

Customer Must Check And Verify All Dimensions On The Job.
Do Not Scale The Drawings.
All Drawings, Specifications And Related Documents Are The Copyright Of KIRKOR ARCHITECTS + PLANNERS. No Part Of This Document May Be Reproduced Without The Written Consent Of KIRKOR ARCHITECTS + PLANNERS.
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No.	Revision	Date

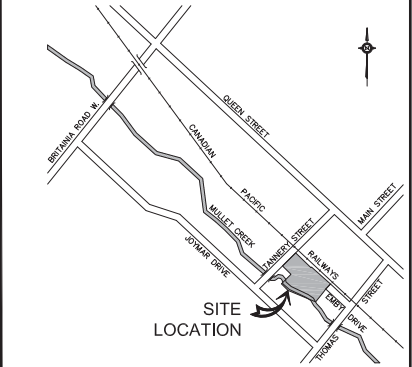
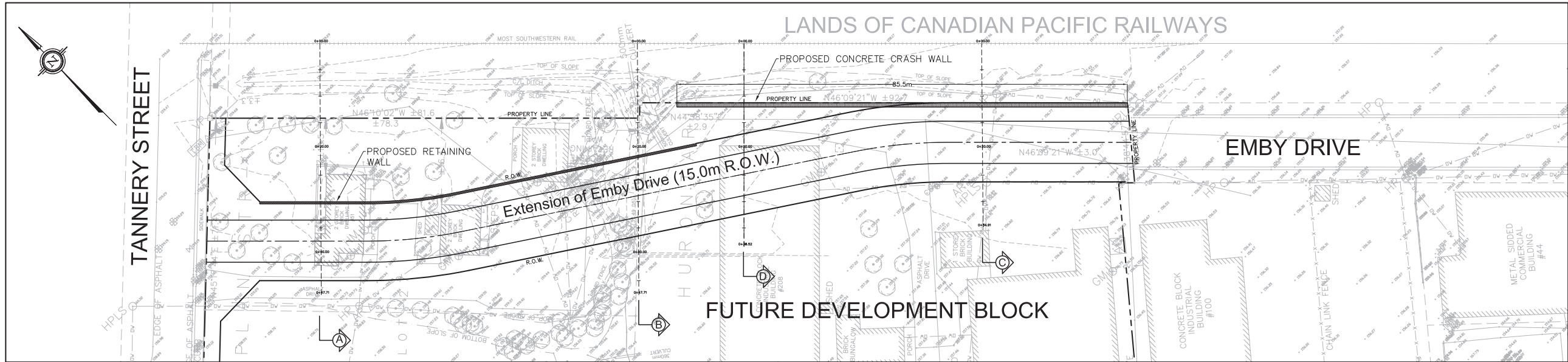
Site Plan Statistics & Context Plan

Phase 12
NIX CAPITAL
Proposed

Townhouse Residential Development
TANNERY TOWNHOMES
MISSISSAUGA, ONTARIO

AS NOTED
T.S.
S.M.
17-145
May 6, 2019

RZ-01



KEY PLAN

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION MEASURED 19 MAY 2017. BOUNDARY IS APPROXIMATE. THIS IS NOT A PLAN OF SURVEY.

TEMPORARY BENCHMARK

ELEVATION 159.56

CUT CROSS ON THE SIDEWALK OPPOSITE #51 TANNERY STREET. CUT CROSS IS LOCATED 18.1m SOUTHWESTERLY FROM THE MOST WESTERLY RAIL OF CANADIAN PACIFIC RAILWAYS LINE, 4.3m SOUTHWESTERLY FROM THE GAS VENT PIPE AND 21.2m NORTHEASTERLY FROM THE WATER VALVE IN TANNERY STREET.

The location and extent of all existing utilities are not necessarily shown on this plan, and where shown, are to be considered approximate only. All Contractors shall inform themselves of the exact location and extent of all existing services prior to the start of construction, and shall assume all liabilities for damage to them or delays resulting from their actual extent and location.

No.	Date	Description	By	Ck.
REVISIONS				

PRELIMINARY

JSW+
associates
CONSULTING ENGINEERS
LANDSCAPE ARCHITECTS
PLANNERS
Tel: (905) 889-8100 Fax: (905) 889-6616

Client:

NYX CAPITAL CORP.
201-1131A LESLIE STREET
TORONTO, ON

CITY OF MISSISSAUGA
**51, 57 TANNERY STREET
AND 208 EMBY DRIVE**

REGION OF PEEL

**DERAILMENT PROTECTION
PLAN AND SECTIONS**

Scale: 1:400 (PLAN)	
Designed: L.R.	Checked: L.R.
Drawn: W.G.	Date: NOVEMBER 2017
Job No.	Drawing No.
17-68	DP-1

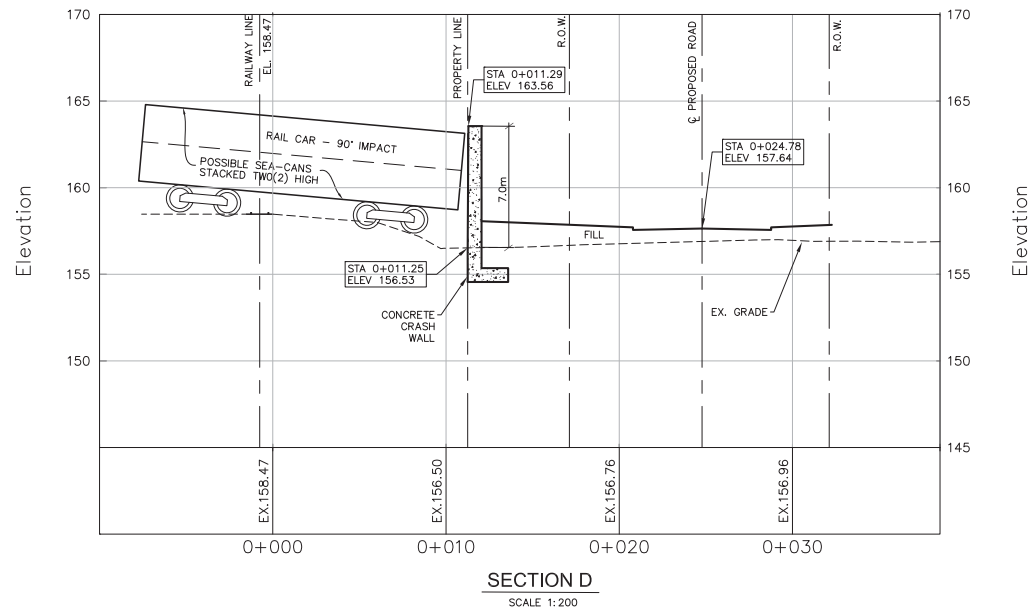
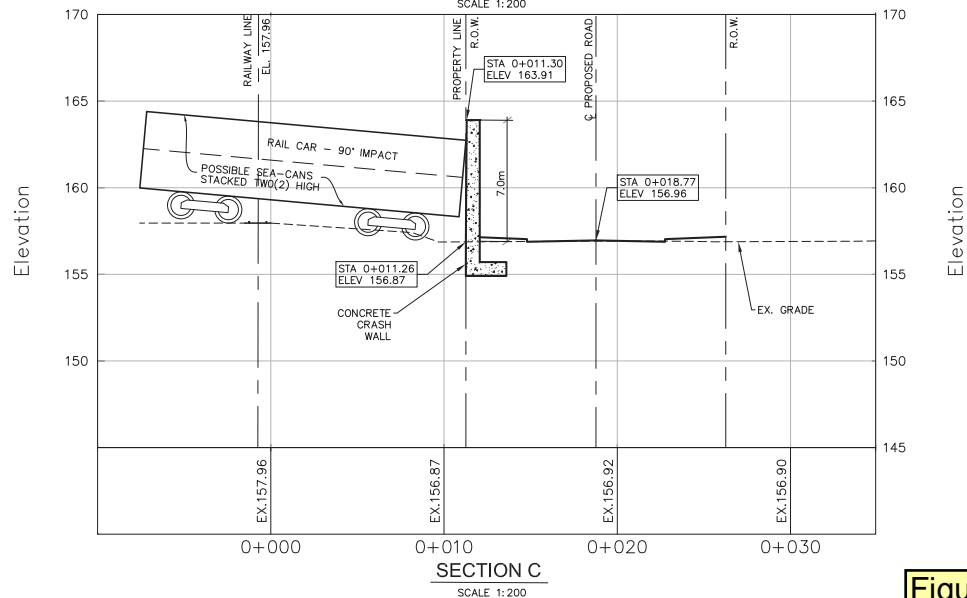
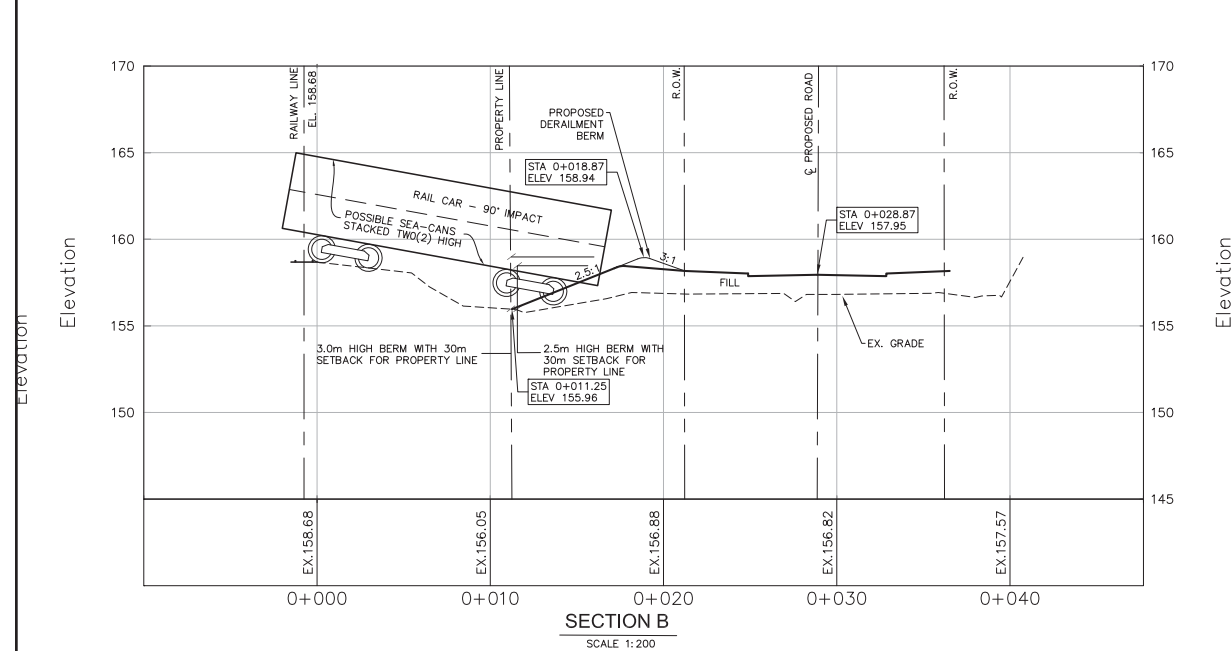
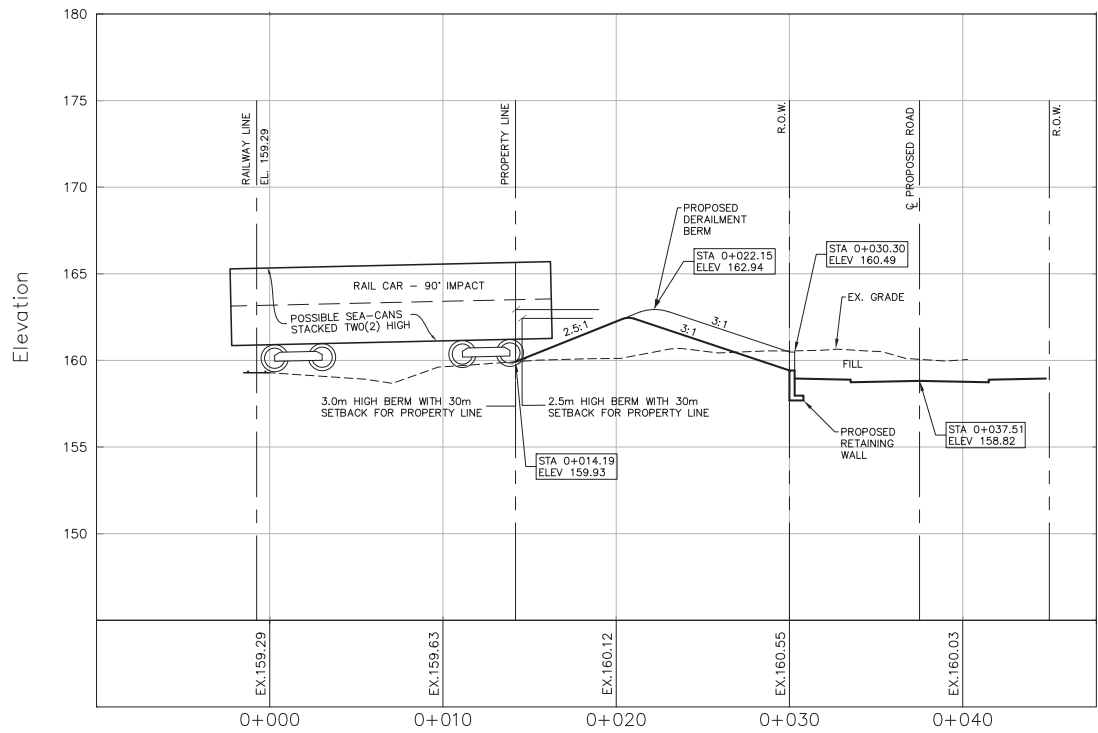


Figure 2b - Proposed Derailment Protection Plan and Sections

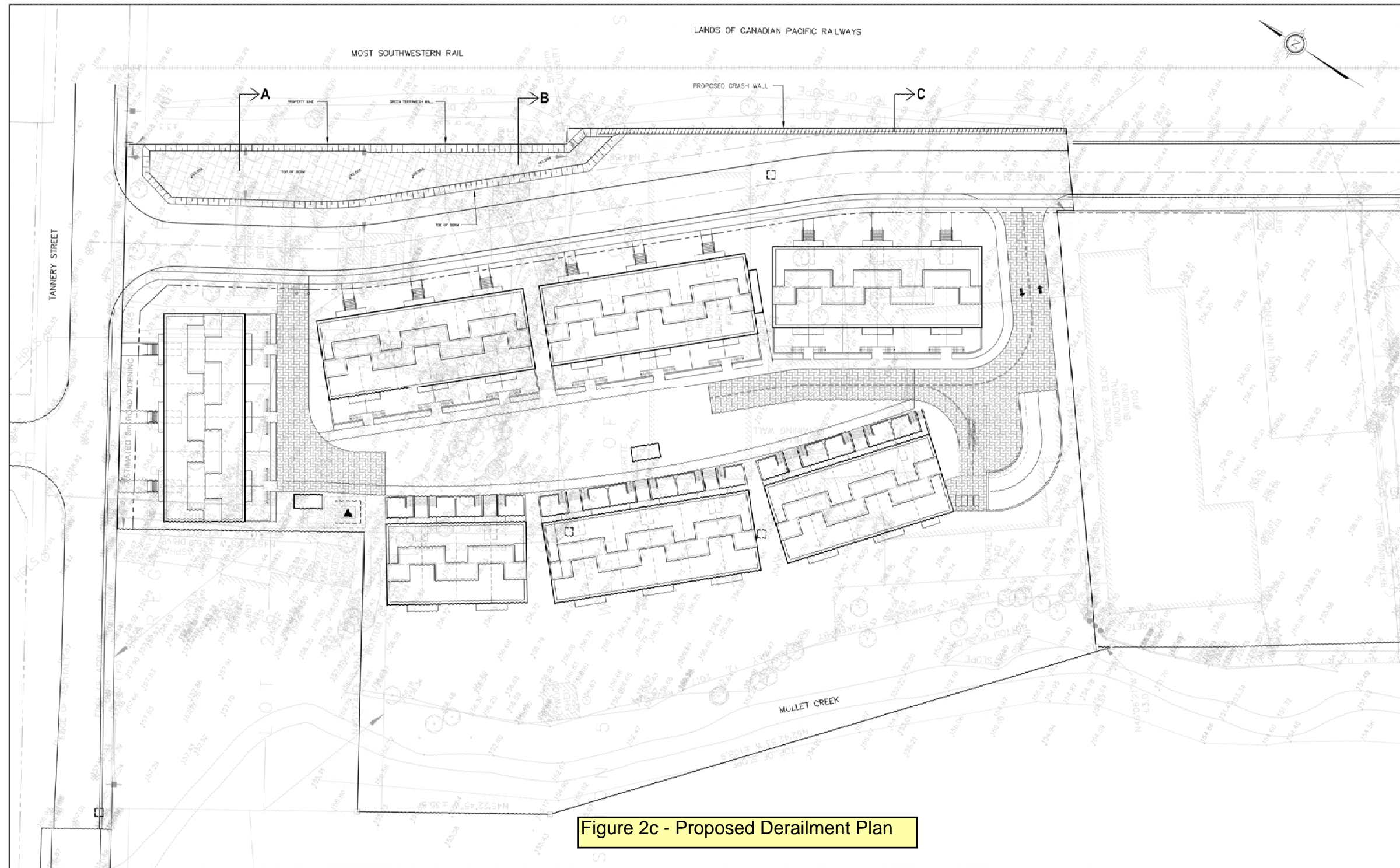
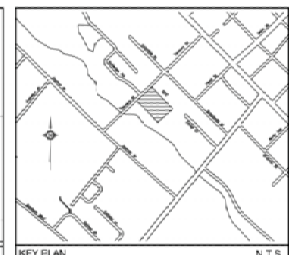


Figure 2c - Proposed Derailment Plan



N.T.S.

No.	Date	Description	By	Iss.

JSW+
associates

CONSULTING ENGINEERS
LANDSCAPE ARCHITECTS

100 BRIMLEY AVE. #100 MISSISSAUGA, ONT. L4Y 1P7
Tel: 905.884.4100 Fax: 905.881.6411

Tannery Developments

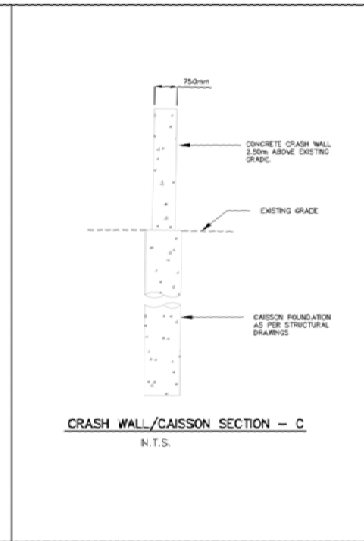
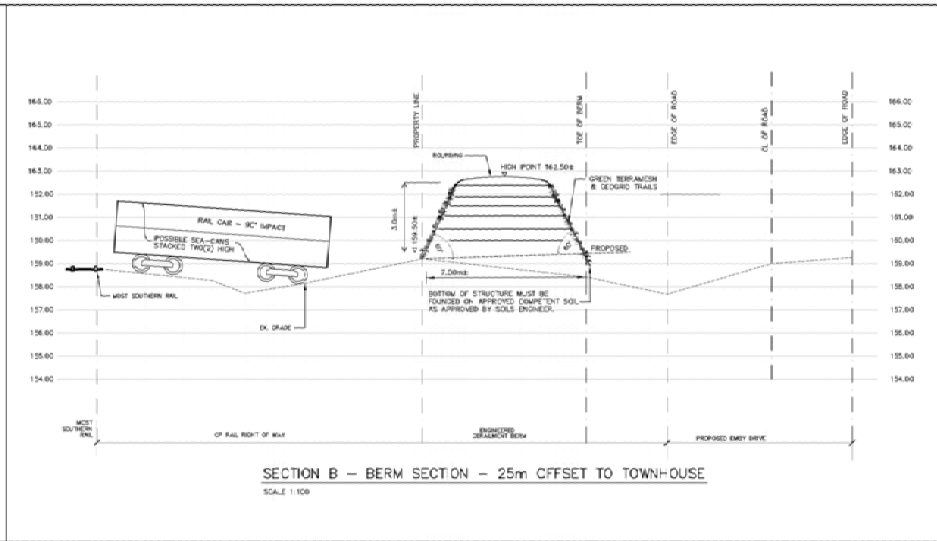
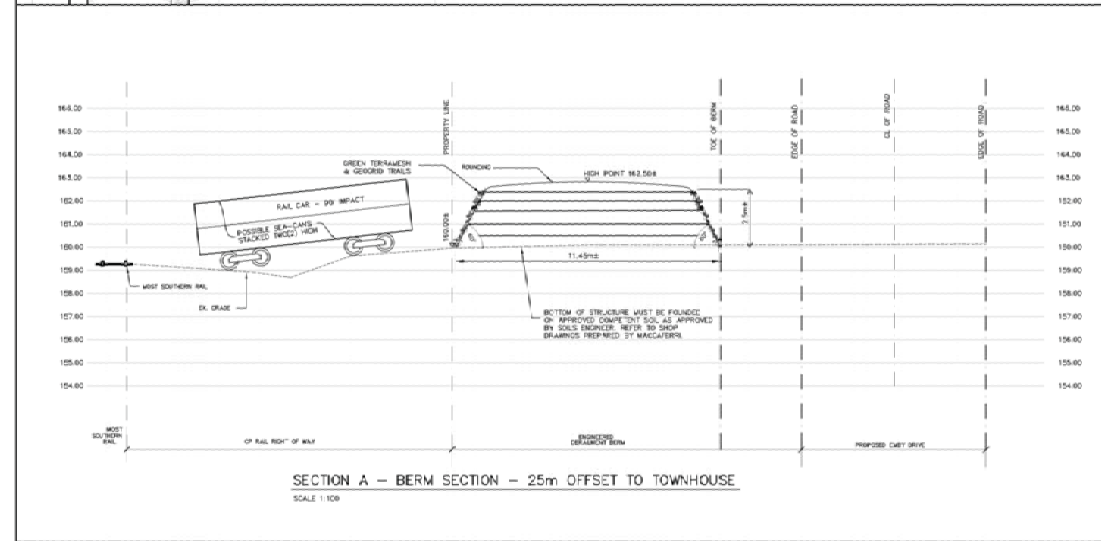
**TANNERY
DEVELOPMENT**

Mississauga, Ontario

**PRELIMINARY DERAILMENT
PROTECTION PLAN**

Scale: 1:400
Designed: L.R. Checked: T.G.
Drawn: K.P. Date: FEB 2018
Job No. Drawing No.

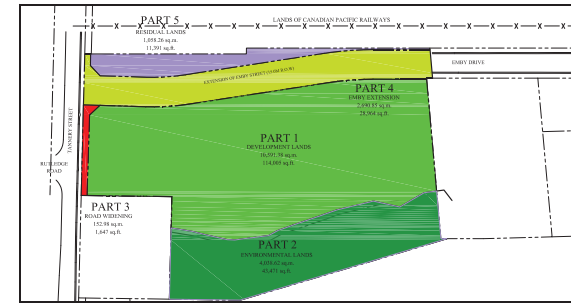
17-68



LEGEND



Central air conditioning is required

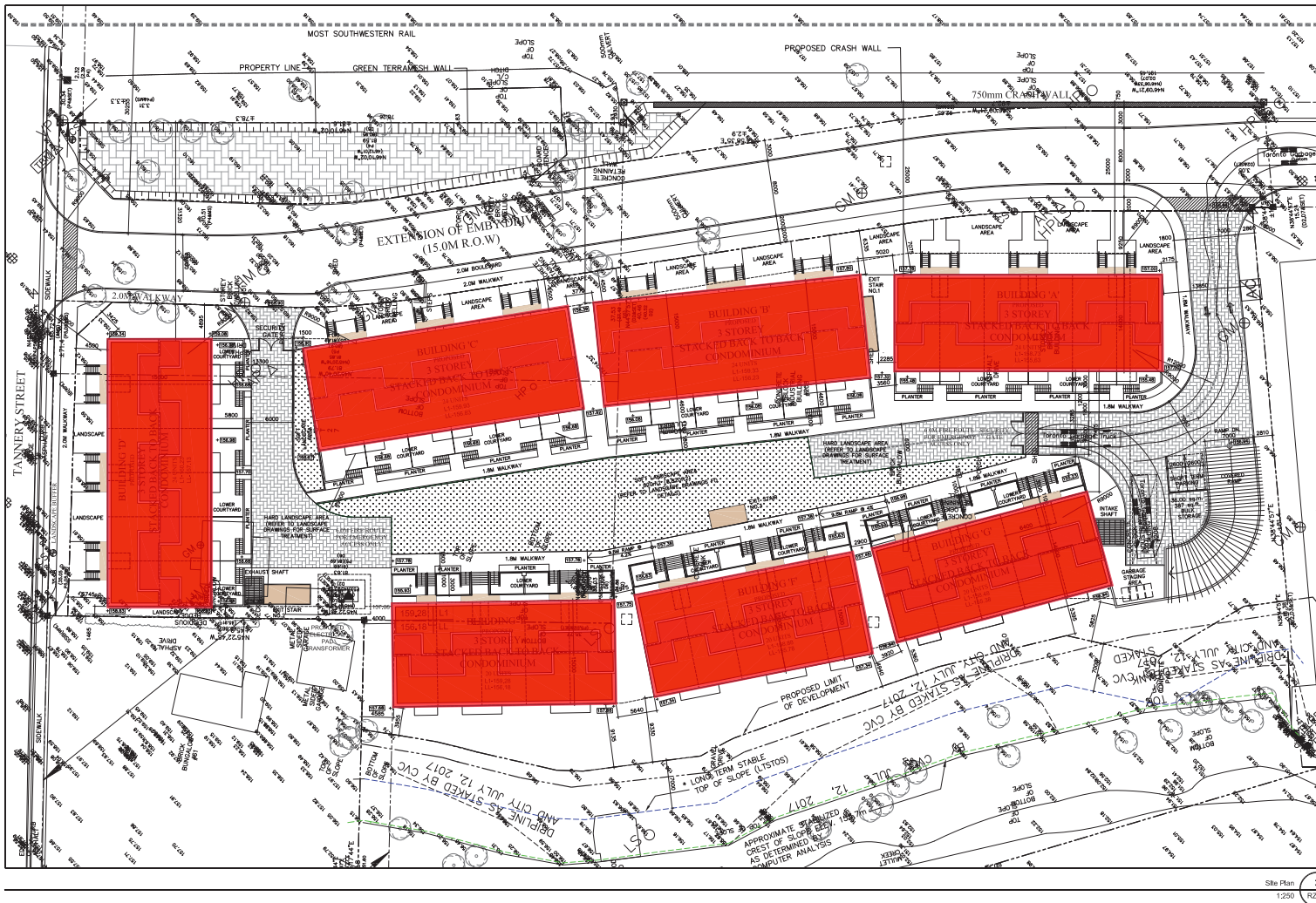


Customer Must Check And Verify All Dimensions On The Job.
Do Not Scale The Drawings.
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This Drawing Is Not To Be Used For Construction Without The Approval Of The Architect.
Date:



KIRKOR ARCHITECTS + PLANNERS
302 De Bruns Dr., Suite #400, Toronto, ON M6G 1H1
Tel: (416) 665-6000, (416) 665-1204, www.kirkorarchitects.com

No.	Revision	Date



1. SITE DATA	2. SITE DATA	3. SITE DATA	4. SITE DATA
1.1 General Information	1.2 General Information	1.3 General Information	1.4 General Information
1.5 General Information	1.6 General Information	1.7 General Information	1.8 General Information
1.9 General Information	1.10 General Information	1.11 General Information	1.12 General Information
1.13 General Information	1.14 General Information	1.15 General Information	1.16 General Information
1.17 General Information	1.18 General Information	1.19 General Information	1.20 General Information
1.21 General Information	1.22 General Information	1.23 General Information	1.24 General Information
1.25 General Information	1.26 General Information	1.27 General Information	1.28 General Information
1.29 General Information	1.30 General Information	1.31 General Information	1.32 General Information
1.33 General Information	1.34 General Information	1.35 General Information	1.36 General Information
1.37 General Information	1.38 General Information	1.39 General Information	1.40 General Information
1.41 General Information	1.42 General Information	1.43 General Information	1.44 General Information
1.45 General Information	1.46 General Information	1.47 General Information	1.48 General Information
1.49 General Information	1.50 General Information	1.51 General Information	1.52 General Information
1.53 General Information	1.54 General Information	1.55 General Information	1.56 General Information
1.57 General Information	1.58 General Information	1.59 General Information	1.60 General Information
1.61 General Information	1.62 General Information	1.63 General Information	1.64 General Information
1.65 General Information	1.66 General Information	1.67 General Information	1.68 General Information
1.69 General Information	1.70 General Information	1.71 General Information	1.72 General Information
1.73 General Information	1.74 General Information	1.75 General Information	1.76 General Information
1.77 General Information	1.78 General Information	1.79 General Information	1.80 General Information
1.81 General Information	1.82 General Information	1.83 General Information	1.84 General Information
1.85 General Information	1.86 General Information	1.87 General Information	1.88 General Information
1.89 General Information	1.90 General Information	1.91 General Information	1.92 General Information
1.93 General Information	1.94 General Information	1.95 General Information	1.96 General Information
1.97 General Information	1.98 General Information	1.99 General Information	1.100 General Information

01 OPA / ZBA
No. 01/02
DATE MAY 31, 18
DATE

**Site Plan
Statistics & Context Plan**

Phase 12

NYX CAPITAL
Proposed

**Townhouse
Residential
Development**
TANNERY TOWNHOMES
MISSISSAUGA, ONTARIO



AS NOTED
T.S.
S.M.
17-145
May 6, 2019

RZ-01

Figure 3 - Proposed Site Plan Showing Ventilation Requirements

Figure 4a: Pass-by 1
Measured Vibratory Velocity Level

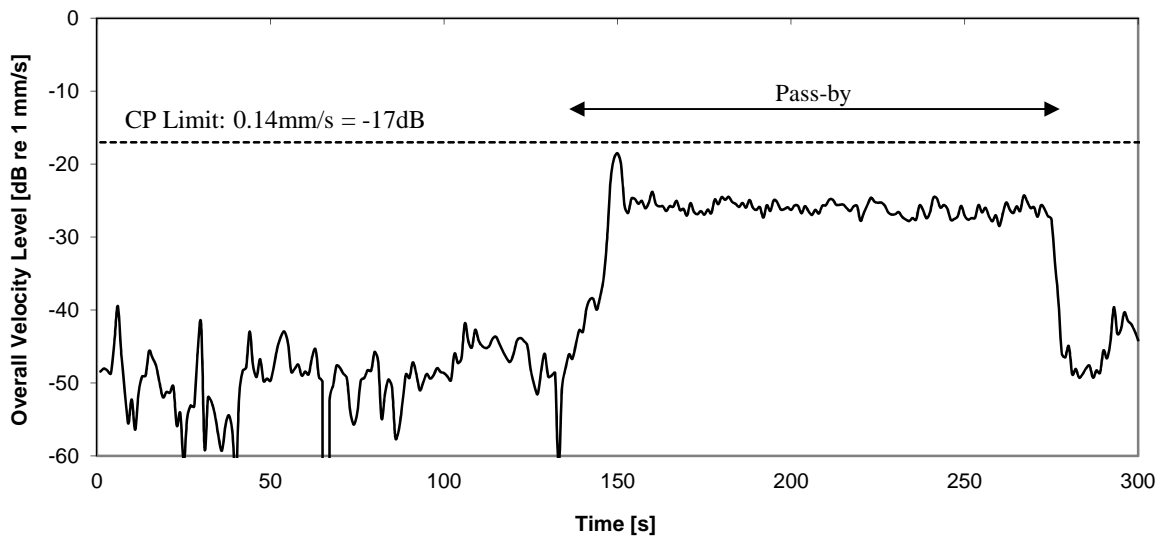


Figure 4b: Pass-by 1
Acceleration Spectrum @ Peak Level (1 sec. Duration)

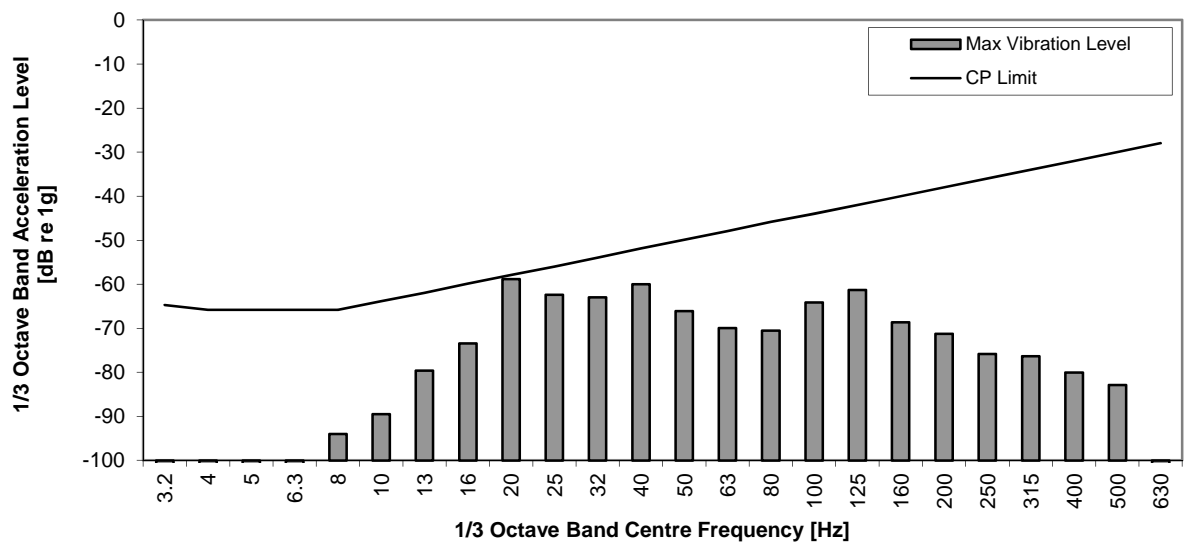


Figure 5a: Pass-by 2
Measured Vibratory Velocity Level

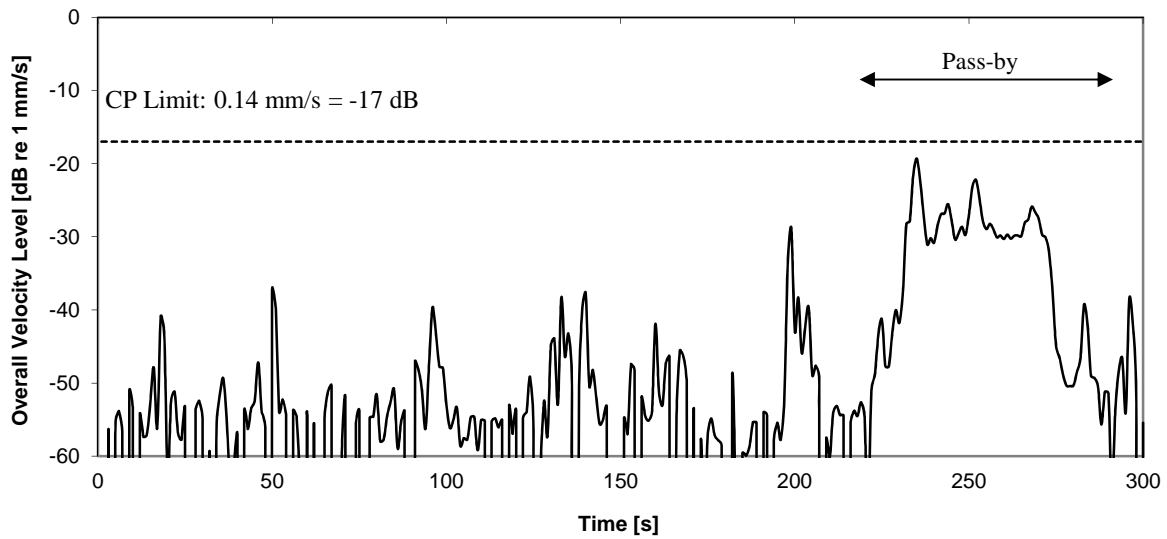
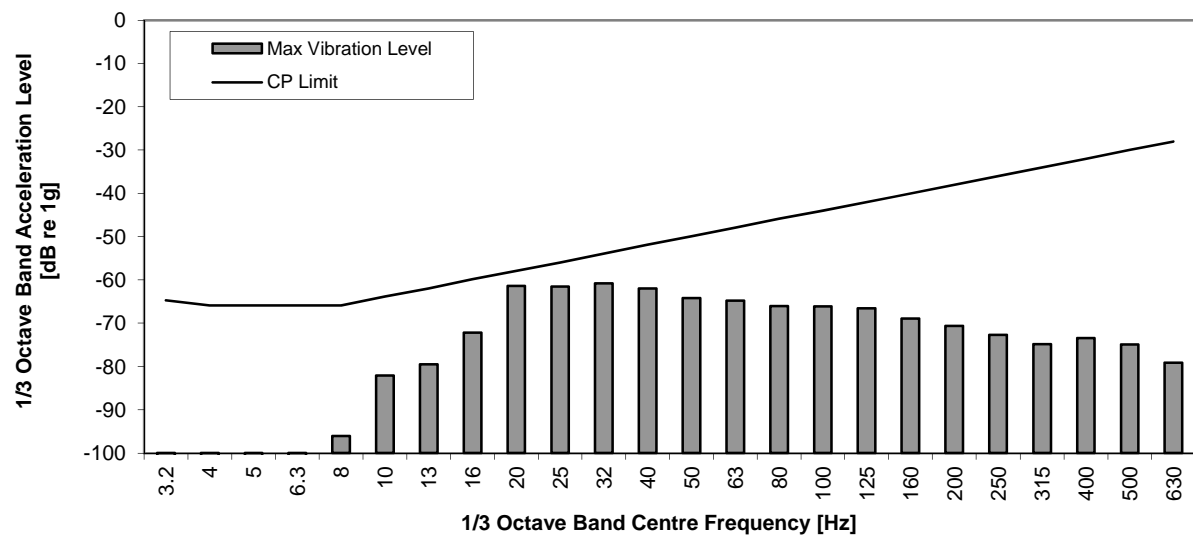


Figure 5b: Pass-by 2
Acceleration Spectrum @ Peak Level (1 sec. Duration)



ACOUSTICS



NOISE



VIBRATION

Figure 6a: Pass-by 3
Measured Vibratory Velocity Level

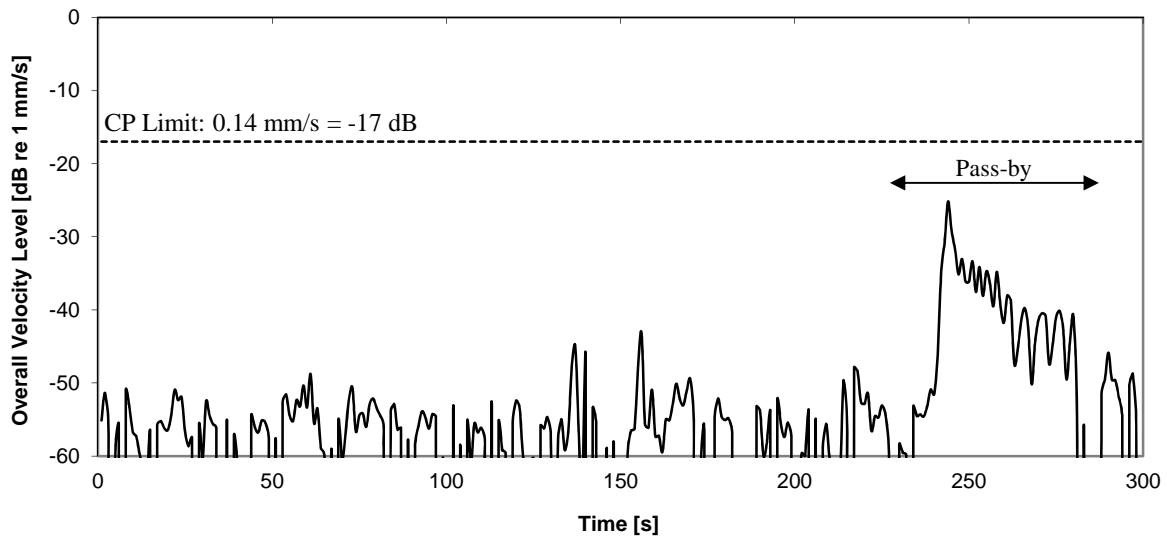


Figure 6b: Pass-by 3
Acceleration Spectrum @ Peak Level (1 sec. Duration)

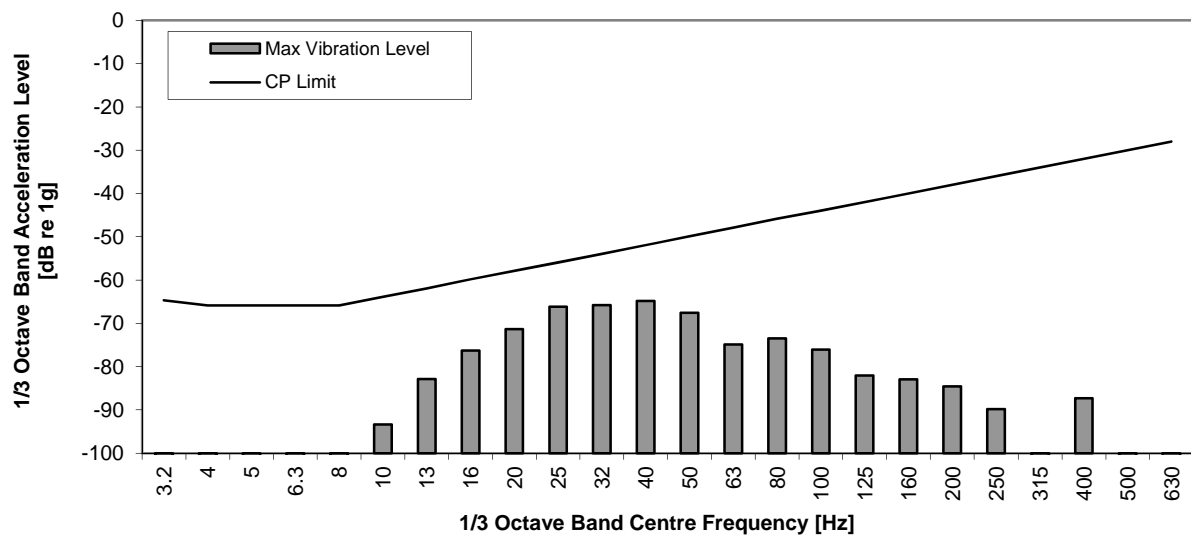


Figure 7a: Pass-by 4
Measured Vibratory Velocity Level

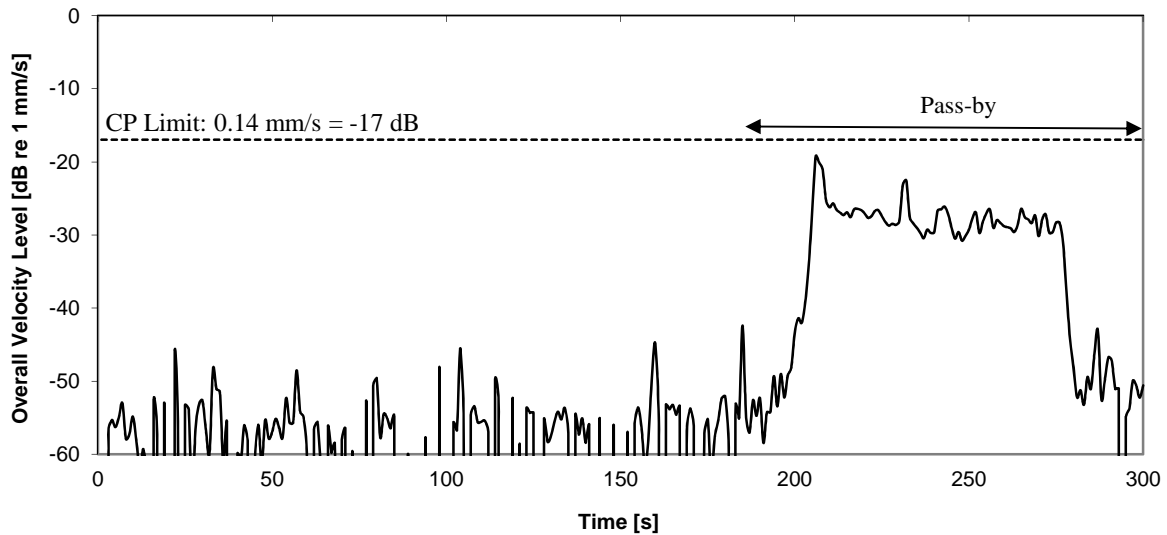
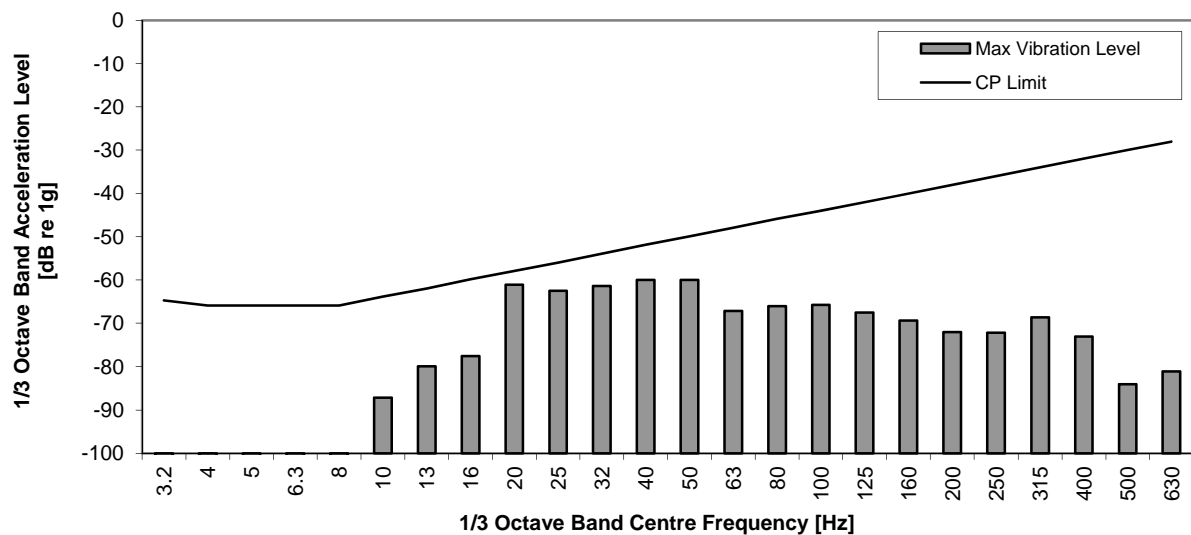


Figure 7b: Pass-by 4
Acceleration Spectrum @ Peak Level (1 sec. Duration)



ACOUSTICS



NOISE



VIBRATION

Figure 8a: Pass-by 5
Measured Vibratory Velocity Level

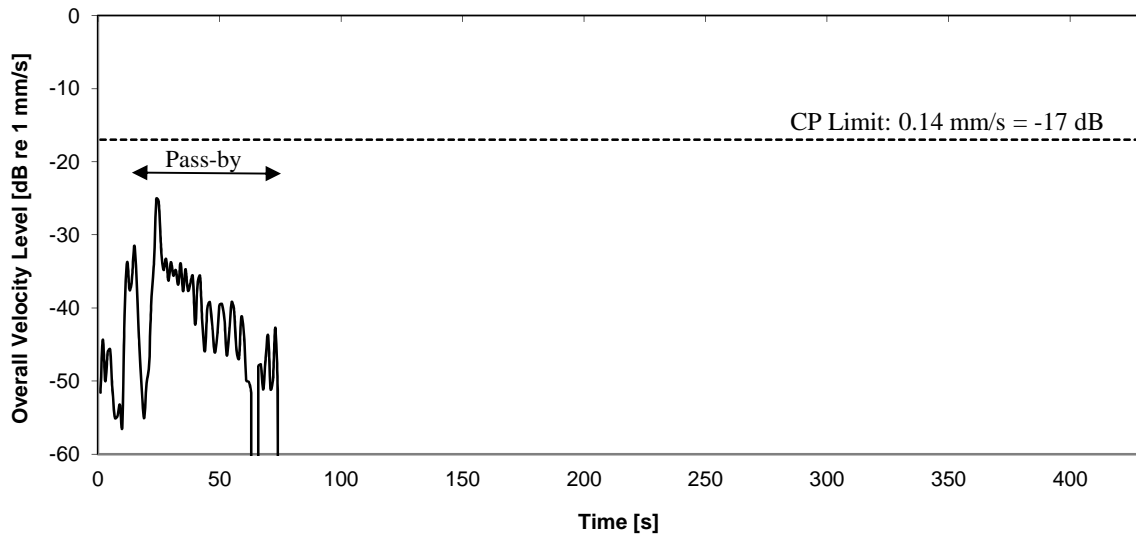
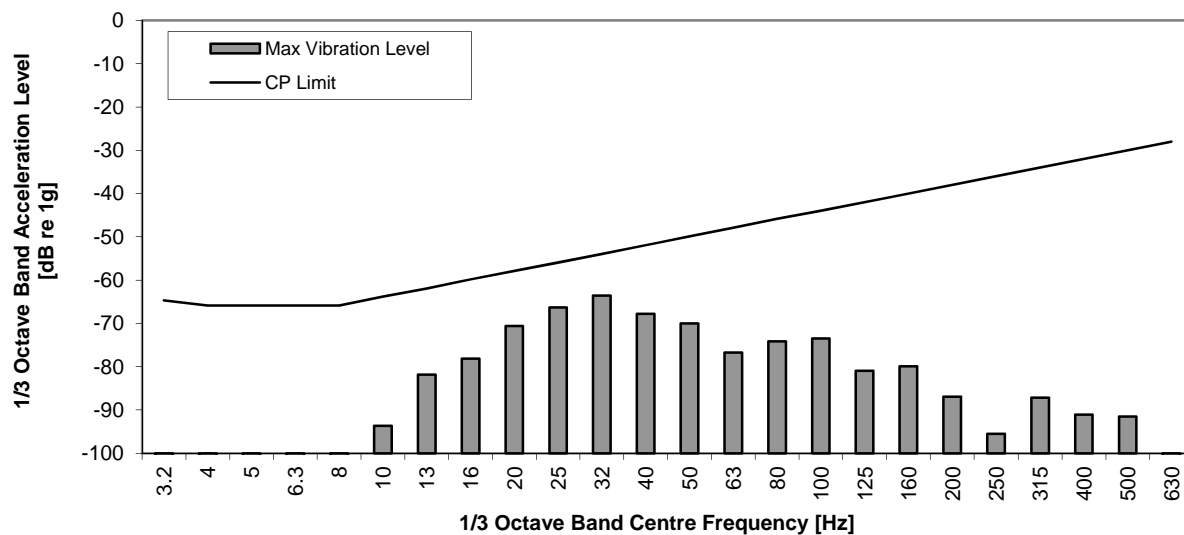


Figure 8b: Pass-by 5
Acceleration Spectrum @ Peak Level (1 sec. Duration)



ACOUSTICS



NOISE



VIBRATION

APPENDIX A

CP Principal Mainline Requirements



CANADIAN PACIFIC RAILWAY

PRINCIPAL MAIN LINE REQUIREMENTS

1. Berm, or combination berm and noise attenuation fence, having extensions or returns at the ends, to be erected on adjoining property, parallel to the railway right-of-way with construction according to the following:
 - a) Minimum total height 5.5 metres above top-of-rail;
 - b) Berm minimum height 2.5 metres and side slopes not steeper than 2.5 to 1.
 - c) Fence, or wall, to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre (4 lb/sq.ft.) of surface area.

No part of the berm/noise barrier is to be constructed on railway property.

A clause should be inserted in all offers of purchase and sale or lease, and be registered on title or included in the lease for each dwelling affected by any noise and vibration attenuation measures, advising that any berm, fencing, or vibration isolation features implemented are not to be tampered with or altered, and further that the owner shall have the sole responsibility for and shall maintain these features.

Dwellings must be constructed such that the interior noise levels meet the criteria of the appropriate Ministry. A noise study should be carried out by a professional noise consultant to determine what impact, if any, railway noise would have on residents of proposed subdivisions and to recommend mitigation measures, if required. The Railway may consider other measures recommended by the study.

2. Setback of dwellings from the railway right-of-way to be a minimum of 30 metres. While no dwelling should be closer to the right-of-way than the specified setback, an unoccupied building, such as a garage, may be built closer. The 2.5 metre high earth berm adjacent to the right-of-way must be provided in all instances.
 3. Ground vibration transmission to be estimated through site tests. If in excess of the acceptable levels, all dwellings within 75 metres of the nearest track should be protected. The measures employed may be:
 - a) Support the building on rubber pads between the foundation and the occupied structure so that the maximum vertical natural frequency of the structure on the pads is 12 Hz;
 - b) Insulate the building from the vibration originating at the railway tracks by an intervening discontinuity or by installing adequate insulation outside the building, protected from the compaction that would reduce its effectiveness so that vibration in the building became unacceptable; or
 - c) Other suitable measures that will retain their effectiveness over time.
 4. A clause should be inserted in all offers of purchase and sale or lease and in the title deed or lease of each dwelling within 300m of the railway right-of-way, warning prospective purchasers or tenants of the existence of the Railway's operating right-of-way; the possibility of alterations including the possibility that the Railway may expand its operations, which expansion may affect the living environment of the residents notwithstanding the inclusion of noise and vibration attenuating measures in the design of the subdivision and individual units, and that the Railway will not be responsible for complaints or claims arising from the use of its facilities and/or operations.
 5. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the Railway, and be substantiated by a drainage report to be reviewed by the Railway.
 6. A 1.83 metre high chain link security fence be constructed and maintained along the common property line of the Railway and the development by the developer at his expense, and the developer is made aware of the necessity of including a covenant running with the lands, in all deeds, obliging the purchasers of the land to maintain the fence in a satisfactory condition at their expense.
 7. Any proposed utilities under or over railway property to serve the development must be approved prior to their installation and be covered by the Railway's standard agreement.
-

APPENDIX B

Road and Rail Traffic Information

Sheeba Paul

From: Rail Data Requests <RailDataRequests@metrolinx.com>
Sent: March-07-19 12:23 PM
To: Sheeba Paul
Subject: RE: rail data request/verification

Hello Sheeba,

Further to your request dated March 5, 2019 (attached below), the subject site (on Barbertown Road, Mississauga) is located within 300 metres of CPR's Galt Subdivision, which carries Milton GO Train service.

It's anticipated that GO service on this corridor will be comprised of diesel 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 20 trains (19 day, 1 night). Trains will be comprised of a single locomotive and up to 12 passenger cars.

The maximum design speed on this corridor is 50 mph (80 km/h).

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 CPR operates trains in this area and it would be prudent to contact them directly for rail traffic information.

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

Best Regards,

IVAN CHEUNG, M.Sc, B.URPI

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: March-05-19 10:28 AM
To: Rail Data Requests
Cc: Adam Snow; Brandon Gaffoor
Subject: RE: rail data request/verification

Hello

Are you able to verify if the rail traffic data attached is still valid?

We are performing a noise study for a development north of Barbertown Road and south of the CP railway line in Mississauga.

A google map is provided in the link below.

<https://www.google.com/maps/place/Barbertown+Rd,+Mississauga,+ON/@43.5747056,-79.6901811,15.37z/data=!4m5!3m4!1s0x882b41754d211307:0x4598313eb48b7b6!8m2!3d43.5737906!4d-79.6940632>

We are requesting rail data or verification of the attached data for the railway line.

- 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](#)
Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203, Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044 e: spaul@hgcengineering.com
Visit our website – www.hgcengineering.com Follow Us – [LinkedIn](#) | [Twitter](#) | [YouTube](#)

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800 - 1290 Central Parkway
West
Mississauga, Ontario
Canada L5C 4R3

T 905 803 3429
E josie_tomei@cpr.ca

September 28, 2018

Via email: vgarcia@hgcengineering.com

Victor Garcia
HGC Engineering
2000 Argentia Road
Plaza One, Suite 203
Mississauga, Ontario L5N 1P7

Dear Sir/Madam:

**Re: Rail Traffic Volumes, CP Mileage 17.35, Galt Subdivision,
3451 Erindale Station Road, Mississauga**

This is in reference to your request for rail traffic data in the vicinity of 3451 Erindale Station Road in the City of Mississauga. The study area is located at mile 17.35 of our Galt Subdivision, which is classified as a Principal Main line.

The information requested is as follows:

1. Number of freight trains between 0700 & 2300: 9
Number of freight trains between 2300 & 0700: 8
2. Maximum cars per train freight: 151
3. Number of locomotives per train: 2 (4 max.)
4. Maximum permissible train speed: 60 mph
5. Erindale Station Road and Wolfedale Road, both located in the study area are grade level crossings. The whistle signal is prohibited approaching public grade crossings through the study area, however, the whistle may be sounded if deemed necessary by the train crew for safety reasons at any time.
6. There are 2 mainline tracks and 1 siding track at this location, all with continuously welded rail.
7. GO Trains run on a mainline in this corridor. Current traffic data should be requested from Metrolinx directly.

The information provided is based on recent rail traffic. Variations of the above may exist on a day-to-day basis. Specific measurements may also vary significantly depending on customer needs.

Yours truly,

Josie Tomei SR/WA
Specialist Real Estate Sales & Acquisitions – Ontario

Date:19-May-24

REQUESTED BY:


Name:Sheeba Paul

Company:HGC Engineering

PREPARED BY:

Name:Bertuen Mickle

Tel#:(905) 615-3200



ID#419

NOISE REPORT FOR PROPOSED DEVELOPMENT

Location:

-Enby Drive : Thomas Street to North End
 -Tannery Street: between Crumbie/Broadway Street and Joymar Drive

ON SITE TRAFFIC DATA

Specific	Street Names				
	Enby Drive	Tannery Street			
AADT:	1,000	5,000			
# of Lanes:	2 Lanes	2 Lanes			
% Trucks:	1%	4%			
Medium/Heavy Trucks Ratio:	55/45	55/45			
Day/Night Split:	90/10	90/10			
Posted Speed Limit:	50km/h	50km/h			
Gradient Of Road:	<2%	<2%			
Ultimate R.O.W:	15.30m	20m			
Comments:	Ultimate Traffic Data Only				

APPENDIX C

STAMSON 5.04 Output

Filename: aday.te Time Period: 16 hours

Description: Daytime sound level at prediction location [A], townhouses with flanking exposure to railway

Rail data, segment # 1: CP

Train Type	! Trains	! Speed (km/h)	! # loc /Train	! # Cars /Train	! Eng type	! Cont weld
* 1. Freight	11.8/10.5	97.0	4.0	151.0	Diesel	Yes
* 2. GO	19.0/1.0	80.0	1.0	12.0	Diesel	Yes

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	Train Name	! Unadj. Trains	! Annual % Increase	! Years of Growth
1.	Freight	9.0/8.0	2.50	11.00
2.	GO	19.0/1.0	2.50	0.00

Data for Segment # 1: CP

Angle1	Angle2	: -90.00 deg	90.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	42.20 m	
Receiver height	:	7.50 m	
Topography	:	1	(Flat/gentle slope; no barrier)
No Whistle	:		
Reference angle	:	0.00	

Results segment # 1: CP

LOCOMOTIVE (0.00 + 68.40 + 0.00) = 68.40 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	75.71	-6.31	-0.99	0.00	0.00	0.00	68.40

WHEEL (0.00 + 61.11 + 0.00) = 61.11 dBA

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



ADAY

-90	90	0.51	69.09	-6.78	-1.19	0.00	0.00	0.00	61.11
-----	----	------	-------	-------	-------	------	------	------	-------

Segment Leq : 69.14 dBA

Total Leq All Segments: 69.14 dBA

Road data, segment # 1: Tannery

 Car traffic volume : 4320 veh/TimePeriod *
 Medium truck volume : 99 veh/TimePeriod *
 Heavy truck volume : 81 veh/TimePeriod *
 Posted speed limit : 50 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Tannery

 Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 16.60 m
 Receiver height : 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: Emby

 Car traffic volume : 891 veh/TimePeriod *
 Medium truck volume : 5 veh/TimePeriod *
 Heavy truck volume : 4 veh/TimePeriod *
 Posted speed limit : 50 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Emby

 Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 15.00 m
 Receiver height : 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Tannery

Source height = 1.16 m

ROAD (0.00 + 55.59 + 0.00) = 55.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.49	60.41	0.00	-0.66	-4.17	0.00	0.00	0.00	55.59

Segment Leq : 55.59 dBA

Results segment # 2: Emby

Source height = 0.82 m

ROAD (0.00 + 49.73 + 0.00) = 49.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	50.91	0.00	0.00	-1.18	0.00	0.00	0.00	49.73

Segment Leq : 49.73 dBA

Total Leq All Segments: 56.59 dBA

TOTAL Leq FROM ALL SOURCES: 69.38 dBA



ANIGHT

STAMSON 5.0 NORMAL REPORT Date: 19-06-2019 11:33:40
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te Time Period: Day/Night 16/8 hours
 Description:

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

Train Type	! Trains	! Speed (km/h)	!# loc /Train	!# Cars /Train	! Eng type	!Cont weld
* 1. Freight	11.8/10.5	97.0	4.0	151.0	Diesel	Yes
* 2. GO	19.0/1.0	80.0	1.0	12.0	Diesel	Yes

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	Train Name	! Unadj. Trains	! Annual % Increase	! Years of Growth
1.	Freight	9.0/8.0	2.50	11.00
2.	GO	19.0/1.0	2.50	0.00

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

24 hr Traffic Volume (AADT or SADT): 5000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 2.20
 Heavy Truck % of Total Volume : 1.80
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: CP (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 : 42.20 / 42.20 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 No Whistle
 Reference angle : 0.00

Results segment # 1: CP (night)

ANIGHT

LOCOMOTIVE (0.00 + 70.42 + 0.00) = 70.42 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	77.72	-6.31	-0.99	0.00	0.00	0.00	70.42

WHEEL (0.00 + 63.23 + 0.00) = 63.23 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	71.20	-6.78	-1.19	0.00	0.00	0.00	63.23

Segment Leq : 71.18 dBA

Total Leq All Segments: 71.18 dBA

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

Car traffic volume : 4320/480 veh/TimePeriod *
Medium truck volume : 99/11 veh/TimePeriod *
Heavy truck volume : 81/9 veh/TimePeriod *
Posted speed limit : 50 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): 5000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.20
Heavy Truck % of Total Volume : 1.80
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Tannery (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 : 16.60 / 16.60 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Tannery (night)

ANIGHT

Source height = 1.16 m

ROAD (0.00 + 49.06 + 0.00) = 49.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.49	53.88	0.00	-0.66	-4.17	0.00	0.00	0.00	49.06

Segment Leq : 49.06 dBA

Total Leq All Segments: 49.06 dBA

(NIGHT): 71.21 dBA

Filename: b.te Time Period: Day/Night 16/8 hours

Description: Townhouses with fronting exposure to railway

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

Train Type	! Trains !	! Speed ! (km/h)	!# loc !/Train	!# Cars !/Train	! Eng type !	!Cont !weld
* 1. Freight	! 11.8/10.5 !	! 97.0 !	! 4.0 !	!151.0 !	!Diesel!	! Yes
* 2. GO	! 19.0/1.0 !	! 80.0 !	! 1.0 !	! 12.0 !	!Diesel!	! Yes

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	Train type: Name	! Unadj. ! Trains	! Annual % ! Increase	! Years of ! Growth
1.	Freight	! 9.0/8.0 !	! 2.50 !	! 11.00 !
2.	GO	! 19.0/1.0 !	! 0.00 !	! 0.00 !

Data for Segment # 1: CP (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 : 36.40 / 36.40 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 No Whistle
 Reference angle : 0.00

Results segment # 1: CP (day)

LOCOMOTIVE (0.00 + 69.31 + 0.00) = 69.31 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	75.71	-5.41	-0.99	0.00	0.00	0.00	69.31

WHEEL (0.00 + 62.08 + 0.00) = 62.08 dBA

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

-90	90	0.51	69.09	-5.81	-1.19	0.00	0.00	0.00	62.08
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Segment Leq : 70.06 dBA

Total Leq All Segments: 70.06 dBA

Results segment # 1: CP (night)

LOCOMOTIVE (0.00 + 71.32 + 0.00) = 71.32 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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-90	90	0.41	77.72	-5.41	-0.99	0.00	0.00	0.00	71.32
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WHEEL (0.00 + 64.20 + 0.00) = 64.20 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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-90	90	0.51	71.20	-5.81	-1.19	0.00	0.00	0.00	64.20
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Segment Leq : 72.09 dBA

Total Leq All Segments: 72.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.06 dBA
(NIGHT): 72.09 dBA



Filename: c.te Time Period: Day/Night 16/8 hours

Description: 2nd row of townhouses with exposure to railway

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

Train Type	! Trains !	! Speed ! (km/h)	!# loc !/Train	!# Cars !/Train	! Eng type !	!Cont !weld
* 1. Freight	! 11.8/10.5 !	! 97.0 !	! 4.0 !	!161.0 !	!Diesel!	! Yes
* 2. GO	! 19.0/1.0 !	! 80.0 !	! 1.0 !	! 12.0 !	!Diesel!	! Yes

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	! Unadj. !	! Annual % !	! Years of !
Name	! Trains !	! Increase !	! Growth !
1. Freight	! 9.0/8.0 !	! 2.50 !	! 11.00 !
2. GO	! 19.0/1.0 !	! 0.00 !	! 0.00 !

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

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1 / 1
 House density : 80 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 82.80 / 79.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 No Whistle
 Reference angle : 0.00

Results segment # 1: CP (day)

LOCOMOTIVE (0.00 + 58.84 + 0.00) = 58.84 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	76.04	-10.42	-0.99	0.00	-5.79	0.00	58.84

WHEEL (0.00 + 51.15 + 0.00) = 51.15 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	69.34	-11.20	-1.19	0.00	-5.79	0.00	51.15

Segment Leq : 59.52 dBA

Total Leq All Segments: 59.52 dBA

Results segment # 1: CP (night)

LOCOMOTIVE (0.00 + 61.16 + 0.00) = 61.16 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	78.09	-10.14	-0.99	0.00	-5.80	0.00	61.16

WHEEL (0.00 + 53.58 + 0.00) = 53.58 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	71.47	-10.90	-1.19	0.00	-5.80	0.00	53.58

Segment Leq : 61.86 dBA

Total Leq All Segments: 61.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.52 dBA
(NIGHT): 61.86 dBA

Filename: d.te Time Period: Day/Night 16/8 hours

Description: 2nd row of townhouses with exposure to railway

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

Train Type	! Trains !	! Speed ! (km/h)	!# loc !/Train	!# Cars !/Train	! Eng type !	!Cont !weld
* 1. Freight	! 11.8/10.5	! 97.0	! 4.0	!151.0	!Diesel	! Yes
* 2. GO	! 19.0/1.0	! 80.0	! 1.0	! 12.0	!Diesel	! Yes

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	Train Name	! Unadj. ! Trains	! Annual % ! Increase	! Years of ! Growth
1.	Freight	! 9.0/8.0	! 2.50	! 11.00
2.	GO	! 19.0/1.0	! 0.00	! 0.00

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

Angle1 Angle2 : 10.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 68.00 / 68.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 No Whistle
 Reference angle : 0.00

Results segment # 1: CP (day)

LOCOMOTIVE (0.00 + 61.83 + 0.00) = 61.83 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
10	90	0.41	75.71	-9.22	-4.65	0.00	0.00	0.00	61.83

WHEEL (0.00 + 54.29 + 0.00) = 54.29 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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10	90	0.51	69.09	-9.91	-4.89	0.00	0.00	0.00	54.29
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Segment Leq : 62.53 dBA

Total Leq All Segments: 62.53 dBA

Results segment # 1: CP (night)

LOCOMOTIVE (0.00 + 63.84 + 0.00) = 63.84 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
10	90	0.41	77.72	-9.22	-4.65	0.00	0.00	0.00	63.84

WHEEL (0.00 + 56.40 + 0.00) = 56.40 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
10	90	0.51	71.20	-9.91	-4.89	0.00	0.00	0.00	56.40

Segment Leq : 64.56 dBA

Total Leq All Segments: 64.56 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.53 dBA
(NIGHT): 64.56 dBA



Filename: e.te Time Period: 16 hours

Description: Interior amenity space

Rail data, segment # 1: CP

Train Type	! Trains !	! Speed ! (km/h)	!# loc !/Train!	!# Cars !/Train!	! Eng type !	!Cont !weld!
1. Freight	! 9.0/11.8 !	! 97.0 !	! 4.0 !	!151.0 !	!Diesel!	! Yes
2. GO	! 19.0/15.1 !	! 80.0 !	! 1.0 !	! 12.0 !	!Diesel!	! Yes

Data for Segment # 1: CP

Angle1	Angle2	:	-90.00 deg	90.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	1		
House density	:	95 %		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	68.20 m		
Receiver height	:	1.50 m		
Topography	:	1	(Flat/gentle slope; no barrier)	
No Whistle				
Reference angle	:	0.00		

Results segment # 1: CP

LOCOMOTIVE (0.00 + 53.64 + 0.00) = 53.64 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	74.68	-10.42	-1.33	0.00	-9.29	0.00	53.64

WHEEL (0.00 + 46.37 + 0.00) = 46.37 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	68.03	-10.92	-1.46	0.00	-9.29	0.00	46.37

Segment Leq : 54.39 dBA

Total Leq All Segments: 54.39 dBA

TOTAL Leq FROM ALL SOURCES: 54.39 dBA E