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Orange Renovations & Restorations – 245 Hinchey Ave Apartment Building
Traffic Noise Study

Dear Ryan,

We are pleased to present the following traffic noise study for a new proposed residential apartment building located at 245 Hinchey Avenue in Ottawa, Ontario. As part of the Site Plan Application (SPA), the City of Ottawa has requested a traffic noise study to be performed. The proposed building is a three storey residential apartment building to be located at 245 Hinchey Avenue which is located in proximity to both Scott St. and the Confederation Light Rail Transit (LRT) Line to the north. This type of study is required by the City of Ottawa under the Environmental Noise Control Guidelines 2016 (ENCG), compliant with the Ministry of Environment, Conservation and Park's NPC-300.

This study considers acoustic concerns regarding traffic noise from Scott St. (~57m from north façade of building) and the Confederation Line LRT (~88m from north façade of building and ~4m below grade). These noise sources are the only sources considered in this study and are the only sources of noise that will have an impact on the development. All other noise sources, such as principal rail lines and airport influence zone are outside of limits as per the City of Ottawa ENCG and Schedule F of the City of Ottawa Official Plan. There is no aircraft noise to be considered and no stationary noise to the surrounding area is considered in this study as no significant stationary noise sources are anticipated.

It was found that noise levels at the plane of window (POW) on the ground floor are above 55 dBA and a detailed building component analysis was completed. No additional mitigation measures were found to be required. Our full analysis is provided in Section 4.0 and 5.0.

If you have any questions, please do not hesitate to contact us.

Regards,

Patrick Richard, M.Sc.E.
Acoustic Consultant

1.0 Introduction

State of the Art Acoustik Inc. was commissioned by Orange Design Build to complete a traffic noise study as requested by the City of Ottawa for the site plan application of a proposed three storey residential apartment building to be located at 245 Hinchey Ave. in Ottawa, Ontario. We have followed the 2016 City of Ottawa Environmental Noise Control Guidelines (ENCG), which are compliant with the Ministry of Environment, Conservation and Park's (MECP) NPC-300.

In Section 2.0, the site plan of the building is shown and surrounding area is analyzed for possible noise sources which would impact the proposed development. This plan also shows angles and distances from the sources to receptor points. This study includes noise from road and LRT sources and there are no other nearby sources. In addition, this analysis does not include an analysis of stationary noise to the surrounding area, as no significant additional noise sources are anticipated.

In Section 3.0, the noise impact calculation procedure is described and in Section 4.0, the predicted noise impact from Scott St. and the LRT onto the new addition has been analyzed. Section 5.0 provides a detailed analysis of the building components of the development, as the noise levels at the exterior PORs is above 55 dBA.

2.0 Site Plan Evaluation

2.1 Project Description

The proposed development consists of a three storey residential apartment building. The building is located at 245 Hinchey Ave. in Ottawa, Ontario. The area surrounding the development consists primarily of low-rise residential buildings The surrounding buildings will help in shielding some of the noise from each of the noise sources. We have considered traffic noise from Scott St. and the Confederation Line LRT as the only noise sources for this location, as all other potential road noise sources are outside of the distances outlined in Section 2.2.1 of the City of Ottawa Environmental Noise Control Guidelines.

2.2 Site Plan Review

The following Figure 2.1 shows the location of the building and the surrounding area including surface transportation noise sources. Wellington St. W, Parkdale Ave. and Holland Ave. are the surface transportation noise sources that are considered as they are located 120m, 104m and 128m away from 260 Armstrong St., respectively. Wellington St. W and Parkdale are both defined as arterial roads and Holland Ave. is defined as a major collector as per City of Ottawa Schedule E.

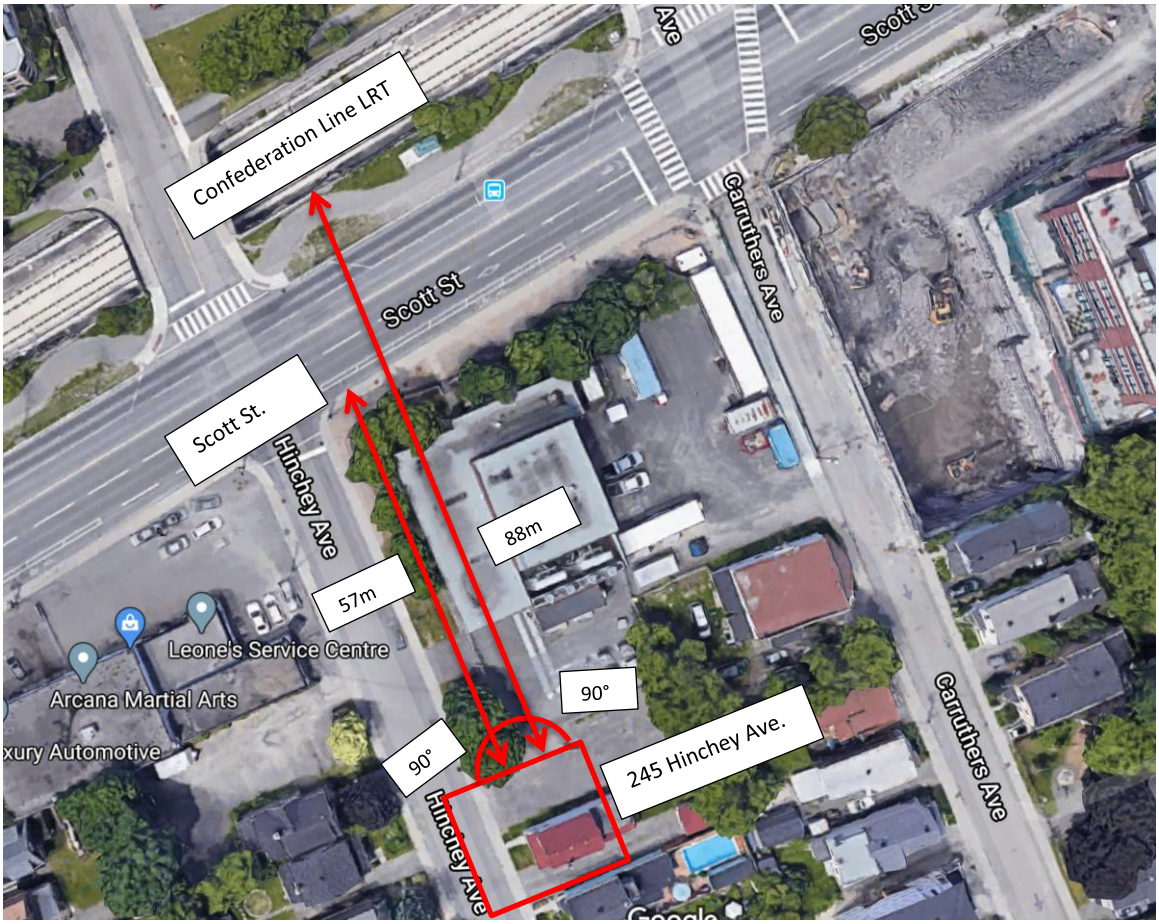

Figure 2.1 – Surrounding area 245 Hinchey Ave. with locations, distances and angles of relevant noise sources

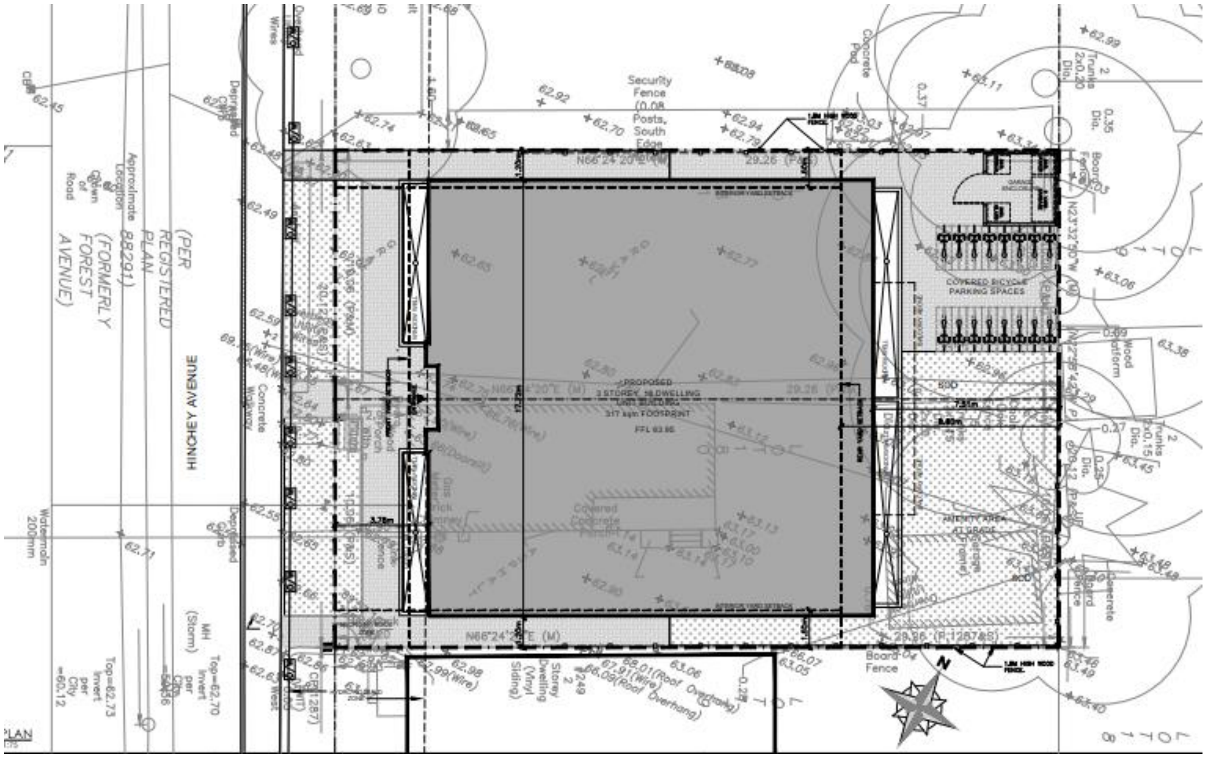

Figure 2.3 – Site plan of 245 Hinchey Ave.

3.0 NOISE IMPACT PROCEDURE

3.1 Procedure Used to Assess Noise Impacts

This assessment uses the City of Ottawa Environmental Noise Control Guidelines (ENCG), dated January 2016, to assess and mitigate noise from roads, transit ways, railways and aircraft. The maximum road noise levels for indoor areas that apply to this building are taken from Table 2.2b of the ENCG and summarized in Table 3.1 below with outdoor level limits shown in Table 3.2.

Time	Indoor Leq Levels (dBA) Class 1, 2 & 3 Areas
	Road Traffic/Light Rail Noise Level Limit (dBA)
07:00 – 23:00	**45** for living/dining areas of residences and sleeping quarters
23:00 - 07:00	**40** for sleeping quarters

Table 3.1 – Criteria for Indoor Area Road and Rail Noise Levels

The ENCG states that noise control studies are to be prepared when the indoor area is within the following setback distances from the road, highway and railway noise sources:

- 100m from an arterial road or a major collector, light rail corridor or bus rapid transitway
- 250m from an existing or proposed highway
- 300m from a proposed or existing rail corridor or secondary main railway line
- 500m from a 400-series provincial highway or principle main railway line

Although the three road noise sources considered in this study are greater than 100m away, the maximum distance is 128m from the building and the City of Ottawa has requested a noise study.

3.2 Noise Attenuation Requirements

This section outlines the required noise control measures and warning clauses and when to apply them, as stipulated by the ENCG for placement within purchase agreements.

If sound levels are predicted to be less than the specified criteria, no attenuation measures are required on the part of the proponent. If the predicted noise exceeds the criteria, the City of Ottawa recommends several attenuation measures.

These attenuation measures may include any or all of the following:

- construction of a noise barrier wall and/or berm;
- installation of a forced air ventilation system with provision for central air;
- installation of central air;
- acoustically selected building façade components

Where excessive noise levels may adversely affect the property or its use, the ENCG requires notices in the form of a Warning Clause to be placed on title in order to alert the buyer or renter of a possible

environmental noise condition or a limitation on his/her property rights. The notices on title must be included in the Development Agreement(s) and in the Agreement(s) or Offer(s) of Purchase and Sale.

The City of Ottawa requires a Warning Clause whenever noise could meet or exceed 55 dBA 16 hour L_{eq} at the Outdoor Living Area or Plane of Window of any living or sleeping area prior to any noise mitigation.

Table 3.2 provides the types of warning clauses and example text to be adapted into warning clauses. These warning clauses should be taken as *example only* and are taken from Appendix A of the ENCG which also states:
"*A warning clause is not considered a form of noise mitigation. It is not acceptable therefore to use warning clauses in place of physical noise control measures to identify an excess over the MOE or City noise limits*."

TYPE	Example Text	Notes
Generic	Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transit way traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment. To help address the need for sound attenuation this development has been designed so as to provide an indoor environment that is within provincial guidelines. Possible measures for sound attenuation include: • multi-pane glass; • brick veneer; • concrete panels;	The generic warning clause outlines that MOE sound levels may be exceeded but the indoor environment is within guidelines. Mitigation measures are described including urban design features. Mention is also made of landscaping to screen the development visually from the source of noise.
Extensive mitigation of indoor and outdoor amenity area	"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/rail/Light Rail/transitway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment. To help address the need for sound attenuation this development may include: • multi-pane glass; • brick veneer; • construction of a solid fence in backyard area To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features. This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning will allow	The warning clause makes reference to MOE sound levels being exceeded from time to time and that there are sound attenuation features and landscaping within the development that should be maintained.

	windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.	
No outdoor amenity area	Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic will interfere with outdoor activities as the sound levels exceed the sound level limits of the City and the Ministry of the Environment. To help address the need for sound attenuation this development may includes • multi-pane glass; • brick veneer; • construction of a solid fence in backyard area To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features. This dwelling unit has been supplied with a central air conditioning system and other measures 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 City and the Ministry of the Environment.	This warning clause notes that only an indoor environment is being provided for.

Table 3.3 - Warning Clause Types and Example Text from the City of Ottawa (from ENCG Table A1)

3.3 Building Component Assessment (AIF Analysis)

According to the ENCG, when noise levels could exceed 55 dBA at the Plane of Windows (POW) of a living area (day) or sleeping quarters (night) the exterior cladding system of the building envelope must be acoustically designed to ensure the indoor noise criteria is achieved. The City of Ottawa recognizes the Acoustic Insulation Factor (AIF[1]) method as an appropriate analysis technique.

To comply with the City of Ottawa policies, the building envelope will require a minimum AIF rating to provide the indoor noise level required for living, dining and bedrooms of residential dwellings as described below.

The City of Ottawa's ENCG outlines the following maximum indoor L_{eq} limits:

- maximum daytime indoor L_{eq} for living spaces should be 45 dBA
- maximum nighttime indoor L_{eq} for bedrooms should be 40 dBA

For the overall exterior wall of any room, the required AIF for road and rail transportation noise is:

Required AIF = Outside L_{eq} - Indoor L_{eq} (Req) + 2dB **(1)**

When the exterior is comprised of components, then the AIF required of each component is determined by the following equation[1]:

Required AIF = Outside L_{eq} - Indoor L_{eq} (Req) + 10 $\log_{10}$ (Number of Components) + 2dB (2)

The required AIF is based on the Outside L_{eq}, Indoor L_{eq} required and the total number of exterior façade components. The AIF method allows for the number of components to be reduced if any component significantly exceeds the required AIF[1]:

"If the AIF of any component exceeds the required AIF by 10 or more, the calculation should be repeated for the other components with the 'total number of components' reduced by one. This reduction in the number of components lowers the required AIF for the others."

[1] J.D. Quirt, Building Research Note: Acoustic Insulation Factor: A Rating for the Insulation of Buildings against Outdoor Noise, National Rearch Council [Revised June 1980]

4.0 Surface Transportation Study

The following section describes our analysis of the road noise impact on the building at 245 Hinchey Ave.

4.1 Road Traffic Information

For this study, the only surface transportation noise sources considered was traffic from Scott St. and the Confederation Line Light Rail Transit (LRT), which are both located to the north of the new development. The new proposed building is farther than 100m from any other urban collector or arterial road, and is not near any other rail lines or within the zone of influence of the airport therefore no other surface noise sources are considered.

Table 4.1 below summarizes the roadway's parameters obtained from Table B1 on p. 75 of The City of Ottawa Environmental Noise Control Guidelines 2016, "Appendix B: Table of Traffic and Road Parameters To Be Used For Sound Level Predictions" for the respective roadway class.

Roadway	Implied Roadway Class	Annual Average Daily Traffic (AADT) Veh/Day	Posted Speed	Day/Night Split (%)	Medium Trucks (%)	Heavy Trucks (%)
Scott St.	2 Lane Urban Arterial	30,000	50 km/h	92/8	7	5

Table 4.1 – Summary of Major Roadway Noise Sources.

Table 4.2 shows the data used for the Confederation Line LRT. The data was gathered from the current busiest traffic day for the LRT which is Fridays (5am to 1am the following day). During rush hours, a train will go by approximately every five minutes at full capacity. We expanded this high traffic volume to apply to all times where the LRT is in operation in order to account for possible traffic increases in the future as well as to incorporate the worst case scenario in regards to noise. The total number of trains passing by was divided into daytime and nighttime numbers with 384 trains during the day (7am-11pm, 194 trains in each direction) and 96 trains during nighttime hours (11pm-1am, 5am-7am, 48 trains in each direction). The speed limit given from the rail car manufacturer Alstom is 80-km/h however often operate at lower speeds.

Rail Line	Train Speed	Day/Night Split	Engine Type	Number of Cars
Confederation Line	80 km/h	384/96	Electric	2/train

Table 4.2 – Summary of Major Rail Noise Sources.

4.2 Procedure Used for Roadway and Railway Noise Analysis

In order to calculate the road noise impact at the proposed development, we utilized the Ministry of Environment's STAMSON modeling software version 5.04. This program allows us to input variables of a road or railway such as traffic volume, types of vehicles, speed, barrier locations and topography to determine the environmental noise impact at a point of reception.

4.3 Points of Reception

To determine the worst case noise impact on the façade of the building, we have chosen two locations; one at the north east corner of the building which is the closest noise sensitive room (bedroom) in proximity to both Scott St. and the LRT and one at the north west corner of building, which is another noise sensitive room (living area). POR1 is located at the Plane of Window (POW) of the corner bedroom in the north east unit on the first floor at a height of 1.5m. We have chosen this POR to represent this scenario for traffic noise from Scott St. and the LRT and is a room which has a large glazing portion as a part of one its exterior walls. POR1 will also encompass the analysis of noise levels at night. POR2 is located at the Plane of Window (POW) of the living area in the north west unit on the first floor at a height of 1.5m which also has a large area of glazing and is subject to analysis of daytime noise levels. The position of our points of reception is shown in Figure 4.1 and 4.2, indicated by the blue cross. Table 4.2 below summarizes receiver heights and distances.

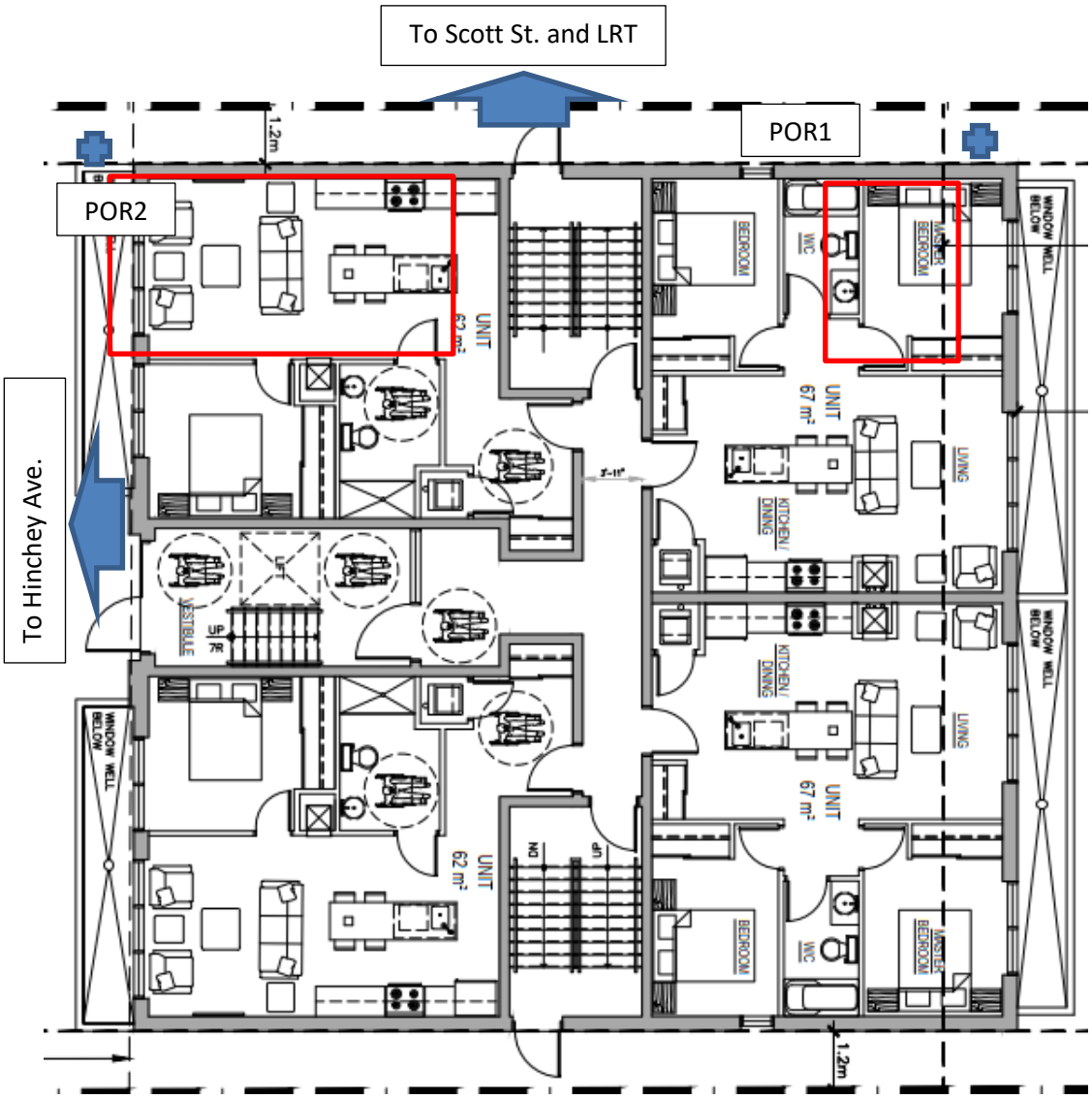

Figure 4.1 – Main level plan view showing the Points of Reception (POR1 and POR2).

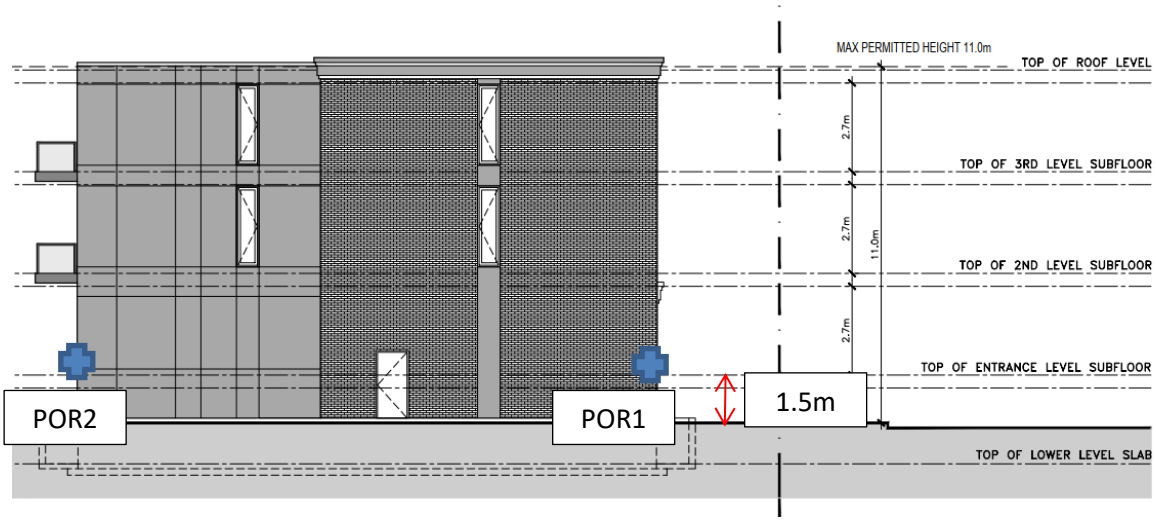

Figure 4.2 – North face elevation view showing the Points of Reception (POR1 and POR2).

Receiver	Height (m)	Distance from Closest Source (m)	Angle to source segment from POR (left)	Angle to source segment from POR (right)
POR1	1.5	~57m (Scott St.)	90°	90°
POR2	1.5	~57m (Scott St.)	90°	90°

Table 4.2 – Table of receiver height and distance from noise source.

4.4 Parameters Used for Analysis

The parameters used in STAMSON to assess the noise impact at POR 1 are shown below in Table 4.3:

Parameter	Values Used
Noise Source:	**Scott St.**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	1
Density of First Row%	30
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	57
Noise Source:	**Confederation Line LRT**
Time Period	16h/8h
Topography	Elevated, no barrier
Rows of Houses	1
Density of First Row%	30
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	88
Elevation Change (m)	4

Table 4.3 – Parameters used in STAMSON model at POR 1 (south-west bedroom)

The parameters used in STAMSON to assess the noise impact at POR 2 are shown below in Table 4.4:

Parameter	Values Used
Noise Source:	**Scott St.**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	1
Density of First Row%	30
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	57
Noise Source:	**Confederation Line LRT**
Time Period	16h/8h
Topography	Elevated, no barrier
Rows of Houses	1
Density of First Row%	30
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	88
Elevation Change (m)	4

Table 4.4 – Parameters used in STAMSON model at POR 2 (east bedroom)

We have assessed daytime levels as well as nighttime levels for POR1 and POR2. It should be noted that there are buildings surrounding the property which act as sound barriers to POR1 and POR2 at 245 Hinchey Ave. As noted in Table 4.3 and 4.4, we have included the shielding in our calculations. It should be noted that although POR1 and POR2 have the same parameters and will have the same sound levels at the façade, the building component analysis will differ for each POR due to room size, exterior building components and time period analyzed.

4.5 Surface Transportation Noise Levels

Table 4.5 below summarizes the predicted sound pressure levels at the points of reception from the results of the STAMSON environmental noise software calculation (Appendix A) for 245 Hinchey Ave.

	POR 1 (dBA)		POR 2 (dBA)	
	Day	**Night**	**Day**	**Night**
Scott St.	64.3	58.1	64.3	58.1
LRT	60.5	58.9	60.5	58.9
Total	**65.8**	**61.5**	**65.8**	**61.5**

Table 4.5 – Predicted Road Noise at each Point of Reception

4.6 Roadway Noise Summary and Analysis

We have calculated the predicted noise level caused by traffic using STAMSON and have shown that a 16h L_{eq} for daytime hours at POR1 and POR2, located on the 1st floor of the proposed building, is 65.8 dBA during the day and 61.5 dBA at night for each POR.. As the levels during the day and at night are above 55 dBA, an evaluation of exterior building components (AIF analysis) is required. Preliminary proposed assemblies for the exterior walls are listed below and are analyzed in the following section.

EXTERIOR STONE / BRICK MASONRY WALL - FRONT/SIDES

-Stone / brick masonry.
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" rockwood comfortbatt insulation (min. R22.5)
-5/8" type x gypsum board

EXTERIOR METAL SIDING WALL – REAR/SIDES

-Pre-finished metal siding
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" rockwood comfortbatt insulation (min. R22.5)
-5/8" type x gypsum board

5.0 Exterior Building Component Analysis (AIF Method)

In this section, we determine if the building complies with the City of Ottawa's ENCG indoor noise requirements based on the existing or proposed wall and window construction. We compare the required minimum façade AIF to the estimated AIF of the currently selected façade materials.

5.1.1 Building Components

The current design of the building's south building façade is made up of 2 different components:

1) Exterior wall
2) Window

The existing exterior wall composition of the north façade was provided by the architect as given in the previous section and Table 5.1 below. The façade is composed of both brick and metal siding as shown in Figure 4.2. This wall type is sufficiently similar to wall type EW5 described in the Canada Mortgage and Housing Corporation (CMHC) document "Road and Rail Noise: Effects on Housing". Table 5.1 shows a comparison of these wall compositions.

Exterior Wall Assembly	CMHC Road and Rail Noise Wall Type
-Stone / brick masonry. -1" rigid insulation -6" steel studs @16" o.c. max. -5.5" rockwood comfortbatt insulation (min. R22.5) -5/8" type x gypsum board	**Wall Type EW5** -100mm brick veener -25mm airspace -Sheathing -50mm mineral wool or glass fibre batts -38x89mm wood studs -12.7mm gypsum board
-Pre-finished metal siding -1" rigid insulation -6" steel studs @16" o.c. max. -5.5" rockwood comfortbatt insulation (min. R22.5) -5/8" type x gypsum board	**Wall Type EW2** -Wood/metal siding -Fibre backer board -Rigid insulation (25-30mm) -50mm mineral wool or glass fibre batts -38x89mm wood studs -12.7mm gypsum board

Table 5.1 – Comparison of new building exterior wall and equivalent wall from CMHC, Road and Rail Noise: Effects on Housing.

There are no glazing assemblies indicated in the architectural drawings and therefore we assume a double pane window that meets minimum OBC requirements such as the following example:

Basic Window Assembly
3m glazing 13mm interplane spacing 3mm glazing

Table 5.2 – Possible Window Assembly used in Calculations

The calculation of AIF for each building component depends on the ratio of the area of a given component on the exterior to the total floor area of the corresponding interior room. Using plan view and elevation drawings, we have determined these dimensions for the two rooms for which we determined the noise impact at each POR. The areas of the exterior wall components and ratios to the floor are given in Table 5.3 below. The layouts of the two spaces are shown in Figure 5.1 & Figure 5.2.

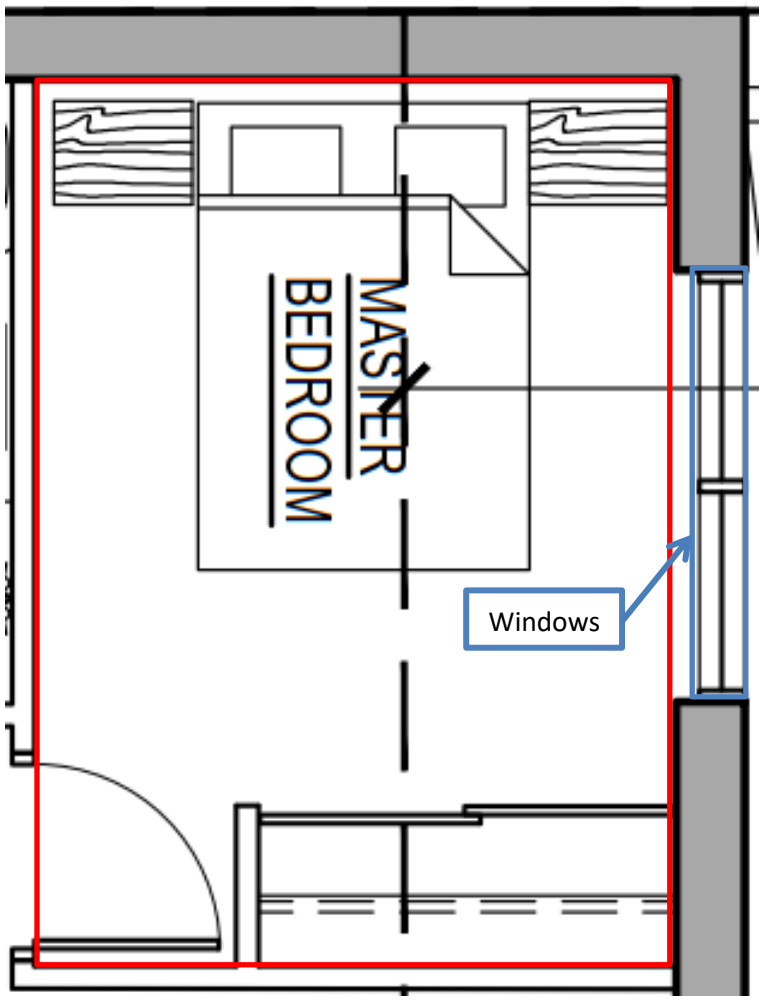

Figure 5.1 – Layout of master bedroom in north east main level unit used for analysis of POR1 indicated in red.

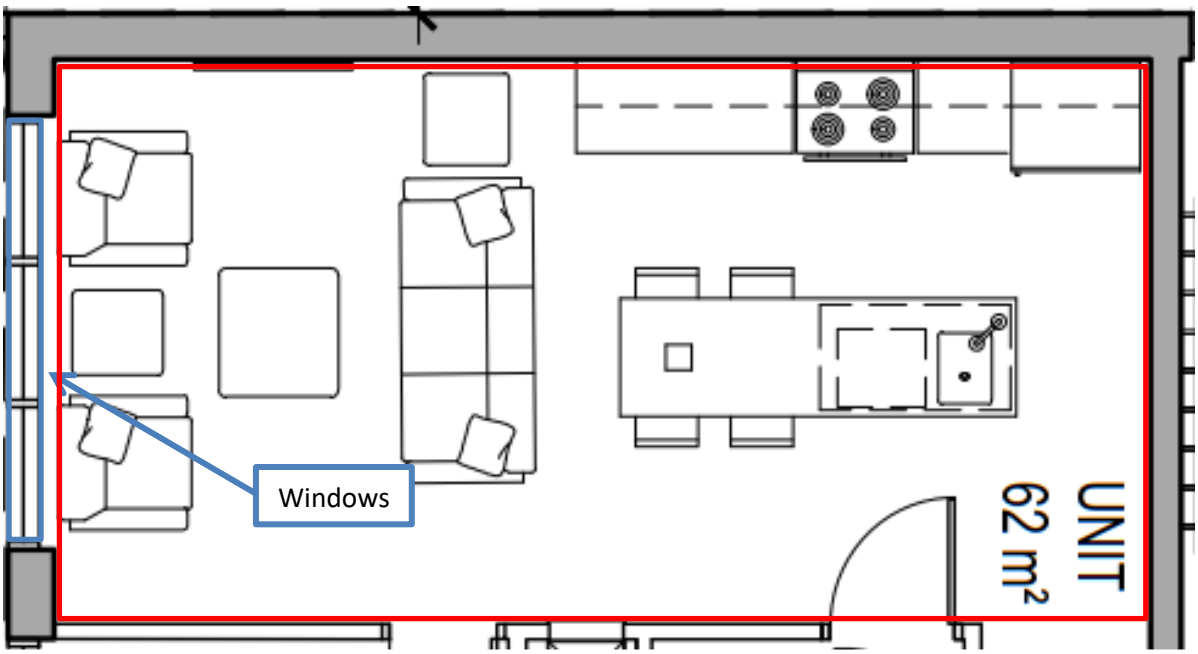

Figure 5.2 – Layout of living area in north west main level unit used for analysis of POR2 indicated in red.

5.1.2 AIF Calculations

Below in Table 5. we provide the results of our AIF calculations based on the procedure given in section 3.4.2 and the building component information given in section 3.6.1 and dimensions from the plans for each component at all PORs. Component AIFs are determined based on component area ratio to floor area given in CMHC "Road and Rail Noise: Effects on Housing" Tables 6.2 and 6.3.

As stated in section 3.4.2, if the AIF of any component exceeds the required AIF by 10 or more (Comp1 AIF > Init AIF +10), the calculation should be repeated for the other components with the 'total number of components' reduced by one. This gives the Final Required AIF for component 2 for which the component AIF is compared to.

POR 1												
Room Floor Area (m^2)	Number of Components	Component Number	Component Type	Component Area (m^2)	Component Area ratio to Floor Area (%)	Outside Leq	Required Indoor Leq	Initial Required AIF	Component AIF	Comp1 AIF > Init AIF +10	Final Required AIF	Acceptable Component AIF
10.8	2	1	Exterior Wall	12.9	119%	61.5	40	27	32	N/A	27	**Yes**
10.8	2	2	Window	4.2	39%	61.5	40	27	27	No	27	**Yes**

Table 5.3 – POR1 AIF parameters used in calculations, resulting required AIF and component AIF, and statement if component AIF is acceptable.

POR 2												
Room Floor Area (m2)	Number of Components	Component Number	Component Type	Component Area (m2)	Component Area ratio to Floor Area (%)	Outside Leq	Required Indoor Leq	Initial Required AIF	Component AIF	Comp1 AIF > Init AIF +10	Final Required AIF	Acceptable Component AIF
25.4	2	1	Exterior Wall	21.1	83%	65.8	45	26	48	N/A	26	**Yes**
25.4	2	2	Window	6.4	25%	65.8	45	26	29	No	26	**Yes**

Table 5.4 – POR2 AIF parameters used in calculations, resulting required AIF and component AIF, and statement if component AIF is acceptable.

All components have acceptable AIFs for all PORs. No changes are required to the exterior façade.

5.2 Warning Clauses

Since the predicted noise level from surface transportation exceeds 55 dBA, a generic warning clause must be added to the development agreement.

The City of Ottawa requires a Warning Clause whenever noise could meet or exceed 55 dBA 16 hour Leq at the Outdoor Living Area or Plane of Window of any living or sleeping area prior to any noise mitigation.

Table 5.5 provides the types of warning clauses and example text to be adapted into warning clauses. These warning clauses should be taken as *example only* and are taken from Appendix A of the ENCG which also states:
"*A warning clause is not considered a form of noise mitigation. It is not acceptable therefore to use warning clauses in place of physical noise control measures to identify an excess over the MOE or City noise limits*."

TYPE	Example Text	Notes
Generic	Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transit way traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment. To help address the need for sound attenuation this development has been designed so as to provide an indoor environment that is within provincial guidelines. Measures for sound attenuation include: • multi-pane glass; • brick veneer; • concrete panels;	The generic warning clause outlines that MOE sound levels may be exceeded but the indoor environment is within guidelines. Mitigation measures are described including urban design features. Mention is also made of landscaping to screen the development visually from the source of noise.
Extensive mitigation of indoor and outdoor amenity area	"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/rail/Light Rail/transitway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment. To help address the need for sound attenuation this development may include: • multi-pane glass; • brick veneer; • construction of a solid fence in backyard area To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features. This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant's	The warning clause makes reference to MOE sound levels being exceeded from time to time and that there are sound attenuation features and landscaping within the development that should be maintained.

	discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.	
No outdoor amenity area	Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic will interfere with outdoor activities as the sound levels exceed the sound level limits of the City and the Ministry of the Environment. To help address the need for sound attenuation this development may includes • multi-pane glass; • brick veneer; • construction of a solid fence in backyard area To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features. This dwelling unit has been supplied with a central air conditioning system and other measures 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 City and the Ministry of the Environment.	This warning clause notes that only an indoor environment is being provided for.

Table 5.5 – Warning Clause Types and Example Text from the City of Ottawa (from ENCG Table A1)

5.3 Traffic Noise Assessment Summary

Exterior Walls

Exterior Wall Assemblies

EXTERIOR STONE / BRICK MASONRY WALL - FRONT/SIDES

-Stone / brick masonry.
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" rockwood comfortbatt insulation (min. R22.5)
-5/8" type x gypsum board

EXTERIOR METAL SIDING WALL – REAR/SIDES

-Pre-finished metal siding
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" rockwood comfortbatt insulation (min. R22.5)
-5/8" type x gypsum board

The AIF value for the exterior wall exceeds the requirements significantly and no changes are required.

Exterior Glazing

A recommended window assembly for the proposed double pane glazing assembly is shown in Table 5.2. The AIF values for this type of window are equal to or exceed the AIF requirements and any double pane glazing equivalent or greater will meet the AIF requirement of each POR.

Overall, no modifications are necessary to the existing or proposed façade components. Since the predicted noise level from surface transportation exceeds 55 dBA, a generic warning clause must be added to the development agreement.

6.0 Conclusion

We have analyzed the traffic noise impact for road sources for the new proposed three storey residential apartment building to be located at 245 Hinchey Ave. A detailed building component analysis was required as noise levels from the three traffic noise sources (Scott St. and the Confederation Line LRT) was greater than 55 dBA at the Plane of Window (POW) at each of the PORs. After completing a detailed AIF analysis of the exterior building components, the proposed exterior assemblies as listed in Section 5.1 are acceptable and windows in Table 5.2 meet or exceed AIF requirements.

If you have any questions or concerns regarding this report, please let us know.

Sincerely,

Patrick Richard, M.Sc.E.
Acoustic Consultant

Approved By:

Donald Buchan, P.Eng
Principal
Buchan Lawton Parent Ltd.

Appendix A
STAMSON Calculations

STAMSON 5.0 NORMAL REPORT Date: 17-12-2019 14:43:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 260arm1.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 75 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 120.00 / 120.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 19430/1690 veh/TimePeriod *
Medium truck volume : 1546/134 veh/TimePeriod *
Heavy truck volume : 1104/96 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): 24000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 75 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 124.00 / 124.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: Parkdale (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: Parkdale (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)

Receiver source distance : 112.00 / 112.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Wellington (day)

Source height = 1.50 m

ROAD (0.00 + 44.03 + 0.00) = 44.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	68.48	0.00	-14.99	-1.46	0.00	-8.00	0.00	44.03

Segment Leq : 44.03 dBA

Results segment # 2: Holland (day)

Source height = 1.50 m

ROAD (0.00 + 45.85 + 0.00) = 45.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.52	0.00	-15.23	-1.46	0.00	-7.99	0.00	45.85

Segment Leq : 45.85 dBA

Results segment # 3: Parkdale (day)

Source height = 1.50 m

ROAD (0.00 + 49.52 + 0.00) = 49.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	68.48	0.00	-14.49	-4.47	0.00	0.00	0.00	49.52

Segment Leq : 49.52 dBA

Total Leq All Segments: 51.86 dBA

Results segment # 1: Wellington (night)

Source height = 1.50 m

ROAD (0.00 + 36.44 + 0.00) = 36.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.88	0.00	-14.99	-1.46	0.00	-8.00	0.00	36.44

Segment Leq : 36.44 dBA

Results segment # 2: Holland (night)

Source height = 1.50 m

ROAD (0.00 + 38.25 + 0.00) = 38.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	62.92	0.00	-15.23	-1.46	0.00	-7.99	0.00	38.25

Segment Leq : 38.25 dBA

Results segment # 3: Parkdale (night)

Source height = 1.50 m

ROAD (0.00 + 41.92 + 0.00) = 41.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	60.88	0.00	-14.49	-4.47	0.00	0.00	0.00	41.92

Segment Leq : 41.92 dBA

Total Leq All Segments: 44.26 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 51.86
(NIGHT): 44.26

STAMSON 5.0 NORMAL REPORT Date: 31-03-2020 16:36:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: HINCH1.te Time Period: Day/Night 16/8 hours
Description:

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

Train Type	Trains !(km/h)	Speed !/Train	# loc !/Train	# Cars! type	Eng !	Cont !weld
1. LRT	384.0/96.0	80.0	1.0	2.0	Elec	No

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 88.00 / 88.00 m
Receiver height : 1.50 / 1.50 m
Topography : 3 (Elevated; no barrier)
No Whistle
Elevation : 4.00 m
Reference angle : 0.00

Results segment # 1: LRT (day)

LOCOMOTIVE (0.00 + 54.50 + 0.00) = 54.50 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.58	-7.68	0.00	0.00	-1.40	0.00	54.50

WHEEL (0.00 + 59.27 + 0.00) = 59.27 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	68.35	-7.68	0.00	0.00	-1.40	0.00	59.27

Segment Leq : 60.52 dBA

Total Leq All Segments: 60.52 dBA

Results segment # 1: LRT (night)

LOCOMOTIVE (0.00 + 52.89 + 0.00) = 52.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	60.57	-7.68	0.00	0.00	0.00	0.00	52.89

WHEEL (0.00 + 57.66 + 0.00) = 57.66 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	65.34	-7.68	0.00	0.00	0.00	0.00	57.66

Segment Leq : 58.91 dBA

Total Leq All Segments: 58.91 dBA

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

Car traffic volume : 24288/2112 veh/TimePeriod *
Medium truck volume : 1932/168 veh/TimePeriod *
Heavy truck volume : 1380/120 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): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 57.00 / 57.00 m

Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Scott (day)

Source height = 1.50 m

ROAD (0.00 + 64.28 + 0.00) = 64.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	71.49	0.00	-5.80	0.00	0.00	-1.41	0.00	64.28

Segment Leq : 64.28 dBA

Total Leq All Segments: 64.28 dBA

Results segment # 1: Scott (night)

Source height = 1.50 m

ROAD (0.00 + 58.10 + 0.00) = 58.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.89	0.00	-5.80	0.00	0.00	0.00	0.00	58.10

Segment Leq : 58.10 dBA

Total Leq All Segments: 58.10 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.81
(NIGHT): 61.53