2024-04-08

Dalhousie Non-Profit Cooperative Inc.
211 Bronson Avenue, suite 224,
Ottawa, ON,
K1R 6H5
c/o **Denis Michaud**, Henry Investments

Dalhousie Non-Profit Cooperative – 10-20 Empress Avenue
Traffic Noise Impact Study R1

Dear Denis,

This report assesses the traffic noise impact on the proposed development at 10-20 Empress Avenue to satisfy the City of Ottawa's decision for a noise attenuation study for the site. The calculations and methodology presented here comply with the City of Ottawa Environmental Noise Control Guidelines (2016) as well as the Ministry of Environment, Conservation and Parks' publication NPC-300.

We have determined that the noise levels generated from Albert Street exceed the acceptable limit of 55 dBA at the plane of window, as per the City of Ottawa noise guidelines. Consequently, it is necessary to include a warning clause in the Offers of Purchase and Sale / Declarations to inform users and potential buyers or tenants about the high noise levels associated with the proximity to Albert Street. The specific details regarding this warning clause can be found in **Section 4.8**.

Should you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,

Tiffany-Rose Filler, M.Sc.
Acoustic Consultant

Contents

1.0 Introduction & Site Description

Henry Investments has commissioned State of the Art Acoustik Inc. to complete a noise study for a new residential development that will be located at 10-20 Empress Avenue in Ottawa, Ontario. The building consists of a four-storey building with forty-one dwellings. It is located in a mainly residential area and within 100 meters of Albert Street, an arterial road. We have reviewed the projected impact of traffic noise from Albert Street to review conformance with the City of Ottawa Environmental Control Guidelines (ENCG), which are compliant with the Ministry of Environment, Conservation and Parks (MECP) NPC-300.

In **Section 2.0**, the site plan of the building is shown, and the surrounding area is analyzed for possible noise sources which would impact the proposed development. This section also shows angles and distances from the sources to receptor points.

In **Section 3.0**, the noise impact calculation procedure is described, and in **Section 4.0**, the predicted noise impact from Albert Street has been analyzed.

2.0 Site Plan Evaluation

2.1 Project Description

The proposed development consists of a new four-storey cooperative that will be located at 10-20 Empress Avenue in Ottawa, Ontario. The area surrounding the development consists primarily of low-rise residential buildings. The only noise source to be considered for this site is Albert Street, as all other potential road noise sources are located beyond the distances specified in Section 2.2.1 of the City of Ottawa Environmental Noise Control Guidelines. For additional information, please refer to **Section 3.1**.

2.1.1 Outdoor Living Areas (OLAs)

An OLA is characterized as a noise-sensitive land that is intended and designed for the quiet enjoyment of the outdoor environment and is readily accessible from the building. In the context of this project, there are two designated OLAs: one located on the rooftop terrace and community garden, and the other situated at the ground floor patio.

2.2 Site Plan Review

The following **Figure 2.1** shows the site plan of the proposed building, including its proximity to Albert Street, which is located approximately 32m from the right of way to the closest façade. **Figure 2.2** shows the proposed site with the distance and angles to Albert Street. Albert Street is indicated as an arterial road per the City of Ottawa's Transportation Master Plan Map 7.

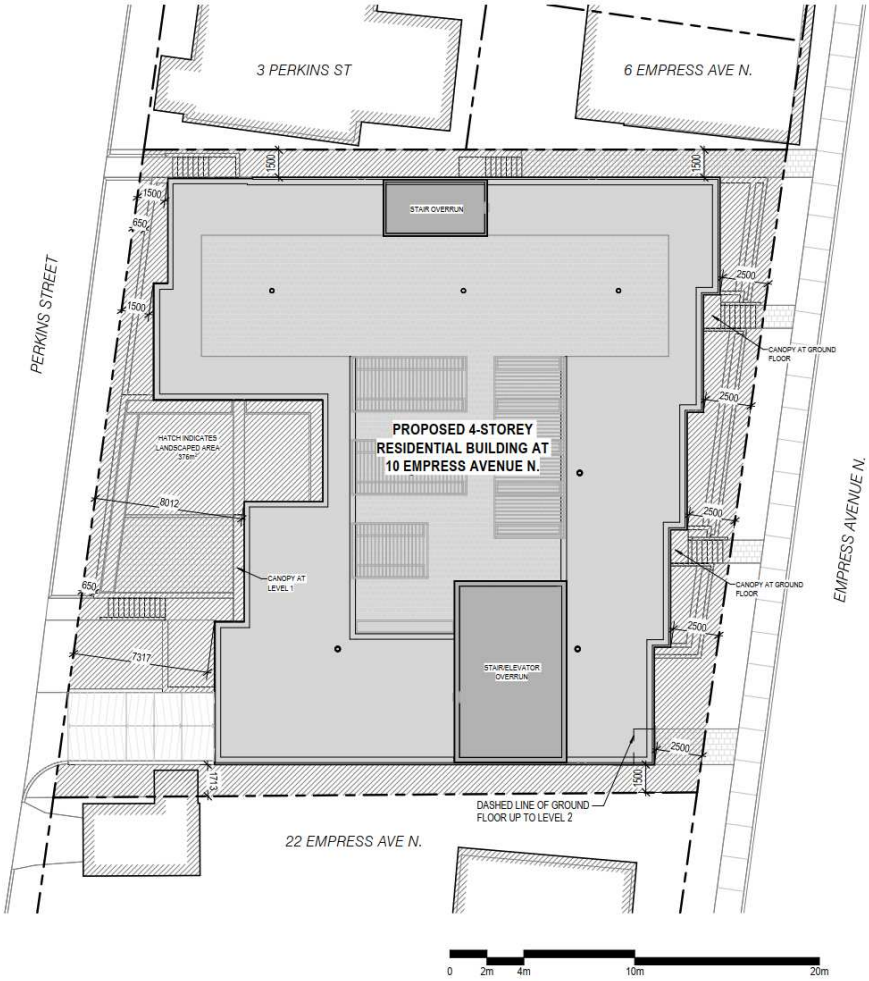


Figure 2.1 – Site plan of 10-20 Empress Avenue.

Figure 2.2 – Surrounding area around 10-20 Empress Avenue (Google Earth Pro)

3.0 Noise Impact Procedure

3.1 City of Ottawa Environmental Noise Guidelines for Traffic Noise (Road & Rail)

This assessment uses the City of Ottawa – Environmental Noise Control Guidelines (ENCG), dated January 2016 and the 2023 update, to assess and mitigate noise from roads, transit ways, railways and aircraft. The maximum road and rail noise levels for outdoor living areas are taken from Table 2.2a of the ENCG and summarized in **Table 3.1** below.

Time	Outdoor Leq Levels (dBA) Class 1, 2 & 3 Areas
	Road/Rail Traffic Noise Level Limit (dBA)
07:00 – 23:00	**55** for Outdoor Living Areas (OLA)

Table 3.1 – Criteria for Outdoor Living Area Road/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 principal main railway line

The traffic noise sources for this site are determined via the City of Ottawa's Transportation Master Plan Map 7, which identifies roads and railways to be considered as traffic noise sources. For 10-20 Empress Avenue, the nearby noise sources are the following:

Roads and Railways	Distance to Façade[1]	Exclusionary Distance Limit
Albert Street	32 metres	100 meters
Booth Street	120 metres	100 meters
Light Rail Transit Line (Pimisi Station)	130 metres	100 meters

[1]Note: The Distance to the Façade Line is calculated from the façade of the proposed development to the right-of-way of the road/railway.

Table 3.3 – List of nearby road noise sources

The noise source must be analyzed when the listed distance to the property line is lower than the respective exclusionary distance limit. Based on the distances in **Table 3.3**, an analysis of the impact of traffic noise is required for Albert Street.

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 and Ministry of Environment, Conservation and Parks (MOECP) 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 the title in order to alert the buyer or renter of a possible environmental noise condition or a limitation on their property rights. The notices on titles must be included in the Development Agreement(s) and the Agreement(s) or Offer(s) of Purchase and Sale.

The City of Ottawa, via MOECP NPC-300, 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 area or 50 dBA at the Plane of Window of any sleeping area prior to any noise mitigation. **Table 3.4** provides the types of warning clauses which are taken from Section C8.1 Transportation Sources of the MOECP NPC-300, which also states:

"The use of warning clauses or easements in respect of noise are recommended when circumstances warrant. Noise warning clauses may be used to warn of potential annoyance due to an existing source of noise and/or to warn of excesses above the sound level limits. Direction on the use of warning clauses should be included in agreements that are registered on title to the lands in question. The warning clauses would be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations."

In addition, Section C8 also notes: "*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	Warning Clause Text
Type A	Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transit way traffic may occasionally 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.
Type B	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 occasions 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.
Type C	This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air condition by the occupant in low and medium density developments 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 Environment.

Type D	This dwelling 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 City and the Ministry of Environment.

Table 3.4 - Warning Clause Types (from MOECP NPC-300 Section C8.1)

3.3 Building Component Assessment (AIF Analysis)

According to the ENCG, when noise levels could exceed 65 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 Research Council [Revised June 1980]

4.0 Surface Transportation Noise Study

The following section describes our analysis of the road noise impact on the new proposed building at 10-20 Empress Avenue.

4.1 Road Traffic Information

This study focuses exclusively on the traffic noise generated by Albert Street, north of the new building's front façade. The proposed building is positioned at a distance greater than 100 meters from any other collector or arterial road, with no nearby rail lines or influence from the airport. Consequently, no other surface noise sources have been considered for this study.

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 (%)
Albert St	4-Lane Urban Arterial Undivided (4-UAU)	30,000	50 km/h	92/8	7	5

Table 4.1 – Summary of Major Roadways

4.2 Procedure Used for Roadway Noise Analysis

To assess the impact of road noise on the proposed development, we employed the Ministry of Environment's STAMSON modelling software version 5.04. This program enables us to input various road variables, including traffic volume, vehicle types, speed, barrier locations, and topography. We can accurately determine the environmental noise impact at specific reception points by utilizing these inputs.

4.3 Points of Reception (POR)

To identify the most severe noise impact on the building's façade, we have selected three PORs based on their proximity to Albert Street. These PORs include the rooftop terrace, the northern façade of the building (3rd floor), and the ground-level patio. **Figure 4.1** provides an elevation view of all the PORs, **Figure 4.2** provides the barrier height for POR 3, and **Figure 4.3-4.5** displays the floor plans of each POR. POR1 is positioned at a height of 16.0m above ground level. This is determined by the rooftop terrace's elevation of 14.5m, with the POR situated 1.5m above it. Our measurements for POR1 include the presence of a barrier that is 2.3m tall. POR2 is located at a height of 9.0m on the 3rd floor, precisely at the plane of the window (POW). POR3 is situated at a height of 1.5m on the ground floor. Our measurements for POR3 incorporate a 2.45m tall wooden plank barrier. **Table 4.2** below summarizes the POR heights, distances to relevant noise sources, and angles to these sources.

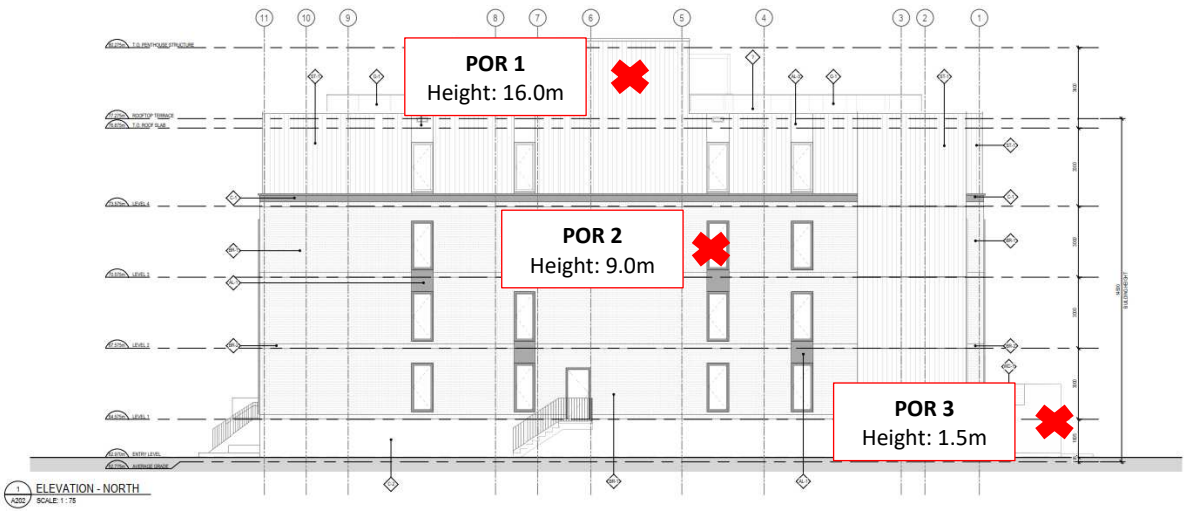


Figure 4.1 – Elevation of 10-20 Empress Ave. showing location and heights of points of reception.

Receiver	Height (m)	Noise Source		
		Albert Street		
		Distance from Source (m)	Angle to source from left	Angle to source from right
POR 1	16.0	55	90	90
POR 2	9.0	49	90	90
POR 3[1]	1.5	70	90	0

Note[1]: POR 3 is partially shielded by the building, limiting the source angle from 0 to 90 degrees.

Table 4.2 – POR height, distance from noise sources, and angles to noise sources.

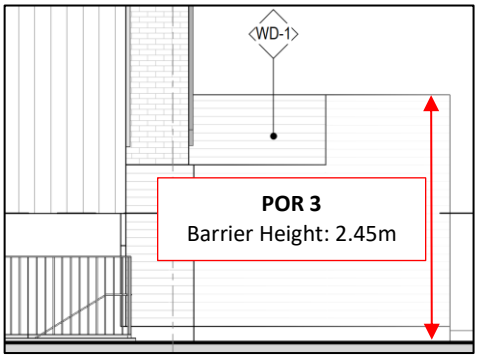


Figure 4.2 – Barrier height for POR 3

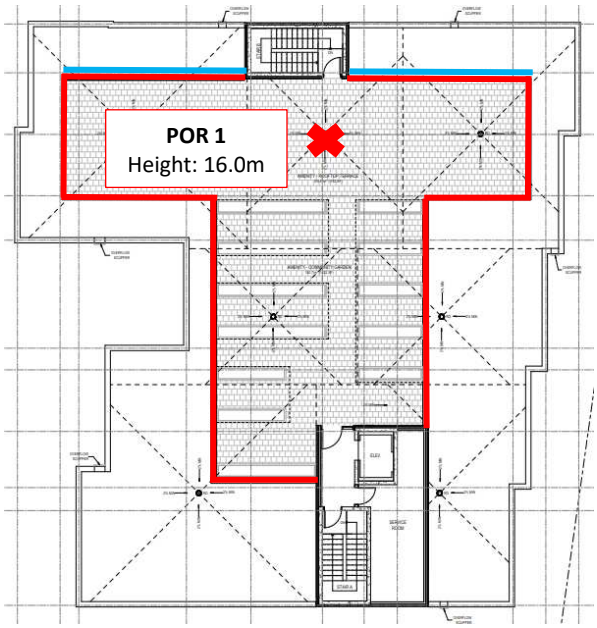


Figure 4.3 – Floor Plan of the rooftop Outdoor Living Area (POR1) of 10-20 Empress Ave. This includes the 2.3m tall barrier (blue line). The space associated with the POR is outlined in red. The red 'X' denotes the receiver location used in STAMSON.

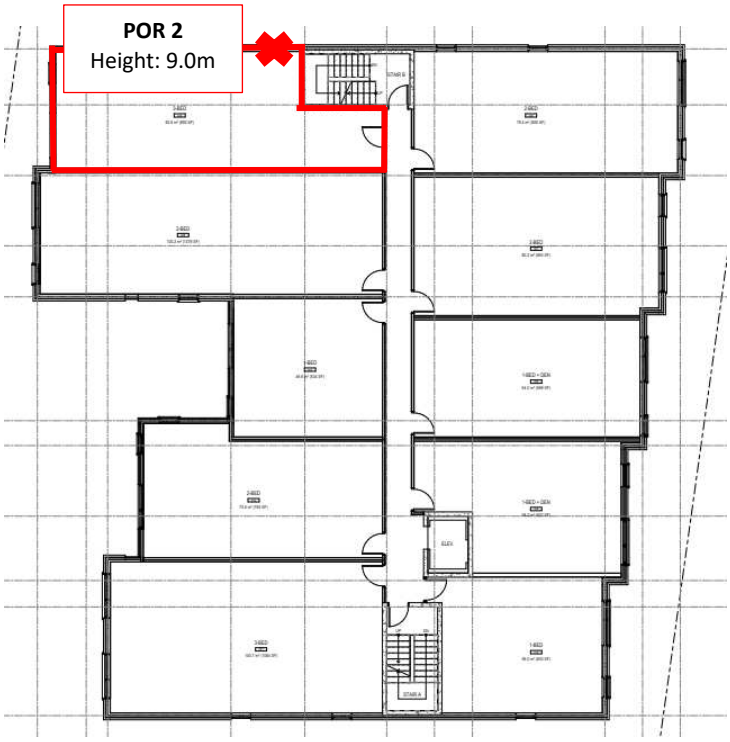


Figure 4.4 – Floor Plan of 3rd floor (POR2) of 10-20 Empress Ave. The room associated with the POR is outlined in red. The red 'X' denotes the receiver location used in STAMSON.

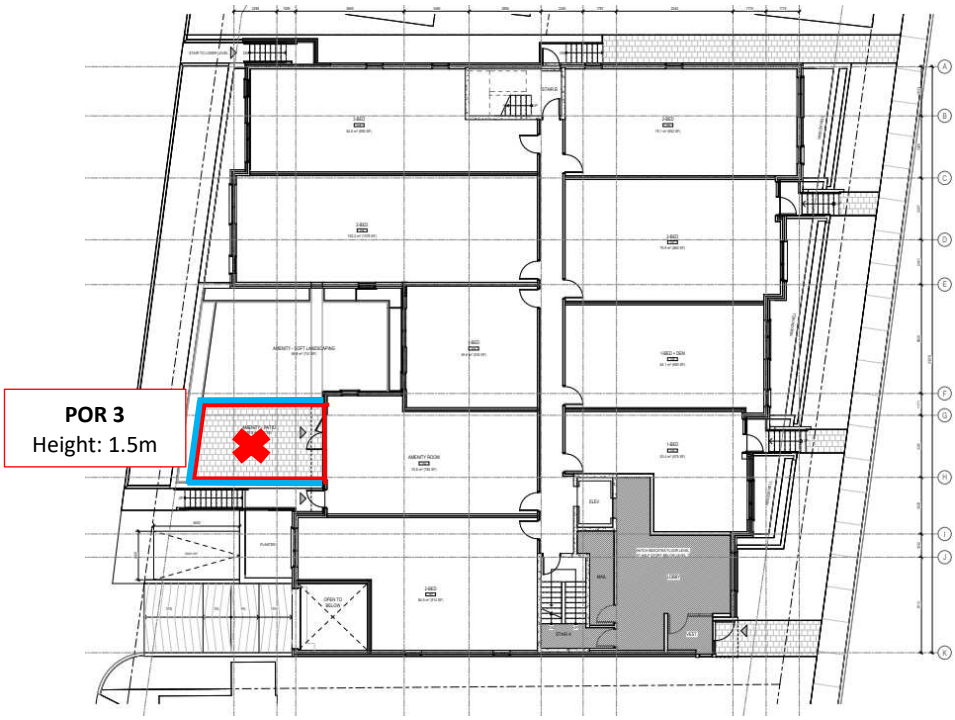


Figure 4.5 – Floor Plan of the ground level patio Outdoor Living Area (POR3) of 10-20 Empress Ave. This includes the 2.45m tall barrier (blue line). The space associated with the POR is outlined in red. The red 'X' denotes the receiver location used in STAMSON.

4.4 Methodology Used in Traffic Noise Impact Calculation

To assess the impact of rail noise on the proposed development, we utilized the Ministry of Environment's STAMSON modelling software version 5.04. This software allows us to input various variables related to rail transportation, such as traffic volume, speed, day and night traffic splits, and topography. We can accurately determine the noise impact at specific PORs by utilizing these inputs.

According to the guidelines provided by the City of Ottawa, if noise levels are expected to exceed 65 dBA at the POW of a noise-sensitive building, the building's exterior cladding system must be acoustically designed to ensure compliance with the indoor noise criteria.

4.5 STAMSON Analysis Parameters

The parameters used in STAMSON to assess the noise impact at PORs 1-3 are indicated in **Tables 4.3-4.5**, respectively.

Parameter	Values Used
Road	Albert Street
Time Period	16h/8h
Topography	Elevated with barrier
Rows of Houses	2
Density of First Row	50%
Intermediate Surface	Reflective
Receiver Height (m)	16
Source Receiver Distance (m)	55
Barrier Angles	Θ1= -90°, Θ2=90°
Barrier to Receiver Distance (m)	3.0
Barrier Height (m)	2.30
Source Elevation (m)	1.5

Table 4.3 – Parameters used in the STAMSON model for POR 1 (Roof OLA)

Parameter	Values Used
Road	Albert Street
Time Period	16h/8h
Topography	Elevated
Rows of Houses	2
Density of First Row	50%
Intermediate Surface	Reflective
Receiver Height (m)	9.0
Source Receiver Distance (m)	49.0
Source Elevation (m)	1.5

Table 4.4 – Parameters used in the STAMSON model for POR 2 (3rd floor north-west unit)

Parameter	Values Used
Road	Albert Street
Time Period	16h/8h
Topography	Flat with barrier
Rows of Houses	2
Density of First Row	50%
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	70
Barrier Angles	Θ1= -90°, Θ2=0°
Barrier to Receiver Distance (m)	3.0
Barrier Height (m)	2.45
Source Elevation (m)	1.5

Table 4.5 – Parameters used in the STAMSON model for POR 3 (Ground Floor Patio OLA)

4.6 Predicted Surface Transportation Noise Levels

Table 4.6 below shows the predicted sound pressure levels at the points of reception from the results of the STAMSON noise software calculation (**Appendix A**).

Noise Source	POR 1 (dBA)	POR 2 (dBA)		POR 3 (dBA)
	Day	Day	Night	Day
Albert Street	54.8[1]	62.1	54.6	53.8[2]

Note[1]: The predicted noise level considers the presence of a 2.3-meter-high barrier on the roof.
Note[2]: This predicted noise level includes the effect from the planned 2.45-metre-tall fence around the ground-level patio.

Table 4.6 – Predicted traffic noise at the PORs

4.7 Roadway Noise Summary and Analysis

We have calculated the predicted noise level caused by traffic using STAMSON and have shown a 16h Leq for daytime hours of **54.8 dBA** at POR1, **62.1 dBA** at POR2, and **53.6 dBA** at POR3. The 8h Leq for nighttime hours is **54.6 dBA** at POR2. Nighttime levels for POR1 and POR3 were not calculated as the exclusionary noise limits for Outdoor Living Areas are only during the daytime. As the levels during the day and at night are below the 65 dBA threshold, an evaluation of exterior building components (AIF analysis) is not required. However, as the predicted noise levels are above 55 dBA for the daytime period at POR 2, warning clauses are required, per the Ministry of Environment requirements.

For POR1, since the daytime sound level in the rooftop outdoor area, including the 2.3-meter-high barrier, is lower than 55 dBA, further noise control measures and warning clauses are not required.

For POR2, since the daytime sound level in the plane of the bedroom window is greater than 55 dBA and less than 65 dBA, and the nighttime sound level is greater than 50 dBA and less than 60 dBA, the unit must be designed with a provision for the installation of central air conditioning in the future. Warning clause **Type C** is required.

For POR3, since the daytime sound level in the ground-level patio is lower than 55 dBA, noise control measures and warning clauses are not required.

4.8 Warning Clauses

The following warning clauses are required for this property:

Due to the predicted noise at the Plane of Window Receptors (POR 2) being between 55 and 60 dBA, a **Type C** warning clause is required:

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air condition by the occupant in low and medium density developments 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 Environment. "

5.0 Conclusion

We have completed the traffic noise impact study for 10-20 Empress Avenue. The only road/rail noise source to consider is Albert Street, which will be located approximately 32 meters north of the property. The daytime predicted noise levels at the plane of window exceed 55 and are below 60 dBA. The units must be designed with a provision for the installation of central air conditioning in the future, and a Type C warning is required.

The noise levels at the Outdoor Living Area on the roof are below 55 dBA with the current barrier. No further acoustical mitigation or warning clauses are required.

The noise levels at the Outdoor Living Area on the first-floor patio are below 55 dBA with the current barrier. No acoustical mitigation or warning clauses are required.

The required warning clause is as follows:

Type C:

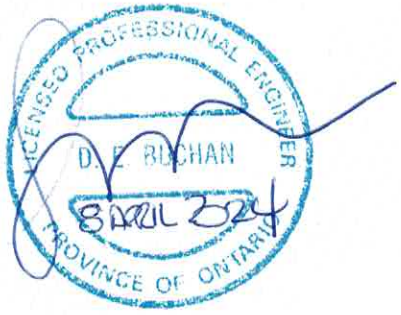
"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air condition by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of Environment. "

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

Sincerely,

Tiffany-Rose Filler, M.Sc.,
Acoustic Consultant

Approved By:



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

APPENDIX

STAMSON Calculations

STAMSON 5.0 NORMAL REPORT Date: 04-12-2023 10:53:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Albert St. (day/night)

Car traffic volume : 24288/8096 veh/TimePeriod
Medium truck volume : 1932/644 veh/TimePeriod
Heavy truck volume : 1380/460 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Albert St. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 55.00 / 55.00 m
Receiver height : 1.50 / 4.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 2.30 m
Elevation : 14.50 m
Barrier receiver distance : 6.00 / 3.00 m
Source elevation : 1.50 m
Receiver elevation : 14.50 m
Barrier elevation : 14.50 m
Reference angle : 0.00

Results segment # 1: Albert St. (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.50 ! 1.50 ! 0.08 ! 14.58

ROAD (0.00 + 54.82 + 0.00) = 54.82 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	-5.64	0.00	0.00	-4.22	0.00	61.63
-90	90	0.00	71.49	0.00	-5.64	0.00	0.00	0.00	-11.03	54.82

Segment Leq : 54.82 dBA

Total Leq All Segments: 54.82 dBA

Results segment # 1: Albert St. (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.50 ! 4.50 ! 3.63 ! 18.13

ROAD (0.00 + 64.09 + 0.00) = 64.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	69.73	0.00	-5.64	0.00	0.00	0.00	-0.36	63.73*
-90	90	0.00	69.73	0.00	-5.64	0.00	0.00	0.00	0.00	64.09

* Bright Zone !

Segment Leq : 64.09 dBA

Total Leq All Segments: 64.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.82
(NIGHT): 64.09

STAMSON 5.0 NORMAL REPORT Date: 02-11-2023 35:28:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: Time Period: Day/Night 16/8 hours
Description:
Road data, segment # 1: Albert St. (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)

Data for Segment # 1: Albert St. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 50 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 49.00 / 48.00 m
Receiver height : 1.50 / 9.00 m
Topography : 3 (Elevated; no barrier)
Elevation : 7.50 m
Reference angle : 0.00

Results segment # 1: Albert St. (day)

Source height = 1.50 m

ROAD (0.00 + 62.11 + 0.00) = 62.11 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	-5.14	0.00	0.00	-4.24	0.00	62.11

Segment Leq : 62.11 dBA
Total Leq All Segments: 62.11 dBA

Results segment # 1: Albert St. (night)

Source height = 1.50 m
ROAD (0.00 + 54.60 + 0.00) = 54.60 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	-5.05	0.00	0.00	-4.24	0.00	54.60

Segment Leq : 54.60 dBA
Total Leq All Segments: 54.60 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.11
(NIGHT): 54.60

STAMSON 5.0 NORMAL REPORT Date: 02-11-2023 35:25:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Albert St. (day/night)

Car traffic volume : 2112/2112 veh/TimePeriod
Medium truck volume : 168/168 veh/TimePeriod
Heavy truck volume : 120/120 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 50 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 49.00 / 48.00 m
Receiver height : 9.00 / 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Albert St. (day)

Source height = 1.50 m
ROAD (0.00 + 51.51 + 0.00) = 51.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	60.88	0.00	-5.14	0.00	0.00	-4.24	0.00	51.51

Segment Leq : 51.51 dBA
Total Leq All Segments: 51.51 dBA

Results segment # 1: Albert St. (night)

Source height = 1.50 m
ROAD (0.00 + 54.60 + 0.00) = 54.60 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	-5.05	0.00	0.00	-4.24	0.00	54.60

Segment Leq : 54.60 dBA
Total Leq All Segments: 54.60 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.51
(NIGHT): 54.60

STAMSON 5.0 NORMAL REPORT Date: 02-11-2023 135:37:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: Time Period: Day/Night 16/8 hours
Description:
Road data, segment # 1: Albert St. (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)

Data for Segment # 1: Albert St. (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 50 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 70.00 / 70.00 m
Receiver height : 1.50 / 9.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
Barrier height : 2.45 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 1.50 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Albert St. (day)

Source height = 1.50 m
Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.50 ! 1.50 ! 1.56 ! 1.56

ROAD (0.00 + 53.81 + 0.00) = 53.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	71.49	0.00	-6.69	-3.01	0.00	-4.18	0.00	57.61
-90	0	0.00	71.49	0.00	-6.69	-3.01	0.00	0.00	-7.98	53.81

Segment Leq : 53.81 dBA
Total Leq All Segments: 53.81 dBA

Results segment # 1: Albert St. (night)

Source height = 1.50 m Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.50 ! 9.00 ! 8.74 ! 8.74
ROAD (0.00 + 50.01 + 0.00) = 50.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	63.89	0.00	-6.69	-3.01	0.00	-4.18	0.00	50.01
-90	0	0.00	63.89	0.00	-6.69	-3.01	0.00	0.00	-0.02	54.17*
-90	0	0.00	63.89	0.00	-6.69	-3.01	0.00	0.00	0.00	54.19

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* Bright Zone !
Segment Leq : 50.01 dBA
Total Leq All Segments: 50.01 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.81
(NIGHT): 50.01