2022-05-12

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Bridor Developments – 3817-3843 Innes Road Apartment Buildings
Noise Impact Study

Dear Eric,

We are pleased to present the following traffic noise study for a new proposed residential development of three apartment buildings located at 3817-3843 Innes Road 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 planned development is for two new four storey apartment buildings (Block A and Block B) with a total of 110 units which is in proximity to Innes Road and Frank Bender Road. As per City of Ottawa requirements, noise from traffic and noise from the surrounding area onto the new buildings is to be considered, and noise from the new buildings to the surrounding area must also be considered. There is no significant or large noise-making equipment included in the design of the two new buildings, therefore noise from the new development to the surrounding area will be minimal however at the request of the City of Ottawa we have provided a brief overview of the noise from condensing units to the surrounding area.

This study considers traffic noise from Innes Road (~11m from north façade of closest building) and Frank Bender St. (~70m from east façade of building). These noise sources are the only traffic noise sources considered in this study. 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. In addition to the traffic noise, we have also conducted measurements at the proposed development site in order to determine whether noise from the adjacent commercial and retail area on the south side of Innes Road will have an impact on the development.

It was found that noise levels at the plane of window (POW) on the ground floor are above 65 dBA and a detailed building component analysis was completed. Mitigation measures above the Ontario Building Code (OBC) were found to be required for windows in closer proximity to Innes Road. Our full traffic nose analysis is provided in Section 4.0 and 5.0. In addition, our analysis of noise from the surrounding area showed that traffic noise is the only significant nearby noise source and that no equipment from the retail area will have an impact on the new development. We have also addressed any potential noise from the condensing units to the surrounding area for the new development as well and have provided some general recommendations in Section 6.0.

1.0 Introduction

State of the Art Acoustik Inc. was commissioned by Bridor Developments to complete a noise impact study as requested by the City of Ottawa for the site plan application of a proposed two building residential apartment building to be located at 3817-3843 Innes Rd. 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 section also shows angles and distances from the sources to receptor points. This study includes noise from road 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 however we have provided brief comments and recommendations on the small condensing units that will be used.

In Section 3.0, the noise impact calculation procedure is described and in Section 4.0, the predicted noise impact from Innes Road and Frank Bender St. 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 65 dBA.

Section 6.0 discusses other noise impacts onto the building itself, and includes the results and discussion of measurements taken on the proposed site of the development in order to determine the impact of the commercial area located across Innes Road from the development site. This section also provides a brief overview of the mechanical equipment to be used for the three buildings and their potential impact to the surrounding area.

2.0 Site Plan Evaluation

2.1 Project Description

The proposed development consists of two new residential apartment buildings, Block A and Block B which are four storeys each and mirror images of each other. The buildings are located at 3817 to 3843 Innes Road in Ottawa, Ontario. The area surrounding the development consists primarily of low-rise residential buildings and a retail area, including a large hardware store, pet store and bank on the south side of Innes Road and a gas station to the east. We have considered traffic noise from Innes Road and Frank Bender Street as the only traffic noise sources for this location, as per the City of Ottawa requirements, and 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 site plan of the two buildings including its proximity to Innes Road, whose closest edge is located approximately 11m from the closest façade of Block A.

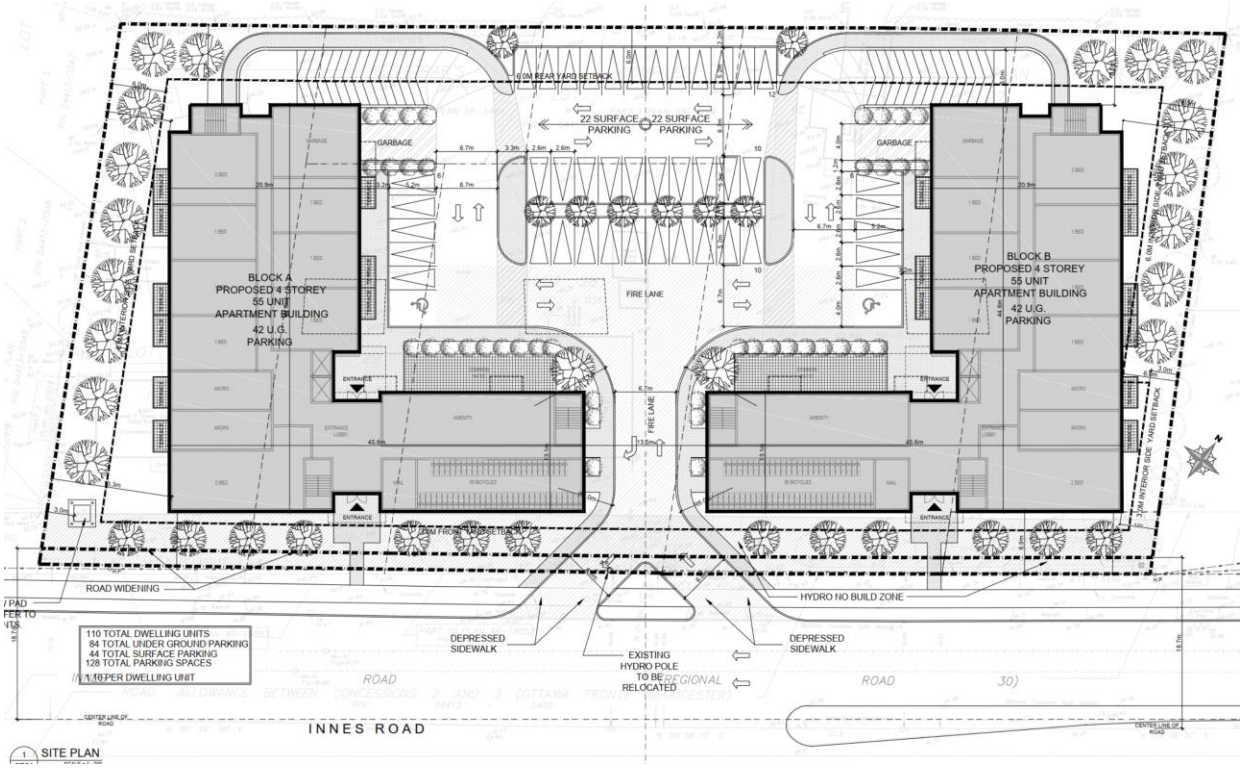


Figure 2.1 – Site plan of 3817-3843 Innes Road.

Figure 2.2 shows the proposed site with distances to Innes Road and Frank Bender St., which is approximately 70m from the nearest façade to the east. Innes Road and Frank Bender are defined as an arterial road and collector, respectively, as per City of Ottawa Schedule E. POR and OLA locations are discussed in detail in Section 4.3.

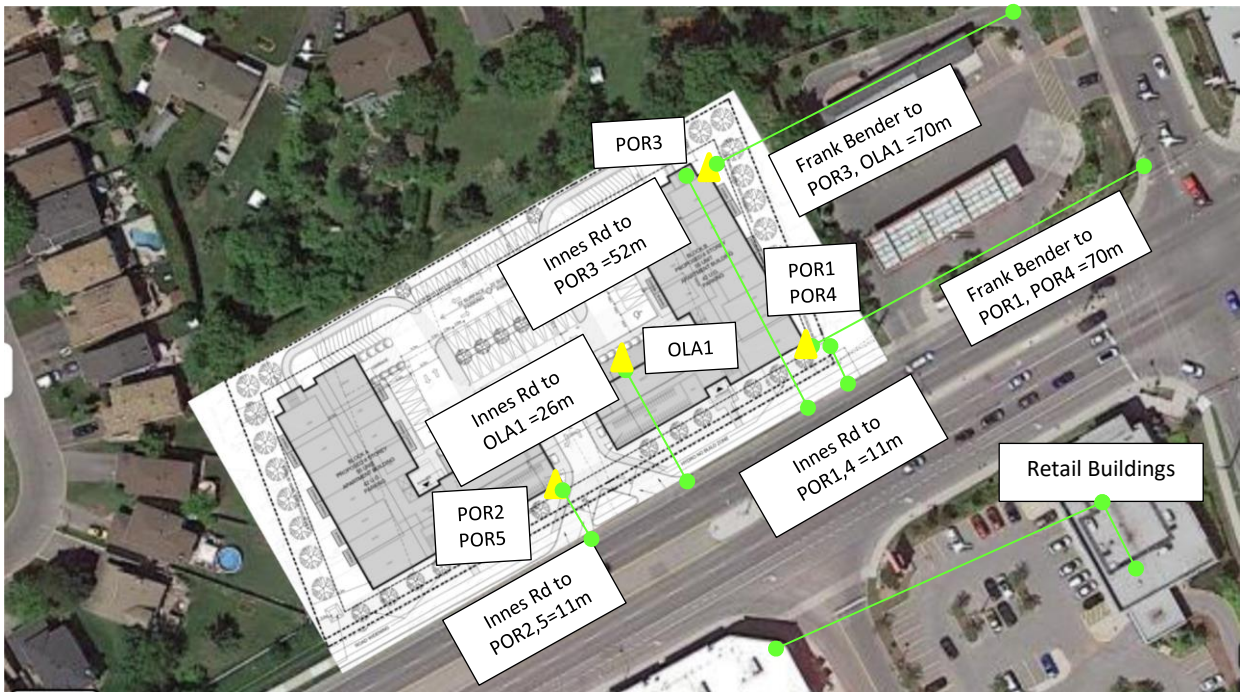


Figure 2.2 – Surrounding area 3817-3843 Innes Rd. with locations and distances of relevant noise sources to each POR and OLA. PORs and OLAs are indicated by yellow triangles in figure above.

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 and 3.2 below.

	Indoor Leq Levels (dBA) Class 1, 2 & 3 Areas
	Road Traffic 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 Noise Levels

	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

Table 3.2 – 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 principle main railway line

Both Innes Road and Frank Bender Street are both within 100m of the planned development and therefore an analysis of the impact of traffic noise is required. Note that Block A is beyond 100m from Frank Bender St. and is excluded from the noise calculation for POR2 and POR5.

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 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 3.3 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 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*."

Specific examples of warning clauses in regards to the new development at 3817-3843 Innes Road are indicated in Section 5.2.

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 3.3 - 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 Rearch Council [Revised June 1980]

4.0 Surface Transportation Noise Study

The following section describes our analysis of the road noise impact on the three buildings at 3817-3843 Innes Rd.

4.1 Road Traffic Information

For this study, the only surface transportation noise sources considered was traffic from Innes Road, located just south of the development and Frank Bender Street, which is located to the east of the new development. The new proposed building is farther than 100m from any other collector or arterial road, and is not near any 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 (%)
Innes Road	4 Lane Urban Arterial - Divided	35,000	60 km/h	92/8	7	5
Frank Bender St.	2 Lane Urban Collecto	8,000	40 km/h	92/8	7	5

Table 4.1 – Summary of Major Roadway Noise Sources.

4.2 Procedure Used for Roadway 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 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 five points of reception (POR) and an additional point at the Common Patio directly behind Block B. POR1 and POR4 are located at the south east corner of Block B which is the closest noise sensitive room (bedroom) in proximity to both Innes Road and at Frank Bender Street on the 1st and 4th floors, a height of 1.5m and 10.5m, respectively. POR2 and POR5 are located at the south west corner of Block A, which is a noise sensitive room (bedroom), in proximity to Innes Road only on the 1st and 4th floors, a height of 1.5m and 10.5m, respectively. We have also chosen a POR near the back of Block B (POR3) in order to determine whether noise from Innes Road decreases significantly enough so that any noise mitigation measures can be eased or reduced further away from the road noise source. The height of POR3 is 1.5m (1st floor POR). The final POR (OLA1) located at the Outdoor Living Area (OLA) or Common Patio at the rear of Block B was also chosen in order to determine noise levels at the outdoor amenity areas.

The position of the points of reception in plan view is shown in Figure 4.1 through 4.4 indicated by the blue cross. Note that POR4 and POR5, located directly above POR1 and POR2 respectively at a height of 10.5m is also shown in Figures 4.1 and 4.2. Table 4.2 below summarizes receiver heights, angles and distances. Figures 4.5 through 4.7 show the PORs in the elevation views except an elevation of OLA1.

Receiver	Height (m)	Distance from Source (m)		Angle to Innes Rd from POR		Angle to Frank Bender from POR	
		Innes Rd	Frank Bender	Angle 1	Angle 2	Angle 1	Angle 2
POR1	1.5	11	70	90°	90°	90°	90°
POR2	1.5	11	N/A	90°	90°	N/A	N/A
POR3	1.5	52	70	0°	90°	90°	90°
POR4	7.5	11	70	90°	90°	90°	90°
POR5	7.5	11	N/A	90°	90°	N/A	N/A
OLA1	1.5	26	95	90°	90°	90°	90°

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

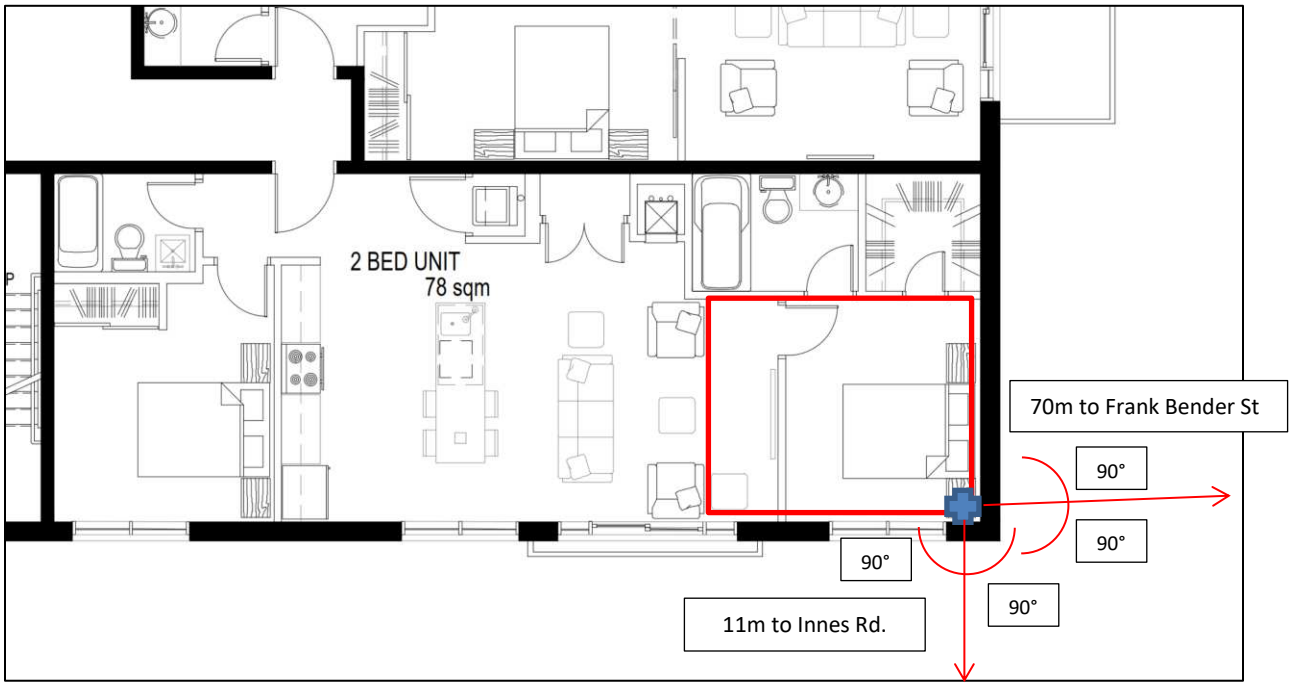


Figure 4.1 – Main level plan view showing POR1 and POR4 in Block B. POR4 is an identical location outside of an identical unit on the 4th floor of Block B at a height of 10.5m.

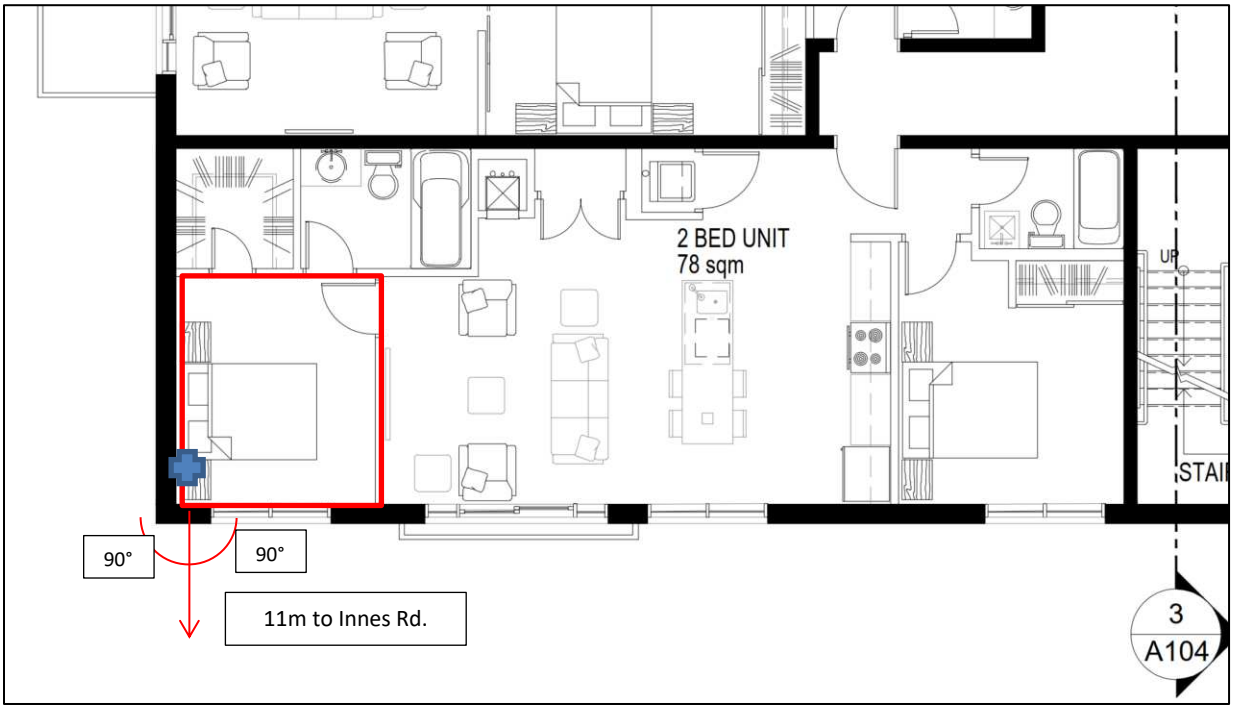


Figure 4.2 – Main level plan view showing POR2 and POR5 in Block A. POR5 is an identical location outside of an identical unit on the 4th floor of Block A at a height of 10.5m.

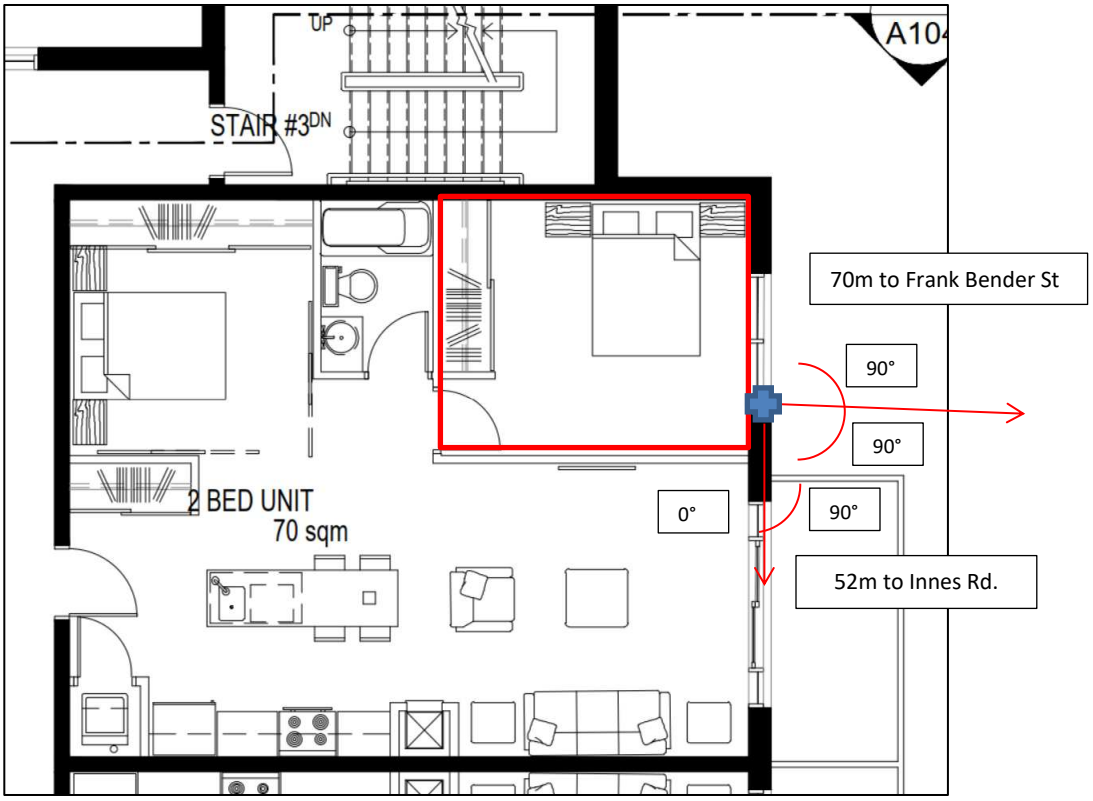


Figure 4.3 – Main level plan view showing POR3 in Block B at 1.5m.

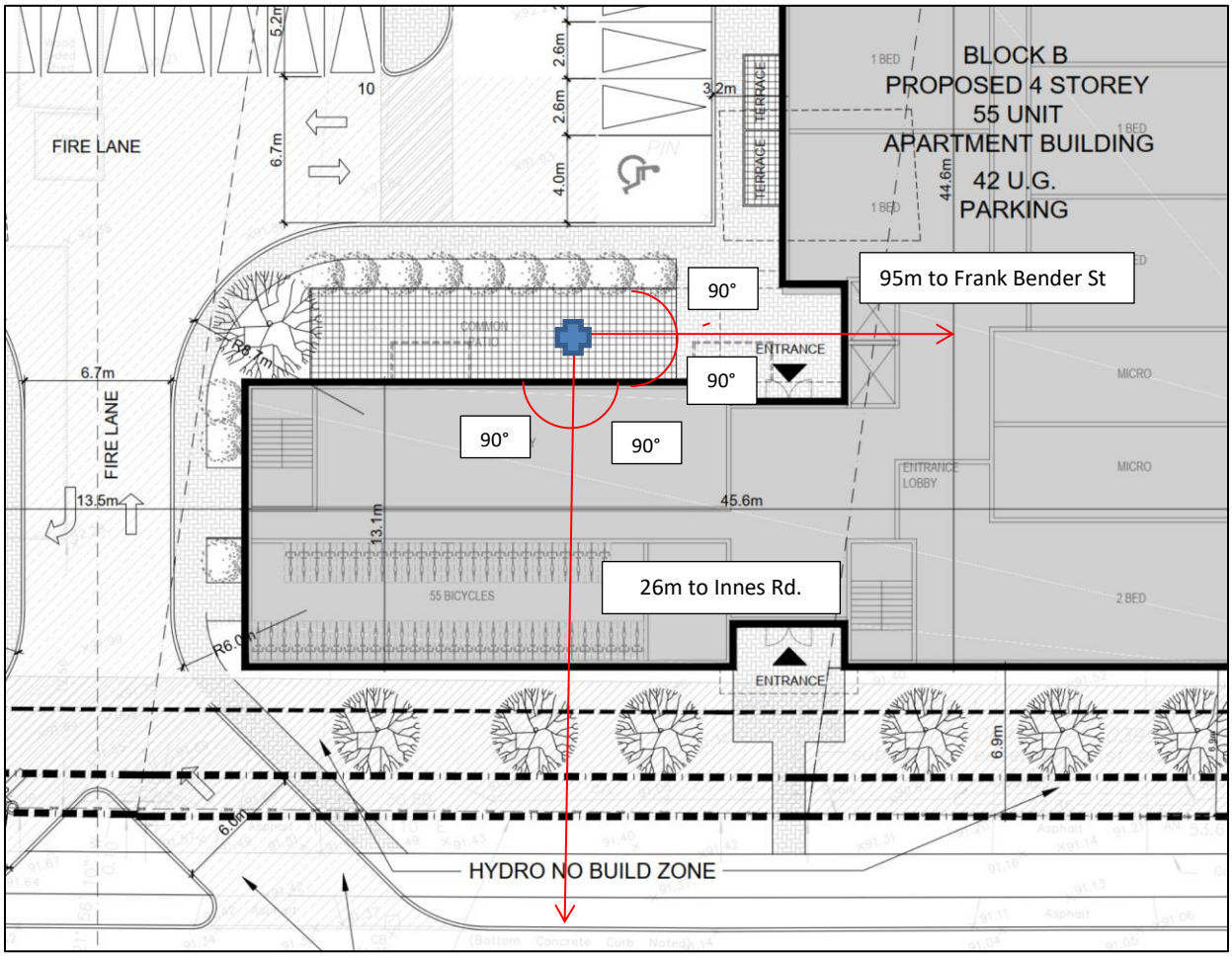


Figure 4.4 – Site plan view showing OLA1 at Block B Common Patio.

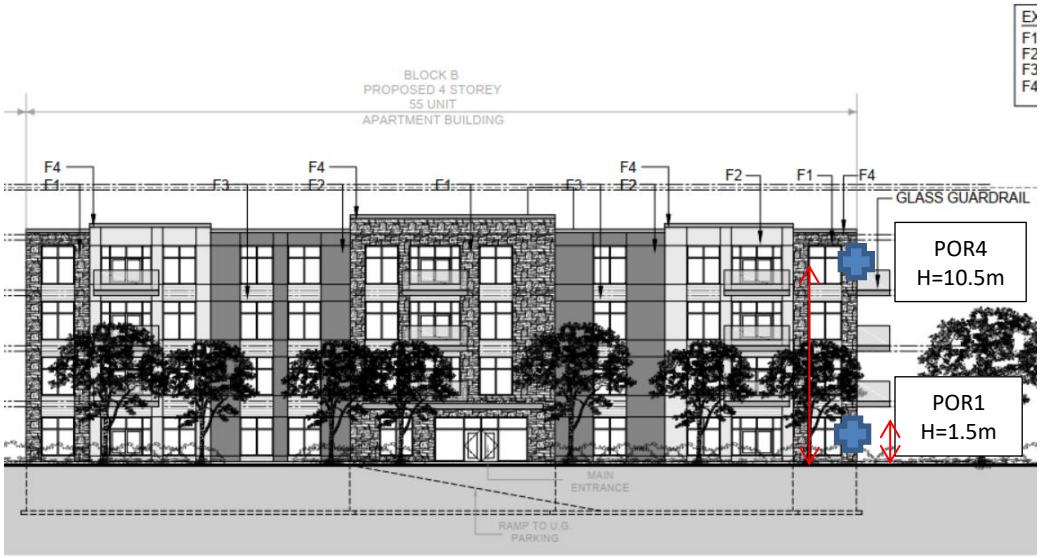


Figure 4.5 – South face elevation view showing POR1 and POR4.

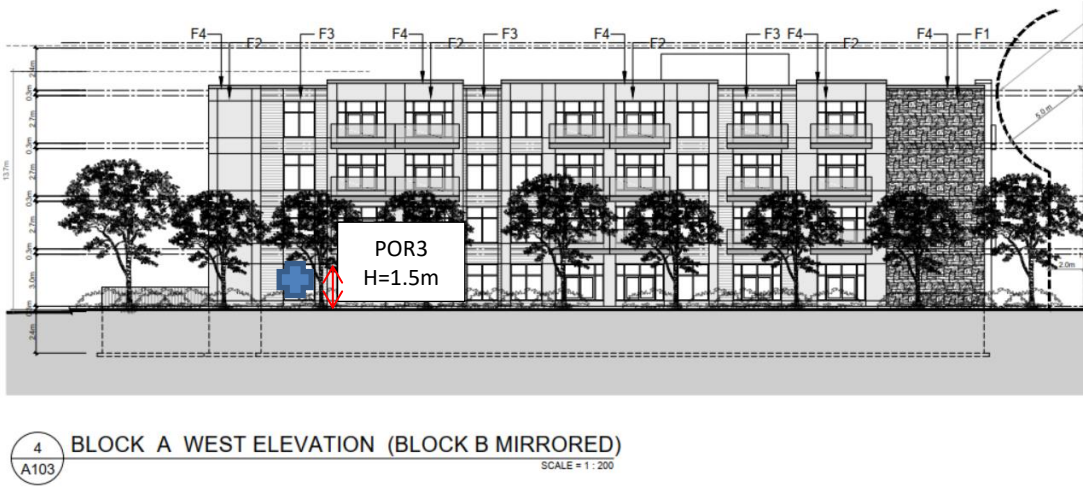


Figure 4.6 – East face elevation view showing POR3.

Figure 4.7 – South face elevation view showing POR2 and POR5.

4.4 Parameters Used for Analysis

The parameters used in STAMSON to assess the noise impact at POR1 are shown below in Table 4.3:

Parameter	Values Used
Noise Source:	**Innes Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	0
Density of First Row%	N/A
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)*	15
Noise Source:	**Frank Bender Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	0
Density of First Row%	N/A
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	70

Table 4.3 – Parameters used in STAMSON model at POR1 (ground floor south east bedroom, Block B)

*The minimum source-receiver distance that can be input into STAMSON is 15m. Leqs calculated in Section 4.5 have been adjusted as per ORNAMENT for distances less than 15m. See results in Table 4.8 below.

The parameters used in STAMSON to assess the noise impact at POR2 are shown below in Table 4.4:

Parameter	Values Used
Noise Source:	**Innes Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	0
Density of First Row%	N/A
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)*	15

Table 4.4 – Parameters used in STAMSON model at POR 2 (ground floor south-west bedroom, Block A)
*The minimum source-receiver distance that can be input into STAMSON is 15m. Leqs calculated in Section 4.5 have been adjusted as per ORNAMENT for distances less than 15m. See results in Table 4.8 below.

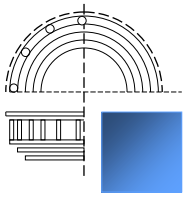
The parameters used in STAMSON to assess the noise impact at POR3 are shown below in Table 4.5:

Parameter	Values Used
Noise Source:	**Innes Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	0
Density of First Row%	N/A
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	52
Noise Source:	**Frank Bender Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	0
Density of First Row%	N/A
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	70

Table 4.5 – Parameters used in STAMSON model at POR3 (ground floor north-east bedroom, Block B)

The parameters used in STAMSON to assess the noise impact at POR4 are shown below in Table 4.6:

Parameter	Values Used
Noise Source:	**Innes Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	0
Density of First Row%	N/A
Intermediate Surface	Reflective
Receiver Height (m)	10.5
Source Receiver Distance (m)*	15
Noise Source:	**Frank Bender Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	0
Density of First Row%	N/A



Intermediate Surface	Reflective
Receiver Height (m)	10.5
Source Receiver Distance (m)	70

Table 4.6 – Parameters used in STAMSON model at POR4 (4th floor south east bedroom, Block B).

*The minimum source-receiver distance that can be input into STAMSON is 15m. Leqs calculated in Section 4.5 have been adjusted as per ORNAMENT for distances less than 15m. See results in Table 4.8 below.

The parameters used in STAMSON to assess the noise impact at POR5 are shown below in Table 4.7:

Parameter	Values Used
Noise Source:	**Innes Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	0
Density of First Row%	N/A
Intermediate Surface	Reflective
Receiver Height (m)	10.5
Source Receiver Distance (m)*	15

Table 4.7 – Parameters used in STAMSON model at POR4 (4th floor south west bedroom, Block A).

*The minimum source-receiver distance that can be input into STAMSON is 15m. Leqs calculated in Section 4.5 have been adjusted as per ORNAMENT for distances less than 15m. See results in Table 4.8 below.

The parameters used in STAMSON to assess the noise impact at OLA1 are shown below in Table 4.8:

Parameter	Values Used
Noise Source:	**Innes Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	1
Density of First Row%	85%
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	26
Noise Source:	**Frank Bender Rd**
Time Period	16h/8h
Topography	Flat/gentle slope no barrier
Rows of Houses	1
Density of First Row%	85%
Intermediate Surface	Reflective
Receiver Height (m)	1.5
Source Receiver Distance (m)	95

Table 4.8 – Parameters used in STAMSON model at OLA1 (Sitting Area, Block B)

We have assessed daytime and nighttime levels for each POR except at OLA1 as they are all located within bedrooms. POR1 and POR4 will be the worst case scenario, as they are exposed to both Innes Road traffic and Frank Bender Road. POR2 and POR5 is exposed to Innes Road only, as Frank Bender Street is significantly further than 100m from these PORs and is partially shielded by both buildings. POR3 is exposed to traffic noise from Innes Road to the east as the Block A building shields from traffic noise to the west. It is also exposed to traffic noise from Frank Bender Street which is ~70m to the east. These conditions have all been reflected in our calculations. OLA1 is located at the Common Patio at

the rear of Block A and almost fully shielded from noise from both Innes Road and Frank Bender by the Block A building.

4.5 Surface Transportation Noise Levels

Table 4.8 and Table 4.9 below summarize the predicted sound pressure levels at the points of reception and OLAs from the results of the STAMSON environmental noise software calculation (Appendix A) for 3817-3843 Innes Road.

	POR1 (dBA)		POR2 (dBA)		POR3 (dBA)		POR4 (dBA)		POR5 (dBA)	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Innes Rd	73.6*	66.0*	73.6*	66.0*	60.3	52.7	74.1*	66.5*	74.1*	66.5*
Frank Bender St	51.4	43.8	N/A	N/A	51.4	43.8	53.7	46.1	N/A	N/A
Total	**73.6**	**66.0**	**73.6**	**66.0**	**60.8**	**53.2**	**74.1**	**66.5**	**74.1**	**66.5**

Table 4.8 – Predicted Road Noise at each Point of Reception

*Values have been adjusted as per Ministry of Environment ORNAMENT Technical Document to account for distances less than 15m from road noise source to POR as described below.

Equation (13) in Section 5.5 of ORNAMENT document has been used in conjunction with Figure 3 on Page 39. The equation used was for reflective ground and was added to the value calculated in STAMSON:

Adjustment = 10*log (15/D) where D = 11m, the perpendicular distance to the source from the POR. Therefore, the adjustment to each result marked with a * in Table 4.8 is +1.35 dB, which has been reflected in the final sound prediction calculation.

	OLA1 (dBA)
	Day
Innes Rd	57.8
Frank Bender St	42.6
Total	**57.9**

Table 4.9 – Predicted Road Noise at each OLA

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 is **73.6 dBA**, **73.6 dBA** at POR2, **60.8 dBA** at POR3, **74.1 dBA** at POR4, **74.1 dBA** at POR5 and **57.9 dBA** at OLA1. The 8h L_{eq} for nighttime hours at POR1 is **66.0 dBA**, **66.0 dBA** at POR2, **53.2 dBA** at POR3, **66.5 dBA** at POR4 and **66.5 dBA** at POR5. Note that there is very little impact of noise from Frank Bender Street, as the majority of the noise is from Innes Road, which is much closer and has much more traffic. The predicted level at Common Patio of Block B (OLA1) is **57.9 dBA**, with a similar level expected at the Common Patio of Block A as it is the same distance from Innes Road. This exceeds the limit of 55 dBA but is below 60 dBA, therefore noise mitigation is not necessary, but warning clauses are required. As the levels during the day and at night at each POR are above 65

dBA, an evaluation of exterior building components (AIF analysis) is required. Detailed preliminary assemblies for the exterior walls were not yet available, however we assume the exterior is to be a combination of metal siding/flashing, stone and brick (which are confirmed on the architectural elevations) and we have based preliminary assemblies based on this information and common exterior wall assemblies. These are listed below for the PORs in this report and are analyzed in the following section.

EXTERIOR STONE / BRICK MASONRY WALL – POR1, POR2, POR4, POR 5

-Stone / brick masonry.
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" batt insulation
-5/8" type x gypsum board

EXTERIOR METAL SIDING/FLASHING WALL – POR3
-Metal siding/flashing
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" batt insulation
-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 each POR's façades is made up of the following components:

1) Exterior wall (Stone for POR1, POR2, POR4, POR5, metal siding for POR3)
2) Window (No assembly yet specified, minimum assembly will be determined through AIF analysis)

The existing exterior wall compositions at each POR are as given in the previous section and Table 5.1 below. The façades are composed of stone, brick and vinyl siding as shown in Figure 4.5. The wall type for POR1, POR2, POR4 and POR5 is sufficiently similar to wall type EW5 described in the Canada Mortgage and Housing Corporation (CMHC) document "Road and Rail Noise: Effects on Housing" while the metal siding wall type used for POR3 is sufficiently similar to wall type EW2. 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" batt insulation -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
-Metal siding/flashing -1" rigid insulation -6" steel studs @16" o.c. max. -5.5" batt insulation -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 drawings and therefore we have assumed a double pane window that meets minimum OBC requirements as a preliminary such as the following example:

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

Table 5.2 –Window Assembly used in preliminary calculations and assessment at all PORs.

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 five bedrooms 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 5.3-5.7 below. The layouts of the spaces are shown in Figure 5.1, Figure 5.2 and Figure 5.3. Note that the bedroom that is represented by POR4 has the exact same interior layout and exterior assemblies as POR1 and POR5 has the same interior layout and assemblies as POR2.

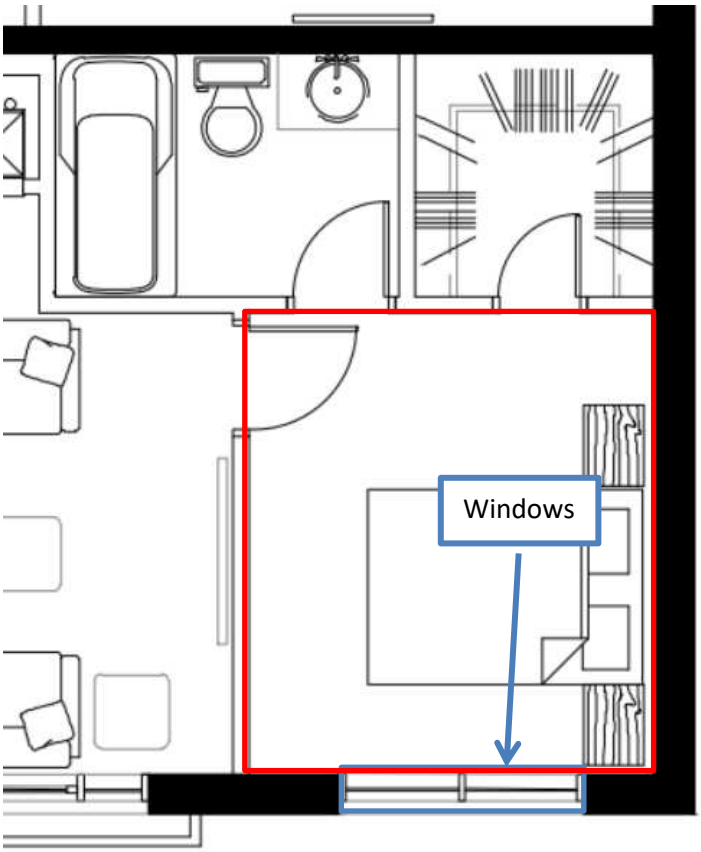


Figure 5.1 – Layout of bedroom in south east main level unit in Block B used for analysis of POR1 indicated in red. Layout is the same for analysis of POR4 located on the 4th floor in the south east unit above. Exterior wall assembly equivalent to CMHC wall type EW5.

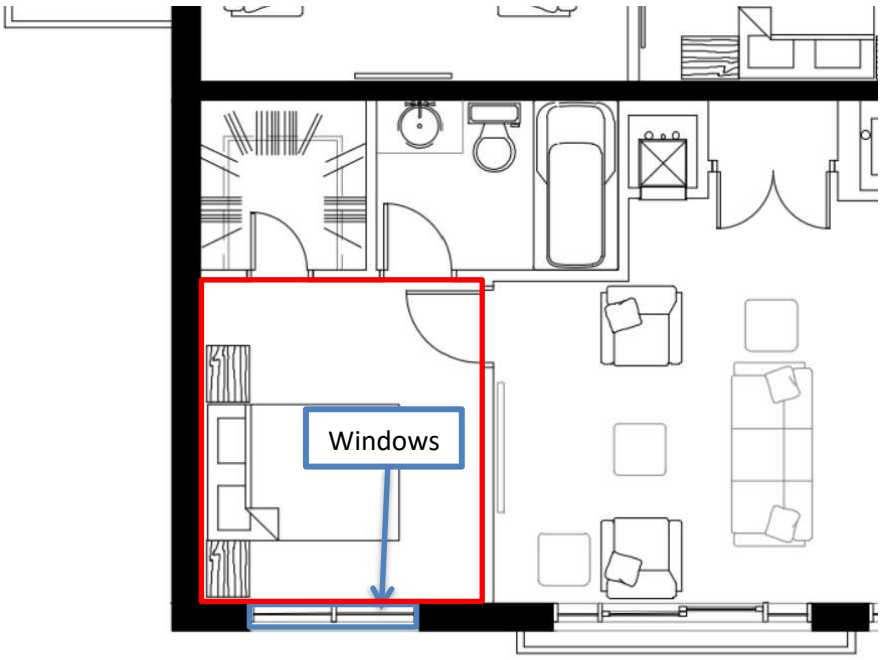


Figure 5.2 – Layout of bedroom in south west main level unit in Block A used for analysis of POR2 indicated in red. Layout is the same for analysis of POR4 located on the 4th floor in the south east unit above. Exterior wall assembly equivalent to CMHC wall type EW5.

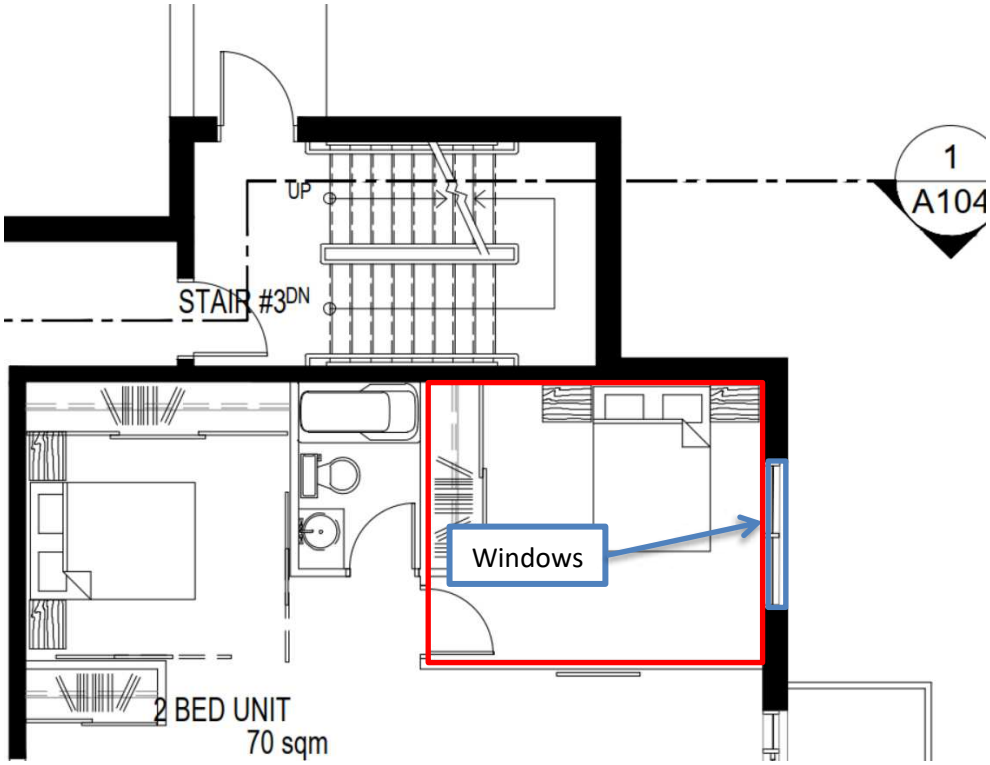


Figure 5.3 – Layout of bedroom in north east main level unit in Block B used for analysis of POR3 indicated in red. Exterior wall assembly equivalent to CMHC wall type EW2.

5.1.2 AIF Calculations

Below in Tables 5.3-5.7, we provide the results of our AIF calculations based on the procedure given in Section 3.3 and the building component information given in Section 5.1.1 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 3.3, 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 to which the component AIF is compared.

POR1												
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
9.7	2	1	Exterior Wall	15.4	159%	73.6	45	34	45	Yes	31	**Yes**
9.7	2	2	Window	3.6	37%	73.6	45	34	28	Yes	31	**No**

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

POR2												
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
9.7	2	1	Exterior Wall	15.4	159%	73.6	45	34	45	Yes	31	**Yes**
9.7	2	2	Window	3.6	37%	73.6	45	34	28	Yes	31	**No**

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

POR3												
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
12.2	2	1	Exterior Wall	13.6	111%	60.8	45	21	33	Yes	18	**Yes**
12.2	2	2	Window	3.6	30%	60.8	45	21	29	Yes	18	**Yes**

Table 5.5 – POR3 AIF parameters used in calculations, resulting required AIF and component AIF, and statement if component AIF is acceptable.

POR4												
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
9.7	2	1	Exterior Wall	15.4	159%	74.1	45	34	45	Yes	31	**Yes**
9.7	2	2	Window	3.6	37%	74.1	45	34	28	Yes	31	**No**

Table 5.6 – POR4 AIF parameters used in calculations, resulting required AIF and component AIF, and statement if component AIF is acceptable.

POR5												
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
9.7	2	1	Exterior Wall	15.4	159%	74.1	45	34	45	Yes	31	**Yes**
9.7	2	2	Window	3.6	37%	74.1	45	34	28	Yes	31	**No**

Table 5.7 – POR5 AIF parameters used in calculations, resulting required AIF and component AIF, and statement if component AIF is acceptable.

As noted in the final column of Tables 5.3, 5.4, 5.6 and 5.7, the window assembly used in our calculation does not meet the AIF requirement and needs to be improved. Note that for POR3, the window assembly does meet AIF requirements and therefore units near the back of each building can have less stringent window assembly requirements. Specific units where this glazing is required is discussed in greater detail below.

For each case where the proposed window assembly does not meet the required AIF, the window assembly must be a minimum AIF of AIF 31, which can be translated into an STC rating for the glazing, using the percentage area of the window to the total floor area in Table D2 in Appendix D of CMHC "Road and Rail Noise: Effects on Housing". By using this table, we obtain that a glazing assembly of at least STC 33 is to be used and have provided options in Table 5.8 below for meeting this requirement. The requirement may require laminated glass, however there are double pane assemblies that do meet the STC 33 requirement. We have provided an example assembly for a non-laminated assembly and laminated assembly below.

Recommended Glazing Assembly	STC Rating
6mm glass | 13mm airspace | 6mm glass	STC 34 (Test ID TR16-113)
Saflex 3mm | 0.76mm Saflex Q| 3mm	STC 36 (Test ID TR16-122)

Table 5.8 – Example glazing assemblies to meet AIF requirements at POR1, POR2, POR4 and POR5.

5.2 Warning Clauses

As the predicted noise levels from surface transportation exceed 55 dBA at all PORs, a 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 5.7 provides the types of warning clauses which have been taken directly from the MOECP NPC-300 Section C8.1 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*."

A description of which units require which Warning Clause is detailed below Table 5.9.

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

The development was not yet at the stage where individual suite/unit numbers were available and therefore have identified units using directional descriptions, building number (Block, A and B) and storey number. We have included a drawing in the Appendix where each of these warning clauses are to be applied along with specific glazing requirements.

Units that require a Type A Warning Clause:
Block A: All units on all floors require a Type A Warning Clause, as the Common Patio is above the limit of 55 dBA but below the 60 dBA threshold for additional mitigation such as a noise barrier.

Block B: All units on all floors require a Type A Warning Clause, as the Common Patio is above the limit of 55 dBA but below the 60 dBA threshold for additional mitigation such as a noise barrier. This was not calculated in our analysis but has similar exposure to Innes Road as OLA2.

Units that require a Type B Warning Clause:
Type B Warning Clauses must be applied to lease or condominium agreements units which require additional sound isolation above Ontario Building Code requirements for windows as indicated in Section 5.1 above. These units will still meet City of Ottawa indoor noise limits when windows and exterior doors are closed.

Block A: All units with an east, west or south facing façade on 1st, 2nd, 3rd and 4th floors *except* for units at north east and north west corners of Block A as indicated in the drawing provided in the Appendix.
Block B: All units with an east, west or south facing façade on 1st, 2nd, 3rd, and 4th floors as indicated in the drawing provided in the Appendix. This applies to every unit in Block B.

Units that require a Type D Warning Clause:
Block A: All units on all floors require a Type D Warning Clause, as all units will be provided with a condensing unit on the balcony of the unit to control air conditioning within each unit, thereby allowing windows and exterior doors to be closed.

Block B: All units on all floors require a Type D Warning Clause, as all units will be provided with a condensing unit on the balcony of the unit to control air conditioning within each unit, thereby allowing windows and exterior doors to be closed.

5.3 Traffic Noise Assessment Summary

Exterior Walls

Exterior Wall Assemblies

EXTERIOR STONE / BRICK MASONRY WALL

-Stone / brick masonry.
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" batt insulation
-5/8" type x gypsum board

EXTERIOR VINYL SIDING WALL

-Metal siding/flashing
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" batt insulation
-5/8" type x gypsum board

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

Exterior Glazing

We have provided recommended window assemblies for POR1, POR2, POR4 and POR5 in Table 5.6 but as demonstrated in the analysis of POR3, it is not necessary to maintain the STC 33 requirement along the full perimeter of each building. Based on results of our calculations, we have included a drawing in the Appendix in order to demonstrate where the STC 33 glazing is to be implemented. Note that this glazing is required for the full façade for all units on each floor where indicated in the drawing.

Outdoor Living Area

The Common Patios are located at the rear of Block A and Block B and were found to have predicted noise levels of 57.9 dBA, exceeding the limit of 55 dBA but below 60 dBA. All units in each Block are to include a Type A Warning Clause as indicated in Section 5.2, as the Common Patios are considered Outdoor Living Areas for all units.

6.0 Site Measurements and Stationary Noise to the Surrounding Area

6.1 Site Measurements and Observations

As noted above, at the request of the City of Ottawa, the noise impact from the surrounding area was to be considered in the noise impact study. The main concern is that mechanical equipment serving the retail area across Innes Road may have an impact on the new proposed development. Therefore, we went to the site and performed brief measurements in two locations, approximately at the location of points of reception POR1 and POR2 in the traffic noise study above, in order to determine whether there was any other noise impact other than traffic. We performed the measurements for approximately 15 minutes at each POR during a Thursday afternoon (beginning at approximately 2:30pm) when any equipment would be operational during a normal day. Below in Figure 6.1, the dBA level at each minute of the measurement at each POR location is given. While results vary to some degree, they are between 62 dBA and 72 dBA in all cases and from observations made on site, noise was almost exclusively due to traffic and there were no other apparent noise sources either from the retail area on the south side of Innes Road or otherwise.

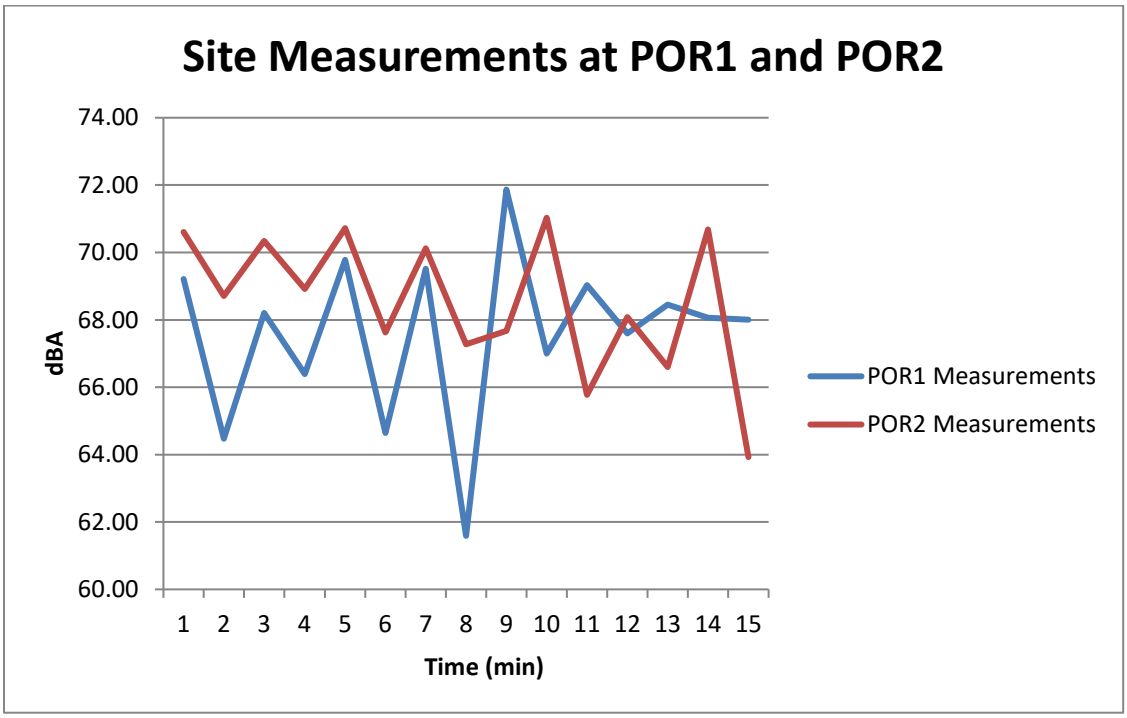


Figure 6.1 – Results of measurements taken at each minute at POR1 and POR2 locations of proposed new development.

6.2 Stationary Noise to Surrounding Area

In addition to the noise impact from traffic and the surrounding area onto the new development, it was also requested that the impact from equipment from the new development be addressed. Bridor Developments has indicated that there will not be any significant noise-making equipment associated with the proposed development such as MUA/AHUs, chillers, cooling towers, generators, etc. and that residential units are intended to have an internal boiler system with a small air handler in each unit with an AC condenser on the balcony. Therefore the only exterior noise generating equipment is the condensers on the balcony of each unit which do not generate a significant amount of noise. We have been provided with the proposed condensing units to be used, which are to be located on balconies, meaning that the closest condensing unit to an adjacent property will be approximately 6.75m from the abutting property line. The units that will be used, as shown in the Appendix, have sound power levels of 54 dBA from which we can determine the sound pressure at a certain distance away. With a basic calculation, using the distance from the property line (6.75m), we can see that the resulting sound pressure levels are well below 45 dBA in Figure 6.2 and that even multiple units at this distance will not result in a sound pressure level even close to 45 dBA.

Point Source Lp from Lw, hemi-spherical radiation			Metric
Lw		R1	
54.0	dB	6.8	m
		22.15	ft
Lp			
29.4	dB		

Figure 6.2 – Sound pressure level calculation at a distance of 6.75m at the closest property line.

Even combining two sources of the same sound power levels at the same distance away will result in a 3 dBA increase of the resulting sound power levels at the given distance. Therefore, the condensing units will not have a significant noise impact on the surrounding existing properties. We have also provided some general recommendations for these condensing units:

- Install units on neoprene mounts or pads such as Mason BR mounts or Mason SW pads so that minimal vibration is transmitted to the balcony and to the structure itself.
- Shield condensing units as much as possible from adjacent balconies, ideally with solid balcony dividers.
- Select quiet versions of condensing unit models if possible.

7.0 Conclusion

We have analyzed the traffic noise impact for road sources for the new proposed three building development to be located at 3817-3843 Innes Road. A detailed building component analysis was required as noise levels from the traffic noise sources (Innes Road and Frank Bender Street) was greater than 65 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 wall assemblies as listed in Section 5.1 are acceptable. Windows that meet the OBC requirement in Table 5.2 meet or exceed AIF requirements for only certain sections of the two buildings, and façades which are closer to Innes Road require a glazing assembly that has an STC rating of at least STC 33. We have provided sample assemblies to meet this requirement in Table 5.6. The areas where the higher STC glazing is required are presented in the Appendix. In addition, we have indicated which units require Warning Clauses in condominium or lease agreements in Section 5.2 which are also indicated in the drawing in the Appendix.

We have also addressed noise from the surrounding area and have found that traffic is by far the most significant noise source impacting the new development and that any mechanical equipment from the commercial area across the street is not a concern. In addition, the only noise generating equipment from the development to the surrounding area will be small condensing units on residential balconies, which should not be problematic for neighbouring properties however we have provided some general recommendations in order to minimize issues to adjacent units within the same building in Section 6.2.

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
STC 33 Window Requirements Drawing
Condensing Unit Preliminary Selections

STAMSON 5.0 NORMAL REPORT Date: 02-05-2022 21:47:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: innes1.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Innes (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 : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000
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: Frank Bender (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 : 70.00 / 70.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Innes (day)

Source height = 1.50 m

ROAD (0.00 + 72.22 + 0.00) = 72.22 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.68	0.00	0.00	-1.46	0.00	0.00	0.00	72.22

Segment Leq : 72.22 dBA

Results segment # 2: Frank Bender (day)

Source height = 1.50 m

ROAD (0.00 + 51.39 + 0.00) = 51.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.96	0.00	-11.11	-1.46	0.00	0.00	0.00	51.39

Segment Leq : 51.39 dBA

Total Leq All Segments: 72.26 dBA

Results segment # 1: Innes (night)

Source height = 1.50 m

ROAD (0.00 + 64.62 + 0.00) = 64.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.08	0.00	0.00	-1.46	0.00	0.00	0.00	64.62

Segment Leq : 64.62 dBA

Results segment # 2: Frank Bender (night)

Source height = 1.50 m

ROAD (0.00 + 43.80 + 0.00) = 43.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	56.36	0.00	-11.11	-1.46	0.00	0.00	0.00	43.80

Segment Leq : 43.80 dBA

Total Leq All Segments: 64.66 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.26
(NIGHT): 64.66

STAMSON 5.0 NORMAL REPORT Date: 02-05-2022 21:47:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: innes2.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Innes (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 : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Innes (day)

Source height = 1.50 m

ROAD (0.00 + 72.22 + 0.00) = 72.22 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.68	0.00	0.00	-1.46	0.00	0.00	0.00	72.22

Segment Leq : 72.22 dBA

Total Leq All Segments: 72.22 dBA

Results segment # 1: Innes (night)

Source height = 1.50 m

ROAD (0.00 + 64.62 + 0.00) = 64.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.08	0.00	0.00	-1.46	0.00	0.00	0.00	64.62

Segment Leq : 64.62 dBA

Total Leq All Segments: 64.62 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.22
(NIGHT): 64.62

STAMSON 5.0 NORMAL REPORT Date: 29-04-2022 15:48:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: innes3.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Innes (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 : 52.00 / 52.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000
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: Frank Bender (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 : 70.00 / 70.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Innes (day)

Source height = 1.50 m

ROAD (0.00 + 60.25 + 0.00) = 60.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	73.68	0.00	-8.96	-4.47	0.00	0.00	0.00	60.25

Segment Leq : 60.25 dBA

Results segment # 2: Frank Bender (day)

Source height = 1.50 m

ROAD (0.00 + 51.39 + 0.00) = 51.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.96	0.00	-11.11	-1.46	0.00	0.00	0.00	51.39

Segment Leq : 51.39 dBA

Total Leq All Segments: 60.78 dBA

Results segment # 1: Innes (night)

Source height = 1.50 m

ROAD (0.00 + 52.65 + 0.00) = 52.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	66.08	0.00	-8.96	-4.47	0.00	0.00	0.00	52.65

Segment Leq : 52.65 dBA

Results segment # 2: Frank Bender (night)

Source height = 1.50 m

ROAD (0.00 + 43.80 + 0.00) = 43.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	56.36	0.00	-11.11	-1.46	0.00	0.00	0.00	43.80

Segment Leq : 43.80 dBA

Total Leq All Segments: 53.18 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.78
(NIGHT): 53.18

STAMSON 5.0 NORMAL REPORT Date: 29-04-2022 15:48:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: innes4.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Innes (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 : 15.00 / 15.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000
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: Frank Bender (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 : 70.00 / 70.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Innes (day)

Source height = 1.50 m

ROAD (0.00 + 72.72 + 0.00) = 72.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.39	73.68	0.00	0.00	-0.96	0.00	0.00	0.00	72.72

Segment Leq : 72.72 dBA

Results segment # 2: Frank Bender (day)

Source height = 1.50 m

ROAD (0.00 + 53.70 + 0.00) = 53.70 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.39 63.96 0.00 -9.30 -0.96 0.00 0.00 0.00 53.70

Segment Leq : 53.70 dBA

Total Leq All Segments: 72.77 dBA

Results segment # 1: Innes (night)

Source height = 1.50 m

ROAD (0.00 + 65.12 + 0.00) = 65.12 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.39 66.08 0.00 0.00 -0.96 0.00 0.00 0.00 65.12

Segment Leq : 65.12 dBA

Results segment # 2: Frank Bender (night)

Source height = 1.50 m

ROAD (0.00 + 46.10 + 0.00) = 46.10 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.39 56.36 0.00 -9.30 -0.96 0.00 0.00 0.00 46.10

Segment Leq : 46.10 dBA

Total Leq All Segments: 65.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.77
(NIGHT): 65.17

STAMSON 5.0 NORMAL REPORT Date: 29-04-2022 15:46:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: innes5.te Time Period: Day/Night 16/8 hours

Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Innes (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 : 15.00 / 15.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Innes (day)

Source height = 1.50 m

ROAD (0.00 + 72.72 + 0.00) = 72.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.39	73.68	0.00	0.00	-0.96	0.00	0.00	0.00	72.72

Segment Leq : 72.72 dBA

Total Leq All Segments: 72.72 dBA

Results segment # 1: Innes (night)

Source height = 1.50 m

ROAD (0.00 + 65.12 + 0.00) = 65.12 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.39	66.08	0.00	0.00	-0.96	0.00	0.00	0.00	65.12

Segment Leq : 65.12 dBA

Total Leq All Segments: 65.12 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.72
(NIGHT): 65.12

STAMSON 5.0 NORMAL REPORT Date: 29-04-2022 15:52:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Innes (day/night)

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 26.00 / 26.00 m
Receiver height : 1.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000
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: Frank Bender (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 95.00 / 70.00 m
Receiver height : 1.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Innes (day)

Source height = 1.50 m

ROAD (0.00 + 57.79 + 0.00) = 57.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	90	0.66	73.68	0.00	-3.97	-4.82	0.00	-7.10	0.00	57.79

Segment Leq : 57.79 dBA

Results segment # 2: Frank Bender (day)

Source height = 1.50 m

ROAD (0.00 + 42.63 + 0.00) = 42.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.96	0.00	-13.31	-1.46	0.00	-6.57	0.00	42.63

Segment Leq : 42.63 dBA

Total Leq All Segments: 57.92 dBA

Results segment # 1: Innes (night)

Source height = 1.50 m

ROAD (0.00 + 58.07 + 0.00) = 58.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	90	0.48	66.08	0.00	-3.54	-4.47	0.00	0.00	0.00	58.07

Segment Leq : 58.07 dBA

Results segment # 2: Frank Bender (night)

Source height = 1.50 m

ROAD (0.00 + 45.32 + 0.00) = 45.32 dBA

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

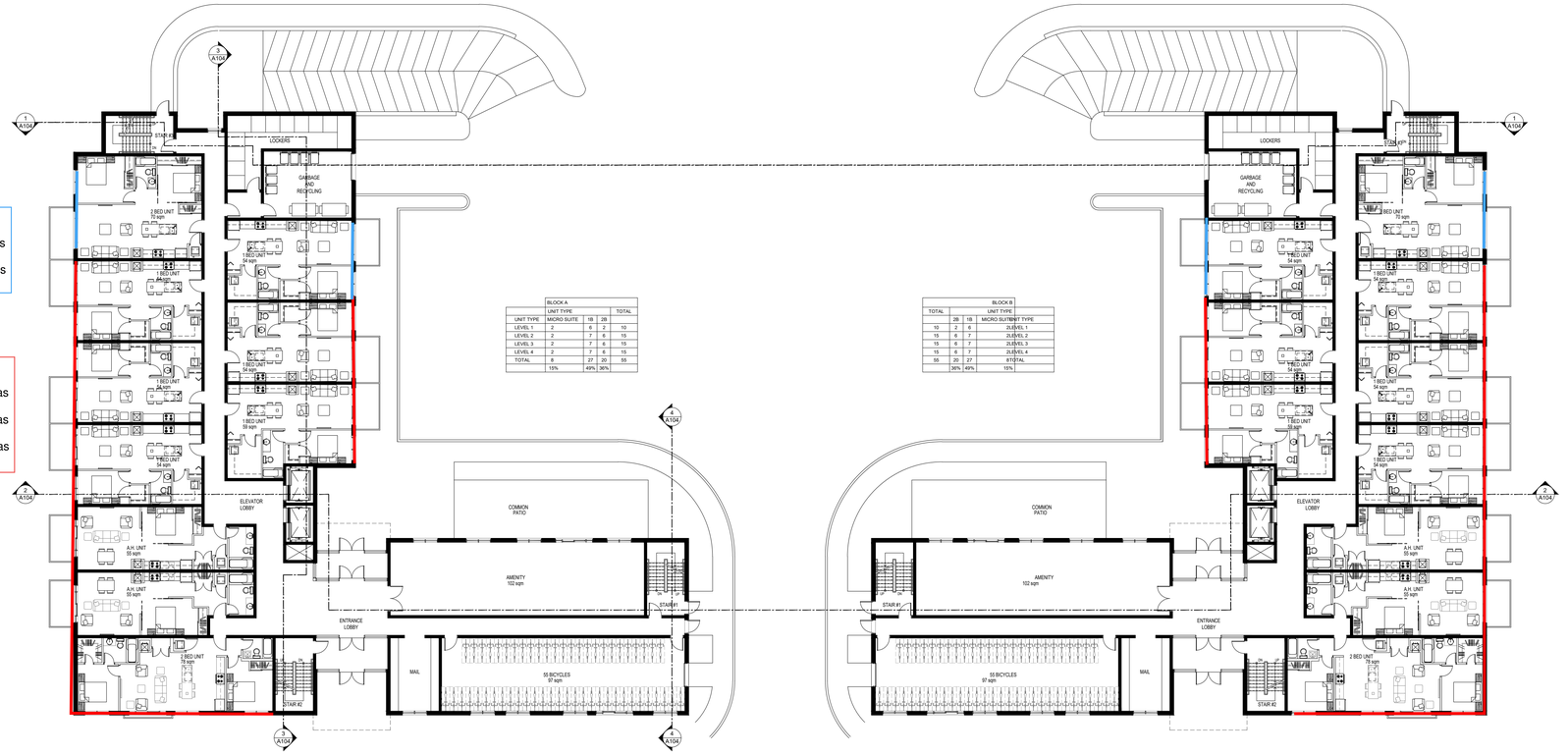
-90	90	0.48	56.36	0.00	-9.90	-1.14	0.00	0.00	0.00	45.32

Segment Leq : 45.32 dBA

Total Leq All Segments: 58.29 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 57.92
(NIGHT): 58.29

-OBC Window Requirement (as per Section 5.1)
-Type A Warning Clause Requirement (as per Section 5.2)
-Type D Warning Clause Requirement (as per Section 5.2)

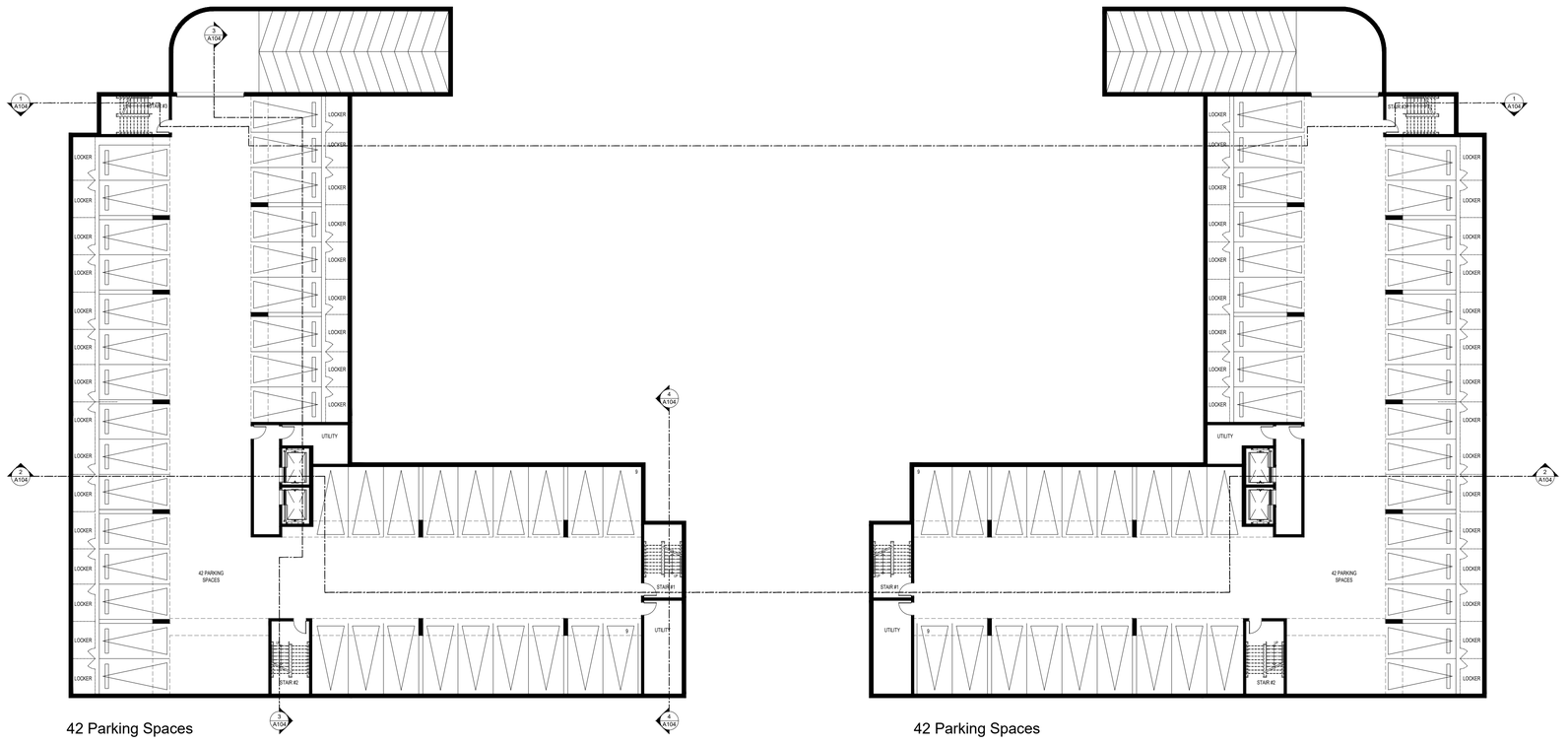
-STC 33 Window Requirement (as per Section 5.1)
-Type A Warning Clause Requirement (as per Section 5.2)
-Type B Warning Clause Requirement (as per Section 5.2)
-Type D Warning Clause Requirement (as per Section 5.2)



BLOCK A				
	UNIT TYPE			TOTAL
UNIT TYPE	MICRO SUITE	1B	2B	
LEVEL 1	2	6	2	10
LEVEL 2	2	7	6	15
LEVEL 3	2	7	6	15
LEVEL 4	2	7	6	15
TOTAL	8	27	20	55
	15%	49%	36%	

BLOCK B				
TOTAL	UNIT TYPE			
	2B	1B	MICRO SUITE	UNIT TYPE
10	2	6		2LEVEL 1
15	6	7		2LEVEL 2
15	6	7		2LEVEL 3
15	6	7		2LEVEL 4
55	20	27		8TOTAL
	36%	49%		15%

1 A100 MAIN LEVEL PLAN
SCALE = 1 : 200



42 Parking Spaces

42 Parking Spaces

2 A100 LOWER LEVEL PLAN
SCALE = 1 : 200

CLIENT:

BRIDOR Developments

No.	REVISIONS	BY	DATE
13	FOR REVIEW		
12	FOR REVIEW		
11	FOR REVIEW		
10	FOR REVIEW		
09	FOR REVIEW		
08	FOR REVIEW	PE	NOV. 02 2020
07	FOR REVIEW	PE	OCT. 27 2020
06	FOR REVIEW	PE	AUG 05 2020
05	FOR REVIEW	PE	JUNE 22 2020
04	FOR REVIEW	PE	JUNE 09 2020
03	FOR REVIEW	PE	JUNE 03 2020
02	FOR REVIEW	PE	MAY 28 2020
01	FOR REVIEW	PE	MAY 11 2020

-OBC Window Requirement (as per Section 5.1)
-Type A Warning Clause Requirement (as per Section 5.2)
-Type D Warning Clause Requirement (as per Section 5.2)

NOT AUTHENTIC UNLESS SIGNED AND DATED

P2 concepts
280 SLATER STREET, SUITE 200
OTTAWA, ONTARIO, K1P 6N8

CONSULTING ENGINEERS

STRUCTURAL

MECHANICAL

ELECTRICAL

-STC 36 Window Requirement (as per Section 5.1)
-Type A Warning Clause Requirement (as per Section 5.2)
-Type B Warning Clause Requirement (as per Section 5.2)
-Type D Warning Clause Requirement (as per Section 5.2)

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.E.	P.E.	P.E.

PROJECT

3817-3843 INNES ROAD
ORLEANS

DRAWING TITLE

LOWER AND MAIN
LEVEL PLANS

PROJECT NO.
0378

DATE
MAY, 11, 2020

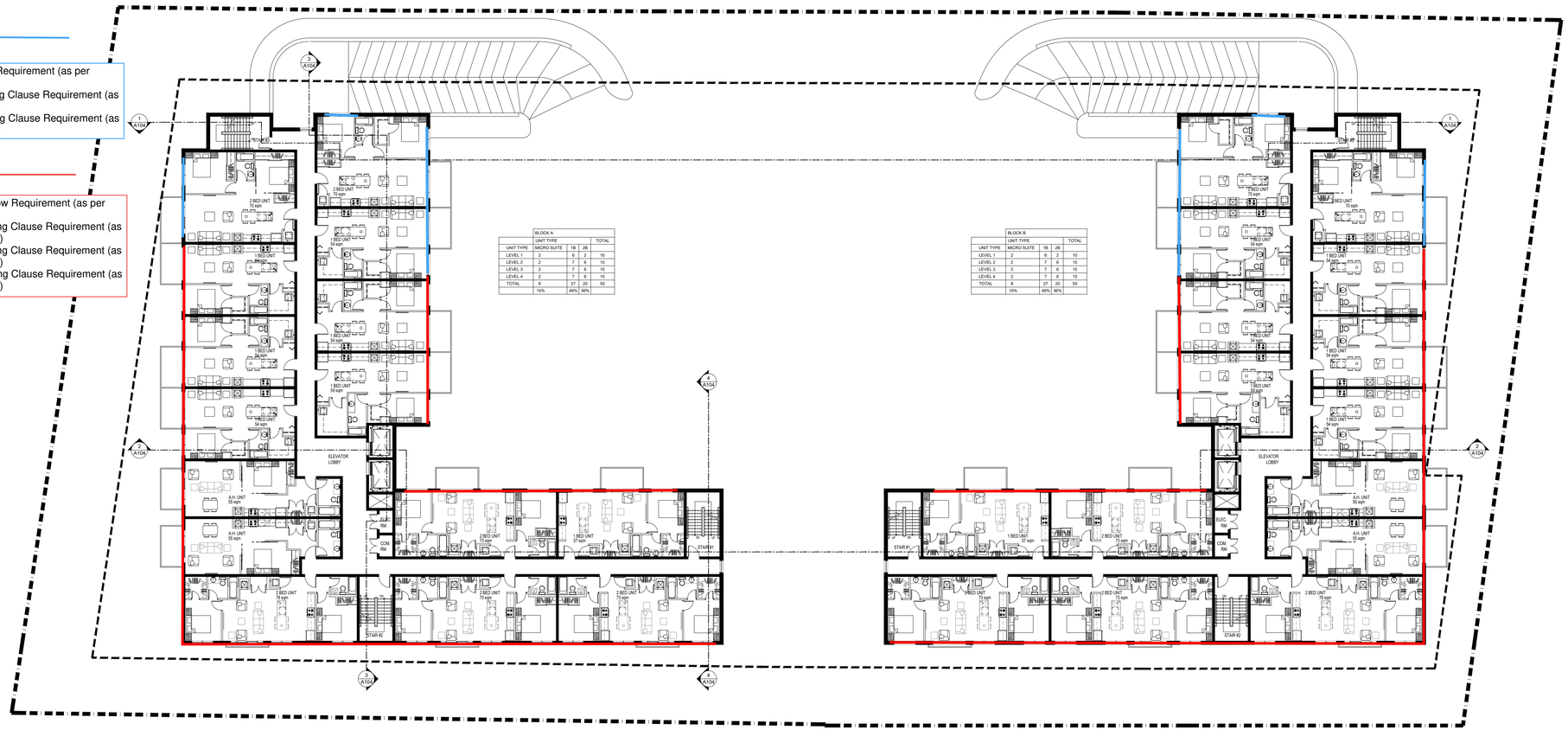
A100

FILE # D07-12-20-0164

18285

-OBC Window Requirement (as per Section 5.1)
-Type A Warning Clause Requirement (as per Section 5.2)
-Type D Warning Clause Requirement (as per Section 5.2)

-STC 33 Window Requirement (as per Section 5.1)
-Type A Warning Clause Requirement (as per Section 5.2)
-Type B Warning Clause Requirement (as per Section 5.2)
-Type D Warning Clause Requirement (as per Section 5.2)



1 A101 TYPICAL LEVEL PLAN
SCALE = 1 : 200

CLIENT:
BRIDOR Developments

No.	REVISIONS	BY	DATE
12	FOR REVIEW	PE	MAR. 21 2022
11	FOR REVIEW	PE	APR. 09 2021
10	FOR REVIEW	PE	FEB. 24 2021
09	FOR REVIEW	PE	NOV. 10 2020
08	FOR REVIEW	PE	NOV. 02 2020
07	FOR REVIEW	PE	OCT. 27 2020
06	FOR REVIEW	PE	AUG 05 2020
05	FOR REVIEW	PE	JUNE 22 2020
04	FOR REVIEW	PE	JUNE 09 2020
03	FOR REVIEW	PE	JUNE 03 2020
02	FOR REVIEW	PE	MAY 28 2020
01	FOR REVIEW	PE	MAY 11 2020

NOT AUTHENTIC UNLESS SIGNED AND DATED

P2 concepts
FIRM ROOMWOOD AVE., SUITE 201
OTTAWA, ONTARIO, K1Y 4W8

CONSULTING ENGINEERS

STRUCTURAL

MECHANICAL

ELECTRICAL

DESIGNED BY: P.E.
DRAWN BY: P.E.
APPROVED BY: P.E.

PROJECT
3817-3843 INNES ROAD
ORLEANS

DRAWING TITLE
TYPICAL LEVEL PLAN

PROJECT NO. 0378
DATE MAY, 11, 2020

A101

FILE # D07-12-20-0164

18285

DIRECT AIR

SUBMITTAL DATA SHEET

Job Name :		**Location:**	
Purchaser:		**Engineer:**	
Submitted to:		**Reference:**	**Approval:**
Phone:		**Email:**	

Model No.	DIRG-12CN
Unit designation	
Qty	
Type	ROTARY compressor

Ac for Apt. Units.

Power supply			Ph-V-Hz	115V~ 60Hz, 1Ph
Cooling		Capacity	Btu/h	12000
		SEER		13
TOTAL LOAD			A	7.70
OUTDOOR FAN MOTOR LOAD			A	0.70
MINIMUM CIRCUIT AMPACITY			A	10.0
MAX.FUSE			A	15.0
Starting current			A	/
Compressor		Model		ASM100E11VEZ
		Type		ROTARY
		Brand		GMCC
		Capacity	Btu/h	11600 (at 1150V)
		Input	W	800 (at 115V)
		Rated current(RLA)	A	7.00 (at 115V)
		Locked rotor Amp(LRA)	A	49
		Thermal protector		UP3-27
		Thermal protector position		INTERNAL
		Capacitor	uF	70
		Refrigerant oil/oil charge	ml	ESTEL OIL RB68 / 300
Outdoor fan motor		Model		YDK-35-6H D
		Brand		Chigo
		Input	W	77
		Capacitor	uF	8
		Speed	r/min	910 / -- / --
Outdoor air flow			m3/h	2400
Outdoor noise level			dB(A)	54
Outdoor unit		Dimension(W*D*H)	mm	812×256×540
		Packing (W*D*H)	mm	920×335×585
		Net/Gross weight	Kg	39/41
Refrigerant type			Kg	R410A/1400g
Design pressure			Mpa	540/300 PSIG
Refrigerant piping		Liquid side/ Gas side	mm(inch)	Φ6.35/Φ12.7(1/4"/1/2")

*Due to Direct Air's policy of continous product improvement specifications are subject to change without notice