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Bridor Developments – 5497 Manotick Main Street Apartment Building
Noise Impact Study – R4

Dear Eric,

We are pleased to present the following traffic noise study for a new proposed residential development of an apartment building located at 5497 Manotick Main Street in Manotick, Ontario. As part of the Site Plan Application (SPA), the City of Ottawa has requested a noise study to be completed. The planned development is for a new apartment building with a total of 28 residential units over three floors, which is in proximity to Manotick Main Street (also indicated as Rideau Valley Drive N). 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 new building, therefore noise from the new development to the surrounding area will be minimal and will not be analyzed as a part of our noise study. In addition, there are no sources of significant noise from the surrounding that may impact the new development. Therefore, we will be only fully analyzing noise from traffic onto the building.

This study considers traffic noise from Manotick Main Street (~21m from the south-west façade of the building). This noise source is the only traffic noise source considered in this study. All other noise sources, such as other main or arterial roads, principal rail lines and airport influence zone are outside of limits as per the City of Ottawa ENCG and Schedule G of the City of Ottawa Official Plan.

It was found that noise levels at the plane of window (POW) on the ground floor and 3rd floor PORs are above 65 dBA and a detailed building component analysis was completed. It was found that no additional mitigation measures were required, however a Type D warning clause must be included in the purchase or rental agreement. In addition, we have reviewed the surrounding area of the proposed development and have found that there will be little to no impact from the existing buildings nearby. 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 apartment building with ground floor commercial space to be located at 5497 Manotick Main Street in Manotick, 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 only noise from road sources and there is no other nearby sources. In addition, this analysis does not include an analysis of stationary noise to the surrounding area, as no significant additional noise sources are anticipated.

In Section 3.0, the noise impact calculation procedure is described and in Section 4.0, the predicted noise impact from Manotick Main Street 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 are above 65 dBA.

Section 6.0 discusses other noise impacts onto the building itself, and also provides a brief overview of the mechanical equipment to be used for the new building.

2.0 Site Plan Evaluation

2.1 Project Description

The proposed development consists of a new residential building, with a ground floor consisting of eight units and the 2nd and 3rd floors consisting of ten units each for a total of 28 units. The building is located at 5497 Manotick Main Street in Manotick, Ontario. The area surrounding the development consists primarily of low-rise residential and commercial buildings, including two single storey commercial buildings adjacent to the property. We have considered traffic noise from Manotick Main Street as the only traffic noise source 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 proposed building including its proximity to Manotick Main St., which is located approximately 21m from the closest façade.

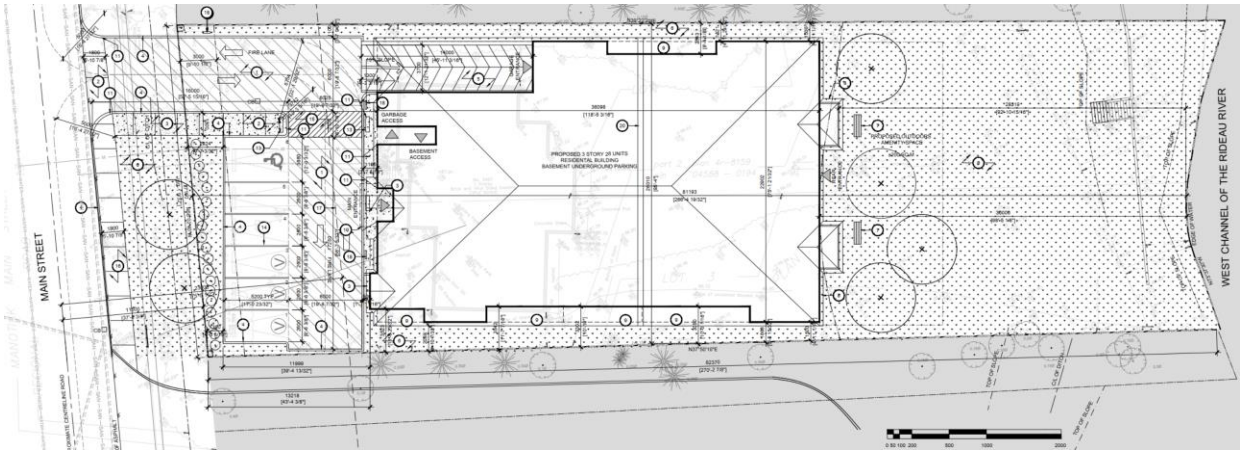


Figure 2.1 – Site plan of 5497 Manotick Main St.

Figure 2.2 shows the proposed site plan overlayed onto the existing map with distances to Manotick Main St. Manotick Main St. is indicated as an arterial road, as per City of Ottawa Schedule G.

Figure 2.2 – Surrounding area 5497 Manotick Main St. with locations and distances of relevant noise sources with approximate site plan overlay.

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. There are no Outdoor Living Areas as defined in the ENCG.

Time	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

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

Manotick Main St. is within 100m of the planned development and therefore an analysis of the impact of traffic noise is required.

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 3.2 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*."

Specific examples of warning clauses in regards to the new development at 5497 Manotick Main St. 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 3.2 - 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 proposed new building at 5497 Manotick Main St.

4.1 Road Traffic Information

For this study, the only surface transportation noise sources considered was traffic from Manotick Main St., which is located to the south-west of the front façade of the new building. 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 (%)
Manotick Main St.	4 Lane Urban Arterial - Undivided	30,000	50 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 two points of reception (POR); one along the south-west façade on the ground floor at the plane of window (POW) of the bedroom facing the road and one at the bedroom plane of window of the south west unit on the 3rd floor, which has larger windows. These points are the closest to the right of way of Manotick Main St., as the building sits on a slight angle from the street. POR1 at the plane of window of the 1st floor bedroom is at a height of 1.5m and POR2 at the POW on the 3rd floor is at a height of 7.5m. The position of our points of reception is shown in Figure 4.1, 4.2 and 4.3 indicated by the blue cross. Table 4.2 below summarizes receiver heights and distances.

Receiver	Height (m)	Distance from Source (m)	Angle to Manotick Main St. from POR	
		Manotick Main Rd	Angle 1	Angle 2
POR1	1.5	21	90°	90°
POR2	7.5	21	90°	90°

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

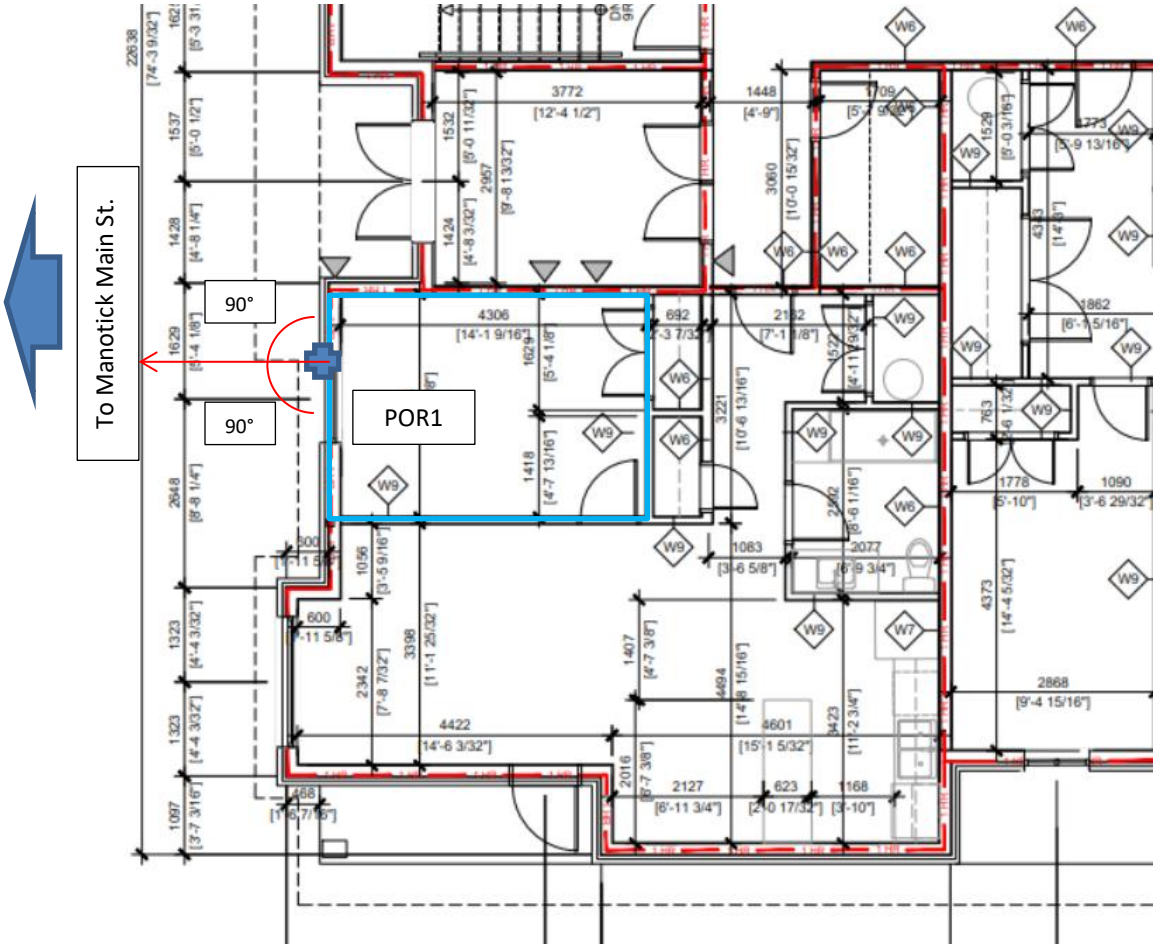


Figure 4.1 – 1st floor plan view showing POR1.

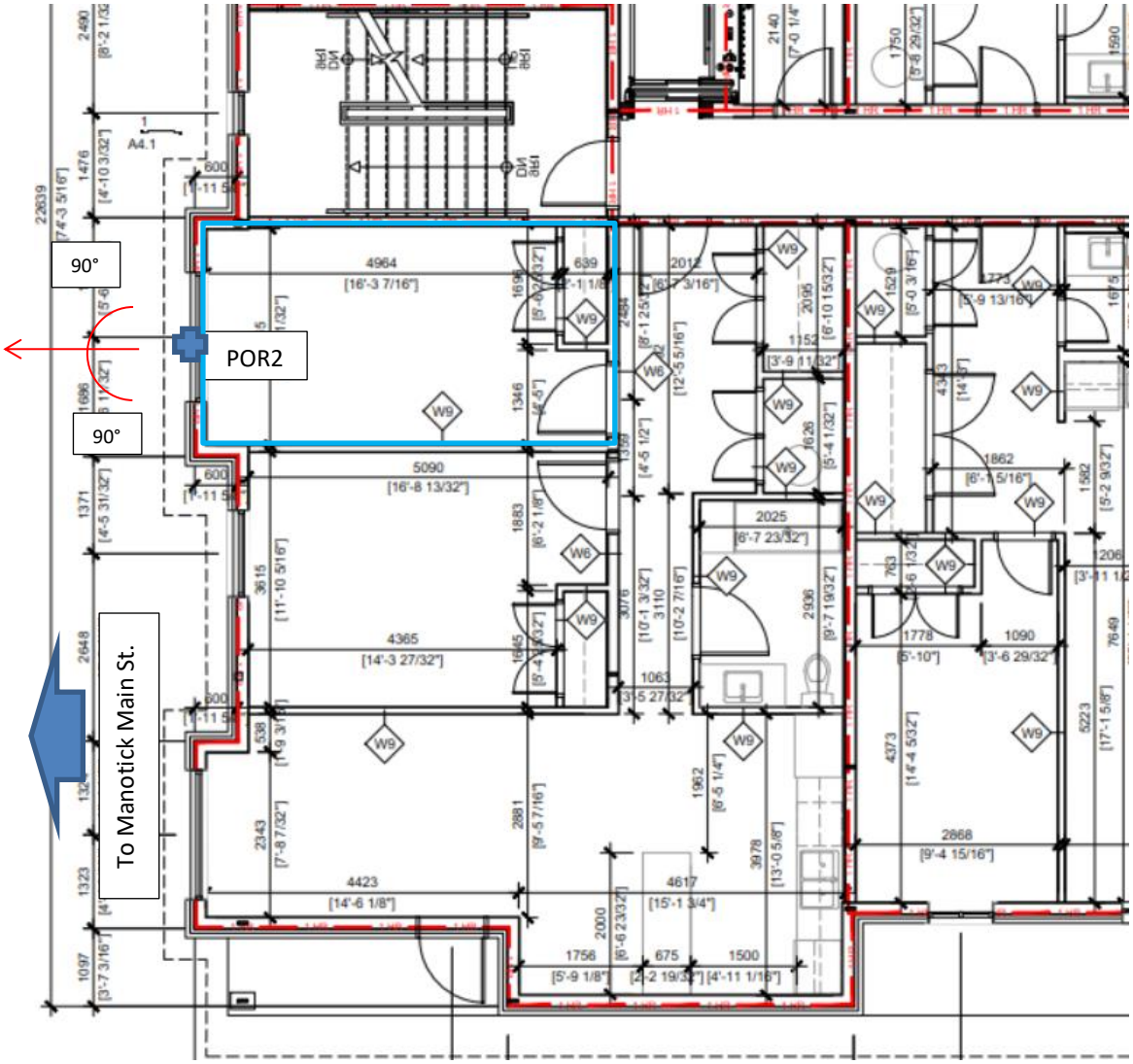


Figure 4.2 – 3rd floor plan view showing POR2.

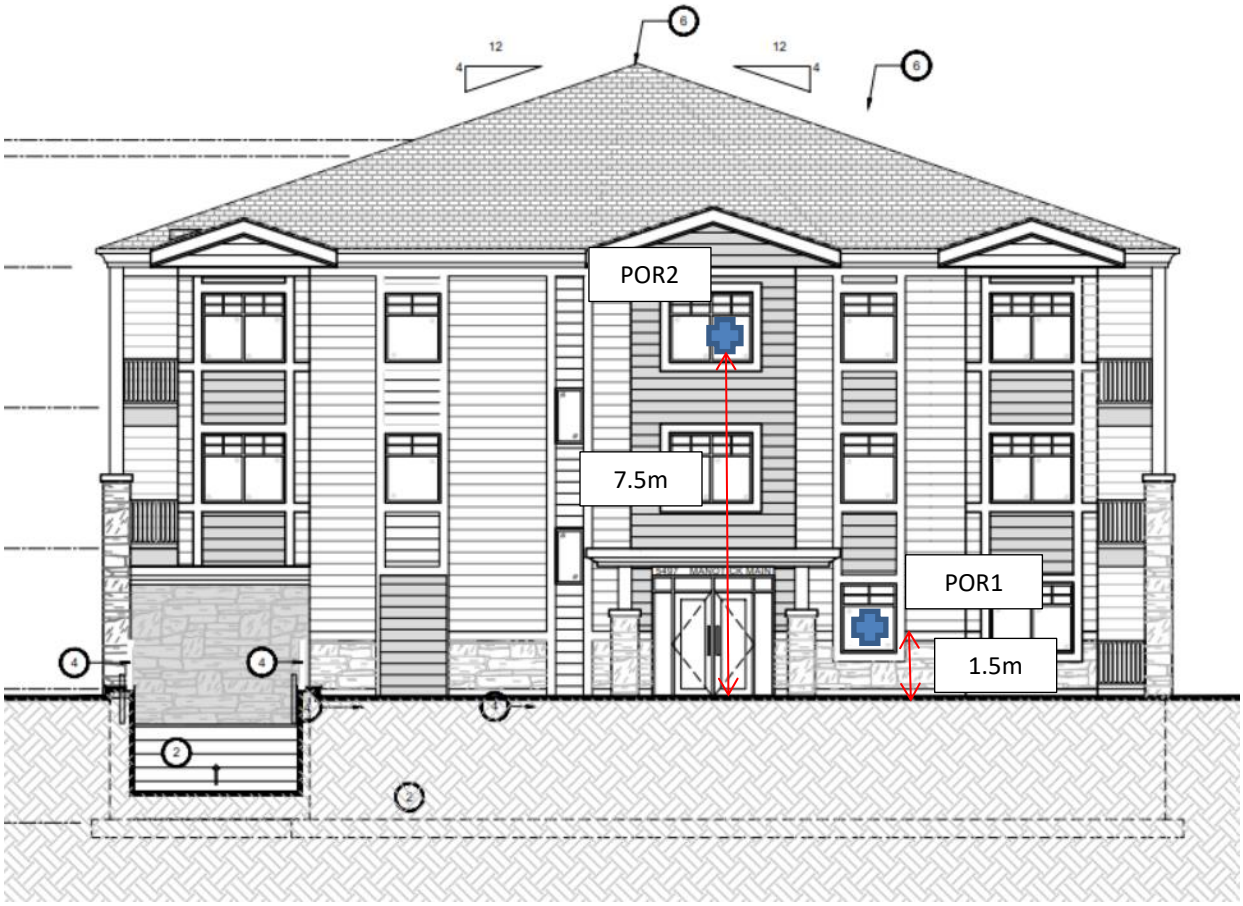


Figure 4.3 – Front elevation view showing the Points of Reception (POR1 and POR2).

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:	**Manotick Main St.**
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)*	21

Table 4.3 – Parameters used in STAMSON model at POR1 (1st floor bedroom)

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

Parameter	Values Used
Noise Source:	**Manotick Main St.**
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)	7.5
Source Receiver Distance* (m)	21

Table 4.4 – Parameters used in STAMSON model at POR 2 (3rd floor bedroom)

4.5 Surface Transportation Noise Levels

Table 4.6 below summarizes the predicted sound pressure levels at the points of reception from the results of the STAMSON environmental noise software calculation (Appendix A) for 5497 Manotick Main St.

	POR 1 (dBA)		POR 2 (dBA)	
	Day	**Night**	**Day**	**Night**
Manotick Main St	70.0	62.4	70.0	62.4

Table 4.6 – Predicted Road Noise at each Point of Reception

4.6 Roadway Noise Summary and Analysis

We have calculated the predicted noise level caused by traffic using STAMSON and have shown a 16h L_{eq} for daytime hours is **70.0 dBA**, at both POR1 and POR2. The 8h L_{eq} for nighttime hours at POR1 and POR2 is **62.4 dBA**. As the levels during the day and at night 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 as per elevations, the exterior is to be partial stone veneer and vinyl siding on the 1st floor and vinyl siding on the remainder of the building. 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 MASONRY WALL – POR1

-Stone veneer
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" batt insulation
-1/2" type x gypsum board

EXTERIOR VINYL SIDING WALL – POR1/POR2

-Vinyl siding
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" batt insulation
-1/2" 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/vinyl siding for POR1/vinyl siding for POR2)
2) Window (No assembly yet specified, 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 and the cementitious panel system as shown in Figure 4.3. The wall type for both POR1 (stone/vinyl siding) and POR2 (vinyl siding) is sufficiently similar to wall type EW5 (stone) and EW2 (siding) described in the Canada Mortgage and Housing Corporation (CMHC) document "Road and Rail Noise: Effects on Housing". Table 5.1 shows a comparison of these wall compositions.

Exterior Wall Assembly	CMHC Road and Rail Noise Wall Type
-Stone veneer -1" rigid insulation -6" steel studs @16" o.c. max. -5.5" batt insulation -1/2" 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
-Vinyl siding -1" rigid insulation -6" steel studs @16" o.c. max. -5.5" batt insulation -1/2" type x gypsum board	**Wall Type EW2** -Wood/metal siding -Sheathing -50mm mineral wool or glass fibre batts or 25-50mm rigid insulation -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 such as the following example:

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

Table 5.2 –Window Assembly used in Calculations

The calculation of AIF for each building component depends on the ratio of the area of a given component on the exterior to the total floor area of the corresponding interior room. Using plan view and elevation drawings, we have determined these dimensions for the bedrooms (1st and 3rd floor) 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 and 5.4 below. The layouts of the two spaces are shown in Figure 5.1 and Figure 5.2.

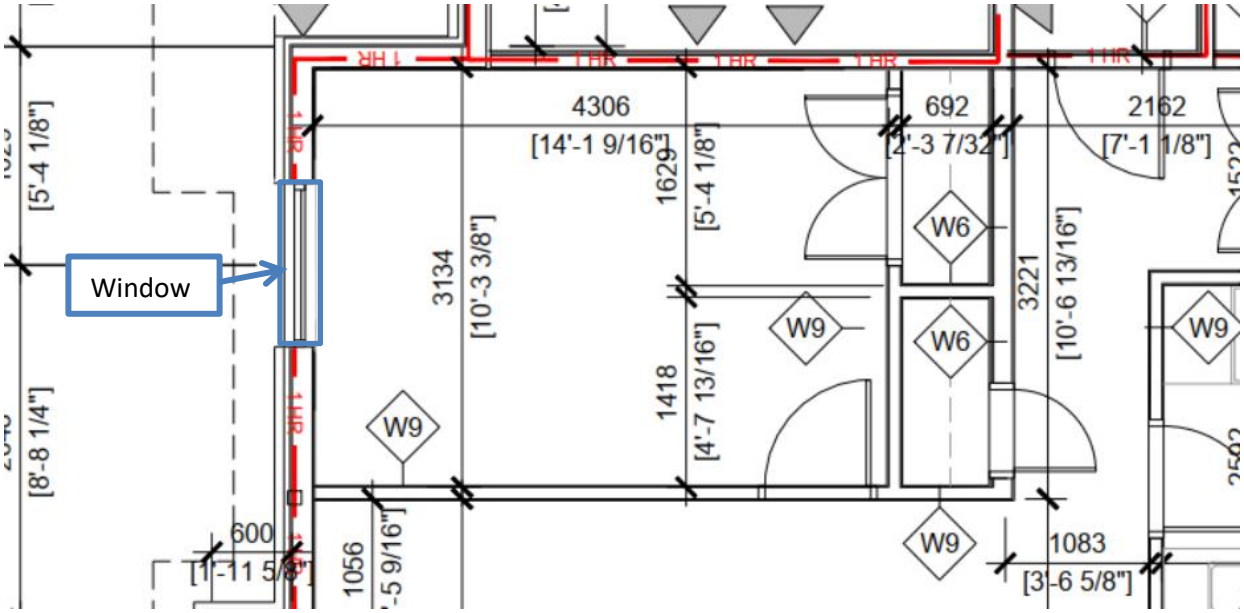


Figure 5.1 – Layout of bedroom in south west 1st floor unit used for analysis of POR1. Exterior wall assembly equivalent to CMHC wall type EW5 and EW2.

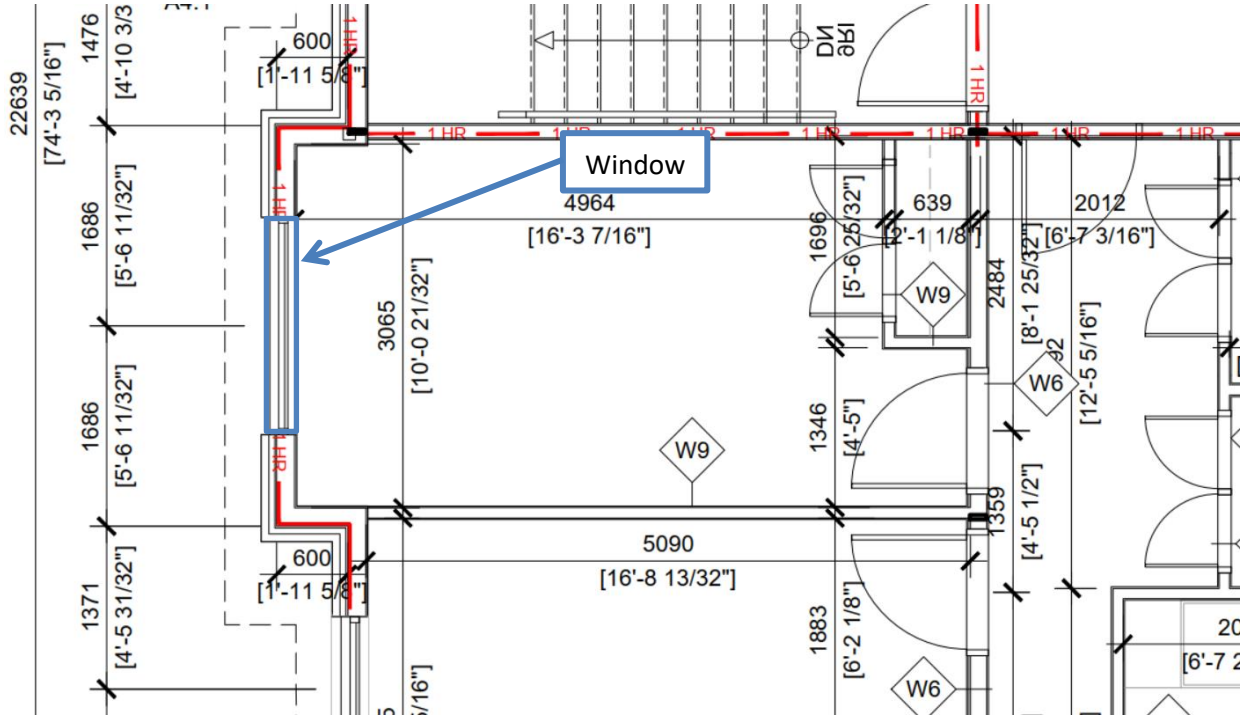


Figure 5.2 – Layout of living area in south west 3rd floor unit used for analysis of POR2. Exterior wall assembly equivalent to CMHC wall type EW2.

5.1.2 AIF Calculations

Below in Table 5.3 and 5.4, 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 for which the component AIF is compared to.

POR1												
Room Floor Area (m2)	Number of Components	Component Number	Component Type	Component Area (m2)	Component Area ratio to Floor Area (%)	Outside Leq	Required Indoor Leq	Initial Required AIF	Component AIF	Comp1 AIF > Init AIF +10	Final Required AIF	Acceptable Component AIF
13.3	3	1	Exterior Wall	3.4	26%	70	45	32	53	N/A	32	**Yes**
13.3	3	2	Exterior Wall	4.64	35%	70	45	32	38	Yes	30	**Yes**
13.3	3	3	Window 2	1.8	14%	70	45	32	34	Yes	30	**Yes**

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

POR 2												
Room Floor Area (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
16.3	2	1	Exterior Wall	10.8	66%	70	45	30	35	No	30	**Yes**
16.3	2	2	Window	2.7	17%	70	45	30	32	No	30	**Yes**

Table 5.4 – POR2 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 Table 5.3 and 5.4, all assemblies meet the AIF requirement.

5.2 Warning Clauses

As the predicted noise levels from surface transportation exceed 65 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 5.6.

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 an 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 5.6 – Warning Clause Types and Example Text from the City of Ottawa (from ENCG Table A1)

Units that require a Type D Warning Clause:
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 Assemblies

Exterior Wall Assemblies

EXTERIOR STONE / BRICK MASONRY WALL

-Stone veneer.
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" batt insulation
-1/2" type x gypsum board

EXTERIOR VINYL SIDING

-Vinyl siding
-1" rigid insulation
-6" steel studs @16" o.c. max.
-5.5" batt insulation
-1/2" type x gypsum board

EXTERIOR WINDOWS (NONE SPECIFIED, OBC MINIMUM USED FOR CALCULATIONS)
1/8” glazing
½” interplane spacing
1/8” glazing

The AIF value for the exterior wall and windows is equivalent or exceeds the requirements and no changes are required.

Warning Clauses

A Type D warning clause as described in Section 5.2 above is to be included in the development agreement to all units.

6.0 Additional Noise Considerations

6.1 Existing Buildings and Noise Sources

We have reviewed the surrounding area to address potential noise sources that may impact the proposed development. There is a small one storey building which houses a bank adjacent to the proposed new development with a one storey strip mall slightly further away to the east. There are several small rooftop units (RTUs) on the roof of each of these buildings however it is not anticipated that they will have any significant noise impact on the new development at 5497 Manotick Main St. and that traffic noise will be the dominant source of noise based on our calculations and the proximity of the road to the new building. There are no other noteworthy nearby sources of noise in the surrounding area.

6.2 Stationary Noise to Surrounding Area

In addition to the noise impact from traffic onto the new development, it was also requested that the impact from equipment from the new development be addressed. The client 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 a heat pump system with an outdoor unit on each balcony. Therefore, the only exterior noise generating equipment are the units on the balcony which do not generate a significant amount of noise. We have been provided with the proposed heat pump units to be used, for which the closest unit to an adjacent building will be approximately 9m from the balcony of the north-west unit to the residence to the north-west. The units that will be used, as shown in the Appendix, have sound power levels of 56 dBA and 59 dBA, depending on the size of the unit, from which we can determine the sound pressure at a certain distance away. With a basic calculation, using the larger of the two units and the distance from the nearest residence (9m), we can see that the resulting sound pressure levels are well below 45 dBA and that even multiple units at this distance will not result in a sound pressure level of a maximum of 45 dBA.

Point Source Lp from Lw, hemi-spherical radiation				Metric
Lw		R1		
59.0	dB	9.0	m	
		29.53	ft	
Lp				
31.9	dB			

Figure 6.2 – Sound pressure level calculation at a distance of 9m at the closest property line.

Even combining multiple sources of the same sound power levels at the same distance away will not result in sound pressure levels at the same distance of more than 45 dBA. Therefore, the 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 development to be located at 5497 Manotick Main St. A detailed building component analysis was required as noise levels from the traffic noise sources (Manotick Main St.) 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 and window assemblies as listed in Section 5.1 are acceptable.

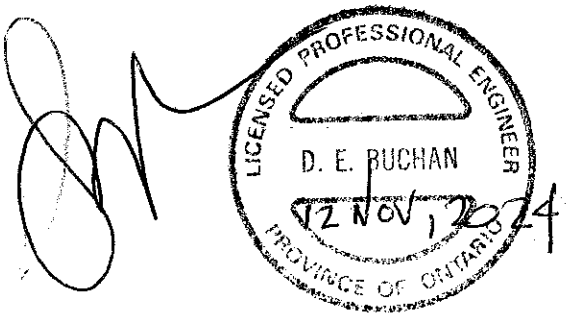
We have also addressed noise from the surrounding area and have found that traffic is by far the most significant noise source impacting the new development and that any mechanical equipment from the commercial area across the street is not a concern. In addition, the only noise generating equipment 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.
Senior Acoustic Consultant

Approved By:



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

Appendix A
STAMSON Calculations
Balcony Heat Pump Units

STAMSON 5.0 NORMAL REPORT Date: 05-11-2024 12:46:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 5497mano.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 24288/2112 veh/TimePeriod *
Medium truck volume : 1932/168 veh/TimePeriod *
Heavy truck volume : 1380/120 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 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: MANOTICKMAIN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 21.00 / 21.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: MANOTICKMAIN (day)

Source height = 1.50 m

ROAD (0.00 + 70.03 + 0.00) = 70.03 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 -1.46 0.00 0.00 0.00 0.00 70.03

Segment Leq : 70.03 dBA

Total Leq All Segments: 70.03 dBA

Results segment # 1: MANOTICKMAIN (night)

Source height = 1.50 m

ROAD (0.00 + 62.43 + 0.00) = 62.43 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	-1.46	0.00	0.00	0.00	0.00	62.43

Segment Leq : 62.43 dBA

Total Leq All Segments: 62.43 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 70.03
(NIGHT): 62.43

STAMSON 5.0 NORMAL REPORT Date: 05-11-2024 12:47:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 5497man2.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 24288/2112 veh/TimePeriod *
Medium truck volume : 1932/168 veh/TimePeriod *
Heavy truck volume : 1380/120 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 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: MANOTICKMAIN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 21.00 / 21.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: MANOTICKMAIN (day)

Source height = 1.50 m

ROAD (0.00 + 70.03 + 0.00) = 70.03 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	-1.46	0.00	0.00	0.00	0.00	70.03

Segment Leq : 70.03 dBA

Total Leq All Segments: 70.03 dBA

Results segment # 1: MANOTICKMAIN (night)

Source height = 1.50 m

ROAD (0.00 + 62.43 + 0.00) = 62.43 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	-1.46	0.00	0.00	0.00	0.00	62.43

Segment Leq : 62.43 dBA

Total Leq All Segments: 62.43 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 70.03
(NIGHT): 62.43

SPECIFICATIONS — 0.75 | 2 TON

Nominal Size - Tons		**0.75**	**1**	**1.5**	**2**
Outdoor Unit Model No.		**MLB009S4S**	**MLB012S4S**	**MLB018S4S**	**MLB024S4S**
Ambient Temperature Operating Range - °F	Cooling	–22 - 122	–22 - 122	–22 - 122	–22 - 122
	Heating	–22 - 86	–22 - 86	–22 - 86	–22 - 86
Sound Data (dBA)	Cooling	54.5	56	59	62
	Heating	54.5	56	59	62
Refrigerant	Charge furnished (R-410A)	2 lbs. 9 oz.	2 lbs. 9 oz.	4 lbs. 1 oz.	5 lbs. 12 oz.
	Maximum line length with furnished charge - ft.	25	25	25	25
	Additional charge required per ft. - oz.	0.16	0.16	0.16	0.32
Compressor	No. and Type	(1) Rotary	(1) Rotary	(1) Rotary	(1) Rotary
	Refrigerant oil type	VG74	VG74	VG74	VG74
	Refrigerant oil charge - oz.	11.8	11.8	21	21
Connections - in.	Liquid/Gas pipe (flare)	1/4 / 3/8	1/4 / 1/2	1/4 / 1/2	3/8 / 5/8
	Maximum refrigerant pipe length - ft.	98	98	98	164
	Max. difference in level of indoor unit - ft.	66	66	66	82
Outdoor Fan	(No.) Diameter - in.	(1) 17	(1) 17	(1) 19	(1) 22
	Total air volume - cfm	1120	1180	1355	2355
	rpm	850/680/450	850/680/450	810/720/1150	1150/1050/900/850
Outdoor Coil	Number of rows	2	2	2	2
	Fins per inch	18	18	18	19
	Fin type	Hydrophilic aluminum			
	Tube outside diameter - in.	3/8	3/8	3/8	3/8
	Tube type	Rifled copper tubing			
	Net face area - ft.^{2}	4.73	4.73	5.19	8.16
Design Pressure	PSIG	550/340	550/340	550/340	550/340
Shipping Data	Net/Shipping weight (lbs.)	74 / 80	74 / 80	101 / 108	135 / 145
ELECTRICAL DATA					
Electrical Characteristics - 60 Hz - 1 Phase		208/230V	208/230V	208/230V	208/230V
[1] Maximum Overcurrent Protection (MOCP) amps		15	15	25	35
[2] Minimum circuit ampacity (MCA)		15	15	16	25
Outdoor Fan Motor	Rated load amps	0.4	0.4	0.76	0.5
	Output - W	34	34	80	120

NOTE - Extremes of operating range are plus and minus 10% of line voltage.

[1] HACR type circuit breaker or fuse.

[2] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.