Somerset and Breezehill
1050 Somerset Street

Noise Control Study

Prepared By:

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City of Ottawa
Planning and Growth Management Department
Infrastructure Approvals Division
110 Laurier Street West, 4th Floor
Ottawa, ON
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Attention: Mr. Joshua White

Reference: Somerset and Breezehill Development
1050 Somerset Street
Noise Control Study - Our File No.: 111152

Enclosed for your review are three (3) copies of the Noise Control Study for the Somerset and Breezehill development located on the southwest corner of Somerset Street and Breezehill Avenue.

The study evaluates the impact of noise and outlines noise attenuation measures to mitigate the impacts.

Please contact the undersigned should you have any questions or comments pertaining to the enclosed report.

Yours truly,

NOVATECH ENGINEERING CONSULTANTS LTD.

Greg MacDonald, P.Eng.
Senior Project Manager

c.c: Neil Malhotra, Claridge Homes

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1.0 INTRODUCTION

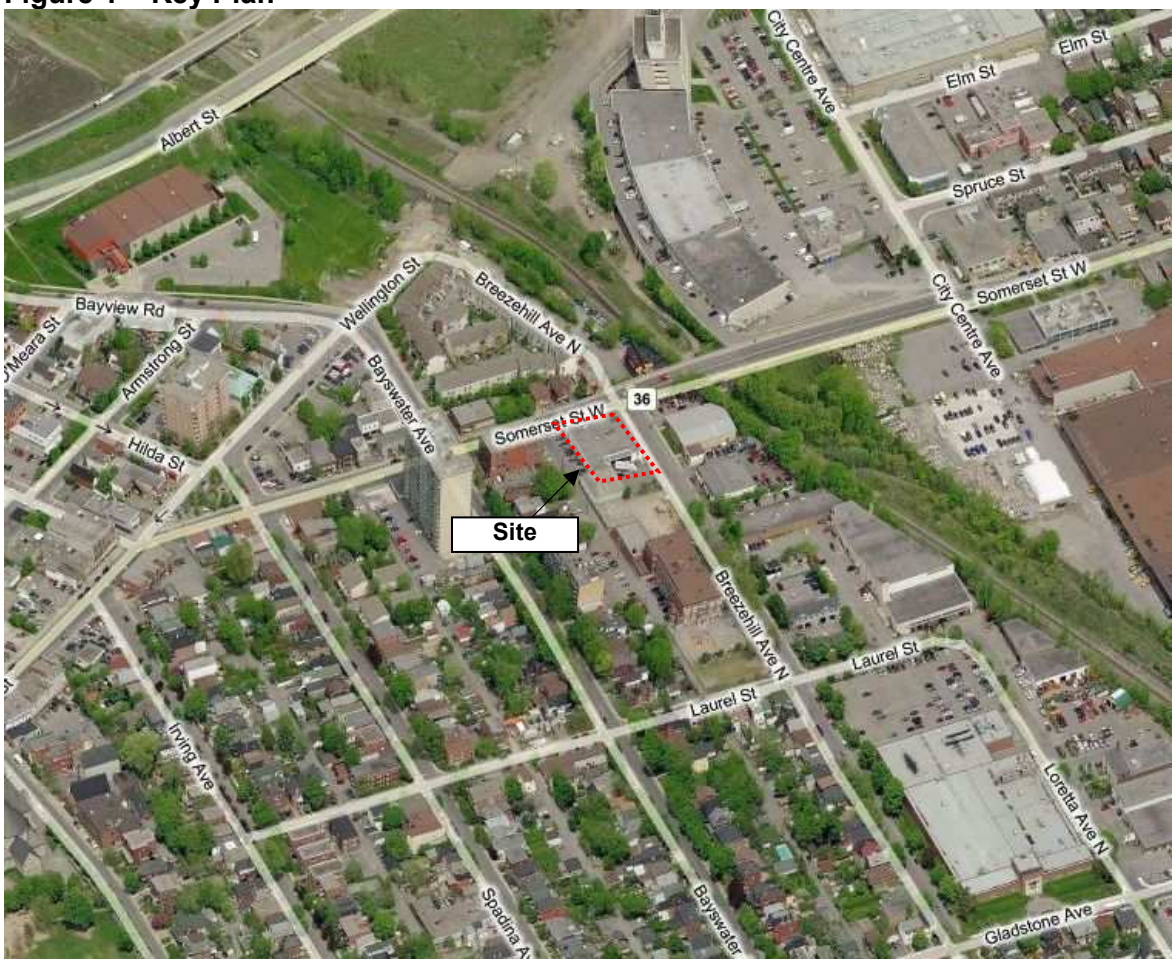
This report is submitted on behalf of Claridge Homes for the Somerset and Breezehill high rise condominium development located at 1050 Somerset Street. The study is submitted in support of the site plan application and evaluates the impact of noise for traffic.

2.0 BACKGROUND

2.1 Project Description

The subject site is located on the south-west corner of Somerset Street and Breezehill Avenue, as shown in Figure 1. The development will consist of a 28-storey high-rise condominium building with 567 square metres of ground floor commercial fronting Somerset Street, 7 two-storey townhouse units located at the rear occupying the first two levels of the building and 264 condominium units on Floors 2 to 28. Five (5) levels of underground parking will be provided with access off of a City Laneway along the west side of the building. A site plan of the proposed development is shown in Figure 2.

Figure 1 – Key Plan



As identified in the City of Ottawa's Zoning By-law (ZBL), the site is currently designated as TM[126]H(15) and TM11[126]H(20) – Traditional Main Street zone which accommodates a broad range of uses including retail, service commercial, office, residential and institutional, including mixed-use buildings. A zoning amendment application will seek to revise the site's current designation to TM11 as well as an increase in height. Specific details are provided in the Planning Rationale submitted as part of the ZBL Amendment application.

New construction will replace a one storey building which contains a retail store and an automotive repair facility. The current builidng has an access onto Somerset Street and Breezehill Avenue. Access on Somerset Street is for the shared parking and paved laneway for the retail store and the neighboring properties. The access to the automotive repair facility is off of Breezehill Avenue. A City-owned laneway is located directly adjacent to the west side of the site.

2.2 Noise Sources

The City of Ottawa Official Plan stipulates that a noise study shall be prepared when a new development is proposed within 100 metres of an arterial or major collector roadway, or a rapid-transit corridor.

For the purpose of this report Somerset Street will be considered the primary noise sources for the development. In the area of the proposed site, Schedule 'E' of The City of Ottawa Official Plan, Amendment 76, entitled "Urban Road Network" reads follows:

- Somerset Street: An urban arterial road with a protected right of way (ROW) width of 20 m, consisting of one eastbound and one westbound lanes with no on street parking permitted and a posted speed of 60Km/hr.

Data has been requested from the City on the operations of the O-Train. Once received, STAMPSON software will be used to asses the report of noise for the operator of the building.

3.0 CITY OF OTTAWA NOISE CONTROL GUIDELINES

3.1 Sound Level Criteria

The City of Ottawa is concerned with noise from aircraft, roads, transitways and railways as expressed in the City of Ottawa Official Plan (May 2003) since it can affect the quality of life of residents. To protect residents from unacceptable levels of noise, the City of Ottawa has specific environmental noise control guidelines, which are based on the technical guidelines and recommendations prepared by the Ontario Ministry of Environment. The City of Ottawa's Environmental Noise Control Guidelines (ENCG), Final Draft - May 10, 2006 has been used for the purpose of this report.

The quantitative sound level criteria, which requires that specific outdoor and indoor living areas of residential developments meet certain energy equivalent sound levels (Leq), are summarized in Table 1 and Table 2, respectively. Compliance with the outdoor sound level criteria will generally ensure compliance with the indoor sound level criteria.

Table 1: City of Ottawa Outdoor Noise Level Criteria

Time Period	Receiver Location	Noise Level Criteria (Leq)
Daytime (07:00 – 23:00)	Outdoor Living Area (OLA)	55 dBA
Daytime (07:00 – 23:00)	Plane of Window (POW) at Living/Dining Rooms	55 dBA
Nighttime (23:00 – 07:00)	Plane of Window (POW) at Bedrooms/Sleeping Quarter	50 dBA

The outdoor living area is defined as that part of an outdoor amenity area, which is provided for the quiet enjoyment of the outdoor environment during the daytime period. These amenity areas are typically backyards, gardens, terraces and patios.

Table 2: City of Ottawa Indoor Noise Level Criteria

Time Period	Receiver Location	Noise Level Criteria (Leq)
Daytime (07:00 – 23:00)	Living/Dining Rooms of residential dwelling units, theatres, places of worship, school, individual or semi-private offices, conference rooms, reading rooms, classrooms, etc	45 dBA
Nighttime (23:00 – 07:00)	Sleeping quarters of residential units, hospitals, nursing homes, senior citizen homes, etc	40 dBA

3.2 Noise Attenuation Requirements

When sound levels are predicted to be less than the specified criteria for the daytime and nighttime conditions, no attenuation measures are required by the proponent. As the noise criteria is exceeded, a combination of attenuation measures are recommended by the City of Ottawa to modify the development environment. These attenuation measures may include:

- Construction of a noise barrier wall and/or berm;
- Installation of a forced air ventilation system with provision for central air conditioning;
- Installation of central air conditioning;
- Custom building design, construction and/or acoustic insulation.

If noise levels are expected to exceed the applicable sound level criteria, the City of Ottawa recommends a warning clause be registered on title. This warning clause serves to alert potential buyers and/or renters of the possible noise condition and of any limitations that may exist on his/her property rights. The warning clause shall be registered on title and incorporated in the Subdivision Agreement and in the Agreement of Purchase and Sale.

Noise attenuation requirements at the Outdoor Living Areas (OLA) and Plane of Window (POW) are outlined in Table 3.

Table 3: City of Ottawa Noise Attenuation Requirements

Noise Level (dBA)				Noise Attenuation Requirements
Daytime (07:00-23:00)		Nighttime (23:00-07:00)		
Unattenuated	Attenuated	Unattenuated	Attenuated	
OUTDOOR LIVING AREA (OLA)				
OLA < 55				None
55 < OLA < 60				Noise Clause Type A
OLA > 60	OLA < 55			Noise Barrier
OLA > 60	OLA > 55			Noise Barrier Noise Clause Type B
PLANE OF WINDOW (POW)				
POW < 55		POW < 50		None
55 < POW < 65		50 < POW < 60		Forced Air Ventilation Noise Clause Type C
POW > 65		POW > 60		Central Air Conditioning Noise Clause Type D Building Façade Analysis

The wording of the warning clauses to be placed on title and included in the Site Plan and Condominium Agreement and the Offer of Purchase and Sale are as follows:

Type A

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of Environment's noise criteria."

Type B

"Purchasers/tenants are advised that despite the inclusion of noise control features in this development and within the building units, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

Type C

"This dwelling unit is fitted with a forced air heating system and the ducting, etc was sized to accommodate a central air conditioning system. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.")

Type D

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of Environment's noise criteria."

4.0 PREDICTION OF OUTDOOR NOISE LEVELS

4.1 Roadway Traffic

Noise levels from Somerset Street were assessed using the ultimate road and traffic parameters below from "Table 1.7 of the City of Ottawa's Environmental Noise Control Guidelines". The traffic and roadway parameters used for sound level predictions are shown in Table 4.

Table 4: Traffic and Roadway Parameters

	Somerset Street
Roadway Classification	2 Lane Urban Arterial
Annual Average Daily Traffic (AADT)	15,000 vehicles/day
Day/Night Split (%)	92/8
Medium Trucks (%)	7
Heavy Trucks (%)	5
Posted Speed	60Km/hr

4.2 Noise Level Analysis

The noise levels were analyzed using Version 5.03 of the STAMSON computer program issued by the MOE. Proposed grades were required for the software and were obtained from the Grading Plan contained in the back of this report. Receiver locations used in the noise simulations are shown on Figure 3 – Receiver Location Plan. A larger scale plan is also included in the back of this report.

4.3 Noise Level Results

Simulated noise levels for the units adjacent to Somerset Street exceed the allowable noise level criteria, resulting in the requirement for a building façade analysis and warning clauses.

The predicted noise levels at the selected receiver locations within the development are illustrated in Table 5. Daytime and nighttime noise levels are shown for the plane of window (POW). A typical roof top patio on the 5th storey is included in the analysis . The OLA for individual balconies does not meet the City of Ottawa OLA criteria (e.g., OLA needs to be a minimum of 4.0m deep per Appendix B5-B6 of ENCG).

Table 5: Simulation Results

		Noise Levels Leq (dBA)	
Location (UN=Unit No#)	**File Name (R=Receiver)**	**Daytime POW (Living/Dining)**	**Nighttime POW (Bedroom)**
Ground Floor Commercial	R1-$_{COMM}$	70.0	62.4
7th Floor	R2	70.0	62.4
5th Floor Outdoor Patio (Typ.)	R3	70.0	62.4
5th Foor Outdoor Patio with 1.25m high concrete parapet wall	R3-$_{OLA}$	54.7	47.2

4.4 Implementation

The City of Ottawa ENCG requires that noise clauses be applied when noise levels are above 55dBA and wall & window construction be reviewed when noise levels exceed 60 dBA. The acoustical insulation factor (AIF) method recognized by the City of Ottawa is used to assess the wall and window requirements.

The Acoustic Insulation Factor (AIF) is used as a measure of the reduction of outdoor noise provided by the elements of the outer surface of a building. The difference between the indoor noise criterion and the outdoor noise level establishes the acoustical insulation requirement for the exterior shell. The exterior shell is comprised of primarily two components; windows and walls (patio doors are treated as windows). Canada Mortgage and Housing (CMHC) Standards [1] require that no component transmit more than 1/N of the total sound power that would give the maximum acceptable noise level inside the room. Thus, in a room with two exterior components, neither should transmit more than one-half of the total allowable sound power.

[1] Road and Rail Noise: Effects on Housing, CMHC, Ottawa. Publication NHA #185 1/78, 1978

Mathematically, this Acoustical Insulation Factor can be expressed as:

Required AIF = L_{eg} (Outside) – L_{eg} (Inside) + 10 $\log_{10}$ (N) +2dBA

Where, N = Number of components;
L = Sound Level expressed on a common decibel scale.

The acoustical insulation factor for the building day time giving the highest result, is calculated as follows:

- $AIF_{Day\text{-}time}$ = 70 dBA – 45 dBA + 10log(2) dBA + 2dBA = 30 dBA

- $AIF_{Day\text{-}time(Commercial)}$ = 70 dBA – 50 dBA + 10log(2) dBA + 2dBA = 25 dBA

The above value can also be referenced directly from Table 11.2 in Appendix B.

Tables from the document entitled “Acoustic Insulation Factor: A Rating for the Insulation of Buildings Against Outdoor Noise”, produced by the Division of Building Research, National Research Council of Canada, June 1980 (J.D. Quirt) were used to assess the exterior facade against the required AIF. This reference material is included in Appendix B.

In order to assess the façade against the required AIF, percentage of window to room area and exterior wall to room area are required. This information is not yet available from the architect so assumed values are used. Once room layouts are confirmed, the information below will be adjusted. Results are presented in Table 6.

Table 6: Percentage Window and Wall Area to Room Area

Description	Values	
Number and Type of Components Forming Building Envelope = 2 (Windows and Exterior Walls)	**Typical Unit**	**Commercial**
Percentage of Window Area to Total Floor Area of Room	30	30
Percentage of Wall Area to Total Floor Area of Room	12	5

Using the percentage of window area to room area, and the required acoustical insulation factor (AIF), Table 5 in Appendix B was used to identify the various window assembles that would satisfy the required AIF. Similarly, Table 6.3 in Appendix B was used to select the typical wall assembly that would satisfy the required AIF. Results of this analysis are provided in Table 7.

Table 7: Selected Window and Wall Assemblies to Meet AIF

Description	AIF	Window Assembly Options	Typical Wall Assembly
Residential Typical Unit	30	▪ 2 mm – 22 mm – 2 mm ▪ 3 mm – 16 mm – 3 mm ▪ 4 mm – 13 mm – 4 mm ▪ 3 mm – 6 mm – 6 mm ▪ 3 mm – 6 mm – 6 mm ▪ Triple Glazing (See Table 5 in Appendix B)	EW1
Commercial Unit	25	▪ 2 mm – 22 mm – 2 mm ▪ 3 mm – 16 mm – 3 mm ▪ 4 mm – 13 mm – 4 mm ▪ 3 mm – 6 mm – 6 mm ▪ 3 mm – 6 mm – 6 mm	EW1

Notes:

I. EW1 type wall consisting of 12.7mm gypsum board, vapour barrier, 38x89mm studs with 50mm (or thicker) mineral wool or glass fibre batts in inter stud cavities plus sheathing, wood siding or metal siding and fibre backer board.

II. "2 mm – 63 mm – 2 mm" denotes 2 mm glass, 63 mm air space and 2 mm glass.

Tables 11 and 12 in Appendix B were used to convert the AIF values to Sound Transmission Class, or STC values. Results are summarized in Table 8.

Table 8: Equivalent Sound Transmission Class , STC Values

		Windows		Walls	
	AIF	Conversion	STC	Conversion	STC
Typical Residential Unit	30	STC + 1 = AIF	31	STC - 2 = AIF	28
Commercial Unit	30	STC + 1 = AIF	31	STC - 0 = AIF	30

The attenuation measures required to satisfy the City of Ottawa noise criteria and the noise clauses that are to be included on title and in the Agreement of Purchase and Sale for the various dwelling units are summarized in Table 9.

Table 9 - Required Noise Attenuation Measures

Buildings	Attenuation Measure	Notice on Title
Residential & Commercial	Central Air Conditioning. Acoustically selected walls and windows for all rooms.	D
Typical Outdoor Roof Top Patio	1.0 metre high concrete parapet. 1.0 metre high glass railing with a minimum STC of 35	B

5.0 CONCLUSIONS

An analysis of the roadway traffic along Somerset Street indicates attenuation measures will be necessary.

The following is a summary of the attenuation measures and notice requirements to be placed on title for all units.

Residential

- Provide Central Air Conditioning;
- Provide window assembly to meet a sound transmission class, STC of 31.
- Provide wall assembly to meet a sound transmission class, STC of 28.
- Notice on title: "This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of Environment's noise criteria.**"**

Commercial

- Provide Central Air Conditioning;
- Provide window assembly to meet a sound transmission class, STC of 31.
- Provide wall assembly to meet a sound transmission class, STC of 30.
- Notice on title: "This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of Environment's noise criteria.**"**

Typical Roof Top Patio

- Provide 1.25 metre concrete parapet Wall
- Notice on Title "Purchasers/tenants are advised that despite the inclusion of noise control features in this development and within the building units, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

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APPENDIX A

SOUND LEVEL CALCULATIONS

APPENDIX B

ACCOUSTIC INSULATION FACTOR TABLES