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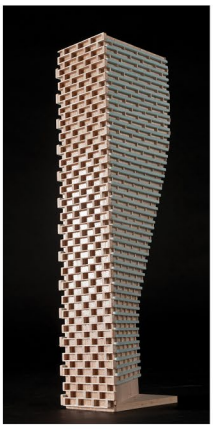
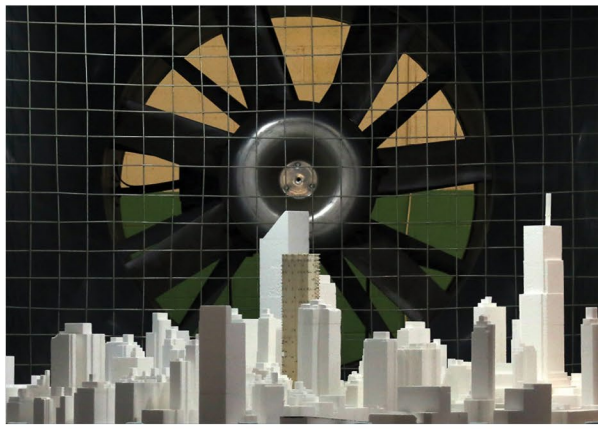
ROADWAY TRAFFIC NOISE ASSESSMENT

370 Athlone Avenue
Ottawa, Ontario

REPORT: GW24-013-Detailed Traffic Noise Study





July 10th, 2024

PREPARED FOR
Jersey Developments Inc.
370 Athlone Avenue
Ottawa, ON, K1Z 5M4

PREPARED BY
Adam Bonello, BASc., Junior Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

EXECUTIVE SUMMARY

This report describes a detailed traffic noise study performed for the proposed residential development, located at 370 Athlone Avenue in Ottawa, Ontario. The proposed development comprises of a single, rectangular building spanning 3 floors. The major contributor of traffic noise is Richmond Road.

The assessment is based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP) NPC-300[2] guidelines, concept masterplan provided by Grant Henley Design Group in January 2024, with future roadway traffic volumes corresponding with the City of Ottawa's Official Plan (OP) roadway classifications and the Ministry of Transportation Ontario (MTO).

The results of the current analysis indicate that noise levels will range between 47 and 60 dBA during the daytime period (07:00-23:00) and between 39 and 52 dBA during the nighttime period (23:00-07:00). The highest noise level (60 dBA) occurs along the east, front-facing façade of the building, which is most exposed to Richmond Road.

Results of the calculations indicate that building components compliant with OBC (2020) will be sufficient to achieve acceptable indoor noise levels. However, the building will require forced air heating systems, with provisions for central air conditioning to be added by the homeowners if desired. Installation of air conditioning would allow windows and doors to remain closed, thus providing a quiet and comfortable indoor environment. A Type C Warning Clause[3] will also be required on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

The development site is surrounded by low-rise residential and commercial buildings with no or small mechanical equipment placed outdoors. Therefore, no stationary noise impacts from the surroundings onto the development is expected.

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016
[2] Ministry of the Environment, Conservation and Parks (MECP), Environmental Noise Guideline – Publication NPC-300, August 2013
[3] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 8

As the proposed development is a low-rise building, the mechanical equipment serving the building is anticipated to be small. Therefore, stationary noise impacts from the development onto the surroundings are expected to be negligible. Any stationary noise impacts from the mechanical equipment that will be serving the development can be minimized by judicious placement of the equipment such as its placement in less exposed areas. Due to its size, the building is expected to be in compliance with the MECP's noise guideline NPC-216 - Residential Air Conditioning.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Jersey Developments Inc. to undertake a detailed traffic noise study for the proposed residential development, located at 370 Athlone Avenue in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to a detailed traffic noise study.

The present scope of work involves assessing exterior noise levels at the study site generated by the surrounding transportation sources. The assessment was performed based on theoretical noise calculation methods conforming to the City of Ottawa[4] and Ministry of the Environment, Conservation and Parks (MECP) NPC-300[5] guidelines, site plan drawings by Grant Henley Design Group in January 2024, with future roadway traffic volumes corresponding with the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The proposed development is a 3-storey rectangular building. The apartment development comprises of 16 residential units with a garbage area, bike spaces, and soft landscaping in the rear.

The major contributor of traffic noise is Richmond Road, located just south of the property. Except for the shops and retail properties on Richmond Road, the study site is surrounded by low-rise housing, parkland, and the Ottawa Gymnastics Center. Figure 1 illustrates a complete site plan with the surrounding context.

Other sources of traffic noise such as Scott Street were deemed insignificant due to the large offset distances between them and the site. Additionally, nearby local roads such as Athlone and Tweedsmuir Avenues were deemed insignificant, due to their low traffic volumes.

[4] City of Ottawa Environmental Noise Control Guidelines, January 2016
[5] Ministry of the Environment, Conservation and Parks (MECP), Environmental Noise Guideline – Publication NPC-300, August 2013

The balconies located on the front and back facades of the building were not classified as outdoor living areas (OLAs) as they extend less than 4 metres in depth from the façade, and consequently excluded from the analysis. The only OLA assessed in this study is the backyard of the building.

As the proposed development is a low-rise building, the mechanical equipment serving the building is anticipated to be small. Therefore, stationary noise impacts from the development onto the surroundings are expected to be negligible. Any stationary noise impacts from the mechanical equipment that will be serving the development can be minimized by judicious placement of the equipment such as its placement in less exposed areas. Due to its size, the building is expected to be in compliance with the MECP's noise guideline NPC-216 - Residential Air Conditioning.

3. OBJECTIVES

The main goals of this work are to (i) calculate the future noise levels on the study site produced by local transportation, (ii) ensure that interior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4 of this report.

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that particular source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-5} Pascals). The 'A' suffix refers to a weighting scale, which better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For vehicle traffic, the equivalent sound energy level, L_{eq}, provides a measure of the time-varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time-varying noise level over a period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00)/8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The NPC-300 guidelines specify that the recommended indoor noise limit range (that is relevant to this study) is 45 and 40 dBA for residence living rooms and sleeping quarters, respectively, as listed in Table 1. However, to account for deficiencies in building construction and to control peak noise, these levels should be targeted toward 42 and 37 dBA.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [6]

Type of Space	Time Period	L_{eq} (dBA)
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50
Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, day-care centers, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, etc.	07:00 – 23:00	45
Sleeping quarters of hotels/motels	23:00 - 07:00	45
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise while a standard closed window is capable of providing a minimum 20 dBA noise reduction[7]. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the need for having windows and doors closed, which normally triggers the need for central air

[6] Adapted from Table C-2, Part C, Section 3.2.3 of NPC-300
[7] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125

conditioning (or similar systems). Where noise levels exceed 65 dBA daytime, and 60 dBA nighttime building components will require higher levels of sound attenuation[8].

4.2.2 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes for Richmond Road are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[9]. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Class	Speed Limit (km/h)	Ultimate AADT	Day/Night Split	Truck Volume Percentages	
					Medium Truck	Heavy Truck
Richmond Road	2-Lane Urban Arterial	50	**15,000**	92/8	**7**	**5**

4.2.3 Theoretical Traffic Noise Predictions

Noise predictions were performed with the aid of the MECP computerized noise assessment program, STAMSON 5.04, for road analysis. Appendix B includes the STAMSON 5.04 input and output data.

Roadway traffic noise calculations were performed by treating each roadway segment as a separate line source of noise, and by using proposed and existing building locations as noise barriers. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Vehicle parameters such as truck traffic volume percentages, posted speed limit, and day/night split are summarized in Table 2.

[8] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3
[9] City of Ottawa Transportation Master Plan, November 2013

- Default ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Noise receptors were strategically placed at 2 locations around the study area (see Figure 2).
- For select sources where appropriate, receptors considered the proposed and existing building as a barrier partially or fully obstructing exposure to the source.
- Receptor distances and exposure angles are illustrated in Figure A1.

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the current analysis indicate that noise levels will range between 47 and 60 dBA during the daytime period (07:00-23:00) and between 39 and 52 dBA during the nighttime period (23:00-07:00). The highest noise level (60 dBA) occurs along the east, front-facing façade of the building, which is most exposed to Richmond Road.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON Roadway Noise Level (dBA)	
			Day	Night
1	9.5	POW: East Façade	60	52
2	9.5	POW: South Façade	59	51
3	1.5	OLA: Backyard Amenity	47	39

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 47 and 60 dBA during the daytime period (07:00-23:00) and between 39 and 52 dBA during the nighttime period (23:00-07:00). The highest noise level (60 dBA) occurs along the east, front-facing façade of the building, which is most exposed to Richmond Road.

Results of the calculations indicate that building components compliant with OBC (2020) will be sufficient to achieve acceptable indoor noise levels. However, the building will require forced air heating systems, with provisions for central air conditioning to be added by the homeowners if desired. Installation of air conditioning would allow windows and doors to remain closed, thus providing a quiet and comfortable indoor environment. The following Type C Warning Clause[10] will also be required on all Lease, Purchase and Sale Agreements, as summarized below:

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 conditioning 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 Municipality and the Ministry of the Environment."*

The development site is surrounded by low-rise residential and commercial buildings with no or small mechanical equipment placed outdoors. Therefore, no stationary noise impacts from the surroundings onto the development is expected.

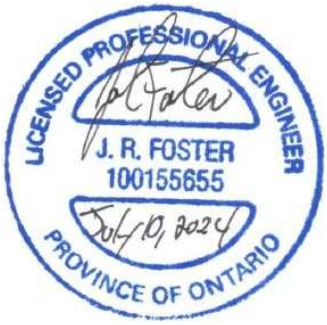
[10] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 8

As the proposed development is a low-rise building, the mechanical equipment serving the building is anticipated to be small. Therefore, stationary noise impacts from the development onto the surroundings are expected to be negligible. Any stationary noise impacts from the mechanical equipment that will be serving the development can be minimized by judicious placement of the equipment such as its placement in less exposed areas. Due to its size, the building is expected to be in compliance with the MECP's noise guideline NPC-216 - Residential Air Conditioning.

This concludes our assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Sincerely,

Gradient Wind Engineering Inc.



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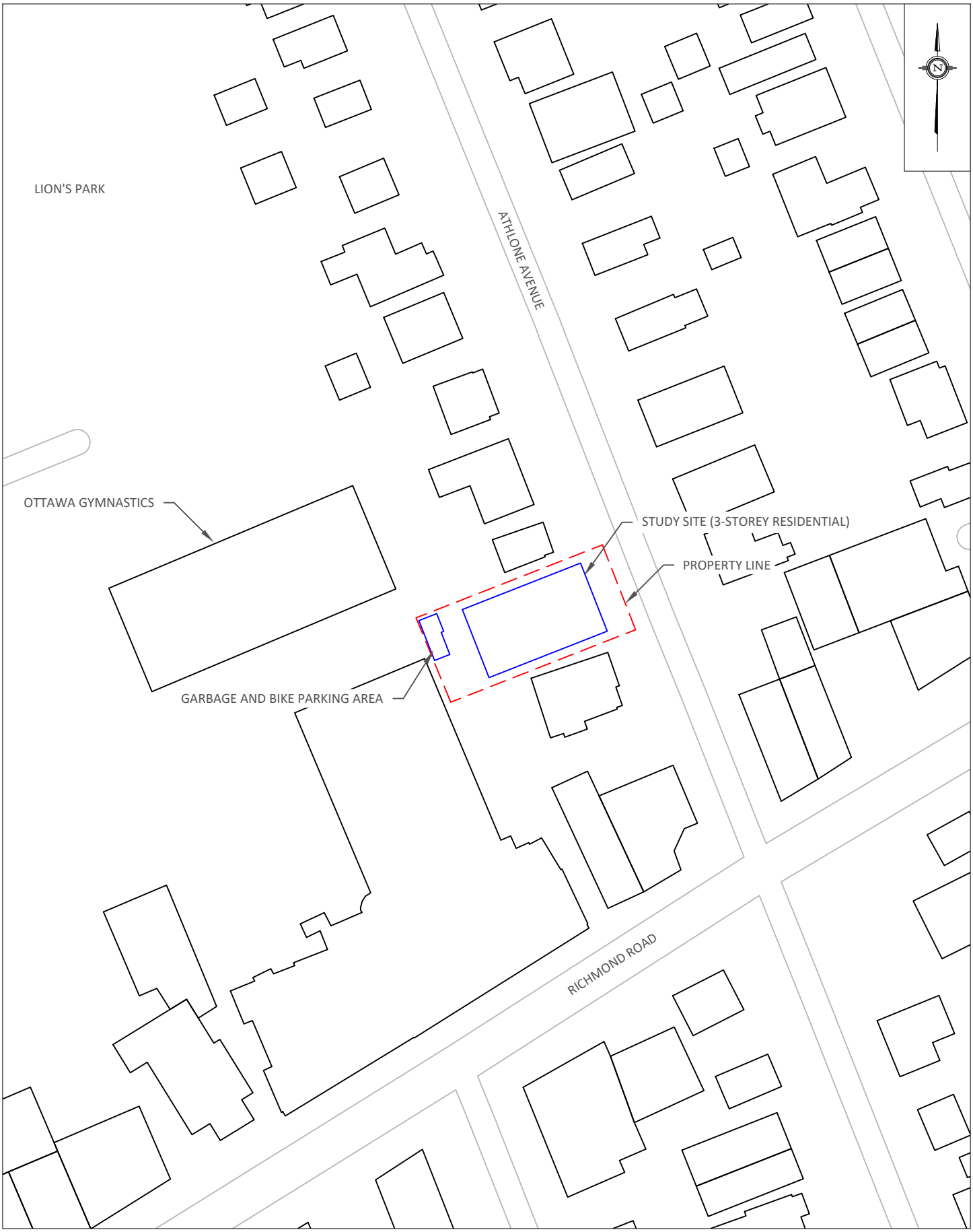
Lead Engineer

Gradient Wind File #24-013-Traffic Noise



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PROJECT	370 ATHLONE AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW24-013-1
DATE	FEBRUARY 15, 2024
DRAWN BY	A.B.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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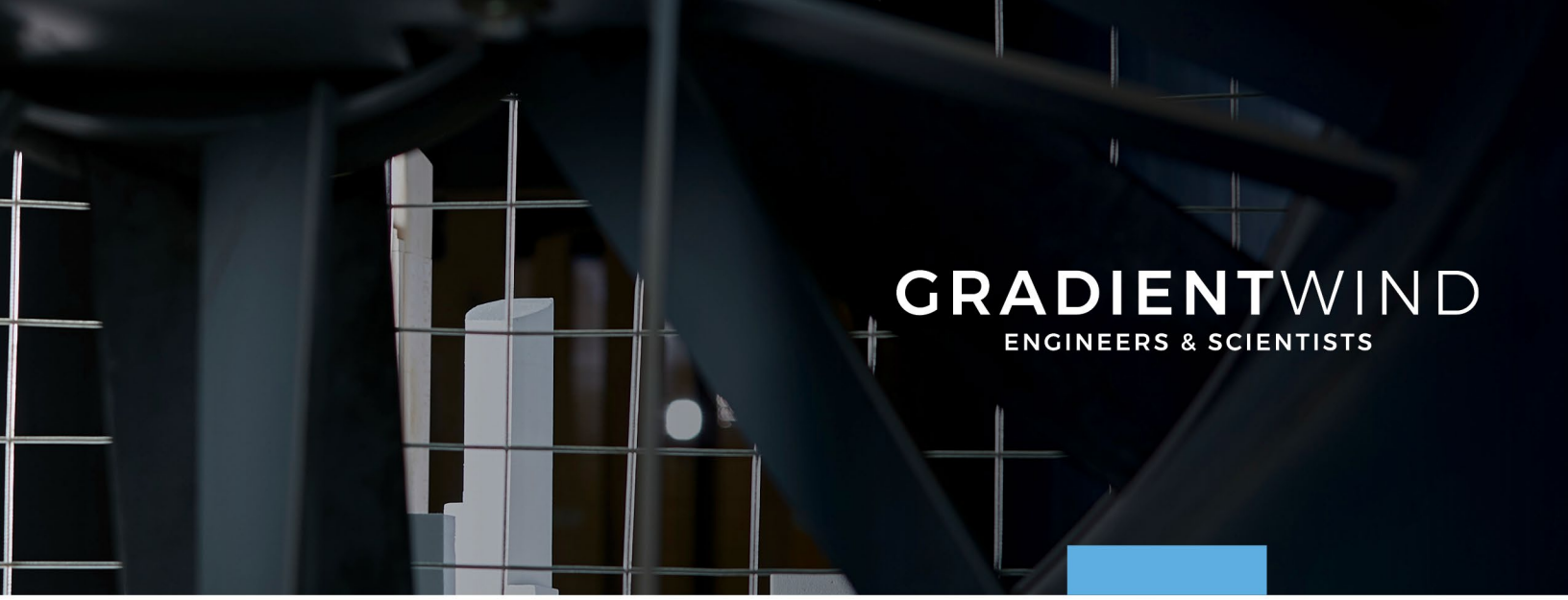
SCALE	1:500 (APPROX.)
DRAWING NO.	GW24-013-2
DATE	FEBRUARY 15, 2024
DRAWN BY	A.B.

DESCRIPTION

FIGURE 2:
TRAFFIC NOISE RECEPTOR LOCATIONS



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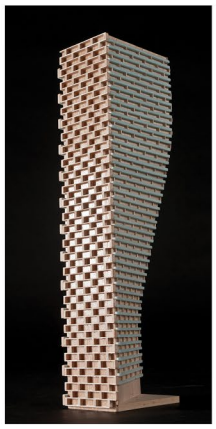

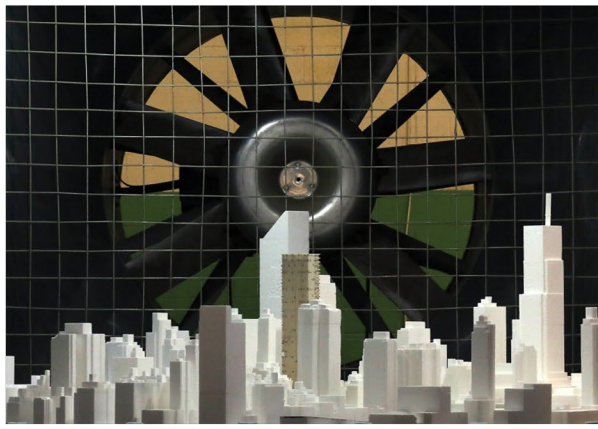

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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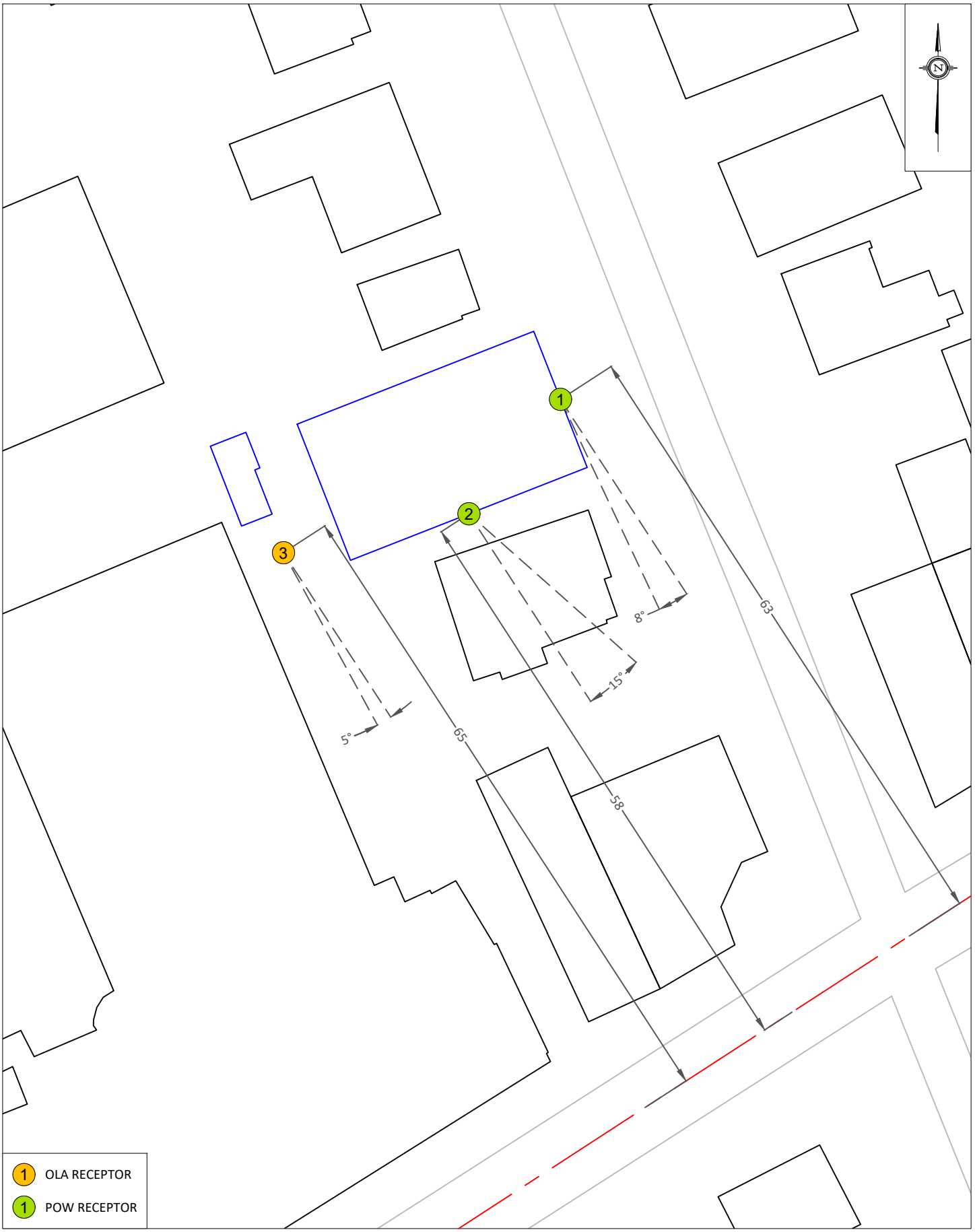

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PROJECT	370 ATHLONE AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GW24-013-A1
DATE	FEBRUARY 15, 2024
DRAWN BY	A.B.

DESCRIPTION

FIGURE A1:
RECEPTOR DISTANCE AND EXPOSURE ANGLES

```
STAMSON 5.0          NORMAL REPORT          Date: 15-02-2024 10:35:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te                  Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Richmond (day/night)
----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Richmond (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   8.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  63.00 / 63.00  m
Receiver height           :   9.50 / 9.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Richmond (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 59.61 + 0.00) = 59.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      8   0.00  68.48   0.00  -6.23  -2.64   0.00   0.00   0.00  59.61
-------------------------------------------------------------------------------

Segment Leq : 59.61 dBA

Total Leq All Segments: 59.61 dBA

Results segment # 1: Richmond (night)
-------------------------------------
```

```
Source height = 1.50 m

ROAD (0.00 + 52.01 + 0.00) = 52.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      8   0.00  60.88   0.00  -6.23  -2.64   0.00   0.00   0.00  52.01
-------------------------------------------------------------------------------

Segment Leq : 52.01 dBA

Total Leq All Segments: 52.01 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.61
                           (NIGHT): 52.01
```

```
STAMSON 5.0        COMPREHENSIVE REPORT        Date: 15-02-2024 10:36:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2.te                 Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Richmond (day/night)
----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Richmond (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   -15.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   9.50 / 9.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Segment # 1: Richmond (day)
---------------------------

Source height = 1.50 m

ROAD (0.00 + 58.80 + 0.00) = 58.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -15   0.00  68.48   0.00  -5.87  -3.80   0.00   0.00   0.00  58.80
-------------------------------------------------------------------------------

Segment Leq : 58.80 dBA

Total Leq All Segments: 58.80 dBA

Segment # 1: Richmond (night)
-----------------------------
```

```
Source height = 1.50 m

ROAD (0.00 + 51.21 + 0.00) = 51.21 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -15   0.00  60.88   0.00  -5.87  -3.80   0.00   0.00   0.00  51.21
-------------------------------------------------------------------------------

Segment Leq : 51.21 dBA

Total Leq All Segments: 51.21 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.80
                           (NIGHT): 51.21
```

STAMSON 5.0 COMPREHENSIVE REPORT Date: 15-02-2024 10:37:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3.te Time Period: Day/Night 16/8 hours
Description:

```
Road data, segment # 1: Richmond (day/night)
-------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Richmond (day/night)
-------------------------------------------
Angle1   Angle2           :   0.00 deg   5.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  65.00 / 65.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Segment # 1: Richmond (day)
---------------------------

Source height = 1.50 m

ROAD (0.00 + 46.55 + 0.00) = 46.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0      5   0.00  68.48   0.00  -6.37 -15.56   0.00   0.00   0.00  46.55
-------------------------------------------------------------------------------

Segment Leq : 46.55 dBA

Total Leq All Segments: 46.55 dBA

Segment # 1: Richmond (night)
-----------------------------
```

```
Source height = 1.50 m

ROAD (0.00 + 38.95 + 0.00) = 38.95 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0      5   0.00  60.88   0.00  -6.37 -15.56   0.00   0.00   0.00  38.95
-------------------------------------------------------------------------------

Segment Leq : 38.95 dBA

Total Leq All Segments: 38.95 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 46.55
                           (NIGHT): 38.95
```