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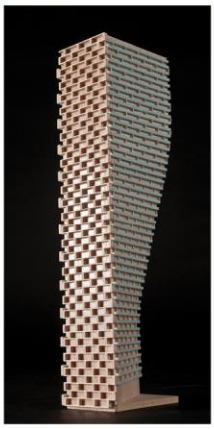
ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

353-357 Gardner Street
Ottawa, Ontario

REPORT: 20-119 – Traffic Noise Feasibility



June 25, 2020

PREPARED FOR

Longwood Building Corporation
357 Gardner Street
Ottawa, ON K1L 7V8

PREPARED BY

Giuseppe Garro, MASc., Junior Environmental Scientist
Joshua Foster, P.Eng., Principal

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EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment undertaken in support of a Zoning By-law Amendment (ZBA) submission for a proposed residential development located at 353-357 Gardner Street in Ottawa, Ontario. The development is a 9-storey building with a nearly square planform with parking located on the ground floor and basement levels. The primary sources of roadway traffic noise include Vanier Parkway and McArthur Avenue. Figure 1 illustrates a complete site plan with surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) site plan drawings provided by Rosaline J. Hill Architect Inc. in June of 2020.

The results of the current study indicate that noise levels due to roadway traffic over the site will range between 64 and 73 dBA during the daytime period (07:00-23:00) and between 57 and 65 dBA during the nighttime period (23:00-07:00). The highest noise level (73 dBA) occurs at the east façade, which is nearest and most exposed to Vanier Parkway. The noise levels predicted due to roadway traffic exceed the criteria listed in the ENCG for building components. Therefore, upgraded building components will be required.

Results of the calculations also indicate that the building will require central air conditioning, or a similar ventilation system, due to roadway traffic noise. This will allow occupants to keep windows closed and maintain a comfortable living environment. Warning Clauses will also be required on all Lease, Purchase and Sale Agreements.

Should Outdoor Living Areas (OLA) be incorporated within the building design, it is recommended that they be positioned to avoid exposure to the roadway to reduce noise levels as much as possible. If the need arises for OLA noise mitigation, this can be addressed during site plan control. Furthermore, a detailed roadway traffic noise study will be required at the time of site plan approval to determine specific noise control measures for the development.

With regards to stationary noise impacts from roof top mechanical units situated on the study building to the surrounding noise-sensitive areas, once the mechanical plans become available, a stationary noise study will be performed. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels at the surrounding noise-sensitive buildings are below the City of Ottawa's Noise Guidelines.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Longwood Building Corporation to undertake a roadway traffic noise feasibility assessment in support of a Zoning By-law Amendment (ZBA) submission for a proposed residential development located at 353-357 Gardner Street in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to a roadway traffic noise feasibility assessment of exterior noise levels generated by local roadway traffic.

The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on architectural drawings provided by Rosaline J. Hill Architect Inc. in June of 2020, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this roadway traffic noise feasibility assessment is a proposed residential development located at 353-357 Gardner Street in Ottawa, Ontario. The study site is located on a rectangular parcel of land northwest of the intersection of Vanier Parkway and McArthur Avenue in Ottawa, Ontario. The proposed development comprises a 9-storey building with a roughly square planform at grade. The ground floor consists of parking space, bicycle space, storage locker space, a residential lobby and building support facilities with the primary building entrance located at the southeast corner. Secondary entrances are located along the west elevation including a parking entrance to the ground floor parking area. The below grade parking level is accessed at the north elevation via a laneway from Gardner Street. Levels 2 and above are reserved for residential occupancy. At Level 9, the floorplate steps back at the north to accommodate private terraces. The floorplate steps back at the north and south sides at the mechanical penthouse level.

The study building is surrounded by low-rise residential dwellings in all directions, with isolated mid- and high-rise buildings to the east along Vanier Parkway and west along North River Road. The primary sources

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016
[2] Ontario Ministry of the Environment and Climate Change – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013

of roadway traffic noise include Vanier Parkway and McArthur Avenue. Figure 1 illustrates a complete site plan with surrounding context.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway traffic, and (ii) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2 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 surface roadway traffic noise, 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 City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range is 45 and 40 dBA for living rooms and sleeping quarters respectively for roadway, as listed in Table 1. Based

on Gradient Wind's experience, more comfortable indoor noise levels should be targeted, towards 42 and 37 dBA, respectively, to control peak noise and deficiencies in building envelope construction.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [3]

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 centres, 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[4]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[5]. 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 triggers the need for forced air heating with provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation[6].

The sound level criterion for outdoor living areas is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. Terraces and balconies are considered to be noise sensitive outdoor living areas (OLA) if they are greater than or equal

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

to 4-meters in depth. Since outdoor balconies and terraces are below the 4-meter criteria, OLA's were not included in the assessment.

4.2.2 Theoretical Roadway Noise Predictions

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

Roadway traffic noise calculations were performed by treating each roadway segment as separate line sources of noise. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- 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.
- Receptor height was taken to be 26.2 meters at Level 9 for the center of the plane of window (POW).
- For select receptors, the proposed building was considered as a noise barrier partially obstructing exposure to the roadway (Figure 3).
- Noise receptors were strategically placed at 4 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 3.

4.2.3 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 are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[7] which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes

[7] City of Ottawa Transportation Master Plan, November 2013

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 Traffic Data	Speed Limit (km/h)	Traffic Volume
Vanier Parkway	4-Lane Urban Arterial Divided (4-UAD)	60	**35,000**
McArthur Avenue	2-Lane Urban Arterial Undivided (2-UAU)	50	**15,000**

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below. A complete set of input and output data from all STAMSON 5.04 calculations are available in Appendix A.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade/Roof (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	26.2	POW – 9th Floor – South Façade	71	63
2	26.2	POW – 9th Floor – East Façade	73	65
3	26.2	POW – 9th Floor – North Façade	69	61
4	26.2	POW – 9th Floor – West Façade	64	57

The results of the current analysis indicate that noise levels will range between 64 and 73 dBA during the daytime period (07:00-23:00) and between 57 and 65 dBA during the nighttime period (23:00-07:00). The highest noise level (73 dBA) occurs at the east façade, which is nearest and most exposed to Vanier Parkway.

6. CONCLUSIONS AND RECOMMENDATIONS

The noise levels predicted due to roadway traffic exceed the criteria listed in ENCG for building components and upgraded building components will be required. Due to the limited information available at the time of the study, which was prepared for rezoning application, detailed STC calculations could not be performed at this time. A detailed review of the window and wall assemblies should be performed by a qualified engineer with expertise in acoustics during the detailed design stage of the building.

Results of the calculations also indicate that the building will require central air conditioning, or a similar ventilation system, due to roadway traffic noise. This will allow occupants to keep windows closed and maintain a comfortable living environment. Warning Clauses will also be required on all Lease, Purchase and Sale Agreements.

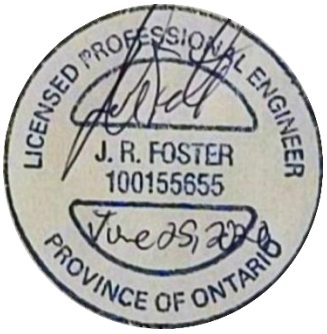
Should Outdoor Living Areas (OLA) be incorporated within the building design, it is recommended that they be positioned to avoid exposure to the roadway to reduce noise levels as much as possible. If the need arises for OLA noise mitigation, this can be addressed during site plan control. Furthermore, a detailed roadway traffic noise study will be required at the time of site plan approval to determine specific noise control measures for the development.

With regards to stationary noise impacts from roof top mechanical units situated on the study building to the surrounding noise-sensitive areas, once the mechanical plans become available, a stationary noise study will be performed. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels at the surrounding noise-sensitive buildings are below the City of Ottawa's Noise Guidelines.

This concludes our roadway traffic noise 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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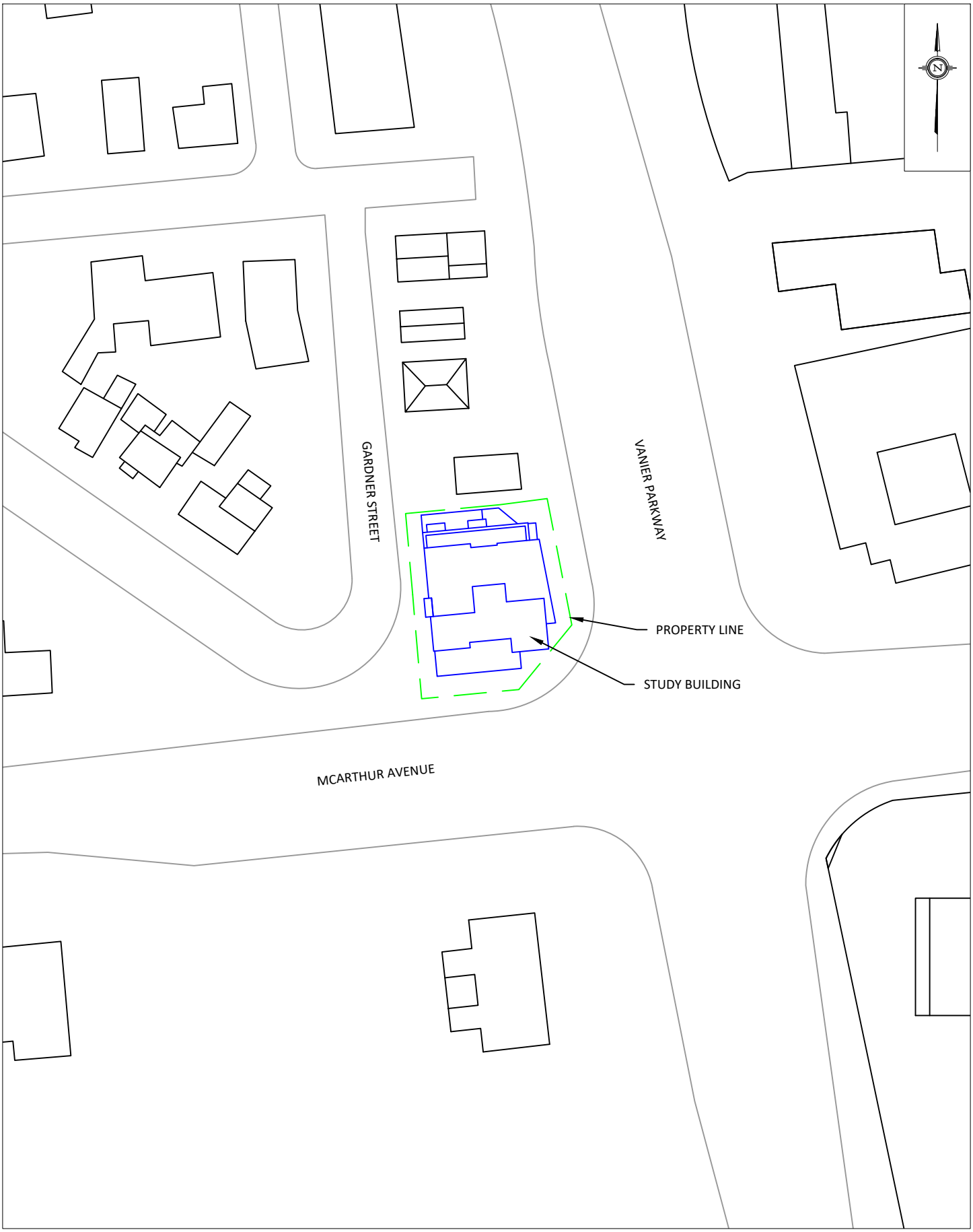
Principal

Gradient Wind File 20-119 – Traffic Noise Feasibility



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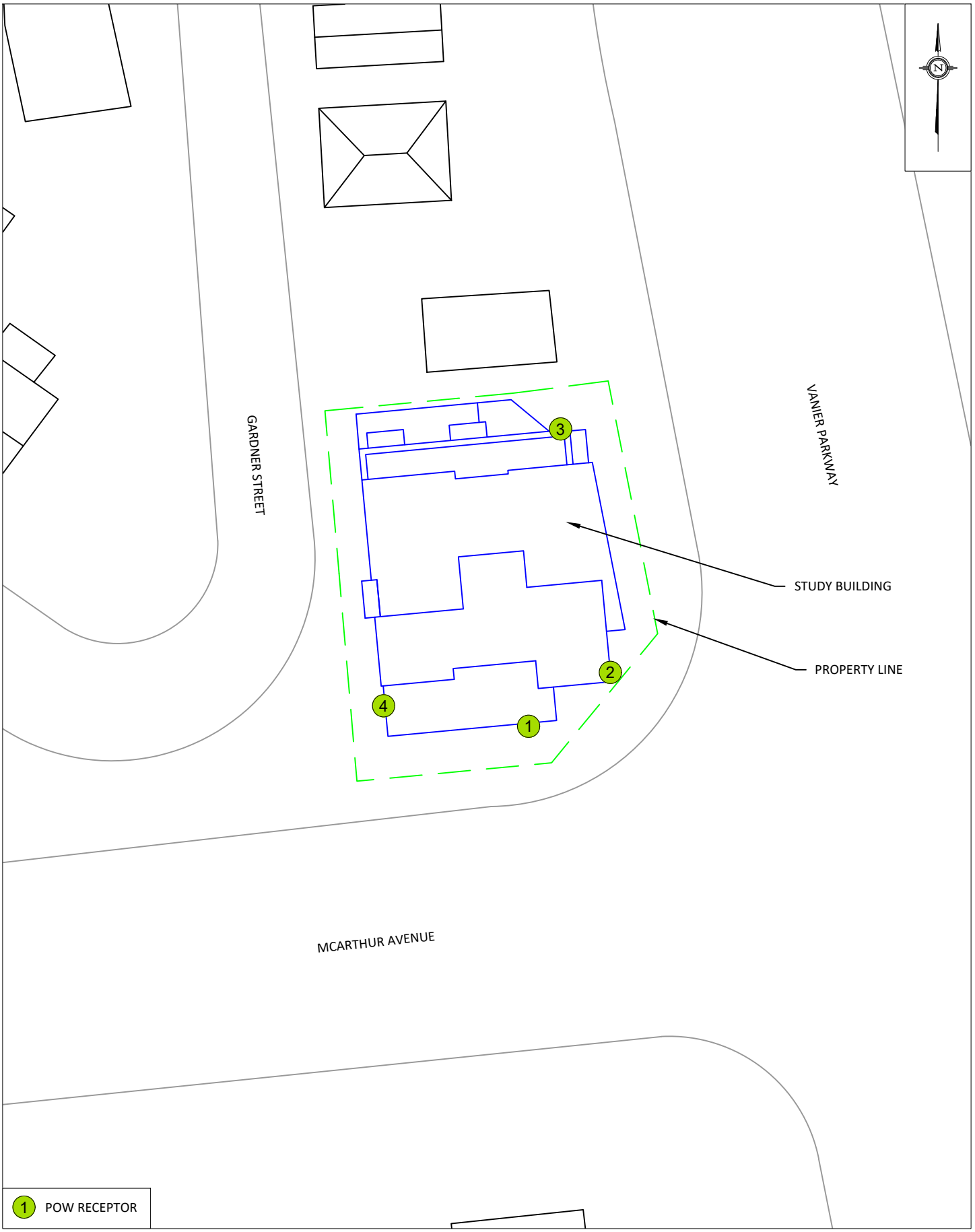
PROJECT	353-357 GARDNER STREET, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW20-119-1
DATE	JUNE 24, 2020	DRAWN BY	G.G.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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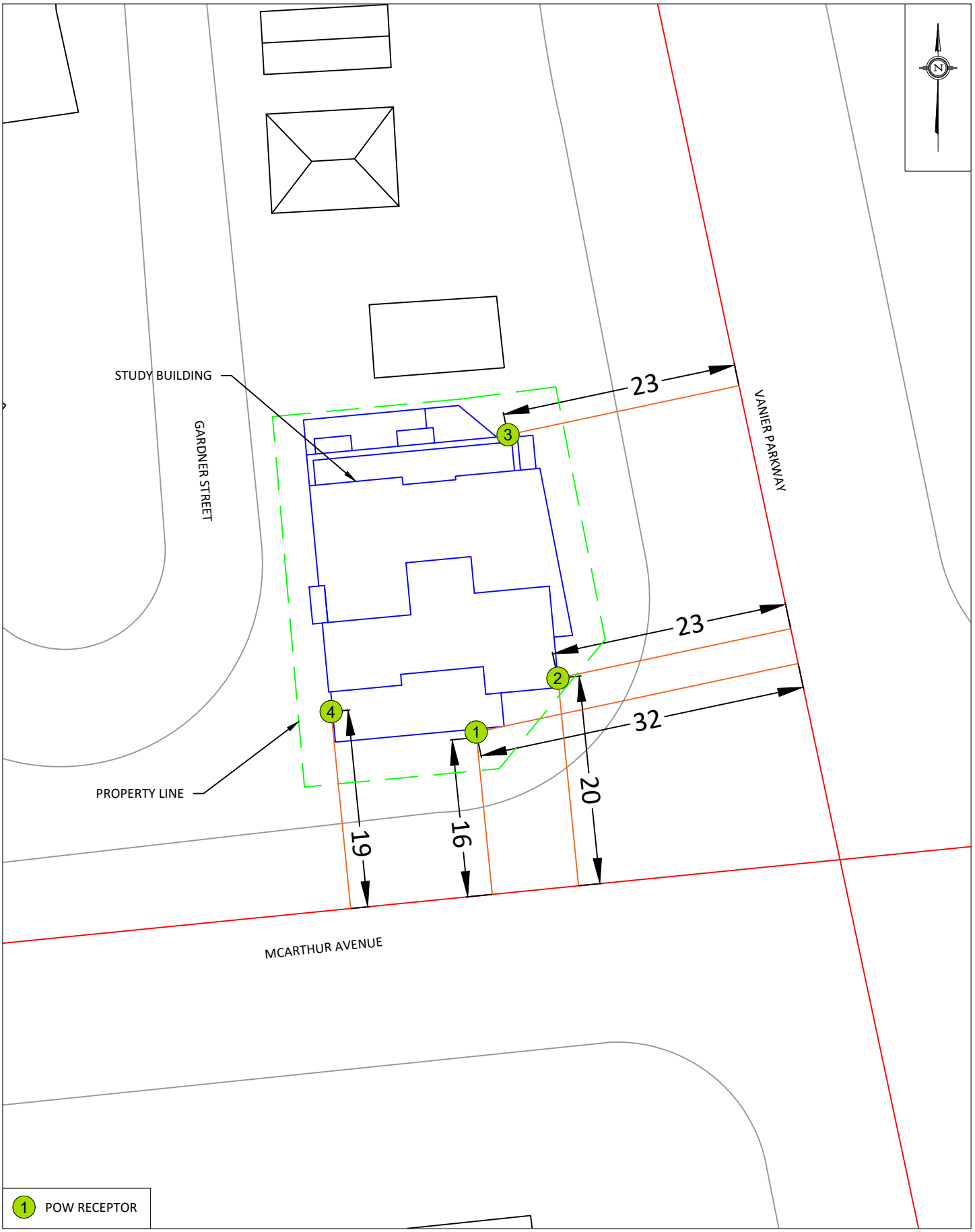
PROJECT	353-357 GARDNER STREET, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:500 (APPROX.)	DRAWING NO.	GW20-119-2
DATE	JUNE 24, 2020	DRAWN BY	G.G.

FIGURE 2:
RECEPTOR LOCATIONS



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PROJECT	353-357 GARDNER STREET, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		
SCALE	1:500 (APPROX.)	DRAWING NO.	GW20-119-3
DATE	JUNE 24, 2020	DRAWN BY	G.G.

DESCRIPTION

FIGURE 3:
RECEPTOR 1-4 STAMSON INPUT PARAMETERS

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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```
STAMSON 5.0        NORMAL REPORT        Date: 24-06-2020 16:04:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: McArthur Av (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: McArthur Av (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  :  16.00 / 16.00  m
Receiver height           :  26.20 / 26.20  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Vanier Pky (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          :   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 # 2: Vanier Pky (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  32.00 / 32.00  m
Receiver height           :  26.20 / 26.20  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: McArthur Av (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.20 + 0.00) = 68.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00  -0.28   0.00   0.00   0.00   0.00
68.20
-------------------------------------------------------------------------------
--

Segment Leq : 68.20 dBA

Results segment # 2: Vanier Pky (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 67.38 + 0.00) = 67.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     90   0.00  73.68   0.00  -3.29  -3.01   0.00   0.00   0.00
67.38
-------------------------------------------------------------------------------
--

Segment Leq : 67.38 dBA

Total Leq All Segments: 70.82 dBA
```

```
Results segment # 1: McArthur Av (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.60 + 0.00) = 60.60 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00  -0.28   0.00   0.00   0.00   0.00
60.60
-------------------------------------------------------------------------
--

Segment Leq : 60.60 dBA

Results segment # 2: Vanier Pky (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 59.78 + 0.00) = 59.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  66.08   0.00  -3.29  -3.01   0.00   0.00   0.00
59.78
-------------------------------------------------------------------------
--

Segment Leq : 59.78 dBA

Total Leq All Segments: 63.22 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.82
                           (NIGHT): 63.22
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-06-2020 16:05:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: McArthur Av (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: McArthur Av (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  20.00 / 20.00  m
Receiver height           :  26.20 / 26.20  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Vanier Pky (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          :   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 # 2: Vanier Pky (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  :  23.00 / 23.00  m
Receiver height           :  26.20 / 26.20  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: McArthur Av (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.22 + 0.00) = 64.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90      0   0.00  68.48   0.00  -1.25  -3.01   0.00   0.00   0.00
64.22
-------------------------------------------------------------------------------
--

Segment Leq : 64.22 dBA

Results segment # 2: Vanier Pky (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 71.82 + 0.00) = 71.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  73.68   0.00  -1.86   0.00   0.00   0.00   0.00
71.82
-------------------------------------------------------------------------------
--

Segment Leq : 71.82 dBA

Total Leq All Segments: 72.52 dBA
```

```
Results segment # 1: McArthur Av (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.62 + 0.00) = 56.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90      0   0.00  60.88   0.00  -1.25  -3.01   0.00   0.00   0.00
56.62
-------------------------------------------------------------------------------
--

Segment Leq : 56.62 dBA

Results segment # 2: Vanier Pky (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.22 + 0.00) = 64.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  66.08   0.00  -1.86   0.00   0.00   0.00   0.00
64.22
-------------------------------------------------------------------------------
--

Segment Leq : 64.22 dBA

Total Leq All Segments: 64.92 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.52
                           (NIGHT): 64.92
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-06-2020 16:05:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Vanier Pky (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          :   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: Vanier Pky (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  23.00 / 23.00  m
Receiver height           :  26.20 / 26.20  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Vanier Pky (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.81 + 0.00) = 68.81 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90      0   0.00  73.68   0.00  -1.86  -3.01   0.00   0.00   0.00
68.81
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 68.81 dBA

Total Leq All Segments: 68.81 dBA

Results segment # 1: Vanier Pky (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 61.21 + 0.00) = 61.21 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  66.08   0.00  -1.86  -3.01   0.00   0.00   0.00
61.21
-------------------------------------------------------------------------
--

Segment Leq : 61.21 dBA

Total Leq All Segments: 61.21 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.81
                           (NIGHT): 61.21
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-06-2020 16:05:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: McArthur Av (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: McArthur Av (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  19.00 / 19.00  m
Receiver height           :  26.20 / 26.20  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: McArthur Av (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.44 + 0.00) = 64.44 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     90    0.00  68.48   0.00  -1.03  -3.01   0.00   0.00   0.00
64.44
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 64.44 dBA

Total Leq All Segments: 64.44 dBA

Results segment # 1: McArthur Av (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.85 + 0.00) = 56.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  60.88   0.00  -1.03  -3.01   0.00   0.00   0.00
56.85
-------------------------------------------------------------------------
--

Segment Leq : 56.85 dBA

Total Leq All Segments: 56.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.44
                           (NIGHT): 56.85
```