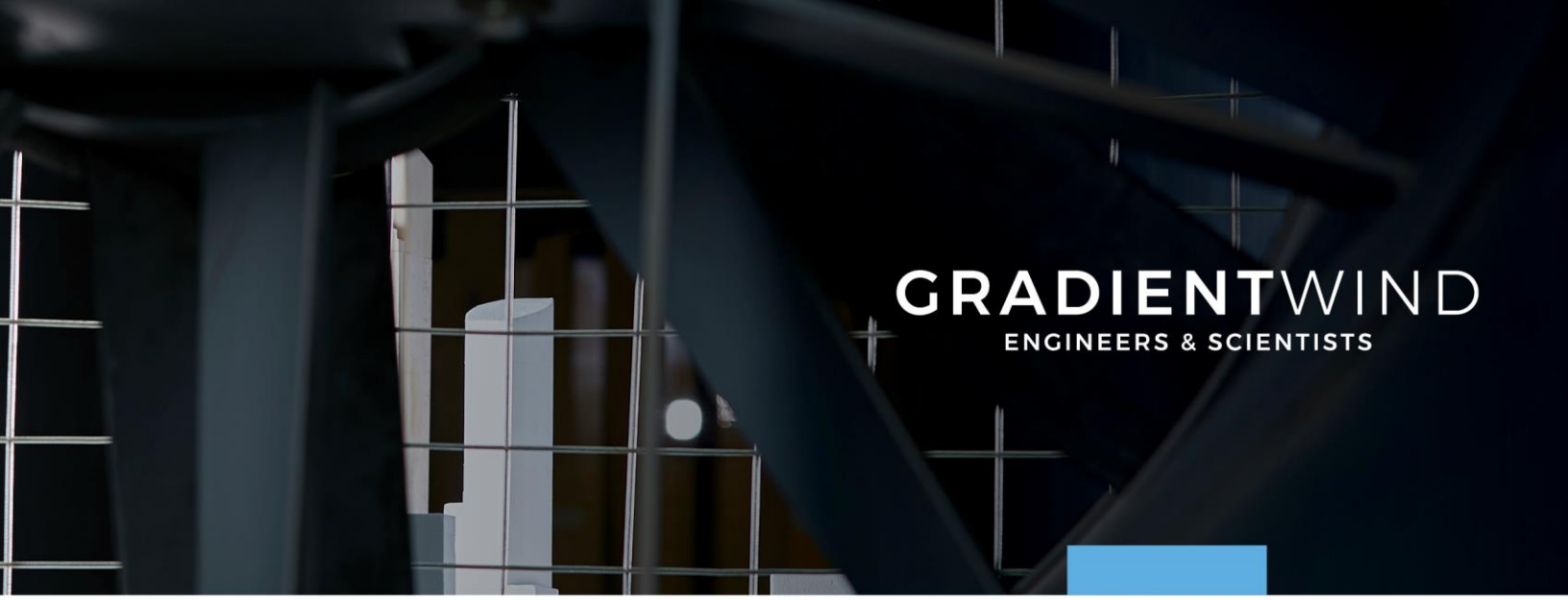

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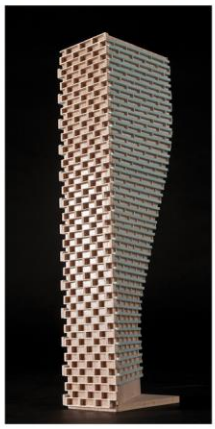
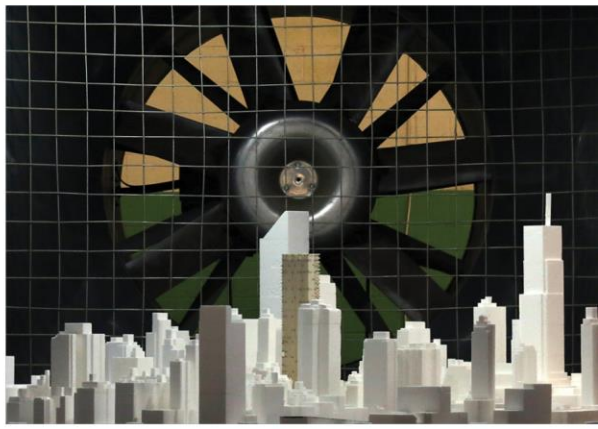
ENGINEERS & SCIENTISTS

ROADWAY TRAFFIC NOISE ASSESSMENT

112 Montreal Road
Ottawa, Ontario

GRADIENT WIND REPORT: 20-018-Traffic Noise





February 20, 2020

PREPARED FOR

2705460 Ontario Inc.
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PREPARED BY

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127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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EXECUTIVE SUMMARY

This report describes a roadway traffic noise assessment undertaken in support of site plan application for a proposed residential development located at 112 Montreal Road in Ottawa, Ontario. The development consists of three buildings of a rectangular planform with a curved facade appearance referred to as: Buildings A, B and C. Building A and B feature 19-storeys plus a mechanical penthouse fronting Vanier Parkway, connected through an 8-storey podium and Building C features 16-storeys plus mechanical penthouse. The primary sources of roadway traffic noise are Montreal Road and Vanier Parkway. 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 Woodman Architect & Associates Limited in January 2020.

The results of the current analysis indicate that noise levels will range between 49 and 73 dBA during the daytime period (07:00-23:00) and between 51 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. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 3.

Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. A Warning Clause[1] will also be required in all Lease, Purchase and Sale Agreements as summarized in Section 6.

Noise levels during the daytime period at the Level 4 and Level 9 terrace are expected to reach 55 dBA and 49 dBA, respectively. As these levels do not exceed the OLA noise criterion of 55 dBA as stipulated in the ENCG, noise mitigation at the terraces is not required.

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016

As the design of the development progresses, the stationary noise impacts of the buildings onto the surroundings will be considered. Stationary noise sources associated with the development could include rooftop air handling units, cooling towers or dry coolers, and emergency generators. Noise from these sources however can be controlled to acceptable limits established by MECP by judicious selection of the equipment, locating the equipment on high rooftops away from nearby residential receptors, and where necessary, installing silencers or noise screens.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 2705460 Ontario Inc. to undertake a roadway traffic noise assessment in support of site plan application for a proposed residential development located at 112 Montreal Road in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

Our work is based on theoretical noise calculation methods conforming to the City of Ottawa[2] and Ministry of the Environment, Conservation and Parks (MECP)[3] guidelines. Noise calculations were based on architectural drawings provided by Woodman Architect & Associates Limited in January 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 assessment is a proposed residential development located at 112 Montreal Road in Ottawa, Ontario. The study site is located on an irregular parcel of land bounded by Vanier Parkway to the east, Montreal Road at the north, Palace Street at the west and Selkirk Street at the south.

The proposed development consists of three residential buildings of a rectangular planform with a curved facade appearance referred to as: Buildings A, B and C. Building A and B feature 19-storeys plus a mechanical penthouse fronting Vanier Parkway, connected through an 8-storey podium. Building C features 16-storeys plus a mechanical penthouse. Building A at the north elevation provides for 213 units, Building B at the southeast elevation provides for 219 units, and Tower C at the west elevation provides for 159 units. Outdoor amenity areas (OLA) designated for tenant use are located on the Level 4 terrace on the west side of Building A, as well as the Level 9 terrace located between Building A and B directly above the shared 8-storey podium. Vehicular parking is provided on two levels below grade which can be

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

accessed at the southwest portion of the site via an internal private street. A drop-off/moving truck roundabout is located at the center of the site between all three buildings.

The site is surrounded by low-rise residential and commercial buildings in all directions. The primary sources of roadway traffic noise are Montreal Road to the north and Vanier Parkway to the east. 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 (that is relevant to this study) is 45 and 40 dBA for living rooms and sleeping quarters respectively for roadway as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [4]

Type of Space	Time Period	Leq (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[5]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[6]. 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[7].

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

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.

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 22.5 metres, 46.5 metres, and 55.5 metres for the centre of the plane of window (POW) at Level 8, 16, and 19, respectively. Receptor height was taken to be 10.5 metres and 25.5 metres for the outdoor living area (OLA) at the Level 4 and 9 terraces, respectively.
- For select sources where appropriate, receptors considered the proposed and existing buildings as a barrier, partially or fully obstructing exposure to the source as illustrated by exposure angles in Figures 4-6.
- Screening effects of proposed parapets and perimeter guards were conservatively omitted in the report.
- Noise receptors were strategically placed at 10 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 4-6.

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[8] which provide additional details on future roadway expansions. 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 Traffic Data	Speed Limit (km/h)	Traffic Volumes
Vanier Parkway	4-Lane Urban Arterial Divided (4-UAD)	60	**35,000**
Montreal Road	2-Lane Urban Arterial (2-UAU)	50	**15,000**

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in conformance with the Ontario Building Code (2012) typically exceed STC 35, depending on exterior cladding, thickness and interior finish details. For example, brick veneer walls can achieve STC 50 or more. Standard commercially sided exterior metal stud walls have around STC 45. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40, depending on the window manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

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

As per Section 4.2, when daytime noise levels from road sources at the plane of the window exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure[9] considers:

- Window type and total area as a percentage of total room floor area
- Exterior wall type and total area as a percentage of the total room floor area
- Acoustic absorption characteristics of the room
- Outdoor noise source type and approach geometry
- Indoor sound level criteria, which varies according to the intended use of a space

Based on published research[10], exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Due to the limited information available at the time of the study, which was prepared for site plan approval, detailed floor layouts and building elevations have not been finalized; therefore, detailed STC calculations could not be performed at this time. As a guideline, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels).

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.

[9] Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985
[10] CMHC, Road & Rail Noise: Effects on Housing

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	55.5	POW – Building A – 19th Floor – North Façade	69	62
2	55.5	POW – Building A – 19th Floor – East Façade	72	65
3	22.5	POW – Podium – 8th Floor – East Façade	73	65
4	55.5	POW – Building B – 19th Floor – South Façade	68	60
5	55.5	POW – Building A – 19th Floor – West Façade	59	51
6	46.5	POW – Building C – 16th Floor – East Façade	65	57
7	46.5	POW – Building C – 16th Floor – West Façade	59	51
8	10.5	OLA – Building A – 4th Floor – Terrace	55	N/A
9	25.5	OLA – Podium – 9th Floor – Terrace	49	N/A
10	46.5	POW – Building C – 16th Floor – North Façade	66	58

N/A: Nighttime noise levels at OLAs are night considered as per ENCG

The results of the current analysis indicate that noise levels will range between 49 and 73 dBA during the daytime period (07:00-23:00) and between 51 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.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.3, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels). As per city of Ottawa requirements, detailed STC calculations will be required to be completed prior to building permit application for each unit type. The STC requirements for the windows are summarized below for various units within the development (see Figure 3):

Building A and B

- **Bedroom Windows / Curtainwalls**

(i) Bedroom windows facing north, and south will require a minimum STC of 32

(ii) Bedroom windows facing east will require a minimum STC of 36

(iii) All other bedroom windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Living Room Windows / Curtainwalls**

(i) Living room windows facing north and south will require a minimum STC of 27

(ii) Living room windows facing east will require a minimum STC of 31

(iii) All other living room windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Exterior Walls (for steel stud)**

(i) Exterior wall components on the north, south and east façades will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[11]

Building C

- **Bedroom Windows / Curtainwalls**

(i) Bedroom windows facing north will require a minimum STC of 28

(ii) All other bedroom windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Living Room Windows / Curtainwalls**

(i) Living room windows facing north will require a minimum STC of 23

(ii) All other living room windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Exterior Walls (for steel stud)**

(i) Exterior wall components on the north façade will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[12]

[11] J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.
[12] J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.

The STC requirements apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a punch window system is used. A review of window supplier literature indicates that the specified STC ratings can be achieved by a variety of window systems having a combination of glass thickness and inter-pane spacing. We have specified an example window configuration, however several manufacturers and various combinations of window components, such as those proposed, will offer the necessary sound attenuation rating. It is the responsibility of the manufacturer to ensure that the specified window achieves the required STC. This can only be assured by using window configurations that have been certified by laboratory testing. The requirements for STC ratings assume that the remaining components of the building are constructed and installed according to the minimum standards of the Ontario Building Code. The specified STC requirements also apply to swinging and/or sliding patio doors.

Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Noise levels during the daytime period at the Level 4 and Level 9 terrace are expected to reach 55 dBA and 49 dBA, respectively. As these levels do not exceed the OLA noise criterion of 55 dBA as stipulated in the ENCG, noise mitigation at the terraces is not required.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 49 and 73 dBA during the daytime period (07:00-23:00) and between 51 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. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 3.

Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. For Building

A and B, the following Warning Clause[13] will also be required on all Lease, Purchase and Sale Agreements, as summarized below:

> *"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 roadway traffic may, on occasion, 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, Conservation and Parks. To help address the need for sound attenuation, this development includes:*
>
> - *STC rated multi-pane glazing elements and spandrel panels*
> - *North and south façade bedroom/living room: STC 32/27*
> - *East façade bedroom/living room: STC 36/31*
>
> *This dwelling unit has also been designed with air conditioning. Air conditioning 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 the Environment, Conservation and Parks.*
>
> *To ensure that provincial sound level limits are not exceeded, it is important to maintain these sound attenuation features."*

For Building C, the following Warning Clause[14] will also be required on all Lease, Purchase and Sale Agreements, as summarized below:

> *"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 roadway traffic may, on occasion, 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,*

[13] City of Ottawa Environmental Noise Control Guidelines, January 2016
[14] City of Ottawa Environmental Noise Control Guidelines, January 2016

Conservation and Parks. To help address the need for sound attenuation, this development includes:

- *STC rated multi-pane glazing elements and spandrel panels*
  - *North façade bedroom/living room: STC 28/23*

This dwelling unit has also been designed with air conditioning. Air conditioning 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 the Environment, Conservation and Parks.

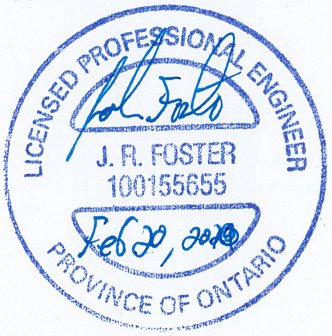
To ensure that provincial sound level limits are not exceeded, it is important to maintain these sound attenuation features."

Noise levels during the daytime period at the Level 4 and Level 9 terrace are expected to reach 55 dBA and 49 dBA, respectively. As these levels do not exceed the OLA noise criterion of 55 dBA as stipulated in the ENCG, noise mitigation at the terraces is not required.

This concludes our 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,

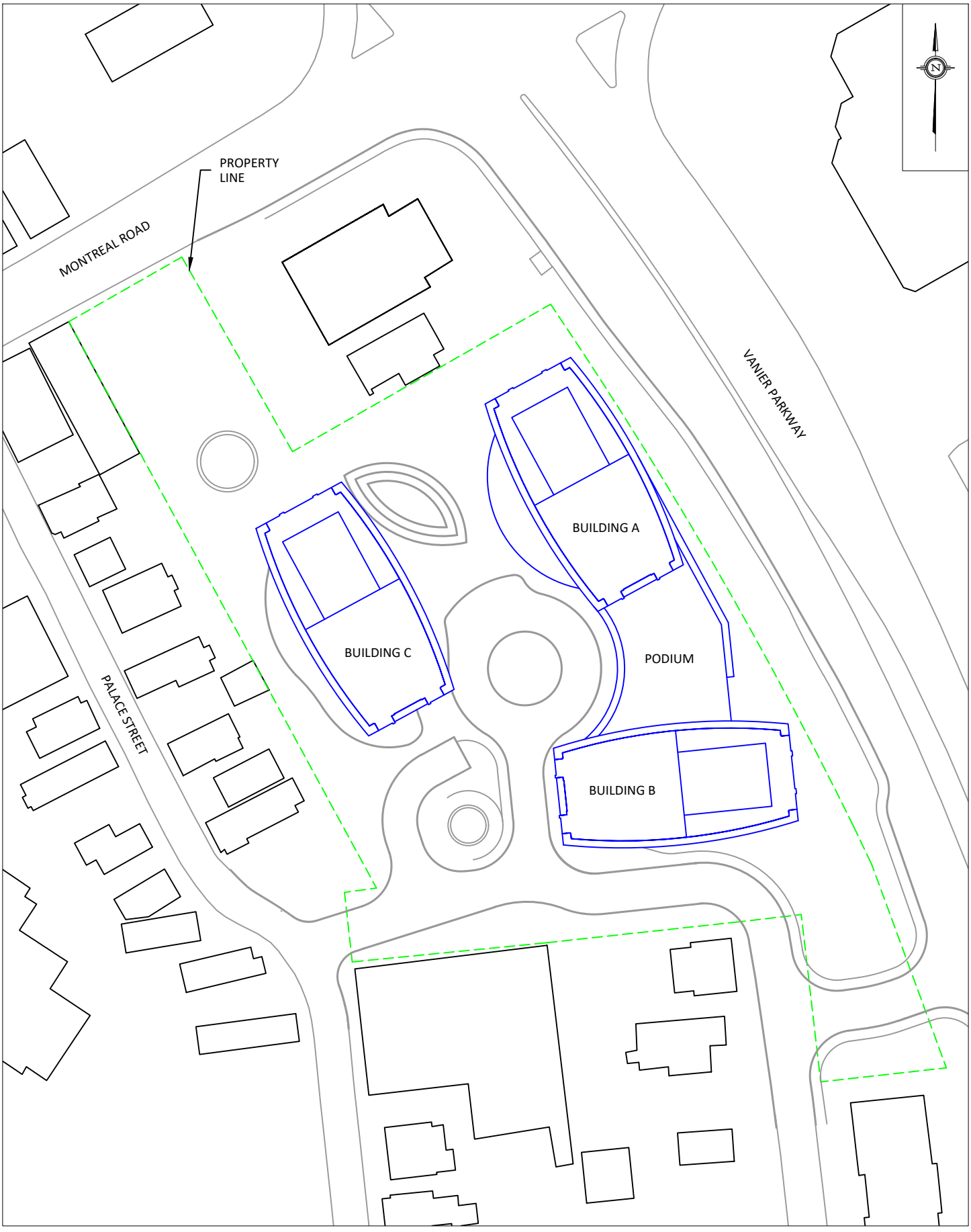
Gradient Wind Engineering Inc.



Giuseppe Garro, MASc.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #20-018-Traffic Noise



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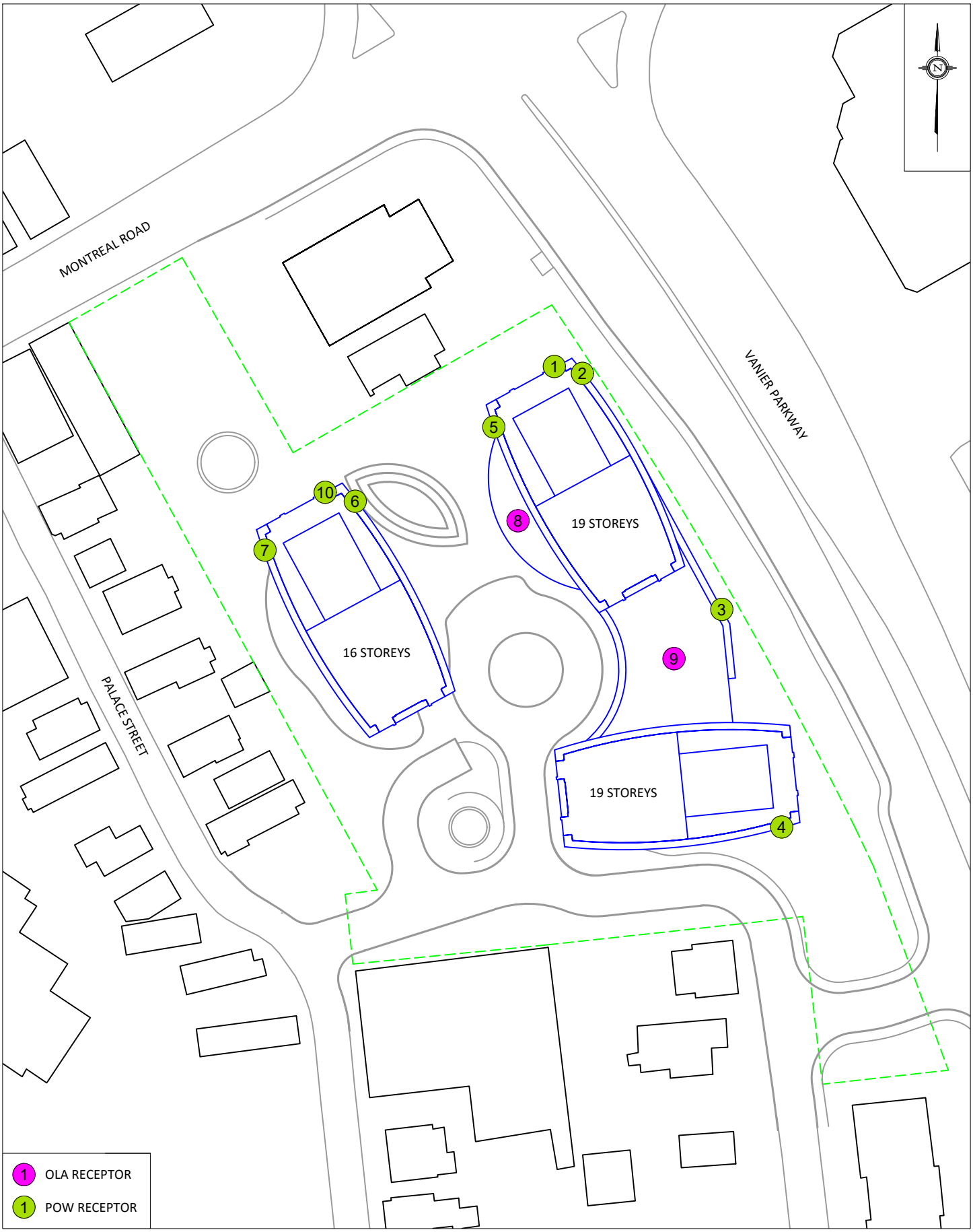
PROJECT	112 MONTREAL ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GWE20-018-1
DATE	FEBRUARY 13, 2020
DRAWN BY	G.G.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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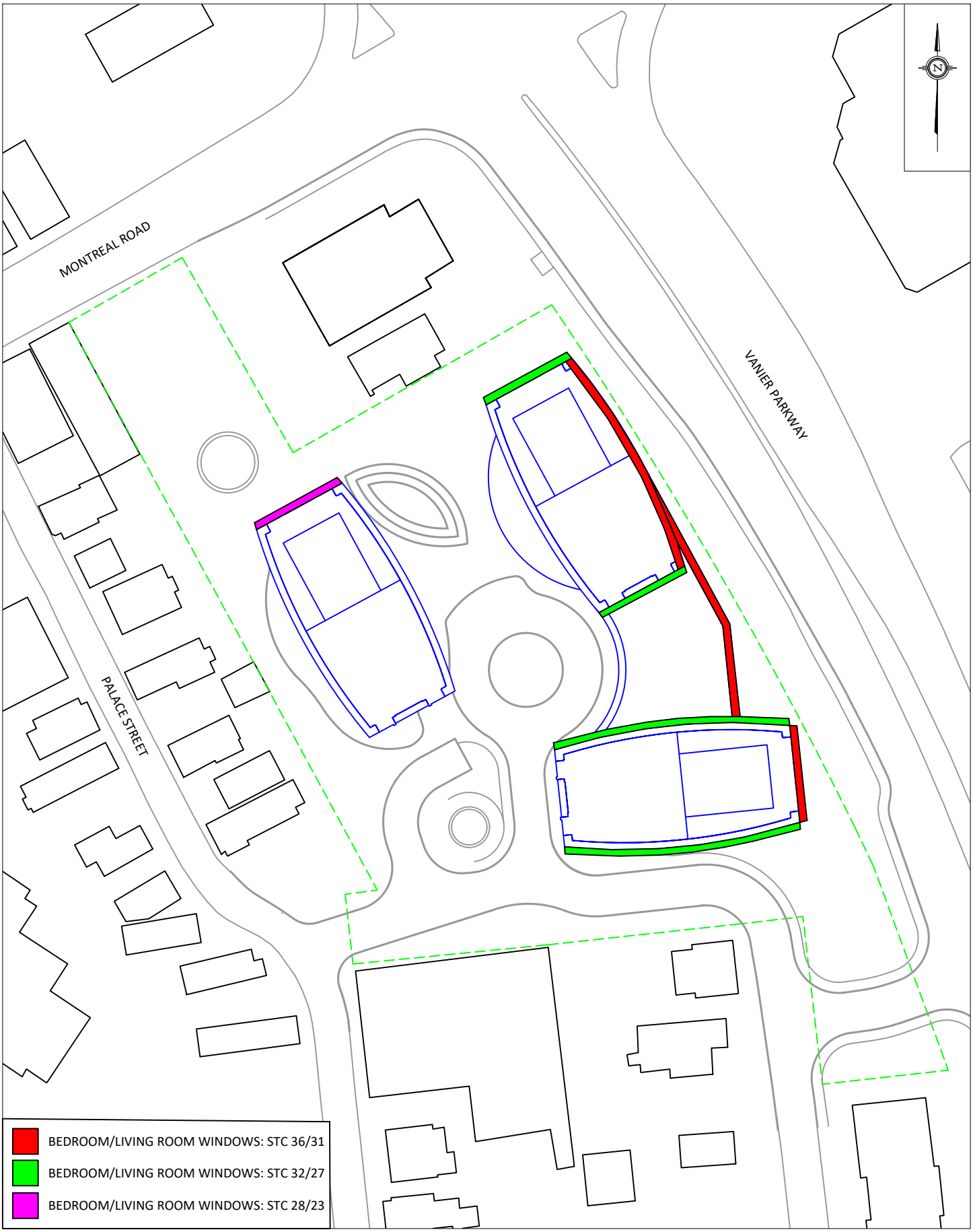
PROJECT	112 MONTREAL ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GWE20-018-2
DATE	FEBRUARY 13, 2020
DRAWN BY	G.G.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS



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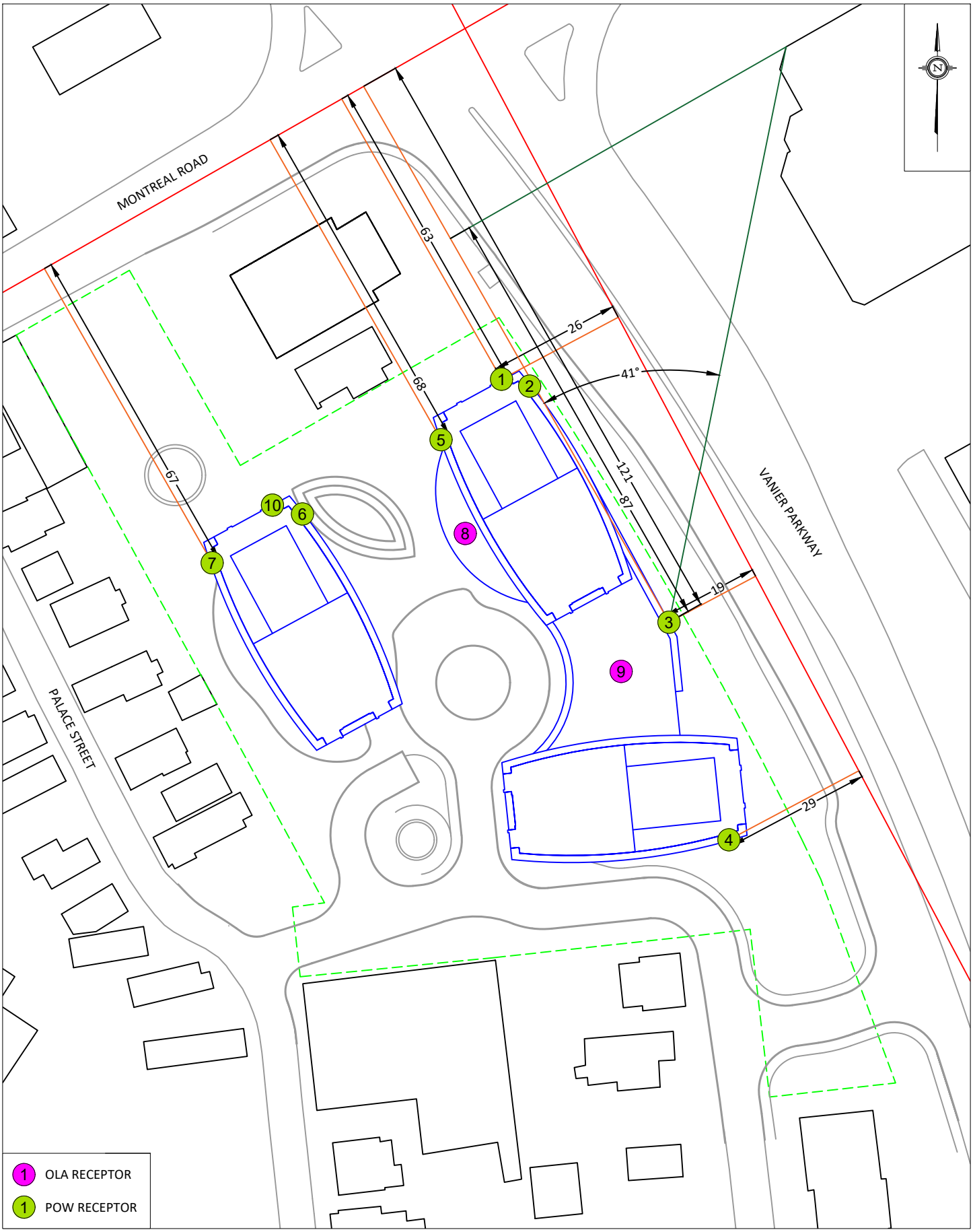
PROJECT	112 MONTREAL ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GWE20-018-3
DATE	FEBRUARY 13, 2020	DRAWN BY	G.G.

FIGURE 3:
WINDOW STC REQUIREMENTS



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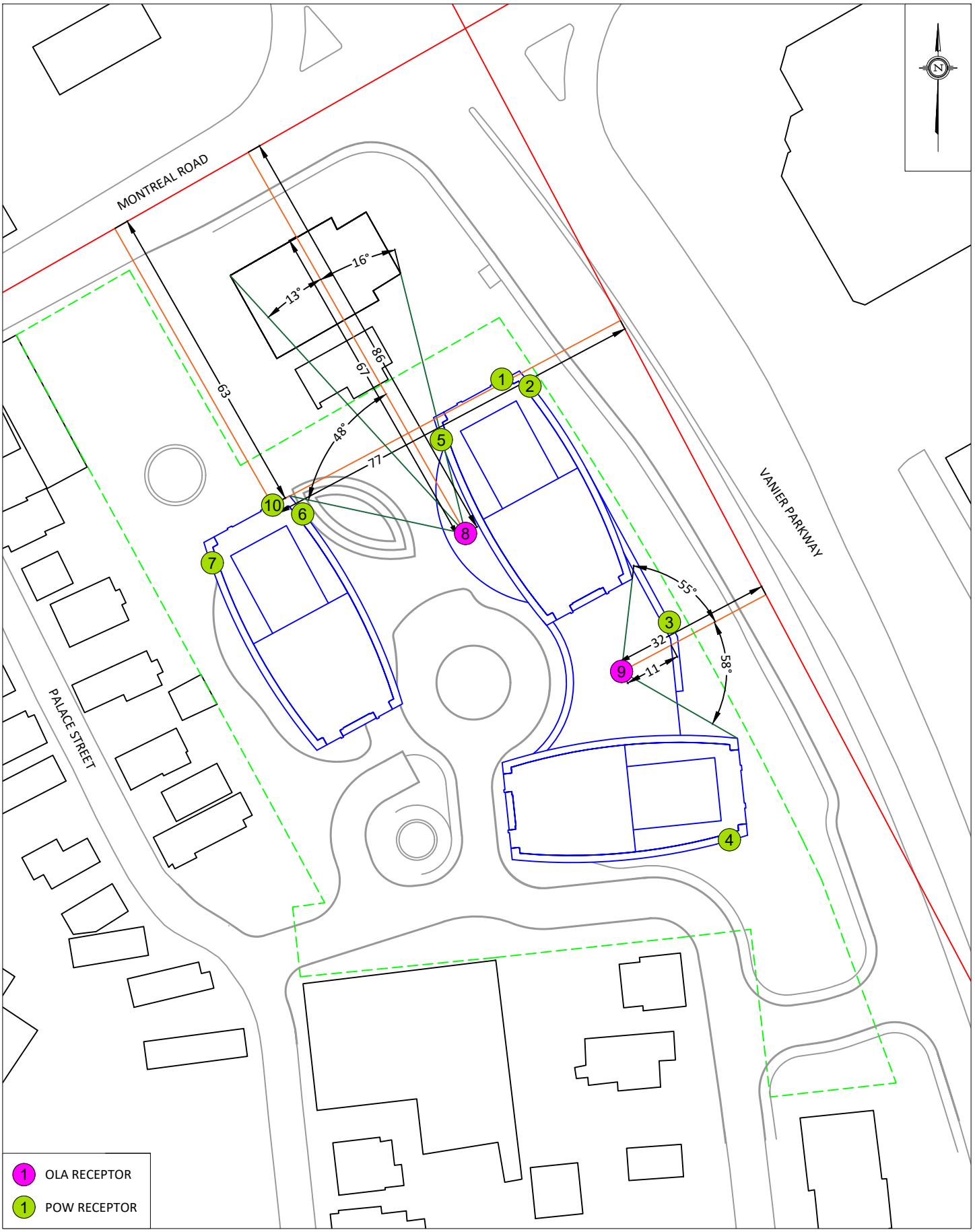
SCALE	1:1000 (APPROX.)
DRAWING NO.	GWE20-018-4
DATE	FEBRUARY 13, 2020
DRAWN BY	G.G.

DESCRIPTION

FIGURE 4:
RECEPTOR 1, 3-5, AND 7 STAMSON INPUT PARAMETERS



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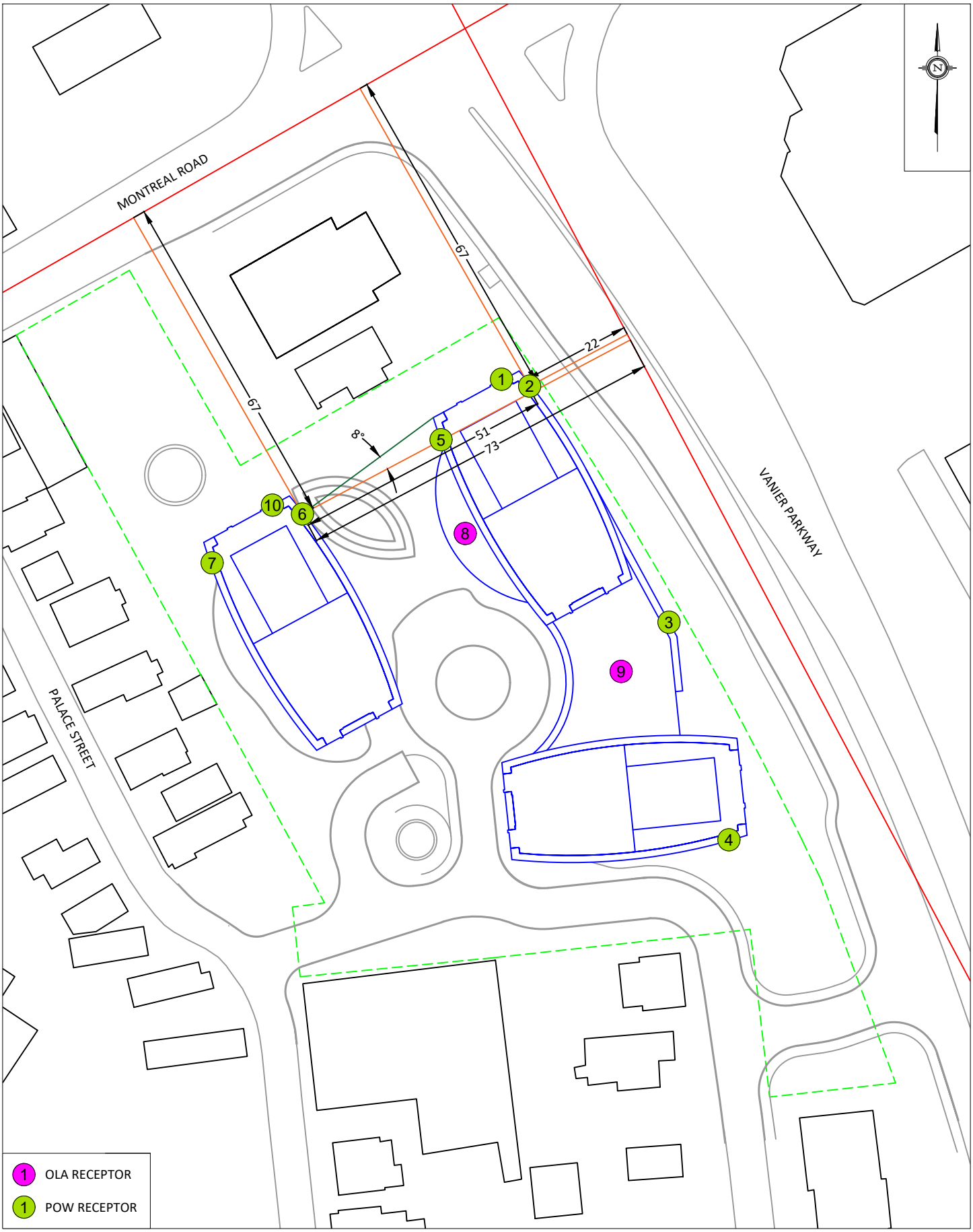
SCALE	1:1000 (APPROX.)
DRAWING NO.	GWE20-018-5
DATE	FEBRUARY 13, 2020
DRAWN BY	G.G.

DESCRIPTION

FIGURE 5:
RECEPTOR 8-10 STAMSON INPUT PARAMETERS



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PROJECT	112 MONTREAL ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GWE20-018-6
DATE	FEBRUARY 13, 2020
DRAWN BY	G.G.

DESCRIPTION

FIGURE 6:
RECEPTOR 2 AND 6 STAMSON INPUT PARAMETERS

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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```
STAMSON 5.0        NORMAL REPORT        Date: 12-02-2020 13:16:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Montreal Rd (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: Montreal Rd (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  :  63.00 / 63.00  m
Receiver height           :  55.50 / 55.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Vanier PKWY (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 PKWY (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  :  26.00 / 26.00  m
Receiver height           :  55.50 / 55.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: Montreal Rd (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 62.25 + 0.00) = 62.25 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  -6.23   0.00   0.00   0.00   0.00  62.25
-------------------------------------------------------------------------------

Segment Leq : 62.25 dBA


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

Source height = 1.50 m

ROAD (0.00 + 68.28 + 0.00) = 68.28 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  -2.39  -3.01   0.00   0.00   0.00  68.28
-------------------------------------------------------------------------------

Segment Leq : 68.28 dBA

Total Leq All Segments: 69.25 dBA


Results segment # 1: Montreal Rd (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.65 + 0.00) = 54.65 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  -6.23   0.00   0.00   0.00   0.00  54.65
-------------------------------------------------------------------------------

Segment Leq : 54.65 dBA
```

```
Results segment # 2: Vanier PKWY (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.68 + 0.00) = 60.68 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  -2.39  -3.01   0.00   0.00   0.00  60.68
-------------------------------------------------------------------------------

Segment Leq : 60.68 dBA

Total Leq All Segments: 61.65 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 69.25
                           (NIGHT): 61.65
```

```
STAMSON 5.0         NORMAL REPORT         Date: 12-02-2020 13:16:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Montreal Rd (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: Montreal Rd (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  :  67.00 / 67.00  m
Receiver height           :  55.50 / 55.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: Vanier PKWY (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 PKWY (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  :  22.00 / 22.00  m
Receiver height           :  55.50 / 55.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: Montreal Rd (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.97 + 0.00) = 58.97 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  -6.50  -3.01   0.00   0.00   0.00  58.97
-------------------------------------------------------------------------------

Segment Leq : 58.97 dBA


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

Source height = 1.50 m

ROAD (0.00 + 72.01 + 0.00) = 72.01 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  -1.66   0.00   0.00   0.00   0.00  72.01
-------------------------------------------------------------------------------

Segment Leq : 72.01 dBA

Total Leq All Segments: 72.22 dBA


Results segment # 1: Montreal Rd (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 51.37 + 0.00) = 51.37 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  -6.50  -3.01   0.00   0.00   0.00  51.37
-------------------------------------------------------------------------------
```

```
Segment Leq : 51.37 dBA


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

Source height = 1.50 m

ROAD (0.00 + 64.42 + 0.00) = 64.42 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  -1.66   0.00   0.00   0.00   0.00  64.42
-------------------------------------------------------------------------------

Segment Leq : 64.42 dBA

Total Leq All Segments: 64.63 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 72.22
                           (NIGHT): 64.63
```

```
STAMSON 5.0         NORMAL REPORT         Date: 12-02-2020 13:16:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Montreal Rd (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: Montreal Rd (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  : 121.00 / 121.00 m
Receiver height           :  22.50 / 22.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  41.00 deg   Angle2 : 90.00 deg
Barrier height            :  12.00 m
Barrier receiver distance :  87.00 / 87.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 2: Vanier PKWY (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 PKWY (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  :  19.00 / 19.00  m
Receiver height           :  22.50 / 22.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: Montreal Rd (day)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       22.50 !        7.40 !         7.40

ROAD (52.99 + 44.38 + 0.00) = 53.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     41   0.00  68.48   0.00  -9.07  -6.42   0.00   0.00   0.00  52.99
-------------------------------------------------------------------------------
    41     90   0.00  68.48   0.00  -9.07  -5.65   0.00   0.00  -9.38  44.38
-------------------------------------------------------------------------------

Segment Leq : 53.55 dBA


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

Source height = 1.50 m

ROAD (0.00 + 72.65 + 0.00) = 72.65 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  -1.03   0.00   0.00   0.00   0.00  72.65
-------------------------------------------------------------------------------

Segment Leq : 72.65 dBA
```

```
Total Leq All Segments: 72.70 dBA


Results segment # 1: Montreal Rd (night)
----------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       22.50 !        7.40 !         7.40

ROAD (45.39 + 36.79 + 0.00) = 45.95 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     41   0.00  60.88   0.00  -9.07  -6.42   0.00   0.00   0.00  45.39
-------------------------------------------------------------------------------
    41     90   0.00  60.88   0.00  -9.07  -5.65   0.00   0.00  -9.38  36.79
-------------------------------------------------------------------------------

Segment Leq : 45.95 dBA


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

Source height = 1.50 m

ROAD (0.00 + 65.05 + 0.00) = 65.05 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  -1.03   0.00   0.00   0.00   0.00  65.05
-------------------------------------------------------------------------------

Segment Leq : 65.05 dBA

Total Leq All Segments: 65.10 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 72.70
                           (NIGHT): 65.10
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-02-2020 13:16:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Vanier PKWY (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 PKWY (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  :  29.00 / 29.00  m
Receiver height           :  55.50 / 55.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 1.50 m

ROAD (0.00 + 67.80 + 0.00) = 67.80 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  -2.86  -3.01   0.00   0.00   0.00  67.80
-------------------------------------------------------------------------------

Segment Leq : 67.80 dBA

Total Leq All Segments: 67.80 dBA
```

```
Results segment # 1: Vanier PKWY (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.21 + 0.00) = 60.21 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  -2.86  -3.01   0.00   0.00   0.00  60.21
-------------------------------------------------------------------------------

Segment Leq : 60.21 dBA

Total Leq All Segments: 60.21 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 67.80
                           (NIGHT): 60.21
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-02-2020 13:17:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Montreal rd (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: Montreal rd (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  :  68.00 / 68.00  m
Receiver height           :  55.50 / 55.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Montreal rd (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.91 + 0.00) = 58.91 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  -6.56  -3.01   0.00   0.00   0.00  58.91
-------------------------------------------------------------------------------

Segment Leq : 58.91 dBA

Total Leq All Segments: 58.91 dBA
```

```
Results segment # 1: Montreal rd (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 51.31 + 0.00) = 51.31 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  -6.56  -3.01   0.00   0.00   0.00  51.31
-------------------------------------------------------------------------------

Segment Leq : 51.31 dBA

Total Leq All Segments: 51.31 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 58.91
                           (NIGHT): 51.31
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-02-2020 13:17:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Montreal Rd (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: Montreal Rd (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  :  67.00 / 67.00  m
Receiver height           :  46.50 / 46.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Vanier PKWY (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 PKWY (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  :  73.00 / 73.00  m
Receiver height           :  46.50 / 46.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -8.00 deg   Angle2 : 90.00 deg
Barrier height            :  63.00 m
Barrier receiver distance :  51.00 / 51.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: Montreal Rd (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.97 + 0.00) = 58.97 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  -6.50  -3.01   0.00   0.00   0.00  58.97
-------------------------------------------------------------------------------

Segment Leq : 58.97 dBA


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

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       46.50 !       15.06 !        15.06

ROAD (63.39 + 44.53 + 0.00) = 63.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     -8   0.00  73.68   0.00  -6.87  -3.41   0.00   0.00   0.00  63.39
-------------------------------------------------------------------------------
    -8     90   0.00  73.68   0.00  -6.87  -2.64   0.00   0.00 -19.64  44.53
-------------------------------------------------------------------------------

Segment Leq : 63.45 dBA

Total Leq All Segments: 64.77 dBA
```

```
Results segment # 1: Montreal Rd (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 51.37 + 0.00) = 51.37 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  -6.50  -3.01   0.00   0.00   0.00  51.37
-------------------------------------------------------------------------------

Segment Leq : 51.37 dBA


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

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       46.50 !       15.06 !        15.06

ROAD (55.79 + 36.93 + 0.00) = 55.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     -8   0.00  66.08   0.00  -6.87  -3.41   0.00   0.00   0.00  55.79
-------------------------------------------------------------------------------
    -8     90   0.00  66.08   0.00  -6.87  -2.64   0.00   0.00 -19.64  36.93
-------------------------------------------------------------------------------

Segment Leq : 55.85 dBA

Total Leq All Segments: 57.17 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 64.77
                           (NIGHT): 57.17
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-02-2020 13:17:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Montreal rd (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: Montreal rd (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  :  67.00 / 67.00  m
Receiver height           :  46.50 / 46.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Montreal rd (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.97 + 0.00) = 58.97 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  -6.50  -3.01   0.00   0.00   0.00  58.97
-------------------------------------------------------------------------------

Segment Leq : 58.97 dBA

Total Leq All Segments: 58.97 dBA
```

```
Results segment # 1: Montreal rd (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 51.37 + 0.00) = 51.37 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  -6.50  -3.01   0.00   0.00   0.00  51.37
-------------------------------------------------------------------------------

Segment Leq : 51.37 dBA

Total Leq All Segments: 51.37 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 58.97
                           (NIGHT): 51.37
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-02-2020 13:17:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Montreal Rd (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: Montreal Rd (day/night)
---------------------------------------------
Angle1   Angle2           : -48.00 deg   16.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  86.00 / 86.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -13.00 deg   Angle2 : 16.00 deg
Barrier height            :   4.00 m
Barrier receiver distance :  67.00 / 67.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: Montreal Rd (day)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        3.48 !         3.48
```

```
ROAD (53.78 + 47.52 + 0.00) = 54.71 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -48    -13   0.00  68.48   0.00  -7.58  -7.11   0.00   0.00   0.00  53.78
-------------------------------------------------------------------------------
   -13     16   0.00  68.48   0.00  -7.58  -7.93   0.00   0.00  -5.45  47.52
-------------------------------------------------------------------------------

Segment Leq : 54.71 dBA

Total Leq All Segments: 54.71 dBA

Results segment # 1: Montreal Rd (night)
----------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        3.48 !         3.48

ROAD (46.19 + 39.93 + 0.00) = 47.11 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -48    -13   0.00  60.88   0.00  -7.58  -7.11   0.00   0.00   0.00  46.19
-------------------------------------------------------------------------------
   -13     16   0.00  60.88   0.00  -7.58  -7.93   0.00   0.00  -5.45  39.93
-------------------------------------------------------------------------------

Segment Leq : 47.11 dBA

Total Leq All Segments: 47.11 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.71
                           (NIGHT): 47.11
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-02-2020 13:17:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Vanier PKWY (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 PKWY (day/night)
---------------------------------------------
Angle1   Angle2           : -55.00 deg   58.00 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           :  25.50 / 25.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -55.00 deg   Angle2 : 58.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

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

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       25.50 !       17.25 !        17.25
```

```
ROAD (0.00 + 48.94 + 0.00) = 48.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -55     58   0.00  73.68   0.00  -3.29  -2.02   0.00   0.00 -19.42  48.94
-------------------------------------------------------------------------------

Segment Leq : 48.94 dBA

Total Leq All Segments: 48.94 dBA

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

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       25.50 !       17.25 !        17.25

ROAD (0.00 + 41.34 + 0.00) = 41.34 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -55     58   0.00  66.08   0.00  -3.29  -2.02   0.00   0.00 -19.42  41.34
-------------------------------------------------------------------------------

Segment Leq : 41.34 dBA

Total Leq All Segments: 41.34 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 48.94
                           (NIGHT): 41.34
```

```
STAMSON 5.0         NORMAL REPORT         Date: 12-02-2020 13:18:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r10.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Montreal Rd (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: Montreal Rd (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  :  63.00 / 63.00  m
Receiver height           :  46.50 / 46.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Vanier PKWY (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 PKWY (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  :  77.00 / 77.00  m
Receiver height           :  46.50 / 46.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Montreal Rd (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 62.25 + 0.00) = 62.25 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  -6.23   0.00   0.00   0.00   0.00  62.25
-------------------------------------------------------------------------------

Segment Leq : 62.25 dBA

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

Source height = 1.50 m

ROAD (0.00 + 63.56 + 0.00) = 63.56 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  -7.10  -3.01   0.00   0.00   0.00  63.56
-------------------------------------------------------------------------------

Segment Leq : 63.56 dBA

Total Leq All Segments: 65.96 dBA

Results segment # 1: Montreal Rd (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.65 + 0.00) = 54.65 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  -6.23   0.00   0.00   0.00   0.00  54.65
-------------------------------------------------------------------------------

Segment Leq : 54.65 dBA
```

```
Results segment # 2: Vanier PKWY (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 55.97 + 0.00) = 55.97 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  -7.10  -3.01   0.00   0.00   0.00  55.97
-------------------------------------------------------------------------------

Segment Leq : 55.97 dBA

Total Leq All Segments: 58.37 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 65.96
                           (NIGHT): 58.37
```