

**ROADWAY TRAFFIC NOISE
ASSESSMENT**

700 Coronation Avenue
Ottawa, Ontario

GRADIENT WIND REPORT: 20-185 – Traffic Noise



October 21, 2020

PREPARED FOR
MJ Asset Management Ltd.
533 Gilmour Street
Ottawa, ON K1R 5L3

PREPARED BY
Giuseppe Garro, M.A.Sc., Junior Environmental Scientist
Joshua Foster, P.Eng., Principal

EXECUTIVE SUMMARY

This report describes a roadway traffic noise assessment undertaken in support of a joint Site Plan Control (SPA) and Zoning By-law Amendment (ZBA) application for a proposed low-rise residential building located at 700 Coronation Avenue in Ottawa, Ontario. The proposed development is a 4-storey multi-unit residential building overlooking 700 Coronation Avenue. The primary source of traffic noise on the development is Coronation Avenue to the north. 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) architectural drawings provided by Project1 Studio Incorporated in August 2020.

The results of the current analysis indicate that noise levels will range between 44 and 63 dBA during the daytime period (07:00-23:00) and between 48 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs at the north façade, which is nearest and most exposed to Coronation Avenue.

Results of the calculations also indicate that standard building components will be sufficient, however the development will require forced air heating with provisions for central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause will also be required on all Lease, Purchase and Sale Agreements, as summarized in Section 6. Noise levels at the rear amenity area are expected to fall below 55 dBA during the daytime period. Therefore, no acoustic mitigation is required.

As the building design progresses, the stationary noise impacts of the building on the surroundings would be considered. Stationary noise sources associated with the development are expected to comprise of DX Split Air Conditioning units. These sources are not expected to be a concern at noise sensitive spaces and surrounding properties, provided the following are considered in the design: judicious selection of the equipment, locating the equipment on a high roof away from nearby residential receptors, and where



necessary, installing silencers or noise screens. Installation of the equipment should be done in accordance with NPC-216 Residential Air Conditioning Devices.



TABLE OF CONTENTS

1. INTRODUCTION 1

2. TERMS OF REFERENCE 1

3. OBJECTIVES 2

4. METHODOLOGY..... 2

4.1 Background.....2

4.2 Roadway Traffic Noise.....2

4.2.1 Criteria for Roadway Traffic Noise2

4.2.2 Theoretical Roadway Noise Predictions4

4.2.3 Roadway Traffic Volumes.....5

5. ROADWAY TRAFFIC NOISE RESULTS 5

5.1 Roadway Traffic Noise Levels.....5

6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS..... 6

FIGURES

APPENDICES

Appendix A – STAMSON 5.04 Input and Output Data and Supporting Information



1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by MJ Asset Management Ltd. to undertake a roadway traffic noise assessment in support of a joint Site Plan Control (SPA) and Zoning By-law Amendment (ZBA) application for a proposed low-rise residential building located at 700 Coronation Avenue 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 Ottawa¹ and Ministry of the Environment, Conservation and Parks (MECP)² guidelines. Noise calculations were based on architectural drawings prepared by Project1 Studio Incorporated in August 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 multi-unit residential building located at 700 Coronation Avenue in Ottawa, Ontario. The proposed development is situated on a nearly rectangular parcel of land located southeast of the intersection of Coronation Avenue and Botsford Street. The development comprises a proposed 4-storey residential building and an existing low-rise residential building, both with mostly rectangular planforms. The development overlooks low-rise commercial buildings to the north with low-rise residential buildings in the remaining compass directions. The floorplate steps back from various elevations on Levels 1 (through 4) to accommodate inset balconies. A building access point (entrance) is provided on the north side of the building. One level of underground parking is accessed via a ramp between the proposed and existing residential buildings.

The rear amenity area associated with the development was included in the assessment as an Outdoor Living Area (OLA). All other amenity spaces (e.g., balconies) are less than 4 meters in depth and are not considered noise sensitive as per ENCG guidelines. The primary source of traffic noise on the development is Coronation Avenue to the north. Figure 1 illustrates a complete site plan with surrounding context.

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



As the building design progresses, the stationary noise impacts of the building on the surroundings would be considered. Stationary noise sources associated with the development are expected to comprise of DX Split Air Conditioning units. These sources are not expected to be a concern at noise sensitive spaces and surrounding properties, provided the following are considered in the design: judicious selection of the equipment, locating the equipment on a high roof away from nearby residential receptors, and where necessary, installing silencers or noise screens. Installation of the equipment should be done in accordance with NPC-216 Residential Air Conditioning Devices.

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. 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	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 reduction⁴. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment⁵. 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

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

daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation⁶.

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, with the exception of the rear amenity area which was taken to be absorptive due to the presence of soft (lawn) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Receptor height was taken to be 10.8 metres above grade at the 4th storey for the centre of the plane of window for Receptors 1-3, and 1.5 meters above grade for the rear amenity area for Receptor 4.
- For select sources where appropriate, Receptors 1-4 considered the surrounding buildings as a barrier partially or fully obstructing exposure to the source as illustrated by exposure angles in Figures 3 and 4.
- 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 and 4.

⁶ MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

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 Plan⁷ 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
Coronation Avenue	2-Lane Urban Collector Undivided (2-UCU)	50	8,000

5. ROADWAY TRAFFIC NOISE RESULTS

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 (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	10.8	POW – 4 th Floor – East Façade	56	48
2	10.8	POW – 4 th Floor – North Façade	63	55
3	10.8	POW – 4 th Floor – West Façade	59	52
4	1.5	OLA – Rear Amenity Area	44	N/A

N/A = Nighttime noise levels for the OLA are not considered as per ENCG

⁷ City of Ottawa Transportation Master Plan, November 2013



The results of the current analysis indicate that noise levels will range between 44 and 63 dBA during the daytime period (07:00-23:00) and between 48 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs at the north façade, which is nearest and most exposed to Coronation Avenue. Since noise levels are less than 65 dBA at the building façade, standard building components in compliance with Ontario Building Code standards will be sufficient to attenuate noise levels indoors when windows are closed.

The noise levels predicted due to roadway traffic are between 55 dBA and 65 dBA for the development. Therefore, this building will require forced air heating with provisions for central air conditioning, which if installed at the owner's discretion, will allow building 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. As for the rear amenity area, noise levels are not expected to exceed the 55 dBA noise level criteria for OLAs. Therefore, no acoustic mitigation is required for the rear amenity area.

6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 44 and 63 dBA during the daytime period (07:00-23:00) and between 48 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs at the north façade, which is nearest and most exposed to Coronation Avenue.

Results of the calculations also indicate that standard building components will be sufficient, however the development will require forced air heating with provisions for central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause will also be required on all Lease, Purchase and Sale Agreements, as summarized below:

“Purchasers/tenants are advised that sound levels due to increasing road 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.”

GRADIENTWIND

ENGINEERS & SCIENTISTS

This dwelling unit has also been designed with forced air heating with provisions for central air conditioning at the occupant's discretion. These noise measures will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of Environment, Conservation and Parks.

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

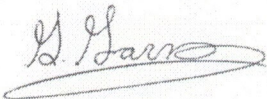
Noise levels at the rear amenity area are expected to fall below 55 dBA during the daytime period. Therefore, no acoustic mitigation is required.

As the building design progresses, the stationary noise impacts of the building on the surroundings would be considered. Stationary noise sources associated with the development are expected to comprise of DX Split Air Conditioning units. These sources are not expected to be a concern at noise sensitive spaces and surrounding properties, provided the following are considered in the design: judicious selection of the equipment, locating the equipment on a high roof away from nearby residential receptors, and where necessary, installing silencers or noise screens. Installation of the equipment should be done in accordance with NPC-216 Residential Air Conditioning Devices.

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.

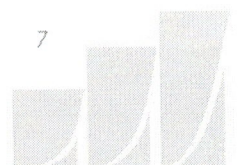


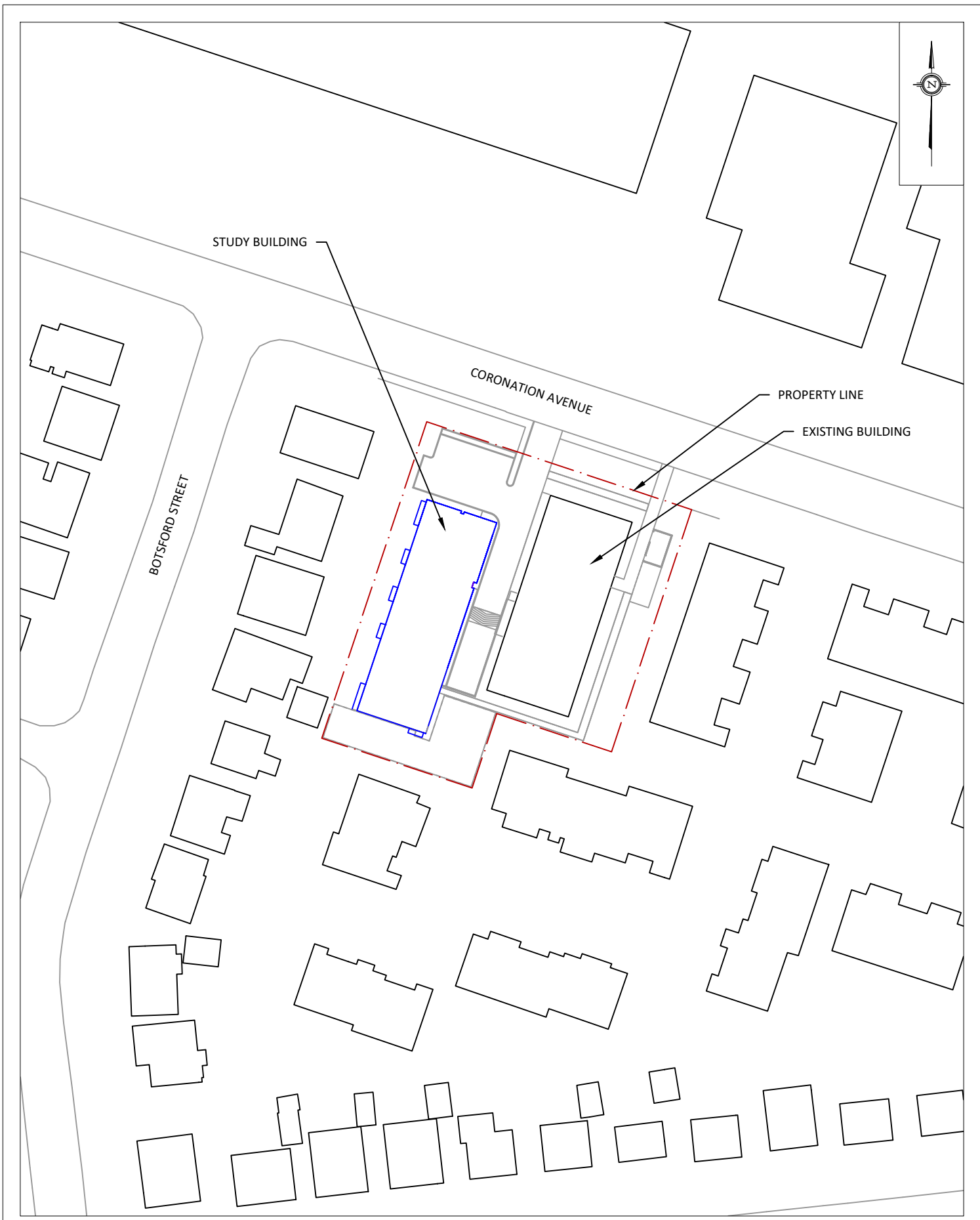
Giuseppe Garro, MASc.
Junior Environmental Scientist

Gradient Wind Report #20-185 – Traffic Noise

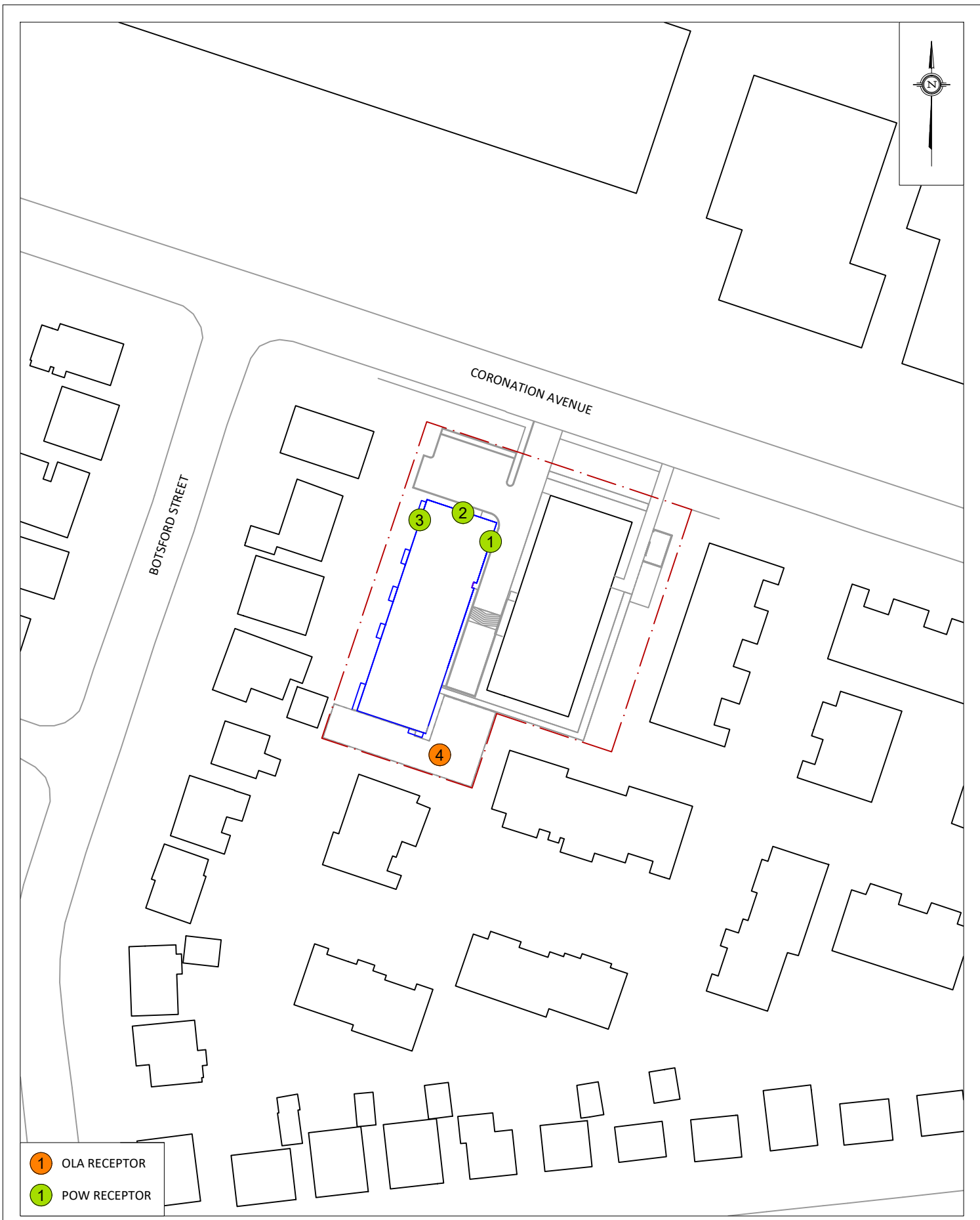


Joshua Foster, P.Eng.
Principal



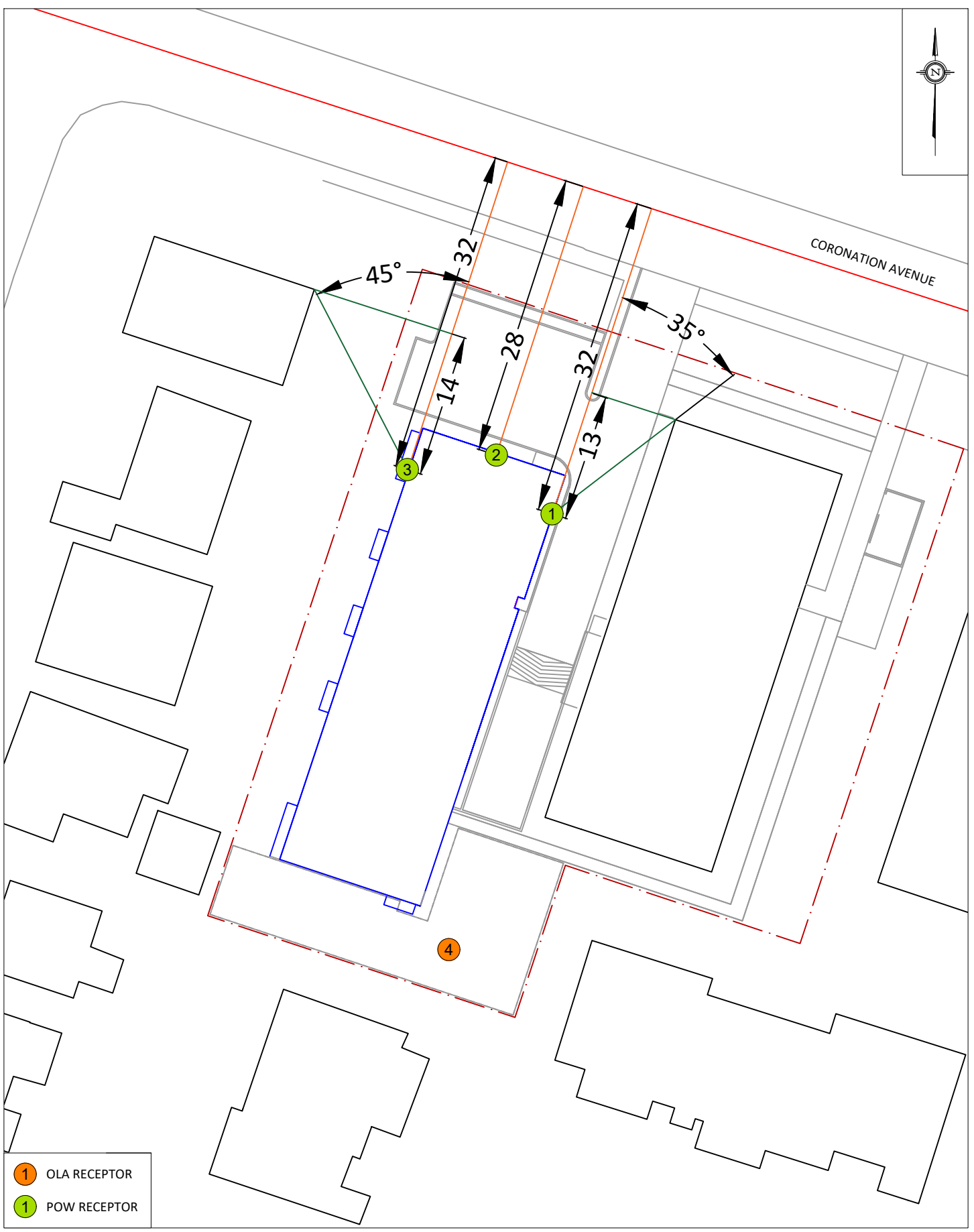
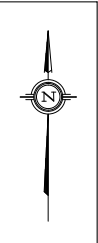


GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT 700 CORONATION AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
	SCALE 1:1000 (APPROX.)	DRAWING NO. GWE20-185-1	
	DATE OCTOBER 2, 2020	DRAWN BY G.G.	



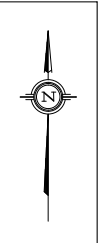
- 1 OLA RECEPTOR
- 1 POW RECEPTOR

GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	700 CORONATION AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION	FIGURE 2: RECEPTOR LOCATIONS	
	SCALE	1:1000 (APPROX.)	DRAWING NO.			GWE20-185-2
	DATE	OCTOBER 2, 2020	DRAWN BY			G.G.



- 1 OLA RECEPTOR
- 1 POW RECEPTOR

GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT 700 CORONATION AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION FIGURE 3: RECEPTOR 1-3 STAMSON INPUT PARAMETERS
	SCALE 1:500 (APPROX.)	DRAWING NO. GWE20-185-3	
	DATE OCTOBER 2, 2020	DRAWN BY G.G.	



CORONATION AVENUE

4°

5°

76

48

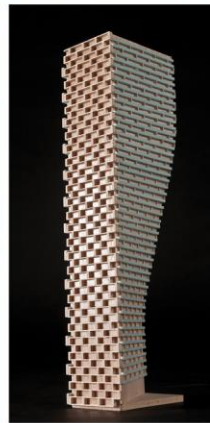
57

1 OLA RECEPTOR

1 POW RECEPTOR

GRADIENTWIND

ENGINEERS & SCIENTISTS



APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0 NORMAL REPORT Date: 02-10-2020 14:18:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Coron. Ave (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000
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: Coron. Ave (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 : 10.80 / 10.80 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 35.00 deg Angle2 : 90.00 deg
Barrier height : 11.00 m
Barrier receiver distance : 13.00 / 13.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Coron. Ave (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)



GRADIENTWIND

ENGINEERS & SCIENTISTS

SubLeq	Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	
-----+-----+-----+-----											
	1.50	!	10.80	!	7.02	!	7.02				
ROAD (55.35 + 45.38 + 0.00) = 55.76 dBA											
55.35	0	35	0.00	65.75	0.00	-3.29	-7.11	0.00	0.00	0.00	

45.38	35	90	0.00	65.75	0.00	-3.29	-5.15	0.00	0.00	-11.93	

Segment Leq : 55.76 dBA

Total Leq All Segments: 55.76 dBA

Results segment # 1: Coron. Ave (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	!	Receiver Height (m)	!	Barrier Height (m)	!	Elevation of Barrier Top (m)
-----+-----+-----+-----						
1.50	!	10.80	!	7.02	!	7.02

SubLeq	Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
ROAD (47.75 + 37.78 + 0.00) = 48.17 dBA										
47.75	0	35	0.00	58.16	0.00	-3.29	-7.11	0.00	0.00	0.00

37.78	35	90	0.00	58.16	0.00	-3.29	-5.15	0.00	0.00	-11.93

Segment Leq : 48.17 dBA

Total Leq All Segments: 48.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.76
(NIGHT): 48.17



GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0 NORMAL REPORT Date: 02-10-2020 14:18:51
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Coron. Ave (day/night)

```
-----
Car traffic volume   : 6477/563   veh/TimePeriod  *
Medium truck volume : 515/45    veh/TimePeriod  *
Heavy truck volume  : 368/32    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): 8000
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: Coron. Ave (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 : 28.00 / 28.00 m
Receiver height : 10.80 / 10.80 m
Topography      : 1           (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: Coron. Ave (day)

Source height = 1.50 m

ROAD (0.00 + 63.04 + 0.00) = 63.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------

SubLeq									

--									
	-90	90	0.00	65.75	0.00	-2.71	0.00	0.00	0.00
63.04									

--									



Segment Leq : 63.04 dBA

Total Leq All Segments: 63.04 dBA

Results segment # 1: Coron. Ave (night)

Source height = 1.50 m

ROAD (0.00 + 55.45 + 0.00) = 55.45 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

--
-90 90 0.00 58.16 0.00 -2.71 0.00 0.00 0.00 0.00
55.45

--

Segment Leq : 55.45 dBA

Total Leq All Segments: 55.45 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.04
(NIGHT): 55.45



GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0 NORMAL REPORT Date: 02-10-2020 14:18:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Coron. Ave (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000
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: Coron. Ave (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 : 32.00 / 32.00 m
Receiver height : 10.80 / 10.80 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -45.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 14.00 / 14.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Coron. Ave (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)



GRADIENTWIND

ENGINEERS & SCIENTISTS

```

-----+-----+-----+-----
          1.50 !          10.80 !          6.73 !          6.73
ROAD (0.00 + 56.44 + 56.44) = 59.45 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq
-----
--
-90 -45 0.00 65.75 0.00 -3.29 -6.02 0.00 0.00 -4.36
52.08*
-90 -45 0.00 65.75 0.00 -3.29 -6.02 0.00 0.00 0.00
56.44
-----
--
-45 0 0.00 65.75 0.00 -3.29 -6.02 0.00 0.00 0.00
56.44
-----
--

```

* Bright Zone !

Segment Leq : 59.45 dBA

Total Leq All Segments: 59.45 dBA

Results segment # 1: Coron. Ave (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 !          10.80 !          6.73 !          6.73

```

```

ROAD (0.00 + 48.85 + 48.85) = 51.86 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq
-----
--
-90 -45 0.00 58.16 0.00 -3.29 -6.02 0.00 0.00 -4.36
44.49*
-90 -45 0.00 58.16 0.00 -3.29 -6.02 0.00 0.00 0.00
48.85
-----
--
-45 0 0.00 58.16 0.00 -3.29 -6.02 0.00 0.00 0.00
48.85

```



--

* Bright Zone !

Segment Leq : 51.86 dBA

Total Leq All Segments: 51.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.45
(NIGHT): 51.86



GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0 NORMAL REPORT Date: 02-10-2020 14:19:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Coron. Ave (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000
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: Coron. Ave (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 76.00 / 76.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -4.00 deg
Barrier height : 12.30 m
Barrier receiver distance : 48.00 / 48.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: Coron. Ave (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)



GRADIENTWIND

ENGINEERS & SCIENTISTS

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

```

24 hr Traffic Volume (AADT or SADT): 8000
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: Coron. Ave (day/night)

```

-----
Angle1  Angle2          : 0.00 deg  90.00 deg
Wood depth          : 0          (No woods.)
No of house rows    : 0 / 0
Surface             : 1          (Absorptive ground surface)
Receiver source distance : 76.00 / 76.00 m
Receiver height     : 1.50 / 1.50 m
Topography          : 2          (Flat/gentle slope; with barrier)
Barrier angle1      : 5.00 deg  Angle2 : 90.00 deg
Barrier height      : 11.00 m
Barrier receiver distance : 57.00 / 57.00 m
Source elevation    : 0.00 m
Receiver elevation  : 0.00 m
Barrier elevation    : 0.00 m
Reference angle     : 0.00
    
```

Results segment # 1: Coron. Ave (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 !          1.50 !          1.50 !          1.50
    
```

ROAD (0.00 + 38.58 + 37.52) = 41.09 dBA

```

Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
    
```

```

-----
--
-90    -4    0.00  65.75  0.00  -7.05  -3.21  0.00  0.00 -16.91
38.58
    
```

```

-----
--
-4     0    0.66  65.75  0.00 -11.70 -16.53  0.00  0.00  0.00
37.52
    
```



GRADIENTWIND

ENGINEERS & SCIENTISTS

Segment Leq : 41.09 dBA

Results segment # 2: Coron. Ave (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (38.48 + 38.69 + 0.00) = 41.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
SubLeq									

--	0	5	0.66	65.75	0.00	-11.70	-15.57	0.00	0.00	0.00
38.48										

--	5	90	0.00	65.75	0.00	-7.05	-3.26	0.00	0.00	-16.75
38.69										

Segment Leq : 41.60 dBA

Total Leq All Segments: 44.36 dBA

Results segment # 1: Coron. Ave (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 30.99 + 29.92) = 33.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
SubLeq									



GRADIENTWIND

ENGINEERS & SCIENTISTS

```

-90    -4    0.00  58.16   0.00  -7.05  -3.21   0.00   0.00  -16.91
30.99
-----

```

```

--
-4     0    0.66  58.16   0.00 -11.70 -16.53   0.00   0.00   0.00
29.92
-----

```

Segment Leq : 33.50 dBA

Results segment # 2: Coron. Ave (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (30.89 + 31.10 + 0.00) = 34.01 dBA

```

Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-----

```

```

--
0     5    0.66  58.16   0.00 -11.70 -15.57   0.00   0.00   0.00
30.89
-----

```

```

--
5     90   0.00  58.16   0.00  -7.05  -3.26   0.00   0.00 -16.75
31.10
-----

```

Segment Leq : 34.01 dBA

Total Leq All Segments: 36.77 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 44.36
(NIGHT): 36.77

