



Roadway Traffic Noise Assessment

807-825 Montreal Road

Ottawa, Ontario

REPORT: GWE15-086-TRAFFIC NOISE

Prepared For:

Anthony Nicolini
2068358 Ontario Inc. (Darwin Group)
183 Michael Cowpland Drive
Ottawa, Ontario
K2M 0M3

Prepared By:

Michael Lafortune, Environmental Technologist
Joshua Foster, P.Eng., Associate

August 17th, 2015

EXECUTIVE SUMMARY

This document describes a roadway traffic noise assessment performed for a proposed retail and office development comprising a nine-storey building at 807-825 Montreal Road in Ottawa, Ontario. The building will rise 38.75 meters above local grade. Figure 1 illustrates a site plan with surrounding context. The major source of roadway noise affecting the development is roadway traffic along Montreal Road to the south.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment (MOE) 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 received from Chmiel Architects.

The results of the current study indicate that noise levels due to roadway traffic over the site will range between 49 and 75 dBA during the daytime period (07:00-23:00) and between 41 and 68 dBA during the nighttime period (23:00-07:00). The highest traffic noise levels will occur along the south façade, which is nearest and most exposed to Montreal Road. Minimum building construction in all areas is required to satisfy the Ontario Building Code (2012). In addition, Sound Transmission Class (STC) ratings are required for building components where noise levels exceed 65 dBA (see Figure 4).

In addition to upgraded windows, the installation of central air conditioning (or similar mechanical system) will be required for all indoor spaces facing east, south or west (see Figure 5). As the development is commercial, Warning Clauses on title do not apply.

TABLE OF CONTENTS

	PAGE
1. INTRODUCTION	1
2. TERMS OF REFERENCE	1
3. OBJECTIVES	1
4. METHODOLOGY	2
4.1 Background	2
4.2 Roadway Traffic Noise	2
4.2.1 Criteria for Roadway Traffic Noise	2
4.2.2 Roadway Traffic Volumes	5
4.2.3 Theoretical Roadway Noise Predictions	5
4.3 Indoor Noise Calculations	6
5. RESULTS AND DISCUSSION	7
5.1 Roadway Noise Levels	7
5.2 Noise Control Measures	7
6. CONCLUSIONS AND RECOMMENDATIONS	10

FIGURES

APPENDICES:

Appendix A – STAMSON 5.04 Input and Output Data

1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by 2068358 Ontario Inc. (Darwin Group) to undertake a roadway traffic noise study of a proposed retail and office building at 807-825 Montreal Road in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to a roadway traffic noise assessment. GWE's scope of work involved assessing exterior and interior noise levels generated by local roadway traffic. The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa¹ and Ontario Ministry of the Environment and Climate Change (MOE)² guidelines. Noise calculations were based on architectural drawings received from Chmiel Architects, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this environmental noise assessment is a proposed retail and office development comprising a nine-storey building. The development is located northeast of the Montreal Road & LeBoutillier Avenue intersection. The major source of roadway noise is Montreal Road to the south. The site is surrounded on all sides with mixed-use land, primarily residential. Figure 1 illustrates a complete site plan with surrounding context.

Upon completion, the development will rise 38.75 meters above local grade. The ground floor will house retail space, while the remaining floors occupy office space only. There are no outdoor living area's (OLA's) associated with the development.

3. OBJECTIVES

The main goals of this work are to: (i) calculate the future noise levels on the study building produced by local roadway traffic, and (ii) ensure that interior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2 of this report.

¹ City of Ottawa Environmental Noise Control Guidelines, SS Wilson Associates, May 10, 2006

² Ministry of the Environment – Publication NPC-300

2068358 Ontario Inc. (Darwin Group)

4. METHODOLOGY

4.1 Background

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

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For vehicle traffic, the equivalent sound energy level, L_{EQ} , provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{EQ} is commonly calculated on the basis of a 16-hour (L_{EQ16}) daytime (07:00-23:00) / 8-hour (L_{EQ8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise level limit's (that are relevant to this study) are 45 and 50 dBA for conference/private office space and retail/general office space respectively, as listed in Table 1. Based on GWE's experience, more comfortable indoor noise levels should be targeted toward 42 and 47 dBA to control peak noise, and deficiencies in building envelope construction.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD & RAIL)³

Type of Space	Time Period	L _{EQ} (dBA)	
		Road	Rail
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50	45
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	40
Sleeping quarters of hotels/motels	23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40	35

Predicted noise levels at the plane of window (POW) and outdoor living area (OLA) dictate the action required to achieve the recommended sound levels. When noise levels at these areas exceed the criteria outlined in Table 2, specific outdoor, ventilation and Warning Clause requirements may apply. In addition, when noise levels exceed the criteria outlined in Table 3, upgraded building components must be designed.

³ Adapted from ENCG – Table 1.6
2068358 Ontario Inc. (Darwin Group)

TABLE 2: ROAD & RAIL NOISE COMBINED – OUTDOOR NOISE, VENTILATION AND WARNING CLAUSE REQUIREMENTS⁴

Time Period	L_{EQ} (dBA)	Ventilation Requirements	Outdoor Noise Control Measures	Warning Clause
Outdoor Living Area (OLA)				
Daytime (07:00 – 23:00)	$L_{EQ(16hr)} < 55$	N/A	Not required	Not required
	$55 < L_{EQ(16hr)} \leq 60$	N/A	May not be required but should be considered	Type A [†]
	$L_{EQ(16hr)} > 60$	N/A	Required to reduce the L_{EQ} to below 60 dBA and as close to 55 dBA where feasible	Type B ^{††}
Plane of Window (POW)				
Daytime (07:00 – 23:00)	$L_{EQ(16hr)} < 55$	Not required	N/A	Not required
	$55 < L_{EQ(16hr)} \leq 65$	Forced air heating with provision for central air conditioning	N/A	Type C
	$L_{EQ(16hr)} > 65$	Central air conditioning	N/A	Type D
Nighttime (23:00 – 07:00)	$L_{EQ(8hr)} < 50$	Not required	N/A	Not required
	$50 < L_{EQ(8hr)} \leq 60$	Forced air heating with provision for central air conditioning	N/A	Type C
	$L_{EQ(8hr)} > 60$	Central air conditioning	N/A	Type D

† - Required if resultant L_{EQ} exceeds 55 dBA

†† - Required if resultant L_{EQ} exceeds 55 dBA and if it is administratively, economically and/or technically feasible

TABLE 3: ROAD & RAIL NOISE BUILDING COMPONENT REQUIREMENTS⁵

Source	L_{EQ} (dBA)	Building Component Requirements
Road	$L_{EQ(16hr)} > 65$ (Daytime)	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	$L_{EQ(8hr)} > 60$ (Nighttime)	
Rail	$L_{EQ(16hr)} > 60$ (Daytime)	
	$L_{EQ(8hr)} > 55$ (Nighttime)	

⁴ Adapted from ENCG – Table 1.10

⁵ Adapted from ENCG – Table 1.8

2068358 Ontario Inc. (Darwin Group)

4.2.2 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan⁶. Average Annual Daily Traffic (AADT) volumes are then based on data in Table 1.7 of the ENCG for each roadway classification. The Transportation Master Plan – Affordable 2013 Roadway Network provides additional details on future roadway expansions. Table 4 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 4: ROADWAY TRAFFIC DATA

Roadway	Roadway Class	Speed Limit (km/h)	Official Plan AADT
Montreal Road	4-UAD	60	35,000

4.2.3 Theoretical Roadway Noise Predictions

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

Roadway noise calculations were performed by treating each road segment as separate line sources of noise, and by using existing building locations as noise barriers. In addition to the traffic volumes summarized in Table 4, 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 was taken to be 92% / 8% respectively for all streets
- Absorptive and reflective intermediate ground surfaces based on specific source-receiver path ground characteristics
- Study site topography considered in source height, barrier height and road grade parameters

Noise receptors were strategically placed at 10 locations around the study area (see Figures 2 and 3).

⁶ City of Ottawa Transportation Master Plan, November 2013
2068358 Ontario Inc. (Darwin Group)

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 veneered walls can achieve STC 55. 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. Windows are the known weak point in a partition.

According to the ENCG, when daytime noise levels (from road and rail 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 procedure⁷ 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 research⁸, 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).

⁷ Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985

⁸ CMHC, Road & Rail Noise: Effects on Housing
2068358 Ontario Inc. (Darwin Group)

5. RESULTS AND DISCUSSION

5.1 Roadway Noise Levels

The results of the roadway noise calculations are summarized in Table 5 below. Appendix A contains the complete set of input and output data from all STAMSON 5.04 calculations.

TABLE 5: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)	
		Day	Night
1	POW – 1 st Floor – South Façade	75	67
2	POW – 1 st Floor – West Façade	71	63
3	POW – 4 th Floor – North Façade	49	41
4	POW – 4 th Floor – East Façade	71	63
5	POW – 4 th Floor – South Façade	75	68
6	POW – 4 th Floor – West Façade	71	63
7	POW – 7 th Floor – North Façade	49	41
8	POW – 7 th Floor – East Façade	71	63
9	POW – 7 th Floor – South Façade	75	68
10	POW – 7 th Floor – West Façade	71	63

The results of the current analysis indicate that noise levels will range between 49 and 75 dBA during the daytime period (07:00-23:00) and between 41 and 68 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 75 dBA) occurs on the south façade (Receptors 1, 5 and 9), which is nearest and most exposed to Montreal Road.

5.2 Noise Control Measures

The noise levels predicted due to road traffic exceed the criteria listed in the ENCG 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 Figures 4 and 5):

- **Retail and General Office Space Windows**
 - (i) Retail and general office space windows facing east or west will require a minimum STC of 24
 - (ii) Retail and general office space windows facing south will require a minimum STC of 28
 - (iii) All other retail and general office space windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Conference Rooms and Private Office Space Windows**
 - (i) Conference room and private office space windows facing east or west will require a minimum STC of 29
 - (ii) Conference room and private office space windows facing south will require a minimum STC of 33
 - (iii) All other conference room and private office space windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Exterior Walls**
 - (i) Exterior wall components on the south and west façades require a minimum STC of 45 which will be achieved with brick cladding or an acoustical equivalent according to NRC test data⁹. Glazed curtain wall systems will conform to the requirements for windows stated above.

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 not specified any particular window configurations, as there are several manufacturers and various combinations of window components that will offer the necessary sound attenuation rating. However, 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. All specified building components will require review by a qualified acoustical engineer for conformance to the recommendations of this report prior to building permit application.

⁹ J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.
2068358 Ontario Inc. (Darwin Group)

Results of the calculations also indicate that all indoor spaces facing east, south or west will require central air conditioning (or similar mechanical system), which will allow occupants to keep windows closed and maintain a comfortable living environment.

TABLE 6: SITE VENTILATION REQUIREMENTS

Location	Ventilation Requirements
East, South and West facing offices	Central Air Conditioning
North facing spaces	None

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current study indicate that noise levels due to roadway traffic over the site will range between 49 and 75 dBA during the daytime period (07:00-23:00) and between 41 and 68 dBA during the nighttime period (23:00-07:00). The highest traffic noise levels will occur along the south façade, which is nearest and most exposed to Montreal Road. Minimum building construction in all areas is required to satisfy the Ontario Building Code (2012). In addition, Sound Transmission Class (STC) ratings are required for building components where noise levels exceed 65 dBA (see Figure 4).

In addition to upgraded windows, the installation of central air conditioning (or similar mechanical system) will be required for all indoor spaces facing east, south or west (see Figure 5).

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

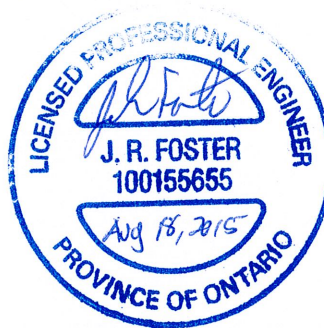
Yours truly,

Gradient Wind Engineering Inc.

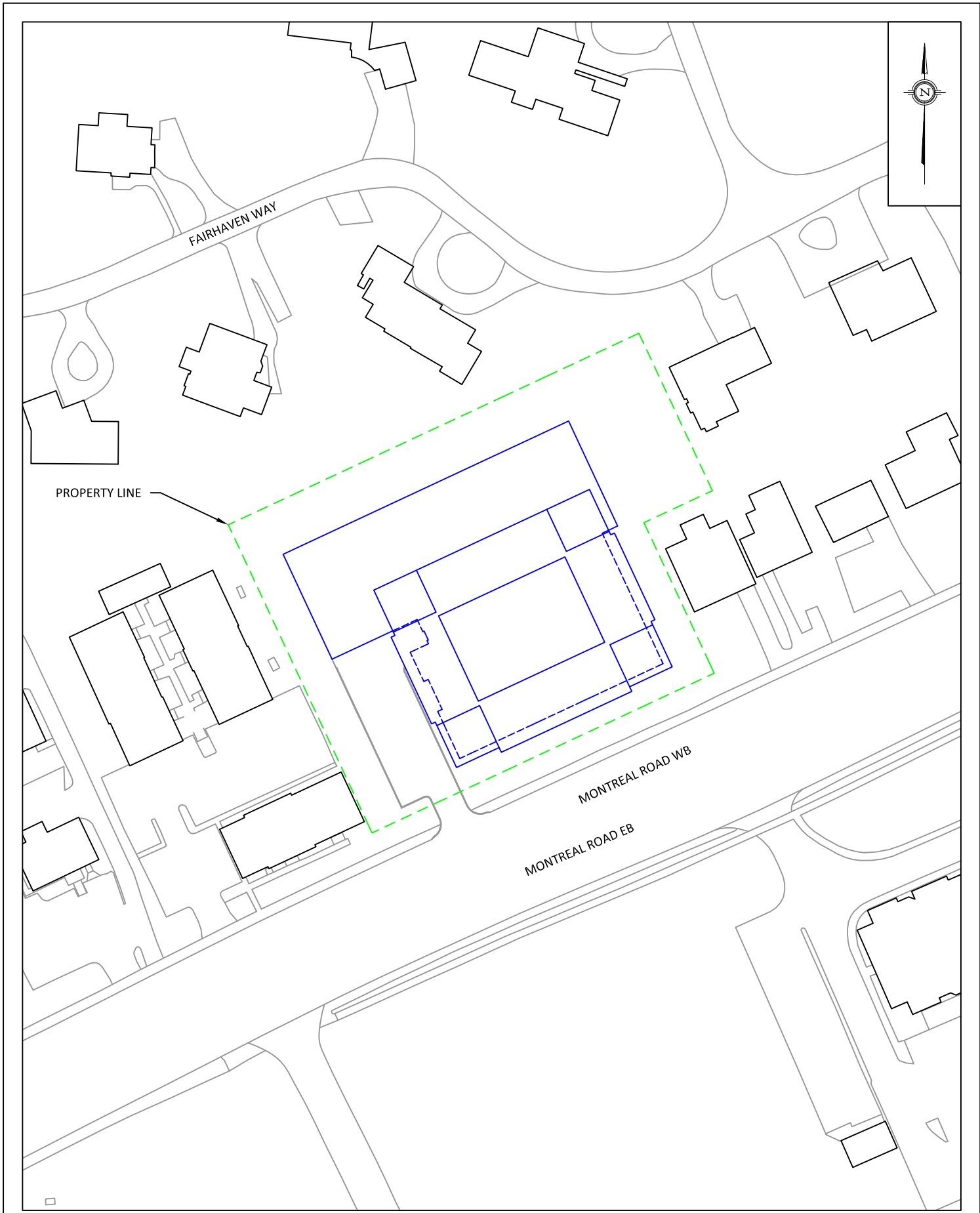



Michael Lafortune
Environmental Technologist

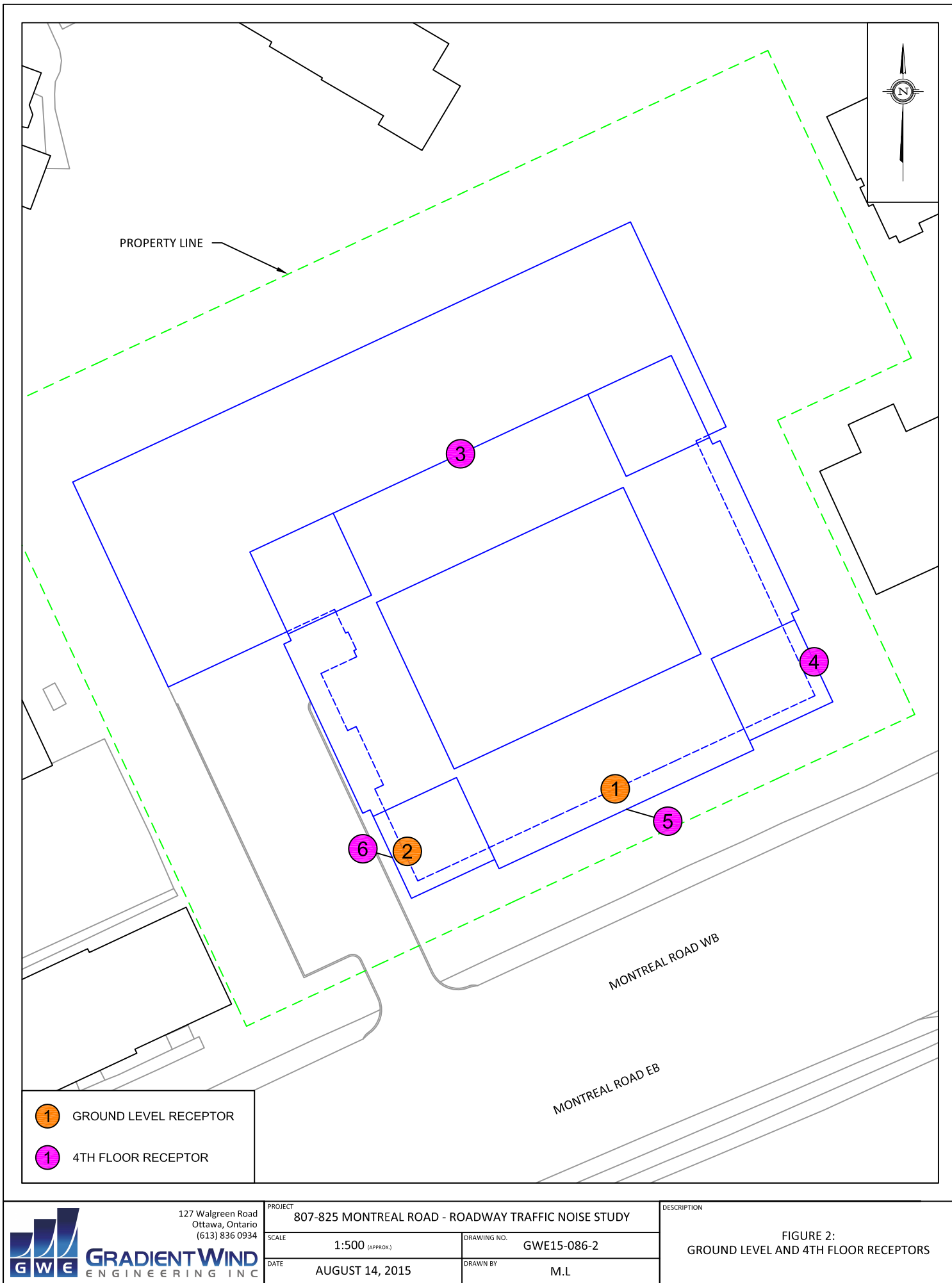
GWE15-086-TRAFFIC NOISE

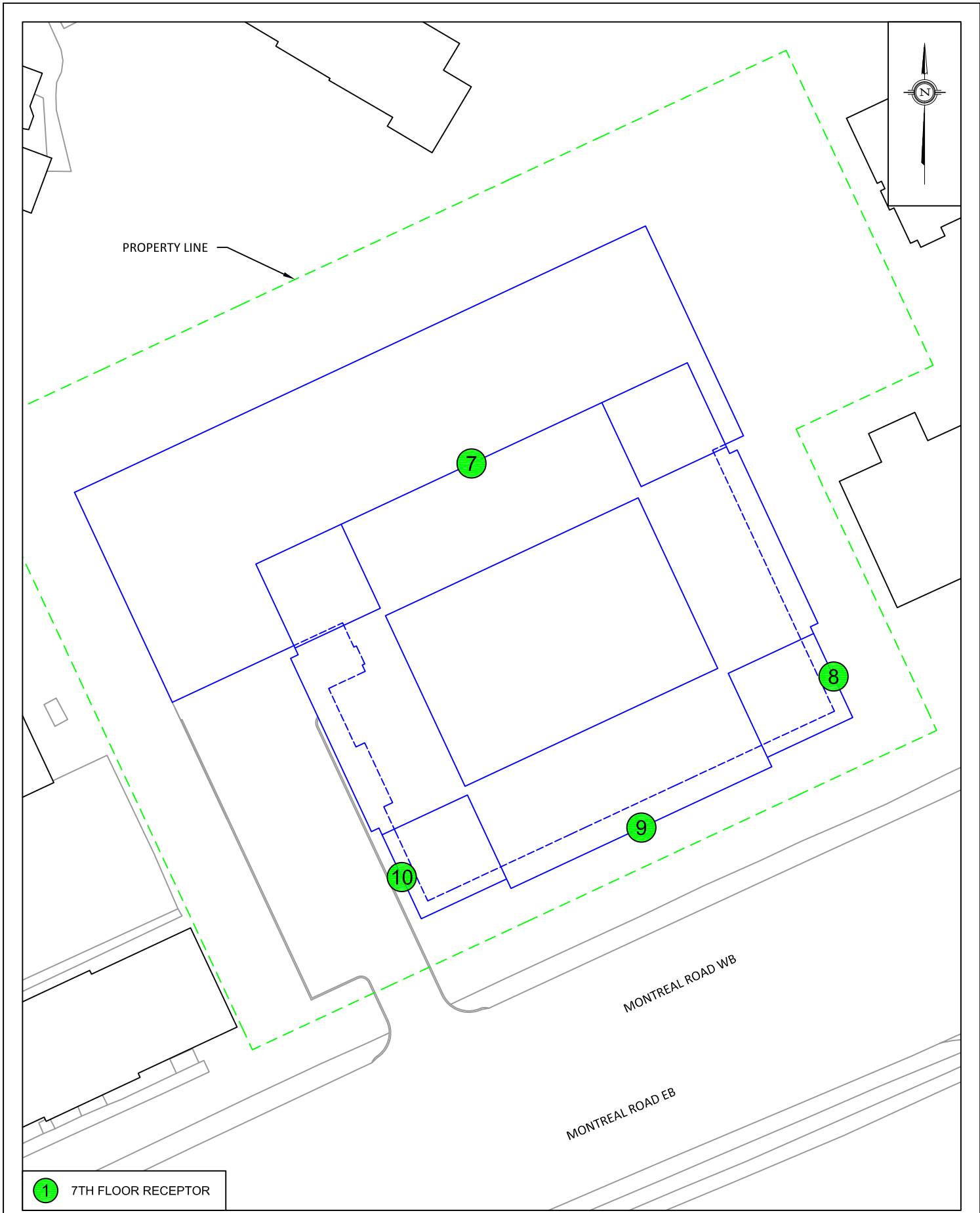


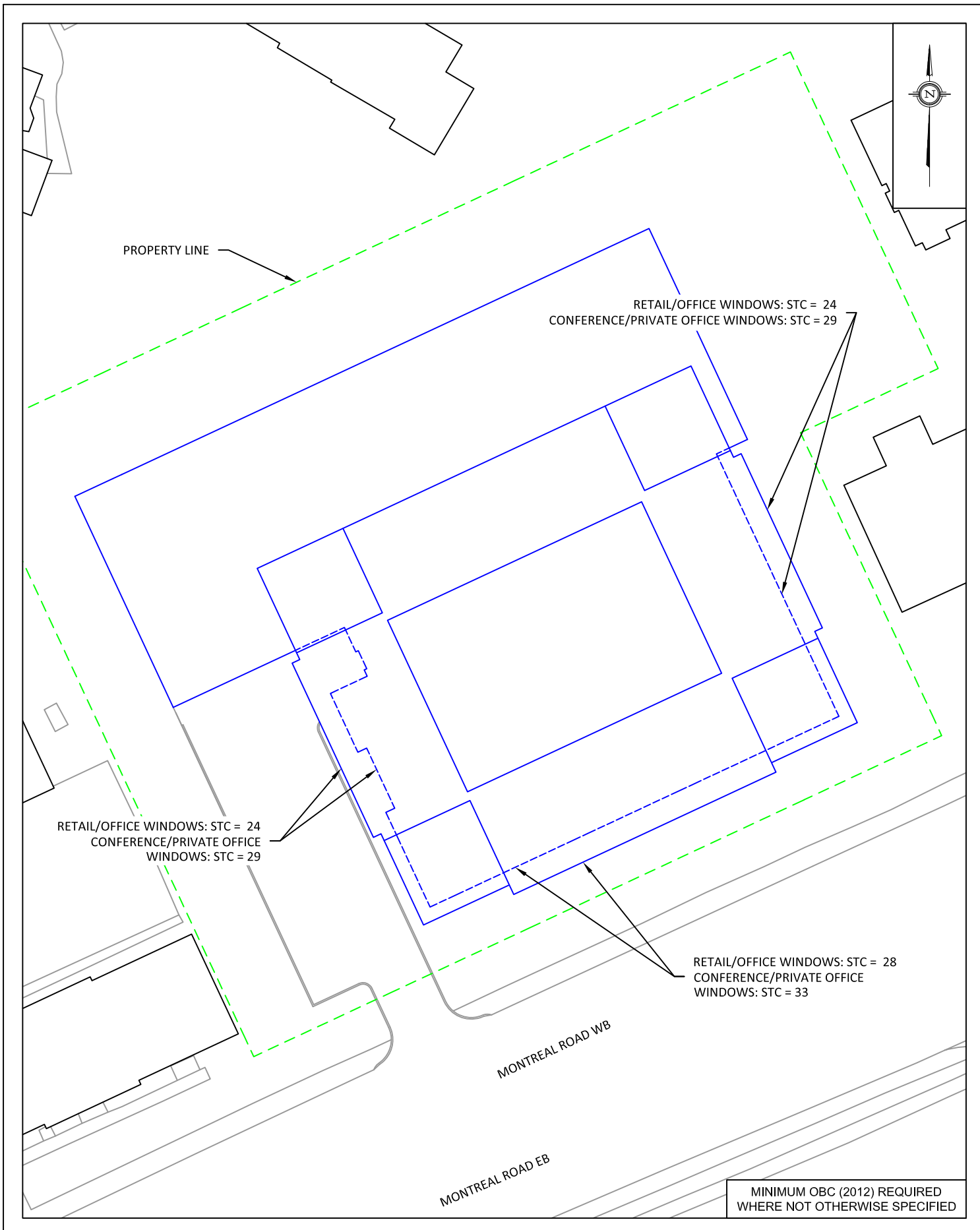
Joshua Foster, P.Eng.
Associate




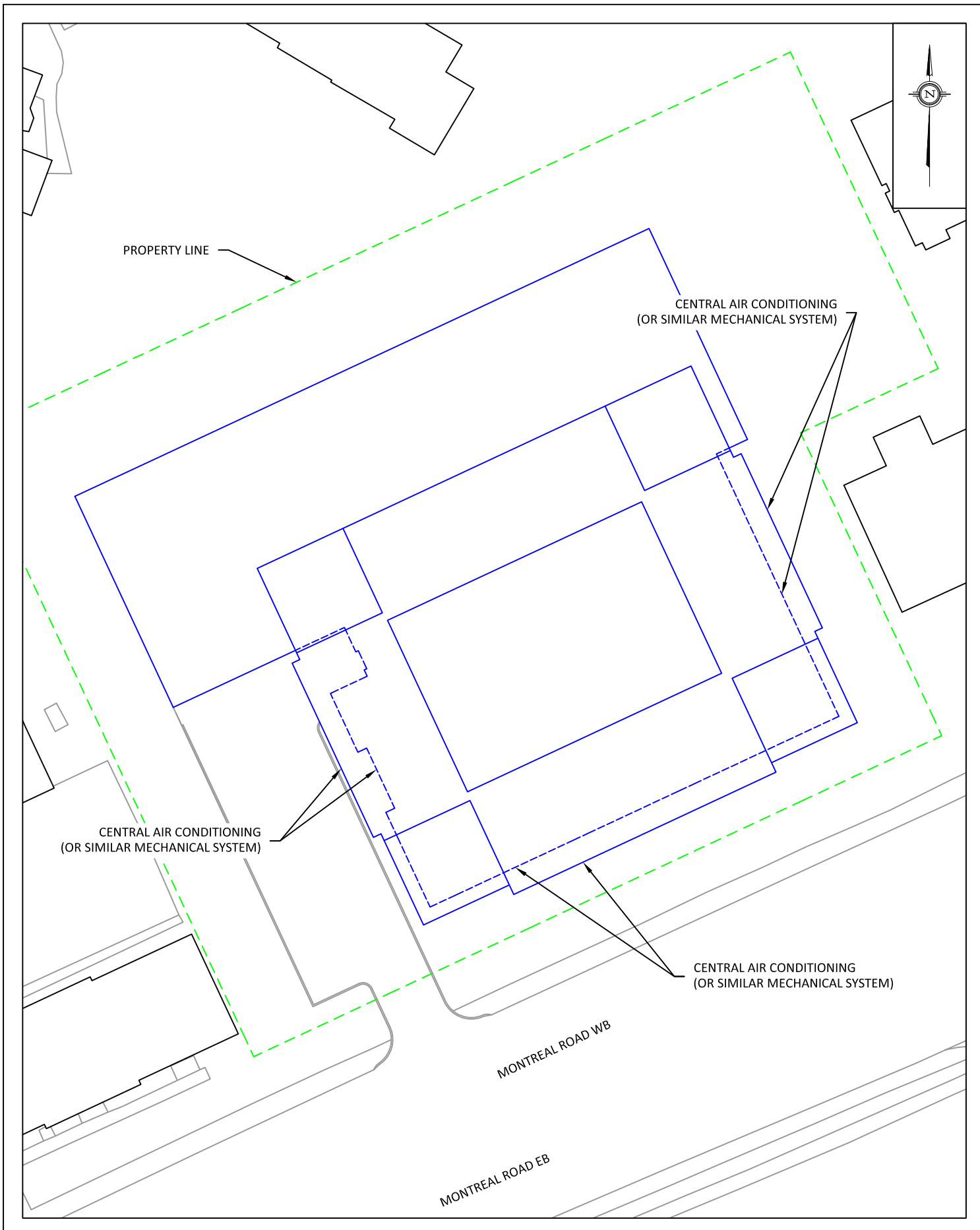
 GRADIENTWIND ENGINEERING INC	127 Walgreen Road Ottawa, Ontario (613) 836 0934		PROJECT 807-825 MONTREAL ROAD - ROADWAY TRAFFIC NOISE STUDY	DESCRIPTION FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
	SCALE 1:1000 (APPROX.)	DRAWING NO. GWE15-086-1		
	DATE AUGUST 14, 2015	DRAWN BY M.L.		








 <p>127 Walgreen Road Ottawa, Ontario (613) 836 0934</p> <p>GRADIENT WIND ENGINEERING INC.</p>	PROJECT 807-825 MONTREAL ROAD - ROADWAY TRAFFIC NOISE STUDY		DESCRIPTION FIGURE 4: STC REQUIREMENTS	
	SCALE 1:500 (APPROX.)	DRAWING NO. GWE15-086-4		
	DATE AUGUST 14, 2015	DRAWN BY M.L.		



 <p>127 Walgreen Road Ottawa, Ontario (613) 836 0934</p>	PROJECT 807-825 MONTREAL ROAD - ROADWAY TRAFFIC NOISE STUDY		DESCRIPTION FIGURE 5: VENTILATION REQUIREMENTS	
	SCALE 1:500 (APPROX.)	DRAWING NO. GWE15-086-5		
	DATE AUGUST 14, 2015	DRAWN BY M.L.		

APPENDIX A

STAMSON 5.04 - INPUT AND OUTPUT DATA (ROADWAY TRAFFIC NOISE)

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:20:32
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : -79.00 deg 79.00 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 : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %

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: MontrealEB (day/night)

Angle1 Angle2 : -73.00 deg 73.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 2 (Reflective ground surface)

Receiver source distance : 30.00 / 30.00 m

Receiver height : 1.50 / 1.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Results segment # 1: MontrealWB (day)

Source height = 1.50 m

ROAD (0.00 + 72.66 + 0.00) = 72.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-79	79	0.00	74.26	0.00	-1.03	-0.57	0.00	0.00	0.00	72.66

Segment Leq : 72.66 dBA

Results segment # 2: MontrealEB (day)

Source height = 1.50 m

ROAD (0.00 + 70.34 + 0.00) = 70.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-73	73	0.00	74.26	0.00	-3.01	-0.91	0.00	0.00	0.00	70.34

Segment Leq : 70.34 dBA

Total Leq All Segments: 74.66 dBA

Results segment # 1: MontrealWB (night)

Source height = 1.50 m

ROAD (0.00 + 65.07 + 0.00) = 65.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-79	79	0.00	66.66	0.00	-1.03	-0.57	0.00	0.00	0.00	65.07

Segment Leq : 65.07 dBA

Results segment # 2: MontrealEB (night)

Source height = 1.50 m

ROAD (0.00 + 62.74 + 0.00) = 62.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-73	73	0.00	66.66	0.00	-3.01	-0.91	0.00	0.00	0.00	62.74

Segment Leq : 62.74 dBA

Total Leq All Segments: 67.07 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 74.66

(NIGHT): 67.07

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:20:40
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : 0.00 deg 77.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 23.00 / 23.00 m
 Receiver height : 2.50 / 2.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 74.00 deg Angle2 : 77.00 deg
 Barrier height : 13.00 m
 Barrier receiver distance : 6.00 / 6.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %

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: MontrealEB (day/night)

Angle1 Angle2 : 0.00 deg 71.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 2 (Reflective ground surface)

Receiver source distance : 33.00 / 33.00 m

Receiver height : 2.50 / 2.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Results segment # 1: MontrealWB (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 ! 2.50 ! 2.24 ! 2.24

ROAD (68.54 + 34.62 + 0.00) = 68.54 dBA

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

0 74 0.00 74.26 0.00 -1.86 -3.86 0.00 0.00 0.00 68.54

74 77 0.00 74.26 0.00 -1.86 -17.78 0.00 0.00 -20.00 34.62

Segment Leq : 68.54 dBA

Results segment # 2: MontrealEB (day)

Source height = 1.50 m

ROAD (0.00 + 66.79 + 0.00) = 66.79 dBA

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

0 71 0.00 74.26 0.00 -3.42 -4.04 0.00 0.00 0.00 66.79

Segment Leq : 66.79 dBA

Total Leq All Segments: 70.76 dBA

Results segment # 1: MontrealWB (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 ! 2.50 ! 2.24 ! 2.24

ROAD (60.94 + 27.02 + 0.00) = 60.94 dBA

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

0 74 0.00 66.66 0.00 -1.86 -3.86 0.00 0.00 0.00 60.94

74 77 0.00 66.66 0.00 -1.86 -17.78 0.00 0.00 -20.00 27.02

Segment Leq : 60.94 dBA

Results segment # 2: MontrealEB (night)

Source height = 1.50 m

ROAD (0.00 + 59.20 + 0.00) = 59.20 dBA

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

0 71 0.00 66.66 0.00 -3.42 -4.04 0.00 0.00 0.00 59.20

Segment Leq : 59.20 dBA

Total Leq All Segments: 63.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.76
(NIGHT): 63.17

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:20:49
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : -55.00 deg 55.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 57.00 / 57.00 m
 Receiver height : 14.30 / 14.30 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -55.00 deg Angle2 : 55.00 deg
 Barrier height : 38.40 m
 Barrier receiver distance : 1.00 / 1.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %

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: MontrealEB (day/night)

Angle1 Angle2 : -47.00 deg 47.00 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 : 14.30 / 14.30 m

Topography : 2 (Flat/gentle slope; with barrier)

Barrier angle1 : -47.00 deg Angle2 : 47.00 deg

Barrier height : 38.40 m

Barrier receiver distance : 1.00 / 1.00 m

Source elevation : 0.00 m

Receiver elevation : 0.00 m

Barrier elevation : 0.00 m

Reference angle : 0.00

Results segment # 1: MontrealWB (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	14.30	14.08	14.08

ROAD (0.00 + 46.32 + 0.00) = 46.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	55	0.00	74.26	0.00	-5.80	-2.14	0.00	0.00	-20.00	46.32

Segment Leq : 46.32 dBA

Results segment # 2: MontrealeB (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	14.30	14.11	14.11

ROAD (0.00 + 44.87 + 0.00) = 44.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	47	0.00	74.26	0.00	-6.56	-2.82	0.00	0.00	-20.00	44.87

Segment Leq : 44.87 dBA

Total Leq All Segments: 48.67 dBA

Results segment # 1: MontrealWB (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	14.30	14.08	14.08

ROAD (0.00 + 38.72 + 0.00) = 38.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	55	0.00	66.66	0.00	-5.80	-2.14	0.00	0.00	-20.00	38.72

Segment Leq : 38.72 dBA

Results segment # 2: MontrealeB (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	14.30	14.11	14.11

ROAD (0.00 + 37.27 + 0.00) = 37.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	47	0.00	66.66	0.00	-6.56	-2.82	0.00	0.00	-20.00	37.27

Segment Leq : 37.27 dBA

Total Leq All Segments: 41.07 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.67

(NIGHT): 41.07

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:20:56
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : -77.00 deg 0.00 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 : 13.30 / 13.30 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %

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: MontrealEB (day/night)

Angle1 Angle2 : -71.00 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 : 13.30 / 13.30 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Results segment # 1: MontrealWB (day)

Source height = 1.50 m

ROAD (0.00 + 68.91 + 0.00) = 68.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-77	0	0.00	74.26	0.00	-1.66	-3.69	0.00	0.00	0.00	68.91

Segment Leq : 68.91 dBA

Results segment # 2: MontrealEB (day)

Source height = 1.50 m

ROAD (0.00 + 66.93 + 0.00) = 66.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	0	0.00	74.26	0.00	-3.29	-4.04	0.00	0.00	0.00	66.93

Segment Leq : 66.93 dBA

Total Leq All Segments: 71.04 dBA

Results segment # 1: MontrealWB (night)

Source height = 1.50 m

ROAD (0.00 + 61.31 + 0.00) = 61.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-77	0	0.00	66.66	0.00	-1.66	-3.69	0.00	0.00	0.00	61.31

Segment Leq : 61.31 dBA

Results segment # 2: MontrealEB (night)

Source height = 1.50 m

ROAD (0.00 + 59.33 + 0.00) = 59.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	0	0.00	66.66	0.00	-3.29	-4.04	0.00	0.00	0.00	59.33

Segment Leq : 59.33 dBA

Total Leq All Segments: 63.44 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.04

(NIGHT): 63.44

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:21:02
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : -80.00 deg 80.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 17.00 / 17.00 m
 Receiver height : 14.30 / 14.30 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %

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: MontrealEB (day/night)

Angle1 Angle2 : -74.00 deg 74.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 2 (Reflective ground surface)

Receiver source distance : 27.00 / 27.00 m

Receiver height : 14.30 / 14.30 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Results segment # 1: MontrealWB (day)

Source height = 1.50 m

ROAD (0.00 + 73.20 + 0.00) = 73.20 dBA

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

-80	80	0.00	74.26	0.00	-0.54	-0.51	0.00	0.00	0.00	73.20
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 73.20 dBA

Results segment # 2: MontrealEB (day)

Source height = 1.50 m

ROAD (0.00 + 70.85 + 0.00) = 70.85 dBA

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

-74	74	0.00	74.26	0.00	-2.55	-0.85	0.00	0.00	0.00	70.85
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 70.85 dBA

Total Leq All Segments: 75.19 dBA

Results segment # 1: MontrealWB (night)

Source height = 1.50 m

ROAD (0.00 + 65.60 + 0.00) = 65.60 dBA

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

-80	80	0.00	66.66	0.00	-0.54	-0.51	0.00	0.00	0.00	65.60
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 65.60 dBA

Results segment # 2: MontrealEB (night)

Source height = 1.50 m

ROAD (0.00 + 63.26 + 0.00) = 63.26 dBA

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

-74	74	0.00	66.66	0.00	-2.55	-0.85	0.00	0.00	0.00	63.26
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 63.26 dBA

Total Leq All Segments: 67.60 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 75.19

(NIGHT): 67.60

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:21:09
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : 0.00 deg 77.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 23.00 / 23.00 m
 Receiver height : 15.30 / 15.30 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 73.00 deg Angle2 : 77.00 deg
 Barrier height : 13.00 m
 Barrier receiver distance : 6.00 / 6.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %

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: MontrealEB (day/night)

Angle1 Angle2 : 0.00 deg 71.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 2 (Reflective ground surface)

Receiver source distance : 33.00 / 33.00 m

Receiver height : 15.30 / 15.30 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Results segment # 1: MontrealWB (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 ! 15.30 ! 11.70 ! 11.70

ROAD (68.48 + 49.33 + 0.00) = 68.53 dBA

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

0 73 0.00 74.26 0.00 -1.86 -3.92 0.00 0.00 0.00 68.48

73 77 0.00 74.26 0.00 -1.86 -16.53 0.00 0.00 -6.54 49.33

Segment Leq : 68.53 dBA

Results segment # 2: MontrealEB (day)

Source height = 1.50 m

ROAD (0.00 + 66.79 + 0.00) = 66.79 dBA

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

0 71 0.00 74.26 0.00 -3.42 -4.04 0.00 0.00 0.00 66.79

Segment Leq : 66.79 dBA

Total Leq All Segments: 70.76 dBA

Results segment # 1: MontrealWB (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 ! 15.30 ! 11.70 ! 11.70

ROAD (60.88 + 41.73 + 0.00) = 60.94 dBA

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

0 73 0.00 66.66 0.00 -1.86 -3.92 0.00 0.00 0.00 60.88

73 77 0.00 66.66 0.00 -1.86 -16.53 0.00 0.00 -6.54 41.73

Segment Leq : 60.94 dBA

Results segment # 2: MontrealEB (night)

Source height = 1.50 m

ROAD (0.00 + 59.20 + 0.00) = 59.20 dBA

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

0 71 0.00 66.66 0.00 -3.42 -4.04 0.00 0.00 0.00 59.20

Segment Leq : 59.20 dBA

Total Leq All Segments: 63.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.76
(NIGHT): 63.17

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:21:17
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : -55.00 deg 55.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 57.00 / 57.00 m
 Receiver height : 25.20 / 25.20 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -55.00 deg Angle2 : 55.00 deg
 Barrier height : 38.40 m
 Barrier receiver distance : 1.00 / 1.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %

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: MontrealEB (day/night)

Angle1 Angle2 : -47.00 deg 47.00 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 : 25.20 / 25.20 m

Topography : 2 (Flat/gentle slope; with barrier)

Barrier angle1 : -47.00 deg Angle2 : 47.00 deg

Barrier height : 38.40 m

Barrier receiver distance : 1.00 / 1.00 m

Source elevation : 0.00 m

Receiver elevation : 0.00 m

Barrier elevation : 0.00 m

Reference angle : 0.00

Results segment # 1: MontrealWB (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	25.20	24.78	24.78

ROAD (0.00 + 46.32 + 0.00) = 46.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	55	0.00	74.26	0.00	-5.80	-2.14	0.00	0.00	-20.00	46.32

Segment Leq : 46.32 dBA

Results segment # 2: MontrealeB (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	25.20	24.85	24.85

ROAD (0.00 + 44.87 + 0.00) = 44.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	47	0.00	74.26	0.00	-6.56	-2.82	0.00	0.00	-20.00	44.87

Segment Leq : 44.87 dBA

Total Leq All Segments: 48.67 dBA

Results segment # 1: MontrealWB (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	25.20	24.78	24.78

ROAD (0.00 + 38.72 + 0.00) = 38.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	55	0.00	66.66	0.00	-5.80	-2.14	0.00	0.00	-20.00	38.72

Segment Leq : 38.72 dBA

Results segment # 2: MontrealeB (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	25.20	24.85	24.85

ROAD (0.00 + 37.27 + 0.00) = 37.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	47	0.00	66.66	0.00	-6.56	-2.82	0.00	0.00	-20.00	37.27

Segment Leq : 37.27 dBA

Total Leq All Segments: 41.07 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.67

(NIGHT): 41.07

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:21:25
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : -77.00 deg 0.00 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 : 24.20 / 24.20 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %

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: MontrealEB (day/night)

Angle1 Angle2 : -71.00 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 : 24.20 / 24.20 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Results segment # 1: MontrealWB (day)

Source height = 1.50 m

ROAD (0.00 + 68.91 + 0.00) = 68.91 dBA

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

-77	0	0.00	74.26	0.00	-1.66	-3.69	0.00	0.00	0.00	68.91
-----	---	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 68.91 dBA

Results segment # 2: MontrealEB (day)

Source height = 1.50 m

ROAD (0.00 + 66.93 + 0.00) = 66.93 dBA

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

-71	0	0.00	74.26	0.00	-3.29	-4.04	0.00	0.00	0.00	66.93
-----	---	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 66.93 dBA

Total Leq All Segments: 71.04 dBA

Results segment # 1: MontrealWB (night)

Source height = 1.50 m

ROAD (0.00 + 61.31 + 0.00) = 61.31 dBA

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

-77	0	0.00	66.66	0.00	-1.66	-3.69	0.00	0.00	0.00	61.31
-----	---	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 61.31 dBA

Results segment # 2: MontrealEB (night)

Source height = 1.50 m

ROAD (0.00 + 59.33 + 0.00) = 59.33 dBA

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

-71	0	0.00	66.66	0.00	-3.29	-4.04	0.00	0.00	0.00	59.33
-----	---	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 59.33 dBA

Total Leq All Segments: 63.44 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.04

(NIGHT): 63.44

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:21:32
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : -80.00 deg 80.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 17.00 / 17.00 m
 Receiver height : 25.20 / 25.20 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %

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: MontrealEB (day/night)

Angle1 Angle2 : -74.00 deg 74.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 2 (Reflective ground surface)

Receiver source distance : 27.00 / 27.00 m

Receiver height : 25.20 / 25.20 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Results segment # 1: MontrealWB (day)

Source height = 1.50 m

ROAD (0.00 + 73.20 + 0.00) = 73.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	80	0.00	74.26	0.00	-0.54	-0.51	0.00	0.00	0.00	73.20

Segment Leq : 73.20 dBA

Results segment # 2: MontrealEB (day)

Source height = 1.50 m

ROAD (0.00 + 70.85 + 0.00) = 70.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-74	74	0.00	74.26	0.00	-2.55	-0.85	0.00	0.00	0.00	70.85

Segment Leq : 70.85 dBA

Total Leq All Segments: 75.19 dBA

Results segment # 1: MontrealWB (night)

Source height = 1.50 m

ROAD (0.00 + 65.60 + 0.00) = 65.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	80	0.00	66.66	0.00	-0.54	-0.51	0.00	0.00	0.00	65.60

Segment Leq : 65.60 dBA

Results segment # 2: MontrealEB (night)

Source height = 1.50 m

ROAD (0.00 + 63.26 + 0.00) = 63.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-74	74	0.00	66.66	0.00	-2.55	-0.85	0.00	0.00	0.00	63.26

Segment Leq : 63.26 dBA

Total Leq All Segments: 67.60 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 75.19

(NIGHT): 67.60

STAMSON 5.0 NORMAL REPORT Date: 13-08-2015 08:21:39
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: MontrealWB (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 : 3 %
 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: MontrealWB (day/night)

 Angle1 Angle2 : 0.00 deg 77.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 23.00 / 23.00 m
 Receiver height : 26.20 / 26.20 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 73.00 deg Angle2 : 77.00 deg
 Barrier height : 13.00 m
 Barrier receiver distance : 6.00 / 6.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Road data, segment # 2: MontrealEB (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 : 3 %
 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: MontrealEB (day/night)

 Angle1 Angle2 : 0.00 deg 71.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 33.00 / 33.00 m
 Receiver height : 26.20 / 26.20 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: MontrealWB (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 ! 26.20 ! 19.76 ! 19.76

ROAD (68.48 + 55.87 + 0.00) = 68.71 dBA

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

0 73 0.00 74.26 0.00 -1.86 -3.92 0.00 0.00 0.00 68.48

73 77 0.00 74.26 0.00 -1.86 -16.53 0.00 0.00 0.00 55.87*
73 77 0.00 74.26 0.00 -1.86 -16.53 0.00 0.00 0.00 55.87

* Bright Zone !

Segment Leq : 68.71 dBA

Results segment # 2: MontreaLEB (day)

Source height = 1.50 m

ROAD (0.00 + 66.79 + 0.00) = 66.79 dBA

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

0 71 0.00 74.26 0.00 -3.42 -4.04 0.00 0.00 0.00 66.79

Segment Leq : 66.79 dBA

Total Leq All Segments: 70.87 dBA

Results segment # 1: MontrealWB (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 ! 26.20 ! 19.76 ! 19.76

ROAD (60.88 + 48.27 + 0.00) = 61.12 dBA

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

0 73 0.00 66.66 0.00 -1.86 -3.92 0.00 0.00 0.00 60.88

73 77 0.00 66.66 0.00 -1.86 -16.53 0.00 0.00 0.00 48.27*
73 77 0.00 66.66 0.00 -1.86 -16.53 0.00 0.00 0.00 48.27

* Bright Zone !

Segment Leq : 61.12 dBA

Results segment # 2: MontreaLEB (night)

Source height = 1.50 m

ROAD (0.00 + 59.20 + 0.00) = 59.20 dBA

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

0 71 0.00 66.66 0.00 -3.42 -4.04 0.00 0.00 0.00 59.20

Segment Leq : 59.20 dBA

Total Leq All Segments: 63.28 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.87
(NIGHT): 63.28