



Roadway Traffic Noise Assessment

1145 Carp Road

Ottawa, Ontario

REPORT: GWE17-057 – Traffic Noise

Prepared For:

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EXECUTIVE SUMMARY

This document describes a roadway traffic noise assessment performed for a proposed residential development located at 1145 Carp Road, in Ottawa, Ontario. The development comprises a new four-storey building, as well as renovation of an existing two-storey heritage building used for commercial purposes on the same property. Amenity space is provided at grade to the rear of the new four-storey building, as well as at balconies for each residential suite. The major source of transportation noise is Carp Road and Hazeldean Road. 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 and Climate Change (MOECC) 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 Vandenberg & Wildeboer Architects.

The results of the current analysis indicate that noise levels will range between 60 and 71 dBA during the daytime period (07:00-23:00) and between 53 and 64 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 71 dBA) occur along the development's south and west facades, which are nearest and most exposed to Carp Road and Hazeldean Road. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated on Figures 3 – 4.

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

Noise levels at the rear patio (Receptor 6) are expected to approach 60 dBA during the daytime period. If this area is to be used as an outdoor living area, noise control measures are required to reduce the L_{eq} to 55 dBA. Consideration of a 2.5-meter noise barrier surrounding the patio, proved that noise levels can be reduced to 55 dBA, as illustrated in Figure 5. Noise barriers must be continuous with no openings and have a minimum surface density of 20 kg/m². As found in Part 5 of the ENCG with regards to noise barrier design, the following information will be required by the City for review prior to the approval of the grading plan and installation:

1. Shop drawings, signed and sealed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing the details of the acoustic barrier systems components, including material specifications.
2. Structural drawing(s), signed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.
3. Layout plan, and wall elevations, showing proposed colours and patterns.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by Saint Joseph Developments to undertake a roadway traffic noise assessment of a proposed residential development located at 1145 Carp 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 Ministry of the Environment and Climate Change (MOECC)² guidelines. Noise calculations were based on architectural drawings received from Vandenberg & Wildeboer 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 roadway traffic noise assessment is a proposed residential development, comprising a new four-storey building, as well as an existing two-storey heritage building used for commercial purposes on the same property. The site is located northeast of the Carp Road & Hazeldean Road intersection. The site is surrounded by commercial and residential land uses. Amenity space is provided at grade to the rear of the new four-storey building. Balconies less than 4 m in depth are not considered as outdoor living areas, as per the ENCG. The major source of transportation noise is Carp Road and Hazeldean Road. Figure 1 illustrates a complete site plan with surrounding context.

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 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 of this report.

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

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 limit range (that is relevant to this study) is 45 and 40 dBA for living rooms and sleeping quarters respectively, as listed in Table 1. To account for deficiencies in building construction, these levels should be targeted toward 47, 42 and 37 dBA.

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) 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 normally triggers the need for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, 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.

4.2.1 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

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 MOECC, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8

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

⁷ City of Ottawa Transportation Master Plan, November 2013

are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway / Transit Class	Speed Limit (km/h)	Traffic Volumes
Carp Road	4-UAD	60	35,000
Hazeldean Road	4-UAD	60	35,000

4.2.2 Theoretical Transportation Noise Predictions

Noise predictions were performed with the aid of the MOECC computerized noise assessment program, STAMSON 5.04, for road and rail analysis. Roadway traffic noise calculations were performed by treating each roadway 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 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 was taken to be 92% / 8% respectively for all streets
- Absorptive and reflective intermediate ground surfaces based on specific source-receiver path ground characteristics
- Topography considered in height parameters
- Study building considered as potential for noise barrier for some receptors.
- Receptor distances and exposure angles illustrated in Figures A1-A3 in Appendix A.

Noise receptors were strategically identified at six locations around the study area (see Figure 2).

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in

conformance with the Ontario Building Code (2012) typically exceed STC 35, depending on exterior cladding, thickness and interior finish details. For example, brick veneer walls can achieve STC 50 or more. Standard vinyl or wood sided exterior “2X6” walls have around STC 35. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40, depending on the window manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

As per Section 4.2, 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 procedure⁸ 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 research⁹, 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).

⁸ Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985

⁹ CMHC, Road & Rail Noise: Effects on Housing
Saint Joseph Developments – 1145 Carp Road

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)	
		Day	Night
1	4 th Floor – Four-storey Building – North Façade	64	56
2	4 th Floor – Four-storey Building – East Façade	68	61
3	4 th Floor – Four-storey Building – South Façade	70	62
4	4 th Floor – Four-storey Building – South Façade	70	63
5	4 th Floor – Four-storey Building – West Façade	71	64
6	Ground Level – Four-storey Building – Rear Patio	60	53

The results of the current analysis indicate that noise levels will range between 60 and 71 dBA during the daytime period (07:00-23:00) and between 53 and 64 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 71 dBA) occur along the development's south and west facades, which are nearest and most exposed to Carp Road and Hazeldean Road.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.3 the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels). As per city of Ottawa requirements, detailed STC calculations will be required to be completed prior to building permit application for each unit type. The STC requirements for the windows are summarized below for various units within the development (see Figures 3 – 4):

- **Bedroom Windows**

- (i) Bedroom windows facing west on the four-storey building will require a minimum STC of 34
- (ii) Bedroom windows facing south on the four-storey building will require a minimum STC of 33
- (iii) Bedroom windows facing east on the four-storey building will require a minimum STC of 31
- (iv) All other bedroom windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Living Room Windows**

- (i) Living room windows facing west on the four-storey building will require a minimum STC of 29
- (ii) Living room windows facing south on the four-storey building will require a minimum STC of 28
- (iii) Living room windows facing east on the four-storey building will require a minimum STC of 26
- (iv) All other bedroom windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Exterior Walls**

- (i) Exterior wall components on the east south and west façades of the four-storey building will require a minimum STC of 45 which will be achieved with brick cladding or an acoustical equivalent according to NRC test data¹⁰

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

¹⁰ J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.

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

5.3 Noise Barrier Calculation

Noise levels at the rear patio (Receptor 6) are expected to approach 60 dBA during the daytime period. If this area is to be used as an outdoor living area, noise control measures are required to reduce the L_{eq} to 55 dBA. Consideration of a 2.5-meter noise barrier surrounding the patio, proved that noise levels can be reduced to 55 dBA, as illustrated in Figure 5. Noise barriers must be continuous with no openings, and have a minimum surface density of 20 kg/m². Table 11 summarizes the results of the barrier investigation. Design of the barriers will conform to the requirements outlined in Part 5 of the ENCG.

TABLE 4: RESULTS OF BARRIER INVESTIGATION

Location	Reference Receptors	Barrier Height (m)	Daytime L_{eq} Noise Levels (dBA)	
			Without Barrier	With Barrier
Four-storey Building – Rear Patio	6	2.5	60	55

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 60 and 71 dBA during the daytime period (07:00-23:00) and between 53 and 64 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 71 dBA) occur along the development's south and west facades, which are nearest and most exposed to Carp Road and Hazeldean Road. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated on Figures 3 – 4.

Noise levels at the rear patio (Receptor 6) are expected to approach 60 dBA during the daytime period. If this area is to be used as an outdoor living area, noise control measures are required to reduce the L_{eq} to 55 dBA. Consideration of a 2.5-meter noise barrier surrounding the patio, proved that noise levels can be reduced to 55 dBA, as illustrated in Figure 5. Noise barriers must be continuous with no openings, and

have a minimum surface density of 20 kg/m². As found in Part 5 of the ENCG with regards to noise barrier design, the following information will be required by the City for review prior to the approval of the grading plan and installation:

1. Shop drawings, signed and sealed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing the details of the acoustic barrier systems components, including material specifications.
2. Structural drawing(s), signed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.
3. Layout plan, and wall elevations, showing proposed colours and patterns.

Results of the calculations also indicate that the new four-storey building will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. Additionally, an acoustic barrier with a height of 2.5-metres is required for the patio as illustrated in Figure 5. The following Warning Clause¹¹ will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized below:

“Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing roadway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment and Climate Change. To help address the need for sound attenuation, this development includes:

¹¹ City of Ottawa Environmental Noise Control Guidelines, January 2016
Saint Joseph Developments – 1145 Carp Road
Roadway Traffic Noise Assessment

- *STC rated multi-pane glazing elements and spandrel panels*
 - *West façade bedroom/living room: STC 34/29*
 - *South façade bedroom/living room: STC 33/28*
 - *East façade bedroom/living room: STC 31/26*
- *STC rated exterior walls*
 - *East, south and west façade: STC 45*
- *An acoustic barrier 2.5 m in height around the perimeter of the at grade amenity area*

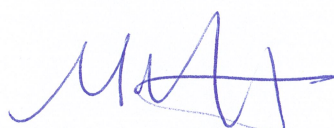
This dwelling unit has also been designed with air conditioning. Air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment and Climate Change.

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

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,

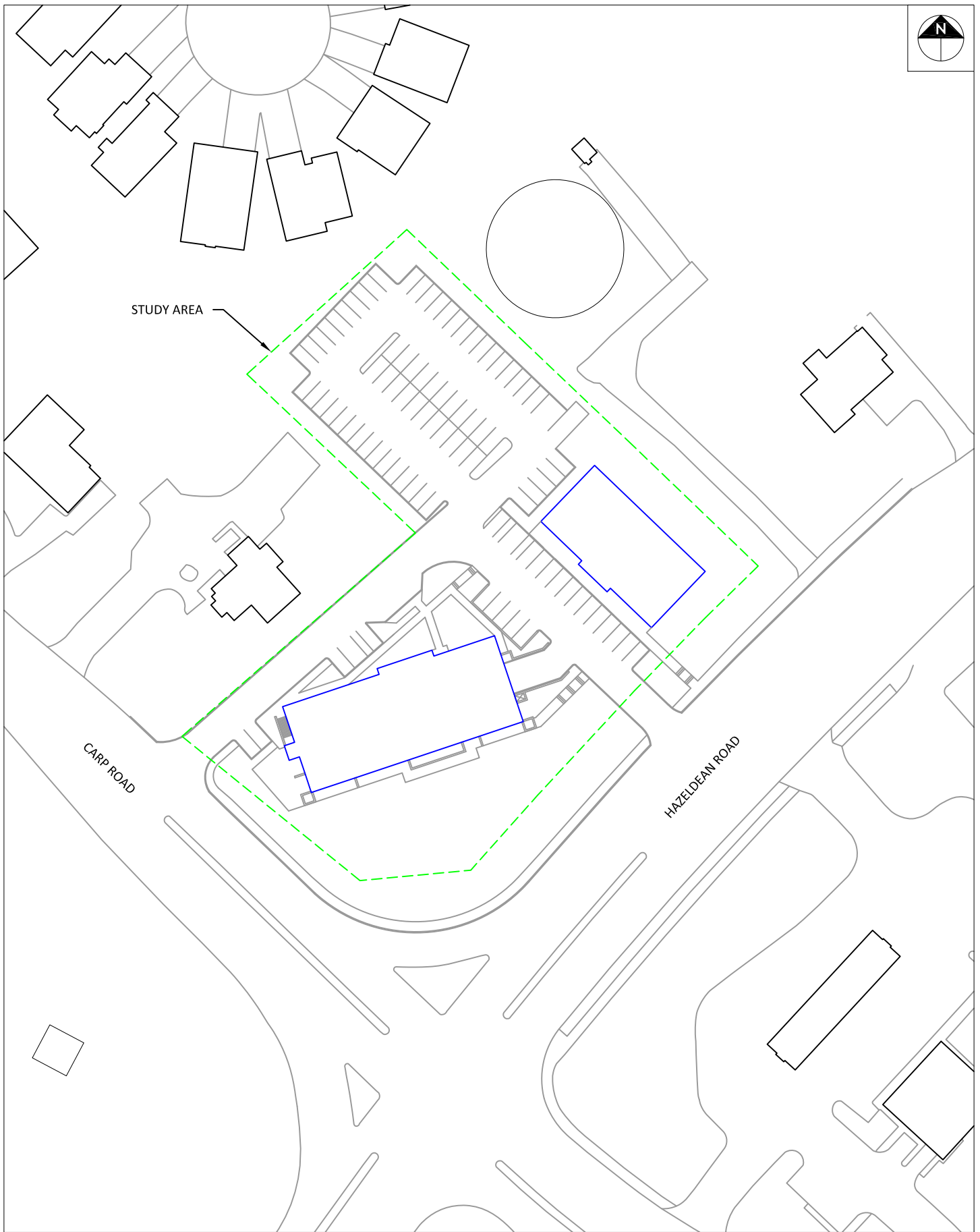
Gradient Wind Engineering Inc.


A handwritten signature in blue ink, appearing to read 'Michael Lafortune'.

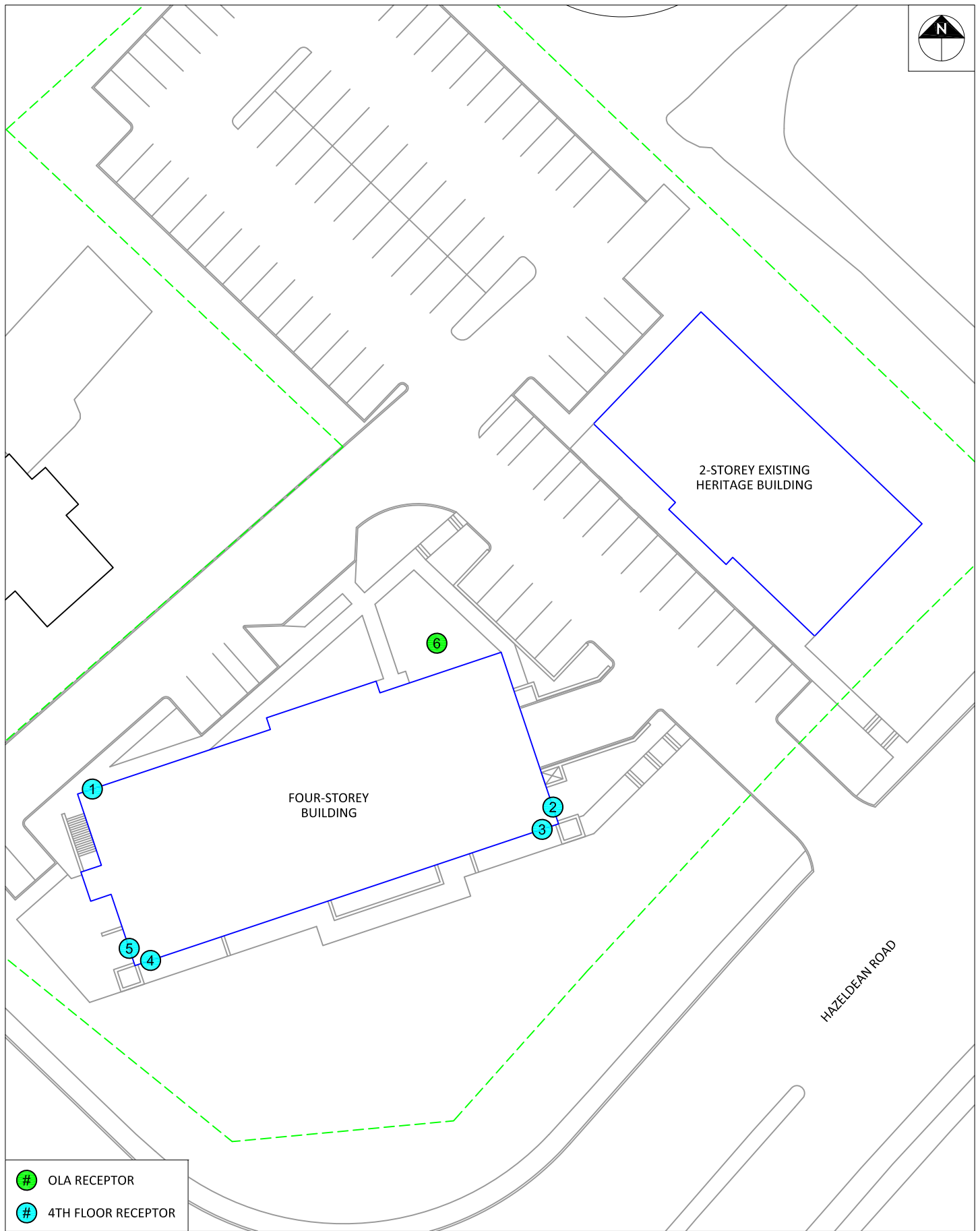
Michael Lafortune, C.E.T.
Environmental Scientist
GWE17-057 – Traffic Noise




Joshua Foster, P.Eng.
Principal

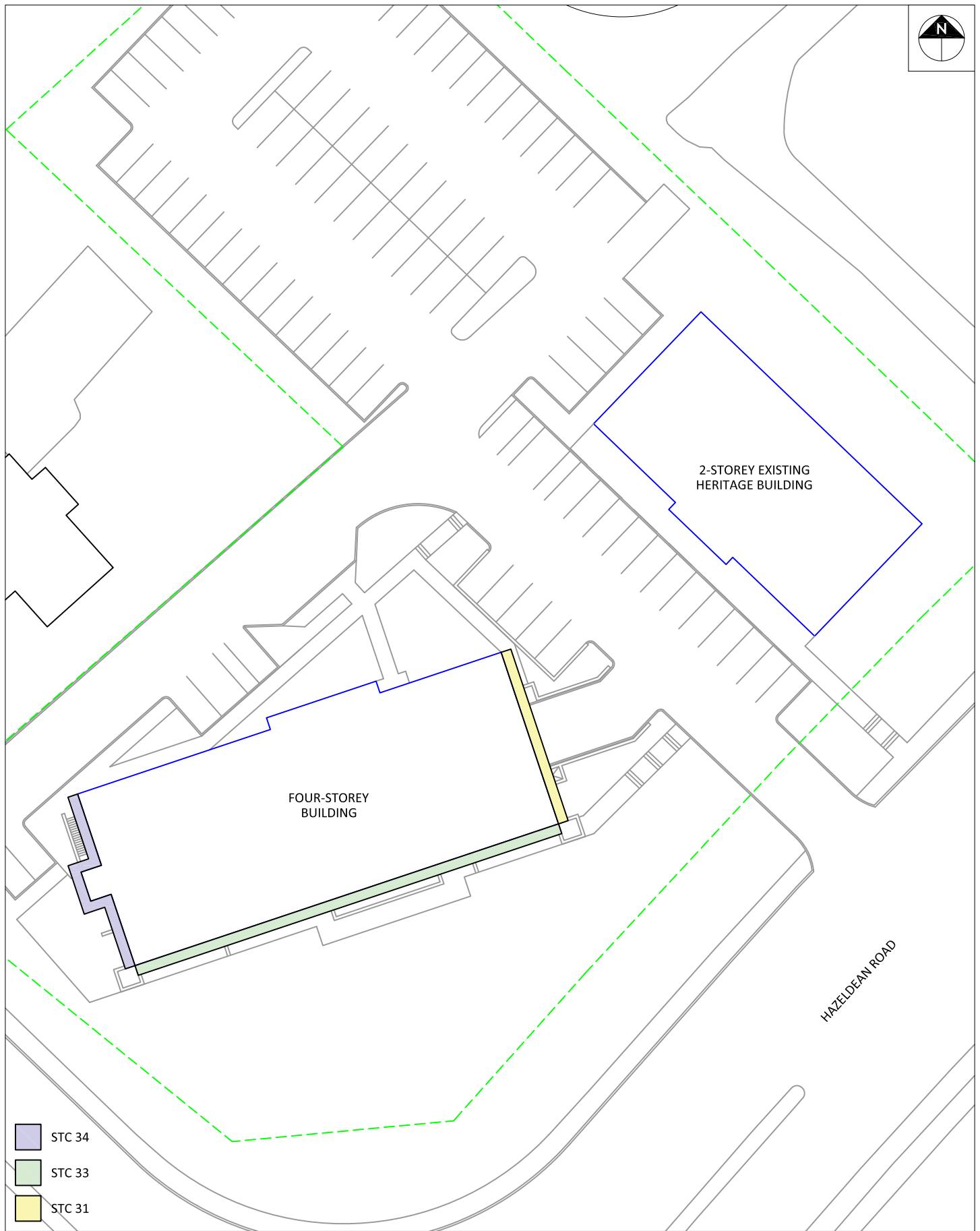


 <div> 127 Walgreen Road Ottawa, Ontario (613) 836 0934 </div>	PROJECT		1145 CARP ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
	SCALE	1:1000 (APPROX.)	DRAWING NO.	GWE17-057-1	
	DATE	AUGUST 3, 2018	DRAWN BY	M.L.	
FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT					



- # OLA RECEPTOR
- # 4TH FLOOR RECEPTOR

	PROJECT 1145 CARP ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION FIGURE 2: RECEPTOR LOCATIONS
	SCALE 1:500 (APPROX.)	DRAWING NO. GWE17-057-2	
	DATE AUGUST 3, 2018	DRAWN BY M.L.	



127 Walgreen Road
Ottawa, Ontario
(613) 836 0934

GRADIENT WIND
ENGINEERING INC

PROJECT

1145 CARP ROAD, OTTAWA
ROADWAY TRAFFIC NOISE ASSESSMENT

SCALE

1:500 (APPROX.)

DRAWING NO.

GWE17-057-3

DATE

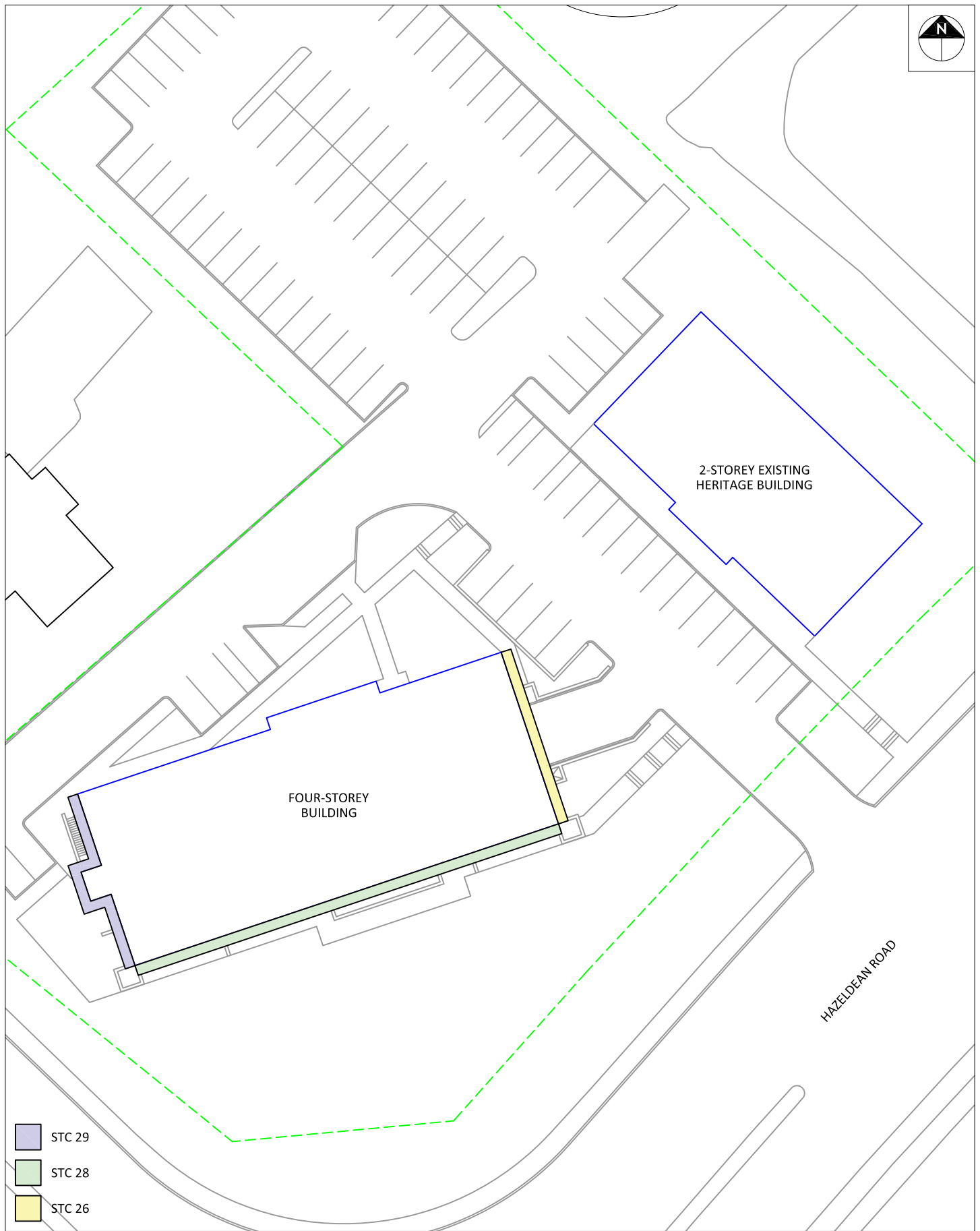
AUGUST 3, 2018

DRAWN BY

M.L.

DESCRIPTION

FIGURE 3:
BEDROOM WINDOW STC REQUIREMENTS



GRADIENT WIND
ENGINEERING INC

127 Walgreen Road
Ottawa, Ontario
(613) 836 0934

PROJECT

1145 CARP ROAD, OTTAWA
ROADWAY TRAFFIC NOISE ASSESSMENT

SCALE

1:500 (APPROX.)

DRAWING NO.

GWE17-057-4

DATE

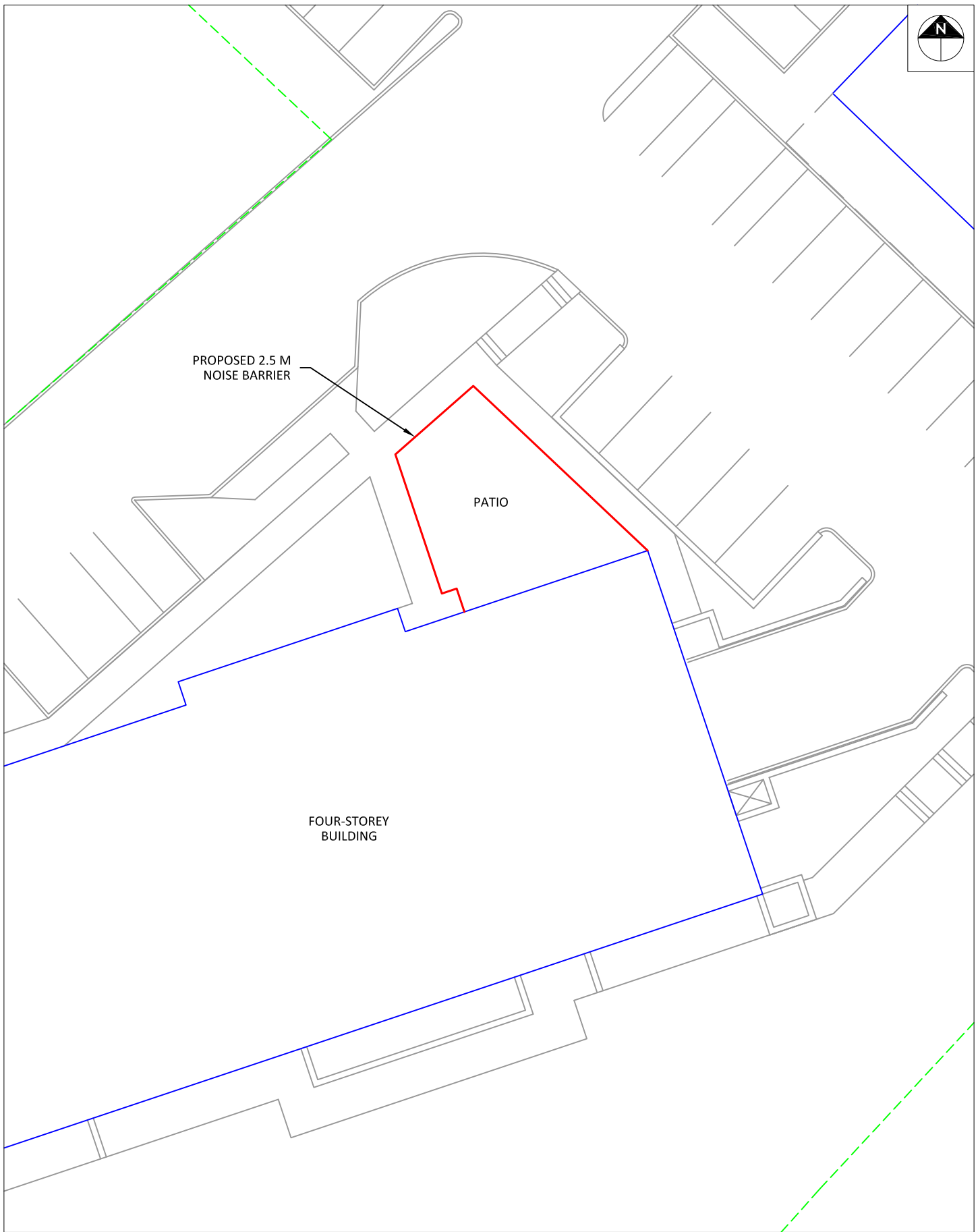
AUGUST 3, 2018


DRAWN BY

M.L.

DESCRIPTION

FIGURE 4:
LIVING ROOM WINDOW STC REQUIREMENTS



	PROJECT 1145 CARP ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION FIGURE 5: PROPOSED NOISE BARRIER LOCATION
	SCALE 1:250 (APPROX.)	DRAWING NO. GWE17-057-5	
	DATE AUGUST 3, 2018	DRAWN BY M.L.	

APPENDIX A

STAMSON 5.04 - INPUT AND OUTPUT DATA

STAMSON 5.0 NORMAL REPORT Date: 15-05-2017 35:15:00
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Carp (day/night)

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: Carp (day/night)

```
-----
Angle1   Angle2      : 28.00 deg  90.00 deg
Wood depth : 0        (No woods.)
No of house rows : 0 / 0
Surface     : 1        (Absorptive ground surface)
Receiver source distance : 33.00 / 33.00 m
Receiver height : 1.50 / 1.50 m
Topography    : 3        (Elevated; no barrier)
Elevation     : 13.50 m
Reference angle : 0.00
```

Results segment # 1: Carp (day)

Source height = 1.50 m

ROAD (0.00 + 63.77 + 0.00) = 63.77 dBA

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

28	90	0.26	73.68	0.00	-4.30	-5.61	0.00	0.00	0.00
63.77									

Segment Leq : 63.77 dBA

Total Leq All Segments: 63.77 dBA

Results segment # 1: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 56.17 + 0.00) = 56.17 dBA

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

28	90	0.26	66.08	0.00	-4.30	-5.61	0.00	0.00	0.00
56.17									

Segment Leq : 56.17 dBA

Total Leq All Segments: 56.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 63.77
(NIGHT) : 56.17

STAMSON 5.0 NORMAL REPORT Date: 15-05-2017 35:15:11
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanL (day/night)

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: HazeldeanL (day/night)

```
-----
Angle1   Angle2       : -90.00 deg   -70.00 deg
Wood depth : 0         (No woods.)
No of house rows : 0 / 0
Surface     : 1         (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography    : 3         (Elevated; no barrier)
Elevation     : 15.50 m
Reference angle : 0.00
```

Road data, segment # 2: HazeldeanR (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: HazeldeanR (day/night)

Angle1	Angle2	:	-48.00 deg	38.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	29.00 / 29.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	3	(Elevated; no barrier)	
Elevation	:	15.50	m	
Reference angle	:	0.00		

Results segment # 1: HazeldeanL (day)

Source height = 1.50 m

ROAD (0.00 + 62.46 + 0.00) = 62.46 dBA

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

-90	-70	0.20	73.68	0.00	0.00	-11.21	0.00	0.00	0.00
62.46									

Segment Leq : 62.46 dBA

Results segment # 2: HazeldeanR (day)

Source height = 1.50 m

ROAD (0.00 + 66.96 + 0.00) = 66.96 dBA

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

-48	38	0.20	73.68	0.00	-3.42	-3.30	0.00	0.00	0.00
66.96									

Segment Leq : 66.96 dBA

Total Leq All Segments: 68.28 dBA

Results segment # 1: HazeldeanL (night)

Source height = 1.50 m

ROAD (0.00 + 54.87 + 0.00) = 54.87 dBA

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

-90	-70	0.20	66.08	0.00	0.00	-11.21	0.00	0.00	0.00
54.87									

Segment Leq : 54.87 dBA

Results segment # 2: HazeldeanR (night)

Source height = 1.50 m

ROAD (0.00 + 59.36 + 0.00) = 59.36 dBA

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

-48	38	0.20	66.08	0.00	-3.42	-3.30	0.00	0.00	0.00
59.36									

Segment Leq : 59.36 dBA

Total Leq All Segments: 60.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.28
(NIGHT): 60.68

STAMSON 5.0 NORMAL REPORT Date: 15-05-2017 35:15:16
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Hazeldean (day/night)

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: Hazeldean (day/night)

```
-----
Angle1   Angle2      : -52.00 deg   90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface     : 1 (Absorptive ground surface)
Receiver source distance : 29.00 / 29.00 m
Receiver height : 1.50 / 1.50 m
Topography    : 3 (Elevated; no barrier)
Elevation     : 15.50 m
Reference angle : 0.00
```

Road data, segment # 2: Carp (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: Carp (day/night)

Angle1	Angle2	:	-63.00 deg	28.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	61.00 / 61.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	3	(Elevated; no barrier)	
Elevation	:	13.50	m	
Reference angle	:	0.00		



Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 68.85 + 0.00) = 68.85 dBA

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

SubLeq

-52	90	0.20	73.68	0.00	-3.42	-1.41	0.00	0.00	0.00
68.85									

Segment Leq : 68.85 dBA

Results segment # 2: Carp (day)

Source height = 1.50 m

ROAD (0.00 + 62.88 + 0.00) = 62.88 dBA

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

SubLeq

-63	28	0.26	73.68	0.00	-7.65	-3.15	0.00	0.00	0.00
62.88									

Segment Leq : 62.88 dBA

Total Leq All Segments: 69.83 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 61.25 + 0.00) = 61.25 dBA

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

--									
-52	90	0.20	66.08	0.00	-3.42	-1.41	0.00	0.00	0.00
61.25									

--									

Segment Leq : 61.25 dBA

Results segment # 2: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 55.28 + 0.00) = 55.28 dBA

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

--									
-63	28	0.26	66.08	0.00	-7.65	-3.15	0.00	0.00	0.00
55.28									

--									

Segment Leq : 55.28 dBA

Total Leq All Segments: 62.23 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.83
(NIGHT): 62.23

STAMSON 5.0 NORMAL REPORT Date: 15-05-2017 35:15:20
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Hazeldean (day/night)

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: Hazeldean (day/night)

```
-----
Angle1   Angle2      : -52.00 deg   90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface     : 1 (Absorptive ground surface)
Receiver source distance : 54.00 / 54.00 m
Receiver height : 1.50 / 1.50 m
Topography    : 3 (Elevated; no barrier)
Elevation     : 15.50 m
Reference angle : 0.00
```

Road data, segment # 2: Carp (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: Carp (day/night)

Angle1	Angle2	:	-80.00 deg	28.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	25.00 / 25.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	3	(Elevated; no barrier)	
Elevation	:	13.50	m	
Reference angle	:	0.00		



Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 65.62 + 0.00) = 65.62 dBA

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

SubLeq

-52	90	0.20	73.68	0.00	-6.65	-1.41	0.00	0.00	0.00
65.62									

Segment Leq : 65.62 dBA

Results segment # 2: Carp (day)

Source height = 1.50 m

ROAD (0.00 + 68.33 + 0.00) = 68.33 dBA

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

SubLeq

-80	28	0.26	73.68	0.00	-2.78	-2.56	0.00	0.00	0.00
68.33									

Segment Leq : 68.33 dBA

Total Leq All Segments: 70.19 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 58.03 + 0.00) = 58.03 dBA

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

-52	90	0.20	66.08	0.00	-6.65	-1.41	0.00	0.00	0.00
58.03									

Segment Leq : 58.03 dBA

Results segment # 2: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 60.73 + 0.00) = 60.73 dBA

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

-80	28	0.26	66.08	0.00	-2.78	-2.56	0.00	0.00	0.00
60.73									

Segment Leq : 60.73 dBA

Total Leq All Segments: 62.60 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.19
(NIGHT): 62.60

STAMSON 5.0 NORMAL REPORT Date: 15-05-2017 35:15:25
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Hazeldean (day/night)

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: Hazeldean (day/night)

```
-----
Angle1   Angle2      : 38.00 deg  90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface     : 2 (Reflective ground surface)
Receiver source distance : 56.00 / 56.00 m
Receiver height : 1.50 / 1.50 m
Topography    : 3 (Elevated; no barrier)
Elevation     : 15.50 m
Reference angle : 0.00
```

Road data, segment # 2: Carp (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: Carp (day/night)

Angle1	Angle2	:	-62.00 deg	90.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	25.00 / 25.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	3	(Elevated; no barrier)	
Elevation	:	13.50	m	
Reference angle	:	0.00		



Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 62.56 + 0.00) = 62.56 dBA

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

SubLeq

--									
38	90	0.00	73.68	0.00	-5.72	-5.39	0.00	0.00	0.00
62.56									

Segment Leq : 62.56 dBA

Results segment # 2: Carp (day)

Source height = 1.50 m

ROAD (0.00 + 70.72 + 0.00) = 70.72 dBA

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

SubLeq

--									
-62	90	0.00	73.68	0.00	-2.22	-0.73	0.00	0.00	0.00
70.72									

Segment Leq : 70.72 dBA

Total Leq All Segments: 71.34 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 54.97 + 0.00) = 54.97 dBA

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

38	90	0.00	66.08	0.00	-5.72	-5.39	0.00	0.00	0.00
54.97									

Segment Leq : 54.97 dBA

Results segment # 2: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 63.13 + 0.00) = 63.13 dBA

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

-62	90	0.00	66.08	0.00	-2.22	-0.73	0.00	0.00	0.00
63.13									

Segment Leq : 63.13 dBA

Total Leq All Segments: 63.75 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.34
(NIGHT): 63.75



STAMSON 5.0 NORMAL REPORT Date: 15-06-2017 12:06:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanL (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HazeldeanL (day/night)

Angle1 Angle2 : -90.00 deg -57.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 34.00 / 34.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -57.00 deg
Barrier height : 7.00 m
Barrier receiver distance : 21.00 / 21.00 m
Source elevation : 125.00 m
Receiver elevation : 129.00 m
Barrier elevation : 126.00 m
Reference angle : 0.00

Road data, segment # 2: HazeldeanC (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: HazeldeanC (day/night)

Angle1	Angle2	:	-57.00 deg	-48.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	34.00 / 34.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	2	(Flat/gentle slope; with barrier)	
Barrier angle1	:	-57.00 deg	Angle2 :	-48.00 deg
Barrier height	:	0.00 m		
Barrier receiver distance	:	4.00 / 4.00	m	
Source elevation	:	125.00 m		
Receiver elevation	:	129.00 m		
Barrier elevation	:	129.00 m		
Reference angle	:	0.00		

Road data, segment # 3: HazeldeanR (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 3: HazeldeanR (day/night)

Angle1	Angle2	:	-48.00 deg	90.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	48.00 / 48.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	2	(Flat/gentle slope; with barrier)	
Barrier angle1	:	-48.00 deg	Angle2 :	90.00 deg
Barrier height	:	13.00	m	
Barrier receiver distance	:	4.00 / 4.00	m	
Source elevation	:	125.00	m	
Receiver elevation	:	129.00	m	
Barrier elevation	:	129.00	m	
Reference angle	:	0.00		

Road data, segment # 4: CarpL (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 4: CarpL (day/night)

Angle1	Angle2	:	-67.00 deg	21.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	67.00 / 67.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	2	(Flat/gentle slope; with barrier)	
Barrier angle1	:	-67.00 deg	Angle2 :	21.00 deg
Barrier height	:	13.00 m		
Barrier receiver distance	:	7.00 / 7.00	m	
Source elevation	:	127.00 m		
Receiver elevation	:	129.00 m		
Barrier elevation	:	129.00 m		
Reference angle	:	0.00		

Road data, segment # 5: CarpC (day/night)

```

-----
Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

```

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

```

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

```

Data for Segment # 5: CarpC (day/night)

```

-----
Angle1 Angle2 : 21.00 deg 46.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 67.00 / 67.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 21.00 deg Angle2 : 46.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 4.00 / 4.00 m
Source elevation : 127.00 m
Receiver elevation : 129.00 m
Barrier elevation : 129.00 m
Reference angle : 0.00

```

Road data, segment # 6: CarpR (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 6: CarpR (day/night)

Angle1	Angle2	:	46.00 deg	90.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	67.00 / 67.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	2	(Flat/gentle slope; with barrier)	
Barrier angle1	:	46.00 deg	Angle2 :	90.00 deg
Barrier height	:	6.00 m		
Barrier receiver distance	:	26.00 / 26.00	m	
Source elevation	:	127.00 m		
Receiver elevation	:	129.00 m		
Barrier elevation	:	128.00 m		
Reference angle	:	0.00		

Results segment # 1: HazeldeanL (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	2.03	128.03

ROAD (0.00 + 50.92 + 0.00) = 50.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-90	-57	0.00	73.68	0.00	-3.55	-7.37	0.00	0.00	-11.83

SubLeq

50.92

Segment Leq : 50.92 dBA

Results segment # 2: HazeldeanC (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	1.03	130.03

ROAD (0.00 + 57.11 + 0.00) = 57.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-57	-48	0.00	73.68	0.00	-3.55	-13.01	0.00	0.00	0.00

SubLeq

57.11*

57.11

* Bright Zone !

Segment Leq : 57.11 dBA

Results segment # 3: HazeldeanR (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	1.17	130.17

ROAD (0.00 + 48.24 + 0.00) = 48.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-48	90	0.00	73.68	0.00	-5.05	-1.15	0.00	0.00	-19.23

SubLeq

Segment Leq : 48.24 dBA

Results segment # 4: CarpL (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	1.29	130.29

ROAD (0.00 + 44.07 + 0.00) = 44.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-67	21	0.00	73.68	0.00	-6.50	-3.11	0.00	0.00	-20.00

SubLeq

Segment Leq : 44.07 dBA

Results segment # 5: CarpC (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	1.38	130.38

ROAD (0.00 + 53.77 + 0.00) = 53.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
21	46	0.66	73.68	0.00	-10.79	-9.12	0.00	0.00	0.00

SubLeq

53.77*	21	46	0.66	73.68	0.00	-10.79	-9.12	0.00	0.00	0.00
53.77	21	46	0.66	73.68	0.00	-10.79	-9.12	0.00	0.00	0.00

* Bright Zone !

Segment Leq : 53.77 dBA

Results segment # 6: CarpR (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	1.72	129.72

ROAD (0.00 + 47.58 + 0.00) = 47.58 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
46	90	0.30	73.68	0.00	-8.45	-7.65	0.00	0.00	-9.99

SubLeq 47.58

Segment Leq : 47.58 dBA

Total Leq All Segments: 60.11 dBA

Results segment # 1: HazeldeanL (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	2.03	128.03

ROAD (0.00 + 43.33 + 0.00) = 43.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-90	-57	0.00	66.08	0.00	-3.55	-7.37	0.00	0.00	-11.83

SubLeq 43.33

Segment Leq : 43.33 dBA

Results segment # 2: HazeldeanC (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	1.03	130.03

ROAD (0.00 + 49.52 + 0.00) = 49.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-57	-48	0.00	66.08	0.00	-3.55	-13.01	0.00	0.00	0.00

SubLeq

49.52*	-57	-48	0.00	66.08	0.00	-3.55	-13.01	0.00	0.00	0.00
49.52	-57	-48	0.00	66.08	0.00	-3.55	-13.01	0.00	0.00	0.00

* Bright Zone !

Segment Leq : 49.52 dBA

Results segment # 3: HazeldeanR (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	1.17	130.17

ROAD (0.00 + 40.64 + 0.00) = 40.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-48	90	0.00	66.08	0.00	-5.05	-1.15	0.00	0.00	-19.23

SubLeq

40.64	-48	90	0.00	66.08	0.00	-5.05	-1.15	0.00	0.00	-19.23
-------	-----	----	------	-------	------	-------	-------	------	------	--------

Segment Leq : 40.64 dBA

Results segment # 4: CarpL (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	1.29	130.29

ROAD (0.00 + 36.47 + 0.00) = 36.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-67	21	0.00	66.08	0.00	-6.50	-3.11	0.00	0.00	-20.00

SubLeq

36.47

Segment Leq : 36.47 dBA

Results segment # 5: CarpC (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	1.38	130.38

ROAD (0.00 + 46.17 + 0.00) = 46.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
21	46	0.66	66.08	0.00	-10.79	-9.12	0.00	0.00	0.00

SubLeq

46.17*
46.17

* Bright Zone !

Segment Leq : 46.17 dBA

Results segment # 6: CarpR (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 !	1.72 !	129.72

ROAD (0.00 + 39.98 + 0.00) = 39.98 dBA

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

--									
46	90	0.30	66.08	0.00	-8.45	-7.65	0.00	0.00	-9.99
39.98									

--

Segment Leq : 39.98 dBA

Total Leq All Segments: 52.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.11
(NIGHT): 52.51

STAMSON 5.0 NORMAL REPORT Date: 15-06-2017 12:07:04
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6b.te Time Period: Day/Night 16/8 hours
 Description: 2.5 m Barrier

Road data, segment # 1: HazeldeanL (day/night)

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: HazeldeanL (day/night)

```
-----
Angle1   Angle2           : -90.00 deg   -57.00 deg
Wood depth           : 0             (No woods.)
No of house rows     : 0 / 0
Surface              : 2             (Reflective ground surface)
Receiver source distance : 34.00 / 34.00 m
Receiver height       : 1.50 / 1.50 m
Topography           : 2             (Flat/gentle slope; with barrier)
Barrier angle1        : -90.00 deg   Angle2 : -57.00 deg
Barrier height        : 7.00 m
Barrier receiver distance : 21.00 / 21.00 m
Source elevation      : 125.00 m
Receiver elevation    : 129.00 m
Barrier elevation     : 126.00 m
Reference angle       : 0.00
```

Road data, segment # 2: HazeldeanC (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: HazeldeanC (day/night)

Angle1	Angle2	:	-57.00 deg	-48.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	34.00 / 34.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	2	(Flat/gentle slope; with barrier)	
Barrier angle1	:	-57.00 deg	Angle2 :	-48.00 deg
Barrier height	:	2.50 m		
Barrier receiver distance	:	4.00 / 4.00	m	
Source elevation	:	125.00 m		
Receiver elevation	:	129.00 m		
Barrier elevation	:	129.00 m		
Reference angle	:	0.00		

Road data, segment # 3: HazeldeanR (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 3: HazeldeanR (day/night)

Angle1	Angle2	:	-48.00 deg	90.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	48.00 / 48.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	2	(Flat/gentle slope; with barrier)	
Barrier angle1	:	-48.00 deg	Angle2 :	90.00 deg
Barrier height	:	13.00 m		
Barrier receiver distance	:	4.00 / 4.00	m	
Source elevation	:	125.00 m		
Receiver elevation	:	129.00 m		
Barrier elevation	:	129.00 m		
Reference angle	:	0.00		

Road data, segment # 4: CarpL (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 4: CarpL (day/night)

Angle1	Angle2	:	-67.00 deg	21.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	67.00 / 67.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	2	(Flat/gentle slope; with barrier)	
Barrier angle1	:	-67.00 deg	Angle2 :	21.00 deg
Barrier height	:	13.00 m		
Barrier receiver distance	:	7.00 / 7.00	m	
Source elevation	:	127.00 m		
Receiver elevation	:	129.00 m		
Barrier elevation	:	129.00 m		
Reference angle	:	0.00		

Road data, segment # 5: CarpC (day/night)

```
-----
Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00
```

Data for Segment # 5: CarpC (day/night)

```
-----
Angle1 Angle2 : 21.00 deg 46.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 67.00 / 67.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 21.00 deg Angle2 : 46.00 deg
Barrier height : 2.50 m
Barrier receiver distance : 4.00 / 4.00 m
Source elevation : 127.00 m
Receiver elevation : 129.00 m
Barrier elevation : 129.00 m
Reference angle : 0.00
```

Road data, segment # 6: CarpR (day/night)

Car traffic volume	:	28336/2464	veh/TimePeriod	*
Medium truck volume	:	2254/196	veh/TimePeriod	*
Heavy truck volume	:	1610/140	veh/TimePeriod	*
Posted speed limit	:	60 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 6: CarpR (day/night)

Angle1	Angle2	:	46.00 deg	90.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	67.00 / 67.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	2	(Flat/gentle slope; with barrier)	
Barrier angle1	:	46.00 deg	Angle2 :	90.00 deg
Barrier height	:	6.00 m		
Barrier receiver distance	:	26.00 / 26.00	m	
Source elevation	:	127.00 m		
Receiver elevation	:	129.00 m		
Barrier elevation	:	128.00 m		
Reference angle	:	0.00		

Results segment # 1: HazeldeanL (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	2.03	128.03

ROAD (0.00 + 50.92 + 0.00) = 50.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-90	-57	0.00	73.68	0.00	-3.55	-7.37	0.00	0.00	-11.83

SubLeq

50.92

Segment Leq : 50.92 dBA

Results segment # 2: HazeldeanC (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	1.03	130.03

ROAD (0.00 + 46.40 + 0.00) = 46.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-57	-48	0.00	73.68	0.00	-3.55	-13.01	0.00	0.00	-10.71

SubLeq

46.40

Segment Leq : 46.40 dBA

Results segment # 3: HazeldeanR (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	1.17	130.17

ROAD (0.00 + 48.24 + 0.00) = 48.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-48	90	0.00	73.68	0.00	-5.05	-1.15	0.00	0.00	-19.23

SubLeq

48.24

Segment Leq : 48.24 dBA

Results segment # 4: CarpL (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	1.29	130.29

ROAD (0.00 + 44.07 + 0.00) = 44.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-67	21	0.00	73.68	0.00	-6.50	-3.11	0.00	0.00	-20.00

SubLeq

44.07

Segment Leq : 44.07 dBA

Results segment # 5: CarpC (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	1.38	130.38

ROAD (0.00 + 45.17 + 0.00) = 45.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
21	46	0.51	73.68	0.00	-9.82	-9.00	0.00	0.00	-9.69

SubLeq 45.17

Segment Leq : 45.17 dBA

Results segment # 6: CarpR (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	1.72	129.72

ROAD (0.00 + 47.58 + 0.00) = 47.58 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
46	90	0.30	73.68	0.00	-8.45	-7.65	0.00	0.00	-9.99

SubLeq 47.58

Segment Leq : 47.58 dBA

Total Leq All Segments: 55.44 dBA

Results segment # 1: HazeldeanL (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	2.03	128.03

ROAD (0.00 + 43.33 + 0.00) = 43.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-90	-57	0.00	66.08	0.00	-3.55	-7.37	0.00	0.00	-11.83

SubLeq

Segment Leq : 43.33 dBA

Results segment # 2: HazeldeanC (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	1.03	130.03

ROAD (0.00 + 38.81 + 0.00) = 38.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-57	-48	0.00	66.08	0.00	-3.55	-13.01	0.00	0.00	-10.71

SubLeq

Segment Leq : 38.81 dBA

Results segment # 3: HazeldeanR (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	1.17	130.17

ROAD (0.00 + 40.64 + 0.00) = 40.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-48	90	0.00	66.08	0.00	-5.05	-1.15	0.00	0.00	-19.23

SubLeq

Segment Leq : 40.64 dBA

Results segment # 4: Carpl (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	1.29	130.29

ROAD (0.00 + 36.47 + 0.00) = 36.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-67	21	0.00	66.08	0.00	-6.50	-3.11	0.00	0.00	-20.00

SubLeq

Segment Leq : 36.47 dBA

Results segment # 5: CarpC (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	1.38	130.38

ROAD (0.00 + 37.57 + 0.00) = 37.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
21	46	0.51	66.08	0.00	-9.82	-9.00	0.00	0.00	-9.69

SubLeq

21 46 0.51 66.08 0.00 -9.82 -9.00 0.00 0.00 -9.69
37.57

Segment Leq : 37.57 dBA

Results segment # 6: CarpR (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 !	1.72 !	129.72

ROAD (0.00 + 39.98 + 0.00) = 39.98 dBA

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

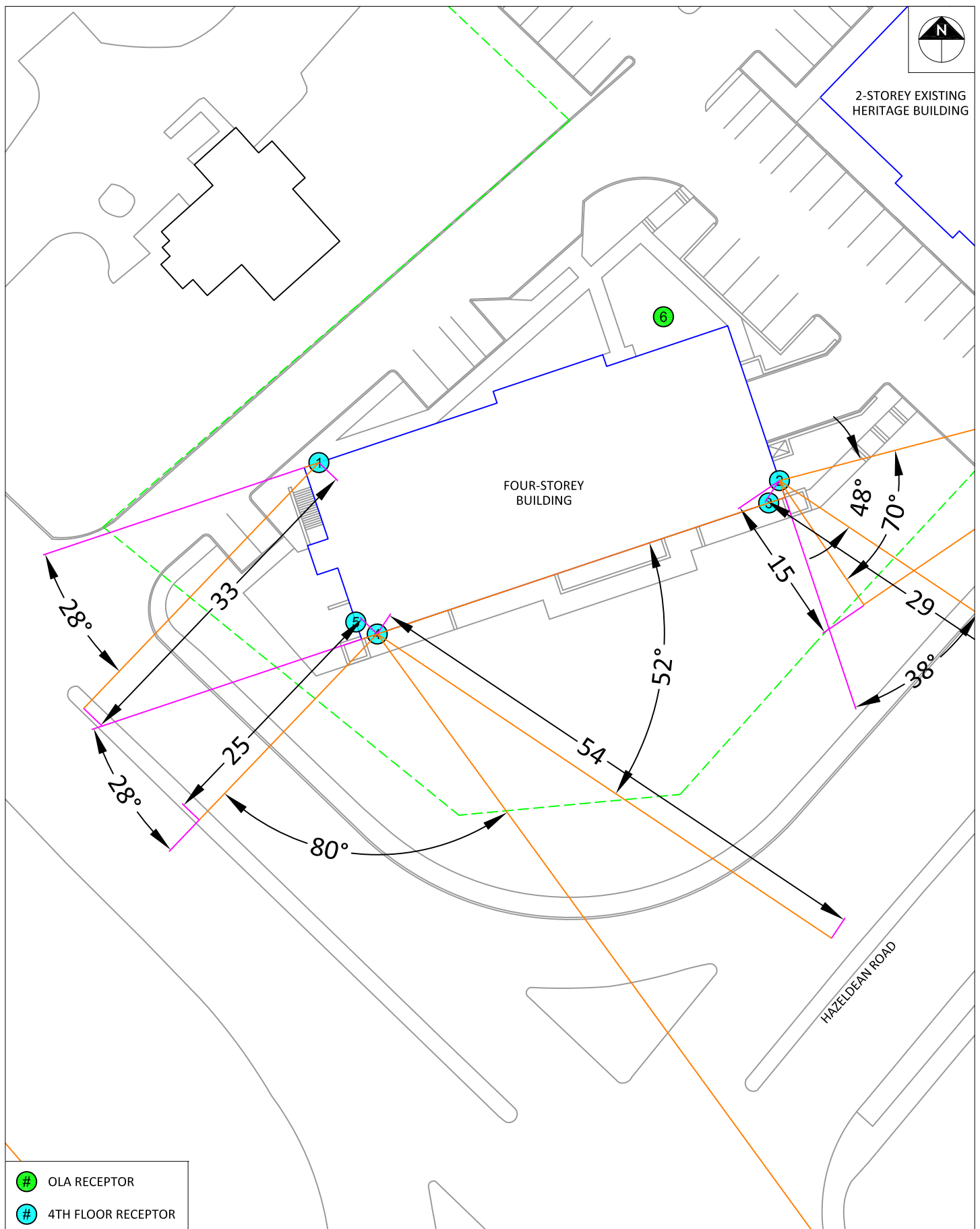
--									
46	90	0.30	66.08	0.00	-8.45	-7.65	0.00	0.00	-9.99
39.98									

--

Segment Leq : 39.98 dBA

Total Leq All Segments: 47.84 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 55.44
(NIGHT) : 47.84



127 Walgreen Road
Ottawa, Ontario
(613) 836 0934

GRADIENT WIND
ENGINEERING INC.

PROJECT

1145 CARP ROAD, OTTAWA
ROADWAY TRAFFIC NOISE ASSESSMENT

SCALE

1:500 (APPROX.)

DRAWING NO.

GWE17-057-A1

DATE

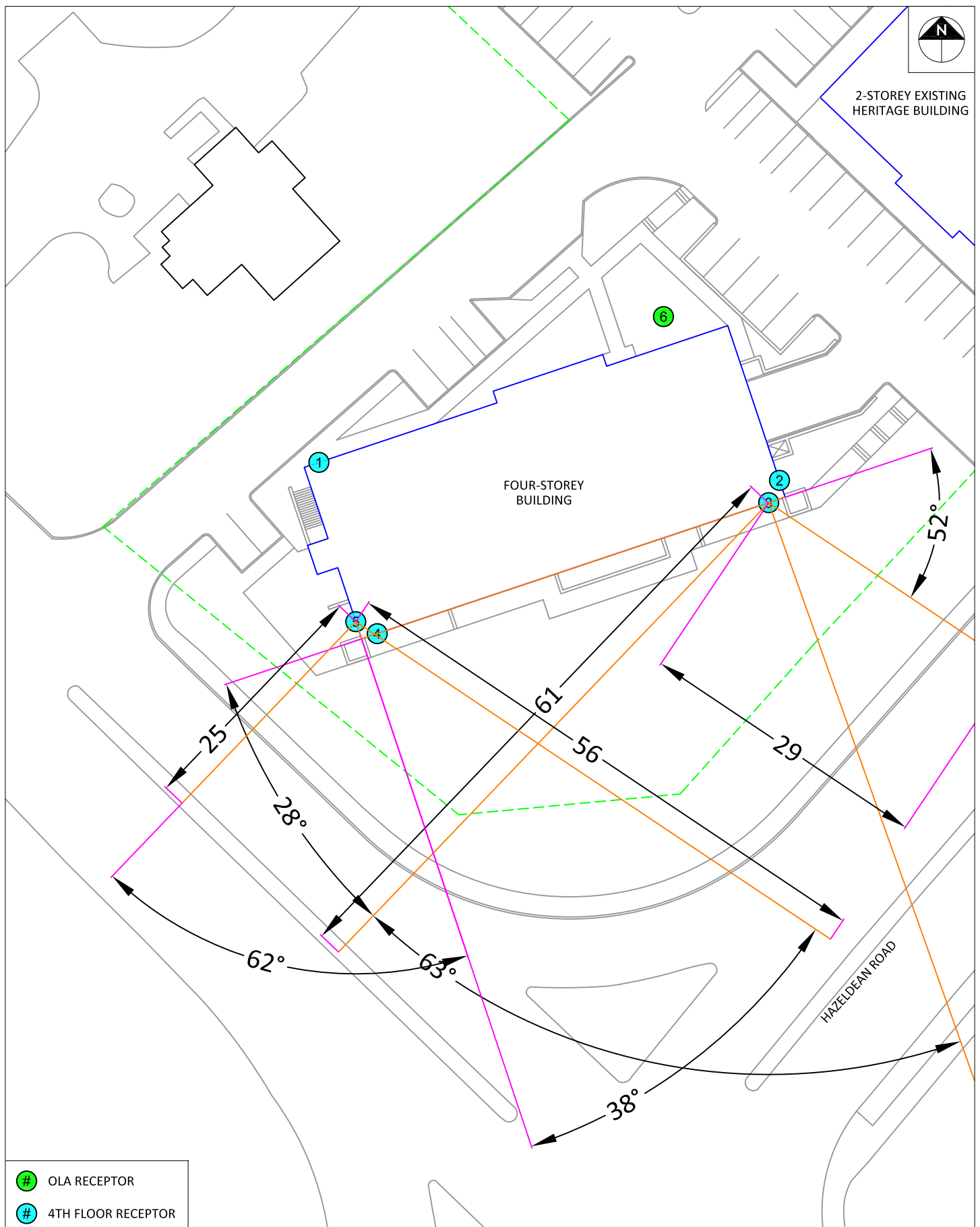
AUGUST 3, 2018

DRAWN BY

M.L.

DESCRIPTION

FIGURE A1:
RECEPTOR DISTANCES AND EXPOSURE ANGLES



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PROJECT	1145 CARP ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT	
SCALE	1:500 (APPROX.)	DRAWING NO. GWE17-057-A2
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DESCRIPTION
FIGURE A2: RECEPTOR DISTANCES AND EXPOSURE ANGLES

