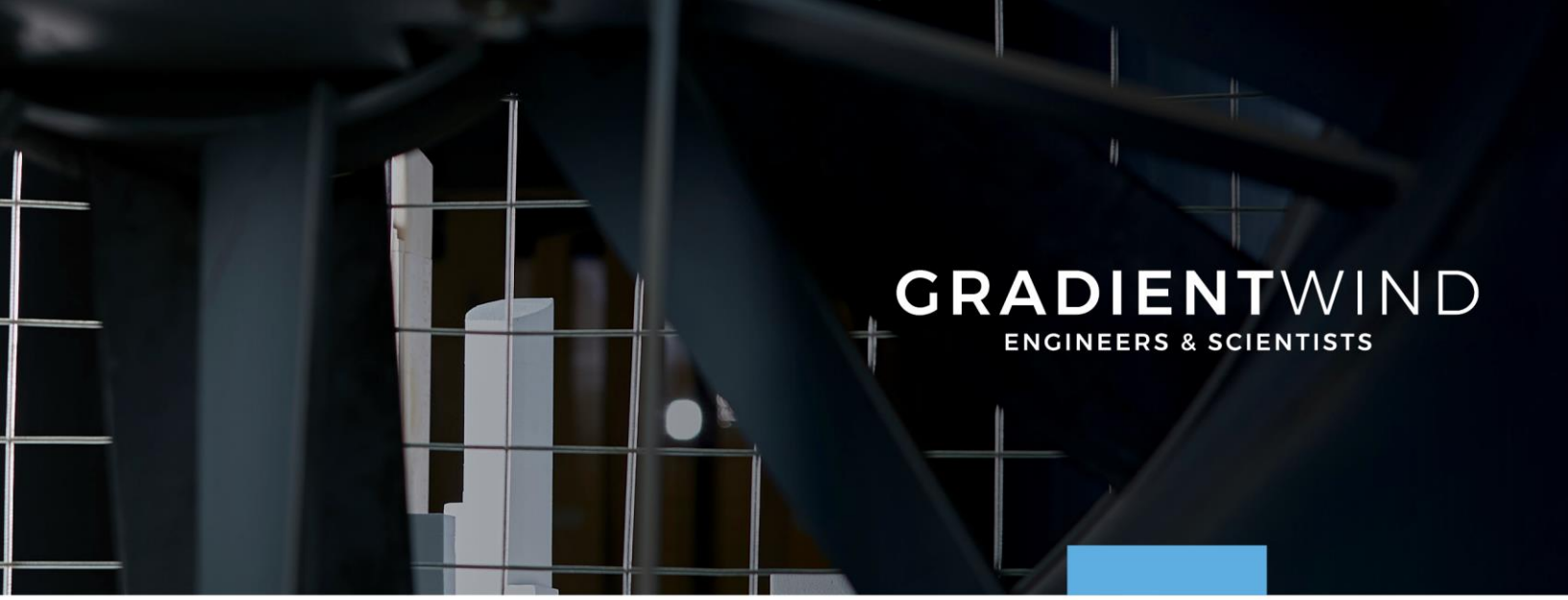

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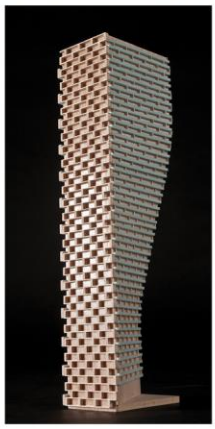
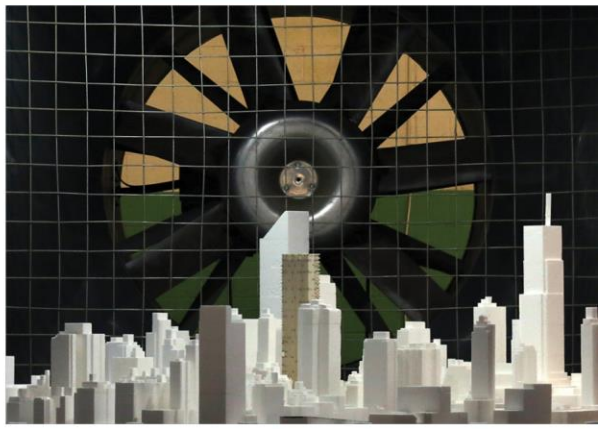
TRANSPORTATION NOISE ASSESSMENT

Borbridge Avenue & Brian Good Avenue
Ottawa, Ontario

Report: GW24 - 229 - Traffic Noise Draft





February 10, 2025

DRAFT

PREPARED FOR

Conseil des écoles catholiques du Centre-Est (CECCE)
4000 Labelle Street
Ottawa, ON K1J 1A1

PREPARED BY

Benjamin Page, AdvDip., Jr. Environmental Scientist
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127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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EXECUTIVE SUMMARY

This report describes a detailed transportation noise assessment performed for the proposed school development located at the intersection of Borbridge Avenue and Brian Good Avenue in Ottawa, Ontario. The study site is on a parcel of land bordered by Borbridge Avenue to the north, Brian Goode Avenue to the west, and low-rise residential dwellings in the remaining directions.

The proposed development comprises a one-storey school with a 'U' shaped planform featuring an academic wing, a sports wing, a central courtyard, and a daycare yard. The development is surrounded by low-rise residential buildings in all directions. The major sources of roadway traffic noise are Borbridge Avenue and Brian Good Avenue. Figure 1 illustrates the site plan with the surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) site plan drawings prepared by GRC Architects, provided January 22, 2025.

The results of the current analysis indicate that noise levels will range between 39 and 63 dBA during the daytime period (07:00-23:00) and 48 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs along the northwest façade, which is most exposed to Borbridge Avenue and Brian Good Avenue. Since noise levels are less than 65 dBA at the building façade, standard building components in compliance with Ontario Building Code standards will be sufficient to attenuate noise levels indoors when windows are closed.

The noise levels predicted due to roadway traffic are between 55 dBA and 65 dBA for the development. Therefore, this building will require forced air heating with provisions for central air conditioning, which if installed at the owner's discretion, will allow building occupants to keep windows closed and maintain a comfortable living environment. However, due to the fact this development is for a school, air conditioning will be provided as part of the design. In addition to ventilation requirements, a Type D warning clause will also be required in all Purchase and Sale Agreements for the benefit of the school board or future purchaser of the school, as summarized in Section 6.

Noise levels at the Daycare Yard amenity area are expected to exceed the 55 dBA OLA noise criterion during the daytime period, reaching up to 59 dBA without mitigation. While noise control measures are not required since levels remain below 60 dBA, they are recommended to reduce noise as close as possible to 55 dBA. A barrier investigation determined that a 2.0 m tall barrier along the north and east perimeters of the Daycare Yard can reduce noise levels to 52 dBA. If noise control measures are not implemented, a Type A warning clause must be included in all Purchase and Sale Agreements for the benefit of the school board or future purchaser of the school, as summarized in Section 6.

With regards to stationary noise impacts, it is recommended a stationary noise study be conducted once mechanical plans for the proposed development become available. This study would assess the impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise-sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. Noise impacts can generally be minimized by judicious selection and placement of the equipment. Where necessary noise screens and silencers can be placed into the design.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Conseil des écoles catholiques du Centre-Est (CECCE) to undertake a transportation noise assessment for the proposed school development located at the intersection of Borbridge Avenue and Brian Good Avenue in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to the assessment of exterior noise levels generated by local roadway traffic.

This assessment is based on theoretical noise calculation methods conforming to the City of Ottawa[1] and the Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on site plan drawings prepared by GRC Architects in January 2025, surrounding street layouts and existing and approved future building massing information obtained from the City of Ottawa, as well as recent satellite imagery, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The subject site is located southeast of the intersection of Borbridge Avenue and Brian Good Avenue in Ottawa, Ontario. The proposed development is on a parcel of land bordered by Borbridge Avenue to the north, Brian Goode Avenue to the west, and low-rise residential dwellings in the remaining directions.

The proposed development comprises a one-storey school with a 'U' shaped planform featuring an academic wing, a sports wing, a central courtyard, and a daycare yard. The site also includes an outdoor soccer field, 57 parking spaces, two bus drop-off zones, 12 spaces for future portables, and a space for a future expansion. This proposal is based on a site plan prepared by GRC Architects, provided January 22, 2025.

[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

The proposed development is surrounded by low-rise residential buildings in all directions. The major sources of roadway traffic noise are Borbridge Avenue and Brian Good Avenue. Figure 1 illustrates the site plan with the surrounding context.

3. OBJECTIVES

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

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure level 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 sound pressure 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 vehicular 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 and LRT, 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) for roadways is 45 and 40 dBA for living rooms and sleeping quarters, respectively, and 50 for retail stores as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA

Type of Space	Time Period	Leq (dBA)
General offices, reception areas, **retail stores**, etc.	07:00 – 23:00	50
Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, etc.	07:00 – 23:00	45
Sleeping quarters of hotels/motels	23:00 – 07:00	45
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction[3]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[4]. Therefore, where noise levels exceed 55 dBA during daytime and 50 dBA at nighttime, the ventilation for the building should consider the need for having windows and doors closed, which triggers

[3] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[4] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8

the need for forced air heating with provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation[5].

The sound level criterion for outdoor living areas (OLA) is 55 dBA, which applies during the daytime period (07:00 to 23:00). When noise levels exceed 55 dBA and are less than or equal to 60 dBA, mitigation should be considered to reduce noise levels to as close to 55 dBA if technically, economically, and administratively feasible. If noise levels exceed 60 dBA, mitigation must be provided to reduce noise levels below 60 dBA.

4.2.2 Theoretical Roadway Noise Predictions

The impact of transportation noise sources on the development was determined by computer modelling. Transportation noise source modelling is based on the software program *Predictor-Lima* which utilizes the United States Federal Highway Administration's Traffic Noise Model (TNM) to represent the roadway line sources. The TNM analysis model has been recognized by the Ministry of Transportation Ontario (MTO) as the recommended noise model for transportation projects (ref. Environmental Guide for Noise, 2022 by the Ministry of Transportation (MTO)[6]). The Ministry of Environment, Conservation and Parks has also adopted the TMN model as per their "Draft Guideline Noise Pollution Control Publications 306 (NPC-306)[7].

The *Predictor-Lima* computer program can represent three-dimensional surfaces and the first reflection of sound waves over a suitable spectrum for human hearing. Calculations were performed for receptors around the study site to determine the noise impact from roadway sources.

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

[5] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3
[6] Ministry of Transportation, Environmental Guide for Noise, 2022. Retrieved from Environmental Guide for Noise 2022
[7] Ministry of Environment, Conservation and Parks, Ontario, "Methods to determine Sound Levels Due to Road and Rail Traffic", Draft February 12, 2020

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all roads was taken to be 92% / 8%, respectively.
- Ground surfaces were taken to be reflective due to the presence of hard ground (pavement, concrete) on the paths between the receptors and road segments.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- A total of seven (7) receptor locations were chosen around the study site; five (5) of them are at the facades of the building as Plane of Window (POW) receptors and two (2) of them as Outdoor Living Area (OLA) receptors. The receptor locations can be seen in Figure 2.
- For select sources where appropriate, receptors considered the proposed and/or existing buildings as a barrier partially or fully obstructing exposure to the source as illustrated by exposure angles in Figure 3.

4.2.3 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[8] which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. The major sources of roadway traffic noise impacting the study site are Borbridge Avenue and Brian Good Avenue. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Borbridge Avenue	2-Lane Major Collector (2-UMCU)	40	**12,000**
Brian Good Avenue	2-Lane Urban Collector (2-UCU)	40	**8,000**

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

5. ROADWAY TRAFFIC NOISE RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Type/Location	Predictor-Lima Noise Level (dBA)	
			Day	Night
1	3.5	POW / Northwest Façade - Level 1	63	55
2	3.5	POW / West Façade - Level 1	61	53
3	3.5	POW / South Façade - Level 1	55	48
4	3.5	POW / East Façade - Level 1	57	49
5	3.5	POW / Northeast Façade - Level 1	61	54
6	1.5	OLA / Central Courtyard Amenity	39	N/A*
7	1.5	OLA / Daycare Yard Amenity	59	N/A*

* OLA noise levels during the nighttime are not considered, as per the ENCG.

The results of the current analysis indicate that noise levels will range between 39 and 63 dBA during the daytime period (07:00-23:00) and 48 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs along the northwest façade, which is most exposed to Borbridge Avenue and Brian Good Avenue. Since noise levels are less than 65 dBA at the building façade, standard building components in compliance with Ontario Building Code standards will be sufficient to attenuate noise levels indoors when windows are closed.

In addition, correlation calculations between Predictor-Lima and STAMSON 5.04 (Ministry of the Environment, Conservations and Parks' (MECP) computerized noise assessment program) were performed for three (3) receptor locations. The results of the calculations (Table 4) showed a good correlation with a difference of ±3 points between Predictor-Lima and STAMSON 5.04. Appendix A includes the STAMSON 5.04 input and output data.

TABLE 4: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Type / Location	Predictor-Lima Noise Level (dBA)		STAMSON 5.04 Noise Level (dBA)	
			Day	Night	Day	Night
1	3.5	POW / Northwest Façade Level 1	63	55	65	58
2	3.5	POW / West Façade - Level 1	61	53	63	56
3	3.5	POW / South Façade - Level 1	55	48	58	50

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic are between 55 dBA and 65 dBA for the development. Therefore, this building will require forced air heating with provisions for central air conditioning, which if installed at the owner's discretion, will allow building occupants to keep windows closed and maintain a comfortable living environment. However, due to the fact this development is for a school, air conditioning will be provided as part of the design. In addition to ventilation requirements, a Type D warning clause will also be required in all Purchase and Sale Agreements for the benefit of the school board or future purchaser of the school, as summarized in Section 6.

5.2.1 Noise Barrier Calculation

Noise levels at the Daycare Yard amenity area are expected to exceed the 55 dBA OLA noise criterion during the daytime period, reaching up to 59 dBA without mitigation. While noise control measures are not required since levels remain below 60 dBA, they are recommended to reduce noise as close as possible to 55 dBA. Further analysis evaluated the noise-mitigating impact of raising the perimeter guards from 1.5 m to 2.5 m above the walking surface. The results, summarized in Table 5, indicate that a 2.0 m tall barrier along the north and east perimeters of the Daycare Yard can reduce noise levels to 52 dBA. Figure 4 illustrates the barrier requirements. If noise control measures are not implemented, a Type A warning clause must be included in all Purchase and Sale Agreements for the benefit of the school board or future purchaser of the school, as summarized in Section 6.

TABLE 5: RESULTS OF NOISE BARRIER INVESTIGATION

Receptor Number	Receptor Height Above Roof (m)	Receptor Location	Daytime L_{eq} Noise Levels (dBA)			
			No Barrier	With 1.5m Barrier	With 2m Barrier	With 2.5m Barrier
R7	1.5	OLA / Daycare Yard Amenity	59	56	52	50

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 39 and 63 dBA during the daytime period (07:00-23:00) and 48 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs along the northwest façade, which is most exposed to Borbridge Avenue and Brian Good Avenue. Since noise levels are less than 65 dBA at the building façade, standard building components in compliance with Ontario Building Code standards will be sufficient to attenuate noise levels indoors when windows are closed. Figures 5 and 6 illustrate the traffic noise contours for daytime and nighttime periods respectively.

The noise levels predicted due to roadway traffic are between 55 dBA and 65 dBA for the development. Therefore, this building will require forced air heating with provisions for central air conditioning, which if installed at the owner's discretion, will allow building occupants to keep windows closed and maintain a comfortable living environment. However, due to the fact this development is for a school, air conditioning will be provided as part of the design. In addition to ventilation requirements, a Type D warning clause will also be required in all Purchase and Sale Agreements for the benefit of the school board or future purchaser of the school, as summarized below:

Type D

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

Noise levels at the Daycare Yard amenity area are expected to exceed the 55 dBA OLA noise criterion during the daytime period, reaching up to 59 dBA without mitigation. While noise control measures are not required since levels remain below 60 dBA, they are recommended to reduce noise as close as possible to 55 dBA. A barrier investigation determined that a 2.0 m tall barrier along the north and east perimeters of the Daycare Yard can reduce noise levels to 52 dBA. If noise control measures are not implemented, a Type A warning clause must be included in all Purchase and Sale Agreements for the benefit of the school board or future purchaser of the school, as summarized below:

Type A

> *"The school board (owner) or daycare tenant are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."*

With regards to stationary noise impacts, it is recommended a stationary noise study be conducted once mechanical plans for the proposed development become available. This study would assess the impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise-sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. Noise impacts can generally be minimized by judicious selection and placement of the equipment. Where necessary noise screens and silencers can be placed into the design.

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

Sincerely,

Gradient Wind Engineering Inc.

Benjamin Page, AdvDip.
Jr. Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #GW24-229 – Traffic Noise Draft

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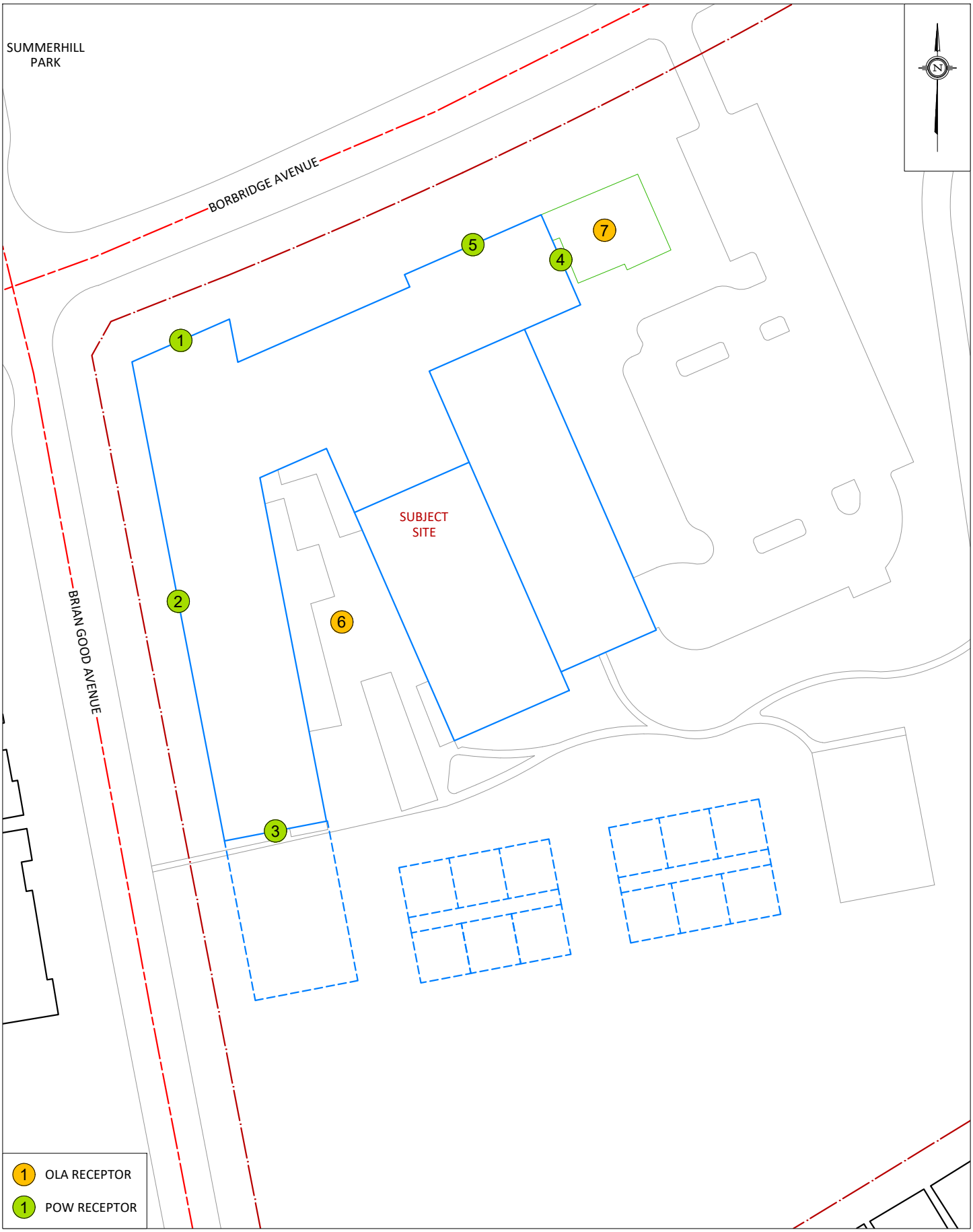
PROJECT	RIVERSIDE SOUTH, OTTAWA TRANSPORTATION NOISE ASSESSMENT
SCALE	1:4000 (SCALE.)
DRAWING NO.	24-229-1
DATE	FEBRUARY 10, 2025
DRAWN BY	B.P.
DESCRIPTION	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT



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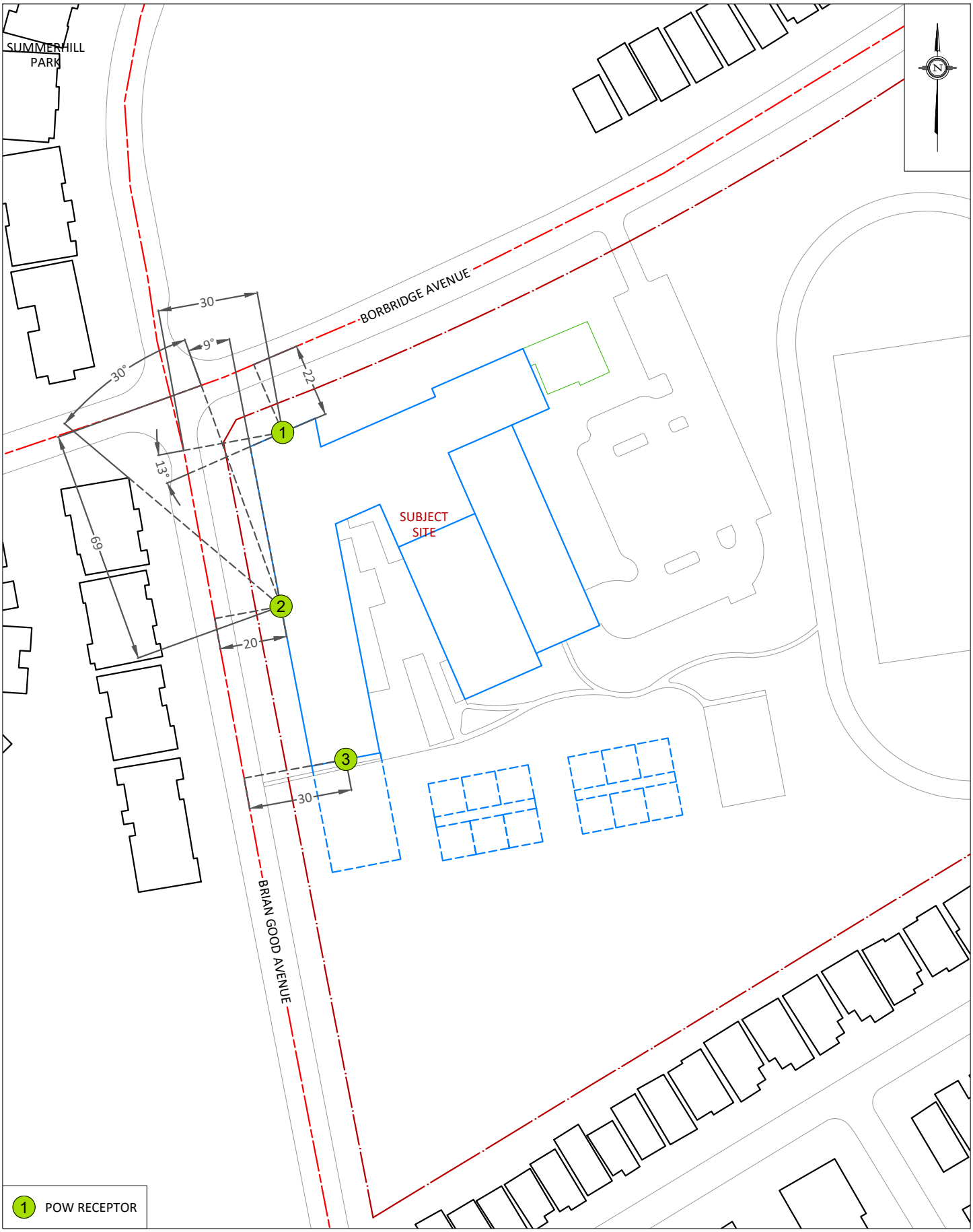
PROJECT	RIVERSIDE SOUTH, OTTAWA TRANSPORTATION NOISE ASSESSMENT		
SCALE	1:1000 (SCALE.)	DRAWING NO.	24-229-2
DATE	FEBRUARY 10, 2025	DRAWN BY	B.P.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS



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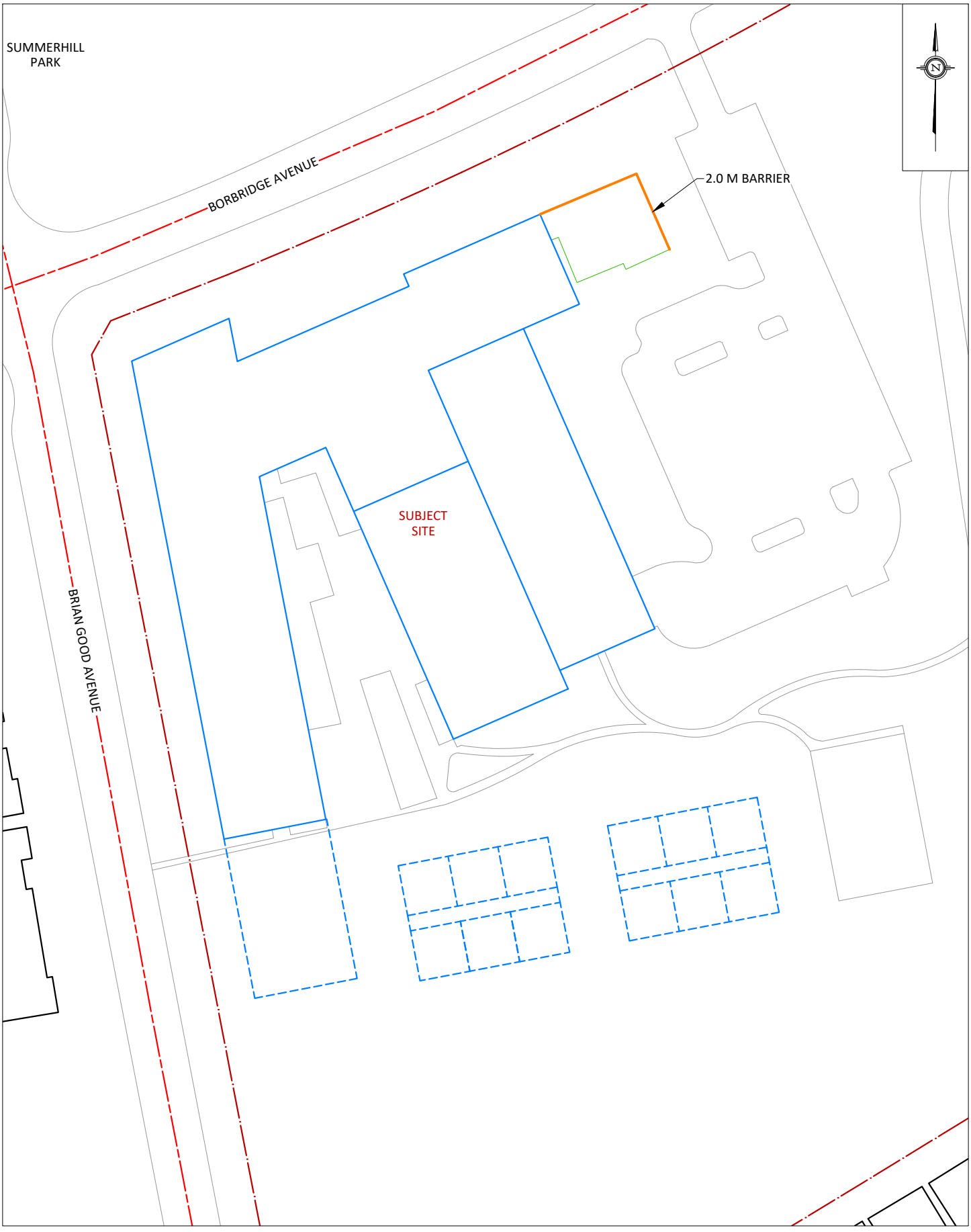
PROJECT	RIVERSIDE SOUTH, OTTAWA TRANSPORTATION NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1500 (SCALE.)	DRAWING NO.	24-229-3
DATE	FEBRUARY 10, 2025	DRAWN BY	B.P.

FIGURE 3:
STAMSON 5.04 INPUT DATA



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PROJECT	RIVERSIDE SOUTH, OTTAWA TRANSPORTATION NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (SCALE.)	DRAWING NO. 24-229-4	FIGURE 4: BARRIER REQUIREMENTS
DATE	FEBRUARY 10, 2025	DRAWN BY B.P.	

FIGURE 5: DAYTIME NOISE CONTOURS (3.5 M ABOVE GRADE)

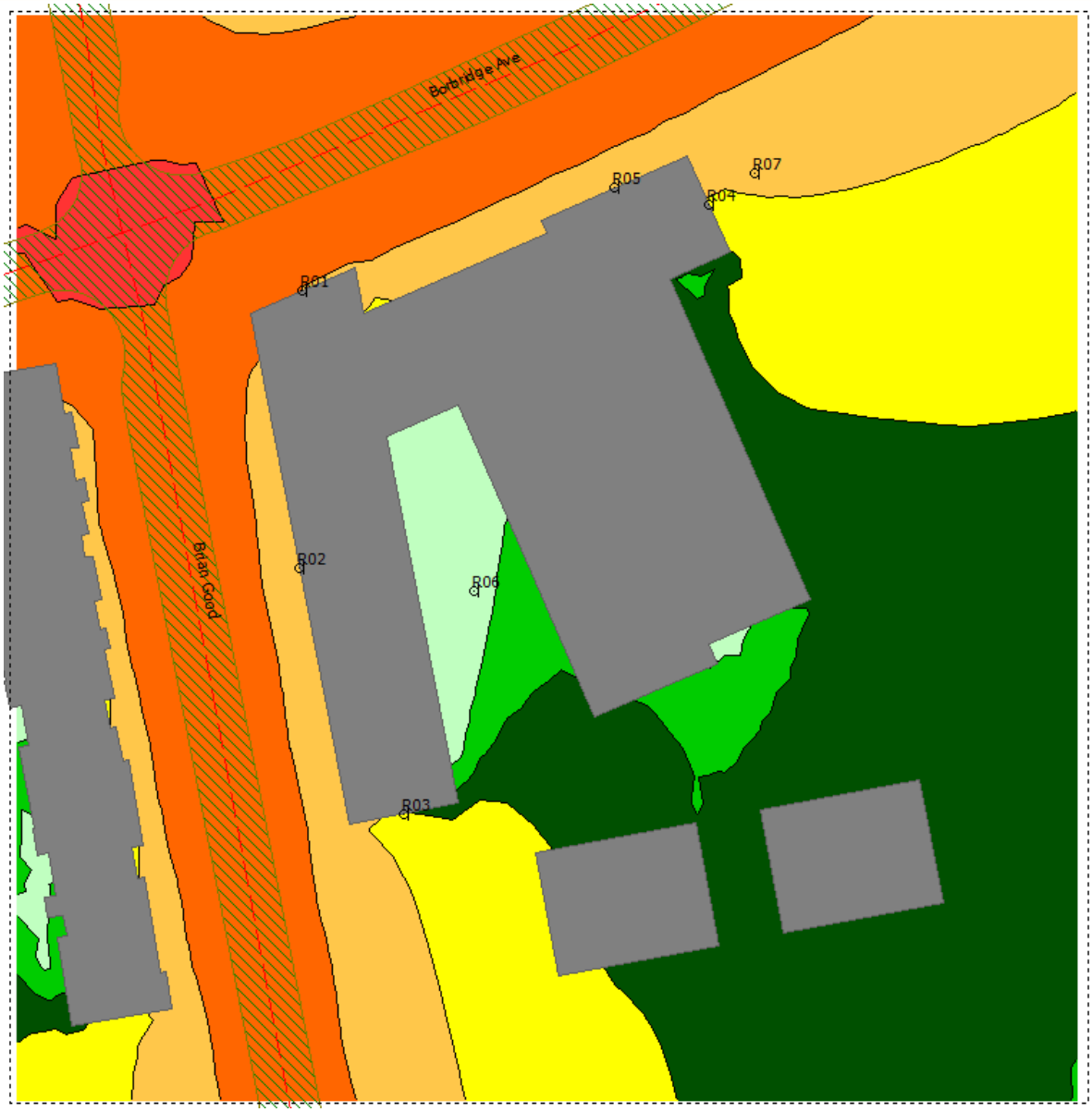

FIGURE 6: NIGHTTIME NOISE CONTOURS (3.5 M ABOVE GRADE)

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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STAMSON 5.0 NORMAL REPORT Date: 10-02-2025 11:41:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R1.te Time Period: Day/Night 16/8 hours
Description:

```
Road data, segment # 1: Borbridge (day/night)
-----------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    veh/TimePeriod  *
Posted speed limit  :    40 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):  12000
    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: Borbridge (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  22.00 / 22.00  m
Receiver height           :   3.50 / 3.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Brian Good (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```

```
Data for Segment # 2: Brian Good (day/night)
--------------------------------------------
Angle1   Angle2           : -13.00 deg   90.00 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           :   3.50 / 3.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Borbridge (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.05 + 0.00) = 64.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  65.72   0.00  -1.66   0.00   0.00   0.00   0.00  64.05
-------------------------------------------------------------------------------

Segment Leq : 64.05 dBA

Results segment # 2: Brian Good (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.52 + 0.00) = 58.52 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -13     90   0.00  63.96   0.00  -3.01  -2.42   0.00   0.00   0.00  58.52
-------------------------------------------------------------------------------

Segment Leq : 58.52 dBA

Total Leq All Segments: 65.12 dBA

Results segment # 1: Borbridge (night)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.45 + 0.00) = 56.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  58.12   0.00  -1.66   0.00   0.00   0.00   0.00  56.45
-------------------------------------------------------------------------------

Segment Leq : 56.45 dBA
```

```
Results segment # 2: Brian Good (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 50.93 + 0.00) = 50.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -13     90   0.00  56.36   0.00  -3.01  -2.42   0.00   0.00   0.00  50.93
-------------------------------------------------------------------------------

Segment Leq : 50.93 dBA

Total Leq All Segments: 57.52 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.12
                           (NIGHT): 57.52
```

```
STAMSON 5.0        NORMAL REPORT        Date: 10-02-2025 11:44:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R2.te                 Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Borbridge (day/night)
----------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    veh/TimePeriod  *
Posted speed limit  :    40 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):  12000
    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: Borbridge (day/night)
-------------------------------------------
Angle1   Angle2           : -30.00 deg   9.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  69.00 / 69.00  m
Receiver height           :   3.50 / 3.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Brian Good (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```

```
Data for Segment # 2: Brian Good (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  20.00 / 20.00  m
Receiver height           :   3.50 / 3.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Borbridge (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 52.45 + 0.00) = 52.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -30      9   0.00  65.72   0.00  -6.63  -6.64   0.00   0.00   0.00  52.45
-------------------------------------------------------------------------------

Segment Leq : 52.45 dBA

Results segment # 2: Brian Good (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 62.71 + 0.00) = 62.71 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  63.96   0.00  -1.25   0.00   0.00   0.00   0.00  62.71
-------------------------------------------------------------------------------

Segment Leq : 62.71 dBA

Total Leq All Segments: 63.10 dBA

Results segment # 1: Borbridge (night)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 44.85 + 0.00) = 44.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -30      9   0.00  58.12   0.00  -6.63  -6.64   0.00   0.00   0.00  44.85
-------------------------------------------------------------------------------

Segment Leq : 44.85 dBA
```

```
Results segment # 2: Brian Good (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 55.11 + 0.00) = 55.11 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  56.36   0.00  -1.25   0.00   0.00   0.00   0.00  55.11
-------------------------------------------------------------------------------

Segment Leq : 55.11 dBA

Total Leq All Segments: 55.50 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.10
                           (NIGHT): 55.50
```

STAMSON 5.0 NORMAL REPORT Date: 10-02-2025 11:46:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R3.te Time Period: Day/Night 16/8 hours
Description:

```
Road data, segment # 1: Brian Good (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Brian Good (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  30.00 / 30.00  m
Receiver height           :   3.50 / 3.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Brian Good (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 57.93 + 0.00) = 57.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  63.96   0.00  -3.01  -3.01   0.00   0.00   0.00  57.93
-------------------------------------------------------------------------------

Segment Leq : 57.93 dBA

Total Leq All Segments: 57.93 dBA
```

```
Results segment # 1: Brian Good (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 50.34 + 0.00) = 50.34 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  56.36   0.00  -3.01  -3.01   0.00   0.00   0.00  50.34
-------------------------------------------------------------------------------

Segment Leq : 50.34 dBA

Total Leq All Segments: 50.34 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.93
                           (NIGHT): 50.34
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