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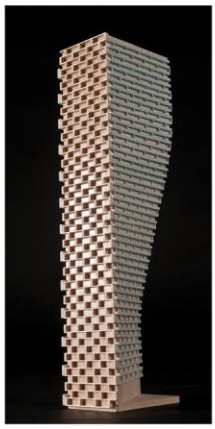
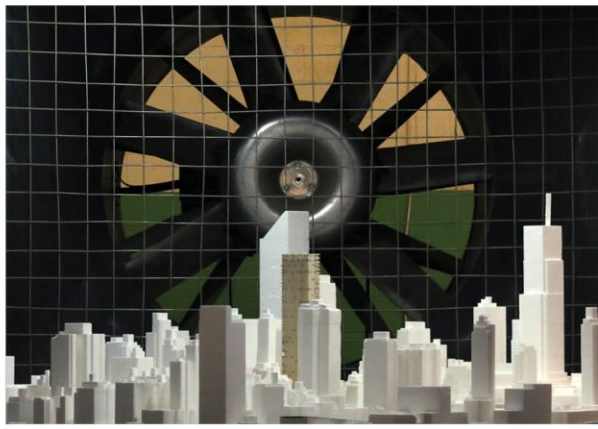
ROADWAY TRAFFIC NOISE ASSESSMENT

384 Arlington Avenue
Ottawa, Ontario

REPORT: 22-131 – Traffic Noise





June 6, 2024

PREPARED FOR

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EXECUTIVE SUMMARY

This report describes a roadway traffic noise assessment undertaken in support of a site plan application for a proposed residential development located at 384 Arlington Avenue in Ottawa, Ontario. The proposed development comprises a 24-storey building, with outdoor amenity spaces on the ground level, levels 4 and 7. The primary sources of roadway traffic noise are Bronson Avenue and the Trans-Canada Highway. Figure 1 illustrates a complete site plan with surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by MECP's and 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 by Neuf Architect(e)s, provided in May 2024.

The results of the current analysis indicate that unattenuated noise levels will range between 61 and 79 dBA during the daytime period (07:00-23:00) and between 53 and 71 dBA during the nighttime period (23:00-07:00). The highest noise level (79 dBA) occurs at the north façade, which is closest and most exposed to the Trans-Canada Highway. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA.

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

Noise levels at the ground level, and level 4 and level 7 terraces, are expected to reach 66 dBA during the daytime period. As such, noise control measures are required to reduce noise levels to under 60 dBA. Results of the noise barrier investigation proved that the use of a noise barrier is not effective at the ground level terrace, due to its proximity to the highway. Noise control measures are also not effective in reducing noise levels below 60 dBA at the level 4 and level 7 terraces. In this case, a 2 m high noise barrier

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

can be used to reduce noise levels as much as practically possible. Higher noise barriers are not feasible as they will negatively interfere with the architecture of the proposed building.

The noise barrier must be constructed from materials having a minimum surface density of 20 kg/m^2 (STC rating of 30) and contain no gaps. Design of the noise barrier will conform to the requirements outlined in Part 5 of the ENCG. A Type B Warning Clause will also be required on all Lease, Purchase, and Sale Agreements for units with access to the ground level, and level 4 and level 7 terraces, as summarized in Section 6.

Stationary noise impacts from existing buildings onto the proposed development are expected to be minimal. Noise from the mechanical equipment servicing near-by buildings is expected to be sufficiently attenuated by the setback distance.

With regard to stationary noise impacts of the development on the surroundings and itself, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed building become available. The stationary noise study would assess impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise-sensitive areas. Noise impacts can generally be minimized by judicious selection and placement of the equipment.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Windmill Development Group to undertake a roadway traffic noise assessment in support of a proposed residential development located at 384 Arlington Avenue in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

Our work is based on theoretical noise calculation methods conforming to the City of Ottawa[2] and Ministry of the Environment, Conservation and Parks (MECP)[3] noise guidelines. Noise calculations were based on architectural drawings by Neuf Architect(e)s, provided in May 2024, 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 at 384 Arlington Avenue in Ottawa; situated on a parcel of land bounded by Arlington Avenue to the north, Arthur Lane North to the east, Raymond Street to the south, and Bell Street North to the west. The proposed development comprises a nominally rectangular 24-storey residential tower topped with a mechanical penthouse level (MPH), rising above an eight-storey podium comprising a 'C'-shaped planform with its long axis-oriented along Arthur Lane North.

Above three below-grade parking levels, the ground floor includes bike maintenance and storage rooms, a pet wash area, and residential suites along the perimeter of the floorplan. A pet run and a ground level terrace are to the west, fronting Arthur Lane. Levels 2 and 3 comprise entirely of residential suites, with Level 3 containing an indoor amenity space to the northwest corner. At Level 4, the building steps back from the northwest to accommodate an outdoor amenity area. The floorplan comprises of residential suites and an indoor amenity space. Levels 5-6 comprise entirely of residential suites along the perimeter of the floorplan. At level 7, the building steps back from the north to accommodate an outdoor amenity area. The building rises uniformly to level 24.

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

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 and the MECP Guidelines as outlined in Section 4.2 of this report.

4. METHODOLOGY

4.1 Background

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

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For surface roadway traffic noise, the equivalent sound energy level, L_{eq}, provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00) / 8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range (that is relevant to this study) is 45 and 40 dBA for living rooms and sleeping quarters respectively for roadway as listed in Table 1.

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

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

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction[5]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[6]. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the need for having windows and doors closed, which triggers the need for forced air heating with provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation[7].

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 60 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

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

4.2.2 Theoretical Roadway Noise Predictions

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

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

- Truck traffic on all roadways was assumed to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- For select receptors where appropriate, the proposed building was assumed to act as a barrier partially or fully obstructing exposure to the source as illustrated by exposure angles in Figures 4-7.
- Noise receptors were placed at 8 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures A1-A4.

4.2.3 Roadway Traffic Volumes

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

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

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Queensway (Highway 417)	Freeway	100	**146,664**
Bronson Avenue	4-Lane Arterial (Undivided)	50	**30,000**

4.3 Indoor Noise Calculations

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

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

- Indoor sound level criteria, which varies according to the intended use of a space
- 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

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

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

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	72.4	POW – South Façade, Level 24	79	71
2	72.4	POW – East Façade, Level 24	76	68
3	72.4	POW – North Façade, Level 24	61	53
4	72.4	POW – West Façade, Level 24	76	68
5	1.5	OLA – Ground Level Terrace	66	N/a*
6	11.3	OLA – Level 4 Terrace	65	N/a*
7	20.7	OLA – Level 7 Terrace	65	N/a*

*Noise levels during the nighttime are not considered as per ENCG

The results of the current analysis indicate that unattenuated noise levels will range between 61 and 79 dBA during the daytime period (07:00-23:00) and between 53 and 71 dBA during the nighttime period (23:00-07:00). The highest noise level (79 dBA) occurs at the north façade, which is closest and most exposed to the Trans-Canada Highway.

[10] CMHC, Road & Rail Noise: Effects on Housing

5.2 Noise Control Measures

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

- **Bedroom Windows**

(i) Bedroom windows facing east, west, and south will require a minimum STC of 40

(ii) All other bedroom windows are to satisfy Ontario Building Code (OBC 2020) requirements.

- **Living Room Windows**

(i) Living room windows facing south will require a minimum STC of 37

(ii) Living room windows facing east and west will require a minimum STC of 34

(iii) All other living room windows are to satisfy Ontario Building Code (OBC 2020) requirements.

- **Exterior Walls**

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

The STC requirements apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a 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. The specified STC requirements also apply to swinging and/or sliding patio doors.

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

5.3 Noise Barrier Calculation

Unattenuated noise levels at the ground level, level 4 and level 7 terraces are expected to reach 66 dBA during the daytime period. *If these areas are to be used as outdoor living areas*, noise control measures are required to reduce noise levels to under 60 dBA. Further analysis investigated the noise mitigating impact of 1.1 to 3.5 m tall noise barriers along the perimeter. Results of the investigation proved that the use of a noise barrier is not effective at the ground level terrace, due to its proximity to the highway. Noise control measures are also not effective in reducing noise levels below 60 dBA at the level 4 or level 7 terraces. In this case, a 2 m high noise barrier can be used to reduce noise levels as much as practically possible. Higher noise barriers are not feasible as they will negatively interfere with the architecture of the proposed building. Locations of the recommended noise barriers can be seen in Figure 4.

Noise barriers shall have a minimum surface density of 20 kg/m^2 and contain no gaps. A Type B Warning Clause will be required on all Lease, Purchase, and Sale Agreements for units sharing these amenity spaces, as summarized in Section 6.

TABLE 4: NOISE BARRIER INVESTIGATION

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	No noise barrier	1.1 m high noise barrier	1.5 m high noise barrier	2 m high noise barrier	2.2 m high noise barrier	2.5 m high noise barrier	3.5 m high noise barrier
5	1.5	Ground Level Terrace	66	N/a	N/a	N/a	66*	66*	65
6	11.3	Level 4 Terrace	65	63	63	**62**	-	61	60
7	20.7	Level 7 Terrace	65	63	62	**62**	-	62	61

*Considers only the impact of the highway noise barrier, as a noise barrier around the perimeter of the area is not effective at this height.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that unattenuated noise levels will range between 61 and 79 dBA during the daytime period (07:00-23:00) and between 53 and 71 dBA during the nighttime period (23:00-07:00). The highest noise level (79 dBA) occurs at the north façade, which is closest and most exposed to the Trans-Canada Highway. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 3.

Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause[12] will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized below:

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

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."

Unattenuated noise levels at the ground level, and the level 4 and level 7 terraces, are expected to reach 66 dBA during the daytime period. As such, noise control measures are required to reduce noise levels to under 60 dBA. Results of the noise barrier investigation proved that the use of a noise barrier is not effective at the ground level terrace, due to its proximity to the highway. Noise control measures are also not effective in reducing noise levels below 60 dBA at the level 4 and level 7 terraces. In this case, a 2 m high noise barrier can be used to reduce noise levels as much as practically possible. Higher noise barriers are not feasible as they will negatively interfere with the architecture of the proposed building.

The noise barrier must be constructed from materials having a minimum surface density of 20 kg/m^2 (STC rating of 30) and contain no gaps. Design of the noise barrier will conform to the requirements outlined in Part 5 of the ENCG. The following information will be required by the City for review prior to installation of the barrier:

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.

A Type B Warning Clause will be required on all Lease, Purchase, and Sale Agreements for units with access to the ground level, level 4 and level 7 terraces, as summarized below:

Type B:

"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 road traffic may on occasions 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 regard to stationary noise impacts, a stationary noise study should be performed for the site during the detailed design once mechanical plans for the proposed building become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise-sensitive areas. Noise impacts can generally be minimized by judicious selection and placement of the equipment. The building is much taller than the surroundings so by placing large pieces of equipment, such as cooling towers, condensers, and air handling equipment on the centre of the roof or in a mechanical penthouse, the surrounding points of reception will be shielded by the building massing. Where necessary noise screens and silencers can be placed into the design.

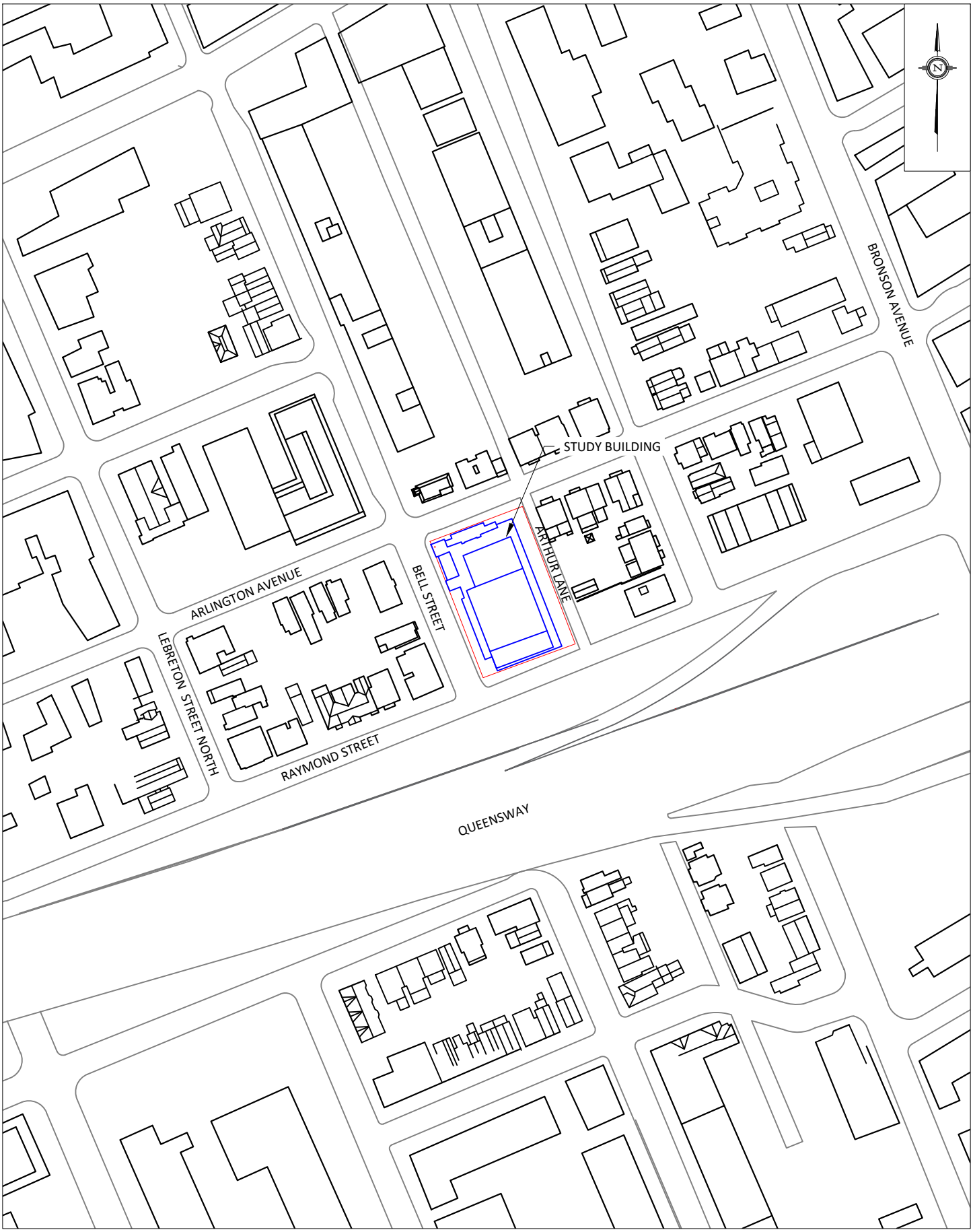
This concludes our roadway traffic noise assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Sincerely,

Gradient Wind Engineering Inc.

Essraa Alqassab, BASc.
Junior Environmental Scientist
Gradient Wind File #22-131-Traffic Noise

Joshua Foster, P.Eng.
Lead Engineer



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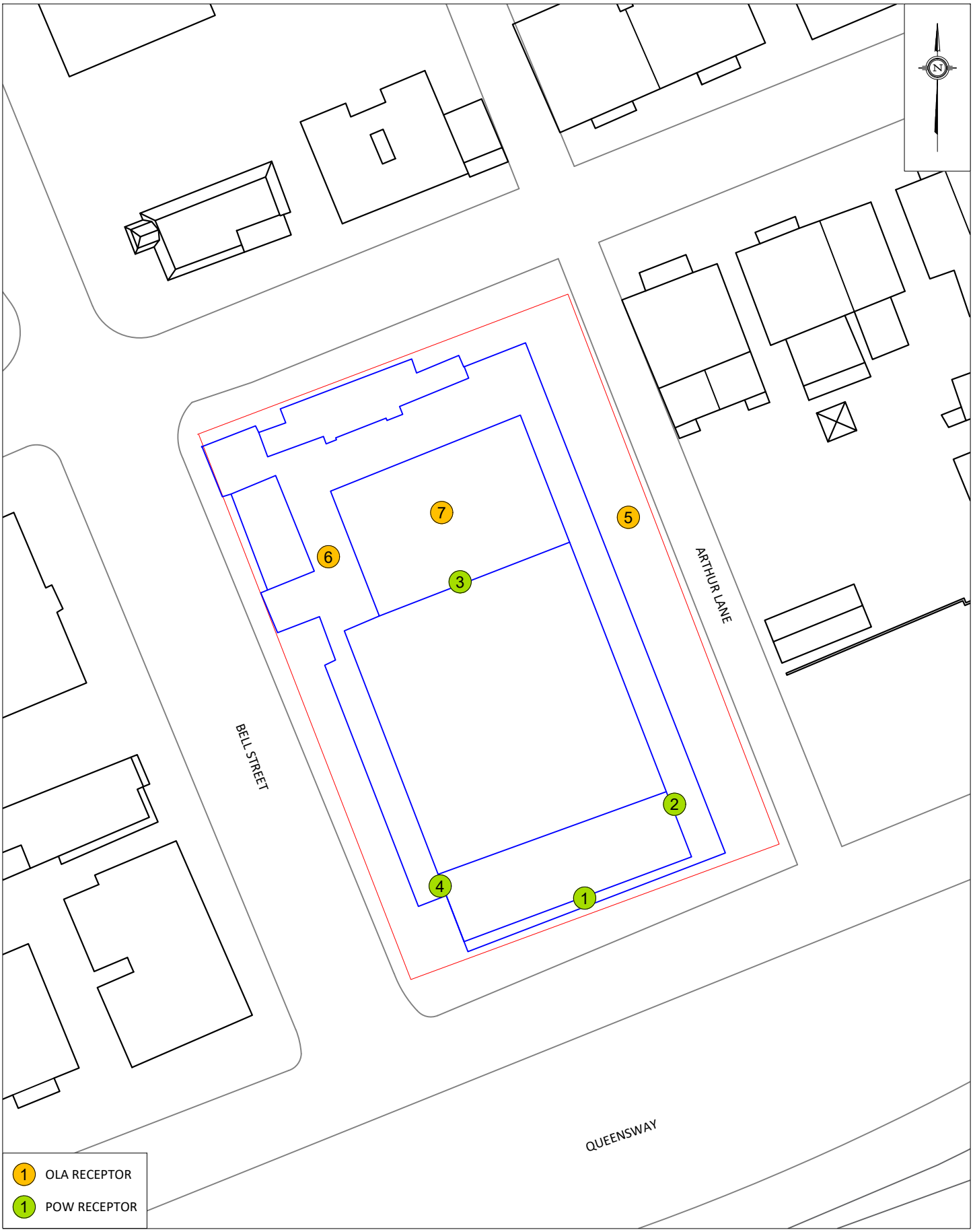
PROJECT	384 ARLINGTON AVENUE, OTTAWA ON ROADWAY TRAFFIC ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	GW22-131-1
DATE	APRIL 24, 2024
DRAWN BY	E.A.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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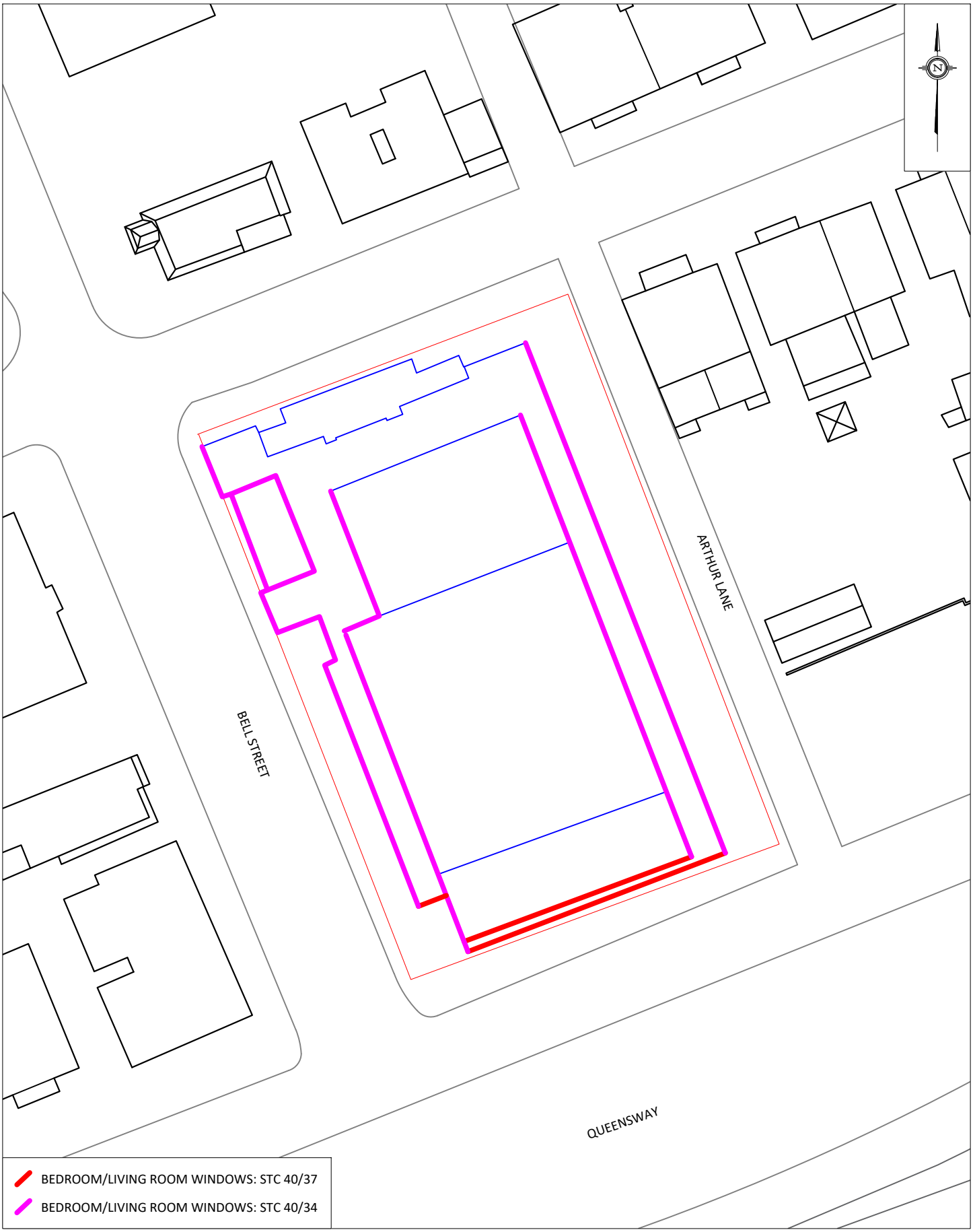
SCALE	1:200 (APPROX.)	DRAWING NO.	GW22-131-2
DATE	JUNE 6, 2024	DRAWN BY	E.A.

FIGURE 2:
RECEPTOR LOCATIONS



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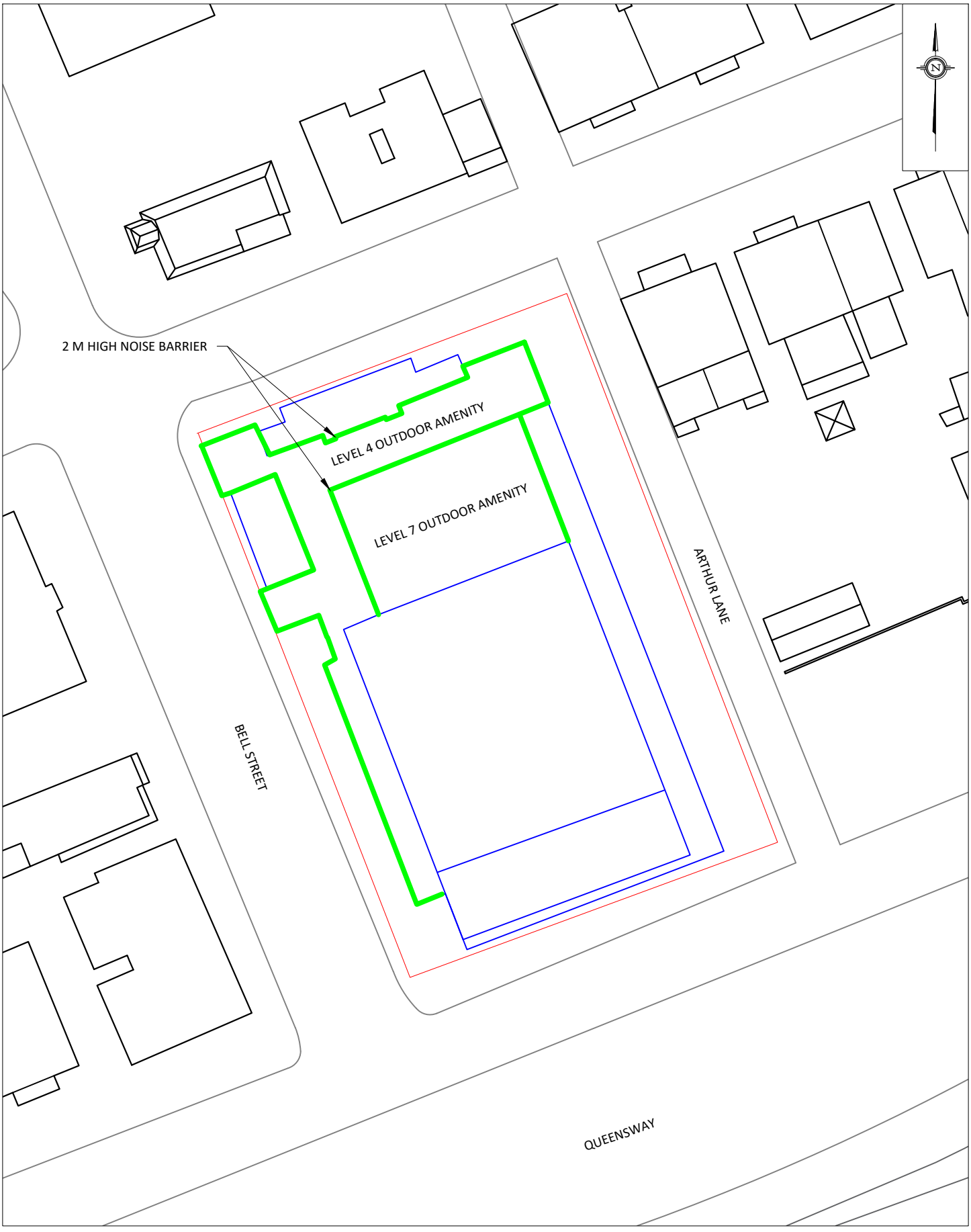
SCALE	1:200 (APPROX.)	DRAWING NO.	GW22-131-3
DATE	APRIL 24, 2024	DRAWN BY	E.A.

DESCRIPTION

FIGURE 3:
STC RECOMMENDATIONS



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DESCRIPTION

FIGURE 4:
NOISE BARRIER RECOMMENDATIONS

APPENDIX A

STAMSON INPUTS AND OUTPUTS

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PROJECT	384 ARLINGTON AVENUE, OTTAWA ON ROADWAY TRAFFIC ASSESSMENT		DESCRIPTION
SCALE	1:1,5000 (APPROX.)	DRAWING NO. GW22-131-A1	FIGURE A1: STAMSON PARAMETERS
DATE	APRIL 24, 2024	DRAWN BY E.A.	

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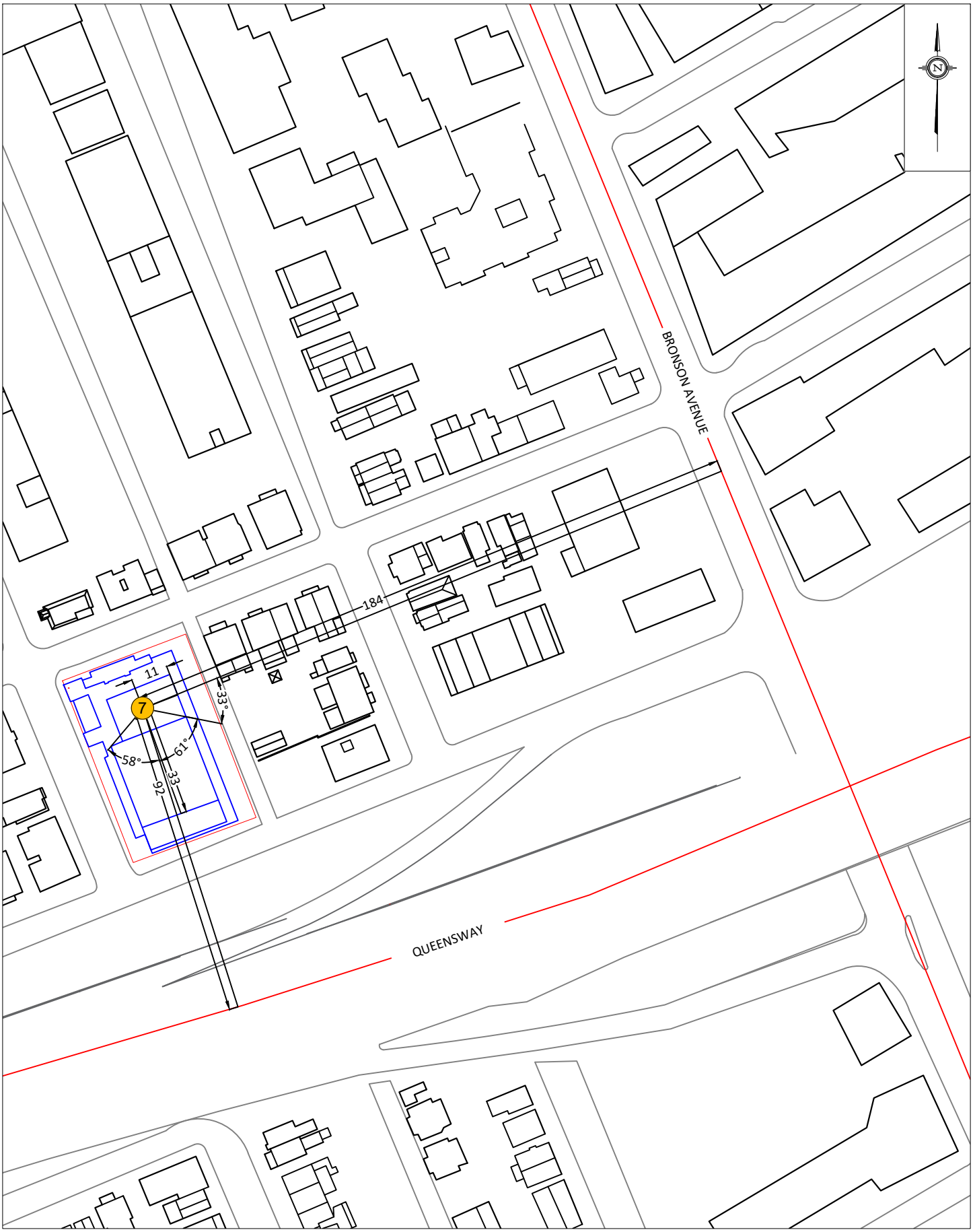
SCALE	1:1,500 (APPROX.)	DRAWING NO.	GW22-131-A2
DATE	APRIL 24, 2024	DRAWN BY	E.A.

FIGURE A2:
STAMSON PARAMETERS



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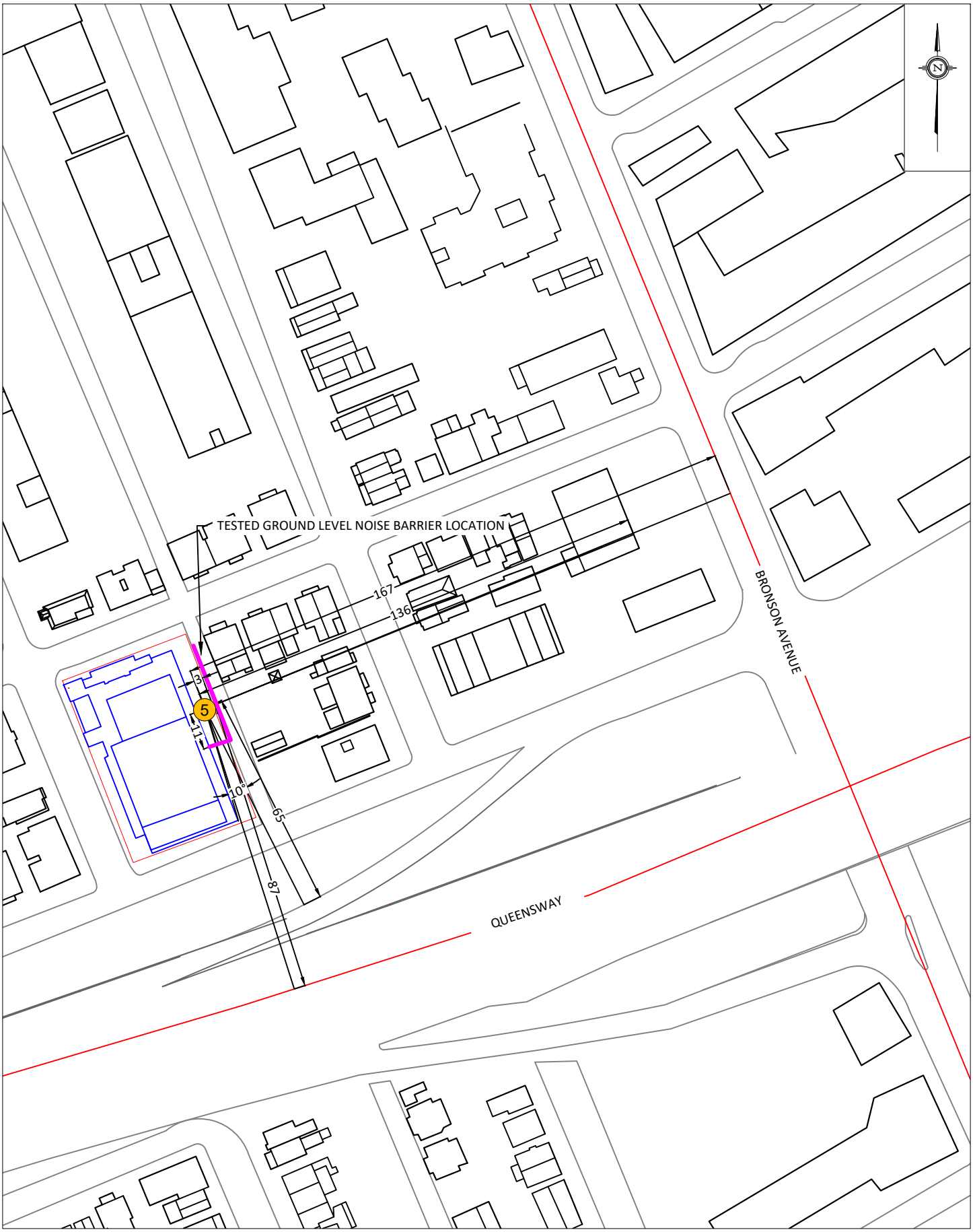
SCALE	1:1,500 (APPROX.)	DRAWING NO.	GW22-131-A3
DATE	APRIL 24, 2024	DRAWN BY	E.A.

FIGURE A3:
STAMSON PARAMETERS



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DATE	APRIL 24, 2024	DRAWN BY	E.A.

FIGURE A4:
STAMSON PARAMETERS

```
STAMSON 5.0        NORMAL REPORT        Date: 24-04-2024 09:15:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417 (day/night)
-----------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417 (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  :  52.00 / 52.00  m
Receiver height           :  72.40 / 72.40  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: HWY417 (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 79.01 + 0.00) = 79.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  84.41   0.00  -5.40   0.00   0.00   0.00   0.00  79.01
-------------------------------------------------------------------------------

Segment Leq : 79.01 dBA

Total Leq All Segments: 79.01 dBA


Results segment # 1: HWY417 (night)
```

```
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 71.41 + 0.00) = 71.41 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  76.81   0.00  -5.40   0.00   0.00   0.00   0.00  71.41
-------------------------------------------------------------------------------

Segment Leq : 71.41 dBA

Total Leq All Segments: 71.41 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 79.01
                           (NIGHT): 71.41
```

```
STAMSON 5.0         NORMAL REPORT         Date: 24-04-2024 09:15:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417 (day/night)
-----------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417 (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  :  59.00 / 59.00  m
Receiver height           :  72.40 / 72.40  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: BRONSON (day/night)
-------------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  30000
    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: BRONSON (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  : 173.00 / 173.00 m
Receiver height           :  72.40 / 72.40  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 0.00 deg
Barrier height            :   6.00 m
Barrier receiver distance : 157.00 / 157.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: HWY417 (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 75.45 + 0.00) = 75.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  84.41   0.00  -5.95  -3.01   0.00   0.00   0.00  75.45
-------------------------------------------------------------------------------

Segment Leq : 75.45 dBA


Results segment # 2: BRONSON (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       72.40 !        8.05 !         8.05

ROAD (0.00 + 57.86 + 57.86) = 60.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  71.49   0.00 -10.62  -3.01   0.00   0.00  -0.77  57.09*
   -90      0   0.00  71.49   0.00 -10.62  -3.01   0.00   0.00   0.00  57.86
-------------------------------------------------------------------------------
     0     90   0.00  71.49   0.00 -10.62  -3.01   0.00   0.00   0.00  57.86
-------------------------------------------------------------------------------
```

```
 * Bright Zone !

Segment Leq : 60.87 dBA

Total Leq All Segments: 75.60 dBA


Results segment # 1: HWY417 (night)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 67.85 + 0.00) = 67.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  76.81   0.00  -5.95  -3.01   0.00   0.00   0.00  67.85
-------------------------------------------------------------------------------

Segment Leq : 67.85 dBA


Results segment # 2: BRONSON (night)
------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       72.40 !        8.05 !         8.05

ROAD (0.00 + 50.26 + 50.26) = 53.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  63.89   0.00 -10.62  -3.01   0.00   0.00  -0.77  49.50*
   -90      0   0.00  63.89   0.00 -10.62  -3.01   0.00   0.00   0.00  50.26
-------------------------------------------------------------------------------
     0     90   0.00  63.89   0.00 -10.62  -3.01   0.00   0.00   0.00  50.26
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 53.27 dBA

Total Leq All Segments: 68.00 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 75.60
                           (NIGHT): 68.00
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-04-2024 09:58:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417 (day/night)
-----------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417 (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  :  86.00 / 86.00  m
Receiver height           :  72.40 / 72.40  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  74.70 m
Barrier receiver distance :  26.00 / 26.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: BRONSON (day/night)
-------------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

```
    24 hr Traffic Volume (AADT or SADT):  30000
    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: BRONSON (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  : 185.00 / 185.00 m
Receiver height           :  72.40 / 72.40  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 0.00 deg
Barrier height            :   6.00 m
Barrier receiver distance : 154.00 / 154.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: HWY417 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       72.40 !       50.96 !        50.96

ROAD (0.00 + 58.09 + 0.00) = 58.09 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  84.41   0.00  -7.58   0.00   0.00   0.00 -18.73  58.09
-------------------------------------------------------------------------------

Segment Leq : 58.09 dBA


Results segment # 2: BRONSON (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
```

```
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       72.40 !       13.38 !        13.38

ROAD (0.00 + 57.57 + 0.00) = 57.57 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  71.49   0.00 -10.91  -3.01   0.00   0.00  -0.09  57.48*
   -90      0   0.00  71.49   0.00 -10.91  -3.01   0.00   0.00   0.00  57.57
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 57.57 dBA

Total Leq All Segments: 60.85 dBA


Barrier table for segment # 1: HWY417 (day)
-----------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
  76.20 !   76.20 !   57.95 !   57.95 !
  76.70 !   76.70 !   57.91 !   57.91 !
  77.20 !   77.20 !   57.87 !   57.87 !
  77.70 !   77.70 !   57.83 !   57.83 !
  78.20 !   78.20 !   57.80 !   57.80 !
  78.70 !   78.70 !   57.76 !   57.76 !
  79.20 !   79.20 !   57.73 !   57.73 !
  79.70 !   79.70 !   57.70 !   57.70 !
  80.20 !   80.20 !   57.67 !   57.67 !
  80.70 !   80.70 !   57.64 !   57.64 !

Barrier table for segment # 2: BRONSON (day)
-------------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
   7.50 !    7.50 !   57.57 !   57.57 !
   8.00 !    8.00 !   57.57 !   57.57 !
   8.50 !    8.50 !   57.57 !   57.57 !
   9.00 !    9.00 !   57.57 !   57.57 !
   9.50 !    9.50 !   57.57 !   57.57 !
  10.00 !   10.00 !   57.57 !   57.57 !
  10.50 !   10.50 !   57.57 !   57.57 !
  11.00 !   11.00 !   57.57 !   57.57 !
  11.50 !   11.50 !   57.57 !   57.57 !
  12.00 !   12.00 !   57.57 !   57.57 !


Results segment # 1: HWY417 (night)
```

```
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       72.40 !       50.96 !        50.96

ROAD (0.00 + 50.50 + 0.00) = 50.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  76.81   0.00  -7.58   0.00   0.00   0.00 -18.73  50.50
-------------------------------------------------------------------------------

Segment Leq : 50.50 dBA


Results segment # 2: BRONSON (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       72.40 !       13.38 !        13.38

ROAD (0.00 + 49.97 + 0.00) = 49.97 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  63.89   0.00 -10.91  -3.01   0.00   0.00  -0.09  49.88*
   -90      0   0.00  63.89   0.00 -10.91  -3.01   0.00   0.00   0.00  49.97
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 49.97 dBA

Total Leq All Segments: 53.25 dBA


Barrier table for segment # 1: HWY417 (night)
-------------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
  76.20 !   76.20 !   50.36 !   50.36 !
  76.70 !   76.70 !   50.31 !   50.31 !
```

```
  77.20 !   77.20 !   50.27 !   50.27 !
  77.70 !   77.70 !   50.24 !   50.24 !
  78.20 !   78.20 !   50.20 !   50.20 !
  78.70 !   78.70 !   50.17 !   50.17 !
  79.20 !   79.20 !   50.13 !   50.13 !
  79.70 !   79.70 !   50.10 !   50.10 !
  80.20 !   80.20 !   50.07 !   50.07 !
  80.70 !   80.70 !   50.05 !   50.05 !

Barrier table for segment # 2: BRONSON (night)
-----------------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
   7.50 !    7.50 !   49.97 !   49.97 !
   8.00 !    8.00 !   49.97 !   49.97 !
   8.50 !    8.50 !   49.97 !   49.97 !
   9.00 !    9.00 !   49.97 !   49.97 !
   9.50 !    9.50 !   49.97 !   49.97 !
  10.00 !   10.00 !   49.97 !   49.97 !
  10.50 !   10.50 !   49.97 !   49.97 !
  11.00 !   11.00 !   49.97 !   49.97 !
  11.50 !   11.50 !   49.97 !   49.97 !
  12.00 !   12.00 !   49.97 !   49.97!



TOTAL Leq FROM ALL SOURCES (DAY): 60.85
                           (NIGHT): 53.25
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-04-2024 09:16:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417 (day/night)
-----------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417 (day/night)
----------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :  72.40 / 72.40  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: HWY417 (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 75.52 + 0.00) = 75.52 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  84.41   0.00  -5.87  -3.01   0.00   0.00   0.00  75.52
-------------------------------------------------------------------------------

Segment Leq : 75.52 dBA

Total Leq All Segments: 75.52 dBA


Results segment # 1: HWY417 (night)
```

```
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 67.93 + 0.00) = 67.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  76.81   0.00  -5.87  -3.01   0.00   0.00   0.00  67.93
-------------------------------------------------------------------------------

Segment Leq : 67.93 dBA

Total Leq All Segments: 67.93 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 75.52
                           (NIGHT): 67.93
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-04-2024 09:14:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417 (day/night)
-----------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  87.00 / 87.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 10.00 deg
Barrier height            :   3.50 m
Barrier receiver distance :  65.00 / 65.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 2: BRONSON (day/night)
-------------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

```
    24 hr Traffic Volume (AADT or SADT):  30000
    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: BRONSON (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  : 167.00 / 167.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance : 136.00 / 136.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: HWY417 (day)
---------------------------------

Source height = 1.50 m

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

ROAD (0.00 + 66.29 + 0.00) = 66.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     10   0.00  84.41   0.00  -7.63  -2.55   0.00   0.00  -7.93  66.29
-------------------------------------------------------------------------------

Segment Leq : 66.29 dBA


Results segment # 2: BRONSON (day)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
```

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

ROAD (0.00 + 50.30 + 0.00) = 50.30 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  71.49   0.00 -10.47   0.00   0.00   0.00 -10.73  50.30
-------------------------------------------------------------------------------

Segment Leq : 50.30 dBA

Total Leq All Segments: 66.40 dBA


Results segment # 1: HWY417 (night)
-----------------------------------

Source height = 1.50 m

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

ROAD (0.00 + 58.69 + 0.00) = 58.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     10   0.00  76.81   0.00  -7.63  -2.55   0.00   0.00  -7.93  58.69
-------------------------------------------------------------------------------

Segment Leq : 58.69 dBA


Results segment # 2: BRONSON (night)
------------------------------------

Source height = 1.50 m

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

ROAD (0.00 + 42.70 + 0.00) = 42.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  63.89   0.00 -10.47   0.00   0.00   0.00 -10.73  42.70
-------------------------------------------------------------------------------
```

```
Segment Leq : 42.70 dBA

Total Leq All Segments: 58.80 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 66.40
                           (NIGHT): 58.80
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-04-2024 14:14:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5b.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: HWY417 (day/night)
-----------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  87.00 / 87.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 10.00 deg
Barrier height            :   3.50 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: BRONSON (day/night)
-------------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

```
    24 hr Traffic Volume (AADT or SADT):  30000
    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: BRONSON (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  : 167.00 / 167.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance : 136.00 / 136.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: HWY417 (day)
---------------------------------

Source height = 1.50 m

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

ROAD (0.00 + 65.08 + 0.00) = 65.08 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     10   0.00  84.41   0.00  -7.63  -2.55   0.00   0.00  -9.14  65.08
-------------------------------------------------------------------------------

Segment Leq : 65.08 dBA


Results segment # 2: BRONSON (day)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
```

```
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 50.30 + 0.00) = 50.30 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  71.49   0.00 -10.47   0.00   0.00   0.00 -10.73  50.30
-------------------------------------------------------------------------------

Segment Leq : 50.30 dBA

Total Leq All Segments: 65.22 dBA


Results segment # 1: HWY417 (night)
-----------------------------------

Source height = 1.50 m

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

ROAD (0.00 + 57.49 + 0.00) = 57.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     10   0.00  76.81   0.00  -7.63  -2.55   0.00   0.00  -9.14  57.49
-------------------------------------------------------------------------------

Segment Leq : 57.49 dBA


Results segment # 2: BRONSON (night)
------------------------------------

Source height = 1.50 m

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

ROAD (0.00 + 42.70 + 0.00) = 42.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  63.89   0.00 -10.47   0.00   0.00   0.00 -10.73  42.70
-------------------------------------------------------------------------------
```

```
Segment Leq : 42.70 dBA

Total Leq All Segments: 57.63 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 65.22
                           (NIGHT): 57.63
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-04-2024 09:20:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417 (day/night)
-------------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417 (day/night)
-----------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  11.30 / 11.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 90.00 deg
Barrier height            :   9.80 m
Barrier receiver distance :  41.00 / 41.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: HWY417 (day)
----------------------------------

Source height = 1.50 m

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

```
------------+-------------+-------------+--------------
       1.50 !       11.30 !        6.93 !         6.93

ROAD (0.00 + 64.91 + 0.00) = 64.91 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  84.41   0.00  -7.88  -3.01   0.00   0.00  -8.61  64.91
-------------------------------------------------------------------------------

Segment Leq : 64.91 dBA

Total Leq All Segments: 64.91 dBA


Barrier table for segment # 1: HWY417 (day)
-----------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
  11.30 !   11.30 !   62.70 !   62.70 !
  11.80 !   11.80 !   62.06 !   62.06 !
  12.30 !   12.30 !   61.47 !   61.47 !
  12.80 !   12.80 !   60.91 !   60.91 !
  13.30 !   13.30 !   60.39 !   60.39 !
  13.80 !   13.80 !   59.90 !   59.90 !
  14.30 !   14.30 !   59.44 !   59.44 !
  14.80 !   14.80 !   59.01 !   59.01 !
  15.30 !   15.30 !   58.59 !   58.59 !
  15.80 !   15.80 !   58.20 !   58.20 !


Results segment # 1: HWY417 (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       11.30 !        6.93 !         6.93

ROAD (0.00 + 57.31 + 0.00) = 57.31 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  76.81   0.00  -7.88  -3.01   0.00   0.00  -8.61  57.31
-------------------------------------------------------------------------------

Segment Leq : 57.31 dBA

Total Leq All Segments: 57.31 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 64.91
                           (NIGHT): 57.31
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-04-2024 10:32:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417 (day/night)
-----------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417 (day/night)
----------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  11.30 / 11.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 90.00 deg
Barrier height            :  11.80 m
Barrier receiver distance :  41.00 / 41.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: HWY417 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       11.30 !        6.93 !         6.93
```

```
ROAD (0.00 + 62.06 + 0.00) = 62.06 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  84.41   0.00  -7.88  -3.01   0.00   0.00 -11.46  62.06
-------------------------------------------------------------------------------

Segment Leq : 62.06 dBA

Total Leq All Segments: 62.06 dBA


Results segment # 1: HWY417 (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       11.30 !        6.93 !         6.93

ROAD (0.00 + 54.47 + 0.00) = 54.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  76.81   0.00  -7.88  -3.01   0.00   0.00 -11.46  54.47
-------------------------------------------------------------------------------

Segment Leq : 54.47 dBA

Total Leq All Segments: 54.47 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 62.06
                           (NIGHT): 54.47

STAMSON 5.0        NORMAL REPORT        Date: 24-04-2024 09:23:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417_1 (day/night)
--------------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417_1 (day/night)
-----------------------------------------
Angle1   Angle2           :  58.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  20.70 / 20.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  58.00 deg   Angle2 : 90.00 deg
Barrier height            :  19.20 m
Barrier receiver distance :  33.00 / 33.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 2: BRONSON (day/night)
-------------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  30000
    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: BRONSON (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   33.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
```

```
Receiver source distance  : 164.00 / 164.00 m
Receiver height           :  20.70 / 20.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 33.00 deg
Barrier height            :  19.20 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 3: HWY417_2 (day/night)
-------------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417_2 (day/night)
------------------------------------------
Angle1   Angle2           : -61.00 deg   58.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  20.70 / 20.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -61.00 deg   Angle2 : 58.00 deg
Barrier height            :  74.70 m
Barrier receiver distance :  33.00 / 33.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 4: HWY417_3 (day/night)
-------------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417_3 (day/night)
------------------------------------------
Angle1   Angle2           : -90.00 deg   -61.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  20.70 / 20.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -61.00 deg
Barrier height            :  19.20 m
Barrier receiver distance :  33.00 / 33.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: HWY417_1 (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 59.50 + 0.00) = 59.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    58     90   0.00  84.41   0.00  -7.88  -7.50   0.00   0.00  -9.53  59.50
-------------------------------------------------------------------------------

Segment Leq : 59.50 dBA


Results segment # 2: BRONSON (day)
----------------------------------
```

```
Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       19.41 !        19.41

ROAD (0.00 + 59.45 + 0.00) = 59.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     33   0.00  71.49   0.00 -10.39  -1.65   0.00   0.00  -4.92  54.53*
   -90     33   0.00  71.49   0.00 -10.39  -1.65   0.00   0.00   0.00  59.45
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 59.45 dBA


Results segment # 3: HWY417_2 (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 54.73 + 0.00) = 54.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -61     58   0.00  84.41   0.00  -7.88  -1.80   0.00   0.00 -20.00  54.73
-------------------------------------------------------------------------------

Segment Leq : 54.73 dBA


Results segment # 4: HWY417_3 (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81
```

```
ROAD (0.00 + 59.31 + 0.00) = 59.31 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -61   0.00  84.41   0.00  -7.88  -7.93   0.00   0.00  -9.30  59.31
-------------------------------------------------------------------------------

Segment Leq : 59.31 dBA

Total Leq All Segments: 64.66 dBA


Barrier table for segment # 1: HWY417_1 (day)
-----------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
  20.70 !   20.70 !   58.18 !   58.18 !
  21.20 !   21.20 !   57.78 !   57.78 !
  21.70 !   21.70 !   57.40 !   57.40 !
  22.20 !   22.20 !   57.03 !   57.03 !
  22.70 !   22.70 !   56.68 !   56.68 !
  23.20 !   23.20 !   56.35 !   56.35 !
  23.70 !   23.70 !   56.03 !   56.03 !
  24.20 !   24.20 !   55.72 !   55.72 !
  24.70 !   24.70 !   55.42 !   55.42 !
  25.20 !   25.20 !   55.13 !   55.13 !

Barrier table for segment # 2: BRONSON (day)
-----------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
  20.70 !   20.70 !   52.15 !   52.15 !
  21.20 !   21.20 !   50.78 !   50.78 !
  21.70 !   21.70 !   49.49 !   49.49 !
  22.20 !   22.20 !   48.33 !   48.33 !
  22.70 !   22.70 !   47.30 !   47.30 !
  23.20 !   23.20 !   46.39 !   46.39 !
  23.70 !   23.70 !   45.57 !   45.57 !
  24.20 !   24.20 !   44.82 !   44.82 !
  24.70 !   24.70 !   44.15 !   44.15 !
  25.20 !   25.20 !   43.52 !   43.52 !

Barrier table for segment # 3: HWY417_2 (day)
-----------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
  76.20 !   76.20 !   54.73 !   54.73 !
  76.70 !   76.70 !   54.73 !   54.73 !
  77.20 !   77.20 !   54.73 !   54.73 !
```

```
  77.70 !   77.70 !   54.73 !   54.73 !
  78.20 !   78.20 !   54.73 !   54.73 !
  78.70 !   78.70 !   54.73 !   54.73 !
  79.20 !   79.20 !   54.73 !   54.73 !
  79.70 !   79.70 !   54.73 !   54.73 !
  80.20 !   80.20 !   54.73 !   54.73 !
  80.70 !   80.70 !   54.73 !   54.73 !

Barrier table for segment # 4: HWY417_3 (day)
-----------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
  20.70 !   20.70 !   58.02 !   58.02 !
  21.20 !   21.20 !   57.63 !   57.63 !
  21.70 !   21.70 !   57.25 !   57.25 !
  22.20 !   22.20 !   56.89 !   56.89 !
  22.70 !   22.70 !   56.55 !   56.55 !
  23.20 !   23.20 !   56.22 !   56.22 !
  23.70 !   23.70 !   55.90 !   55.90 !
  24.20 !   24.20 !   55.59 !   55.59 !
  24.70 !   24.70 !   55.30 !   55.30 !
  25.20 !   25.20 !   55.02 !   55.02 !


Results segment # 1: HWY417_1 (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 51.90 + 0.00) = 51.90 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    58     90   0.00  76.81   0.00  -7.88  -7.50   0.00   0.00  -9.53  51.90
-------------------------------------------------------------------------------

Segment Leq : 51.90 dBA


Results segment # 2: BRONSON (night)
------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
```

```
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       19.41 !        19.41

ROAD (0.00 + 51.85 + 0.00) = 51.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     33   0.00  63.89   0.00 -10.39  -1.65   0.00   0.00  -4.92  46.93*
   -90     33   0.00  63.89   0.00 -10.39  -1.65   0.00   0.00   0.00  51.85
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 51.85 dBA


Results segment # 3: HWY417_2 (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 47.14 + 0.00) = 47.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -61     58   0.00  76.81   0.00  -7.88  -1.80   0.00   0.00 -20.00  47.14
-------------------------------------------------------------------------------

Segment Leq : 47.14 dBA


Results segment # 4: HWY417_3 (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 51.71 + 0.00) = 51.71 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -61   0.00  76.81   0.00  -7.88  -7.93   0.00   0.00  -9.30  51.71
```

Segment Leq : 51.71 dBA

Total Leq All Segments: 57.06 dBA

Barrier table for segment # 1: HWY417_1 (night)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
20.70	20.70	50.59	50.59
21.20	21.20	50.19	50.19
21.70	21.70	49.80	49.80
22.20	22.20	49.44	49.44
22.70	22.70	49.09	49.09
23.20	23.20	48.75	48.75
23.70	23.70	48.43	48.43
24.20	24.20	48.12	48.12
24.70	24.70	47.82	47.82
25.20	25.20	47.54	47.54

Barrier table for segment # 2: BRONSON (night)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
20.70	20.70	44.55	44.55
21.20	21.20	43.18	43.18
21.70	21.70	41.89	41.89
22.20	22.20	40.73	40.73
22.70	22.70	39.70	39.70
23.20	23.20	38.79	38.79
23.70	23.70	37.97	37.97
24.20	24.20	37.23	37.23
24.70	24.70	36.55	36.55
25.20	25.20	35.93	35.93

Barrier table for segment # 3: HWY417_2 (night)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
76.20	76.20	47.14	47.14
76.70	76.70	47.14	47.14
77.20	77.20	47.14	47.14
77.70	77.70	47.14	47.14
78.20	78.20	47.14	47.14
78.70	78.70	47.14	47.14
79.20	79.20	47.14	47.14

```
  79.70 !   79.70 !   47.14 !   47.14 !
  80.20 !   80.20 !   47.14 !   47.14 !
  80.70 !   80.70 !   47.14 !   47.14 !

Barrier table for segment # 4: HWY417_3 (night)
-----------------------------------------------

Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
  20.70 !   20.70 !   50.43 !   50.43 !
  21.20 !   21.20 !   50.03 !   50.03 !
  21.70 !   21.70 !   49.66 !   49.66 !
  22.20 !   22.20 !   49.30 !   49.30 !
  22.70 !   22.70 !   48.95 !   48.95 !
  23.20 !   23.20 !   48.62 !   48.62 !
  23.70 !   23.70 !   48.30 !   48.30 !
  24.20 !   24.20 !   48.00 !   48.00 !
  24.70 !   24.70 !   47.70 !   47.70 !
  25.20 !   25.20 !   47.42 !   47.42 !



TOTAL Leq FROM ALL SOURCES (DAY): 64.66
                           (NIGHT): 57.06
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-04-2024 10:32:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7b.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: HWY417_1 (day/night)
----------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417_1 (day/night)
----------------------------------------
Angle1   Angle2           :  58.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  20.70 / 20.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  58.00 deg   Angle2 : 90.00 deg
Barrier height            :  21.20 m
Barrier receiver distance :  33.00 / 33.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 2: BRONSON (day/night)
----------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

```
    24 hr Traffic Volume (AADT or SADT):  30000
    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: BRONSON (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   33.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 164.00 / 164.00 m
Receiver height           :  20.70 / 20.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 33.00 deg
Barrier height            :  21.20 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 3: HWY417_2 (day/night)
--------------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417_2 (day/night)
------------------------------------------
Angle1   Angle2           : -61.00 deg   58.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  20.70 / 20.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -61.00 deg   Angle2 : 58.00 deg
```

```
Barrier height            :  74.70 m
Barrier receiver distance :  33.00 / 33.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 4: HWY417_3 (day/night)
-------------------------------------------
Car traffic volume  : 118739/10325 veh/TimePeriod  *
Medium truck volume :  9445/821   veh/TimePeriod  *
Heavy truck volume  :  6747/587   veh/TimePeriod  *
Posted speed limit  :   100 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): 146664
    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: HWY417_3 (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   -61.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  20.70 / 20.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -61.00 deg
Barrier height            :  21.20 m
Barrier receiver distance :  33.00 / 33.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: HWY417_1 (day)
-----------------------------------

Source height = 1.50 m

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

```
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 57.78 + 0.00) = 57.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    58     90   0.00  84.41   0.00  -7.88  -7.50   0.00   0.00 -11.25  57.78
-------------------------------------------------------------------------------

Segment Leq : 57.78 dBA


Results segment # 2: BRONSON (day)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       19.41 !        19.41

ROAD (0.00 + 50.78 + 0.00) = 50.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     33   0.00  71.49   0.00 -10.39  -1.65   0.00   0.00  -8.67  50.78
-------------------------------------------------------------------------------

Segment Leq : 50.78 dBA


Results segment # 3: HWY417_2 (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 54.73 + 0.00) = 54.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -61     58   0.00  84.41   0.00  -7.88  -1.80   0.00   0.00 -20.00  54.73
-------------------------------------------------------------------------------

Segment Leq : 54.73 dBA


Results segment # 4: HWY417_3 (day)
```

```
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 57.63 + 0.00) = 57.63 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -61   0.00  84.41   0.00  -7.88  -7.93   0.00   0.00 -10.97  57.63
-------------------------------------------------------------------------------

Segment Leq : 57.63 dBA

Total Leq All Segments: 62.03 dBA


Results segment # 1: HWY417_1 (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 50.19 + 0.00) = 50.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    58     90   0.00  76.81   0.00  -7.88  -7.50   0.00   0.00 -11.25  50.19
-------------------------------------------------------------------------------

Segment Leq : 50.19 dBA


Results segment # 2: BRONSON (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       19.41 !        19.41
```

```
ROAD (0.00 + 43.18 + 0.00) = 43.18 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     33   0.00  63.89   0.00 -10.39  -1.65   0.00   0.00  -8.67  43.18
-------------------------------------------------------------------------------

Segment Leq : 43.18 dBA


Results segment # 3: HWY417_2 (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 47.14 + 0.00) = 47.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -61     58   0.00  76.81   0.00  -7.88  -1.80   0.00   0.00 -20.00  47.14
-------------------------------------------------------------------------------

Segment Leq : 47.14 dBA


Results segment # 4: HWY417_3 (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       20.70 !       13.81 !        13.81

ROAD (0.00 + 50.03 + 0.00) = 50.03 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -61   0.00  76.81   0.00  -7.88  -7.93   0.00   0.00 -10.97  50.03
-------------------------------------------------------------------------------

Segment Leq : 50.03 dBA

Total Leq All Segments: 54.44 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 62.03
                           (NIGHT): 54.44
```