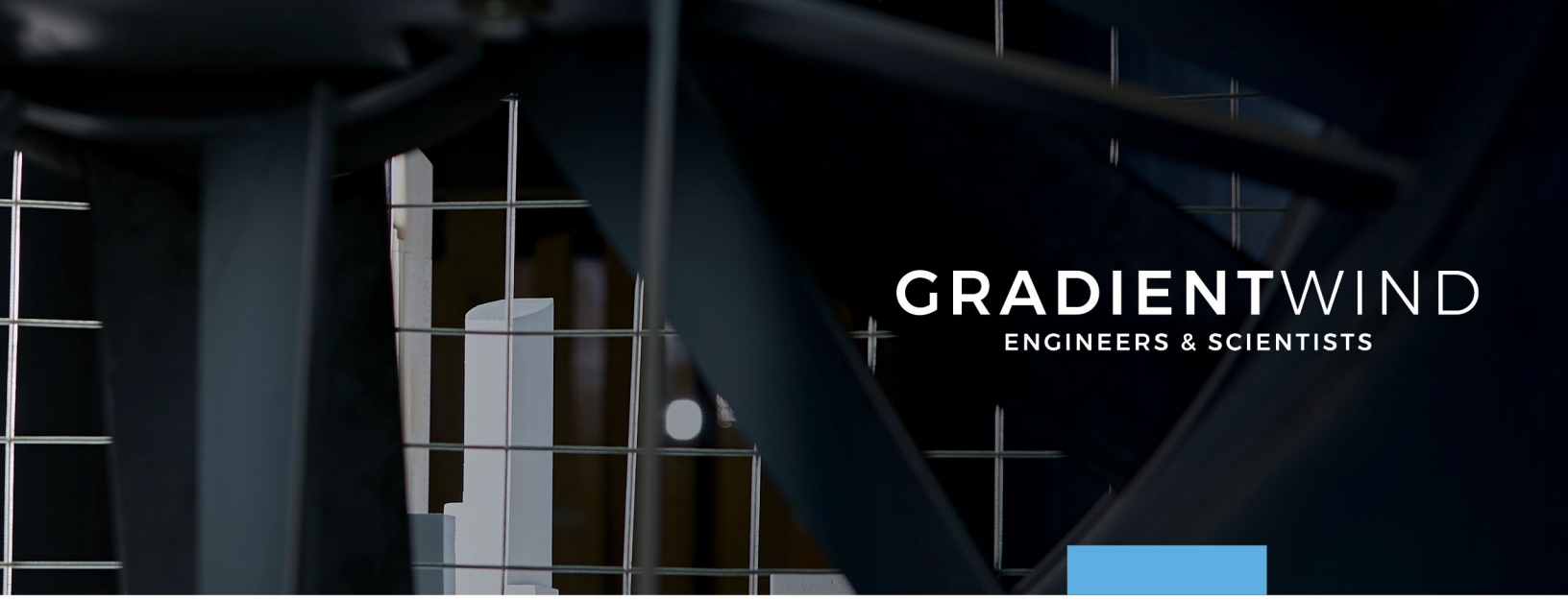

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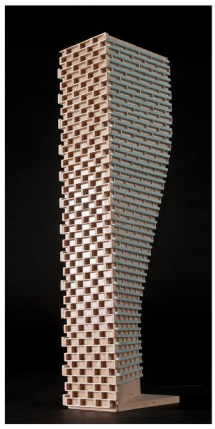
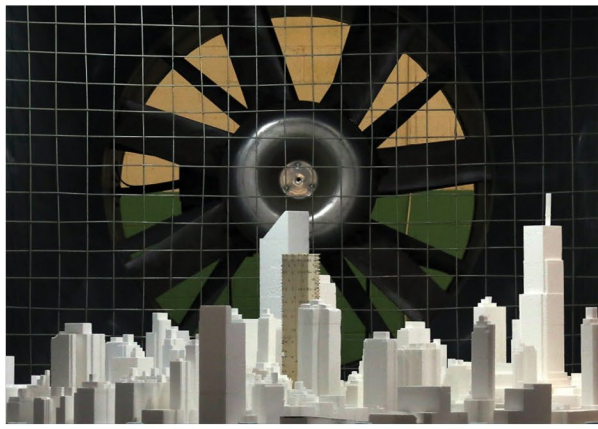
ROADWAY TRAFFIC NOISE ASSESSMENT

1500 Merivale Road
Ottawa, Ontario

GRADIENT WIND REPORT: 21-166 – Traffic Noise





April 5, 2023

PREPARED FOR

Claridge Homes
210 Gladstone Avenue
Ottawa, ON K2P 0Y6

PREPARED BY

Giuseppe Garro, MASc., Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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EXECUTIVE SUMMARY

This report describes a roadway traffic noise assessment undertaken in support of a Site Plan Control (SPA) application for Phase 1 of a proposed multi-building development located at 1500 Merivale Road in Ottawa, Ontario. Phase 1 comprises a 10-storey mixed-use building, a public park, and an internal public roadway. The primary source of roadway traffic noise impacting Phase 1 is Merivale Road. Figure 1A and 1B illustrates a complete site plan with surrounding context. This assessment is subsequent to a previous roadway traffic noise feasibility assessment completed by Gradient Wind (ref. *Gradient Wind report #21-166, "Roadway Traffic Noise Feasibility Assessment"*, dated August 30, 2021).

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) architectural drawings provided by EVOQ Architecture in October 2022.

The results of the current analysis indicate that noise levels will range between 55 and 73 dBA during the daytime period (07:00-23:00) and between 61 and 65 dBA during the nighttime period (23:00-07:00). The highest noise level (73 dBA) occurs at the southeast façade, which is nearest and most exposed to Merivale Road. 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 and Table 4. 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 Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Noise levels at the rooftop amenity terrace are expected to not exceed 55 dBA during the daytime period. Therefore, no acoustic mitigation is required.

As the building design progresses, the stationary noise impacts of the building on the surroundings would be considered at a future stage. Stationary noise sources associated with the development are expected to comprise of DX Split Air Conditioning units. These sources are not expected to be a concern at noise sensitive spaces and surrounding properties, provided the following are considered in the design:

judicious selection of the equipment, locating the equipment on a high roof away from nearby residential receptors, and where necessary, installing silencers or noise screens. Installation of the equipment should be done in accordance with NPC-216 Residential Air Conditioning Devices.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Claridge Homes to undertake a roadway traffic noise assessment in support of a Site Plan Control (SPA) application for Phase 1 of a proposed multi-building development located at 1500 Merivale Road 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[1] and Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on architectural drawings provided by EVOQ Architecture in October 2022, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this roadway traffic noise assessment is Phase 1 of a proposed multi-building development located at 1500 Merivale Road in Ottawa, Ontario. Phase 1 comprises a 10-storey mixed-use building, a public park, and an internal public roadway. The building is located at the south property line of the development masterplan bounded by an existing low-rise commercial building to the west, Merivale Road to the south, Phase 2 to the east, and a proposed public park to the north. To the south beyond Merivale Road is a place or worship, as well as a low-rise commercial building.

The proposed 10-storey building comprises 3 levels of below-grade parking accessed at the northeast corner of the building. The grade level and second level of the building include commercial space at the southeast corner, amenity and building support facilities at the southwest corner, with the remaining levels dedicated to residential use. Levels 3-10 are designated for residential use only. At Level 3, the floorplate steps back at the east elevation. Similarly, the floorplate steps back at the east façade at Level 10 to create communal amenity terrace areas.

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

The rooftop terrace associated with the development was included in the assessment as an Outdoor Living Area (OLA). As per ENCG, parks are not defined as OLAs or noise sensitive spaces, therefore, the noise levels in these areas have not been evaluated in this assessment. The primary source of roadway traffic noise impacting Phase 1 is Merivale Road. Figures 1A and 1B illustrate a complete site plan with surrounding context.

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

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study building produced by local roadway traffic, and (ii) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2 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 50, 45, and 40 dBA for retail stores, living rooms, and sleeping quarters respectively, as listed in Table 1. Based on Gradient Wind's experience, more comfortable indoor noise levels should be targeted, towards 47, 42, and 37 dBA, respectively, to control peak noise and deficiencies in building envelope construction.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [3]

Type of Space	Time Period	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

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c

a standard closed window is capable of providing a minimum 20 dBA noise reduction[4]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[5]. 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[6].

The sound level criterion for outdoor living areas is 60 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.

4.2.2 Theoretical Roadway Noise Predictions

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

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

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

[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.2.3 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[7] which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Merivale Road	4-Lane Arterial (Divided)	60	**35,000**

5. ROADWAY TRAFFIC NOISE RESULTS

5.1 Roadway Traffic Noise Levels

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	29.5	POW – 10th Floor – Southwest Façade	68	61
2	29.5	POW – 10th Floor – Southeast Façade	73	65
3	26.5	POW – 9th Floor – Northeast Façade	69	61
4	30	OLA – Level 10 Terrace	55	N/A*

*Nighttime noise levels for the OLA are not considered as per ENCG

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

The results of the current analysis indicate that noise levels will range between 55 and 73 dBA during the daytime period (07:00-23:00) and between 61 and 65 dBA during the nighttime period (23:00-07:00). The highest noise level (73 dBA) occurs at the southeast façade, which is nearest and most exposed to Merivale Road.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.2, 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 ENCG requirements, detailed STC calculations will be required to be completed prior to building permit application. The STC requirements for the windows are summarized below in Table 4 and outlined in Figure 3. Where specific updated building components are not identified, bedroom/living room/retail windows are to satisfy Ontario Building Code (OBC 2020) requirements.

TABLE 4: NOISE CONTROL REQUIREMENTS

Façade	Floor Number	Min. Window STC (Bedroom/Living Room/Retail)	Exterior Wall STC	Warning Clauses	A/C or FAH
Southeast	1-10	36/31/26	45	Type D	A/C
Southwest, Northeast	1-10	32/27/25	45	Type D	A/C

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 doors.

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.

Noise levels at the rooftop amenity terrace are expected to not exceed 55 dBA during the daytime period. Therefore, no acoustic mitigation is required.

6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 55 and 73 dBA during the daytime period (07:00-23:00) and between 61 and 65 dBA during the nighttime period (23:00-07:00). The highest noise level (73 dBA) occurs at the southeast façade, which is nearest and most exposed to Merivale Road. 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 and Table 4.

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 Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized below.

Type D:

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

Noise levels at the rooftop amenity terrace are expected to not exceed 55 dBA during the daytime period. Therefore, no acoustic mitigation is required.

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

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

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

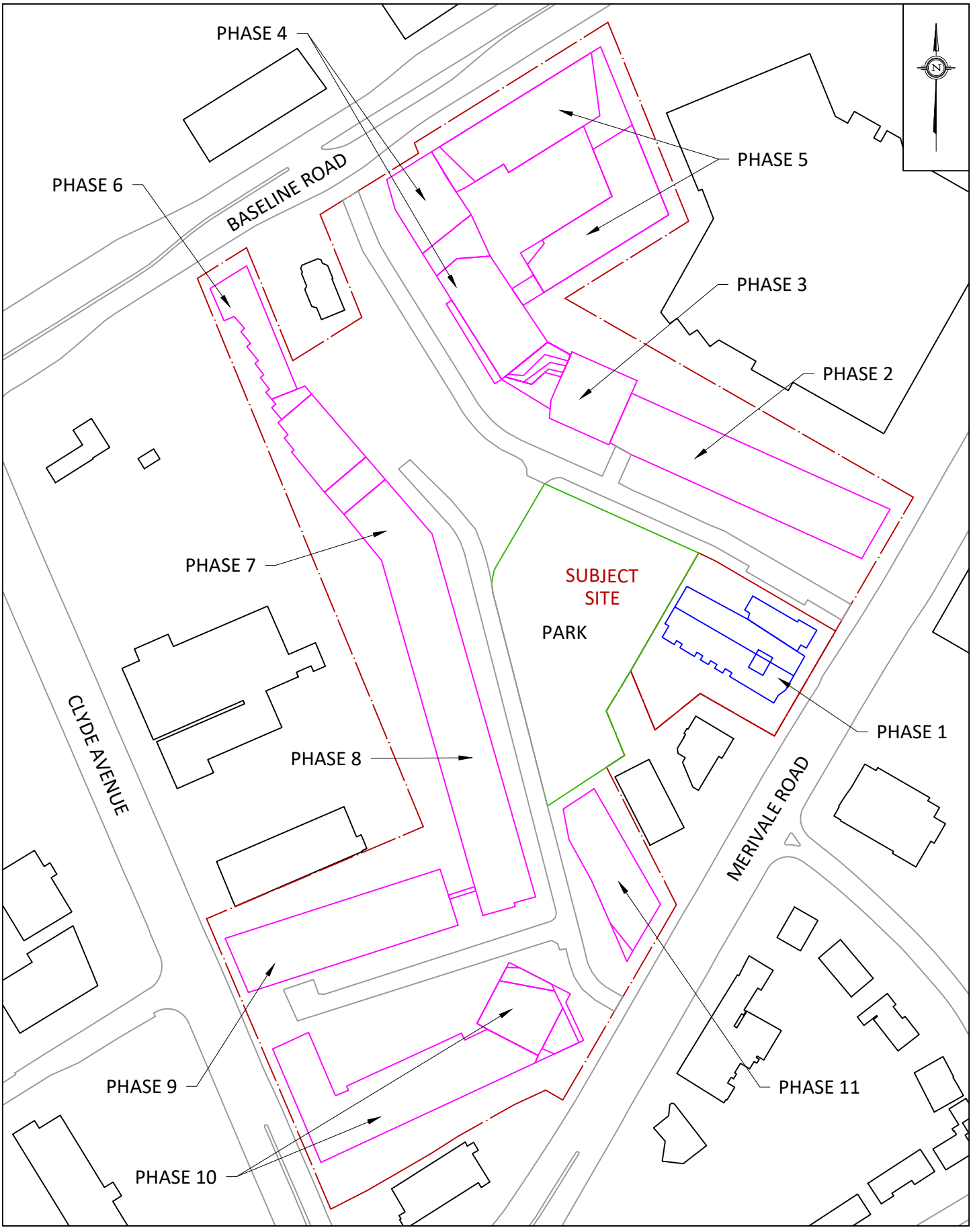
Sincerely,

Gradient Wind Engineering Inc.

Giuseppe Garro, MASc.
Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind Report #21-166



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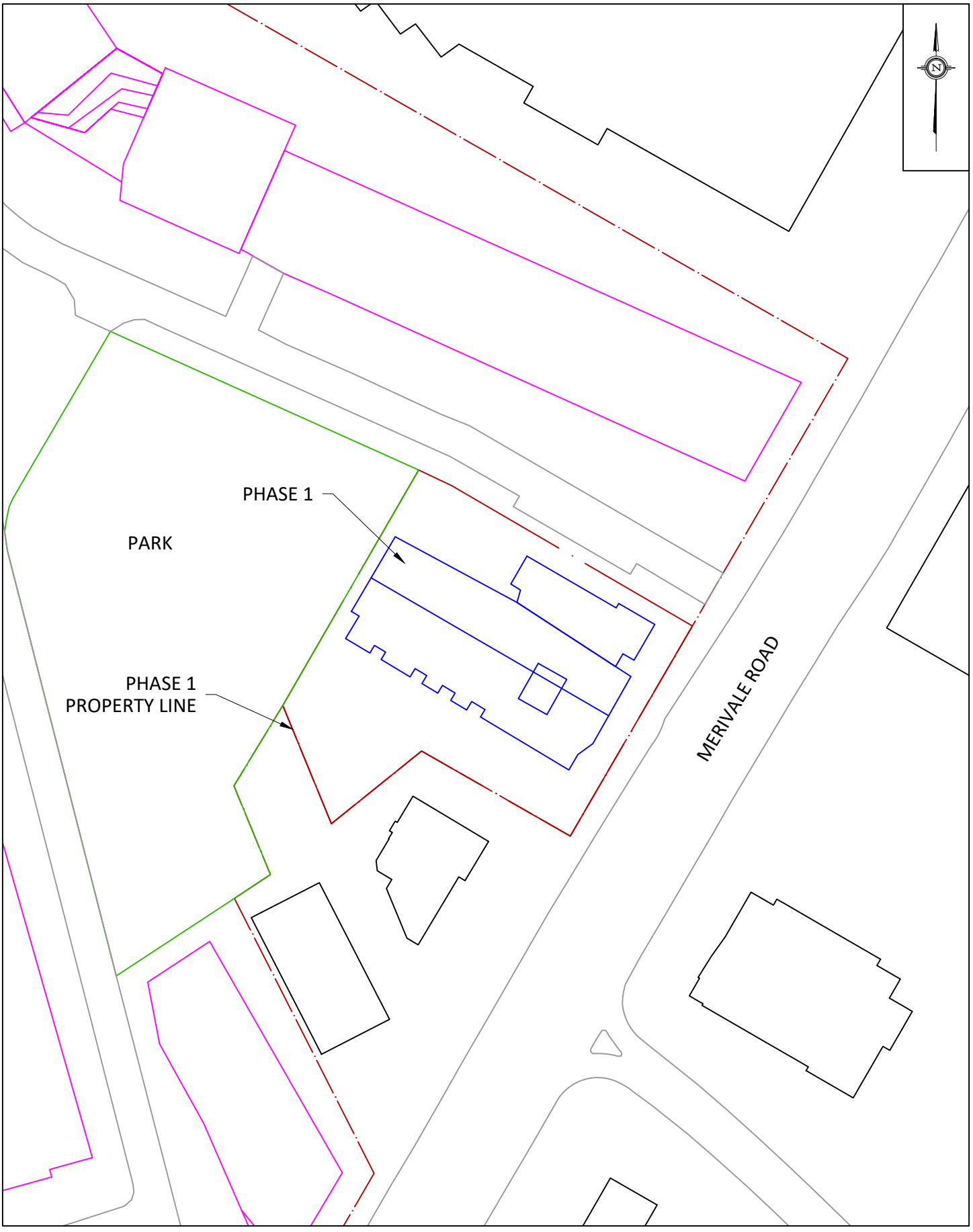
PROJECT	1500 MERIVALE ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	GW21-166-1A
DATE	MARCH 30, 2023
DRAWN BY	G.G.

DESCRIPTION

FIGURE 1A:
MASTERPLAN WITH SURROUNDING CONTEXT



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PROJECT	1500 MERIVALE ROAD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW21-166-1B
DATE	MARCH 30, 2023	DRAWN BY	G.G.

DESCRIPTION

FIGURE 1B:
PHASE 1 SITE PLAN WITH SURROUNDING CONTEXT

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SCALE	1:1000 (APPROX.)
DRAWING NO.	GW21-166-2
DATE	MARCH 30, 2023
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DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS

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DRAWING NO.	GW21-166-3
DATE	MARCH 30, 2023
DRAWN BY	G.G.

DESCRIPTION

FIGURE 3:
WINDOW STC REQUIREMENTS

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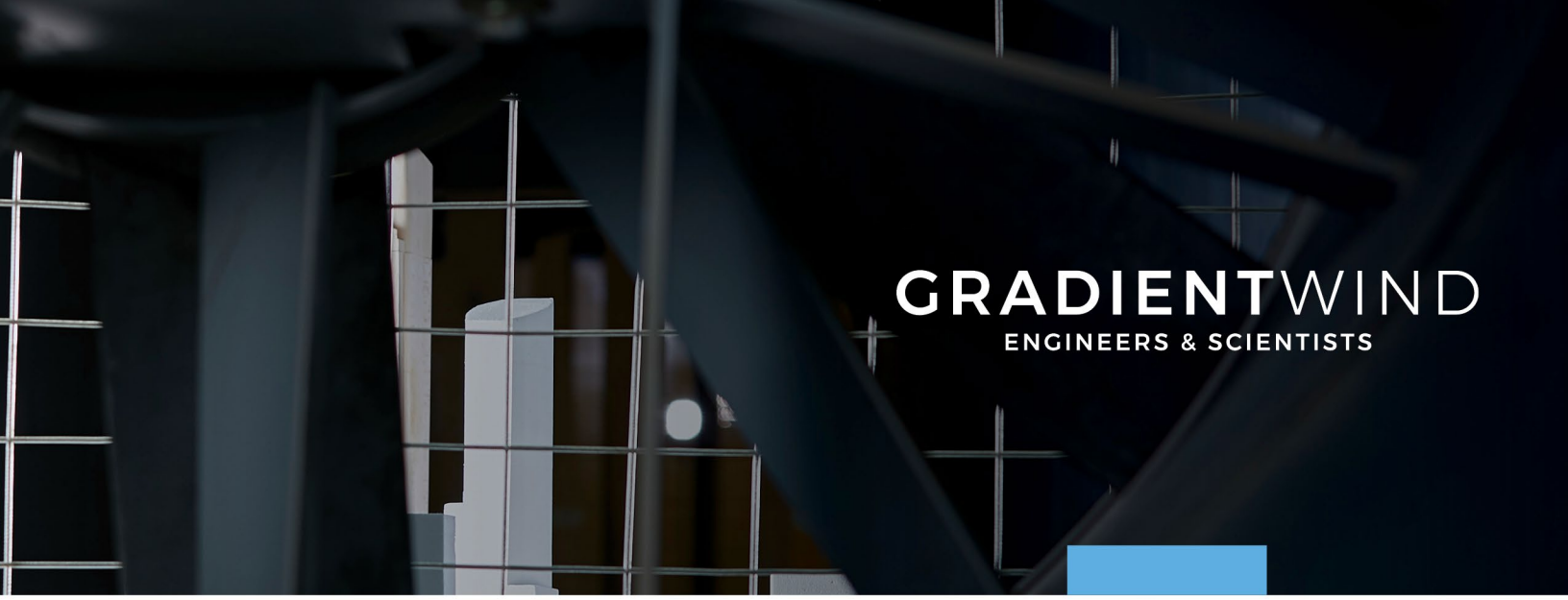
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW21-166-4
DATE	MARCH 30, 2023
DRAWN BY	G.G.

DESCRIPTION

FIGURE 4:
STAMSON INPUT PARAMETERS



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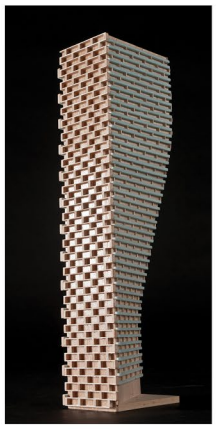

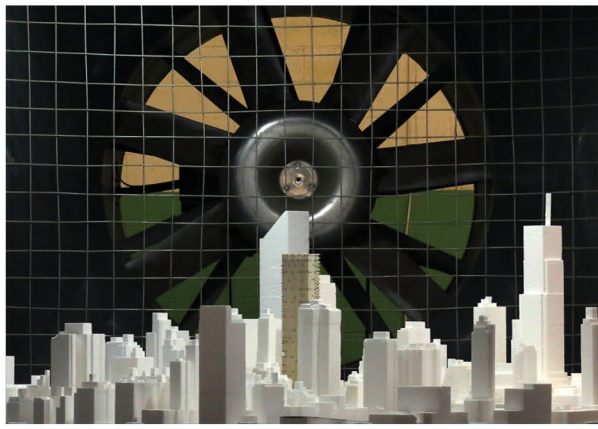

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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```
STAMSON 5.0        NORMAL REPORT        Date: 31-03-2023 14:20:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


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

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

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

Data for Segment # 1: MR (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  :  26.00 / 26.00  m
Receiver height           :  29.50 / 29.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 68.28 + 0.00) = 68.28 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     90   0.00  73.68   0.00  -2.39  -3.01   0.00   0.00   0.00
68.28
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 68.28 dBA

Total Leq All Segments: 68.28 dBA

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

Source height = 1.50 m

ROAD (0.00 + 60.68 + 0.00) = 60.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  66.08   0.00  -2.39  -3.01   0.00   0.00   0.00
60.68
-------------------------------------------------------------------------
--

Segment Leq : 60.68 dBA

Total Leq All Segments: 60.68 dBA


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

```
STAMSON 5.0        NORMAL REPORT        Date: 31-03-2023 14:20:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


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

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

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

Data for Segment # 1: MR (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  :  19.00 / 19.00  m
Receiver height           :  29.50 / 29.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 72.65 + 0.00) = 72.65 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  73.68   0.00  -1.03   0.00   0.00   0.00   0.00
72.65
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 72.65 dBA

Total Leq All Segments: 72.65 dBA

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

Source height = 1.50 m

ROAD (0.00 + 65.05 + 0.00) = 65.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.00  66.08   0.00  -1.03   0.00   0.00   0.00   0.00
65.05
-------------------------------------------------------------------------
--

Segment Leq : 65.05 dBA

Total Leq All Segments: 65.05 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 72.65
                           (NIGHT): 65.05
```

```
STAMSON 5.0        NORMAL REPORT        Date: 31-03-2023 14:20:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


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

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

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

Data for Segment # 1: MR (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  :  22.00 / 22.00  m
Receiver height           :  26.50 / 26.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 69.00 + 0.00) = 69.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90      0   0.00  73.68   0.00  -1.66  -3.01   0.00   0.00   0.00
69.00
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 69.00 dBA

Total Leq All Segments: 69.00 dBA

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

Source height = 1.50 m

ROAD (0.00 + 61.41 + 0.00) = 61.41 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  66.08   0.00  -1.66  -3.01   0.00   0.00   0.00
61.41
-------------------------------------------------------------------------
--

Segment Leq : 61.41 dBA

Total Leq All Segments: 61.41 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.00
                           (NIGHT): 61.41
```

```
STAMSON 5.0        NORMAL REPORT        Date: 31-03-2023 14:21:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


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

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

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

Data for Segment # 1: MR (day/night)
----------------------------------
Angle1   Angle2           : -90.00 deg   37.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :  30.00 / 30.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 37.00 deg
Barrier height            :  28.50 m
Barrier receiver distance :   6.00 / 6.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: MR (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 !       30.00 !       23.16 !        23.16

ROAD (0.00 + 54.69 + 0.00) = 54.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     37   0.00  73.68   0.00  -2.22  -1.51   0.00   0.00 -15.25
54.69
-------------------------------------------------------------------------
--

Segment Leq : 54.69 dBA

Total Leq All Segments: 54.69 dBA

Results segment # 1: MR (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 !       30.00 !       23.16 !        23.16

ROAD (0.00 + 47.10 + 0.00) = 47.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     37   0.00  66.08   0.00  -2.22  -1.51   0.00   0.00 -15.25
47.10
-------------------------------------------------------------------------
--

Segment Leq : 47.10 dBA

Total Leq All Segments: 47.10 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 54.69
                           (NIGHT): 47.10
```