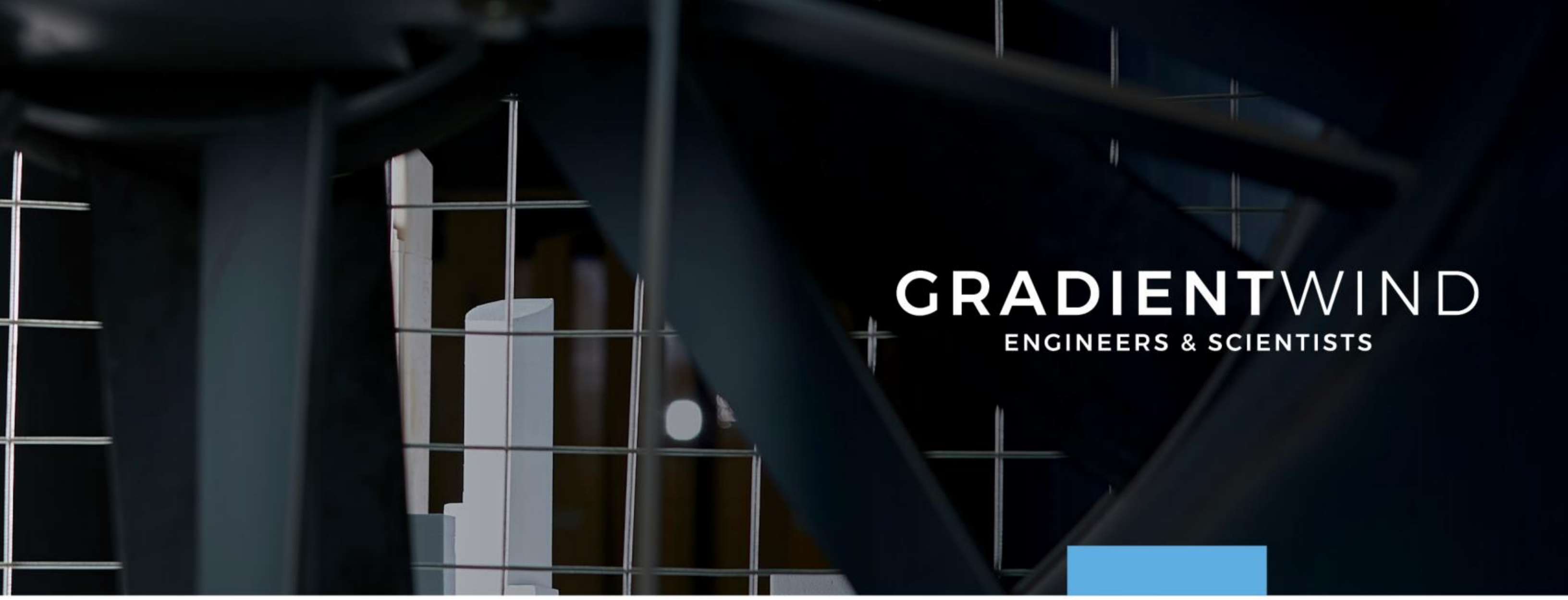
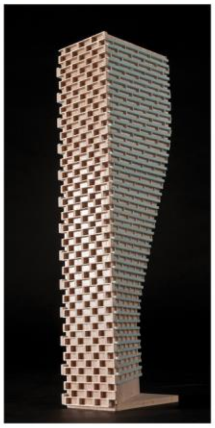
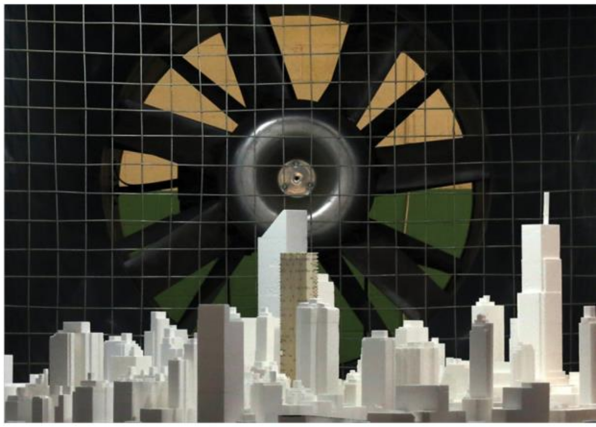


ROADWAY TRAFFIC NOISE ASSESSMENT

Baseline Tower Phases 4-5
Ottawa, Ontario

Report: 21-424-Traffic Noise R1





July 19th, 2024

PREPARED FOR
Brigil
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PREPARED BY
Efser Kara, MSc, LEED GA, Acoustic Scientist
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EXECUTIVE SUMMARY

This report describes a roadway traffic noise assessment undertaken for a proposed multi-building development located at the intersection of Baseline Road and Sandcastle Drive, known as Baseline Tower, in Ottawa, Ontario. The proposed development comprises 3 buildings subdivided into 3 phases, a public park, and pedestrian walkways throughout the site. The primary sources of roadway traffic noise include Baseline Road and Sandcastle Drive. Figure 1 illustrates a complete site plan with the surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) architectural drawings provided by Neuf Architect(e)s in June 2024.

The results of the current analysis indicate that noise levels at the building façades will range between 53 and 68 dBA during the daytime period (07:00-23:00) and between 45 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the north façade of Phase 6 which is nearest and most exposed to Baseline Road. Upgraded building components will be required for all towers where noise levels exceed 65 dBA (see Figure 3). Noise levels at the outdoor amenity areas were found to fall below 60 dBA, therefore noise control measures are not required.

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, the Type D Warning Clauses will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed block become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed block on surrounding noise sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Brigil to undertake a roadway traffic noise assessment for a proposed multi-building development known as Baseline Tower Phases 4-6. This report summarizes the methodology, results, and recommendations related to the assessment of exterior 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 Neuf Architect(e)s, 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 southeast intersection of Baseline Road and Sandcastle Drive in Ottawa, on a parcel of land to the immediate west of Baseline Tower Phases 1 and 2. The proposed development comprises four phases, Phases 3-4, 5, and 6, situated south, central, and north of the subject site, respectively. All buildings are topped with a mechanical penthouse (MPH). The subject site comprises a downwards slope towards the north, therefore the basement 0 level of Phase 3-4 and the general ground floors of Phases 5 and 6 is at the level of Baseline Road.

East-west laneways extend from Sandcastle Drive to meet an existing laneway along the east elevation of the subject site extending from Baseline Road. Surface parking is provided along the eastern laneway and to the north of Phase 3-4 and drop-off areas are at the northwest corner of Phase 3-4 and to the east of Phases 5 and 6. Access to shared below-grade parking levels is provided by a vehicular entrance and a parking ramp at the northeast corners of Phases 3-4 and 5, respectively, via the noted internal laneways. A parkland dedication is proposed to the west of Phase 3-4.

Phase 3-4 comprises a nine-storey building with a nominally 'L'-shaped planform with its short axis oriented along Sandcastle Drive. The ground floor includes commercial spaces to the west, a main

[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

entrance, bike storage, and a coworking space to the north, central building support spaces, and parking spaces throughout the remainder of the level. Level 2 includes central indoor amenity spaces and residential units throughout the remainder of the level, while Levels 3-9 are reserved for residential occupancy. The building steps back from the south elevation at this level to accommodate a common amenity terrace.

Phase 5 comprises a near rectangular 28-storey building, inclusive of a three-storey podium comprising a nominally ‘I’-shaped planform, with its long axis-oriented along Sandcastle Drive. The podium levels (excluding the general and upper ground floors) are shared with Phase 6 which comprises a near rectangular 32-storey building.

The general ground floor of Phase 5 includes a residential main entrance to the east, commercial spaces at the southeast and northwest corners, a social room and music room at the southwest corner, and a bike storage to the north. The general ground floor of Phase 6 includes a residential main entrance at the southeast corner, a loading space to the south, and commercial spaces throughout the remainder of the level. The upper ground floor of Phase 5 includes a coworking space and a storage space to the north and is open to below throughout the remainder of the level, while upper ground floor of Phase 6 is open to below throughout the entire level. Levels 2 and 3 are reserved for residential use, with a pool mechanical space at the northeast corner of Phase 5 at Level 3. At Level 4, Phase 5 includes an indoor pool and spa to the east and a gym, yoga studio, and a lounge at the southwest corner, to the west, and at the northwest corner, respectively, while Phase 6 includes a social room to the south and residential units throughout the remainder of the level. A landscaped area is located between Phases 5 and 6.

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed block become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed block on surrounding noise sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

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) explore potential noise mitigation options, where required.

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 traffic as listed in Table 1.

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 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 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. 60 dBA is the maximum permissible noise level at an OLA, in any case.

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

4.2.2 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master 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
Baseline Road	4-Lane Arterial (Divided)	70	**35,000**
Sandcastle Drive	2-Lane Urban Collector	40	**8,000**

4.2.3 Theoretical Roadway Noise Predictions

Noise predictions were determined by computer modelling using two programs: Predictor-Lima and STAMSON 5.04. To provide a general understanding of noise across the site, the employed software program was Predictor-Lima, which incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5. This computer program is capable of representing three-dimensional surface and first reflections of sound waves over a suitable spectrum for human hearing. A receptor grid was placed across the subject site, along with a number of discrete receptors at key sensitive areas. Although this program is useful for outputting noise contours, it is not the approved calculation method for roadway predictions by the City of Ottawa. Therefore, the results were confirmed by performing discrete noise calculations with the MECP computerized noise assessment program, STAMSON 5.04, at two sample receptor locations. Receptor distances and exposure angles are illustrated in Figure 4. Appendix A includes the STAMSON 5.04 input and output data.

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

Roadway noise calculations were performed by treating each road segment as a separate line source of noise, and by using existing buildings as noise barriers. In addition to the traffic volumes summarized in Table 1, theoretical noise predictions were based on the following parameters:

- The day/night split was taken to be 92%/8% respectively for all streets.
- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be flat/gentle slope surrounding the subject site.
- Phases 1-3 of the Baseline Towers development were included in the assessment.
- Noise receptors were strategically placed at 12 locations around the study area, see Figure 2.
- Receptor distances and exposure angles used in the STAMSON calculations are illustrated in Figure 4.

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 previously mentioned, the windows are the known weak point in a partition.

As per Section 4.2, when daytime noise levels (from road and rail sources) at the plane of the window exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure[8] considers:

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

- Window type and total area as a percentage of total room floor area
- Exterior wall type and total area as a percentage of the total room floor area
- Acoustic absorption characteristics of the room
- Outdoor noise source type and approach geometry
- Indoor sound level criteria, which varies according to the intended use of a space

Based on published research[9], exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Due to the limited information available at the time of the study, which was prepared for site plan approval, detailed floor layouts and building elevations have not been finalized; therefore, detailed STC calculations could not be performed at this time. As a guideline, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels + Safety Factor).

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

The results of the current analysis indicate that noise levels at the building façades will range between 53 and 68 dBA during the daytime period (07:00-23:00) and between 45 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the north façade of Phase 6 which is nearest and most exposed to Baseline Road. Figures 4 and 5 illustrate daytime and nighttime noise contours throughout the site, 25 m above grade. Noise levels at the outdoor amenity areas were found to fall below 60 dBA, therefore noise control measures are not required.

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor Number	Absolute Receptor Height (m)	Receptor Location	Noise Level (dBA)	
			Day	Night
R1	102.6	POW - Phase 6 North Façade, Level 32	68	61
R2	102.6	POW - Phase 6 West Façade, Level 32	67	60
R3	102.6	POW - Phase 6 East Façade, Level 32	66	59
R4	102.6	POW - Phase 6 South Façade, Level 32	56	48
R5	89	POW - Phase 5 West Façade, Level 28	64	56
R6	89	POW - Phase 5 North Façade, Level 28	63	55
R7	89	POW - Phase 5 South Façade, Level 28	57	50
R8	26.2	POW - Phase 3-4 West Façade, Level 9	60	53
R9	26.2	POW - Phase 3-4 North Façade, Level 9	58	51
R10	26.2	POW - Phase 3-4 South Façade, Level 9	58	51
R11	1.5	OLA - Phase 5/6 Level 4 Amenity	57	N/a
R12	1.5	OLA - Phase 4, Level 2 Amenity	38	N/a
R13	26.2	POW - Phase 3-4 North Façade, Level 9	53	45

*Above podium roof

Table 4 below shows a comparison between the calculated noise levels using Predictor-Lima and STAMSON. Noise levels calculated in STAMSON were found to have good correlation with Predictor-Lima and variability between the two programs was within an acceptable level of ±1-3dBA. Appendix A includes the STAMSON 5.04 input and output data.

TABLE 4: RESULT CORRELATION BETWEEN PREDICTOR AND STAMSON

Receptor Number	Receptor Location	Absolute Receptor Height (m)	STAMSON 5.04 Noise Level (dBA)		PREDICTOR-LIMA Noise Level (dBA)	
			Day	Night	Day	Night
R2	POW - Phase 6 West Façade, Level 32	102.6	70	63	67	60
R3	POW - Phase 6 East Façade, Level 32	102.6	68	60	66	59

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 + Safety Factor). 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, north, and west on Phase 6 will require a minimum STC of 31

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

- **Living Room Windows**

(i) Living room windows facing east, north, and west on Phase 6 will require a minimum STC of 26

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

- **Retail**

(iii) Retail windows facing east, north, and west on Phase 6 will require a minimum STC of 21

(iv) All other retail windows are to satisfy Ontario Building Code (OBC 2020) requirements.

- **Exterior Walls**

(i) Exterior wall components on these façades will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[10]

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

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

combinations of window components, such as those proposed, will offer the necessary sound attenuation rating. It is the responsibility of the manufacturer to ensure that the specified window achieves the required STC. This can only be assured by using window configurations that have been certified by laboratory testing. The requirements for STC ratings assume that the remaining components of the building are constructed and installed according to the minimum standards of the Ontario Building Code. The specified STC requirements also apply to swinging and/or sliding patio doors.

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 Lease, Purchase and Sale Agreements, as summarized in Section 6.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels at the building façades will range between 53 and 68 dBA during the daytime period (07:00-23:00) and between 45 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the north façade of Phase 6 which is nearest and most exposed to Baseline Road. Upgraded building components will be required for all towers where noise levels exceed 65 dBA (see Figure 3). Noise levels at the outdoor amenity areas were found to fall below 60 dBA, therefore noise control measures are not required.

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, the Type D Warning Clauses will also be required in all Lease, Purchase and Sale Agreements, as summarized below:

Type D:

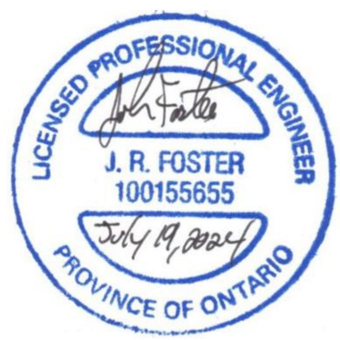
> *"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."*

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed block become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed block on surrounding noise sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

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,

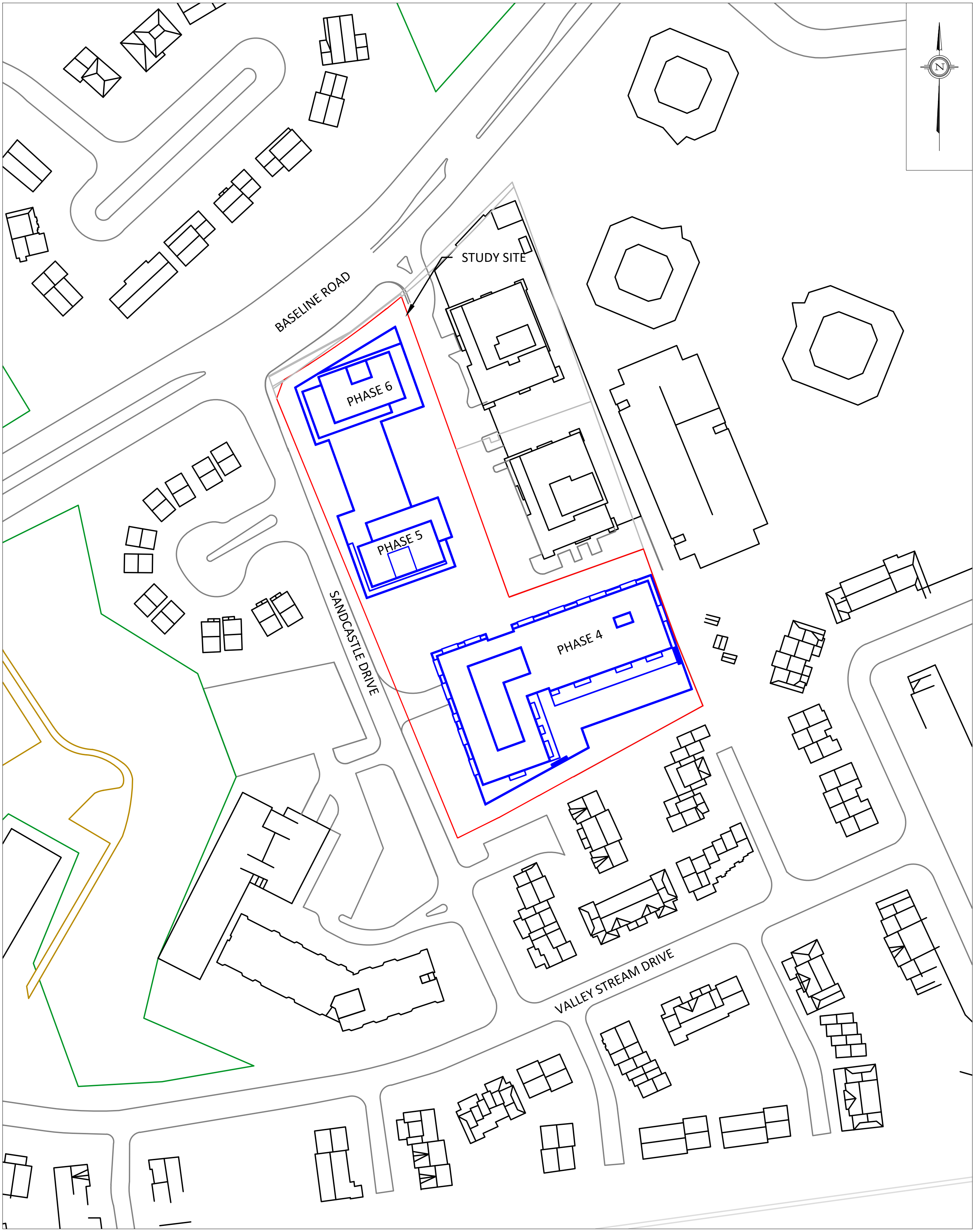
Gradient Wind Engineering Inc.



Efser Kara, MSc, LEED GA
Acoustic Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File 21-424-Traffic Noise R1



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PROJECT	BASELINE TOWER PHASE 4-6 ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	GW21-424-1
DATE	JUNE 18, 2024
DRAWN BY	E.A.
DESCRIPTION	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT

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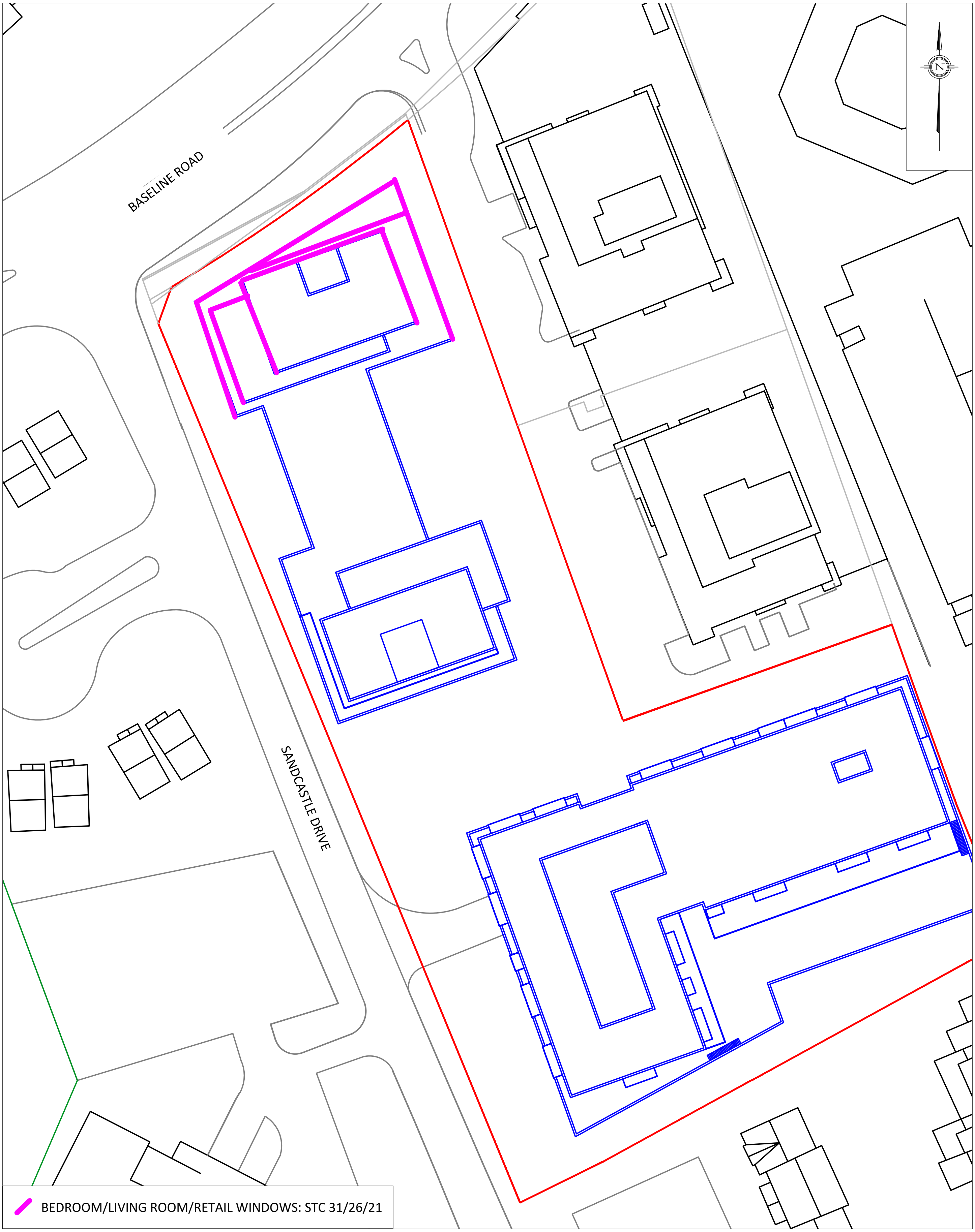
PROJECT	BASELINE TOWER PHASE 4-6 ROADWAY TRAFFIC NOISE ASSESSMENT			DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW21-424-2	FIGURE 2: RECEPTOR LOCATIONS
DATE	JUNE 18, 2024	DRAWN BY	E.A.	



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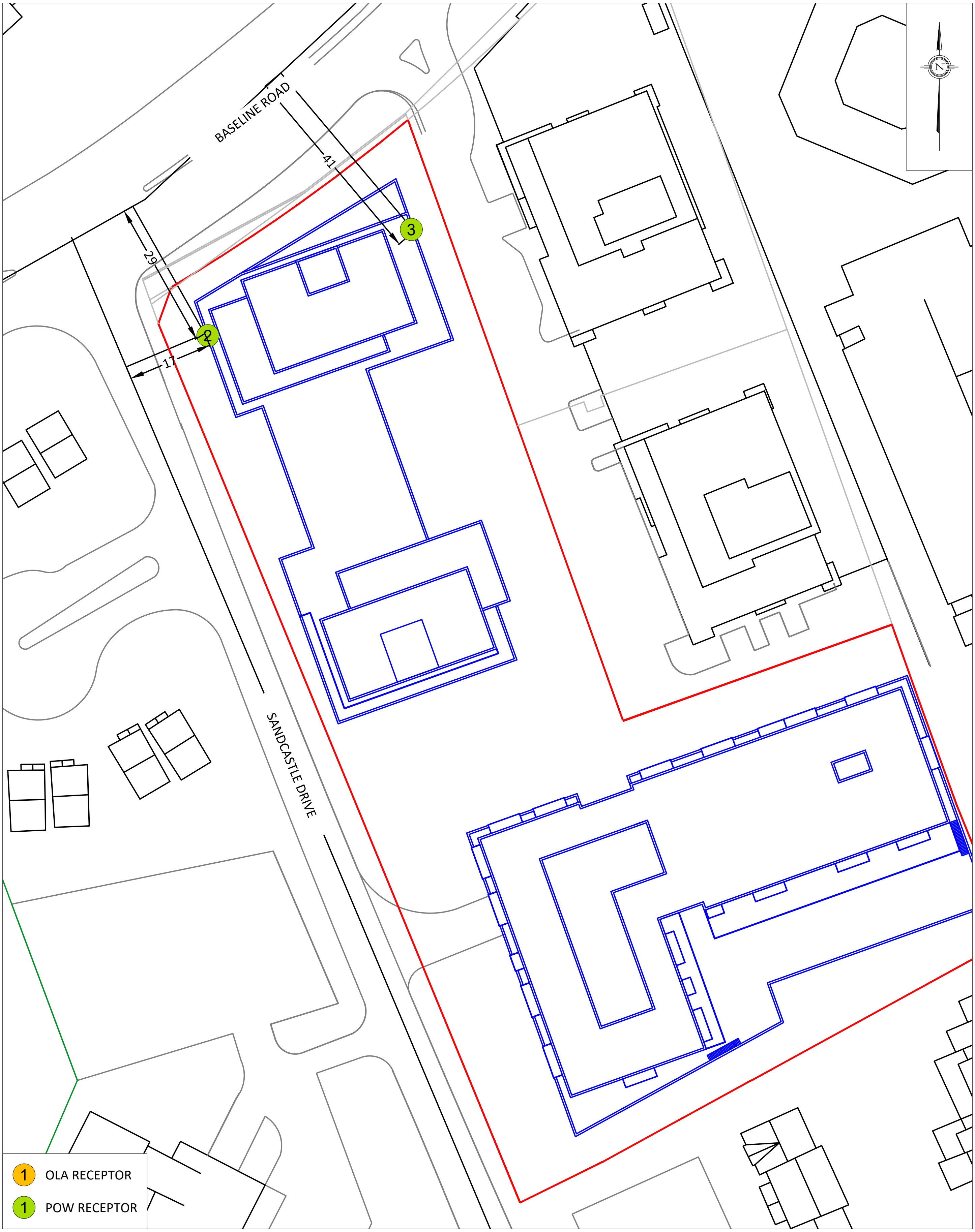
PROJECT	BASELINE TOWER PHASE 4-6 ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW21-424-3
DATE	JUNE 18, 2024	DRAWN BY	E.A.

DESCRIPTION

FIGURE 3:
WINDOW STC REQUIREMENTS



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PROJECT		DESCRIPTION
BASELINE TOWER PHASE 4-6 ROADWAY TRAFFIC NOISE ASSESSMENT		FIGURE 4: STAMSON PARAMETERS
SCALE 1:1000 (APPROX.)	DRAWING NO. GW21-424-4	
DATE JUNE 18, 2024	DRAWN BY E.A.	

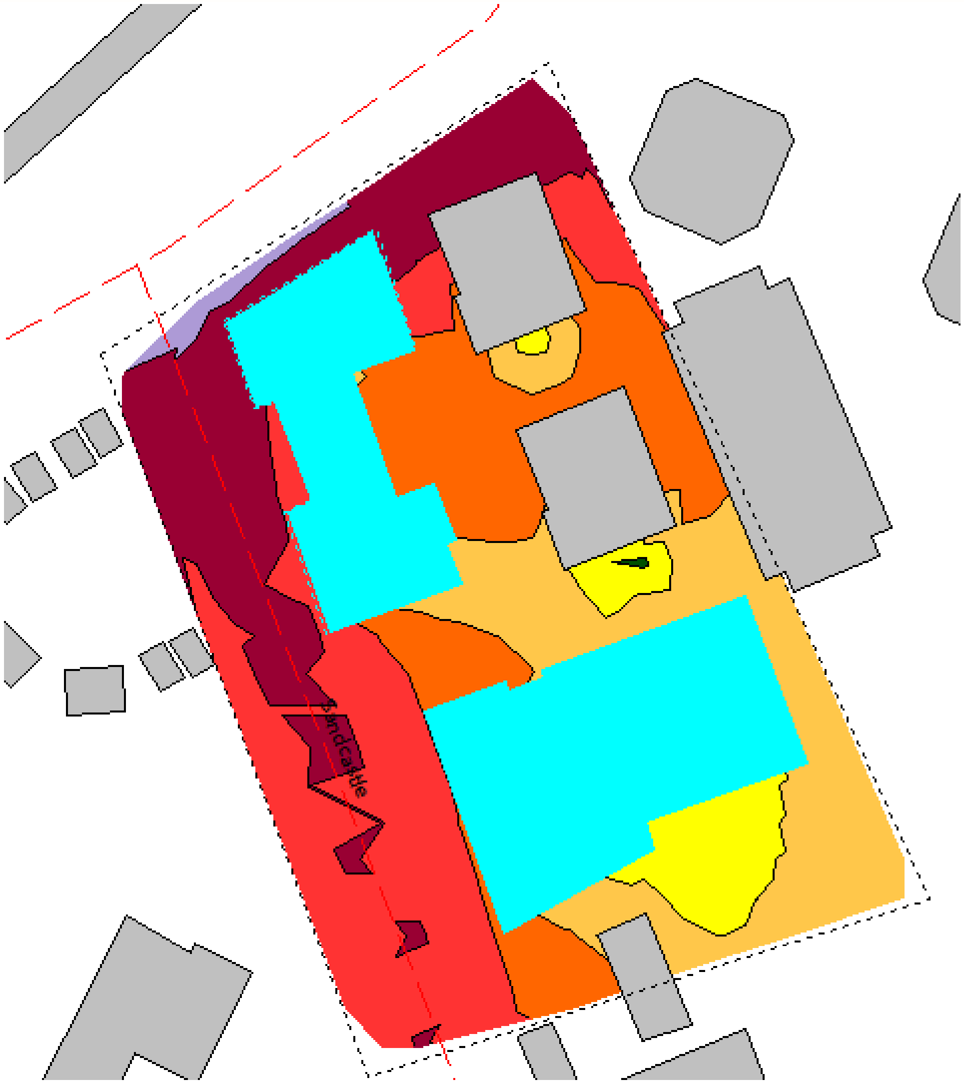
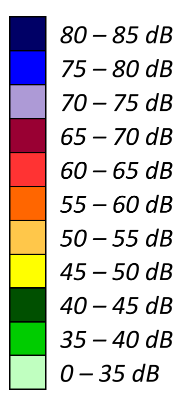


FIGURE 4: DAYTIME TRAFFIC NOISE CONTOURS (25 M ABOVE GRADE)



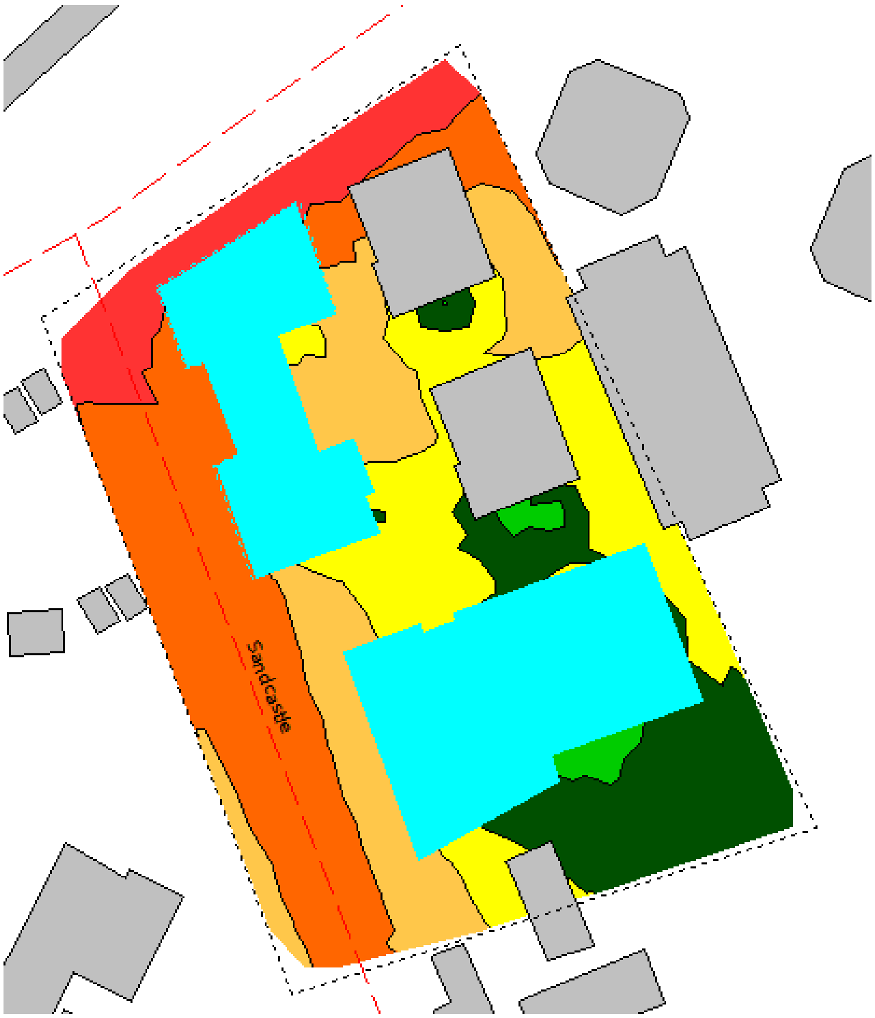
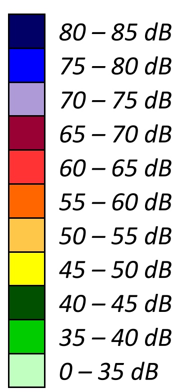
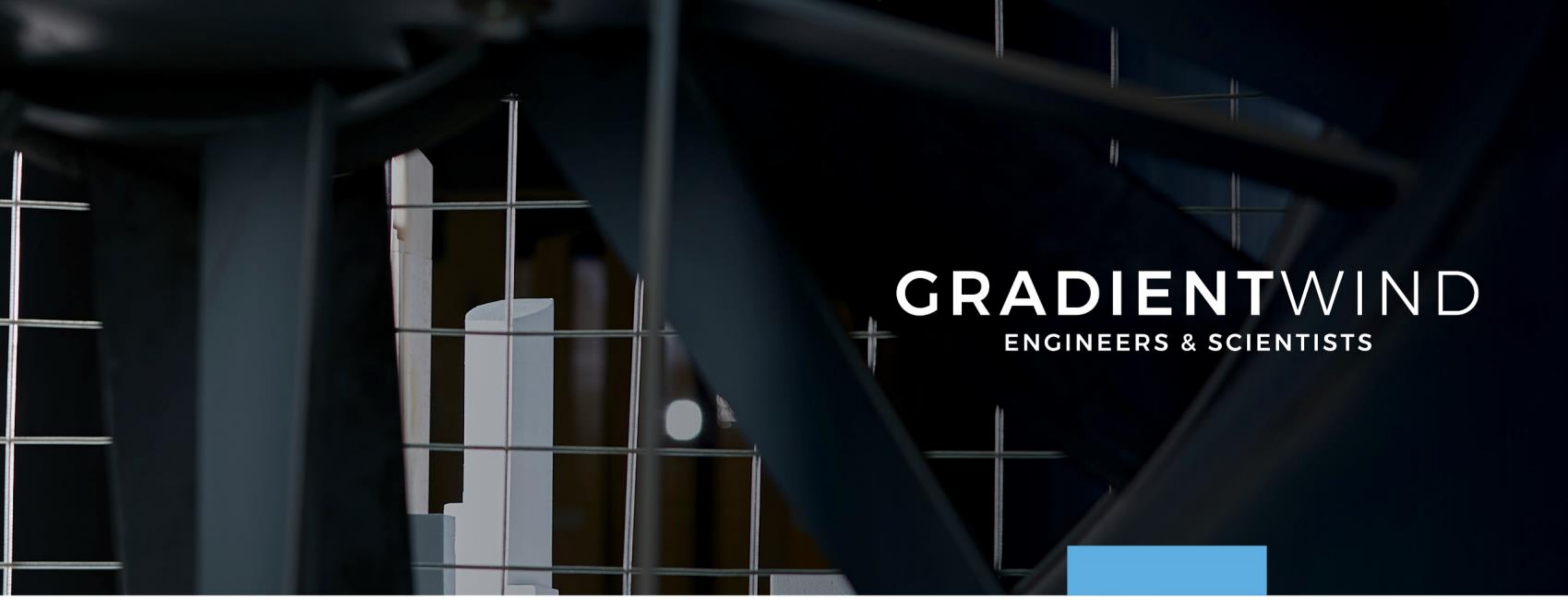
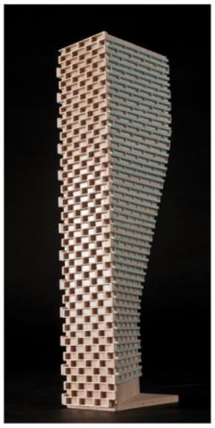
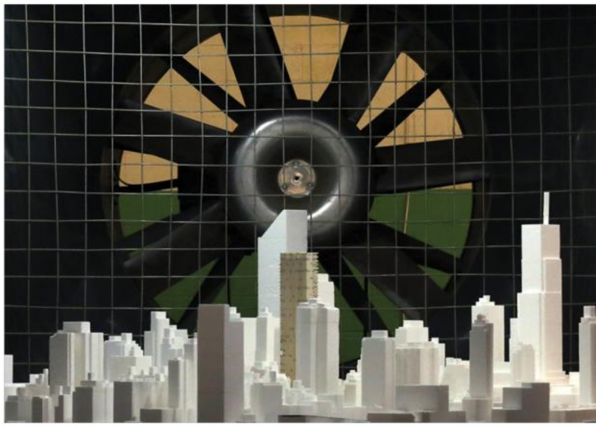


FIGURE 5: NIGHTTIME TRAFFIC NOISE CONTOURS (25 M ABOVE GRADE)









APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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```
STAMSON 5.0        NORMAL REPORT        Date: 18-06-2024 11:17:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Baseline (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  :    70 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: Baseline (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   :  29.00 / 29.00  m
Receiver height            : 102.60 / 102.60 m
Topography                 :      1       (Flat/gentle slope; no barrier)
Reference angle            :   0.00


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

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
```

```
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Sandcastle (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   :  17.00 / 17.00  m
Receiver height            : 102.60 / 102.60 m
Topography                 :      1       (Flat/gentle slope; no barrier)
Reference angle            :   0.00


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

Source height = 1.50 m

ROAD (0.00 + 69.12 + 0.00) = 69.12 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90      0   0.00  75.00   0.00  -2.86  -3.01   0.00   0.00   0.00
69.12
--------------------------------------------------------------------------
--

Segment Leq : 69.12 dBA


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

Source height = 1.50 m

ROAD (0.00 + 63.41 + 0.00) = 63.41 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90     90   0.00  63.96   0.00  -0.54   0.00   0.00   0.00   0.00
63.41
--------------------------------------------------------------------------
--

Segment Leq : 63.41 dBA
```

Total Leq All Segments: 70.15 dBA

```
Results segment # 1: Baseline (night)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 61.53 + 0.00) = 61.53 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90      0   0.00  67.40   0.00  -2.86  -3.01   0.00   0.00   0.00
61.53
--------------------------------------------------------------------------
--

Segment Leq : 61.53 dBA


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

Source height = 1.50 m

ROAD (0.00 + 55.82 + 0.00) = 55.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90     90   0.00  56.36   0.00  -0.54   0.00   0.00   0.00   0.00
55.82
--------------------------------------------------------------------------
--

Segment Leq : 55.82 dBA

Total Leq All Segments: 62.56 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 70.15
                         (NIGHT): 62.56
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-06-2024 12:07:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Baseline (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  :    70 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: Baseline (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  :  41.00 / 41.00  m
Receiver height           : 102.60 / 102.60 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 1.50 m

ROAD (0.00 + 67.62 + 0.00) = 67.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
     0     90   0.00  75.00   0.00  -4.37  -3.01   0.00   0.00   0.00
67.62
```

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

Segment Leq : 67.62 dBA

Total Leq All Segments: 67.62 dBA


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

Source height = 1.50 m

ROAD (0.00 + 60.02 + 0.00) = 60.02 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
     0     90   0.00  67.40   0.00  -4.37  -3.01   0.00   0.00   0.00
60.02
--------------------------------------------------------------------------
--

Segment Leq : 60.02 dBA

Total Leq All Segments: 60.02 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 67.62
                         (NIGHT): 60.02
```