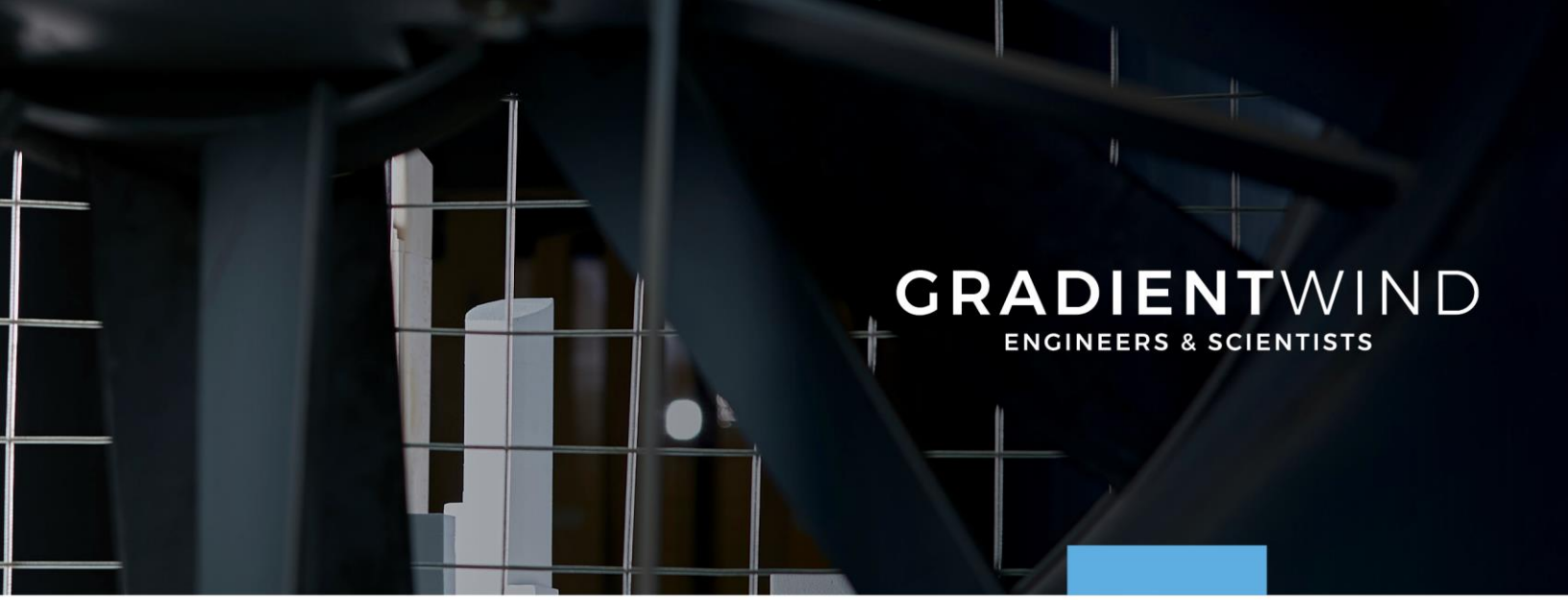
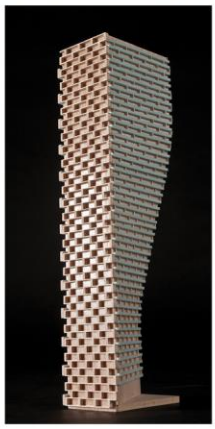


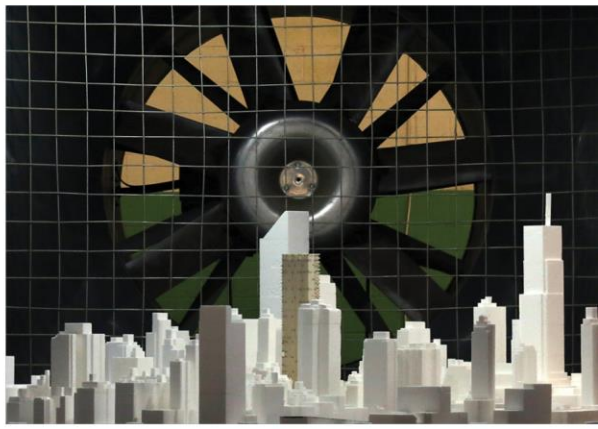
GRADIENTWIND
ENGINEERS & SCIENTISTS

DETAILED ROADWAY TRAFFIC NOISE ASSESSMENT

176 Nepean Street & 293-307 Lisgar Street Ottawa, Ontario

REPORT: 17-128-Detailed Traffic Noise





October 1, 2020

PREPARED FOR

Richcraft (Lisgar) Ltd.
2280 St. Laurent Blvd. Suite 201
Ottawa, ON K1G 4K1
Canada

PREPARED BY

Michael Lafortune, C.E.T., Environmental Scientist
Joshua Foster, P.Eng., Principal

EXECUTIVE SUMMARY

This report describes a detailed roadway traffic noise assessment undertaken in support of site plan application for a proposed mixed-use development located at 176 Nepean and 293-307 Lisgar Street in Ottawa, Ontario. The proposed development comprises two towers rising on the north and south sides of the site, atop separate 9-storey podia. The two towers are connected by 4-storey structure. The north tower rises 27 storeys, and the south tower rises 25 storeys. The major sources of roadway traffic noise impacting the development are roadway traffic from Bank Street and O'Connor Street. 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 the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) site plan drawings prepared by Graziani + Corazza Architects Inc.

The results of the current analysis indicate that noise levels will range between 55 and 62 dBA during the daytime period (07:00-23:00) and between 47 and 54 dBA during the nighttime period (23:00-07:00). The highest noise level (62 dBA) occurs at west façade of the north tower, which is nearest and most exposed to Bank Street. Noise levels at the Level 10 terraces fall below the Environmental Noise Control Guidelines (ENCG) criteria for Outdoor Living Areas (OLA), therefore no mitigation will be required. Noise levels at the plane of window do not exceed the ENCG criteria for upgraded building components, therefore standard OBC compliant windows and exterior walls will be sufficient.

Results of the calculations also indicate that the development will require forced air heating with provision for central air conditioning. Central air conditioning, if installed, will allow occupants to keep windows closed and maintain a comfortable living environment. A Warning Clause will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

With regards to stationary noise impacts, a stationary noise study will be performed once mechanical plans for the proposed building become available. The study will determine noise impacts from rooftop mechanical units of the proposed building on surrounding noise-sensitive areas. This study will include

recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Richcraft (Lisgar) Ltd. to undertake a detailed roadway traffic noise assessment in support of site plan application for a proposed mixed-use development located at 176 Nepean Street and 293-307 Lisgar Street 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 prepared by Graziani + Corazza Architects Inc. in September 2020, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this detailed roadway traffic noise assessment is a proposed mixed-use development to be located at 176 Nepean and 293-307 Lisgar Street in Ottawa, Ontario. The development is located at the centre of a city block bounded by Nepean Street to the north, O'Connor Street to the east, Lisgar Street to the south, and Bank Street to the west. Directly to the east of the site is a 16-storey development at 287 Lisgar Street, while the existing 16-storey development at 300 Lisgar Street is directly to the south. The remaining immediate surroundings comprise a mix of low and medium-rise buildings, as well as surface parking. The major sources of roadway traffic noise impacting the development are roadway traffic from Bank Street and O'Connor Street. Figure 1 illustrates a complete site plan with surrounding context.

The proposed development comprises two towers rising on the north and south sides of the site, atop separate 9-storey podia. The two towers are connected by 4-storey structure. The north tower rises 27 storeys, and the south tower rises 25 storeys. The development includes private balconies and terraces on the various floors, including two large terraces at Level 10, on the east and west sides of the south

[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

tower, atop the podium. Balconies less than 4 m in depth are not considered as outdoor living areas, as per the ENCG.

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 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)[3]

Type of Space	Time Period	Leq (dBA)
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50
Living/dining/den areas of **residences**, hospitals, schools, nursing/retirement homes, 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.

[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] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MECP, 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 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.
- Noise receptors were strategically placed at 12 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 3-7.

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
Bank Street	2-Lane Urban Arterial (2-UAU)	40	**15,000**
O'Connor Stret	2-Lane Urban Arterial (2-UAU)	40	**15,000**

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

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	76.7	South Tower – 25th Floor – South Façade	56	49
2	76.7	South Tower – 25th Floor – East Façade	57	50
3	76.7	South Tower – 25th Floor – North Façade	55	47
4	76.7	South Tower – 25th Floor – West Façade	59	51
5	19	South Tower – 6th Floor – East Façade	57	49
6	19	South Tower – 6th Floor – North Façade	55	47
7	76.7	North Tower – 25th Floor – East Façade	57	49
8	76.7	North Tower – 25th Floor – South Façade	58	51
9	76.7	North Tower – 25th Floor – West Façade	62	54
10	76.7	North Tower – 25th Floor – North Façade	59	51
11	31.7	South Tower – 10th Floor – East Terrace OLA	55	47
12	31.7	South Tower – 10th Floor – West Terrace OLA	55	47

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 55 and 62 dBA during the daytime period (07:00-23:00) and between 47 and 54 dBA during the nighttime period (23:00-07:00). The highest noise level (62 dBA) occurs at west façade of the north tower, which is nearest and most exposed to Bank Street. Noise levels at the Level 10 terraces fall below the ENCG criteria for OLAs, therefore no mitigation will be required. Noise levels at the plane of window do not exceed the ENCG criteria for upgraded building components, therefore standard OBC compliant windows and exterior walls will be sufficient.

Results of the calculations also indicate that the development will require forced air heating with provision for central air conditioning. Central air conditioning, if installed, will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause[8] will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized below:

> *"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment, Conservations and Parks*
>
> *To help address the need for sound attenuation, this development has also been designed with forced air heating with provision for central air conditioning. Air conditioning, if installed, will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment and Climate Change.*
>
> *To ensure that provincial sound level limits are not exceeded, it is important to maintain these sound attenuation features."*

With regards to stationary noise impacts, a stationary noise study will be performed once mechanical plans for the proposed building become available. The study will determine noise impacts from rooftop mechanical units of the proposed building on surrounding noise-sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits.

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

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.

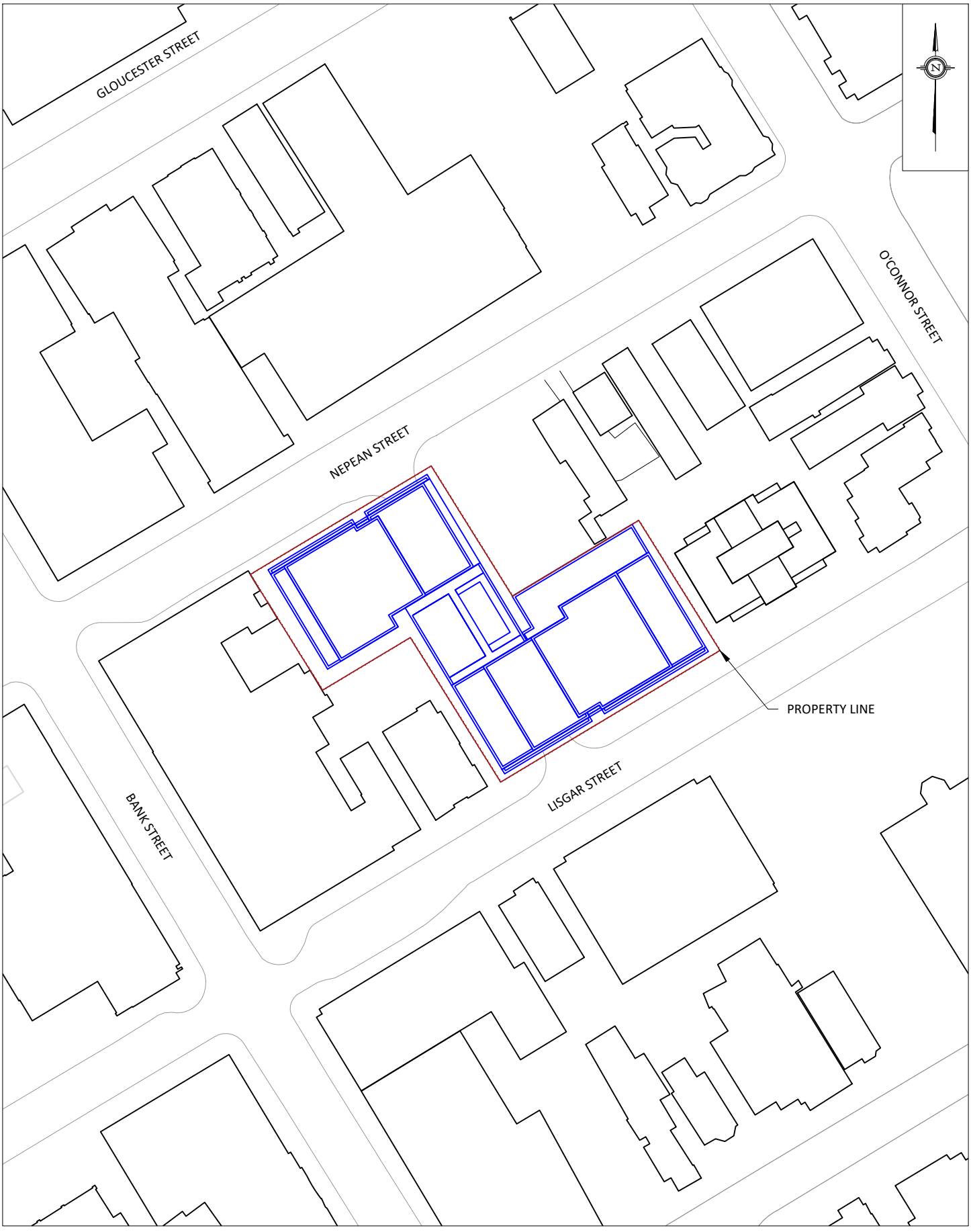
Sincerely,

Gradient Wind Engineering Inc.

Michael Lafortune, C.E.T.
Environmental Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #17-128-Detailed Traffic Noise



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PROJECT	176 NEPEAN STREET & 293-307 LISGAR STREET, OTTAWA DETAILED ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW17-128-1
DATE	SEPTEMBER 30, 2020
DRAWN BY	M.L.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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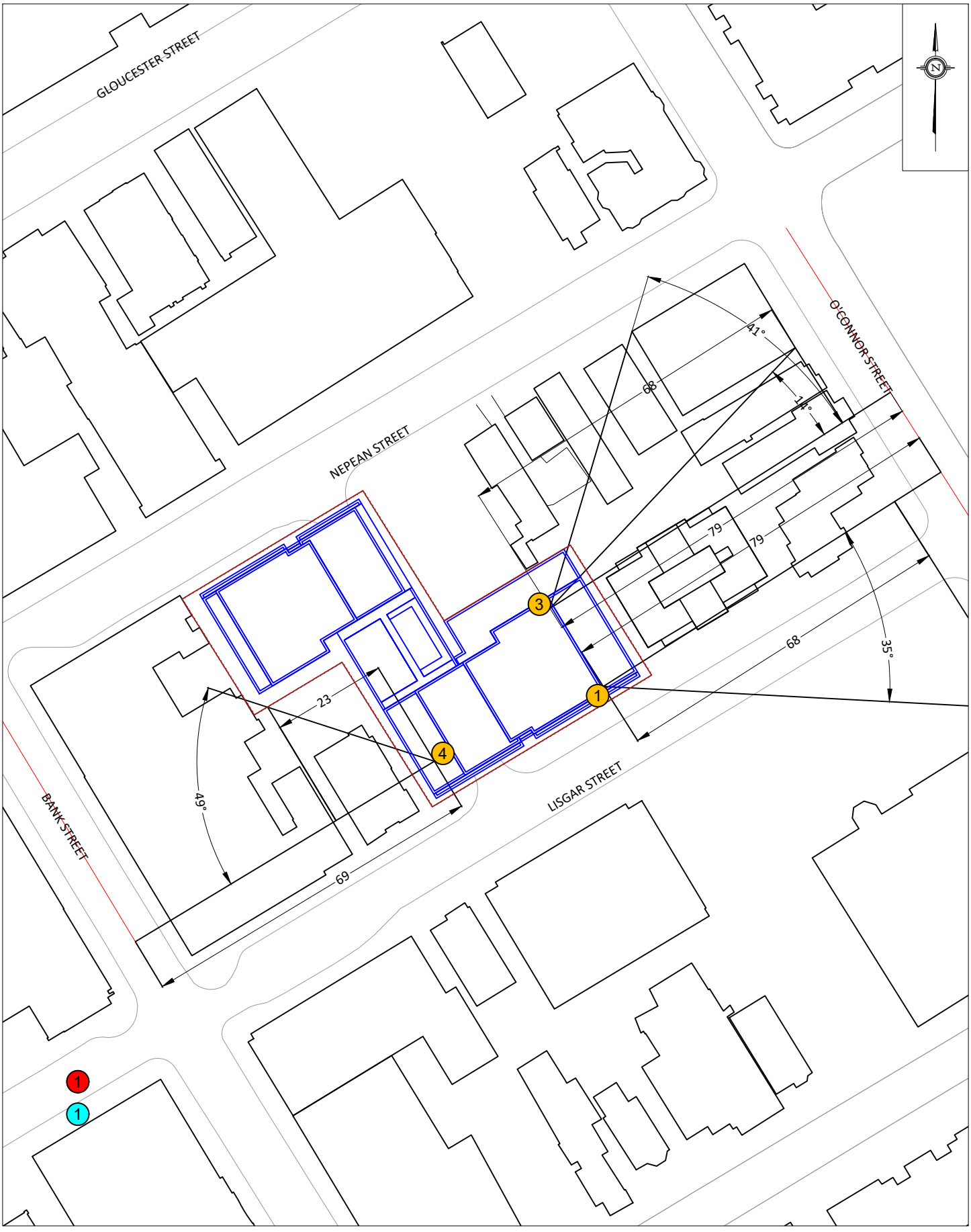
PROJECT	176 NEPEAN STREET & 293-307 LISGAR STREET, OTTAWA DETAILED ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:500 (APPROX.)	DRAWING NO.	GW17-128-2
DATE	SEPTEMBER 30, 2020	DRAWN BY	M.L.

FIGURE 2:
RECEPTOR LOCATIONS



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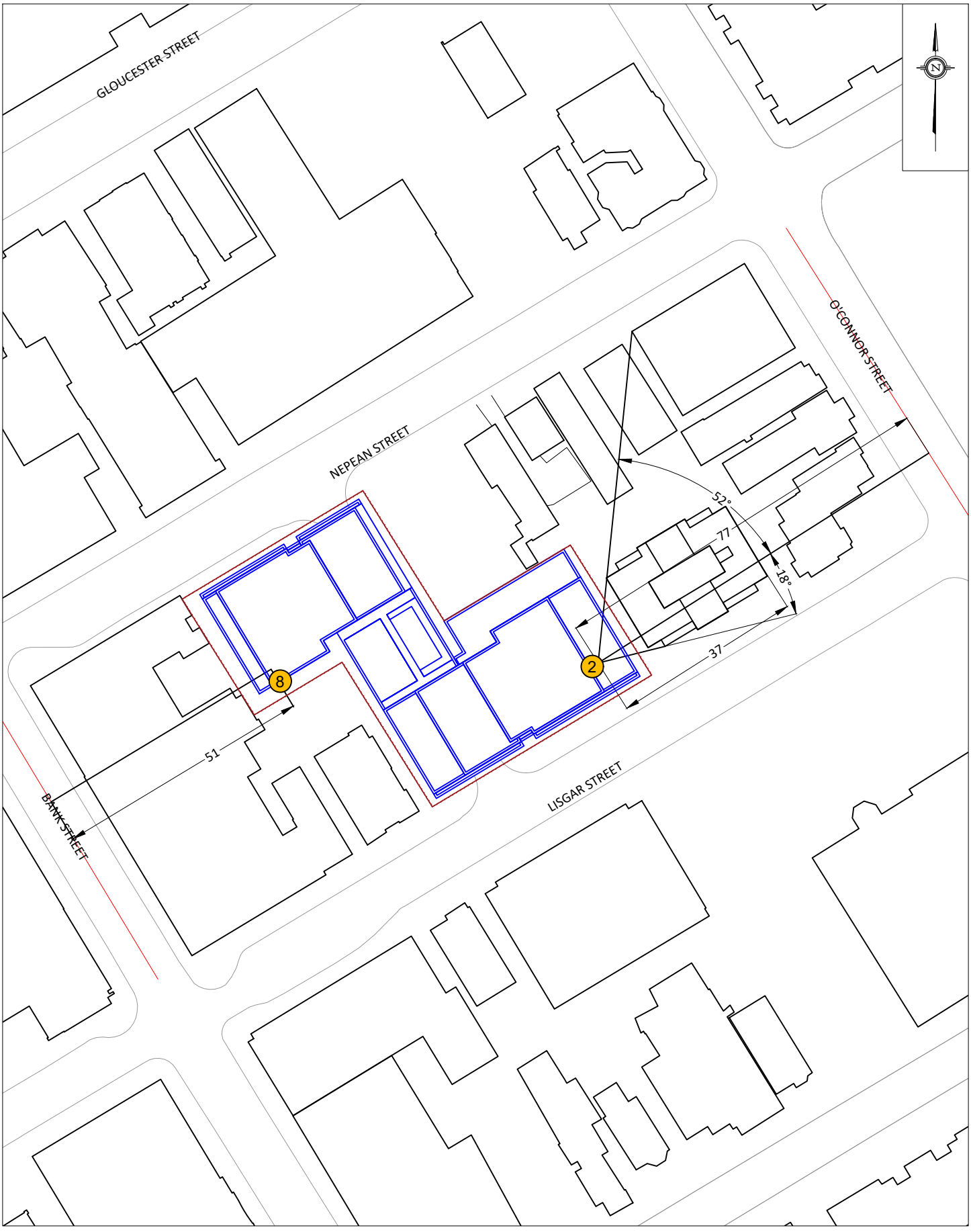
PROJECT	176 NEPEAN STREET & 293-307 LISGAR STREET, OTTAWA DETAILED ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW17-128-3
DATE	SEPTEMBER 30, 2020	DRAWN BY	M.L.

DESCRIPTION

FIGURE 3:
STAMSON INPUT PARAMETERS - RECEPTOR 1,3,4



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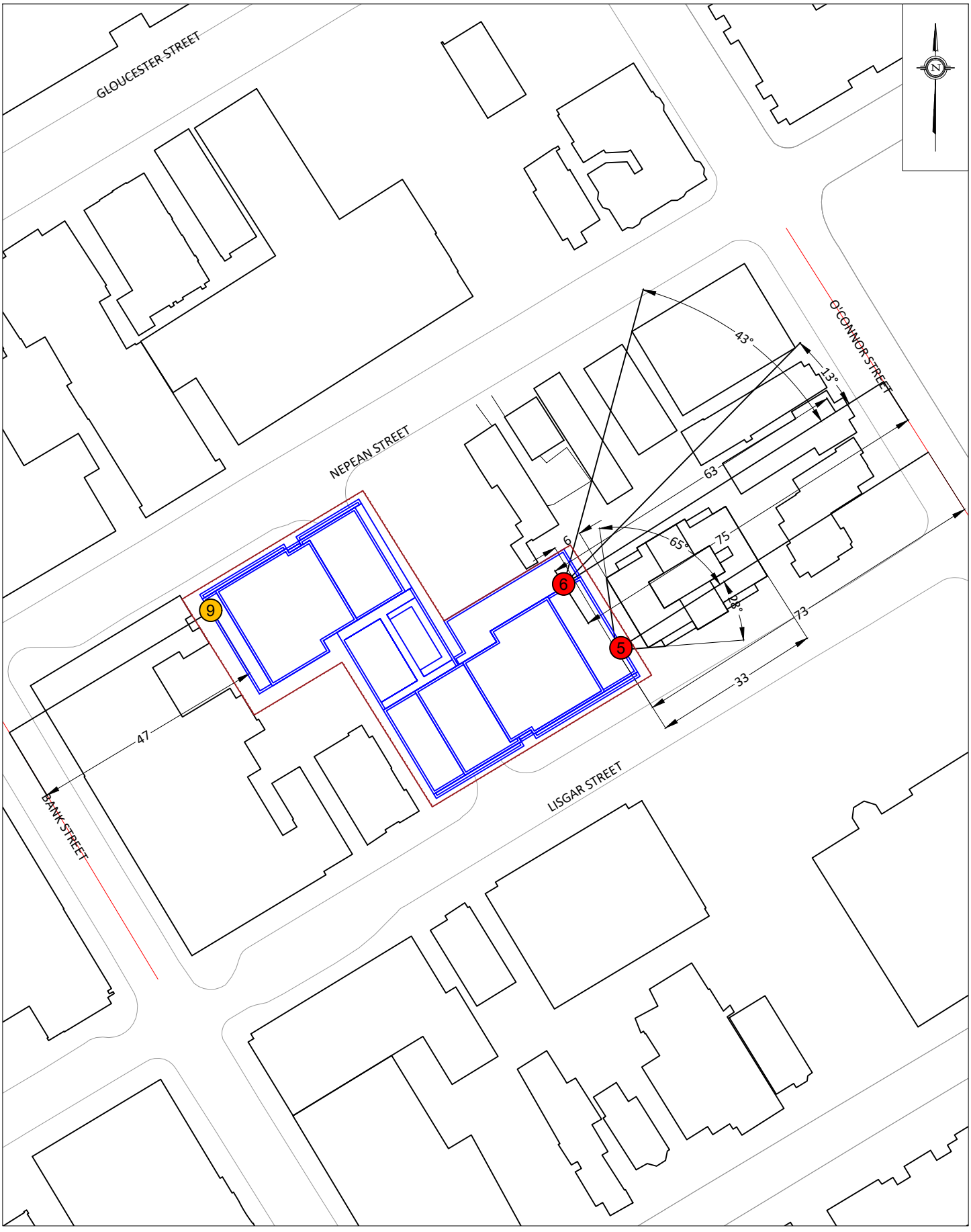
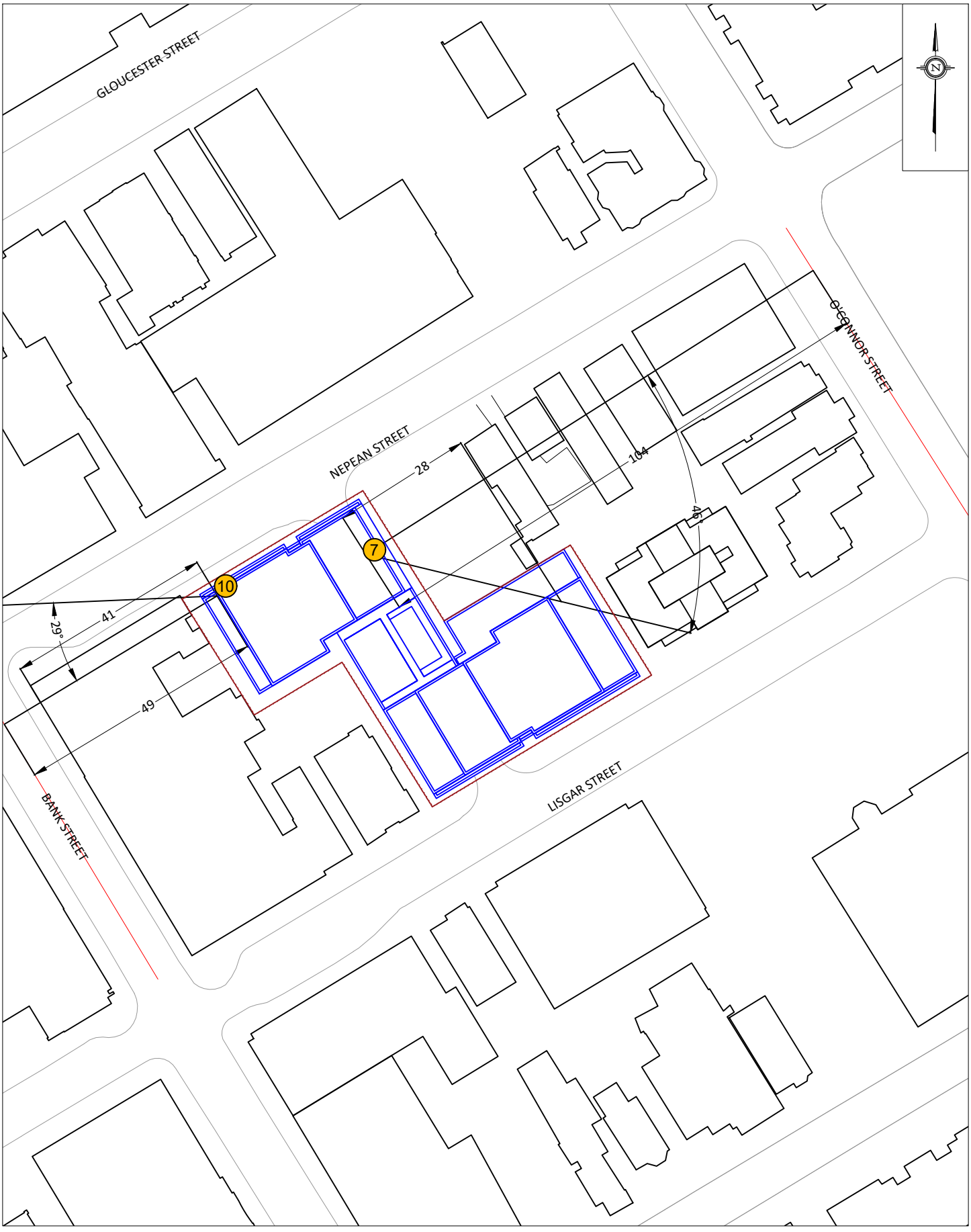
PROJECT	176 NEPEAN STREET & 293-307 LISGAR STREET, OTTAWA DETAILED ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW17-128-4
DATE	SEPTEMBER 30, 2020
DRAWN BY	M.L.

DESCRIPTION

FIGURE 4:
STAMSON INPUT PARAMETERS - RECEPTOR 2,8



GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD , OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT: 176 NEPEAN STREET & 293-307 LISGAR STREET, OTTAWA DETAILED ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION: FIGURE 5: STAMSON INPUT PARAMETERS - RECEPTOR 5,6,9
	SCALE: 1:1000 (APPROX.)	DRAWING NO.: GW17-128-5	
	DATE: SEPTEMBER 30, 2020	DRAWN BY: M.L.	



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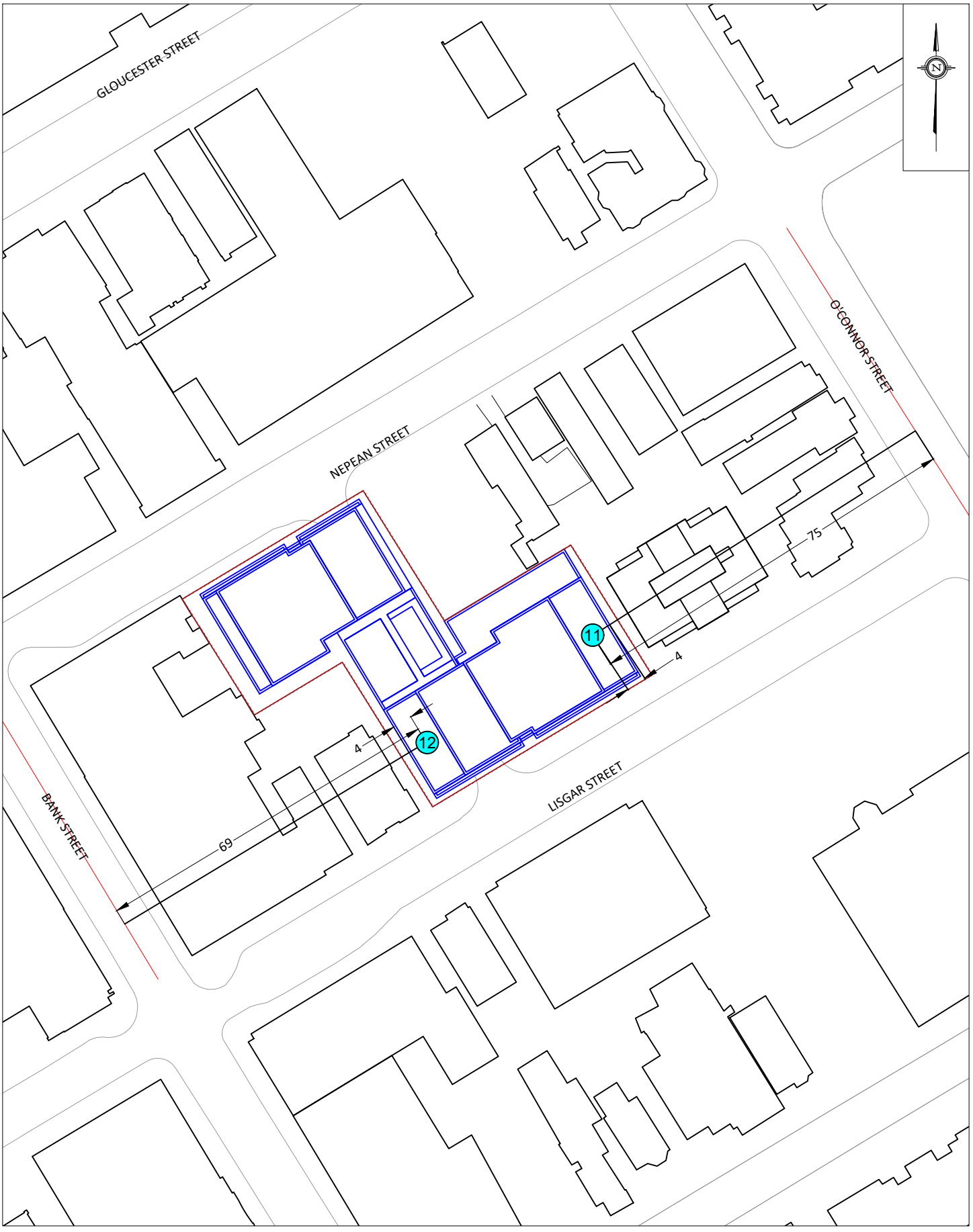
	SCALE: 1:1000 (APPROX.)	DRAWING NO.: GW17-128-6	FIGURE 6: STAMSON INPUT PARAMETERS - RECEPTOR 7,10
	DATE: SEPTEMBER 30, 2020	DRAWN BY: M.L.	



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PROJECT	176 NEPEAN STREET & 293-307 LISGAR STREET, OTTAWA DETAILED ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW17-128-7
DATE	SEPTEMBER 30, 2020	DRAWN BY	M.L.

DESCRIPTION

FIGURE 7:
STAMSON INPUT PARAMETERS - RECEPTOR 11,12

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: 30-01-2018 15:46:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: O'Connor (day/night)
----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: O'Connor (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  :  79.00 / 79.00  m
Receiver height           :  76.70 / 76.70  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: O'Connor (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.46 + 0.00) = 56.46 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  66.69   0.00  -7.22  -3.01   0.00   0.00   0.00  56.46
-------------------------------------------------------------------------------

Segment Leq : 56.46 dBA

Total Leq All Segments: 56.46 dBA


Results segment # 1: O'Connor (night)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.86 + 0.00) = 48.86 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  59.09   0.00  -7.22  -3.01   0.00   0.00   0.00  48.86
-------------------------------------------------------------------------------

Segment Leq : 48.86 dBA

Total Leq All Segments: 48.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.46
                           (NIGHT): 48.86
```

```
STAMSON 5.0         NORMAL REPORT         Date: 30-01-2018 15:46:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: O'Connor (day/night)
----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: O'Connor (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  :  77.00 / 77.00  m
Receiver height           :  76.70 / 76.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -52.00 deg   Angle2 : 18.00 deg
Barrier height            :  48.00 m
Barrier receiver distance :  37.00 / 37.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: O'Connor (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 !       76.70 !       25.13 !        25.13

ROAD (52.83 + 35.48 + 55.60) = 57.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -52   0.00  66.69   0.00  -7.10  -6.75   0.00   0.00   0.00  52.83
-------------------------------------------------------------------------------
   -52     18   0.00  66.69   0.00  -7.10  -4.10   0.00   0.00 -20.00  35.48
-------------------------------------------------------------------------------
    18     90   0.00  66.69   0.00  -7.10  -3.98   0.00   0.00   0.00  55.60
-------------------------------------------------------------------------------

Segment Leq : 57.47 dBA

Total Leq All Segments: 57.47 dBA


Results segment # 1: O'Connor (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 !       76.70 !       25.13 !        25.13

ROAD (45.23 + 27.88 + 48.01) = 49.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -52   0.00  59.09   0.00  -7.10  -6.75   0.00   0.00   0.00  45.23
-------------------------------------------------------------------------------
   -52     18   0.00  59.09   0.00  -7.10  -4.10   0.00   0.00 -20.00  27.88
-------------------------------------------------------------------------------
    18     90   0.00  59.09   0.00  -7.10  -3.98   0.00   0.00   0.00  48.01
-------------------------------------------------------------------------------

Segment Leq : 49.87 dBA

Total Leq All Segments: 49.87 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.47
```

(NIGHT): 49.87

```
STAMSON 5.0        NORMAL REPORT        Date: 30-01-2018 15:47:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: O'Connor (day/night)
----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: O'Connor (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  :  79.00 / 79.00  m
Receiver height           :  76.70 / 76.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -41.00 deg   Angle2 : -14.00 deg
Barrier height            :  34.00 m
Barrier receiver distance :  68.00 / 68.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: O'Connor (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 !       76.70 !       13.05 !        13.05

ROAD (53.82 + 31.23 + 48.38) = 54.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -41   0.00  66.69   0.00  -7.22  -5.65   0.00   0.00   0.00  53.82
-------------------------------------------------------------------------------
   -41    -14   0.00  66.69   0.00  -7.22  -8.24   0.00   0.00 -20.00  31.23
-------------------------------------------------------------------------------
   -14      0   0.00  66.69   0.00  -7.22 -11.09   0.00   0.00   0.00  48.38
-------------------------------------------------------------------------------

Segment Leq : 54.93 dBA

Total Leq All Segments: 54.93 dBA


Results segment # 1: O'Connor (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 !       76.70 !       13.05 !        13.05

ROAD (46.22 + 23.63 + 40.78) = 47.33 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -41   0.00  59.09   0.00  -7.22  -5.65   0.00   0.00   0.00  46.22
-------------------------------------------------------------------------------
   -41    -14   0.00  59.09   0.00  -7.22  -8.24   0.00   0.00 -20.00  23.63
-------------------------------------------------------------------------------
   -14      0   0.00  59.09   0.00  -7.22 -11.09   0.00   0.00   0.00  40.78
-------------------------------------------------------------------------------

Segment Leq : 47.33 dBA

Total Leq All Segments: 47.33 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.93
```

```
(NIGHT): 47.33
```

```
STAMSON 5.0         NORMAL REPORT         Date: 30-01-2018 15:47:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Bank Street (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: Bank Street (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  :  69.00 / 69.00  m
Receiver height           :  76.70 / 76.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  49.00 deg   Angle2 : 90.00 deg
Barrier height            :  99.00 m
Barrier receiver distance :  23.00 / 23.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Bank Street (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 !       76.70 !       56.83 !        56.83

ROAD (58.94 + 34.62 + 0.00) = 58.95 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     49   0.00  66.69   0.00  -6.63  -1.12   0.00   0.00   0.00  58.94
-------------------------------------------------------------------------------
    49     90   0.00  66.69   0.00  -6.63  -6.42   0.00   0.00 -19.01  34.62
-------------------------------------------------------------------------------

Segment Leq : 58.95 dBA

Total Leq All Segments: 58.95 dBA


Results segment # 1: Bank Street (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 !       76.70 !       56.83 !        56.83

ROAD (51.34 + 27.03 + 0.00) = 51.35 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     49   0.00  59.09   0.00  -6.63  -1.12   0.00   0.00   0.00  51.34
-------------------------------------------------------------------------------
    49     90   0.00  59.09   0.00  -6.63  -6.42   0.00   0.00 -19.01  27.03
-------------------------------------------------------------------------------

Segment Leq : 51.35 dBA

Total Leq All Segments: 51.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.95
                           (NIGHT): 51.35
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-01-2018 15:46:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: O'Connor (day/night)
----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: O'Connor (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  :  73.00 / 73.00  m
Receiver height           :  19.00 / 19.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -65.00 deg   Angle2 : 28.00 deg
Barrier height            :  48.00 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: O'Connor (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 !       19.00 !       11.09 !        11.09

ROAD (51.24 + 36.95 + 55.18) = 56.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -65   0.00  66.69   0.00  -6.87  -8.57   0.00   0.00   0.00  51.24
-------------------------------------------------------------------------------
   -65     28   0.00  66.69   0.00  -6.87  -2.87   0.00   0.00 -20.00  36.95
-------------------------------------------------------------------------------
    28     90   0.00  66.69   0.00  -6.87  -4.63   0.00   0.00   0.00  55.18
-------------------------------------------------------------------------------

Segment Leq : 56.70 dBA

Total Leq All Segments: 56.70 dBA


Results segment # 1: O'Connor (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 !       19.00 !       11.09 !        11.09

ROAD (43.64 + 29.35 + 47.59) = 49.11 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -65   0.00  59.09   0.00  -6.87  -8.57   0.00   0.00   0.00  43.64
-------------------------------------------------------------------------------
   -65     28   0.00  59.09   0.00  -6.87  -2.87   0.00   0.00 -20.00  29.35
-------------------------------------------------------------------------------
    28     90   0.00  59.09   0.00  -6.87  -4.63   0.00   0.00   0.00  47.59
-------------------------------------------------------------------------------

Segment Leq : 49.11 dBA

Total Leq All Segments: 49.11 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.70
```

```
(NIGHT): 49.11
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-01-2018 15:47:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: O'Connor (day/night)
----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: O'Connor (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  :  75.00 / 75.00  m
Receiver height           :  19.00 / 19.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -43.00 deg   Angle2 : -13.00 deg
Barrier height            :  34.00 m
Barrier receiver distance :  63.00 / 63.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: O'Connor (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 !       19.00 !        4.30 !         4.30

ROAD (53.86 + 31.91 + 48.28) = 54.95 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -43   0.00  66.69   0.00  -6.99  -5.83   0.00   0.00   0.00  53.86
-------------------------------------------------------------------------------
   -43    -13   0.00  66.69   0.00  -6.99  -7.78   0.00   0.00 -20.00  31.91
-------------------------------------------------------------------------------
   -13      0   0.00  66.69   0.00  -6.99 -11.41   0.00   0.00   0.00  48.28
-------------------------------------------------------------------------------

Segment Leq : 54.95 dBA

Total Leq All Segments: 54.95 dBA


Results segment # 1: O'Connor (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 !       19.00 !        4.30 !         4.30

ROAD (46.27 + 24.32 + 40.69) = 47.35 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -43   0.00  59.09   0.00  -6.99  -5.83   0.00   0.00   0.00  46.27
-------------------------------------------------------------------------------
   -43    -13   0.00  59.09   0.00  -6.99  -7.78   0.00   0.00 -20.00  24.32
-------------------------------------------------------------------------------
   -13      0   0.00  59.09   0.00  -6.99 -11.41   0.00   0.00   0.00  40.69
-------------------------------------------------------------------------------

Segment Leq : 47.35 dBA

Total Leq All Segments: 47.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.95
```

```
(NIGHT): 47.35
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-01-2018 15:47:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: O'Connor (day/night)
---------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: O'Connor (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  : 104.00 / 104.00 m
Receiver height           :  76.70 / 76.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  46.00 deg   Angle2 : 90.00 deg
Barrier height            :  93.00 m
Barrier receiver distance :  28.00 / 28.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: O'Connor (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 !       76.70 !       66.17 !        66.17

ROAD (57.06 + 34.23 + 0.00) = 57.08 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     46   0.00  66.69   0.00  -8.41  -1.22   0.00   0.00   0.00  57.06
-------------------------------------------------------------------------------
    46     90   0.00  66.69   0.00  -8.41  -6.12   0.00   0.00 -17.93  34.23
-------------------------------------------------------------------------------

Segment Leq : 57.08 dBA

Total Leq All Segments: 57.08 dBA


Results segment # 1: O'Connor (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 !       76.70 !       66.17 !        66.17

ROAD (49.46 + 26.63 + 0.00) = 49.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     46   0.00  59.09   0.00  -8.41  -1.22   0.00   0.00   0.00  49.46
-------------------------------------------------------------------------------
    46     90   0.00  59.09   0.00  -8.41  -6.12   0.00   0.00 -17.93  26.63
-------------------------------------------------------------------------------

Segment Leq : 49.48 dBA

Total Leq All Segments: 49.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.08
                           (NIGHT): 49.48
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-01-2018 15:47:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Bank Street (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: Bank Street (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  :  51.00 / 51.00  m
Receiver height           :  76.70 / 76.70  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Bank Street (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.36 + 0.00) = 58.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  66.69   0.00  -5.31  -3.01   0.00   0.00   0.00  58.36
-------------------------------------------------------------------------------

Segment Leq : 58.36 dBA

Total Leq All Segments: 58.36 dBA


Results segment # 1: Bank Street (night)
-----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 50.76 + 0.00) = 50.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  59.09   0.00  -5.31  -3.01   0.00   0.00   0.00  50.76
-------------------------------------------------------------------------------

Segment Leq : 50.76 dBA

Total Leq All Segments: 50.76 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.36
                           (NIGHT): 50.76
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-01-2018 15:47:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Bank Street (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: Bank Street (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  :  47.00 / 47.00  m
Receiver height           :  76.70 / 76.70  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Bank Street (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 61.73 + 0.00) = 61.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.69   0.00  -4.96   0.00   0.00   0.00   0.00  61.73
-------------------------------------------------------------------------------

Segment Leq : 61.73 dBA

Total Leq All Segments: 61.73 dBA


Results segment # 1: Bank Street (night)
-----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.77 + 0.00) = 53.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  59.09   0.00  -5.31   0.00   0.00   0.00   0.00  53.77
-------------------------------------------------------------------------------

Segment Leq : 53.77 dBA

Total Leq All Segments: 53.77 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.73
                           (NIGHT): 53.77
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-01-2018 15:48:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r10.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Bank Street (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: Bank Street (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  :  49.00 / 49.00  m
Receiver height           :  76.70 / 76.70  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Bank Street (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.53 + 0.00) = 58.53 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  66.69   0.00  -5.14  -3.01   0.00   0.00   0.00  58.53
-------------------------------------------------------------------------------

Segment Leq : 58.53 dBA

Total Leq All Segments: 58.53 dBA


Results segment # 1: Bank Street (night)
-----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 50.94 + 0.00) = 50.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  59.09   0.00  -5.14  -3.01   0.00   0.00   0.00  50.94
-------------------------------------------------------------------------------

Segment Leq : 50.94 dBA

Total Leq All Segments: 50.94 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.53
                           (NIGHT): 50.94
```

```
STAMSON 5.0         NORMAL REPORT         Date: 30-09-2020 08:56:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r11.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: O'Connor (day/night)
---------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: O'Connor (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  :  75.00 / 75.00  m
Receiver height           :  31.70 / 31.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  30.20 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: O'Connor (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 !       31.70 !       30.09 !        30.09

ROAD (0.00 + 54.65 + 0.00) = 54.65 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.69   0.00  -6.99   0.00   0.00   0.00  -5.04  54.65
-------------------------------------------------------------------------------

Segment Leq : 54.65 dBA

Total Leq All Segments: 54.65 dBA


Results segment # 1: O'Connor (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 !       31.70 !       30.09 !        30.09

ROAD (0.00 + 47.06 + 0.00) = 47.06 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  59.09   0.00  -6.99   0.00   0.00   0.00  -5.04  47.06
-------------------------------------------------------------------------------

Segment Leq : 47.06 dBA

Total Leq All Segments: 47.06 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 54.65
                           (NIGHT): 47.06
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-09-2020 08:56:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r12.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Bank (day/night)
----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: Bank (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  :  69.00 / 69.00  m
Receiver height           :  31.70 / 31.70  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  30.20 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Bank (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 !       31.70 !       29.95 !        29.95

ROAD (0.00 + 54.84 + 0.00) = 54.84 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.69   0.00  -6.63   0.00   0.00   0.00  -5.22  54.84
-------------------------------------------------------------------------------

Segment Leq : 54.84 dBA

Total Leq All Segments: 54.84 dBA


Results segment # 1: Bank (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 !       31.70 !       29.95 !        29.95

ROAD (0.00 + 47.25 + 0.00) = 47.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  59.09   0.00  -6.63   0.00   0.00   0.00  -5.22  47.25
-------------------------------------------------------------------------------

Segment Leq : 47.25 dBA

Total Leq All Segments: 47.25 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 54.84
                           (NIGHT): 47.25
```