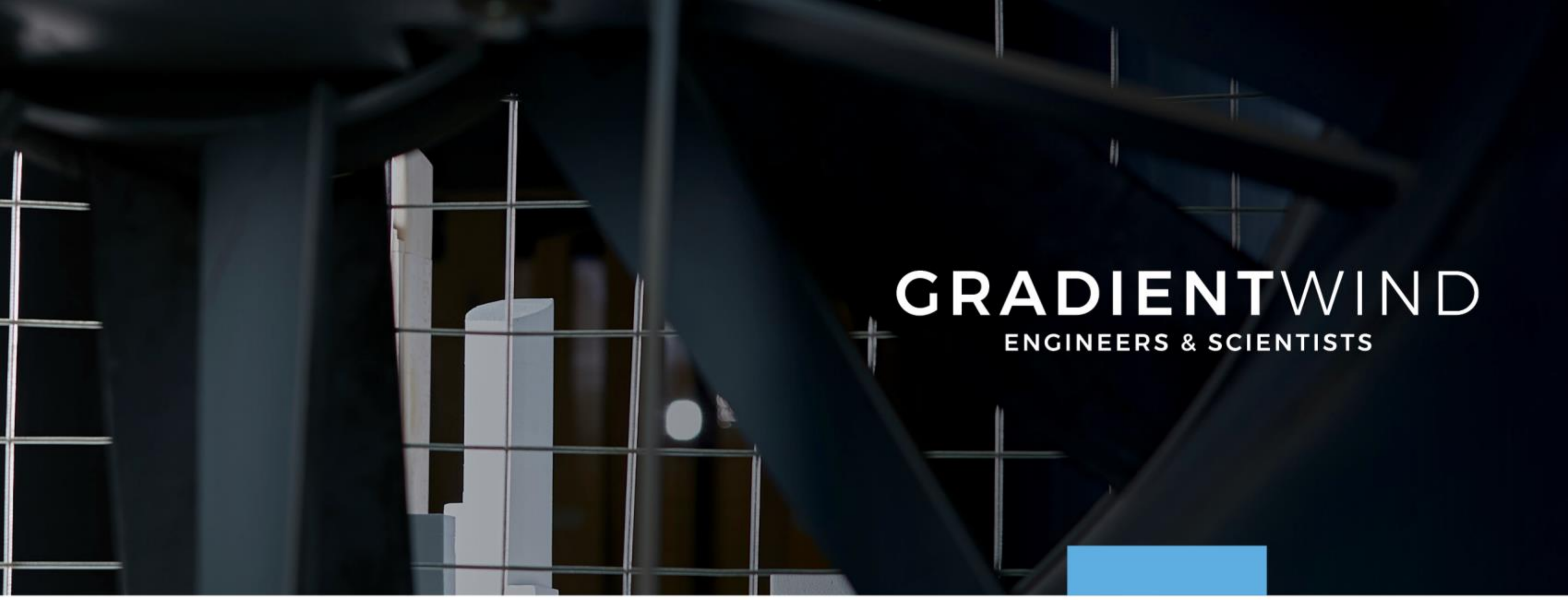
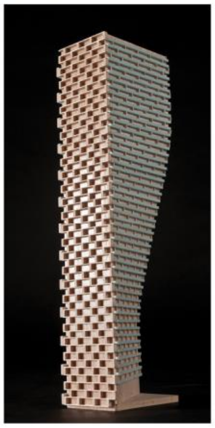
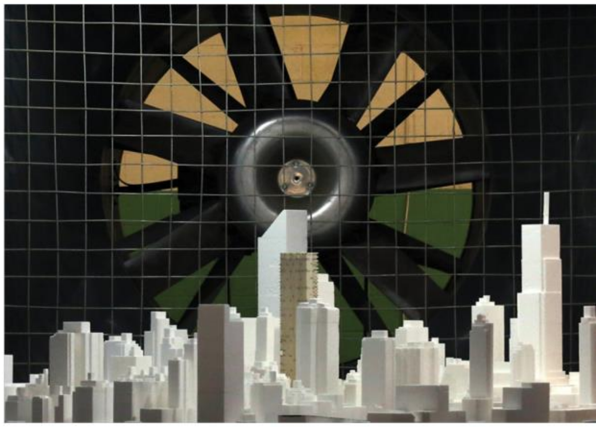


TRANSPORTATION NOISE ASSESSMENT

240 Bank Street
Ottawa, Ontario

Report: 24-262-Transportation Noise





January 23, 2025

PREPARED FOR
240 Bank St. Holdings LTD.
240 Bank Street
Ottawa, ON K2P 1X4

PREPARED BY
Benjamin Page, AdvDip, Junior Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

EXECUTIVE SUMMARY

This report describes a transportation noise assessment undertaken to support an office-to-residential conversion for the existing building located at 240 Bank Street in Ottawa, Ontario. The existing building rises six-storey with a rectangular planform at the southwest corner of Bank Street and Lisgar Street. The primary source of roadway traffic noise is Bank Street, a two-lane Urban Arterial (2-UAU) roadway situated to the east of the site. 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 S.J. Lawrence Architect Incorporated in December 2024.

The results of the current analysis indicate that noise levels at the building façades will range between 48 and 68 dBA during the daytime period (07:00-23:00) and between 41 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the east façade, which is nearest and most exposed to Bank Street.

Upgraded building components will be required where noise levels exceed 65 dBA. Building components that are compliant with the Ontario Building Code (OBC 2020) will be sufficient for the remaining façades of the building. Results of the calculations also indicate that the development will require central air conditioning, or a similar ventilation system, which will allow occupants to keep windows closed and maintain a comfortable living environment. A Type D Warning Clause will also be required to be placed on Lease, Purchase and Sale Agreements as summarized in Section 6.

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

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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 240 Bank St. Holdings LTD. to undertake a transportation noise assessment to support an office-to-residential conversion for the existing building located at 240 Bank Street in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior noise levels generated by local transportation.

This assessment 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 S.J. Lawrence Architect Incorporated in December 2024, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this transportation noise assessment is an existing office building located at 240 Bank Street in Ottawa, Ontario. The subject site is located on a rectangular parcel of land bounded by Lisgar Street to the north, Bank Street to the east, Cooper Street to the south, and low- to high-rise office and apartment buildings to the west.

The existing building rises six-storey with a rectangular planform at the southwest corner of Bank Street and Lisgar Street. The building includes six levels currently occupied by commercial spaces, a basement level and a mechanical penthouse. The site is surrounded by a mix of low-, mid-, and high-rise buildings in all directions. The primary source of roadway traffic noise is Bank Street, a two-lane Urban Arterial (2-UAU) roadway situated to the east of the site. Figure 1 illustrates a complete site plan with the surrounding context.

---

[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

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 Transportation Noise

4.2.1 Criteria for Transportation Traffic Noise

For vehicular traffic, the equivalent sound energy level, L_{eq}, provides a measure of the time-varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time-varying noise level over a period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00) / 8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range (that is relevant to this study) is 50, 45 and 40 dBA for retail space, living rooms and sleeping quarters, respectively, for roadway traffic as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA

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[3]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[4]. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the need for having windows and doors closed, which normally triggers the need for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation[5].

The sound level criterion for outdoor living areas (OLA) is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA but are less than 60 dBA, mitigation should be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. Where noise levels exceed 60 dBA noise mitigation is required. If these measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause.

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

4.2.2 Theoretical Transportation 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:

- 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 a flat/gentle slope surrounding the study building.
- For select sources where appropriate, the receptors considered the proposed buildings and surrounding, existing buildings as barriers, partially or fully obstructing exposure to the source.
- Noise receptors were strategically placed at 4 locations around the study area (see Figure 2).
- Receptor distances and exposure angles used in the STAMSON calculations are illustrated in Figure 3.

4.2.3 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[6] 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.

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

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Bank Street	2-Lane Urban Arterial (2-UAU)	50	**15,000**

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in conformance with the Ontario Building Code (2020) typically exceed STC 35, depending on exterior cladding, thickness and interior finish details. For example, concrete and masonry walls can achieve STC 50 or more. Curtainwall systems typically provide around STC 35, depending on the glazing elements. 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.

According to ENCG, 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[7] considers:

- Acoustic absorption characteristics of the room
- Outdoor noise source type and approach geometry
- Indoor sound level criteria, which vary according to the intended use of a space

Based on published research[8], 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. Window STC calculations have therefore been based on the following assumptions:

---

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

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

- Bedrooms are assumed to intermediate level of absorption (0.8 absorption coefficient), while living rooms are assumed to have an intermediate level of absorption (0.8 absorption coefficient). Retail areas were considered to be intermediate (0.8 absorption coefficient) or hard (0.5 absorption coefficient).
- Exterior walls are assumed to have spandrel panels with a minimum STC rating of 45
- Room, window, and wall dimensions are based on architectural drawings provided by S.J. Lawrence Architect Incorporated in December 2024.

STC calculations were performed based on the method developed by the National Research Council in their Building Practice Note # 56[9].

5. TRANSPORTATION NOISE RESULTS

5.1 Transportation Noise Levels

The results of the current analysis indicate that noise levels at the building façades will range between 48 and 68 dBA during the daytime period (07:00-23:00) and between 41 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the east façade, which is nearest and most exposed to Bank Street.

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. Upgraded building components, including STC-rated glazing elements and exterior walls, will be required where noise levels due to roadway traffic exceed 65 dBA, as discussed in Section 4.2.1. Results of the calculations also indicate that the development will require central air conditioning, or a similar ventilation system, which will allow occupants to keep windows closed and maintain a comfortable living environment. A Type D Warning Clause will also be required to be placed on Lease, Purchase, and Sale Agreements as summarized in Section 6.

[9] Quirt, J.D. Controlling Sound Transmission into Buildings, National Research Council of Canada, Ottawa September 1985

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 is available in Appendix A.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor Number	Absolute Receptor Height (m)	Receptor Location	Noise Level (dBA)	
			Day	Night
PHASE 1				
1	16.5	POW – East Façade	68	61
2	16.5	POW – North Façade	66	59
3	16.5	POW – West Façade	48	41
4	16.5	POW – South Façade	66	59

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.3 for building components. As discussed in Section 4.3, the anticipated STC requirements for windows have been estimated based on results obtained from the BPN 56 methodology. The STC requirements for the windows are summarized below for various units within the development (see Figure 4). Where specific updated building components are not identified, bedroom/living room/retail windows are to satisfy Ontario Building Code (OBC 2020) requirements.

- **Bedroom Windows**

(i) Bedroom windows facing east, north, and south will require a minimum STC of 30.

- **Living Room Windows**

(i) Living room windows facing east, north, and south will require a minimum STC of 30.

- **Exterior Walls**

(i) Exterior wall components on the east, north, and south 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 and doors. 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. 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 roadway traffic noise calculations indicate that the development will require the installation of air conditioning. 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 48 and 68 dBA during the daytime period (07:00-23:00) and between 41 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the east façade, which is nearest and most exposed to Bank Street.

Upgraded building components will be required where noise levels exceed 65 dBA as illustrated in Figure 4. Building components that are compliant with the Ontario Building Code (OBC 2020) will be sufficient for the remaining façades of the building. Results of the calculations also indicate that the development will require central air conditioning, or a similar ventilation system, which will allow occupants to keep

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

windows closed and maintain a comfortable living environment. A Type D Warning Clause will also be required to be placed on 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."*

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

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

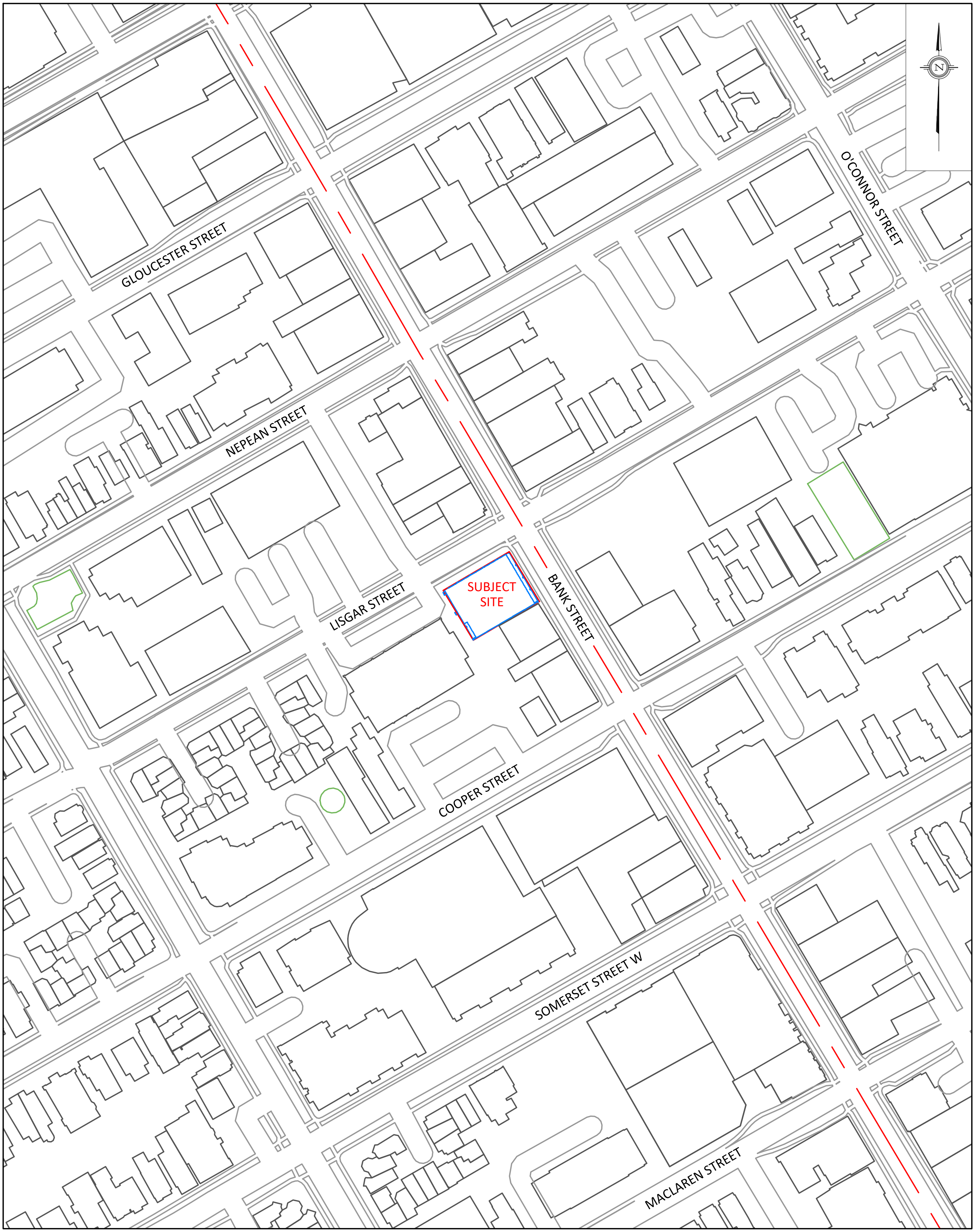
Sincerely,

Gradient Wind Engineering Inc.

Benjamin Page, AdvDip.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File 24-262-Transportation Noise



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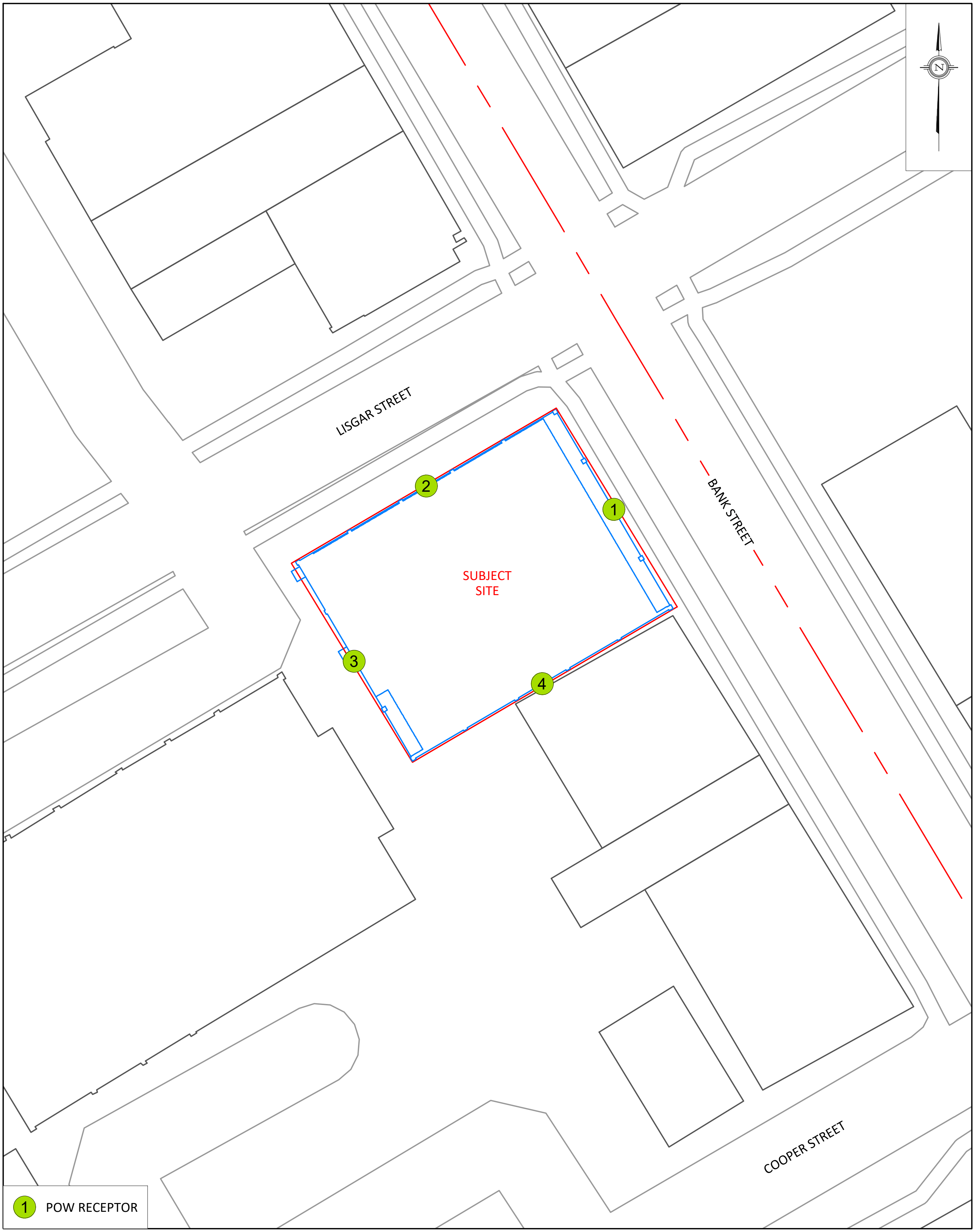
PROJECT	240 BANK STREET, OTTAWA TRANSPORTATION NOISE STUDY
SCALE	1:2000
DRAWING NO.	24-262-NOISE-FIG1
DATE	JANUARY 23, 2025
DRAWN BY	B.P.
DESCRIPTION	FIGURE 1: PROPOSED SITE PLAN AND SURROUNDING CONTEXT



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PROJECT	240 BANK STREET, OTTAWA TRANSPORTATION NOISE STUDY
SCALE	1:500
DRAWING NO.	24-262-NOISE-FIG2
DATE	JANUARY 23, 2025
DRAWN BY	B.P.
DESCRIPTION	FIGURE 2: RECEPTOR LOCATION

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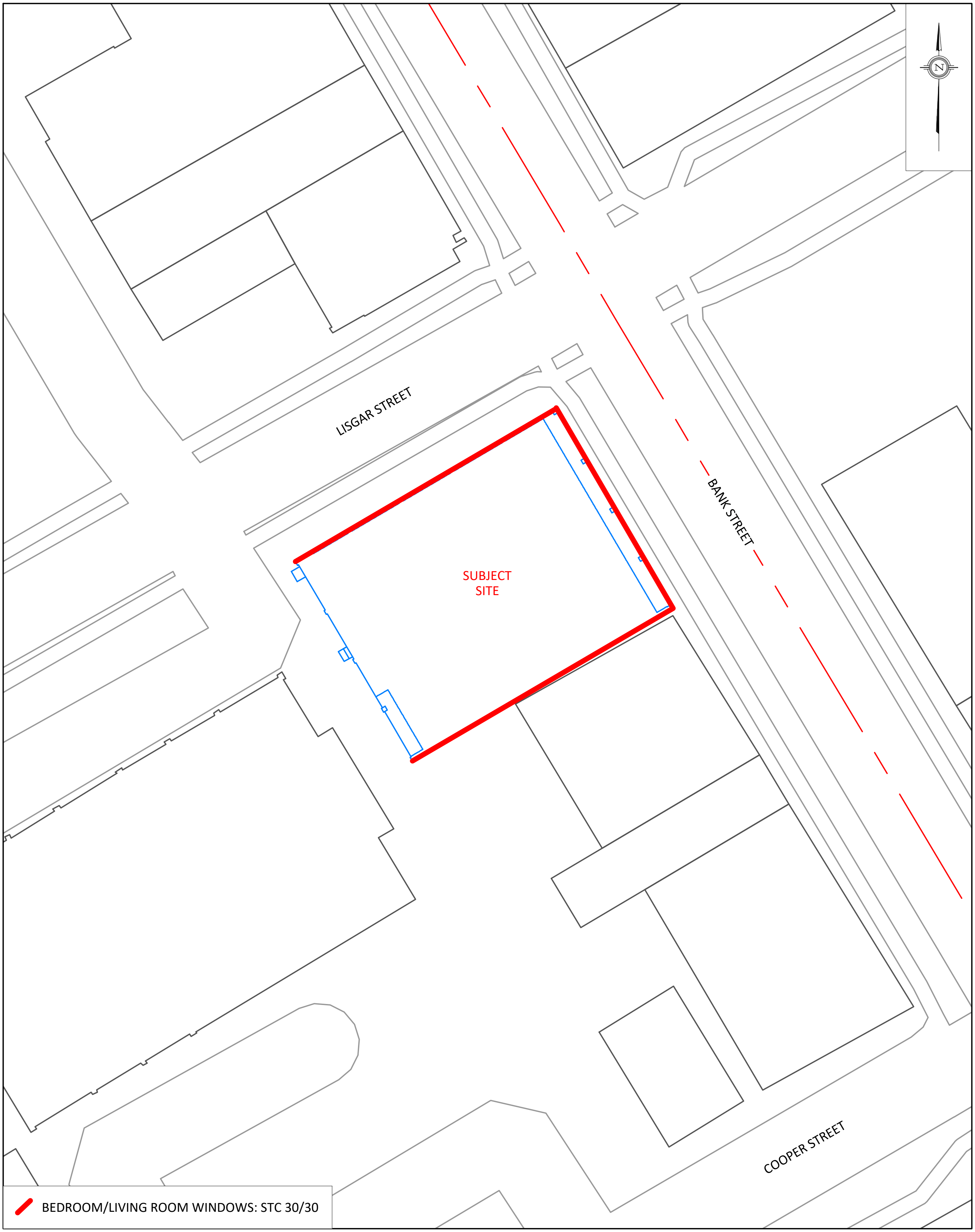
PROJECT	240 BANK STREET, OTTAWA TRANSPORTATION NOISE STUDY		DESCRIPTION
SCALE	1:500	DRAWING NO. 24-262-NOISE-FIG3	FIGURE 3: STAMSON 5.04 INPUT DATA
DATE	JANUARY 23, 2025	DRAWN BY B.P.	



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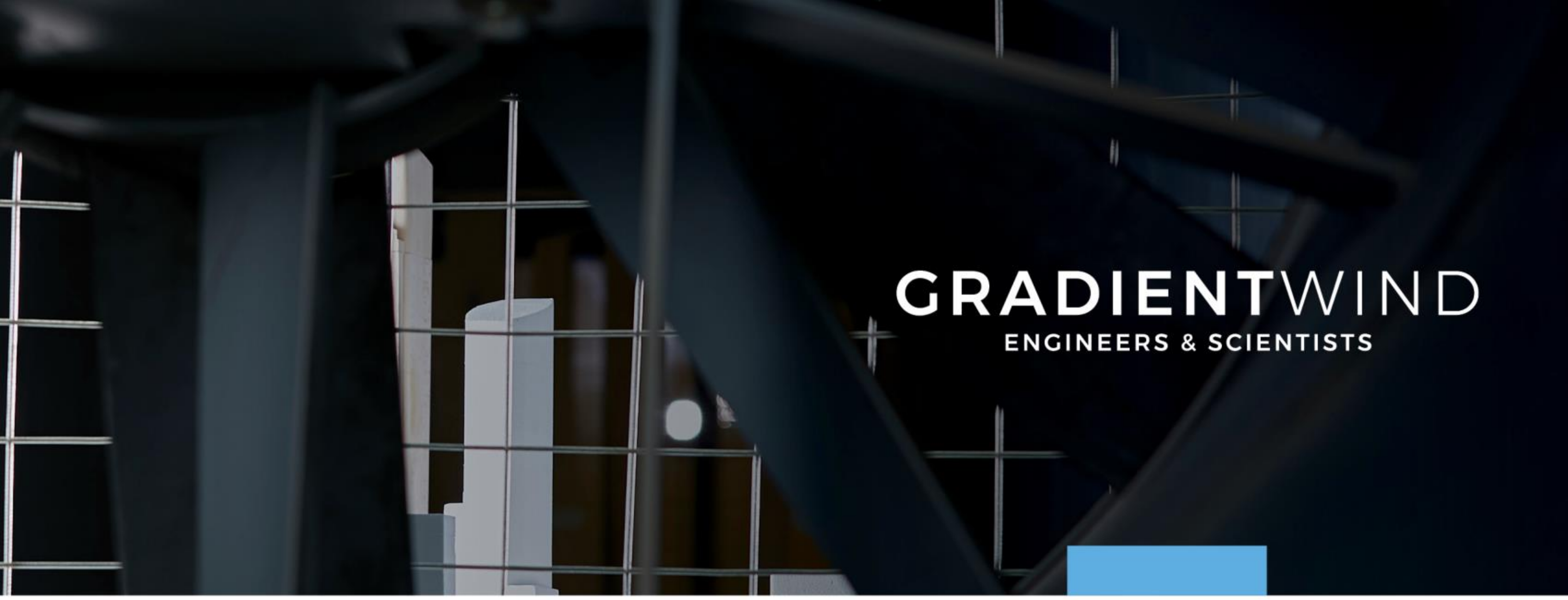
PROJECT: 240 BANK STREET, OTTAWA TRANSPORTATION NOISE STUDY		DESCRIPTION: FIGURE 4: STC REQUIREMENTS
SCALE: 1:500	DRAWING NO.: 24-262-NOISE-FIG4	
DATE: JANUARY 23, 2025	DRAWN BY: B.P.	



APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

```
STAMSON 5.0        NORMAL REPORT        Date: 20-01-2025 13:48:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R1.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  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  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  :  15.00 / 15.00  m
Receiver height           :  16.50 / 16.50  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 + 68.48 + 0.00) = 68.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.00  68.48   0.00   0.00   0.00   0.00   0.00   0.00  68.48
----------------------------------------------------------------------------

Segment Leq : 68.48 dBA

Total Leq All Segments: 68.48 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 60.88 + 0.00) = 60.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.00  60.88   0.00   0.00   0.00   0.00   0.00   0.00  60.88
----------------------------------------------------------------------------

Segment Leq : 60.88 dBA

Total Leq All Segments: 60.88 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.48
                         (NIGHT): 60.88
```

```
STAMSON 5.0         NORMAL REPORT        Date: 20-01-2025 13:49:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R2.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  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  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 :  24.00 / 24.00  m
Receiver height          :  16.50 / 16.50  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 + 66.44 + 0.00) = 66.44 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.00  68.48   0.00  -2.04   0.00   0.00   0.00   0.00  66.44
----------------------------------------------------------------------------

Segment Leq : 66.44 dBA

Total Leq All Segments: 66.44 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 58.84 + 0.00) = 58.84 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.00  60.88   0.00  -2.04   0.00   0.00   0.00   0.00  58.84
----------------------------------------------------------------------------

Segment Leq : 58.84 dBA

Total Leq All Segments: 58.84 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.44
                         (NIGHT): 58.84
```

```
STAMSON 5.0        NORMAL REPORT        Date: 20-01-2025 13:50:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R3.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  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  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  :  39.00 / 39.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  18.00 m
Barrier receiver distance :   0.01 / 0.01   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 !       16.50 !       16.50 !        16.50

ROAD (0.00 + 48.43 + 0.00) = 48.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.00  68.48   0.00  -4.15   0.00   0.00   0.00 -15.90  48.43
----------------------------------------------------------------------------

Segment Leq : 48.43 dBA

Total Leq All Segments: 48.43 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 !       16.50 !       16.50 !        16.50

ROAD (0.00 + 40.84 + 0.00) = 40.84 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.00  60.88   0.00  -4.15   0.00   0.00   0.00 -15.90  40.84
----------------------------------------------------------------------------

Segment Leq : 40.84 dBA

Total Leq All Segments: 40.84 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.43
                         (NIGHT): 40.84
```

```
STAMSON 5.0        NORMAL REPORT        Date: 20-01-2025 13:50:56
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  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  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  :  25.00 / 25.00  m
Receiver height           :  16.50 / 16.50  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 + 66.26 + 0.00) = 66.26 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.00  68.48   0.00  -2.22   0.00   0.00   0.00   0.00  66.26
----------------------------------------------------------------------------

Segment Leq : 66.26 dBA

Total Leq All Segments: 66.26 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 58.66 + 0.00) = 58.66 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.00  60.88   0.00  -2.22   0.00   0.00   0.00   0.00  58.66
----------------------------------------------------------------------------

Segment Leq : 58.66 dBA

Total Leq All Segments: 58.66 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.26
                         (NIGHT): 58.66
```