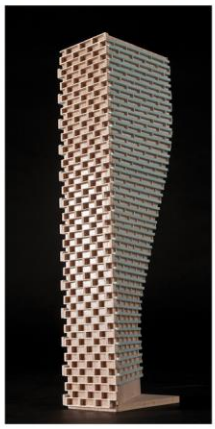
GRADIENTWIND
ENGINEERS & SCIENTISTS

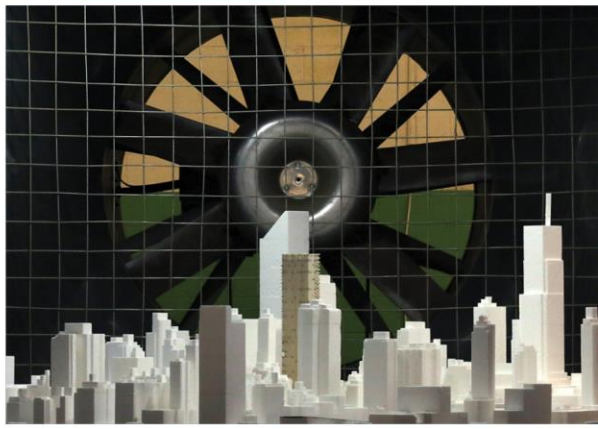
TRANSPORTATION NOISE & VIBRATION ASSESSMENT

OPA/ZBLA Resubmission v1

50 Speers Road
Oakville, Ontario

REPORT: 22-209 - Transportation Noise





February 27, 2024

PREPARED FOR

Helberg Properties Limited
c/o Arcanos Property Management Corporation
235 Carlaw Avenue, Suite 403
Toronto, ON M4M 2S1

PREPARED BY

Efser Kara, MSc, LEED GA, Acoustic Scientist
Joshua Foster, P.Eng., Lead Engineer

EXECUTIVE SUMMARY

This report describes a quantitative transportation noise assessment in support of Zoning By-law Amendment (ZBLA) application for the proposed residential development located at 50 Speers Road Oakville, Ontario (hereinafter referred to as the "subject site", "study site", or "proposed development"). The proposed development is a 27-storey residential tower. The tower rises on a 'H'-shaped 2-storey and 'T'-shaped 5-storey podia. The development site is bordered by Speers Road to the northwest, high-rise residential buildings to the northeast and southwest, and low-rise residential and Oakwood Public School to the southeast. GO Metrolinx Rail Line runs to the northwest of Speers Road, separated by high-rise residential and mixed-use buildings, and low-rise commercial buildings. Kerr Street is located approximately 100 metres to the southwest of the development site. Throughout this report, the Speers Road façade of the building is referred to as north. The primary sources of transportation noise impacting the development are Speers Road, Kerr Street, and GO Metrolinx Rail Line. The ground vibration impact from the rail line is not considered in this study as the rail line is located farther than 75 metres[1]. Figure 1 illustrates a 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 Ministry of Transportation of Ontario (MTO) requirements; (ii) future traffic volumes corresponding to roadway classification and projected data from Map 4 - 2019 Traffic Volumes, City of Oakville; (iii) railway data provided by Metrolinx; and (iv) architectural drawings provided by BDP Quadrangle dated February 2024.

The results of the current analysis indicate that roadway noise levels will range between 49 and 71 dBA during the daytime period (07:00-23:00) and between 42 and 64 dBA during the nighttime period (23:00-07:00); railway noise levels will range between 43 and 66 dBA during the daytime period (07:00-23:00) and between 38 and 60 dBA during the nighttime period (23:00-07:00); at POW receptors. The highest noise levels (71 and 70 dBA) occur at the north façade of the building, which is nearest and most exposed to Speers Road and GO Metrolinx Rail Line.

[1] Dialog and J.E. Coulter Associates Limited, prepared for The Federation of Canadian Municipalities and The Railway Associated of Canada, May 2013

As the noise levels exceed the noise level criteria for roadways and railways defined by NPC-300, upgraded building components will be required for the exterior windows and walls of the study building. The results of the calculations also indicate that the development will require central air conditioning or a similar mechanical system, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to upgraded building elements and ventilation requirements, a Type D Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

The noise levels exceed 60 dBA in Level 8 northeast and northwest terraces (R15, R17), and Level 3 northeast and northwest terraces (R18, R20). Therefore, a noise barrier study was conducted to determine the mitigation measures required to reduce the noise levels at or below the NPC-300 criteria. The result of our investigation showed that the noise levels can be reduced to or below 60 dBA with a 1.5-metre-high barrier/parapet wall or solid railing at the Level 8 northeast and northwest terraces and Level 3 northwest terrace. To reduce the noise levels to 60 dBA in the Level 3 northeast terrace, a 2.40-metre high barrier will be required. As it will not be technically and administratively feasible to build a noise barrier that high, we recommend reducing the noise levels with a 1.5-metre high noise barrier/parapet wall or solid railing. Figure 4 illustrates the barrier locations.

In addition to noise barriers, a Type B Warning Clause will be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6. Also, a Metrolinx warning clause will also be required as per GO Metrolinx requirements since the development is within 300 m of the rail line, as summarized in Section 6.

The subject site is surrounded by high-rise residential and mixed-use buildings, and low-rise commercial and residential buildings. Gradient Wind conducted a survey of the study site, using the satellite view of the area. Our survey revealed that the large mechanical equipment, serving the high-rise buildings, is already enclosed by noise screens and other mechanical equipment is relatively small. Therefore, we did not identify any significant existing sources of stationary noise impacting the development site.

With regards to the impacts of the proposed building on the surroundings and itself, by careful placing and judicious selection of noise-generating equipment like cooling towers, chillers, and generators, stationary noise impact from the proposed building can comply with the sound level limits defined in NPC-300. Where necessary, noise screens, silencers, and other noise control measures can be added.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Helberg Properties Limited in care of Arcanos Property Management Corporation to undertake a quantitative transportation noise and vibration assessment in support of the Zoning By-law Amendment (ZBLA) application for the proposed development located at 50 Speers Road in Oakville, Ontario. This report summarizes the methodology, results, and recommendations related to a transportation noise assessment investigating exterior noise levels generated by local road and railway traffic.

The assessment was performed based on theoretical noise calculation methods conforming to the Ministry of the Environment, Conservation and Parks (MECP) NPC-300 guidelines. Noise calculations were based on architectural drawings provided by BDP Quadrangle, dated February 2024, with future traffic volumes corresponding to roadway classification and projected data from Map 4 - 2019 Traffic Volumes, City of Oakville[2], and railway data provided by Metrolinx.

2. TERMS OF REFERENCE

The proposed development comprises a 27-storey residential tower with three levels of underground parking. The tower rises on a nominally 'H'-shaped 2-storey and, above it, a 'T'-shaped 5-storey podia. The development site is bordered by Speers Road to the northwest, high-rise residential buildings to the northeast and southwest, and low-rise residential and Oakwood Public School to the southeast. A GO Metrolinx Rail Line runs approximately 260 metres to the northwest of Speers Road, separated by high-rise residential and mixed-use buildings, and low-rise commercial buildings. Queen Mary Drive is approximately 150 metres to the northeast, and Kerr Street is located approximately 100 metres to the southwest of the development site. Throughout this report, the Speers Road façade of the building is referred to as north.

[2] Map 4 – 2019 Traffic Volumes, City of Oakville. Retrieved from: Traffic Studies & Plans (oakville.ca)

The ground floor of the development contains residential occupancies, an indoor amenity space, an outdoor amenity area located to the south of the building, a property management office, service rooms, and a loading area and parking access ramp at the northeast corner of the building. Access to the building is provided from the north side of the tower fronting Speers Road. Levels 8 and 27 feature indoor amenity spaces besides the residential suites. The remaining building areas are reserved for residential occupancies.

Levels 3, 8, and 26 feature floorplate changes. The floor plate sets back on Level 3 on the west side and the northeast corner, and on Level 8 from the east and west sides creating residential terraces as well as green roofs. On Level 26, the floor plate sets back from all directions creating residential terraces.

As per NPC-300, balconies and elevated terraces (e.g., rooftops) with a minimum depth of 4 metres are considered outdoor living areas (OLA). The outdoor living areas assessed in this study are Level 8 northeast, northwest, and southeast terraces, Level 3 northwest and northeast terraces, and the at-grade outdoor living area on the south side of the proposed development. This study is based on drawings prepared by BDP Quadrangle, dated February 2024.

The primary sources of transportation noise impacting the development are Speers Road, Kerr Street, and GO Metrolinx Rail Line. The ground vibration impact from the rail line is not considered in this study as the rail line is located farther than 75 metres from the study site.[3]

3. OBJECTIVES

The main goals of this work are to (i) calculate the future noise levels on the study buildings produced by local transportation sources, (ii) determine whether exterior noise levels exceed the allowable limits specified by the MECP Noise Control Guidelines – NPC-300 as outlined in Section 4 of this report, and (iii) provide mitigation measures.

[3] Dialog and J.E. Coulter Associates Limited, prepared for The Federation of Canadian Municipalities and The Railway Associated of Canada, May 2013

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 Noise

For vehicle 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. NPC-300 s guidelines specify that the recommended indoor noise limit range (that is relevant to this study) is 45 dBA for living areas of residences both daytime and nighttime while it is 45 and 40 dBA for sleeping quarters during daytime and nighttime, respectively, as listed in Table 1. However, to account for deficiencies in building construction and to control peak noise, these levels should be targeted toward 47, 42 and 37 dBA.

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

Type of Space	Time Period	L_{eq} (dBA)	
		Road	Rail
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50	45
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	40
Sleeping quarters of hotels/motels	23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40	35

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 of 20 dBA noise reduction[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 normally triggers the need for central air conditioning (or similar systems). Where roadway noise levels exceed 65 dBA daytime and 60 dBA nighttime and railway noise levels exceed 60 dBA daytime and 55 dBA nighttime, building components will require higher levels of sound attenuation[6]. Due to the significantly lower frequency content of railway noise, the indoor criteria for rail is 5 dBA lower than that of roadway noise, as can be seen in Table 1.

Due to the characteristics of rail noise which occur over short periods (i.e. whistles, brake squealing), and a significant low frequency component produced by the movement of the locomotive along the track, road and rail traffic noise require separate analyses, particularly when assessing indoor sound levels. In order to account for the special characteristics of railway sound, the indoor sound level criteria are more stringent by 5 dB as compared to the roadway traffic criteria (as shown in Table 1). This difference typically results in requirements for upgraded glazing elements to provide better noise attenuation from the

[4] Adapted from Table C-2, Part C, Section 3.2.3 of NPC-300
[5] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[6] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

building envelope. Interior noise level criteria include the influence of the rail crossings and warning whistle bursts. For this site, whistle bursts were not considered due to the lack of at-grade crossings in the vicinity.

The sound level criterion for outdoor living areas (OLA) is 55 dBA, which applies during the daytime period (07:00 to 23:00). When noise levels exceed 55 dBA and are less than or equal to 60 dBA, mitigation should be considered to reduce noise levels to as close to 55 dBA if technically, economically, and administratively feasible. If noise levels exceed 60 dBA, mitigation must be provided to reduce noise levels below 60 dBA.

4.2.2 Transportation Sources Volumes

NPC-300 dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes have been considered for the mature state of development based on roadway classification and projected data from Map 4 - 2019 Traffic Volumes, City of Oakville[7]. The posted speed limits for the roadways were obtained from the street views.

The anticipated train counts of the GO Rail Line, which carries Lakeshore West GO Rail Service, and the speed limit were obtained from Metrolinx[8] (see Appendix A). Table 2 (below) summarizes the AADT values used for each roadway and rail line included in this assessment.

TABLE 2: TRANSPORTATION SOURCES DATA

Segment	Roadway/Transit Class	Speed Limit (km/h)	Existing AADT Count	Year of Count	Projected 2033 AADT
Speers Road	Multi-purpose Arterial	60	48,900	**2018**	**65,813**
Kerr Street	Major/Multi-purpose Arterial	50	25,900	**2018**	**34,858**
GO Metrolinx Rail Line	Railway	129	N/A	**N/A**	**354/54***

* - Daytime/nighttime volumes

[7] Map 4 – 2019 Traffic Volumes, City of Oakville. Retrieved from: Traffic Studies & Plans (oakville.ca)
[8] Email from Metrolinx

4.2.3 Transportation Noise Predictions

The impact of transportation noise sources on the development was determined by computer modelling. Transportation noise source modelling is based on the software program *Predictor-Lima* which utilizes the United States Federal Highway Administration's Traffic Noise Model (TNM) to represent the roadway line sources. The TNM analysis model has been recognized by the Ministry of Transportation Ontario (MTO) as the recommended noise model for transportation projects (ref. Environmental Guide for Noise, 2022 by the Ministry of Transportation (MTO)[9]). The Ministry of Environment, Conservation and Parks has also adopted the TMN model as per their "Draft Guideline Noise Pollution Control Publications 306 (NPC-306)[10].

The *Predictor-Lima* computer program can represent three-dimensional surfaces and the first reflection of sound waves over a suitable spectrum for human hearing. Calculations were performed for receptors in close proximity to the railway with the assistance of the MECP rail and road noise analysis program STAMSON 5.04, which incorporates the calculation model '*Sound from Trains Environment Analysis Method*' (STEAM). The impact of railway noise is then correlated with *Predictor-Lima* line source to accurately represent noise from the rail line within the Predictor model.

A set of comparative calculations were also performed for comparisons using STAMSON. The STAMSON model, however, is an older software and requires each receptor to be calculated separately. STAMSON also does not accurately account for building reflections and various screening elements, and curved road geometry. The result of the comparative calculations showed that the noise levels have an acceptable difference of 3 dBA of those predicted in Predictor. A total of fourteen (14) receptor locations were identified around the site, as illustrated in Figure 2.

Roadway noise calculations were performed by treating each road and rail segment as separate line sources of noise, and by using existing building locations as noise barriers. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

[9] Ministry of Transportation, Environmental Guide for Noise, 2022. Retrieved from Environmental Guide for Noise 2022

[10] Ministry of Environment, Conservation and Parks, Ontario, "Methods to determine Sound Levels Due to Road and Rail Traffic", Draft February 12, 2020

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks for conservatism.
- The day/night split for all roads was taken to be 90% / 10%, respectively.
- The ground surface was modelled as reflective due to the presence of pavement and concrete in the proximity of the study site.
- The GO rail line was modelled as diesel trains with 2 locomotives and 12 cars with a speed of 129 km/hr.
- Noise receptors were placed at fourteen (14) locations on the façades of the study building as Plane of Window (POW) receptors. Six (6) receptors were placed as Outdoor Living Areas (OLA) at 1.5 metres above the walking surface on Levels 3 and 8 terraces, and the at-grade outdoor living area.
- The locations of the receptors are illustrated in Figure 2.

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 the NPC-300, when daytime noise levels from rail and road sources at the plane of the window exceed 60 and 65 dBA, respectively, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure[11] considers:

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

Based on published research[12], exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Due to the limited information available at the time of the study, which was prepared for a zoning by-law amendment application, final detailed floor layouts and building elevations were unavailable and therefore detailed STC calculations could not be performed at this time. As a guideline, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels).

5. RESULTS AND DISCUSSION

5.1 Transportation Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 on the next page.

[11] Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985
[12] CMHC, Road & Rail Noise: Effects on Housing

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Receptor Type / Location	Height Above Grade (m)	Roadway Noise Levels (dBA)		Railway Noise Levels (dBA)		Transportation Noise Levels (dBA)	
			Day	Night	Day	Night	Day	Night
1	POW / North Façade - Level 26	76.4	68	62	65	60	70	64
2	POW / North Façade - Level 26	76.4	67	60	66	60	69	63
3	POW / Northeast Façade - Level 26	76.4	62	56	64	59	66	61
4	POW / Southeast Façade - Level 26	76.4	58	52	60	55	62	57
5	POW / South Façade - Level 26	76.4	49	42	43	38	50	44
6	POW / Southwest Façade - Level 26	76.4	64	58	58	53	65	59
7	POW / Northwest Façade - Level 26	76.4	66	60	64	59	68	62
8	POW / North Façade - Level 2	5.5	71	64	56	50	71	64
9	POW / North Façade - Level 2	5.5	68	62	61	56	69	63
10	POW / East Façade - Level 2	5.5	56	49	53	48	58	52
11	POW / West Façade - Level 2	5.5	66	60	49	43	66	60
12	POW / North Façade - Level 8	20.8	68	62	62	57	69	63
13	POW / East Façade - Level 8	20.8	59	53	60	54	62	57
14	POW / West Façade - Level 8	20.8	66	59	52	47	66	60
15	OLA / Level 8 Northeast Terrace	23.8	62	N/A*	63	N/A*	66	N/A*
16	OLA / Level 8 Southeast Terrace	23.8	49	N/A*	58	N/A*	58	N/A*
17	OLA / Level 8 Northwest Terrace	23.8	65	N/A*	60	N/A*	66	N/A*
18	OLA / Level 3 Northwest Terrace	8.5	67	N/A*	50	N/A*	67	N/A*
19	OLA / At-grade Outdoor Living Area	1.5	34	N/A*	41	N/A*	42	N/A*
20	OLA / Level 3 Northeast Terrace	8.5	68	N/A*	61	N/A*	69	N/A*

* OLA noise levels during the nighttime are not considered, as per NPC-300.

The results of the current analysis indicate that roadway noise levels will range between 49 and 71 dBA during the daytime period (07:00-23:00) and between 42 and 64 dBA during the nighttime period (23:00-07:00); railway noise levels will range between 43 and 66 dBA during the daytime period (07:00-23:00) and between 38 and 60 dBA during the nighttime period (23:00-07:00); at POW receptors. The highest

noise levels (71 and 70 dBA) occur at the north façade of the building, which is nearest and most exposed to Speers Road and GO Metrolinx Rail Line.

The noise levels exceed 60 dBA in Level 8 northeast and northwest terraces (R15, R17), and Level 3 northeast and northwest terraces (R18, R20). Therefore, a barrier study was conducted to determine the mitigation measures required to reduce the noise levels to or below 60 dBA in these areas (see Section 5.2.1).

A set of comparative calculations were also performed for comparisons using STAMSON. The STAMSON model, however, is an older software and requires each receptor to be calculated separately. STAMSON also does not accurately account for building reflections and multiple screening elements, and curved road geometry. Table 4 below shows a comparison between Predictor-Lima and STAMSON. Noise levels calculated in STAMSON were found to have a good correlation with Predictor-Lima and variability between the two programs was within an acceptable level of 2-3 dBA.

TABLE 4: RESULT CORRELATION WITH STAMSON

Receptor Number	Receptor Location	Receptor Height (m)	Railway & Roadway Total Noise Levels (dBA)			
			STAMSON 5.04		PREDICTOR-LIMA	
			Day	Night	Day	Night
R08	POW / North Façade - Level 2	5.5	73	67	71	64
R09	POW / North Façade - Level 2	5.5	72	66	69	63

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.3, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels). Detailed STC calculations will be required to be completed prior to the building permit application for each unit type. The STC requirements for the windows are summarized below for various units within the development (see Figure 5):

- **Bedroom Windows**
  - (i) Bedroom windows of the residential tower facing north and northwest, and the 2-storey podium facing north will require a minimum STC of 35
  - (ii) Bedroom windows of the 2-storey podium facing east, the podium levels 3-7 facing north and the residential tower facing northeast will require a minimum STC of 33
  - (iii) Bedroom windows of the 2-storey podium facing west will require a minimum STC of 31
  - (iv) All other bedroom windows are to satisfy Ontario Building Code (OBC 2020) requirements.
- **Living Room/Office Windows**
  - (i) Living room windows of the residential tower facing north and northwest, and the 2-storey podium facing north will require a minimum STC of 30
  - (ii) Living room windows of the 2-storey podium facing east, the podium levels 3-7 facing north and the residential tower facing northeast will require a minimum STC of 28
  - (iii) Living room windows of the 2-storey podium facing west will require a minimum STC of 26
  - (iv) All other living room windows are to satisfy Ontario Building Code (OBC 2020) requirements.
- **Exterior Walls**
  - (i) Exterior wall components on all façades will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[13]

The STC requirements apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a window/wall system is used. Several manufacturers and various combinations of window components will offer the necessary sound attenuation ratings. 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.

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

Results of the calculations also indicate that the development will require central air conditioning or a similar mechanical system, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

TABLE 5: WINDOW & WALL STC REQUIREMENTS SUMMARY

Window STC Requirements			
Building Section	**Façade**	**Room**	**STC Requirement**
2-Storey Podium & Residential Tower	North	Bedroom	STC 35
		Living Room	STC 30
Residential Tower	Northwest	Bedroom	STC 35
		Living Room	STC 30
Podium Levels 3-7	North	Bedroom	STC 33
		Living Room	STC 28
2-Storey Podium	East	Bedroom	STC 33
		Living Room	STC 28
Residential Tower	Northeast	Bedroom	STC 33
		Living Room	STC 28
2-Storey Podium & Podium Levels 3-7	West	Bedroom	STC 31
		Living Room	STC 26
• All other windows to satisfy Ontario Building Code (OBC 2020) requirements.			
Wall STC Requirements			
• Exterior wall components on all façades will require a minimum STC of 45.			
Warning Clause Requirement			
Type D			

5.2.1 Noise Barrier Calculation

The noise levels exceed 60 dBA in Level 8 northeast and northwest terraces (R15, R17), and Level 3 northeast and northwest terraces (R18, R20). Therefore, a barrier study was conducted to determine the mitigation measures required to reduce the noise levels to or below 60 dBA in these areas.

The result of our investigation showed that the noise levels can be reduced to or below 60 dBA with a 1.5-metre-high barrier/parapet wall or solid railing at Level 8 northeast and northwest terraces and Level 3 northwest terraces. To reduce the noise levels to 60 dBA in Level 3 northeast terrace, a 2.40-metre high barrier will be required. As it will not be technically and administratively feasible to build a noise barrier that high, we recommend reducing the noise levels with a 1.5-metre high noise barrier/parapet wall or solid railing. The noise levels at the terraces with and without a noise barrier can be seen in Table 6.

Noise barriers should be built with solid elements having a minimum surface mass of 20 kg/m² and should contain no gaps. The noise barrier for the terraces can be built as a parapet wall, a solid glass railing, or a combination of both. However, it should not contain gaps. Glass noise screens can be built as glass-to-glass. If balusters are used the screen should be designed without any gap between the glass and balusters. Figure 4 illustrates the barrier locations.

In addition to noise barriers, a Type B Warning Clause will be required in on all Lease, Purchase and Sale Agreements.

TABLE 6: NOISE BARRIER INVESTIGATION RESULTS

Receptor Reference	Location	Barrier/Parapet Wall Height Above Walking Surface (m)	Daytime L_{eq} Noise Levels (dBA)	
			Without Barrier	With Barrier
15	OLA / Level 8 Northeast Terrace	1.1	66	64
		1.5		59
17	OLA / Level 8 Northwest Terrace	1.1	66	63
		1.5		60
18	OLA / Level 3 Northwest Terrace	1.1	67	65
		1.5		60
20	OLA / Level 3 Northeast Terrace	1.1	69	66
		1.5		62
		1.8		61
		2.4		60

Recommended noise barrier requirements are summarized in Table 7 below:

TABLE 7: NOISE BARRIER REQUIREMENTS SUMMARY

Outdoor Area Location	Recommended Barrier/Parapet Wall Height Above Walking Surface (m)	Daytime L_{eq} Noise Levels (dBA) with the Recommended Barrier*	Warning Clause
OLA / Level 8 Northeast Terrace	1.5	59	Type B
OLA / Level 8 Northwest Terrace	1.5	60	
OLA / Level 3 Northwest Terrace	1.5	60	
OLA / Level 3 Northeast Terrace	1.5	62	

*Noise barriers should be built with solid elements having a minimum surface mass of 20 kg/m² and should contain no gaps. The noise barrier for the terraces can be built as a parapet wall, a solid glass railing, or a combination of both. However, it should not contain gaps. Glass noise screens can be built as glass-to-glass. If balusters are used the screen should be designed without any gap between the glass and balusters.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that roadway noise levels will range between 49 and 71 dBA during the daytime period (07:00-23:00) and between 42 and 64 dBA during the nighttime period (23:00-07:00); railway noise levels will range between 43 and 66 dBA during the daytime period (07:00-23:00) and between 38 and 60 dBA during the nighttime period (23:00-07:00); at POW receptors. The highest noise levels (71 and 70 dBA) occur at the north façade of the building, which is nearest and most exposed to Speers Road and GO Metrolinx Rail Line.

As the noise levels exceed the noise level criteria for roadways and railways defined by NPC-300, upgraded building components will be required for the exterior windows and walls of the study building. The Results of the calculations also indicate that the development will require central air conditioning or a similar mechanical system, which will allow occupants to keep windows closed and maintain a comfortable living environment.

In addition to upgraded building elements and ventilation requirements, a Type D Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized below:

> *"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."*

The noise levels exceed 60 dBA in Level 8 northeast and northwest terraces (R15, R17), and Level 3 northeast and northwest terraces (R18, R20). Therefore, a barrier study was conducted to determine the mitigation measures required to reduce the noise levels at or below the NPC-300 criteria. The result of our investigation showed that the noise levels can be reduced to or below 60 dBA with a 1.5-metre-high barrier/parapet wall or solid railing at Level 8 northeast and northwest terraces and Level 3 northwest terraces. To reduce the noise levels to 60 dBA in Level 3 northeast terrace, a 2.40-metre high barrier will be required. As it will not be technically and administratively feasible to build a noise barrier that high, we recommend reducing the noise levels with a 1.5-metre high noise barrier/parapet wall or solid railing. Noise barriers should be built with solid elements having a minimum surface mass of 20 kg/m² and should contain no gaps. Glass noise screens can be used as noise barriers. Figure 4 illustrates the barrier locations.

In addition to noise barriers, a Type B Warning Clause will be required in all Lease, Purchase and Sale Agreements, as summarized below:

Type B

> *"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing transportation noise may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."*

The following warning clause will also be required in all Lease, Purchase and Sale Agreements as per GO Metrolinx requirements since the development is within 300 m of the rail line:

GO/Metrolinx Warning Clause:

> *"Metrolinx and its assigns and successors in interest operate commuter transit service within 300 metres from the land which is the subject hereof. In addition to the current use of these lands, there may be alterations to or expansions of the rail and other facilities on such lands in the future including the possibility that Metrolinx or any railway entering into an agreement with Metrolinx or any railway assigns or successors as aforesaid may expand their operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwellings. Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under these lands."*

The subject site is surrounded by high-rise residential and mixed-use buildings, and low-rise commercial and residential buildings. Gradient Wind conducted a survey of the study site, using the satellite view of the area. Our survey revealed that the large mechanical equipment serving the high-rise buildings is already enclosed by noise screens and other mechanical equipment is relatively small. Therefore, we did not identify any significant existing sources of stationary noise impacting the development site.

With regards to the impacts of the proposed building on the surroundings and itself, by careful placing and judicious selection of noise-generating equipment like cooling towers, chillers, and generators, stationary noise impact from the proposed building can comply with the sound level limits defined in NPC-300. Where necessary, noise screens, silencers, and other noise control measures can be added.

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

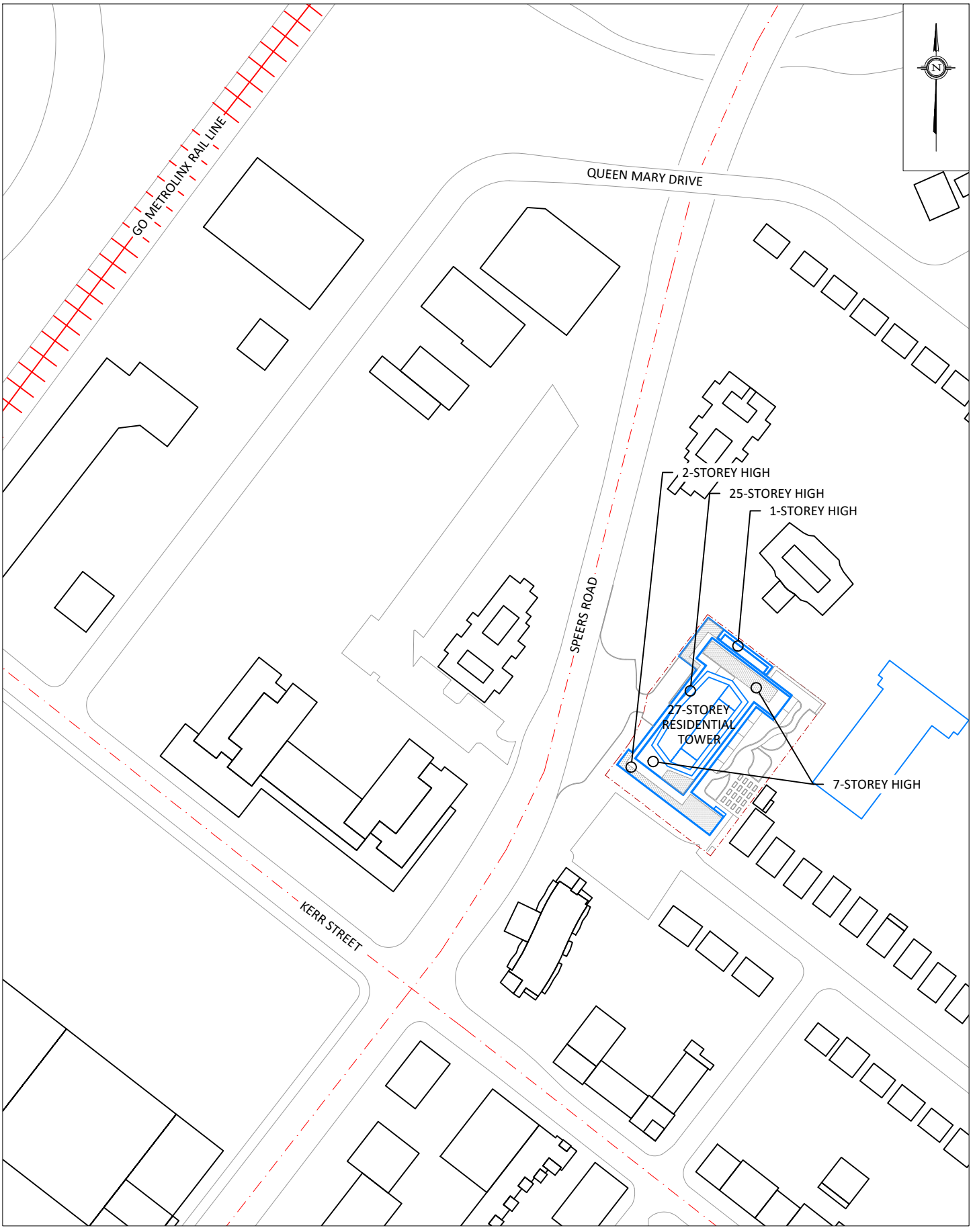
Sincerely,

Gradient Wind Engineering Inc.

Efser Kara, MSc, LEED GA
Acoustic Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #22-209-Transportation Noise



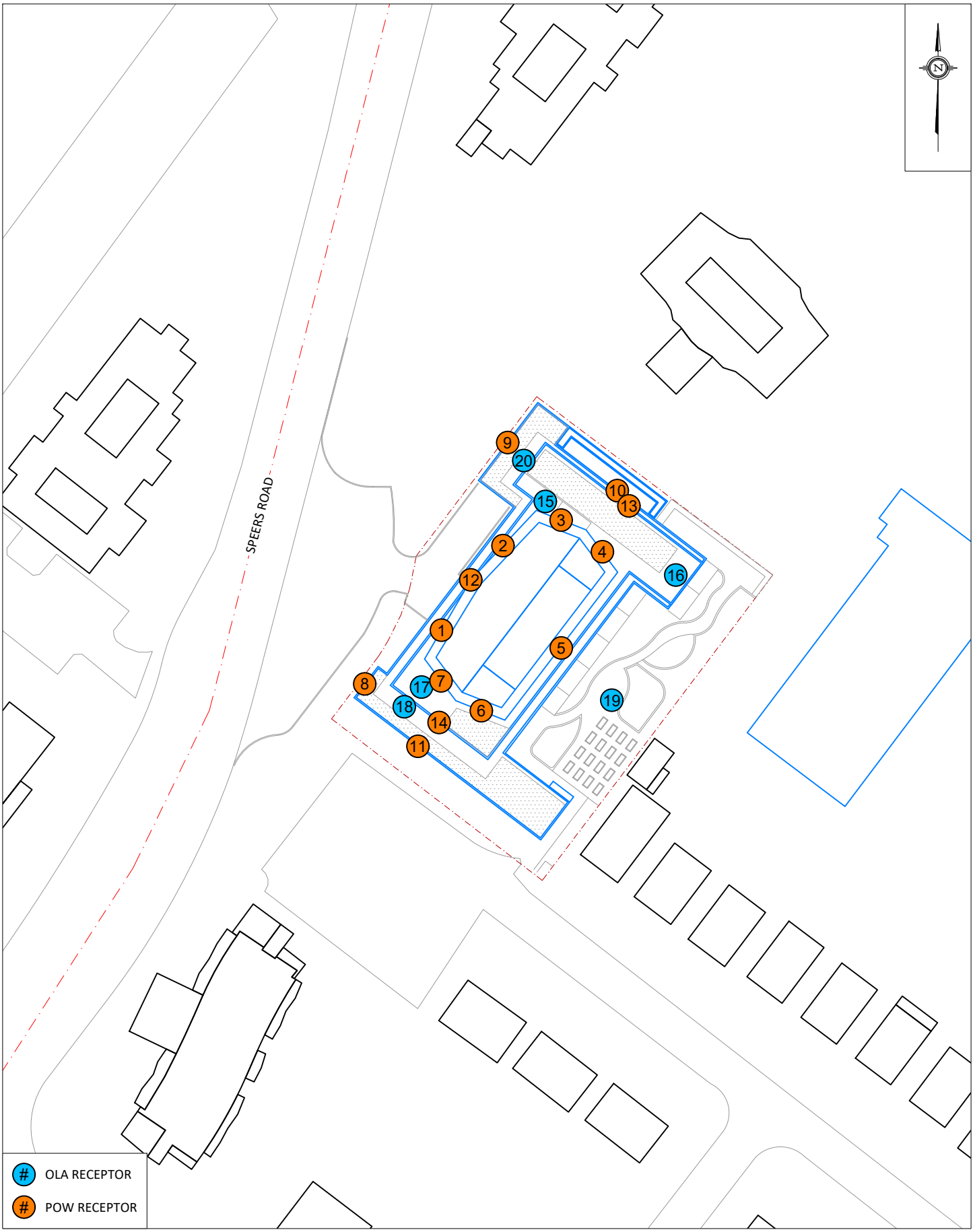
GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD, OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	50 SPEERS ROAD, OAKVILLE TRANSPORTATION NOISE & VIBRATION ASSESSMENT		
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW22-209-1
DATE	FEBRUARY 12, 2024	DRAWN BY	E.K.

DESCRIPTION

FIGURE 1:
PROPERTY LINE AND SURROUNDING CONTEXT

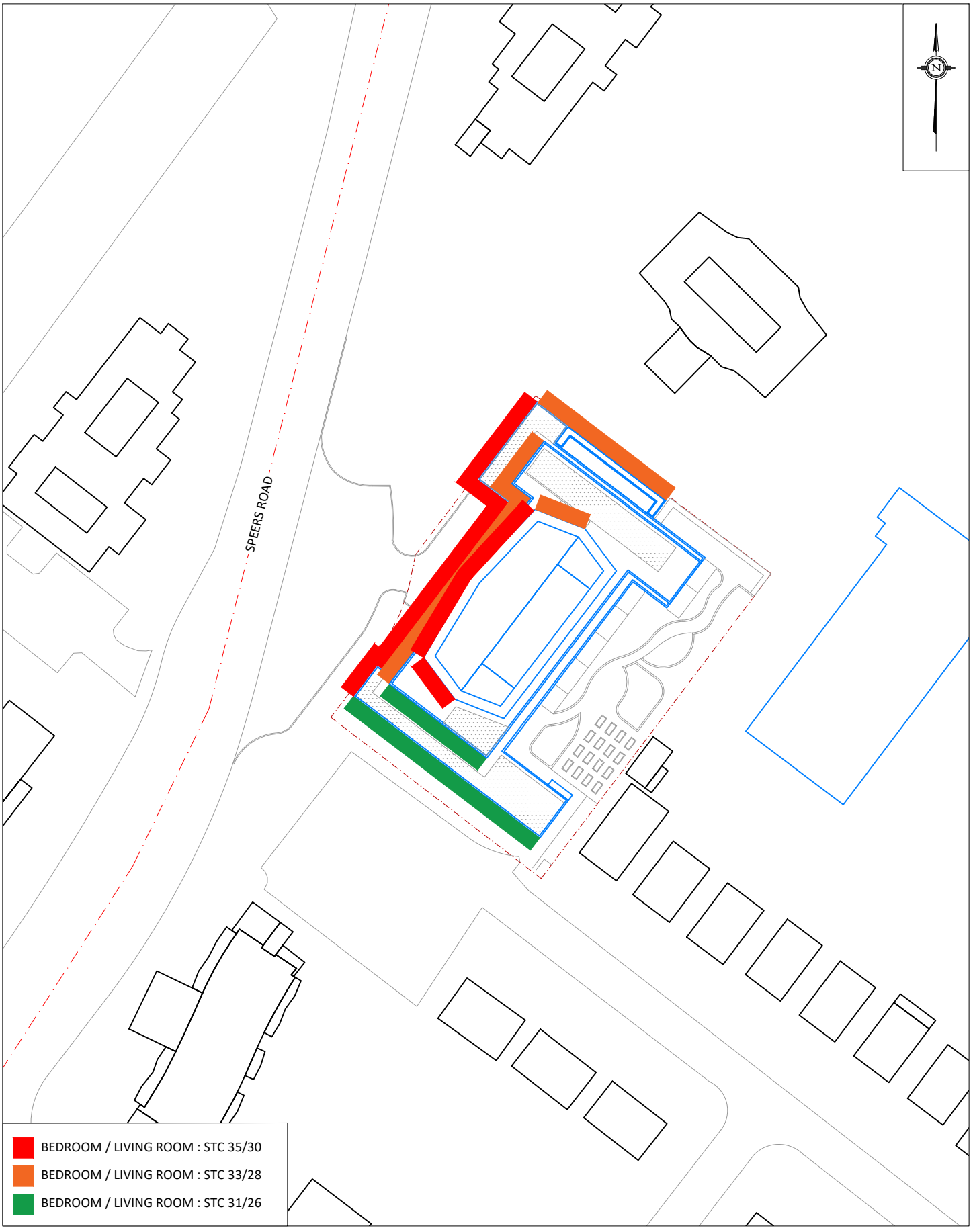


GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD, OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	50 SPEERS ROAD, OAKVILLE TRANSPORTATION NOISE & VIBRATION ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW22-209-2
DATE	FEBRUARY 12, 2024	DRAWN BY	E.K.

FIGURE 2:
RECEPTOR LOCATION

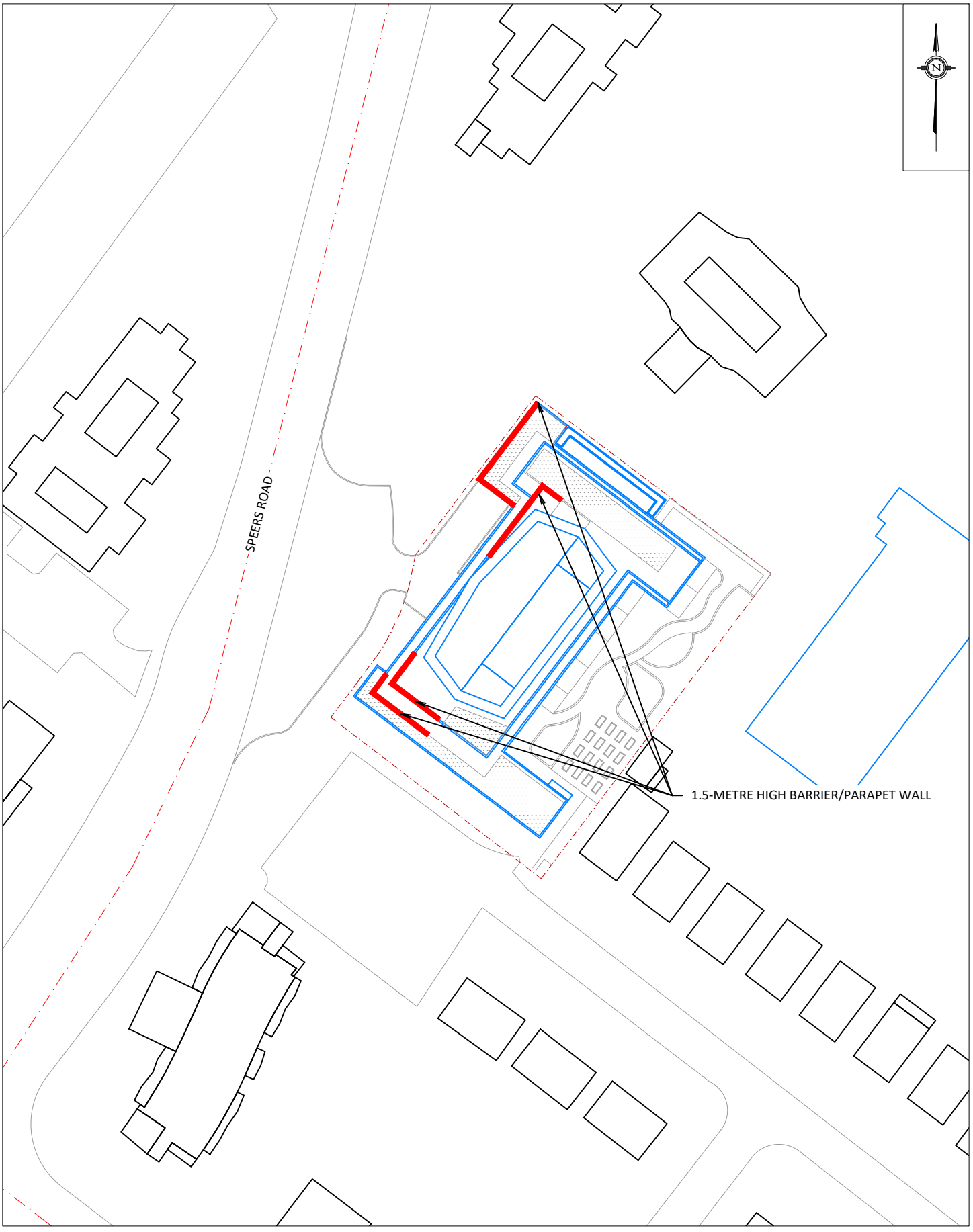


GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD, OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	50 SPEERS ROAD, OAKVILLE TRANSPORTATION NOISE & VIBRATION ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW22-209-3
DATE	FEBRUARY 12, 2024	DRAWN BY	E.K.

FIGURE 3:
WINDOW STC REQUIREMENTS



GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD, OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	50 SPEERS ROAD, OAKVILLE TRANSPORTATION NOISE & VIBRATION ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW22-209-4
DATE	FEBRUARY 12, 2024	DRAWN BY	E.K.

FIGURE 4:
NOISE BARRIER LOCATIONS

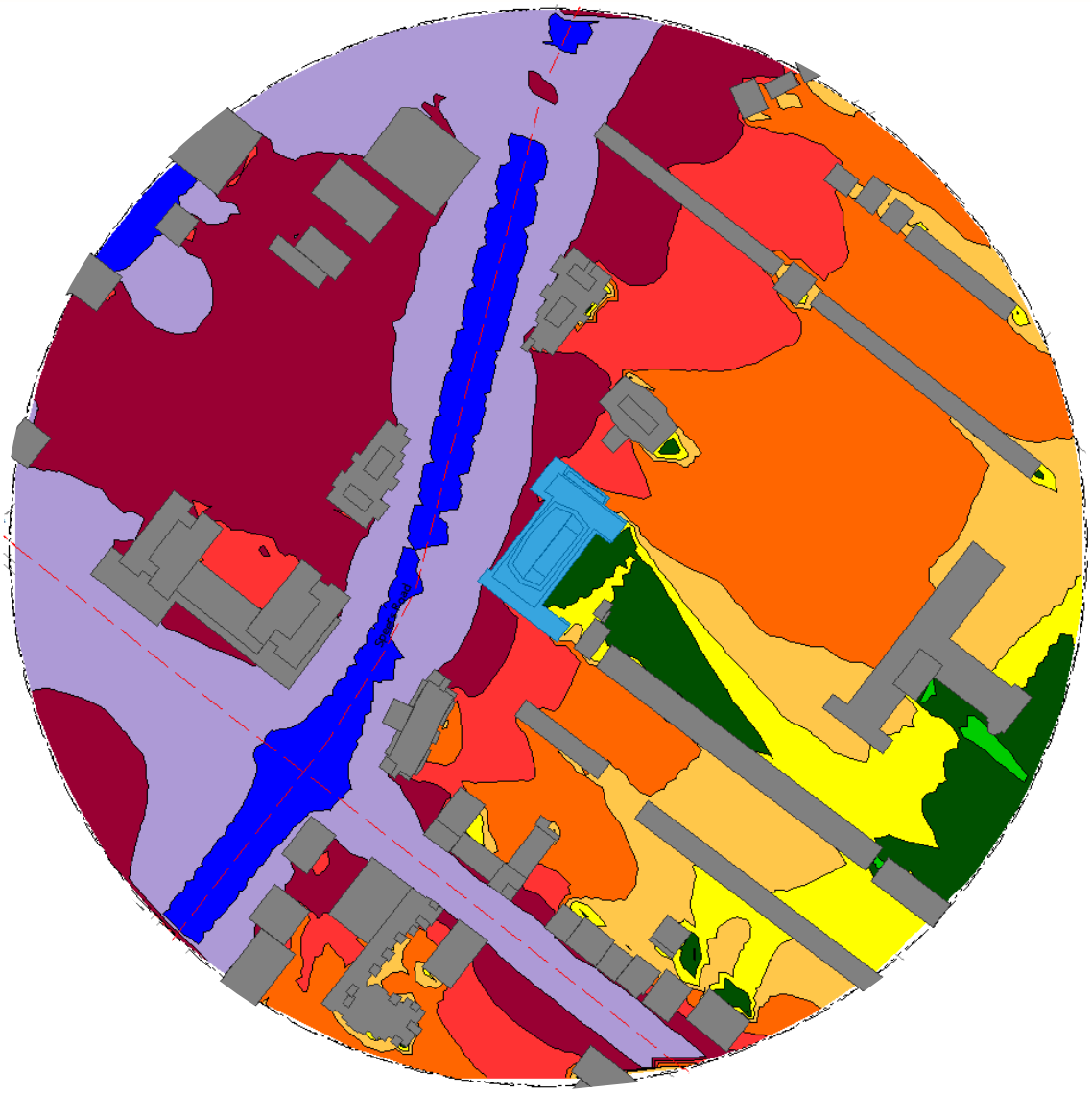


FIGURE 6: DAYTIME NOISE CONTOURS (4.5 M ABOVE GRADE)

80 – 85 dB
75 – 80 dB
70 – 75 dB
65 – 70 dB
60 – 65 dB
55 – 60 dB
50 – 55 dB
45 – 50 dB
40 – 45 dB
35 – 40 dB
0 – 35 dB

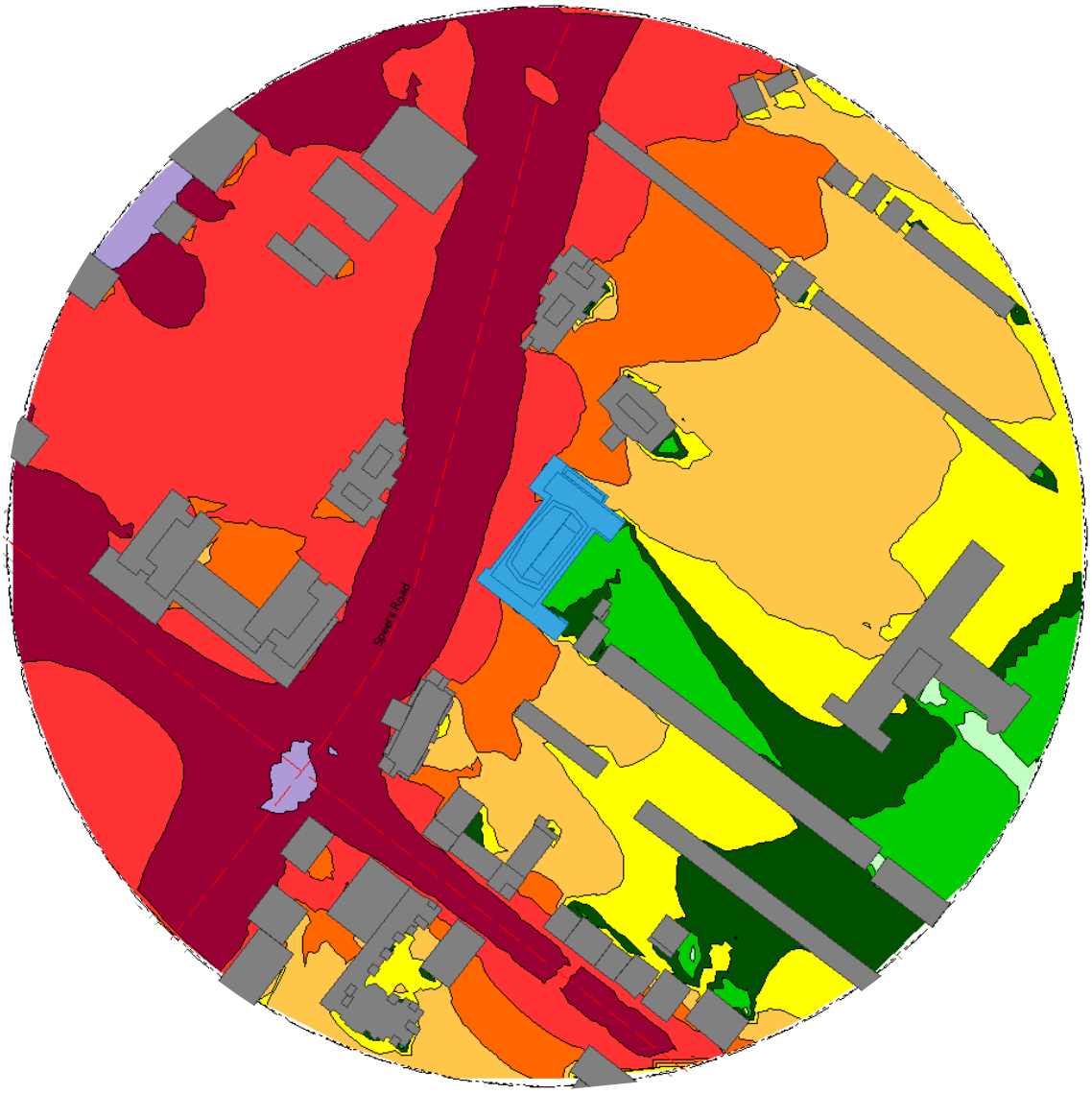
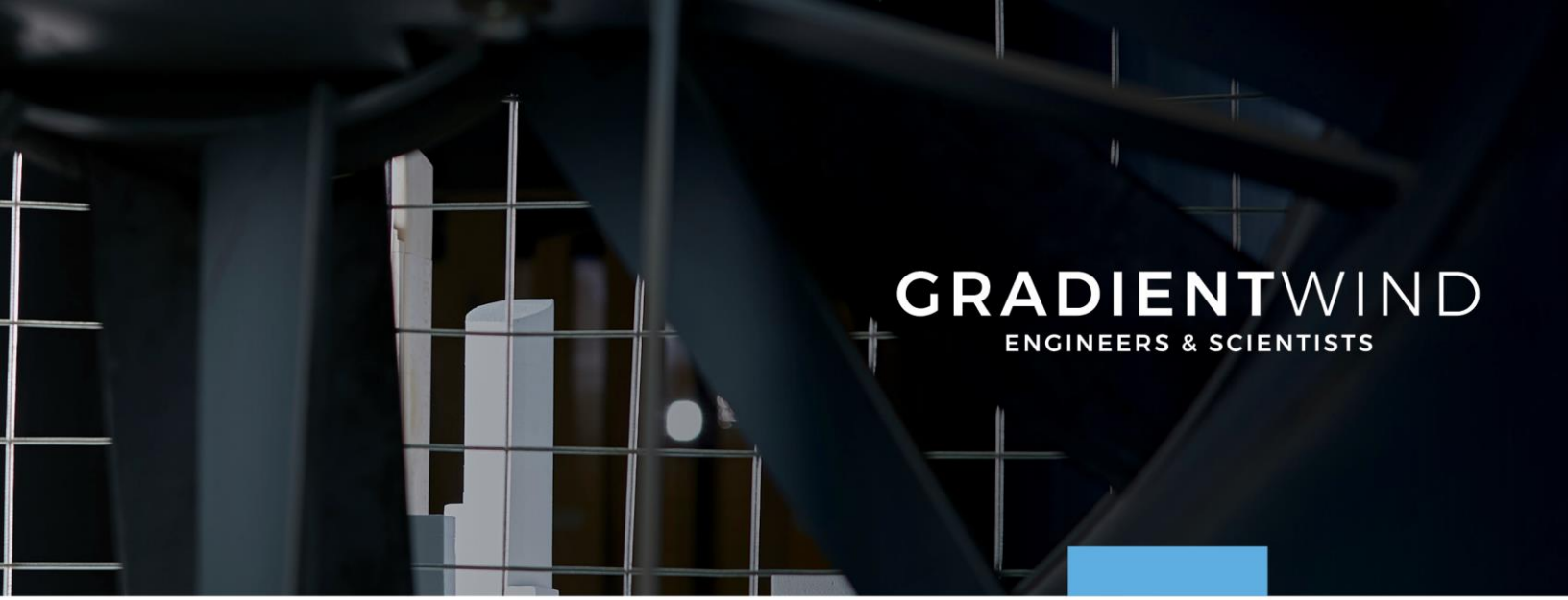
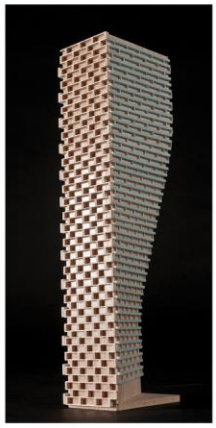
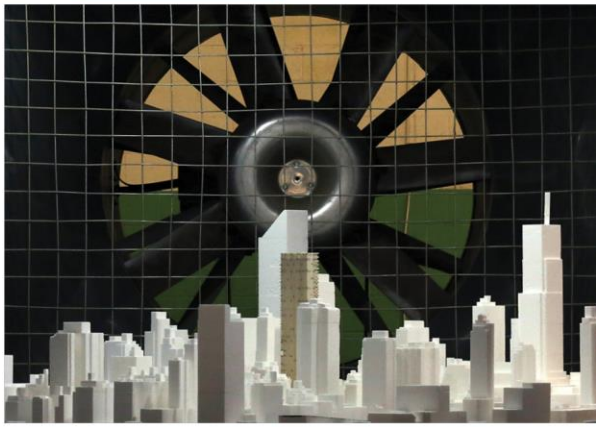


FIGURE 7: NIGHTTIME NOISE CONTOURS (4.5 M ABOVE GRADE)







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: 14-02-2024 21:33:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Rail data, segment # 1: Go Rail Ln1 (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 1: Go Rail Ln1 (day/night)

```
Angle1   Angle2          : -90.00 deg   -67.00 deg
Wood depth               :     0      (No woods.)
No of house rows         :     2 / 0
Surface                  :     1      (Absorptive ground surface)
Receiver source distance : 277.00 / 277.00 m
Receiver height          :   5.50 / 5.50   m
Topography               :     2      (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1           : -90.00 deg   Angle2 : -67.00 deg
Barrier height           :   5.00 m
Barrier receiver distance : 251.00 / 251.00 m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

Rail data, segment # 2: GO Rail Ln2 (day/night)

Train Type	Trains !	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 2: GO Rail Ln2 (day/night)

Angle1 Angle2 : -67.00 deg -21.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 277.00 / 277.00 m
Receiver height : 5.50 / 5.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -67.00 deg Angle2 : -21.00 deg
Barrier height : 65.00 m
Barrier receiver distance : 139.00 / 139.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Rail data, segment # 3: GO Rail Ln3 (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 3: GO Rail Ln3 (day/night)

Angle1 Angle2 : -21.00 deg -15.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 277.00 / 277.00 m
Receiver height : 5.50 / 5.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -21.00 deg Angle2 : -15.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 251.00 / 251.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Rail data, segment # 4: GO Rail Ln4 (day/night)

Train Type	Trains !	Speed !(km/h)	# loc !/Train	# Cars !/Train	Eng type	Cont weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 4: GO Rail Ln4 (day/night)

Angle1 Angle2 : -15.00 deg 26.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 277.00 / 277.00 m
Receiver height : 5.50 / 5.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -15.00 deg Angle2 : 26.00 deg
Barrier height : 48.00 m
Barrier receiver distance : 72.00 / 72.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Rail data, segment # 5: GO Rail Ln5 (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 5: GO Rail Ln5 (day/night)

Angle1 Angle2 : 26.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 277.00 / 277.00 m
Receiver height : 5.50 / 5.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : 26.00 deg Angle2 : 90.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 251.00 / 251.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Go Rail Ln1 (day)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.14 ! 4.14
0.50 ! 5.50 ! 0.97 ! 0.97

LOCOMOTIVE (0.00 + 50.54 + 0.00) = 50.54 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -67 0.47 83.85 -18.55 -12.46 0.00 -2.30 0.00 50.54
-90 -67 0.17 83.85 -14.75 -10.26 0.00 0.00 -5.16 53.68

WHEEL (0.00 + 42.58 + 0.00) = 42.58 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -67 0.57 77.95 -19.88 -13.18 0.00 -2.30 0.00 42.58
-90 -67 0.27 77.95 -16.08 -11.06 0.00 0.00 -7.46 43.35

Segment Leq : 51.18 dBA

Results segment # 2: GO Rail Ln2 (day)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.75 ! 4.75
0.50 ! 5.50 ! 2.99 ! 2.99

LOCOMOTIVE (0.00 + 45.27 + 0.00) = 45.27 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-67 -21 0.00 83.85 -12.66 -5.93 0.00 -2.30 0.00 62.97
-67 -21 0.00 83.85 -12.66 -5.93 0.00 0.00 -20.00 45.27

WHEEL (0.00 + 39.36 + 0.00) = 39.36 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-67 -21 0.00 77.95 -12.66 -5.93 0.00 -2.30 0.00 57.06
-67 -21 0.00 77.95 -12.66 -5.93 0.00 0.00 -20.00 39.36

Segment Leq : 46.26 dBA

Results segment # 3: GO Rail Ln3 (day)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.14 ! 4.14
0.50 ! 5.50 ! 0.97 ! 0.97

LOCOMOTIVE (0.00 + 48.54 + 0.00) = 48.54 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-21 -15 0.00 83.85 -12.66 -14.77 0.00 -2.30 0.00 54.12
-21 -15 0.00 83.85 -12.66 -14.77 0.00 0.00 -7.88 48.54

WHEEL (0.00 + 35.82 + 0.00) = 35.82 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-21 -15 0.00 77.95 -12.66 -14.77 0.00 -2.30 0.00 48.21
-21 -15 0.00 77.95 -12.66 -14.77 0.00 0.00 -14.70 35.82

Segment Leq : 48.77 dBA

Results segment # 4: GO Rail Ln4 (day)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 5.11 ! 5.11
0.50 ! 5.50 ! 4.20 ! 4.20

LOCOMOTIVE (0.00 + 44.77 + 0.00) = 44.77 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-15 26 0.47 83.85 -18.55 -6.48 0.00 -2.30 0.00 56.52
-15 26 0.00 83.85 -12.66 -6.42 0.00 0.00 -20.00 44.77

WHEEL (0.00 + 38.86 + 0.00) = 38.86 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-15 26 0.57 77.95 -19.88 -6.49 0.00 -2.30 0.00 49.28
-15 26 0.00 77.95 -12.66 -6.42 0.00 0.00 -20.00 38.86

Segment Leq : 45.76 dBA

Results segment # 5: GO Rail Ln5 (day)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.14 ! 4.14
0.50 ! 5.50 ! 0.97 ! 0.97

LOCOMOTIVE (0.00 + 56.90 + 0.00) = 56.90 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
26 90 0.47 83.85 -18.55 -6.11 0.00 -2.30 0.00 56.90
26 90 0.10 83.85 -13.99 -4.91 0.00 0.00 -6.56 58.39

WHEEL (0.00 + 46.61 + 0.00) = 46.61 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
26 90 0.57 77.95 -19.88 -6.41 0.00 -2.30 0.00 49.36
26 90 0.21 77.95 -15.32 -5.29 0.00 0.00 -10.73 46.61

Segment Leq : 57.29 dBA

Total Leq All Segments: 59.15 dBA

Results segment # 1: Go Rail Ln1 (night)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.14 ! 4.14
0.50 ! 5.50 ! 0.97 ! 0.97

LOCOMOTIVE (0.00 + 48.53 + 0.00) = 48.53 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -67 0.17 78.70 -14.75 -10.26 0.00 0.00 -5.16 48.53

WHEEL (0.00 + 38.20 + 0.00) = 38.20 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -67 0.27 72.79 -16.08 -11.06 0.00 0.00 -7.46 38.20

Segment Leq : 48.91 dBA

Results segment # 2: GO Rail Ln2 (night)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.75 ! 4.75
0.50 ! 5.50 ! 2.99 ! 2.99

LOCOMOTIVE (0.00 + 40.11 + 0.00) = 40.11 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-67 -21 0.00 78.70 -12.66 -5.93 0.00 0.00 -20.00 40.11

WHEEL (0.00 + 34.20 + 0.00) = 34.20 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-67 -21 0.00 72.79 -12.66 -5.93 0.00 0.00 -20.00 34.20

Segment Leq : 41.10 dBA

Results segment # 3: GO Rail Ln3 (night)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.14 ! 4.14
0.50 ! 5.50 ! 0.97 ! 0.97

LOCOMOTIVE (0.00 + 43.39 + 0.00) = 43.39 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-21 -15 0.00 78.70 -12.66 -14.77 0.00 0.00 -7.88 43.39

WHEEL (0.00 + 30.66 + 0.00) = 30.66 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-21 -15 0.00 72.79 -12.66 -14.77 0.00 0.00 -14.70 30.66

Segment Leq : 43.62 dBA

Results segment # 4: GO Rail Ln4 (night)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 5.11 ! 5.11
0.50 ! 5.50 ! 4.20 ! 4.20

LOCOMOTIVE (0.00 + 39.61 + 0.00) = 39.61 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-15 26 0.00 78.70 -12.66 -6.42 0.00 0.00 -20.00 39.61

WHEEL (0.00 + 33.70 + 0.00) = 33.70 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-15 26 0.00 72.79 -12.66 -6.42 0.00 0.00 -20.00 33.70

Segment Leq : 40.60 dBA

Results segment # 5: GO Rail Ln5 (night)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.14 ! 4.14
0.50 ! 5.50 ! 0.97 ! 0.97

LOCOMOTIVE (0.00 + 53.23 + 0.00) = 53.23 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
26 90 0.10 78.70 -13.99 -4.91 0.00 0.00 -6.56 53.23

WHEEL (0.00 + 41.45 + 0.00) = 41.45 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
26 90 0.21 72.79 -15.32 -5.29 0.00 0.00 -10.73 41.45

Segment Leq : 53.51 dBA

Total Leq All Segments: 55.44 dBA

Road data, segment # 1: Speers Rd (day/night)

Car traffic volume : 52124/5792 veh/TimePeriod *
Medium truck volume : 4146/461 veh/TimePeriod *
Heavy truck volume : 2962/329 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 65813
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 : 90.00

Data for Segment # 1: Speers Rd (day/night)

Angle1 Angle2 : -67.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 29.00 / 29.00 m
Receiver height : 5.50 / 5.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Kerr St1 (day/night)

Car traffic volume : 27608/3068 veh/TimePeriod *
Medium truck volume : 2196/244 veh/TimePeriod *
Heavy truck volume : 1569/174 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): 34858
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 : 90.00

Data for Segment # 2: Kerr St1 (day/night)

Angle1 Angle2 : 0.00 deg 26.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 123.00 / 123.00 m
Receiver height : 5.50 / 5.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: Kerr St2 (day/night)

Car traffic volume : 27608/3068 veh/TimePeriod *
Medium truck volume : 2196/244 veh/TimePeriod *
Heavy truck volume : 1569/174 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): 34858
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 : 90.00

Data for Segment # 3: Kerr St2 (day/night)

Angle1 Angle2 : 26.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 123.00 / 123.00 m
Receiver height : 5.50 / 5.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 26.00 deg Angle2 : 90.00 deg
Barrier height : 65.00 m
Barrier receiver distance : 97.00 / 97.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Speers Rd (day)

Source height = 1.50 m

ROAD (0.00 + 72.87 + 0.00) = 72.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	90	0.00	76.32	0.00	-2.86	-0.59	0.00	0.00	0.00	72.87

Segment Leq : 72.87 dBA

Results segment # 2: Kerr St1 (day)

Source height = 1.50 m

ROAD (0.00 + 49.49 + 0.00) = 49.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	26	0.54	72.05	0.00	-14.07	-8.48	0.00	0.00	0.00	49.49

Segment Leq : 49.49 dBA

Results segment # 3: Kerr St2 (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 ! 5.50 ! 2.34 ! 2.34

ROAD (0.00 + 38.73 + 0.00) = 38.73 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
26 90 0.00 72.05 0.00 -9.14 -4.49 0.00 0.00 -19.69 38.73

Segment Leq : 38.73 dBA

Total Leq All Segments: 72.89 dBA

Results segment # 1: Speers Rd (night)

Source height = 1.50 m

ROAD (0.00 + 66.33 + 0.00) = 66.33 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-67 90 0.00 69.79 0.00 -2.86 -0.59 0.00 0.00 0.00 66.33

Segment Leq : 66.33 dBA

Results segment # 2: Kerr St1 (night)

Source height = 1.49 m

ROAD (0.00 + 42.95 + 0.00) = 42.95 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
0 26 0.54 65.51 0.00 -14.07 -8.48 0.00 0.00 0.00 42.95

Segment Leq : 42.95 dBA

Results segment # 3: Kerr St2 (night)

Source height = 1.49 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.49 ! 5.50 ! 2.34 ! 2.34

ROAD (0.00 + 32.19 + 0.00) = 32.19 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
26 90 0.00 65.51 0.00 -9.14 -4.49 0.00 0.00 -19.69 32.19

Segment Leq : 32.19 dBA

Total Leq All Segments: 66.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.07
(NIGHT): 66.69

STAMSON 5.0 NORMAL REPORT Date: 14-02-2024 21:38:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Rail data, segment # 1: Go Rail Ln1 (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 1: Go Rail Ln1 (day/night)

```
Angle1   Angle2          : -90.00 deg   -17.00 deg
Wood depth               :     0      (No woods.)
No of house rows         :     2 / 0
Surface                  :     2      (Reflective ground surface)
Receiver source distance : 271.00 / 271.00 m
Receiver height          :   5.50 / 5.50   m
Topography               :     2      (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1           : -90.00 deg   Angle2 : -17.00 deg
Barrier height           :  65.00 m
Barrier receiver distance :  72.00 / 72.00  m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

Rail data, segment # 2: GO Rail Ln2 (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 2: GO Rail Ln2 (day/night)

Angle1 Angle2 : -17.00 deg -10.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 271.00 / 271.00 m
Receiver height : 5.50 / 5.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -17.00 deg Angle2 : -10.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 251.00 / 251.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Rail data, segment # 3: GO Rail Ln3 (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 3: GO Rail Ln3 (day/night)

Angle1 Angle2 : -10.00 deg 3.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 271.00 / 271.00 m
Receiver height : 5.50 / 5.50 m
Topography : 1 (Flat/gentle slope; no barrier)
No Whistle
Reference angle : 0.00

Rail data, segment # 4: GO Rail Ln4 (day/night)

Train Type	Trains !	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 4: GO Rail Ln4 (day/night)

Angle1 Angle2 : 3.00 deg 48.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 271.00 / 271.00 m
Receiver height : 5.50 / 5.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : 3.00 deg Angle2 : 48.00 deg
Barrier height : 2.00 m
Barrier receiver distance : 251.00 / 251.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Rail data, segment # 5: GO Rail Ln5 (day/night)

Train Type	Trains !	Speed !(km/h)	# loc !/Train	# Cars !/Train	Eng type	Cont !weld
1. Diesel	354.0/54.0	129.0	2.0	12.0	Diesel	No

Data for Segment # 5: GO Rail Ln5 (day/night)

Angle1 Angle2 : 48.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 271.00 / 271.00 m
Receiver height : 5.50 / 5.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : 48.00 deg Angle2 : 90.00 deg
Barrier height : 36.00 m
Barrier receiver distance : 51.00 / 51.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Go Rail Ln1 (day)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 5.10 ! 5.10
0.50 ! 5.50 ! 4.17 ! 4.17

LOCOMOTIVE (0.00 + 47.89 + 0.00) = 47.89 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -17 0.00 83.85 -12.57 -3.92 0.00 -2.30 0.00 65.07
-90 -17 0.00 83.85 -12.57 -3.92 0.00 0.00 -19.48 47.89

WHEEL (0.00 + 41.96 + 0.00) = 41.96 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -17 0.00 77.95 -12.57 -3.92 0.00 -2.30 0.00 59.16
-90 -17 0.00 77.95 -12.57 -3.92 0.00 0.00 -19.50 41.96

Segment Leq : 48.88 dBA

Results segment # 2: GO Rail Ln2 (day)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.11 ! 4.11
0.50 ! 5.50 ! 0.87 ! 0.87

LOCOMOTIVE (0.00 + 51.17 + 0.00) = 51.17 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-17 -10 0.00 83.85 -12.57 -14.10 0.00 -2.30 0.00 54.88
-17 -10 0.00 83.85 -12.57 -14.10 0.00 0.00 -6.01 51.17

WHEEL (0.00 + 37.14 + 0.00) = 37.14 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-17 -10 0.00 77.95 -12.57 -14.10 0.00 -2.30 0.00 48.98
-17 -10 0.00 77.95 -12.57 -14.10 0.00 0.00 -14.14 37.14

Segment Leq : 51.34 dBA

Results segment # 3: GO Rail Ln3 (day)

LOCOMOTIVE (0.00 + 59.87 + 0.00) = 59.87 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	3	0.00	83.85	-12.57	-11.41	0.00	0.00	0.00	59.87

WHEEL (0.00 + 53.97 + 0.00) = 53.97 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	3	0.00	77.95	-12.57	-11.41	0.00	0.00	0.00	53.97

Segment Leq : 60.86 dBA

Results segment # 4: GO Rail Ln4 (day)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.11 ! 4.11
0.50 ! 5.50 ! 0.87 ! 0.87

LOCOMOTIVE (0.00 + 56.85 + 0.00) = 56.85 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
3	48	0.47	83.85	-18.41	-6.29	0.00	-2.30	0.00	56.85
3	48	0.34	83.85	-16.91	-6.22	0.00	0.00	0.00	60.73*
3	48	0.47	83.85	-18.41	-6.29	0.00	0.00	0.00	59.15

* Bright Zone !

WHEEL (0.00 + 47.02 + 0.00) = 47.02 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
3	48	0.57	77.95	-19.73	-6.35	0.00	-2.30	0.00	49.57
3	48	0.45	77.95	-18.22	-6.28	0.00	0.00	-6.42	47.02

Segment Leq : 57.28 dBA

Results segment # 5: GO Rail Ln5 (day)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 5.22 ! 5.22
0.50 ! 5.50 ! 4.56 ! 4.56

LOCOMOTIVE (0.00 + 47.09 + 0.00) = 47.09 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
48 90 0.47 83.85 -18.41 -8.68 0.00 -2.30 0.00 54.46
48 90 0.00 83.85 -12.57 -6.32 0.00 0.00 -17.88 47.09

WHEEL (0.00 + 41.11 + 0.00) = 41.11 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
48 90 0.57 77.95 -19.73 -9.15 0.00 -2.30 0.00 46.77
48 90 0.00 77.95 -12.57 -6.32 0.00 0.00 -17.95 41.11

Segment Leq : 48.07 dBA

Total Leq All Segments: 63.08 dBA

Results segment # 1: Go Rail Ln1 (night)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 5.10 ! 5.10
0.50 ! 5.50 ! 4.17 ! 4.17

LOCOMOTIVE (0.00 + 42.73 + 0.00) = 42.73 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -17 0.00 78.70 -12.57 -3.92 0.00 0.00 -19.48 42.73

WHEEL (0.00 + 36.81 + 0.00) = 36.81 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -17 0.00 72.79 -12.57 -3.92 0.00 0.00 -19.50 36.81

Segment Leq : 43.72 dBA

Results segment # 2: GO Rail Ln2 (night)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.11 ! 4.11
0.50 ! 5.50 ! 0.87 ! 0.87

LOCOMOTIVE (0.00 + 46.02 + 0.00) = 46.02 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-17 -10 0.00 78.70 -12.57 -14.10 0.00 0.00 -6.01 46.02

WHEEL (0.00 + 31.99 + 0.00) = 31.99 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-17 -10 0.00 72.79 -12.57 -14.10 0.00 0.00 -14.14 31.99

Segment Leq : 46.19 dBA

Results segment # 3: GO Rail Ln3 (night)

LOCOMOTIVE (0.00 + 54.72 + 0.00) = 54.72 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	3	0.00	78.70	-12.57	-11.41	0.00	0.00	0.00	54.72

WHEEL (0.00 + 48.81 + 0.00) = 48.81 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	3	0.00	72.79	-12.57	-11.41	0.00	0.00	0.00	48.81

Segment Leq : 55.71 dBA

Results segment # 4: GO Rail Ln4 (night)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 4.11 ! 4.11
0.50 ! 5.50 ! 0.87 ! 0.87

LOCOMOTIVE (0.00 + 54.00 + 0.00) = 54.00 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
3 48 0.34 78.70 -16.91 -6.22 0.00 0.00 0.00 55.57*
3 48 0.47 78.70 -18.41 -6.29 0.00 0.00 0.00 54.00
---

* Bright Zone !

WHEEL (0.00 + 41.87 + 0.00) = 41.87 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
3 48 0.45 72.79 -18.22 -6.28 0.00 0.00 -6.42 41.87

Segment Leq : 54.26 dBA

Results segment # 5: GO Rail Ln5 (night)

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 5.50 ! 5.22 ! 5.22
0.50 ! 5.50 ! 4.56 ! 4.56

LOCOMOTIVE (0.00 + 41.93 + 0.00) = 41.93 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
48 90 0.00 78.70 -12.57 -6.32 0.00 0.00 -17.88 41.93

WHEEL (0.00 + 35.95 + 0.00) = 35.95 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
48 90 0.00 72.79 -12.57 -6.32 0.00 0.00 -17.95 35.95

Segment Leq : 42.91 dBA

Total Leq All Segments: 58.60 dBA

Road data, segment # 1: Speers Rd (day/night)

Car traffic volume : 52124/5792 veh/TimePeriod *
Medium truck volume : 4146/461 veh/TimePeriod *
Heavy truck volume : 2962/329 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 65813
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 : 90.00

Data for Segment # 1: Speers Rd (day/night)

Angle1 Angle2 : -67.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 44.00 / 44.00 m
Receiver height : 5.50 / 5.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Speers Rd (day)

Source height = 1.50 m

ROAD (0.00 + 71.06 + 0.00) = 71.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	90	0.00	76.32	0.00	-4.67	-0.59	0.00	0.00	0.00	71.06

Segment Leq : 71.06 dBA

Total Leq All Segments: 71.06 dBA

Results segment # 1: Speers Rd (night)

Source height = 1.50 m

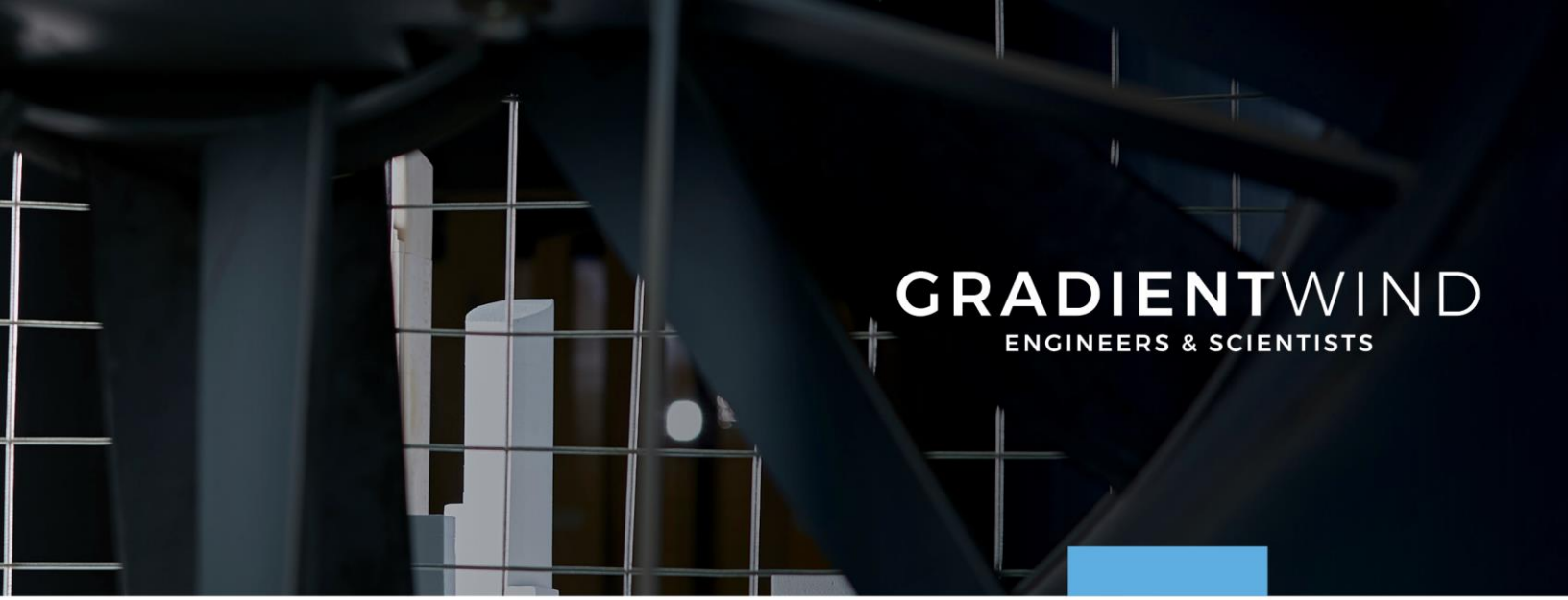
ROAD (0.00 + 64.52 + 0.00) = 64.52 dBA

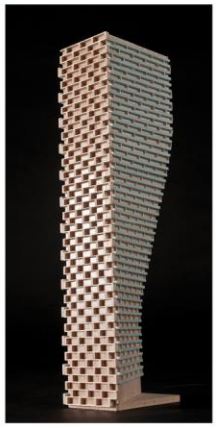
Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	90	0.00	69.79	0.00	-4.67	-0.59	0.00	0.00	0.00	64.52

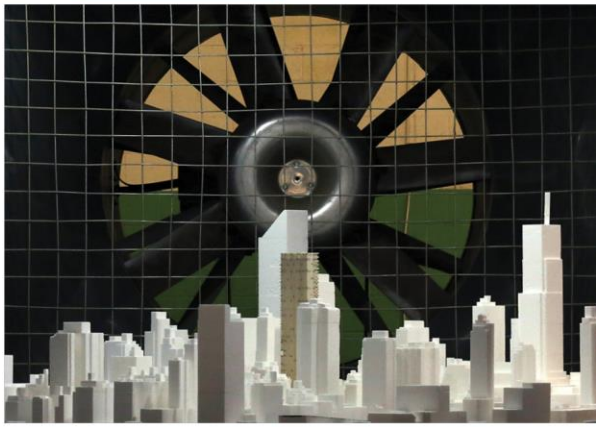
Segment Leq : 64.52 dBA

Total Leq All Segments: 64.52 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.70
(NIGHT): 65.51







APPENDIX B

SUPPORTING DOCUMENTATION

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

From: Rail Data Requests
To: Efser Kara
Subject: RE: Oakville, ON - GO Metrolinx Information
Date: April 25, 2023 3:57:29 PM
Attachments: image002.png
image003.png

Good Afternoon,

Further to your request dated April 25, 2023, the subject lands (50 Speers Road, Oakville) are located within 300 metres of the Metrolinx Oakville Subdivision (which carries Lakeshore West GO rail service).

It's anticipated that GO rail service on this Subdivision will be comprised of diesel and electric trains. The GO rail fleet combination on this Subdivision will consist of up to 2 locomotives and 12 passenger cars. The typical GO rail weekday train volume forecast near the subject lands, including both revenue and equipment trips is in the order of 408 trains. The planned detailed trip breakdown is listed below:

	1 Diesel Locomotive	2 Diesel Locomotives	1 Electric Locomotive	2 Electric Locomotives		1 Diesel Locomotive	2 Diesel Locomotives	1 Electric Locomotive	2 Electric Locomotives
Day (0700-2300)	132	0	222	0	Night (2300-0700)	20	0	34	0

The current track design speed near the subject lands is 80 mph (129 km/h).

There are *anti-whistling by-laws* in affect near the subject lands at Chartwell Rd and Kerr St.
With respect to future electrified rail service, Metrolinx is committed to finding the most sustainable solution for electrifying the GO rail network and we are currently working towards the next phase.
Options have been studied as part of the Transit Project Assessment Process (TPAP) for the GO Expansion program, currently in the procurement phase. The successful proponent team will be responsible for selecting and delivering the right trains and infrastructure to unlock the benefits of GO Expansion. The contract is in a multi-year procurement process and teams have submitted their bids to Infrastructure Ontario and Metrolinx for evaluation and contract award. GO Expansion construction will get underway in late 2023.
However, we can advise that train noise is dominated by the powertrain at lower speeds and by the wheel- track interaction at higher speeds. Hence, the noise level and spectrum of electric trains is expected to be very similar at higher speeds, if not identical, to those of equivalent diesel trains.
Given the above considerations, it would be prudent at this time, for the purposes of acoustical analyses for development in proximity to Metrolinx corridors, to assume that the acoustical characteristics of electrified and diesel trains are equivalent. In light of the aforementioned information, acoustical models should employ diesel train parameters as the basis for analyses. We anticipate that additional information regarding specific operational parameters for electrified trains will become available in the future once the proponent team is selected.
Operational information is subject to change and may be influenced by, among other factors, service planning priorities, operational considerations, funding availability and passenger demand.

It should be noted that this information only pertains to Metrolinx rail service. It would be prudent to contact other rail operators in the area directly for rail traffic information pertaining to non-Metrolinx rail service.

I trust this information is useful. Should you have any questions or concerns, please do not hesitate to contact me.

Regards,

Tara KamalAhmadi

Tara Kamal Ahmadi
Junior Analyst
Third Party Projects Review, Capital Projects Group
Metrolinx | 20 Bay Street | Suite 600 | Toronto | Ontario | M5J 2W3

From: Efser Kara <efser.kara@gradientwind.com>
Sent: April 24, 2023 10:29 AM
To: Rail Data Requests <RailDataRequests@metrolinx.com>
Subject: Oakville, ON - GO Metrolinx Information

Hello,

For a noise study that we are conducting at 50 Speers Road, Oakville, we would like to get the train activity data for the GO Metrolinx Line that runs to the north of Speers Road in Oakville/ Ontario.

Could you provide the data listed below for that rail line?

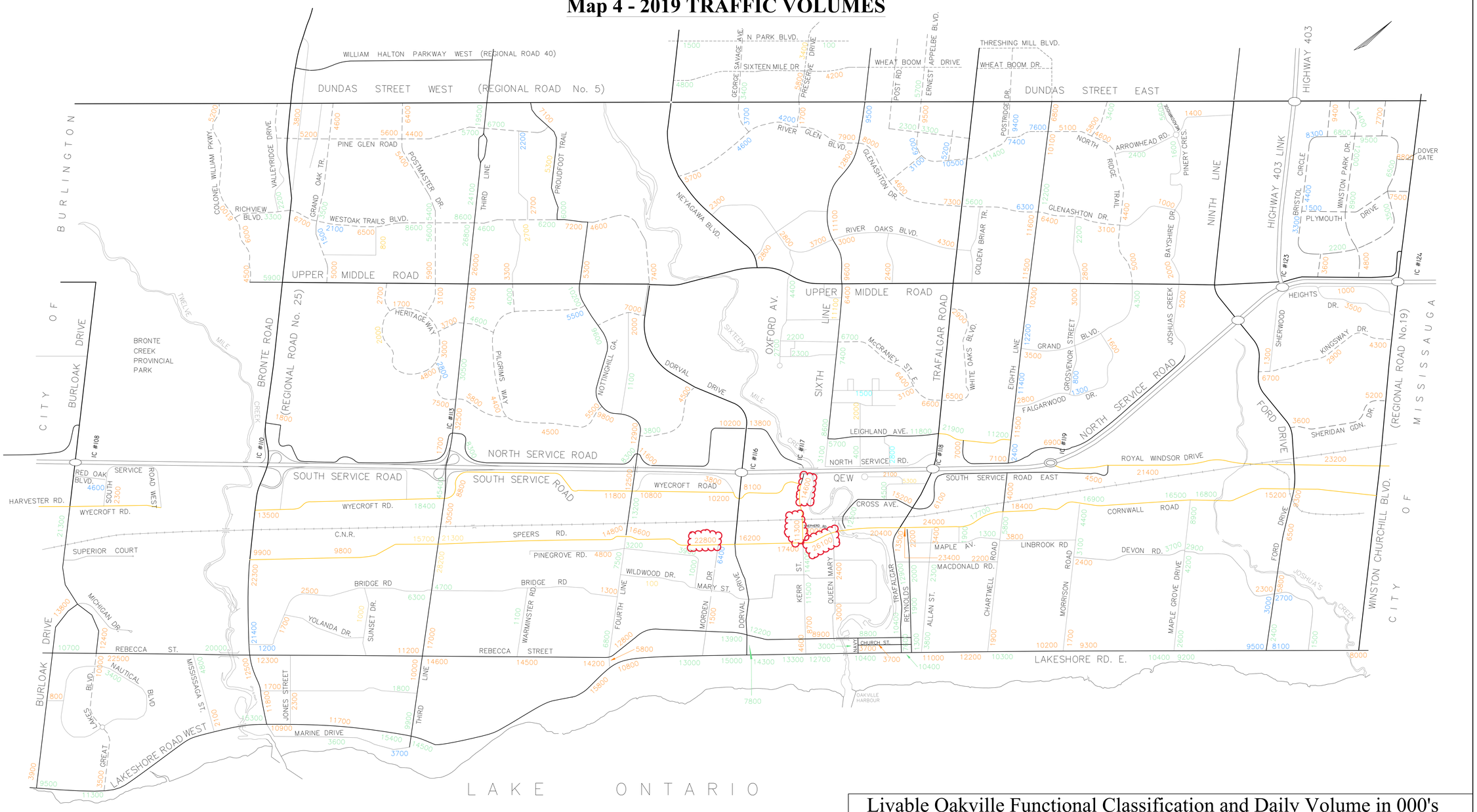
-Number of train passes during the daytime (7:00-23:00) and nighttime (23:00-7:00) periods
-Train types (freight, passenger, etc.)
-Number of locomotives and cars per train
-Maximum speed of the trains
-Whether or not there is whistle noise
-Whether or not the rails are welded

Thank you in advance.

Kind regards,

EFSER KARA, MSc, LEED GA
ACOUSTIC SCIENTIST
efser.kara@gradientwind.com
T 613 836 0934 | M 613 981 8807
127 Walgreen Road, Ottawa, ON, Canada K0A 1L0
GRADIENTWIND.COM

Map 4 - 2019 TRAFFIC VOLUMES



LEGEND

2019 Volumes 2018 Volumes 2017 Volumes 2016 Volumes 2015 Volumes Beyond 2015 Volumes

Please Note: All Volumes Are Rounded to the Nearest 100.

Livable Oakville Functional Classification and Daily Volume in 000's

Road Class	Typical Maximum		Road Class	Typical Maximum	
Major Arterials	40-60	———	Industrial Arterials	15	– – – – – – –
Multi-purpose Arterials	20-40	———	Major Collectors	10	– – – – – – –
Minor Arterials	20-40	———	Collectors	5	———

OAKVILLE

Last Updated: February 24, 2016