SS Wilson Associates
CONSULTING & ENGINEERING

REPORT NO. WA26-006

DETAILED NOISE AND VIBRATION CONTROL STUDY PROPOSED DATA CENTRE DEVELOPMENT 3110 SOUTH SERVICE ROAD BURLINGTON, ON

SUBMITTED TO:

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1.0 Introduction

1.1 General

SS Wilson Associates (SSWA) was retained by Cuadro Arch Ltd., on behalf of the project team, to prepare a Noise and Vibration Control Study in support of the proposed data centre development located at 3110 South Service Road in the City of Burlington, Ontario.

The subject site is located on the south side of South Service Road, immediately south of the Queen Elizabeth Way (QEW) and Highway 403 corridor. The surrounding area consists of commercial, institutional, and employment industrial land uses. Based on available aerial imagery, the site is situated within a developed commercial corridor and is directly exposed to significant transportation noise from the adjacent QEW. The location of the subject site is illustrated in Figure 1.

1.2 Purpose of Report

The purpose of this report is to assess the potential noise and vibration impacts associated with the proposed development and to identify mitigation requirements, where applicable, in accordance with provincial guidelines and municipal requirements. This report has been prepared to support the Site Plan Approval (SPA) process.

1.3 Proposed Development

The proposed development consists of a two-storey data centre facility with a lower-level parking structure accessed via an internal ramp. The development includes rooftop mechanical equipment (air-cooled chillers), at-grade emergency power generators and electrical transformers located on the south side of the building, as well as garage exhaust wells located on the north side.

This assessment is based on Site Plan Drawing No. A-01-2 prepared by Cuadro Arch Ltd., dated May 4, 2026, which identifies the locations of the above-noted equipment forming the basis of the stationary noise assessment. The site layout, building configuration, and equipment locations are illustrated in Figure 2.

1.4 Study Criteria and Requirements

This study has been prepared in accordance with the applicable guidelines of the Ministry of the Environment, Conservation and Parks (MECP), including NPC-300, as well as the City of Burlington submission requirements. The assessment also addresses City review comments, including the classification of the site as a Class 1 area and the consideration of both on-site and off-site sources of noise and vibration.

1.5 Objective of the Study

The objective of this study is to:

a) Assess transportation noise impacts from the QEW and South Service Road
b) Assess stationary noise impacts from:
   - On-site sources (e.g., rooftop cooling equipment, generators, transformers, and exhaust systems)
   - Off-site stationary sources
c) Evaluate noise mitigation requirements, including façade design, and acoustic barriers (if applicable)

d) Assess ground-borne vibration impacts, including comparison to applicable Vibration Criteria (VC) curves for data centre environments.

1.6 Previous Study

A previous noise and vibration study was prepared for an earlier development concept at this site (SSWA Report No. WA21-039, dated May 17, 2022). As the site location and surrounding transportation environment remain unchanged, the transportation noise analysis presented herein is generally consistent with the previous assessment, with updates made to reflect the revised building footprint, receptor locations, and current design information.

The measurement locations for ambient sound and vibration data collected as part of the previous study are illustrated in Figure 4, and have been used in this assessment as a reference for existing site conditions

2.0 Proposed Facility Description

2.1 General

The proposed development consists of a two-storey data centre facility with a lower-level parking structure. The building is intended to accommodate data centre operations along with associated support functions, including administrative areas, security room, and building services.

2.2 Site Layout and Building Elements

The proposed development includes a two-storey building footprint with vehicular access provided from South Service Road. The site layout incorporates a designated loading to the west side, and servicing area to the south, as well as lower-level parking accessed via an internal ramp.

Outdoor service areas are provided to accommodate mechanical and electrical equipment, including generators, transformers, and garage exhaust shafts. These equipment are shown on the Site Plan drawing, and form the basis of the stationary noise assessment.

2.3 Building Functional Areas

The proposed facility includes a combination of operational and support spaces typical of data centre developments. These include:

- Data halls/server rooms (primary operational areas)
- Control and monitoring rooms
- Office and administrative areas, including meeting and conference rooms
- Electrical and mechanical service rooms
- Staff support areas, including break rooms and washrooms
- Circulation areas, including corridors, stairwells, and elevators

Based on the site plan drawings, the open office and reception areas are considered noise- and vibration-sensitive spaces, and are therefore assessed with respect to applicable indoor criteria.

2.4 Mechanical and Electrical Equipment

a) <u>Rooftop Cooling Equipment</u>

The facility will include rooftop air-cooled chillers. Based on the available mechanical design brief, a total of 12 chillers is proposed, with the system designed to operate on an N+1 redundancy basis, allowing up to 11 units to operate under normal conditions. Each unit includes multiple fan assemblies and is expected to operate continuously to support data centre cooling requirements. These units will represent the main source of stationary noise and will be located at the roof level.

b) Emergency Power Generation

Emergency power will be provided by diesel generators located on the south side of the building. The generators are intended to operate under emergency conditions and periodic testing scenarios (typically once per month). In the absence of finalized acoustic data, representative sound levels based on comparable equipment have been adopted for the assessment.

c) Transformers

Electrical transformers will be located at grade on the south side of the building, as identified on the site plan. These units are expected to operate continuously and are included in the stationary noise assessment.

d) Ventilation and Exhaust Systems

The development will include garage exhaust shafts associated with the lower-level parking structure. The exhaust shaft is located on the north side of the building, and due to the high ambient sound levels from the QEW / Highway 403 corridor, noise from this source is expected to be insignificant at nearby noise-sensitive receptors.

2.5 Summary of Noise Sources

Based on the current design, the main on-site sources of stationary noise to be assessed include:

- Rooftop air-cooled chillers (primary continuous source)
- Emergency generators (intermittent operation)
- Transformers (continuous operation)
- Garage exhaust and ventilation systems
- Loading and servicing activities, where applicable

These sources form the basis of the stationary noise assessment presented in this report. All sources have been assessed assuming conservative operating conditions, including simultaneous operation where applicable.

3.0 Sound Level Criteria

3.1 Environmental Noise Classification

The assessment of environmental noise impacts has been carried out using MECP NPC-300 guidelines to determine existing and future sound levels at building façades and at surrounding points of reception.

Based on a review of the surrounding land uses and City of Burlington comments, the subject site is considered to be located within a Class 1 area, representing an urban environment where the ambient sound environment is dominated by transportation sources such as road traffic.

3.2 Transportation Noise Criteria

3.2.1 Outdoor Noise Criteria

The applicable sound level criterion for outdoor living areas (OLAs) is 55 dBA (16-hour daytime, 07:00 - 23:00). However, OLAs are generally associated with residential land uses. Given the nature of the proposed data centre development, which does not include designated outdoor amenity areas intended for quiet enjoyment, this criterion is not expected to apply.

3.2.2 Indoor Points of Reception (Office and Support Spaces)

For the proposed development, indoor sound level criteria are applied to occupied and noise-sensitive spaces, including offices, meeting rooms, control/monitoring rooms, and staff areas.

This study adopts the “best management practice” criteria provided by MEPC NPC-300 for office type environments. An indoor sound level target of approximately 45 to 50 dBA (daytime) is considered appropriate for general office and administrative spaces, with more noise-sensitive areas (e.g., meeting rooms or executive offices) typically designed to achieve 40 to 45 dBA.

Central air conditioning is required whenever the daytime sound level at the outside wall of any habitable room containing windows exceeds LAeq(16hr-day) of 65 dBA, or when the nighttime sound level at the outside wall of any habitable room exceeds LAeq(8hr-night) of 60 dBA. However, since the proposed facility will likely use sealed, non-operable windows, air conditioning systems will be installed independent of the outdoor sound levels.

3.2.3 Façade-Based Assessment (Exterior Sound Levels)

Indoor sound levels are dependent on façade construction, particularly glazing performance. For modern office buildings with sealed, non-operable windows, a façade attenuation of approximately 25 dB can be assumed. Based on an indoor design target of 45 dBA, this corresponds to an allowable exterior sound level of approximately:

45 dBA + 25 dB = 70 dBA (Plane of Window)

Accordingly, an exterior sound level of 70 dBA at the building façade is adopted as the criterion for achieving acceptable indoor conditions within office and occupied spaces.

A review of previously measured ambient sound levels along South Service Road (refer to Figure 4) indicates that existing sound levels due to highway traffic are consistently elevated, generally ranging between approximately 75 dBA and 85 dBA during daytime and evening periods. These measurements confirm that transportation noise from the adjacent QEW dominates the ambient acoustic environment.

Given these conditions, the adoption of a 70 dBA plane-of-window criterion represents a practical and conservative threshold for assessing both transportation and stationary noise impacts on the proposed building. Where predicted sound levels exceed this threshold, mitigation measures such as enhanced glazing performance or reduction in source sound levels will be required.

3.3 Stationary Noise Criteria

Stationary sources considered in this assessment include both off-site sources associated with surrounding land uses (e.g., restaurants, patios, and hotel) and on-site sources associated with the proposed development (e.g., rooftop cooling equipment, generators, transformers, and ventilation systems). The assessment considers both the impact of off-site stationary sources on the proposed facility, as well as the impact of on-site stationary sources on surrounding noise-sensitive land uses and points of reception. The assessment has been carried out in accordance with the MECP NPC-300 guidelines.

3.3.1 Assessment Methodology

For sound from a stationary source, including quasi-steady impulsive sound (but excluding other impulsive sound), the applicable sound level is based on the predictable worst-case one-hour equivalent sound level (LAeq,1hr) at a point of reception. In accordance with NPC-300, the applicable sound level limit is defined as the greater of the exclusion limit or the background (ambient) sound level at that point of reception.

3.3.2 Exclusion Limits - Class 1 Area

For a Class 1 area, the applicable exclusion limits for Outdoor Points of Reception (OPOR) are:

- 50 dBA (LAeq,1hr) during the daytime (07:00 - 19:00)
- 50 dBA (LAeq,1hr) during the evening (19:00 - 23:00)

Although the proposed development does not include outdoor noise-sensitive areas, nearby uses such as restaurant patio areas may be considered outdoor points of reception and will be assessed where applicable. For these locations, the applicable criterion will be the greater of the exclusion limit or the background sound level, in accordance with NPC-300.

For plane of window assessments at noise-sensitive indoor spaces, the applicable exclusion limits are summarized below:

Time Period	Sound Level Limit (dBA)
07:00 - 19:00	50
19:00 - 23:00	50
23:00 - 07:00	45

3.3.3 Background Sound Level Consideration

Due to the proximity of the site to the QEW/Highway 403 corridor, transportation noise is expected to dominate the ambient sound environment throughout the day, evening, and nighttime periods.

An assessment of ambient sound levels was conducted based on both predicted sound levels and measured sound level data, with measurements obtained from a comparable location along South Service Road. A sample of the measured sound levels is provided in Figure 4, which illustrates the variation in sound levels over time, including the lowest hourly conditions during the day, evening, and nighttime periods.

Based on a review of both predicted and measured data, ambient sound levels are generally elevated and are expected to exceed the NPC-300 exclusion limits at most points of reception. Accordingly, the ambient sound levels have been used as the basis for the stationary noise assessment, and the applicable criterion for each receptor has been selected based on the lower of the predicted or measured ambient sound levels, where appropriate.

4.0 Vibration Criteria

4.1 Discussion of Vibration Criteria

Ground-borne vibration should be considered for developments located in proximity to potential vibration sources such as transportation corridors and industrial activities. In the context of the proposed development, the primary source of vibration is expected to be vehicular traffic along the adjacent QEW/Highway 403 corridor.

Vibration may affect both occupant comfort and the performance of equipment within a building. For typical office environments, vibration is generally assessed based on human perception and comfort. However, for specialized facilities such as data centres, vibration must also be evaluated in terms of its potential impact on electronic equipment and operational reliability, particularly within data halls and control/monitoring areas.

To assess vibration impacts, industry-standard Vibration Criteria (VC) curves are commonly used. These criteria, originally developed by Gordon and Ungar, define acceptable levels of vibration based on the root-mean-square (RMS) particle velocity and are widely used for evaluating vibration-sensitive environments. The various vibration criteria and their applications are as shown in the following table[1]:

Criterion Curve	Max. Velocity (RMS) [µm/s]	Description
Office	400	Perceptible vibration; suitable for general office environments
Residential	200	Barely perceptible vibration; suitable for residential occupancy
VC-A	50	Suitable for general electronic and light equipment environments
VC-B	25	Suitable for more vibration-sensitive equipment and high-performance facilities
VC-C	12.5	Suitable for highly sensitive equipment (e.g., precision manufacturing, lithography)

For the proposed data centre, the primary areas of concern include data halls, control/monitoring areas, and associated electronic equipment spaces. Based on typical industry practice, VC-A is considered appropriate for standard data centre operations and is adopted as the primary assessment criterion. VC-A provides a suitable balance between vibration control and practical design. More stringent criteria such as VC-B may be required for specific high-sensitivity or mission-critical equipment, but such requirements are typically confirmed during the detailed design stage once data hall equipment specifications are available.

Accordingly, while VC-A has been used as the governing criterion for this assessment, vibration performance should be reviewed during detailed design. If more stringent requirements are identified during the detailed design stage, the assessment may be refined to consider VC-B and any associated mitigation measures.

5.0 Points of Reception Summary

5.1 General

The points of reception have been selected to represent the worst-case noise exposure conditions for both the proposed development and surrounding noise-sensitive land uses. The selection of receptors considers the location and orientation of dominant noise sources, including transportation and stationary sources, as well as the position of the proposed facility relative to adjacent developments.

[1] Colin G. Gordon, "*Generic vibration criteria for vibration-sensitive equipment*," Proc. SPIE 3786, Optomechanical Engineering and Vibration Control, (28 September 1999)

The selected receptors are considered representative of the most exposed conditions. Compliance at the selected receptor locations is expected to ensure compliance at other receptors that are located further away or are otherwise shielded from the sources of noise.

5.2 Internal Points of Reception (Proposed Facilty)

The Internal points of reception are defined at the plane of window of noise-sensitive spaces within the proposed data centre and are used to evaluate the impact of transportation noise and off-site stationary noise sources.

Due to the proximity of the QEW/Highway 403 corridor, the north façade of the building represents the most exposed condition. Accordingly, a representative receptor (R-A) has been established along the north façade to assess worst-case indoor noise impacts, including plane of window sound levels due to nearby stationary sources associated with surrounding HVAC equipment.

It is noted that generators and transformers are located on the south side of the building, away from primary office, meeting, and conference areas. As such, internal noise impacts from on-site stationary sources on these noise-sensitive spaces are expected to be limited.

The proposed facility does not include designated outdoor living or amenity areas, and therefore no OLA receptors have been identified.

5.3 External Points of Reception (Surrounding Uses)

The external points of reception are used to evaluate the impact of on-site stationary noise sources associated with the proposed data centre on surrounding noise-sensitive land uses. The following representative receptors have been identified based on a review of surrounding developments:

POR-1: Outdoor patio of Boston Pizza (3120 South Service Road)
POR-2: Ground floor windows - Boston Pizza (3120 South Service Road)
POR-3: Outdoor patio of Cherry House restaurant (3106 South Service Road)
POR-4: Ground floor windows - Cherry House restaurant (3106 South Service Road)
POR-5: Upper storey windows (9th/10th floor) - TransUnion office building (3095 Harvester Road)
POR-6: Upper storey windows (6th floor) - Holiday Inn hotel (3063 South Service Road)

These receptors represent the closest and most exposed locations to the proposed stationary noise sources, including rooftop mechanical equipment, generators, and transformers.

6.0 Noise Impact Assessment

6.1 Transportation Noise Assessment

Transportation noise impacts on the proposed development are primarily influenced by traffic along the Queen Elizabeth Way (QEW) / Highway 403 corridor, located immediately north of the site.

Traffic data for the QEW was obtained from the Ministry of Transportation Ontario (MTO) and used to establish both existing and future traffic conditions. Future traffic volumes were projected to a horizon year of 2036 using an assumed annual growth rate of 2.5%. A summary of the traffic data used in this assessment is provided in Table 6.

Table 6.1: Summary of Road Traffic Data for QEW / Highway 403

Parameter	Value
Number of Lanes (Current & Future)	7 + 2 HOV Lanes
Posted Speed	100 km/h
AADT (Year 2019)	208,776 vehicles/day
Future AADT (2036)	317,677 vehicles/day
Annual Growth Rate	2.5%
Total Truck Percentage	10%
Medium Truck Split	4.7% to 5.8%
Heavy Truck Split	4.2% to 5.3%
Day/Night Split	83%-87% / 13%-17%
Directional Split	56% EB / 44% WB
Road Gradient	2.0%

Sound level predictions were carried out using accepted MECP methodologies (STAMSON/ ORNAMENT), accounting for traffic volumes, vehicle composition, roadway geometry, and distance attenuation. A sample STAMSON calculation for the north building façade (R-A) is provided in Appendix B, while the supporting traffic data is included in Appendix A.

The traffic data for South Service Road was not available from the City of Burlington at the time of this study. However, given the significantly higher traffic volumes associated with the QEW, sound levels from South Service Road are expected to be minor in comparison and do not influence the overall façade sound levels at the proposed building.

To supplement the traffic data and confirm ambient sound levels, sound level measurements conducted as part of a previous assessment were reviewed (illustrated in Figure 4). These measurements confirm that QEW traffic is the dominant source of environmental noise at the site.

6.2 Predicted Transportation Noise Levels

Based on the STAMSON calculations, transportation noise levels at the most exposed north façade of the proposed building are predicted to be approximately 79 dBA Leq (16 hr day) and 75 dBA Leq (8 hr night). These sound levels are considered high and reflect the close proximity of the site to the QEW/Highway 403 corridor.

As discussed in Section 3.0, an exterior sound level of 70 dBA at the plane of window is considered the threshold for achieving acceptable indoor conditions within office environments. The predicted façade sound levels therefore exceed this threshold and require mitigation through building design. These elevated transportation noise levels also contribute to the ambient sound environment, which governs the stationary noise assessment, as discussed in Section 3.3.

6.3 Indoor Noise Control Considerations

Based on a review of the architectural drawings, the main noise-sensitive spaces directly exposed to transportation noise are limited to the open space office, reception, and lobby/waiting areas located along the north façade of the building.

Other occupied spaces, including the conference/training room and staff lounge, are located internally and are not directly exposed to exterior glazing facing the QEW. As such, these spaces benefit from additional building shielding and do not govern façade design requirements.

Given the predicted daytime sound level of approximately 79 dBA Leq at the north façade, upgraded glazing will be required for the exposed office and reception areas to achieve acceptable indoor sound levels.

As a preliminary design recommendation, glazing along the north façade should achieve a minimum rating of STC 38 for general office and reception spaces. This is considered sufficient to reduce exterior sound levels to approximately 45 dBA indoors, consistent with acceptable acoustic conditions for office environments, assuming sealed glazing and mechanical ventilation/air conditioning.

Final window glazing STC requirements should be confirmed prior to Building Permit, based on the finalized glazing systems and exterior wall specifications as indicated on the architectural drawings, including consideration of window-to-wall ratios and manufacturer-specific performance data.

6.4 Off-Site Stationary Noise Impact on the Proposed Building

The off-site stationary noise sources in the surrounding area are primarily associated with rooftop HVAC equipment and kitchen exhaust systems serving nearby commercial and restaurant uses, including Boston Pizza and Cherry House Restaurant.

Based on a review of aerial imagery and previous assessments, the typical equipment associated with these facilities includes condensing units, make-up air units (MAUs), and kitchen exhaust fans. Sound emission levels were based on the SSWA internal database and representative manufacturer data for similar commercial rooftop HVAC systems, and are considered appropriate for this assessment.

The stationary noise assessment was carried out using CadnaA acoustic modeling software, incorporating the ISO 9613-2 propagation methodology, which accounts for distance attenuation, ground effects, and shielding from surrounding structures.

The evaluation of off-site stationary noise sources was completed at the representative receptor R-A, located at the plane of window of the north façade at ground-storey elevation. While the receptor is located on the north side, the majority of off-site stationary noise sources are positioned to the east and south of the proposed building and are partially shielded by intervening structures and building massing.

As shown in Figure 5, the predicted off-site stationary noise impact at R-A is approximately 42 dBA during the daytime and 41 dBA during the evening. These levels are significantly below the road traffic noise levels to the QEW, which is approximately 79 dBA during the daytime/evening lowest-hour condition. Accordingly, the contribution from off-site stationary noise sources is considered negligible relative to the dominant transportation noise environment.

The nighttime impacts from these sources have not been assessed, as the office areas of the proposed facility are not expected to operate during nighttime hours and nearby restaurant operations are also expected to be inactive during this period.

Based on the above, no mitigation measures are required for off-site stationary noise sources impacting the proposed building.

6.5 On-Site Stationary Noise Impact Assessment

6.5.1 General

The stationary noise sources associated with the proposed data centre have the potential to impact surrounding noise-sensitive receptors. The primary sources considered in this assessment include rooftop mechanical equipment (air-cooled chillers), transformers, and supporting electrical infrastructure. The emergency generator is addressed separately in Section 6.6 in accordance with MECP requirements.

6.5.2 Points of Reception

The external points of reception considered in this assessment are described in Section 5.0 and include:

- POR-1 to POR-4: Restaurant patios and ground floor windows (Boston Pizza and Cherry House Restaurant)
- POR-5: Upper storey windows of the TransUnion office building
- POR-6: Upper storey windows of the Holiday Inn hotel

With respect to applicable time periods, POR-1 to POR-4, which correspond to commercial and restaurant uses, are assessed during the daytime and evening periods only, while POR-5, representing office use, is assessed during the daytime period only. POR-6, associated with the hotel use, is considered a noise-sensitive receptor and is therefore assessed during the daytime, evening, and nighttime periods.

6.5.3 Ambient Sound Levels and Applicable Criteria

The ambient sound environment at the site is dominated by traffic noise from the QEW/Highway 403 corridor, as discussed in Section 3.0. Ambient sound levels at each point of reception were established using STAMSON-based predictions. Traffic data provided by the Ministry of Transportation Ontario (MTO) was used to predict sound levels at each receptor location, accounting for distance attenuation and relative exposure to the highway. Receptors with partial shielding or indirect exposure to the QEW were conservatively adjusted to reflect reduced sound levels based on their orientation and degree of exposure. As the points of reception have varying exposure to the QEW, the resulting minimum hourly ambient sound levels differ by location, and receptor-specific ambient criteria have been established for the stationary noise assessment. Table 6.5.3-1 summarizes the predicted and measured ambient sound levels and identifies the applicable criteria used for each receptor.

Table 6.5.3-1: 1-Hour Minimum Ambient Sound Levels and Applicable Criteria

Receptor	Predicted Minimum Leq-1-Hour Ambient	Measured Minimum Leq-1-Hour Ambient	Applicable Criteria Selected for Stationary Assessment
POR1	78 dBA (day) 76 dBA (eve)	76 dBA (day) 76 dBA (eve)	76 dBA (day) 76 dBA (eve)
POR2	74 dBA (day) 72 dBA (eve)	73 dBA (day) 73 dBA (eve)	73 dBA (day) 72 dBA (eve)
POR3	70 dBA (day) 68 dBA (eve)	70 dBA (day) 70 dBA (eve)	70 dBA (day) 68 dBA (eve)

POR4	70 dBA (day) 68 dBA (eve)	71 dBA (day) 71 dBA (eve)	70 dBA (day) 68 dBA (eve)
POR5	73 dBA (day) 71 dBA (eve)	72 dBA (day) 72 dBA (eve)	72 dBA (day) 71 dBA (eve)
POR6	73 dBA (day) 71 dBA (eve) 64 dBA (night)	72 dBA (day) 72 dBA (eve) 68 dBA (night)	72 dBA (day) 71 dBA (eve) 64 dBA (night)

For the purposes of the stationary noise assessment:

- POR-1 to POR-5 are assessed using the minimum hourly daytime/evening ambient sound levels, as these receptors are associated with commercial and office uses
- POR-6 (hotel) is assessed using the minimum hourly nighttime ambient sound level, as this represents the most sensitive period for this receptor

The resulting ambient sound levels, ranging from approximately 68 dBA to 76 dBA, are higher than the NPC-300 Class 1 exclusion limits and therefore govern the stationary noise assessment at all receptors. Accordingly, the predicted sound levels from on-site stationary sources are compared against these receptor-specific ambient criteria to determine compliance.

6.5.4 Sound Level Calculation Model

A three-dimensional acoustic model was developed using the CadnaA environmental noise prediction software, implementing the ISO 9613-2 propagation methodology for calculating sound levels from multiple sources to multiple receivers.

The model accounts for:

- Sound power levels and reference emission characteristics for each source
- Spatial coordinates (x, y, z) of all sources and receptors
- Equipment operating durations during each assessment period
- Geometric spreading (spherical divergence)
- Attenuation due to building structures and partial shielding
- Ground attenuation and elevation differences
- Atmospheric attenuation due to air absorption

All equipment was assumed to operate simultaneously to represent a predictable worst-case scenario. Detailed stationary noise calculations are provided in Appendix C.

6.5.5 Stationary Source Sound Level Summary

The main stationary noise sources associated with the proposed data centre include rooftop air-cooled chillers and ground-mounted transformers.

Sound emission data for the chillers were provided by the project proponent based on manufacturer information. Sound emission levels for the transformers were not available at the time of this study and have therefore been conservatively assumed based on data from comparable installations and previous projects.

All equipment has been modeled with continuous operation during daytime, evening, and nighttime periods. Table 6.5.5-1 summarizes the stationary source input data used in the acoustic model.

Table 6.5.5-1: Stationary Source Input Data Used in the Acoustic Model

Name	ID	Sound Power Level (dBA)	Day (min)	Eve (min)	Night (min)	Equipment Height (m)
CU-01	CU_01	92	60	60	60	2.5
CU-02	CU_02	92	60	60	60	2.5
CU-03	CU_03	92	60	60	60	2.5
CU-04	CU_04	92	60	60	60	2.5
CU-05	CU_05	92	60	60	60	2.5
CU-06	CU_06	92	60	60	60	2.5
CU-07	CU_07	92	60	60	60	2.5
CU-08	CU_08	92	60	60	60	2.5
CU-09	CU_09	92	60	60	60	2.5
CU-10	CU_10	92	60	60	60	2.5
CU-11	CU_11	92	60	60	60	2.5
CU-12	CU_12	92	60	60	60	2.5
Transformer 1	Transformer_1	80	60	60	60	2.5
Transformer 2	Transformer_2	80	60	60	60	2.5

6.5.6 Impact Assessment and Findings

Using the acoustic model and operating assumptions described in the sections above, sound levels from the proposed on-site stationary noise sources were calculated at each of the identified noise-sensitive points of reception (PORs).

The sound power levels of the stationary noise sources were reviewed to confirm that the predicted sound levels at the receptors remain within the applicable ambient-based criteria established in Section 6.5.3.

Table 6.5.6-1: 1-Hour Equivalent Sound Levels Due to On-Site Stationary Noise Sources

Receptor	Applicable Criteria Selected for Stationary Assessment	Predicted Stationary Noise Impact	Compliance with Applicable MECP Criteria
POR-1	76 dBA (day) 76 dBA (eve)	44 dBA (day) 44 dBA (eve)	Yes
POR-2	73 dBA (day) 72 dBA (eve)	45 dBA (day) 45 dBA (eve)	Yes
POR-3	70 dBA (day) 68 dBA (eve)	50 dBA (day) 50 dBA (eve)	Yes
POR-4	70 dBA (day) 68 dBA (eve)	46 dBA (day) 46 dBA (eve)	Yes
POR-5	72 dBA (day) 71 dBA (eve)	54 dBA (day) 54 dBA (eve)	Yes
POR-6	72 dBA (day) 71 dBA (eve) 64 dBA (night)	50 dBA (day) 50 dBA (eve) 50 dBA (night)	Yes

6.5.7 Discussion of Results

The predicted sound levels at all receptors are below the lowest hourly ambient sound levels, which are used as the applicable criteria at this site due to the proximity of the QEW.

The highest sound levels are predicted at POR-5 (TransUnion office), which has a relatively direct line-of-sight to rooftop mechanical equipment and reduced ground attenuation due to its elevation. Receptors located closer to the south side of the building (POR-3 and POR-4) are influenced by transformer locations, however, the effects of distance attenuation, building shielding, and elevated ambient sound levels result in compliant sound levels.

Figure 6 illustrates the predicted sound level contours across the site and at each receptor location. As shown, all points of reception comply with the applicable sound level criteria.

Based on the calculated sound levels and the assessment of the model results, the proposed development is expected to comply with the applicable MECP NPC-300 requirements, provided that the mechanical equipment sound emissions are consistent with the values assumed in this study.

6.5.8 Summary and Confirmation of Compliance

The proposed data centre is expected to comply with the applicable MECP NPC-300 requirements at all surrounding points of reception. No adverse stationary noise impacts are anticipated, and no mitigation measures are required at this stage of design.

Final equipment specifications, including transformers and any generator systems, should be confirmed prior to building permit, and the acoustic model updated as necessary to verify consistency with the assumptions in this report.

6.6 Emergency Generator Assessment

Emergency power equipment is assessed separately from other stationary noise sources in accordance with MECP guidelines. While generators are intended for use during emergency situations and are exempt from sound level limits during such events, routine maintenance and testing is considered a predictable noise source and is therefore subject to assessment.

Given the proximity of the site to the QEW/Highway 403 corridor, ambient sound levels are elevated at all receptors. As such, the MECP exclusion limits do not apply, and the lowest hourly ambient sound levels (as established in Section 6.5.3) are used as the applicable criteria for the assessment of generator testing.

The proposed emergency generator is located on the south side of the building, as shown on the site plan. In the absence of finalized equipment specifications, a conservative sound power level of 108 dBA has been assumed to represent a heavy-duty generator installation typical of data centre facilities. Generator testing is typically conducted once per month for approximately one hour during the daytime period, and this condition has been used as the basis for the assessment.

The generator noise impact was assessed at the nearest noise-sensitive points of reception. The predicted sound levels and compliance with the applicable ambient criteria are summarized in Table 6.6-1 below.

Table 6.6-1: Generator Noise Impact Assessment

Receptor	Applicable Criteria (Ambient Sound Level)	Predicted Generator Sound Level	Compliance
POR-3 (Cherry House Patio)	70 dBA (day)	55 dBA (day)	Yes
POR-4 (Cherry House Façade)	70 dBA (day)	53 dBA (day)	Yes
POR-5 (TransUnion Office)	72 dBA (day)	62 dBA (day)	Yes
POR-6 (Holiday Inn Hotel)	72 dBA (day)	58 dBA (dayt)	Yes

POR-1 and POR-2 are not affected by generator operations, as they are located on the north side of the building and are effectively shielded by the proposed structure. Generator-related sound levels at these locations are therefore considered negligible.

As shown in Figure 7, the predicted sound levels at all receptors remain below the applicable ambient sound levels. Based on the above, the generator noise during routine testing is expected to comply with MECP NPC-300 requirements, and no mitigation measures are required at this stage.

It should be noted that the generator sound power level has been conservatively assumed. Prior to building permit, the final generator specifications, quantity, and enclosure details should be confirmed, and the acoustic model updated as necessary to verify compliance with the applicable criteria.

7.0 Vibration Impact Assessment

7.1 Measurement

To assess the potential ground-borne vibration impacts on the proposed data centre facility, vibration measurements from a previous study conducted at this site were reviewed. The measurements were originally collected for a prior development on the subject lands and are considered representative of existing vibration conditions due to the proximity to the QEW/ Highway 403 corridor.

The measurements were conducted over a one-hour period during peak traffic conditions and captured multiple heavy truck pass-bys, which represent the dominant source of ground-borne vibration in the area.

7.2 Measurement easurement Equipment

The following instrumentation was used for the vibration measurements:

- Scantek Model PV-57A PCB (ICP) accelerometer
- Rion NA-28 Sound/Vibration Level and Frequency Real Time Analyzer (RTA)
- Brüel & Kjær Calibration Exciter Type 4294

The analyzer was configured to record vibration levels in 1/3 octave bands on a continuous basis, with particular focus on identifying the maximum vibration levels associated with individual truck pass-by events.

The measurement location is shown in Figure 3, and Figures 8 and 9 illustrate a typical field instrumentation setup and measurement configuration.

7.3 Assessment of Traffic-Induced Vibrations

The measured vibration data was reviewed to identify distinct heavy truck pass-by events, which represent the primary source of ground-borne vibration at the site. A total of nine representative truck pass-bys were identified and assessed.

The vibration levels were processed in 1/3 octave bands and expressed as acceleration levels (dB re: 10^{-6} g). The results for each pass-by event, along with the average response, are presented in Figure 10, where they are plotted against the applicable vibration criteria curves outlined in Section 4.0.

Based on the measured data, the following observations are made:

- The average vibration levels from truck pass-bys fall within the range of VC-A to VC-B across most of the frequency spectrum.
- Some individual pass-by events approach or locally exceed the VC-B curve, particularly within the mid-frequency range (approximately 50 to 160 Hz).
- At lower and higher frequencies, vibration levels remain consistently below the more stringent criteria ranges.

These results are considered representative of worst-case vibration conditions associated with heavy truck traffic along the adjacent QEW corridor.

7.4 Discussion of Results

As shown in Figure 10, the measured vibration levels generally fall within the VC-A to VC-B range across the frequency spectrum. These levels are considered typical for sites influenced by heavy truck traffic and are compatible with commercial and institutional land uses. For the proposed data centre facility, where the primary spaces include data halls, office areas, and control/monitoring rooms, the vibration environment is considered acceptable based on the VC-A criterion adopted in Section 4.0.

While some individual truck pass-by events approach the more stringent VC-B range, these events are short in duration and intermittent, and are not expected to adversely affect typical data centre equipment or operations.

There are no rail sources are present in the vicinity of the site, which are typically associated with higher levels of ground-borne vibration.

7.5 Summary and Conclusion

Based on the review of the measured vibration data, ground-borne vibration levels at the site are considered acceptable for the proposed data centre facility based on the VC-A criterion, which is commonly applied for data centre environments. Accordingly, no vibration mitigation measures are required at this stage.

It is noted that the final vibration performance requirements will ultimately depend on the specific equipment and manufacturer recommendations for the systems to be installed within the data halls. In the event that such equipment requires more stringent vibration criteria (e.g., VC-B or

VC-C), this assessment should be revisited prior to the Building Permit stage, once detailed equipment specifications become available, to confirm compliance and identify any additional mitigation measures, if necessary.

8.0 Summary and Recommendations

8.1 Summary of Conclusions

Based on the analysis conducted in this study, the following conclusions are made:

1. Transportation noise from the adjacent QEW/Highway 403 corridor is significant, with sound levels at the most exposed north façade of the building predicted to be approximately 79 dBA during daytime and 75 dBA during nighttime. Appropriate building façade design, including upgraded glazing and mechanical ventilation, will be required to achieve acceptable indoor sound levels within office and occupied spaces.
2. The stationary noise assessment, including on-site sources (rooftop chillers, transformers, generator) and off-site commercial sources, indicates that ambient sound levels from the QEW is higher than the applicable criteria. The predicted sound levels from all on-site stationary sources are below the applicable ambient sound levels at all surrounding points of reception. Accordingly, no adverse stationary noise impacts are anticipated, and no mitigation measures are required at this stage, provided that the equipment sound emissions are consistent with those assumed in this report.
3. Emergency generator operation is exempt from assessment during emergency conditions, however, routine testing was evaluated. Based on an assumed conservative sound power level, generator testing (typically limited to daytime periods) is expected to comply with applicable criteria, with no adverse impacts predicted.
4. Ground- round-borne vibration associated with traffic along the QEW was assessed using previously measured data for the site. Vibration levels are generally within the range of VC-A to VC-B, with VC-A adopted as the governing criterion for this study. Based on this assessment, vibration levels are considered acceptable for the proposed data centre facility, and no mitigation measures are required at this stage.

8.2 Recommendations

Based on the findings of this study, the following recommendations are provided:

1. The building should be designed with glazing capable of achieving a minimum STC 38 rating along the north façade to maintain acceptable indoor sound levels within office and occupied spaces. Final glazing and exterior wall specifications shall be confirmed prior to Building Permit based on the finalized architectural drawings, including window-to-wall ratios and manufacturer-specific performance data.
2. Prior to Building Permit, the final locations, quantities, and exact make and model of all mechanical and electrical equipment, including rooftop units, transformers, and generators, shall be confirmed.
3. The acoustic model should be updated, if necessary, to verify that sound emissions remain consistent with those assumed in this report and that compliance with applicable criteria is maintained.
4. While vibration levels based on the VC-A criterion are considered acceptable for data centre applications, it is recommended that the equipment manufacturer for the data hall be advised of this criterion and confirm its suitability for the proposed systems. Should the manufacturer require more stringent vibration criteria (e.g., VC-B or VC-C), the assessment shall be revisited and refined prior to Building Permit, once detailed equipment specifications are available, to confirm compliance and identify any necessary mitigation measures.

Based on the results of this study, the proposed data centre development is feasible from a noise and vibration perspective and is expected to comply with applicable MECP guidelines and City of Burlington requirements, subject to the recommendations outlined above.

FIGURES

Figure 1
Figure 1: Key Plan Showing Location of Subject Site

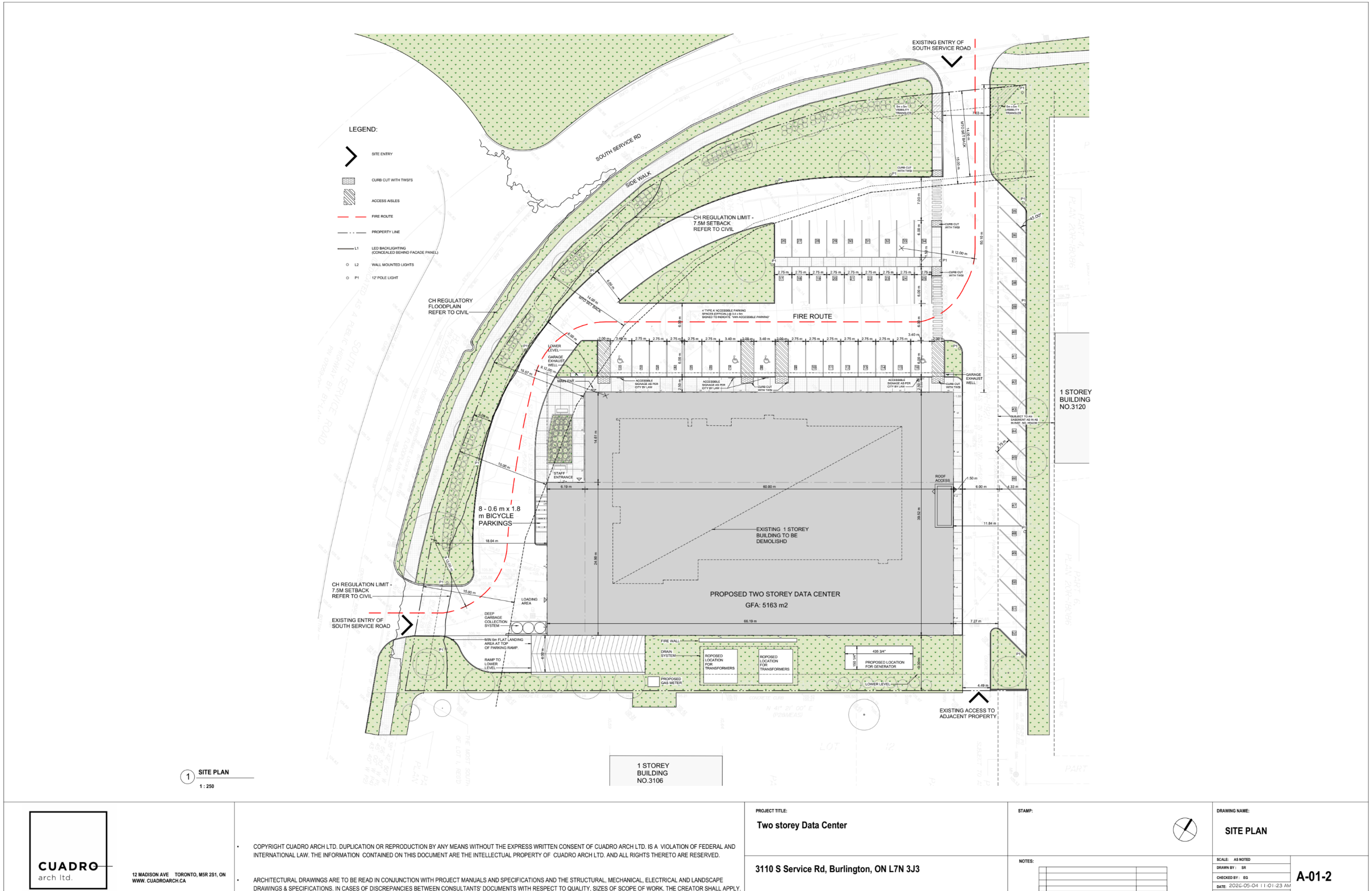

Figure 2: Site Plan Showing Proposed Building and Equipment Layout

Figure 3: Ambient Noise and Vibration Measurement Locations

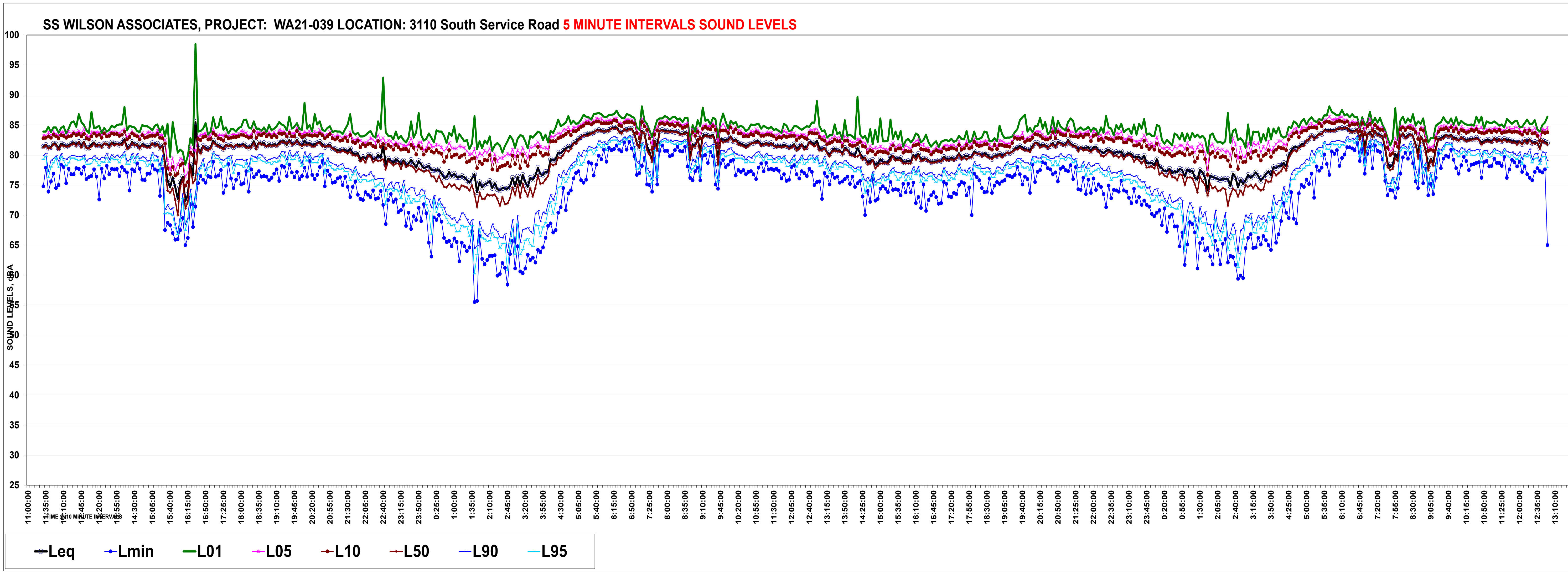

Figure 4: Sample Measured Transportation Noise Levels Along South Service Road (08/31/21-09/02/21)

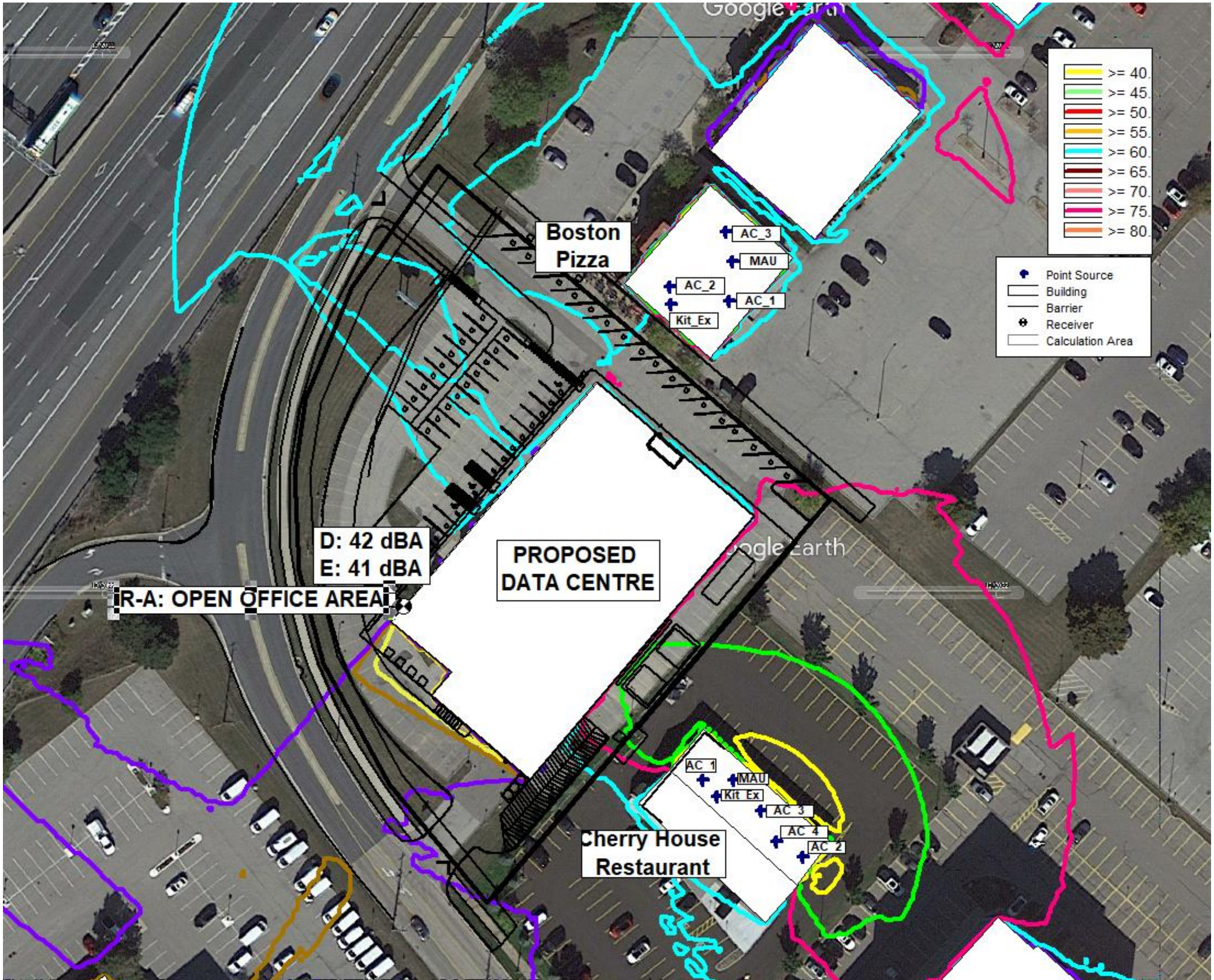

Figure 5: Predicted Daytime Sound Levels at Plane of Window Due to Off-Site Stationary Noise Sources

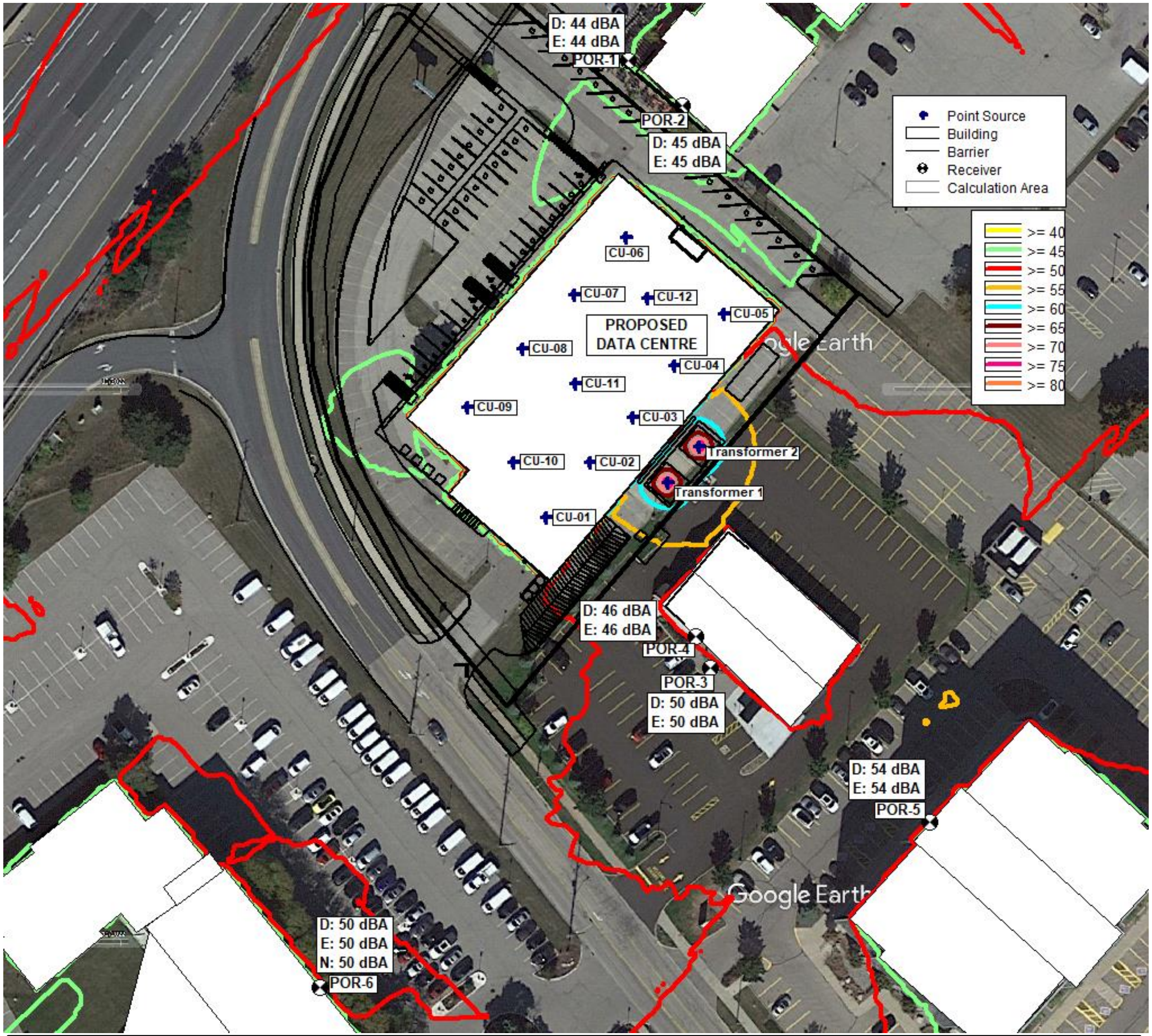

Figure 6: Predicted Daytime Sound Levels at Plane of Window Due to On-Site Stationary Noise Sources (Proposed Data Centre)

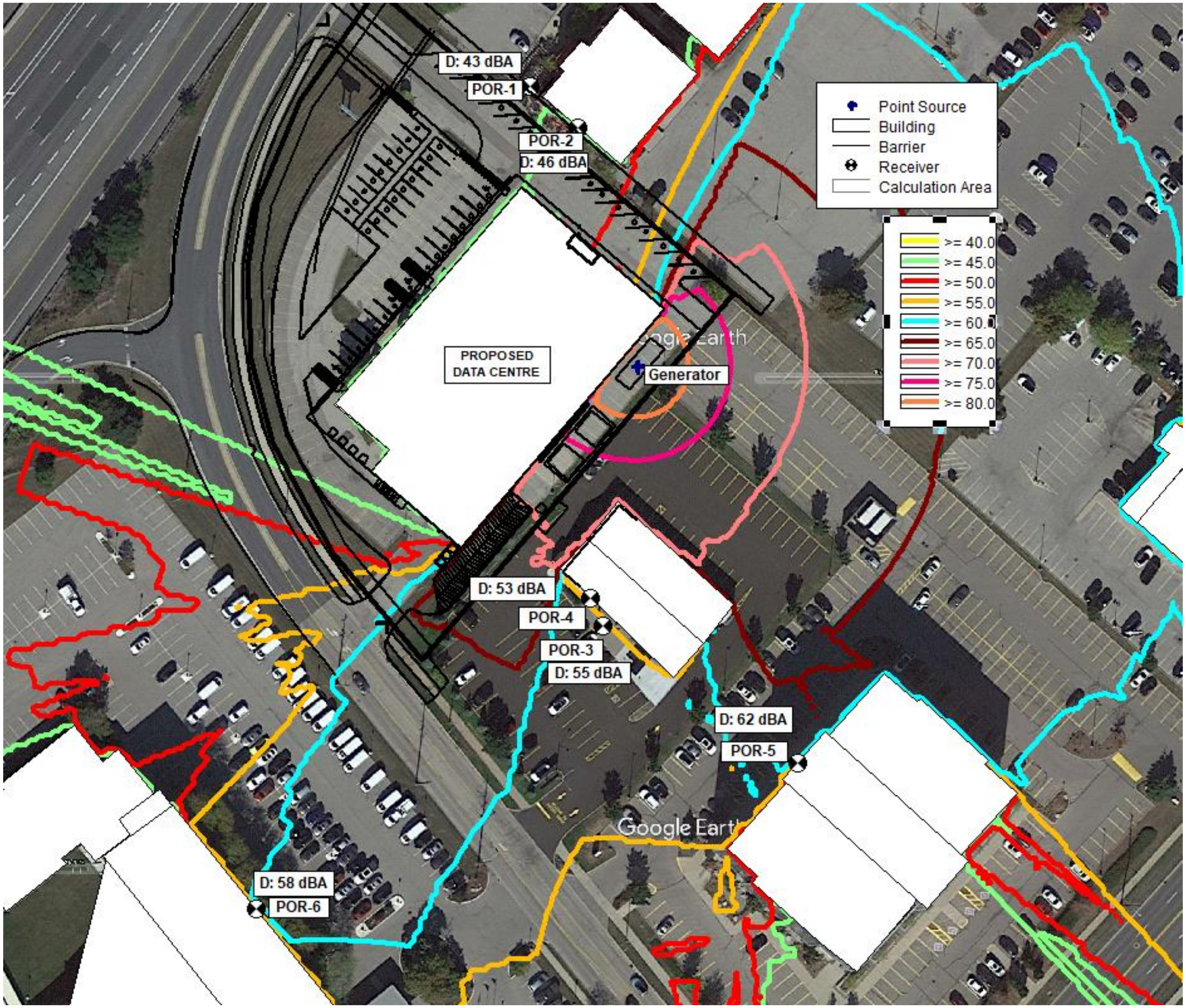

Figure 7: Predicted Daytime Sound Levels Due to Emergency Generator at Surrounding Points of Reception

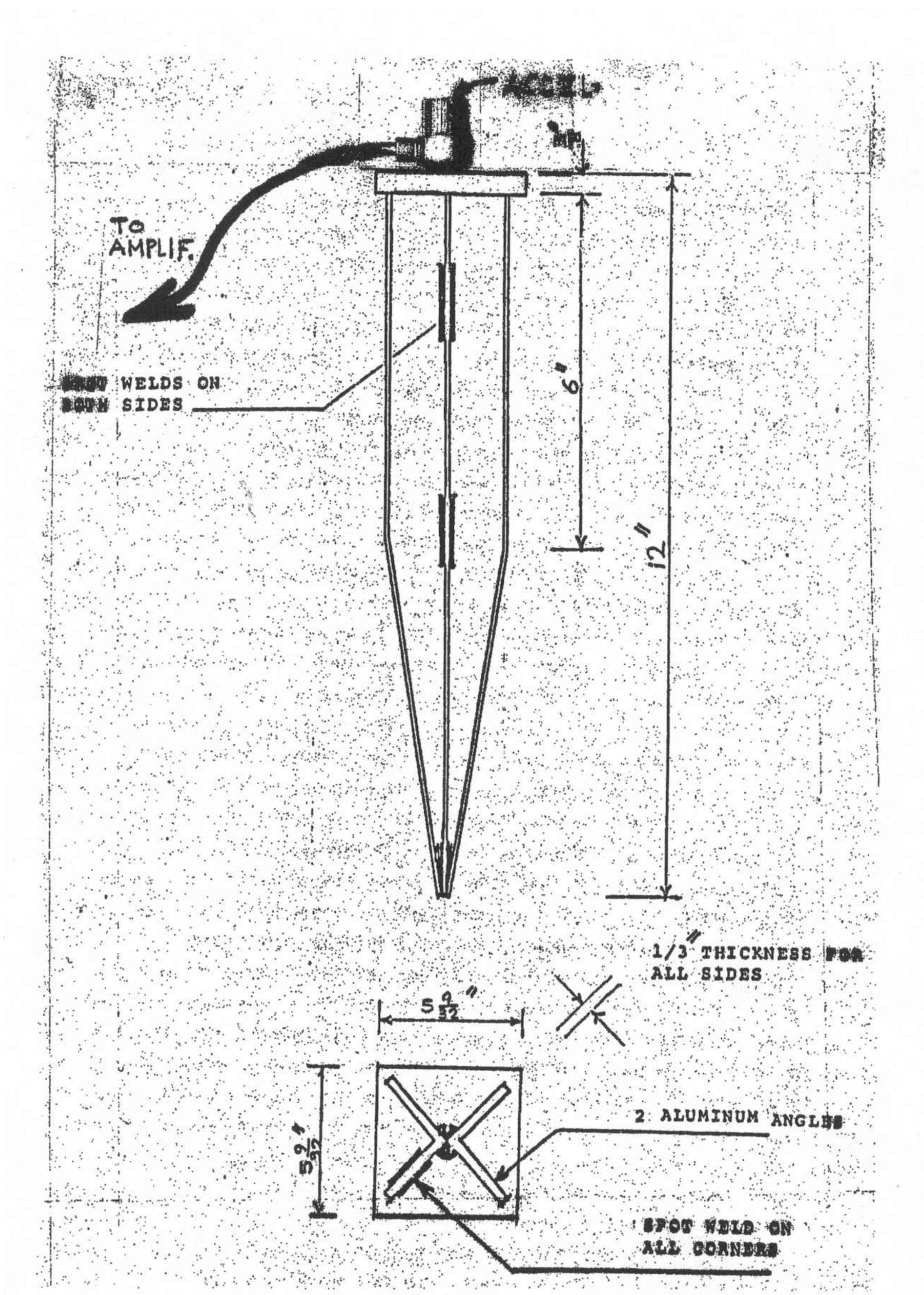

Figure 8: Ground Spike Installation for Vibration Measurement

Figure 9: Vibration Measurement Equipment Setup

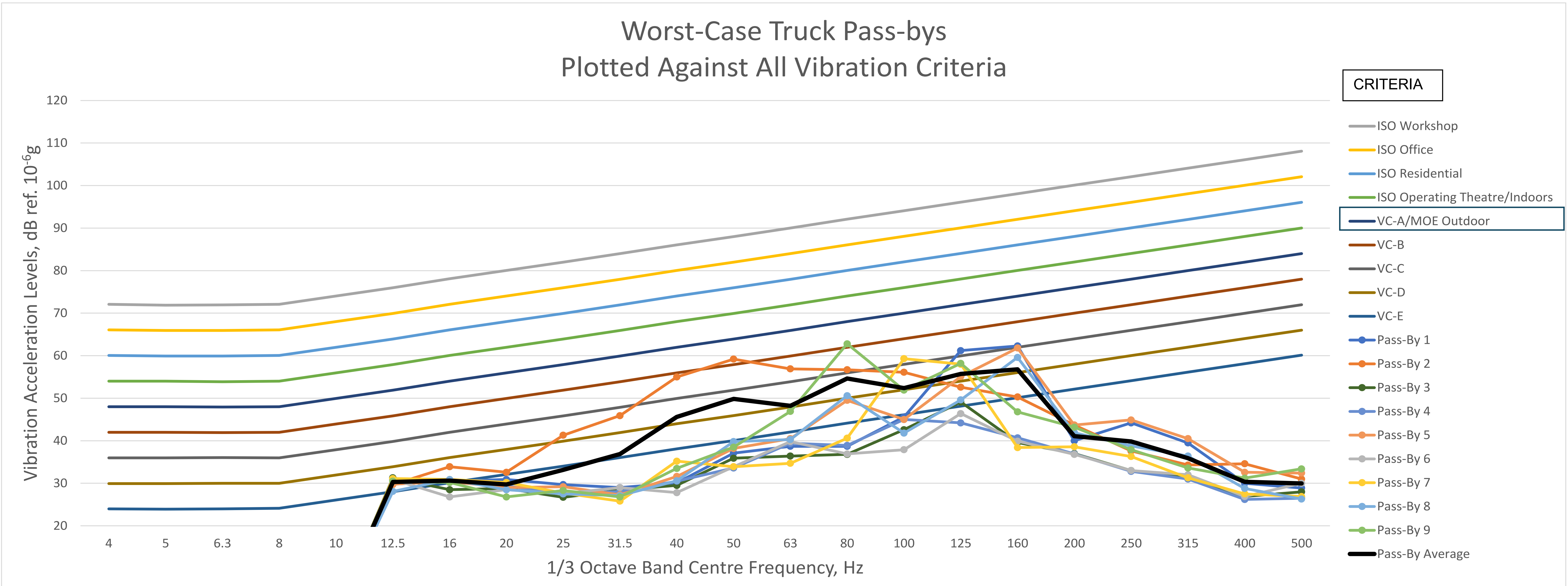

Figure 10: Measured Truck-Induced Vibration Levels Compared to VC Criteria Curves

APPENDIX A
ROAD TRAFFIC DATA

SS Wilson Associates

From: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Sent: Tuesday, August 31, 2021 7:52 PM
To: SS Wilson Associates
Cc: Terro, Eric (MTO); Bee, Christopher (MTO)
Subject: FW: Traffic Request - WA21-039
Attachments: 2021-08-30 Traffic Data Request - QEW.pdf; 1 day L by L class report Aug 14, 2019 (GPL) QEW-Guelph-Walker EB.xls; 1 day L by L class report Aug 14, 2019 (GPL) QEW-Guelph-Walker WB.xls; 1 day L by L class report Aug 14, 2019 (HOV) QEW-Guelph-Walker EB.xls; 1 day L by L class report Aug 14, 2019 (HOV) QEW-Guelph-Walker WB.xls; 7 day hourly report Aug 14-20, 2019 (GPL+HOV) QEW-Guelph- Walker EB.xls; 7 day hourly report-Aug14-20, 2019 (GPL+HOV) QEW-Guelph-Walker WB.xls

To Cheryl McMurter, SS Wilson Associates:

Further to your data request (attached), please find the following extractions:

For (1) **R.O.W. width**. (2) **Roadway Gradient**,(3) **Road Speed Limit,** please contact Raymond Ng, P.Eng. (raymond.ng@ontario.ca), Senior Project Engineer in the MTO
Highway Planning and Design Office, and he will direct you to the correct person for this QEW section.

For **number of lanes**, you can check on Google Maps, or MTO data shows QEW between Guelph Line and Walker's Line, WB: 3Ls (GPL) (General Purpose Lanes) 1L HOV; EB : 4Ls (GPL) , 1L HOV.

For **AADT, directional split %**, **truck %,** please see table here:

year	QEW/ Guelph Line AADT (2 w)	QEW/ Guelph Line directional split %	QEW/ Guelph Line truck %	QEW/Walker's Line AADT (2 w)	QEW/Walker's Line directional split %	QEW/Walker's Line truck %
2010	169000	57 % (towards Toronto)	10%	184800	51% (towards Toronto)	10%
2011	170000	57	10	189500	51	10
2012	171000	57	10	185000	51	10
2013	170000	57	10	172000	51	10
2014	175000	57	10	185000	51	10
2015	193000	57	10	188000	51	10
2016	195000	57	10	190000	51	10

above data is official MTO data to 2016 only.
You can plot the above data on a graph over time, and draw the best straight line through the data points and extend the straight line to 2019 to estimate data for 2019.
2020 and 2021 data is unreliable because of COVID.
" truck %" includes long large trucks, short medium trucks, buses, vans, cars with trailer, and specials, but NOT REGULAR CARS. There is no further breakdown from this data.

For breakdown of **medium truck % and heavy truck%,** please see the attached 4 files that give detailed one day (Wed, Aug 14, 2019) lane by lane classification data. The files are self explanatory with details at the header of the reports, with corresponding filenames:

--1 day L by L class report Aug 14, 2019 (GPL) QEW-Guelph-Walker WB
--1 day L by L class report Aug 14, 2019 (HOV) QEW-Guelph-Walker WB
--1 day L by L class report Aug 14, 2019 (GPL) QEW-Guelph-Walker EB
--1 day L by L class report Aug 14, 2019 (HOV) QEW-Guelph-Walker EB

Please ignore the confidence level % in the reports.

If there are gaps in the hourly data above for classification breakdown of modes, please interpolate data between the hours where there is data.

For **weekly hourly volume** (7 days in Aug 2019), from which you can calculate **% day% night splits,** you can check the following attached files, everything is self explanatory, with filenames**:**

--7 day hourly report Aug 14-20, 2019 (GPL+HOV) QEW-Guelph -Walker WB
--7 day hourly report Aug 14-20, 2019 (GPL+HOV) QEW-Guelph -Walker EB

Please ignore the confidence level % in the reports.

Let me know if you have any questions.
Regards.

Christopher Bee
MTO CR Traffic Office, TIMD
STIRCS (Safety Traffic Information and Roadwork Coordination Section)

N10 Hourly Traffic Data Adjustment-March 2010 **SS WILSON ASSOCIATES** **Proceed**

HOURLY TRAFFIC DATA AND RESULTING SOUND LEVEL ADJUSTMENTS

TABLE

April 30, 2026

File Number : WA26-006

Project Name : Data Center - Receptor R-A

Description : 3110 South Service Road, Burlington

Description : R-A

Description : EASTBOUND HOURLY ADJUSTMENT

Daytime Volume **88,939** in 16 Hours

Night Time Volume **18,531** in 8 Hours

Averge Day-Night Hours 5,559 & 2316

PREDICTED Leq 24 78.00 dBA

If the actual traffic count is ZERO (0) enter as 0.001 , otherwise if there is no count leave as ZERO (0), i.e blank

Lane Direction (EB, NB,..) and Date	Wednesday, Aug 14 2019	Thursday Aug 15, 2019	Friday, Aug 16, 2019	Saturday, Aug 17, 2019	Sunday, Aug 18, 2019	Monday, Aug 19, 2019	Tuesday, Aug 20, 2019	. . . .	. . . .	No. of Hours Used	Total Hourly Volumes	Average 24 Hour Volumes	% OF Given Hours	Leq 1hr LESS Leq 24 hrs, dB
00:00-01:00	1,213	1,160	1,325	1,778	3,037	1,301	1,155			7	10,969	1,567	1.5	-4.6
01:00-02:00	739	837	859	1,170	1,824	748	726			7	6,903	986	0.9	-6.6
02:00-03:00	602	660	751	855	1,104	663	608			7	5,243	749	0.7	-7.8
03:00-04:00	747	764	833	719	788	710	758			7	5,319	760	0.7	-7.7
04:00-05:00	1,895	1,943	1,948	939	739	1,843	1,925			7	11,232	1,605	1.5	-4.5
05:00-06:00	6,083	5,944	5,771	1,934	1,100	6,159	6,112			7	33,103	4,729	4.4	0.2
06:00-07:00	7,208	7,063	6,847	2,433	1,479	7,170	7,321			7	39,521	5,646	5.3	1.0
07:00-08:00	7,103	7,000	6,970	3,075	1,783	7,146	7,169			7	40,246	5,749	5.3	1.1
08:00-09:00	6,528	6,077	5,051	3,972	2,736	6,509	6,301			7	37,174	5,311	4.9	0.7
09:00-10:00	5,986	5,961	5,848	4,935	4,038	6,173	6,146			7	39,087	5,584	5.2	1.0
10:00-11:00	6,222	6,374	5,985	6,066	5,425	5,891	6,051			7	42,014	6,002	5.6	1.3
11:00-12:00	5,886	5,896	6,074	6,446	6,038	6,049	5,435			7	41,824	5,975	5.6	1.3
12:00-13:00	5,668	5,437	6,268	6,573	6,587	5,806	6,283			7	42,622	6,089	5.7	1.3
13:00-14:00	5,588	6,050	6,241	6,378	5,380	6,047	6,119			7	41,803	5,972	5.6	1.3
14:00-15:00	6,221	6,087	6,347	6,498	6,670	6,187	6,001			7	44,011	6,287	5.9	1.5
15:00-16:00	6,078	5,996	6,053	6,641	6,781	6,022	4,797			7	42,368	6,053	5.6	1.3
16:00-17:00	6,294	6,235	5,821	6,578	6,635	6,205	5,445			7	43,213	6,173	5.7	1.4
17:00-18:00	5,754	6,116	5,450	6,701	6,483	5,153	5,812			7	41,469	5,924	5.5	1.2
18:00-19:00	6,183	6,032	5,998	6,399	6,518	5,537	5,908			7	42,575	6,082	5.7	1.3
19:00-20:00	4,207	4,914	5,540	5,667	6,288	4,661	4,864			7	36,141	5,163	4.8	0.6
20:00-21:00	4,543	4,790	4,847	5,383	5,879	4,472	4,537			7	34,451	4,922	4.6	0.4
21:00-22:00	4,395	4,299	3,979	4,987	5,227	3,921	4,061			7	30,869	4,410	4.1	-0.1
22:00-23:00	2,912	3,352	3,113	4,105	3,721	2,656	2,848			7	22,707	3,244	3.0	-1.4
23:00-24:00	2,112	2,291	2,830	3,850	2,423	1,917	2,007			7	17,430	2,490	2.3	-2.5
TOTALS	**110,167**	**111,278**	**110,749**	**104,082**	**98,683**	**108,946**	**108,389**	**0**	**0**	168	752,294	107,471	100	
Number of Survey Hours/Day	24	24	24	24	24	24	24	0	0					
Average Hourly Volume/Day	4,590	4,637	4,615	4,337	4,112	4,539	4,516	0	0		Overall Average	**4,478**		

N10 Hourly Traffic Data Adjustment-March 2010 **SS WILSON ASSOCIATES** **Proceed**

HOURLY TRAFFIC DATA AND RESULTING SOUND LEVEL ADJUSTMENTS

April 26, 2026 **TABLE**

File Number : WA26-006
Project Name : Data Center - R-A
Description : 3110 South Service Road, Burlington
Description :
Description : WESTBOUND HOURLY ADJUSTMENT

Daytime Volume **85,733** in 16 Hours
Night Time Volume **13,312** in 8 Hours
Averge Day-Night Hours 5,358 & 1664

PREDICTED Leq 24 78.00 dBA

If the actual traffic count is ZERO (0) enter as 0.001 , otherwise if there is no count leave as ZERO (0), i.e blank

Lane Direction (EB, NB,..) and Date	Wednesday, Aug 14 2019	Thursday Aug 15, 2019	Friday, Aug 16, 2019	Saturday, Aug 17, 2019	Sunday, Aug 18, 2019	Monday, Aug 19, 2019	Tuesday, Aug 20, 2019	. . . .	. . .	No. of Hours Used	Total Hourly Volumes	Average 24 Hour Volumes	% OF Given Hours	Leq 1hr LESS Leq 24 hrs, dB
00:00-01:00	1,737	1,916	1,830	2,385	2,965	1,944	2,053			7	14,830	2,119	2.1	-2.9
01:00-02:00	920	963	1,099	1,354	1,853	790	936			7	7,915	1,131	1.1	-5.6
02:00-03:00	680	663	1,009	898	1,063	548	639			7	5,500	786	0.8	-7.2
03:00-04:00	662	715	678	719	682	524	904			7	4,884	698	0.7	-7.7
04:00-05:00	1,086	1,118	821	593	582	793	802			7	5,795	828	0.8	-7.0
05:00-06:00	1,755	1,672	1,702	1,001	701	1,754	1,632			7	10,217	1,460	1.5	-4.5
06:00-07:00	4,149	3,943	3,998	1,984	1,307	4,138	4,128			7	23,647	3,378	3.4	-0.9
07:00-08:00	6,124	6,110	5,690	3,000	2,023	6,043	5,966			7	34,956	4,994	5.0	0.8
08:00-09:00	6,199	6,201	5,824	4,247	3,190	5,894	6,059			7	37,614	5,373	5.4	1.1
09:00-10:00	6,004	6,047	5,986	6,026	4,938	5,719	5,440			7	40,160	5,737	5.8	1.4
10:00-11:00	6,421	6,441	6,525	7,034	6,576	6,258	6,138			7	45,393	6,485	6.5	2.0
11:00-12:00	6,086	6,345	6,364	6,169	5,803	6,275	5,866			7	42,908	6,130	6.2	1.7
12:00-13:00	6,295	6,173	6,242	5,438	5,225	5,580	5,874			7	40,827	5,832	5.9	1.5
13:00-14:00	6,241	6,106	6,141	5,108	5,165	5,877	5,695			7	40,333	5,762	5.8	1.4
14:00-15:00	6,159	5,659	6,061	5,661	5,563	5,431	5,983			7	40,517	5,788	5.8	1.5
15:00-16:00	5,498	5,480	4,883	6,309	6,393	5,050	5,668			7	39,281	5,612	5.7	1.3
16:00-17:00	4,417	4,889	3,861	6,381	6,192	4,535	4,351			7	34,626	4,947	5.0	0.8
17:00-18:00	4,063	4,530	2,818	6,343	5,886	4,290	4,506			7	32,436	4,634	4.7	0.5
18:00-19:00	5,441	6,017	4,894	5,423	5,424	5,869	5,985			7	39,053	5,579	5.6	1.3
19:00-20:00	5,671	6,267	6,017	5,012	5,087	6,000	6,256			7	40,310	5,759	5.8	1.4
20:00-21:00	5,366	5,482	5,464	3,816	5,014	4,888	5,085			7	35,115	5,016	5.1	0.8
21:00-22:00	4,686	4,651	4,711	4,839	4,392	3,883	4,225			7	31,387	4,484	4.5	0.4
22:00-23:00	3,717	3,631	4,217	3,872	3,326	3,084	3,366			7	25,213	3,602	3.6	-0.6
23:00-24:00	3,082	2,691	3,469	3,310	2,495	2,512	2,839			7	20,398	2,914	2.9	-1.5
TOTALS	**102,459**	**103,710**	**100,304**	**96,922**	**91,845**	**97,679**	**100,396**	**0**	**0**	168	693,315	99,045	100	
Number of Survey Hours/Day	24	24	24	24	24	24	24	0	0					
Average Hourly Volume/Day	4,269	4,321	4,179	4,038	3,827	4,070	4,183	0	0		Overall Average	4,127		

APPENDIX B

SAMPLE STAMSON TRANSPORTATION NOISE CALCULATION

SS WILSON ASSOCIATES - TRAFFIC NOISE PREDICTION MODEL

Consulting Engineers, Richmond Hill, Ontario. *V8 December 4, 2018*

Data Centre Facility

3110 South Service Road - Future 2036 Predicted

Source(s) of Road Traffic Noise: **Hwy 403/QEW/S. Service Rd.**

Receptor Name: **RA - North Side Building Façade**

SSWA Project Number WA26-006

Record Number	*1*	*2*	*3*	*4*
Include the following Segments in the calculations? (0 or 1)	1 Yes	1 Yes	1 Yes	1 Yes
Road Name & Direction	QEW WB	QEW WB	QEW EB	QEW EB
Segment Detail	Lanes	HOV	Lanes	HOV
Section/Segment Number	S1	S2	S2	S2
MOE Topographic Case (1-11)-See Instructions	1	1	1	1
	Topography 1	Topography 1	Topography 1	Topography 1
	S and R on flat ground	S and R on flat ground	S and R on flat ground	S and R on flat ground
Traffic Data Input Method	24 hour Data	24 hour Data	24 hour Data	24 hour Data
Alpha (α) Input; Manual or Auto?	Automatic	Automatic	Automatic	Automatic
Notes on your choice of α	As per MOE Procedures	As per MOE Procedures	As per MOE Procedures	As per MOE Procedures
Manual Alpha				
Intermediate Surface; Absorptive or Reflective	Reflective	Reflective	Reflective	Reflective
Pavement Type	Asphalt-Concret	Asphalt-Concret	Asphalt-Concret	Asphalt-Concret
Include Effect of Dense Woods?	No	No	No	No
Measured Angle Case Number	1	1	1	1
Angle description	-θ1 Left & +θ2 Right	-θ1 Left & +θ2 Right	-θ1 Left & +θ2 Right	-θ1 Left & +θ2 Right
Angle Theta 1	-90	-90	-90	-90
Angle Theta 2	90	90	90	90
Angle Theta Error Detection Flag				
Subtended Angle (Angle of Exposure), °	180	180	180	180
% increase / year	2.50%	2.50%	2.50%	2.50%
Number of years	17	17	17	17
24 Hour Traffic Data	74673	17251	98352	18500
Medium Truck %	5.40%	5.00%	5.80%	4.70%
Heavy Truck %	4.60%	5.00%	4.20%	5.30%
Daytime Traffic Split	87.00%	87.00%	83.00%	83.00%
Daytime Hours	16	16	16	16
Posted Speed (Km/Hr) [S]	100	100	100	100
Road Gradient (%) [Gradient]	2.00%	2.00%	2.00%	2.00%
Wood Depth (m)	0	0	0	0
Number of Rows of Houses	0	0	0	0
Night time Number of Rows of Houses	0	0	0	0
Percentage of Row Occupied by Houses	80%	80%	80%	80%
Height of Row of House [HH]	7	7	7	7
Receiver Height (m) [RH]	12	12	12	12
Night time Reciever Height (m) [NRH]	12	12	12	12
Source-Receiver Distance [SRD]	120.5	112.5	89	99.5
Night time Source-Receiver Distance [NSRD]	120.5	112.5	89	99.5
Barrier Height (m) [BH]	0	0	0	0
Barrier-Receiver Distance (m)	12	12	12	12
Ground Elevation Difference (m) [e]	0	0	0	0
Source Ground Elevation (m)	0	0	0	0
Receiver Ground Elevation (m)	0	0	0	0
Barrier Ground Elevation (m)	0	0	0	0
Source Height Input [Manual or Auto]	Automatic	Automatic	Automatic	Automatic
Manual Source Height (m) [MSH]				
Dominant Octave Frequency Band (Hz) [F]	500	500	500	500
Additionl dBA Correction Factor 1- Specify	0	0	0	0
Additionl dBA Correction Factor 2- Specify	0	0	0	0
RESULTS FOR SEGMENTS				
24 Hour Daily Segment Leq	**72.89**	**66.94**	**75.28**	**67.86**
Day Time [16 hours] Segment Leq	**74.05**	**68.10**	**76.24**	**68.82**
Night Time [8 hours] Segment Leq	**68.80**	**62.85**	**72.36**	**64.94**

FINAL/OVERALL	**24 Hour Daily Leq**	**Day Time Leq**	**Night Time Leq**
	78	**79**	**75**

APPENDIX C

SAMPLE STATIONARY NOISE CALCULATION

POR-2 - Daytime Sample Calc

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (m)	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (m)	1000.00
Min. Length of Section (m)	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°C)	10
rel. Humidity (%)	70
Ground Absorption G	0.00
Wind Speed for Dir. (m/s)	3.0
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver
Name: POR-2
ID: POR_2
X: 17597288.56
Y: 4800882.94
Z: 2.50

Point Source, ISO 9613, Name: "CU-06", ID: "CU_06"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
9	17597277.98	4800858.49	14.50	0	DEN	A	92.2	0.0	0.0	0.0	40.3	0.3	-3.0	0.0	0.0	14.8	0.0	0.0	39.7

Point Source, ISO 9613, Name: "CU-12", ID: "CU_12"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
16	17597281.93	4800847.19	14.50	0	DEN	A	92.2	0.0	0.0	0.0	42.7	0.4	-3.0	0.0	0.0	17.1	0.0	0.0	35.0

Point Source, ISO 9613, Name: "CU-05", ID: "CU_05"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
22	17597296.27	4800844.16	14.50	0	DEN	A	92.2	0.0	0.0	0.0	43.3	0.4	-3.0	0.0	0.0	12.7	0.0	0.0	38.8

Point Source, ISO 9613, Name: "CU-07", ID: "CU_07"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
25	17597268.37	4800847.83	14.50	0	DEN	A	92.2	0.0	0.0	0.0	43.5	0.4	-3.0	0.0	0.0	18.5	0.0	0.0	32.8

Point Source, ISO 9613, Name: "CU-04", ID: "CU_04"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
29	17597286.96	4800834.42	14.50	0	DEN	A	92.2	0.0	0.0	0.0	45.0	0.5	-3.0	0.0	0.0	17.9	0.0	0.0	31.8

Point Source, ISO 9613, Name: "CU-08", ID: "CU_08"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
35	17597258.66	4800837.70	14.50	0	DEN	A	92.2	0.0	0.0	0.0	45.9	0.6	-3.0	0.0	0.0	19.0	0.0	0.0	29.7

Point Source, ISO 9613, Name: "CU-11", ID: "CU_11"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
42	17597268.53	4800831.06	14.50	0	DEN	A	92.2	0.0	0.0	0.0	46.1	0.6	-3.0	0.0	0.0	19.2	0.0	0.0	29.3

Point Source, ISO 9613, Name: "CU-03", ID: "CU_03"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
46	17597279.28	4800824.83	14.50	0	DEN	A	92.2	0.0	0.0	0.0	46.6	0.6	-3.0	0.0	0.0	18.9	0.0	0.0	29.1

Point Source, ISO 9613, Name: "CU-02", ID: "CU_02"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
51	17597271.21	4800816.43	14.50	0	DEN	A	92.2	0.0	0.0	0.0	47.9	0.7	-3.0	0.0	0.0	19.4	0.0	0.0	27.2

Point Source, ISO 9613, Name: "CU-09", ID: "CU_09"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
57	17597248.36	4800826.67	14.50	0	DEN	A	92.2	0.0	0.0	0.0	47.9	0.7	-3.0	0.0	0.0	19.0	0.0	0.0	27.6

Point Source, ISO 9613, Name: "CU-10", ID: "CU_10"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
61	17597257.03	4800816.52	14.50	0	DEN	A	92.2	0.0	0.0	0.0	48.4	0.7	-3.0	0.0	0.0	19.5	0.0	0.0	26.5

POR-2 - Daytime Sample Calc

Point Source, ISO 9613, Name: "CU-01", ID: "CU_01"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
71	17597263.04	4800806.16	14.50	0	DEN	A	92.2	0.0	0.0	0.0	49.3	0.8	-3.0	0.0	0.0	19.5	0.0	0.0	25.7
87	17597263.04	4800806.16	14.50	1	DEN	A	92.2	0.0	0.0	0.0	58.2	1.8	-3.0	0.0	0.0	0.0	0.0	2.0	33.2

Point Source, ISO 9613, Name: "Transformer 2", ID: "Transformer_2"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
95	17597291.74	4800819.47	2.50	0	DEN	A	80.1	0.0	0.0	0.0	47.1	0.3	-3.0	0.0	0.0	20.7	0.0	0.0	15.0
98	17597291.74	4800819.47	2.50	2	DEN	A	80.1	0.0	0.0	0.0	57.9	0.9	-4.0	0.0	0.0	4.8	0.0	8.5	12.0

Point Source, ISO 9613, Name: "Transformer 1", ID: "Transformer_1"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
101	17597285.74	4800812.59	2.50	0	DEN	A	80.1	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	21.2	0.0	0.0	13.6
104	17597285.74	4800812.59	2.50	2	DEN	A	80.1	0.0	0.0	0.0	57.7	0.9	-3.9	0.0	0.0	4.9	0.0	5.7	14.9