

ENVIRONMENTAL NOISE REPORT

PROPOSED OFFICE BUILDING RE-DEVELOPMENT
49 HIGH STREET
CITY OF BARRIE



PREPARED FOR
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TABLE OF CONTENTS

	SUMMARY	1
1.0	INTRODUCTION	3
2.0	NOISE SOURCES	4
2.1	Transportation Sources	4
2.2	Stationary Sources	4
3.0	ENVIRONMENTAL NOISE AND VIBRATION CRITERIA	6
3.1	Transportation Sources (Noise)	6
3.1.1	Indoors.....	6
3.1.2	Outdoors	7
3.2	Stationary Sources	8
3.3	City of Barrie Noise Control By-law.....	9
4.0	NOISE IMPACT ASSESSMENT	10
4.1	Road Traffic.....	10
4.2	Stationary Sources	10
5.0	NOISE ABATEMENT MEASURES	13
5.1	Transportation Sources	13
5.1.1	Indoors.....	13
5.1.2	Outdoors	14
5.2	Stationary Sources	14
6.0	CONCLUSIONS.....	18
7.0	REFERENCES	19

LIST OF TABLES

TABLE 1	SUMMARY OF ROAD TRAFFIC DATA.....	20
TABLE 2	SUMMARY OF PREDICTED SOUND LEVELS OUTDOORS DUE TO ROAD TRAFFIC	21
TABLE 3	SUMMARY OF MINIMUM NOISE ABATEMENT MEASURES.....	22

LIST OF FIGURES

FIGURE 1	KEY PLAN
FIGURE 2	PLAN OF DEVELOPMENT SHOWING MINIMUM NOISE ABATEMENT MEASURES
FIGURE 3	IMPACT OF NOISE FROM THE PROPOSED DEVELOPMENT ON ITSELF AND THE SURROUNDING ENVIRONMENT - PLAN SHOWING ANALYZED SOURCES OF CONTINUOUS NOISE AND PREDICTED SOUND LEVELS WITHOUT MITIGATION MEASURES
FIGURE 4	IMPACT OF NOISE FROM THE SURROUNDING ENVIRONMENT ON THE PROPOSED DEVELOPMENT - PLAN SHOWING ANALYZED SOURCES OF CONTINUOUS NOISE AND PREDICTED SOUND LEVELS WITHOUT MITIGATION MEASURES
FIGURE 5	IMPACT OF NOISE FROM THE SURROUNDING ENVIRONMENT ON THE PROPOSED DEVELOPMENT - PLAN SHOWING ANALYZED SOURCES OF CONTINUOUS NOISE AND PREDICTED SOUND LEVELS WITH MITIGATION MEASURES

LIST OF APPENDICES

APPENDIX A	CORRESPONDENCE REGARDING ROAD TRAFFIC DATA.....	A-1
APPENDIX B	ENVIRONMENTAL NOISE CRITERIA	B-1
APPENDIX C	SAMPLE CALCULATION OF PREDICTED SOUND LEVELS	C-1
APPENDIX D	SAMPLE CALCULATION OF ARCHITECTURAL COMPONENT SELECTION	D-1
APPENDIX E	SAMPLE CALCULATION OF SOUND LEVELS DUE TO STATIONARY NOISE SOURCES - CADNAA	E-1

SUMMARY

The proposed office building re-development (an office building to be re-developed to a mixed-use residential building) is located on the north side of Dunlop Street West, east of High Street, in the City of Barrie and is subject to road noise from Dunlop Street West, Toronto Street, and Bradford Street. Additionally, potential noise from existing stationary noise source developments have been evaluated. The site is not affected by industrial, rail traffic or aircraft noise sources.

The environmental noise guidelines of the City of Barrie, County of Simcoe and the Ministry of the Environment, Conservation and Parks (previously, MOE) set out sound level limits for both indoor and outdoor space. Sound levels due to the adjacent roads were determined using ORNAMENT, the noise prediction model of the MOE for road traffic.

Using the road traffic data provided by the City of Barrie, the sound levels for various locations in the development were determined.

To address transportation noise, standard window/exterior door and exterior wall construction will be acoustically satisfactory for all proposed residential units. See Section 5.1.1 for details. Prior to issuance of building permits, the acoustical requirements should be reviewed to ensure compliance with the applicable guidelines. Prior to final occupancy, the residential units requiring mitigation should be inspected by an acoustical consultant to ensure the required mitigative measures have been incorporated.

At the time of preparation of this report, specific information regarding mechanical equipment including make and model selections associated with the proposed re-development is not known. The existing rooftop mechanical equipment and exhaust systems associated with the existing subject site building (an office building to be re-developed into a mixed-use residential building) are assumed to remain and have been investigated and assessed in a preliminary fashion. The existing mechanical systems associated with the existing subject site building are not anticipated to affect the feasibility of the proposed re-development. See Section 4.2 for further details. Once the detailed information on the proposed mechanical systems (if proposed by the proponent at a later stage) associated with the proposed re-development becomes available, the analysis should be updated to ensure the applicable sound level limits are met. Proposed mechanical equipment should comply with the sound level limits of the Ministry of the Environment, Conservation and Parks Publication NPC-300. It is expected that with appropriate mitigation measures in place, it is feasible to meet the applicable sound level limits at the existing and proposed noise sensitive receptors.

The proposed re-development was evaluated using the MOE noise criteria for stationary sources applicable to both a Class 1 area and a Class 4 area. Sound level limit compliance

from the stationary noise sources associated with the existing non-residential developments is predicted to achieve the Class 4 sound level limits at this proposed development with the addition of mitigation measures. Therefore, it is recommended that the proposed development be designated as a Class 4 area. See Sections 4.2 and 5.2 for details.

Currently, the proposed site is considered to be a Class 1 area; therefore, for the Class 4 designation to be used, the land use planning authority would need to approve the new classification based on the noise analysis and incorporate a Class 4 designation in a planning document, as determined by the City of Barrie. See Sections 4.2 and 5.2 for details.

Provision for the addition of central air conditioning is required for some residential units within the site. The proposed residential units within the building are expected to be centrally air conditioned, thereby satisfying these requirements. Additionally, since the use of the Class 4 designation is proposed to address the stationary noise sources associated with the existing non-residential developments (as discussed in the report) the installation of mandatory central air conditioning is required for all residential units within the subject site.

Where minor excesses exist or mitigation is required, future occupants will be advised through the use of warning clauses.

Purchasers/tenants of all residential units will be advised through a warning clause that the development is in proximity to commercial uses whose activities may at times be audible.

1.0 INTRODUCTION

Jade Acoustics Inc. was retained to prepare an Environmental Noise Report to investigate the potential impact of noise on the proposed office building re-development to the satisfaction of the City of Barrie and County of Simcoe.

Other aspects of the potential noise impact, including internal acoustics between residential units are not investigated in the report.

The proposed site is identified as:

49 High Street
City of Barrie
County of Simcoe

The proposed re-development is bounded by Dunlop Street West to the south, High Street to the west, existing mixed-use development to the east, and surface parking to the north. The surrounding uses are existing residential, mixed-use residential, and commercial uses. Note that the subject site building is physically connected to the mixed-use residential building (110 Dunlop Street West) to the east. A key plan is included in this report as Figure 1.

The subject site is currently a four-storey office building with ground-level commercial/retail space. The proposed re-development is to repurpose a portion of the ground floor as parking garages and storage space, convert the third and fourth floors into residential units, while the second floor will remain for office use and a portion of the ground floor will remain for commercial/retail use. The site plan with the top floor residential unit layout is attached as Figure 2.

The analysis is based on the following:

- Site visit conducted by Jade Acoustics Inc. staff on August 21, 2024;
- Site Plan, Architectural Plans and elevation drawings prepared by Khalsa Design Inc. dated May 30, 2024, received September 4, 2024;
- Information related to 110 Dunlop Street West, including HVAC drawings, architectural drawings, and electrical drawings obtained from the City of Barrie, provided by the proponent on October 23 and 31, 2024; and
- Road Traffic data provided by the City of Barrie on August 27, 2024.

The proposed development is shown on Figure 2.

2.0 NOISE SOURCES

2.1 Transportation Sources

The major transportation noise source of potential impact on the proposed re-development is the road traffic on Dunlop Street West, Toronto Street, and Bradford Street.

The road traffic data for all roadways to a horizon year of 2034 was calculated using the road traffic information provided by the City of Barrie noted in Section 1.0. The medium/heavy truck split and day/night split were assumed and accounted for in the analysis.

The traffic volume for High Street was expected to be low. It is considered to be acoustically insignificant at the subject site; therefore, it was not included in the analysis.

The road traffic information is summarized in Table 1 and correspondence regarding road traffic volumes is included in Appendix A.

The site is not affected by rail or aircraft traffic.

2.2 Stationary Sources

Impact of Noise from the Proposed Development on Itself and the Surrounding Environment

As mentioned in Section 1.0, commercial/retail and office uses are to remain on the Levels 1 and 2 of the subject site building. At the time of preparation of this report, the existing rooftop mechanical equipment and exhaust systems associated with these commercial/retail and office uses within the existing subject site building are assumed to remain and have been investigated and assessed in a preliminary fashion. The existing mechanical systems associated with the existing subject site building are not anticipated to affect the feasibility of the proposed re-development. Section 4.0 includes details of the noise assessment.

The mechanical sources of noise associated with the proposed re-development which may acoustically impact the adjacent residential developments and the subject site itself include but may not be limited to rooftop HVAC units, exhaust systems, and garage exhaust fans. Detailed information regarding mechanical equipment make and model selections associated with the proposed re-development is not known at this stage. These potential noise sources will be evaluated when information becomes available and through the building permit process.

Impact of Noise from the Surrounding Environment on the Proposed Development

The closest stationary sources are the rooftop mechanical equipment of the building at 110 Dunlop Street West, which is physically connected to the subject site building. According to information from the City of Barrie referenced in Section 1.0, this mixed-use building features commercial/retail spaces on the ground floor and residential units on the upper floors facing Dunlop Street West. The rooftop mechanical equipment associated with this mixed-use building was analyzed in this report based on information collected from the site visit and the information from the City of Barrie. Refer to Section 4.2 for details of the analysis. No rooftop visit on this mixed-use building was conducted in preparation of this report. At the time of the preparation of this report, the proponent of the proposed re-development made multiple attempts to contact the property owner(s) but received no response.

There are several existing non-residential properties in the vicinity of the proposed development. The closest non-residential properties of acoustical significance are the buildings physically connected to the mixed-use building at 110 Dunlop Street West, located on its east side. Although most tenants in these properties are currently vacant (except for the Auto Shoppe), the existing rooftop mechanical systems could impact the proposed noise-sensitive receptors once the spaces are occupied. Therefore, the existing rooftop mechanical systems associated with these properties have been analyzed in this report. See Section 4.2 for further details.

All other non-residential properties are situated such that the existing noise sensitive receptors are located at nearer or similar distance; therefore, with more significant exposure to the noise sources when compared with the proposed noise sensitive receptors. As the stationary noise sources must achieve compliance with the applicable sound level limits at these other noise sensitive receptor locations, it is expected that the sound levels will also be met at the subject site. No contact with these non-residential properties was made in preparation of this report.

The proposed site is not affected by industrial uses.

3.0 ENVIRONMENTAL NOISE CRITERIA

The environmental noise criteria used for residential developments in the City of Barrie, the County of Simcoe and the MOE environmental noise criteria are contained in Appendix B and summarized below.

The most recent environmental noise guidelines (NPC-300) of the Ontario Ministry of the Environment, Conservation and Parks (previously, MOE) titled “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning, Publication NPC-300”, dated August, 2013, released October 21, 2013 (updated final version # 22) were used for the analysis. A brief summary of the NPC-300 guidelines is given in Appendix B. The guidelines are also summarized below.

3.1 Transportation Sources (Noise)

3.1.1 Indoors

If the nighttime (11:00 p.m. to 7:00 a.m.) sound level in terms of Leq at the exterior face of a bedroom or living/dining room window is greater than 60 dBA and/or if the daytime (7:00 a.m. to 11:00 p.m.) sound level in terms of Leq at the exterior face of a bedroom or living/dining room window is greater than 65 dBA, means must be provided so that windows can be kept closed for noise control purposes and central air conditioning is required. For nighttime sound levels (LeqNight) greater than 50 dBA to less than or equal to 60 dBA on the exterior face of a bedroom or living/dining room window or daytime sound levels (LeqDay) greater than 55 dBA to less than or equal to 65 dBA on the exterior face of a bedroom or living/dining room window, there need only be the provision for adding central air conditioning by the occupant at a later date. This typically involves a ducted heating system sized to accommodate the addition of central air conditioning by the occupant at a later date. A warning clause advising the occupant of the potential interference with some activities is also required.

In all cases, air cooled condenser units must not exceed an AHRI sound rating of 7.6 bels. The air cooled condenser units must be sited in accordance with the zoning by-laws with respect to setbacks as well as location. The City of Barrie noise by-law also indicates that the installation is to be in accordance with the provisions of MOE Publication NPC-216. To note here for completeness, the subject site building is expected to be centrally air conditioned.

A warning clause advising the occupant of the potential interference with some activities is also required.

As required by the MOE, indoor noise criteria for road traffic noise is 40 dBA (Leq8hour) for the bedrooms during nighttime hours, 45 dBA (Leq8hour) for living/dining rooms during nighttime hours and 45 dBA (Leq16hour) for the living/dining rooms and bedrooms during daytime hours.

These criteria are used to determine the architectural requirements.

3.1.2 Outdoors

For the outdoor amenity areas (Outdoor Living Area – OLA), a design goal of 55 dBA for the daytime period between 7:00 a.m. to 11:00 p.m. is used for road traffic. In some cases an excess not exceeding 5 dBA is considered acceptable. Where the unmitigated sound levels during the day exceed 55 dBA (Leq16hour, daytime) but are equal to or less than 60 dBA (Leq16hour, daytime), a warning clause is required and mitigation should be considered. Where the unmitigated sound levels exceed 60 dBA, mitigation measures and a warning clause are required.

The definition of outdoor amenity area as defined by the MOE is given below.

"Outdoor Living Area (OLA)

(applies to impact assessments of transportation sources) means that part of a noise sensitive land use that is:

- intended and designed for the quiet enjoyment of the outdoor environment; and
- readily accessible from the building.

The OLA includes:

- backyards, front yards, gardens, terraces or patios;
- balconies and elevated terraces (e.g. rooftops), with a minimum depth of 4 metres, that are not enclosed, provided they are the only outdoor living area (OLA) for the occupant; or
- common outdoor living areas (OLAs) associated with high-rise multi-unit buildings."

For both the indoor and outdoor conditions where the acoustical criteria are exceeded, warning clauses must be placed in offers of purchase and sale, lease agreements, and included in the condominium agreement.

Based on the information provided by the proponent, no outdoor living area is proposed for the proposed re-development.

3.2 Stationary Sources

MOE Noise Guidelines

The guidelines of the Ontario Ministry of the Environment, Conservation and Parks (MOE) for stationary sources are to be used for commercial/industrial facilities.

The MOE document NPC-300 titled “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning” has been used in this assessment.

The MOE also has vibration guidelines with respect to stationary sources, NPC-207. These guidelines require that the peak vibration velocities not exceed 0.3 mm/s at the point of reception during the day or night.

The MOE recognizes the need for back-up beepers/alarms as safety devices and as such does not have any guidelines or criteria to address these sources.

It should be noted that the MOE guidelines do not require that the source be inaudible, but rather that specific sound level limits be achieved.

With respect to stationary sources of noise in urban areas, the MOE guidelines require that the sound level due to the stationary source at the building façade and outdoor amenity spaces not exceed the sound level due to road traffic and in certain situations due to rail traffic in any hour of source operation, subject to specific exclusions. Tables C-5, C-6, C-7 and C-8 of NPC-300 included in Appendix B provided the exclusion limit values of one-hour equivalent sound level (Leq,dBA) and impulsive sound level (L_{LM},dBAI).

In general, if the criteria for a stationary source of noise are exceeded, the MOE recommends that control be implemented at the source rather than at the receiver. Alternatively, if the receiver is set back from the source or if a physical barrier is constructed so that the criteria can be met at the receiver, no additional mitigative measures are required. Treatment of the receptor building by the use of suitable wall and window construction and central air conditioning to keep windows closed is not an acceptable solution to the MOE in Class 1 and 2 areas (urban). In addition, a warning clause in offers of purchase and sale and/or lease agreement noting the proximity of dwellings to such a source should be considered.

The definition of Class 4 area as defined by the MOE (provided in NPC-300 guidelines) is given below.

“Class 4 area means an area or specific site that would otherwise be defined as Class 1 or 2 and which:

- is an area intended for development with new noise sensitive land use (s) that are not yet built;
- is in proximity to existing, lawfully established stationary source (s); and
- has formal confirmation from the land use planning authority with the Class 4 area classification which is determined during the land use planning process.

Additionally, areas with existing noise sensitive land use (s) cannot be classified as Class 4.”

The proposed site is currently considered to be a Class 1 area, which is intended for development with noise-sensitive land uses that are not yet built and is in proximity to existing, lawfully established stationary sources (i.e., sources immediately east of the subject site). Based on the above, the proposed development can be classified as a Class 4 area upon approval by the land use planning authority (the City of Barrie, in this case). As discussed in this report, a Class 4 designation is recommended for the proposed development.

A Class 4 designation of a proposed noise sensitive use can be used to permit higher sound levels from neighbouring stationary sources. Class 4 does not exempt the evaluation of the noise impact of the noise sources associated with the proposed building on the noise sensitive receptors within the proposed building.

Sound level limits for Class 4 areas shown in NPC-300 Tables C-5, C-6, C-7 and C-8 assume closed windows together with a ventilation system which is in most situations, central air conditioning.

3.3 City of Barrie Noise Control By-law

The City of Barrie has By-law No. 2006-140 (as amended) which regulates noise likely to disturb the inhabitants of the City of Barrie. It provides mainly qualitative information with some quantitative information with respect to noise sources. Prohibitions by time and place are included in the by-law.

4.0 NOISE IMPACT ASSESSMENT

4.1 Road Traffic

For road traffic noise, the sound levels in terms of Leq, the energy equivalent continuous sound levels for both day (16 hours) and night (8 hours), were predicted using ORNAMENT, the MOE Traffic Noise Prediction Model for road traffic. The analysis was based on the Site Plan, architectural plans, and elevation drawings mentioned in Section 1.0. The topography between the source and the receiver and screening effect due to the proposed and existing buildings, where applicable, have been taken into account. The location of the receiver above grade has been taken based on the planned building heights shown on the elevation drawings.

The highest sound levels due to the road traffic are predicted at the south and east façades of the proposed building. Table 2 provides a summary of the predicted sound levels outdoors due to road traffic at specific locations without any mitigative measures. Appendix C includes sample calculations.

The unmitigated sound levels at the top residential level at the south façade are predicted to be up to 65 dBA during the daytime hours (7:00 a.m. and 11:00 p.m.) and 58 dBA during the nighttime hours (11:00 p.m. and 7:00 a.m.).

The unmitigated sound levels at the top residential level at the east façade are predicted to be up to 58 dBA during the daytime hours (7:00 a.m. and 11:00 p.m.) and 52 dBA during the nighttime hours (11:00 p.m. and 7:00 a.m.).

As mentioned in Section 3.1.2, no outdoor living area is proposed.

Where the sound level limits are expected to be exceeded, mitigation measures and warning clauses are required.

4.2 Stationary Sources

Impact of Noise from the Proposed Development on Itself and the Surrounding Environment

As noted in Section 2.2, the existing rooftop mechanical equipment and exhaust systems associated with the commercial/retail and office uses within the existing subject site building are assumed to remain at this time. An analysis has been conducted based on the noise inventory completed during the site visit by Jade Acoustics Inc. staff on August 21, 2024. These noise sources associated with the mechanical system include:

- Rooftop HVAC units; and
- Kitchen/bathroom Exhaust Fans.

Due to onsite conditions, sound measurements of the above noted equipment were generally prohibitive. Therefore, sound power level information for representative units for similar buildings from Jade Acoustics Inc. files was used for the assessment.

Figure 3 shows the location of the analyzed existing noise sources on the subject site building and the associated unmitigated sound levels at the facades of the proposed building and at the closest noise sensitive receptors.

For all of the mechanical units modelled, all rooftop HVAC units were assumed to have duty cycles of 100% (daytime), 70% (evening), and 40% (nighttime). All rooftop exhaust fans were assumed to have duty cycles of 100% (daytime), 100% (evening), and 0% (nighttime).

The MOE exclusion sound level limits of 50 dBA (daytime and evening hours) and 45 dBA (nighttime hours) were used to assess compliance with the Class 1 requirements.

The unmitigated sound levels in terms of one-hour Leq were calculated for the façades of the proposed building and closest noise sensitive receptors using the CadnaA 2024 MR1 computer program, which uses International Standard Analytical Code ISO 9613-2.

As can be seen on Figure 3, the predicted unmitigated sound levels at the east façade of the subject site building exceed the Class 1 sound level limits; therefore, mitigation measures to address the noise impact of the proposed development on itself are required. The predicted unmitigated sound levels at the closest neighbouring noise sensitive receptors do not exceed the Class 1 sound level limits; therefore, mitigation measures to address the noise impact of the proposed development on the environment are not required. See Section 5.2 for details.

As mentioned in Section 2.2, specific information regarding the proposed mechanical sources of noise associated with the proposed re-development is not available at the time of preparation of this report. These potential noise sources will be evaluated when information becomes available and through the building permit process.

Impact of Noise from the Surrounding Environment on the Proposed Development

As discussed in Section 2.2, the stationary noise associated with the properties at 110 Dunlop Street West and those on its east side has been analyzed. The acoustic model, sound power level information, and locations of the stationary sources were based on observations made during the site visit by Jade Acoustics Inc. staff on August 21, 2024, information obtained from the City of Barrie as noted in Section 1.0, information from Jade Acoustics Inc.'s files for similar facilities, and information available online.

These noise sources associated with these properties include:

- Rooftop HVAC units;
- Exhaust Fans; and
- Auto repair noise from the overhead bay doors.

All rooftop HVAC units were assumed to have duty cycles of 100% (daytime), 70% (evening), and 40% (nighttime). All rooftop exhaust fans were assumed to have duty cycles of 100% (daytime), 100% (evening), and 0% (nighttime). For the auto service bay doors, a duty cycle of thirty (30) minutes of a full hour during the daytime was accounted for in the analysis, as the Auto Shoppe operates during the daytime hours only based on the information available online.

Due to the nature of these properties, impulsive noise sources were not expected and were therefore not analyzed in this report.

A list of the analyzed noise sources is provided in Appendix E. Figures 4 and 5 show the location of the analyzed existing noise sources on these properties and the associated unmitigated sound levels at the façades of the proposed building.

The unmitigated sound levels in terms of one-hour Leq were calculated for the façades of the proposed building using the CadnaA 2024 MR1 computer program, which uses International Standard Analytical Code ISO 9613-2.

As can be seen on Figure 4, the predicted unmitigated sound levels at some of the façades of the proposed building exceed the Class 1 sound level limits; therefore, mitigation measures to address the noise impact of the surrounding environment on the proposed development are required.

As indicated in Figure 5, with mitigation measures included as needed to address stationary noise sources, Class 1 sound level limits will still not be met with the proposed physical mitigation measures. The predicted sound levels were also compared with the MOE Class 4 exclusion sound level limits of 60 dBA (daytime and evening hours) and 55 dBA (nighttime), for completeness, applicable at the building façade and plane of window. As shown in Figure 5, exceedances at the worst façade of the proposed building were not predicted; therefore, additional physical mitigation measures are predicted to be required to meet the Class 4 sound level limits. See Section 5.2 for details.

5.0 NOISE ABATEMENT MEASURES

The noise mitigation requirements for both the indoor and outdoor locations are detailed below. Table 3 and Figure 2 provide a summary of the acoustical mitigation requirements for the residential units in this development.

The assessment of interior noise between residential units or between office/commercial spaces and residential units is not included in the scope of this report and has not been considered at this time.

5.1 Transportation Sources

5.1.1 Indoors

As required, indoor sound level criteria for road traffic can be achieved in all cases by using appropriate architectural elements for external walls, windows, exterior doors, and roof construction. The indoor limit for road traffic noise is 40 dBA for the bedrooms during nighttime hours and 45 dBA for the living/dining rooms during daytime and nighttime hours, as well as for bedrooms during daytime hours. These criteria have been used in this analysis. The characteristic spectra for road traffic have been accounted for in the determination of the architectural components. Appendix D contains a sample calculation of the architectural component selection.

In determining the architectural requirements, for the units adjacent to Dunlop Street West, it is assumed that a corner bedroom during daytime hours located on the upper floor will be the worst-case receptor because the day/night traffic split results in more than 5 dBA difference between the predicted daytime and nighttime sound levels. This difference is more than the difference between the MOE indoor criteria for road traffic for daytime and nighttime hours; therefore, the bedroom with calculated daytime sound level was used for the analysis.

Based on the calculations and utilizing the architectural plans and elevation drawings mentioned in Section 1.0 for these residential units, standard exterior window/door and exterior wall construction is acoustically acceptable for all residential units. Appendix D includes a sample calculation for the worst case analyzed dwelling, the STC ratings are noted and to clarify again here the STC ratings specified will be met by standard construction for exterior walls, windows and doors. Once the architectural plans have been finalized, the requirements should be revisited to ensure compliance with the applicable indoor sound level limits.

Due to the noise from the road traffic, provision for adding central air conditioning would be required for some residential units in the proposed development. The proposed building is expected to be centrally air conditioned, thereby satisfying these requirements. Additionally,

since Class 4 area has been proposed for the proposed development to address stationary sources and mandatory central air conditioning would be required to satisfy the Class 4 requirements.

Warning clauses will also be required to be placed in offers of purchase and sale, lease agreements, and included in the development agreement for all relevant residential units to make future occupants aware of the potential noise situation. See Section 5.0 and Table 3 for details.

Table 3 summarizes the required noise control measures.

5.1.2 Outdoors

As noted in Section 4.1, no outdoor living area is proposed within the proposed development. Therefore, no acoustic barrier is required.

5.2 Stationary Sources

Impact of Noise from the Proposed Development on Itself and the Surrounding Environment

As discussed in Sections 2.2 and 4.2, detailed information regarding the proposed mechanical systems associated with the proposed re-development is not available at this stage. Should they be required, potential mitigation measures could include, but not be limited to acoustic louvres, silencers, and acoustic barriers. These potential noise sources will be evaluated when information becomes available and through the building permit process.

The existing rooftop mechanical systems associated with the current subject site building are assumed to remain at this time, as mentioned in Sections 2.2 and 4.2. Based on discussions with the maintenance staff of the subject site building, maintenance, repair, or replacement of the existing rooftop equipment and components occurs on an ongoing, as-needed basis. While the assessment identifies the need for mitigation measures, the proposed residential units will be rental, with the same ownership as the subject site building. Therefore, any required noise mitigation measures can be implemented at a later date through a retrofit installation. To note here for completeness, mitigation measures to address the noise impact of the proposed development on the environment are not required as noted in Section 4.2.

This report recommends that a more detailed review be conducted when information about the proposed mechanical systems associated with the subject site becomes available, as the proposed systems could replace the current mechanical systems analyzed. Final mitigation measures should be determined based on consideration of both the proposed and existing mechanical equipment. Noise mitigation measures that could be implemented may include, but

are not limited to, local barriers, silencers, acoustic louvres, and/or replacing equipment with quieter units. Should replacement of any existing mechanical equipment occur prior to the construction of the proposed development, the new equipment should be reviewed by an acoustical engineer to assist with equipment selection and to determine whether independent acoustical mitigation measures are required.

Impact of Noise from the Surrounding Environment on the Proposed Development

As discussed in Section 4.2, based on the stationary noise source review, noise mitigation measures are required to achieve the MOE sound level limits.

Based on the analysis, the Class 1 and Class 4 sound level limits will not be met without the use of physical mitigation measures. Mitigation has been assessed in order to meet both the Class 1 and Class 4 sound level limits.

Mitigation measures assessed to meet Class 1 requirements include the following:

1. Increase the setback distance between the proposed noise-sensitive receptors and the existing stationary sources.
2. Install local barriers at the noise-sensitive receptors or at the stationary sources.
3. Implement special house designs to eliminate exposure to the existing stationary sources.

The above alternatives are considered onerous and infeasible by the proponent for the following reasons:

1. The subject site building is physically connected to the adjacent building that has the existing stationary sources in question, making it not feasible to increase the setback distance and build the desired built form.
2. As mentioned above, the subject site building is physically connected to the adjacent building that has the existing stationary sources in question, there is no available land/space within the subject site to install the local barrier. Additionally, rooftop barriers at the stationary sources to achieve Class 1 sound level limits at the proposed noise sensitive receptors have been analyzed and multiple rooftop barriers with a height of at least 10 m high would be required. Barriers/walls of these heights are not feasible.

3. Special dwelling designs would include, but are not limited to, eliminating windows/doors in noise sensitive spaces. Approximately half of the proposed units would be impacted by the existing stationary sources. Based on discussions with the proponent of the proposed development, implementing special house designs affects the feasibility of the proposed development and was deemed infeasible.

As mentioned in Section 3.2, a Class 4 area designation can be implemented upon approval by the land use planning authority. Physical mitigation measures to meet the Class 1 sound level limits are onerous and undesirable by the proponent and therefore not feasible. Consequently, a Class 4 designation is recommended for the proposed development, and mitigation measures to achieve the Class 4 sound level limits are summarized further in the report.

The use of physical mitigation at sources associated with the building at 110 Dunlop Street West is proposed to meet the Class 4 sound level limits. Two (2) 2.5 m high acoustic barriers and two (2) 2.0 m high acoustic barriers, installed on the roof of the building to the east at 110 Dunlop Street, are required as shown in Figure 5. The final design of the acoustic barriers will need to be reviewed during the detailed design stage. As the physical mitigation measures shown in Figure 5 would need to be installed within the property to the east, discussions and collaboration with the property owner(s) will be required.

The rooftop acoustic barriers will need to have a minimum surface density of 10 kg/m² or more. The barrier should be of continuous construction with no gaps.

As mentioned above, the incorporation of the Class 4 designation at the proposed site will need to be approved by the City of Barrie. This is required to allow for the use of the sound level limits permitted under Class 4.

As mentioned in Section 3.2, Class 4 designation can be used for new sensitive land uses adjacent to lawfully established stationary sources if approved by the municipality. To clarify, the subject site, which is to be re-developed with new noise-sensitive land uses, currently functions as an office building with ground floor commercial/retail use without any existing noise-sensitive land uses. Mandatory central air conditioning would also be required to satisfy the Class 4 requirements.

With the designation of the site as Class 4, a warning clause advising future owners/tenants of this designation and mandatory central air conditioning for the dwellings will be required. A sample Class 4 warning clause has been provided below for reference.

“Purchasers/tenants are advised that sound levels due to the adjacent commercial uses are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been

supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed. The residential area has been designated Class 4 as defined by the Ministry of the Environment, Conservation and Parks.”

Due to their proximity to the existing non-residential uses, all proposed residential units should be provided with a proximity warning clause notifying the purchasers/tenants that the activities and/or equipment associated with the non-residential uses may at times be audible. See Table 3 and Notes to Table 3.

As can be seen in Figure 5, Class 4 sound level limits will be met with the use of physical mitigation measures.

6.0 CONCLUSIONS

With the incorporation of the items discussed (see Table 3, Notes to Table 3 and Figure 2), the sound levels will be within the appropriate environmental noise criteria. In accordance with City and Ministry implementation guidelines, where mitigation is required, future occupants will be advised through the use of warning clauses.

As discussed in Sections 2.2, 4.2, and 5.2, once the detailed information of the proposed mechanical systems and/or through the building permit process, the current analysis should be revisited to ensure the applicable sound level limits are met at the existing and future noise sensitive receptors.

Prior to issuance of building permits, the acoustical requirements should be reviewed by a qualified professional engineer specializing in acoustics to ensure compliance with the applicable guidelines.

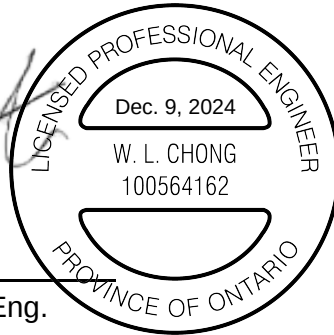
Prior to issuance of occupancy permits, a qualified professional engineer specializing in acoustics shall confirm that the acoustical requirements are in compliance with the noise report.

Respectfully submitted,

JADE ACOUSTICS INC.

Per:


Wai Lung (Jake) Chong, P.Eng.



Per:


Chris B. Kellar, P.Eng.



JC/CK/jg

L:\Reports\24-112 Dec 9-24 49 High Street (ENR).doc

7.0 REFERENCES

1. "Model Municipal Noise Control By-Law" Final Report, by the Ontario Ministry of the Environment, August, 1978.
2. "ORNAMENT – Ontario Road Noise Analysis Method for Environment and Transportation", Ontario Ministry of the Environment, October, 1989.
3. "Building Practice Note No. 56: Controlling Sound Transmission into Buildings", by J.D. Quirt, Division of Building Research, National Research Council of Canada, September, 1985.
4. "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", Ontario Ministry of the Environment and Climate Change, Publication NPC-300, August, 2013 (updated final version # 22).
5. "Impulse Vibration in Residential Buildings", Ontario Ministry of the Environment Publication NPC-207 (Draft), November, 1983.
6. City of Barrie Noise Control By-law Number 2006-140 (as amended), June 12, 2006.

TABLE 1

PROPOSED OFFICE BUILDING RE-DEVELOPMENT

49 HIGH STREET

CITY OF BARRIE

SUMMARY OF ROAD TRAFFIC DATA

A. ROAD TRAFFIC

ROAD	TORONTO STREET	DUNLOP STREET WEST	BRADFORD STREET
AADT* (2034)	6,966	8,704	13,842
No. of Lanes	3	4	5
Speed (km/h)	50	50	50
Trucks (%)	1	6	5
Medium/Heavy Split(%)**	50/50	50/50	50/50
Gradient (%)	0%	3%	4.6%
Day/Night Split (%)**	90/10	90/10	90/10

* AADT: Annual Average Daily Traffic.

** Assumed

TABLE 2
PROPOSED OFFICE BUILDING RE-DEVELOPMENT
49 HIGH STREET
CITY OF BARRIE

SUMMARY OF PREDICTED SOUND LEVELS
OUTDOORS DUE TO ROAD TRAFFIC

Building Level	Location*	Source	Distance (m)	Leq (dBA)			
				Day		Night	
				Separate	Combined	Separate	Combined
Fourth Level	Unit 410 South Façade	Bradford Street	29.0	58		52	
		Toronto Street	85.0	43	65	36	58
		Dunlop Street West	15.0	64		57	
	Unit 408 East Façade	Toronto Street	80.5	46		40	
		Dunlop Street West	25.0	58	58	51	52

* See Figure 2.

TABLE 3
PROPOSED OFFICE BUILDING RE-DEVELOPMENT
49 HIGH STREET
CITY OF BARRIE

SUMMARY OF MINIMUM NOISE ABATEMENT MEASURES

Location	Air Conditioning ⁽¹⁾	Exterior Wall ⁽²⁾	Window STC Rating ⁽³⁾	Acoustic Fence	Warning Clause ⁽⁴⁾
All Residential Units	Mandatory*	Standard**	Standard**	No	A, B, C, D

* Class 4 area has been proposed for the proposed development to address the adjacent stationary sources and mandatory air conditioning would be required to satisfy the Class 4 requirement. The proposed residential units are expected to be centrally air conditioned, thereby satisfying these requirements.

** Based on preliminary calculations. See Section 5.0 for details.

See Notes to Table 3 on following pages and Figures 2 to 5 for details.

NOTES TO TABLE 3

1. Central air conditioning is required for all proposed residential units within the building prior to occupancy in order that windows and exterior doors remain closed for noise control purposes. It is expected that the proposed units within the building will be provided with central conditioning, thereby satisfying the ventilation requirements.
2. STC – Sound Transmission Class Rating (Reference ASTM-E413). Results shown are based on the review of the architectural plans provided as noted in Section 1.0 of this report. Requirements are to be finalized once final architectural plans are available.
3. STC – Sound Transmission Class Rating (Reference ASTM-E413). Results shown are based on the review of the architectural plans provided as noted in Section 1.0 of this report. Requirements are to be finalized once final architectural plans are available.
4. Warning clauses are required for all proposed residential units to advise the future occupants of the potential noise impact from transportation and stationary noise sources as given below.

Suggested warning clauses to be placed in the development agreement and to be included in offers of purchase and sale or lease agreement on designated units:

A. "Purchasers/tenants are advised that despite the inclusion of noise control features in this development area and within the building units, noise due to increasing road traffic may continue to be of concern, occasionally interfering with some activities of the dwelling occupants as the noise level may exceed the noise criteria of the Municipality and the Ministry of the Environment, Conservation and Parks. I the purchaser hereby agree to place this clause in all subsequent offers of purchase and sale when I sell the property."

B. "Purchasers/Tenants are advised that the dwelling has been or will be fitted with a central air conditioning system which will enable occupants to keep windows closed if road traffic noise interferes with the indoor activities."

C. "Purchasers/Tenants are advised that the dwelling unit is in proximity to commercial uses whose activities may be audible at times."

D. "Purchasers/tenants are advised that sound levels due to the adjacent commercial uses are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed. The residential area has been designated Class 4 as defined by the Ministry of the Environment, Conservation and Parks."



N.T.S

**Proposed Office Building Re-development
49 High Street
City of Barrie**

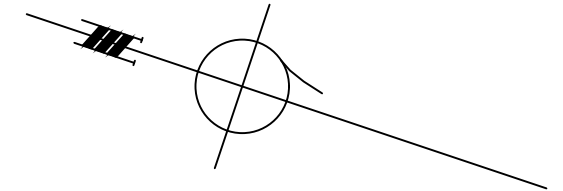
Date: December 2024

File: 24-112

KEY PLAN

FIGURE 1





LEGEND:

○ Analyzed locations

Notes: All residential units require mandatory central air conditioning and a warning clause (See text for details)

All residential units require warning clauses "C" and "D". See report text, Table 3, and Notes to Table 3 for details.

Mitigation Measures proposed to address Stationary Sources of Noise are shown in Figure 5

DUNLOP STREET WEST

HIGH STREET

EXISTING MIXED-USE RESIDENTIAL (110 DUNLOP STREET WEST)

Proposed Office Building
Re-development
4-Storey

EXISTING
RESIDENTIAL

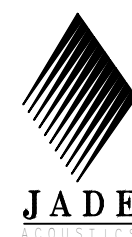
EXISTING RESIDENTIAL AND COMMERCIAL

N.T.S.

Proposed Office Building Re-development
49 High Street
City of Barrie

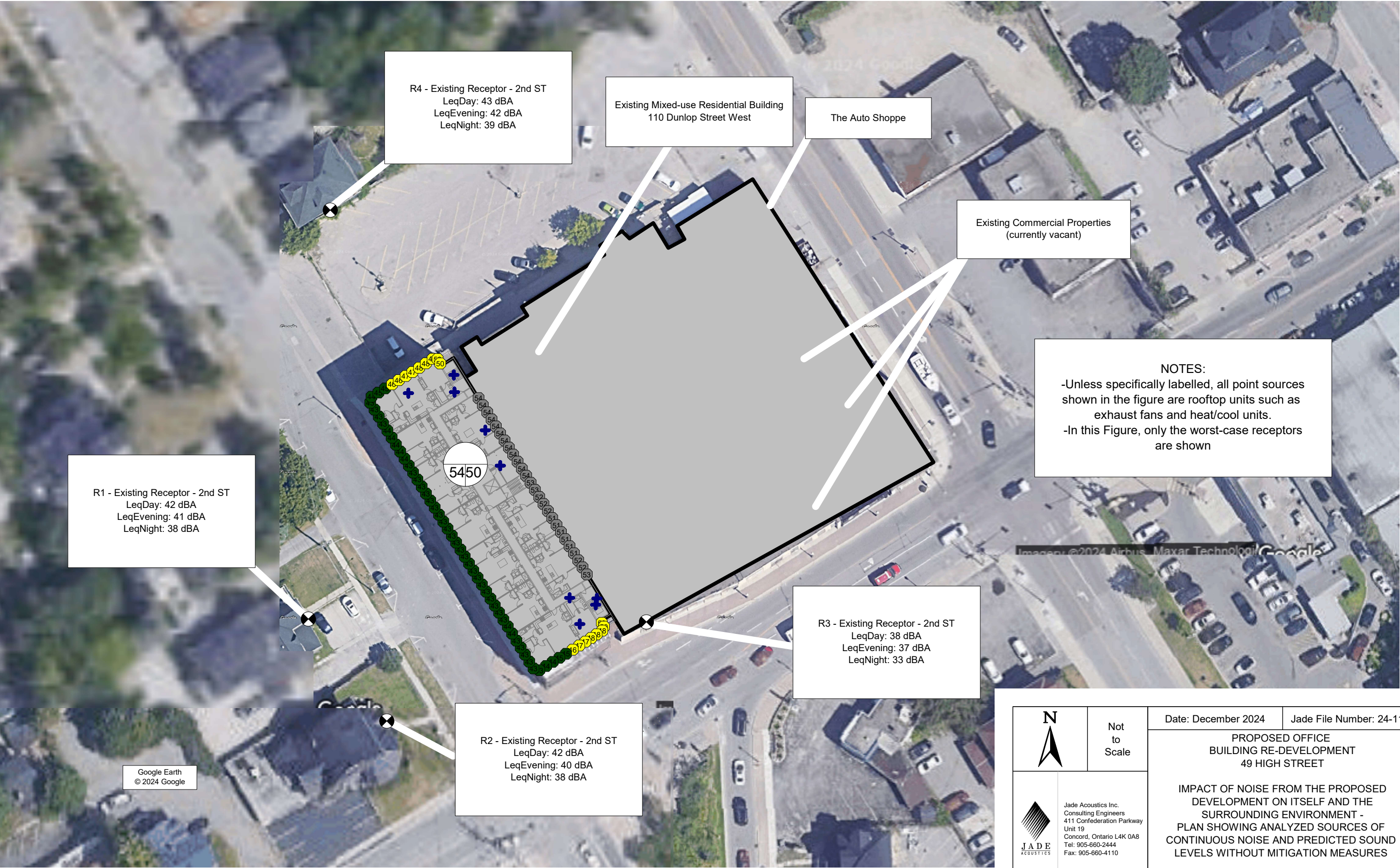
Date: December 2024

Our File: 24-112



PLAN OF
DEVELOPMENT
SHOWING MINIMUM
NOISE ABATEMENT
MEASURES

FIGURE 2



NOTES:
-Unless specifically labelled, all point sources shown in the figure are rooftop units such as exhaust fans and heat/cool units.
-In this Figure, only the worst-case receptors are shown



Not
to
Scale



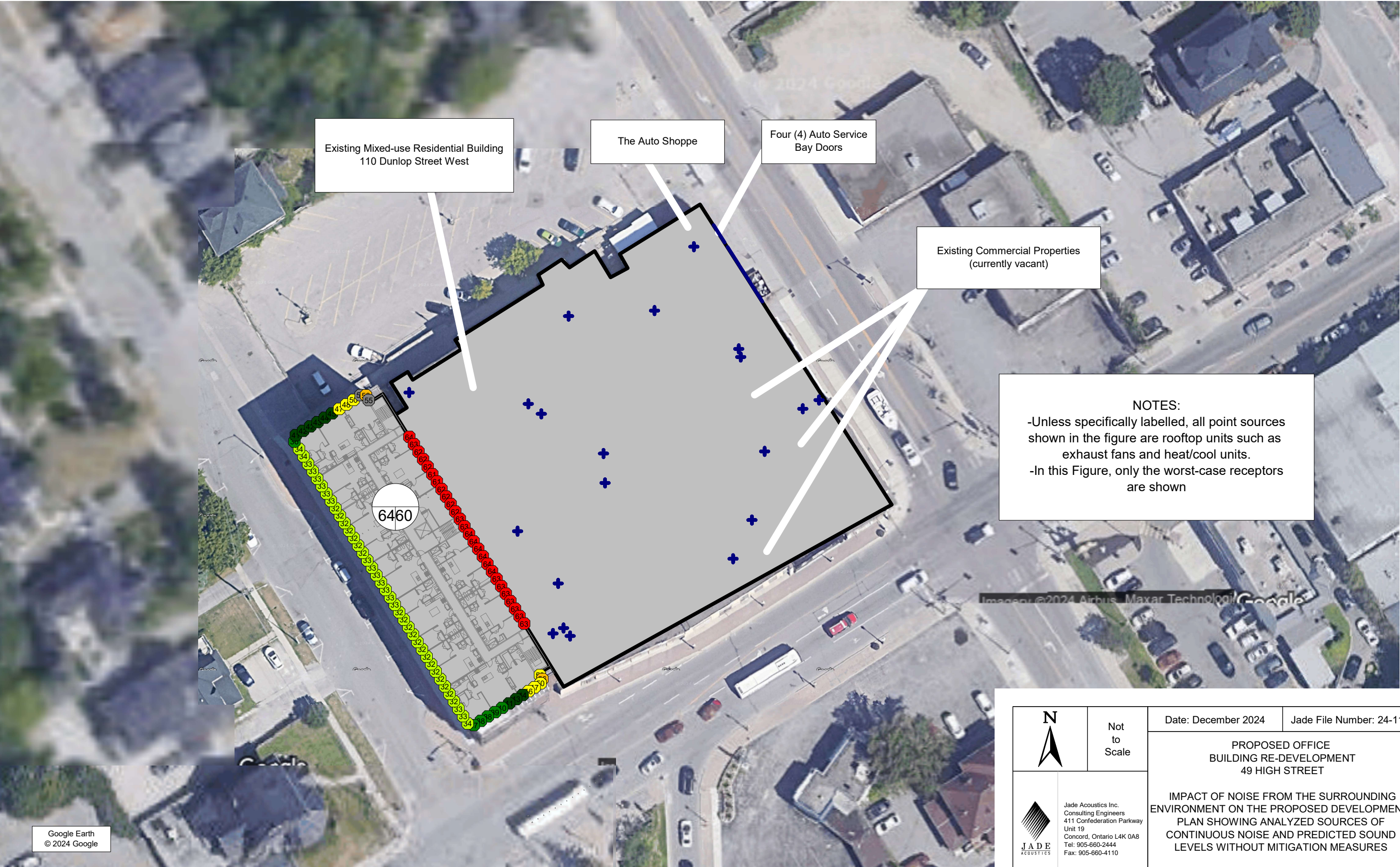
Jade Acoustics Inc.
Consulting Engineers
411 Confederation Parkway
Unit 19
Concord, Ontario L4K 0A8
Tel: 905-660-2444
Fax: 905-660-4110

Date: December 2024 Jade File Number: 24-112

PROPOSED OFFICE
BUILDING RE-DEVELOPMENT
49 HIGH STREET

IMPACT OF NOISE FROM THE PROPOSED
DEVELOPMENT ON ITSELF AND THE
SURROUNDING ENVIRONMENT -
PLAN SHOWING ANALYZED SOURCES OF
CONTINUOUS NOISE AND PREDICTED SOUND
LEVELS WITHOUT MITIGATION MEASURES

FIGURE 3

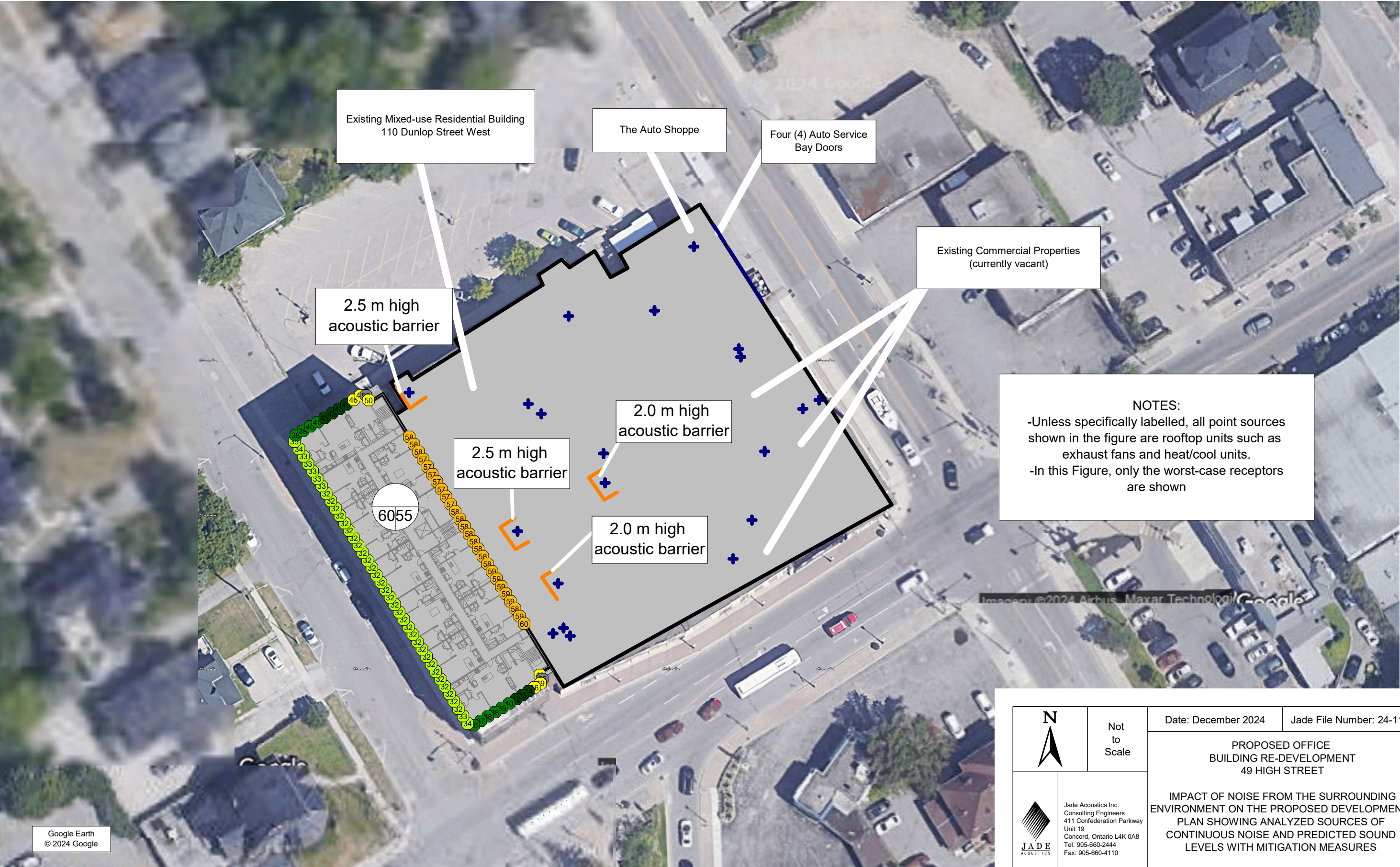


NOTES:
-Unless specifically labelled, all point sources shown in the figure are rooftop units such as exhaust fans and heat/cool units.
-In this Figure, only the worst-case receptors are shown

	Not to Scale	Date: December 2024	Jade File Number: 24-112
		PROPOSED OFFICE BUILDING RE-DEVELOPMENT 49 HIGH STREET IMPACT OF NOISE FROM THE SURROUNDING ENVIRONMENT ON THE PROPOSED DEVELOPMENT - PLAN SHOWING ANALYZED SOURCES OF CONTINUOUS NOISE AND PREDICTED SOUND LEVELS WITHOUT MITIGATION MEASURES FIGURE 4	



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Fax: 905-660-4110



NOTES:
-Unless specifically labelled, all point sources shown in the figure are rooftop units such as exhaust fans and heat/cool units.
-In this Figure, only the worst-case receptors are shown

	Not to Scale	Date: December 2024	Jade File Number: 24-112
		PROPOSED OFFICE BUILDING RE-DEVELOPMENT 49 HIGH STREET IMPACT OF NOISE FROM THE SURROUNDING ENVIRONMENT ON THE PROPOSED DEVELOPMENT - PLAN SHOWING ANALYZED SOURCES OF CONTINUOUS NOISE AND PREDICTED SOUND LEVELS WITH MITIGATION MEASURES FIGURE 5	



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APPENDIX A

CORRESPONDENCE REGARDING ROAD TRAFFIC DATA

Jake Chong

From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: August 27, 2024 10:05 AM
To: Jake Chong
Subject: RE: Traffic data request - City of Barrie - JAI File: 24-112

Good morning Jake,

Please refer to the requested information below:

Toronto Street, north or south of Dunlop Street West

- Current ADT; 6,500 (2019)
- Growth Rate; 1% per annum
- Ultimate number of lanes; 3 lanes with AT
- Percentage of trucks; 1% commercial and heavy
- Ratio of medium trucks to heavy trucks; N/A
- Day/night traffic split; N/A
- Posted speed limit; 50km/h
- Gradient of road; and N/A
- Right-of-way width (R.O.W.). ultimate 27m

Dunlop Street West, east or west of Toronto Street

- Current ADT; 7,000 (2023)
- Growth Rate; 2% per annum
- Ultimate number of lanes; 4 lanes with AT
- Percentage of trucks; 6% commercial and heavy
- Ratio of medium trucks to heavy trucks; N/A
- Day/night traffic split; N/A
- Posted speed limit; 50km/h
- Gradient of road; and < 3%
- Right-of-way width (R.O.W.). ultimate 29m

Bradford Street, south of Dunlop Street West

- Current ADT; 10,000 (2023)
- Growth Rate; 3% per annum
- Ultimate number of lanes; 5 lanes with AT infrastructure.
- Percentage of trucks; 5% commercial and heavy
- Ratio of medium trucks to heavy trucks; N/A
- Day/night traffic split; N/A
- Posted speed limit; 50km/h
- Gradient of road; and – Max Slope is 4.6% and min slope is 0.05%
- Right-of-way width (R.O.W.). ultimate 34m

Should you have any further questions, please let me know.

Thanks.

Justin MacDonald, C.E.T., PTP

APPENDIX B

ENVIRONMENTAL NOISE CRITERIA

ONTARIO MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MOE)

Reference: "Environmental Noise Guidelines Stationary and Transportation Sources – Approval and Planning", Publication NPC-300, August, 2013, released October 21, 2013 (updated final version # 22).

SOUND LEVEL CRITERIA FOR ROAD AND RAIL NOISE

TABLE C-1

Sound Level Limit for Outdoor Living Areas

Road and Rail

Time Period	L_{eq} (16) (dBA)
16 hr., 07:00 - 23:00	55

TABLE C-2

**Indoor Sound Level Limits
Road and Rail**

Type of Space	Time Period	L_{eq} (dBA)	
		Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
	23:00 – 07:00	40	35

SOUND LEVEL CRITERIA FOR AIRCRAFT NOISE

TABLE C-3

Outdoor Aircraft Noise Limit

Time Period	NEF/NEP
24-hour	30

TABLE C-4

Indoor Aircraft Noise Limit (Applicable over 24-hour period)

Type of Space	Indoor NEF/NEP*
Living/dining/den areas of residences, hospitals, nursing/retirement homes, schools, daycare centres, etc.	5
Sleeping Quarters	0

- * The indoor NEF/NEP values in Table C-4 are used to determine acoustical insulation requirements based on the NEF/NEP contour maps.

SOUND LEVEL CRITERIA FOR STATIONARY SOURCES

TABLE C-5

Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA) Outdoor Points of Reception

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	55
19:00 – 23:00	50	45	40	55

TABLE C-6

**Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA)
Plane of Window of Noise Sensitive Spaces**

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	60
19:00 – 23:00	50	50	40	60
23:00 – 07:00	45	45	40	55

TABLE C-7

**Exclusion Limit Values for Impulsive Sound Level (L_{LM} , dBAI)
Outdoor Points of Reception**

Time of Day	Actual Number of Impulses in Period of One-Hour	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 23:00	9 or more	50	50	45	55
	7 to 8	55	55	50	60
	5 to 6	60	60	55	65
	4	65	65	60	70
	3	70	70	65	75
	2	75	75	70	80
	1	80	80	75	85

TABLE C-8

**Exclusion Limit Values of Impulsive Sound Level (L_{LM} , dBAI)
Plane of Window - Noise Sensitive Spaces (Day/Night)**

Actual Number of Impulses in Period of One-Hour	Class 1 Area (07:00-23:00)/ (23:00-07:00)	Class 2 Area (07:00-23:00)/ (23:00-07:00)	Class 3 Area (07:00-19:00)/ (19:00-07:00)	Class 4 Area (07:00-23:00)/ (23:00-07:00)
9 or more	50/45	50/45	45/40	60/55
7 to 8	55/50	55/50	50/45	65/60
5 to 6	60/55	60/55	55/50	70/65
4	65/60	65/60	60/55	75/70
3	70/65	70/65	65/60	80/75
2	75/70	75/70	70/65	85/80
1	80/75	80/75	75/70	90/85

SUPPLEMENTARY SOUND LEVEL LIMITS

Indoor limits for transportation sources applicable to noise sensitive land uses are specified in Table C-2 and Table C-4. Table C-9 and Table C-10 are expanded versions of Table C-2 and Table C-4, and present guidelines for acceptable indoor sound levels that are extended to land uses and developments which are not normally considered noise sensitive. The specified values are maximum sound levels and apply to the indicated indoor spaces with the windows and doors closed. The sound level limits in Table C-9 and Table C-10 are presented as information, for good-practice design objectives.

TABLE C-9

**Supplementary Indoor Sound Level Limits
Road and Rail**

Type of Space	Time Period	L _{eq} (Time Period) (dBA)	
		Road	Rail
General offices, reception areas, retail stores, etc.	16 hours between 07:00 – 23:00	50	45
Living/dining areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc.	16 hours between 07:00 – 23:00	45	40
Sleeping quarters of hotels/motels	8 hours between 23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	8 hours between 23:00 – 07:00	40	35

TABLE C-10

**Supplementary Indoor Aircraft Noise Limit
(Applicable over 24-hour period)**

Type of Space	Indoor NEF/NEP*
General offices, reception areas, retail stores, etc.	15
Individual or semi-private offices, conference rooms, etc.	10
Living/dining areas of residences, sleeping quarters of hotels/motels, theatres, libraries, schools, daycare centres, places of worship, etc.	5
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	0

* The indoor NEF/NEP values in Table C-10 are not obtained from NEF/NEP contour maps. The values are representative of the indoor sound levels and are used as assessment criteria for the evaluation of acoustical insulation requirements.

APPENDIX C

SAMPLE CALCULATION OF PREDICTED SOUND LEVELS

APPENDIX C-1

SAMPLE CALCULATION OF PREDICTED SOUND LEVELS

FILE: 24-112
 NAME: 49 High Street
 REFERENCE DRAWINGS: Site Plan
 LOCATION: Unit 410, south facade

Noise Source	Toronto Street	Toronto Street (2 nd segment)	Dunlop Street West	Bradford Street
Segment Angle:	0 to 36	65 to 76	-90 to 90	0 to 90
Time Period:	16 hr. (day)	16 hr. (day)	16 hr. (day)	16 hr. (day)
Distance (m):	84.79	84.79	15.00	12.50

CALCULATION OF PREDICTED SOUND LEVELS*

Reference Leq (dBA)*:	59.41	59.41	64.71	66.16
Distance Correction (dBA):	-10.00	-10.00	0.00	-3.82
Finite Element Correction (dBA):	-7.09	-13.73	-0.85	-3.85
Allowance for Future Growth (dBA):	Incl.	Incl.	Incl.	Incl.
LeqDay (dBA):	42.31	35.68	63.87	58.49
Combined LeqDay (dBA):	65.00			

* Leq determined using the computerized model of the Ministry of the Environment and Climate Change Noise Assessment Guidelines, STAMSON Version 5.04 (ORNAMENT). See attached printouts.

APPENDIX C-2 SAMPLE CALCULATION OF PREDICTED SOUND LEVELS

FILE: 24-112
NAME: 49 High Street
REFERENCE DRAWINGS: Site Plan
LOCATION: Unit 410, south facade

Noise Source	Toronto Street	Toronto Street (2 nd segment)	Dunlop Street West	Bradford Street
Segment Angle:	0 to 36	65 to 76	-90 to 90	0 to 90
Time Period:	8 hr. (night)	8 hr. (night)	8 hr. (night)	8 hr. (night)
Distance (m):	84.79	84.79	15.00	12.50

CALCULATION OF PREDICTED SOUND LEVELS*

Reference Leq (dBA)*:	52.72	52.72	58.17	59.67
Distance Correction (dBA):	-10.00	-10.00	0.00	-3.82
Finite Element Correction (dBA):	-7.09	-13.73	-0.85	-3.85
Allowance for Future Growth (dBA):	Incl.	Incl.	Incl.	Incl.
LeqNight (dBA):	35.63	28.99	57.32	52.00
Combined LeqNight (dBA):	58.47			

* Leq determined using the computerized model of the Ministry of the Environment and Climate Change Noise Assessment Guidelines, STAMSON Version 5.04 (ORNAMENT). See attached printouts.

Filename: southbr.te **Time Period:** Day/Night 16/8 hours
Description: South facade requirement

Road data, segment # 1: toronto st (day/night)

Car traffic volume : 6207/690 veh/TimePeriod *
Medium truck volume : 31/3 veh/TimePeriod *
Heavy truck volume : 31/3 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): 6966
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 0.50
Heavy Truck % of Total Volume : 0.50
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: toronto st (day/night)

Angle1 Angle2 : 0.00 deg 36.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 84.79 / 84.79 m
Receiver height : 12.50 / 12.50 m
Topography : 0 (Define your own alpha.)
Barrier angle1 : 0.00 deg Angle2 : 36.00 deg
Barrier height : 0.01 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Alpha : 0.33
Reference angle : 0.00

Road data, segment # 2: dunlop st (day/night)

Car traffic volume : 7364/818 veh/TimePeriod *
Medium truck volume : 235/26 veh/TimePeriod *
Heavy truck volume : 235/26 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8704
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: dunlop st (day/night)

```
-----
Angle1 Angle2      : -90.00 deg  90.00 deg
Wood depth          :      0      (No woods.)
No of house rows    :      0 / 0
Surface             :      1      (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height     : 12.50 / 12.50 m
Topography          :      1      (Flat/gentle slope; no barrier)
Reference angle     :      0.00
```

Road data, segment # 3: Bradford St (day/night)

```
-----
Car traffic volume : 11835/1315 veh/TimePeriod *
Medium truck volume : 311/35 veh/TimePeriod *
Heavy truck volume : 311/35 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient      : 5 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 13842
Percentage of Annual Growth        : 0.00
Number of Years of Growth          : 0.00
Medium Truck % of Total Volume     : 2.50
Heavy Truck % of Total Volume      : 2.50
Day (16 hrs) % of Total Volume     : 90.00
```

Data for Segment # 3: Bradford St (day/night)

```
-----
Angle1 Angle2      : 0.00 deg  90.00 deg
Wood depth          :      0      (No woods.)
No of house rows    :      0 / 0
Surface             :      1      (Absorptive ground surface)
Receiver source distance : 29.06 / 29.06 m
Receiver height     : 12.50 / 12.50 m
Topography          :      0      (Define your own alpha.)
Barrier angle1      : 0.00 deg  Angle2 : 90.00 deg
Barrier height      : 0.01 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation    : 0.00 m
Receiver elevation   : 0.00 m
Barrier elevation    : 0.00 m
Alpha               : 0.33
Reference angle     : 0.00
```

Road data, segment # 4: Toronto st2 (day/night)

```
-----
Car traffic volume : 6207/690 veh/TimePeriod *
Medium truck volume : 31/3 veh/TimePeriod *
Heavy truck volume : 31/3 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): 6966
Percentage of Annual Growth        : 0.00
Number of Years of Growth          : 0.00
Medium Truck % of Total Volume     : 0.50
Heavy Truck % of Total Volume      : 0.50
Day (16 hrs) % of Total Volume     : 90.00
```


Data for Segment # 4: Toronto st2 (day/night)

```

-----
Angle1 Angle2      : 65.00 deg  76.00 deg
Wood depth          :      0      (No woods.)
No of house rows    :      0 / 0
Surface             :      1      (Absorptive ground surface)
Receiver source distance : 84.79 / 84.79 m
Receiver height      : 12.50 / 12.50 m
Topography           :      0      (Define your own alpha.)
Barrier angle1       : 65.00 deg  Angle2 : 76.00 deg
Barrier height        : 0.01 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation      : 0.00 m
Receiver elevation     : 0.00 m
Barrier elevation      : 0.00 m
Alpha                : 0.33
Reference angle       : 0.00

```

Results segment # 1: toronto st (day)

```

-----
ROAD (0.00 + 42.31 + 0.00) = 42.31 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
      0      36  0.33 59.41  0.00 -10.00 -7.09  0.00  0.00  0.00 42.31
-----

```

Segment Leq : 42.31 dBA

Results segment # 2: dunlop st (day)

```

-----
Source height = 1.32 m

ROAD (0.00 + 63.87 + 0.00) = 63.87 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
    -90      90  0.34 64.71  0.00  0.00 -0.85  0.00  0.00  0.00 63.87
-----

```

Segment Leq : 63.87 dBA

Results segment # 3: Bradford St (day)

```

-----
ROAD (0.00 + 58.49 + 0.00) = 58.49 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
      0      90  0.33 66.16  0.00 -3.82 -3.85  0.00  0.00  0.00 58.49
-----

```

Segment Leq : 58.49 dBA

Results segment # 4: Toronto st2 (day)

```

-----
ROAD (0.00 + 35.68 + 0.00) = 35.68 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
      65      76  0.33 59.41  0.00 -10.00 -13.73  0.00  0.00  0.00 35.68
-----

```

Segment Leq : 35.68 dBA

Total Leq All Segments: 65.00 dBA

Results segment # 1: toronto st (night)

ROAD (0.00 + 35.63 + 0.00) = 35.63 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 36 0.33 52.72 0.00 -10.00 -7.09 0.00 0.00 0.00 35.63

Segment Leq : 35.63 dBA

Results segment # 2: dunlop st (night)

Source height = 1.31 m

ROAD (0.00 + 57.32 + 0.00) = 57.32 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.34 58.17 0.00 0.00 -0.85 0.00 0.00 0.00 57.32

Segment Leq : 57.32 dBA

Results segment # 3: Bradford St (night)

ROAD (0.00 + 52.00 + 0.00) = 52.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 90 0.33 59.67 0.00 -3.82 -3.85 0.00 0.00 0.00 52.00

Segment Leq : 52.00 dBA

Results segment # 4: Toronto st2 (night)

ROAD (0.00 + 28.99 + 0.00) = 28.99 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

65 76 0.33 52.72 0.00 -10.00 -13.73 0.00 0.00 0.00 28.99

Segment Leq : 28.99 dBA

Total Leq All Segments: 58.47 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 58.47

APPENDIX D

SAMPLE CALCULATION OF ARCHITECTURAL COMPONENT SELECTION

APPENDIX D-1
SAMPLE CALCULATION OF ARCHITECTURAL COMPONENT SELECTION*

FILE: 24-112
NAME: 49 High Street
REFERENCE DRAWINGS: Site Plan
LOCATION: Unit 410, south façade (daytime)

ROAD

Wall area as a percentage of floor area:	South: 37%	
	East: 12%	
Window area as a percentage of floor area:	South: 38%	
	East: 12%	
Number of components:	4	
Outdoor Leq:	South: 65 (+3 for reflections) = 68 dBA	
	East: 62 (+3 for reflections) = 65 dBA	
Indoor Leq:	45	
Noise Reduction (dBA):	South: 23	
	East: 20	
Noise Spectrum:	Mixed Road Traffic	Angle Correction: 0
Absorption:	Medium	

APPROPRIATE ELEMENTS

Configuration		
Wall	South	Standard**
	East	Standard**
Window	South	Standard**
	East	Standard**

* Based upon "Controlling Sound Transmission into Buildings", Building Practice Note 56 by National Research Council of Canada, September, 1985.

** See Section 5.1.1 for details.

APPENDIX E

SAMPLE CALCULATION OF SOUND LEVELS DUE TO STATIONARY NOISE SOURCES – CADNAA

Name	Sel.	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
				Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
				(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		(m)		(m)	(m)	(m)
RTU6		~	!000100!	77.7	77.7	77.7	Lw	TCFA06		0	0	0				60	42	24	0		(none)	0.92	g	17604028	4915777	8.1
A/C unit		~	!000100!	73.4	73.4	73.4	Lw	lennox		0	0	0				60	42	24	0		(none)	0.5	g	17604034	4915796	7.67
EF1		~	!000100!	74.3	74.3	74.3	Lw	CUE142		0	0	0				60	60	0	0		(none)	1.2	g	17604032	4915784	8.38
A/C unit 1		~	!000100!	73.4	73.4	73.4	Lw	lennox		0	0	0				60	42	24	0		(none)	0.5	g	17604029	4915813	7.67
EF2		~	!000100!	74.3	74.3	74.3	Lw	CUE142		0	0	0				60	60	0	0		(none)	0.5	g	17604040	4915803	7.67
A/C unit 2		~	!000100!	73.4	73.4	73.4	Lw	lennox		0	0	0				60	42	24	0		(none)	0.5	g	17604043	4915805	7.67
EF3		~	!000100!	74.3	74.3	74.3	Lw	CUE142		0	0	0				60	60	0	0		(none)	1.2	g	17604030	4915812	8.38
RTU7		~	!000100!	77.7	77.7	77.7	Lw	TCFA06		0	0	0				60	42	24	0		(none)	0.92	g	17604022	4915831	8.1
EF - tailpipe		~	!000100!	79.8	79.8	79.8	Lw	ART406		0	0	0				60	0	0	0		(none)	0.95	g	17604015	4915820	8.13
RTU1 - Miss Jones		~	!000100!	81.4	81.4	81.4	Lw	KGA060		0	0	0				60	42	24	0		(none)	0.92	g	17604001	4915764	8.1
RTU1 - Miss Jones		~	!000100!	81.4	81.4	81.4	Lw	KGA060		0	0	0				60	42	24	0		(none)	0.92	g	17603999	4915766	8.1
EF - Miss Jones		~	!000100!	74.3	74.3	74.3	Lw	CUE142		0	0	0				60	60	0	0		(none)	0.95	g	17603998	4915765	8.13
RTU1		~	!000100!	88.3	88.3	88.3	Lw	KGA092		0	0	0				60	42	24	0		(none)	0.92	g	17603992	4915782	8.1
RTU2		~	!000100!	81.4	81.4	81.4	Lw	KGA060		0	0	0				60	42	24	0		(none)	0.92	g	17603998	4915773	8.1
RTU3		~	!000100!	92.5	92.5	92.5	Lw	TGA180		0	0	0				60	42	24	0		(none)	1.2	g	17604006	4915795	8.38
RTU4		~	!000100!	92.5	92.5	92.5	Lw	TGA180		0	0	0				60	42	24	0		(none)	1.2	g	17604007	4915790	8.38
RTU5		~	!000100!	89	89	89	Lw	ZF090		0	0	0				60	42	24	0		(none)	0.95	g	17603973	4915806	8.13
FN-1		~	!000100!	73.9	73.9	73.9	Lw	Lennox16ACXN060		0	0	0				60	42	24	0		(none)	0.95	g	17603996	4915802	8.13
AirCon		~	!000100!	67.9	67.9	67.9	Lw	COND_LCBO		0	0	0				60	42	24	0		(none)	0.95	g	17604000	4915819	8.13
Liebert Air Cooled Cond		~	!000100!	79.7	79.7	79.7	Lw	ELXC072		0	0	0				60	42	24	0		(none)	0.95	g	17603993	4915804	8.13
Carrier - subject site building			!000000!	77.7	77.7	77.7	Lw	TCFA06		0	0	0				60	42	24	0		(none)	0.92	g	17603960	4915799	16.16
EF - subject site building			!000000!	74.3	74.3	74.3	Lw	CUE142		0	0	0				60	60	0	0		(none)	0.93	g	17603969	4915803	16.17
RTU2 - subject site building			!000000!	92.5	92.5	92.5	Lw	TGA180		0	0	0				60	42	24	0		(none)	0.93	g	17603969	4915799	16.17
EF2 - subject site building			!000000!	74.3	74.3	74.3	Lw	CUE142		0	0	0				60	60	0	0		(none)	0.93	g	17603974	4915792	16.17
RTU3 - subject site building			!000000!	92.5	92.5	92.5	Lw	TGA180		0	0	0				60	42	24	0		(none)	2.39	g	17603977	4915786	17.63
EF3 - subject site building			!000000!	83	83	83	Lw	DX11B		0	0	0				60	60	0	0		(none)	1.17	g	17603994	4915761	16.41
RTU4 - subject site building			!000000!	92.5	92.5	92.5	Lw	TGA180		0	0	0				60	42	24	0		(none)	0.93	g	17603990	4915762	16.17
EF4 - subject site building			!000000!	74.3	74.3	74.3	Lw	CUE142		0	0	0				60	60	0	0		(none)	1.17	g	17603995	4915762	16.41
Air Con - subject site building			!000000!	73.9	73.9	73.9	Lw	Lennox16ACXN060		0	0	0				60	42	24	0		(none)	0.57	g	17603991	4915757	15.81

Name	Sel.	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuatio	Operating Time			K0	Freq.	Direct.
				Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night			
				(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)	
ARS1		~	!000103!	82	82	82	71	71	71	Lw	ARS		0	0	0				30	0	0	0		Opening (ÖAL28)
ARS2		~	!000103!	82	82	82	71	71	71	Lw	ARS		0	0	0				30	0	0	0		Opening (ÖAL28)
ARS3		~	!000103!	82	82	82	71	71	71	Lw	ARS		0	0	0				30	0	0	0		Opening (ÖAL28)
ARS4		~	!000103!	82	82	82	71	71	71	Lw	ARS		0	0	0				30	0	0	0		Opening (ÖAL28)

Buildings

Name	Sel.	M.	ID	Level Lr			Limit. Value				Land Use			Height		Coordinates			
				Day	Night	Evening	Day	Night	Evening	Type	Auto	Noise Type				X	Y	Z	
				(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)					(m)		(m)	(m)	(m)	
R1 - Existing Receptor			!01!	42.4	38.3	40.9	50	45	50					4.5	r	17603942	4915758	4.5	
R2 - Existing Receptor			!01!	41.9	37.7	40.4	50	45	50					4.5	r	17603956	4915740	4.5	
R3 - Existing Receptor			!01!	38.4	32.7	37.4	50	45	50					4.5	r	17604003	4915758	4.5	
R4 - Existing Receptor			!01!	43.5	39	42.1	50	45	50					4.5	r	17603946	4915832	4.5	

Building Evaluation

Name	M.	ID	Level			Excess Levels		Land Use			Coordinates			Floor Height		Round up
			Day	Night	Evening	From	To	Type	Auto	Noise Type	X	Y	Ø	EG	OG-OG	
			(dBA)	(dBA)	(dBA)	Floor	Floor				(m)	(m)	(m)	(m)	(m)	
Subject Site (Figure 3)		!0B!	54.3	50.1	52.8				x	Roads	17603971	4915786	8	8.8	3.66	0.5
Subject Site (Figure 4)		!0B!	64.3	60.3	62.7				x	Roads	17603971	4915786	8	8.8	3.66	0.5
Subject Site (Figure 5)		!0B!	59.7	55	58.4				x	Roads	17603971	4915786	8	8.8	3.66	0.5

Buildings

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	
							Begin	
							(m)	
proposed site			!02!	x	0	0.37	15.24	r
Adjacent Existing build			!02!	x	0	0.37	7.17	r