REPORT

105-109 Henderson Avenue

Ottawa, Ontario

Noise Impact Assessment Study

SACL #SW18026.10

Feb 04, 2020

Submitted to:

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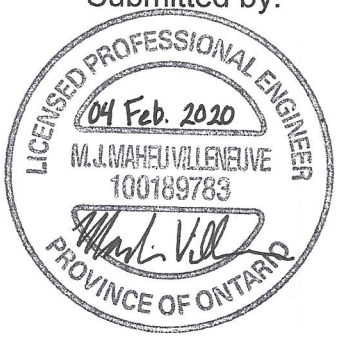

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1. Introduction

At the request of Nemorin Group Ltd. (NGL), Swallow Acoustic Consultants Ltd. (SACL) is pleased to present this Noise Impact Assessment Study (NIAS) for the proposed 3-storey residential building (the Project) to be located at 105-109 Henderson Avenue in Ottawa, Ontario (the Site). This NIAS assesses noise impacts from nearby surface transportation sources. Based on observations made at the site and surrounding area, there are stationary noise sources operated by Hydro Ottawa at 113 Henderson Avenue, which is the property directly adjacent to 109 Henderson Avenue.

The Project is a residential development consisting of both new and heritage construction. Two existing houses will contain a total of four residential units, and a new 3-storey building located behind the houses will contain 16 residential units. An Outdoor Living Area (OLA) is located at grade in the back yard on the east side of the building.

Adjacent properties consist of two- and three-storey residential buildings, as well as the Hydro Ottawa facility to the south.

The main surface transportation corridor impacting on the Project is King Edward Avenue, based on its roadway classification per the City of Ottawa, and its proximity to the development.

Aerial photos of the area are presented in Figure 1 and Figure 2. The site plan for the Project is presented in Figure 3, which has also been marked-up to show the Point of Assessment (PoA) locations. A 3D rendering of the Project has also been provided in Figure 4.

2. Noise Assessment Criteria

The City of Ottawa requirements for environmental noise impact assessments are outlined in the Environmental Noise Control Guidelines (ENCG) [1], which in turn reference the Environmental Noise Guideline, NPC-300 [2], prepared by the Ontario Ministry of the Environment, Conservation and Parks (MECP). The Project is located in a Class 1 area, which is defined as an area with an acoustical environment typical of a major population centre.

The sections below describe the applicable noise assessment criteria for surface transportation noise sources and stationary noise sources.

2.1. Surface Transportation Noise Assessment Criteria

Sound level limits values outlined in ENCG for road traffic noise impacting on noise-sensitive areas applicable to the Project are summarized in Table 1.

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Table 1: Sound Level Limits for Noise-Sensitive Areas

Type of Point of Reception	Time Period	Sound Level Limit for Road Traffic Noise Leq [dBA]
Outdoor Living Area (OLA)	Daytime (07:00 to 23:00)	55
Indoor Space (Living Quarters)	Daytime (07:00 to 23:00)	45
	Nighttime (23:00 to 07:00)	45
Indoor Space (Sleeping Quarters)	Daytime (07:00 to 23:00)	45
	Nighttime (23:00 to 07:00)	40

For outdoor living areas (OLA) where it is not technically or economically feasible to achieve the noise level criterion in Table 1, NPC-300 and the ENCG include a conditional tolerance of no more than 5 dB above the noise level criterion, and a warning clause requirement.

Furthermore, based on the plane of window calculations for indoor spaces, upgraded building components, ventilation systems and warning clauses may be required. The ENCG building component and ventilation requirements for road noise are shown in Tables 2 and 3, below.

Table 2: ENCG Building Component Requirements (Road Noise)

Assessment Location	Sound Level (time as noted)	Building Component Requirements
Plane of Living Room Window and/or Bedroom Window	Daytime LEQ-16HR Less than or equal to 65 dBA	Building compliant with the Ontario Building Code
	Daytime LEQ-16HR Greater than 65 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
Plane of Living Room Window and/or Bedroom Window	Night-time LEQ-8HR Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
	Night-time LEQ-8HR Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

(Reference: MECP NPC-300, Section C7.1.3 – Indoor Living Areas: Building Components)

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Table 3: ENCG Ventilation and Warning Clause Requirements (Road noise)

Assessment Location	Sound Level (time as noted)	Ventilation Requirement	Warning Clause Requirement
Plane of Living Room Window and/or Bedroom Window	Daytime LEQ-16HR Less than or equal to 55 dBA	None required	Not required
	Daytime LEQ-16HR Greater than 55 dBA to less than or equal to 65 dBA	Forced air heating with provision for central air conditioning	Required Type C
	Daytime LEQ-16HR Greater than 65 dBA	Central air conditioning	Required Type D
Plane of Living Room Window and/or Bedroom Window	Night-time LEQ-8HR Greater than 50 dBA to less than or equal to 60 dBA	Forced air heating with provision for central air conditioning	Required Type C
	Night-time LEQ-8HR Greater than 60 dBA	Central air conditioning	Required Type D

(Reference: MECP NPC-300, Section C7.1.2 – Plane of a Window: Ventilation Requirements)

2.2. Neighbouring Stationary Source Noise Assessment Criteria

Stationary sources of noise include all sources of sound and vibration that exist or operate on nearby premises, excluding construction noise sources. The noise level criterion for noise from stationary sources in a given time period is the higher value between (1) the time period exclusion limit value prescribed by the MECP, and (2) the corresponding minimum hourly background/ambient sound level ($L_{eq,1hr}$) due to traffic during the time period. Exclusion limit values outlined in the ENCG for new noise-sensitive land uses in proximity to existing stationary noise sources have been summarized in Table 4 for Class 1 areas.

Table 4: ENCG Exclusion Limit Values for Class 1 Areas (New Noise-Sensitive Land Uses in Proximity to Existing Stationary Sources)

Type of Point of Reception	Time Period	Time Period Description	Exclusion Limit Leq,1hr [dBA]
Outdoor Living Area (OLA)	07:00 to 23:00	Daytime	50
Plane of Window (Living Quarters)	07:00 to 23:00	Daytime	50
Plane of Window (Sleeping Quarters)	23:00 to 07:00	Night-time	45

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3. Surface Transportation Noise

3.1. Surface Transportation Noise – Road Noise Levels

The surface transportation corridor impacting on the Project is King Edward Avenue, which is classified as an "Urban Arterial" roadway as per the City of Ottawa Transportation Master Plan (TMP) [3]. King Edward Avenue is located within 100 m of the Project's limits. Other major transportation routes in the area such as Laurier Avenue, Highway 417, and the transitway are beyond the distance limits required for assessment, per the ENCG.

The "ultimate" road and traffic data information, including the Annual Average Daily Traffic (AADT), for King Edward Avenue was obtained from the ENCG based on its roadway classification and is summarized in Table 5. These parameters were used to predict the traffic noise levels following the prediction method outlined in the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) [4], developed by the MECP. Software developed by the MECP to perform ORNAMENT calculations, STAMSON Version 5.04, was used to predict the noise levels. Calculation results from STAMSON are available in Appendix A.

Table 5: ENCG Traffic and Road Parameters for STAMSON Modelling

Road	Implied Roadway Class	Speed Limit [km/h]	Ultimate AADT [Vehicles/day]	Day/Night Split [%]	Medium Trucks [%]	Heavy Trucks [%]
King Edward Avenue	2-Lane Urban Arterial (2-UAU)	40	15,000	92/8	7	5

Separation distances were taken from the centreline of the road segment to the PoA.

3.2. Surface Transportation Noise - Points of Assessment

PoAs were chosen to represent worst-case scenarios at the Plane of Window (PoW) of bedrooms and living spaces. An OLA is also located in the building's back yard at-grade as PoA 'D', with the assessment location located approximately 3 m from the building façade, aligned with the midpoint of the subject façade. Table 6 contains a description of the location of each PoA, and their locations are shown in Figure 3.

Table 6: Points of Assessment (PoA) Locations

Point of Assessment (PoA)	Height (ref. Grade) [m]	Storey	Building Facade	Notes/Comments
PoA 'A'	6.0	2nd	West	PoW: Bedroom/Living Room exposed to King Edward Avenue.
PoA 'B'	3.0	Ground	West	PoW: Bedroom/Living Room exposed to King Edward Avenue.
PoA 'C'	9.0	3rd	West	PoW: Bedroom/Living Room exposed to King Edward Avenue.
PoA 'D'	1.5	Ground	N/A	OLA: Backyard area exposed to King Edward Avenue.

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For PoAs located at the 2nd level or lower, noise from King Edward Avenue is partially obstructed by the 2-storey residences between the proposed development and the transportation corridor itself, modelled as two rows of houses (50% density) in STAMSON. For PoA 'D', representing the backyard OLA, noise from King Edward Avenue is partially obstructed by the Project itself, which was modelled by SACL as a noise barrier in STAMSON.

The ground surface between King Edward Avenue and the Project includes many backyards, and is therefore modelled as absorptive in our analysis.

3.3. Surface Transportation Noise - Calculations

Sample STAMSON transportation noise calculations can be found in Appendix A and the calculation angles and distances are presented in Appendix B. Table 7 shows the daytime and night-time noise level prediction results at each PoA, along with a comparison to the daytime and night-time criteria for noise control measures outlined in Section 2.

Table 7: Daytime and Night-time Calculated Noise Levels Due to Surface Transportation Noise

Point of Assessment (PoA)	Transportation Noise Level Calculation [dBA]		Building Component Requirement	Minimum Ventilation Requirement	Warning Clause
	Daytime	Nighttime			
PoA 'A'	49	42	OBC-compliant	OBC-compliant	None
PoA 'B'	48	41	OBC-compliant	OBC-compliant	None
PoA 'C'	54	46	OBC-compliant	OBC-compliant	None
PoA 'D'	39	N/A (OLA)	N/A (OLA)	N/A (OLA)	None

The calculated transportation noise levels are below the criteria limit for noise control measures at all residential PoAs. Therefore, no noise control measures are needed for the Project, and no warning clauses for noise are required.

4. Stationary Noise Sources

4.1. Noise Criteria for Stationary Noise Sources

The guidelines for assessing the noise impact of stationary noise sources on proposed noise sensitive areas in Ottawa are provided in the ENCG Part 1: Environmental Noise Control Guidelines for Land Use Planning, Section 3.0. Table 8 outlines the exclusionary noise criteria for stationary sources of noise at a noise-sensitive receptor in a Class 1 (Urban) area. A Class 1 area is an area with an acoustical environment typical of a major population centre, and accurately describes the Project location and surrounding area. The site-specific noise criteria for each time of day are either the value in Table 8 or the minimum hourly background noise level ($L_{EQ[1hr]}$), whichever is higher. Based on the site visit findings, it is not expected that the background noise

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levels in the area surrounding the Project will exceed the values in Table 8, and thus the table limits apply as the maximum sound levels at all noise-sensitive receptors due to stationary noise sources.

Table 8: ENCG Exclusion Noise Level Limits – Stationary Noise Sources[1]

Time Period	Class 1 Area (Urban) $L_{EQ[1hr]}$ (dBA)
Day-time (0700 – 1900)	50
Evening (1900 – 2300)	50
Night-time (2300 – 0700)	45

[1] Reference: ENCG Table 3.2a Guidelines for Stationary Noise – Steady and Varying Sound

4.2. Existing Neighbouring Stationary Noise Sources

As noted during a site visit undertaken by SACL on April 27th 2018, there are stationary noise sources operated by Hydro Ottawa at 113 Henderson Avenue, which is the property directly adjacent to 109 Henderson Avenue. The stationary noise sources consist of transformers and transformer fans. Measurements were performed at the Hydro Ottawa facility on a subsequent site visit on December 11, 2018 and used to develop a noise model to determine noise levels at the Project.

4.2.1. Receptor Locations

One plane-of-window and one outdoor receptor were chosen as the critical receptors that are most exposed to the stationary noise sources. These receptor locations are presented in Table 9 and shown in Figure 5. The receptor R1 is on the south side of the Project and overlooks the transformers in the courtyards. Receptor OR1 is in the back yard and has no line of sight to the transformers due to the wall.

Table 9: Stationary Noise Sources – Receptor Locations

Receptor	Height (m)	Description
R1	9.0	Third floor window on the south façade of the Project facing the Hydro Ottawa building
OR1	1.5	East ground-level back yard outdoor area, centre of lot

4.2.2. Existing Stationary Noise Sources

The Hydro Ottawa facility is a transformer station that is built within a 1-storey building directly neighbouring the Project to the south. Equipment located within the building was noted to generally be quiet, and while there are louvres around the building that may be opened for cooling, the noise breakout is not expected to be significant.

Three (3) transformers are located within two enclosed courtyard areas at the northeast end of the Hydro Ottawa building. Transformers T1 and T3 are located in the west courtyard and T2 is located in the east courtyard. The courtyard is constructed of concrete block on all sides, up to a height of 5 m. Associated with each of the three transformers are four (4) cooling fans, all Krenz&Co Model F16-A7839 fans. The fans operate only during high temperature conditions during the summer, and thus could not be measured during the site visit. Sound levels for the fans are based on manufacturer specifications, provided in Appendix C. An aerial view of the Hydro Ottawa building is presented in Figure 6. Noise measurements were taken on-site at the Hydro Ottawa building and the noise sources are detailed in Table 10.

Table 10: Hydro Ottawa Stationary Noise Sources

Source ID	Source Description	Sound Power Level (dBA)
T1 / T2 / T3	Transformers 1 – 3	81 (each)
T1F1 – T1F4, T2F1 – T2F4, T3F1 – T3F4	Transformer 1 Fans 1 – 4, Transformer 2 Fans 1 – 4, Transformer 3 Fans 1 – 4. (Krenz&Co Fan Model F16-A7839)	82 (each)

4.2.3. Sound Levels at the Project Receptors

Sound levels at the Receptors due to the neighbouring stationary sources were calculated using the software Cadna/A in accordance with the methods descried in ISO 9613-2, and the results are presented below. The Cadna/A calculation output is presented in Appendix D. Figure 5 shows the location of the noise sources in the model.

The transformers T1, T2 and T3 were assumed to be in operation 24 hours a day, 7 days a week. All of the (12) fans are assumed to be in operation during the daytime, and the fans are assumed to be in operation at 50% load during the nighttime under the worst-case predictable operating conditions.

Table 11: Sound Pressure Levels at Receptors

Point of Reception	Location	Calculated Sound Pressure Level [Day / Night] (dBA)	Applicable Sound Level Limits [Day / Night] (dBA)	Compliance (Yes / No)
R1	Building plane-of-window at 3rd Floor	64 / 62	50 / 45	No
OR1	Outdoor	40 / --	50 / --	Yes

The sound level limits at R1 are exceeded by 14 dB and 17 dB during the daytime and nighttime periods, respectively, and noise mitigation will be required.

4.2.4. Noise Mitigation Recommendations

Based on the calculation results, both the transformers and associated fans are significant contributors of noise at the Project. Noise mitigation in the form of a noise barrier, or a smaller noise barrier with upgrade to lower-noise fans are possible options, and are detailed further as follows:

- **Option 1 – Noise Barrier**
  - 10.75 m high noise barrier, approximately 16 m in length, 10 m along the north side and 3.5 m on the west wing and 2.5 m on the east wing
- **Option 2 – Noise Barrier and Upgrade Fans**
  - 9.75 m high noise barrier, approximately 16 m in length, 10 m along the north side and 3.5 m on the west wing and 2.5 m on the east wing
  - Replace all twelve (12) transformer fans with low-noise fans meeting sound pressure level of 61 dBA at 2 m (or sound power level of 75 dBA) or lower
    - The Krenz&Co Fan Model F24-A7836 may be a suitable replacement, with specifications included in Appendix C. Other fans meeting the required sound levels may also be suitable.

The noise barrier can be built on top of the existing 5 m high concrete block wall that currently surrounds the transformers. A 5.75 m increase in wall height is required under Option 1, or a 4.75m increase is required under Option 2. Figure 7 shows the location and details of the proposed noise barrier for both Options 1 and 2.

Per NPC-300, the noise barrier must meet a minimum surface density of 20 kg/m^2 and be structurally sound, appropriately designed to withstand wind and snow load, and constructed without cracks or surface gaps. As the existing wall is constructed of concrete block, the noise barrier may also consist of concrete block. Additional structural support may be required for the additional wall height. Other wall materials may be used, provided they meet the minimum surface density requirement.

With noise mitigation Option 1 or 2 implemented, sound levels at the Project are expected to meet the sound level limits, as noted in Table 12.

Table 12: Sound Pressure Levels at Receptors with Noise Mitigation

Point of Reception	Location	Calculated Sound Pressure Level [Day / Night] (dBA)	Applicable Sound Level Limits [Day / Night] (dBA)	Compliance (Yes / No)
R1	Building plane-of-window at 3rd Floor	47 / 45	50 / 45	Yes
OR1	Outdoor	38 / --	50 / --	Yes

4.3. The Project as Stationary Noise Source

The Project may also be considered a Stationary Source for adjacent land uses. Mechanical equipment selections have not yet been made, and therefore, a detailed analysis is not possible at this time. The final design will be required to comply with ENCG sound level limits from a Stationary Source at all nearby noise-sensitive land uses.

5. Concluding Comments

Our noise level calculations indicate that the impact of transportation noise on the proposed residential development will meet ENCG requirements. Noise mitigation will be required to be implemented at the Hydro Ottawa transformer station neighbouring the proposed development. With the noise mitigation implemented as noted, it is expected that all sound level limits at the proposed development will be met. The proposed residential development located at 105-109 Henderson Avenue should therefore be approved from the noise aspect.

------ End ------

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References

1. City of Ottawa Environmental Noise Control Guidelines (ENCG), approved by Ottawa City Council in January 2016.
2. Ministry of the Environment, Conservation and Parks (MECP) Publication NPC-300: Stationary and Transportation Sources - Approval and Planning, published in August 2013.
3. City of Ottawa Transportation Master Plan (TMP), published by the City of Ottawa on November 2013.
4. Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT), Technical document published by the MECP in October 1989.

Figures

Figure 1. Site Aerial

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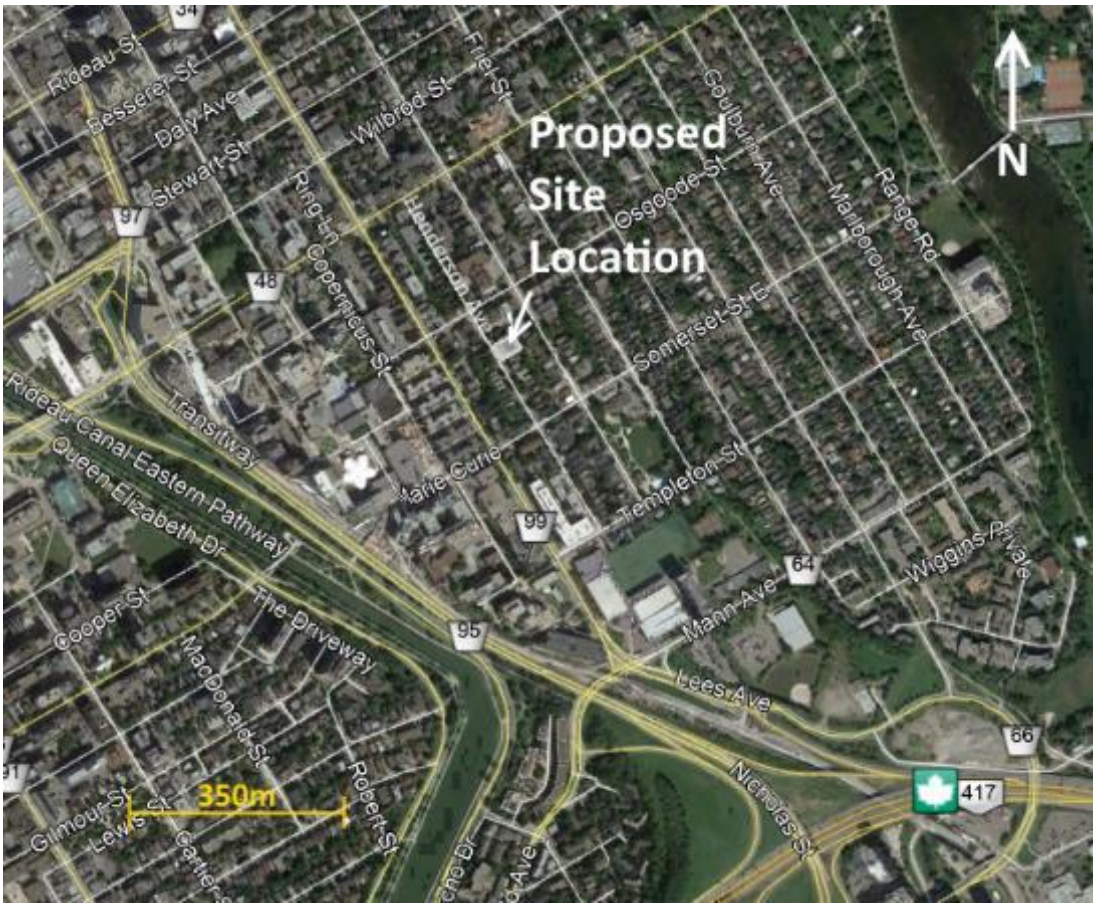

Figure 2. Site Aerial with Highway 417 shown.

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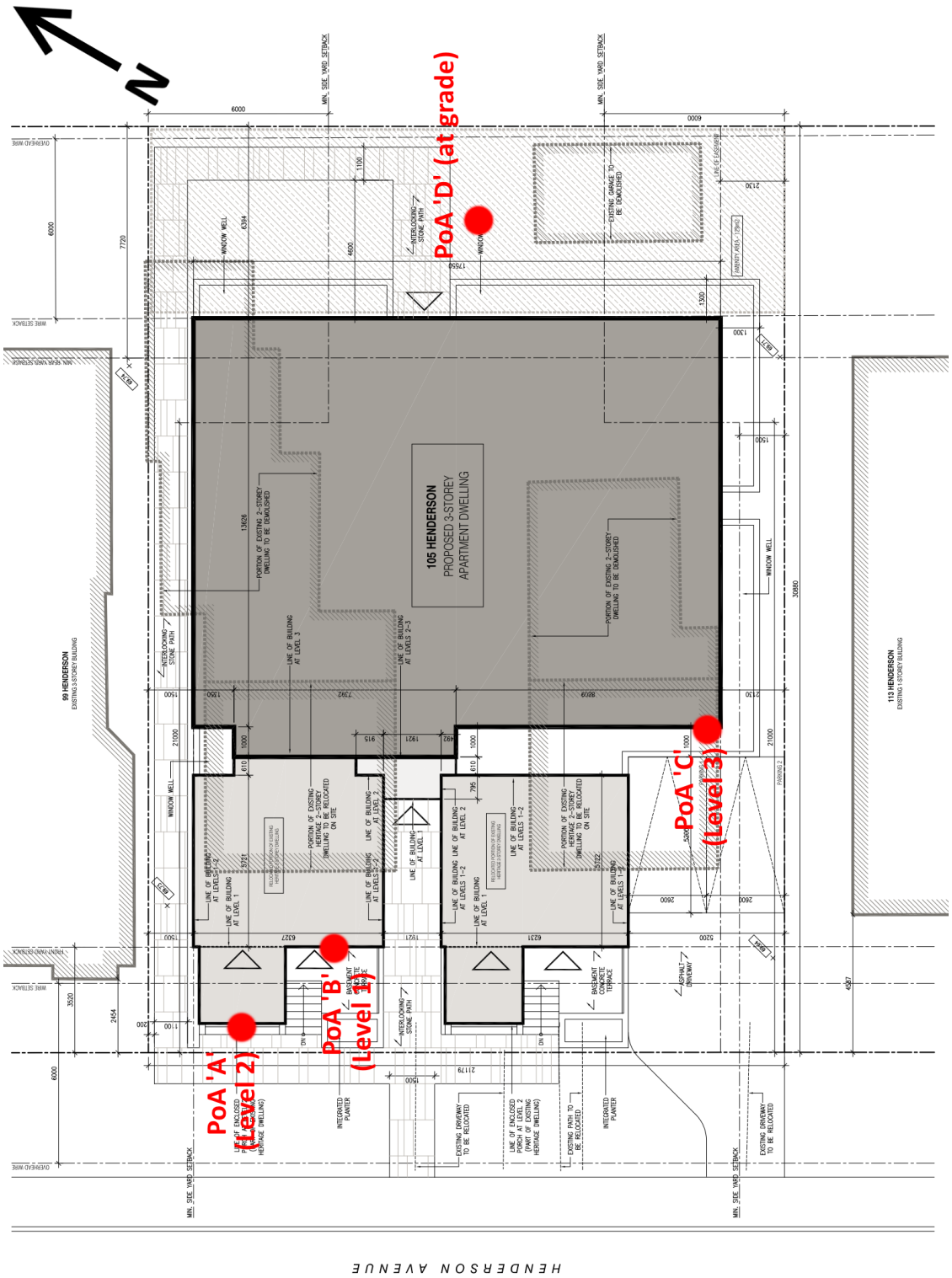

Figure 3. Site Plan, with Location of PoA 'A' to 'D'.

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Figure 4. 3D Rendering of Project

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Figure 5. Receptor and Stationary Noise Source Locations

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Figure 6. Location of Hydro Ottawa Building Neighbouring 105 and 109 Henderson Ave.

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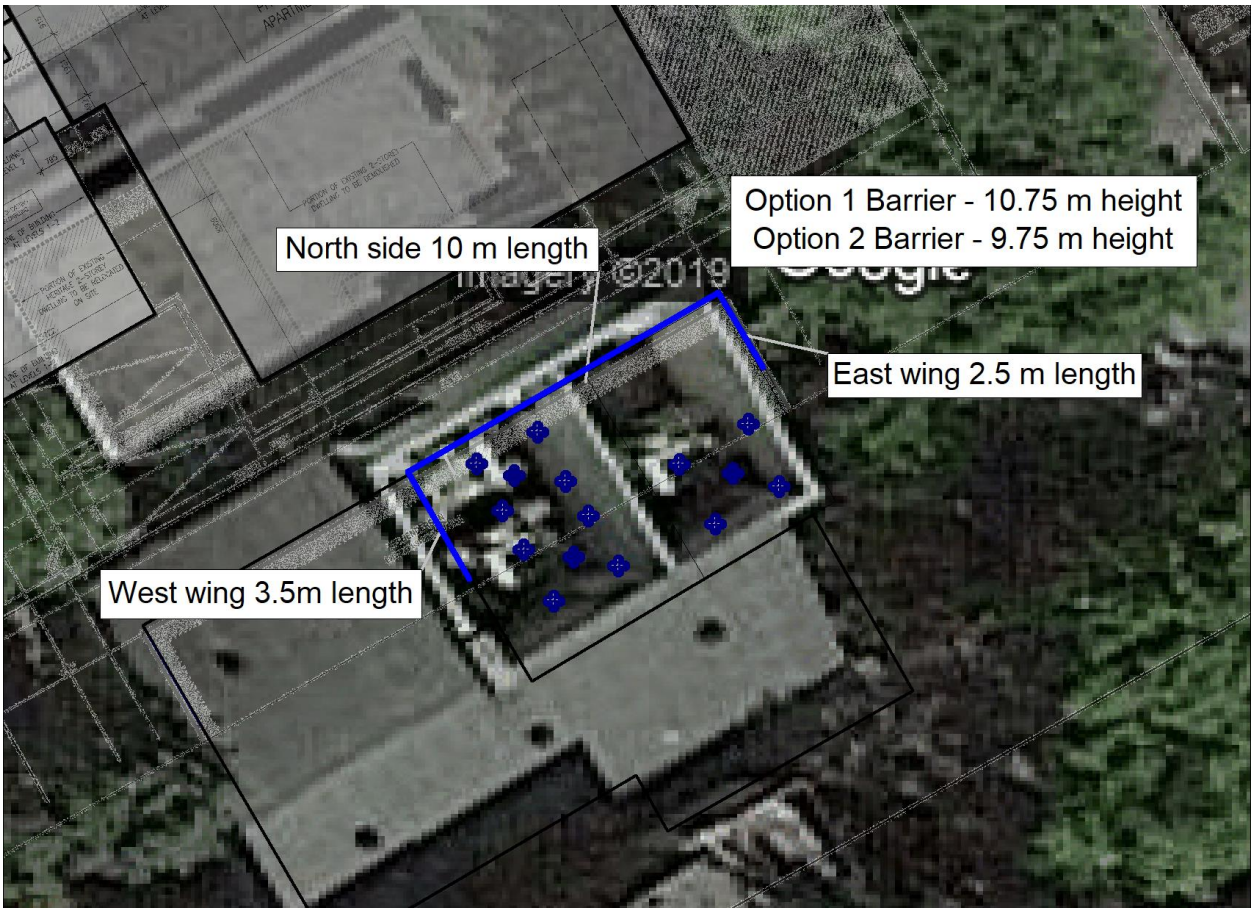

Figure 7. Noise Barrier Options

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Appendices

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APPENDIX A: STAMSON Transportation Noise Calculation Results

```
STAMSON 5.0         SUMMARY REPORT         Date: 25-04-2018 15:16:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poaa.te                Time Period: Day/Night 16/8 hours
Description: Noise level prediction at PoA 'A'.


Road data, segment # 1: KingEdward (day/night)
----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: KingEdward (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      2 / 2
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :   6.00 / 6.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.KingEdward       !     1.50 !    49.30 !    49.30
--------------------+----------+----------+----------
                      Total                  49.30 dBA


Result summary (night)
```

```
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.KingEdward       !     1.50 !    41.71 !    41.71
--------------------+----------+----------+----------
                      Total                  41.71 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 49.30
                           (NIGHT): 41.71
```


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```
STAMSON 5.0        SUMMARY REPORT        Date: 25-04-2018 15:17:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poab.te              Time Period: Day/Night 16/8 hours
Description: Noise level prediction at PoA 'B'.


Road data, segment # 1: KingEdward (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: KingEdward (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      2 / 2
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  94.00 / 94.00  m
Receiver height           :   3.00 / 3.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.KingEdward       !     1.50 !    48.29 !    48.29
--------------------+----------+----------+----------
                      Total                   48.29 dBA


Result summary (night)
----------------------

                    !  source  !   Road   !  Total
```

	height (m)	Leq (dBA)	Leq (dBA)
1.KingEdward	1.50	40.69	40.69
Total			40.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.29
(NIGHT): 40.69

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info@swallowacoustic.ca www.swallowacoustic.ca

```
STAMSON 5.0        SUMMARY REPORT        Date: 27-04-2018 11:28:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poac.te              Time Period: Day/Night 16/8 hours
Description: Noise level prediction at PoA 'C'.


Road data, segment # 1: KingEdward (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: KingEdward (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  : 100.00 / 100.00 m
Receiver height           :   9.00 / 9.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.KingEdward       !     1.50 !    53.81 !    53.81
--------------------+----------+----------+----------
                      Total                   53.81 dBA


Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
```

	! (m)	! (dBA)	! (dBA)
1.KingEdward	! 1.50	! 46.21	! 46.21
	Total		46.21 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.81
(NIGHT): 46.21

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info@swallowacoustic.ca www.swallowacoustic.ca

```
STAMSON 5.0        SUMMARY REPORT        Date: 25-04-2018 15:45:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poad.te              Time Period: Day/Night 16/8 hours
Description: Noise level prediction at PoA 'D'.


Road data, segment # 1: KingEdward (day/night)
----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: KingEdward (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      2 / 2
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 116.00 / 116.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -70.00 deg   Angle2 : 70.00 deg
Barrier height            :  10.50 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Result summary (day)
--------------------

                   !  source  !   Road   !  Total
                   !  height  !   Leq    !   Leq
                   !   (m)    !  (dBA)   !  (dBA)
-------------------+----------+----------+----------
 1.KingEdward      !     1.50 !    39.24 !    39.24
-------------------+----------+----------+----------
                     Total                  39.24 dBA
```

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.KingEdward	1.50	31.65	31.65
Total			31.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 39.24
(NIGHT): 31.65

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APPENDIX B: STAMSON Calculation POR Angles

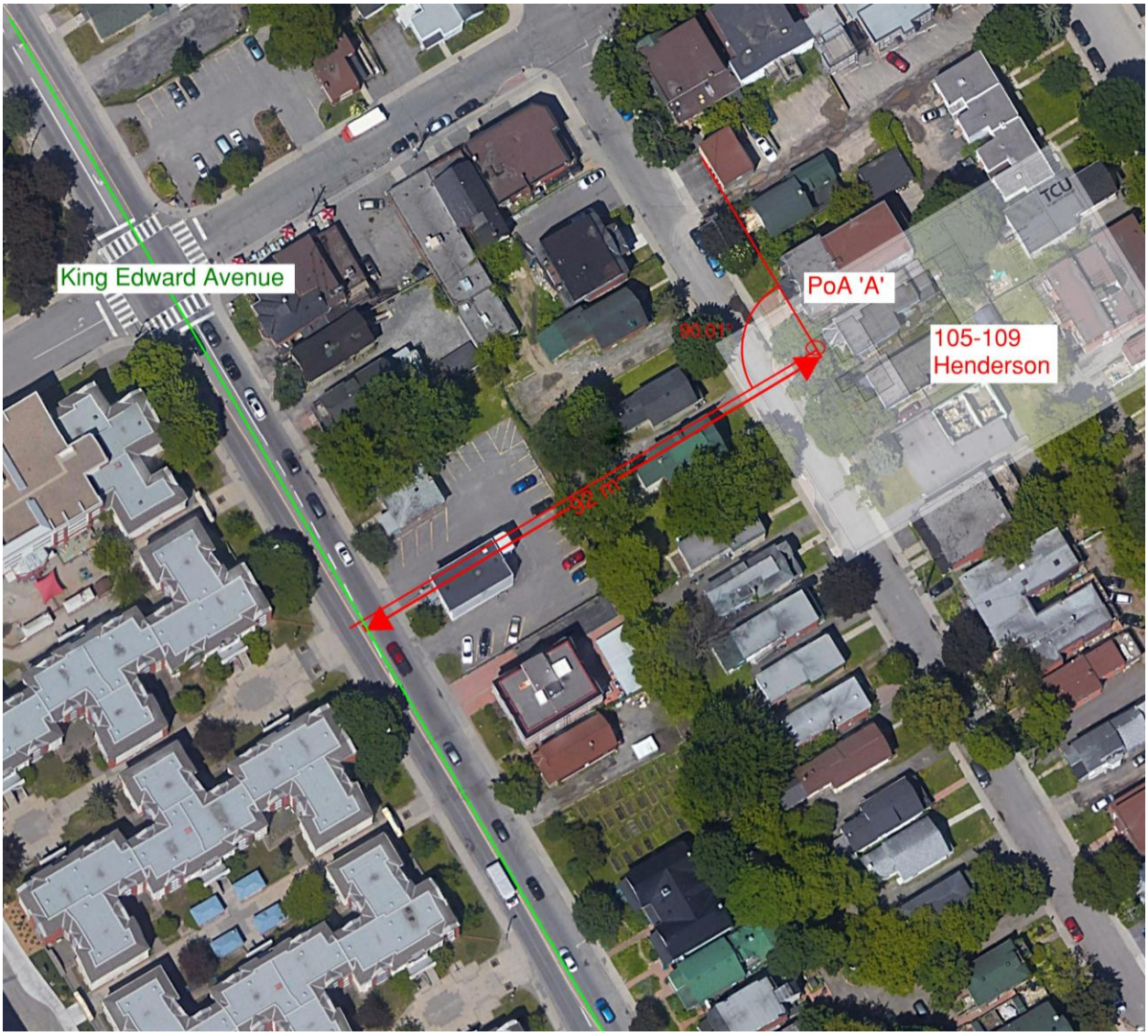

Figure 8. PoA 'A' Assessment Angles and Distance

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Figure 9. PoA 'B' Assessment Angles and Distance

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info@swallowacoustic.ca www.swallowacoustic.ca

Figure 10. PoA 'C' Assessment Angles and Distance

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info@swallowacoustic.ca www.swallowacoustic.ca

Figure 11. PoA 'D' Assessment Angles and Distance

SWALLOW ACOUSTIC CONSULTANTS LTD.
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info@swallowacoustic.ca www.swallowacoustic.ca

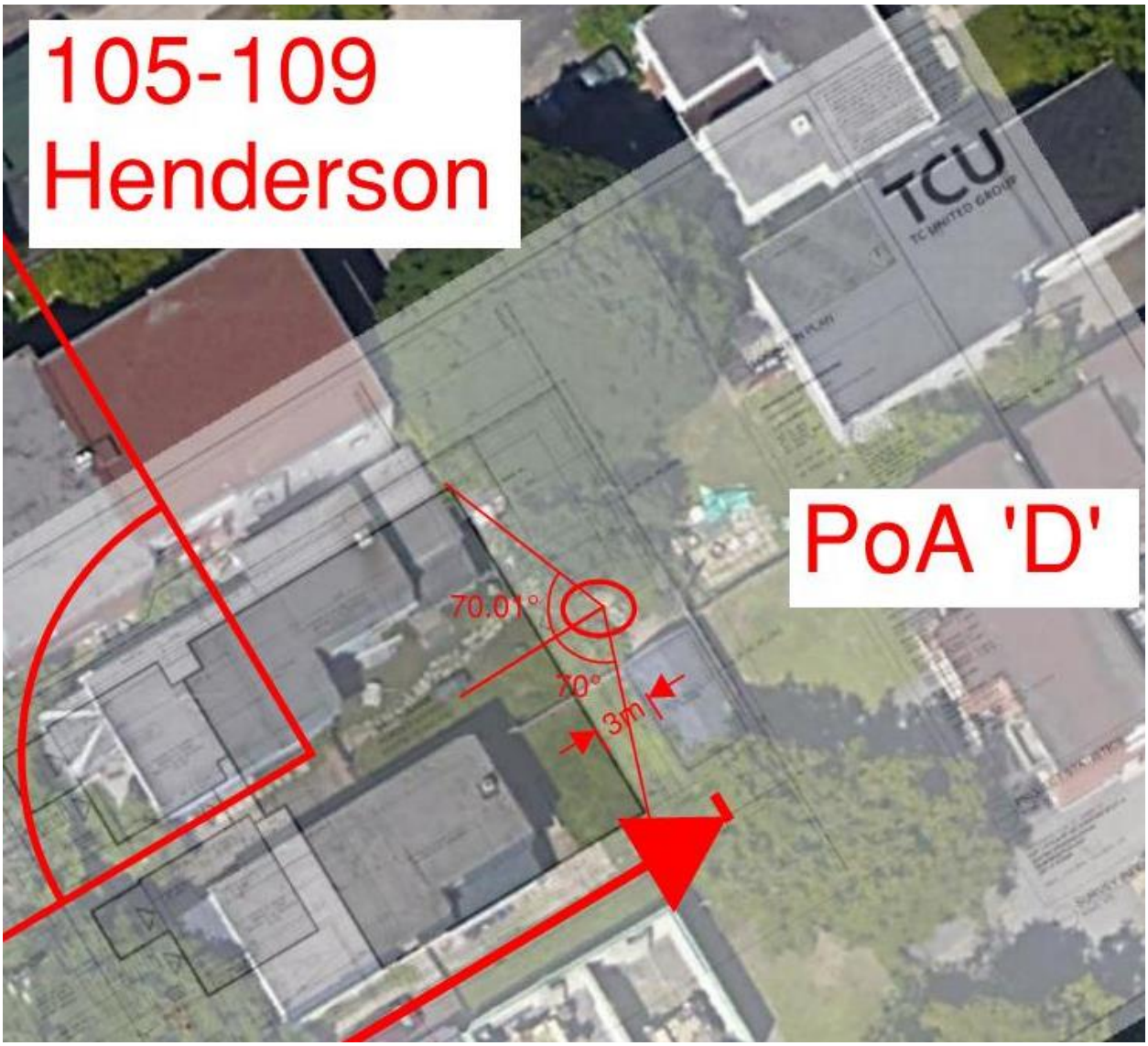

Figure 12. PoA 'D' Assessment Angles and Distance – Building Barrier

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info@swallowacoustic.ca www.swallowacoustic.ca

APPENDIX C: Hydro Ottawa Transformer Fan Manufacturer Sound Level Data

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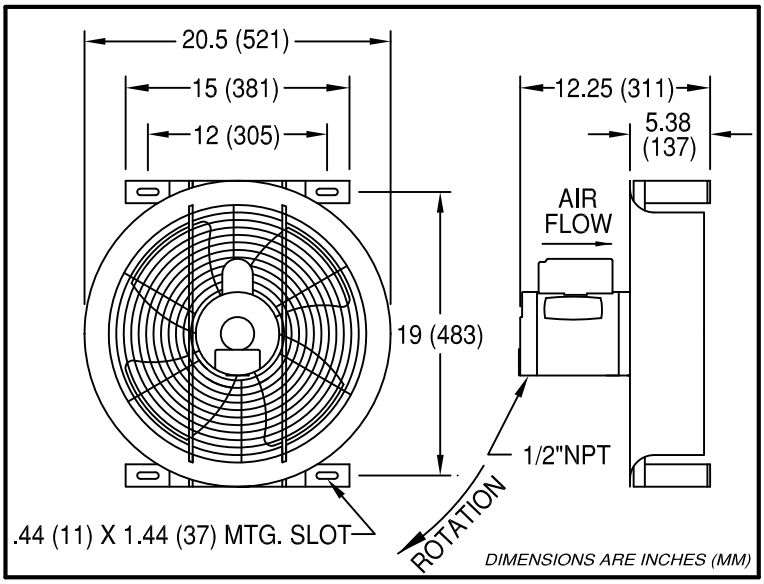
info@swallowacoustic.ca www.swallowacoustic.ca

TRANSFORMER COOLING FAN MODEL F16

FAN DIMENSIONS



FAN RATINGS

KRENZ & CO. PART NO.	F16-A7839
HP	1/4
RPM	1750
VOLTS	208-230
PHASE	1
HERTZ	60
CFM (1)	4500
dBA (2)	68.2

(1) ACTUAL CFM AS MEASURED WITH HORIZONTAL AIRFLOW ON DISCHARGE SIDE OF ONE TRANSFORMER RADIATOR.

(2) FAN SOUND TEST PROCEDURE CONFORMS TO IEEE C57.12.90-1999 FOR TRANSFORMER SOUND MEASUREMENTS, REQUIRING MULTIPLE READINGS AT 2M. FAN IS IN THE OPEN.

FAN FEATURES

FAN HOUSING
- HOT DIP GALVANIZED STEEL VENTURI HOUSING.
- HOT DIP GALVANIZED STEEL INLET AND OUTLET GUARDS.
- MEETS OSHA REQUIREMENTS.

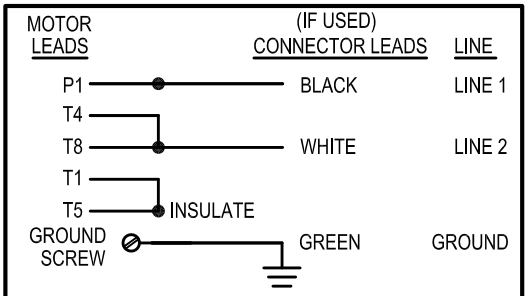
FAN MOTOR
- TOTALLY ENCLOSED NON-VENTILATED, IP54 ENCLOSURE.
- NEMA 48 FRAME WITH .625" DIA. 416 STAINLESS STEEL SHAFT.
- PERMANENTLY LUBRICATED, DOUBLE SEALED BALL BEARINGS.
- CLASS F INSULATION, CLASS B TEMPERATURE RISE.
- 55°C (131°F) MAXIMUM AMBIENT TEMPERATURE.
- INTEGRAL CONDUIT BOX WITH 1/2" NPT CONNECTION HOLE.
- AUTOMATIC-RESET OVERLOAD PROTECTION.
- FOUR-STEP PROPRIETARY COATING SYSTEM.
- ANSI 70 GRAY FINAL COAT IS STANDARD.
- FOUR 1/8" NPT CONDENSATION DRAIN HOLES.

FAN BLADE
- ONE PIECE, 4-WING, CAST ALUMINUM.
- CLOCKWISE FROM INLET SIDE.

FAN ELECTRICAL DATA

VOLTS	208	230	240
FAN AMPS	1.49	1.48	1.5
FULL LOAD AMPS	1.7	1.7	1.7
STARTING AMPS	6.7	7.6	7.9
LOCKED ROTOR AMPS	6.7	7.6	7.9
FAN WATTS	296	308	312
POWER FACTOR %	95.5	90.5	86.7

FAN MOTOR CONNECTION DIAGRAM



CLOCKWISE ROTATION FACING LEAD END.
TO REVERSE ROTATION INTERCHANGE T5 & T8.

IMPORTANT

TO AVOID MOTOR DAMAGE, CONDENSATION DRAIN PLUGS MUST BE INSTALLED PER INSTRUCTIONS SUPPLIED WITH EACH FAN.

NOTICE

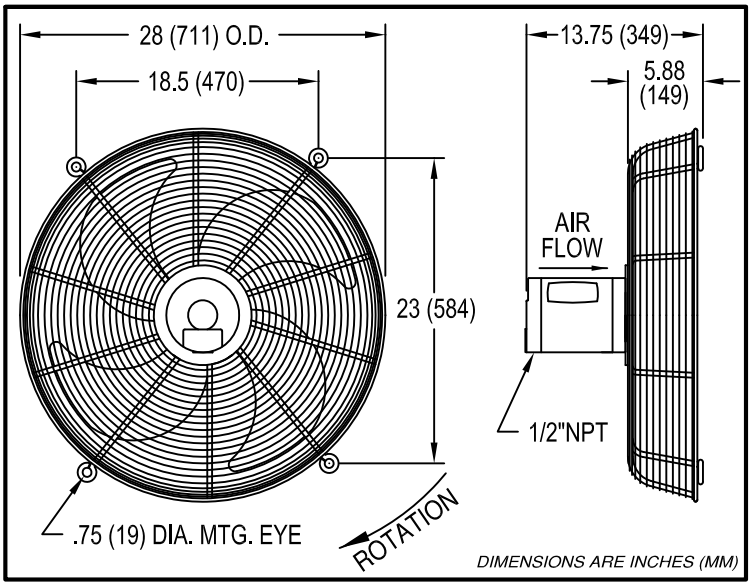
FAN PERFORMANCE DATA SHOWN IS TYPICAL DATA , NOT GUARANTEED DATA. DUE TO NORMAL MANUFACTURING TOLERANCES, SPECIFIC FAN PERFORMANCE MAY VARY.

KRENZ & CO., INC.
P.O. BOX 187, GERMANTOWN, WI 53022
PH:(262)-255-2310, FX:(262)-255-2904
E-MAIL: krenz@krenzvent.com

DATE	KRENZ & CO. PART NO.	F16-A7839
12/14/10		
BY GL		

TRANSFORMER COOLING FAN MODEL F24

FAN DIMENSIONS



FAN RATINGS

KRENZ & CO. PART NO.	F24-A7836
HP	1/6
RPM	1140
VOLTS	208-230
PHASE	1
HERTZ	60
CFM (1)	5200
dBA (2)	61.0

(1) Actual Airflow in CFM as measured with Horizontal Airflow on discharge side of one 15" deep transformer radiator.

(2) Nominal Sound Pressure values expressed are determined from Sound Power measurements performed in accordance with AMCA 300-08 and are based on a 2 meter measurement distance.

FAN FEATURES

FAN HOUSING
- BASKET TYPE WITH DISCHARGE GUARD.
- MEETS OSHA REQUIREMENTS.
- HOT DIP GALVANIZED STEEL.

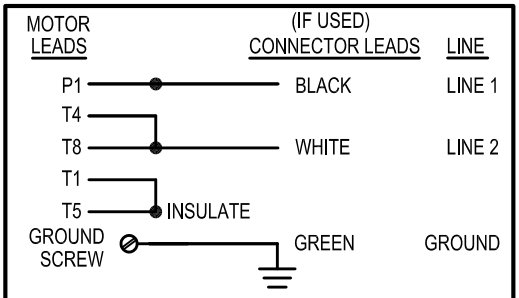
FAN MOTOR
- TOTALLY ENCLOSED NON-VENTILATED, IP54 ENCLOSURE.
- NEMA 48 FRAME WITH .625" DIA. 416 STAINLESS STEEL SHAFT.
- PERMANENTLY LUBRICATED, DOUBLE SEALED BALL BEARINGS.
- CLASS F INSULATION, CLASS B TEMPERATURE RISE.
- 55°C (131°F) MAXIMUM AMBIENT TEMPERATURE.
- INTEGRAL CONDUIT BOX WITH 1/2" NPT CONNECTION HOLE.
- AUTOMATIC-RESET OVERLOAD PROTECTION.
- FOUR-STEP PROPRIETARY COATING SYSTEM.
- ANSI 70 GRAY FINAL COAT IS STANDARD.
- FOUR 1/8" NPT CONDENSATION DRAIN HOLES.

FAN BLADE
- ONE PIECE, 4-WING, CAST ALUMINUM.
- CLOCKWISE FROM INLET SIDE.

FAN ELECTRICAL DATA

VOLTS	208	230	240
FAN AMPS	1.15	1.13	1.12
FULL LOAD AMPS	1.2	1.2	1.2
STARTING AMPS	2.83	3.18	3.25
LOCKED ROTOR AMPS	2.83	3.18	3.25
FAN WATTS	220	236	240
POWER FACTOR %	92.0	90.8	89.3

FAN MOTOR CONNECTION DIAGRAM



CLOCKWISE ROTATION FACING LEAD END.
TO REVERSE ROTATION INTERCHANGE T5 & T8.

IMPORTANT

TO AVOID MOTOR DAMAGE, CONDENSATION DRAIN PLUGS MUST BE INSTALLED PER INSTRUCTIONS SUPPLIED WITH EACH FAN.

NOTICE

FAN PERFORMANCE DATA SHOWN IS TYPICAL DATA , NOT GUARANTEED DATA. DUE TO NORMAL MANUFACTURING TOLERANCES, SPECIFIC FAN PERFORMANCE MAY VARY.

KRENZ & CO., INC.
P.O. BOX 187, GERMANTOWN, WI 53022
PH:(262)-255-2310, FX:(262)-255-2904
E-MAIL: krenz@krenzvent.com

DATE	KRENZ & CO. PART NO.	F24-A7836
4/6/16		
BY RR		

APPENDIX D: CadnaA Noise Model Calculation Output

SWALLOW ACOUSTIC CONSULTANTS LTD.
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info@swallowacoustic.ca www.swallowacoustic.ca

Report (20200129 SW18206 Model - noise barrier.cna)

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	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 (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	1.00
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	

Configuration	
Parameter	Value
Strictly acc. to AzB	

Result Table

Receiver		Land Use	Limiting Value		rel. Axis			Lr w/o Noise Control		dL req.		Lr w/ Noise Control		Exceeding		passive NC
Name	ID		Day	Night	Station	Distance	Height	Day	Night	Day	Night	Day	Night	Day	Night	
			dB(A)	dB(A)	m	m	m	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
R1			0	0				64.3	62.4	64.3	62.4	58.3	58.3	58.3	58.3	58.3
OR1			0	0				40.1	38.8	40.1	38.8	36.2	36.2	36.2	36.2	36.2

Group Day and Night

Name	Expression	Partial Sum Level All On			
		R1		OR1	
		Day	Night	Day	Night
Root	!*	64.3	62.4	40.1	38.8
Barriers	!00*				
With new fans	!0000*				
Existing	!0001*				
New No New Fans	!0002*				
Buildings	!01*				
Fans	!02*	62.8	59.8	37.2	34.2
New	!0200*				
Existing	!0201*	62.8	59.8	37.2	34.2
Transformers	!03*	59.1	59.1	36.9	36.9

Partial Day/Night

Source			Partial Level All On			
Name	M.	ID	R1		OR1	
			Day	Night	Day	Night
T1		!03!	55.4	55.4	30.1	30.1
T1F1		!0201!	53.4	50.4	24.2	21.2
T1F2		!0201!	53.4	50.4	23.1	20.1
T1F3		!0201!	53.0	50.0	24.0	21.0
T1F4		!0201!	53.0	50.0	22.8	19.8
T2		!03!	55.3	55.3	35.0	35.0
T2F1		!0201!	51.8	48.8	30.0	27.0
T2F2		!0201!	53.7	50.7	30.1	27.1
T2F3		!0201!	51.3	48.3	27.8	24.8
T2F4		!0201!	53.3	50.3	30.1	27.1
T3		!03!	50.6	50.6	28.2	28.2
T3F1		!0201!	48.5	45.5	20.9	17.9
T3F2		!0201!	49.3	46.3	23.2	20.2
T3F3		!0201!	50.1	47.1	24.1	21.1
T3F4		!0201!	48.5	45.5	21.5	18.5
T1F1	~	!0200!				
T1F2	~	!0200!				
T1F3	~	!0200!				
T1F4	~	!0200!				
T2F1	~	!0200!				
T2F2	~	!0200!				
T2F3	~	!0200!				

Source			Partial Level All On			
Name	M.	ID	R1		OR1	
			Day	Night	Day	Night
T2F4	~	!0200!				
T3F1	~	!0200!				
T3F2	~	!0200!				
T3F3	~	!0200!				
T3F4	~	!0200!				
Front Louvre			17.4	17.4	4.5	4.5

Sound Sources

Point Sources

Name	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)
T1		!03!	85.6	85.6	85.6	Lw	Transformer		0.0	0.0	0.0							0.0		(none)	1.40	r	18446824.20	5030216.41	1.4
T1F1		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446822.79	5030216.62	2.0
T1F2		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446824.63	5030217.59	2.0
T1F3		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446823.64	5030215.16	2.0
T1F4		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446825.49	5030216.16	2.0
T2		!03!	85.6	85.6	85.6	Lw	Transformer		0.0	0.0	0.0							0.0		(none)	1.40	r	18446828.77	5030218.80	1.4
T2F1		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446827.23	5030219.06	2.0
T2F2		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446829.20	5030220.20	2.0
T2F3		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446828.26	5030217.35	2.0
T2F4		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446830.08	5030218.42	2.0
T3		!03!	85.6	85.6	85.6	Lw	Transformer		0.0	0.0	0.0							0.0		(none)	1.40	r	18446822.51	5030218.74	1.4
T3F1		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446821.44	5030219.07	2.0
T3F2		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446823.98	5030218.57	2.0
T3F3		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446822.18	5030217.72	2.0
T3F4		!0201!	82.2	82.2	79.2	Lw	Fans		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446823.17	5030219.99	2.0
T1F1	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446822.77	5030216.65	2.0
T1F2	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446824.62	5030217.62	2.0
T1F3	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446823.62	5030215.19	2.0
T1F4	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446825.47	5030216.19	2.0
T2F1	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446827.21	5030219.09	2.0
T2F2	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446829.19	5030220.23	2.0
T2F3	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446828.24	5030217.38	2.0
T2F4	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446830.07	5030218.45	2.0
T3F1	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446821.42	5030219.10	2.0
T3F2	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446823.96	5030218.60	2.0
T3F3	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446822.16	5030217.75	2.0
T3F4	~	!0200!	75.0	75.0	72.0	Lw	NewFan		0.0	0.0	-3.0							0.0		(none)	2.00	r	18446823.16	5030220.02	2.0

Area Sources

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Moving Pt. Src		
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night				Number		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		Day	Evening	Night

Geometry Area Sources

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)

Vertical Area Sources

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuation	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)	
Front Louvre			66.1	66.1	66.1	61.3	61.3	61.3	Lw	Louvre		0.0	0.0	0.0							3.0		(none)

Geometry Vertical Area Sources

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)
Front Louvre	1.00	r			18446812.03	5030214.17	1.00	0.00
					18446813.56	5030211.55	1.00	0.00

Receptors

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
R1			46.9	45.4	0.0	0.0		x	Total	9.00	r	18446822.55	5030225.26	9.00
OR1			37.7	35.9	0.0	0.0		x	Total	1.50	r	18446825.74	5030237.33	1.50

Obstacles

Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			
			left	right		horz.	vert.	Begin		End	
					(m)	(m)	(m)	(m)		(m)	
Transformer Courtyard		!0001!	0.21	0.21				5.00	a		
Transformer Courtyard Middle		!0001!	0.21	0.21				5.00	a		
Transformer Courtyard New Barrier old fans		!0002!	0.21	0.21				10.75	a		
Transformer Courtyard New Barrier new fans	~	!0000!	0.21	0.21				9.75	a		

Geometry Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			Coordinates			
			left	right		horz.	vert.	Begin		End	x	y	z	Ground
					(m)	(m)	(m)	(m)		(m)	(m)	(m)	(m)	(m)
Transformer Courtyard		!0001!	0.21	0.21				5.00	a		18446823.01	5030212.88	5.00	0.00
											18446819.53	5030218.80	5.00	0.00
											18446828.37	5030223.84	5.00	0.00
											18446831.69	5030218.01	5.00	0.00
											18446823.00	5030212.89	5.00	0.00
Transformer Courtyard Middle		!0001!	0.21	0.21				5.00	a		18446824.49	5030221.67	5.00	0.00
											18446827.99	5030215.74	5.00	0.00
Transformer Courtyard New Barrier old fans		!0002!	0.21	0.21				10.75	a		18446821.27	5030215.80	10.75	0.00
											18446819.54	5030218.83	10.75	0.00
											18446828.33	5030223.89	10.75	0.00
											18446829.58	5030221.81	10.75	0.00
Transformer Courtyard New Barrier new fans	~	!0000!	0.21	0.21				9.75	a		18446820.81	5030216.56	9.75	0.00
											18446819.53	5030218.85	9.75	0.00

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(m)	(m)	(m)	(m)		(m)		(m)	(m)	(m)	(m)
												18446828.32	5030223.91	9.75	0.00
												18446829.61	5030221.83	9.75	0.00

Building

Name	M.	ID	RB	Residents	Absorption	Height	
						Begin	
						(m)	
Unit 1a/1b		!01!		0	0.37	7.50	r
Unit 2a/2b		!01!		0	0.37	7.50	r
Unit 3/4/5/6		!01!		0	0.37	10.50	r
Hydro Ottawa Bldg		!01!		0	0.37	4.00	r

Geometry Building

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(m)		(m)	(m)	(m)	(m)
Unit 1a/1b		!01!		0	0.37	7.50	r	18446797.53	5030231.97	7.50	0.00
								18446799.83	5030233.26	7.50	0.00
								18446799.73	5030233.43	7.50	0.00
								18446804.88	5030236.32	7.50	0.00
								18446805.56	5030235.11	7.50	0.00
								18446806.11	5030235.42	7.50	0.00
								18446808.14	5030231.79	7.50	0.00
								18446807.61	5030231.50	7.50	0.00
								18446808.09	5030230.64	7.50	0.00
								18446802.94	5030227.76	7.50	0.00
								18446801.30	5030230.69	7.50	0.00
								18446798.99	5030229.39	7.50	0.00
Unit 2a/2b		!01!		0	0.37	7.50	r	18446801.70	5030224.60	7.50	0.00
								18446804.00	5030225.90	7.50	0.00
								18446803.92	5030226.03	7.50	0.00
								18446809.09	5030228.95	7.50	0.00
								18446812.25	5030223.36	7.50	0.00
								18446807.07	5030220.43	7.50	0.00
								18446805.30	5030223.56	7.50	0.00
								18446803.00	5030222.26	7.50	0.00
Unit 3/4/5/6		!01!		0	0.37	10.50	r	18446809.88	5030228.80	10.50	0.00
								18446806.11	5030235.48	10.50	0.00
								18446806.98	5030235.97	10.50	0.00
								18446806.31	5030237.16	10.50	0.00
								18446818.60	5030244.09	10.50	0.00
								18446827.49	5030228.33	10.50	0.00
								18446815.26	5030221.43	10.50	0.00
								18446810.80	5030229.33	10.50	0.00
Hydro Ottawa Bldg		!01!		0	0.37	4.00	r	18446811.90	5030214.46	4.00	0.00
								18446819.50	5030218.79	4.00	0.00
								18446823.00	5030212.87	4.00	0.00
								18446831.05	5030217.63	4.00	0.00
								18446833.90	5030212.60	4.00	0.00
								18446826.89	5030208.59	4.00	0.00

Name	M.	ID	RB	Residents	Absorption	Height	Coordinates			
						Begin	x	y	z	Ground
						(m)	(m)	(m)	(m)	(m)
							18446825.98	5030210.17	4.00	0.00
							18446817.35	5030205.10	4.00	0.00