REPORT

244 Fountain Place

Ottawa, Ontario

Noise Impact Assessment Study

SACL #B6-221

September 12, 2016

Submitted to:

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1. Introduction

At the request of TC United Group, Swallow Acoustic Consultants Ltd. (SACL) is pleased to present this Noise Impact Assessment Study (NIAS) for the proposed 3 and 4-storey residential buildings (the "Project") to be located on currently vacant land at 244 Fountain Place in Ottawa, Ontario. The entire development consists of residential suites, with parking located behind the two buildings. Building 'A' is 3 storeys high and is located near to Rideau Street, whereas Building 'B' is 4 storeys high and is located near Besserer Street. Adjacencies include residences, as well as Besserer Park to the northwest. Each building has its own rooftop terrace and there is also a backyard located southwest of Building 'B'. This NIAS assesses noise impacts from nearby surface transportation sources. Based on observations made at the site, there are no significant stationary noise sources that are likely to exceed the applicable sound level criteria for the Project, and an assessment of stationary noise sources associated with the Project is outside the scope of this report (details in Section 5). This report supercedes a previous version of the report, dated April 22, 2016. Changes have been made following revisions to the project design.

The only surface transportation corridor impacting on the Project is Rideau Street, due to its roadway classification per the City of Ottawa and its proximity to the development. Copies of the proposed site plans are included in Appendix A. The site plan drawings have been marked-up to show the location of worst-case Points of Assessment (POA).

2. Noise Assessment Criteria

The City of Ottawa requirements for environmental noise impact assessments are outlined in the ENCG [1], which in turn reference guideline documents prepared by the Ontario Ministry of the Environment and Climate Change (MOECC). 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

Exclusion limit values outlined in ENCG [1] for surface transportation noise impacting on a noise-sensitive development have been summarized in Table 1 for a residential development. There are no railway corridors within the ENCG's prescribed radius of the proposed development, and therefore only significant road corridors are considered in this report.

Table 1: ENCG Exclusion Limit Values for residential developments Areas (Road Noise)

Type of Point of Reception	Time Period	Time Period Description	Sound Level Limit L_{EQ} [dBA]
Outdoor Living Area (OLA)	07:00 to 23:00	Daytime	55
Indoor Space (Living Quarters)	07:00 to 23:00	Daytime	45
Indoor Space (Sleeping Quarters)	07:00 to 23:00	Daytime	45
Indoor Space (Sleeping Quarters)	23:00 to 07:00	Night-time	40

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For outdoor living areas (OLA) where it is not technically or economically feasible to achieve the noise level criterion in Table 1, the MOECC and City of Ottawa Guidelines include a conditional tolerance of no more than 5 dB above the noise level criterion.

Furthermore, based on the plane of window calculations for indoor spaces, upgraded building components, ventilation systems and warning clauses may be required. The City of Ottawa requirements, shown in Table 2 and Table 3 below, are based on the requirements found in MOECC document NPC-300 [3].

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 $L_{EQ-16HR}$ Less than or equal to 65 dBA	Building compliant with the Ontario Building Code
	Daytime $L_{EQ-16HR}$ 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 L_{EQ-8HR} Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
	Night-time L_{EQ-8HR} Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

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

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 $L_{EQ-16HR}$ Less than or equal to 55 dBA	None required	Not required
	Daytime $L_{EQ-16HR}$ 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 $L_{EQ-16HR}$ Greater than 65 dBA	Central air conditioning	Required Type D
Plane of Living Room Window and/or Bedroom Window	Night-time L_{EQ-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 L_{EQ-8HR} Greater than 60 dBA	Central air conditioning	Required Type D

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

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2.2. Neighbouring Stationary Source Noise Assessment Criteria

Stationary sources of noise include all sources of sound and vibration that exist or operate on a 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 MOECC, 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 [1] 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 L_{EQ-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

3. Surface Transportation Noise

3.1. Surface Transportation Noise - Sources

The only surface transportation corridor impacting on the Project is Rideau Street. This transportation corridor was included due to its roadway classification ("Urban Arterial" per the City of Ottawa Transportation Master Plan (TMP) [2]) and due to its proximity to the Project (within 100 m of the Project's limits). The "ultimate" road and traffic data information, including the Annual Average Daily Traffic (AADT), for Rideau Street was obtained from the ENCG [1] and is summarized in Table 5. These parameters were used to predict the traffic noise levels using STAMSON Version 5.04, a software developed by the MOECC. Sample results from STAMSON are available in Appendix B.

Table 5: ENCG Traffic and Road Parameters for STAMSON Modelling

Road	Implied Roadway Class	Speed Limit [km/h]	Ultimate AADT [Vehicles per day]	Day/Night Split [%]	Medium Trucks [%]	Heavy Trucks [%]
Rideau Street (Eastbound)	4-Lane Urban Arterial-Undivided (Eastbound and Westbound, 2 lanes ea.)	50	15,000	92/8	7	5
Rideau Street (Westbound)		50	15,000	92/8	7	5

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Separation distances were taken from the centre of the road segments.

3.2. Surface Transportation Noise - Points of Assessment

Points of Assessment (POA) were chosen to represent a worst-case scenarios at the Plane of Window (PoW) of bedrooms and living spaces. Table 6 contains a description of the location of each POA, and a site plan is included in Appendix A showing the location of each POA.

Table 6: Locations of Points of Assessment (POA)

Point of Assessment (POA)	Height (ref. Grade) [m]	Storey	Building ('A' or 'B') / Facade	Notes/Comments
POA 'A'	1.5	Lower	'A' / Northwest	PoW: Living space facing Besserer Park
POA 'B'	1.5	Lower	'A' / Northeast	PoW: Living space facing Fountain Place
POA 'C'	1.5	Lower	'A' / Northeast	PoW: Bedroom facing Fountain Place
POA 'D'	4.5	Ground	'A' / Northwest	PoW: Living space facing Besserer Park
POA 'E'	4.5	Ground	'A' / Northeast	PoW: Living space facing Fountain Place
POA 'F'	4.5	Ground	'A' / Northeast	PoW: Living space facing Fountain Place
POA 'G'	4.5	Ground	'A' / Southeast	PoW: Living space facing the Rideau River
POA 'H'	7.5	2nd	'A' / Northwest	PoW: Living space facing Besserer Park
POA 'I'	7.5	2nd	'A' / Northeast	PoW: Living space facing Fountain Place. Worst case.
POA 'J'	7.5	2nd	'A' / Northeast	PoW: Living space facing Fountain Place
POA 'K'	7.5	2nd	'A' / Southeast	PoW: Living space facing the Rideau River
POA 'L'	10.5	Roof	'A' / Rooftop	OLA: Middle of rooftop terrace for Building 'A'
POA 'M'	1.5	Lower	'B' / Northeast	PoW: Bedroom facing Fountain Place
POA 'N'	1.5	Lower	'B' / Northeast	PoW: Living space facing Fountain Place
POA 'O'	4.5	Ground	'B' / Northeast	PoW: Bedroom facing Fountain Place
POA 'P'	4.5	Ground	'B' / Northwest	PoW: Living space facing Besserer Park
POA 'Q'	4.5	Ground	'B' / Northeast	PoW: Living space facing Fountain Place
POA 'R'	10.5	3rd	'B' / Northeast	PoW: Bedroom facing Fountain Place
POA 'S'	10.5	3rd	'B' / Northwest	PoW: Living space facing Besserer Park
POA 'T'	10.5	3rd	'B' / Northeast	PoW: Living space facing Fountain Place
POA 'U'	13.5	Roof	'B' / Rooftop	OLA: Middle of rooftop terrace for Building 'B'
POA 'V'	1.5	Grade	Backyard	OLA: Backyard southwest of Building 'B'

Of note, for POA's A, D, H, P and S, line-of-sight to the Rideau Street traffic is partially obstructed by a small hill in Besserer Park to the northwest. However, the effect of this hill on the predicted noise levels was found to be negligible, and therefore the terrain was considered flat in our model and calculations; the only exception is for POA 'V', where a 4.5 m retaining wall to its northwest offers considerable acoustic shading from surface transportation noise sources travelling on

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Rideau Street. Furthermore, residential balconies associated with the project are not expected to be over 4 m in depth, and therefore are not assessed as OLAs as per the ENCG [1].

3.3. Surface Transportation Noise - Calculations

Sample calculations generated by STAMSON can be found in Appendix B. Table 7 shows the daytime and night-time noise level predictions at each POA, along with a comparison to the daytime and night-time criteria for noise control measure, outlined in Table 3.

Table 7: Daytime / Night-time Calculated Noise Levels - Surface Transportation Noise

Point of Assessment (POA)	Daytime Noise Level Calculation [dBA]	Night-time Noise Level Calculation [dBA]	Criteria for Noise Control Measures (Daytime) [dBA]	Criteria for Noise Control Measures (Night-time) [dBA]	Compliant? (Day/Night)
POA 'A'	64	57	55	50	(No / No)
POA 'B'	65	57	55	50	(No / No)
POA 'C'	64	56	55	50	(No / No)
POA 'D'	65	57	55	50	(No / No)
POA 'E'	65	57	55	50	(No / No)
POA 'F'	65	57	55	50	(No / No)
POA 'G'	57	49	55	50	(No / Yes)
POA 'H'	65	57	55	50	(No / No)
POA 'I'	65	58	55	50	(No / No)
POA 'J'	65	58	55	50	(No / No)
POA 'K'	57	50	55	50	(No / Yes)
POA 'L'	66	N/A	55	N/A	(No)
POA 'M'	60	52	55	50	(No / No)
POA 'N'	46	38	55	50	(Yes / Yes)
POA 'O'	60	52	55	50	(No / No)
POA 'P'	61	54	55	50	(No / No)
POA 'Q'	52	44	55	50	(Yes / Yes)
POA 'R'	61	54	55	50	(No / No)
POA 'S'	63	55	55	50	(No / No)
POA 'T'	58	51	55	50	(No / No)
POA 'U'	63	N/A	55	N/A	(No)
POA 'V'	48	N/A	55	N/A	(Yes)

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4. Noise Control – Surface Transportation Noise

4.1. Indoor Noise Control Measures

4.1.1. Ventilation Requirements

The results of Section 3.3 indicate that the calculated surface transportation noise levels exceed the applicable sound level limits at the plane of bedroom and living room windows for the Project. Therefore, as per Table 3 of this NIAS, forced air heating with provision for central air conditioning must be provided to all units. The associated warning clause in Section 4.1.4 must be included in all agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations.

4.1.2. Building Component Requirements

As indicated in Table 2, the calculated sound levels listed in Section 3.3 indicate that the building components must simply meet Ontario Building Code requirements in order to offer adequate sound isolation.

4.1.3. Outdoor Living Area Mitigation

The backyard OLA located southwest of Building 'B', represented by POA 'V', complies with the outdoor noise level limit shown in Table 1. However, the rooftop terraces associated with POA 'L' and 'U' do not meet the outdoor noise level limits shown in Table 1, and therefore some form of noise mitigation is required in order to reduce these noise levels.

The noise level prediction at POA 'L', associated with Building 'A', is 66 dBA. A 1.6 m tall noise barrier at the northeast and northwest sides of this rooftop OLA perimeter is shown to reduce the noise levels down to 59 dBA, which is compliant considering the conditional tolerance noted in Section 2.1. In order to reduce the noise level prediction at POA 'L' to 55 dBA, a 2.9 m tall barrier around the rooftop OLA perimeter is required. As such, it is recommended that a 1.6 m tall noise barrier be erected around the northeast and northwest sides of the rooftop OLA perimeter for Building 'A' (see Figure 3 in Appendix A), and that the associated warning clause in Section 4.1.4 be included in all agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations.

Similarly, the noise level prediction at POA 'U', associated with Building 'B', is 63 dBA. A 1.0 m tall noise barrier at the northeast and northwest sides of this rooftop OLA perimeter is shown to reduce the noise levels down to 59 dBA, which is compliant considering the conditional tolerance noted in Section 2.1. In order to reduce the noise level prediction at POA 'U' to 55 dBA, a 2.3 m tall barrier around the rooftop OLA perimeter is required. Nonetheless, for consistency with Building 'A', it is recommended that a 1.6 m tall noise barrier be erected around the northeast and northwest sides of the rooftop OLA perimeter for Building 'B' (see Figure 6 in Appendix A), and that the associated warning clause in Section 4.1.4 be included in all agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations. SACL predictions show that a 1.6 m tall noise barrier would reduce the noise level down to 57 dBA.

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Of note, per ENCG requirements, all noise barriers must not contain any holes or gaps, and must have a minimum surface density of 20 kg/m^2. Transparent barriers can be used, as long as they meet the minimum density requirement of 20 kg/m^2. All acoustic barriers must comply with the requirements listed in the ENCG. A verification of wind/snow loads must also be undertaken by a third party professional.

4.1.4. Warning Clause Requirements

The results of Section 3.3 indicate that the predicted surface transportation noise levels exceed the applicable sound level limits at the plane of bedroom and living room windows for the Project. Therefore, per Table 3, a warning clause “Type C” must be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations. MOECC-suggested wording, consistent with the ENCG, for the warning clause is as follows:

> "This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment and Climate Change.”

Furthermore, the noise levels at the rooftop OLA’s are above the sound level limit in Table 1, but remain within the 5 dBA tolerance due to the inclusion of the proposed noise barriers (see Section 4.1.3). Therefore, it is required that a warning clause be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations. MOECC-suggested wording for the warning clause is as follows:

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

5. Neighbouring Stationary Source Noise

A site visit was conducted on April 21, 2016, in order to identify potential stationary noise sources that may impact the project. No significant stationary noise sources were identified in the vicinity of the proposed development that are likely to cause noise levels in excess of MOECC and City of Ottawa requirements.

The Project will 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 need to comply with ENCG sound level limits from a Stationary Source at all nearby noise-sensitive land uses.

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6. Concluding Comments

With the incorporation of the noise control measures and warning clauses as presented in Section 4 of this report, the impact of transportation noise on the proposed residential development will meet ENCG requirements. There are currently no significant stationary noise sources that impact the Project. The proposed residential development located at 244 Fountain Place 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. City of Ottawa Transportation Master Plan (TMP), published by the City of Ottawa on November 2013;
3. Ministry of the Environment and Climate Change (MOECC) Publication NPC-300: Stationary and Transportation Sources - Approval and Planning, published in October 2013;
4. Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT), Technical document published by the MOECC in October 1989;
5. Ministry of the Environment and Climate Change (MOECC) Publication: Manual for Environmental Noise Assessment in Land Use Planning Course, published in November 1999.

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Appendices

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Appendix A – Site Plans

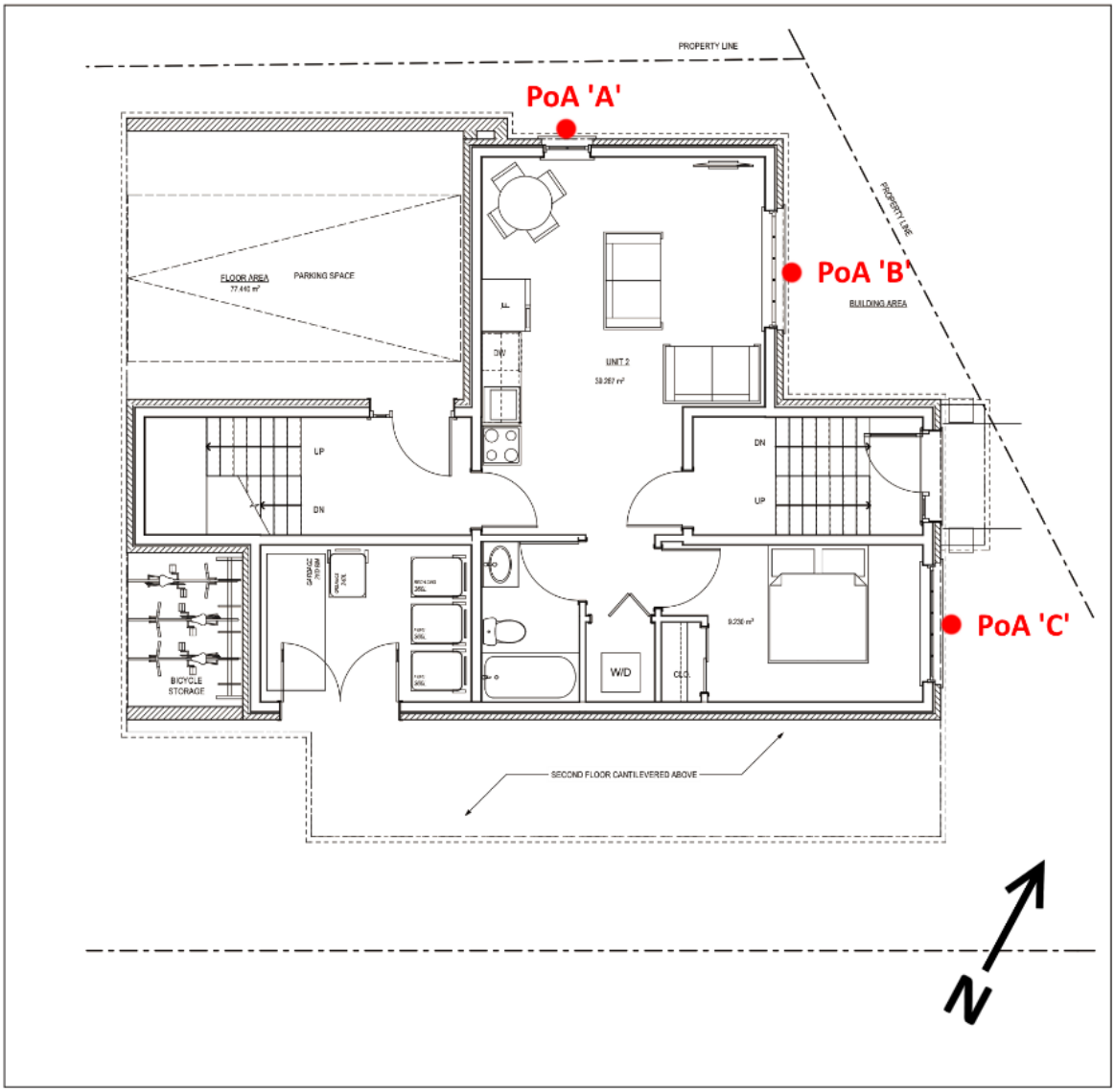

Figure 1: Site plan showing location of Points of Reception POA 'A', POA 'B' & POA 'C' on the Lower Level of Building 'A'.

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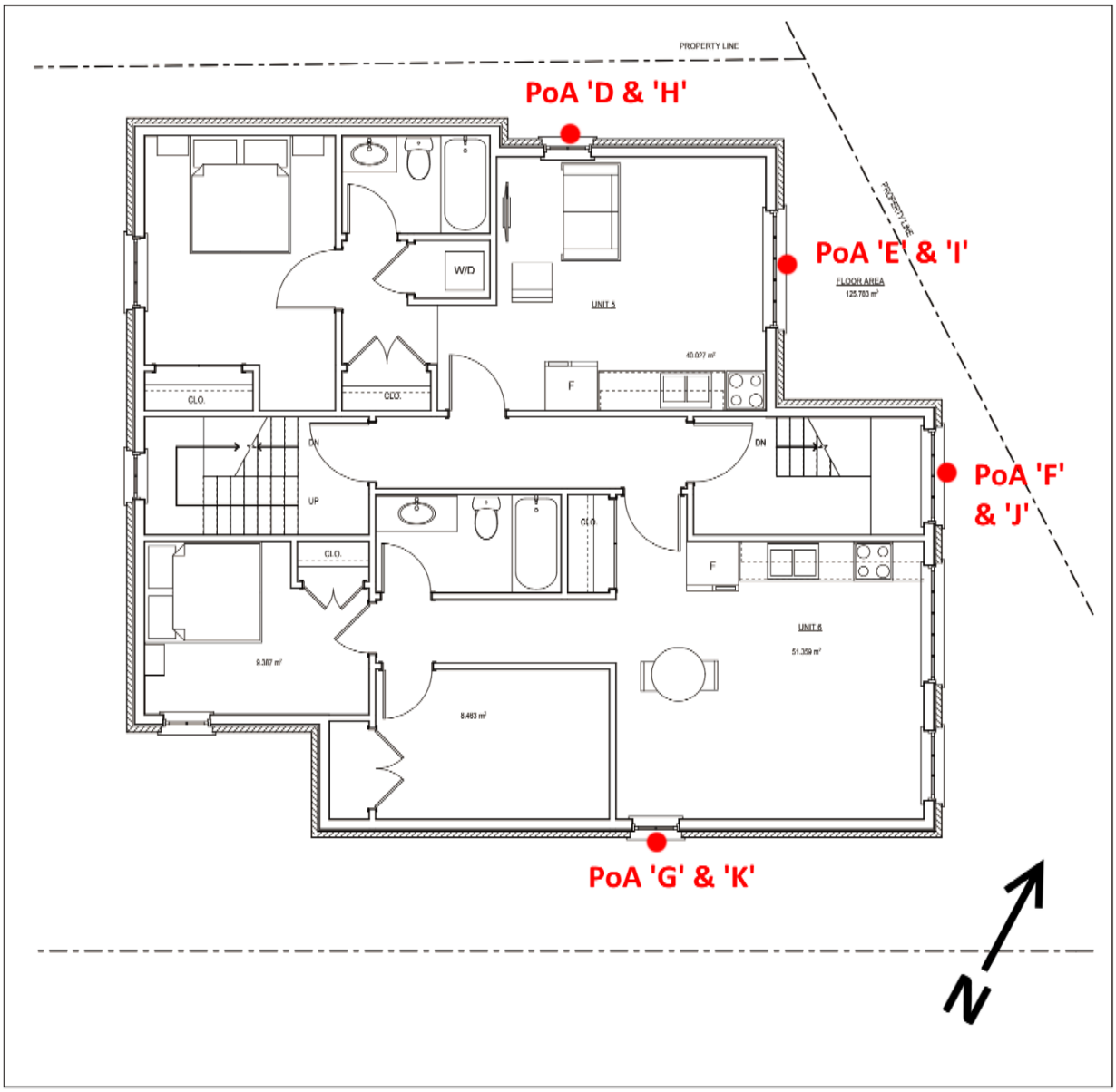

Figure 2: Site plan showing location of Points of Reception POA 'D' through 'K' on Floors "Ground" and 2 of Building 'A'.

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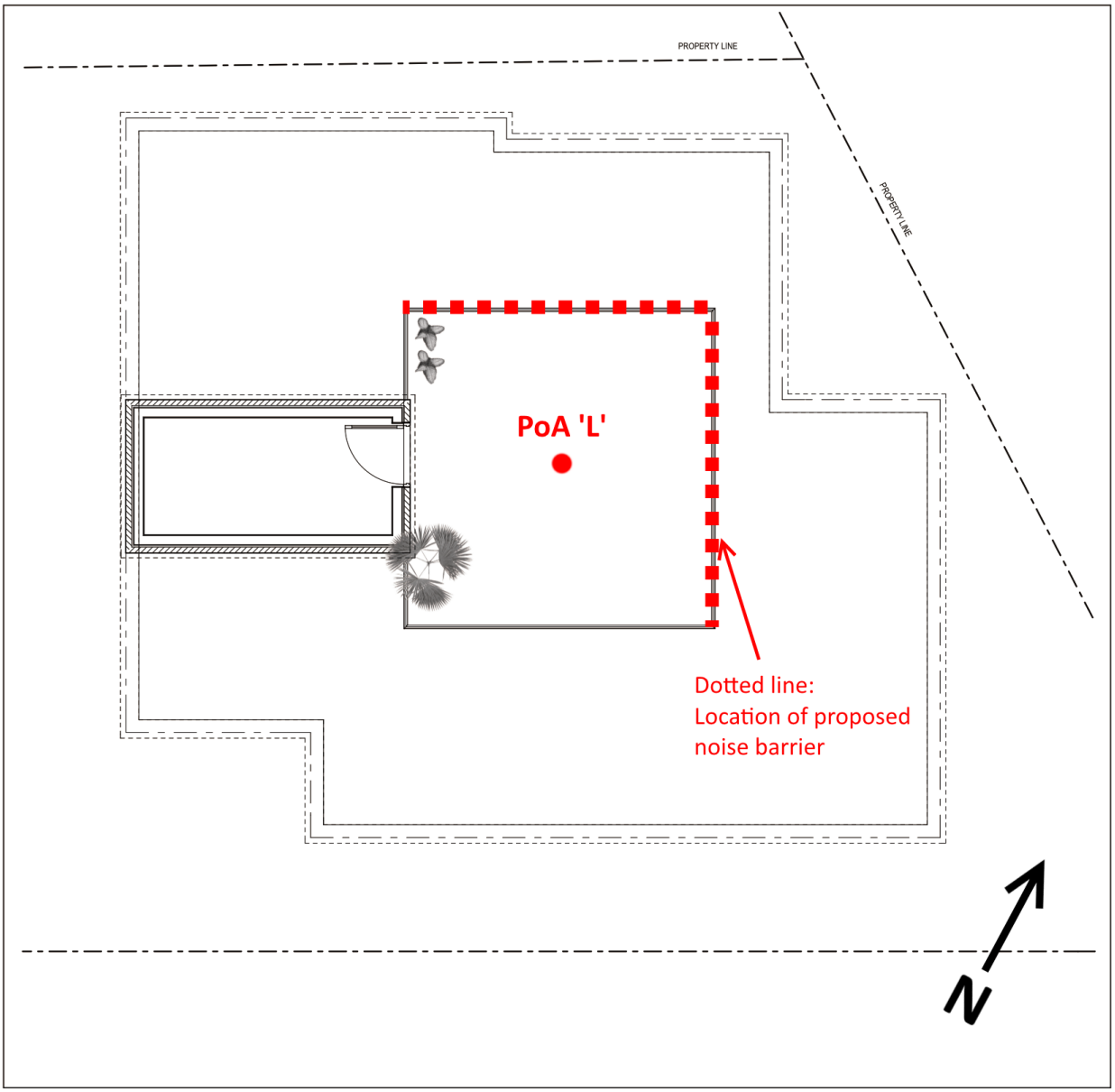

Figure 3: Site plan showing location of Point of Reception POA 'L' on the rooftop of Building 'A'.

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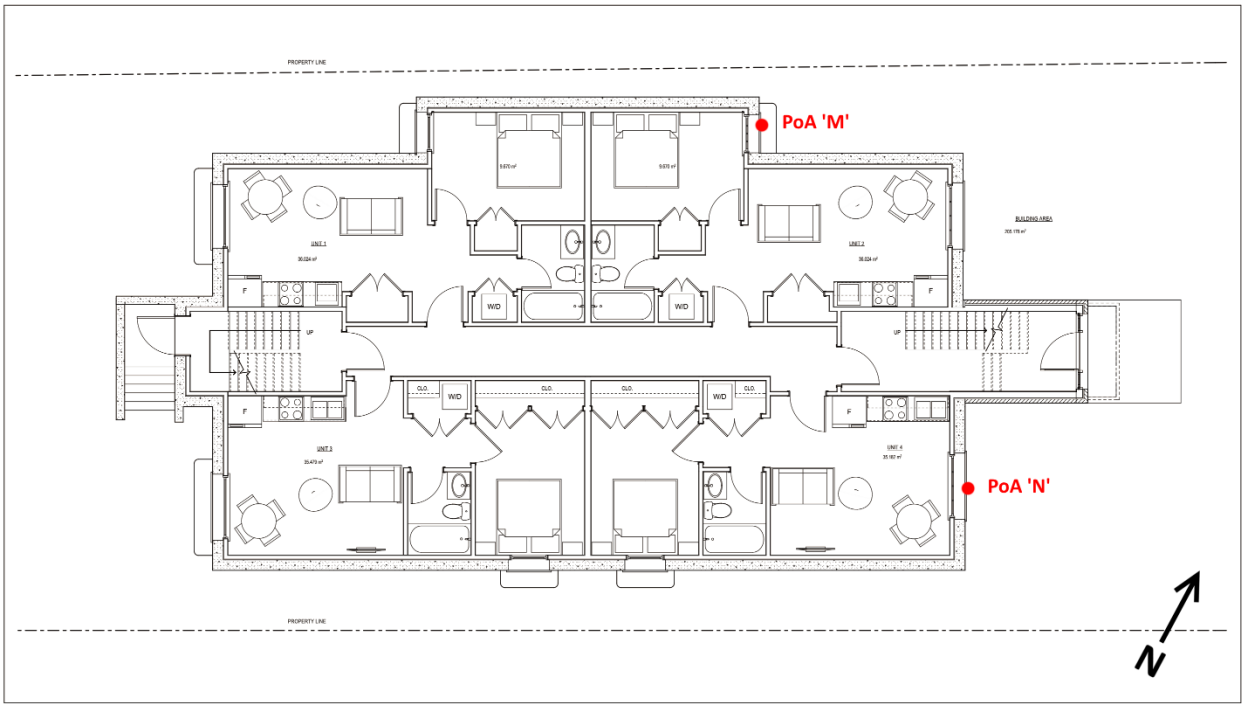

Figure 4: Site plan showing location of Point of Reception POA 'M' and 'N' on the Lower Level of Building 'B'.

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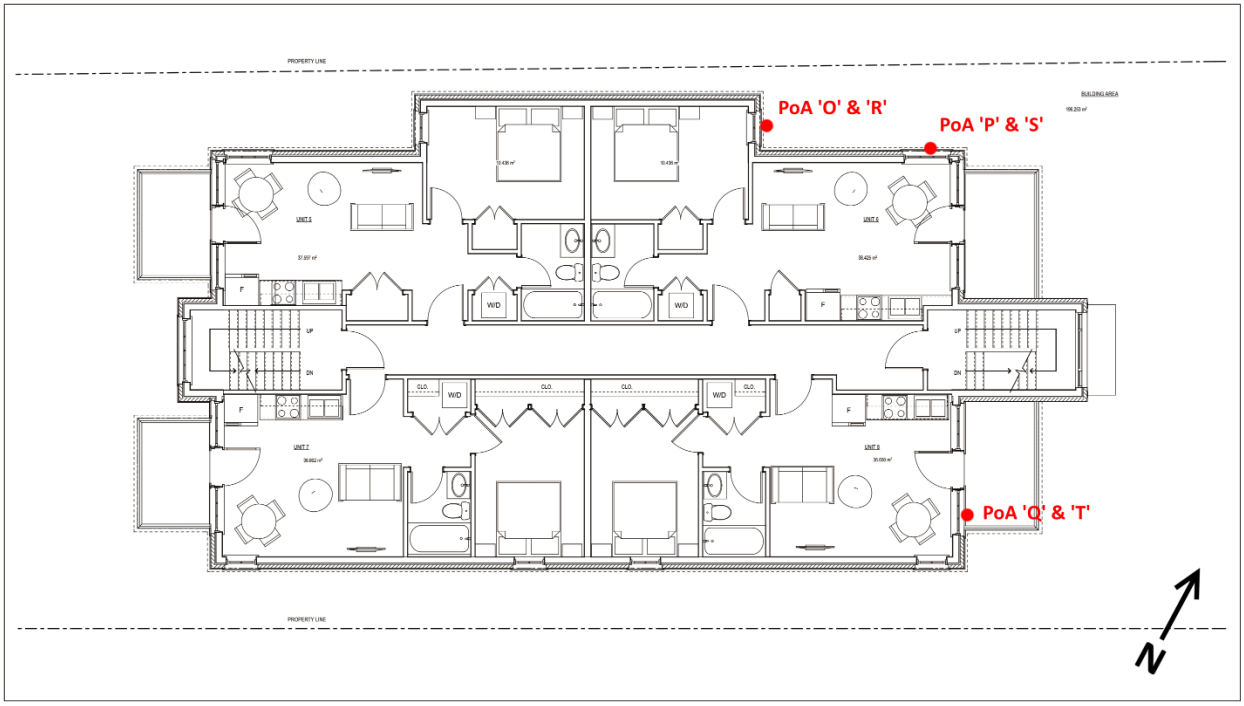

Figure 5: Site plan showing location of Points of Reception POA 'O' through 'T' on Floors "Ground" and 3 of Building 'B'.

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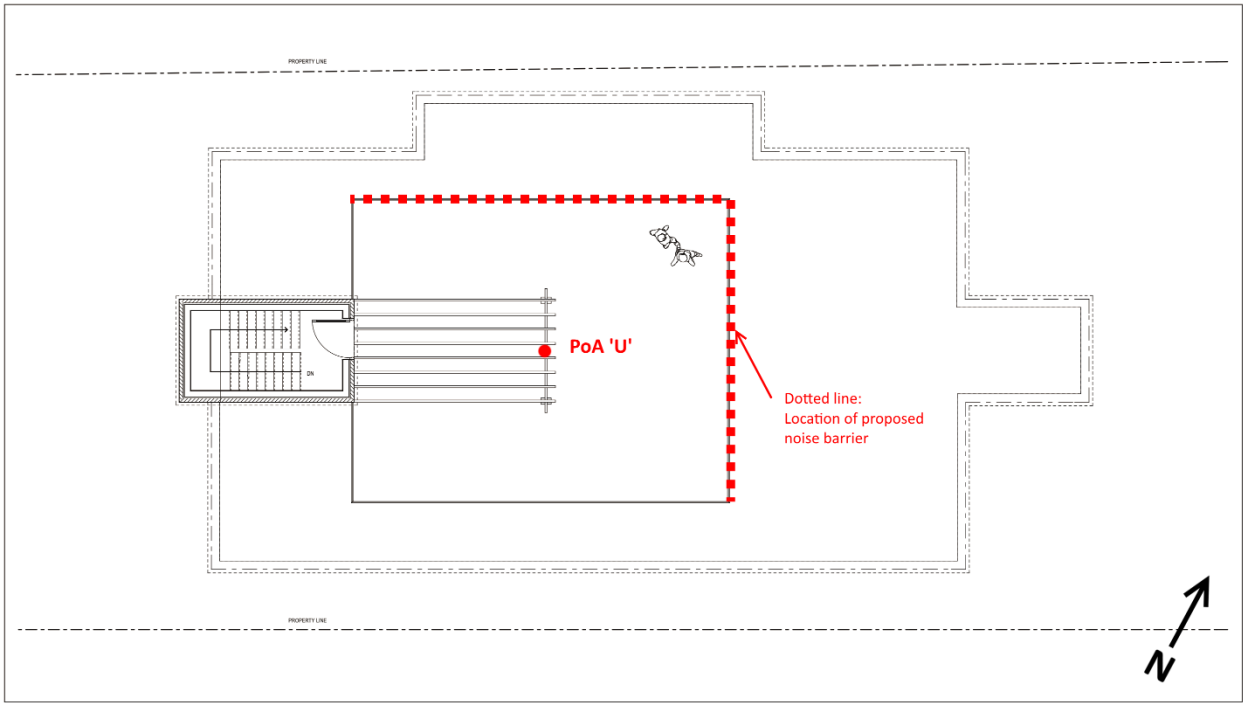

Figure 6: Site plan showing location of Point of Reception POA 'U' on the rooftop of Building 'B'.

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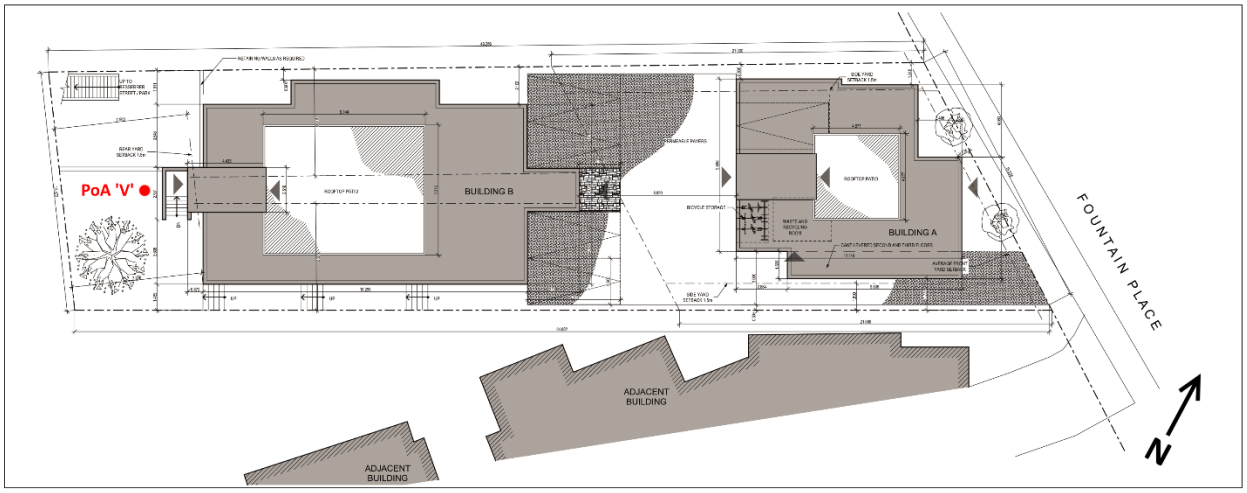

Figure 7: Site plan showing location of Point of Reception POA 'V' at grade, along with Buildings 'A' (east side) and Building 'B' (west side).

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Figure 8: Site plan overlaid onto GoogleEarth, showing the immediate surrounding area.

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Appendix B – Sample Transportation Noise Results from STAMSON

The following transportation noise level calculations were extracted from STAMSON for POA 'I' (worst-case scenario overall for indoor noise levels) and POA 'L' (worst-case scenario for Outdoor Living Area noise levels; includes scenarios with and without barriers). All other STAMSON results are available upon request for review.

```
STAMSON 5.0        SUMMARY REPORT        Date: 08-09-2016 15:29:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poae2.te             Time Period: Day/Night 16/8 hours
Description: Noise level predictions at PoA 'I'.


Road data, segment # 1: RideauSt.EB (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: RideauSt.EB (day/night)
---------------------------------------------
Angle1   Angle2           : -45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  26.00 / 26.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: RideauSt.WB (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```


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* 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 # 2: RideauSt.WB (day/night)
---------------------------------------------
Angle1   Angle2           : -45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  32.00 / 32.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.RideauSt.EB	1.50	62.88	62.88
2.RideauSt.WB	1.50	61.55	61.55
Total			65.28 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.RideauSt.EB	1.50	55.29	55.29
2.RideauSt.WB	1.50	53.95	53.95
Total			57.68 dBA

```
TOTAL Leq FROM ALL SOURCES (DAY): 65.28
                           (NIGHT): 57.68
```


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```
STAMSON 5.0        SUMMARY REPORT        Date: 08-09-2016 16:04:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poak2.te             Time Period: Day/Night 16/8 hours
Description: Noise level predictions at PoA 'L'; no barrier.


Road data, segment # 1: RideauSt.EB (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: RideauSt.EB (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  :  31.00 / 31.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   9.00 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 2: RideauSt.WB (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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


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```
    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 # 2: RideauSt.WB (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  :  37.00 / 37.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   9.00 m
Barrier receiver distance :   4.00 / 4.00   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.RideauSt.EB      !     1.50 !    63.14 !    63.14 *
 2.RideauSt.WB      !     1.50 !    62.07 !    62.07 *
--------------------+----------+----------+----------
                      Total                  65.65 dBA

  * Bright Zone  !


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

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.RideauSt.EB      !     1.50 !    55.54 !    55.54 *
 2.RideauSt.WB      !     1.50 !    54.47 !    54.47 *
--------------------+----------+----------+----------
                      Total                  58.05 dBA

  * Bright Zone  !
```


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```
TOTAL Leq FROM ALL SOURCES (DAY): 65.65
                           (NIGHT): 58.05
```


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```
STAMSON 5.0        SUMMARY REPORT        Date: 08-09-2016

16:06:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poal_1.te            Time Period: Day/Night 16/8 hours
Description: Noise level predictions at PoA 'L'; 1.6m barrier.


Road data, segment # 1: RideauSt.EB (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: RideauSt.EB (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  :  31.00 / 31.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  10.60 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 2: RideauSt.WB (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```


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* 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 # 2: RideauSt.WB (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  :  37.00 / 37.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  10.60 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.RideauSt.EB	1.50	56.28	56.28
2.RideauSt.WB	1.50	56.27	56.27
Total			59.29 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.RideauSt.EB	1.50	48.68	48.68
2.RideauSt.WB	1.50	48.67	48.67
Total			51.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.29

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(NIGHT): 51.69

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```
STAMSON 5.0        SUMMARY REPORT        Date: 08-09-2016

16:08:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poal_2.te            Time Period: Day/Night 16/8 hours
Description: Noise level predictions at PoA 'L'; 2.9m barrier.


Road data, segment # 1: RideauSt.EB (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: RideauSt.EB (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  :  31.00 / 31.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  11.90 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 2: RideauSt.WB (day/night)
-----------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```


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* 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 # 2: RideauSt.WB (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  :  37.00 / 37.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  11.90 m
Barrier receiver distance :   4.00 / 4.00   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.RideauSt.EB      !     1.50 !    52.12 !    52.12
 2.RideauSt.WB      !     1.50 !    51.87 !    51.87
--------------------+----------+----------+----------
                      Total                  55.01 dBA


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

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.RideauSt.EB      !     1.50 !    44.52 !    44.52
 2.RideauSt.WB      !     1.50 !    44.28 !    44.28
--------------------+----------+----------+----------
                      Total                  47.41 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 55.01
```


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(NIGHT): 47.41

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