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Paterson Group Inc.
Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

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Environmental Noise Control Study

Proposed Multi-Storey Building
349 Danforth Avenue
Ottawa, Ontario

Prepared For

Ottawa Carleton Construction

October 1, 2020

Report: PG5453-1

Table of Contents Page

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Ottawa Carleton Construction to conduct an environmental noise control study for the proposed multi-storey building to be located at 349 Danforth Avenue, in the City of Ottawa.

The objective of the current study is to:

- ❏ Determine the primary noise sources impacting the site and compare the projected sound levels to guidelines set out by the Ministry of Environment and Climate Change (MOECC) and the City of Ottawa.

- ❏ Review the projected noise levels and offer recommendations regarding warning classes, construction materials or alternative sound barriers.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes acoustical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

This study has been conducted according to City of Ottawa document - Engineering Noise Control Guidelines (ENCG), dated January 2016, and the Ontario Ministry of the Environment Guideline NPC-300.

2.0 Background

It is understood that the proposed project will consist of a 3-storey residential building with one (1) underground level. Associated at-grade parking areas, access lanes, and landscaped areas are further anticipated. No ground level outdoor living areas are identified on the proposed site plan. It is understood that there will be a roof top patio included for this development. Therefore, the roof top patio was analyzed as an outdoor living area.

3.0 Methodology and Noise Assessment Criteria

The City of Ottawa outlines three (3) sources of environmental noise that must be analyzed separately:

- Surface Transportation Noise
- Stationary Noise
  - new noise-sensitive development applications (noise receptors) in proximity to existing or approved stationary sources of noise, and
  - new stationary sources of noise (noise generating) in proximity to existing or approved noise-sensitive developments
- Aircraft noise

Surface Transportation Noise

The City of Ottawa's Official Plan, in addition to the ENCG, dictate that the influence area must contain any of following conditions to classify as a surface transportation noise source for a subject site:

- Within 100 m of the right-of-way of an existing or proposed arterial, collector or major collector road; a light rail transit corridor; bus rapid transit, or transit priority corridor
- Within 250 m of the right-of-way for an existing or proposed highway or secondary rail line
- Within 300 m from the right of way of a proposed or existing rail corridor or a secondary main railway line
- Within 500 m of an existing 400 series provincial highway, freeway or principle main railway line.

The NPC-300 outlines the limitations of the stationary and environmental noise levels in relation to the location of the receptors. These can be found in the following tables:

Table 1 - Sound Level Limits for Outdoor Living Areas

Time Period	Required $L_{eq(16)}$ (dBA)
16-hour, 7:00-23:00	55

- Standards taken from Table 2.2a; Sound Level Limit for Outdoor Living Areas - Road and Rail

Table 2 - Sound Level Limits for Indoor Living Area			
Type of Space	**Time Period**	**Required L_{eq} (dBA)**	
		Road	**Rail**
Living/Dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc	7:00-23:00	45	40
Theaters, place of worship, libraries, individual or semi-private offices, conference rooms, reading rooms	23:00-7:00	45	40
Sleeping quarters	7:00-23:00	45	40
	23:00-7:00	40	35
❑ Standards taken from Table 2.2b; Sound Level Limit for Indoor Living Areas - Road and Rail			

It is noted in ENCG that the limits outlined in Table 2 are for the sound levels on the interior of the glass pane. The ENCG further goes on to state that the limit for the exterior of the pane of glass will be 55 dBA.

If the sound level limits are exceeded at the window panes for the indoor living areas, the following Warning Clauses may be referenced:

Table 3 - Warning Clauses for Sound Level Exceedances	
Warning Clause	**Description**
Warning Clause Type A	"Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally 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."
Warning Clause Type B	"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air 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."
Warning Clause Type C	"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."
Warning Clause Type D	"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."
❑ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines - NPC-300	

Stationary Noise

Stationary noise sources include sources or facilities that are fixed or mobile and can cause a combination of sound and vibration levels emitted beyond the property line. These sources may include commercial air conditioner units, generators and fans. Facilities that may contribute to stationary noise may include car washes, snow disposal sites, transit stations and manufacturing facilities.

This development is not in proximity to existing or approved stationary sources of noise. Therefore, a stationary noise analysis will not be required.

Aircraft/Airport Noise

The subject site is not located within the Airport Vicinity Development Zone. Therefore the proposed development will not require an aircraft/airport noise analysis. No warning clauses regarding aircraft or airport noise will be required.

4.0 Analysis

Surface Transportation Noise

The proposed building is bordered to the north by commercial buildings followed by Richmond Road, to the east by a parking lot followed by a commercial building, Churchill Avenue North, and Lincoln Avenue, to the west by parking lots and commercial buildings, and to the south by Danforth Avenue followed by commercial buildings, Byron Avenue, Byron Place, and Lower Byron Avenue. Richmond Road, Churchill Avenue North, Lincoln Avenue, Danforth Avenue, Byron Avenue, Byron Place and Lower Byron Avenue are identified within the 100 m radius of the proposed building.

Based on the City of Ottawa Official Plan, Schedule F, Richmond Road is considered a 2 lane urban arterial road (2-UAU). The section of Churchill Avenue North north of Richmond Road is also considered a 2 lane urban arterial road (2-UAU). The section of Churchill Avenue North located south of Richmond Road is considered a 2 lane major collector road (2-UMCU). Byron Avenue is considered a 2 lane urban collector road (2-UCU). All other roads within the 100 m radius from the proposed building are not classified as either arterial, collector or major collector roads and therefore are not included in this study.

All noise sources are presented in Drawing PG5453-3 - Site Geometry, located in Appendix 1.

The noise levels from road traffic are provided by the City of Ottawa, taking into consideration the right-of-way width and the implied roadway class. It is understood that these values represent the maximum allowable capacity of the proposed roadways. The parameters to be used for sound level predictions can be found below.

Table 4 - Traffic and Road Parameters

Road	Implied Roadway	AADT (Veh/day)	Posted Speed (km/h)	Day/Night Split %	Medium Truck %	Heavy Truck %
Richmond Road	2-UAU	15000	50	92/8	7	5
Churchill Avenue North (North of Richmond Road)	2-UAU	15000	50	92/8	7	5
Churchill Avenue North (South of Richmond Road)	2-UMCU	12000	50	92/8	7	5
Byron Avenue	2-UCU	8000	50	92/8	7	5

❑ Data obtained from the City of Ottawa document ENCG

Three (3) levels of reception points were selected for this analysis. The following elevations were selected from standard heights.

Table 5 - Elevation of Reception Points

Floor Number	Elevation at Centre of Window (m)	Floor Use	Daytime/Nighttime Analysis
First Floor	1.5	Living Area/Bedroom	daytime/nighttime
Third Floor	7.5	Living Area/Bedroom	daytime/nighttime
Roof Top Patio	10.5	--	Outdoor Living Area

For this analysis, a reception point was taken at the centre of each floor, at the first floor and third floor. For the outdoor living area, a roof top patio was identified. A reception point in the centre of this area, 10.5 m high was selected for the analysis of this area. Reception points are detailed on Drawing PG5453-2 - Receptor Locations presented in Appendix 1.

All horizontal distances have been measured from the reception point to the edge of the right-of-way. The roadways were analyzed where they intersected the 100 m buffer zone, which is reflected in the local angles described in Paterson Drawings PG5453-3A to 3E - Site Geometry in Appendix 1.

Table 7 - Summary of Reception Points and Geometry, located in Appendix 1, provides a summary of the points of reception and their geometry with respect to the noise sources. The analysis is completed so that no effects of sound reflection off of the building facade are considered, as stipulated by the ENCG.

The subject site is at grade with the neighbouring roads. The topography within the 100 m radius from the proposed building slopes gently to the north, ranging from approximate geodetic elevation 68 m at Richmond Road to approximate geodetic elevation 76 m at Byron Avenue.

The analysis was completed using STAMSON version 5.04, a computer program which uses the road and rail traffic noise prediction methods using ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environment Analysis Method), publications from the Ontario Ministry of Environment and Energy.

5.0 Results

5.1 Surface Transportation Noise

The primary descriptors are the 16-hour daytime and the 8-hour night time equivalent sound levels, $L_{eq(16)}$ and the $L_{eq(8)}$ for City roads.

The proposed traffic noise levels were analyzed at all reception points. The results of the STAMSON software are provided in Appendix 2, and the summary of the results are provided below in Table 6.

Table 6 - Proposed Noise Levels

Reception Point	Description	Daytime at Facade $L_{EQ(16)}$ (dBA)	Nighttime at Facade $L_{EQ(16)}$ (dBA)	Outdoor Living Area $L_{EQ(16)}$ (dBA)
REC 1-1	Northern elevation, first floor	45.89	38.29	--
REC 1-3	Northern elevation, third floor	50.07	42.47	--
REC 2-1	Eastern elevation, first floor	55.35	47.75	--
REC 2-3	Eastern elevation, third floor	56.47	48.87	--
REC 3-1	Southern elevation, first floor	55.55	47.96	--
REC 3-3	Southern elevation, third floor	56.56	48.97	--
REC 4-1	Western elevation, first floor	49.72	42.12	--
REC 4-3	Western elevation, third floor	50.92	43.32	--
REC 5	Outdoor Living Area	--	--	57.58

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

A roof top patio was identified in the centre of the proposed building. One (1) receptor point was selected for the analysis at outdoor living area (REC 5). It is assumed that the roof top patio will only be utilized as an outdoor living area provided that the proposed building is constructed. The proposed $L_{eq(16)}$ at the roof top patio will be 57.58 dBA. The value is a marginal exceedance of the 55 dBA threshold that is specified by the MOECC and the City of Ottawa. This exceedance is considered acceptable provided that a Warning Clause Type A is provided on all deeds of sale.

6.2 Indoor Living Areas and Ventilation

The results of the STAMSON modeling indicates that the daytime $L_{eq(16)}$ ranges between 45.89 dBA and 56.56 dBA. The ENCG states that the limits for the exterior of the pane of glass is 55 dBA. This value was exceeded at eastern and southern elevations. Therefore, units on the eastern or southern elevations are to be designed with the provision for a central air conditioning unit. Additionally, warning clause Type C, as outlined in Table 3, is also recommended for all units on the eastern and southern elevations. It is also noted that the modeling indicates that the $L_{eq(16)}$ is below 65 dBA, and therefore standard building materials are acceptable to provide adequate soundproofing.

7.0 Conclusion

The subject site is located at 349 Danforth Avenue. It is understood that the development will consist of a 3 storey residential building. The associated analysis identified three surface transportation noise sources: Richmond Road, Churchill Avenue North, and Byron Avenue.

Several reception points were selected for the analysis, consisting of pane of glass reception points on both the first and top level. The eastern and southern elevations of the proposed building exceeded the 55 dBA guideline specified by the ENCG. Therefore, a warning clause Type C will be required for this dwelling in addition to the installation of a central air conditioning unit.

A review of the outdoor living area (roof top patio) was completed as well. It is assumed that the roof top patio will only be utilized as an outdoor living area provided that the proposed building is constructed. The anticipated noise levels at outdoor living area would be a marginal exceedance of the 55 dBA threshold, and is considered acceptable provided that the warning clause Type A is included on all deeds of sale.

The following warning clause is to be included on all Offers of Purchase and Sale and/or lease agreements:

> "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."
>
> "Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally 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."

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. Our recommendations should be reviewed when the project drawings and specifications are complete.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Ottawa Carleton Construction or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Stephanie A. Boisvenue, P.Eng.

Scott S. Dennis, P.Eng.

Report Distribution:

- ❑ Ottawa Carleton Construction (e-mail copy)
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APPENDIX 1

TABLE 7 - SUMMARY OF RECEPTION POINTS AND GEOMETRY

DRAWING PG5453-2 - RECEPTOR LOCATION PLAN

DRAWING PG5453-3 - SITE GEOMETRY

DRAWING PG5453-3A - SITE GEOMETRY (REC 1-1 and REC 1-3)

DRAWING PG5453-3B - SITE GEOMETRY (REC 2-1 and REC 2-3)

DRAWING PG5453-3C - SITE GEOMETRY (REC 3-1 and REC 3-3)

DRAWING PG5453-3D - SITE GEOMETRY (REC 4-1 and REC 4-3)

DRAWING PG5453-3E - SITE GEOMETRY (REC 5)

Table 7 - Summary of Reception Points and Geometry
349 Danforth Avenue

Point of Reception	Location	Leq Day (dBA)	Churchill Avenue North (North of Richmond Road)								Churchill Avenue North (South of Richmond Road)							
			Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)	Barrier Height (m)	Barrier Distance (m)	Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)	Barrier Height (m)	Barrier Distance (m)
REC 1-1	Northern Elevation, 1st Floor	45.89	80	1.5	80.01	-37, -28	n/a	n/a	4.5	45	60	1.5	n/a	-28, 0	n/a	n/a	4.5	58
REC 1-3	Northern Elevation, 3rd Floor	50.07	80	7.5	80.35	-37, -28	n/a	n/a	4.5	45	60	7.5	n/a	-28, 0	n/a	n/a	4.5	58
REC 2-1	Eastern Elevation, 1st Floor	55.35	80	1.5	80.01	-45, -35	n/a	n/a	4.5	70	50	1.5	50.02	-35, 71	1	30	n/a	n/a
REC 2-3	Eastern Elevation, 3rd Floor	56.47	80	7.5	80.35	-45, -35	n/a	n/a	4.5	70	50	7.5	50.56	-35, 71	1	30	n/a	n/a
REC 3-1	Southern Elevation, 1st Floor	55.55	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	55	1.5	55.02	0, 67	1	20	n/a	n/a
REC 3-3	Southern Elevation, 3rd Floor	56.56	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	55	7.5	55.51	0, 67	1	20	n/a	n/a
REC 4-1	Western Elevation, 1st Floor	49.72	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
REC 4-3	Western Elevation, 3rd Floor	50.92	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
REC 5	Outdoor Living Area	57.58	80	10.5	80.69	-44, -33	n/a	n/a	4.5	75	60	10.5	60.91	-33, 69	1	30	n/a	n/a

Point of Reception	Location	Leq Day (dBA)	Richmond Road								Byron Avenue							
			Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)	Barrier Height (m)	Barrier Distance (m)	Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)	Barrier Height (m)	Barrier Distance (m)
REC 1-1	Northern Elevation, 1st Floor	45.89	35	1.5	35.03	-65, 69	n/a	n/a	4.5	30	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
REC 1-3	Northern Elevation, 3rd Floor	50.07	35	7.5	35.79	-65, 69	n/a	n/a	4.5	30	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
REC 2-1	Eastern Elevation, 1st Floor	55.35	45	1.5	45.02	0, 62	n/a	n/a	4.5	43	50	1.5	50.02	-47, 0	1	60	n/a	n/a
REC 2-3	Eastern Elevation, 3rd Floor	56.47	45	7.5	45.62	0, 62	n/a	n/a	4.5	43	50	7.5	50.56	-47, 0	1	60	n/a	n/a
REC 3-1	Southern Elevation, 1st Floor	55.55	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	35	1.5	35.03	-54, 77	1	70	n/a	n/a
REC 3-3	Southern Elevation, 3rd Floor	56.56	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	35	7.5	35.79	-54, 77	1	70	n/a	n/a
REC 4-1	Western Elevation, 1st Floor	49.72	45	1.5	45.02	-57, 0	n/a	n/a	4.5	43	50	1.5	50.02	0, 70	1	50	n/a	n/a
REC 4-3	Western Elevation, 3rd Floor	50.92	45	7.5	45.62	-57, 0	n/a	n/a	4.5	43	50	7.5	50.56	0, 70	1	50	n/a	n/a
REC 5	Outdoor Living Area	57.58	45	10.5	46.21	-60, 65	n/a	n/a	4.5	43	50	10.5	51.09	-50, 72	1	50	n/a	n/a

TEMPORARILY REMOVE

WALKOUT BASEMENT

PRIVACY FENCE

349 DANFORTH AVENUE
PROPOSED 3-STOREY BUILDING

EXISTING BUILDING
(TO BE DEMOLISHED)

RETAINING WALL FOR WALKOUT BASEMENT

ENT./EXIT

ENT./EXIT

WV

Concrete Curb

SOD

Edge of Asphalt

CB
T=68.87

DANFORTH AVENUE

(FORMERLY JAMES STREET INST. NP48636)

Crown of Road

Crown of Road

OUP

LS

ENT./EXIT

CB

BF

Asphalt
Dumpster area

BF

Guard Rail
0.05 North
0.10 West

CB
T=68.62

SCALE: 1:100

0 1 2 3 4 5m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

OTTAWA CARLETON CONSTRUCTION LTD.

NOISE ATTENUATION STUDY
PROPOSED 3-STOREY BUILDING - 349 DANFORTH AVENUE

OTTAWA, **ONTARIO**

Title:

SITE PLAN

Scale: 1:100	**Date:** 09/2020
Drawn by: YA	**Report No.:** PG5453-1
Checked by: SB	**Dwg. No.:** PG5453-1
Approved by: DJG	**Revision No.:**

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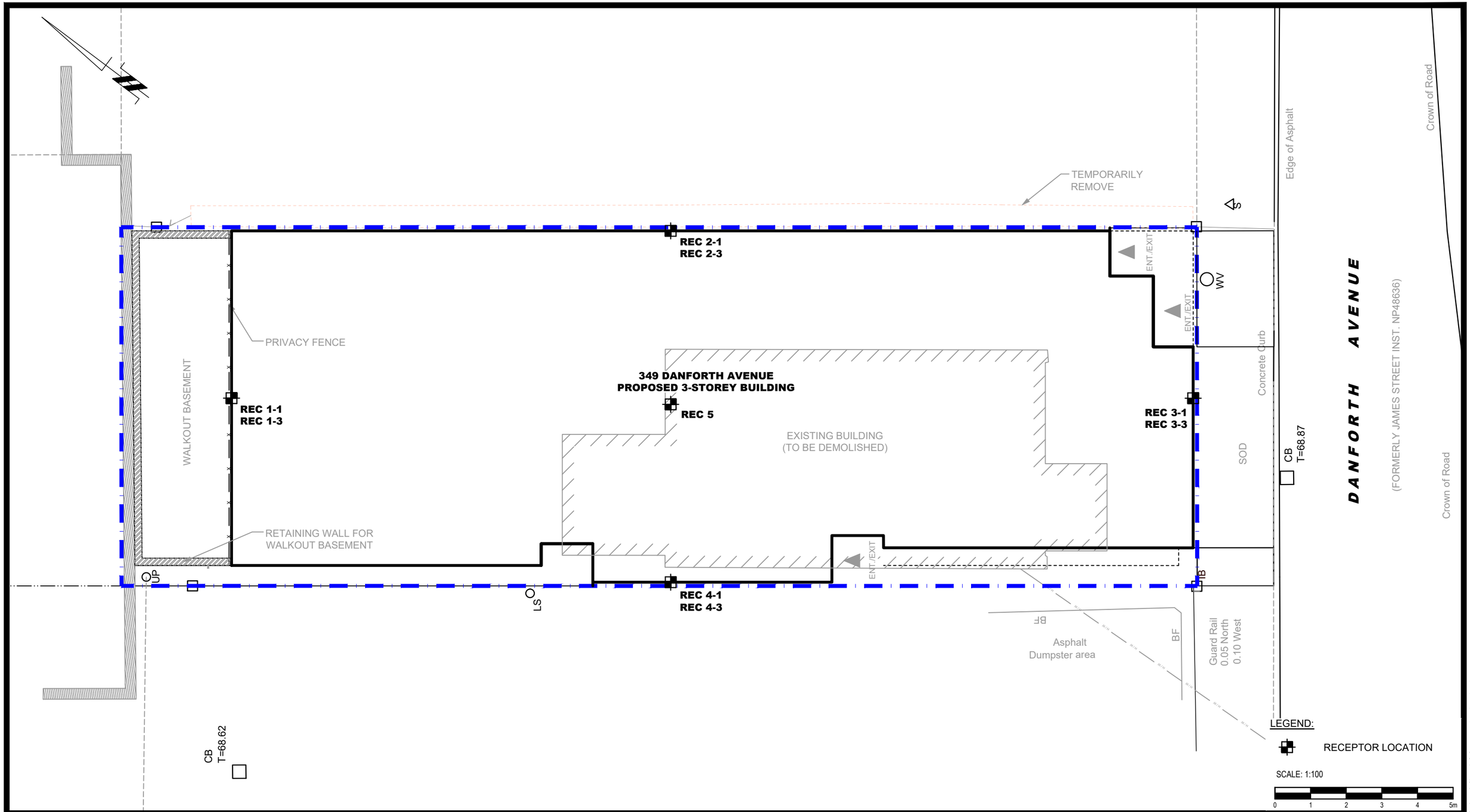

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consulting engineers

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Ottawa, Ontario K2E 7J5
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NOISE ATTENUATION STUDY
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OTTAWA, ONTARIO

Title:

RECEPTOR LOCATION PLAN

Scale: 1:100	Date: 09/2020
Drawn by: YA	Report No.: PG5453-1
Checked by: SB	Dwg. No.: PG5453-2
Approved by: DJG	Revision No.:

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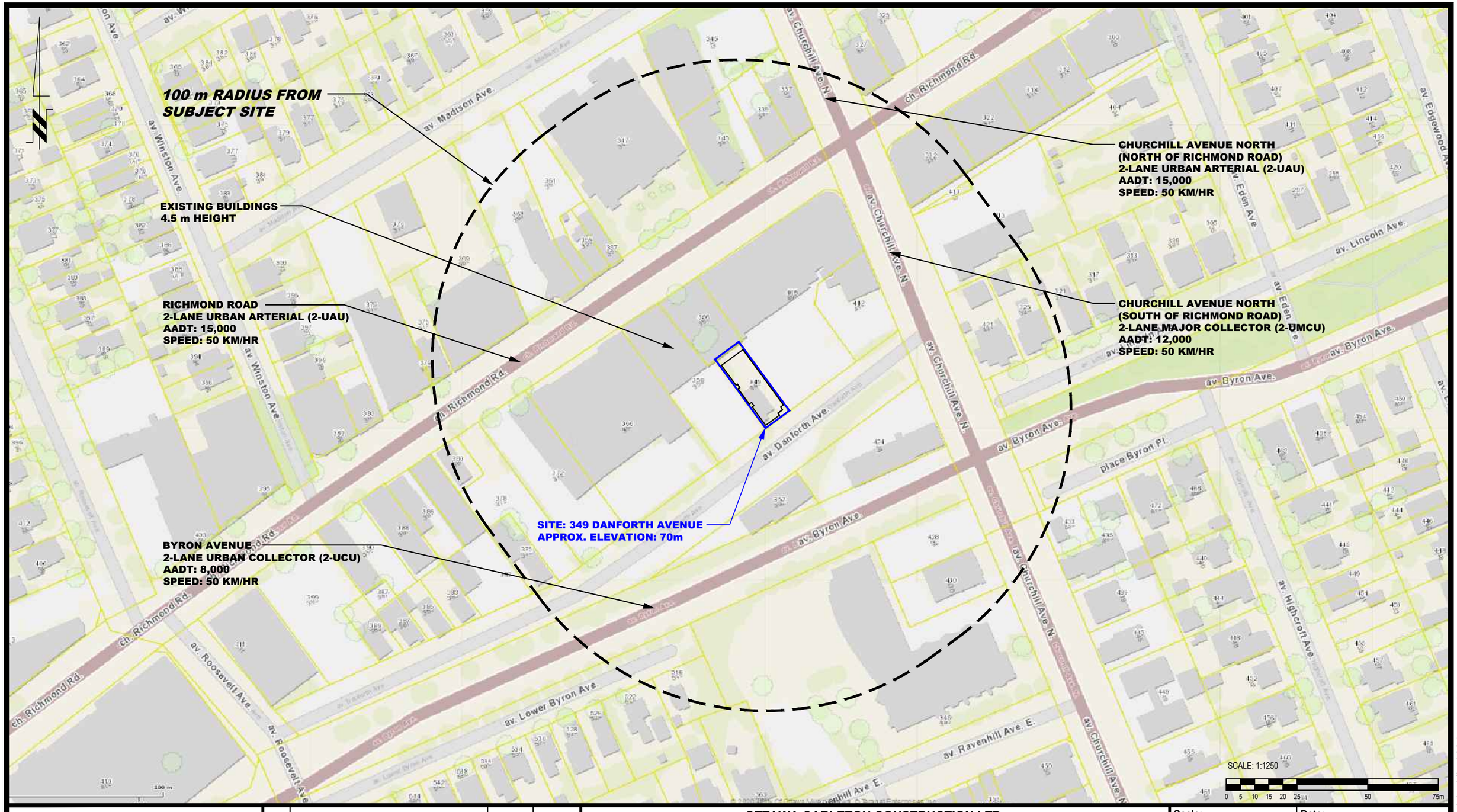

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NOISE ATTENUATION STUDY
PROPOSED 3-STOREY BUILDING - 349 DANFORTH AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY

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Drawn by: YA	Report No.: PG5453-1
Checked by: SB	Dwg. No.: PG5453-3
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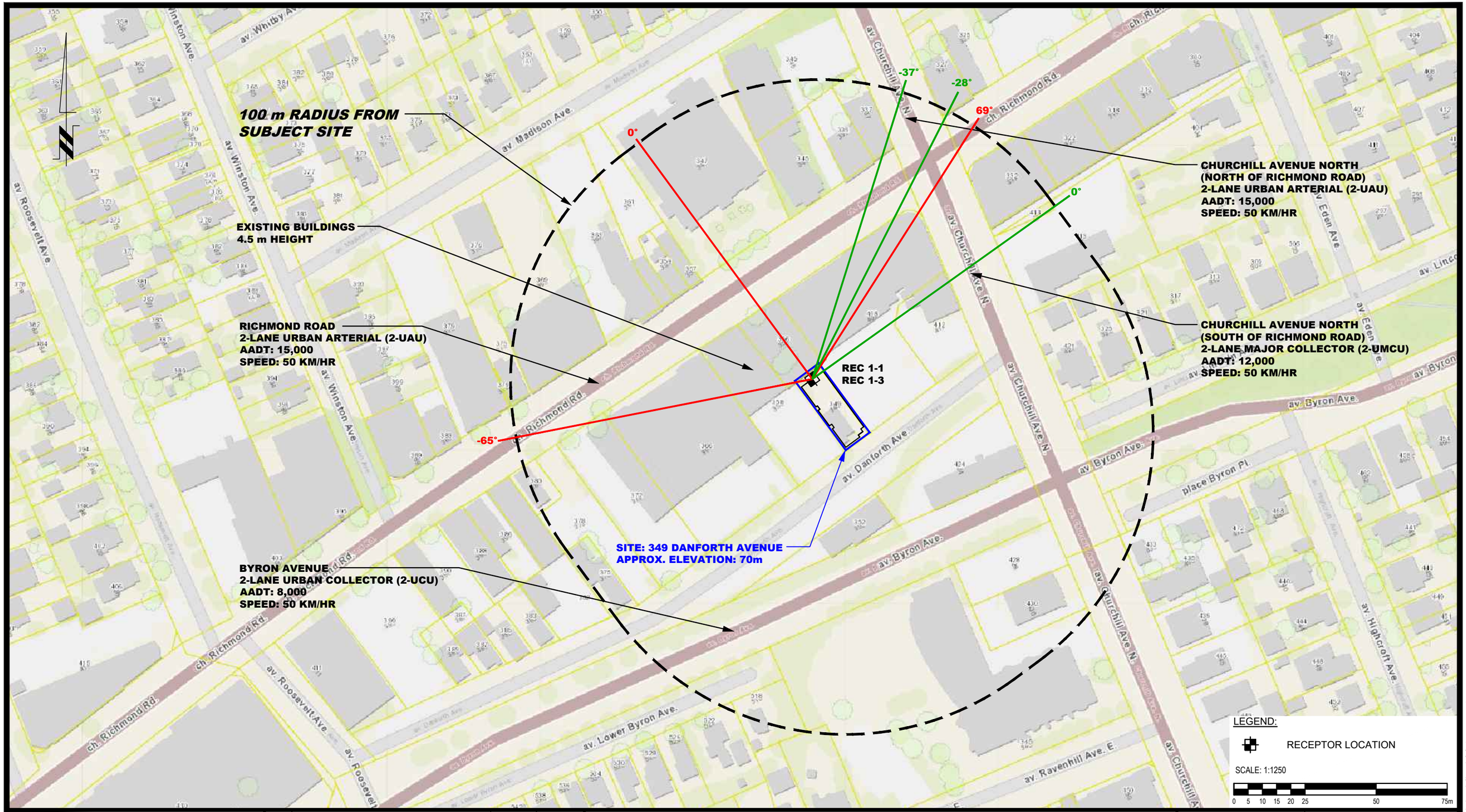

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OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 1-1 AND REC 1-3

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Approved by: DJG	Revision No.:

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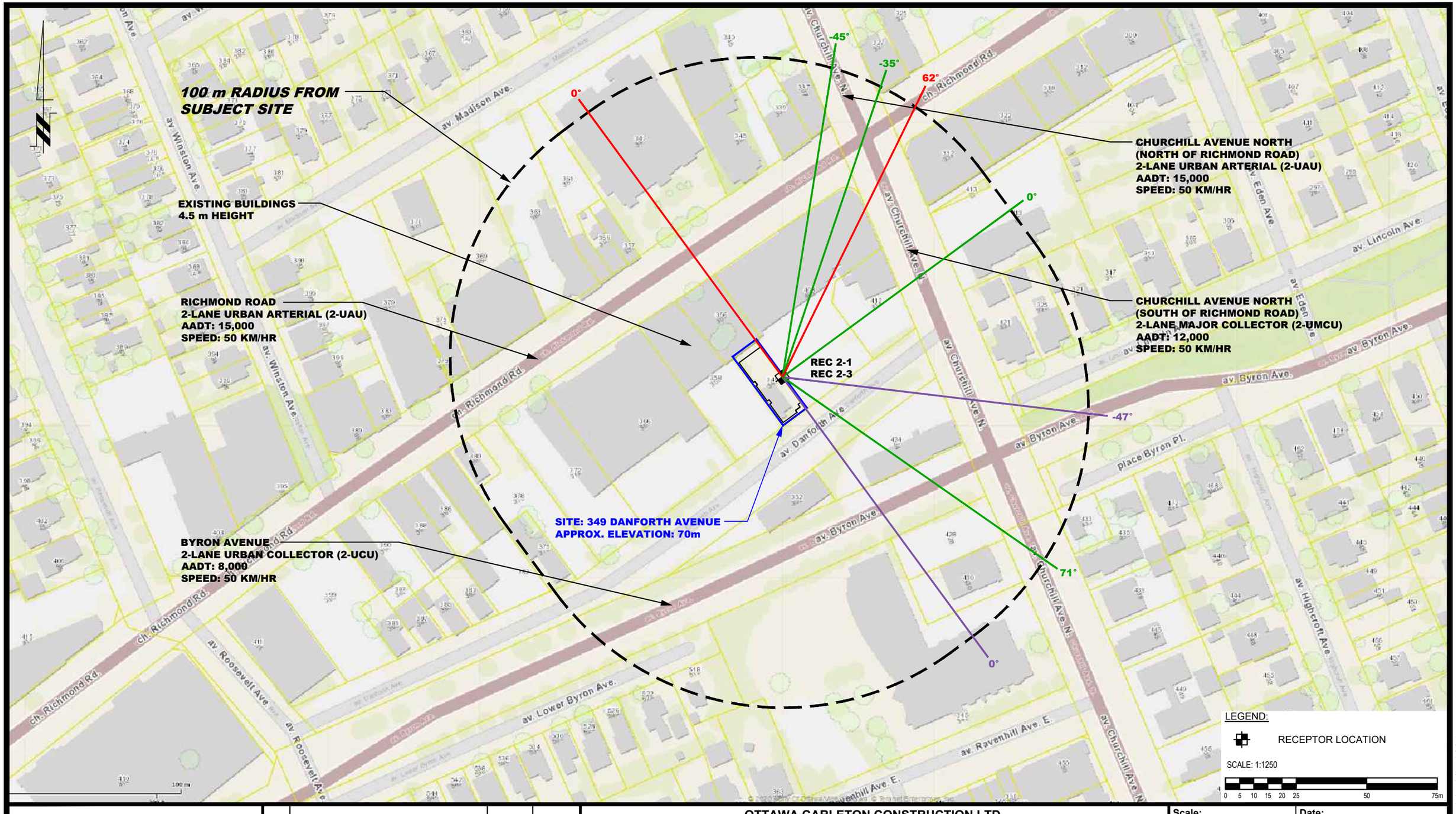

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NOISE ATTENUATION STUDY
PROPOSED 3-STOREY BUILDING - 349 DANFORTH AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 2-1 AND REC 2-3

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Approved by: DJG	Revision No.:

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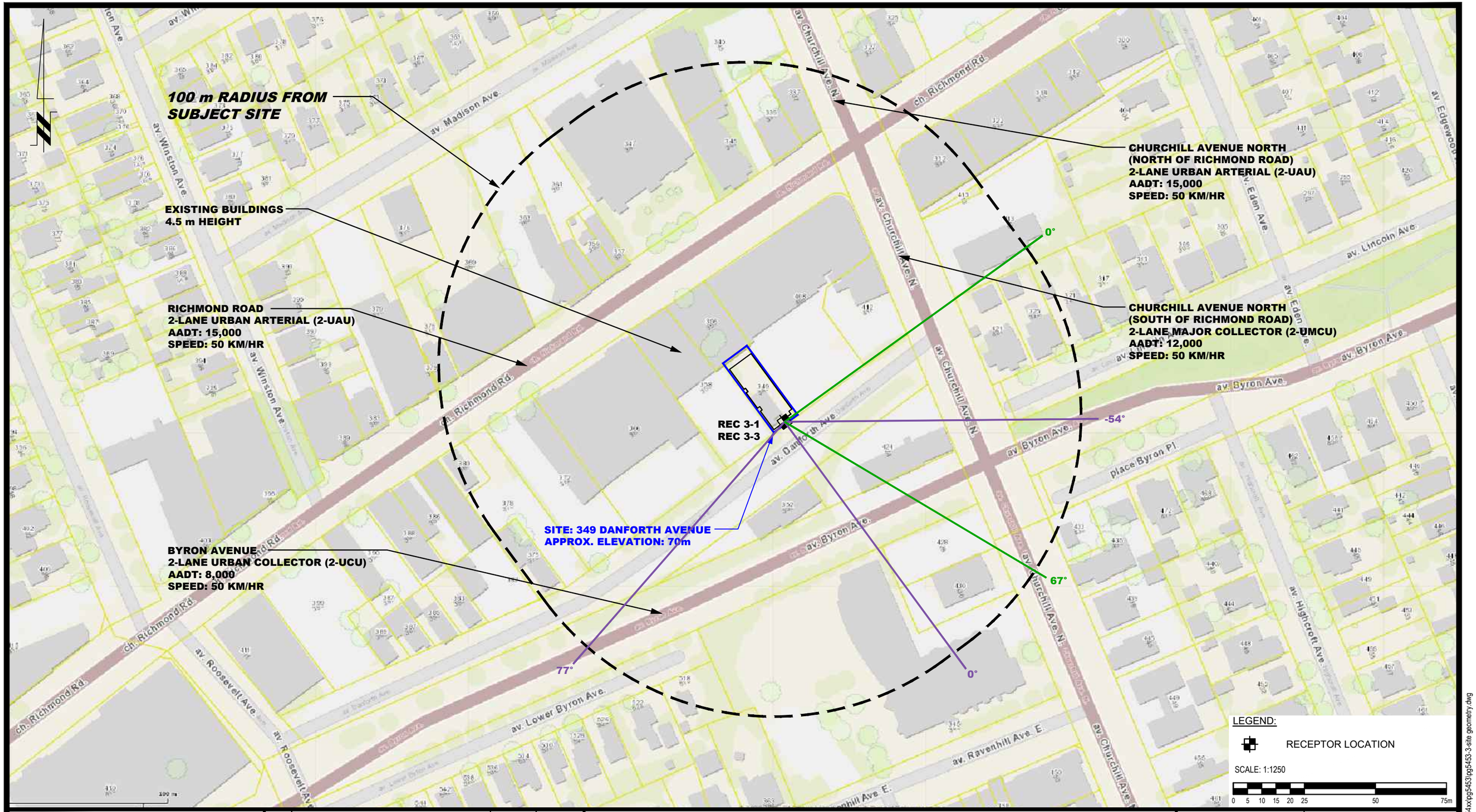

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OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 3-1 AND REC 3-3

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Approved by: DJG	Revision No.:

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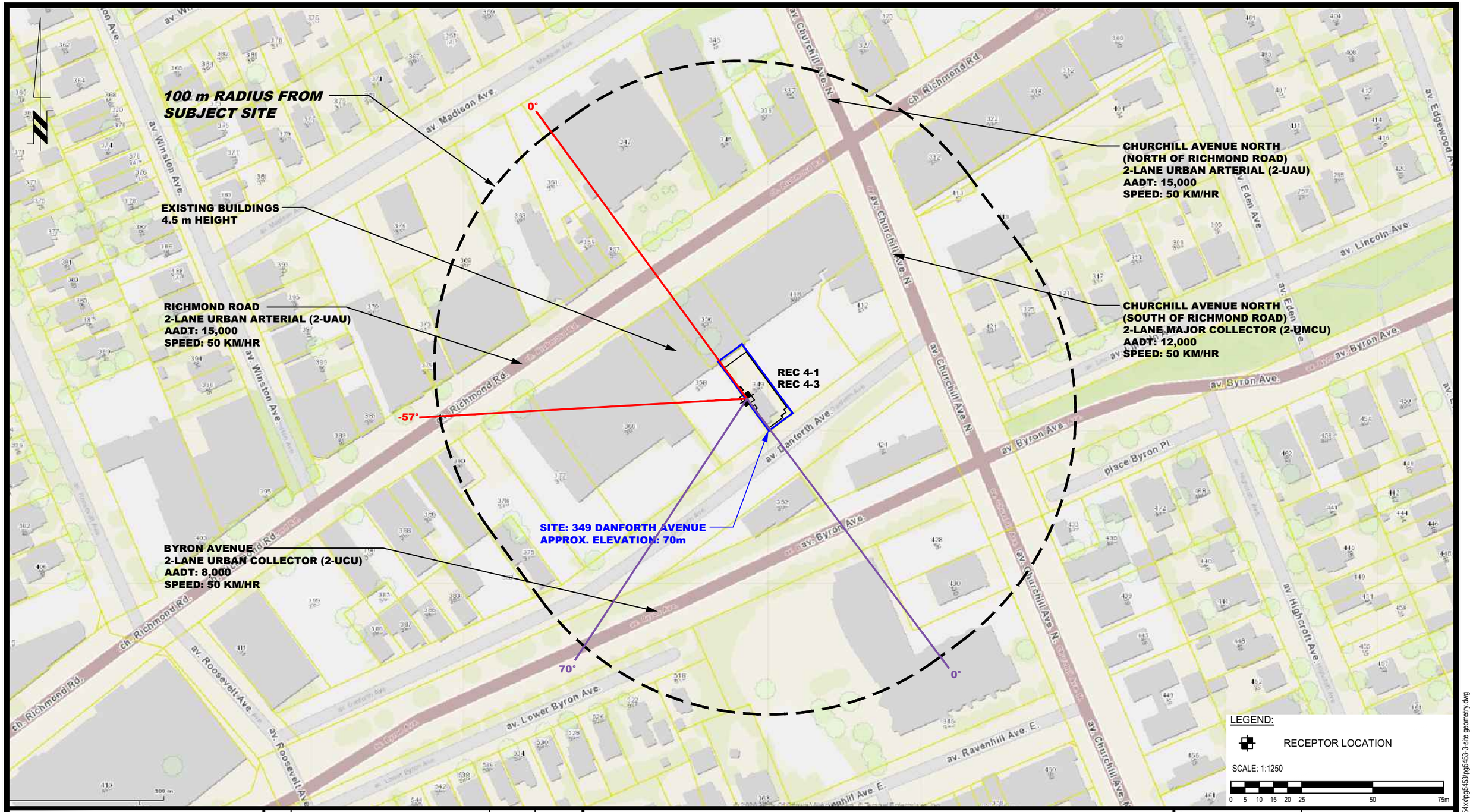

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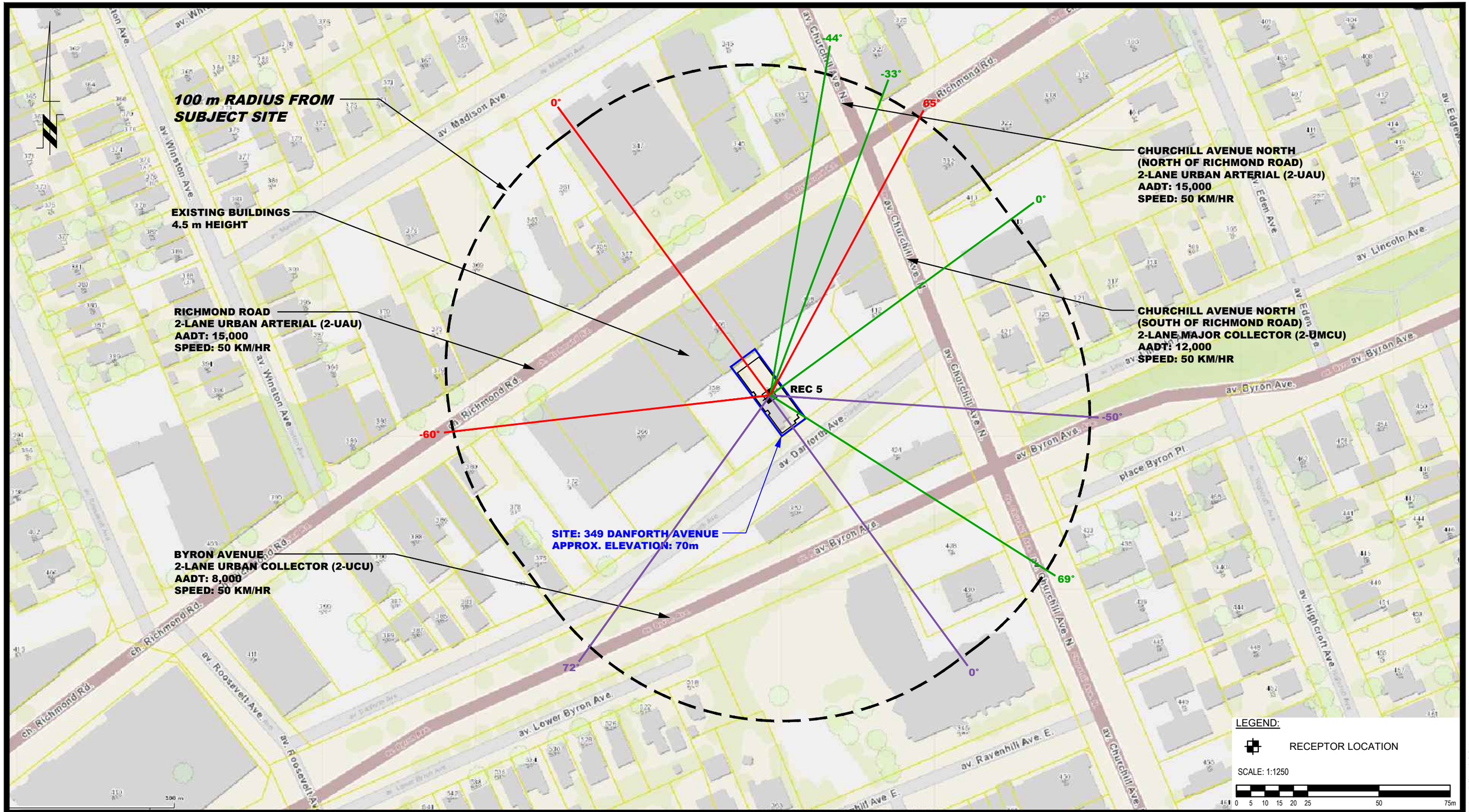
OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 4-1 AND REC 4-3

Scale: 1:1250	Date: 09/2020
Drawn by: YA	Report No.: PG5453-1
Checked by: SB	Dwg. No.: PG5453-3D
Approved by: DJG	Revision No.:

p:\autocad drawings\geotechnical\pg54xx\pg5453\pg5453-3-site geometry.dwg



patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

OTTAWA CARLETON CONSTRUCTION LTD.

NOISE ATTENUATION STUDY
PROPOSED 3-STOREY BUILDING - 349 DANFORTH AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 5

Scale: 1:1250	Date: 09/2020
Drawn by: YA	Report No.: PG5453-1
Checked by: SB	Dwg. No.: PG5453-3E
Approved by: DJG	Revision No.:

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APPENDIX 2

STAMSON RESULTS

STAMSON 5.0 NORMAL REPORT Date: 17-09-2020 15:34:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec11.te Time Period: Day/Night 16/8 hours
Description: Reception Point 1-1

Road data, segment # 1: Churchill N (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: Churchill N (day/night)

Angle1 Angle2 : -37.00 deg -28.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -37.00 deg Angle2 : -28.00 deg
Barrier height : 4.50 m
Barrier receiver distance : 45.00 / 45.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: Churchill S (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 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):  12000
    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: Churchill S (day/night)
---------------------------------------------
Angle1   Angle2           : -28.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  60.00 / 60.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -28.00 deg   Angle2 : 0.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  58.00 / 58.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

♠
Road data, segment # 3: Richmond Rd (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 # 3: Richmond Rd (day/night)
---------------------------------------------
Angle1   Angle2           : -65.00 deg   69.00 deg
```

```
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -65.00 deg   Angle2 : 69.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  30.00 / 30.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

🠉

```
Results segment # 1: Churchill N (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 34.19 + 0.00) = 34.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -37    -28   0.39  68.48   0.00 -10.11 -13.30   0.00   0.00 -10.88  34.19
-------------------------------------------------------------------------------

Segment Leq : 34.19 dBA
```

🠉

```
Results segment # 2: Churchill S (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 31.27 + 0.00) = 31.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
```

```
-------------------------------------------------------------------------------
   -28      0   0.39  67.51   0.00  -8.37  -8.15   0.00   0.00 -19.72  31.27
-------------------------------------------------------------------------------

Segment Leq : 31.27 dBA

↟
Results segment # 3: Richmond Rd (day)
---------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 45.42 + 0.00) = 45.42 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -65     69   0.39  68.48   0.00  -5.12  -1.72   0.00   0.00 -16.22  45.42
-------------------------------------------------------------------------------

Segment Leq : 45.42 dBA

Total Leq All Segments: 45.89 dBA

↟
Results segment # 1: Churchill N (night)
-----------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 26.60 + 0.00) = 26.60 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -37    -28   0.39  60.88   0.00 -10.11 -13.30   0.00   0.00 -10.88  26.60
-------------------------------------------------------------------------------

Segment Leq : 26.60 dBA
```

↟
Results segment # 2: Churchill S (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 23.67 + 0.00) = 23.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-28	0	0.39	59.91	0.00	-8.37	-8.15	0.00	0.00	-19.72	23.67

Segment Leq : 23.67 dBA

↟
Results segment # 3: Richmond Rd (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 37.82 + 0.00) = 37.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	69	0.39	60.88	0.00	-5.12	-1.72	0.00	0.00	-16.22	37.82

Segment Leq : 37.82 dBA

Total Leq All Segments: 38.29 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 45.89
(NIGHT): 38.29

STAMSON 5.0 NORMAL REPORT Date: 17-09-2020 15:52:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec13.te Time Period: Day/Night 16/8 hours
Description: Reception Point 1-3

Road data, segment # 1: Churchill N (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: Churchill N (day/night)

Angle1 Angle2 : -37.00 deg -28.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -37.00 deg Angle2 : -28.00 deg
Barrier height : 4.50 m
Barrier receiver distance : 45.00 / 45.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Churchill S (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 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):  12000
    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: Churchill S (day/night)
---------------------------------------------
Angle1   Angle2           : -28.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  60.00 / 60.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -28.00 deg   Angle2 : 0.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  58.00 / 58.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

♠
Road data, segment # 3: Richmond Rd (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 # 3: Richmond Rd (day/night)
---------------------------------------------
Angle1   Angle2           : -65.00 deg   69.00 deg
```

```
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -65.00 deg   Angle2 : 69.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  30.00 / 30.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

↟

```
Results segment # 1: Churchill N (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        7.50 !        4.12 !         4.12

ROAD (0.00 + 41.36 + 0.00) = 41.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -37    -28   0.21  68.48   0.00  -8.80 -13.17   0.00   0.00  -5.16  41.36
-------------------------------------------------------------------------------

Segment Leq : 41.36 dBA
```

↟

```
Results segment # 2: Churchill S (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        7.50 !        1.70 !         1.70

ROAD (0.00 + 33.24 + 0.00) = 33.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
```

```
-------------------------------------------------------------------------------
   -28      0   0.21  67.51   0.00  -7.29  -8.12   0.00   0.00 -18.87  33.24
-------------------------------------------------------------------------------

Segment Leq : 33.24 dBA

↟
Results segment # 3: Richmond Rd (day)
---------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        7.50 !        2.35 !         2.35

ROAD (0.00 + 49.34 + 0.00) = 49.34 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -65     69   0.21  68.48   0.00  -4.45  -1.52   0.00   0.00 -13.17  49.34
-------------------------------------------------------------------------------

Segment Leq : 49.34 dBA

Total Leq All Segments: 50.07 dBA

↟
Results segment # 1: Churchill N (night)
-----------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        7.50 !        4.12 !         4.12

ROAD (0.00 + 33.76 + 0.00) = 33.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -37    -28   0.21  60.88   0.00  -8.80 -13.17   0.00   0.00  -5.16  33.76
-------------------------------------------------------------------------------

Segment Leq : 33.76 dBA
```

↟
Results segment # 2: Churchill S (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	1.70	1.70

ROAD (0.00 + 25.64 + 0.00) = 25.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-28	0	0.21	59.91	0.00	-7.29	-8.12	0.00	0.00	-18.87	25.64

Segment Leq : 25.64 dBA

↟
Results segment # 3: Richmond Rd (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	2.35	2.35

ROAD (0.00 + 41.74 + 0.00) = 41.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	69	0.21	60.88	0.00	-4.45	-1.52	0.00	0.00	-13.17	41.74

Segment Leq : 41.74 dBA

Total Leq All Segments: 42.47 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 50.07
(NIGHT): 42.47

STAMSON 5.0 NORMAL REPORT Date: 17-09-2020 16:55:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec21.te Time Period: Day/Night 16/8 hours
Description: Reception Point 2-1

Road data, segment # 1: Churchill N (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: Churchill N (day/night)

Angle1 Angle2 : -45.00 deg -35.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -45.00 deg Angle2 : -35.00 deg
Barrier height : 4.50 m
Barrier receiver distance : 70.00 / 70.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: Churchill S (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 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):  12000
    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: Churchill S (day/night)
---------------------------------------------
Angle1   Angle2           : -35.00 deg   71.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     30 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

↟
Road data, segment # 3: Richmond Rd (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 # 3: Richmond Rd (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   62.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  45.00 / 45.00  m
Receiver height           :   1.50 / 1.50   m
```

```
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 62.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  43.00 / 43.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

↟

```
Road data, segment # 4: Byron Ave (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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 # 4: Byron Ave (day/night)
-----------------------------------------------
Angle1   Angle2           : -47.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

↟

```
Results segment # 1: Churchill N (day)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
```

```
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 31.78 + 0.00) = 31.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -45    -35   0.39  68.48   0.00 -10.11 -13.01   0.00   0.00 -13.58  31.78
-------------------------------------------------------------------------------

Segment Leq : 31.78 dBA

↟
Results segment # 2: Churchill S (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.50 + 0.00) = 54.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -35     71   0.66  67.51   0.00  -8.68  -2.90   0.00  -1.43   0.00  54.50
-------------------------------------------------------------------------------

Segment Leq : 54.50 dBA

↟
Results segment # 3: Richmond Rd (day)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 37.97 + 0.00) = 37.97 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     62   0.39  68.48   0.00  -6.63  -5.00   0.00   0.00 -18.89  37.97
-------------------------------------------------------------------------------

Segment Leq : 37.97 dBA

↟
Results segment # 4: Byron Ave (day)
-----------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 47.27 + 0.00) = 47.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	0	0.66	65.75	0.00	-8.68	-6.17	0.00	-3.63	0.00	47.27

Segment Leq : 47.27 dBA

Total Leq All Segments: 55.35 dBA

↟
Results segment # 1: Churchill N (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 24.19 + 0.00) = 24.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	-35	0.39	60.88	0.00	-10.11	-13.01	0.00	0.00	-13.58	24.19

Segment Leq : 24.19 dBA

↟
Results segment # 2: Churchill S (night)

Source height = 1.50 m

ROAD (0.00 + 46.90 + 0.00) = 46.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-35	71	0.66	59.91	0.00	-8.68	-2.90	0.00	-1.43	0.00	46.90

Segment Leq : 46.90 dBA

↟
Results segment # 3: Richmond Rd (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 30.37 + 0.00) = 30.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	62	0.39	60.88	0.00	-6.63	-5.00	0.00	0.00	-18.89	30.37

Segment Leq : 30.37 dBA

↟

Results segment # 4: Byron Ave (night)

Source height = 1.50 m

ROAD (0.00 + 39.68 + 0.00) = 39.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	0	0.66	58.16	0.00	-8.68	-6.17	0.00	-3.63	0.00	39.68

Segment Leq : 39.68 dBA

Total Leq All Segments: 47.75 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 55.35
(NIGHT): 47.75

↟

↟

STAMSON 5.0 NORMAL REPORT Date: 17-09-2020 16:58:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec23.te Time Period: Day/Night 16/8 hours
Description: Reception Point 2-3

Road data, segment # 1: Churchill N (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: Churchill N (day/night)

Angle1 Angle2 : -45.00 deg -35.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -45.00 deg Angle2 : -35.00 deg
Barrier height : 4.50 m
Barrier receiver distance : 70.00 / 70.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: Churchill S (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 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):  12000
    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: Churchill S (day/night)
---------------------------------------------
Angle1   Angle2           : -35.00 deg   71.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     30 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

↟
Road data, segment # 3: Richmond Rd (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 # 3: Richmond Rd (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   62.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  45.00 / 45.00  m
Receiver height           :   7.50 / 7.50   m
```

```
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 62.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  43.00 / 43.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

↟

```
Road data, segment # 4: Byron Ave (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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 # 4: Byron Ave (day/night)
-------------------------------------------
Angle1   Angle2           : -47.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

↟

```
Results segment # 1: Churchill N (day)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
```

```
------------+-------------+-------------+--------------
       1.50 !        7.50 !        2.25 !         2.25

ROAD (0.00 + 35.61 + 0.00) = 35.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -45    -35   0.21  68.48   0.00  -8.80 -12.80   0.00   0.00 -11.27  35.61
-------------------------------------------------------------------------------

Segment Leq : 35.61 dBA

↟
Results segment # 2: Churchill S (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 55.59 + 0.00) = 55.59 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -35     71   0.48  67.51   0.00  -7.74  -2.75   0.00  -1.43   0.00  55.59
-------------------------------------------------------------------------------

Segment Leq : 55.59 dBA

↟
Results segment # 3: Richmond Rd (day)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        7.50 !        1.76 !         1.76

ROAD (0.00 + 40.14 + 0.00) = 40.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     62   0.21  68.48   0.00  -5.77  -4.83   0.00   0.00 -17.74  40.14
-------------------------------------------------------------------------------

Segment Leq : 40.14 dBA

↟
Results segment # 4: Byron Ave (day)
-----------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 48.30 + 0.00) = 48.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	0	0.48	65.75	0.00	-7.74	-6.08	0.00	-3.63	0.00	48.30

Segment Leq : 48.30 dBA

Total Leq All Segments: 56.47 dBA

↟

Results segment # 1: Churchill N (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	2.25	2.25

ROAD (0.00 + 28.01 + 0.00) = 28.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	-35	0.21	60.88	0.00	-8.80	-12.80	0.00	0.00	-11.27	28.01

Segment Leq : 28.01 dBA

↟

Results segment # 2: Churchill S (night)

Source height = 1.50 m

ROAD (0.00 + 47.99 + 0.00) = 47.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-35	71	0.48	59.91	0.00	-7.74	-2.75	0.00	-1.43	0.00	47.99

Segment Leq : 47.99 dBA

↟

Results segment # 3: Richmond Rd (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	1.76	1.76

ROAD (0.00 + 32.54 + 0.00) = 32.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	62	0.21	60.88	0.00	-5.77	-4.83	0.00	0.00	-17.74	32.54

Segment Leq : 32.54 dBA

↟

Results segment # 4: Byron Ave (night)

Source height = 1.50 m

ROAD (0.00 + 40.71 + 0.00) = 40.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	0	0.48	58.16	0.00	-7.74	-6.08	0.00	-3.63	0.00	40.71

Segment Leq : 40.71 dBA

Total Leq All Segments: 48.87 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 56.47
(NIGHT): 48.87

↟

↟

STAMSON 5.0 NORMAL REPORT Date: 17-09-2020 16:16:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec31.te Time Period: Day/Night 16/8 hours
Description: Reception Point 3-1

Road data, segment # 1: Churchill S (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 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): 12000
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: Churchill S (day/night)

Angle1 Angle2 : 0.00 deg 67.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 / 55.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Byron Ave (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000

```
    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: Byron Ave (day/night)
-------------------------------------------
Angle1   Angle2           : -54.00 deg   77.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     70 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

↟
Results segment # 1: Churchill S (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 52.24 + 0.00) = 52.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     67   0.66  67.51   0.00  -9.37  -5.01   0.00  -0.90   0.00  52.24
-------------------------------------------------------------------------------

Segment Leq : 52.24 dBA

↟
Results segment # 2: Byron Ave (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 52.82 + 0.00) = 52.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -54     77   0.66  65.75   0.00  -6.11  -2.13   0.00  -4.68   0.00  52.82
-------------------------------------------------------------------------------

Segment Leq : 52.82 dBA

Total Leq All Segments: 55.55 dBA

↟
Results segment # 1: Churchill S (night)
```

Source height = 1.50 m

ROAD (0.00 + 44.64 + 0.00) = 44.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	67	0.66	59.91	0.00	-9.37	-5.01	0.00	-0.90	0.00	44.64

Segment Leq : 44.64 dBA

↟

Results segment # 2: Byron Ave (night)

Source height = 1.50 m

ROAD (0.00 + 45.23 + 0.00) = 45.23 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-54	77	0.66	58.16	0.00	-6.11	-2.13	0.00	-4.68	0.00	45.23

Segment Leq : 45.23 dBA

Total Leq All Segments: 47.96 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 55.55
(NIGHT): 47.96

↟

↟

STAMSON 5.0 NORMAL REPORT Date: 17-09-2020 16:23:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec33.te Time Period: Day/Night 16/8 hours
Description: Reception Point 3-3

Road data, segment # 1: Churchill S (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 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): 12000
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: Churchill S (day/night)

Angle1 Angle2 : 0.00 deg 67.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 / 55.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Byron Ave (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000

```
    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: Byron Ave (day/night)
-------------------------------------------
Angle1   Angle2           : -54.00 deg   77.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     70 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

↟
Results segment # 1: Churchill S (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.43 + 0.00) = 53.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     67   0.48  67.51   0.00  -8.35  -4.82   0.00  -0.90   0.00  53.43
-------------------------------------------------------------------------------

Segment Leq : 53.43 dBA

↟
Results segment # 2: Byron Ave (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.67 + 0.00) = 53.67 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -54     77   0.48  65.75   0.00  -5.45  -1.95   0.00  -4.68   0.00  53.67
-------------------------------------------------------------------------------

Segment Leq : 53.67 dBA

Total Leq All Segments: 56.56 dBA

↟
Results segment # 1: Churchill S (night)
```

Source height = 1.50 m

ROAD (0.00 + 45.84 + 0.00) = 45.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	67	0.48	59.91	0.00	-8.35	-4.82	0.00	-0.90	0.00	45.84

Segment Leq : 45.84 dBA

↟

Results segment # 2: Byron Ave (night)

Source height = 1.50 m

ROAD (0.00 + 46.08 + 0.00) = 46.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-54	77	0.48	58.16	0.00	-5.45	-1.95	0.00	-4.68	0.00	46.08

Segment Leq : 46.08 dBA

Total Leq All Segments: 48.97 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 56.56
(NIGHT): 48.97

↟

↟

STAMSON 5.0 NORMAL REPORT Date: 17-09-2020 17:00:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec41.te Time Period: Day/Night 16/8 hours
Description: Reception Point 4-1

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

Angle1 Angle2 : -57.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 45.00 / 45.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -57.00 deg Angle2 : 0.00 deg
Barrier height : 4.50 m
Barrier receiver distance : 43.00 / 43.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: Byron Ave (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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):   8000
    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: Byron Ave (day/night)
------------------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

🠉
Results segment # 1: Richmond Rd (day)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 37.45 + 0.00) = 37.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -57      0   0.39  68.48   0.00  -6.63  -5.30   0.00   0.00 -19.10  37.45
-------------------------------------------------------------------------------

Segment Leq : 37.45 dBA

🠉
Results segment # 2: Byron Ave (day)
------------------------------------

Source height = 1.50 m
```

ROAD (0.00 + 49.45 + 0.00) = 49.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	65.75	0.00	-8.68	-4.89	0.00	-2.73	0.00	49.45

Segment Leq : 49.45 dBA

Total Leq All Segments: 49.72 dBA

Results segment # 1: Richmond Rd (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 29.86 + 0.00) = 29.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-57	0	0.39	60.88	0.00	-6.63	-5.30	0.00	0.00	-19.10	29.86

Segment Leq : 29.86 dBA

Results segment # 2: Byron Ave (night)

Source height = 1.50 m

ROAD (0.00 + 41.85 + 0.00) = 41.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	58.16	0.00	-8.68	-4.89	0.00	-2.73	0.00	41.85

Segment Leq : 41.85 dBA

Total Leq All Segments: 42.12 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.72
(NIGHT): 42.12

STAMSON 5.0 NORMAL REPORT Date: 17-09-2020 17:02:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec43.te Time Period: Day/Night 16/8 hours
Description: Reception Point 4-3

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

Angle1 Angle2 : -57.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 45.00 / 45.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -57.00 deg Angle2 : 0.00 deg
Barrier height : 4.50 m
Barrier receiver distance : 43.00 / 43.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Byron Ave (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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):   8000
    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: Byron Ave (day/night)
------------------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

🠉
Results segment # 1: Richmond Rd (day)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        7.50 !        1.76 !         1.76

ROAD (0.00 + 39.60 + 0.00) = 39.60 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -57      0   0.21  68.48   0.00  -5.77  -5.16   0.00   0.00 -17.95  39.60
-------------------------------------------------------------------------------

Segment Leq : 39.60 dBA

🠉
Results segment # 2: Byron Ave (day)
------------------------------------

Source height = 1.50 m
```

ROAD (0.00 + 50.59 + 0.00) = 50.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.48	65.75	0.00	-7.74	-4.69	0.00	-2.73	0.00	50.59

Segment Leq : 50.59 dBA

Total Leq All Segments: 50.92 dBA

Results segment # 1: Richmond Rd (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	1.76	1.76

ROAD (0.00 + 32.00 + 0.00) = 32.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-57	0	0.21	60.88	0.00	-5.77	-5.16	0.00	0.00	-17.95	32.00

Segment Leq : 32.00 dBA

Results segment # 2: Byron Ave (night)

Source height = 1.50 m

ROAD (0.00 + 42.99 + 0.00) = 42.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.48	58.16	0.00	-7.74	-4.69	0.00	-2.73	0.00	42.99

Segment Leq : 42.99 dBA

Total Leq All Segments: 43.32 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.92
(NIGHT): 43.32

STAMSON 5.0 NORMAL REPORT Date: 17-09-2020 17:17:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec5.te Time Period: Day/Night 16/8 hours
Description: Reception Point 5

Road data, segment # 1: Churchill N (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: Churchill N (day/night)

Angle1 Angle2 : -44.00 deg -33.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height : 10.50 / 10.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -44.00 deg Angle2 : -33.00 deg
Barrier height : 4.50 m
Barrier receiver distance : 75.00 / 75.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: Churchill S (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 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):  12000
    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: Churchill S (day/night)
---------------------------------------------
Angle1   Angle2           : -33.00 deg   69.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     30 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  60.00 / 60.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

♠
Road data, segment # 3: Richmond Rd (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 # 3: Richmond Rd (day/night)
---------------------------------------------
Angle1   Angle2           : -60.00 deg   65.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  45.00 / 45.00  m
Receiver height           :  10.50 / 10.50  m
```

```
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -60.00 deg   Angle2 : 65.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  43.00 / 43.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

↟

```
Road data, segment # 4: Byron Ave (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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 # 4: Byron Ave (day/night)
-----------------------------------------------
Angle1   Angle2           : -50.00 deg   72.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

↟

```
Results segment # 1: Churchill N (day)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
```

```
------------+-------------+-------------+--------------
       1.50 !       10.50 !        2.06 !         2.06

ROAD (0.00 + 33.92 + 0.00) = 33.92 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -44    -33   0.12  68.48   0.00  -8.14 -12.27   0.00   0.00 -14.15  33.92
-------------------------------------------------------------------------------

Segment Leq : 33.92 dBA

↟
Results segment # 2: Churchill S (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.93 + 0.00) = 54.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -33     69   0.39  67.51   0.00  -8.37  -2.81   0.00  -1.40   0.00  54.93
-------------------------------------------------------------------------------

Segment Leq : 54.93 dBA

↟
Results segment # 3: Richmond Rd (day)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        1.90 !         1.90

ROAD (0.00 + 44.37 + 0.00) = 44.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -60     65   0.12  68.48   0.00  -5.34  -1.70   0.00   0.00 -17.06  44.37
-------------------------------------------------------------------------------

Segment Leq : 44.37 dBA

↟
Results segment # 4: Byron Ave (day)
-----------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 53.66 + 0.00) = 53.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-50	72	0.39	65.75	0.00	-7.27	-2.09	0.00	-2.73	0.00	53.66

Segment Leq : 53.66 dBA

Total Leq All Segments: 57.58 dBA

↟

Results segment # 1: Churchill N (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	10.50	2.06	2.06

ROAD (0.00 + 26.32 + 0.00) = 26.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-44	-33	0.12	60.88	0.00	-8.14	-12.27	0.00	0.00	-14.15	26.32

Segment Leq : 26.32 dBA

↟

Results segment # 2: Churchill S (night)

Source height = 1.50 m

ROAD (0.00 + 47.33 + 0.00) = 47.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-33	69	0.39	59.91	0.00	-8.37	-2.81	0.00	-1.40	0.00	47.33

Segment Leq : 47.33 dBA

↟

Results segment # 3: Richmond Rd (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	10.50	1.90	1.90

ROAD (0.00 + 36.77 + 0.00) = 36.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	65	0.12	60.88	0.00	-5.34	-1.70	0.00	0.00	-17.06	36.77

Segment Leq : 36.77 dBA

↟

Results segment # 4: Byron Ave (night)

Source height = 1.50 m

ROAD (0.00 + 46.07 + 0.00) = 46.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-50	72	0.39	58.16	0.00	-7.27	-2.09	0.00	-2.73	0.00	46.07

Segment Leq : 46.07 dBA

Total Leq All Segments: 49.99 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 57.58
(NIGHT): 49.99

↟

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