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Environmental Noise Control Study

Proposed Multi-Storey Building
701 Churchill Avenue

Prepared For

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May 13, 2019

Report: PG4889-1

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1.0 Introduction

Paterson Group (Paterson) was commissioned by Mr. Duy Phuc Nguyen to conduct an environmental noise control study for the proposed residential building to be located at 701 Churchill Avenue North, 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 development will consist of a four (4) storey residential building with an outdoor amenity area located on the east side of the building.

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 |
| <input type="checkbox"/> 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 |
| <input type="checkbox"/> 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." |
| <input type="checkbox"/> 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.

A stationary noise analysis is not required for this development.

Aircraft/Airport Noise

Due to the location of the proposed development, an aircraft/airport noise analysis will not be required.

4.0 Analysis

4.1 Surface Transportation Noise

The proposed development is bordered to the west by Churchill Avenue North, to the north by Currell Avenue, and to the south and east by residential buildings. Additional roads located within the 100 m radius consist of Edison Avenue, Robin Lane and Irene Crescent. Additionally, Highway 417 is located within 500 m of the subject site.

Based on the City of Ottawa Official Plan, Schedule E, Churchill Avenue North is considered a 2 lane major collector road (2-UMCU). All other roads within the 100 m radius are not classified as either arterial, collector or major collector road and therefore are not included in this study. Additionally, it was noted that the provincial Highway 417 is within 500 m of the proposed building and therefore is included in this study. All noise sources are presented in Drawing PG4889-1B to 1F - Site Geometry, located in Appendix 1.

It is understood that the proposed development will consist of a three (3) storey residential building. Reception points were selected on every elevation at the first floor and third floor.

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 % |
| Churchill Avenue N. | 2-UMCU | 12000 | 40 | 92/8 | 7 | 5 |
| Highway 417 West | Freeway | 54999 | 100 | 92/8 | 7 | 5 |
| Highway 417 East | Freeway | 54999 | 100 | 92/8 | 7 | 5 |
| <input type="checkbox"/> Data obtained from the City of Ottawa document ENCG | | | | | | |

Two (2) levels of reception points were selected for this analysis. The following elevations were selected from the heights provided on the building elevation plans for this development.

| Table 5 - Elevation of Reception Points | | | |
|------------------------------------------------|------------------------------------------|------------------------------|-----------------------------------|
| Floor Number | Elevation at Centre of Window (m) | Floor Use | Daytime/Nighttime Analysis |
| Ground Floor | 1.5 | Living and sleeping quarters | daytime/nighttime |
| Third Floor | 8.1 | Living and sleeping quarters | daytime/nighttime |

For this analysis, a reception point was taken at the centre of the predetermined floors. For the outdoor living area, the reception point was selected at 1.5 m height, 1.5 m away from the building perimeter. Reception points are noted on Drawing PG4889-2 - Receptor Locations 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 either the 100 m buffer zone or the 500 m buffer zone, which is reflected in the local angles, presented in Drawings PG4889-1B to 1F - Site Geometry in Appendix 1.

Table 8 - Summary of Reception Points and Geometry 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 ENG. The subject site is relatively flat and at grade with the neighbouring roads within the 100 m radius.

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 presented in Appendix 2, and the summary of the results are detailed in Table 6.

| Table 6 - Proposed Noise Levels | | | | |
|----------------------------------------|-------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------|
| Reception Point | Description | Outdoor Living Area $L_{EQ(16)}$ (dBA) | Daytime at Facade $L_{EQ(16)}$ (dBA) | Nighttime at Facade $L_{EQ(16)}$ (dBA) |
| REC 1-1 | Western Elevation, 1 st Floor | n/a | 64.21 | 56.61 |
| REC 1-3 | Western Elevation, 3 rd Floor | n/a | 64.53 | 56.93 |
| REC 2-1 | Northern Elevation, 1 st Floor | n/a | 57.36 | 49.76 |
| REC 2-3 | Northern Elevation, 3 rd Floor | n/a | 58.07 | 50.47 |
| REC 3-1 | Eastern Elevation, 1 st Floor | n/a | 45.74 | 38.81 |
| REC 3-3 | Eastern Elevation, 3 rd Floor | n/a | 48.81 | 41.21 |
| REC 4-1 | Southern Elevation, 1 st Floor | n/a | 57.71 | 50.11 |
| REC 4-3 | Southern Elevation, 3 rd Floor | n/a | 58.66 | 51.06 |
| REC 5 | Rear Yard | 54.4 | n/a | n/a |

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

The outdoor living area was identified at the eastern portion of the site. While the proposed building will be located between the primary noise source (Churchill Avenue North) and the receptor, for this analysis no building was utilized as a barrier as the noise impact assessment at an outdoor living area must exclude the effect of sound reflection from the facade. The results of this analysis indicate that the noise level will be 54.40 dBA, which is below the 55 dBA threshold and is considered acceptable. No additional noise mitigation measures will be required.

6.2 Indoor Living Areas and Ventilation

The results of the STAMSON modeling indicates that the daytime $L_{eq(16)}$ ranges between 34.81 dBA and 64.53 dBA. The ENG C states that the limits for the exterior of the pane of glass is 55 dBA. This threshold was exceeded on the western, northern and southern elevation. Therefore, all units on the western, northern and southern elevations should have a warning clause C. In addition, the ENG C states that provided that the $L_{eq(16)}$ is below 65 dBA, then standard construction materials are considered acceptable for noise reduction and that no additional analysis of building materials will be required.

7.0 Conclusion

The subject site is located at 701 Churchill Avenue North. It is understood that the development will consist of a three (3) storey building with a rear yard (outdoor living area). The associated analysis identified three noise sources: Churchill Avenue North, Highway 417 Westbound and Highway 417 Eastbound.

Reception points were selected in the centre of each elevation on the first and third storey of each building as well as in the outdoor living area. There were no exceedances of the 55 dBA threshold at the outdoor living area. However, an exceedance of the 55 dBA threshold was noted on the western, southern and eastern elevations. Therefore, all units on these elevations must have a Warning Clause Type C attached to all purchase of sales and be designed with the provision for adding central air conditioning:

"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."

Based on the results of the analysis, it was determined that standard construction materials are to be sufficient to provide adequate noise protection to the indoor-living areas.

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 Mr. Duy Phuc Nguyen 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 Dennis, P.Eng.



Report Distribution:

- ☐ Mr. Duy Phuc Nguyen (3 copies)
- ☐ Paterson Group (1 copy)

APPENDIX 1

TABLE 7 - SUMMARY OF RECEPTION POINTS AND GEOMETRY

DRAWING PG4889-1A - SITE PLAN

DRAWING PG4889-1B - SITE GEOMETRY (REC 1-1 and REC 1-3)

DRAWING PG4889-1C - SITE GEOMETRY (REC 2-1 and REC 2-3)

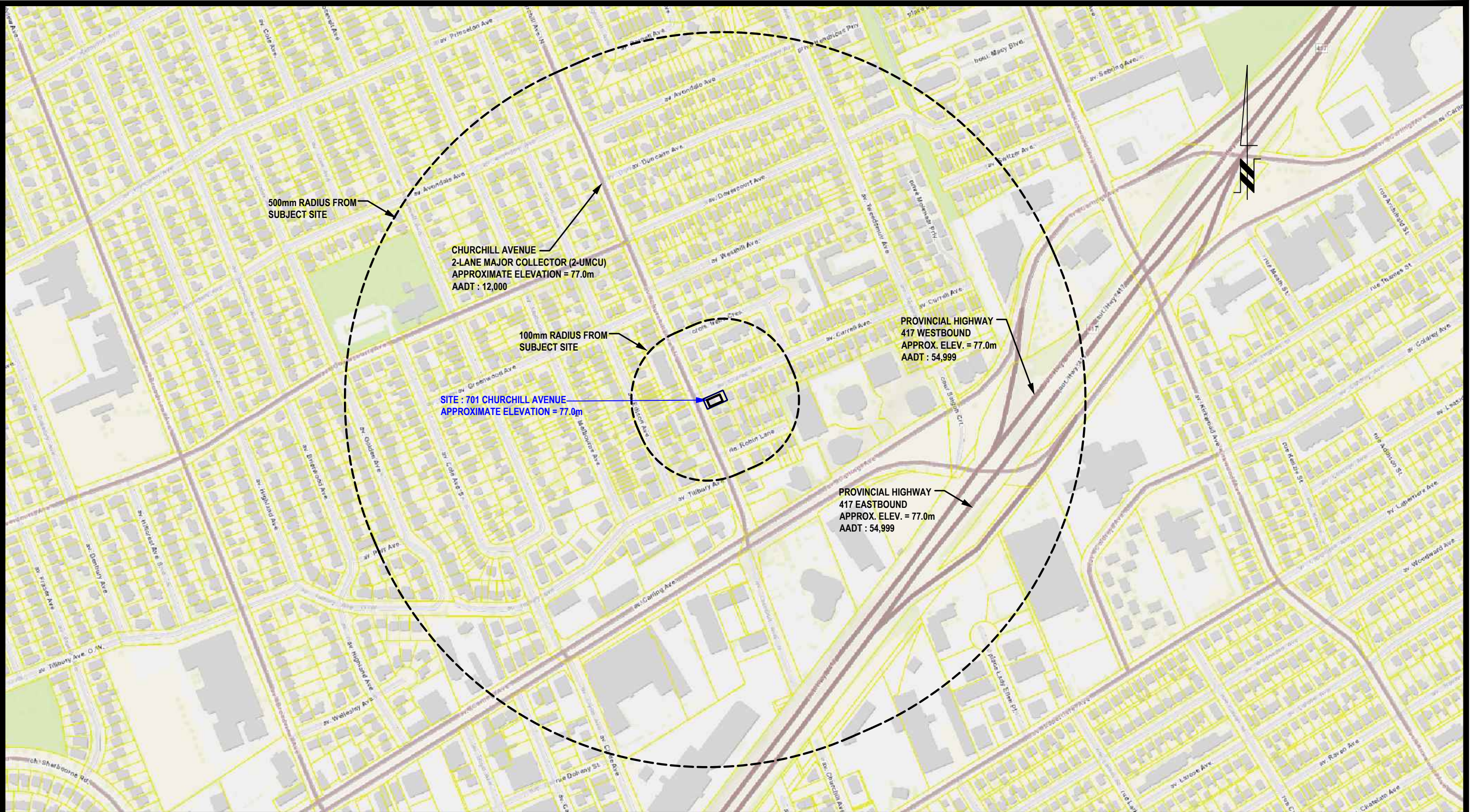
DRAWING PG4889-1D - SITE GEOMETRY (REC 3-1 and REC 3-3)

DRAWING PG4889-1E - SITE GEOMETRY (REC 4-1 and REC 4-3)

DRAWING PG4889-1F - SITE GEOMETRY (REC 5-0)

DRAWING PG4889-2 - RECEPTOR LOCATIONS

| Table 7 - Summary of Reception Points and Geometry 701 Churchill Avenue | | | | | | | | | | | | | | |
|----------------------------------------------------------------------------|---------------------------------|---------------|-----------------------|--------------|-----------|----------------------|--------------------------|--------------|-----------------------|--------------|-----------|----------------------|--------------------|--------------|
| Point of Reception | Location | Leq Day (dBA) | Churchill Avenue | | | | | | | | | | | |
| | | | Horizontal (m) | Vertical (m) | Total (m) | Local Angle (degree) | Number of Rows of Houses | Density (%) | | | | | | |
| REC 1-1 | Western Elevation, 1st Floor | 64.21 | 15 | 1.5 | 15.07 | -82.5, 82.5 | n/a | n/a | | | | | | |
| REC 1-3 | Western Elevation, 3rd Floor | 64.53 | 15 | 8.1 | 17.05 | -82.5, 82.5 | n/a | n/a | | | | | | |
| REC 2-1 | Northern Elevation, 1st Floor | 57.36 | 25 | 1.5 | 25.04 | 0, 77 | n/a | n/a | | | | | | |
| REC 2-3 | Northern Elevation, 3rd Floor | 58.08 | 25 | 8.1 | 26.28 | 0, 77 | n/a | n/a | | | | | | |
| REC 3-1 | Eastern Elevation, 1st Floor | 45.74 | n/a | n/a | n/a | n/a | n/a | n/a | | | | | | |
| REC 3-3 | Eastern Elevation, 3rd Floor | 48.81 | n/a | n/a | n/a | n/a | n/a | n/a | | | | | | |
| REC 4-1 | Southern Elevation, 1st Floor | 61.56 | 25 | 1.5 | 25.04 | -76.5, 0 | n/a | n/a | | | | | | |
| REC 4-3 | Southern Elevation, 3rd Floor | 58.66 | 25 | 8.1 | 26.28 | -76.5, 0 | n/a | n/a | | | | | | |
| REC 5 | Rear Yard (Outdoor living area) | 54.4 | 35 | 1.5 | 35.03 | -76.5, 76.5 | n/a | n/a | | | | | | |
| Point of Reception | Location | Leq Day (dBA) | Highway 417 Westbound | | | | | | Highway 417 Eastbound | | | | | |
| | | | Horizontal (m) | Vertical (m) | Total (m) | Local Angle (degree) | Barrier Height (m) | Distance (m) | Horizontal (m) | Vertical (m) | Total (m) | Local Angle (degree) | Barrier Height (m) | Distance (m) |
| REC 1-1 | Western Elevation, 1st Floor | 64.21 | 390 | 1.5 | 390 | 0, 16.5 | n/a | n/a | 415 | 1.5 | 415 | 0, 14 | n/a | n/a |
| REC 1-3 | Western Elevation, 3rd Floor | 64.53 | 390 | 8.1 | 390.08 | 0, 16.5 | n/a | n/a | 415 | 8.1 | 415.08 | 0, 14 | n/a | n/a |
| REC 2-1 | Northern Elevation, 1st Floor | 57.36 | 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 2-3 | Northern Elevation, 3rd Floor | 58.08 | 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 3-1 | Eastern Elevation, 1st Floor | 45.74 | 390 | 1.5 | 390 | -76, 0 | n/a | n/a | 405 | 1.5 | 405 | -73.5, 0 | n/a | n/a |
| REC 3-3 | Eastern Elevation, 3rd Floor | 48.81 | 390 | 8.1 | 390.08 | -76, 0 | n/a | n/a | 405 | 8.1 | 405.08 | -73.5, 0 | n/a | n/a |
| REC 4-1 | Southern Elevation, 1st Floor | 61.56 | 385 | 1.5 | 385 | -76.5, 18 | n/a | n/a | 400 | 1.5 | 400 | -74, 15 | n/a | n/a |
| REC 4-3 | Southern Elevation, 3rd Floor | 58.66 | 385 | 8.1 | 385.09 | -76.5, 18 | n/a | n/a | 400 | 8.1 | 400.08 | -74, 15 | n/a | n/a |
| REC 5 | Rear Yard (Outdoor living area) | 54.4 | 390 | 1.5 | 390 | -76, 19 | 3 | 490 | 405 | 1.5 | 405 | -73, 16 | 3 | 490 |



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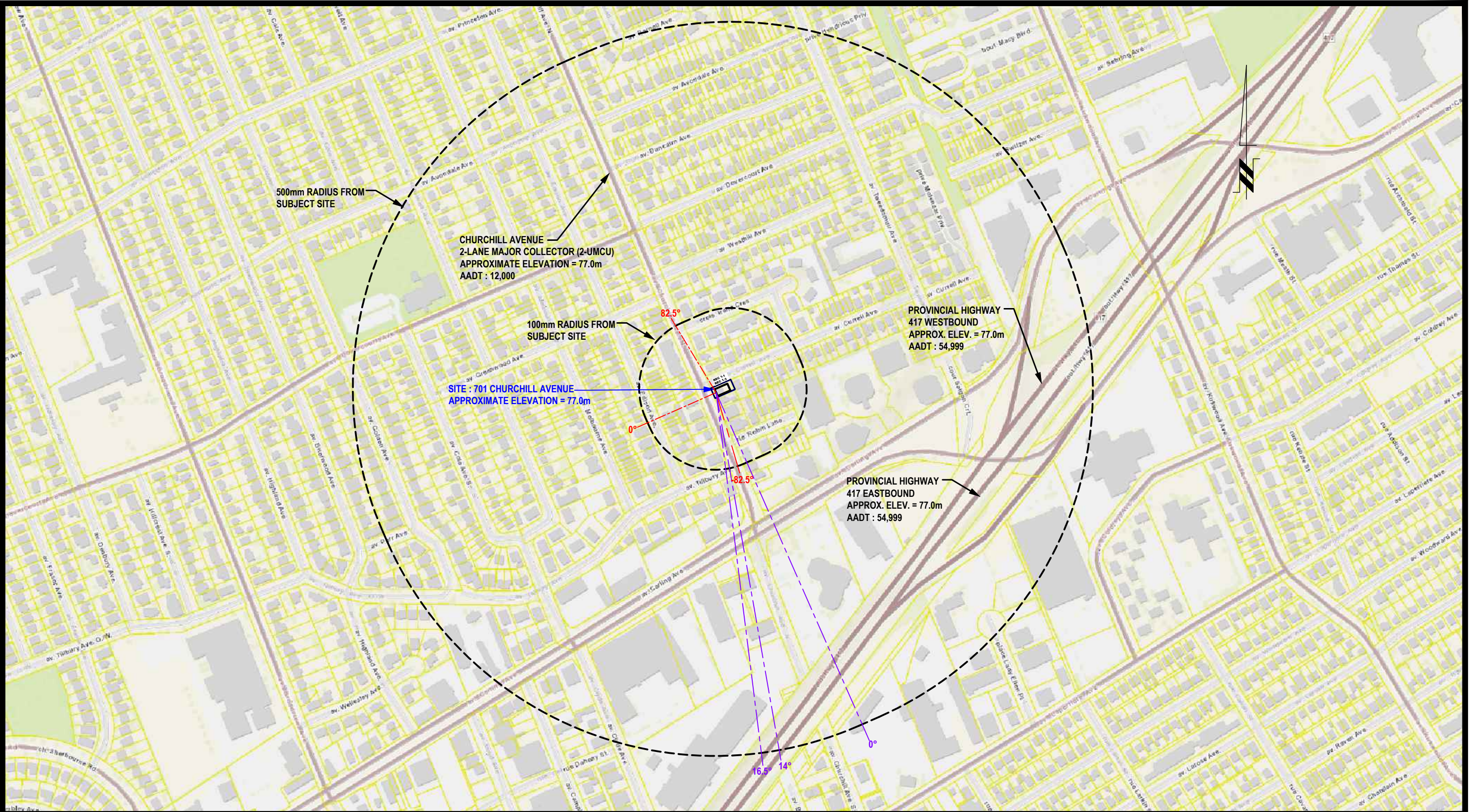
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| NO. | REVISIONS | DATE | INITIAL |

MR. DUY PHUC NGUYEN
NOISE ATTENUATION STUDY
PROP. LOW-RISE RESIDENTIAL DEVELOPMENT - 701 CHURCHILL AVE.
OTTAWA, ONTARIO
Title: **SITE PLAN**

Scale: 1:5000
Drawn by: RCG
Checked by: SB
Approved by: DJG

Date: 04/2019
Report No.: PG4888-1
PG4889-1A
Revision No.:



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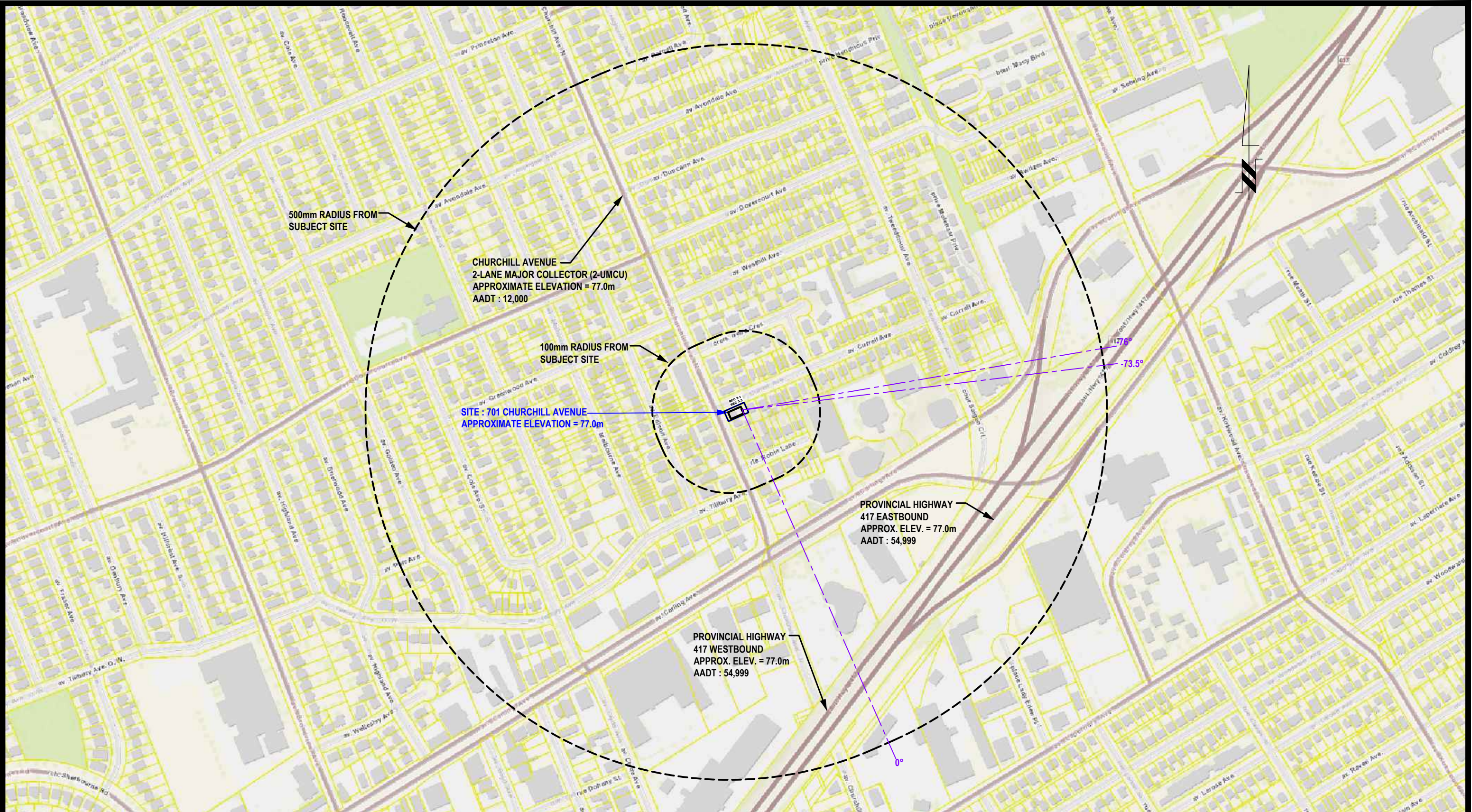
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MR. DUY PHUC NGUYEN
NOISE ATTENUATION STUDY
PROP. LOW-RISE RESIDENTIAL DEVELOPMENT - 701 CHURCHILL AVE.
OTTAWA, ONTARIO
Title: **SITE GEOMETRY - REC 1-1, REC 1-3**

Scale: 1:5000
Drawn by: RCG
Checked by: SB
Approved by: DJG

Date: 04/2019
Report No.: PG4888-1
PG4889-1B
Revision No.:



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MR. DUY PHUC NGUYEN
NOISE ATTENUATION STUDY
PROP. LOW-RISE RESIDENTIAL DEVELOPMENT - 701 CHURCHILL AVE.
OTTAWA, ONTARIO
Title:
SITE GEOMETRY - REC 3-1, REC 3-3

Scale: 1:5000
Drawn by: RCG
Checked by: SB
Approved by: DJG

Date: 04/2019
Report No.: PG4888-1
PG4889-1D
Revision No.:

APPENDIX 2

STAMSON RESULTS

STAMSON 5.0 NORMAL REPORT Date: 10-05-2019 12:49:54
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 (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 : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 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 (day/night)

Angle1 Angle2 : -83.00 deg 83.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999
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: Hwy 417 West (day/night)

| | | | | |
|--------------------------|--------|-------------------|---------------------------------|-----------|
| Angle1 | Angle2 | : | 0.00 deg | 17.00 deg |
| Wood depth | : | 0 | (No woods.) | |
| No of house rows | : | 5 / 5 | | |
| House density | : | 60 % | | |
| Surface | : | 1 | (Absorptive ground surface) | |
| Receiver source distance | : | 390.00 / 390.00 m | | |
| Receiver height | : | 1.50 / 1.50 m | | |
| Topography | : | 1 | (Flat/gentle slope; no barrier) | |
| Reference angle | : | 0.00 | | |



Road data, segment # 3: Hwy 417 East (day/night)

| | | | | |
|---------------------|---|------------|-------------------------------|---|
| Car traffic volume | : | 44527/3872 | veh/TimePeriod | * |
| Medium truck volume | : | 3542/308 | veh/TimePeriod | * |
| Heavy truck volume | : | 2530/220 | veh/TimePeriod | * |
| Posted speed limit | : | 100 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): | 54999 |
| 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: Hwy 417 East (day/night)

| | | | | |
|--------------------------|--------|-------------------|---------------------------------|-----------|
| Angle1 | Angle2 | : | 0.00 deg | 14.00 deg |
| Wood depth | : | 0 | (No woods.) | |
| No of house rows | : | 5 / 5 | | |
| House density | : | 60 % | | |
| Surface | : | 1 | (Absorptive ground surface) | |
| Receiver source distance | : | 415.00 / 415.00 m | | |
| Receiver height | : | 1.50 / 1.50 m | | |
| Topography | : | 1 | (Flat/gentle slope; no barrier) | |
| Reference angle | : | 0.00 | | |



Results segment # 1: Churchill (day)

Source height = 1.50 m

ROAD (0.00 + 64.19 + 0.00) = 64.19 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -83 | 83 | 0.66 | 65.72 | 0.00 | 0.00 | -1.53 | 0.00 | 0.00 | 0.00 | 64.19 |

Segment Leq : 64.19 dBA

↑
Results segment # 2: Hwy 417 West (day)

Source height = 1.50 m

ROAD (0.00 + 37.29 + 0.00) = 37.29 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|--------|-------|-------|-------|--------|
| 0 | 17 | 0.66 | 80.15 | 0.00 | -23.49 | -10.29 | 0.00 | -9.07 | 0.00 | 37.29 |

Segment Leq : 37.29 dBA

↑
Results segment # 3: Hwy 417 East (day)

Source height = 1.50 m

ROAD (0.00 + 36.04 + 0.00) = 36.04 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|--------|-------|-------|-------|--------|
| 0 | 14 | 0.66 | 80.15 | 0.00 | -23.94 | -11.12 | 0.00 | -9.05 | 0.00 | 36.04 |

Segment Leq : 36.04 dBA

Total Leq All Segments: 64.21 dBA

↑
Results segment # 1: Churchill (night)

Source height = 1.50 m

ROAD (0.00 + 56.59 + 0.00) = 56.59 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|

| | | | | | | | | | | |
|-----|----|------|-------|------|------|-------|------|------|------|-------|
| -83 | 83 | 0.66 | 58.12 | 0.00 | 0.00 | -1.53 | 0.00 | 0.00 | 0.00 | 56.59 |
|-----|----|------|-------|------|------|-------|------|------|------|-------|

Segment Leq : 56.59 dBA

↑
Results segment # 2: Hwy 417 West (night)

Source height = 1.50 m

ROAD (0.00 + 29.70 + 0.00) = 29.70 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|--------|-------|-------|-------|--------|
| 0 | 17 | 0.66 | 72.55 | 0.00 | -23.49 | -10.29 | 0.00 | -9.07 | 0.00 | 29.70 |

Segment Leq : 29.70 dBA

↑
Results segment # 3: Hwy 417 East (night)

Source height = 1.50 m

ROAD (0.00 + 28.44 + 0.00) = 28.44 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|--------|-------|-------|-------|--------|
| 0 | 14 | 0.66 | 72.55 | 0.00 | -23.94 | -11.12 | 0.00 | -9.05 | 0.00 | 28.44 |

Segment Leq : 28.44 dBA

Total Leq All Segments: 56.61 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 64.21
(NIGHT): 56.61

↑
↑

STAMSON 5.0 NORMAL REPORT Date: 10-05-2019 12:50:51
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 (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 : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 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 (day/night)

Angle1 Angle2 : -83.00 deg 83.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 8.10 / 8.10 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999
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: Hwy 417 West (day/night)

| | | | | |
|--------------------------|--------|-------------------|---------------------------------|-----------|
| Angle1 | Angle2 | : | 0.00 deg | 17.00 deg |
| Wood depth | : | 0 | (No woods.) | |
| No of house rows | : | 5 / 5 | | |
| House density | : | 60 % | | |
| Surface | : | 1 | (Absorptive ground surface) | |
| Receiver source distance | : | 390.00 / 390.00 m | | |
| Receiver height | : | 8.10 / 8.10 m | | |
| Topography | : | 1 | (Flat/gentle slope; no barrier) | |
| Reference angle | : | 0.00 | | |



Road data, segment # 3: Hwy 417 East (day/night)

| | | | | |
|---------------------|---|------------|-------------------------------|---|
| Car traffic volume | : | 44527/3872 | veh/TimePeriod | * |
| Medium truck volume | : | 3542/308 | veh/TimePeriod | * |
| Heavy truck volume | : | 2530/220 | veh/TimePeriod | * |
| Posted speed limit | : | 100 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): | 54999 |
| 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: Hwy 417 East (day/night)

| | | | | |
|--------------------------|--------|-------------------|---------------------------------|-----------|
| Angle1 | Angle2 | : | 0.00 deg | 14.00 deg |
| Wood depth | : | 0 | (No woods.) | |
| No of house rows | : | 5 / 5 | | |
| House density | : | 60 % | | |
| Surface | : | 1 | (Absorptive ground surface) | |
| Receiver source distance | : | 415.00 / 415.00 m | | |
| Receiver height | : | 8.10 / 8.10 m | | |
| Topography | : | 1 | (Flat/gentle slope; no barrier) | |
| Reference angle | : | 0.00 | | |



Results segment # 1: Churchill (day)

Source height = 1.50 m

ROAD (0.00 + 64.50 + 0.00) = 64.50 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -83 | 83 | 0.46 | 65.72 | 0.00 | 0.00 | -1.22 | 0.00 | 0.00 | 0.00 | 64.50 |

Segment Leq : 64.50 dBA

↑
Results segment # 2: Hwy 417 West (day)

Source height = 1.50 m

ROAD (0.00 + 40.11 + 0.00) = 40.11 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|--------|-------|-------|-------|--------|
| 0 | 17 | 0.46 | 80.15 | 0.00 | -20.69 | -10.28 | 0.00 | -9.07 | 0.00 | 40.11 |

Segment Leq : 40.11 dBA

↑
Results segment # 3: Hwy 417 East (day)

Source height = 1.50 m

ROAD (0.00 + 38.90 + 0.00) = 38.90 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|--------|-------|-------|-------|--------|
| 0 | 14 | 0.46 | 80.15 | 0.00 | -21.08 | -11.11 | 0.00 | -9.05 | 0.00 | 38.90 |

Segment Leq : 38.90 dBA

Total Leq All Segments: 64.53 dBA

↑
Results segment # 1: Churchill (night)

Source height = 1.50 m

ROAD (0.00 + 56.90 + 0.00) = 56.90 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|

| | | | | | | | | | | |
|-----|----|------|-------|------|------|-------|------|------|------|-------|
| -83 | 83 | 0.46 | 58.12 | 0.00 | 0.00 | -1.22 | 0.00 | 0.00 | 0.00 | 56.90 |
|-----|----|------|-------|------|------|-------|------|------|------|-------|

Segment Leq : 56.90 dBA

↑
Results segment # 2: Hwy 417 West (night)

Source height = 1.50 m

ROAD (0.00 + 32.51 + 0.00) = 32.51 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|--------|-------|-------|-------|--------|
| 0 | 17 | 0.46 | 72.55 | 0.00 | -20.69 | -10.28 | 0.00 | -9.07 | 0.00 | 32.51 |

Segment Leq : 32.51 dBA

↑
Results segment # 3: Hwy 417 East (night)

Source height = 1.50 m

ROAD (0.00 + 31.30 + 0.00) = 31.30 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|--------|-------|-------|-------|--------|
| 0 | 14 | 0.46 | 72.55 | 0.00 | -21.08 | -11.11 | 0.00 | -9.05 | 0.00 | 31.30 |

Segment Leq : 31.30 dBA

Total Leq All Segments: 56.93 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 64.53
(NIGHT): 56.93

↑
↑

STAMSON 5.0 NORMAL REPORT Date: 14-05-2019 10:42:13
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 (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 : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 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 (day/night)

Angle1 Angle2 : 0.00 deg 77.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Results segment # 1: Churchill (day)

Source height = 1.50 m

ROAD (0.00 + 57.36 + 0.00) = 57.36 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| 0 | 77 | 0.66 | 65.72 | 0.00 | -3.68 | -4.67 | 0.00 | 0.00 | 0.00 | 57.36 |

Segment Leq : 57.36 dBA

Total Leq All Segments: 57.36 dBA

↑

Results segment # 1: Churchill (night)

Source height = 1.50 m

ROAD (0.00 + 49.76 + 0.00) = 49.76 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|

| | | | | | | | | | | |
|---|----|------|-------|------|-------|-------|------|------|------|-------|
| 0 | 77 | 0.66 | 58.12 | 0.00 | -3.68 | -4.67 | 0.00 | 0.00 | 0.00 | 49.76 |
|---|----|------|-------|------|-------|-------|------|------|------|-------|

Segment Leq : 49.76 dBA

Total Leq All Segments: 49.76 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 57.36

(NIGHT): 49.76

↑

↑

STAMSON 5.0 NORMAL REPORT Date: 14-05-2019 10:43:04
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 (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 : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 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 (day/night)

Angle1 Angle2 : 0.00 deg 77.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 8.10 / 8.10 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Results segment # 1: Churchill (day)

Source height = 1.50 m

ROAD (0.00 + 58.07 + 0.00) = 58.07 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| 0 | 77 | 0.46 | 65.72 | 0.00 | -3.24 | -4.40 | 0.00 | 0.00 | 0.00 | 58.07 |

Segment Leq : 58.07 dBA

Total Leq All Segments: 58.07 dBA

↑

Results segment # 1: Churchill (night)

Source height = 1.50 m

ROAD (0.00 + 50.47 + 0.00) = 50.47 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|

| | | | | | | | | | | |
|---|----|------|-------|------|-------|-------|------|------|------|-------|
| 0 | 77 | 0.46 | 58.12 | 0.00 | -3.24 | -4.40 | 0.00 | 0.00 | 0.00 | 50.47 |
|---|----|------|-------|------|-------|-------|------|------|------|-------|

Segment Leq : 50.47 dBA

Total Leq All Segments: 50.47 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 58.07

(NIGHT): 50.47

↑

↑

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

Road data, segment # 1: Hwy 417 West (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999
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: Hwy 417 West (day/night)

Angle1 Angle2 : -76.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 5 / 5
House density : 60 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 390.00 / 390.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Hwy 417 East (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999

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: Hwy 417 East (day/night)

 Angle1 Angle2 : -74.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 5 / 5
 House density : 60 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 405.00 / 405.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: Hwy 417 West (day)

 Source height = 1.50 m

ROAD (0.00 + 42.89 + 0.00) = 42.89 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -76 | 0 | 0.66 | 80.15 | 0.00 | -23.49 | -4.70 | 0.00 | -9.07 | 0.00 | 42.89 |

Segment Leq : 42.89 dBA



Results segment # 2: Hwy 417 East (day)

 Source height = 1.50 m

ROAD (0.00 + 42.57 + 0.00) = 42.57 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -74 | 0 | 0.66 | 80.15 | 0.00 | -23.76 | -4.76 | 0.00 | -9.06 | 0.00 | 42.57 |

Segment Leq : 42.57 dBA

Total Leq All Segments: 45.74 dBA



Results segment # 1: Hwy 417 West (night)

Source height = 1.50 m

ROAD (0.00 + 35.29 + 0.00) = 35.29 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -76 | 0 | 0.66 | 72.55 | 0.00 | -23.49 | -4.70 | 0.00 | -9.07 | 0.00 | 35.29 |

Segment Leq : 35.29 dBA

↑
Results segment # 2: Hwy 417 East (night)

Source height = 1.50 m

ROAD (0.00 + 34.97 + 0.00) = 34.97 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -74 | 0 | 0.66 | 72.55 | 0.00 | -23.76 | -4.76 | 0.00 | -9.06 | 0.00 | 34.97 |

Segment Leq : 34.97 dBA

Total Leq All Segments: 38.14 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 45.74
 (NIGHT): 38.14

↑
↑

STAMSON 5.0 NORMAL REPORT Date: 14-05-2019 10:46:14
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: Hwy 417 West (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999
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: Hwy 417 West (day/night)

Angle1 Angle2 : -76.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 5 / 5
House density : 60 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 390.00 / 390.00 m
Receiver height : 8.10 / 8.10 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Hwy 417 East (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999

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: Hwy 417 East (day/night)

 Angle1 Angle2 : -74.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 5 / 5
 House density : 60 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 405.00 / 405.00 m
 Receiver height : 8.10 / 8.10 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: Hwy 417 West (day)

 Source height = 1.50 m

ROAD (0.00 + 45.95 + 0.00) = 45.95 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -76 | 0 | 0.46 | 80.15 | 0.00 | -20.69 | -4.44 | 0.00 | -9.07 | 0.00 | 45.95 |

Segment Leq : 45.95 dBA



Results segment # 2: Hwy 417 East (day)

 Source height = 1.50 m

ROAD (0.00 + 45.65 + 0.00) = 45.65 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -74 | 0 | 0.46 | 80.15 | 0.00 | -20.93 | -4.51 | 0.00 | -9.06 | 0.00 | 45.65 |

Segment Leq : 45.65 dBA

Total Leq All Segments: 48.81 dBA



Results segment # 1: Hwy 417 West (night)

$$\text{ROAD } (0.00 + 38.35 + 0.00) = 38.35 \text{ dBA}$$

Segment Leq : 38.35 dBA

Results segment # 2: Hwy 417 East (night)

$$\text{ROAD } (0.00 + 38.05 + 0.00) = 38.05 \text{ dBA}$$

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -74 | 0 | 0.46 | 72.55 | 0.00 | -20.93 | -4.51 | 0.00 | -9.06 | 0.00 | 38.05 |

Segment Leq : 38.05 dBA

Total Leq All Segments: 41.21 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.81
(NIGHT): 41.21

STAMSON 5.0 NORMAL REPORT Date: 14-05-2019 10:48:52
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: Churchill (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 : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 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 (day/night)

Angle1 Angle2 : -77.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999
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: Hwy 417 West (day/night)

 Angle1 Angle2 : -77.00 deg 18.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 5 / 5
 House density : 60 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 385.00 / 385.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Road data, segment # 3: Hwy 417 East (day/night)

 Car traffic volume : 46045/4004 veh/TimePeriod *
 Medium truck volume : 2024/176 veh/TimePeriod *
 Heavy truck volume : 2530/220 veh/TimePeriod *
 Posted speed limit : 100 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): 54999
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 4.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: Hwy 417 East (day/night)

 Angle1 Angle2 : -74.00 deg 15.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 5 / 5
 House density : 60 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 400.00 / 400.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: Churchill (day)

Source height = 1.50 m

ROAD (0.00 + 57.36 + 0.00) = 57.36 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -77 | 0 | 0.66 | 65.72 | 0.00 | -3.68 | -4.67 | 0.00 | 0.00 | 0.00 | 57.36 |

Segment Leq : 57.36 dBA

↑

Results segment # 2: Hwy 417 West (day)

Source height = 1.50 m

ROAD (0.00 + 44.11 + 0.00) = 44.11 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -77 | 18 | 0.66 | 80.15 | 0.00 | -23.40 | -3.56 | 0.00 | -9.08 | 0.00 | 44.11 |

Segment Leq : 44.11 dBA

↑

Results segment # 3: Hwy 417 East (day)

Source height = 1.50 m

ROAD (0.00 + 43.14 + 0.00) = 43.14 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -74 | 15 | 0.66 | 79.67 | 0.00 | -23.67 | -3.80 | 0.00 | -9.07 | 0.00 | 43.14 |

Segment Leq : 43.14 dBA

Total Leq All Segments: 57.71 dBA

↑

Results segment # 1: Churchill (night)

Source height = 1.50 m

ROAD (0.00 + 49.76 + 0.00) = 49.76 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|

| | | | | | | | | | | |
|-----|---|------|-------|------|-------|-------|------|------|------|-------|
| -77 | 0 | 0.66 | 58.12 | 0.00 | -3.68 | -4.67 | 0.00 | 0.00 | 0.00 | 49.76 |
|-----|---|------|-------|------|-------|-------|------|------|------|-------|

Segment Leq : 49.76 dBA

↑

Results segment # 2: Hwy 417 West (night)

Source height = 1.50 m

ROAD (0.00 + 36.51 + 0.00) = 36.51 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -77 | 18 | 0.66 | 72.55 | 0.00 | -23.40 | -3.56 | 0.00 | -9.08 | 0.00 | 36.51 |

Segment Leq : 36.51 dBA

↑

Results segment # 3: Hwy 417 East (night)

Source height = 1.50 m

ROAD (0.00 + 35.54 + 0.00) = 35.54 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -74 | 15 | 0.66 | 72.07 | 0.00 | -23.67 | -3.80 | 0.00 | -9.07 | 0.00 | 35.54 |

Segment Leq : 35.54 dBA

Total Leq All Segments: 50.11 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 57.71
(NIGHT): 50.11

↑

↑

STAMSON 5.0 NORMAL REPORT Date: 14-05-2019 10:48:19
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: Churchill (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 : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 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 (day/night)

Angle1 Angle2 : -77.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 8.10 / 8.10 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999
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: Hwy 417 West (day/night)

 Angle1 Angle2 : -77.00 deg 18.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 5 / 5
 House density : 60 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 385.00 / 385.00 m
 Receiver height : 8.10 / 8.10 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Road data, segment # 3: Hwy 417 East (day/night)

 Car traffic volume : 46045/4004 veh/TimePeriod *
 Medium truck volume : 2024/176 veh/TimePeriod *
 Heavy truck volume : 2530/220 veh/TimePeriod *
 Posted speed limit : 100 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): 54999
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 4.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: Hwy 417 East (day/night)

 Angle1 Angle2 : -74.00 deg 15.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 5 / 5
 House density : 60 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 400.00 / 400.00 m
 Receiver height : 8.10 / 8.10 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: Churchill (day)

Source height = 1.50 m

ROAD (0.00 + 58.07 + 0.00) = 58.07 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -77 | 0 | 0.46 | 65.72 | 0.00 | -3.24 | -4.40 | 0.00 | 0.00 | 0.00 | 58.07 |

Segment Leq : 58.07 dBA

↑
Results segment # 2: Hwy 417 West (day)

Source height = 1.50 m

ROAD (0.00 + 47.11 + 0.00) = 47.11 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -77 | 18 | 0.46 | 80.15 | 0.00 | -20.61 | -3.35 | 0.00 | -9.08 | 0.00 | 47.11 |

Segment Leq : 47.11 dBA

↑
Results segment # 3: Hwy 417 East (day)

Source height = 1.50 m

ROAD (0.00 + 46.16 + 0.00) = 46.16 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -74 | 15 | 0.46 | 79.67 | 0.00 | -20.85 | -3.60 | 0.00 | -9.07 | 0.00 | 46.16 |

Segment Leq : 46.16 dBA

Total Leq All Segments: 58.66 dBA

↑
Results segment # 1: Churchill (night)

Source height = 1.50 m

ROAD (0.00 + 50.47 + 0.00) = 50.47 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|

| | | | | | | | | | | |
|-----|---|------|-------|------|-------|-------|------|------|------|-------|
| -77 | 0 | 0.46 | 58.12 | 0.00 | -3.24 | -4.40 | 0.00 | 0.00 | 0.00 | 50.47 |
|-----|---|------|-------|------|-------|-------|------|------|------|-------|

Segment Leq : 50.47 dBA



Results segment # 2: Hwy 417 West (night)

Source height = 1.50 m

ROAD (0.00 + 39.51 + 0.00) = 39.51 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -77 | 18 | 0.46 | 72.55 | 0.00 | -20.61 | -3.35 | 0.00 | -9.08 | 0.00 | 39.51 |

Segment Leq : 39.51 dBA



Results segment # 3: Hwy 417 East (night)

Source height = 1.50 m

ROAD (0.00 + 38.56 + 0.00) = 38.56 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -74 | 15 | 0.46 | 72.07 | 0.00 | -20.85 | -3.60 | 0.00 | -9.07 | 0.00 | 38.56 |

Segment Leq : 38.56 dBA

Total Leq All Segments: 51.06 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 58.66
(NIGHT): 51.06



STAMSON 5.0 NORMAL REPORT Date: 14-05-2019 10:52:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec50.te Time Period: Day/Night 16/8 hours
Description: Reception Point 5-0 - Outdoor Living Area

Road data, segment # 1: Churchill (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 : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 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 (day/night)

Angle1 Angle2 : -77.00 deg 77.00 deg
Wood depth : 0 (No woods.)
No of house rows : 5 / 0
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

↑

Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999
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: Hwy 417 West (day/night)

Angle1 Angle2 : -76.00 deg 19.00 deg
Wood depth : 0 (No woods.)
No of house rows : 5 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 390.00 / 390.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 3: Hwy 417 East (day/night)

Car traffic volume : 44527/3872 veh/TimePeriod *
Medium truck volume : 3542/308 veh/TimePeriod *
Heavy truck volume : 2530/220 veh/TimePeriod *
Posted speed limit : 100 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): 54999
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: Hwy 417 East (day/night)

Angle1 Angle2 : -73.00 deg 16.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 405.00 / 405.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Results segment # 1: Churchill (day)

Source height = 1.50 m

ROAD (0.00 + 48.27 + 0.00) = 48.27 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -77 | 77 | 0.66 | 65.72 | 0.00 | -6.11 | -1.66 | 0.00 | -9.68 | 0.00 | 48.27 |

Segment Leq : 48.27 dBA

↑

Results segment # 2: Hwy 417 West (day)

Source height = 1.50 m

ROAD (0.00 + 44.05 + 0.00) = 44.05 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -76 | 19 | 0.66 | 80.15 | 0.00 | -23.49 | -3.53 | 0.00 | -9.07 | 0.00 | 44.05 |

Segment Leq : 44.05 dBA

↑

Results segment # 3: Hwy 417 East (day)

Source height = 1.50 m

ROAD (0.00 + 52.62 + 0.00) = 52.62 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -73 | 16 | 0.66 | 80.15 | 0.00 | -23.76 | -3.77 | 0.00 | 0.00 | 0.00 | 52.62 |

Segment Leq : 52.62 dBA

Total Leq All Segments: 54.40 dBA

↑

Results segment # 1: Churchill (night)

Source height = 1.50 m

ROAD (0.00 + 50.35 + 0.00) = 50.35 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -77 | 77 | 0.66 | 58.12 | 0.00 | -6.11 | -1.66 | 0.00 | 0.00 | 0.00 | 50.35 |

