

Environmental Noise Control Study

Proposed Development

6165 Thunder Road
Ottawa, Ontario

Prepared for Brofort Investments Inc

Report PG7306-1, Dated October 10, 2024

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1.0 Introduction

Paterson Group (Paterson) was commissioned by Brofort Inc. to conduct an environmental noise control study for the proposed residential development to be located at 6165 Thunder Road, 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 residential development as they are understood at the time of writing this report.

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

2.0 Proposed Development

It is understood that the proposed development will consist of a warehouse development. Associated at-grade roadways and parking areas are also anticipated as a part of the proposed development.

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 the 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 below 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
I. 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
Theatres, places 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
I. 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."
I.	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.

The proposed development is not in proximity to any existing or approved stationary sources of noise. Therefore, a stationary noise analysis will not be required with respect to off-site stationary noise sources impacting the proposed development.

Aircraft/Airport Noise

The subject site is not located within the Airport Vicinity Development Zone. Therefore this project 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 subject site is currently undeveloped and bordered by Boundary Road to the east and further by commercial developments, Thunder Road to the south and west, and further by the Queensway HWY 417 to the north. Boundary Road and Thunder Road were identified within the 100 m radius and Queensway HWY 417 was identified within the 500 m radius of the proposed development.

Based on the new City of Ottawa Official Plan, Schedule F, Boundary Road is considered a 2-lane rural arterial road (2-RAU), and Thunder Road is considered a 2-lane major collector (2-UMCU). Other roads within the 100 m radius of the proposed development are not classified as either arterial, collector or major collector roads and therefore are not included in this study.

Additionally, based on the new City of Ottawa Official Plan, Schedule F, the Queensway HWY 417 is considered a Queensway.

All noise sources are presented in Drawing PG7306-1-Site Geometry located in Appendix 1.

The noise levels from road traffic are provided by the City of Ottawa which takes 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 %
Queensway 417 East	Queensway	36,666	100	92/8	7	5
Queensway 417 West	Queensway	36,666	100	92/8	7	5
Thunder Road	Major Collector	12,000	60	92/8	7	5
Boundary Road	Rural Arterial	15,000	80	92/8	7	5
Data obtained from the City of Ottawa document ENCG or City of Ottawa Officials						

One (1) level of reception points were selected for this analysis. The following elevations were selected from the heights provided on the survey plan for the subject buildings.

Table 5 - Elevation of Reception Points			
Floor Number	Elevation at the Centre of Window / Ground Surface (m)	Floor Use	Daytime/Nighttime Analysis
Ground Floor	1.5	Office Area	Daytime/Nighttime

For this analysis, a reception point was taken at the centre of each floor on the ground floor of the structure. Reception points are detailed in Drawing PG7306-2-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, and the Queensway highways were analyzed where they intersected the 500 m buffer zone which is reflected in the local angles described in Paterson Drawings PG7306-3A to 3D-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 concerning the noise sources. The analysis is completed so that no effects of sound reflection off the building facade are considered, as stipulated by the ENGIC. It should be noted that one receptor is assigned to the side of the building affected by noise. The anticipated noise at each receptor represents the worst-case scenario for the proposed building.

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.

The subject site is relatively level and at grade with the neighbouring roads within a 100 to 500 m radius.

5.0 Results

Surface Transportation

The primary descriptors are the 16-hour daytime and the 8-hour nighttime 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 located in Appendix 2, and the summary of the results is noted in Table 6 below.

Table 6 – Proposed Noise Levels				
Reception Point	Description	OLA (dBA)	Daytime at Facade $L_{eq(16)}$ (dBA)	Nighttime at Facade $L_{eq(8)}$ (dBA)
REC 1-1	Eastern Elevation – Ground Level	-	62.42	54.84
REC 2-1	Southern Elevation – Ground Level	-	60.24	52.64
REC 3-1	Western Elevation – Ground Level	-	63.22	55.62
REC 4-1	Northern Elevation – Ground Level	-	61.26	53.66

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

No outdoor living areas were identified as part of the development.

6.2 Indoor Living Areas and Ventilation

The results of the STAMSON modelling indicate that the $L_{eq(16)}$ for the proposed development ranges between 60.55 dBA and 63.22 dBA. The noise values calculated exceed the limit of 55 dBA as specified by the ENGCC and therefore **Warning Clause Type C** will be required to be stated on any deeds of sale.

Warning Clause Type C: "This building 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 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."

7.0 Summary of Findings

The subject site is located at 6165 Thunder Road, in the City of Ottawa. It is understood that the proposed development will consist of a commercial building. The associated analysis identified four surface transportation noise sources: Queensway HWY 417 East, Queensway HWY 417 West, Thunder Road, and Boundary Road.

Several reception points were selected for the analysis, consisting of panes of glass reception points at each ground floor elevation.

All elevations exceeded the 55 dBA guideline specified by the ENGCC and will require Warning Clause Type C.

Warning Clause Type C: "This building 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 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."

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 Brofort Investments Inc. 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.



Otilia McLaughlin, B.Eng.



Stephanie A. Boisvenue, P.Eng.

Report Distribution:

- ☐ Brofort Investments Inc.
- ☐ Paterson Group

APPENDIX 1

TABLE 7 – SUMMARY OF RECEPTION POINTS AND GEOMETRY

DRAWING PG7306-1 – SITE PLAN

DRAWING PG7306-2 – RECEPTOR LOCATION PLAN

DRAWING PG7306-3 – SITE GEOMETRY

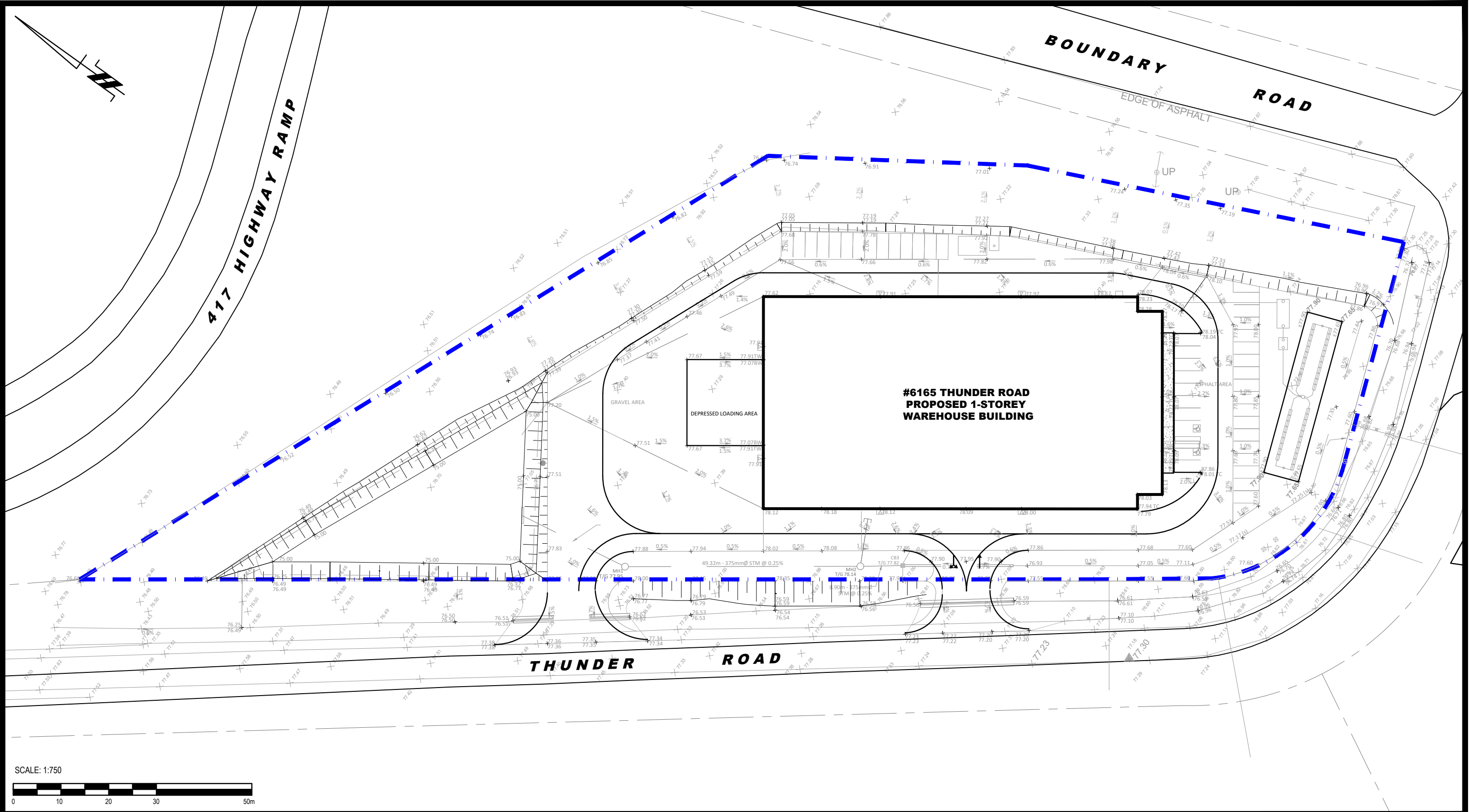
DRAWING PG730-3A- SITE GEOMETRY (REC 1-1)

DRAWING PG7306-3B- SITE GEOMETRY (REC 2-1)

DRAWING PG7306-3C- SITE GEOMETRY (REC 3-1)

DRAWING PG7306-3D- SITE GEOMETRY (REC 4-1)

Table 7 - Summary of Reception Points and Geometry																			
6165 Thunder Road																			
Point of Reception	Location	Total Leq Day (dBA)	Total Leq Night (dBA)	Queensway 417 East								Queensway 417 West							
				Horizontal	Vertical	Total	Local Angle	Number of	Density	Barrier Height	Barrier	Horizontal	Vertical	Total	Local Angle	Number of	Density	Barrier Height	Barrier
				(m)	(m)	(m)	(degree)	Rows of Houses	(%)	(m)	Distance (m)	(m)	(m)	(m)	(degree)	Rows of Houses	(%)	(m)	Distance (m)
REC 1-1	Eastern Elevation	62.42	54.84	377	1.5	377.0	-45, 43	n/a	n/a	n/a	n/a	425	1.5	425.0	-38, 35	n/a	n/a	n/a	n/a
REC 2-1	Southern Elevation	60.24	52.64	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 3-1	Western Elevation	63.22	55.62	429	1.5	429.0	0, 5	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 4-1	Northern Elevation	61.93	54.33	495	1.5	361.0	-42, 47	n/a	n/a	n/a	n/a	412	1.5	412.0	-35, 38	n/a	n/a	n/a	n/a
Point of Reception	Location	-	-	Thunder Road								Boundary Road							
				Horizontal	Vertical	Total	Local Angle	Number of	Density	Barrier Height	Barrier	Horizontal	Vertical	Total	Local Angle	Number of	Density	Barrier Height	Barrier
				(m)	(m)	(m)	(degree)	Rows of Houses	(%)	(m)	Distance (m)	(m)	(m)	(m)	(degree)	Rows of Houses	(%)	(m)	Distance (m)
REC 1-1	Eastern Elevation	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	50	1.5	50.0	-54, 82	n/a	n/a	n/a	n/a
REC 2-1	Southern Elevation	-	-	53	1.5	53.0	-29, 90	n/a	n/a	n/a	n/a	61	1.5	61.0	0, 68	n/a	n/a	n/a	n/a
REC 3-1	Western Elevation	-	-	27	1.5	27.0	-87, 75	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 4-1	Northern Elevation	-	-	50	1.5	50.0	-16, 44	n/a	n/a	n/a	n/a	82	1.5	82.0	-31,0	n/a	n/a	n/a	n/a



SCALE: 1:750



NO.	REVISIONS	DATE	INITIAL

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Title:

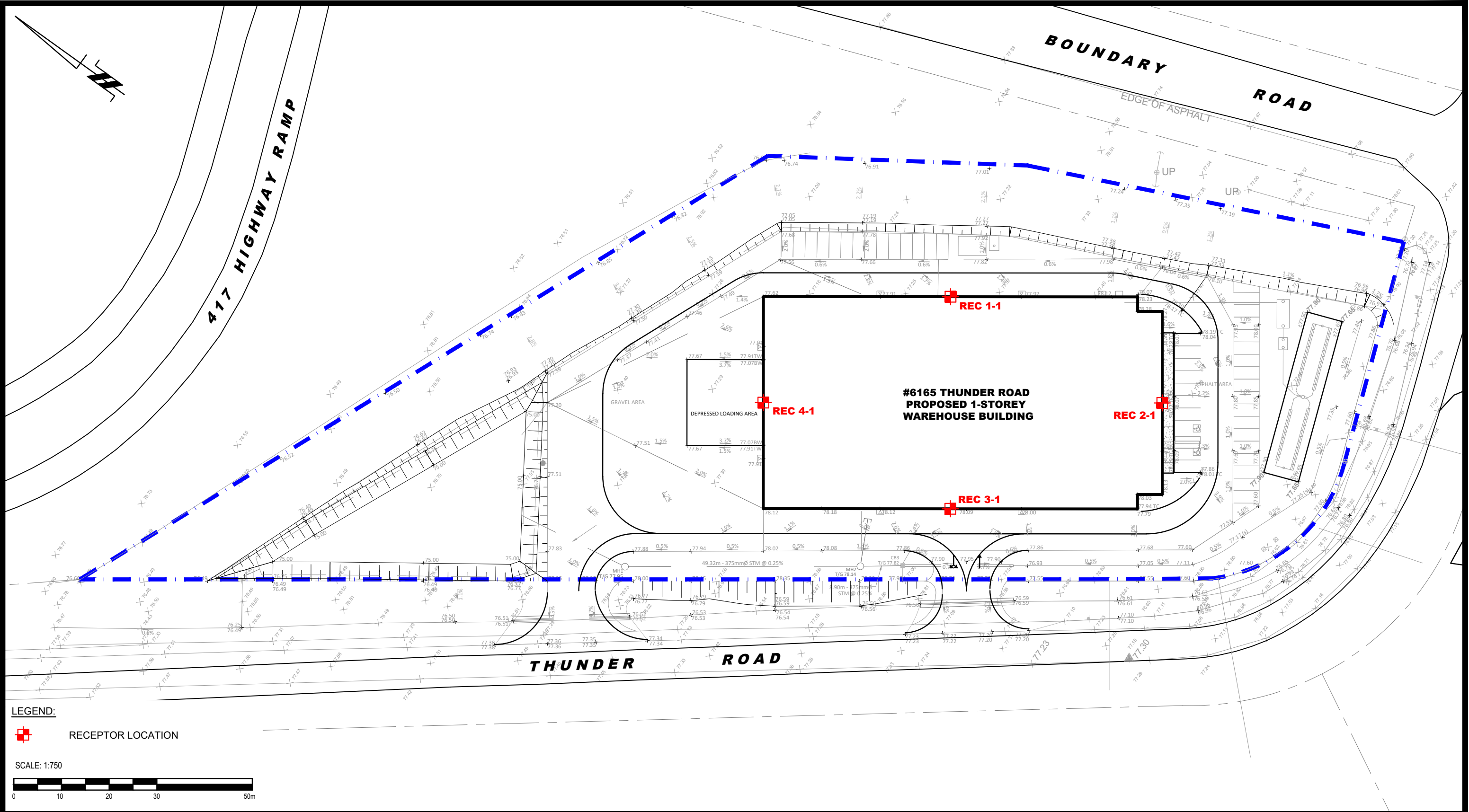
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NOISE ATTENUATION STUDY
PROPOSED WAREHOUSE BUILDING
6165 THUNDER ROAD

ONTARIO

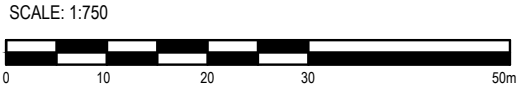
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Scale:	1:750
Drawn by:	YA
Checked by:	OM
Approved by:	SB

Date:	09/2024
Report No.:	PG7306-1
Dwg. No.:	PG7306-1
Revision No.:	



LEGEND:
 RECEPTOR LOCATION





PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

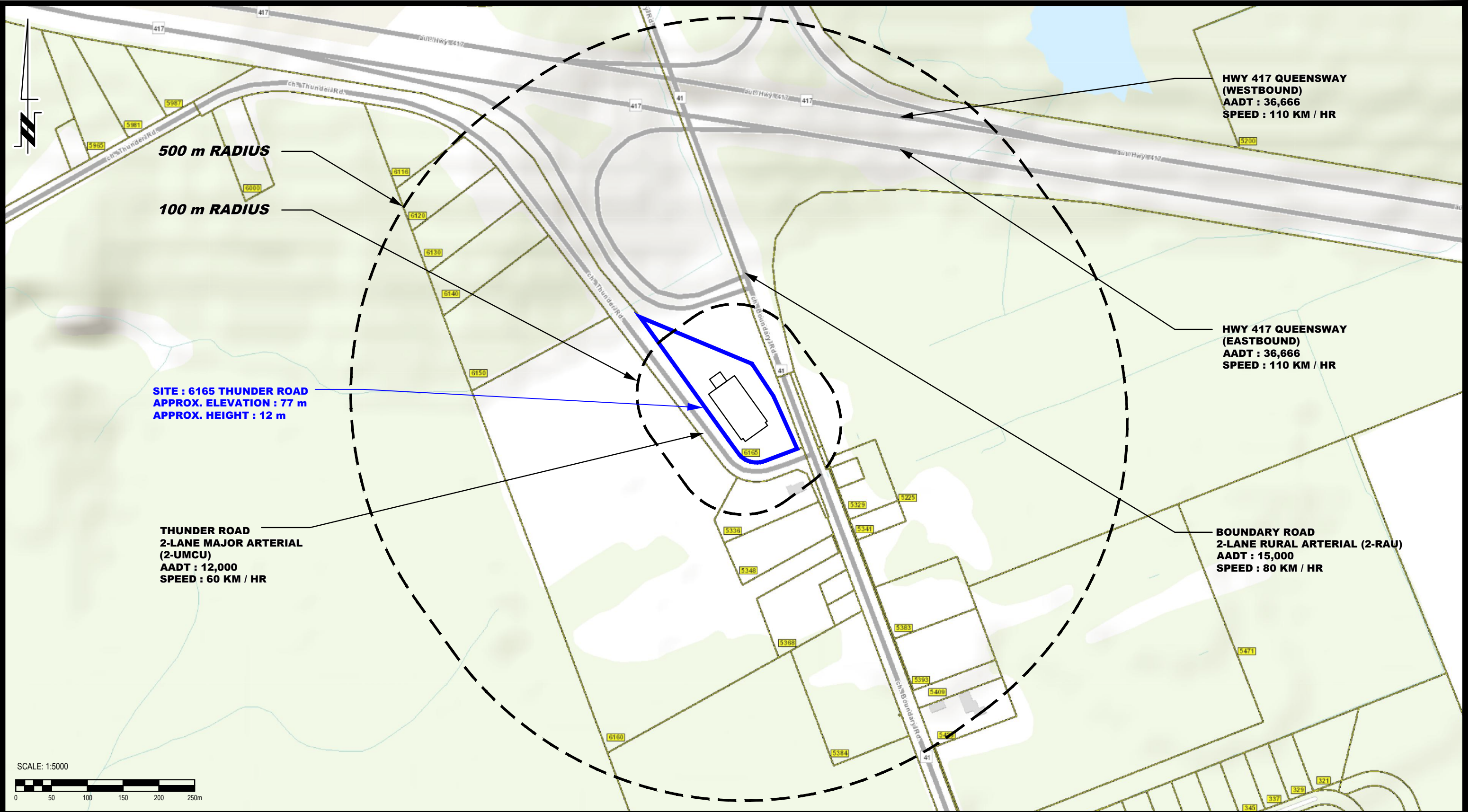
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NOISE ATTENUATION STUDY
PROPOSED WAREHOUSE BUILDING
6165 THUNDER ROAD

OTTAWA,
Title:

ONTARIO

RECEPTOR LOCATION PLAN

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Drawn by:	YA	Report No.:	PG7306-1
Checked by:	OM	Dwg. No.:	PG7306-2
Approved by:	SB	Revision No.:	





9 AURIGA DRIVE
OTTAWA, ON
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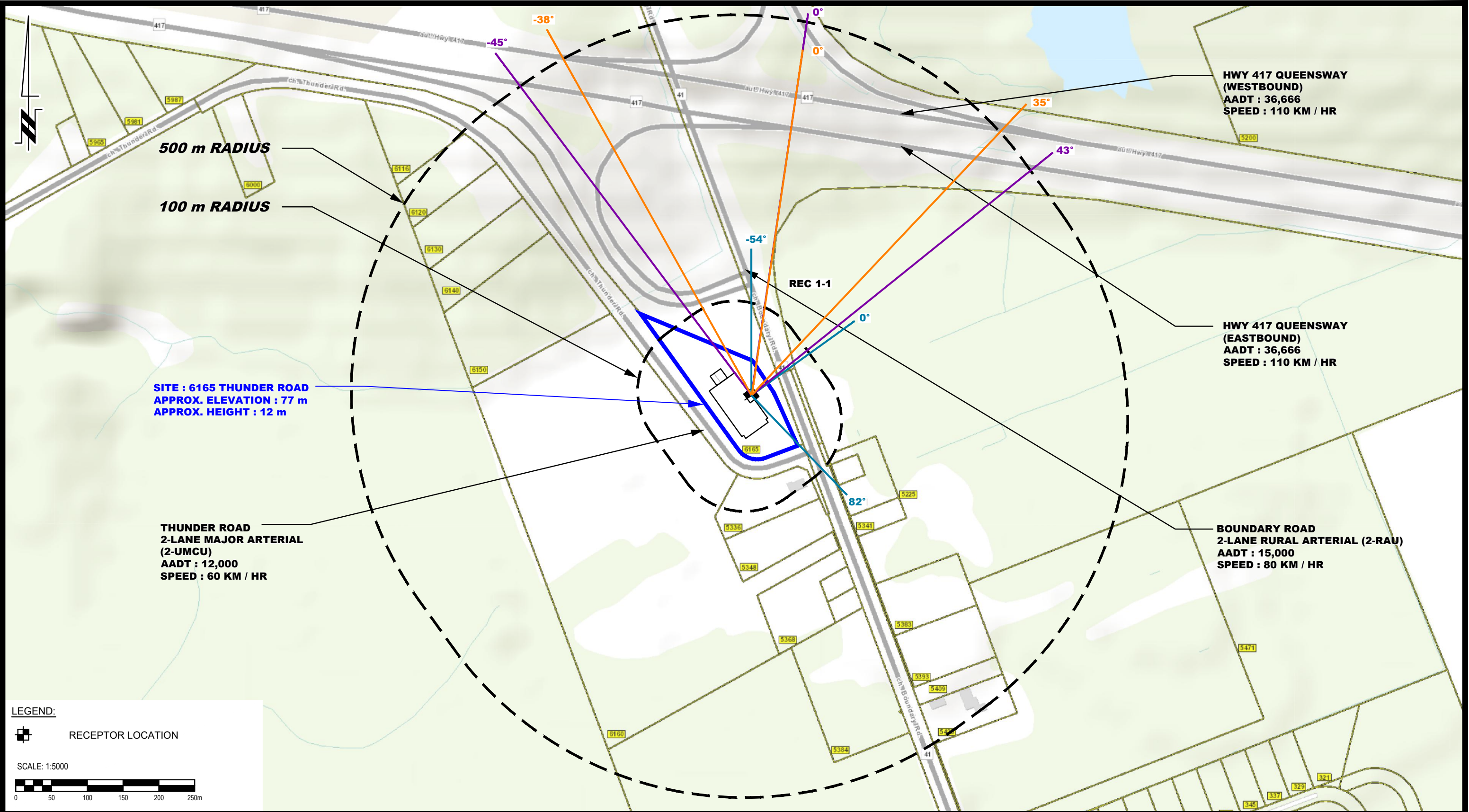
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NOISE ATTENUATION STUDY
PROPOSED WAREHOUSE BUILDING
6165 THUNDER ROAD

ONTARIO

SITE GEOMETRY

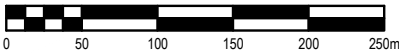
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Approved by:	SB	Revision No.:	



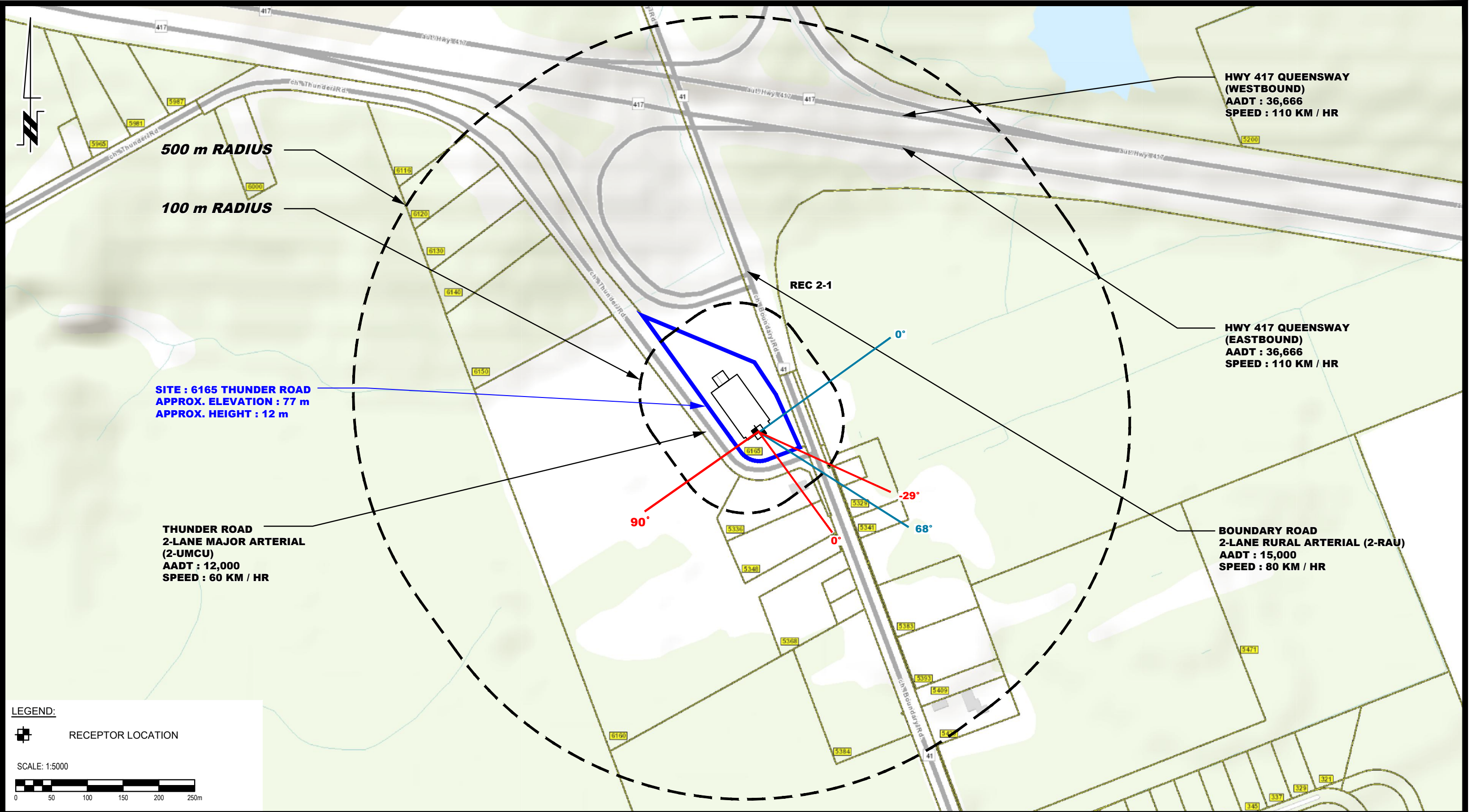
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 RECEPTOR LOCATION

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 PATERSON GROUP 9 AURIGA DRIVE OTTAWA, ON K2E 7T9 TEL: (613) 226-7381					BROFORT INVESTMENTS INC. NOISE ATTENUATION STUDY PROPOSED WAREHOUSE BUILDING 6165 THUNDER ROAD OTTAWA, ONTARIO	Scale: 1:5000	Date: 09/2024
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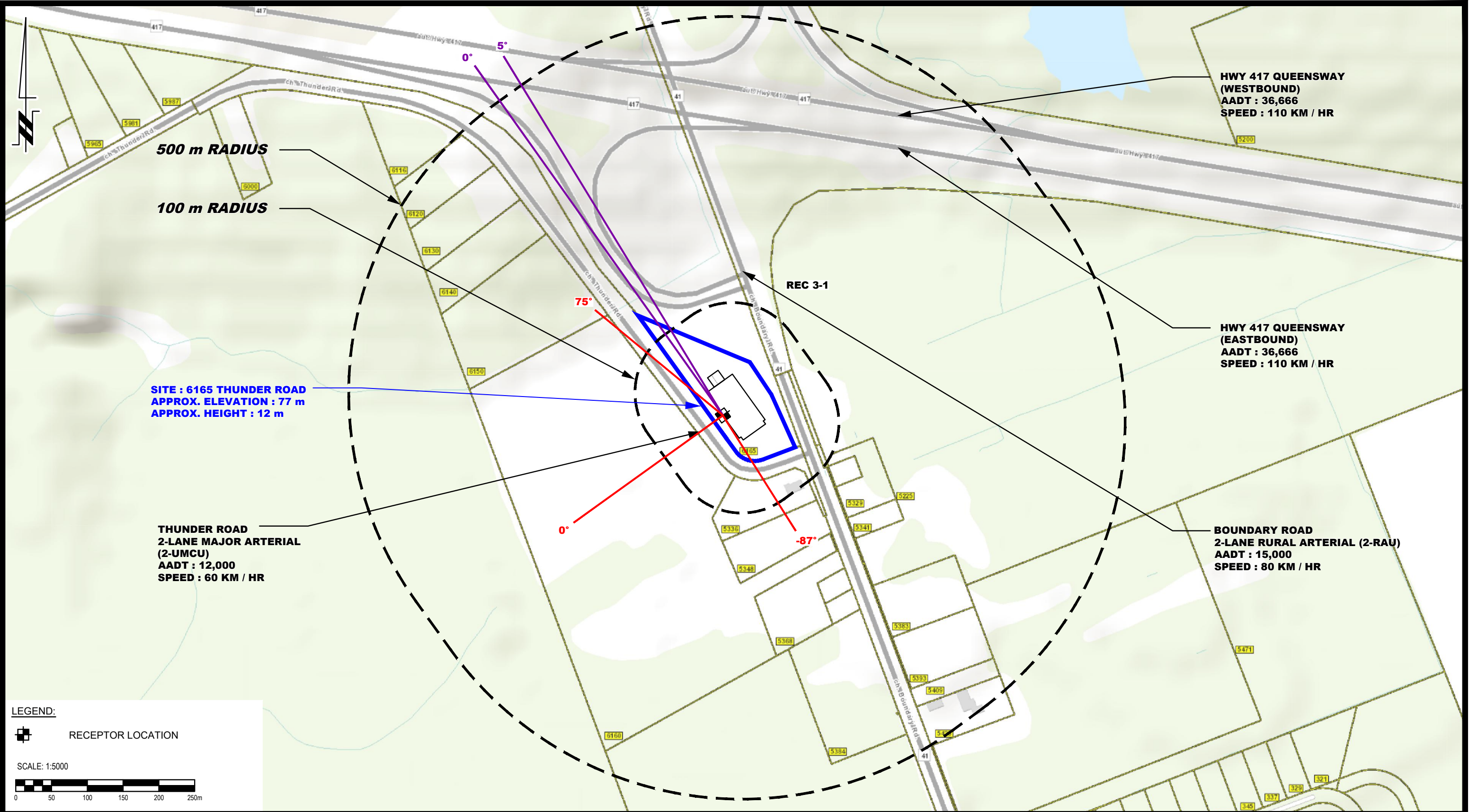


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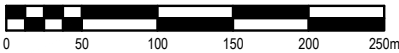
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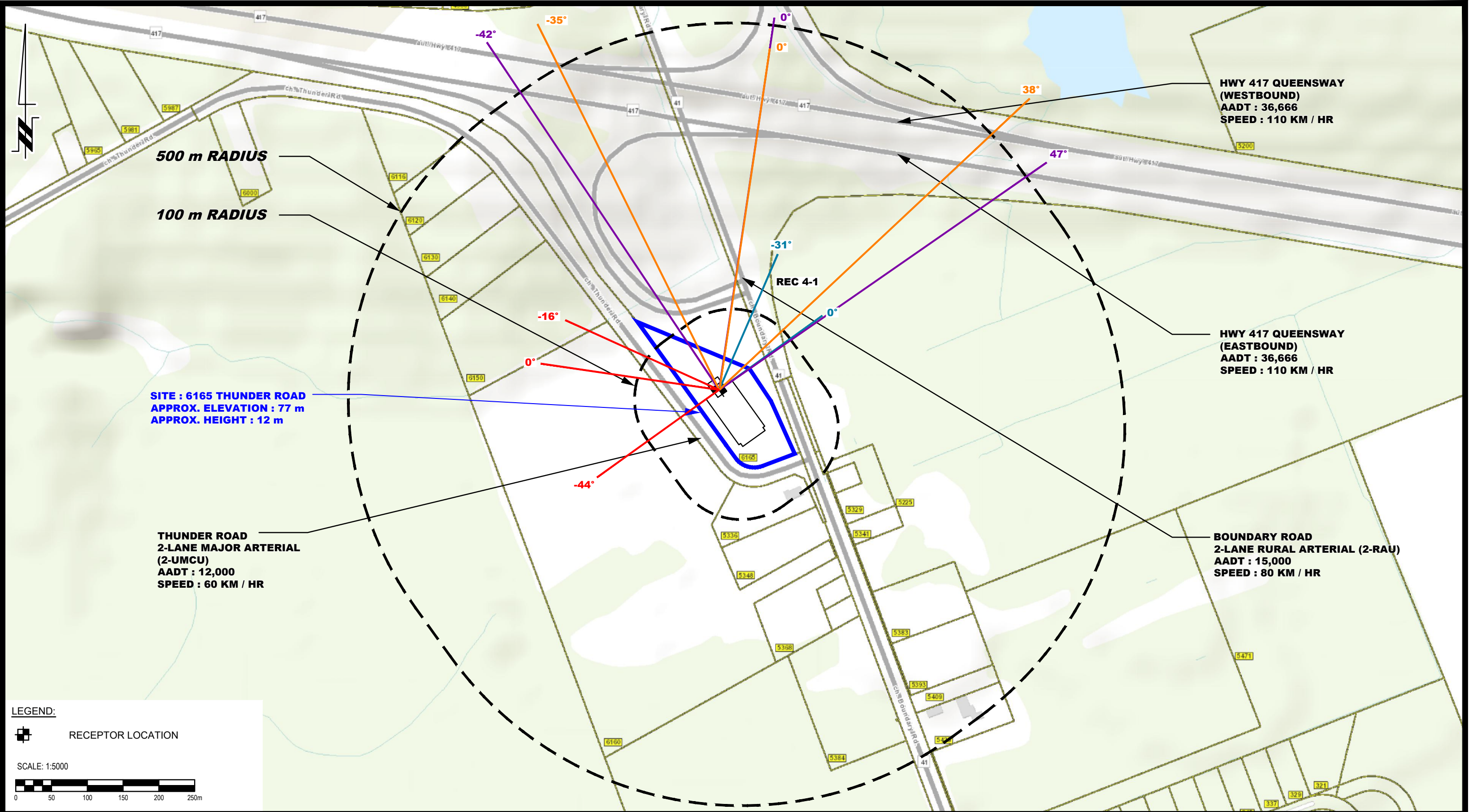
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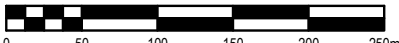
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 RECEPTOR LOCATION

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							Checked by: OM	Dwg. No.: PG7306-3D
							Approved by: SB	Revision No.:
NO.	REVISIONS	DATE	INITIAL	OTTAWA, Title:				

APPENDIX 2

STAMSON RESULTS

Filename: REC11.te Time Period: Day/Night 16/8 hours
Description: REC 1-1 Eastern Elevation

Road data, segment # 1: HWY East (day/night)

Car traffic volume : 29685/2581 veh/TimePeriod *
Medium truck volume : 2361/205 veh/TimePeriod *
Heavy truck volume : 1687/147 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): 36666
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 East (day/night)

Angle1 Angle2 : -45.00 deg 43.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 377.00 / 377.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 29685/2581 veh/TimePeriod *
Medium truck volume : 2361/205 veh/TimePeriod *
Heavy truck volume : 1687/147 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): 36666
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 West (day/night)

```

-----
Angle1   Angle2           : -38.00 deg   35.00 deg
Wood depth           :           0       (No woods.)
No of house rows     :           0 / 0
Surface              :           1       (Absorptive ground surface)
Receiver source distance : 425.00 / 425.00 m
Receiver height       :           1.50 / 1.50 m
Topography           :           1       (Flat/gentle slope; no barrier)
Reference angle       :           0.00
  
```



Road data, segment # 3: Boundary 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   :    80 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: Boundary Rd (day/night)

```

-----
Angle1   Angle2           : -54.00 deg   82.00 deg
Wood depth           :           0       (No woods.)
No of house rows     :           0 / 0
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: HWY East (day)

Source height = 1.50 m

ROAD (0.00 + 51.74 + 0.00) = 51.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	43	0.66	78.39	0.00	-23.24	-3.40	0.00	0.00	0.00	51.74

Segment Leq : 51.74 dBA



Results segment # 2: HWY West (day)

Source height = 1.50 m

ROAD (0.00 + 50.16 + 0.00) = 50.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-38	35	0.66	78.39	0.00	-24.11	-4.12	0.00	0.00	0.00	50.16

Segment Leq : 50.16 dBA



Results segment # 3: Boundary Rd (day)

Source height = 1.50 m

ROAD (0.00 + 61.74 + 0.00) = 61.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-54	82	0.66	72.49	0.00	-8.68	-2.07	0.00	0.00	0.00	61.74

Segment Leq : 61.74 dBA

Total Leq All Segments: 62.42 dBA



Results segment # 1: HWY East (night)

Source height = 1.50 m

ROAD (0.00 + 44.15 + 0.00) = 44.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	43	0.66	70.79	0.00	-23.24	-3.40	0.00	0.00	0.00	44.15

Segment Leq : 44.15 dBA



Results segment # 2: HWY West (night)

Source height = 1.50 m

ROAD (0.00 + 42.56 + 0.00) = 42.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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-38	35	0.66	70.79	0.00	-24.11	-4.12	0.00	0.00	0.00	42.56
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Segment Leq : 42.56 dBA



Results segment # 3: Boundary Rd (night)

Source height = 1.50 m

ROAD (0.00 + 54.14 + 0.00) = 54.14 dBA										
Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-54	82	0.66	64.89	0.00	-8.68	-2.07	0.00	0.00	0.00	54.14

Segment Leq : 54.14 dBA

Total Leq All Segments: 54.82 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 62.42
(NIGHT): 54.82



Filename: rec21.te Time Period: Day/Night 16/8 hours
Description: REC 2-1 Southern Elevation

Road data, segment # 1: Boundary 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 : 80 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: Boundary Rd (day/night)

Angle1 Angle2 : 0.00 deg 68.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 61.00 / 61.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Thunder Rd (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 : 60 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: Thunder Rd (day/night)

Angle1 Angle2 : -29.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 53.00 / 53.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Results segment # 1: Boundary Rd (day)

Source height = 1.50 m

ROAD (0.00 + 57.41 + 0.00) = 57.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.66	72.49	0.00	-10.11	-4.97	0.00	0.00	0.00	57.41

Segment Leq : 57.41 dBA



Results segment # 2: Thunder Rd (day)

Source height = 1.50 m

ROAD (0.00 + 57.04 + 0.00) = 57.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-29	90	0.66	69.03	0.00	-9.10	-2.89	0.00	0.00	0.00	57.04

Segment Leq : 57.04 dBA

Total Leq All Segments: 60.24 dBA



Results segment # 1: Boundary Rd (night)

Source height = 1.50 m

ROAD (0.00 + 49.81 + 0.00) = 49.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.66	64.89	0.00	-10.11	-4.97	0.00	0.00	0.00	49.81

Segment Leq : 49.81 dBA



Results segment # 2: Thunder Rd (night)

Source height = 1.50 m

ROAD (0.00 + 49.44 + 0.00) = 49.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-29	90	0.66	61.43	0.00	-9.10	-2.89	0.00	0.00	0.00	49.44

Segment Leq : 49.44 dBA

Total Leq All Segments: 52.64 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 60.24
(NIGHT): 52.64



Filename: rec31.te Time Period: Day/Night 16/8 hours
Description: REC 3-1 Western Elevation

Road data, segment # 1: HWY EAST (day/night)

Car traffic volume : 29685/2581 veh/TimePeriod *
Medium truck volume : 2361/205 veh/TimePeriod *
Heavy truck volume : 1687/147 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): 36666
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 EAST (day/night)

Angle1 Angle2 : 0.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 429.00 / 429.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Thunder Rd (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 : 60 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: Thunder Rd (day/night)

Angle1 Angle2 : -87.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 27.00 / 27.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Results segment # 1: HWY EAST (day)

Source height = 1.50 m

ROAD (0.00 + 38.64 + 0.00) = 38.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	5	0.66	78.39	0.00	-24.18	-15.57	0.00	0.00	0.00	38.64

Segment Leq : 38.64 dBA



Results segment # 2: Thunder Rd (day)

Source height = 1.50 m

ROAD (0.00 + 63.20 + 0.00) = 63.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-87	75	0.66	69.03	0.00	-4.24	-1.59	0.00	0.00	0.00	63.20

Segment Leq : 63.20 dBA

Total Leq All Segments: 63.22 dBA



Results segment # 1: HWY EAST (night)

Source height = 1.50 m

ROAD (0.00 + 31.05 + 0.00) = 31.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	5	0.66	70.79	0.00	-24.18	-15.57	0.00	0.00	0.00	31.05

Segment Leq : 31.05 dBA

⬆
Results segment # 2: Thunder Rd (night)

Source height = 1.50 m

ROAD (0.00 + 55.60 + 0.00) = 55.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-87	75	0.66	61.43	0.00	-4.24	-1.59	0.00	0.00	0.00	55.60

Segment Leq : 55.60 dBA

Total Leq All Segments: 55.62 dBA

⬆

TOTAL Leq FROM ALL SOURCES (DAY): 63.22
 (NIGHT): 55.62

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⬆

Filename: rec41.te Time Period: Day/Night 16/8 hours
Description: REC 4-1 Northern Elevation

Road data, segment # 1: HWY EAST (day/night)

Car traffic volume : 29685/2581 veh/TimePeriod *
Medium truck volume : 2361/205 veh/TimePeriod *
Heavy truck volume : 1687/147 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): 36666
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 EAST (day/night)

Angle1 Angle2 : -42.00 deg 47.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 495.00 / 495.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: HWY WEST (day/night)

Car traffic volume : 29685/2581 veh/TimePeriod *
Medium truck volume : 2361/205 veh/TimePeriod *
Heavy truck volume : 1687/147 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): 36666
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 WEST (day/night)

Angle1 Angle2 : -35.00 deg 38.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 412.00 / 412.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Road data, segment # 3: Thunder Rd (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 : 60 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 # 3: Thunder Rd (day/night)

Angle1 Angle2 : -16.00 deg 44.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 27.00 / 27.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Road data, segment # 4: Boundary 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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: Boundary Rd (day/night)

Angle1 Angle2 : -31.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 82.00 / 82.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: HWY EAST (day)

Source height = 1.50 m

ROAD (0.00 + 49.82 + 0.00) = 49.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-42	47	0.66	78.39	0.00	-25.21	-3.36	0.00	0.00	0.00	49.82

Segment Leq : 49.82 dBA



Results segment # 2: HWY WEST (day)

Source height = 1.50 m

ROAD (0.00 + 50.38 + 0.00) = 50.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-35	38	0.66	78.39	0.00	-23.88	-4.12	0.00	0.00	0.00	50.38

Segment Leq : 50.38 dBA



Results segment # 3: Thunder Rd (day)

Source height = 1.50 m

ROAD (0.00 + 59.80 + 0.00) = 59.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-16	44	0.66	69.03	0.00	-4.24	-4.99	0.00	0.00	0.00	59.80

Segment Leq : 59.80 dBA



Results segment # 4: Boundary Rd (day)

Source height = 1.50 m

ROAD (0.00 + 52.46 + 0.00) = 52.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-31	0	0.66	72.49	0.00	-12.25	-7.78	0.00	0.00	0.00	52.46

Segment Leq : 52.46 dBA

Total Leq All Segments: 61.26 dBA

↑

Results segment # 1: HWY EAST (night)

Source height = 1.50 m

ROAD (0.00 + 42.22 + 0.00) = 42.22 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-42	47	0.66	70.79	0.00	-25.21	-3.36	0.00	0.00	0.00	42.22

Segment Leq : 42.22 dBA

↑

Results segment # 2: HWY WEST (night)

Source height = 1.50 m

ROAD (0.00 + 42.79 + 0.00) = 42.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-35	38	0.66	70.79	0.00	-23.88	-4.12	0.00	0.00	0.00	42.79

Segment Leq : 42.79 dBA

↑

Results segment # 3: Thunder Rd (night)

Source height = 1.50 m

ROAD (0.00 + 52.20 + 0.00) = 52.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-16	44	0.66	61.43	0.00	-4.24	-4.99	0.00	0.00	0.00	52.20

Segment Leq : 52.20 dBA



Results segment # 4: Boundary Rd (night)

Source height = 1.50 m

ROAD (0.00 + 44.86 + 0.00) = 44.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-31	0	0.66	64.89	0.00	-12.25	-7.78	0.00	0.00	0.00	44.86

Segment Leq : 44.86 dBA

Total Leq All Segments: 53.66 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 61.26
(NIGHT): 53.66

