REPORT
PROJECT: 120031-5.2.2

NOISE CONTROL FEASIBILITY STUDY
RSDC PHASE 12 LANDS
RIVERSIDE SOUTH COMMUNITY
RIDEAU RIVER AREA

Prepared for RIVERSIDE SOUTH DEVELOPMENT CORPORATION
by IBI GROUP

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Updated NOVEMBER 2020

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1 INTRODUCTION

This report has been prepared to determine the impact of roadway traffic on the residential lands of the Riverside South Development Corporation (RSDC) Phase 12 Lands in the Riverside South Community Rideau River Area. The report deals with the expected noise levels in the development and any required noise control measures.

The Phase 12 lands is shown on **Figure 1.1**. The site consists of two separate blocks located on the west side of River Road. The north block is located south of Earl Armstrong Road while the south block is located south of Borbridge Avenue.

2 BACKGROUND

2.1 Noise Sources

The study area is primarily subject to roadway noise from existing River Road and Earl Armstrong Road. Aircraft noise from the Ottawa International Airport impacts the site as it is included in the Airport Vicinity Development Zone (AVDZ). There are no rail lines within 500 meters of the site.

2.2 Sound Level Limits for Road Traffic

Sound level criteria for road traffic is taken from the City of Ottawa Environmental Noise Control Guidelines hereafter referred to as the guidelines. Noise levels are expressed in the form Leq (T) which refers to a weighted level of a steady sound carrying the same total energy in the time period T (in hours) as the observed fluctuation sound.

2.2.1 Outdoor sound level criterion

As per Table 2.2a of the guidelines the sound level criteria for the outdoor living area (OLA) for the daytime period between 07:00 and 23:00 hours is 55 dBA Leq (16). Sound levels for the OLA are calculated 3 metres from the building face at the centre of the unit or within the center of the OLA at a height of 1.5 meters above the ground.

If the Leq sound level is less than or equal to the above criteria then no further action is required by the developer. If the sound level exceeds the criteria by less than 5 dBA then the developer may, with City approval, either provide a warning clause to prospective purchasers or install physical attenuation. For sound levels greater than 5 dBA above the criteria control measures are required to reduce the noise levels as close to 55 dBA as technically, economically and administratively possible. Should the sound levels with the barrier in place exceed 55 dBA a warning clause is also required.

2.2.2 Indoor sound level criterion – ventilation and warning clause requirements

Similar to outdoor noise levels, the recommended indoor sound, the sound level criteria from Table 2.2b of the guidelines are:

- Bedrooms – 23:00 to 07:00 – 40 dBA Leq 98)
- Other areas – 07:00 to 23:00 – 45 dBA Leq (16)

The sound levels are based on the windows and doors to an indoor space being closed.

For the purpose of assessing indoor sound levels, the outdoor sound levels are observed at the plane of the living room window at 2.5 meters above the ground for daytime noise and at the plane of the bedroom window 4.5 meters above the ground for nighttime noise.

As per NPC-300 C7.1.2.1 and C7.1.2.2 when the outdoor noise levels at the living room are greater than 55 dBA and less than or equal to 65 dBA and/or greater than 50 dBA and less than or equal to 60 dBA at the bedroom window then a warning clause is required and forced air heating with provision for central air conditioning is required.

Should the outdoor noise levels exceed 65 dBA at the living room and/or exceed 60 dBA at the bedroom then central air conditioning is mandatory and a warning clause is required.

2.2.3 Indoor Sound Level Criterion – Building Components

As per NPC-300 C7.1.3 when the outdoor sound levels are less than or equal to 65 dBA at the living room window and/or less than or equal to 60 dBA at the bedroom level then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria then the building component (walls, windows etc.) must be designed to achieve indoor sound level criteria.

2.3 Sound Level Limits for Aircraft Noise

Aircraft noise impact assessment is based on the Noise Exposure Forecast (NEF) and Noise Exposure Projection (NEP) methods approved by Transport Canada. The noise contours were used to define the Airport Operating Influence Zone (AOIZ) and Airport Vicinity Development Zone (AVDZ) which is shown on Schedule K of the Official Plan.

No new noise sensitive developments are permitted within the AOIZ. Noise sensitive development is permitted within the AVDZ and outside of the AOIZ subject to a noise study or under the Prescribed Measures for Aircraft Noise in Part 6 of the Guidelines. Indoor and outdoor sound level limits for aircraft noise is included in Table 4.2a of the Guidelines.

3 ROADWAY NOISE

3.1 Road Traffic Data

The major source of road noise impacting the site is the traffic moving along River Road and Earl Armstrong Road.

The section of River Road adjacent to the site is currently a two lane rural roadway with a posted speed limit of 80 km/hr. An allowance to widen the road to four urban divided lanes is included in this study. It is assumed with the urbanization the speed limit will be reduced to 60 km/hr. Earl Armstrong Road is currently a four lane urban divided roadway with a posted speed limit of 70 km/hr. Traffic volume parameters are taken from Table B1 in Appendix B of the guidelines for a 4-UAD roadway. Table 3.1 summarizes the traffic and road parameters are used to assess the noise levels.

TABLE 3.1 – TRAFFIC AND ROAD DATA SUMMARY

	RIVER ROAD	EARL ARMSTRONG
Annual Average Daily Traffic (AADT)	35,000	35,000
Posted Speed Limit (km/hr)	60	70
% Medium Trucks	7%	7%
% Heavy Trucks	5%	5%
% Daytime Traffic	92%	92%

3.2 Calculation Methods

Roadway noise is calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment.

This study will identify the noise contours generated by the traffic for various scenarios. To determine the indoor noise level requirements for ventilation and noise clauses, the contours for the 55 dBA daytime and 50 dBA nighttime levels are determined. For the requirement to evaluate building components, the 65 dBA daytime and 60 dBA night time contours are used. To determine the requirements for noise barriers, the 55 dBA and 60 dBA daytime noise contours are used. The following table provides the offset from centerline of the roadway to the noise contours. The distances in Table 3.2 are from the centerline of the right-of-way.

TABLE 3.2 – NOISE CONTOUR OFFSETS

NOISE CRITERIA		DISTANCE FROM CENTERLINE (M)	
		RIVER ROAD	EARL ARMSTRONG
Indoor Daytime	65 dBA	45.5	54.5
	55 dBA	186.6	223.5
Indoor Nighttime	60 dBA	32.9	39.7
	50 dBA	142.6	172.0
Outdoor Living Area	60 dBA	92.1	110.4
	55 dBA	186.6	223.5

Based on the above table for indoor noise evaluation, the daytime contours are further from centerline than the nighttime levels for each criterion; therefore, only the daytime levels will be used in the evaluation. Noise contours for both indoor and outdoor noise evaluation are shown on **Figure 2**. The noise contours have not been adjusted to reflect screening from proposed buildings. For clarity purposes, the noise contours have not been extended where they intersect with the noise contours from other roadways.

4 RESULTS

4.1 Indoor Sound Levels

The daytime indoor 55 dBA contour shown on **Figure 2.1** represents the limit in which a Type 'C' Warning Clause and forced air heating with provision for central air conditioning are required for the residential units. The 65 dBA daytime contour is the limit in which a Type 'D' warning clause, central air conditioning and an acoustical review/design of the building components are required. As noted in Section 3.2, the noise contours have not been adjusted to account for screening by the proposed buildings.

The 65 dBA contour impacts all units backing onto or flanking River Road requiring mandatory air conditioning, a review of building components and a Type 'D' warning clause. The 65 dBA contour from Earl Armstrong Road does not reach the multi-density buildings at the north end of the site. Without allowance for screening the 55 dBA contour covers almost the entire site. For units with indoor noise between 65 and 55 dBA alternative means of ventilation and a Type 'C' warning clause is required. The location of units requiring a Type 'C' and 'D' warning clause will be determined during detailed design.

Type 'C':

"This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property."

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 City's and the Ministry of the Environment's noise criteria."

4.2 Outdoor Sound Levels

The outdoor 60 dBA contour on **Figure 2** represents the limit in which physical attenuation is required in the outdoor living areas of residential units. For units between the 60 dBA and 55 dBA contours, physical attenuation may not be required but should be considered as stated in Part 4, Section 3.4 of the guidelines.

The 60 dBA contour impacts all outdoor living areas for units that back onto or flank River Road requiring physical attenuation. The multi-unit buildings at the north of the site do not have outdoor living areas. The location of noise barriers along River Road is shown on **Figure 2.1**. In order to reduce the noise below 55 dBA the barriers may need to be up to four meters in height which is not practical. A 2.5 meter high barrier would likely reduce the noise below 65 dBA but be above 55 dBA so that a Type 'B' warning clause will be required. At locations where the noise level in the OLA is below 60 dBA but above 55 dBA a Type 'A' warning clause could be used in lieu of a noise barrier. The location and height of the noise barriers and location of the Type 'A' and 'B' warning clauses will be determined during detailed design.

Warning clauses for outdoor noise are as follows:

Type 'A'

"Purchasers/tenants are advised that sound levels due to increasing River Road may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

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 River Road, traffic may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

4.3 Aircraft Sound Levels

As stated in Section 2.1, the site is within the Airport Vicinity Development Zone (AVDZ), the limit of the AVCZ is shown on **Figure 2**. The site however is outside of the 25 NEF/NEP contour line so the building components and ventilation requirements of Part 6 Prescribed Measures for Aircraft Noise of the Guidelines do not apply. A warning clause is required for the residential units inside the AVDZ.

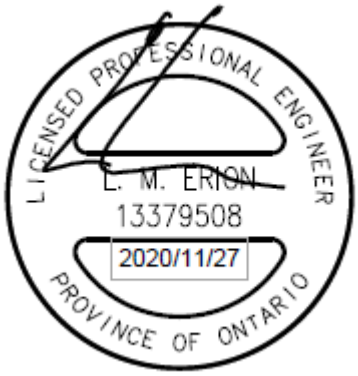
Warning clause for aircraft noise is as follows:

"Purchasers/tenants are advised that due to the proximity of the airport, noise from the airport and individual aircraft may at times interfere with outdoor or indoor activities".

5 CONCLUSION

This report outlines the impact of roadway noise on the RSDC Phase 12 Lands development. The exact location of residential units requiring noise warning clauses, ventilation, air conditioning requirements, acoustical review/design of building components, and the location and size of noise barriers will be determined during the detailed design phase when site plans and grading plans are finalized.

Prepared by:



Lance Erion, P. Eng.
Associate

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EARL ARMSTRONG ROAD

PHASE 2

SUMMERHILL STREET

RIVER ROAD

BLOCK 81

BLOCK 80

BLOCK 82

PHASE 12

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 94

RIVERSIDE SOUTH PHASE 12

RIDEAU RIVER

POND

REMAINS OF UTILITY POLES

AUGUST 8, WATER'S EDGE

JULY 4, 1990 WATER'S EDGE

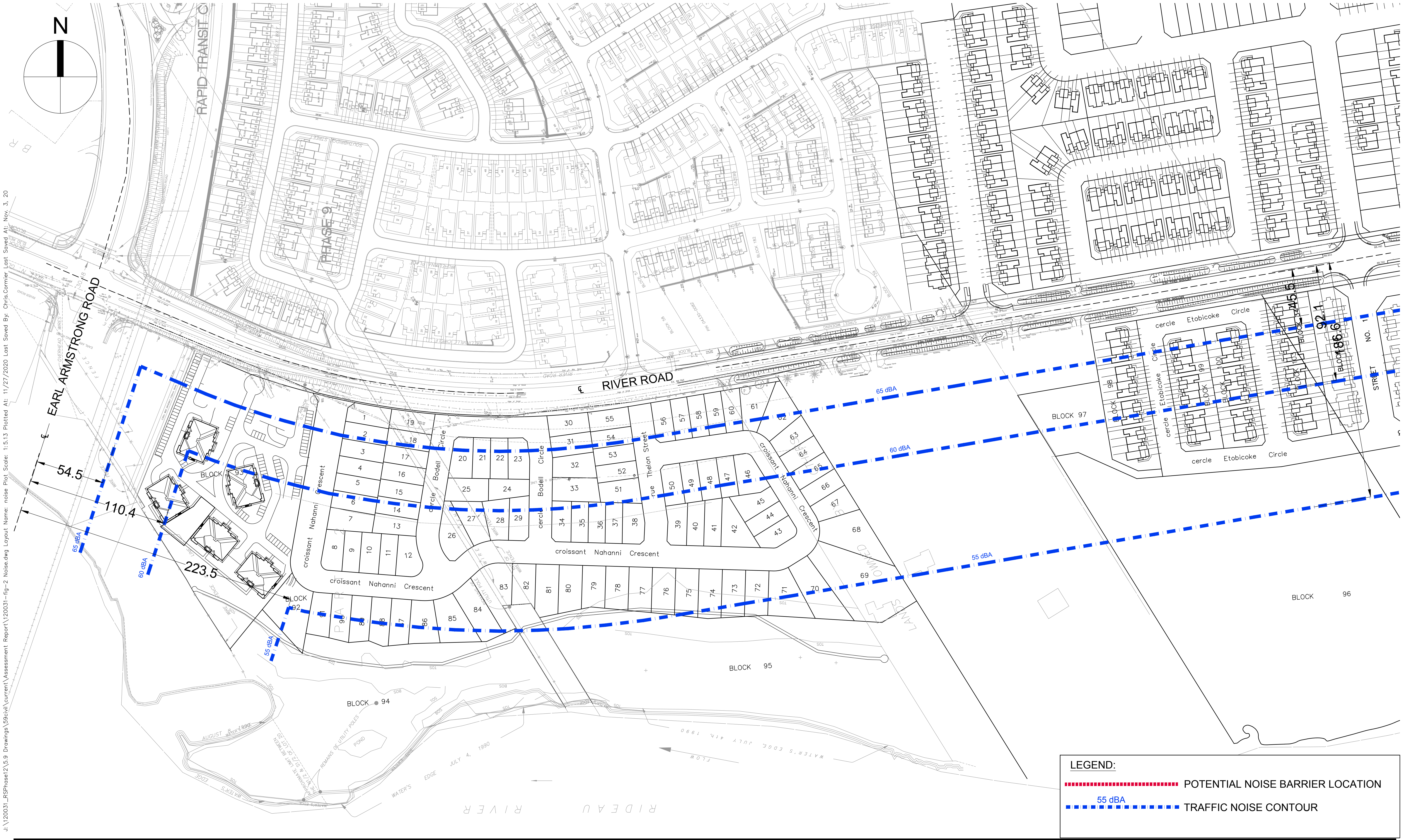
WATER'S EDGE JULY 4th, 1990

FLOW

BY OWNED LANDS

Scale	Project Title	Drawing Title	Sheet No.
IBI			
1:2000	RIVERSIDE SOUTH PHASE 12	LOCATION PLAN	FIGURE 1.1

J:\120031_RSPhase12\5.9 Drawings\59civil\current\Assessment Report\120031-fig-2 Noise.dwg Layout Name: noise Plot Scale: 1:5.13 Plotted At: 11/27/2020 Last Saved By: Chris.Cormier Last Saved At: Nov. 3, 20



Scale	Project Title	Drawing Title	Sheet No.
NTS	RSS PHASE 12	NOISE PLAN	FIGURE 2

APPENDIX

STAMSON 5.0 COMPREHENSIVE REPORT Date: 20-09-2017 16:10:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ri65d60n.te Time Period: Day/Night 16/8 hours
Description: 4-UAD Indoor 65 dBA daytime 60 dBA night

Road data, segment # 1: 4-UAD (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	km/h
Road gradient	: 2	%
Road pavement	: 1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	35000
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: 4-UAD (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 45.45 / 32.90	m
Receiver height	: 2.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Segment # 1: 4-UAD (day)

Source height = 1.50 m

ROAD (0.00 + 65.00 + 0.00) = 65.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	74.26	0.00	-7.85	-1.41	0.00	0.00	0.00	65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

Segment # 1: 4-UAD (night)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	66.66	0.00	-5.36	-1.30	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 60.00

STAMSON 5.0 COMPREHENSIVE REPORT Date: 20-09-2017 16:50:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ri55d50n.te Time Period: Day/Night 16/8 hours
Description: 4-UAD Indoor 55 dBA daytime 50 dBA night

Road data, segment # 1: 4-UAD (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	km/h
Road gradient	: 2	%
Road pavement	: 1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	35000
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: 4-UAD (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 186.60 / 142.60	m
Receiver height	: 2.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Segment # 1: 4-UAD (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	74.26	0.00	-17.85	-1.41	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Segment # 1: 4-UAD (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	66.66	0.00	-15.36	-1.30	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

STAMSON 5.0 COMPREHENSIVE REPORT Date: 20-09-2017 15:51:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rol60.te Time Period: Day/Night 16/8 hours
Description: 4-UAD OLA 60 dBA

Road data, segment # 1: 4-UAD (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	km/h
Road gradient	: 2	%
Road pavement	: 1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	35000
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: 4-UAD (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 88.50 / 88.50	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Segment # 1: 4-UAD (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	74.26	0.00	-12.80	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Segment # 1: 4-UAD (night)

Source height = 1.50 m

ROAD (0.00 + 53.25 + 0.00) = 53.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	66.66	0.00	-12.10	-1.30	0.00	0.00	0.00	53.25

Segment Leq : 53.25 dBA

Total Leq All Segments: 53.25 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 53.25

STAMSON 5.0 COMPREHENSIVE REPORT Date: 20-09-2017 15:47:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rol55.te Time Period: Day/Night 16/8 hours
Description: 4-UAD OLA 55 dBA

Road data, segment # 1: 4-UAD (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	km/h
Road gradient	: 2	%
Road pavement	: 1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	35000
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: 4-UAD (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 177.20 / 177.20	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Segment # 1: 4-UAD (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	74.26	0.00	-17.80	-1.46	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Segment # 1: 4-UAD (night)

Source height = 1.50 m

ROAD (0.00 + 48.52 + 0.00) = 48.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	66.66	0.00	-16.84	-1.30	0.00	0.00	0.00	48.52

Segment Leq : 48.52 dBA

Total Leq All Segments: 48.52 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 48.52

STAMSON 5.0 COMPREHENSIVE REPORT Date: 20-09-2017 15:26:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: in65d60n.te Time Period: Day/Night 16/8 hours
Description: 2-UCU Indoor 65 dBA day, 60 dBA night

Road data, segment # 1: 2-UCU (day/night)

Car traffic volume	: 6477/563	veh/TimePeriod	*
Medium truck volume	: 515/45	veh/TimePeriod	*
Heavy truck volume	: 368/32	veh/TimePeriod	*
Posted speed limit	: 50 km/h		
Road gradient	: 2 %		
Road pavement	: 1 (Typical asphalt or concrete)		

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

24 hr Traffic Volume (AADT or SADT)	: 8000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 1: 2-UCU (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 15.00 / 15.00	m
Receiver height	: 2.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Segment # 1: 2-UCU (day)

Source height = 1.50 m

ROAD (0.00 + 64.97 + 0.00) = 64.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	66.38	0.00	0.00	-1.41	0.00	0.00	0.00	64.97

Segment Leq : 64.97 dBA

Total Leq All Segments: 64.97 dBA

Segment # 1: 2-UCU (night)

Source height = 1.50 m

ROAD (0.00 + 57.48 + 0.00) = 57.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.78	0.00	0.00	-1.30	0.00	0.00	0.00	57.48

Segment Leq : 57.48 dBA

Total Leq All Segments: 57.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.97
(NIGHT): 57.48

STAMSON 5.0 COMPREHENSIVE REPORT Date: 20-09-2017 15:27:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: in55d50n.te Time Period: Day/Night 16/8 hours
Description: 2-UCU Indoor 55 dBA day, 50 dBA night

Road data, segment # 1: 2-UCU (day/night)

Car traffic volume	: 6477/563	veh/TimePeriod *
Medium truck volume	: 515/45	veh/TimePeriod *
Heavy truck volume	: 368/32	veh/TimePeriod *
Posted speed limit	: 50	km/h
Road gradient	: 2	%
Road pavement	: 1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: 2-UCU (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 61.30 / 44.90	m
Receiver height	: 2.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Segment # 1: 2-UCU (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	66.38	0.00	-9.97	-1.41	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Segment # 1: 2-UCU (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.78	0.00	-7.48	-1.30	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

STAMSON 5.0 COMPREHENSIVE REPORT Date: 20-09-2017 15:37:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ola60.te Time Period: Day/Night 16/8 hours
Description: 2-UCU OLA 60 dBA

Road data, segment # 1: 2-UCU (day/night)

Car traffic volume	: 6477/563	veh/TimePeriod	*
Medium truck volume	: 515/45	veh/TimePeriod	*
Heavy truck volume	: 368/32	veh/TimePeriod	*
Posted speed limit	: 50	km/h	
Road gradient	: 2	%	
Road pavement	: 1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: 2-UCU (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg	
Wood depth	: 0	(No woods.)	
No of house rows	: 0 / 0		
Surface	: 1	(Absorptive ground surface)	
Receiver source distance	: 29.70 / 29.70	m	
Receiver height	: 1.50 / 4.50	m	
Topography	: 1	(Flat/gentle slope; no barrier)	
Reference angle	: 0.00		

Segment # 1: 2-UCU (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.38	0.00	-4.92	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Segment # 1: 2-UCU (night)

Source height = 1.50 m

ROAD (0.00 + 52.82 + 0.00) = 52.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.78	0.00	-4.66	-1.30	0.00	0.00	0.00	52.82

Segment Leq : 52.82 dBA

Total Leq All Segments: 52.82 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 52.82

STAMSON 5.0 COMPREHENSIVE REPORT Date: 20-09-2017 15:30:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ola55.te Time Period: Day/Night 16/8 hours
Description: 2-UCU OLA 55 dBA

Road data, segment # 1: 2-UCU (day/night)

Car traffic volume	: 6477/563	veh/TimePeriod	*
Medium truck volume	: 515/45	veh/TimePeriod	*
Heavy truck volume	: 368/32	veh/TimePeriod	*
Posted speed limit	: 50	km/h	
Road gradient	: 2	%	
Road pavement	: 1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: 2-UCU (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg	
Wood depth	: 0	(No woods.)	
No of house rows	: 0 / 0		
Surface	: 1	(Absorptive ground surface)	
Receiver source distance	: 59.40 / 59.40	m	
Receiver height	: 1.50 / 4.50	m	
Topography	: 1	(Flat/gentle slope; no barrier)	
Reference angle	: 0.00		

Segment # 1: 2-UCU (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.38	0.00	-9.92	-1.46	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Segment # 1: 2-UCU (night)

Source height = 1.50 m

ROAD (0.00 + 48.10 + 0.00) = 48.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.78	0.00	-9.38	-1.30	0.00	0.00	0.00	48.10

Segment Leq : 48.10 dBA

Total Leq All Segments: 48.10 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 48.10