REPORT
PROJECT: 118404

NOISE CONTROL FEASIBILITY STUDY
CLARIDGE HOMES PHASE 3 LANDS
4725 SPRATT ROAD
RIVERSIDE SOUTH COMMUNITY
RIDEAU RIVER AREA

Prepared for CLARIDGE HOMES (SPRATT ROAD) INC.
by IBI GROUP

FEBRUARY 2019

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1 INTRODUCTION

This report has been prepared to determine the impact of roadway traffic on the residential lands at 4725 Spratt Road of the Claridge Homes Phase 3 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 current draft plan of subdivision for 4725 Spratt Road is shown on **Figure 1**. The property covers about 11 ha and is located south of the future Bus Rapid Transit (BRT) corridor and east of Spratt Road.

2 BACKGROUND

2.1 Noise Sources

The study area is primarily subject to traffic noise from the extension of Spratt Road and Street No. 1 which is the extension of Borbridge Avenue. The future Bus Rapid Transit (BRT) corridor is adjacent to the site. The majority of the site is within 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 Nosie 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 Traffic Volume Data

The major source of noise external to the development is the traffic moving along Spratt Road, Street No. 1 and the proposed Bus Rapid Transit (BRT) corridor to the south of the subject site.

Spratt Road and Street No. 1 are two lane urban collectors traffic data is taken from Appendix B Table B1 of the guidelines for a 2-UCU. Bus traffic data is taken from the Barrhaven-Riverside South Bus Rapid Transit System Noise Impact Assessment February 2013 by RWDI Air Inc. which is included in Appendix F of the Environmental Report. Table 3 of the Noise Report contains the traffic inputs for the dedicated BRT section as shown in an e-mail from the City of Ottawa in the Appendix.

TABLE 3.1
TRAFFIC AND ROAD DATA SUMMARY

	COLLECTURE 2-UCU	BRT
Annual Average Daily Traffic (AADT)	8,000	600 buses
Posted Speed Limit (per/hr)	50	80
% Medium Trucks	7%	-
% Heavy Trucks	5%	-
% Daytime Traffic	92%	74%

3.2 Calculation Methods

Roadway noise was calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment. In the BRT Noise Report the buses were modelled as heavy trucks to simulate the three axle articulated buses used in Ottawa. In the STAMSON program the rapid transit function is used to calculate the BRT noise with a custom source used to simulate the "heavy truck" buses.

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)	
		BRT	COLLECTORS 2-UCU
Indoor Daytime	65 dBA	22.5	12.9
	55 dBA	94.4	56.1
Indoor Nighttime	60 dBA	38.9	7.3
	50 dBA	172.7	41.0
Outdoor Living Area	60 dBA	46.0	27.7
	55 dBA	94.4	56.1

Based on the above table for indoor noise evaluation for the collector roads, 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. For the BRT, the nighttime noise levels are further from centreline so only the nighttime levels will be used for the indoor noise 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 the larger roadway.

4 RESULTS

4.1 Indoor Sound Levels

The daytime indoor 55 dBA contour for the collector roads shown on **Figure 2** 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 60 dBA nighttime contour for the BRT 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. A summary of the results of each roadway is as follows:

BRT – The 60 dBA indoor nighttime contour is located 38.9 meters from the BRT centreline which impacts all units backing onto the corridor, mandatory central air conditioning, a review of building components and a Type 'D' warning clause. It is expected that the row of townhouses backing the BRT will screen noise from the other townhouse units.

Collector Roads – The 65 dBA contour is 12.9 meters from the centreline of the collector road which puts the contour inside of a typical 26 meter ROW, therefore no unit adjacent to the roadways will exceed 65 dBA. All units directly fronting or flanking the collector road will be above 55 dBA requiring alternative means of ventilation and a Type "C" warning clause, the exact number of units that exceed 55 dBA will be determined during detailed design.

Warning clauses for indoor noise are as follows:

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. A summary of the results for each roadway is as follows:

BRT – As the 60 dBA outdoor contour is located 46.0 m from the centerline of the BRT all outdoor living areas (OLA) for units backing onto the BRT will require physical alteration. Noise barriers are required for these units and are shown on **Figure 2**. In order to reduce the noise below 55 dBA the barriers may need to be up to four meters in height, if this is not practical, then a barrier height of 2.5 meters would likely reduce the noise level below 60 dBA and a Type "B" warning clause will be required.

Collector Roads – As the 60 dBA contour is located 27.7 meters from the centreline of the collector roads the units directly flanking the collector roads will likely require physical attenuation, potential

noise barrier locations are shown on **Figure 2**. Due to overland flow routes drainage and access easements it may not be practical to construct a continuous barrier in these locations, a partial barrier will reduce the noise levels below 60 dBA but may not reduce below 55 dBA requiring a Type "B" warning clause. At locations where the noise level is below 60 dBA but above 55 dBA a Type "A" warning clause could be considered in lieu of a barrier.

Warning clauses for outdoor noise are as follows:

Type 'A'

"Purchasers/tenants are advised that sound levels due to increasing BRT, Spratt Road and Street No. 1 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 BRT, Spratt Road and Street No. 1 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 majority of 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 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 and BRT noise on the Claridge 4725 Spratt Road in the Phase 3 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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N

12.9
27.7
56.1

TRANSIT CORRIDOR

℄ BUS RAPID TRANSIT (BRT)

60 dBA (NIGHT)
65 dBA (DAY)

38.9
46.0

STREET NO. 2

STREET NO. 4

55 dBA
60 dBA
65 dBA

56.1
12.9
27.7

℄ STREET No. 1

℄ SPRATT ROAD

STREET NO. 5

STREET NO. 6

LIMIT OF AIRPORT VICINITY DEVELOPMENT ZONE (AVDZ)

LEGEND:

- POTENTIAL NOISE BARRIER LOCATION
- 55 dBA — BRT TRAFFIC NOISE CONTOUR
- 60 dBA — TRAFFIC NOISE CONTOUR

J: \118404_4725SprattRd\5.9 Drawings\59civil\current\Assessment Report\118404-fig-2-NOISE.dwg Layout Name: noise Plot Scale: 1:5.13 Plotted At: 2/28/2019 Last Saved By: James.Battison Last Saved At: Feb. 28, 19

Scale	Project Title	Drawing Title	Sheet No.
NTS	4725 SPRATT	NOISE PLAN	FIGURE 2

APPENDIX

Lance Erion

From: Yousfani, Asad <Asad.Yousfani@ottawa.ca>
Sent: Monday, April 04, 2016 10:08 AM
To: Lance Erion
Cc: Kaufman, Cathlyn; Jim Burghout; Terry Brule
Subject: FW: BRRT

Hi Lance,

I've received the following information from Frank for you to update the noise study.

Thanks,

Asad

From: McKinney, Frank
Sent: Monday, April 04, 2016 9:39 AM
To: Yousfani, Asad
Subject: FW: BRRT

Hi Asad, as requested by IBI at Friday's meeting:

As per p. 5 of Appendix F, the vehicle type, volume and speed assumptions were as follows:

"The ENCG accepts noise models based on the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT), including the computerized version, STAMSON (MOE 1996). These models have built-in sound power data for road vehicles; however, they do not specify values specifically for buses. Based on ENCG section 2.4.1, transitway buses should be classified as "medium trucks" for modeling purposes using STAMSON. However, the buses operating on the BRT are 60 foot articulating buses, with three axles and a weight over 18,000 kg. Based on the MOE "STAMSON Version 4.1 User's Guide", a vehicle with three or more axles and a weight greater than 12,000 kg should be considered as a "heavy truck" for modelling. Therefore, the proposed BRT buses were modelled as "heavy trucks". A summary of the model inputs is presented below in Table 3.

Table 3: Traffic Inputs for Surface Transportation Corridor Modelling

	Dedicated BRT Sections of Project	Transit Street without Proposed BRT	Transit Street with Median BRT
AADT	600	14000	14600
Speed Limit	80 km/h	60 km/h	60 km/h
Day / Night Split	74% / 26%	92% / 8%	91% / 9%
% Medium / % Heavy of Total Traffic	0% / 100%	7% / 5%	7% / 8%

Frank

STAMSON 5.0 NORMAL REPORT Date: 26-02-2019 14:25:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: locin55.te Time Period: Day/Night 16/8 hours
Description: 2-UCU Road 65 dBA Daytime, 60 dBA Night

Road data, segment # 1: 2-UCU Road (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	1 %	
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 Road (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	

Results segment # 1: 2-UCU Road (day)

Source height = 1.50 m

ROAD (0.00 + 64.34 + 0.00) = 64.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	65.75	0.00	0.00	-1.41	0.00	0.00	0.00	64.34

Segment Leq : 64.34 dBA

Total Leq All Segments: 64.34 dBA

Results segment # 1: 2-UCU Road (night)

Source height = 1.50 m

ROAD (0.00 + 56.85 + 0.00) = 56.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.16	0.00	0.00	-1.30	0.00	0.00	0.00	56.85

Segment Leq : 56.85 dBA

Total Leq All Segments: 56.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.34
(NIGHT): 56.85

Divergence - Line Source

Origin	Distance	d1	15	m
	Noise	n1	56.85	dBA
Receiver	Noise	n2	60	dBA
Distance (est)		d2	7.3	

Note: Distance (est) = d1 / (10^((n2-n1)/10))
*When n2>n1

Divergence - Line Source

Origin	Distance	d1	15	m
	Noise	n1	64.34	dBA
Receiver	Noise	n2	65	dBA
Distance (est)		d2	12.9	

Note: Distance (est) = d1 / (10^((n2-n1)/10))
*When n2>n1

STAMSON 5.0 NORMAL REPORT Date: 26-02-2019 14:32:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: locin55.te Time Period: Day/Night 16/8 hours
Description: 2-UCU Road 55 dBA Daytime, 50 dBA Night

Road data, segment # 1: 2-UCU Road (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	1 %	
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 Road (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	56.10 / 41.00	m
Receiver height	2.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Reference angle	0.00	

Results segment # 1: 2-UCU Road (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	65.75	0.00	-9.34	-1.41	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: 2-UCU Road (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	58.16	0.00	-6.86	-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 NORMAL REPORT Date: 26-02-2019 14:36:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: loc60ola.te Time Period: Day/Night 16/8 hours
Description: 2-UCU Road 60 dBA Daytime

Road data, segment # 1: 2-UCU Road (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	1 %	
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 Road (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	27.70 / 19.70	m
Receiver height	2.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Reference angle	0.00	

Results segment # 1: 2-UCU Road (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	0.63	65.75	0.00	-4.34	-1.41	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: 2-UCU Road (night)

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	0.57	58.16	0.00	-1.86	-1.30	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 55.00

STAMSON 5.0 NORMAL REPORT Date: 26-02-2019 17:21:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: brt55.te Time Period: Day/Night 16/8 hours
Description: BRT 55 dBA Daytime, 50 dBA Night

RT/Custom data, segment # 1: BRT (day/night)
---
1 - Custom (87.0 dBA):
Traffic volume : 444/156 veh/TimePeriod
Speed : 80 km/h

Data for Segment # 1: BRT (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 : 94.40 / 172.70 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: BRT (day)

Source height = 2.40 m

RT/Custom (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	69.16	-12.81	-1.36	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: BRT (night)

Source height = 2.40 m

RT/Custom (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.54	67.63	-16.37	-1.25	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 NORMAL REPORT Date: 26-02-2019 17:09:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: brt60.te Time Period: Day/Night 16/8 hours
Description: BRT 60 dBA Daytime

RT/Custom data, segment # 1: BRT (day/night)
---

1 - Custom (87.0 dBA):
Traffic volume : 444/156 veh/TimePeriod
Speed : 80 km/h

Data for Segment # 1: BRT (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	: 46.00 / 38.85	m
Receiver height	: 2.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Results segment # 1: BRT (day)

Source height = 2.40 m

RT/Custom (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	69.16	-7.80	-1.36	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: BRT (night)

Source height = 2.40 m

RT/Custom (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.54	67.63	-6.38	-1.25	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): 60.00
(NIGHT): 60.00

STAMSON 5.0 NORMAL REPORT Date: 26-02-2019 17:17:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: brt65.te Time Period: Day/Night 16/8 hours
Description: BRT 65 dBA Daytime, 60 dBA Night

RT/Custom data, segment # 1: BRT (day/night)
---
1 - Custom (87.0 dBA):
Traffic volume : 444/156 veh/TimePeriod
Speed : 80 km/h

Data for Segment # 1: BRT (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 : 22.45 / 38.85 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: BRT (day)

Source height = 2.40 m

RT/Custom (0.00 + 65.00 + 0.00) = 65.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	69.16	-2.81	-1.36	0.00	0.00	0.00	65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

Results segment # 1: BRT (night)

Source height = 2.40 m

RT/Custom (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.54	67.63	-6.38	-1.25	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