



REPORT
PROJECT: 105203-5.2.2

NOISE CONTROL FEASIBILITY STUDY
CLARIDGE HOMES PHASE 2 LANDS
- 807 RIVER ROAD
- 4720 SPRATT ROAD
RIVERSIDE SOUTH COMMUNITY
RIDEAU RIVER AREA



Prepared for CLARIDGE HOMES
by IBI GROUP

SEPTEMBER 2017

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1 INTRODUCTION

This report has been prepared to determine the impact of roadway traffic on the residential lands of the Claridge Homes Phase 2 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 the Claridge Phase 2 Lands is shown on Figure 1. The property, which is generally located near the south west corner of the Riverside South Community, covers about 86 ha. The property is located between River Road and Spratt Road sandwiched between the RSDC property to the north and south. Cardel Homes also owns a parcel to the south of the subject site.

2 BACKGROUND

2.1 Noise Sources

The study area is primarily subject to roadway noise from existing River Road and Spratt Road and from the extension of Brian Good Avenue and a proposed collector road between River and Spratt Roads identified as Street No. 1 on the draft plan.

Aircraft noise from the Ottawa International Airport is not a factor as the site is located just outside 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.

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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.

3 ROADWAY NOISE

3.1 Road Traffic Data

The major source of road noise impacting the site is the traffic moving along River Road, Spratt Road, the extension of Brian Good Avenue and the collector road between River and Spratt Roads identified as Street No. 1.

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. Spratt Road currently is a gravel rural road through the site, however, north of Earl Armstrong Road, Spratt Road is a four lane undivided roadway. In the study area south of Earl Armstrong, Spratt Road will be a two lane urban collector roadway, similarly Brian Good Avenue and Street No. 1 will also be two lane urban collectors. River Road is classified as a 4-UAD while the collector roads are 2-UCU. Traffic volume parameters are taken from Appendix B of the guidelines, 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 4-UAD	COLLECTORS 2-UCU
Annual Average Daily Traffic (AADT)	35,000	8,000
Posted Speed Limit (km/hr)	60	50
% 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 4-UAD	COLLECTORS 2-UCU
Indoor Daytime	65 dBA	45.5	6.4
	55 dBA	186.6	36.7
Indoor Nighttime	60 dBA	32.9	3.6
	50 dBA	142.6	26.5
Outdoor Living Area	60 dBA	88.5	17.9
	55 dBA	177.2	35.9

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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 the larger roadway.

4 RESULTS

4.1 Indoor Sound Levels

The daytime indoor 55 dBA contour 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 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. A summary of the results of each roadway is as follows:

River Road – The 65 dBA indoor contour located 45.5 meters from the centerline of River Road impacts all units adjacent to the road. The 55 dBA extending 186.6 meters from centerline impacts a large number of units although the noise will be reduced due to screening from the buildings closer to the road. Residential units that directly face or flank River Road will have sound levels above 65 dBA requiring mandatory central air conditioning, a review of building components and a Type “D” warning clause. Units that fall between 65 dBA and 55 dBA requiring alternative means of ventilation and a type “C” warning clause will be determined during detailed design.

Collector Roads – The 65 dBA contour is 15 meters from the centreline of the collector road which puts the contour 2 meters outside of a typical 26 meter ROW, therefore it is unlikely that any 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:

River Road – As the 60 dBA outdoor contour is located 88.5 m from the centerline of the road all outdoor living areas (OLA) in this range will require physical alteration. There are no units that back onto River Rod so that only units that flank the road will have the OLA exposed, 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

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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 65 dBA contour is located 29.7 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 River Road, Spratt Road, Brian Good Avenue, 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 River Road, Spratt Road, Brian Good Avenue, 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.”

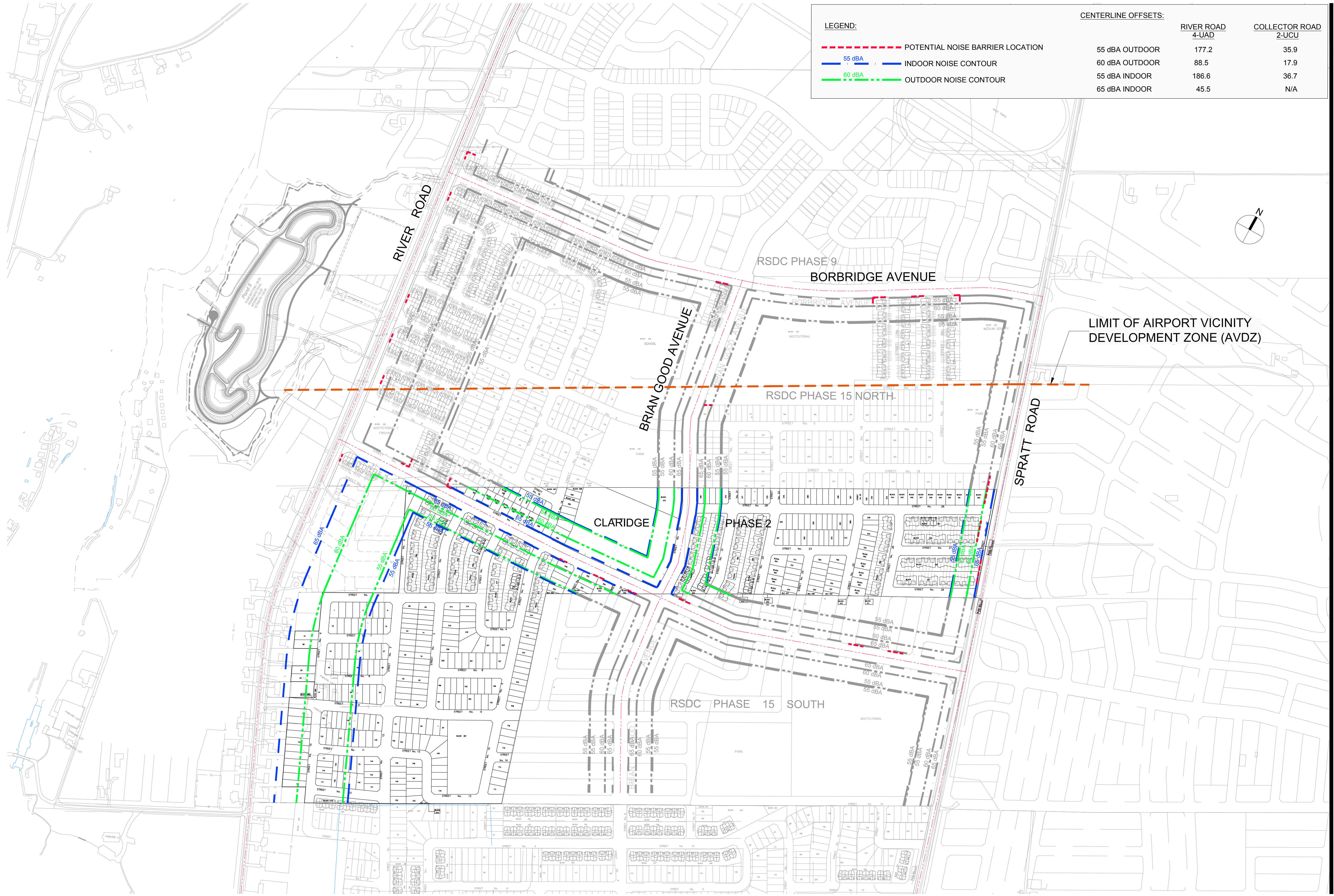
5 CONCLUSION

This report outlines the impact of roadway noise on the Claridge Phase 2 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



LEGEND:

- - - - - POTENTIAL NOISE BARRIER LOCATION
- — — — — 55 dBA INDOOR NOISE CONTOUR
- · - · - 60 dBA OUTDOOR NOISE CONTOUR

CENTERLINE OFFSETS:

	RIVER ROAD 4-UAD	COLLECTOR ROAD 2-UCU
55 dBA OUTDOOR	177.2	35.9
60 dBA OUTDOOR	88.5	17.9
55 dBA INDOOR	186.6	36.7
65 dBA INDOOR	45.5	N/A

Sheet No.

Drawing Title

FIGURE 2

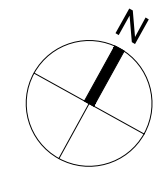
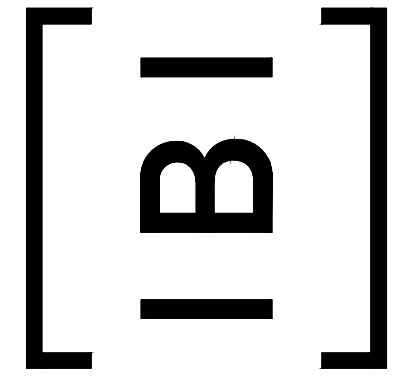
NOISE PLAN

Project Title

NOISE CONTROL FEASIBILITY STUDY
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 RIVERSIDE SOUTH COMMUNITY
 RIDEAU RIVER AREA

Scale

N.T.S.



APPENDIX

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

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

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

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

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

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

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

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