

NOISE IMPACT ASSESSMENT STUDY

Development Address:

159, 163 and 167 Parkdale Avenue
Ottawa, Ontario

City of Ottawa Building Permit: [0000000]

Client:

Richcraft Group of Companies
2280 St. Laurent Boulevard
Ottawa, Ontario, K1G 4K1

Attention: Phil Castro MCIP, RPP

Prepared by:

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20 January 2012



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28 Storey Residential Tower
159, 163 and 167 Parkdale Avenue
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City of Ottawa Building Permit: [0000000]

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	5
1.0 INTRODUCTION / BACKGROUND INFORMATION.....	6
1.1 REFERENCES.....	6
1.2 PURPOSE.....	7
1.3 SCOPE.....	7
2.0 SOUND LEVEL CRITERIA.....	8
3.0 PREDICTION OF NOISE LEVELS.....	10
3.1 ROAD TRAFFIC INFORMATION.....	10
3.2 RAIL TRAFFIC INFORMATION.....	10
3.3 NOISE LEVEL PREDICTIONS: METHODOLOGY.....	11
3.4 NOISE LEVEL PREDICTIONS: CONDOMINIUMS AND TOWNHOUSES.....	11
3.4.1 Impact of Road Vehicle Traffic Noise.....	11
3.4.2 Impact of LRT Noise.....	12
3.4.3 Combination of Road and Rail Noise.....	12
3.5 INDOOR NOISE CONTROL MEASURES: CONDOMINIUMS AND TOWNHOUSES... 13	13
3.6 NOISE LEVEL PREDICTIONS: OUTDOOR AMENITY AREA.....	13
3.7 NOISE CONTROL MEASURES: OUTDOOR AMENITY AREA.....	13
3.8 SUMMARY OF INDOOR PREDICTIONS.....	14
4.0 RECOMMENDATIONS.....	16
APPENDIX A : STAMSON 5.02 OUTPUTS DATED 10 DECEMBER 2011.....	17
APPENDIX B : RECEIVER HEIGHTS AND STAMSON PREDICTIONS.....	29
APPENDIX C : SITE PLANS.....	30
APPENDIX D : RECOMMENDED WORDING FOR NOTICES.....	32

LIST OF TABLES

Table 1: Sound Level Criteria for Outdoor Living Areas.....	8
Table 2: Indoor Sound Level Criteria: Road.....	8
Table 3: Road and Rail Noise: Building Component Requirements (Daytime) (07:00 –23:00).....	9
Table 4: Road Noise: Building Component Requirements (Night-time) (23:00-07:00).....	9
Table 5: Table of Traffic Flow Data.....	10
Table 6: Table of Rail Traffic Data.....	11
Table 7: Predicted Noise Levels: Daytime Hours (07h00-23h00).....	14
Table 8: Predicted Noise Levels: Night-time Hours (23h00-07h00).....	15

EXECUTIVE SUMMARY

In accordance with the Ontario Ministry of the Environment Noise and Land-Use Planning Guidelines, this report and associated study present an assessment of the environmental noise impacting on the property located at 159, 163 and 167 Parkdale Avenue in Ottawa, Ontario. This development proposal is made by Richcraft Group of Companies.

Outdoor and indoor noise levels are predicted and compared with requirements of the Environmental Noise Control Guidelines (ENCG) published by the City of Ottawa.

The predictions indicate that in order to meet indoor noise level requirements, building construction must be designed and executed to meet indoor noise level requirements, windows need to remain closed and therefore that air conditioning needs to be provided for each unit. This also requires that Notices-on-Title be incorporated into all Agreements of Lease or Purchase and Sale, and incorporated into the Development Agreements which are registered on the property title.

The results indicate that the noise emissions for the site will, with respect to background levels of noise, comply with City of Ottawa Environmental Noise Control Guidelines and therefore, do not constrain the proposed property development.

1.0 INTRODUCTION / BACKGROUND INFORMATION

In accordance with the Ontario Ministry of the Environment Noise and Land-Use Planning Guidelines, this report provides a detailed study of the environmental noise impact upon the development proposed by Richcraft Group of Companies and located at 159, 163 and 167 Parkdale Avenue in Ottawa, Ontario.

The proposed development is a 28 storey condominium tower with 6 levels of underground parking. A total of 6 townhouse units are located on the ground and second levels, with an additional 18 residential apartment units on levels two and three and 180 units on levels 4-28 above for a total of 204 units.

In accordance with City and Provincial guidelines, the predicted impact of ambient noise as emanating from significant sources of road traffic forms part of this study.

Noise levels are predicted at several locations on the building facade.

Site plans are provided in Appendix C, with the assessment locations marked.

1.1 REFERENCES

This study is based on information presented in the following document:

- Richcraft – 79 Lyndale and Parkdale.pdf

Reference is made to the following documents:

- 1) Ontario Ministry of the Environment (MoE) publication LU-131: Noise Assessment Criteria in Land Use Planning including its accompanying Annex and supporting documents, dated October, 1997;
- 2) Ontario Ministry of the Environment (MoE) publication NPC-205 dated October 1995;
- 3) City of Ottawa Environmental Noise Control Guidelines adopted 10 May 2006 (ENCG)
- 4) Ontario Ministry of the Environment (MoE) modelling tool STAMSON, version 5.02

- 5) A report prepared by Gradient Microclimate Engineering Inc., entitled "Air Quality, Noise , and Vibration Impact Study – City of Ottawa: Environmental Assessment Downtown Ottawa Transit Tunnel", and dated 28 May, 2011. The report can be viewed from the following web address:

www.ottawalightrail.ca/media/pdf/Appendix%20E_8MB.pdf

1.2 PURPOSE

The purpose of this report is to demonstrate that this project can be developed in a manner that meets all applicable requirements regarding environmental noise.

1.3 SCOPE

This Noise Impact Assessment presents a detailed study of the issues, as defined by the ENCG and Provincial Guidelines. It is concluded that an assessment of noise transmission via the windows is required to confirm that the requirements for indoor noise will be met.

The scope of this report is limited to the issues described above, and makes no claim as to the validity of the noise level criteria or their ability to satisfy the expectations of all persons.

2.0 SOUND LEVEL CRITERIA

This property is categorized as Class 1, with an acoustical environment typical of an urban area, and the land use is classified as “noise sensitive” (ref. LU-131).

Sound level criteria from the ENCG, which also replicate those found in the MoE guideline, are reproduced below.

Table 1: Sound Level Criteria for Outdoor Living Areas

Time Period	$L_{eq}(16)$ dBA
16 hour, 07:00-23:00	55

Table 2: Indoor Sound Level Criteria: Road

Type of Space	Road L_{eq} dBA
Living/Dining areas of Residences (Time Period: 16 hour, 07:00-23:00)	45
Sleeping Quarters (Time Period: 8 hours, 23:00-07:00)	40

The outdoor living area criteria apply only to outdoor spaces that are more than 4 metres deep and therefore do not apply to the apartment balconies proposed for this development. Noise levels are therefore only assessed from the perspective of the living/dining and bedroom windows (the facade of the building or plane of a window).

Indoor noise level criteria are provided by the guidelines for living and sleeping areas, with the requirement that building components must be designed and selected to ensure that the indoor criteria are met. Extracts from the ENCG follow.

**Table 3: Road and Rail Noise: Building Component Requirements
(Daytime) (07:00 –23:00)**

Noise Source	L_{eq} (16 hours) dBA
Road	Less than or equal to 65 dBA: OBC Greater than 65 dBA: Building components must be designed to ensure indoor criteria are met
Rail	Less than or equal to 60 dBA: OBC Greater than 60 dBA: Building components must be designed to ensure indoor criteria are met

**Table 4: Road Noise: Building Component Requirements
(Night-time) (23:00-07:00)**

Noise Source	L_{eq} (8 hours) dBA
Road	Less than or equal to 60 dBA: OBC Greater than 60 dBA: Building components must be designed to ensure indoor criteria are met
Rail	Less than or equal to 55 dBA: OBC Greater than 55 dBA: Building components must be designed to ensure indoor criteria are met

3.0 PREDICTION OF NOISE LEVELS

3.1 ROAD TRAFFIC INFORMATION

The ENCG referenced above (Table 1.7, page 15) has been used to divide the reported daily traffic volume data (AADT) into vehicle categories and by time-of-day. All input data is repeated in the results, discussed below, and attached as Appendix A. For ease of reference, the traffic data are summarized in the following table.

Table 5: Table of Traffic Flow Data

Source	AADT	Daytime/ Night-time	Cars	Medium Trucks	Heavy Trucks
Parkdale Avenue	15000	13800/1200	12144/1056	966/84	690/60

Traffic flow was presumed to be at the centre of the roadway, as is normal practice.

The speed limit on Parkdale Avenue is 50 km/h.

3.2 RAIL TRAFFIC INFORMATION

The City of Ottawa is currently planning to convert the existing Transitway (currently part of the Bus Rapid Transit or BRT network) into an electric Light Rail Transit (LRT) line near the site. Because the proposed LRT line will be located within 250 metres of the site, an analysis of its noise impact is included here.

In order to assess noise levels due to the new LRT line, reference is made to an environmental impact study prepared by Gradient Microclimate Engineering (GME). The study involved assessing noise, vibration, and air quality impacts of the proposed LRT line at multiple points of reception along the Transitway.

To determine the noise impact, the GME study used inputs as listed in Table 6. This input data was replicated and used to assess the noise impact at the proposed development on Parkdale Avenue.

Table 6: Table of Rail Traffic Data

Source	LRT
Number of Trains	
Daytime / Night-time	540/60
Speed (km/h)	80
Locomotives per train	1
Cars per train	4
Engine type	Electric
Continuously welded track?	Yes
Whistle?	No

Rail traffic was presumed to be located at approximately the centre of the existing BRT roadway.

3.3 NOISE LEVEL PREDICTIONS: METHODOLOGY

Road and rail noise impact predictions were made using the MoE tool STAMSON, version 5.02. However, as noted in the ORNAMENT and STEAM technical documents used to develop the STAMSON application, these prediction methods are only accurate when the source-receiver height is small compared to the source-receiver horizontal distance. Considering the height of the tower and the short distance to Parkdale Avenue, the STAMSON results are not valid when evaluating noise levels at the upper floors if only the horizontal distance is used. For instance, it was determined that the noise level predicted due to Parkdale Avenue at an 82.5-metre receiver height yielded the same results as a 2.5 metre receiver height, while in reality, the greater source-receiver distance at the 82.5 metre height will result in decreased noise levels.

As such, the actual source-receiver distance was used to determine the impact of Parkdale Avenue, rather than only the horizontal distance. More information and calculations are included as Appendix B.

3.4 NOISE LEVEL PREDICTIONS: CONDOMINIUMS AND TOWNHOUSES

3.4.1 Impact of Road Vehicle Traffic Noise

Predictions of daytime and night-time noise levels due to vehicle traffic on Parkdale Avenue were made at the West facade of the tower facing Parkdale Avenue, at heights of 2.5 metres, 28.5 metres, and 82.5 metres, representing approximately the first, 10th and 28th floor respectively. Predictions were also made

at the same heights on the South facade, which is shielded from a portion of Parkdale Avenue, and is also representative of units on the North facade. The East facade was not evaluated because it is completely shielded from Parkdale Avenue.

The predictions were made using the MoE tool STAMSON, version 5.02, and the results are attached as Appendix A.

The predictions indicate average daytime noise levels of 68, 65, and 61 dBA L_{eq} at the West facade and 65, 62, and 58 dBA L_{eq} at the North and South facades. The predictions also indicate average night-time noise levels of 61, 58, and 53 dBA L_{eq} on the West facade and 58, 55, and 50 dBA L_{eq} on the North and South facades.

3.4.2 Impact of LRT Noise

Predictions of daytime and night-time noise levels due to rail traffic on the proposed LRT line were made at the South facade of the tower, which has full exposure to the proposed line, at a height of 2.5 metres. Predictions were also made at a 2.5 metre height on the West facade, which is shielded from a portion of the LRT line, and also represents the units on the East facade. The North facade was not evaluated because it is completely shielded from the LRT line.

The predictions were made using the MoE tool STAMSON, version 5.02, and the results are attached as Appendix A.

The predictions indicate average daytime noise levels of 59 dBA L_{eq} on the South facade and 56 dBA L_{eq} on the West facade. The predictions also indicate average night-time noise levels of 53 dBA L_{eq} on the South facade and 50 dBA L_{eq} on the West facade.

3.4.3 Combination of Road and Rail Noise

The combined noise level due to Parkdale Avenue and the proposed LRT line at all points of reception is included in Table 7 below. At the worst-case location, located on the first floor at the West facade, the predictions indicate 69 dBA L_{eq} daytime and 61 dBA L_{eq} night-time.

The plane-of-window noise criteria are exceeded, and so all units will require Notices-on-Title and central air conditioning so that windows can remain closed to satisfy interior noise criteria levels. Recommended wording is included in Appendix D.

3.5 INDOOR NOISE CONTROL MEASURES: CONDOMINIUMS AND TOWNHOUSES

The indoor noise criteria in the units will *only* be met with the windows closed, which necessitates the use of central air conditioning. Sound pressure levels within the units due to the central air conditioning must not exceed 40 dBA in order to comply with the requirements of the ENCG. This applies to all units.

All construction is required to meet the requirements of the Ontario Building Code (OBC). An evaluation of noise transmission via the building envelope and in particular the windows is required to confirm that the indoor criteria will be met for the first 10 storeys on the West facade only. No other special measures are required.

3.6 NOISE LEVEL PREDICTIONS: OUTDOOR AMENITY AREA

There are no outdoor amenity spaces associated with the proposed development to which the noise criteria would apply.

3.7 NOISE CONTROL MEASURES: OUTDOOR AMENITY AREA

No outdoor noise control measures are recommended or required.

3.8 SUMMARY OF INDOOR PREDICTIONS

The following tables summarize the predictions. The Location ID (Points of Assessment or PoA) are marked on the site plans included as Appendix C.

Table 7: Predicted Noise Levels: Daytime Hours (07h00-23h00)

Facade	Floor	Location ID	Predicted Road Noise	Predicted Rail Noise	Combined Road and Rail Noise
West	1	PoA 'A'	68 dBA L_{eq}	56 dBA L_{eq}	69 dBA L_{eq}
	10	PoA 'B'	65 dBA L_{eq}	56 dBA L_{eq}	66 dBA L_{eq}
	28	PoA 'C'	61 dBA L_{eq}	56 dBA L_{eq}	62 dBA L_{eq}
South	1	PoA 'D'	65 dBA L_{eq}	59 dBA L_{eq}	66 dBA L_{eq}
	10	PoA 'E'	62 dBA L_{eq}	59 dBA L_{eq}	64 dBA L_{eq}
	28	PoA 'F'	58 dBA L_{eq}	59 dBA L_{eq}	61 dBA L_{eq}

Table 8: Predicted Noise Levels: Night-time Hours (23h00-07h00)

Facade	Floor	Location ID	Predicted Road Noise	Predicted Rail Noise	Combined Road and Rail Noise
West	1	PoA 'A'	61 dBA L _{eq}	50 dBA L _{eq}	61 dBA L _{eq}
	10	PoA 'B'	58 dBA L _{eq}	50 dBA L _{eq}	58 dBA L _{eq}
	28	PoA 'C'	53 dBA L _{eq}	50 dBA L _{eq}	55 dBA L _{eq}
South	1	PoA 'D'	58 dBA L _{eq}	53 dBA L _{eq}	59 dBA L _{eq}
	10	PoA 'E'	55 dBA L _{eq}	53 dBA L _{eq}	57 dBA L _{eq}
	28	PoA 'F'	50 dBA L _{eq}	53 dBA L _{eq}	55 dBA L _{eq}

4.0 RECOMMENDATIONS

The following noise control measures are recommended for all units:

- Central air conditioning
- Notices-on-Title respecting noise (attached as Appendix D)

Additionally, an evaluation of the noise isolation performance of the building envelope and in particular the windows will be required to confirm that the requirements for indoor noise will be met for the first 10 floors of the West facade.

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20 January 2012

Attachments:

- Appendix A: Stanson 5.02 outputs dated 10 December 2011
- Appendix B: Receiver Heights and STAMSON Predictions
- Appendix C: Site Plans
- Appendix D: Recommended wording for notices

APPENDIX A: STAMSON 5.02 OUTPUTS DATED 10 DECEMBER 2011

(attachment to Integral DX Engineering Ltd. report dated 20 January 2012)

STAMSON 5.0 SUMMARY REPORT Date: 10-12-2011 11:12:16
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 159pw1.te Time Period: Day/Night 16/8 hours
 Description: 159 Parkdale West facade 1st floor

Rail data, segment # 1: LRT (day/night)

Train Type	Trains !	Speed ! (km/h)	!# loc !/Train!	!# Cars! /Train!	Eng !type	!Cont !weld
1.	! 540.0/60.0	! 80.0	! 1.0	! 4.0	! Elec	! Yes

Data for Segment # 1: LRT (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 200.00 / 200.00 m
 Receiver height : 10.20 / 10.20 m
 Topography : 3 (Elevated; no barrier)
 No Whistle
 Elevation : 7.70 m
 Reference angle : 0.00

Result summary (day)

	! Loc ! Leq ! (dBA)	! Wheel ! Leq ! (dBA)	! Whistle ! Left Leq ! (dBA)	! Whistle ! Right Leq ! (dBA)	Total Leq (dBA)
1.LRT	! 50.80	! 54.79	! --	! --	! 56.25 *
Total					56.25 dBA

* Bright Zone !

Result summary (night)

	! Loc ! Leq ! (dBA)	! Wheel ! Leq ! (dBA)	! Whistle ! Left Leq ! (dBA)	! Whistle ! Right Leq ! (dBA)	Total Leq (dBA)
1.LRT	! 44.27	! 48.26	! --	! --	! 49.72 *
Total					49.72 dBA

* Bright Zone !

Road data, segment # 1: Parkdale (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 : 50 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: Parkdale (day/night)

 Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 15.00 / 15.00 m
 Receiver height : 2.50 / 2.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Result summary (day)

	! source !	Road	! Total
	! height !	Leq	! Leq
	! (m) !	(dBA)	! (dBA)
1.Parkdale	! 1.50 !	68.48	! 68.48
Total			68.48 dBA

Result summary (night)

	! source !	Road	! Total
	! height !	Leq	! Leq
	! (m) !	(dBA)	! (dBA)
1.Parkdale	! 1.50 !	60.88	! 60.88
Total			60.88 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.73
 (NIGHT): 61.20

STAMSON 5.0 SUMMARY REPORT Date: 10-12-2011 11:16:25
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 159pw10.te Time Period: Day/Night 16/8 hours
 Description: 159 Parkdale West facade 10th floor

Rail data, segment # 1: LRT (day/night)

Train Type	Trains	Speed (km/h)	# loc / Train	# Cars / Train	Eng type	Cont weld
1.	540.0/60.0	80.0	1.0	4.0	Elec	Yes

Data for Segment # 1: LRT (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 200.00 / 200.00 m
 Receiver height : 36.20 / 36.20 m
 Topography : 3 (Elevated; no barrier)
 No Whistle
 Elevation : 7.70 m
 Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	50.80	54.79	--	--	56.25 *
Total					56.25 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	44.27	48.26	--	--	49.72 *
Total					49.72 dBA

* Bright Zone !

Road data, segment # 1: Parkdale (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 : 50 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: Parkdale (day/night)

```

-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 30.89 / 30.89 m
Receiver height : 28.50 / 28.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
    
```

Result summary (day)

```

-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Parkdale ! 1.50 ! 65.34 ! 65.34
-----+-----+-----
Total 65.34 dBA
    
```

Result summary (night)

```

-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Parkdale ! 1.50 ! 57.75 ! 57.75
-----+-----+-----
Total 57.75 dBA
    
```

TOTAL Leq FROM ALL SOURCES (DAY): 65.84
 (NIGHT): 58.38

STAMSON 5.0 SUMMARY REPORT Date: 10-12-2011 11:15:51
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 159pw28.te Time Period: Day/Night 16/8 hours
 Description: 159 Parkdale West facade 28th floor

Rail data, segment # 1: LRT (day/night)

Train Type	Trains	Speed (km/h)	# loc / Train	# Cars / Train	Eng type	Cont weld
1.	540.0/60.0	80.0	1.0	4.0	Elec	Yes

Data for Segment # 1: LRT (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 200.00 / 200.00 m
 Receiver height : 90.20 / 90.20 m
 Topography : 3 (Elevated; no barrier)
 No Whistle
 Elevation : 7.70 m
 Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	50.80	54.79	--	--	56.25 *
Total					56.25 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	44.27	48.26	--	--	49.72 *
Total					49.72 dBA

* Bright Zone !

Road data, segment # 1: Parkdale (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 : 50 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: Parkdale (day/night)

```
-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 82.38 / 82.38 m
Receiver height : 82.50 / 82.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
-----
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.Parkdale ! 1.50 ! 61.08 ! 61.08
-----+-----+-----+-----
Total 61.08 dBA
-----
```

Result summary (night)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.Parkdale ! 1.50 ! 53.49 ! 53.49
-----+-----+-----+-----
Total 53.49 dBA
-----
```

TOTAL Leq FROM ALL SOURCES (DAY): 62.31
 (NIGHT): 55.01

STAMSON 5.0 SUMMARY REPORT Date: 10-12-2011 11:17:22
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 159ps1.te Time Period: Day/Night 16/8 hours
 Description: 159 Parkdale South facade 1st floor

Rail data, segment # 1: LRT (day/night)

Train Type	Trains	Speed (km/h)	# loc / Train	# Cars / Train	Eng type	Cont weld
1.	540.0/60.0	80.0	1.0	4.0	Elec	Yes

Data for Segment # 1: LRT (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 200.00 / 200.00 m
 Receiver height : 10.20 / 10.20 m
 Topography : 3 (Elevated; no barrier)
 No Whistle
 Elevation : 7.70 m
 Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	53.81	57.80	--	--	59.26 *
Total					59.26 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	47.28	51.27	--	--	52.73 *
Total					52.73 dBA

* Bright Zone !

Road data, segment # 1: Parkdale (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 : 50 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: Parkdale (day/night)

```
-----
Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 2.50 / 2.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
-----
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+
1.Parkdale ! 1.50 ! 65.47 ! 65.47
-----+-----+-----+
Total 65.47 dBA
-----
```

Result summary (night)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+
1.Parkdale ! 1.50 ! 57.87 ! 57.87
-----+-----+-----+
Total 57.87 dBA
-----
```

TOTAL Leq FROM ALL SOURCES (DAY): 66.40
 (NIGHT): 59.03

STAMSON 5.0 SUMMARY REPORT Date: 10-12-2011 11:21:21
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 159ps10.te Time Period: Day/Night 16/8 hours
 Description: 159 Parkdale South facade 10th floor

Rail data, segment # 1: LRT (day/night)

Train Type	Trains	Speed (km/h)	# loc / Train	# Cars / Train	Eng type	Cont weld
1.	540.0/60.0	80.0	1.0	4.0	Elec	Yes

Data for Segment # 1: LRT (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 200.00 / 200.00 m
 Receiver height : 36.20 / 36.20 m
 Topography : 3 (Elevated; no barrier)
 No Whistle
 Elevation : 7.70 m
 Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	53.81	57.80	--	--	59.26 *
Total					59.26 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	47.28	51.27	--	--	52.73 *
Total					52.73 dBA

* Bright Zone !

Road data, segment # 1: Parkdale (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 : 50 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: Parkdale (day/night)

```
-----
Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 30.89 / 30.89 m
Receiver height : 28.50 / 30.89 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
-----
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Parkdale ! 1.50 ! 62.33 ! 62.33
-----+-----+-----
Total 62.33 dBA
-----
```

Result summary (night)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Parkdale ! 1.50 ! 54.74 ! 54.74
-----+-----+-----
Total 54.74 dBA
-----
```

TOTAL Leq FROM ALL SOURCES (DAY): 64.07
 (NIGHT): 56.86

STAMSON 5.0 SUMMARY REPORT Date: 10-12-2011 11:20:38
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 159ps28.te Time Period: Day/Night 16/8 hours
 Description: 159 Parkdale South facade 28th floor

Rail data, segment # 1: LRT (day/night)

Train Type	Trains	Speed (km/h)	# loc / Train	# Cars / Train	Eng type	Cont weld
1.	540.0/60.0	80.0	1.0	4.0	Elec	Yes

Data for Segment # 1: LRT (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 200.00 / 200.00 m
 Receiver height : 90.20 / 90.20 m
 Topography : 3 (Elevated; no barrier)
 No Whistle
 Elevation : 7.70 m
 Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	53.81	57.80	--	--	59.26 *
Total					59.26 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left (dBA)	Whistle Right (dBA)	Total Leq (dBA)
1.LRT	47.28	51.27	--	--	52.73 *
Total					52.73 dBA

* Bright Zone !

Road data, segment # 1: Parkdale (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 : 50 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: Parkdale (day/night)

```
-----
Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 82.38 / 82.38 m
Receiver height : 82.50 / 82.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
-----
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Parkdale ! 1.50 ! 58.07 ! 58.07
-----+-----+-----
Total 58.07 dBA
-----
```

Result summary (night)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Parkdale ! 1.50 ! 50.48 ! 50.48
-----+-----+-----
Total 50.48 dBA
-----
```

TOTAL Leq FROM ALL SOURCES (DAY): 61.72
 (NIGHT): 54.76

APPENDIX B: RECEIVER HEIGHTS AND STAMSON PREDICTIONS

STAMSON predictions are valid only at receiver heights that are small compared to the source-receiver horizontal distance. This is indicated in the ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) Technical Document, dated October 1989 and prepared by V. Schroter and C. Chiu.

Figure 4 in the above-mentioned document shows the possible combinations of ground elevation, uses of barriers, source and receiver heights, distances and configurations that can be used in the method. An excerpt from page 16 of the document reads as follows:

"Application of Figure 4 is restricted to topographies for which the horizontal distances are much greater than the vertical distances. In cases where the vertical distance, such as the elevation, is of the same order of magnitude as any of the horizontal distances, other means of assessment are necessary."

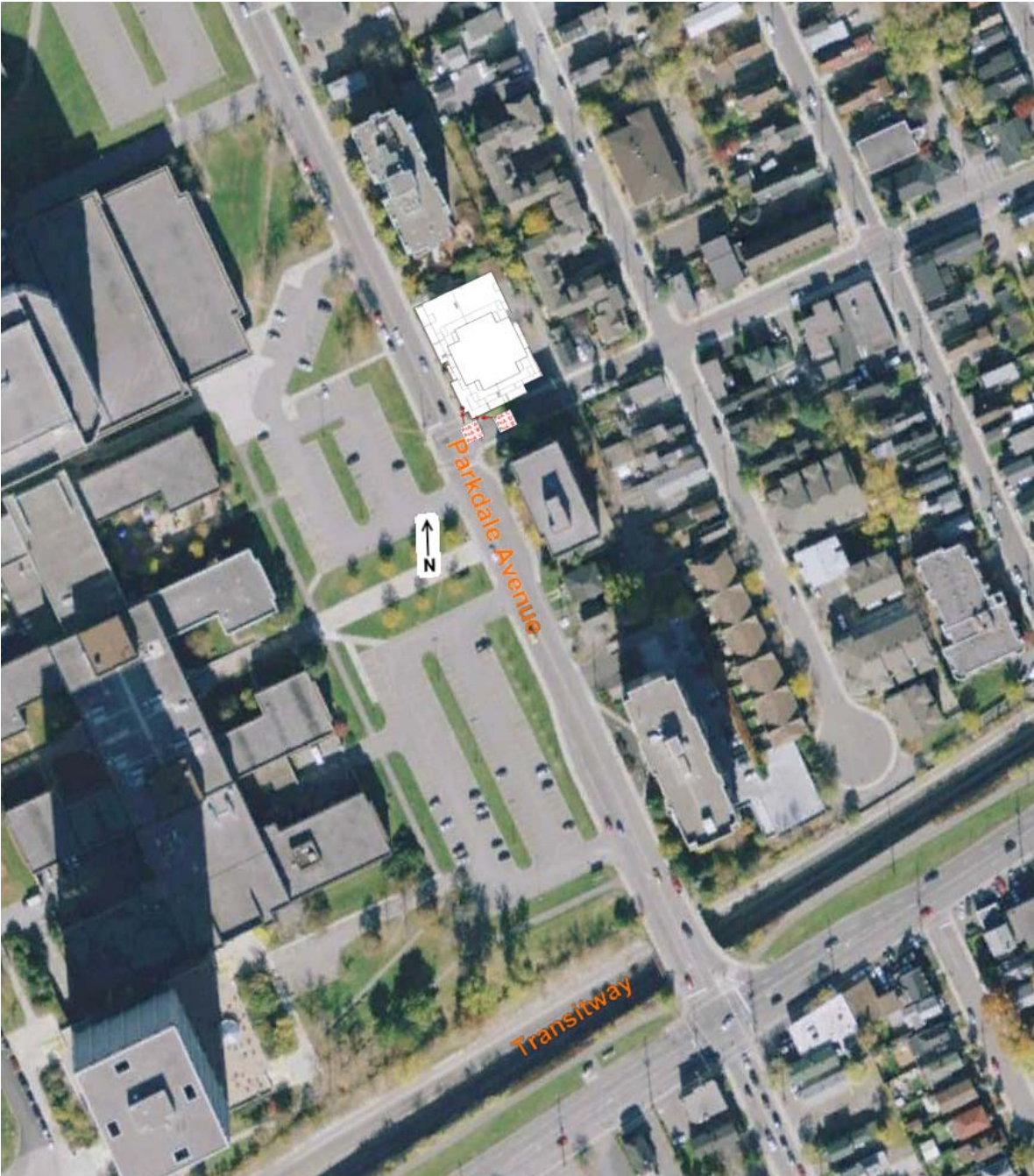
The same paragraph is found on page 15 of the STEAM (Sound from Trains Environmental Analysis Method) Technical Document, dated July 1990 and prepared by V. Schroter.

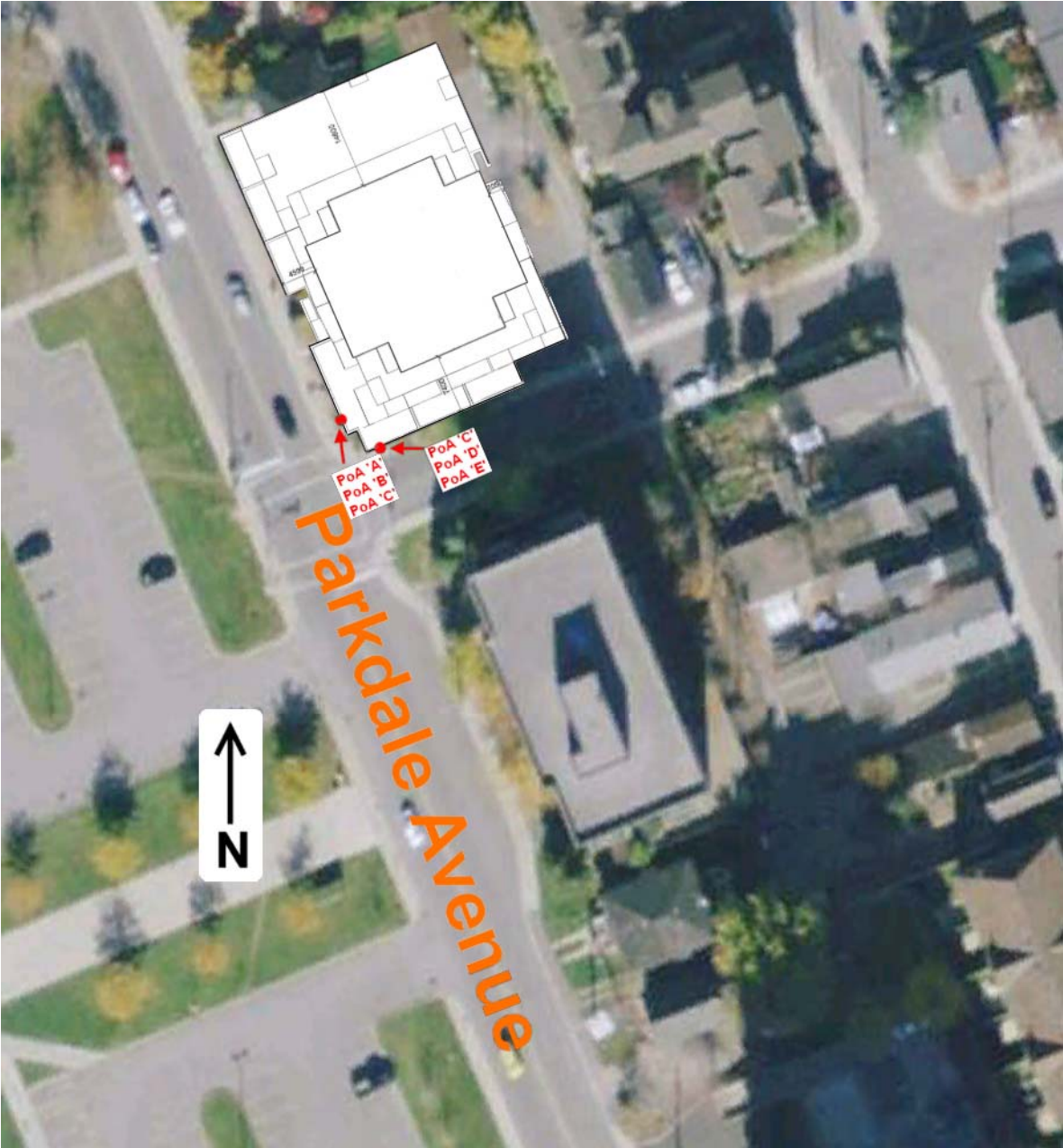
With the above limitation clearly defined, the predictions at upper levels of the proposed tower require further analysis, since the receiver heights are greater than the 15 metre horizontal distance to Parkdale Avenue. For these predictions, the actual line-of-sight distance was used in the STAMSON predictions, rather than the horizontal distance.

For instance, at a receptor height of 28.5 metres, a horizontal source-receiver distance of 15 metres, and knowing that the source height is 1.5 metres, the net source-receiver distance D is determined as:

$$D = \sqrt{15^2 + (28.5 - 1.5)^2}$$
$$D = 30.89 \text{ metres}$$

APPENDIX C: SITE PLANS





APPENDIX D: RECOMMENDED WORDING FOR NOTICES

(attachment to Integral DX Engineering Ltd. report dated 20 January 2012)

"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."

"The Transferee covenants with the Transfer or that the above clause, verbatim, shall be included in all subsequent Agreements of Purchase and Sale and Deeds conveying the lands described herein, which covenant shall run with the said lands and is for the benefit of the subsequent owners of the said lands and the owner of the adjacent road."