Integral dx
ENGINEERING LTD.

NOISE IMPACT ASSESSMENT STUDY

Development Address:
485 Richmond Road
Ottawa, Ontario

City of Ottawa Building Permit: [0000000]

Client:

Minto

c/o:
Minto Communities Inc.
200-180 Kent Street
Ottawa, Ontario, K1P 0B6

Attention: Mr. Kevin A. Harper RPP

Prepared by:
Integral DX Engineering Ltd.
907 Admiral Avenue
Ottawa, Ontario
K1Z 6L6

24 July 2012

NOISE IMPACT ASSESSMENT STUDY

485 Richmond Road Residential Tower
485 Richmond Road
Ottawa, Ontario

City of Ottawa Building Permit: [0000000]

TABLE OF CONTENTS

LIST OF TABLES

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 identified as 485 Richmond Road Residential Tower, located at 485 Richmond Road in Ottawa, Ontario. This development proposal is made by Minto Communities Inc. on behalf of Minto.

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, 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 Minto Communities Inc. and located at 485 Richmond Road in Ottawa, Ontario.

The proposed 24-storey tower, located at the North-East corner of the property, will include parking in the basement and four podium levels, with residential floors above. The property at 485 Richmond Road currently includes an office building and seniors residence which will not be affected by the proposed development. The portion of the property where the new tower will be built is currently part of the parking lot.

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

Noise levels are predicted for the living/dining and bedroom windows of the southern, eastern and northern facades of the proposed building's residential floors. Two predictions were made at each facade: one directly above the podium levels as well as one near the top of the tower.

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

Of note, there is an existing noisy parking garage exhaust belonging to the Canadian Institute for Health Information, located west of the development and near the lot line. Both parties are aware of the excess and plan to relocate or attenuate the exhaust so that it does not pose a problem to the new residential tower at 485 Richmond Road. No other noise sources from surrounding properties were found as being significant at the time of this Study.

1.1 REFERENCES

This study is based on information presented in the following drawings, dated 24 May 2012, received from Mr. Kevin A. Harper via email on 9 July 2012:

- Floor Plans A 2.00 to A 2.04;
- Typical Tower Floor Plan, marked “A -”; and
- Site Plan A 1.01 dated 27 July 2012

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

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 with respect to environmental noise.

1.3 SCOPE

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 following.

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 criteria apply only to outdoor spaces that are greater than 4 metres deep and therefore do not apply to any apartment balconies proposed for this development.

Noise levels are therefore only assessed from the perspective of the bedroom windows (the facade of the building or plane of a window) at the points indicated on the Site Plan (see Appendix B).

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 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

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

3.0 PREDICTION OF NOISE LEVELS – TRAFFIC NOISE

3.1 TRAFFIC INFORMATION

As per Annex B of it's Transportation Master Plan, the City of Ottawa intends on widening Richmond Road to 4 lanes in the vicinity of this project. The present Study was performed assuming that this road widening was complete.

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
Richmond Road	30000	27600/2400	24288/2112	1932/168	1380/120
Byron Avenue	8000	7360/640	7360/640	N/A	N/A
Ottawa River Parkway	35000	32200/2800	29946/2604	2254/196	N/A
Buses from Transitway	2000	1750/250	N/A	1750/250	N/A

Richmond Road was split into two segments in STAMSON, each representing one direction of travel. Traffic from the Ottawa River Parkway and Transitway were combined and separated into two segments in STAMSON, each representing one direction of travel. Traffic flow was presumed to be at the centre of the roadway lanes represented, as is normal practice.

Medium trucks are prohibited from using Byron Avenue, while heavy trucks are prohibited from using both Byron Avenue and the Ottawa River Parkway. Furthermore, data from the OC Transpo website was used to determine the

number of buses (classified here as “medium trucks”) that use the Transitway on a typical weekday. The total number of buses travelling in both directions of routes 60, 61, 62, 65, 66, 67, 68, 69, 70, 71, 73, 76, 77, 87, 93, 94, 95, 96, 97, 261, 262, 263, 283 and 403 was 1283 during daytime hours (07h00-23h00) and 185 during night-time hours (23h00-07h00). The volumes used for the predictions were 1750 buses during the day and 250 buses per night, to ensure a worst-case scenario with an allowance for increased volumes in the future.

The speed limit on both Richmond Road and Byron Avenue is 50 km/h, whereas on the Ottawa River Parkway and the Transitway the speed limit is 60 km/h.

3.2 NOISE LEVEL PREDICTIONS: APARTMENTS

Predictions of daytime and night-time noise levels were made at the southern, eastern and northern facades of the building. Two assessment points were used at each facade: one directly above the podium levels (height of 18m) and one near the top of the tower (height of 76m). Therefore, noise predictions were generated at a total of 6 points of assessment (“POA”).

The predictions were made using the MoE tool STAMSON, version 5.02, and the results are attached as Appendix A. The results are also summarized in Table 6, located in Section 3.4.

Of note, the surrounding buildings/trees were not modelled in STAMSON. These will provide additional acoustical shading for the new residential tower, which will contribute to slightly lower noise levels at the building facades.

Nonetheless, the plane-of-window noise criteria are exceeded, and so all units will requires 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 C.

3.3 INDOOR NOISE CONTROL MEASURES: APARTMENTS

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). No other special measures are required.

3.4 SUMMARY OF NOISE PREDICTIONS

The following table summarizes the predictions for the apartment building.

Table 6: Predicted Noise Levels: Apartment Building

Location	**Predicted Noise Level Daytime** (plane of window)	**Predicted Noise Level Night-time** (plane of bedroom window)
Southern Facade – Directly Above Podium Levels (POA "A")	64 dBA L_{eq}	56 dBA L_{eq}
Southern Facade – Near Top of Tower (POA "B")	64 dBA L_{eq}	56 dBA L_{eq}
Eastern Facade – Directly Above Podium Levels (POA "C")	63 dBA L_{eq}	55 dBA L_{eq}
Eastern Facade – Near Top of Tower (POA "D")	63 dBA L_{eq}	56 dBA L_{eq}
Northern Facade – Directly Above Podium Levels (POA "E")	59 dBA L_{eq}	52 dBA L_{eq}
Northern Facade – Near Top of Tower (POA "F")	61 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 C)

Report Prepared by:
Martin Villeneuve, B.A.Sc. Mech. Eng.

Checked by:
Pier-Gui Lalonde, EIT

Approved by:
Gregory E. Clunis, P.Eng., ing

24 July 2012

Attachments:

- Appendix A: Stamson 5.02 outputs dated 13 July 2012
- Appendix B: Site Plans
- Appendix C: Recommended wording for notices

APPENDIX A: STAMSON 5.02 OUTPUTS DATED 13 JULY 2012

(attachment to Integral DX Engineering Ltd. report dated 24 July 2012)

```
STAMSON 5.0        SUMMARY REPORT        Date: 13-07-2012 15:48:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename:                      Time Period: Day/Night 16/8 hours
Description: Southern facade @ 18m height (POA "A")


Road data, segment # 1: RichmondE (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: RichmondE (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  :  90.30 / 90.30  m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: RichmondW (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 # 2: RichmondW (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  :  83.40 / 83.40  m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 3: Byron (day/night)
-----------------------------------------
Car traffic volume  :  7360/640   veh/TimePeriod  *
Medium truck volume :     0/0     veh/TimePeriod  *
Heavy truck volume  :     0/0     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):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   0.00
    Heavy Truck  % of Total Volume     :   0.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Byron (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  : 120.00 / 120.00 m
Receiver height           :  18.00 / 18.00  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.RichmondE        !     1.50 !    60.68 !    60.68
 2.RichmondW        !     1.50 !    61.03 !    61.03
 3.Byron            !     0.50 !    49.70 !    49.70
--------------------+----------+----------+----------
                      Total                  64.03 dBA
```

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.RichmondE	1.50	53.09	53.09
2.RichmondW	1.50	53.43	53.43
3.Byron	0.50	42.10	42.10
Total			56.44 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.03
(NIGHT): 56.44

```
STAMSON 5.0        SUMMARY REPORT        Date: 13-07-2012 15:49:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT


Filename:                      Time Period: Day/Night 16/8 hours
Description: Southern facade @ 76m height (POA "B")



Road data, segment # 1: RichmondE (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: RichmondE (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  :  90.30 / 90.30  m
Receiver height           :  76.00 / 76.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00



Road data, segment # 2: RichmondW (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 # 2: RichmondW (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  :  83.40 / 83.40  m
Receiver height           :  76.00 / 76.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 3: Byron (day/night)
-----------------------------------------
Car traffic volume  :  7360/640   veh/TimePeriod  *
Medium truck volume :     0/0     veh/TimePeriod  *
Heavy truck volume  :     0/0     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):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   0.00
    Heavy Truck  % of Total Volume     :   0.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Byron (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  : 120.00 / 120.00 m
Receiver height           :  76.00 / 76.00  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.RichmondE        !     1.50 !    60.68 !    60.68
 2.RichmondW        !     1.50 !    61.03 !    61.03
 3.Byron            !     0.50 !    49.70 !    49.70
--------------------+----------+----------+----------
                      Total                  64.03 dBA
```

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.RichmondE	1.50	53.09	53.09
2.RichmondW	1.50	53.43	53.43
3.Byron	0.50	42.10	42.10
Total			56.44 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.03
(NIGHT): 56.44

```
STAMSON 5.0        SUMMARY REPORT        Date: 19-07-2012 15:13:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT


Filename:                      Time Period: Day/Night 16/8 hours
Description: Eastern facade near southern corner @ 18m height (POA "C")



Road data, segment # 1: RichmondE (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: RichmondE (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   36.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  90.10 / 90.10  m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00



Road data, segment # 2: RichmondW (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 # 2: RichmondW (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   36.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  83.20 / 83.20  m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: Byron (day/night)
-----------------------------------------
Car traffic volume  :  7360/640   veh/TimePeriod  *
Medium truck volume :     0/0     veh/TimePeriod  *
Heavy truck volume  :     0/0     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):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   0.00
    Heavy Truck  % of Total Volume     :   0.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Byron (day/night)
---------------------------------------
Angle1   Angle2           : -90.00 deg   36.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 120.00 / 120.00 m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 4: ParkwayE (day/night)
--------------------------------------------
Car traffic volume  : 14973/1302  veh/TimePeriod
Medium truck volume :  2002/223   veh/TimePeriod
Heavy truck volume  :     0/0     veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: ParkwayE (day/night)
------------------------------------------
Angle1   Angle2           :  33.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 172.00 / 172.00 m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 5: ParkwayW (day/night)
-------------------------------------------
Car traffic volume  : 14973/1302  veh/TimePeriod
Medium truck volume :  2002/223   veh/TimePeriod
Heavy truck volume  :     0/0     veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 5: ParkwayW (day/night)
-----------------------------------------
Angle1   Angle2           :  33.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 219.00 / 219.00 m
Receiver height           :  18.00 / 18.00  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.RichmondE        !     1.50 !    59.14 !    59.14
 2.RichmondW        !     1.50 !    59.49 !    59.49
 3.Byron            !     0.50 !    48.15 !    48.15
 4.ParkwayE         !     0.50 !    50.05 !    50.05
 5.ParkwayW         !     0.50 !    48.80 !    48.80
--------------------+----------+----------+----------
                      Total                  62.90 dBA


Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.RichmondE        !     1.50 !    51.55 !    51.55
 2.RichmondW        !     1.50 !    51.89 !    51.89
 3.Byron            !     0.50 !    40.55 !    40.55
 4.ParkwayE         !     0.50 !    43.18 !    43.18
 5.ParkwayW         !     0.50 !    41.93 !    41.93
--------------------+----------+----------+----------
                      Total                  55.38 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.90
                           (NIGHT): 55.38
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 19-07-2012 15:15:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT


Filename:                      Time Period: Day/Night 16/8 hours
Description: Eastern facade near southern corner @ 76m height (POA “D”)



Road data, segment # 1: RichmondE (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: RichmondE (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   36.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  90.10 / 90.10  m
Receiver height           :  76.00 / 76.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00



Road data, segment # 2: RichmondW (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 # 2: RichmondW (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   36.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  83.20 / 83.20  m
Receiver height           :  76.00 / 76.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: Byron (day/night)
-----------------------------------------
Car traffic volume  :  7360/640   veh/TimePeriod  *
Medium truck volume :     0/0     veh/TimePeriod  *
Heavy truck volume  :     0/0     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):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   0.00
    Heavy Truck  % of Total Volume     :   0.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Byron (day/night)
---------------------------------------
Angle1   Angle2           : -90.00 deg   36.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 120.00 / 120.00 m
Receiver height           :  76.00 / 76.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 4: ParkwayE (day/night)
--------------------------------------------
Car traffic volume  : 14973/1302  veh/TimePeriod
Medium truck volume :  2002/223   veh/TimePeriod
Heavy truck volume  :     0/0     veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: ParkwayE (day/night)
------------------------------------------
Angle1   Angle2           :  33.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 172.00 / 172.00 m
Receiver height           :  76.00 / 76.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 5: ParkwayW (day/night)
-------------------------------------------
Car traffic volume  : 14973/1302  veh/TimePeriod
Medium truck volume :  2002/223   veh/TimePeriod
Heavy truck volume  :     0/0     veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 5: ParkwayW (day/night)
-----------------------------------------
Angle1   Angle2           :  33.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 219.00 / 219.00 m
Receiver height           :  76.00 / 76.00  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.RichmondE        !     1.50 !    59.14 !    59.14
 2.RichmondW        !     1.50 !    59.49 !    59.49
 3.Byron            !     0.50 !    48.15 !    48.15
 4.ParkwayE         !     0.50 !    52.95 !    52.95
 5.ParkwayW         !     0.50 !    51.90 !    51.90
--------------------+----------+----------+----------
                      Total                  63.28 dBA


Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.RichmondE        !     1.50 !    51.55 !    51.55
 2.RichmondW        !     1.50 !    51.89 !    51.89
 3.Byron            !     0.50 !    40.55 !    40.55
 4.ParkwayE         !     0.50 !    46.07 !    46.07
 5.ParkwayW         !     0.50 !    45.03 !    45.03
--------------------+----------+----------+----------
                      Total                  55.81 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.28
                           (NIGHT): 55.81
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 19-07-2012 15:17:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename:                      Time Period: Day/Night 16/8 hours
Description: Northern facade @ 18m height (POA “E”)

Road data, segment # 1: ParkwayE (day/night)
-----------------------------------------------
Car traffic volume  : 14973/1302  veh/TimePeriod
Medium truck volume :  2002/223   veh/TimePeriod
Heavy truck volume  :     0/0     veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: ParkwayE (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  : 133.00 / 133.00 m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: ParkwayW (day/night)
-----------------------------------------------
Car traffic volume  : 14973/1302  veh/TimePeriod
Medium truck volume :  2002/223   veh/TimePeriod
Heavy truck volume  :     0/0     veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: ParkwayW (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  : 182.00 / 182.00 m
Receiver height           :  18.00 / 18.00  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.ParkwayE         !     0.50 !    56.69 !    56.69
 2.ParkwayW         !     0.50 !    55.06 !    55.06
--------------------+----------+----------+----------
                      Total                  58.96 dBA
```

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.ParkwayE	0.50	49.81	49.81
2.ParkwayW	0.50	48.18	48.18
Total			52.08 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.96
(NIGHT): 52.08

```
STAMSON 5.0        SUMMARY REPORT        Date: 19-07-2012 15:20:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename:                      Time Period: Day/Night 16/8 hours
Description: Northern facade @ 76m height (POA "F")

Road data, segment # 1: ParkwayE (day/night)
-----------------------------------------------
Car traffic volume  : 14973/1302  veh/TimePeriod
Medium truck volume :  2002/223   veh/TimePeriod
Heavy truck volume  :     0/0     veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: ParkwayE (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  : 133.00 / 133.00 m
Receiver height           :  76.00 / 76.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: ParkwayW (day/night)
-----------------------------------------------
Car traffic volume  : 14973/1302  veh/TimePeriod
Medium truck volume :  2002/223   veh/TimePeriod
Heavy truck volume  :     0/0     veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: ParkwayW (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  : 182.00 / 182.00 m
Receiver height           :  76.00 / 76.00  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.ParkwayE         !     0.50 !    59.06 !    59.06
 2.ParkwayW         !     0.50 !    57.70 !    57.70
--------------------+----------+----------+----------
                      Total                   61.44 dBA
```

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.ParkwayE	0.50	52.19	52.19
2.ParkwayW	0.50	50.82	50.82
Total			54.57 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.44
(NIGHT): 54.57

APPENDIX B: SITE PLANS

(attachment to Integral DX Engineering Ltd. report dated 24 July 2012)

Illustration 1: Roads surrounding the proposed development at 485 Richmond Road.

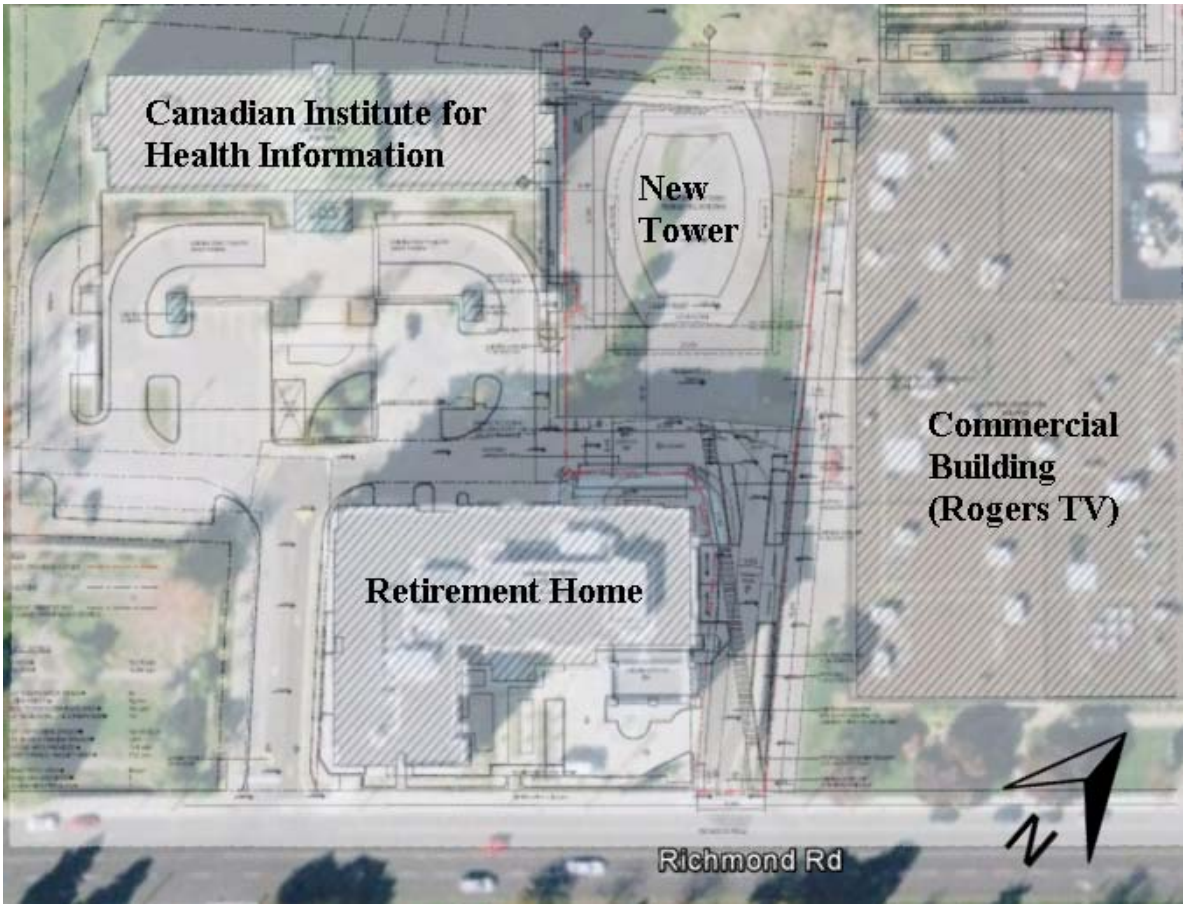

Illustration 2: Various existing buildings surrounding the "New Tower" proposed at 485 Richmond Road.

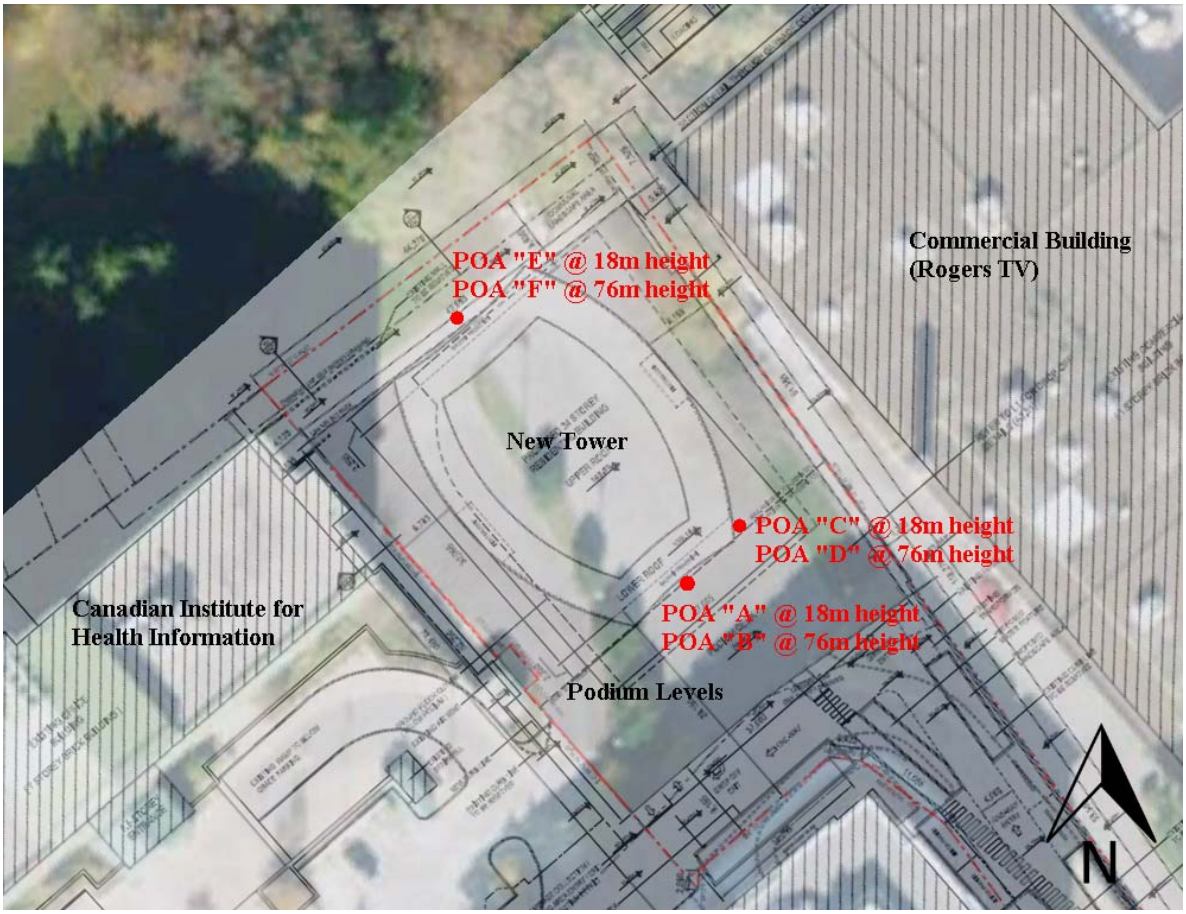

Illustration 3: Points of assessment (POA) used to make the noise predictions using STAMSON.

APPENDIX C: RECOMMENDED WORDING FOR NOTICES

(attachment to Integral DX Engineering Ltd. report dated 24 July 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."