ENVIRONMENTAL NOISE ASSESSMENT

3171 LAKESHORE ROAD WEST
PROPOSED RESIDENTIAL DEVELOPMENT
PART OF LOT 32, CONCESSION 4
SOUTH OF DUNDAS STREET AND BLOCK 79
REGISTERED PLAN M-257
TOWN OF OAKVILLE

PREPARED FOR:

VOGUE WYCLIFFE (OAKVILLE) LIMITED
December 5, 2017

Town of Oakville
1225 Trafalgar Road
Oakville, ON
L6H 0H3

Re: Environmental Noise Assessment
Proposed Residential Development
3171 Lakeshore Road West
Part of Lot 32, Concession 4, South of Dundas Street and Block 79
Registered Plan M-257
Town of Oakville
Project No. Y1713

We are pleased to submit this Environmental Noise Assessment for the above noted development based on the latest Site Plan dated November 2017 to achieve sound levels acceptable to the Ministry of Environment and Climate Change, and the Town of Oakville.

Prior to the issuance of occupancy permits, the Town’s building inspector or a Professional Engineer qualified to perform acoustical engineering services in Ontario shall certify that the noise control measures have been properly installed and constructed as per the recommendations.

Should you have any questions regarding this report, please contact the undersigned.

Respectfully Submitted,

YCA ENGINEERING Limited

Hava Jouharchi, P.Eng.
Senior Project Engineer
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DRAWING Y1713 .................................................. SITE PLAN - NOISE MITIGATION MEASURES
1.0 INTRODUCTION

PURPOSE

A residential development has been proposed by Vogue Wycliffe (Oakville) Limited in the Town of Oakville. This report is an analysis of future sound levels within the proposed residential development and describes the types and locations of noise mitigation measures which will be required.

SITE DESCRIPTION AND LOCATION

The proposed residential development will consist of 22 lots and 6 blocks with detached dwelling units located west of Lakeshore Road West, at more than 200m south of Mississauga Street in the Town of Oakville.

The surrounding land uses are existing residential developments.

KEY PLAN

The location of the proposed development is further indicated by the Key Plan below.
2.0 SOUND LEVEL CRITERIA

OUTDOOR SOUND LEVEL CRITERIA

Outdoor Activity Areas (7 a.m. – 11 p.m.) – 16 Hr. Leq. = 55 dBA

If daytime outdoor sound levels at the backyards (outdoor activity areas) of residential areas exceed 60 dBA, physical noise attenuation measures such as acoustical fences, increased building setbacks or reorientation of dwellings and lots must be employed to reduce the sound levels. In some cases, outdoor sound levels may be allowed to exceed the above criteria by a maximum of 5 dBA. If such excesses occur, purchasers must be informed of the existence of potentially annoying sound levels by means of warning clauses registered on title.

INDOOR SOUND LEVEL CRITERIA

Living and Dining Area (7 a.m.–11 p.m.) – 16 Hr. Leq. = 45 dBA Roads, 40 dBA Railways

Bedrooms (11 p.m. – 7 a.m.) – 8 Hr. Leq. = 40 dBA Roads, 35 dBA Railways

Appropriate building components such as walls, doors and windows are chosen with reference to the following. If daytime sound levels at the external dwelling walls are 65 dBA or less (roadways), and 60 dBA or less (railways), then the indoor sound level criteria described above will be achieved using standard (Ontario Building Code) construction methods and building components. If night-time sound levels are 60 dBA or less (roadways) and 55 dBA or less (railways), standard construction methods and building components can be utilized. If the external sound levels exceed the above criteria, then components having extra sound insulation properties may be required.

Ventilation requirements are determined with reference to the following. If night-time sound levels at the bedroom window of a dwelling unit are in the range of 50 to 60 dBA, the ventilation system must be designed to allow the optional installation of central air conditioning at the owner’s discretion. If night-time sound levels are greater than 60 dBA, central air conditioning must be installed. If daytime sound levels at the living room/dining room windows are in the range of 55 to 65 dBA, the ventilation system must be designed to allow optional installation of central air conditioning. For daytime sound levels greater than 65 dBA, central air conditioning must be installed.

STATIONARY SOURCES

As per the M.O.E.C.C. guidelines (Publication NPC-300), this development is considered to be a Class 2 area. The noise produced by a stationary source at the plane of window for noise sensitive spaces is the energy equivalent sound level ($L_{EQ}$), 50 dBA during daytime and evening time (0700-2300) or 45 dBA during night-time (2300-0700). For outdoor receptors, the energy equivalent sound level ($L_{EQ}$) is 50 dBA during daytime (0700-1900) or 45 dBA during night-time (1900-0700).
3.0 NOISE SOURCES

ROAD TRAFFIC

The proposed residential development will be located west of Lakeshore Road West, at more than 200m south of Mississauga Street in the Town of Oakville. Therefore, noise generated by Lakeshore Road West has the potential to affect future residents. All other roads within this site are local roadways. Therefore due to distance separation and low traffic volumes, these roads are considered acoustically insignificant.

The traffic information for Lakeshore Road West was obtained from the Town of Oakville dated May 2017. The full day (8hr) traffic count of 7,995 was taken with the addition of 3,998 for the evening count and 500 for the night-time count. The traffic count was projected 1% to the year 2027. The traffic data is summarized in Table 1 below:

<table>
<thead>
<tr>
<th>TABLE 1: LAKESHORE ROAD WEST TRAFFIC DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projected Annual Average Daily Traffic *</td>
</tr>
<tr>
<td>Percent Trucks</td>
</tr>
<tr>
<td>Heavy and Medium trucks ratio</td>
</tr>
<tr>
<td>Speed (km/hr)</td>
</tr>
<tr>
<td>Number of Lanes</td>
</tr>
</tbody>
</table>

* The traffic count provided by the Town of Oakville, projected 1% to the year 2027.

Due to the proximity of the Lester B. Pearson Airport, the proposed residential development has been verified and the proposed site is outside the NEF 25 Noise Contour Line. In addition, the proposed residential development is not impacted by rail traffic and commercial developments.
4.0 NOISE ASSESSMENT

Drawing DWG Y1713 is based on the latest Site Plan dated November 2017 showing various noise analysis locations and noise mitigation measures within the proposed residential development.

Sound levels were calculated using the Ministry of Environment’s Stamson 5.04 computer based noise prediction model. The noise criteria and warning clauses are listed in Appendix 3. Table 2 lists the unattenuated sound levels at various locations.

<table>
<thead>
<tr>
<th>LOCATIONS</th>
<th>DISTANCE TO CENTRELINE OF ROAD (m)</th>
<th>DAYTIME (16 Hr. Leq (dBA))</th>
<th>NIGHT-TIME (8 Hr. Leq (dBA))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>REAR YARD</td>
<td>DWELLING WALL</td>
<td>SECOND STOREY</td>
</tr>
<tr>
<td>Lot 1</td>
<td>Front Wall 90.0</td>
<td>52.29</td>
<td>46.58</td>
</tr>
<tr>
<td></td>
<td>Rear Yard 110.0</td>
<td>&lt;55</td>
<td></td>
</tr>
<tr>
<td>Lot 15</td>
<td>Rear Yard 53.0</td>
<td>55.50</td>
<td>55.84</td>
</tr>
<tr>
<td></td>
<td>Rear Wall 50.0</td>
<td>54.56</td>
<td>49.94</td>
</tr>
<tr>
<td>Lot 16</td>
<td>Front Wall 15.0</td>
<td>65.21</td>
<td>58.83</td>
</tr>
<tr>
<td></td>
<td>Rear Yard 35.0</td>
<td>54.01</td>
<td></td>
</tr>
<tr>
<td>Lot 22</td>
<td>Front Wall 16.0</td>
<td>64.75</td>
<td>58.39</td>
</tr>
<tr>
<td></td>
<td>Rear Yard 36.0</td>
<td>53.82</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: UNATTENUATED SOUND LEVELS

Lakeshore Road West
5.0 RECOMMENDED NOISE MITIGATION MEASURES

5.1 OUTDOOR MEASURES

Based on the sound level results in Table 2, the daytime rear yard sound levels at all locations are expected to be below 55 dBA in the absence of mitigative measures. Therefore, noise mitigation measures are not required for any of the residential lots within the proposed development.

5.2 VENTILATION REQUIREMENTS

Ventilation requirements were determined using the sound levels at the building facades listed in Table 2.

MANDATORY AIR CONDITIONERS

The following units must be constructed with Mandatory air conditioners as per Table 2 sound level results:

- Lots 16 to 22 and Block 27

The following warning clause Type D must be incorporated into the Subdivision Agreement, which will be registered on title and should be included in all offers of purchase, sale and lease of dwelling units at the above locations:

Warning Clause Type D:

“This dwelling unit was fitted with a central air conditioner to allow the windows and exterior doors to remain closed, thereby achieving indoor sound levels within the limits recommended by the Ministry of Environment and Climate Change.

PROVISION FOR AIR CONDITIONERS

The following dwelling units must be constructed with a forced air heating system with ducting sized to accommodate an air conditioning unit, in order to allow the homeowner the option of installing central air conditioning should he or she wish to do so in the future as the sound levels are expected to be above 55dBA during the daytime and above 50dBA during the nighttime.

- Lots 8 to 15 and Blocks 23, 24, 25, 26, 28

In addition, the following warning clauses must be incorporated into the Subdivision Agreement, which will be registered on title and should be included in all offers of purchase, sale and lease of the above dwelling units:
Warning Clause Type C:

“This unit was fitted with ducting sized to accommodate an air conditioning unit. The installation of air conditioning by the owner will allow windows and exterior doors to be kept closed, thereby achieving indoor sound levels within the limits recommended by the Ministry of Environment and Climate Change. (Note: care should be taken to ensure that the condenser unit is located in an area that is not sensitive to noise. The sound rating of the air conditioning units must not exceed the sound emission standards established by the Ministry of Environment and Climate Change).”

5.3 BUILDING COMPONENTS

Building components within the proposed development were analyzed using the STC (Sound Transmission Class) method recommended by the M.O.E.C.C. Detailed floor plans of the proposed dwelling units are required in order to best determine the required building components. Although this information is not yet available for the proposed development, the result is based on the assumption that a living, dining or recreation room is located at the side of the house closest to the roadway and contains three components (two exterior walls and a set of windows). The windows are assumed to be 25% of the floor area and the same side exterior walls are assumed to be 80% of the floor area.

DAYTIME SOUND LEVELS

For the worst case location during daytime, (Lot 16) daytime dwelling wall sound level of 66 dBA was calculated at the first storey living/dining room. To ensure acceptable daytime indoor sound levels, the overall building components must provide an STC rating of 29 for windows and STC 38 for exterior wall construction.

NIGHT-TIME SOUND LEVELS

For the worst case location during night-time, (Lot 16) night-time dwelling wall sound level of 65 dBA was calculated at the second storey bedroom. To ensure acceptable night-time indoor sound levels, the overall building components must provide an STC rating of 26 for windows and STC 35 for exterior wall construction.

BUILDING COMPONENT REQUIREMENTS

The minimum standard window and exterior wall construction of the Ontario Building Code meets STC 30 and STC 38, respectively.

WINDOWS

The following are some window configurations meeting an STC rating of 29, assuming the ratio of window area to room floor area is 25%:

- double glazing 3mm x 3mm thickness with 13mm air space (Casements/Fixed) or
- double glazing 3mm x 3mm thickness with 20mm air space (Sliders) or
- any other window type yielding a similar or greater STC rating
EXTERIOR WALLS

Assuming a ratio of wall area to room floor area of 80%, exterior walls of EW-5 construction will be acceptable:

EW5 12.7mm gypsum board, vapour barrier and 38 x 89mm studs with 50mm (or thicker) mineral wool or fiberglass batts in interstud cavities, plus sheathing, 25mm air space and siding/stucco

Sample window and exterior wall configurations have been provided in Appendix 4.

5.4 WARNING CLAUSES

The following warning clause Type A must be incorporated into the Subdivision Agreement, which will be registered on title and included in all offers of purchase and sale or lease of the dwelling units listed below.

- Lots 8 to 22, Blocks 23 to 28

Warning Clause Type A

“Purchasers are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound level will exceed the Ministry of Environment and Climate Change’s noise criteria.”
6.0 SUMMARY OF NOISE MITIGATION MEASURES

The summary of noise abatement measures are listed in the following Table 3 identifying sound barriers, mandatory central air conditioners, provision for central air conditioners, building components and warning clauses.

<table>
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<th>BLOCKS/UNITS</th>
<th>VENTILATION REQUIREMENTS</th>
<th>BUILDING COMPONENTS</th>
<th>SOUND BARRIERS</th>
<th>WARNING CLAUSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots 16 to 22</td>
<td>Mandatory air conditioning</td>
<td>Windows: OBC*</td>
<td>No</td>
<td>Type A, D</td>
</tr>
<tr>
<td>Block 27</td>
<td></td>
<td>Walls: OBC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lots 8 to 15</td>
<td>Provision for air conditioning</td>
<td>Windows: OBC*</td>
<td>No</td>
<td>Type A, C</td>
</tr>
<tr>
<td>Blocks 23, 24, 25, 26, 28</td>
<td></td>
<td>Walls: OBC</td>
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<td></td>
</tr>
<tr>
<td>All Remaining lots</td>
<td>No Requirements</td>
<td></td>
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</table>

* OBC: Ontario Building Code Standard
7.0 RECOMMENDATIONS AND CONCLUSION

RECOMMENDATIONS

1. Mandatory air conditioning is required for Lots 16 to 22, Block 27.

2. Provision for air conditioning in the future for Lots 8 to 15, Blocks 23, 24, 25, 26, 28.

3. Standard window construction will be acoustically acceptable for all dwelling units within the proposed residential development.

4. Prior to the issuance of occupancy permits, the Town's building inspector or a Professional Engineer qualified to perform acoustical engineering services in Ontario shall certify that the noise control measures have been properly installed and constructed as per the recommendations of Halton Region.

5. All applicable warning clauses shall be listed in the Town of Oakville's Site Plan Agreement and also be inserted in the Agreements of Purchase and Sale or Lease and registered on title.

CONCLUSION

This report has determined that sound levels acceptable to the Ministry of Environment and Climate Change, Town of Oakville are expected to be achieved using the abatement measures in this report and as shown on the attached Drawing DWG Y1713.

Respectfully submitted,

YCA ENGINEERING Limited

Hava Jouharchi, P.Eng.
Senior Project Eng
LEGEND:
- Mandatory air conditioning and Warning Clause Type D
- Provision for air conditioning and Warning Clause Type C
- Warning Clause Type A

DRAWING Y1713
3171 Lakeshore Road West
SITE PLAN
APPENDIX 1

TRAFFIC DATA
Location: LAKESHORE ROAD WEST @ MISSISSAGA STREET
Municipality: OAKVILLE
GeoID: 30078201
Count Date: Tuesday, 15 September, 2015

Turning Movements Count - Full Study Report

Total
Truck %
Trucks
Cars

MISSISSAGA STREET

Cyclists 1
10-46
562
7% 12% 3% 6%
160 41 361 484
11 5 11 28
149 36 350 456

Adults 28
Children 0

Adults 35
Children 1

LAKESHORE ROAD WEST

3642 4% 137 3776
7995
116 6% 7 109
4053 3693 3% 127 3766
g 7% 3 41

Cyclists 70

328 16 5%
344
3593 151 4%
3744 4104
93 3 3%
96 8530

4208 147 3%
4356

Adults 18
Children 4

170 34 19 92
11 4 5 9
8% 11% 21% 9%
181 30 24 101

163

Cars
Trucks
Truck %
Total

Adults 50
Children 7

344

Wednesday, May 10, 2017
Page 1 of 1
### Turning Movement Count - Details Report

**Location**
LAKE SHORE ROAD WEST @ MISSISSAIGA STREET

**Municipality**
OAKVILLE

**Count Date**
Tuesday, September 15, 2015

<table>
<thead>
<tr>
<th>Time Period</th>
<th>MISSISSAIGA STREET</th>
<th>LAKESHORE ROAD WEST</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North Approach</td>
<td>South Approach</td>
</tr>
<tr>
<td></td>
<td>LT TH RT Cyclists</td>
<td>Ped LT TH RT Cyclists</td>
</tr>
<tr>
<td>07:00</td>
<td>07:15</td>
<td>07:30</td>
</tr>
<tr>
<td>07:15</td>
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<td>Hourly Total</td>
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<td>18:00</td>
<td>19:00</td>
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</tr>
</tbody>
</table>

**Truck %**
3% 12% 7% 11% 21% 9% 5% 4% 5% 6% 3% 7%
Good Afternoon Lin,
I have been requested to prepare a Noise Study for a proposed residential development in the Town of Oakville. Map of the location is attached.

The location of the site is west of Lakeshore Road West, south of Mississauga Street.

Could you please provide the following traffic data for Lakeshore Road West at your earliest convenience:

- Ultimate/Forecasted traffic volume – The horizon year for your study was not indicated. Please use a 1% per year growth rate to 2021. Should you require a growth rate beyond 2021, please contact Syed Rizvi, Transportation Engineer – West District, who is copied here for growth rates beyond 2021.
- Percentage of trucks – Please use current TMCs for this information. Kindly contact Yaron Levgoren, Traffic Technician, who is copied here for counts within your study area.
- Heavy to medium truck ratio – Please use current TMCs for this information. Kindly contact Yaron Levgoren, Traffic Technician, who is copied here for counts within your study area.
- Posted Speed – Posted speed is 50 km/h
- Number of lanes – Generally Lakeshore Road West is a 3-lane cross-section. However, please use aerial mapping to confirm the number of lanes within your study area.

Thanks you in advance
Hava

Hava Jouharchi, P.Eng.
Senior Project Engineer

YCA Engineering Ltd.
9251 Yonge Street, Suite 8557
Richmond Hill, ON, L4C 9T3
Tel: 416-894-3213
Email: hava@ycaengineering.com
APPENDIX 2

STAMSON 5.04
SOUND LEVEL CALCULATIONS
STAMSON 5.04        SUMMARY REPORT        Date: 16-05-2017 12:56:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: 8rw.te       Time Period: Day/Night 16/8 hours
Description: Lot 8, Rear Wall

Road data, segment # 1: Lakeshore Rd (day/night)
-----------------------------------------------
Car traffic volume : 11718/1302 veh/TimePeriod *
Medium truck volume : 441/49  veh/TimePeriod *
Heavy truck volume : 441/49   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): 14000
  Percentage of Annual Growth: 0.00
  Number of Years of Growth: 0.00
  Medium Truck % of Total Volume: 3.50
  Heavy Truck % of Total Volume: 3.50
  Day (16 hrs) % of Total Volume: 90.00

Data for Segment # 1: Lakeshore Rd (day/night)
----------------------------------------------
Angle1  Angle2       : -90.00 deg  30.00 deg
Wood depth : 0 / 0  (No woods.)
No of house rows : 0 / 0
Surface : 1  (Absorptive ground surface)
Receiver source distance : 55.00 / 55.00  m
Receiver height : 1.50 / 4.50  m
Topography : 1  (Flat/gentle slope; no barrier)

Result summary (day)
----------------------
!  source  !   Road   !  Total
!  height  !   Leq    !   Leq
!   (m)    !  (dBA)   !  (dBA)
----------------------
1.Lakeshore Rd     !     1.37 !    55.84 !    55.84
----------------------
Total                    55.84 dBA

Result summary (night)
----------------------
!  source  !   Road   !  Total
!  height  !   Leq    !   Leq
!   (m)    !  (dBA)   !  (dBA)
----------------------
1.Lakeshore Rd     !     1.37 !    49.94 !    49.94
----------------------
Total                    49.94 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.84
(NIGHT): 49.94
STAMSON 5.04  SUMMARY REPORT  Date: 16-05-2017 12:56:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 8ry.te  Time Period: Day/Night 16/8 hours
Description: Lot 8, Rear Yard

Road data, segment # 1: Lakeshore Rd (day/night)
-----------------------------------------------
Car traffic volume : 11718/1302 veh/TimePeriod *
Medium truck volume : 441/49 veh/TimePeriod *
Heavy truck volume : 441/49 veh/TimePeriod *
Posting speed limit : 50 km/h
Road gradient : 0 %

* Refers to calculated road volumes based on the following input:
  24 hr Traffic Volume (AADT or SADT): 14000
  Percentage of Annual Growth : 0.00
  Number of Years of Growth : 0.00
  Medium Truck % of Total Volume : 3.50
  Heavy Truck % of Total Volume : 3.50
  Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Lakeshore Rd (day/night)
-----------------------------------------------
Angle1  Angle2           :  90.00 deg  0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 50.00 / 50.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 90.00 deg  Angle2 : 0.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 0.00 m
Receiver elevation : 0.50 m
Barrier elevation : 0.00 m

Result summary (day)
---------------------
<p>| source | Road | Total |
| height | Leq  | Leq   |</p>
<table>
<thead>
<tr>
<th>(m)</th>
<th>(dBA)</th>
<th>(dBA)</th>
</tr>
</thead>
</table>
| Lakeshore Rd  | 1.37| 54.15  | 54.15 *
| Lakeshore Rd  | 1.37| 44.11  | 44.11 |
---------------------
Total            |    | 54.56 dBA
Road data, segment # 1: Lakeshore Rd (day/night)

- Car traffic volume: 11718/1302 veh/TimePeriod
- Medium truck volume: 441/49 veh/TimePeriod
- Heavy truck volume: 441/49 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): 14000
  Percentage of Annual Growth: 0.00
  Number of Years of Growth: 0.00
  Medium Truck % of Total Volume: 3.50
  Heavy Truck % of Total Volume: 3.50
  Day (16 hrs) % of Total Volume: 90.00

Data for Segment # 1: Lakeshore Rd (day/night)

---

Angle1 Angle2: -90.00 deg 90.00 deg
Wood depth: 0 / 0 (No woods.)
No of house rows: 0 / 0
Surface: 1 (Absorptive ground surface)
Receiver source distance: 15.00 / 15.00 m
Receiver height: 1.50 / 4.50 m
Topography: 1 (Flat/gentle slope; no barrier)

Result summary (day)

<table>
<thead>
<tr>
<th>! source ! Road ! Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>! height ! Leq ! Leq</td>
</tr>
<tr>
<td>(m) ! (dBA) ! (dBA)</td>
</tr>
</tbody>
</table>

1. Lakeshore Rd ! 1.37 ! 65.21 ! 65.21

Total 65.21 dBA

Result summary (night)

<table>
<thead>
<tr>
<th>! source ! Road ! Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>! height ! Leq ! Leq</td>
</tr>
<tr>
<td>(m) ! (dBA) ! (dBA)</td>
</tr>
</tbody>
</table>

1. Lakeshore Rd ! 1.37 ! 58.83 ! 58.83

Total 58.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.21
(NIGHT): 58.83
Road data, segment # 1: Lakeshore Rd (day/night)
---------------------------------------------------------------------
Car traffic volume : 11718/1302 veh/TimePeriod *
Medium truck volume : 441/49 veh/TimePeriod *
Heavy truck volume : 441/49 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): 14000
  Percentage of Annual Growth : 0.00
  Number of Years of Growth : 0.00
  Medium Truck % of Total Volume : 3.50
  Heavy Truck % of Total Volume : 3.50
  Day (16 hrs) % of Total Volume : 90.00
Data for Segment # 1: Lakeshore Rd (day/night)
---------------------------------------------------------------------
Angle1  Angle2       : -90.00 deg  30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 / 35.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg  Angle2 : 30.00 deg
Barrier height : 4.50 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 0.00 m
Receiver elevation : 0.50 m
Barrier elevation : 0.00 m
Data for Segment # 2: Lakeshore Rd (day/night)
---------------------------------------------------------------------
Angle1  Angle2       : 30.00 deg  90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 / 35.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 30.00 deg  Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.50 m
Barrier elevation : 0.00 m
Result summary (day)
---------------------------------------------------------------------
<table>
<thead>
<tr>
<th>source</th>
<th>Road</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>height</td>
<td>Leq</td>
<td>Leq</td>
</tr>
<tr>
<td>(m)</td>
<td>(dBA)</td>
<td>(dBA)</td>
</tr>
<tr>
<td>-----------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>1. Lakeshore Rd</td>
<td>1.37</td>
<td>44.62</td>
</tr>
<tr>
<td>2. Lakeshore Rd</td>
<td>1.37</td>
<td>53.40</td>
</tr>
</tbody>
</table>
---------------------------------------------------------------------
Total  54.01 dBA
Day-time Outdoor Sound Level Limit

Table C-1 gives the equivalent sound level (L_{eq}) limit for designated Outdoor Living Areas. The limit applies to the entire day-time period from 07:00 to 23:00.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>L_{eq}(16) (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 hr, 07:00 - 23:00</td>
<td>55</td>
</tr>
</tbody>
</table>

Indoor Sound Level Limit

Table C-2 gives the equivalent sound level (L_{eq}) limits and the applicable time periods for the indicated types of indoor space. The specified sound level criteria are minimum requirements and apply to the indicated indoor spaces with the windows and doors closed.

<table>
<thead>
<tr>
<th>Type of Space</th>
<th>Time Period</th>
<th>L_{eq} (Time Period) (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living/dining, den areas of residences, nursing/retirement homes, hospitals, schools, day-care centers, etc.</td>
<td>07:00-23:00</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Living/dining areas of residences, nursing/retirement homes, hospitals, etc. (except schools or daycare centres)</td>
<td>23:00 - 07:00</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Sleeping quarters</td>
<td>07:00-23:00</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Sleeping quarters</td>
<td>23:00 - 07:00</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>35</td>
</tr>
</tbody>
</table>
SUPPLEMENTARY NOISE LIMITS

Indoor limits for transportation sources applicable to noise sensitive land uses are specified in Table C-2 and Table C-9.

### TABLE C-9
Indoor Sound Level Limits (Road and Rail)

<table>
<thead>
<tr>
<th>Type of Space</th>
<th>Time Period</th>
<th>( L_{eq} ) (Time Period) (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Road</td>
</tr>
<tr>
<td>General offices, reception areas, retail stores, etc.</td>
<td>16 hours between 07:00-23:00</td>
<td>50</td>
</tr>
<tr>
<td>Living/dining areas of residences, hospitals, schools, nursing/retirement, homes day-care centers, theatres, place of worship, libraries, individual or semi-private offices, conference rooms, reading rooms etc.</td>
<td>16 hours between 07:00-23:00</td>
<td>45</td>
</tr>
<tr>
<td>Sleeping quarters of hotels/motels</td>
<td>8 hours between 23:00 - 07:00</td>
<td>45</td>
</tr>
<tr>
<td>Sleeping quarters of residences, hospitals, nursing/retirement homes etc</td>
<td>8 hours between 23:00 - 07:00</td>
<td>40</td>
</tr>
</tbody>
</table>

### SUMMARY OF MINIMUM NOISE CONTROL AND VENTILATION REQUIREMENTS FOR ROAD AND RAIL NOISE

#### TABLE 1
COMBINATION OF ROAD AND RAIL NOISE, DAY-TIME (0700 - 2300)
OUTDOOR, VENTILATION AND WARNING CLAUSE REQUIREMENTS

<table>
<thead>
<tr>
<th>ASSESSMENT LOCATION</th>
<th>( L_{eq} ) (16 hr) (dBA)</th>
<th>VENTILATION REQUIREMENTS</th>
<th>OUTDOOR CONTROL MEASURES</th>
<th>WARNING CLAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTDOOR LIVING AREA (OLA)</td>
<td>Less than or equal to 55 dBA</td>
<td>N/A</td>
<td>None required</td>
<td>Not required</td>
</tr>
<tr>
<td></td>
<td>Greater than 55 dBA to less than or equal to 60 dBA</td>
<td>N/A</td>
<td>Control measures (barriers) not required but should be considered</td>
<td>Required if resultant ( L_{eq} ) exceeds 55 dBA Type A</td>
</tr>
<tr>
<td></td>
<td>Greater than 60 dBA</td>
<td>N/A</td>
<td>Control measures (barriers) required to reduce the ( L_{eq} ) below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible</td>
<td>Required if resultant ( L_{eq} ) exceeds 55 dBA Type B</td>
</tr>
<tr>
<td>PLANE OF LIVING ROOM WINDOW</td>
<td>Greater than 50 dBA to less than or equal to 55 dBA</td>
<td>None required</td>
<td>N/A</td>
<td>Not required</td>
</tr>
<tr>
<td></td>
<td>Greater than 55 dBA to less than or equal to 65 dBA</td>
<td>Forced air heating with provision for central air conditioning</td>
<td>N/A</td>
<td>Required Type C</td>
</tr>
<tr>
<td></td>
<td>Greater than 65 dBA</td>
<td>Central air conditioning</td>
<td>N/A</td>
<td>Required Type D</td>
</tr>
</tbody>
</table>

#### TABLE 2
COMBINATION OF ROAD AND RAIL NOISE, NIGHT-TIME (2300 - 0700)
VENTILATION AND WARNING CLAUSE REQUIREMENTS

<table>
<thead>
<tr>
<th>ASSESSMENT LOCATION</th>
<th>( L_{eq} ) (8hr) (dBA)</th>
<th>VENTILATION REQUIREMENTS</th>
<th>WARNING CLAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANE OF BEDROOM WINDOW</td>
<td>Greater than 50 dBA to less or equal to 60 dBA</td>
<td>Forced air heating with provision for central air conditioning</td>
<td>Required Type C</td>
</tr>
<tr>
<td></td>
<td>Greater than 60 dBA</td>
<td>Central air conditioning</td>
<td>Required Type D</td>
</tr>
</tbody>
</table>
### TABLE 3
**ROAD AND RAIL NOISE, DAY-TIME (0700 - 2300)**
**BUILDING COMPONENT REQUIREMENTS**

<table>
<thead>
<tr>
<th>ASSESSMENT LOCATION</th>
<th>$L_{eq}$ (16 hr)</th>
<th>BUILDING COMPONENT REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROAD ROOM WINDOW</strong></td>
<td>Less than or equal to 65 dBA</td>
<td>Building compliant with the Ontario Building Code</td>
</tr>
<tr>
<td></td>
<td>Greater than 65 dBA</td>
<td>Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria</td>
</tr>
<tr>
<td><strong>RAIL ROOM WINDOW</strong></td>
<td>Less than or equal to 60 dBA</td>
<td>Building compliant with the Ontario Building Code</td>
</tr>
<tr>
<td></td>
<td>Greater than 60 dBA</td>
<td>Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria</td>
</tr>
</tbody>
</table>

### TABLE 4
**ROAD AND RAIL NOISE, NIGHT-TIME (2300-0700)**
**BUILDING COMPONENT REQUIREMENTS**

<table>
<thead>
<tr>
<th>ASSESSMENT LOCATION</th>
<th>$L_{eq}$ (8 hr)</th>
<th>BUILDING COMPONENT REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROAD BEDROOM WINDOW</strong></td>
<td>Less than or equal to 60 dBA</td>
<td>Building compliant with the Ontario Building Code</td>
</tr>
<tr>
<td></td>
<td>Greater than 65 dBA</td>
<td>Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria</td>
</tr>
<tr>
<td><strong>RAIL BEDROOM WINDOW</strong></td>
<td>Less than or equal to 60 dBA</td>
<td>Building compliant with the Ontario Building Code</td>
</tr>
<tr>
<td></td>
<td>Greater than 60 dBA</td>
<td>Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria</td>
</tr>
</tbody>
</table>

### TABLE 5
**FACADE REQUIREMENT FOR RAIL NOISE ONLY - 24 HOURS**

<table>
<thead>
<tr>
<th>ASSESSMENT LOCATION</th>
<th>DISTANCE TO RAILWAY (m)</th>
<th>$L_{eq}$ (24 hr) (dBA)</th>
<th>NOISE CONTROL REQUIREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLANE OF BEDROOM WINDOW</strong></td>
<td>Less than 100 m</td>
<td>Less than or equal to 60 dBA</td>
<td>No additional requirement</td>
</tr>
<tr>
<td></td>
<td>Greater than 60 dBA</td>
<td>Brick veneer or acoustically equivalent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greater than 100 m</td>
<td>Less than or equal to 60 dBA</td>
<td>No additional requirement</td>
</tr>
<tr>
<td></td>
<td>Greater than 60 dBA</td>
<td>No additional requirement</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE B-1
**Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq dBA)**
**Outdoor Points of Reception**

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Class 1 Area</th>
<th>Class 2 Area</th>
<th>Class 3 Area</th>
<th>Class 4 Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00-19:00</td>
<td>50</td>
<td>50</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>19:00-23:00</td>
<td>50</td>
<td>45</td>
<td>40</td>
<td>55</td>
</tr>
</tbody>
</table>

### TABLE B-2
**Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq dBA)**
**Plane of Window of Noise Sensitive Spaces**

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Class 1 Area</th>
<th>Class 2 Area</th>
<th>Class 3 Area</th>
<th>Class 4 Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00-19:00</td>
<td>50</td>
<td>50</td>
<td>45</td>
<td>60</td>
</tr>
<tr>
<td>19:00-23:00</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>23:00-07:00</td>
<td>45</td>
<td>45</td>
<td>40</td>
<td>55</td>
</tr>
</tbody>
</table>
WARNING CLAUSES

The following warning clauses may be used individually or in combination:

TYPE A:

“Purchasers are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants and the outdoor sound level may exceed the Municipality and the Ministry of Environment and Climate Change’s noise criteria.”

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 Municipality’s and the Ministry of the Environment and Climate Change’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 MOECC 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 Municipality’s and the Ministry of the Environment and Climate Change’s noise criteria."
APPENDIX 4

SAMPLE WINDOW AND EXTERIOR WALL CONFIGURATIONS
## WINDOW STC RATINGS

<table>
<thead>
<tr>
<th>STC</th>
<th>Double Glazing of indicated glass thickness</th>
<th>Triple Glazing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2mm and 2mm glass</td>
<td>3mm 3mm glass</td>
</tr>
<tr>
<td></td>
<td>3mm and 3mm glass</td>
<td>3mm 3mm glass</td>
</tr>
<tr>
<td></td>
<td>4mm and 4mm glass</td>
<td>3mm 6mm glass</td>
</tr>
<tr>
<td></td>
<td>6mm and 6mm glass</td>
<td>3mm 6mm glass</td>
</tr>
<tr>
<td></td>
<td>Interpane Spacing (mm)</td>
<td>Interpane Spacing (mm)</td>
</tr>
<tr>
<td>27</td>
<td>6</td>
<td>6,6</td>
</tr>
<tr>
<td>28</td>
<td>13</td>
<td>6,10</td>
</tr>
<tr>
<td>29</td>
<td>15, 6</td>
<td>6,10</td>
</tr>
<tr>
<td>30</td>
<td>18, 13</td>
<td>6,15</td>
</tr>
<tr>
<td>31</td>
<td>22, 16, 13, 6</td>
<td>6,15</td>
</tr>
<tr>
<td>32</td>
<td>28, 20, 16, 13, 6</td>
<td>6,20</td>
</tr>
<tr>
<td>33</td>
<td>35, 25, 20, 16, 13, 16</td>
<td>6,20</td>
</tr>
<tr>
<td>34</td>
<td>42, 32, 25, 20, 20, 20</td>
<td>6,15</td>
</tr>
<tr>
<td>35</td>
<td>50, 40, 32, 25, 32, 24</td>
<td>6,15</td>
</tr>
<tr>
<td>36</td>
<td>63, 50, 40, 32, 32, 30</td>
<td>6,20</td>
</tr>
<tr>
<td>37</td>
<td>80, 63, 50, 40, 37, 37</td>
<td>6,20</td>
</tr>
<tr>
<td>38</td>
<td>100, 80, 63, 50, 50, 6,65</td>
<td>6,30</td>
</tr>
<tr>
<td>39</td>
<td>125, 100, 80, 75, 70, 6,65</td>
<td>6,30</td>
</tr>
<tr>
<td>40</td>
<td>150, 125, 100, 95, 90, 6,100</td>
<td>6,30</td>
</tr>
<tr>
<td>41</td>
<td>150, 125, 110, 100, 6,100</td>
<td>6,100</td>
</tr>
<tr>
<td>42</td>
<td>150, 135, 125</td>
<td></td>
</tr>
</tbody>
</table>

Source: National Research Council, Division of Building Research

### EXPLANATORY NOTES:

1. STC data listed in the table are for the well-fitted weather-stripped units that can be opened. The STC values apply only when the windows are closed. For windows fixed and sealed to the frame, add three to the STC given in the table.

2. If the interpane spacing or glass thickness for a specific double-glazed window is not listed in the table, the nearest listed values should be used.

3. If the interpane spacing for a specific triple-glazed window are not listed in the table, use the listed case whose combined spacing are nearest the actual combined spacing.

4. The STC data listed in the table are for typical windows, but details of glass mounting, window seals, etc., may result in slightly different performance for some manufacturer’s products. If the laboratory sound transmission loss data (conforming to ASTM test method E-90) are available, these should be used.
### EXTERIOR WALL STC RATINGS

<table>
<thead>
<tr>
<th>Wall Configuration</th>
<th>EW1</th>
<th>EW2</th>
<th>EW3</th>
<th>EW4</th>
<th>EW1R</th>
<th>EW2R</th>
<th>EW3R</th>
<th>EW5</th>
<th>EW4R</th>
<th>EW6</th>
<th>EW7</th>
<th>EW8</th>
</tr>
</thead>
<tbody>
<tr>
<td>STC Rating</td>
<td>38</td>
<td>40</td>
<td>43</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>54</td>
<td>55</td>
<td>57</td>
<td>58</td>
<td>62</td>
</tr>
</tbody>
</table>

Source: National Research Council, Division of Building Research

### NOTES:

1. The common structure of walls EW1 to EW5 is composed of 12.7mm gypsum board, vapour barrier and 38x89 mm studs with 50 mm (or thicker) mineral wool or glass fibre batts in inter-stud cavities.
   - EW1 denotes the common structure, plus sheathing, plus wood siding or metal siding and fibre backer board
   - EW2 denotes the common structure, plus rigid insulation (25 to 30 mm), and wood siding or metal siding and fibre backer board.
   - EW3 denotes simulated mansard with the common structure, plus sheathing, 28 X89 mm framing, sheathing and asphalt roofing material
   - EW4 denotes the common structure, plus sheathing and 20 mm stucco.
   - EW5 denotes the common structure, plus sheathing, 25 mm air space, 100mm brick veneer.
   - EW6 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25 to 50 mm), 100 mm back-up block 100 mm face brick.
   - EW7 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25 to 50 mm), 140mm back-up block, 100 mm face brick.
   - EW8 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25 to 50 mm), 200 mm concrete.

2. R signifies the mounting of the interior gypsum board on resilient clips.

3. An exterior wall conforming to rainscreen design principles and composed of 12.7 mm gypsum board, 100 mm concrete block, rigid insulation (25 to 50 mm), 25 mm air space, and 100 mm brick veneer has the same STC as EW6.

4. An exterior wall described in EW1 with the addition of rigid insulation (25 to 50 mm) between the sheathing and the external finish has the same STC as EW2.