YCA engineering Limited

Phone: 416-894-3213
hava@ycaengineering.com

9580 Yonge Street, Suite 9557
Richmond Hill, ON L4C 1V6

ENVIRONMENTAL NOISE ASSESSMENT

PROPOSED RESIDENTIAL TOWNHOUSE DEVELOPMENT
666 LIVERPOOL ROAD

PART OF LOTS 9, 10 & 13AND LOTS 11 & 12
BLOCK D, REGISTERED PLAN 65

CITY OF PICKERING

PREPARED FOR:

PLAZA 6 INC.

September 2025
Y2529

EXECUTIVE SUMMARY

The September 2025 Environmental Noise Assessment is issued to present the assessment of the proposed residential development and recommend any noise abatement features necessary to achieve sound levels acceptable to the City of Pickering, the Region of Durham and the Ministry of Environment, Conservation and Parks.

The transportation noise source having the potential to affect the living environment within the proposed development area includes Liverpool Road. The projected traffic volume on this noise source is used as input to the Stamson's 5.04 to generate the resultant sound levels. Copies of the correspondence regarding traffic data is included in Appendix 1 in this report.

Recommended noise abatement measures are described in Sections 5.1, 5.2, 5.3 and 5.4 and summarized in Table 4 of this report and on the attached Figure 2. These measures include:

1. Provision for air conditioning is required for Buildings A and B (All Units).

2. Standard windows and exterior wall construction are sufficient for all units.

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

4. Prior to the issuance of occupancy permits, the City'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.

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1.0 INTRODUCTION

PURPOSE

A residential development has been proposed by Plaza 6 Inc. in the City of Pickering. This report is an analysis of future sound levels within the proposed development and describes the types and locations of noise mitigation measures which will be required based on the latest Concept Plan dated March 2025.

SITE DESCRIPTION AND LOCATION

The development will consist of 4 townhouse buildings (21 units) and a local internal road located west of Liverpool Road, north of Wharf Street and approximately 1.4km south of Bayly Street in the City of Pickering.

The surrounding land uses are existing and proposed residential development, and an existing commercial to the northeast.

KEY PLAN

The location of the proposed development is further indicated by the Key Plan below.

FIGURE 1

2.0 SOUND LEVEL CRITERIA

The sound level descriptors (L_{eq} in dBA) are for 16 hours (daytime) and 8 hours (night-time) based on MECP Guideline NPC-300:

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) exceed 60 dBA, physical noise attenuation measures such as acoustical fences, increased building setbacks or reorientation of the buildings 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.

Living and Dining Area and Bedroom (7 a.m.–11 p.m.) = 45 dBA Roads, 40 dBA Railways
Living and Dining Area (11 p.m.–7 a.m.) = 45 dBA Roads, 40 dBA Railways
Bedrooms (11 p.m. – 7 a.m.) = 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.E.C.P. 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 (0700-2300) or 50 dBA during night-time (1900-2300).

3.0 NOISE SOURCES

ROAD TRAFFIC

As indicated on the attached Figure 1, the proposed residential townhouse development will be located west of Liverpool Road at approximately 1.4km south of Bayly Street in the City of Pickering. Noise generated by Liverpool Road has the potential to affect future development.

All other roads within or near this site are considered acoustically insignificant due to low traffic volumes and distance separation.

Traffic count information for Liverpool Road was obtained from the City of Pickering and projected to the year 2045 at 2% growth per year. The traffic data projected is summarized in Table 1 below:

TABLE 1: LIVERPOOL ROAD TRAFFIC DATA

Projected Annual Average Daily Traffic *	5,100
Percent Trucks	4%
Heavy and Medium trucks ratio	50/50
Speed (km/hr)	40
Number of Lanes	2

* Traffic volume projected to the year 2045 at 2% growth per year.

The proposed residential development is not impacted by aircraft and rail noise due to distance separation.

EXISTING STATIONARY NOISE SOURCES

Copperworks (695 Liverpool Road): is located at the southeast corner of Liverpool Road and Commerce Street, approximately 30m from the proposed residential development to the east side of Liverpool Road. This existing commercial development is a copper supplier with a store fronting Liverpool Road and an indoor workshop at the south and east of the building. The operation hours are 7:30am to 4:00pm weekdays.

The potential noise sources are repair activities within the workshop and occasional delivery activities. Based on the nature of the activities, the noise from this commercial development is not expected to be a significant concern, however a warning clause Type E is recommended in the event that the noise activities are audible at times.

4.0 NOISE ASSESSMENT

ROAD TRAFFIC NOISE ASSESSMENT

Figure 2 is based on the latest Concept Plan dated March 2025 prepared by Cassidy & Co. Architectural Technologists and show 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 2: UNATTENUATED SOUND LEVELS

LOCATIONS	DISTANCE TO CENTRELINE OF ROAD (m)	DAYTIME 16 Hr. Leq dBA		NIGHT-TIME 8 Hr. Leq dBA
		OUTDOOR LIVING AREA	DWELLING WALL	SECOND STOREY
Building A				
Front Wall	15.0[1]	-	57.54	50.94
Balcony above garage	24.0[1]	<55	-	-
Building C				
Front Wall	35.0[1]	-	50.18	43.59
Rear Yard	54.0[1]	<55	-	-

[1] Liverpool Road

5.0 RECOMMENDED NOISE MITIGATION MEASURES

5.1 OUTDOOR MEASURES

The designated outdoor amenity areas for Buildings A and B (All Units) are expected to be the balconies above the garages (located west of buildings) facing away from Liverpool Road. The designated outdoor amenity area for Buildings C and D are expected to be the rear yards.

Based on the sound level results in Table 2, the outdoor sound levels at all the balconies and rear yards are expected to be less than 55 dBA in the absence of noise mitigative measures.

Therefore, outdoor noise mitigation measure is not required for the residential buildings/units.

5.2 VENTILATION REQUIREMENTS

Ventilation requirements were determined using the sound levels at the building facades listed in Table 2 due to road traffic noise sources.

MANDATORY AIR CONDITIONERS

Based on the information in Table 2, no locations are expected to be above 65dBA during the daytime and/or above 60dBA during the nighttime. Therefore, mandatory air conditioning is not required for this residential development.

PROVISION FOR CENTRAL AIR CONDITIONERS

The following units must be constructed with a forced air heating system with ducting sized to accommodate a central 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 per Table 2 sound level results.

- Buildings A and B (All Units)

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

> Warning Clause Type C:
>
> *"This unit was fitted with ducting sized to accommodate a central air conditioning unit. The installation of central air conditioning by the homeowner will allow windows and exterior doors to be kept closed, thereby achieving indoor sound levels within the limits recommended by the Ministry of Environment. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property)."*

5.3 BUILDING COMPONENTS

Building components within the proposed development were analyzed using the STC (Sound Transmission Class) method recommended by the M.E.C.P. 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 30% of the floor area and the same side exterior walls are assumed to be 70% of the floor area.

DAYTIME SOUND LEVELS

For the worst-case location during daytime (Building A), a daytime sound level of 58 dBA was calculated due to road traffic. To ensure acceptable daytime indoor sound levels, the building components must provide an STC rating of 21 for windows, STC 28 for exterior wall construction.

NIGHT-TIME SOUND LEVELS

For the worst-case location during night-time (Building A), a night-time sound level of 51 dBA was calculated. To ensure acceptable nighttime indoor sound levels of 40 dBA from road noise sources, the building components must provide an STC rating of 17 for windows, STC 24 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. Therefore, standard windows and exterior wall construction are sufficient for all units.

WINDOWS

The following are some window configurations meeting a STC rating of 20, assuming the ratio of window area to room floor area is 30%:

- double glazing 4mm x 4mm thickness with 6mm air space or
- double glazing 3mm x 3mm thickness with 13mm air space or
- any other window type yielding a similar or greater STC rating

EXTERIOR WALLS

The following exterior wall constructions EW1 meet the STC 38 rating, assuming a ratio of wall area to room floor area of 70%:

EW1 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 stucco/vinyl siding.

Sample window and exterior wall configurations are included in Appendix 4 for additional options.

5.4 WARNING CLAUSES

The following warning clauses Type A and Type E must be incorporated into the Development Agreement or future Site Plan Agreement as appropriate, which will be registered on title and included in all offers of purchase and sale or lease of the dwelling units listed below.

Warning Clause Type A:

"Occupants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the occupants as the sound level will exceed the noise criteria of the Ministry of the Environment"

- Buildings A and B (All Units)

Warning Clause Type E

"Occupants are advised that due to the proximity of the existing commercial development, noise from the commercial activities may at times be audible."

- Buildings A and B (All Units)

6.0 SUMMARY OF NOISE MITIGATION MEASURES

The summary of noise abatement measures are listed in the following Table 3 identifying ventilation requirements, building components and warning clauses.

TABLE 3: SUMMARY OF NOISE MITIGATION MEASURES

LOCATIONS	VENTILATION REQUIREMENTS	BUILDING COMPONENTS	SOUND BARRIERS	WARNING CLAUSES
Buildings A and B (All Units)	Provision for air conditioning	Windows: OBC* Walls: OBC	-	Type A, C, E
Buildings C and D (All Units)	No Requirements	Windows: OBC* Walls: OBC	-	-

* Ontario Building Code Standard

7.0 RECOMMENDATIONS AND CONCLUSION

RECOMMENDATIONS

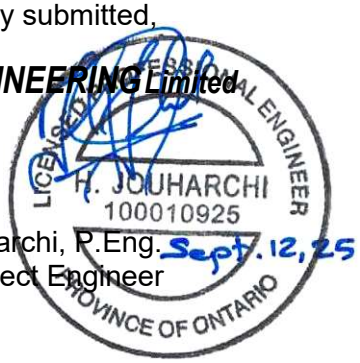
1. Provision for air conditioning is required for Buildings A and B (All Units).
2. Standard windows and exterior wall construction are sufficient for all units.
3. All applicable warning clauses shall be listed in the City of Pickering's Development Agreement and also be inserted in the Agreements of Purchase and Sale or Lease and registered on title.
4. Prior to the issuance of occupancy permits, the City'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.

CONCLUSION

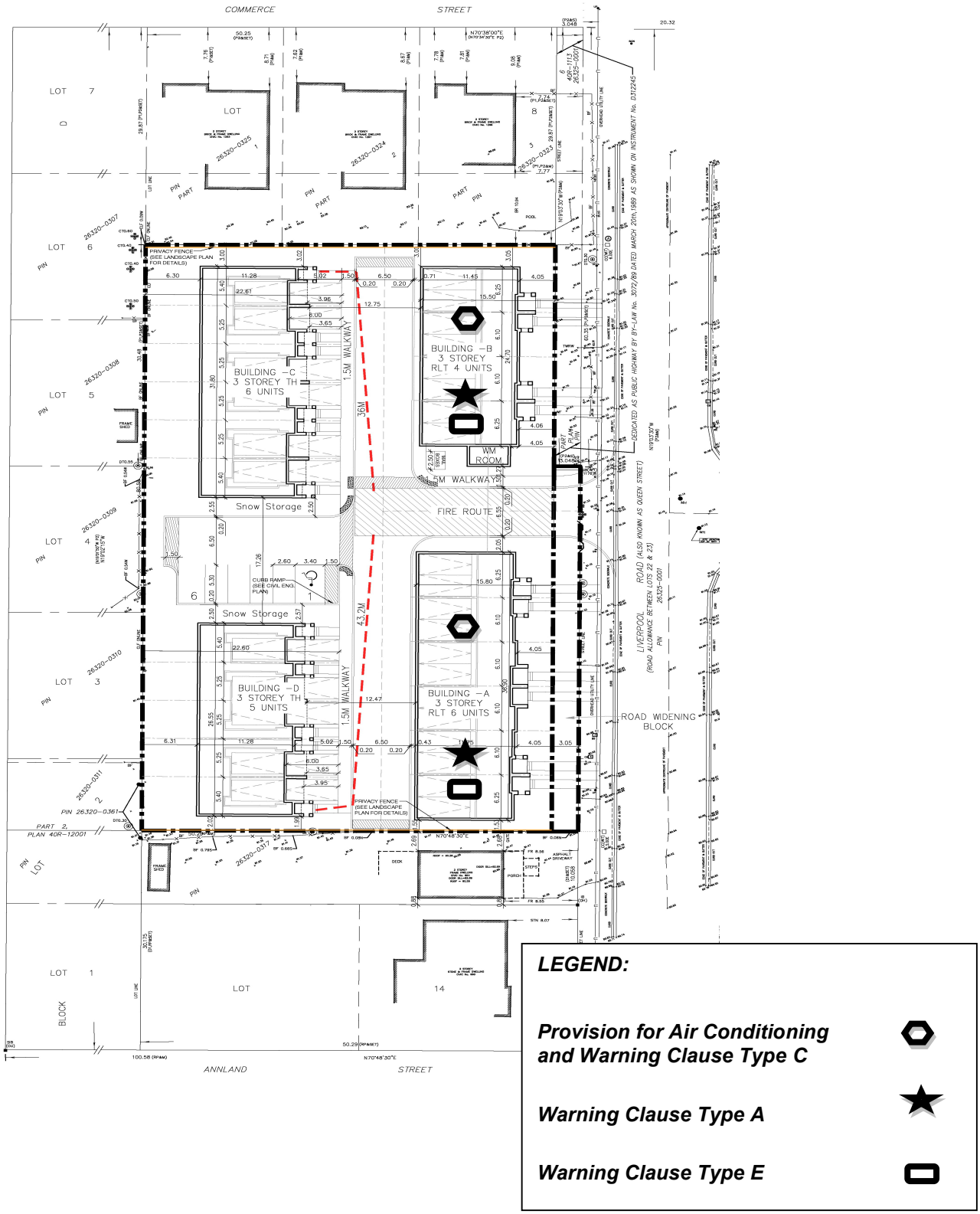
This report has determined that sound levels acceptable to the Ministry of Environment, Conservation and Parks, City of Pickering and the Region of Durham are expected to be achieved using the abatement measures in this report as shown on the attached Figure 2.

Respectfully submitted,

YCA ENGINEERING Limited



Hava Jouharchi, P.Eng.
Senior Project Engineer



LEGEND:

Provision for Air Conditioning and Warning Clause Type C ⬡

Warning Clause Type A ★

Warning Clause Type E ▭

FIGURE 2
666 Liverpool Road
Noise Mitigation Measures

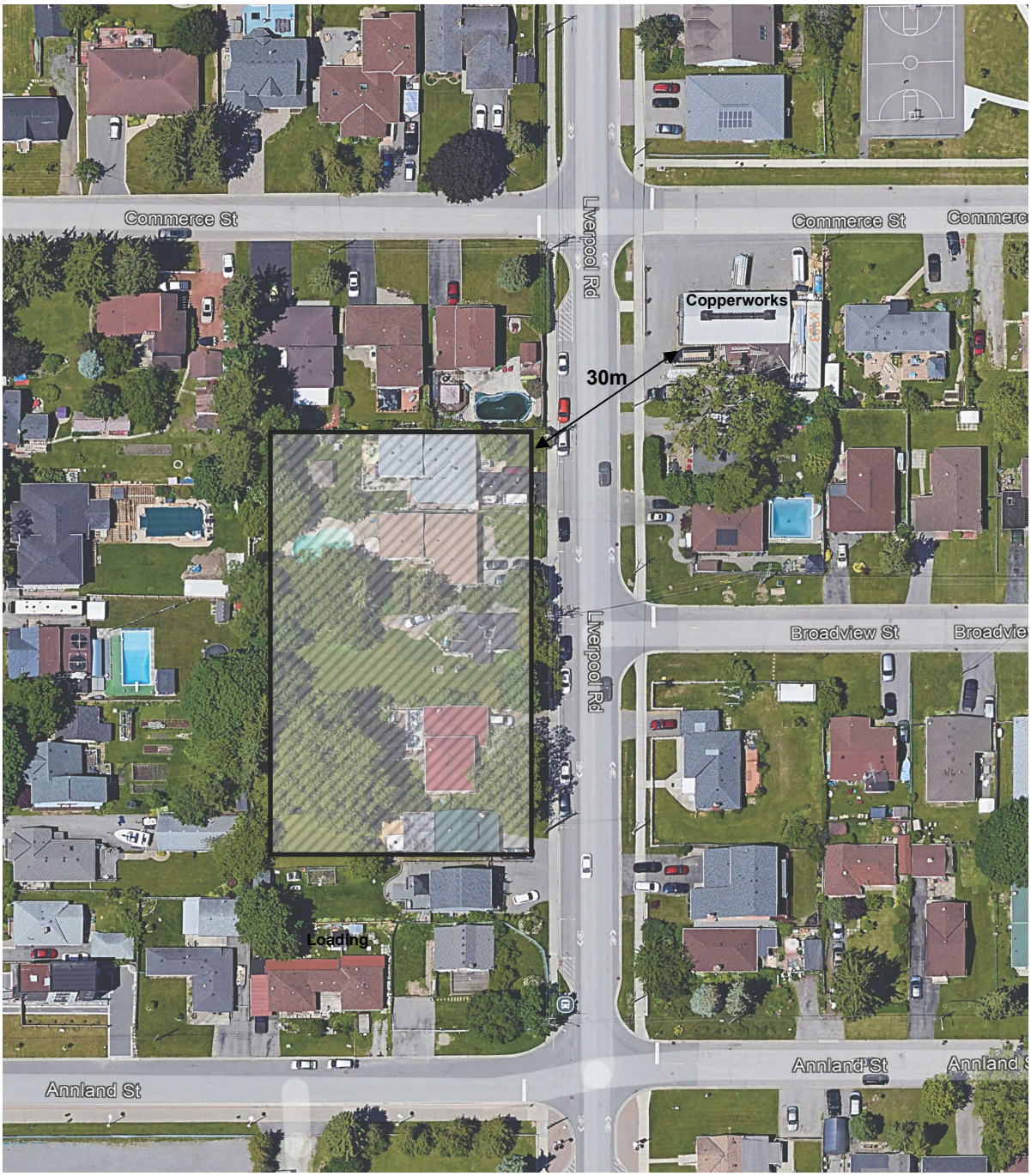


FIGURE 3
666 Liverpool Road
Surrounding Stationary Noise Sources

APPENDIX 1

TRAFFIC DATA

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 14:00:00
To: 18:00:00

One Hour Peak
From: 15:15:00
To: 16:15:00

Municipality: Pickering
Site #: 1500600007
Intersection: Liverpool Rd & Wharf St
TFR File #: 6
Count date: 28-Apr-15

Weather conditions:

Person(s) who counted:

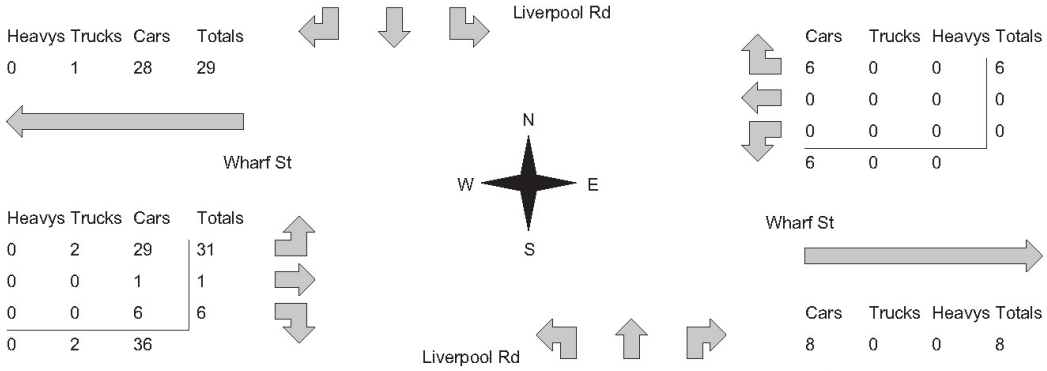
**** Non-Signalized Intersection ****

Major Road: Liverpool Rd runs N/S

North Leg Total: 349	Heavys	0	0	0 | 0
North Entering: 158	Trucks	1	3	0 | 4
North Peds: 2	Cars	25	124	5 | 154
Peds Cross: ⋈	Totals	26	127	5

Heavys	0
Trucks	4
Cars	187
Totals	191

East Leg Total:	14
East Entering:	6
East Peds:	34
Peds Cross:	⧖



Peds Cross: ⧖	Cars	130	Cars	3 | 152 | 2 | 157
West Peds: 19	Trucks	3	Trucks	0 | 2 | 0 | 2
West Entering: 38	Heavys	0	Heavys	0 | 0 | 0 | 0
West Leg Total: 67	Totals	133	Totals	3 | 154 | 2

Peds Cross:	⋈
South Peds:	1
South Entering:	159
South Leg Total:	292

Comments

APPENDIX 2

SOUND LEVEL CALCULATIONS

```
STAMSON 5.0        SUMMARY REPORT        Date: 11-09-2025 09:24:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bkafw.te             Time Period: Day/Night 16/8 hours
Description: Building A, Front Wall

Road data, segment # 1: Liverpool Rd (day/night)
-----------------------------------------------
Car traffic volume  :  4406/490   veh/TimePeriod  *
Medium truck volume :    92/10    veh/TimePeriod  *
Heavy truck volume  :    92/10    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   5100
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Liverpool Rd (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Liverpool Rd     !     1.19 !    57.54 !    57.54
--------------------+---------+---------+---------
                      Total                  57.54 dBA

Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Liverpool Rd     !     1.18 !    50.94 !    50.94
--------------------+---------+---------+---------
                      Total                  50.94 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 57.54
                           (NIGHT): 50.94
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 11-09-2025 09:26:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bkaola.te            Time Period: Day/Night 16/8 hours
Description: Building A, OLA

Road data, segment # 1: Liverpool Rd (day/night)
----------------------------------------------
Car traffic volume  :  4406/490   veh/TimePeriod  *
Medium truck volume :    92/10    veh/TimePeriod  *
Heavy truck volume  :    92/10    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   5100
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Liverpool Rd (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  24.00 / 15.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   3.00 / 10.00  m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Liverpool Rd     !     1.19 !    51.05 !    51.05 *
--------------------+---------+---------+---------
                      Total                   51.05 dBA
  * Bright Zone  !
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 11-09-2025 09:25:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bkcfw.te             Time Period: Day/Night 16/8 hours
Description: Building C, Front Wall

Road data, segment # 1: Liverpool Rd (day/night)
-----------------------------------------------
Car traffic volume  :  4406/490   veh/TimePeriod  *
Medium truck volume :    92/10    veh/TimePeriod  *
Heavy truck volume  :    92/10    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   5100
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Liverpool Rd (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      0       (Define your own alpha.)
Barrier angle1            : -90.00 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        :   0.00 m
Barrier elevation         :   0.00 m
Alpha                     :   0.33

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Liverpool Rd     !     1.19 !    50.18 !    50.18
--------------------+---------+---------+---------
                      Total                  50.18 dBA
Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Liverpool Rd     !     1.18 !    43.59 !    43.59
--------------------+---------+---------+---------
                      Total                  43.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.18
                           (NIGHT): 43.59
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 11-09-2025 09:26:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bkcry.te             Time Period: Day/Night 16/8 hours
Description: Building C, Rear Yard

Road data, segment # 1: Liverpool Rd (day/night)
----------------------------------------------
Car traffic volume  :  4406/490   veh/TimePeriod  *
Medium truck volume :    92/10    veh/TimePeriod  *
Heavy truck volume  :    92/10    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   5100
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Liverpool Rd (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      2 / 1
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  54.00 / 35.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      0       (Define your own alpha.)
Barrier angle1            : -90.00 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        :   0.00 m
Barrier elevation         :   0.00 m
Alpha                     :   0.33

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Liverpool Rd     !     1.19 !    46.24 !    46.24
--------------------+---------+---------+---------
                      Total                   46.24 dBA
```

APPENDIX 3

SOUND LEVEL CRITERIA

MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS

ENVIRONMENTAL NOISE GUIDELINE
Stationary and Transportation Sources - Approval and Planning
Publication NPC-300

August 2013

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 C-1
Sound Level Limit for Outdoor Living Areas
Road and Rail

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

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 C- 2
Indoor Sound Level Limits (Road and Rail)

Type of Space	*Time Period*	*L_{eq} (Time Period) (dBA)*	
		Road	*Rail*
Living/dining, den areas of residences, nursing/retirement homes, hospitals, schools, day-care centers, etc.	*07:00-23:00*	*45*	*40*
Living/dining areas of residences, nursing/retirement homes, hospitals, etc. (except schools or daycare centres)	*23:00 - 07:00*	*45*	*40*
Sleeping quarters	*07:00-23:00*	*45*	*40*
Sleeping quarters	*23:00 - 07:00*	*40*	*35*

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)

Type of Space	*Time Period*	*L_{eq} (Time Period) (dBA)*	
		Road	*Rail*
General offices, reception areas, retail stores, etc.	*16 hours between 07:00-23:00*	*50*	*45*
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.	*16 hours between 07:00-23:00*	*45*	*40*
Sleeping quarters of hotels/motels	*8 hours between 23:00 - 07:00*	*45*	*40*
Sleeping quarters of residences, hospitals, nursing/retirement homes etc	*8 hours between 23:00 - 07:00*	*40*	*35*

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

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

TABLE 2

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

ASSESSMENT LOCATION	*L_{eq}(8hr) (dBA)*	*VENTILATION REQUIREMENTS*	*WARNING CLAUSE*
PLANE OF BEDROOM WINDOW	*Greater than 50 dBA to less or equal to 60 dBA*	*Forced air heating with provision for central air conditioning*	*Required Type C*
	Greater than 60 dBA	*Central air conditioning*	*Required Type D*

TABLE 3
ROAD AND RAIL NOISE, DAY-TIME (0700 - 2300)
BUILDING COMPONENT REQUIREMENTS

ASSESSMENT LOCATION		*L_{eq} (16 hr)*	*BUILDING COMPONENT REQUIREMENTS*
PLANE OF LIVING ROOM WINDOW	*ROAD*	*Less than or equal to 65 dBA*	*Building compliant with the Ontario Building Code*
		Greater than 65 dBA	*Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria*
	RAIL	*Less than or equal to 60 dBA*	*Building compliant with the Ontario Building Code*
		Greater than 60 dBA	*Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria*

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

ASSESSMENT LOCATION		*L_{eq} (8 hr)*	*BUILDING COMPONENT REQUIREMENTS*
PLANE OF BEDROOM WINDOW	*ROAD*	*Less than or equal to 60 dBA*	*Building compliant with the Ontario Building Code*
		Greater than 65 dBA	*Building components (walls, windows, etc.) must bed designed to achieve indoor sound level criteria*
	RAIL	*Less than or equal to 60 dBA*	*Building compliant with the Ontario Building Code*
		Greater than 60 dBA	*Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria*

TABLE 5
FACADE REQUIREMENT FOR RAIL NOISE ONLY - 24 HOURS

ASSESSMENT LOCATION	*DISTANCE TO RAILWAY (m)*	*L_{eq} (24 hr) (dBA)*	*NOISE CONTROL REQUIREMENT*
PLANE OF BEDROOM WINDOW	*Less than 100 m*	*Less than or equal to 60 dBA*	*No additional requirement*
		Greater than 60 dBA	*Brick veneer or acoustically equivalent*
	Greater than 100 m	*Less than or equal to 60 dBA*	*No additional requirement*
		Greater than 60 dBA	*No additional requirement*

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

Time of Day	*Class 1 Area*	*Class 2 Area*	*Class 3 Area*	*Class 4 Area*
07:00-19:00	*50*	*50*	*45*	*55*
19:00 -23:00	*50*	*45*	*40*	*55*

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

Time of Day	*Class 1 Area*	*Class 2 Area*	*Class 3 Area*	*Class 4 Area*
07:00-19:00	*50*	*50*	*45*	*60*
19:00 -23:00	*50*	*50*	*40*	*60*
23:00-07:00	*45*	*45*	*40*	*55*

WARNING CLAUSES

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

TYPE A:

"Occupants 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's noise criteria."

TYPE C:

"This 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's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.)"

TYPE E:

"Occupants are advised that due to the proximity of the existing commercial development, noise from the commercial activities may at times be audible."

APPENDIX 4

SAMPLE WINDOW AND EXTERIOR WALL CONFIGURATIONS

WINDOW STC RATINGS

STC	Double Glazing of indicated glass thickness					Triple Glazing	
	2mm and 2mm glass	**3mm and 3mm glass**	**4mm and 4mm glass**	**3mm and 6mm glass**	**6mm and 6mm glass**	**3mm 3mm and 3mm glass**	**3mm 3mm and 6mm glass**
	Interpane Spacing (mm)					Interpane Spacing (mm)	
27	6						
28	13						
29	15	6					
30	18	13	6				
31	22	16	13	6	6	6,6	
32	28	20	16	13	13	6,10	6,6
33	35	25	20	16	16	6,15	6,10
34	42	32	25	20	20	6,20	6,15
35	50	40	32	25	24	6,30	6,20
36	63	50	40	32	30	6,40	6,30
37	80	63	50	40	37	6,50	6,40
38	100	80	63	55	50	6,65	6,50
39	125	100	80	75	70	6,80	6,65
40	150	125	100	95	90	6,100	6,80
41		150	125	110	100		6,100
42			150	135	125		

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

Wall Configuration	EW1	EW2	EW3	EW4	EW1R	EW2R	EW3R	EW5	EW4R	EW6	EW7 EW5R	EW8
STC Rating	**38**	**40**	**43**	**46**	**47**	**48**	**49**	**54**	**55**	**57**	**58**	**62**

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.