

ENVIRONMENTAL NOISE ASSESSMENT

**THE COLLEGEWAY DEVELOPMENT
PROPOSED 4 STOREY STACKED TOWNHOUSES
THE COLLEGEWAY AND RIDGWAY ROAD
CITY OF MISSISSAUGA**

PREPARED FOR:

3355 THE COLLEGEWAY L.P.

EXECUTIVE SUMMARY

The proposed residential development is located north of The Collegeway and east of Ridgeway Drive and at approximately 530m east of Highway 403 in the City of Mississauga.

The June 2016 Environmental Noise Assessment is issued to present the assessment of the proposed development and recommend any noise abatement features necessary to achieve sound levels acceptable to the City of Mississauga and the Ministry of Environment.

The transportation noise sources having the potential to affect the living environment within the proposed development area include The Collegeway, Ridgeway Drive and Highway 403. The ultimate traffic volumes for the roads are used as input to the Stamson's 5.04 to generate the resultant sound levels. Copies of the correspondence regarding traffic data are included in Appendix 1 in this report.

The stationary noise sources having the potential to affect the proposed residential development are the mechanical roof top units from the existing industrial and residential buildings, and the loading areas of the industrial developments.

The result of the noise assessments are described in Sections 5.1, 5.2, 5.3, 5.4 and summarized in Table 6 of this report and on the attached Drawing Y1613. These measures include:

1. Mandatory air conditioning is required for all Stacked Townhouses (Blocks 1 to 11) and the Proposed Commercial Building.
2. Upgraded windows and exterior wall constructions are required for Blocks 1, 6 to 11 (All Units).
3. The location and installation of the outdoor air conditioning device on the roof Terraces 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.
4. The garbage pick-up area is located west of the development. The garbage pickup is expected to occur during the daytime. The garbage pickup is generally excluded from the stationary source noise sources, however some activities may be audible at times.
5. All applicable warning clauses shall be listed in the City of Mississauga Site Plan Agreement and also be inserted in the Agreements of Purchase and Sale or Lease and registered on title.
6. For the Proposed Commercial Building, the details of the mechanical roof top units are not available at this time. Further investigation is recommended to ensure the sound levels at the adjacent receptor locations meet the MOE sound levels limits once this information becomes available.

7. Prior to construction of the buildings and dwelling units, it is recommended that the architectural plans to be reviewed to ensure all building components, ducting systems and air conditioning locations meet the acoustical requirements.
8. 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

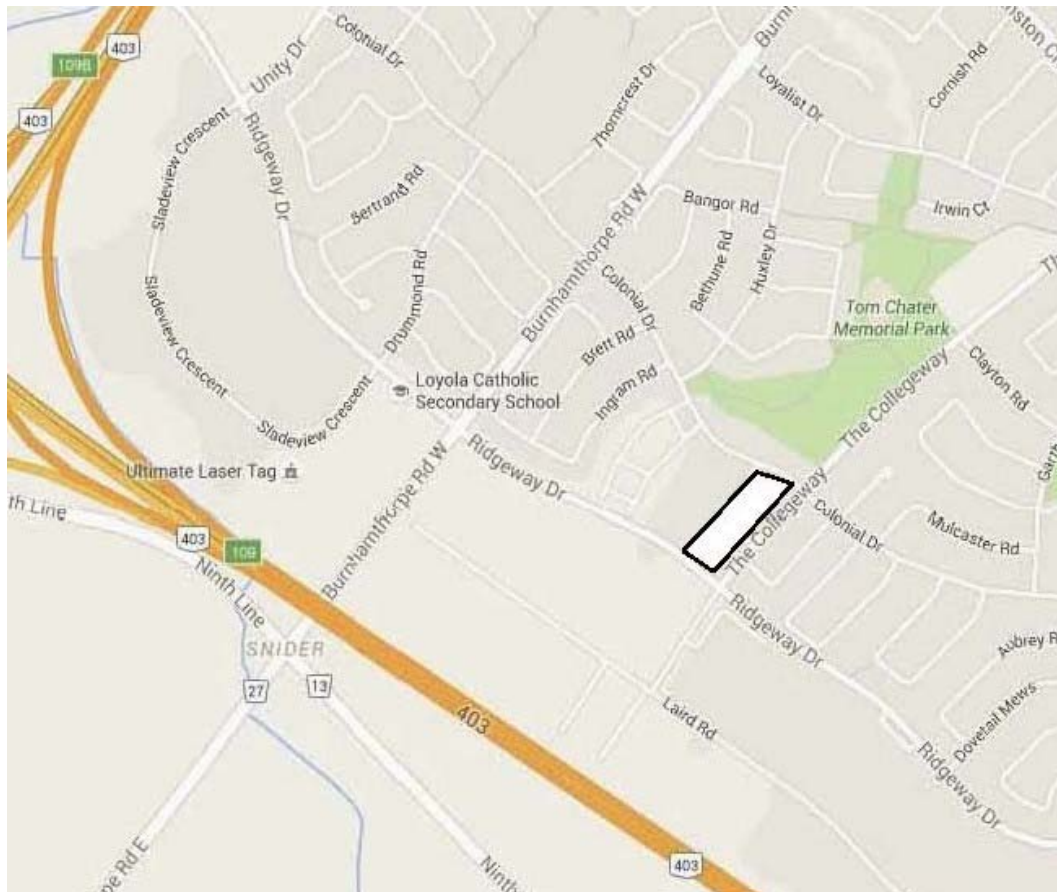
A residential and commercial development has been proposed by 3355 The Collegeway L.P. in the City of Mississauga. This report is an analysis of future sound levels within the proposed residential development and describes the types and locations of noise mitigation measures which will be required.

SITE DESCRIPTION AND LOCATION

This development will consist of eleven (11) Blocks of 4 storey stacked townhouses, a new commercial building and laneways located north of The Collegeway, east of Ridgeway Drive and at approximately 530m east of Highway 403 in the City of Mississauga. The surrounding land uses are existing residential developments to the south and east, a park to the west, community and institutional developments to the north.

KEY PLAN

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



KEY PLAN

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. guidelines (Publication NPC-300), this development is considered to be a Class 1 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 north of The Collegeway, east of Ridgeway Drive and at approximately 530m east of Highway 403 in the City of Mississauga. Colonial Drive is a minor collector road and based on discussion with the City of Mississauga, the traffic data is unavailable. Noise generated by The Collegeway and Ridgeway Drive have the potential to affect future residents. Due to distance separation and low traffic volumes, all other roads near this site are acoustically insignificant.

The ultimate traffic volume information for The Collegeway and Ridgeway Drive was obtained from the City of Mississauga dated April 21, 2016 and is summarized in Tables 1 and 2 below:

TABLE 1: THE COLLEGEWAY TRAFFIC DATA	
Projected Annual Average Daily Traffic *	42,000
Percent Trucks	7%
Heavy and Medium trucks ratio	55:45
Speed (km/hr)	60
Day/Night Split	90/10
Number of Lanes	6
Ultimate R.O.W.	35m

TABLE 2: RIDGEWAY DRIVE TRAFFIC DATA	
Projected Annual Average Daily Traffic *	25,000
Percent Trucks	5%
Medium and Heavy trucks ratio	55:45
Speed (km/hr)	50
Day/Night Split	90/10
Number of Lanes	4
Ultimate R.O.W.	30m

* The ultimate traffic data provided by the City of Mississauga.

The forecasted traffic volume information for Highway No. 403 was obtained on May 2016 from the Ministry of Transportation and summarized in Table 3 below.

TABLE 3: HIGHWAY NO. 403 TRAFFIC DATA	
Projected Annual Average Daily Traffic **	220,000
Percent Trucks	10.5%
Heavy and Medium trucks ratio	50:50
Speed (km/hr)	100
Number of Lanes	8

** Forecasted traffic volume provided by the Ministry of Transportation.

RAIL TRAFFIC

The nearest railway is located more than 1km from the proposed residential development. Due to distance separation, the noise impact from the railway is considered acoustically insignificant.

AIRCRAFT TRAFFIC

Due to the proximity of Lester Pearson Airport, the proposed residential development has been verified and the proposed site is outside the NEF 25 Noise Contour Line.

The noise contour line map for the Lester Pearson Airport is included in Appendix 1.

STATIONARY NOISE SOURCES

Existing high-rise residential developments are located to the north and south of the proposed development with mechanical roof top units having the potential to exceed the sound level limits at the proposed residential development.

Existing commercial/industrial developments are located west of the Ridgeway Drive with offices facing Ridgeway Drive and the loading areas are located west side of the buildings and shielded by the buildings. Screen walls have been located for the mechanical roof top units on the commercial/industrial buildings.

Air conditioning units are shown on the roof Terraces of the proposed residential blocks (The Roof Plan is included in this report). 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.

4.0 NOISE ASSESSMENT

4.1 TRAFFIC NOISE SOURCE ASSESSMENT

Drawing DWG Y1613 is based on the latest Site Plan dated March 23, 2016 prepared by Guthrie Muscovitch Architects 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 4 lists the unattenuated sound levels at various locations..

TABLE 4: UNATTENUATED SOUND LEVELS					
BLOCKS/UNITS		DISTANCE TO CENTRELINE OF ROAD (m)	DAYTIME (16 Hr. Leq (dBA))		NIGHT-TIME (8 Hr. Leq (dBA))
			OUTDOOR AMENITY	DWELLING WALL	SECOND STOREY
Block 1 (North Unit)	Side Wall	80.0* 58.0** 530.0***	-	57.82 63.70 (66.74) 62.48	51.29 57.19 (64.84) 63.78
Block 2 (North Unit)	Side Wall	80.0* 88.0** 560.0***	-	55.15 59.23 (63.19) 59.64	48.62 52.72 (61.79) 60.97
Block 3 (South Unit)	Side Wall	90.0* 142.0** 605.0***	-	54.66 59.81 (63.17) 59.16	48.12 53.30 (61.47) 60.51
Block 5 (South Unit)	Side Wall	100.0* 204.0** 675.0***	-	54.22 55.70 (61.27) 58.47	47.68 50.72 (60.59) 59.86
Block 6 (South Unit)	Side Wall	19.0* 222.0** 695.0***	-	67.07 52.34 (67.48) 55.27	60.54 45.83 (62.14) 56.68
Block 10 (South Unit)	Side Wall	19.0* 88.0** 560.0***	-	67.07 56.22 (67.76) 56.63	60.54 49.71 (62.67) 57.95
Block 11 (South Unit)	Side Wall	19.0* 58.0** 530.0***	-	67.07 60.68 (69.05) 62.48	60.54 54.18 (65.78) 63.78
Proposed Commercial Building	Side Wall	18.0* 19.0** 500.0***	-	64.30 68.54 (70.47) 61.40	57.76 62.03 (66.20) 62.95
Common Outdoor Amenity Area		40.0* 148.0** 610.0***	58.09 49.03 (59.33) 51.22		

* The Collegeway

** Ridgeway Drive

*** Highway 403

() Combined sound level from multiple noise sources

4.2 STATIONARY NOISE SOURCES ASSESSMENT

The noise impact from the existing industrial developments loading areas and the mechanical roof top units to the west and the mechanical roof top units at the existing high-rise residential developments have the potential to exceed the sound level limits at the proposed residential development.

Based on the location of the buildings and the mechanical roof top units as shown on the attached Figure 2, the Sound Power Levels for all the roof top units were taken to be 78dBA to 90dBA for a similar type of mechanical equipment. All roof top units are assumed to be operating 100% of the time during the daytime/evening and operating 50% of the time during the night-time. Most of the loading activities are assumed to be daytime operations with several night-time loading activities. Analysis is included in Appendix 2.

The sound levels were calculated using the CadnaA Version 4.4.145 computer program using the International Standard ISO 9613-2.

TABLE 5 - STATIONARY SOURCES SOUND LEVELS			
RECEPTOR	SOUND LEVEL RESULTS (dBA)		EXCEEDANCE (dBA)
	DAYTIME/EVENING¹ (0700 -2300)	NIGHTTIME² (2300 -0700)	
	Unmitigated (dBA)	Unmitigated (dBA)	
R1 (Block 1, 4th Floor)	49	46	No ¹ /Yes ²
R2 (Block 5, 4th Floor)	44	42	No/No
R3 (Outdoor Amenity)	39	38	No/No
R4 (Commercial Bldg)	49	46	No/Yes

The total sound level results from the mechanical roof top units and loading areas are expected to be slightly exceeding the sound level limit of 45dBA during the night-time at the building facades of Blocks 1 and 11 (residential units at the west portion of the development) and the proposed Commercial Building. Therefore, noise mitigation measures are recommended.

The garbage pick-up area is located west of the development. The garbage pickup is expected to occur during the daytime. The garbage pickup is generally excluded from the stationary source noise sources, however some activities may be audible at times.

5.0 RECOMMENDED NOISE MITIGATION MEASURES

5.1 OUTDOOR MEASURES

5.1.1 TRAFFIC NOISE OUTDOOR MEASURES

According to M.O.E. policy (Publication NPC-300), balconies that have a maximum depth of less than 4 metres are not considered to be outdoor living areas. Based on the site plan, the proposed buildings will incorporate balconies having a depth of less than 4 metres. For this reason, the balconies were not assessed as outdoor living areas for these amenity areas.

The designated outdoor amenity areas for the Townhouses Blocks 1 to 11 (All Units) is the common outdoor amenity area along The Collegeway. The sound level result at the proposed common outdoor amenity area is expected to be 59 dBA or less at the area location shown on the attached Drawing Y1613. Therefore, noise mitigation measure is not required for the Common Outdoor Amenity Area where the amenity area location is shown on Drawing Y1613.

5.1.2 STATIONARY NOISE SOURCE OUTDOOR MEASURES

As per the sound level results in Table 5, the sound level result at designated Common Amenity Area is expected to meet the sound level limits of 50 dBA during the daytime and 45 dBA at night-time.

Therefore, noise mitigation measures are not required due to stationary noise sources.

5.2 VENTILATION REQUIREMENTS

5.2.1 VENTILATION REQUIREMENTS DUE TO ROAD TRAFFIC

Ventilation requirements were determined using the sound levels at the building facades listed in Table 4.

MANDATORY CENTRAL AIR CONDITIONERS

Based on the information in Table 4, most of the building is expected to be above 65dBA during the daytime and/or above 60dBA during the nighttime due to road traffic. Therefore, mandatory air conditioning is required for the following locations:

- Blocks 1 to 11 (All Units)
- Proposed Commercial Building

The following warning clause Type D must be incorporated into the Site Plan Agreement, which will be registered on title and should be included in all offers of purchase, sale and lease of suites noted above:

Warning Clause Type D:

"This Suite was fitted with a central ventilation system 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 CENTRAL AIR CONDITIONERS

Based on the information in Table 4, mandatory air conditioning is required for all the residential units. Therefore, there are no provision for air conditioning requirements.

5.2.2 VENTILATION REQUIREMENTS (STATIONARY NOISE SOURCES)

The commercial/industrial developments to the west are mostly daytime facilities and the noise activities of concern are the mechanical roof top units and the delivery activities.

Based on the MOE Noise Guideline, the use of air conditioning is not acceptable for noise mitigation in the context of controlling the noise from a stationary source. However, if a building is designed with air conditioning (central ventilation) due to transportation noise sources, then air conditioning may provide further noise mitigation for stationary noise sources given that the windows are kept closed if the stationary noise sources are audible at times.

Therefore, mandatory air conditioning is recommended for the following locations as a means of noise mitigation measure to allow the windows and doors to be closed if the noise activities exceed the sound level limits:

- Blocks 1 and 11(All Units)
- Proposed Commercial Building

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

Warning Clause Type D:

"This Suite was fitted with a central ventilation system 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"

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. Detailed floor plans of the proposed dwelling units are provided by Guthrie Muscovitch Architects dated February 2016.

DAYTIME SOUND LEVELS

Residential Units:

For the worst case location during daytime, (Block 11 South Unit) the daytime dwelling wall sound level of 69.05 dBA was calculated at the fourth storey living/dining room. To ensure acceptable daytime indoor sound levels of 45dBA from road noise sources, the overall building components must provide an STC rating of 34 for windows and STC 39 for exterior wall construction.

Commercial Units:

For the proposed commercial building a daytime sound level of 70.47 dBA was calculated due to road traffic. To ensure acceptable daytime indoor sound level of 50 dBA, an STC rating of 30 would be required for windows and STC 35 for exterior wall construction.

NIGHT-TIME SOUND LEVELS

Residential Units:

For the worst case location during night-time, (Block 1, South Unit) the night-time dwelling wall sound level of 65.78 dBA was calculated at the fourth storey bedroom. To ensure acceptable night-time indoor sound levels of 40dBA from road noise sources, the overall building components must provide an STC rating of 34 for windows and STC 39 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, Upgraded windows and wall constructions are required for Blocks 1 and 6 to 11 (All Units). For Blocks 2 to 5 (All Units), standard Ontario Building Code building construction is sufficient.

WINDOWS

The following are some window configurations meeting an STC rating of 34:

- double glazing 4mm x 4mm thickness with 25mm air space (Slider) or
- double glazing 4mm x 4mm thickness with 13mm air space (Casement/Fixed) or
- double glazing 3mm x 6mm thickness with 16mm air space (Slider) or
- any other window type yielding a similar or greater STC rating

EXTERIOR WALLS

The following exterior wall constructions EW5 meet the STC 39 rating:

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 brick/concrete.

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

5.4 WARNING CLAUSES

Due to the high ambient noise from the road sources and commercial activities, a warning clause is recommended in the event that some activities are audible at times.

We recommend the following warning clause to be incorporated into the Site Plan Agreement, which will be registered on title and included in all offers of purchase and sale or lease of suites noted below.

- Blocks 1 to 11 (All Units)
- Proposed Commercial Building

Warning Clause Type A

“Occupants are advised that sound levels due to increasing road traffic and the existing commercial/industrial developments may occasionally interfere with some activities of the occupants as the sound level will exceed the noise criteria of the Municipality and the Ministry of the Environment and Climate Change”

6.0 SUMMARY OF NOISE MITIGATION MEASURES

The summary of noise abatement measures are listed in the following Table 6 identifying sound barriers, mandatory central air conditioners, provision for central air conditioners, building components and warning clauses.

TABLE 6: SUMMARY OF NOISE MITIGATION MEASURES				
BLOCKS/UNITS	VENTILATION REQUIREMENTS	BUILDING COMPONENTS	SOUND BARRIERS	WARNING CLAUSES
Block 1 (All Units)	Mandatory Air Conditioning	Windows: STC 33 Walls: STC 38	-	Type A, D
Block 11 (All Units)	Mandatory Air Conditioning	Windows: STC 34 Walls: STC 39	-	Type A, D
Blocks 2 to 5 (All Units)	Mandatory Air Conditioning	Windows: OBC Walls: OBC	-	Type A, D
Blocks 6 to 10 (All Units)	Mandatory Air Conditioning	Windows: STC 32 Walls: STC 37	-	Type A, D
Common Outdoor Amenity Area	-	-	No	-
Proposed Commercial Building	Mandatory Air Conditioning	Windows: OBC Walls: OBC	-	Type A, D

* Common Outdoor Amenity Area location as shown on the attached Drawing Y1613.

7.0 RECOMMENDATIONS AND CONCLUSION

RECOMMENDATIONS

1. Mandatory air conditioning is required for all Stacked Townhouse (Blocks 1 to 11) and the Proposed Commercial Building.
2. Upgraded windows and exterior wall constructions are required for Blocks 1, 6 to 11 (All the Units).
3. The location and installation of the outdoor air conditioning device on the roof Terraces 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.
4. The garbage pick-up area is located west of the proposed development. The garbage pickup is expected to occur during the daytime. The garbage pickup is generally excluded from the stationary source noise sources, however some activities may be audible at times.
5. All applicable warning clauses shall be listed in the City of Mississauga Site Plan Agreement and also be inserted in the Agreements of Purchase and Sale or Lease and registered on title.
6. For the Proposed Commercial Building, the details of the mechanical roof top units are not available at this time. Further investigation is recommended to ensure the sound levels at the adjacent receptor locations meet the MOE sound levels limits once this information becomes available.
7. Prior to construction of the buildings and dwelling units, it is recommended that the architectural plans to be reviewed to ensure all building components, ducting systems and air conditioning locations meet the acoustical requirements.
8. 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 and the City of Mississauga are expected to be achieved using the abatement measures in this report and as shown on the attached Drawing DWG Y1613.

Respectfully submitted,

YCA ENGINEERING Limited

Hava Jouharchi, P.Eng.
Senior Project Engineer



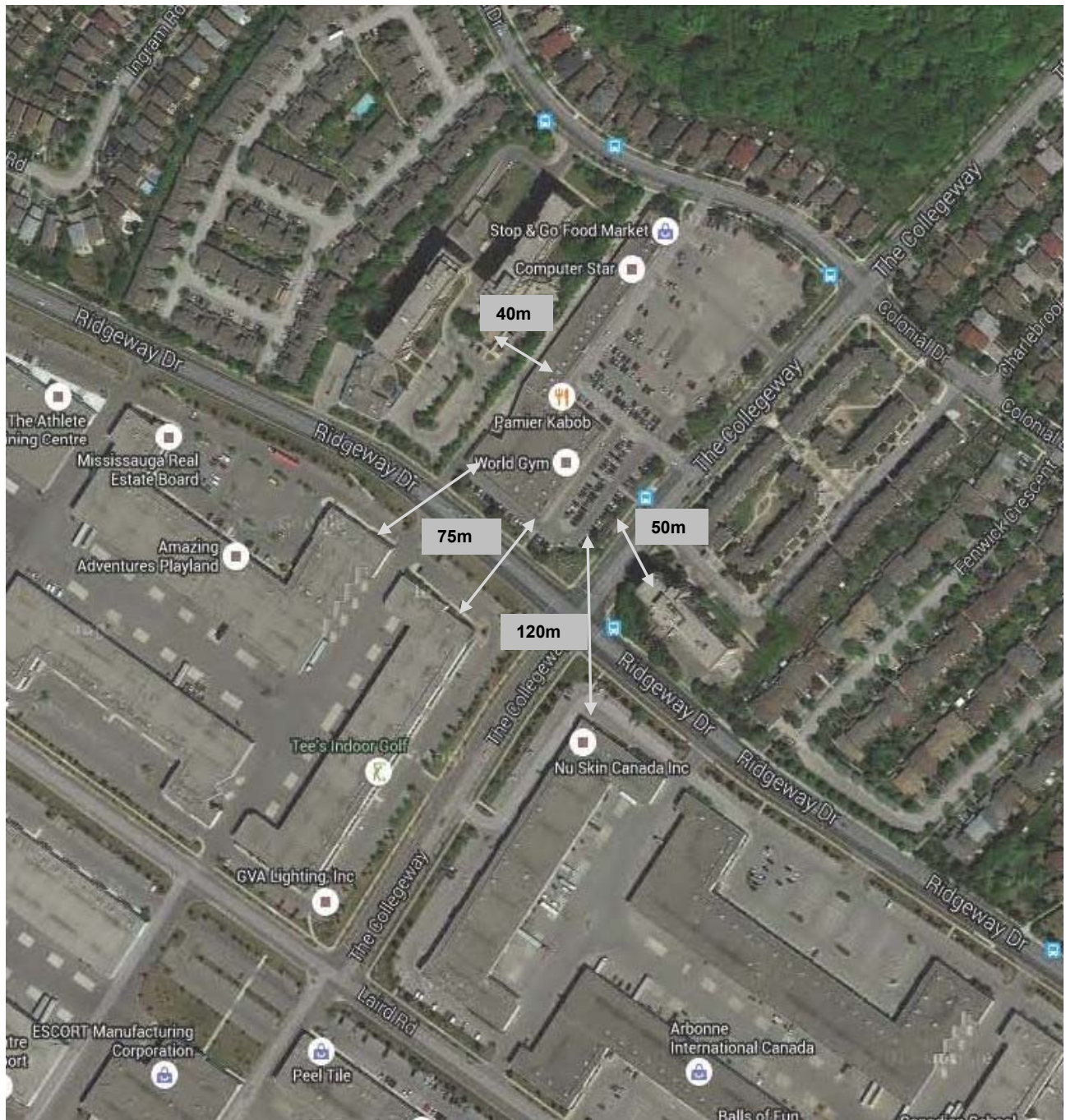



FIGURE 2 - LOCATION OF THE STATIONARY NOISE SOURCES

APPENDIX 1

TRAFFIC DATA

Date:	21-Apr-16	NOISE REPORT FOR PROPOSED DEVELOPMENT			
REQUESTED BY:					
Name:	Hava Jouharchi				
Company:	YCA Engineering Ltd				
Fax#:	() - 0				
PREPARED BY:		Location: The Collegeway @ Ridgeway Drive Ridgeway Drive @ The Collegeway			
Name:	Michael Long x 3016				
Tel#:	(905) 615-3200	Look Up ID#: 355			
ON SITE TRAFFIC DATA					
Specific	Street Names				
	The Collegeway	Ridgeway Drive			
AADT:	20,000	22,000			
# of Lanes:	4 lanes	4 lanes			
% Trucks:	6%	5%			
Medium/Heavy Trucks Ratio:	55/45	55/45			
Day/Night Traffic Split:	90/10	90/10			
Posted Speed Limit:	50kph	60kph			
Gradient of Road:	<2%	<2%			
Ultimate R O W:	26m	26m			
Comments:	Ultimate Traffic Data Only				

From: Afaq, Syed (MTO) [Syed.Afaq@ontario.ca]
Sent: Friday, May 20, 2016 2:16 PM
To: Hava Jouharchi
Subject: RE: RE: Traffic Data Request, Hwy 403 (Apr20,16) Followup

Hi Hava: In response to your request please, find below the information:

Current AADT	= 110,000
Ultimate AADT (Estimated)	= 220,000
Number of Through Lanes	= 8
Posted Speed	= 100 km/hr
% Trucks (Estimated)	= 10.5%

Please note that the above information is estimated based upon our current knowledge of the area, which may be subject to change in the future.

If you require further information, please contact at (416) 585-7307.

Thanks,

Syed Salman Afaq, P.Eng, CAPM, PTP
Planner
Policy & Planning Division

From: Hava Jouharchi
Sent: Wednesday, April 20, 2016 10:39 AM
To: 'Afaq, Syed (MTO)'
Subject: Traffic Data Request, Hwy403 (Apr20,16)

Good Morning Syed,
I have been requested to prepare a noise study in the City of Mississauga (northwest of The Collegeway and Ridgeway Dr)
Key Plan attached.

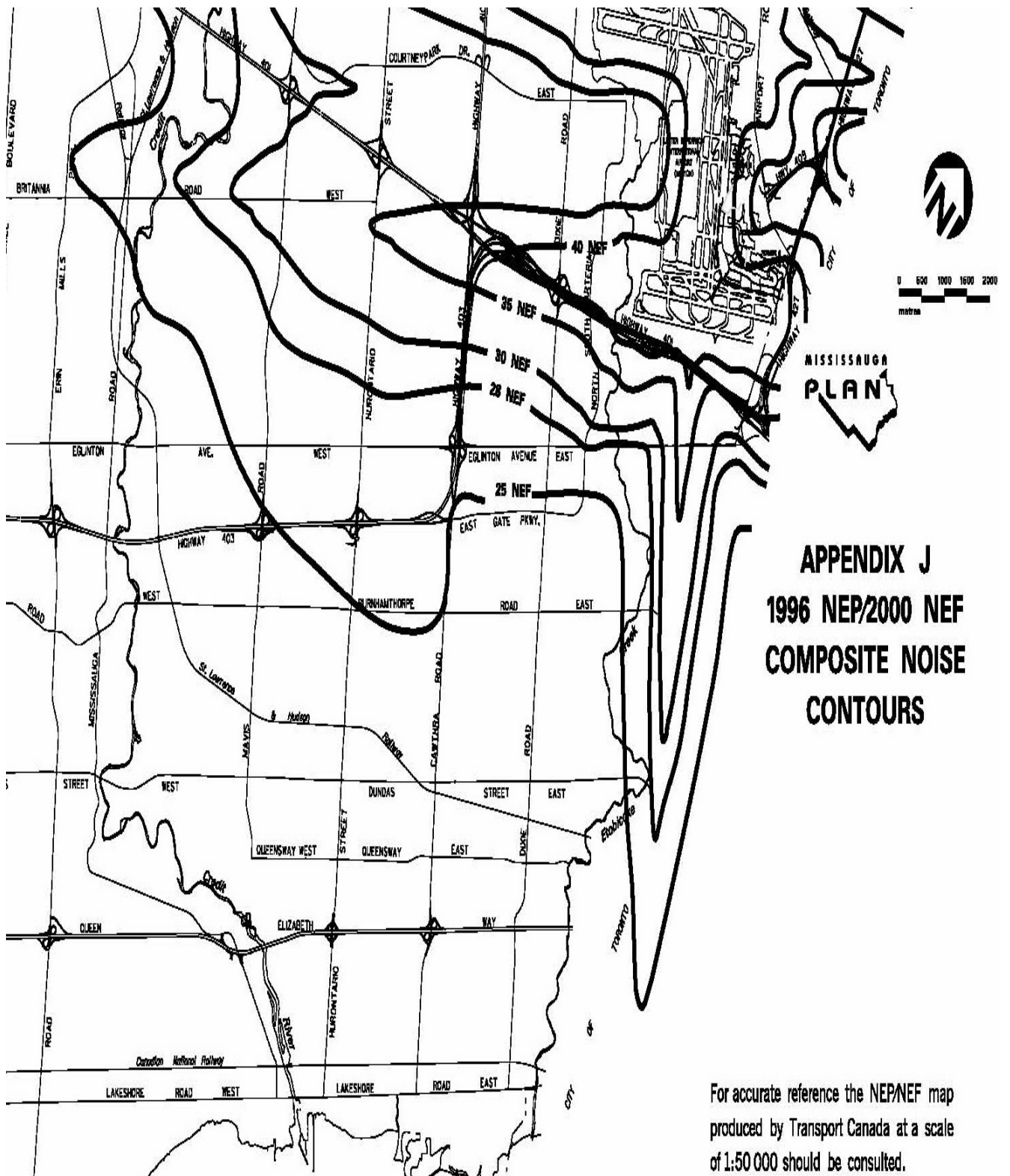
Could you please provide the following at your earliest convenience for Highway 403 (South/East of Burnhamthorpe Rd):

- Ultimate/Forecasted AADT
- Percentage of Trucks
- Ratio of Medium to Heavy Trucks
- Posted speed
- Ultimate # of lanes
- Road gradient.

Thank you in advance.
Hava

*Hava Jouharchi, P.Eng.
Senior Project Engineer*

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APPENDIX 2

STAMSON 5.04

SOUND LEVEL CALCULATIONS

Filename: bk1fw.te Time Period: Day/Night 16/8 hours
Description: Block 1

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

Car traffic volume : 16920/1880 veh/TimePeriod *
Medium truck volume : 594/66 veh/TimePeriod *
Heavy truck volume : 486/54 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 20000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.30
Heavy Truck % of Total Volume : 2.70
Day (16 hrs) % of Total Volume : 90.00

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

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height : 7.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 2: Ridgeway (day/night)

Car traffic volume : 18810/2090 veh/TimePeriod *
Medium truck volume : 545/61 veh/TimePeriod *
Heavy truck volume : 446/50 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 22000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.75
Heavy Truck % of Total Volume : 2.25
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Ridgeway (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 : 58.00 / 58.00 m
Receiver height : 7.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 3: Hwy 403 (day/night)

Car traffic volume : 131273/65627 veh/TimePeriod *
Medium truck volume : 7700/3850 veh/TimePeriod *
Heavy truck volume : 7700/3850 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 2 %

Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 220000

Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00

Medium Truck % of Total Volume : 5.25

Heavy Truck % of Total Volume : 5.25

Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 3: Hwy 403 (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 : 265.00 / 265.00 m
Receiver height : 7.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Result summary (day)

! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.Collegeway ! 1.28 ! 57.82 ! 57.82
2.Ridgeway ! 1.23 ! 63.70 ! 63.70
3.Hwy 403 ! 1.51 ! 65.48 ! 65.48-3= 62.48
-----+-----+-----+-----
Total 66.74 dBA

Result summary (night)

! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.Collegeway ! 1.28 ! 51.29 ! 51.29
2.Ridgeway ! 1.23 ! 57.19 ! 57.19
3.Hwy 403 ! 1.51 ! 66.78 ! 66.78-3= 63.78
-----+-----+-----+-----
Total 64.84 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.74

(NIGHT): 64.84

STAMSON 5.04 SUMMARY REPORT Date: 24-05-2016 11:26:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk6sw.te Time Period: Day/Night 16/8 hours
Description: Block 6

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

Car traffic volume : 16920/1880 veh/TimePeriod *
Medium truck volume : 594/66 veh/TimePeriod *
Heavy truck volume : 486/54 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 20000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.30
Heavy Truck % of Total Volume : 2.70
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Collegeway (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 : 19.00 / 19.00 m
Receiver height : 7.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 2: Ridgeway (day/night)

Car traffic volume : 18810/2090 veh/TimePeriod *
Medium truck volume : 545/61 veh/TimePeriod *
Heavy truck volume : 446/50 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 22000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.75
Heavy Truck % of Total Volume : 2.25
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Ridgeway (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 50 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 222.00 / 222.00 m
Receiver height : 7.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 3: Hwy 403 (day/night)

Car traffic volume : 131273/65627 veh/TimePeriod *
Medium truck volume : 7700/3850 veh/TimePeriod *
Heavy truck volume : 7700/3850 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 220000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 5.25
 Heavy Truck % of Total Volume : 5.25
 Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 3: Hwy 403 (day/night)

 Angle1 Angle2 : -90.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1 / 1
 House density : 50 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 347.50 / 347.50 m
 Receiver height : 7.50 / 10.50 m
 Topography : 1 (Flat/gentle slope; no barrier)

Result summary (day)

	! source !	Road	! Total
	! height !	Leq	! Leq
	! (m) !	(dBA)	! (dBA)
1.Collegeway	! 1.28 !	67.07	! 67.07
2.Ridgeway	! 1.23 !	52.34	! 52.34
3.Hwy 403	! 1.51 !	58.27	! 58.27-3= 55.27
Total			67.48 dBA

Result summary (night)

	! source !	Road	! Total
	! height !	Leq	! Leq
	! (m) !	(dBA)	! (dBA)
1.Collegeway	! 1.28 !	60.54	! 60.54
2.Ridgeway	! 1.23 !	45.83	! 45.83
3.Hwy 403	! 1.51 !	59.68	! 59.68-3= 56.68
Total			62.14 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.48
 (NIGHT): 62.14

STAMSON 5.04 SUMMARY REPORT Date: 24-05-2016 11:26:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk11fw.te Time Period: Day/Night 16/8 hours
Description: Block 11

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

Car traffic volume : 16920/1880 veh/TimePeriod *
Medium truck volume : 594/66 veh/TimePeriod *
Heavy truck volume : 486/54 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 20000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.30
Heavy Truck % of Total Volume : 2.70
Day (16 hrs) % of Total Volume : 90.00

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

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 19.00 / 19.00 m
Receiver height : 7.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 2: Ridgeway (day/night)

Car traffic volume : 18810/2090 veh/TimePeriod *
Medium truck volume : 545/61 veh/TimePeriod *
Heavy truck volume : 446/50 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 22000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.75
Heavy Truck % of Total Volume : 2.25
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Ridgeway (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 : 58.00 / 58.00 m
Receiver height : 7.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 3: Hwy 403 (day/night)

Car traffic volume : 131273/65627 veh/TimePeriod *
Medium truck volume : 7700/3850 veh/TimePeriod *
Heavy truck volume : 7700/3850 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 220000

Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 5.25
 Heavy Truck % of Total Volume : 5.25
 Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 3: Hwy 403 (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 : 265.00 / 265.00 m
 Receiver height : 7.50 / 10.50 m
 Topography : 1 (Flat/gentle slope; no barrier)

Result summary (day)

	! source !	Road !	Total
	! height !	Leq !	Leq
	! (m) !	(dBA)	(dBA)
1.Collegeway	! 1.28 !	64.06 !	64.06
2.Ridgeway	! 1.23 !	63.70 !	63.70
3.Hwy 403	! 1.51 !	65.48 !	65.48-3= 62.48
Total			69.05 dBA

Result summary (night)

	! source !	Road !	Total
	! height !	Leq !	Leq
	! (m) !	(dBA)	(dBA)
1.Collegeway	! 1.28 !	57.53 !	57.53
2.Ridgeway	! 1.23 !	57.19 !	57.19
3.Hwy 403	! 1.51 !	66.78 !	66.78-3=63.78
Total			65.78 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.05
 (NIGHT): 65.78

STAMSON 5.04 SUMMARY REPORT Date: 06-06-2016 10:15:12
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
 Filename: ola45.te Time Period: Day/Night 16/8 hours
 Description: Common Outdoor Amenity

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

```
-----
Car traffic volume   : 16920/1880   veh/TimePeriod  *
Medium truck volume :   594/66     veh/TimePeriod  *
Heavy truck volume  :   486/54     veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement      :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
  24 hr Traffic Volume (AADT or SADT): 20000
  Percentage of Annual Growth         :    0.00
  Number of Years of Growth          :    0.00
  Medium Truck % of Total Volume      :    3.30
  Heavy Truck % of Total Volume       :    2.70
  Day (16 hrs) % of Total Volume     :   90.00
-----
```

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

```
-----
Angle1   Angle2           : -50.00 deg   50.00 deg
Wood depth           :      0           (No woods.)
No of house rows     :      0 / 1
House density        :      50 %
Surface              :      1           (Absorptive ground surface)
Receiver source distance : 40.00 m
Receiver height      : 1.50 m
Topography           :      2           (Flat/gentle slope; with barrier)
Barrier angle1       : -50.00 deg   Angle2 : 50.00 deg
Barrier height       : 0.00 m
Barrier receiver distance : 5.00 m
Source elevation     : 0.00 m
Receiver elevation   : 0.00 m
Barrier elevation    : 0.00 m
-----
```

Road data, segment # 2: Ridgeway (day/night)

```
-----
Car traffic volume   : 18810/2090   veh/TimePeriod  *
Medium truck volume :   545/61     veh/TimePeriod  *
Heavy truck volume  :   446/50     veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     2 %
Road pavement      :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
  24 hr Traffic Volume (AADT or SADT): 22000
  Percentage of Annual Growth         :    0.00
  Number of Years of Growth          :    0.00
  Medium Truck % of Total Volume      :    2.75
  Heavy Truck % of Total Volume       :    2.25
  Day (16 hrs) % of Total Volume     :   90.00
-----
```

Data for Segment # 2: Ridgeway (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 : 148.00 m
Receiver height      : 1.50 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 : 5.00 m
Source elevation     : 0.00 m
Receiver elevation   : 0.00 m
Barrier elevation    : 0.00 m
-----
```

Road data, segment # 3: Hwy 403 (day/night)

```

-----
Car traffic volume : 80004/39996 veh/TimePeriod *
Medium truck volume : 10001/5000 veh/TimePeriod *
Heavy truck volume : 10001/5000 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
  24 hr Traffic Volume (AADT or SADT): 150000
  Percentage of Annual Growth : 0.00
  Number of Years of Growth : 0.00
  Medium Truck % of Total Volume : 10.00
  Heavy Truck % of Total Volume : 10.00
  Day (16 hrs) % of Total Volume : 66.67
Data for Segment # 3: Hwy 403 (day/night)
-----

```

```

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 1
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 305.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 10.00 m
Barrier receiver distance : 8.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m

```

Result summary (day)

```

-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+
1.Collegeway ! 1.28 ! 58.09 ! 58.09 *
2.Ridgeway ! 1.23 ! 49.03 ! 49.03 *
3.Hwy 403 ! 1.78 ! 54.22 ! 54.22 -3= 51.22
-----+-----+-----+
Total 59.33 dBA

```

Project: The Collegeway
Date: June 3, 2016

Source Table

Name	Id	Result, PWL				Lr / Li	Operating Time			K0	Freq.	Direct	Height	Coordinates		
		Day (dBA)	Evening (dBA)	Night (dBA)	Type		Day (min)	Special (min)	Night (min)					X (m)	Y (m)	Z (m)
S1	S1	94.5	94.5	94.5	94.5 .w		60	60	60	30	0	(none)	2 g	162.35	920.85	27
S2	S2	90.5	90.5	90.5	90.5 .w		60	60	60	30	0	(none)	1.2 g	166.47	924.16	26.2
S3	S3	87.5	87.5	87.5	87.5 .w		60	60	60	30	0	(none)	1.2 g	170.41	927.07	26.2
S6	S6	99.5	99.5	99.5	99.5 .w		60	60	60	30	0	(none)	1.2 g	142.35	926.34	26.2
S5	S5	91.5	91.5	91.5	91.5 .w		60	60	60	30	0	(none)	1.2 g	151.58	933.65	26.2
S4	S4	87.5	87.5	87.5	87.5 .w		60	60	60	30	0	(none)	2 g	161.79	942.64	27
S7	S7	99.5	99.5	99.5	99.5 .w		60	60	60	30	0	(none)	2 g	186.38	874.16	27
S8	S8	91.5	91.5	91.5	91.5 .w		60	60	60	30	0	(none)	1.2 g	191.15	870.45	26.2
S9	S9	87.5	87.5	87.5	87.5 .w		60	60	60	30	0	(none)	1.2 g	199.35	860.4	26.2
S12	S12	89.5	89.5	89.5	89.5 .w		60	60	60	30	0	(none)	1.2 g	109.09	887.92	7.2
S11	S11	91.5	91.5	91.5	91.5 .w		60	60	60	30	0	(none)	1.2 g	111.74	885.54	7.2
S10	S10	91.5	91.5	91.5	91.5 .w		60	60	60	30	0	(none)	1.2 g	114.39	883.42	7.2
S13	S13	91.5	91.5	91.5	91.5 .w		60	60	60	30	0	(none)	1.2 g	137.94	867.28	7.2
S14	S14	90.5	90.5	90.5	90.5 .w		60	60	60	30	0	(none)	1.2 g	140.59	864.37	7.2
S15	S15	94.5	94.5	94.5	94.5 .w		60	60	60	30	0	(none)	1.2 g	133.84	871.11	7.2
S17	S17	90.5	90.5	90.5	90.5 .w		60	60	60	30	0	(none)	1.2 g	90.04	888.72	7.2
S16	S16	94.5	94.5	94.5	94.5 .w		60	60	60	30	0	(none)	1.2 g	93.48	885.01	7.2
S19	S19	94.5	94.5	94.5	94.5 .w		60	60	60	30	0	(none)	1.2 g	77.07	921.8	7.2
S18	S18	97.5	97.5	97.5	97.5 .w		60	60	60	30	0	(none)	1.2 g	79.98	918.63	7.2
S20	S20	94.5	94.5	94.5	94.5 .w		60	60	60	30	0	(none)	1.2 g	161.5	840.02	7.2
S21	S21	94.5	94.5	94.5	94.5 .w		60	60	60	30	0	(none)	1.2 g	164.68	837.9	7.2
S22	S22	91.5	91.5	91.5	91.5 .w		60	60	60	30	0	(none)	1.2 g	167.32	834.19	7.2
T4	T4	100	100	100	100 .w		20	20	20	10	0	500 (none)	2 a	126.61	862.62	2
T10	T10	100	100	100	100 .w		20	20	20	10	0	500 (none)	1.2 g	163.54	827.79	1.2
T1	T1	100	100	100	100 .w		20	20	20	10	0	500 (none)	2 a	113.69	876.31	2
T3	T3	100	100	100	100 .w		20	20	20	10	0	500 (none)	1.2 g	105.85	870.14	1.2
T6	T6	100	100	100	100 .w		20	20	20	0	0	500 (none)	2 a	114.67	851.66	2
T11	T11	100	100	100	100 .w		20	20	20	10	0	500 (none)	1.2 g	157.71	822.46	1.2
T12	T12	100	100	100	100 .w		20	20	20	10	0	500 (none)	1.2 g	150.04	816.62	1.2
T7	T7	100	100	100	100 .w		20	20	20	10	0	500 (none)	2 a	88.68	857.64	2
T8	T8	100	100	100	100 .w		20	20	20	0	0	500 (none)	2 a	80.84	875.15	2
T9	T9	100	100	100	100 .w		20	20	20	10	0	500 (none)	2 a	70.33	885.48	2
S23	S23	89.5	89.5	89.5	89.5 .w		60	60	60	30	0	(none)	1 g	139.07	919.18	5
S24	S24	87.5	87.5	87.5	87.5 .w		60	60	60	30	0	(none)	1.2 g	137.07	917.55	5.2

Receiver Table

Name	Id	Level Lr	Height			Coordinates			Lr w/o Noise Control		
			Day (dBA)	Night (dBA)	Noise Type	X (m)	Y (m)	Z (m)	Day (dB(A))	Night (dB(A))	Day (dB(A))
R1	R1	48.9	48.9	45.8 Total	10 a	171.55	902.75	10	48.9	45.8	45.8
R2	R2	44.3	44.3	42.3 Total	10 r	200.31	926.23	10	44.3	42.3	42.3
R3	R3	39	39	37.5 Total	1.5 r	205.19	906.51	1.5	39	37.5	37.5
R4	R4	49.4	49.4	46.3 Total	10 r	173.46	886.82	10	49.4	46.3	46.3

Result Table (No Mitigation)

Receiver Name	ID	Limiting Value		rel. Axis		Distance		Height		Lr w/o Noise Control	
		Day (dB(A))	Night (dB(A))	Station	m	m	m	m	m	Day (dB(A))	Night (dB(A))
R1	R1	0	0	0	0	0	66.94	8	48.9	45.8	45.8
R2	R2	0	0	0	0	0	103.94	8	44.3	42.3	42.3
R3	R3	0	0	0	0	0	96.34	-0.5	39	37.5	37.5
R4	R4	0	0	0	0	0	61.52	8	49.4	46.3	46.3

Receiver
Name: R1
ID: R1
X: 171.55
Y: 902.75
Z: 10.00

Point Source, ISO 9613, Name: "S1", ID: "S1"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	162.35	920.85	27.00	0	500	79.2	78.0	0.0	0.0	39.5	0.1	0.0	0.0	0.0	6.6	0.0	-0.0

Point Source, ISO 9613, Name: "S2", ID: "S2"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	166.47	924.16	26.20	0	500	70.2	69.0	0.0	0.0	39.7	0.1	0.0	0.0	0.0	14.1	0.0	-0.0

Point Source, ISO 9613, Name: "S3", ID: "S3"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	170.41	927.07	26.20	0	500	67.2	66.0	0.0	0.0	40.3	0.1	0.0	0.0	0.0	14.3	0.0	-0.0

Point Source, ISO 9613, Name: "S6", ID: "S6"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	142.35	926.34	26.20	0	500	79.2	78.0	0.0	0.0	43.2	0.1	0.0	0.0	0.0	6.7	0.0	-0.0

Point Source, ISO 9613, Name: "S5", ID: "S5"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	151.58	933.65	26.20	0	500	71.2	70.0	0.0	0.0	43.1	0.1	0.0	0.0	0.0	18.2	0.0	-0.0

Point Source, ISO 9613, Name: "S4", ID: "S4"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	161.79	942.64	27.00	0	500	67.2	66.0	0.0	0.0	44.0	0.1	0.0	0.0	0.0	22.6	0.0	-0.0

Point Source, ISO 9613, Name: "S7", ID: "S7"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	186.38	874.16	27.00	0	500	79.2	78.0	0.0	0.0	42.2	0.1	0.0	0.0	0.0	10.8	0.0	-0.0

Point Source, ISO 9613, Name: "S8", ID: "S8"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	191.15	870.45	26.20	0	500	71.2	70.0	0.0	0.0	43.3	0.1	0.0	0.0	0.0	12.1	0.0	-0.0

Point Source, ISO 9613, Name: "S9", ID: "S9"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	199.35	860.40	26.20	0	500	67.2	66.0	0.0	0.0	45.5	0.1	0.0	0.0	0.0	13.3	0.0	-0.0

Point Source, ISO 9613, Name: "S12", ID: "S12"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	109.09	887.92	7.20	0	500	69.2	68.0	0.0	0.0	47.2	0.1	0.0	0.0	0.0	5.0	0.0	-0.0

Point Source, ISO 9613, Name: "S11", ID: "S11"																	
Nr.	X	Y	Z	Ref.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1	111.74	885.54	7.20	0	500	71.2	70.0	0.0	0.0	46.9	0.1	0.0	0.0	0.0	5.1	0.0	-0.0

Point Source, ISO 9613, Name: "S10", ID: "S10"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	114.39	883.42	7.20	0	500	71.2	70.0	0.0	0.0	46.6	0.1	0.0	0.0	0.0	0.0	0.0	-0.0	24.5	23.2

Point Source, ISO 9613, Name: "S13", ID: "S13"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	137.94	867.28	7.20	0	500	71.2	70.0	0.0	0.0	44.8	0.1	0.0	0.0	0.0	5.2	0.0	-0.0	21.1	19.9

Point Source, ISO 9613, Name: "S14", ID: "S14"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	140.59	864.37	7.20	0	500	70.2	69.0	0.0	0.0	44.9	0.1	0.0	0.0	0.0	5.2	0.0	-0.0	20.0	18.8

Point Source, ISO 9613, Name: "S15", ID: "S15"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	133.84	871.11	7.20	0	500	74.2	73.0	0.0	0.0	44.9	0.1	0.0	0.0	0.0	5.0	0.0	-0.0	24.3	23.0

Point Source, ISO 9613, Name: "S17", ID: "S17"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	90.04	888.72	7.20	0	500	81.0	81.0	0.0	0.0	49.4	0.2	0.0	0.0	0.0	5.0	0.0	-0.0	26.5	26.5

Point Source, ISO 9613, Name: "S16", ID: "S16"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	93.48	885.01	7.20	0	500	85.0	85.0	0.0	0.0	49.1	0.2	0.0	0.0	0.0	3.2	0.0	-0.0	32.5	32.5

Point Source, ISO 9613, Name: "S19", ID: "S19"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	77.07	921.80	7.20	0	500	85.0	85.0	0.0	0.0	50.7	0.2	0.0	0.0	0.0	4.7	0.0	-0.0	29.5	29.5

Point Source, ISO 9613, Name: "S18", ID: "S18"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	79.98	918.63	7.20	0	500	88.0	88.0	0.0	0.0	50.4	0.2	0.0	0.0	0.0	1.9	0.0	-0.0	35.6	35.6

Point Source, ISO 9613, Name: "S20", ID: "S20"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	161.50	840.02	7.20	0	500	74.2	73.0	0.0	0.0	47.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.0	27.0	25.8

Point Source, ISO 9613, Name: "S21", ID: "S21"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	164.68	837.90	7.20	0	500	74.2	73.0	0.0	0.0	47.3	0.1	0.0	0.0	0.0	5.3	0.0	-0.0	21.4	20.2

Point Source, ISO 9613, Name: "S22", ID: "S22"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	167.32	834.19	7.20	0	500	71.2	70.0	0.0	0.0	47.8	0.1	0.0	0.0	0.0	5.1	0.0	-0.0	18.3	17.0

Point Source, ISO 9613, Name: "T4", ID: "T4"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	126.61	862.62	2.00	0	500	84.4	83.2	0.0	0.0	46.7	0.1	1.6	0.0	0.0	15.6	0.0	-0.0	20.5	19.2

Point Source, ISO 9613, Name: "T10", ID: "T10"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	120.30	857.74	1.20	0	500	84.4	83.2	0.0	0.0	47.8	0.1	5.4	0.0	0.0	9.1	0.0	-0.0	22.0	20.8

Point Source, ISO 9613, Name: "T1", ID: "T1"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	163.54	827.79	1.20	0	500	94.4	93.2	0.0	0.0	48.6	0.2	5.6	0.0	0.0	16.0	0.0	-0.0	24.1	22.9

Point Source, ISO 9613, Name: "T3", ID: "T3"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	113.69	876.31	2.00	0	500	84.4	83.2	0.0	0.0	47.1	0.1	1.6	0.0	0.0	7.9	0.0	-0.0	27.7	26.5

Point Source, ISO 9613, Name: "T6", ID: "T6"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	109.19	872.65	2.00	0	500	84.4	83.2	0.0	0.0	47.9	0.1	1.7	0.0	0.0	3.6	0.0	-0.0	31.2	29.9

Point Source, ISO 9613, Name: "T11", ID: "T11"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	105.85	870.14	1.20	0	500	94.4	93.2	0.0	0.0	48.4	0.1	5.5	0.0	0.0	0.0	0.0	-0.0	40.4	39.1

Point Source, ISO 9613, Name: "T12", ID: "T12"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	114.67	851.66	2.00	0	500	84.4	-88.0	0.0	0.0	48.7	0.2	1.7	0.0	0.0	6.2	0.0	-0.0	27.6	-88.0

Point Source, ISO 9613, Name: "T7", ID: "T7"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	157.71	822.46	1.20	0	500	84.4	83.2	0.0	0.0	49.3	0.2	5.8	0.0	0.0	11.0	0.0	-0.0	18.2	17.0

Point Source, ISO 9613, Name: "T8", ID: "T8"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	150.04	816.62	1.20	0	500	84.4	83.2	0.0	0.0	50.0	0.2	6.0	0.0	0.0	11.3	0.0	-0.0	17.0	15.7

Point Source, ISO 9613, Name: "T9", ID: "T9"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	88.68	867.64	2.00	0	500	94.4	93.2	0.0	0.0	50.1	0.2	1.9	0.0	0.0	14.1	0.0	-0.0	28.2	26.9

Point Source, ISO 9613, Name: "S23", ID: "S23"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	80.84	875.15	2.00	0	500	84.4	-88.0	0.0	0.0	50.6	0.2	1.9	0.0	0.0	18.0	0.0	-0.0	13.8	-88.0

Point Source, ISO 9613, Name: "S24", ID: "S24"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	70.33	885.48	2.00	0	500	94.4	93.2	0.0	0.0	51.3	0.2	1.9	0.0	0.0	17.7	0.0	-0.0	23.3	22.1

%3, ISO 9613, Name: "%1", ID: "%2"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	139.07	919.18	5.00	0	500	69.2	68.0	0.0	0.0	42.3	0.1	0.0	0.0	0.0	0.0	0.0	-0.0	26.8	25.6

%3, ISO 9613, Name: "%1", ID: "%2"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	137.07	917.55	5.20	0	500	67.2	66.0	0.0	0.0	42.6	0.1	0.0	0.0	0.0	0.0	0.0	-0.0	24.6	23.3

Line Source, ISO 9613, Name: "TL2", ID: "TL2"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	111.77	864.60	2.00	0	500	97.5	-88.0	0.0	0.0	48.1	0.1	1.7	0.0	0.0	0.0	0.0	-0.0	47.6	-88.0
2	103.07	856.92	2.00	0	500	100.2	-88.0	0.0	0.0	49.4	0.2	1.8	0.0	0.0	1.1	0.0	-0.0	47.8	-88.0
3	96.03	850.72	2.00	0	500	94.0	-88.0	0.0	0.0	50.3	0.2	1.9	0.0	0.0	1.2	0.0	-0.0	40.5	-88.0

Line Source, ISO 9613, Name: "TL1", ID: "TL1"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	71.34	871.11	2.00	0	500	94.0	-88.0	0.0	0.0	51.5	0.2	2.0	0.0	0.0	11.9	0.0	-0.0	28.5	-88.0
2	76.63	865.28	2.00	0	500	99.3	-88.0	0.0	0.0	51.2	0.2	1.9	0.0	0.0	8.0	0.0	-0.0	37.9	-88.0

Line Source, ISO 9613, Name: "TL3", ID: "TL3"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
1	159.98	814.41	2.00	0	500	96.1	-88.0	0.0	0.0	50.0	0.2	1.9	0.0	0.0	11.0	0.0	-0.0	33.1	-88.0
2	152.97	808.46	2.00	0	500	99.4	-88.0	0.0	0.0	50.7	0.2	1.9	0.0	0.0	7.1	0.0	-0.0	39.5	-88.0

APPENDIX 3

SOUND LEVEL CRITERIA

MINISTRY OF THE ENVIRONMENT

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	R	Less than or equal to 65 dBA	Building compliant with the Ontario Building Code
	O		
	A	Greater than 65 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	D		
	R	Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
	A		
	I	Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	L		

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	R	Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
	O		
	A	Greater than 65 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	D		
	R	Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
	A		
	I	Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	L		

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 and the existing commercial/industrial developments may occasionally interfere with some activities of the occupants as the sound level will exceed the noise criteria of the Municipality and the Ministry of the Environment and Climate Change"

TYPE D:

"This Suite was fitted with a central ventilation system 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"

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.

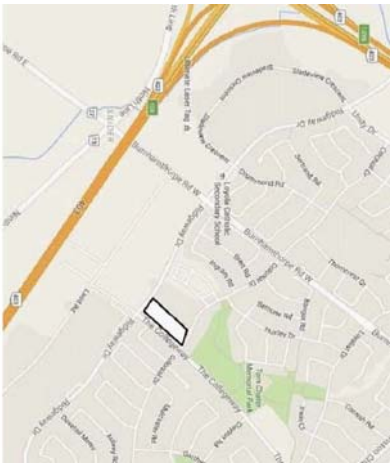
EXTERIOR WALL STC RATINGS

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

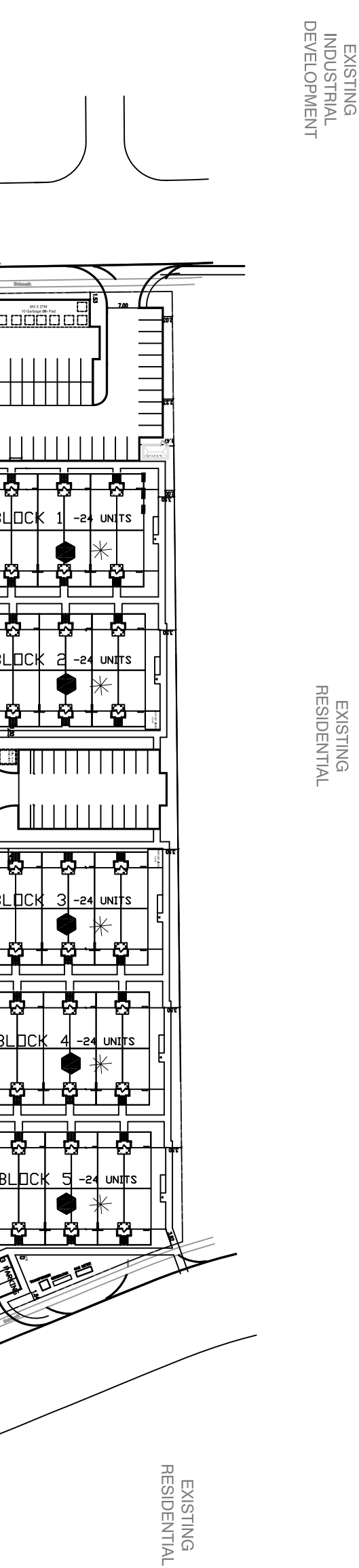
Source: National Research Council, Division of Building Research

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.



KEY PLAN
N.T.S.



LEGEND:

- MANDATORY CENTRAL AIR CONDITIONING AND WARNING CLAUSE D
- OPTIONAL CENTRAL AIR CONDITIONING AND WARNING CLAUSE C
- * WARNING CLAUSE A
- OLA OUTDOOR AMENITY AREAS (Terrace)
- PROPOSED NOISE BARRIER AND WARNING CLAUSE B

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SITE PLAN –
NOISE
MITIGATION MEASURES

THE COLLEGEWAY
PROPOSED 4 STOREY
STACKED TOWNHOUSES
CITY OF MISSISSAUGA
3355 THE COLLEGEWAY L.P.

DRAWING: DWG Y1613

Scale: NTS DATE: June 2016