279 Sarnia Road

Environmental Noise Assessment

Project Location:
279 Sarnia Road, London, ON

Prepared for:
Palumbo Homes
1055 Sarnia Road
London, ON N6H 5J9

Prepared by:
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February 1, 2024

MTE File No.: 52851-200

Engineers, Scientists, Surveyors.

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1.0 INTRODUCTION

MTE Consultants Inc. (MTE) was retained by Palumbo Homes to complete an Environmental Noise Assessment for a proposed residential development at 279 Sarnia Road in London, Ontario. The 0.22 hectare property is located on the north side of Sarnia Road, and northeast from the Sarnia Road and Coombs Ave intersection. The conceptual layout includes two stacked back-to-back townhouses identified as Block A and Block B, an exterior amenity area, landscaped areas and associated driveway and parking area. Proposed townhouse Blocks are 3-storeys high and contain the total of 20 units and an outdoor common amenity area.

The subject site is generally bounded by Sarnia Road to the south, existing residential properties to the west and north, and university grounds to the east. The Site location is shown on **Figure 1.1**.

The purpose of this study is to support the Zoning By-law Amendment and evaluate the road traffic noise impact from forecasted traffic volumes of Sarnia Road on the subject property. This study recommends noise control measures to meet the Ministry of the Environment, Conservation and Parks' (MECP) guidelines, while satisfying the planning requirements of the City of London.

2.0 CRITERIA

This report and analysis have been completed using the requirements of the MECP's Publication *NPC-300: Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning (2013)*.

2.1 Outdoor Noise Level Limits

The recommended outdoor daytime noise levels, taken from Table C-1 in the Publication NPC-300 are:

Usage	Between Hours	Road Noise Levels
Outdoor Living Area (OLA)	07:00 to 23:00	55dBA L_{eq}

Table 2.1 summarizes the noise control measures required for road traffic sources.

Table 2.1 – Required Noise Control Measures for Outdoor Living Areas

Daytime (07:00-23:00)	Exceeds Objective By	Noise Control Measures
55dBA or less	0dBA	No requirements or conditions
56-60dBA	1-5dBA	Noise Warning Clause
>60dBA	>5dBA	Alternative Land Use Alternative Draft Plan Designs Barriers

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PROJECT

279 SARNIA ROAD

TITLE

LOCATION PLAN

Drawn: AH	Scale: 1:10000	Figure: **1.1**
Checked: BP	Project No.: 52851-200	
Date: 2024-02-01	Rev No.: 0	

C-D: P:\P\52851\200\52851-200 FIGURE 1.DWG

Plot Date: January 30, 2024 - 4:07 PM

2.2 Indoor Noise Level Limits

Similar to outdoor noise levels limits, the recommended indoor noise levels taken from Table C-2 in the Publication NPC-300 are:

Usage	Between Hours	Road Noise Levels (L_{eq})
Indoor Living Area	07:00 to 23:00	45dBA
Indoor Living Area (Sleeping Quarters)	23:00 to 07:00	40dBA

Outdoor sound levels (calculated at the plane of window) are used to determine if acoustical mitigation measures are required. **Table 2.2** summarizes control measures, for indoor living area sound levels, based on a 10dBA reduction for a standard wall section applied to the outdoor sound levels due to road traffic.

Table 2.2 – Required Noise Control Measures for Indoor Living Areas

Daytime (07:00-23:00)	Nighttime (23:00-07:00)	Exceeds Objective By	Noise Control Measures
45dBA or less	40dBA or less	0dBA	No requirements or conditions
46-55dBA	41-50dBA	1-10dBA	Noise Warning Clause Provisions for central A/C
>55dBA	>50dBA	>10dBA	Noise Warning Clause Central A/C installed prior to occupancy. Building components designed to achieve indoor sound level criteria

2.3 Calculation Parameters

The allowable outdoor noise level for outdoor living areas is 55dBA, with up to 60dBA being allowed with a noise warning clause. The noise level calculation for outdoor daytime noise has been included for the proposed exterior amenity area located in the northeast corner of the property, at a height of 1.5m above ground level.

The allowable indoor daytime (07:00 - 23:00) and nighttime (23:00 - 07:00) noise levels are 45dBA and 40dBA, respectively. Indoor noise levels are assumed to be 10dBA less than outdoor noise levels, measured at the plane of window, for buildings with standard wall construction. Daytime and nighttime noise calculations for indoor noise levels at locations which represent the worst-case impact have been included. It is typically assumed that daytime and nighttime living areas are most conservatively represented at the top floor of the building. Since building plans are not available, it is assumed the top floor is represented at the building envelope face, 4.5m above ground level.

3.0 ANALYSIS PROCEDURES

3.1 Traffic Data

The road traffic noise source considered in this analysis included:

- Sarnia Road (east of Coombs Avenue)

The City of London Transportation Division provided the Turning Movement Count and AADT Report for the intersection of Sarnia Road and Coombs Avenue, dated October 31, 2023, and estimated a 1.5% annual increase in traffic. Traffic counts recorded the percent of truck traffic but did not differentiate between heavy and medium trucks. MTE estimated a 50/50 split of heavy and medium trucks.

The road traffic information, projected 11 years to 2034, is summarized in **Table 3.1**. See **Appendix A** for road traffic data provided by the City of London.

3.2 Traffic Calculation Methods

Resulting road noise levels were calculated using the Stamson v5.03 computer program approved by the MECP. Daytime and nighttime noise levels were calculated based on 24-hour volume breakdown. The daytime volume (over 16 hours) is obtained by multiplying the determined AADT by the fraction of daily traffic expected during the daytime period (90%). The nighttime volumes are obtained in a similar manner, except using 10% for expected nighttime traffic (over 8 hours). Noise calculation results are attached in **Appendix B**.

Table 3.1 – Projected 2034 Road Traffic Volumes for Sarnia Road

Sarnia Road	Projected 2034 AADT – 25,646vpd Speed Limit = 50km/hr Road Grade = 1.4%		
	Cars	Medium Trucks (1.65%)	Heavy Trucks (1.65%)
Daytime Volume (16hr)	22,320	381	381
Nighttime Volume (8hr)	2,480	42	42

4.0 RESULTS AND ANALYSIS

4.1 Noise Level Calculations

This noise report has been completed to determine noise levels from Sarnia Road for the proposed residential development and to recommend noise mitigation measures, if required. Stamson output files are attached in **Appendix B**.

4.1.1 Points of Assessment (POA)

Points of Assessment (POA) are typically placed in critical locations where the resulting noise levels are expected to be high due to the close proximity to the noise sources, or where the thresholds outlined in **Table 2.2** are achieved. As such, a total of three POAs have been modelled along the proposed building envelopes to assess if special building components (windows, walls, etc.) will be required to attenuate incoming road traffic noise. Calculations for POA2 and POA3 were completed using shielding effects from the proposed Block A.

4.1.2 Outdoor Living Area (OLA)

Similarly, Outdoor Living Area (OLA) Points of Assessment are typically placed in critical locations where the resulting noise levels are assumed to be high due to the close proximity to the noise source, or where thresholds outlined in **Table 2.1** are achieved. As such, one OLA, located within the proposed common amenity area, was modelled to assess if additional noise shielding will be required to attenuate road traffic noise. The noise level calculation incorporated a shielding effect from the proposed Block A and Block B.

Table 4.1 indicates the distances measured to the specified receiver locations within the development used during the modelling analysis.

Table 4.1 – Receiver Location Distance Measurements

Point of Assessment	Location	Receiver Height (m)	Distance from Sarnia Road (m)
POA 1	South side of Block A	4.5 (2nd Floor)	21.3
POA 2	Southeast corner of Block B	4.5 (2nd Floor)	62.7
POA 3	East side Block A	4.5 (2nd Floor)	27.9
OLA1	Common Amenity Area	1.5	70.8

Calculated noise levels for the projected traffic volume growth scenario for these POAs are summarized in **Table 4.2**. Refer to **MTE Drawing 52851-200-NA1.1** for a graphical representation of the locations of the Points of Assessment.

Table 4.2 - ROAD TRAFFIC NOISE LEVELS

Point of Assessment	DAYTIME NOISE LEVELS					NIGHTTIME NOISE LEVELS				
	Calculated Outdoor Road Noise Level (dBA) POW[1]	Attenuated Indoor Road Noise Level[2] (dBA)	Indoor Noise Level Limit (dBA)	**Exceeds Indoor Noise Level By (dBA)**	Comments	Calculated Outdoor Road Noise Level (dBA) POW[1]	Attenuated Indoor Noise Level[2] (dBA)	Indoor Noise Level Limit (dBA)	**Exceeds Indoor Noise Level By (dBA)**	Comments
POA1 (Block A, 2nd floor)	65.7	55.7	45.0	**10.7**	Special Builidng Components, Type D Warning Clause and A/C installed	59.1	49.1	40.0	**9.1**	Daytime Governs
POA2 (Block B, 2nd floor)	60.1	50.1	45.0	**5.1**	Type C Warning Clause and provisions for A/C	53.5	43.5	40.0	**3.5**	Daytime Governs
POA3 (Block A, 2nd floor)	61.6	51.6	45.0	**6.6**	Type C Warning Clause and provisions for A/C	55.0	45.0	40.0	**5.0**	Daytime Governs

Outdoor Living Area Point of Assessment	Calculated Outdoor Road Noise Level (dBA)	Outdoor Noise Level Limit (dBA)	**Exceeds Outdoor Noise Level By (dBA)**	Comments
OLA1	57.9	55.0	**2.9**	Type A Noise Warning Clause

Notes: 1. POW means Plane of Window

2. Assuming standard wall construction (provides 10dBA noise level attenuation)

3. POA means Point of Assessment. OLA means Outdoor Living Area.

4. Results for POA2, POA3 and OLA1 were calculated assuming the potential shielding effect from proposed Townhouse Blocks, where applicable.

4.2 Mitigation Measures

This noise report has been completed to determine the resulting noise impacts from Sarnia Road on the proposed development at 279 Sarnia Road.

4.2.1 Building Components

Noise calculations indicate that POA1, the Points of Assessment representing the townhouse units nearest Sarnia Road in Block A, have plane of window noise levels exceeding 65dBA during the daytime, which warrant a check for the need of special building components. The site Plan provided by Orchard Design Studios Inc. (dated November 17, 2023) was used to complete sample STC calculations to estimate the required STC ratings for building components in living areas nearest Sarnia Road. These calculations, included in **Appendix C**, are based on preliminary site plan and are simply samples. Actual STC requirements, based on final plans, will be required prior to the issuance of building permits. Prior to ordering and installation of any required special components, architectural details of the walls, windows, and exterior doors must be verified by an Acoustical Professional to ensure that they meet the required STC ratings.

A brief summary of sample STC rating requirements for different building components is outlined in **Table 4.3.**

Table 4.3 – Sample Building Components for Road Noise Attenuation

Location	POW (dBA)	Indoor Daytime	Required STC Wall	Required STC Window
Indoor living space facing Sarnia Road	66	45	32 (south wall)	22 (south window)

Notes and Assumptions:

- A typical vinyl siding wall section (vinyl, exterior sheathing, 2x6 studs @ 16" o/c, insulation with 6mm vapour barrier and 1/2" gypsum board) provides an STC rating of 38.
- Adding a second layer of interior gypsum board to a typical vinyl wall section would add 2 points to the provided STC rating.
- Adding resilient channels to a typical vinyl siding wall section would add 5 points to the provided STC rating.
- A typical brick wall section (3 ½” brick veneer, 1” airspace, exterior sheathing, 2x6 studs at 16” o/c, and insulation with a 6mm vapour barrier and ½” gypsum board) provides an STC rating of 53.
- A typical double pane window with a glass/air-space/glass dimension of 3(13)3 generally provides an STC rating of 28. A typical glass patio french door provides an STC rating of 26.

The results summarized in **Table 4.3** indicate that units facing Sarnia Road could require special building components to meet the minimum STC rating requirements. As previously mentioned, these calculations are based on preliminary site plan and actual STC requirements, based on final plans, will be required prior to the issuance of building permits.

4.2.2 Noise Attenuation Barrier

As described in Section 4.1.2, an analysis for additional noise attenuation in the form of a noise attenuation barrier would only be required if the resulting noise level exceeded 60dBA at the proposed outdoor amenity space. As such, no barrier will be required for the proposed outdoor amenity space.

4.2.3 Noise Warning Clauses and Ventilation Requirements

Noise calculations indicate that the indoor noise levels at POA1 (for all floors) exceed the maximum allowable indoor daytime noise level of 55dBA (corresponding to plane of window limit of 65dBA). As such, all townhouse units nearest Sarnia Road in Block A (for all floors) shall have central air conditioning installed prior to occupancy and a Type D Noise Warning Clause shall be registered on title.

Noise calculations indicate that the indoor noise levels at POA2 and POA3 (for all floors) exceed the indoor daytime noise level of 45dBA (corresponding to plane of window limit of 55dBA). As such, all townhouse units in Block B and all townhouse units in Block A facing north, shall be fitted with a forced air heating system to permit the future installation of central air conditioning and a Type C Noise Warning Clause shall be registered on title.

Noise calculations indicate that the outdoor noise level at OLA1 will exceed the outdoor daytime noise level of 55dBA, which warrants the need for a Type A Noise Warning Clause to be registered on title for all units within the development.

5.0 CONCLUSIONS

1. An analysis for attenuating noise barrier requirements is not required for the subject site.
2. All units nearest Sarnia Road in Block A (for all floors) will require an analysis to determine the extent, if required, of special building components (walls, windows and doors) designed to achieve indoor sound level criteria (45dBA for daytime living spaces / 40dBA for nighttime living spaces). **Prior to the issuance of building permits, architectural details of these components are to be verified by a qualified Acoustical Professional to ensure the required sound transmission loss rating will be acceptable to meet indoor sound levels.** Furthermore, these units shall be fitted with central air conditioning and a Type D Noise Warning Clause shall be registered on title.
3. All other units in Block A (facing north) and all units in Block B will require forced air heating as well as provisions for the future installation of central air conditioning by the owner. Furthermore, a Type C Noise Warning Clause shall be registered on title.
4. A Type A Noise Warning Clause shall be registered on title for all units in Block A and Block B.

Noise Warning Clauses

5. The following noise warning clauses shall be registered on title for the units where the resulting noise level exceeds the recommended criteria. The clauses shall be worded as follows:

   All units nearest Sarnia Road in Block A – all floors:

   Noise Warning Clause TYPE A+D: “Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks. This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.”

   All other units in Block A and Block B:

   Noise Warning Clause TYPE A+C: “Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks. This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.”

All of which is respectfully submitted,

MTE Consultants Inc.

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Drawing

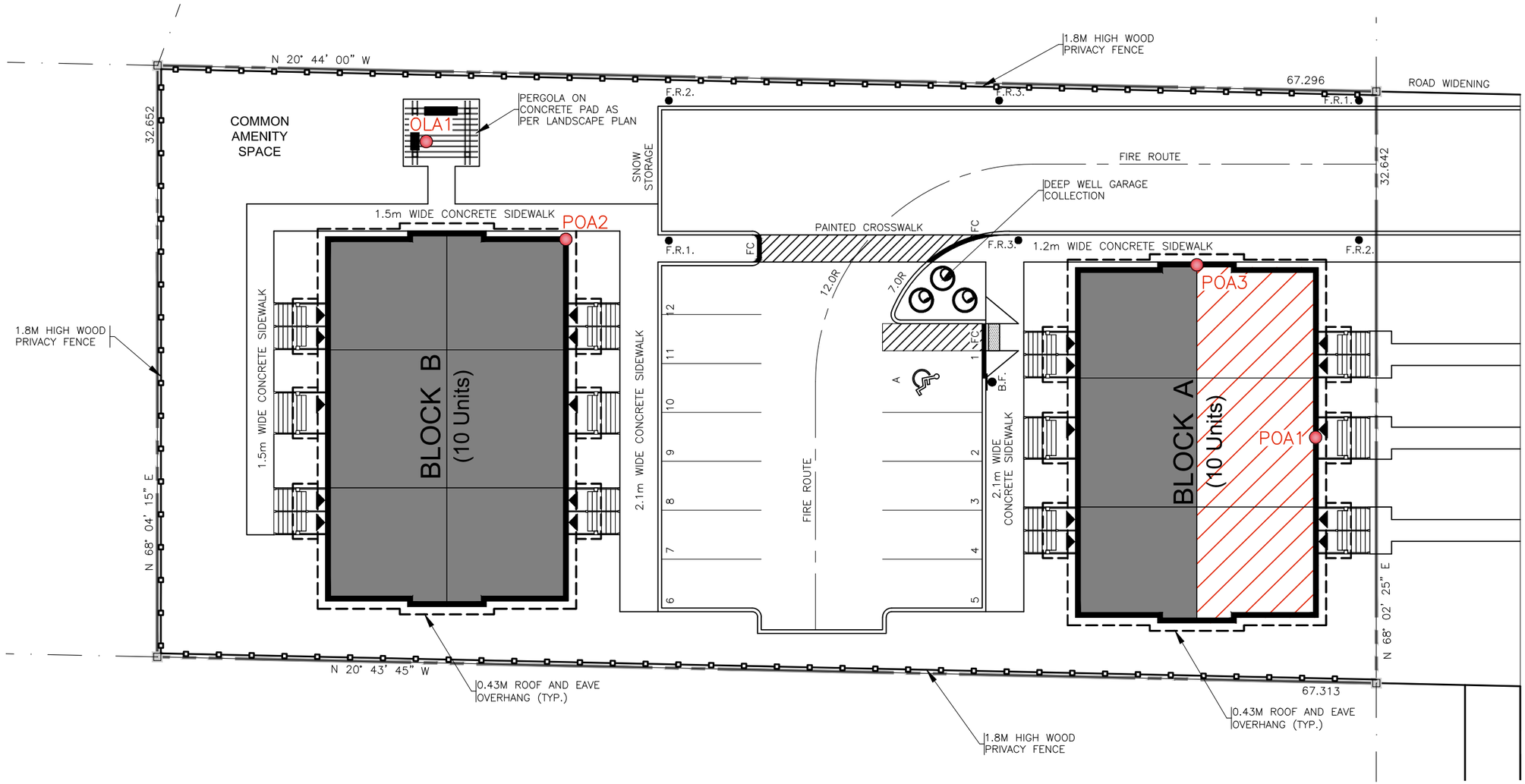
CAD: P:\P\52851\200\52851-200 NOISE_FIG 2.DWG

NOISE ASSESSMENT

POINT OF ASSESSMENT	LOCATION	RECEIVER HEIGHT (m)	DISTANCE FROM SARNIA ROAD (m)
POA1	SOUTH FACE OF BLOCK A	4.5 (2nd FLOOR)	21.3
POA2	SOUTHEAST CORNER OF BLOCK B	4.5 (2nd FLOOR)	62.7
POA3	EAST FACE OF BLOCK A	4.5 (2nd FLOOR)	27.9
OLA1	COMMON AMENITY AREA	1.5	70.8

LEGEND

- SITE BOUNDARY
- POA1 — POINT OF ASSESSMENT (POA)
- TYPE A+ D WARNING CLAUSE, UNITS REQUIRING SPECIAL BUILDING COMPONENTS AND A/C
- TYPE A+ C WARNING CLAUSE PROVISIONS FOR A/C REQUIRED



Plot Date: January 30, 2024 - 4:10 PM

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PROJECT
267 SARNIA ROAD

TITLE
NOISE ASSESSMENT PLAN

Drawn	Scale	Figure
AH	1:250	2.1
Checked: BP	Project No.: 52851-200	
Date: 2024-02-01	Rev No.: 0	

Appendix A

Traffic Data

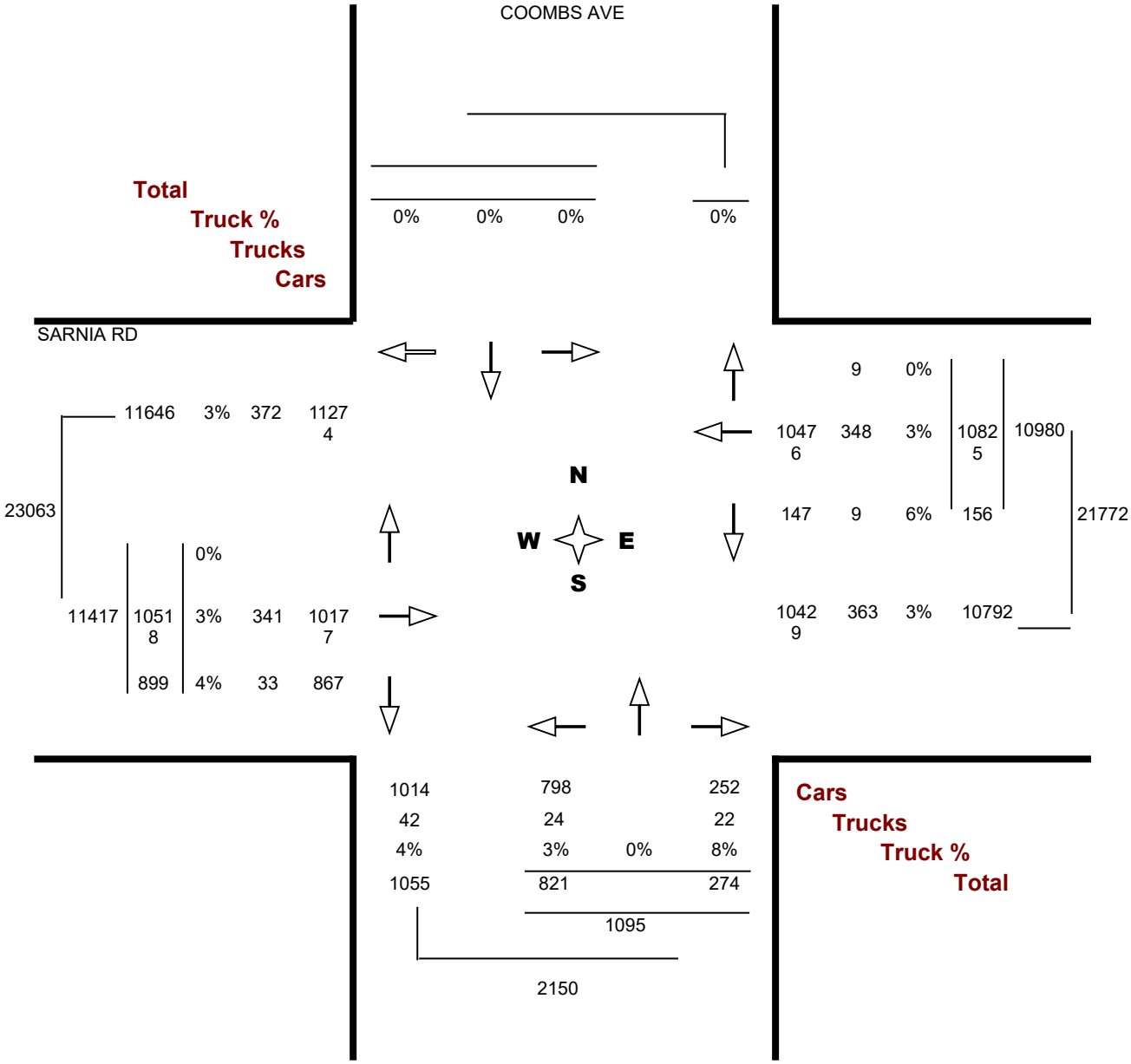
Turning Movements Count - AADT Report

Location..... COOMBS AVE @ SARNIA RD

Municipality. LONDON

Traffic Cont. Stop sign

Count Date.. Tuesday, October 31, 2023 **AADT factor..** 1.81315194235253



Appendix B

STAMSON Output Files

STAMSON 5.0 NORMAL REPORT Date: 18-01-2024 16:01:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: sarpoa1.te Time Period: Day/Night 16/8 hours Description:

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

Car traffic volume : 22320/2480 veh/TimePeriod *
Medium truck volume : 381/42 veh/TimePeriod *
Heavy truck volume : 381/42 veh/TimePeriod *
Posted speed limit : 50 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): 21772
 Percentage of Annual Growth : 1.50
 Number of Years of Growth : 11.00
 Medium Truck % of Total Volume : 1.65
 Heavy Truck % of Total Volume : 1.65
 Day (16 hrs) % of Total Volume : 90.00
 Data for Segment # 1: Sarnia (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 : 21.30 / 21
.30 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier) Reference angle : 0.00

Results segment # 1: Sarnia (day)

Source height = 1.13 m

ROAD (0.00 + 65.68 + 0.00) = 65.68 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
--- -90 90
0.00 67.20 0.00 -1.52 0.00 0.00 0.00 0.00 65.68 ----------

Segment Leq : 65.68 dBA

Total Leq All Segments: 65.68 dBA

Results segment # 1: Sarnia (night)

Source height = 1.13 m

ROAD (0.00 + 59.13 + 0.00) = 59.13 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
--- -90 90
0.00 60.65 0.00 -1.52 0.00 0.00 0.00 0.00 59.13 ----------

Segment Leq : 59.13 dBA

Total Leq All Segments: 59.13 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.68
 (NIGHT): 59.13

STAMSON 5.0 NORMAL REPORT Date: 18-01-2024 13:02:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: sarpoa2.te Time Period: Day/Night 16/8 hours Description:

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

Car traffic volume : 22320/2480 veh/TimePeriod *
Medium truck volume : 381/42 veh/TimePeriod *
Heavy truck volume : 381/42 veh/TimePeriod *
Posted speed limit : 50 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): 21772
 Percentage of Annual Growth : 1.50
 Number of Years of Growth : 11.00
 Medium Truck % of Total Volume : 1.65
 Heavy Truck % of Total Volume : 1.65
 Day (16 hrs) % of Total Volume : 90.00
 Data for Segment # 1: Sarnia (day/night) ----------

Angle1 Angle2 : -90.00 deg 2.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface) Receiver source distance : 62.70 / 62
.70 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier) Reference angle : 0.00

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

Car traffic volume : 22320/2480 veh/TimePeriod *
Medium truck volume : 381/42 veh/TimePeriod *
Heavy truck volume : 381/42 veh/TimePeriod *
Posted speed limit : 50 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): 21772 Percentage of Annual Growth : 1.
50
 Number of Years of Growth : 11.00
 Medium Truck % of Total Volume : 1.65
 Heavy Truck % of Total Volume : 1.65
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Sarnia (day/night) ----------

Angle1 Angle2 : 2.00 deg 37.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface) Receiver source distance : 62.70 / 62
.70 m
Receiver height : 4.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 2.00 deg
Angle2 : 37.00 deg
Barrier height : 11.30 m
Barrier receiver distance : 27.98 / 27.98 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

 Road data, segment # 3: Sarnia (day/night) ----------

Car traffic volume : 22320/2480 veh/TimePeriod *
Medium truck volume : 381/42 veh/TimePeriod *
Heavy truck volume : 381/42 veh/TimePeriod *
Posted speed limit : 50 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): 21772
 Percentage of Annual Growth : 1.50
 Number of Years of Growth : 11.00
 Medium Truck % of Total Volume : 1.65
 Heavy Truck % of Total Volume : 1.65
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 3: Sarnia (day/night) ----------

Angle1 Angle2 : 37.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0 Surface : 2 (Reflective ground surface) Receiver
source distance : 62.70 / 62.70 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier) Reference angle : 0.00

Results segment # 1: Sarnia (day)

Source height = 1.13 m

ROAD (0.00 + 58.07 + 0.00) = 58.07 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
--- -90 2
0.00 67.20 0.00 -6.21 -2.91 0.00 0.00 0.00 58.07 ----------

Segment Leq : 58.07 dBA

Results segment # 2: Sarnia (day)

Source height = 1.13 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) ----------+---------+---------+---------
1.13 ! 4.50 ! 3.00 ! 3.00

ROAD (0.00 + 33.88 + 0.00) = 33.88 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
--- 2 37 0
.00 67.20 0.00 -6.21 -7.11 0.00 0.00 -20.00 33.88 ---

Segment Leq : 33.88 dBA

Results segment # 3: Sarnia (day)

Source height = 1.13 m

ROAD (0.00 + 55.68 + 0.00) = 55.68 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
--- 37 90
0.00 67.20 0.00 -6.21 -5.31 0.00 0.00 0.00 55.68 ---

Segment Leq : 55.68 dBA

Total Leq All Segments: 60.06 dBA

Results segment # 1: Sarnia (night)

Source height = 1.13 m

ROAD (0.00 + 51.52 + 0.00) = 51.52 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
--- -90 2
0.00 60.65 0.00 -6.21 -2.91 0.00 0.00 0.00 51.52 ---

Segment Leq : 51.52 dBA

Results segment # 2: Sarnia (night)

Source height = 1.13 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) ----------+---------
----+----------+----------
1.13 ! 4.50 ! 3.00 ! 3.00

ROAD (0.00 + 27.32 + 0.00) = 27.32 dBA Angle1 Angle2 Alpha RefLeq P.Adj D.Adj
F.Adj W.Adj H.Adj B.Adj SubLeq ---
--- 2 37 0.00 60.65 0.00 -6.21 -7.11 0.00 0.00 -
20.00 27.32 ---

Segment Leq : 27.32 dBA

Results segment # 3: Sarnia (night)

Source height = 1.13 m

ROAD (0.00 + 49.13 + 0.00) = 49.13 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
--- 37 90
0.00 60.65 0.00 -6.21 -5.31 0.00 0.00 0.00 49.13 ---

Segment Leq : 49.13 dBA

Total Leq All Segments: 53.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.06
(NIGHT): 53.51

STAMSON 5.0 NORMAL REPORT Date: 18-01-2024 13:04:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: sarpoa3.te Time Period: Day/Night 16/8 hours Description:

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

Car traffic volume : 22320/2480 veh/TimePeriod *
Medium truck volume : 381/42 veh/TimePeriod *
Heavy truck volume : 381/42 veh/TimePeriod *
Posted speed limit : 50 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): 21772
 Percentage of Annual Growth : 1.50
 Number of Years of Growth : 11.00
 Medium Truck % of Total Volume : 1.65
 Heavy Truck % of Total Volume : 1.65
 Day (16 hrs) % of Total Volume : 90.00
 Data for Segment # 1: Sarnia (day/night) ----------

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface) Receiver source distance : 27.85 / 27
.85 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier) Reference angle : 0.00

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

Car traffic volume : 22320/2480 veh/TimePeriod *
Medium truck volume : 381/42 veh/TimePeriod *
Heavy truck volume : 381/42 veh/TimePeriod *
Posted speed limit : 50 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): 21772 Percentage of Annual Growth : 1.
50
 Number of Years of Growth : 11.00
 Medium Truck % of Total Volume : 1.65
 Heavy Truck % of Total Volume : 1.65
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Sarnia (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 : 27.85 / 27
.85 m
Receiver height : 4.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 0.00 deg
Angle2 : 90.00 deg
Barrier height : 11.30 m
Barrier receiver distance : 0.01 / 0.01 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

 Results segment # 1: Sarnia (day)

Source height = 1.13 m

ROAD (0.00 + 61.50 + 0.00) = 61.50 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
--- -90 0
0.00 67.20 0.00 -2.69 -3.01 0.00 0.00 0.00 61.50 ----------

Segment Leq : 61.50 dBA

Results segment # 2: Sarnia (day)

Source height = 1.13 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) ----------+---------
----+-------------+--------------
 1.13 ! 4.50 ! 4.50 ! 4.50

ROAD (0.00 + 42.89 + 0.00) = 42.89 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
--- 0 90 0
.00 67.20 0.00 -2.69 -3.01 0.00 0.00 -18.61 42.89 ----------

Segment Leq : 42.89 dBA

Total Leq All Segments: 61.56 dBA

Results segment # 1: Sarnia (night)

```
Source height = 1.13 m

ROAD (0.00 + 54.95 + 0.00) = 54.95 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
-------------------------------------------------------------------  -90 0
0.00 60.65 0.00 -2.69 -3.01 0.00 0.00 0.00 54.95 ----------------------------
------------------------------------------------

Segment Leq : 54.95 dBA


Results segment # 2: Sarnia (night)
-----------------------------------

Source height = 1.13 m

Barrier height for grazing incidence
------------------------------------
Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) ------------+---------
----+------------+--------------
 1.13 ! 4.50 ! 4.50 ! 4.50

ROAD (0.00 + 36.34 + 0.00) = 36.34 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
-------------------------------------------------------------------  0 90 0
.00 60.65 0.00 -2.69 -3.01 0.00 0.00 -18.61 36.34  --------------------------
------------------------------------------------

Segment Leq : 36.34 dBA

Total Leq All Segments: 55.01 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 61.56
 (NIGHT): 55.01
```

STAMSON 5.0 NORMAL REPORT Date: 18-01-2024 13:05:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: sarolaf.te Time Period: Day/Night 16/8 hours Description:

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

Car traffic volume : 22320/2480 veh/TimePeriod *
Medium truck volume : 381/42 veh/TimePeriod *
Heavy truck volume : 381/42 veh/TimePeriod *
Posted speed limit : 50 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): 21772
 Percentage of Annual Growth : 1.50
 Number of Years of Growth : 11.00
 Medium Truck % of Total Volume : 1.65
 Heavy Truck % of Total Volume : 1.65
 Day (16 hrs) % of Total Volume : 90.00
 Data for Segment # 1: Sarnia (day/night) ----------

Angle1 Angle2 : -90.00 deg 8.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface) Receiver source distance : 70.79 / 70
.79 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier) Reference angle : 0.00

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

Car traffic volume : 22320/2480 veh/TimePeriod *
Medium truck volume : 381/42 veh/TimePeriod *
Heavy truck volume : 381/42 veh/TimePeriod *
Posted speed limit : 50 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): 21772 Percentage of Annual Growth : 1.
50
 Number of Years of Growth : 11.00
 Medium Truck % of Total Volume : 1.65
 Heavy Truck % of Total Volume : 1.65
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Sarnia (day/night) ----------

Angle1 Angle2 : 8.00 deg 32.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface) Receiver source distance : 70.79 / 70
.79 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 8.00 deg
Angle2 : 32.00 deg
Barrier height : 11.30 m
Barrier receiver distance : 36.23 / 36.23 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

 Road data, segment # 3: Sarnia (day/night) ----------

Car traffic volume : 22320/2480 veh/TimePeriod *
Medium truck volume : 381/42 veh/TimePeriod *
Heavy truck volume : 381/42 veh/TimePeriod *
Posted speed limit : 50 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): 21772
 Percentage of Annual Growth : 1.50
 Number of Years of Growth : 11.00
 Medium Truck % of Total Volume : 1.65
 Heavy Truck % of Total Volume : 1.65
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 3: Sarnia (day/night) ----------

Angle1 Angle2 : 32.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0 Surface : 2 (Reflective ground surface) Receiver
source distance : 70.79 / 70.79 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 32.00 deg
Angle2 : 90.00 deg
Barrier height : 11.30 m
Barrier receiver distance : 5.60 / 5.60 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Sarnia (day)

Source height = 1.13 m

```
ROAD (0.00 + 57.82 + 0.00) = 57.82 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
-------------------------------------------------------------------  -90 8
0.00 67.20 0.00 -6.74 -2.64 0.00 0.00 0.00 57.82 ---------------------------
-------------------------------------------------

Segment Leq : 57.82 dBA

 Results segment # 2: Sarnia (day)
---------------------------------

Source height = 1.13 m

Barrier height for grazing incidence
------------------------------------
Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) ------------+---------
----+-------------+--------------
 1.13 ! 1.50 ! 1.31 ! 1.31

ROAD (0.00 + 31.71 + 0.00) = 31.71 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
-------------------------------------------------------------------  8 32 0
.00 67.20 0.00 -6.74 -8.75 0.00 0.00 -20.00 31.71  ---------------------------
-------------------------------------------------

Segment Leq : 31.71 dBA


Results segment # 3: Sarnia (day)
---------------------------------

Source height = 1.13 m

Barrier height for grazing incidence
------------------------------------
Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (
m) ! Barrier Top (m) ------------+-------------+-------------+--------------
 1.13 ! 1.50 ! 1.47 ! 1.47

ROAD (0.00 + 37.99 + 0.00) = 37.99 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
-------------------------------------------------------------------  32 90
0.00 67.20 0.00 -6.74 -4.92 0.00 0.00 -17.55 37.99  ---------------------------
-------------------------------------------------

Segment Leq : 37.99 dBA

Total Leq All Segments: 57.88 dBA


Results segment # 1: Sarnia (night)
-----------------------------------

Source height = 1.13 m

ROAD (0.00 + 51.27 + 0.00) = 51.27 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
-------------------------------------------------------------------  -90 8
0.00 60.65 0.00 -6.74 -2.64 0.00 0.00 0.00 51.27 ---------------------------
-------------------------------------------------

Segment Leq : 51.27 dBA


Results segment # 2: Sarnia (night)
-----------------------------------

Source height = 1.13 m

Barrier height for grazing incidence
------------------------------------
Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) ------------+---------
----+-------------+--------------
 1.13 ! 4.50 ! 2.78 ! 2.78

ROAD (0.00 + 25.16 + 0.00) = 25.16 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
-------------------------------------------------------------------  8 32 0
.00 60.65 0.00 -6.74 -8.75 0.00 0.00 -20.00 25.16  ---------------------------
-------------------------------------------------

Segment Leq : 25.16 dBA


Results segment # 3: Sarnia (night)
-----------------------------------

Source height = 1.13 m
 Barrier height for grazing incidence
------------------------------------
Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) ------------+---------
----+-------------+--------------
 1.13 ! 4.50 ! 4.23 ! 4.23

ROAD (0.00 + 32.52 + 0.00) = 32.52 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -------
-------------------------------------------------------------------  32 90
0.00 60.65 0.00 -6.74 -4.92 0.00 0.00 -16.47 32.52  ---------------------------
-------------------------------------------------

Segment Leq : 32.52 dBA

Total Leq All Segments: 51.34 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 57.88
(NIGHT): 51.34

Appendix C

Sample STC Calculations

Proposed living space on 2nd floor, South facing unit in Block A, 279 Sarnia Road, London ON
SAMPLE SOUND TRANSMISSION CLASS CALCULATION
Sarnia Road Noise Source

Project Number: 52851-200
Date: January 18, 2024
Design By: BP

1. Free field sound level: 66 dBA
   Correction for reflections: 3 dBA
   Outdoor sound level: 69 dBA
   Indoor sound level: 45 dBA — Subtract indoor from outdoor sound level
   Required Noise Reduction (NR): 24 dB

2. Sound comes from: 0 to 90 degrees angle
   C_1 Correction from Table 7.7: 0 dB
   Sum: 24 dB

Component: South Wall

3. Transmits 50 % of total sound energy
   C_2 from Table 7.8: 3 dB

4. Component area: 11.59 m^2 — 45 % of floor area
   Room floor area: 26.00 m^2
   Room absorption category: intermediate
   C_3 from Table 7.9: -2 dB

5. Noise spectrum type: D (select from Fig. 7.5)
   Component category: d (select from Table 7.10)
   C_4 from Table 7.10: 7 dB

   Required STC: 32

Component: South Window

3. Transmits 50 % of total sound energy
   C_2 from Table 7.8: 3 dB

4. Component area: 2.25 m^2 — 9 % of floor area
   Room floor area: 26.00 m^2
   Room absorption category: intermediate
   C_3 from Table 7.9: -9 dB

5. Noise spectrum type: D (select from Fig. 7.5)
   Component category: c (select from Table 7.10)
   C_4 from Table 7.10: 4 dB

   Required STC: 22