



S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

Preliminary Environmental Noise Assessment Report

141-149 MAIN STREET EAST, GRIMSBY, ONTARIO

**APPLICATION FOR OFFICIAL PLAN AMENDMENT
AND ZONING BY-LAW AMENDMENT**

Prepared For:

LOSANI HOMES (1998) LTD.

June 2020

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1.0 INTRODUCTION

S. Llewellyn and Associates Limited were retained to complete a Preliminary Environmental Noise Assessment in support of the Official Plan Amendment and Zoning By-law Amendment Applications by Losani Homes (1998) Ltd. for a proposed residential condominium development in Grimsby, Ontario.

The development is located at the northwest corner of Main Street East (Regional Road 81) and Wentworth Drive. The 0.89 ha site is bound by Main Street East to the south, Wentworth Drive to the east, existing residential lands to the north, and existing/future residential/commercial lands to the west. The proponent proposes to construct a 7-storey condominium building consisting of 215 units with associated surface and underground parking, concrete curbing and landscaped areas. It is also proposed to have one of the existing buildings on the property incorporated into the proposed condominium building.

The purpose of this study is to evaluate the traffic noise impact on the subject property from forecasted traffic volumes of Main Street East (Regional Road 81) with a projection date of 2040 (20 years). This study also recommends when requirements for further analysis and potential noise control measures to meet the Ministry of the Environment's guidelines, while satisfying the planning requirements of the Town of Grimsby.

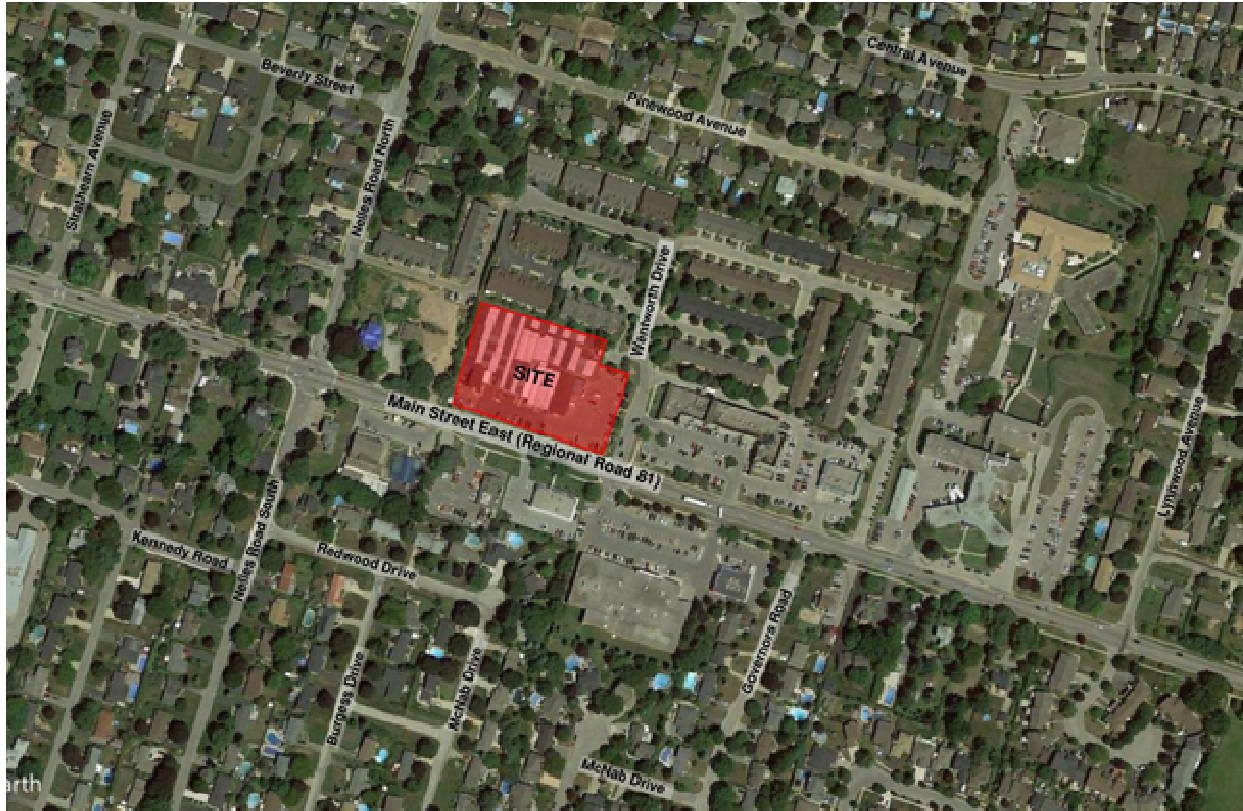


Figure 1: Site Location Plan

2.0 NOISE SOURCES

The subject property is proposed to be developed as a multi-unit residential development. As part of the Official Plan Amendment and Zoning By-law Amendment Applications process, the Town of Grimsby has identified the requirement to assess the noise impacts on the proposed development.

2.1 Road Noise

Based on a review of aerial mapping the only applicable traffic noise source with an impact on the subject site is the road traffic noise from Main Street East (Regional Road 81).

2.2 Rail Noise

There are no railways in the vicinity of the subject site contributing to the nuisance noise levels.

3.0 CRITERIA

The report and analysis have been completed using the requirements of the Ministry of the Environment's (MECP's) Publication NPC:300: *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning (2013)* and The Region of Niagara policy document PW5.NO1.0: *The Regional Road Noise Control Policy*.

3.1 Noise Levels for Outdoor Living Areas

The recommended outdoor day-time noise levels, taken from Publication NPC-300, Table C-1, "Sound Level Limit for Outdoor Living Areas, Road and Rail" and are as follows:

Usage	Between Hours	Combined Noise Levels
Outdoor Amenity Area	07:00 to 23:00	55 dBA L_{eq}

Table 1 summarizes the noise control measures required for various conditions for the Outdoor Living Areas as per Publication NPC-300, Section C7.1, "Road Noise Control".

Table 1: Required Noise Control Measures for Outdoor Living Areas – Road Traffic

Day-time 07:00-23:00	Exceeds Objective By	Noise Control Measures
≤55 dBA	0 dBA	<ul style="list-style-type: none"> No requirements or conditions
>55 to ≤60 dBA	>0 to 5 dBA	<ul style="list-style-type: none"> Noise control measures to reduce noise levels to 55 dBA and/or Noise Warning Clause Type A
>60 dBA	>5 dBA	<ul style="list-style-type: none"> Noise control measures to reduce noise levels to 55 dBA* and/or Noise Warning Clause Type B

3.2 Indoor Noise Level Limits

The recommended indoor noise levels are given in Table C-2: *Indoor Sound Level Limit – Road and Rail* as found in Publication NPC-300 and can be summarized for road traffic noise as follows:

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

Outdoor sound levels (calculated at the plane of the bedroom window for night-time hours and at the plane of the living room window for day-time hours) are used to determine if acoustical mitigation measures are required. Section 3.2.1 of the Publication NPC-300 dictates noise control measures will not be required where outdoor levels resulting from road traffic are 50 dBA or less as calculated at the pane of the window during day or night time hours. Table 2 and

Table 3 summarize the ventilation and building components requirements respectively as outlined in Publication NPC-300, Section C7.1, "Road Noise Control".

Table 2: Ventilation Requirements for Indoor Living Areas – Road Traffic

Day-time ¹ 07:00-23:00	Night-time ¹ 23:00-07:00	Exceeds Objective By	Noise Control Measures
≤55 dBA	≤50 dBA	0 dBA	<ul style="list-style-type: none"> No requirements or conditions
>55 to ≤65 dBA	>50 to ≤60 dBA	>0 to 10 dBA	<ul style="list-style-type: none"> Provisions for air conditioning Noise Warning Clause C
>65 dBA	>60 dBA	>10 dBA	<ul style="list-style-type: none"> Central A/C or other ventilation system installed prior to occupancy Noise Warning Clause D

¹ – Outdoor noise levels measured at the plane of the window

Table 3: Building Component Requirements for indoor Living Areas - Road Traffic

Day-time ¹ 07:00-23:00	Night-time ¹ 23:00-07:00	Noise Control Measures
≤65 dBA	≤60 dBA	<ul style="list-style-type: none"> No requirements or conditions
>65 dBA	>60 dBA	<ul style="list-style-type: none"> Design of building components including windows, walls and doors to maintain sound level limits as set out in Table C-2 of Publication NPC-300

¹ – Outdoor noise levels measured at the plane of the window

3.3 Calculation Parameters

As noted above, the allowable level for noise measured at the outdoor plane of the window, between 07:00 and 23:00 (day-time) is 55 dBA and 50 dBA between 23:00 to 07:00 (night-time) to achieve allowable indoor noise levels. Day-time and night-time noise levels 56 to 65 dBA and 51 to 60 dBA respectively will require the provisions for central air conditioning system and the registration of noise warning clauses on the title of each unit. Day-time noise levels exceeding 65 dBA and night-time noise levels exceeding 60 dBA require the installation of central air conditioning or an approved equivalent ventilation system, the registration of noise warning clause on the title to each unit and the analysis of the building components to determine any necessary acoustic treatments. The calculations have been completed for above the ground level at the building face closest to the noise source for day-time and night-time noise levels respectively. Elevations have been based on the topographical survey.

The allowable outdoor day-time (07:00 to 23:00) noise level is 55 dBA with up to 60 dBA being allowed with a noise warning clause. Outdoor noise levels exceeding 60 dBA requires attenuation measures such as the installation of a noise barrier as per Niagara Region guidelines or earthen berm.

All noise measurements have been calculated at Points of Assessments (Receivers) A to D as shown in Figure 2.0 Noise Assessment Plan. Day-time and night-time noise calculations for indoor and outdoor noise levels have been included in Appendix B.

4.0 ANALYSIS PROCEDURES

4.1 Road Traffic Data

The noise source considered for the acoustical impact on the proposed development is Main Street East (Regional Road 81).

Traffic data was provided on the Niagara Region website (<https://niagaraopendata.ca/dataset/regional-road-traffic-volumes>, accessed May 20, 2020). Traffic volumes for this assessment were the Average Annual Daily Traffic (AADT) recorded at Station I.D. 610013, located on Main Street (Regional Road 81) between Maple Avenue and Park Road South. The most recent available AADT is for 2017, with a volume of 13300 vehicles per day (vpd).

Niagara Region criteria dictate traffic volumes be projected to a 20-year horizon or 2040. A review of the available historic data indicated an AADT of 13,700 vpd in 2011 and 11,500 vpd in 2014. These values indicate a negative growth rate between 2011 and 2014 with positive growth returning from 2014 to 2017. Given these values indicate an overall negative growth in traffic from 2011 to 2017, a 2.0% growth rate was used to conservatively project traffic volumes from the 2017 traffic volumes counts to calculate the AADT₂₀₄₀. Using the AADT₂₀₁₇ of 13,300 vpd, the resulting AADT₂₀₄₀ was 20973 vpd based on a 2.0% annual growth projected to 23 years. Refer to Appendix C for traffic projection calculations.

Based on a previous noise study prepared in the area (*Barnett, R. (July 2020). Environmental Noise Assessment Report, 170 Main Street East, Grimsby Ontario (Project Number: 12032). S. Llewellyn and Associates Limited*) the AADT₂₀₄₀ was broken down based on a traffic composition of 95% passenger cars, 3% medium trucks and 2% heavy trucks.

Day-time and night-time volumes were calculated based on 24-hour volume breakdown into day-time volume (over 16 hrs) and night-time volume (over 8 hrs). These volumes are obtained by multiplying the AADT₂₀₄₀ by the fraction of traffic expected during these periods. As Main Street East is a Regional Road, the fractions are 90% day-time and 10% night-time as per the ORANMENT guidelines. These values are summarized in Table 4 below. Traffic volume projections calculations are attached in Appendix B.

4.2 Road and Surface Characteristics

Main Street East (Regional Road 81) consists of one through lane in each direction (eastbound/westbound) with a shared centre left-turn lane and was modelled as a single segment. The road surface is asphalt with a posted speed limit of 50 km/hr. The intermediate surface was modelled as absorptive.

Table 4: Projected 2040 Traffic Volumes for Main Street East

Main Street East	Projected AADT ₂₀₄₀ – 20973 vpd Speed Limit = 50 km/hr		
	Cars	Medium Trucks (3.0%)	Heavy Trucks (2.0%)
Day-time Volumes	17932	566	378
Night-time Volumes	1992	63	42

4.3 Receiver Characteristics

As the intent of the report is to identify potential nuisance noise and the impact on the proposed development, noise levels were assessed at 4 locations, summarized as follows;

- **Receiver A**

Receiver A was modelled to review noise levels for indoor living areas. Located at the southeast corner of the proposed building and represented the shortest distance from the source to the receiver (13.3 m) and was fully exposed to the noise source. Noise levels were calculated at 1.5 m above the proposed grade and 1.5 m above the proposed finished floor grade for each story of the proposed building. As noted, the distance from the source to the receiver is less than 15.0 m minimum distance modelled by Stamson, therefore the calculated values were increased to account for the reduction of the separation between the source and receiver. Refer to Appendix C for the noise level adjustment calculations.

- **Receiver B**

Receiver B was located at the centre of the proposed outdoor amenity in the northeast quadrant of the site, opposite the east wing of the proposed building. Noise levels were calculated at 1.5 m above the proposed grade and included almost complete shielding from the proposed building.

- **Receiver C**

Receiver C was located at the centre of the proposed outdoor amenity located on the roof of the seventh floor, 3.0 m off the building face. Noise levels were calculated at 1.5 m above the proposed finished floor and included partial shielding from the proposed penthouse and 1.3 m parapet wall.

- **Receiver D**

Receiver D was located at the mid-point of the south wall of the indoor amenity area located on the seventh floor. Noise levels were calculated at 1.5 m above the proposed finished floor with partial shading from the proposed penthouse and included partial shielding from the proposed penthouse and 1.3 m parapet wall.

Refer to Appendix A for receiver locations.

4.4 Calculation Methods

Road traffic noise levels were calculated using Stamson, version 5.03 computer program from the MECP utilizing the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT). Stamson output files can be found in Appendix C.

5.0 ANALYSIS

5.1 Indoor Living and Sleeping Quarters

Indoor noise levels were assessed at Receiver A and D. Calculated noise levels are summarized in Table 5. Noise levels at Receiver A exceeded MECP criteria for noise levels measured at the pane of the window for indoor noise levels for all floors and therefore attenuation measures are required as summarized in Table 6 and Table 7.

5.1.1 Indoor Ventilation Requirements

Noise levels for Receiver A and D are summarized in Table 6 and Table 7 in regards to the MECP ventilation criteria for outdoor noise levels at the pane on the window for indoor living and sleeping quarters, including ventilation requirements and noise warning clauses.

As noted in both tables the outdoor noise levels at Receiver A exceed the MECP criteria and require the units be constructed with modifications to the forced air or approved alternative heating system in regards to central air conditioning requirements. In addition, the title of all units should include the registration of a Noise Warning Clause indicating to future owners/tenants that the unit ventilation systems have been modified to include the installation of or the provision for the future installation of central air conditioning at the owner's discretion. The use of central air conditioning would allow for exterior doors and windows to remain closed, thereby reducing indoor noise levels. Calculated noise levels at Receiver C do not exceed MECP criteria and therefore no additional requirements or conditions are required.

Table 5: Unattenuated Road Traffic Sound Levels Indoor Living Quarters

Receiver Location	Floor	Calculated Day-Time Noise Levels ¹ (07:00 to 23:00)	Calculated Night-Time Noise Levels ¹ (07:00 to 23:00)
Receiver A	1 st	66.1 dBA	59.6 dBA
	2 nd	66.3 dBA	59.8 dBA
	3 rd	66.5 dBA	60.0 dBA
	4 th	66.7 dBA	60.2 dBA
	5 th	66.9 dBA	60.3 dBA
	6 th	67.1 dBA	60.6 dBA
Receiver C	7 th	50.5 dBA	44.0 dBA

Table 6: Unattenuated Road Traffic Sound levels vs MECP Ventilation Requirements for Indoor Day-Time Living Quarters (07:00 - 23:00)

Receiver	Floor	Calculated Noise Levels ¹	MECP Living Quarter Criteria	Ventilation Requirements
Receiver A	1 st	66.1 dBA	> 65 dBA	<ul style="list-style-type: none"> • Central A/C or other ventilation system installed prior to occupancy • Noise Warning Clause D
	2 nd	66.3 dBA		
	3 rd	66.5 dBA		
	4 th	66.7 dBA		
	5 th	66.9 dBA		
	6 th	67.1 dBA		
Receiver D	7 th	50.5 dBA	>55 to ≤65 dBA	<ul style="list-style-type: none"> • No requirements or conditions

¹ – Outdoor noise levels measured at the plane of the window 1.5m above the proposed grade or proposed finished floor.

Table 7: Unattenuated Road Traffic Sound Levels vs MECP Ventilation Requirements for Indoor Night-Time Sleeping Quarters (23:00 - 07:00)

Receiver	Floor	Calculated Noise Levels ²	MECP Living Quarter Criteria	Ventilation Requirements	
Receiver A	1 st	59.6 dBA	>50 to ≤60 dBA	<ul style="list-style-type: none"> • Provisions for air conditioning, and • Registration of Noise Warning Clause Type C on title 	
	2 nd	59.8 dBA			
	3 rd	60.0 dBA			
	Receiver A	4 th	60.2 dBA	> 60 dBA	<ul style="list-style-type: none"> • Central A/C or other ventilation system installed prior to occupancy • Noise Warning Clause D
		5 th	60.3 dBA		
		6 th	60.6 dBA		
Receiver D	7 th	50.5 dBA	>50 to ≤60 dBA	<ul style="list-style-type: none"> • No requirements or conditions 	

² – Outdoor noise levels measured at the plane of the window 1.5m above the proposed grade or proposed finished floor.

5.1.2 Modified Building Component

Noise levels for Receiver A and D are summarized in Table 8 and Table 9 in regard to the MECP building component criteria for outdoor noise levels at the pane on the window for indoor living and sleeping quarters.

As illustrated in Table 8, the calculated day-time noise levels exceed 65 dBA on all floors at Receiver A, and therefore, the verification and/or design of building components to attenuate indoor noise levels are required. Calculated noise levels at Receiver D do not exceed 65 dBA and therefore the verification and/or design of building components for the 7th-floor indoor amenity area is not required.

Table 8: Unattenuated Road Traffic Sound Levels vs MECP Building Component Requirements for Indoor Day-Time Living Quarters (07:00 - 23:00)

Receiver	Floor	Calculated Noise Levels ¹	MECP Living Quarter Criteria	Building Component Requirements
Receiver A	1 st	66.1 dBA	> 65 dBA	<ul style="list-style-type: none"> Design of building components including windows, walls, and doors to maintain sound level limits as set out in Table C-2 of Publication NPC-300
	2 nd	66.3 dBA		
	3 rd	66.5 dBA		
	4 th	66.7 dBA		
	5 th	66.9 dBA		
	6 th	67.1 dBA		
Receiver D	7 th	50.5 dBA	< 65 dBA	<ul style="list-style-type: none"> No requirements or conditions

¹ – Outdoor noise levels measured at the plane of the window 1.5m above the proposed grade or proposed finished floor.

As summarized in Table 8, the calculated night-time noise levels for floors 1 through 6 exceed 60 dBA on all floors at Receiver A, and therefore, the verification and/or design of building components to attenuate indoor noise levels are required for the units on these floors. Calculated noise levels for floors 1 through 3 and at Receiver D on the seventh floor do not exceed 60 dBA and therefore the verification and/or design of building components are not required.

5.2 Outdoor Living Areas

Unattenuated day-time outdoor living areas noise levels have been calculated at Receivers B, at the ground-level outdoor amenity area and Receiver C, at the rooftop outdoor amenity area. The receivers were located at the midpoint of the rear yard, 3.0 m from the building face and 1.5 m above grade. Unattenuated noise levels are summarized in Table 10, refer to Appendix C for noise level calculations.

Table 9: Unattenuated Road Traffic Sound Levels vs MECP Building Component Requirements for Indoor Night-Time Sleeping Quarters (23:00 to 07:00)

Receiver	Floor	Calculated Noise Levels ²	MECP Living Quarter Criteria	Ventilation Requirements
Receiver A	1 st	59.6 dBA	≤ 60 dBA	<ul style="list-style-type: none"> No requirements or conditions
	2 nd	59.8 dBA		
	3 rd	60.0 dBA		
	4 th	60.2 dBA	> 60 dBA	<ul style="list-style-type: none"> Design of building components including windows, walls, and doors to maintain sound level limits as set out in Table C-2 of Publication NPC-300
	5 th	60.3 dBA		
	6 th	60.6 dBA		
Receiver D	7 th	50.5 dBA	≤ 60 dBA	<ul style="list-style-type: none"> No requirements or conditions

² – Outdoor noise levels measured at the plane of the window 1.5m above the proposed grade or proposed finished floor.

As noted in Table 10, calculated attenuated noise levels for outdoor living areas at Receivers B and C do not exceed 55 dBA and therefore no further requirements or conditions are required.

Table 10: Unattenuated Road Traffic Sound Levels for Outdoor Living Areas (07:00 to 23:00)

Receiver Location	Un-attenuated Noise Level ¹	MECP Outdoor Living Area Criteria	Attenuation Requirements
Receiver B	44.1 dBA	≤55 dBA	<ul style="list-style-type: none"> No requirements or conditions
Receiver C	52.4 dBA		

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing analysis, the following conclusions can be made for the subject site:

1. Calculated noise levels confirm indoor noise levels exceed of MECP guidelines and confirm additional noise modelling will be required upon completion of the final site plan and architectural floor plans.
2. Based on calculated noise levels for the day-time indoor living areas and night-time sleeping quarters, noise levels exceed MECP guidelines. Based on the MECP guidelines, these exceedances will require modifications to the forced air or approved alternative heating system to either accommodate the future installation or to include the installation central air conditioning.
3. Calculated daytime noise levels for the indoor living area as well as night-time sleeping quarters on floors 4 through 6 dictates that an analysis of building wall assemblies and components (i.e. windows, doors, etc.) will be required for some units to ensure the required indoor noise levels are achieved.
4. The use of warning clauses will be required to notify future owners/tenants that noise levels exceed MECP guidelines for day-time indoor living areas and night-time sleeping quarters. These noise warning clauses will advise the future owners/tenants of modifications to the forced air or approved alternative heating system to either accommodate the future installation or to include the installation of central air conditioning.
5. Noise levels calculated at the 7th-floor indoor amenity area do not exceed MECP guidelines and no further requirements or conditions are warranted.
6. Noise levels calculated at the proposed ground level and rooftop outdoor amenity areas do not exceed MECP guidelines and no further requirements or conditions are warranted.

It is recommended that;

1. This report be circulated in support of the Official Plan Amendment and Zoning By-law Amendment Applications by Losani Homes (1998) Ltd,
2. Upon completion of the final site plan and architectural plans, a detailed noise assessment is to be completed to confirm the required attenuation requirements and measures.

All of which is respectfully submitted;

Yours truly,

S. LLEWELLYN & ASSOCIATES



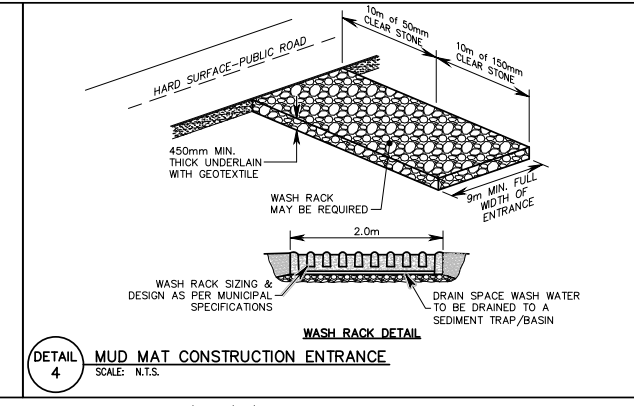
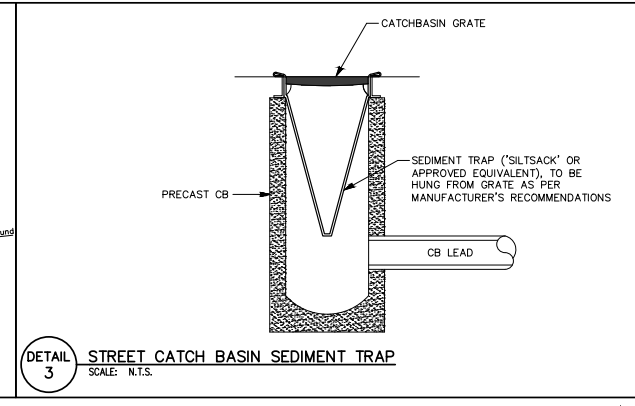
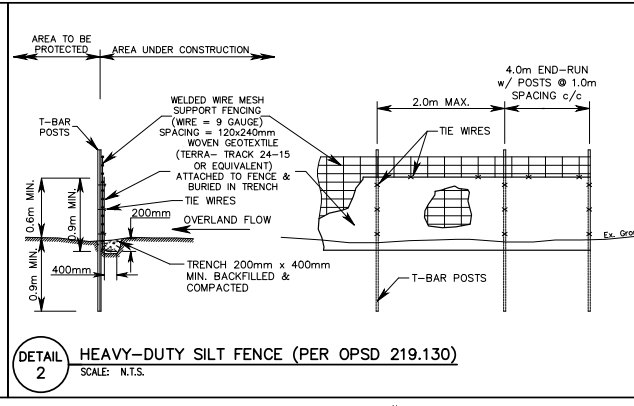
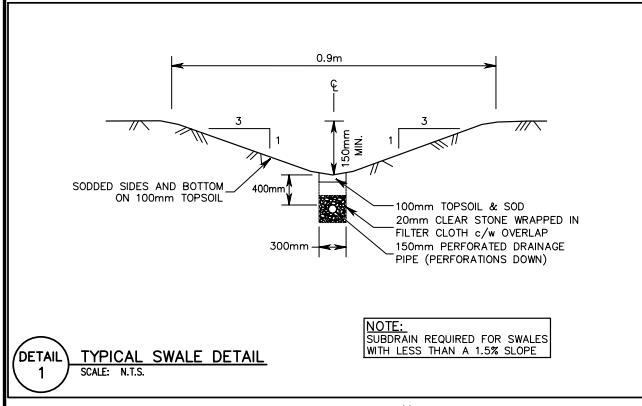
Robert Barnett, C.E.T.
Design Technologist



Steven V. Frankovich, P.Eng.

APPENDIX A

PROPOSED GRADING PLAN

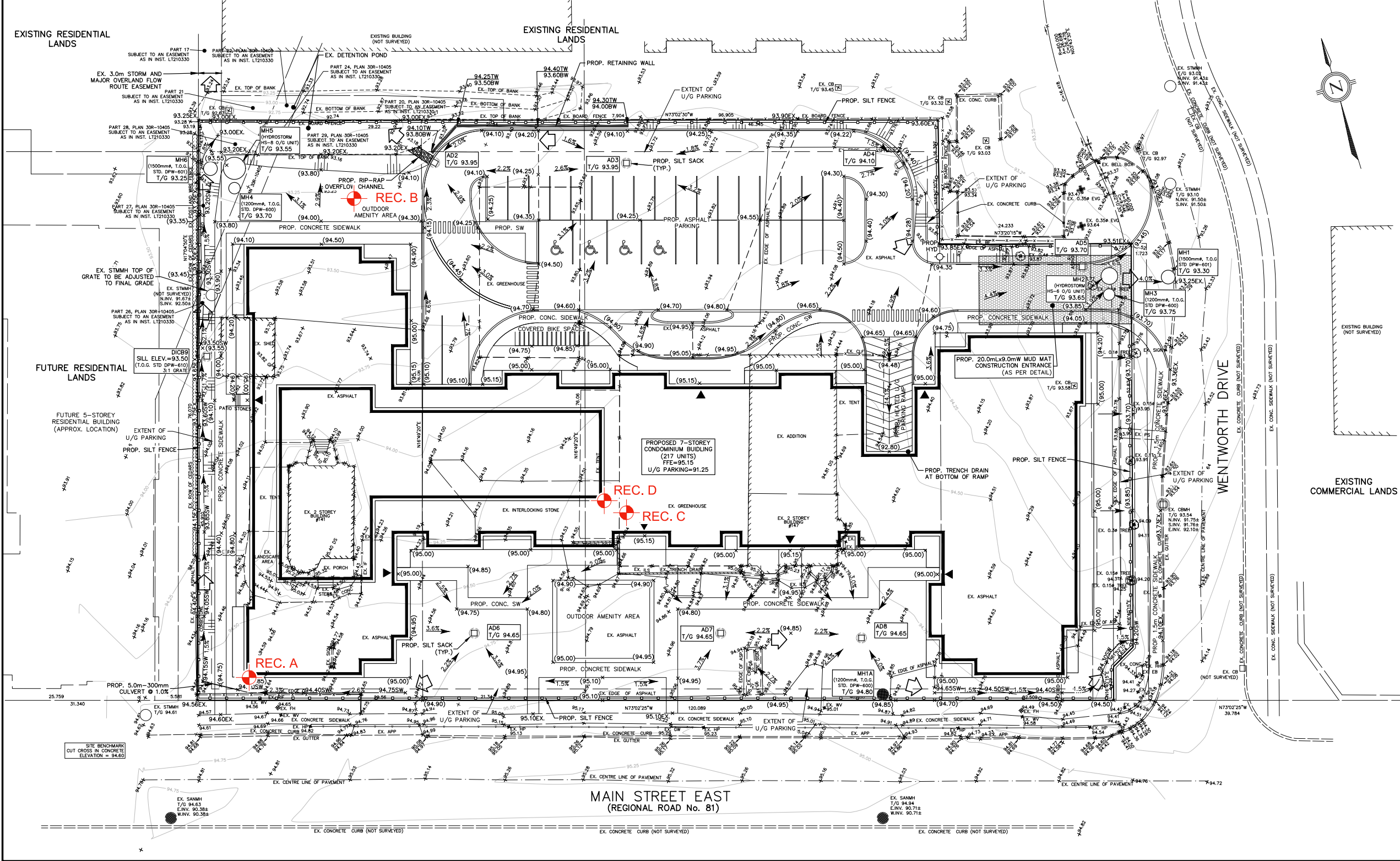


LEGEND

- EXISTING GROUND ELEVATION
- EXISTING HYDRO/ LIGHT POLE
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- PROPOSED GROUND ELEVATION
- PROPOSED ELEVATION TO MATCH EXISTING
- PROPOSED SWALE ELEVATION
- PROPOSED DIRECTION OF SHEET FLOW
- EXISTING CATCH BASIN/DOUBLE CATCHBASIN
- EXISTING STORM AND SANITARY MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED STORM/SANITARY MANHOLE
- PROPOSED CATCHBASIN/DOUBLE CATCHBASIN MANHOLE
- EXISTING DIRECTION OF DRAINAGE
- PROPOSED EMERGENCY OVERLAND FLOW ROUTE
- PROPOSED SILTATION CONTROL FENCE
- PROPOSED CATCHBASIN SILT SACK
- PROPOSED GRADE BREAK

KEY MAP

Shows the site location relative to Main St. E., Wentworth Dr., and other roads.



NO.	DATE	BY	REVISIONS
1	JULY 2020	JNC	REVISED PER SITE PLAN REVISION

NOTES TO CONTRACTOR:

- CONTRACTORS AND SUBCONTRACTORS SHALL NOT SCALE FROM THIS DRAWING.
- ANY INCONSISTENCIES AND OMISSIONS FOUND ON THE DRAWINGS MUST BE REPORTED TO THE ENGINEER FOR CLARIFICATION BEFORE COMMENCING THE WORK.
- PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND ELEVATIONS AND REPORT ALL FINDINGS TO THE ENGINEER. ONCE CONSTRUCTION HAS COMMENCED, THE CONTRACTOR ACCEPTS RESPONSIBILITY FOR ALL DIMENSIONS, ELEVATIONS, AND SITE CONDITIONS.
- THE POSITIONS OF POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVER-GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS. WHERE SHOWN ON THE DRAWING, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
- ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED, REVISED, OR REVISED WITHOUT THE WRITTEN CONSENT OF S. LLEWELLYN & ASSOCIATES LIMITED.

DESIGN	JNC	CHK'D	SL	DATE
DRAWN	JNC	CHK'D	SL	MAY 2020

APPROVALS

STAMP

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LOSANI HOMES (1998) LTD.
 430 McNEILLY ROAD, SUITE 203,
 STONEY CREEK, ON

PROJECT NAME

**141-149 MAIN STREET EAST,
 GRIMSBY**

TITLE

**PRELIMINARY GRADING AND
 EROSION CONTROL PLAN**

PROJECT No.	20007	DRAWING No.	C101
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APPENDIX B

ROAD TRAFFIC DATA

Traffic Counts

Downloaded from Niagara Region Website: <https://niagaraopendata.ca/dataset/regional-road-traffic-volumes>, accessed May 20, 2020

StationID	Reg_Rd_No	From_St	To_St	Count_Yr	AADT	SADT	WADT	Prev_Yr	Prev_Count
2017									
610001	81	Regional Boundary	REG. RD. 10 (Casablanca Blvd.)	2017	7000	7500	6700	2014	6500
610003	81	REG. RD. 10 (Casablanca Blvd.)	Kerman Avenue	2017	7600	7500	7600	2014	6800
610006	81	REG. RD. 512 (Livingston Ave.)	REG. RD. 12 (Mountain St.)	2017	12900	12000	13300	2014	11900
610013	81	Maple Avenue	Park Road S.	2017	13300	12700	13400	2014	11500
610014	81	REG. RD. 14 (Bartlett Ave.)	Thirty Road	2017	11600	12000	11200	2014	10600
610056	81	Thirty Road	REG. RD. 18 (Ontario St.)	2017	9500	9100	9600	2014	7700
610057	81	REG. RD. 18 (Mountain St.)	Merritt Road	2017	7100	7100	7000	2014	5400
610059	81	Merritt Road	REG. RD. 24 (Victoria Ave.)	2017	6300	6400	6200	2014	5700
610060	81	REG. RD. 24 (Victoria Ave.)	Nineteenth Street	2016	5800	6000	5600	2014	5300
610061	81	Nineteenth Street	REG. RD. 26 (Jordan Rd.)	2016	3700	3900	3600	2014	3300
610062	81	REG. RD. 26 (Jordan Rd.)	REG. RD. 34 (Seventh St. Louth)	2016	3000	2800	3100	2014	2300
610101	81	REG. RD. 34 (Seventh St. Louth)	REG. RD. 72 (Louth St.)	2016	7500	7100	7600	2013	4600
610124	81	REG. RD. 55 (Niagara Stone Rd.)	REG. RD. 89 (Glendale Ave.)	2015	5900	6000	5700	2012	2800
610125	81	REG. RD. 100 (Four Mile Creek Rd.)	Concession 1 Road	2015	4400	5100	4000	2012	3900
610126	81	Concession 1 Road	Niagara River Parkway	2015	1700	1900	1500	2012	1800
610362	81	REG. RD. 72 (Louth St.)	Pelham Road	2016	9200	9400	9000	2013	9300
610363	81	Pelham Road	REG. RD. 681 (William St.)	2016	11600	11800	11400	2013	15800
610411	81	Eastchester Avenue	Hartzel Road	2016	9900	9800	9800	2013	11700
610412	81	Hartzel Road	Bunting Road	2016	13200	13000	13200	2013	8000
610413	81	Bunting Road	Emmett Road	2016	7900	8200	7700	2013	7700
610445	81	Emmett Road	REG. RD. 55 (Niagara Stone Rd.)	2016	8700	11400	7300	2013	12800
610496	81	Park Road S.	REG. RD. 14 (Bartlett Ave.)	2017	13800	13600	13700	2014	13900
610553	81	REG. RD. 12 (Mountain St.)	Elm Street	2017	11000	11900	10400	2014	11700
610554	81	REG. RD. 18 (Ontario St.)	REG. RD. 18 (Mountain St.)	2017	11200	12800	10200	2011	11500
610568	81	Elm Street	REG. RD. 512 (Livingston Ave.)	2017	900	900	700	2014	900
610581	81	REG. RD. 89 (Glendale Ave.)	Concession 7 Road	2015	9100	9300	9000	2012	6700
610588	81	Concession 7 Road	REG. RD. 100 (Four Mile Creek Rd.)	2015	6900	7000	6800	2012	6300
610610	81	Elm Street	Maple Avenue	2017	13700	12700	14200	2014	14300
610612	81	Kerman Avenue	Gibson Street	2017	6900	7200	6600	2014	6900
2016									
610001	81	Regional Boundary	REG. RD. 10 (Casablanca Blvd.)	2014	6500	6200	6500	2011	6500
610003	81	REG. RD. 10 (Casablanca Blvd.)	Kerman Avenue	2014	6800	7000	6500	2011	7400
610006	81	REG. RD. 512 (Livingston Ave.)	REG. RD. 12 (Mountain St.)	2014	11900	6100	14700	2011	14900
610013	81	Maple Avenue	Park Road S.	2014	11500	12900	10700	2011	13700
610014	81	REG. RD. 14 (Bartlett Ave.)	Thirty Road	2014	10600	10600	10500	2011	8800
610056	81	Thirty Road	REG. RD. 18 (Ontario St.)	2014	7700	8200	7300	2011	7200
610057	81	REG. RD. 18 (Mountain St.)	Merritt Road	2014	5400	6900	4600	2011	5500
610059	81	Merritt Road	REG. RD. 24 (Victoria Ave.)	2014	5700	6100	5400	2011	5700
610060	81	REG. RD. 24 (Victoria Ave.)	Nineteenth Street	2016	5800	6000	5600	2014	5300
610061	81	Nineteenth Street	REG. RD. 26 (Jordan Rd.)	2016	3700	3900	3600	2014	3300
610062	81	REG. RD. 26 (Jordan Rd.)	REG. RD. 34 (Seventh St. Louth)	2016	3000	2800	3100	2014	2300
610101	81	REG. RD. 34 (Seventh St. Louth)	REG. RD. 72 (Louth St.)	2016	7500	7100	7600	2013	4600
610124	81	REG. RD. 55 (Niagara Stone Rd.)	REG. RD. 89 (Glendale Ave.)	2015	5900	6000	5700	2012	2800
610125	81	REG. RD. 100 (Four Mile Creek Rd.)	Concession 1 Road	2015	4400	5100	4000	2012	3900

Traffic Counts

Downloaded from Niagara Region Website: <https://niagaraopendata.ca/dataset/regional-road-traffic-volumes>, accessed May 20, 2020

StationID	Reg_Rd_No	From_St	To_St	Count_Yr	AADT	SADT	WADT	Prev_Yr	Prev_Count
610126	81	Concession 1 Road	Niagara River Parkway	2015	1700	1900	1500	2012	1800
610362	81	REG. RD. 72 (Louth St.)	Pelham Road	2016	9200	9400	9000	2013	9300
610363	81	Pelham Road	REG. RD. 681 (William St.)	2016	11600	11800	11400	2013	15800
610411	81	Eastchester Avenue	Hartzel Road	2016	9900	9800	9800	2013	11700
610412	81	Hartzel Road	Bunting Road	2016	13200	13000	13200	2013	8000
610413	81	Bunting Road	Emmett Road	2016	7900	8200	7700	2013	7700
610445	81	Emmett Road	REG. RD. 55 (Niagara Stone Rd.)	2016	8700	11400	7300	2013	12800
610496	81	Park Road S.	REG. RD. 14 (Bartlett Ave.)	2014	13900	12200	14700	2011	14000
610553	81	REG. RD. 12 (Mountain St.)	Elm Street	2014	11700	11900	11500	2011	13400
610554	81	REG. RD. 18 (Ontario St.)	REG. RD. 18 (Mountain St.)	2011	11500	12800	10700	2008	14600
610568	81	Elm Street	REG. RD. 512 (Livingston Ave.)	2014	900	600	900	2011	3100
610581	81	REG. RD. 89 (Glendale Ave.)	Concession 7 Road	2015	9100	9300	9000	2012	6700
610588	81	Concession 7 Road	REG. RD. 100 (Four Mile Creek Rd.)	2015	6900	7000	6800	2012	6300
610610	81	Elm Street	Maple Avenue	2014	14300	12700	15000	2011	16800
2015									
610001	81	Regional Boundary	REG. RD. 10 (Casablanca Blvd.)	2014	6500	6200	6500	2011	6500
610006	81	REG. RD. 512 (Livingston Ave.)	REG. RD. 12 (Mountain St.)	2014	11900	6100	14700	2011	14900
610013	81	Maple Avenue	Park Road S.	2014	11500	12900	10700	2011	13700
610014	81	REG. RD. 14 (Bartlett Ave.)	Thirty Road	2014	10600	10600	10500	2011	8800
610056	81	Thirty Road	REG. RD. 18 (Ontario St.)	2014	7700	8200	7300	2011	7200
610057	81	REG. RD. 18 (Mountain St.)	Merritt Road	2014	5400	6900	4600	2011	5500
610059	81	Merritt Road	REG. RD. 24 (Victoria Ave.)	2014	5700	6100	5400	2011	5700
610060	81	REG. RD. 24 (Victoria Ave.)	Nineteenth Street	2014	5300	6000	4800	2010	5600
610061	81	Nineteenth Street	REG. RD. 26 (Jordan Rd.)	2014	3300	3900	2900	2010	3700
610062	81	REG. RD. 26 (Jordan Rd.)	REG. RD. 34 (Seventh St. Louth)	2014	2300	2800	2000	2010	3300
610056	81	Thirty Road	REG. RD. 18 (Ontario St.)	2014	7700	8200	7300	2011	7200
610057	81	REG. RD. 18 (Mountain St.)	Merritt Road	2014	5400	6900	4600	2011	5500
610059	81	Merritt Road	REG. RD. 24 (Victoria Ave.)	2014	5700	6100	5400	2011	5700
610060	81	REG. RD. 24 (Victoria Ave.)	Nineteenth Street	2014	5300	6000	4800	2010	5600
610061	81	Nineteenth Street	REG. RD. 26 (Jordan Rd.)	2014	3300	3900	2900	2010	3700
610062	81	REG. RD. 26 (Jordan Rd.)	REG. RD. 34 (Seventh St. Louth)	2014	2300	2800	2000	2010	3300
610101	81	REG. RD. 34 (Seventh St. Louth)	REG. RD. 72 (Louth St.)	2013	4600	4400	4600	2010	5900
610124	81	REG. RD. 55 (Niagara Stone Rd.)	REG. RD. 89 (Glendale Ave.)	2015	5900	6000	5700	2012	2800
610125	81	REG. RD. 100 (Four Mile Creek Rd.)	Concession 1 Road	2015	4400	5100	4000	2012	3900
610126	81	Concession 1 Road	Niagara River Parkway	2015	1700	1900	1500	2012	1800
610362	81	REG. RD. 72 (Louth St.)	Pelham Road	2013	9300	8400	9700	2010	12400
610363	81	Pelham Road	REG. RD. 681 (William St.)	2013	15800	14800	16200	2010	16400
610411	81	Eastchester Avenue	Hartzel Road	2013	11700	9200	12900	2010	12400
610412	81	Hartzel Road	Bunting Road	2013	8000	11100	6400	2010	12800
610413	81	Bunting Road	Emmett Road	2013	7700	7300	7900	2010	8500
610445	81	Emmett Road	REG. RD. 55 (Niagara Stone Rd.)	2013	12800	12700	12800	2010	11100
610496	81	Park Road S.	REG. RD. 14 (Bartlett Ave.)	2014	13900	12200	14700	2011	14000
610553	81	REG. RD. 12 (Mountain St.)	Elm Street	2014	11700	11900	11500	2011	13400
610554	81	REG. RD. 18 (Ontario St.)	REG. RD. 18 (Mountain St.)	2011	11500	12800	10700	2008	14600
610568	81	Elm Street	REG. RD. 512 (Livingston Ave.)	2014	900	600	900	2011	3100
610581	81	REG. RD. 89 (Glendale Ave.)	Concession 7 Road	2015	9100	9300	9000	2012	6700

Traffic Counts

Downloaded from Niagara Region Website: <https://niagaraopendata.ca/dataset/regional-road-traffic-volumes>, accessed May 20, 2020

StationID	Reg_Rd_No	From_St	To_St	Count_Yr	AADT	SADT	WADT	Prev_Yr	Prev_Count
610588	81	Concession 7 Road	REG. RD. 100 (Four Mile Creek Rd.)	2015	6900	7000	6800	2012	6300
610610	81	Elm Street	Maple Avenue	2014	14300	12700	15000	2011	16800
610612	81	Kerman Avenue	Gibson Street	2014	6900	7200	6600	2011	6900

APPENDIX C

NOISE CALCULATIONS

STAMSON 5.0 NORMAL REPORT Date: 20-05-2020 22:42:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 20007_A1.te Time Period: Day/Night 16/8 hours
Description: Receiver A - First Floor

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

Car traffic volume : 17932/1992 veh/TimePeriod *
Medium truck volume : 566/63 veh/TimePeriod *
Heavy truck volume : 378/42 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 23.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Results segment # 1: (day)

Source height = 1.19 m

ROAD (0.00 + 65.58 + 0.00) = 65.58 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 67.04 0.00 0.00 -1.46 0.00 0.00 0.00 65.58

Segment Leq : 65.58 dBA

Total Leq All Segments: 65.58 dBA

↑
Results segment # 1: (night)

Source height = 1.19 m

ROAD (0.00 + 59.05 + 0.00) = 59.05 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 60.51 0.00 0.00 -1.46 0.00 0.00 0.00 59.05

Segment Leq : 59.05 dBA

Total Leq All Segments: 59.05 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 65.58
(NIGHT): 59.05

↑

↑

STAMSON 5.0 NORMAL REPORT Date: 20-05-2020 22:43:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 20007_A2.te Time Period: Day/Night 16/8 hours
Description: Receiver A - Second Floor

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

Car traffic volume : 17932/1992 veh/TimePeriod *
Medium truck volume : 566/63 veh/TimePeriod *
Heavy truck volume : 378/42 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 23.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 4.30 m
Reference angle : 0.00

^
Results segment # 1: (day)

Source height = 1.19 m

ROAD (0.00 + 65.79 + 0.00) = 65.79 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.54 67.04 0.00 0.00 -1.25 0.00 0.00 0.00 65.79

Segment Leq : 65.79 dBA

Total Leq All Segments: 65.79 dBA

^
Results segment # 1: (night)

Source height = 1.19 m

ROAD (0.00 + 59.26 + 0.00) = 59.26 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.54 60.51 0.00 0.00 -1.25 0.00 0.00 0.00 59.26

Segment Leq : 59.26 dBA

Total Leq All Segments: 59.26 dBA

^
TOTAL Leq FROM ALL SOURCES (DAY): 65.79
(NIGHT): 59.26

^
^

STAMSON 5.0 NORMAL REPORT Date: 21-05-2020 10:28:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 20007_a3.te Time Period: Day/Night 16/8 hours
Description: Receiver A - Third Floor

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

Car traffic volume : 17932/1992 veh/TimePeriod *
Medium truck volume : 566/63 veh/TimePeriod *
Heavy truck volume : 378/42 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 23.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 7.30 m
Reference angle : 0.00

^
Results segment # 1: (day)

Source height = 1.19 m

ROAD (0.00 + 65.96 + 0.00) = 65.96 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.45 67.04 0.00 0.00 -1.08 0.00 0.00 0.00 65.96

Segment Leq : 65.96 dBA

Total Leq All Segments: 65.96 dBA

^
Results segment # 1: (night)

Source height = 1.19 m

ROAD (0.00 + 59.43 + 0.00) = 59.43 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.45 60.51 0.00 0.00 -1.08 0.00 0.00 0.00 59.43

Segment Leq : 59.43 dBA

Total Leq All Segments: 59.43 dBA

^

TOTAL Leq FROM ALL SOURCES (DAY): 65.96
(NIGHT): 59.43

^
^

STAMSON 5.0 NORMAL REPORT Date: 21-05-2020 10:29:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 20007_a4.te Time Period: Day/Night 16/8 hours
Description: Receiver A - Fourth Floor

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

Car traffic volume : 17932/1992 veh/TimePeriod *
Medium truck volume : 566/63 veh/TimePeriod *
Heavy truck volume : 378/42 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 23.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 10.40 m
Reference angle : 0.00

^
Results segment # 1: (day)

Source height = 1.19 m

ROAD (0.00 + 66.15 + 0.00) = 66.15 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.36 67.04 0.00 0.00 -0.89 0.00 0.00 0.00 66.15

Segment Leq : 66.15 dBA

Total Leq All Segments: 66.15 dBA

^
Results segment # 1: (night)

Source height = 1.19 m

ROAD (0.00 + 59.62 + 0.00) = 59.62 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.36 60.51 0.00 0.00 -0.89 0.00 0.00 0.00 59.62

Segment Leq : 59.62 dBA

Total Leq All Segments: 59.62 dBA

^
TOTAL Leq FROM ALL SOURCES (DAY): 66.15
(NIGHT): 59.62

^
^

STAMSON 5.0 NORMAL REPORT Date: 21-05-2020 10:30:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 20007_a5.te Time Period: Day/Night 16/8 hours
Description: Receiver A - Fifth Floor

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

Car traffic volume : 17932/1992 veh/TimePeriod *
Medium truck volume : 566/63 veh/TimePeriod *
Heavy truck volume : 378/42 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 23.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 10.40 m
Reference angle : 0.00

^
Results segment # 1: (day)

Source height = 1.19 m

ROAD (0.00 + 66.15 + 0.00) = 66.15 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.36 67.04 0.00 0.00 -0.89 0.00 0.00 0.00 66.15

Segment Leq : 66.15 dBA

Total Leq All Segments: 66.15 dBA

^
Results segment # 1: (night)

Source height = 1.19 m

ROAD (0.00 + 59.62 + 0.00) = 59.62 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.36 60.51 0.00 0.00 -0.89 0.00 0.00 0.00 59.62

Segment Leq : 59.62 dBA

Total Leq All Segments: 59.62 dBA

^

TOTAL Leq FROM ALL SOURCES (DAY): 66.15
(NIGHT): 59.62

^
^

STAMSON 5.0 NORMAL REPORT Date: 21-05-2020 10:31:17
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 20007_a6.te Time Period: Day/Night 16/8 hours
 Description: Receiver A - Sixth Floor

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

 Car traffic volume : 17932/1992 veh/TimePeriod *
 Medium truck volume : 566/63 veh/TimePeriod *
 Heavy truck volume : 378/42 veh/TimePeriod *
 Posted speed limit : 50 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
 Percentage of Annual Growth : 2.00
 Number of Years of Growth : 23.00
 Medium Truck % of Total Volume : 3.00
 Heavy Truck % of Total Volume : 2.00
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: (day/night)

 Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 15.00 / 15.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 3 (Elevated; no barrier)
 Elevation : 16.50 m
 Reference angle : 0.00

^
 Results segment # 1: (day)

 Source height = 1.19 m

ROAD (0.00 + 66.57 + 0.00) = 66.57 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.17 67.04 0.00 0.00 -0.47 0.00 0.00 0.00 66.57

Segment Leq : 66.57 dBA

Total Leq All Segments: 66.57 dBA

^
 Results segment # 1: (night)

 Source height = 1.19 m

ROAD (0.00 + 60.04 + 0.00) = 60.04 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.17 60.51 0.00 0.00 -0.47 0.00 0.00 0.00 60.04

Segment Leq : 60.04 dBA

Total Leq All Segments: 60.04 dBA

^
 TOTAL Leq FROM ALL SOURCES (DAY): 66.57
 (NIGHT): 60.04

^
 ^

STAMSON 5.0 NORMAL REPORT Date: 25-06-2020 24:23:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 20007_b.te Time Period: Day/Night 16/8 hours
Description: Ground Level Outdoor Amenity Area

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

Car traffic volume : 17932/1992 veh/TimePeriod *
Medium truck volume : 566/63 veh/TimePeriod *
Heavy truck volume : 378/42 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 23.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

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

Angle1 Angle2 : -90.00 deg -68.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 76.15 / 76.15 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 17932/1992 veh/TimePeriod *
Medium truck volume : 566/63 veh/TimePeriod *
Heavy truck volume : 378/42 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
Percentage of Annual Growth : 2.00

Number of Years of Growth : 23.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

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

Angle1 Angle2 : -68.00 deg 13.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 76.15 / 76.15 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -68.00 deg Angle2 : 13.00 deg
Barrier height : 20.80 m
Barrier receiver distance : 5.95 / 5.95 m
Source elevation : 95.05 m
Receiver elevation : 94.05 m
Barrier elevation : 95.15 m
Reference angle : 0.00

▲
Road data, segment # 3: sheilded (day/night)

Car traffic volume : 17932/1992 veh/TimePeriod *
Medium truck volume : 566/63 veh/TimePeriod *
Heavy truck volume : 378/42 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 23.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 3: sheilded (day/night)

Angle1 Angle2 : 13.00 deg 79.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 76.15 / 76.15 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)

Barrier angle1 : 13.00 deg Angle2 : 79.00 deg
 Barrier height : 20.80 m
 Barrier receiver distance : 24.35 / 24.35 m
 Source elevation : 95.05 m
 Receiver elevation : 94.05 m
 Barrier elevation : 95.15 m
 Reference angle : 0.00

↑
 Road data, segment # 4: exposed (day/night)

 Car traffic volume : 17932/1992 veh/TimePeriod *
 Medium truck volume : 566/63 veh/TimePeriod *
 Heavy truck volume : 378/42 veh/TimePeriod *
 Posted speed limit : 50 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
 Percentage of Annual Growth : 2.00
 Number of Years of Growth : 23.00
 Medium Truck % of Total Volume : 3.00
 Heavy Truck % of Total Volume : 2.00
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 4: exposed (day/night)

 Angle1 Angle2 : 79.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 76.15 / 76.15 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: exposed (day)

 Source height = 1.19 m

ROAD (0.00 + 41.22 + 0.00) = 41.22 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 -68 0.66 67.04 0.00 -11.71 -14.11 0.00 0.00 0.00 41.22

Segment Leq : 41.22 dBA

↑
 Results segment # 2: sheilded (day)

 Source height = 1.19 m

Barrier height for grazing incidence

 Source ! Receiver ! Barrier ! Elevation of
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
 -----+-----+-----+-----
 1.19 ! 1.50 ! 0.45 ! 95.60

ROAD (0.00 + 36.52 + 0.00) = 36.52 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -68 13 0.00 67.04 0.00 -7.06 -3.47 0.00 0.00 -20.00 36.52

Segment Leq : 36.52 dBA

↑
 Results segment # 3: sheilded (day)

 Source height = 1.19 m

Barrier height for grazing incidence

 Source ! Receiver ! Barrier ! Elevation of
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
 -----+-----+-----+-----
 1.19 ! 1.50 ! 0.62 ! 95.77

ROAD (0.00 + 35.63 + 0.00) = 35.63 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 13 79 0.00 67.04 0.00 -7.06 -4.36 0.00 0.00 -20.00 35.63

Segment Leq : 35.63 dBA

↑
 Results segment # 4: exposed (day)

 Source height = 1.19 m

ROAD (0.00 + 36.25 + 0.00) = 36.25 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 79 90 0.66 67.04 0.00 -11.71 -19.08 0.00 0.00 0.00 36.25

Segment Leq : 36.25 dBA

Total Leq All Segments: 44.08 dBA

↑
 Results segment # 1: exposed (night)

Source height = 1.19 m

ROAD (0.00 + 34.69 + 0.00) = 34.69 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 -68 0.66 60.51 0.00 -11.71 -14.11 0.00 0.00 0.00 34.69

Segment Leq : 34.69 dBA

↑
 Results segment # 2: shielded (night)

Source height = 1.19 m

Barrier height for grazing incidence

 Source ! Receiver ! Barrier ! Elevation of
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

 1.19 ! 1.50 ! 0.45 ! 95.60

ROAD (0.00 + 29.99 + 0.00) = 29.99 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -68 13 0.00 60.51 0.00 -7.06 -3.47 0.00 0.00 -20.00 29.99

Segment Leq : 29.99 dBA

↑
 Results segment # 3: shielded (night)

Source height = 1.19 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

 1.19 ! 1.50 ! 0.62 ! 95.77

ROAD (0.00 + 29.10 + 0.00) = 29.10 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 13 79 0.00 60.51 0.00 -7.06 -4.36 0.00 0.00 -20.00 29.10

Segment Leq : 29.10 dBA

↑
 Results segment # 4: exposed (night)

Source height = 1.19 m

ROAD (0.00 + 29.72 + 0.00) = 29.72 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 79 90 0.66 60.51 0.00 -11.71 -19.08 0.00 0.00 0.00 29.72

Segment Leq : 29.72 dBA

Total Leq All Segments: 37.55 dBA

↑
 TOTAL Leq FROM ALL SOURCES (DAY): 44.08
 (NIGHT): 37.55
 ↑

STAMSON 5.0 NORMAL REPORT Date: 21-05-2020 08:29:28
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 20007_c.te Time Period: Day/Night 16/8 hours
 Description: Rooftop Outdoor Amenity Area

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

 Car traffic volume : 17932/1992 veh/TimePeriod *
 Medium truck volume : 566/63 veh/TimePeriod *
 Heavy truck volume : 378/42 veh/TimePeriod *
 Posted speed limit : 50 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
 Percentage of Annual Growth : 2.00
 Number of Years of Growth : 23.00
 Medium Truck % of Total Volume : 3.00
 Heavy Truck % of Total Volume : 2.00
 Day (16 hrs) % of Total Volume : 90.00

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

 Angle1 Angle2 : -90.00 deg -74.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 35.10 / 35.10 m
 Receiver height : 1.50 / 1.50 m
 Topography : 4 (Elevated; with barrier)
 Barrier angle1 : -90.00 deg Angle2 : -74.00 deg
 Barrier height : 3.00 m
 Elevation : 19.50 m
 Barrier receiver distance : 10.70 / 10.70 m
 Source elevation : 95.28 m
 Receiver elevation : 114.65 m
 Barrier elevation : 144.65 m
 Reference angle : 0.00

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

 Car traffic volume : 17932/1992 veh/TimePeriod
 Medium truck volume : 566/63 veh/TimePeriod
 Heavy truck volume : 378/42 veh/TimePeriod
 Posted speed limit : 50 km/h

Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

 Angle1 Angle2 : -74.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 35.10 / 35.10 m
 Receiver height : 1.50 / 1.50 m
 Topography : 4 (Elevated; with barrier)
 Barrier angle1 : -74.00 deg Angle2 : 90.00 deg
 Barrier height : 1.30 m
 Elevation : 19.50 m
 Barrier receiver distance : 3.00 / 3.00 m
 Source elevation : 95.30 m
 Receiver elevation : 114.65 m
 Barrier elevation : 114.65 m
 Reference angle : 0.00

↑
 Results segment # 1: Shielded (day)

 Source height = 1.19 m

Barrier height for grazing incidence

 Source ! Receiver ! Barrier ! Elevation of
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

 1.19 ! 1.50 ! -34.50 ! 110.15

ROAD (0.00 + 34.16 + 0.00) = 34.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-74	0.00	67.04	0.00	-3.69	-10.51	0.00	0.00	-18.68	34.16

 Segment Leq : 34.16 dBA

↑
 Results segment # 2: Exposed (day)

 Source height = 1.19 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.19	1.50	-0.18	114.47

ROAD (0.00 + 52.36 + 0.00) = 52.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-74	90	0.01	67.04	0.00	-3.72	-0.42	0.00	0.00	-10.55	52.36

Segment Leq : 52.36 dBA

Total Leq All Segments: 52.43 dBA

Results segment # 1: Shielded (night)

Source height = 1.19 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.19	1.50	-34.50	110.15

ROAD (0.00 + 27.63 + 0.00) = 27.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-74	0.00	60.51	0.00	-3.69	-10.51	0.00	0.00	-18.68	27.63

Segment Leq : 27.63 dBA

Results segment # 2: Exposed (night)

Source height = 1.19 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.19	1.50	-0.18	114.47

ROAD (0.00 + 45.82 + 0.00) = 45.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-74	90	0.01	60.51	0.00	-3.72	-0.42	0.00	0.00	-10.55	45.82

Segment Leq : 45.82 dBA

Total Leq All Segments: 45.89 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.43
(NIGHT): 45.89

Filename: 20007_d.te Time Period: Day/Night 16/8 hours
 Description: Rooftop Indoor Amenity Area

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

 Car traffic volume : 17932/1992 veh/TimePeriod *
 Medium truck volume : 566/63 veh/TimePeriod *
 Heavy truck volume : 378/42 veh/TimePeriod *
 Posted speed limit : 50 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 13300
 Percentage of Annual Growth : 2.00
 Number of Years of Growth : 23.00
 Medium Truck % of Total Volume : 3.00
 Heavy Truck % of Total Volume : 2.00
 Day (16 hrs) % of Total Volume : 90.00

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

 Angle1 Angle2 : -90.00 deg -69.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 36.60 / 36.60 m
 Receiver height : 1.50 / 1.50 m
 Topography : 4 (Elevated; with barrier)
 Barrier angle1 : -90.00 deg Angle2 : -69.00 deg
 Barrier height : 3.00 m
 Elevation : 19.50 m
 Barrier receiver distance : 10.70 / 10.70 m
 Source elevation : 95.28 m
 Receiver elevation : 114.65 m
 Barrier elevation : 144.65 m
 Reference angle : 0.00

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

 Car traffic volume : 17932/1992 veh/TimePeriod
 Medium truck volume : 566/63 veh/TimePeriod
 Heavy truck volume : 378/42 veh/TimePeriod
 Posted speed limit : 50 km/h

Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

 Angle1 Angle2 : -69.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 36.60 / 36.60 m
 Receiver height : 1.50 / 1.50 m
 Topography : 4 (Elevated; with barrier)
 Barrier angle1 : -69.00 deg Angle2 : 90.00 deg
 Barrier height : 1.30 m
 Elevation : 19.50 m
 Barrier receiver distance : 4.60 / 4.60 m
 Source elevation : 95.30 m
 Receiver elevation : 114.65 m
 Barrier elevation : 114.65 m
 Reference angle : 0.00

↑
 Results segment # 1: Shielded (day)

Source height = 1.19 m

Barrier height for grazing incidence

 Source ! Receiver ! Barrier ! Elevation of
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

 1.19 ! 1.50 ! -34.25 ! 110.40

ROAD (0.00 + 34.89 + 0.00) = 34.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-69	0.00	67.04	0.00	-3.87	-9.33	0.00	0.00	-18.94	34.89

Segment Leq : 34.89 dBA

↑
 Results segment # 2: Exposed (day)

Source height = 1.19 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.19	1.50	-0.97	113.68

ROAD (0.00 + 50.40 + 0.00) = 50.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-69	90	0.01	67.04	0.00	-3.90	-0.55	0.00	0.00	-12.19	50.40

Segment Leq : 50.40 dBA

Total Leq All Segments: 50.52 dBA

Results segment # 1: Shielded (night)

Source height = 1.19 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.19	1.50	-34.25	110.40

ROAD (0.00 + 28.36 + 0.00) = 28.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-69	0.00	60.51	0.00	-3.87	-9.33	0.00	0.00	-18.94	28.36

Segment Leq : 28.36 dBA

Results segment # 2: Exposed (night)

Source height = 1.19 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.19	1.50	-0.97	113.68

ROAD (0.00 + 43.87 + 0.00) = 43.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-69	90	0.01	60.51	0.00	-3.90	-0.55	0.00	0.00	-12.19	43.87

Segment Leq : 43.87 dBA

Total Leq All Segments: 43.99 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.52
(NIGHT): 43.99

Adjusted Noise Levels

21-May-20

Receiver A	Elevation	Modelled Distance from Source to Receiver	Calculated Day-time	Calculated Night-time	Calculated Day-time	Calculated Night-time	Actual Distance from Source to Receiver	Calculated Day-time	Calculated Night-time
	Change - e (m)		Noise Levels @ 15.0m (dBA)	Noise Levels @ 15.0m (dBA)	Noise Level @ the Source (dBA)	Noise Level @ the Source (dBA)		Noise Level @ Receiver A (dBA)	Noise Level @ Receiver A (dBA)
1st Floor	0	15.0	65.58	59.05	72.6	66.1	13.3	66.1	59.6
2nd Floor	4.3	15.0	65.79	59.26	72.8	66.3	13.3	66.3	59.8
3rd Floor	7.3	15.0	65.96	59.43	73.0	66.4	13.3	66.5	60.0
4th Floor	10.4	15.0	66.15	59.62	73.2	66.6	13.3	66.7	60.2
5th Floor	13.4	15.0	66.35	59.81	73.4	66.8	13.3	66.9	60.3
6th Floor	16.5	15.0	66.57	60.04	73.6	67.0	13.3	67.1	60.6

