

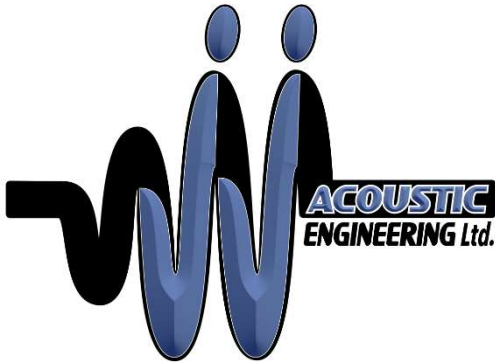


Road Traffic and Stationary Noise Impact Study

83-85 Hickory Street West & 265-267 Hemlock Street,
Waterloo, Ontario

JJ-00452 NIS1





May 23, 2022,

Reference No. JJ-00452-NIS1

Reema Masri, B Sc. Arch. Eng., OAA, MRAIC
Masri O Architects
609 Kumpf Drive, Suite 101
Waterloo, Ontario N2V 1K8

Dear Ms. Masri:

**Re: Road Traffic and Stationary Noise Impact Study
83-85 Hickory Street West & 265-267 Hemlock Street, Waterloo, Ontario**

1. Introduction

JJ Acoustic Engineering Ltd. (JJAE) was retained to complete a Road Traffic and Stationary Noise Impact Study (Study) for the residential development located at 83-85 Hickory Street West & 265-267 Hemlock Street in Waterloo, Ontario (Site). The Site will be developed into a 6-storey residential building. JJAE has provided a copy of the most up-to-date Site Plan in Attachment A.

The Study was prepared consistent with Ontario Ministry of the Environment, Conservation and Park (MOECP) NPC 300, "Environmental Noise Guideline, Stationary and Transportation Sources–Approval and Planning" dated August 2013.

This Study has determined that the potential environmental noise impact from road traffic is significant. The proposed development will need the following: a requirement for central air-conditioning and noise warning clauses. Road traffic noise control requirements for the Site were determined based on road traffic volumes provided by the Region of Waterloo (Region) and forecasted to 10 years from the date of this study.

JJ Acoustic Engineering Ltd.
joey@jjae.ca
226-346-6473

The following attachments were included with this Study:

- Attachment A – Site Plan
- Attachment B – Traffic Data, Road Traffic Summary Table & Sample Stamson Traffic Model Outputs
- Attachment C – Stationary Noise Impact Figures
- Attachment D – Stationary Noise Impact Source Table
- Attachment E – Owners Statement
- Attachment F – Consultant's Declaration

2. Road Traffic Analysis

2.1 Road Traffic Noise Modeling Methodology

The road traffic noise impact was conducted using STAMSON, the MOECP's computerized model of ORNAMENT. The Application of the model for the site was consistent with the ORNAMENT technical documents. The computer model input parameters include, among other data, the number of road segments, number of house rows, the positional relationship of the receptor to a noise source or barrier in terms of distance, elevation and angle of exposure to the source, the basic site topography, the ground surface type, traffic volumes, traffic composition and speed limit.

The predicted sound level is based on the 1-hour equivalent sound level, designated as Leq, and is adjusted by the STAMSON program to the 16-hour daytime and the 8-hour nighttime equivalent sound level. The applicable noise criteria for noise sensitive spaces are specified in terms of the 16-hour daytime period (7:00 a.m. to 11:00 p.m.) and 8-hour nighttime period (11:00 p.m. to 7:00 a.m.) enabling a direct comparison between the STAMSON model output and the noise limits.

2.2 Road Traffic Model Input Parameters

This section describes the STAMSON model input parameters used to predict road traffic noise impact for the Site.

The Site has two significant roadways in the vicinity of the development: Hickory Street West approximately 15 meters to the North and Albert Street approximately 50 meters to the West. Where there are intervening and off-site structures that provide line-of-sight obstruction to the roads, JJAЕ did not include line-of-sight obstruction in our analysis as to calculate worst-case noise impact.

2.2.1 Road Traffic Parameters

The traffic data provided by the Region has been summarized below:

Albert Street:

- Current AADT (2022): 6,500
- Forecast AADT (2032): 7,000
- Commercial Vehicle Rates: 1% medium trucks and 1% heavy trucks
- Posted Speed Limit: 60 km/h
- Day Night Splits: 90% day and 10% night

Hickory Street West:

- Current AADT (2022): 4,100
- Forecast AADT (2032): 4,300
- Commercial Vehicle Rates: 2% medium trucks and 2% heavy trucks
- Posted Speed Limit: 50 km/h
- Day Night Splits: 90% day and 10% night

The traffic data is the foundation of this analysis and the Study will be updated if the values change. Traffic data was supplied by the Region. The Region's AADT report for this Noise Studies report has been supplied in Attachment B.

2.3 Road Traffic Noise Modeling Results

JJAE calculated the Plane of Window (POW) noise exposure for each floor at the Site for the separate daytime and nighttime periods.

The STAMSON road traffic model outputs are provided in Attachment B.

2.4 Road Traffic Modeling Discussion

Noise control requirements will be defined based on NPC 300.

Daytime Outdoor Living Area Assessment (NPC 300, Section C7.1.1)

NPC 300 section A5 (pages 13-14) defines an Outdoor Living Area (OLA). As part of this definition, a balcony or terrace is considered an OLA if it has a minimum depth of 4 meters. All balconies are less than 4 m in depth and therefore will not be considered as OLAs.

JJAE has identified a possible location for an OLA located 5 meters from the West façade. JJAE has calculated the OLA to be 59 dBA. JJAE has determined that it is not feasible to construct a barrier to further reduce noise levels. OLA is indicated on Attachment A.

Plane of a Window – Ventilation Requirements (NPC 300, Section C7.1.2)

The predicted daytime and nighttime Plane of Window (POW) noise impact assumes a worst-case and direct line of sight noise exposure to both roads, unless the building itself blocks line-of-sight (full or partial).

JJAE has used the following criteria, which is a summary of NPC 300 requirements, to evaluate the Site noise impacts from road traffic noise:

Daytime Level (dBA)	Nighttime Level (dBA)	Ventilation Requirements and Warning Clauses	Special Building Components
55	50	Not Required	Not Required
55 – 65	50 – 60	Yes, with Type C Warning Clause	Not Required
66 or more	60 or more	Yes, with Type D Warning Clause	Yes

Table B.1 summarizes the predicted worst-case sound levels and the requirements for the units. The following warning clause is required:

Warning Clause A: "Purchasers/tenants are advised that sound levels due to increasing (rail) 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."

Warning Clause C: "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."

Indoor Living Areas – Building Components (NPC 300, Section C7.1.3)

At minimum, the building must be constructed to standard Ontario Building Code requirements.

3. Stationary Noise Impact Analysis

3.1 Stationary Noise Impact Sound Level Criteria

The general criteria for stationary noise sources are defined by NPC 300. The criteria defined in Table C-5 and C-6, "Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq, dBA) Outdoor Points of Reception" and "Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq, dBA) Plane of Window of Noise Sensitive Spaces" are used to evaluate the noise impact at the proposed development.

The criteria for a Class 1 area have been summarized below:

Receiver Category	Time Period	Stationary Noise Criteria
Outdoor Living Area (OLA)	Day = 7:00 to 23:00	Leq = 55 dBA
Plane of Window (POW)	Day = 7:00 to 23:00	Leq = 50 dBA
	Night = 23:00 to 7:00	Leq = 45 dBA

3.2 Modelling Methodology

The stationary noise impact was evaluated using the CADNA A acoustic modelling software that is based on the ISO 9613-2 standard. The data for all potential stationary noise sources was summarized in Attachment D.

3.3 Site-Specific Noise Limit Justification

The area has elevated traffic noise levels from Hickory Street West and Albert Street. The East façade was determined to be the quietest façade at the Site, therefore; JJAEE used noise impacts from Hickory Street West only. To determine the level for the Site-Specific Noise Limits, JJAEE has used a calculation method provided by the Region. The method uses the current AADT values and assumes the worst case 1 hour traffic amount for the daytime is approximately 8% of the current AADT. Furthermore, the nighttime value can be calculated by using 2% of the current AADT. JJAEE was provided with the Current AADT values from the Region and has been supplied in Attachment B Using these values for the current AADT as well as the % of medium and heavy trucks, JJAEE was able to provide the quantity of cars, medium trucks and heavy trucks to complete our calculation. A summary of our calculation has been provided in Attachment B. JJAEE has used the MOECP's STAMSON program to calculate the 1-hour Leq noise level for the daytime and nighttime for the Site. The new site-specific noise limits were calculated to be 57 dBA for daytime and 52 for nighttime. To be conservative, JJAEE has lowered site-specific noise limits for all façades to 55 dBA during the daytime and 50 dBA during the nighttime. A summary of our calculation has been provided in Attachment B.

Receiver Category	Time Period	Site-Specific Stationary Noise Criteria
Plane of Window (POW)	Day = 7:00 to 23:00	Leq = 55 dBA
	Night = 23:00 to 7:00	Leq = 50 dBA

4. Noise Impact Summary – From Site to Environment

The noise from the Site to the neighboring buildings could not be accounted for because the site has not undergone mechanical design yet. An addendum to this report must be completed once a mechanical design is done to account for noise from the Site to the neighboring building.

5. Noise Impact Summary – From Environment to Site

There are several buildings near the site. JJAЕ has identified several potential stationary noise sources including:

- Small HVAC Units
- Representative MUA
- Residential AC
- Sage 10 Chiller
- Sage 10 MUA
- Sage 8 Chiller
- Sage 8 MUA
- Sage 6 Cooling Tower
- Sage 6 MUA
- Balsam Block MUA
- Balsam Block Condenser
- Balsam Block Chiller
- Representative Chiller

A summary of the noise sources used in our modelling is provided in Attachment D.

JJAЕ modelled the noise impact from all significant noise sources to the Site. The results are summarized in the table below and illustrated on Figure 1.

Facade	Worst Case Daytime Sound Level (dBA)	Daytime Site-Specific Noise Limit (dBA)	Worst Case Nighttime Sound Level (dBA)	Nighttime Site-Specific Noise Limit (dBA)	Limits met
North	39	55	38	50	Yes
East	52	55	48	50	Yes
South	51	55	47	50	Yes
West	41	55	38	50	Yes
OLA	39	50	N/A	N/A	Yes

From the table above it can be seen that all façades meet Site-Specific noise limits.

6. Recommendations

The road traffic noise impacts were above the NPC 300 requirements. Noise mitigation measures include:

- Warning Clause Type C for the North, East and West façades.
- For all the facades expect for the South façade, the dwellings should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion.

Outdoor Living Area:

- Warning Clause Type A

These have been summarized in Attachment B under Table B1.

The stationary noise impacts from neighboring building to the site were evaluated and the sound level predictions were determined to be below the site-specific noise limits for all façades.

The noise from the Site to the neighboring buildings could not be accounted for because the site has not undergone mechanical design yet. An addendum to this report must be completed once a mechanical design is done to account for noise from the Site to the neighboring building

7. Conclusions

The results of this Study indicate that the potential environmental impact from road traffic noise is significant. Mitigation measures will be required including ventilation requirements and noise warning clauses for each unit.

Should you have any questions on the above, please do not hesitate to contact us.

Yours truly,

Written by:

May 23, 2022

Reviewed by:

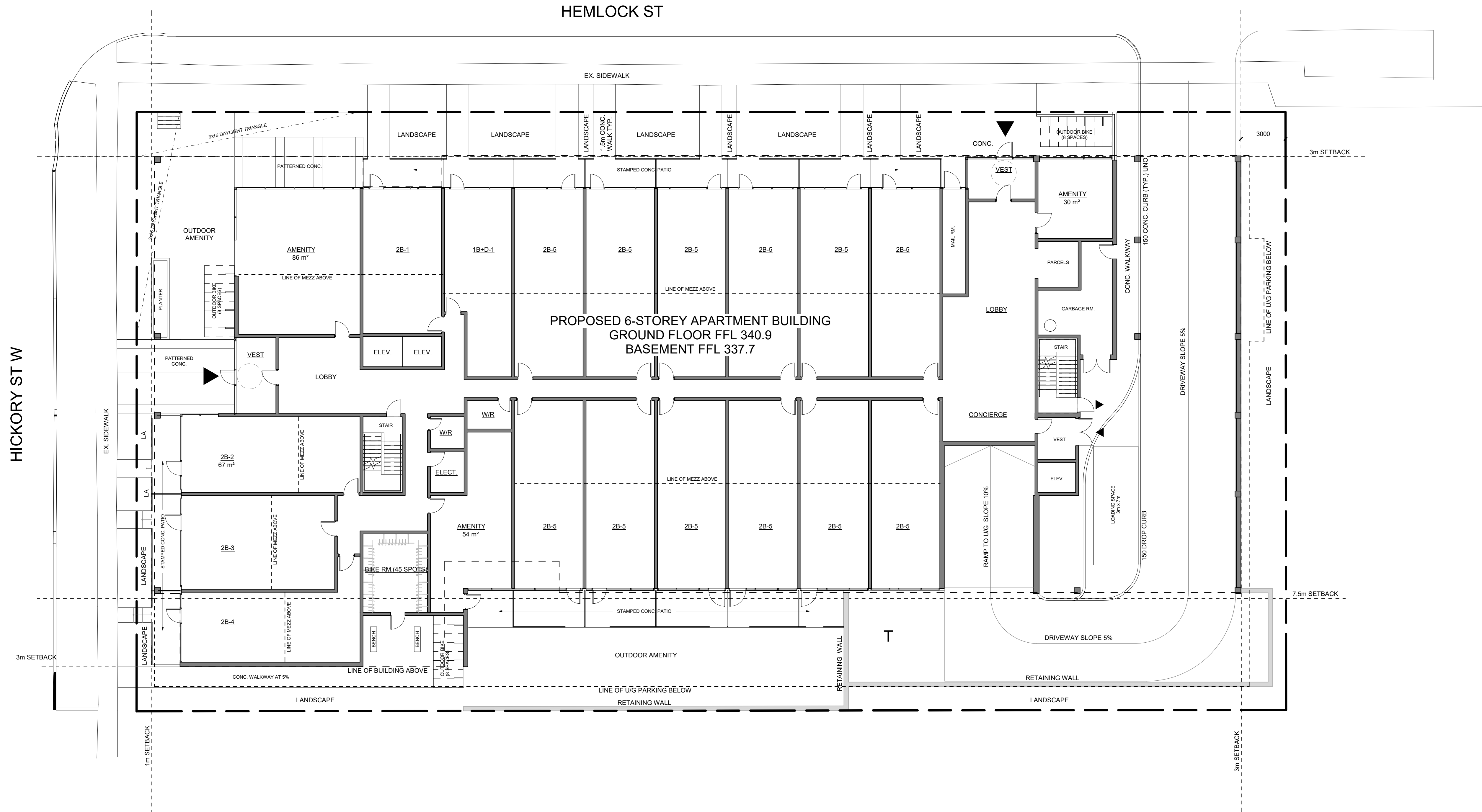


Emmanuel Ghiorghis,
Acoustic Technician



Joey Jraige, P.Eng., B.A.Sc.
President

ATTACHMENT A



SITE PLAN
AD.3.3 SCALE: 1 : 150

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND DISCREPANCIES TO THE CONSULTANT.

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PROJECT:

**83-85 HICKORY STREET
WEST & 265-267
HEMLOCK STREET
WEST,
DCB DEVELOPMENT CANADA INC.**

DRAWING TITLE:

SITE PLAN

DATE: 2022.07.07
SCALE: 1 : 150
DRAWN: Author
STATUS: DESIGN
JOB NO.:

DRAWING NO.:

AD.3.3

ATTACHMENT B

Table B1

Road Traffic Noise Levels and Mitigation Measures Summary
83-85 Hickory Street West & 265-267 Hemlock Street, Waterloo, Ontario

Point of Reception	Road Sound Level Daytime (dBA)	Road Sound Level Nighttime (dBA)	Ventilation Requirements NPC 300	Warning Clauses From NPC 300	Special Building Components
North Façade					
Plane of Window Level 1	61 (dBA)	54 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 2	60 (dBA)	54 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 3	60 (dBA)	54 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 4	60 (dBA)	53 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 5	60 (dBA)	53 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 6	59 (dBA)	53 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
East Façade					
Plane of Window Level 1	56 (dBA)	49 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 2	56 (dBA)	49 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 3	55 (dBA)	49 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 4	55 (dBA)	49 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 5	55 (dBA)	48 (dBA)	Not Required	Not Required	Compliance with Ontario Building Code
Plane of Window Level 6	54 (dBA)	48 (dBA)	Not Required	Not Required	Compliance with Ontario Building Code
South Façade					
Plane of Window Level 1	53 (dBA)	46 (dBA)	Not Required	Not Required	Compliance with Ontario Building Code
Plane of Window Level 2	53 (dBA)	46 (dBA)	Not Required	Not Required	Compliance with Ontario Building Code
Plane of Window Level 3	53 (dBA)	46 (dBA)	Not Required	Not Required	Compliance with Ontario Building Code
Plane of Window Level 4	53 (dBA)	46 (dBA)	Not Required	Not Required	Compliance with Ontario Building Code
Plane of Window Level 5	53 (dBA)	46 (dBA)	Not Required	Not Required	Compliance with Ontario Building Code
Plane of Window Level 6	53 (dBA)	46 (dBA)	Not Required	Not Required	Compliance with Ontario Building Code
West Façade					
Plane of Window Level 1	59 (dBA)	53 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 2	59 (dBA)	53 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 3	59 (dBA)	53 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 4	59 (dBA)	53 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 5	59 (dBA)	52 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Plane of Window Level 6	59 (dBA)	52 (dBA)	Provisions for Ventilation	Type C	Compliance with Ontario Building Code
Outdoor Living Area					
OLA	59 (dBA)	N/A	N/A	N/A	N/A

Attachment B JJA E Single Hour AADT Traffic Calculator

Project Name	267 Hemlock
Project Number	JJ-00452
Street Name	Hickory Street West

Current AADT	4300
% Medium Trucks	2
% Heavy Trucks	2

Daytime %	8
Nighttime %	2

Daytime 1 Hour Total	344
Cars	330
Medium Trucks	7
Heavy Trucks	7

Nighttime 1 Hour Total	86
Cars	83
Medium Trucks	2
Heavy Trucks	2

Region of Waterloo AADT Forecast for Noise Studies

1. Development/Location

267 Hemlock Street, Waterloo, ON

2. Current AADT (2022)

Albert St	Hickory St W
6,600	4,100

3. Forecast AADT (2032)

Albert St	Hickory St W
7,000	4,300

4. Commercial Vehicle Rates

	Albert St	Hickory St W
% Medium Trucks	1%	2%
% Heavy Trucks	1%	2%

5. Posted Speed Limit

Albert St	Hickory St W
60 km/h	50 km/h

6. Day/Night Splits

Regional Standard 90/10 Day/Night Split

7. Expiry

Dec 31 2023

8. Notes

This forecast is intended for the purpose of carrying out a noise study for **267 Hemlock St** only. The above AADT represents the traffic volumes at the east and south legs of the intersection of Hickory St W and Albert St, assuming Hickory St W runs in an east-west direction.

As Albert St and Hickory St W are under the jurisdiction of the City of Waterloo, the City of Waterloo should be contacted to verify the forecast.

This forecast remains valid up to the date indicated above. The Region of Waterloo should be contacted for an updated forecast if there are plans to use this forecast beyond the above validity period.

STAMSON 5.0 NORMAL REPORT Date: 24-05-2022 09:25:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: northf1.te Time Period: Day/Night 16/8 hours
Description: North Facade Floor 1

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

Car traffic volume : 3715/413 veh/TimePeriod *
Medium truck volume : 77/9 veh/TimePeriod *
Heavy truck volume : 77/9 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): 4300
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Hickory St W (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 : 15.00 / 15.00 m
Receiver height : 2.00 / 2.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6174/686 veh/TimePeriod *
Medium truck volume : 63/7 veh/TimePeriod *
Heavy truck volume : 63/7 veh/TimePeriod *
Posted speed limit : 60 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): 7000
Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 1.00
 Heavy Truck % of Total Volume : 1.00
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Albert St (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 : 70.00 / 70.00 m
 Receiver height : 2.00 / 2.00 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Hickory St W (day)

 Source height = 1.19 m

ROAD (0.00 + 59.91 + 0.00) = 59.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	59.91	0.00	0.00	0.00	0.00	0.00	0.00	59.91

Segment Leq : 59.91 dBA

Results segment # 2: Albert St (day)

 Source height = 1.00 m

ROAD (0.00 + 52.63 + 0.00) = 52.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	62.33	0.00	-6.69	-3.01	0.00	0.00	0.00	52.63

Segment Leq : 52.63 dBA

Total Leq All Segments: 60.65 dBA

Results segment # 1: Hickory St W (night)

Source height = 1.20 m

ROAD (0.00 + 53.52 + 0.00) = 53.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	53.52	0.00	0.00	0.00	0.00	0.00	0.00	53.52

Segment Leq : 53.52 dBA

Results segment # 2: Albert St (night)

Source height = 1.00 m

ROAD (0.00 + 46.10 + 0.00) = 46.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	55.80	0.00	-6.69	-3.01	0.00	0.00	0.00	46.10

Segment Leq : 46.10 dBA

Total Leq All Segments: 54.24 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.65
(NIGHT): 54.24

STAMSON 5.0 NORMAL REPORT Date: 24-05-2022 09:25:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: eastf1.te Time Period: Day/Night 16/8 hours
Description: East Facade Floor 1

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

Car traffic volume : 3715/413 veh/TimePeriod *
Medium truck volume : 77/9 veh/TimePeriod *
Heavy truck volume : 77/9 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): 4300
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Hickory St W (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 : 20.00 / 20.00 m
Receiver height : 2.00 / 2.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hickory St W (day)

Source height = 1.19 m

ROAD (0.00 + 55.65 + 0.00) = 55.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	59.91	0.00	-1.25	-3.01	0.00	0.00	0.00	55.65

Segment Leq : 55.65 dBA

Total Leq All Segments: 55.65 dBA

Results segment # 1: Hickory St W (night)

Source height = 1.20 m

ROAD (0.00 + 49.26 + 0.00) = 49.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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-90	0	0.00	53.52	0.00	-1.25	-3.01	0.00	0.00	0.00	49.26
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Segment Leq : 49.26 dBA

Total Leq All Segments: 49.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.65
(NIGHT): 49.26

STAMSON 5.0 NORMAL REPORT Date: 24-05-2022 09:25:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: southf1.te Time Period: Day/Night 16/8 hours
Description: South Facade Floor 1

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

Car traffic volume : 6174/686 veh/TimePeriod *
Medium truck volume : 63/7 veh/TimePeriod *
Heavy truck volume : 63/7 veh/TimePeriod *
Posted speed limit : 60 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): 7000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.00
Heavy Truck % of Total Volume : 1.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Albert St (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 : 70.00 / 70.00 m
Receiver height : 2.00 / 2.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Albert St (day)

Source height = 1.00 m

ROAD (0.00 + 52.63 + 0.00) = 52.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	62.33	0.00	-6.69	-3.01	0.00	0.00	0.00	52.63

Segment Leq : 52.63 dBA

Total Leq All Segments: 52.63 dBA

Results segment # 1: Albert St (night)

Source height = 1.00 m

ROAD (0.00 + 46.10 + 0.00) = 46.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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0	90	0.00	55.80	0.00	-6.69	-3.01	0.00	0.00	0.00	46.10
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Segment Leq : 46.10 dBA

Total Leq All Segments: 46.10 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.63
(NIGHT): 46.10

STAMSON 5.0 NORMAL REPORT Date: 24-05-2022 09:25:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: westf1.te Time Period: Day/Night 16/8 hours
Description: West Facade Floor 1

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

Car traffic volume : 3715/413 veh/TimePeriod *
Medium truck volume : 77/9 veh/TimePeriod *
Heavy truck volume : 77/9 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): 4300
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Hickory St W (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 : 20.00 / 20.00 m
Receiver height : 2.00 / 2.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6174/686 veh/TimePeriod *
Medium truck volume : 63/7 veh/TimePeriod *
Heavy truck volume : 63/7 veh/TimePeriod *
Posted speed limit : 60 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): 7000
Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 1.00
 Heavy Truck % of Total Volume : 1.00
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Albert St (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 : 50.00 / 50.00 m
 Receiver height : 2.00 / 2.00 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Hickory St W (day)

Source height = 1.19 m

ROAD (0.00 + 55.65 + 0.00) = 55.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	59.91	0.00	-1.25	-3.01	0.00	0.00	0.00	55.65

Segment Leq : 55.65 dBA

Results segment # 2: Albert St (day)

Source height = 1.00 m

ROAD (0.00 + 57.11 + 0.00) = 57.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	62.33	0.00	-5.23	0.00	0.00	0.00	0.00	57.11

Segment Leq : 57.11 dBA

Total Leq All Segments: 59.45 dBA

Results segment # 1: Hickory St W (night)

Source height = 1.20 m

ROAD (0.00 + 49.26 + 0.00) = 49.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	53.52	0.00	-1.25	-3.01	0.00	0.00	0.00	49.26

Segment Leq : 49.26 dBA

Results segment # 2: Albert St (night)

Source height = 1.00 m

ROAD (0.00 + 50.57 + 0.00) = 50.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	55.80	0.00	-5.23	0.00	0.00	0.00	0.00	50.57

Segment Leq : 50.57 dBA

Total Leq All Segments: 52.97 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.45
(NIGHT): 52.97

STAMSON 5.0 NORMAL REPORT Date: 24-05-2022 10:19:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: OLA.te Time Period: Day/Night 16/8 hours
Description: Outdoor Living Area

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

Car traffic volume : 3715/413 veh/TimePeriod *
Medium truck volume : 77/9 veh/TimePeriod *
Heavy truck volume : 77/9 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): 4300
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Hickory St W (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 : 30.00 / 30.00 m
Receiver height : 2.00 / 2.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6174/686 veh/TimePeriod *
Medium truck volume : 63/7 veh/TimePeriod *
Heavy truck volume : 63/7 veh/TimePeriod *
Posted speed limit : 60 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): 7000
Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 1.00
 Heavy Truck % of Total Volume : 1.00
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Albert St (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 : 45.00 / 45.00 m
 Receiver height : 2.00 / 2.00 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Hickory St W (day)

 Source height = 1.19 m

ROAD (0.00 + 53.89 + 0.00) = 53.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	59.91	0.00	-3.01	-3.01	0.00	0.00	0.00	53.89

Segment Leq : 53.89 dBA

Results segment # 2: Albert St (day)

 Source height = 1.00 m

ROAD (0.00 + 57.56 + 0.00) = 57.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	62.33	0.00	-4.77	0.00	0.00	0.00	0.00	57.56

Segment Leq : 57.56 dBA

Total Leq All Segments: 59.11 dBA

Results segment # 1: Hickory St W (night)

Source height = 1.20 m

ROAD (0.00 + 47.50 + 0.00) = 47.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	53.52	0.00	-3.01	-3.01	0.00	0.00	0.00	47.50

Segment Leq : 47.50 dBA

Results segment # 2: Albert St (night)

Source height = 1.00 m

ROAD (0.00 + 51.03 + 0.00) = 51.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	55.80	0.00	-4.77	0.00	0.00	0.00	0.00	51.03

Segment Leq : 51.03 dBA

Total Leq All Segments: 52.62 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.11
(NIGHT): 52.62

STAMSON 5.0 NORMAL REPORT Date: 24-05-2022 09:41:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 1hrday.te Time Period: 1 hours
Description: Daytime 1 Hour- Hickory Street West

Road data, segment # 1: Hickory St

Car traffic volume : 330 veh/TimePeriod
Medium truck volume : 7 veh/TimePeriod
Heavy truck volume : 7 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hickory St

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 20.00 m
Receiver height : 2.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hickory St

Source height = 1.19 m

ROAD (0.00 + 57.24 + 0.00) = 57.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	61.50	0.00	-1.25	-3.01	0.00	0.00	0.00	57.24

Segment Leq : 57.24 dBA

Total Leq All Segments: 57.24 dBA

TOTAL Leq FROM ALL SOURCES: 57.24

STAMSON 5.0 NORMAL REPORT Date: 24-05-2022 09:45:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 1hrnight.te Time Period: 1 hours
Description: Nighttime 1 Hour - Hickory Street West

Road data, segment # 1: Hickory St

Car traffic volume : 83 veh/TimePeriod
Medium truck volume : 2 veh/TimePeriod
Heavy truck volume : 2 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hickory St

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 20.00 m
Receiver height : 2.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hickory St

Source height = 1.23 m

ROAD (0.00 + 51.60 + 0.00) = 51.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	55.86	0.00	-1.25	-3.01	0.00	0.00	0.00	51.60

Segment Leq : 51.60 dBA

Total Leq All Segments: 51.60 dBA

TOTAL Leq FROM ALL SOURCES: 51.60

ATTACHMENT C



ATTACHMENT D

Table D1
Stationary Noise Impact Source Data
83-85 Hickory Street West & 265-267 Hemlock Street, Waterloo, Ontario

Noise Source Description	Cadna ID	Total SWL (dBA)	Data Source or Representative Data	Height Absolute (m)	Above Roof (m)		
						x	y
Small_HVAC	Small_HVAC	81.9	Small_HVAC	7.75	1.75	17537876	4813974
SageVI_MUA	SageVI_MUA	88.1	SageVI_MUA	22.75	1.75	17537874	4813697
SageVI_CT	SageVI_CT	92.1	SageVI_CT	20	2	17537870	4813706
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537747	4813937
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537749	4813937
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537742	4813945
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537744	4813946
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537737	4813939
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537739	4813937
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537729	4813933
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537730	4813932
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537728	4813932
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537729	4813931
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537720	4813928
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537721	4813926
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537716	4813918
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537717	4813916
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537707	4813913
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537708	4813912
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537705	4813912
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537706	4813910
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537698	4813908
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537699	4813906
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537683	4813943
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537684	4813942
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537692	4813949
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537693	4813948
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537694	4813950
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537695	4813948
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537673	4813938
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537680	4813929
Residential_AC	Residential_AC	77	MUA_Sage8	10	1	17537691	4813905
Residential_AC	Residential_AC	74.5	Residential_AC	10	1	17537688	4813915
Rep_MUA	Rep_MUA	86	Rep_MUA	20	2	17537841	4813671
Rep_Chiller	Rep_Chiller	92.8	Rep_Chiller	20	2	17537838	4813674
MUA_Sage8	MUA_Sage8	77	MUA_Sage8	20	2	17537818	4813699
MUA_Sage10	MUA_Sage10	80.8	MUA_Sage10	20	2	17537812	4813797
Chiller_Sage8	Chiller_Sage8	91.1	Chiller_Sage8	20	2	17537810	4813711
Chiller_Sage10	Chiller_Sage10	92.8	Chiller_Sage10	20	2	17537826	4813777
BB_New_Chiller	BB_New_Chiller	84.6	BB_New_Chiller	14	2	17537871	4813802
BB_MUA_1	BB_MUA_1	67.6	BB_MUA_1	20	2	17537949	4813799
BB_MUA_1	BB_MUA_1	67.6	BB_MUA_1	20	2	17537935	4813821
BB_MUA_1	BB_MUA_1	67.6	BB_MUA_1	20	2	17537829	4813880
BB_MUA_1	BB_MUA_1	67.6	BB_MUA_1	14	2	17537863	4813835
BB_MUA_1	BB_MUA_1	67.6	BB_MUA_1	14	2	17537873	4813798
BB_MUA_1	BB_MUA_1	67.6	BB_MUA_1	14	2	17537890	4813767
BB_MUA_1	BB_MUA_1	67.6	BB_MUA_1	20	2	17537888	4813901
BB_MUA_1	BB_MUA_1	67.6	BB_MUA_1	19.75	1.75	17537841	4813859
BB_Condenser_1	BB_Condenser_1	62.5	BB_Condenser_1	13.5	1.5	17537855	4813830
BB_Condenser_1	BB_Condenser_1	62.5	BB_Condenser_1	14	2	17537870	4813806
BB_Condenser_1	BB_Condenser_1	62.5	BB_Condenser_1	14	2	17537888	4813771
BB_Chiller_1	BB_Chiller_1	91.1	BB_Chiller_1	14	2	17537857	4813833
BB_Chiller_1	BB_Chiller_1	91.1	BB_Chiller_1	14	2	17537887	4813774
BB_Chiller_1	BB_Chiller_1	91.1	BB_Chiller_1	20	2	17537947	4813802
BB_Chiller_1	BB_Chiller_1	91.1	BB_Chiller_1	20	2	17537931	4813819
BB_Chiller_1	BB_Chiller_1	91.1	BB_Chiller_1	18	2	17537897	4813868
BB_Chiller_1	BB_Chiller_1	91.1	BB_Chiller_1	18	2	17537900	4813870
BB_Chiller_1	BB_Chiller_1	91.1	BB_Chiller_1	18	2	17537905	4813873
BB_Chiller_1	BB_Chiller_1	91.1	BB_Chiller_1	20	2	17537882	4813900
BB_Chiller_1	BB_Chiller_1	91.1	BB_Chiller_1	20	2	17537846	4813853

ATTACHMENT E

Owner's Name: DSCB Development Canada Inc.
Owner's Address: 118 May Ave., Richmond Hill
ON., L4C 3S6

Re: Road Traffic and Stationary Noise Impact Study, 83-85 Hickory Street West & 265-267 Hemlock Street, Waterloo, Ontario

OWNER'S STATEMENT

I am the owner of the property, or the owner's agent, and that I understand and agree with the noise assessment and potential attenuation measures detailed in the study entitled Road Traffic and Stationary Noise Impact Study, 83-85 Hickory Street West & 265-267 Hemlock Street, Waterloo, Ontario, dated May 23, 2022.

The application has been designed to avoid the use of berms or walls as noise attenuation features where feasible. Where berms or walls are recommended, the Noise Study provides economic, planning and engineering justification.

If the application is changed in a way that may affect the noise level calculations, I will have a revised noise study submitted to the Region of Waterloo.

Name
Mohammad Reza Davoodi

Director

Signature
Mohammad Reza Davoodi

Date
August 7, 2022

ATTACHMENT F

CANADA

PROVINCE OF ONTARIO

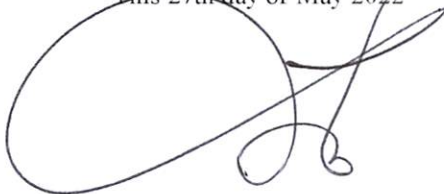
) In the Matter of the
) Environmental Protection
) Act and the Planning Act
)
)
) And in the Matter of
) 83-85 Hickory Street West & 265-
267 Hemlock Street, Waterloo,
Ontario in the Regional
Municipality of Waterloo

I, Joey Jraige, of JJ Acoustic Engineering Ltd., in the Town of Tilbury,
SOLEMNLY DECLARE THAT:

1. I am a Professional Engineer employed by JJ Acoustic Engineering Ltd. which holds a Certificate of Authorization and have personal knowledge of the matters set out below.
2. I was retained or employed as the principal consultant to undertake the assessment of noise impacts and recommendation of noise mitigation measures for the property described as 83-85 Hickory Street West & 265-267 Hemlock Street, Waterloo, Ontario.
3. I have the expertise required to perform these services. Any assessment activities or recommendations requiring the application of engineering principles have been undertaken or supervised by an engineer qualified to perform such services.
4. The information used in the letter report entitled "Road Traffic and Stationary Noise Impact Study" dated May 23, 2022, is the best available information as of the date of the study.
5. The noise level calculations, the interpretation of noise attenuation requirements and the recommended measures are in accordance with Ministry of Environment and Climate Change Guidelines, Region of Waterloo policies, and any applicable policy or guidelines of the Area Municipality, and any other applicable policy or guideline.
6. The physical noise attenuation measures proposed in this study are feasible to implement and will provide the level of attenuation indicated in the study.
7. I acknowledge that this study may be subject to a peer review conducted at my cost.
8. I acknowledge that public authorities and future owners, occupants and others may rely on this statement.

AND I make this solemn Declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath.

DECLARED before me in the Town
of Tilbury, in the Regional
Municipality of Chatham-Kent
This 27th day of May 2022



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)
)
)



LOUIS ELTERS
TAYLOR DELRUE
BARRISTER, SOLICITOR & NOTARY PUBLIC
40 QUEEN ST. S., P.O. BOX 459
TILBURY, ONTARIO N0P 2L0
MY COMMISSION DOES NOT EXPIRE