REPORT

PROPOSED RESIDENTIAL DEVELOPMENT AT 2421 & 2431 NEW STREET

BURLINGTON, ONTARIO

NOISE FEASIBILITY ASSESSMENT

RWDI #1800708

November 27, 2017

SUBMITTED TO

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EXECUTIVE SUMMARY

TRG (New-Guelph) Inc. retained RWDI to conduct a noise feasibility assessment for the proposed residential development located at 2421 & 2431 New Street, Ontario. Only road traffic noise from nearby transportation corridors was identified as the source of sound with the potential to affect the proposed residential development. The sound emissions were assessed at the development using the applicable guidance to determine if sound control measures would be required.

The development was found to be feasible with the following requirements:

- Provision for adding central air conditioning at the occupant's discretion;
- The inclusion of warning clauses in all development agreements, offers of purchase and agreements of purchase and sale or lease.

This feasibility assessment was based on the conceptual design provide on November 10, 2017. Should locations of outdoor living areas or facades adjacent to indoor living and sleeping areas change, this study should be updated to reflect the impacts to sound levels and recommended requirements.

The mechanical equipment on the development will be designed in consultation with an acoustical engineer to meet the required sound level limits at the building itself and on the surrounding environment.

1 INTRODUCTION

TRG (New-Guelph) Inc. retained RWDI to conduct a noise feasibility assessment for the proposed residential development located at 2421 & 2431 New Street, Ontario. This assessment considered the potential impact from nearby roadways on the proposed residential development, and determines the appropriate acoustic control measures, if any.

This assessment was based on the design drawings provided on and before November 10, 2017. The design drawings are provided in Appendix A.

2 SITE AND BUILDING DESCRIPTION

The proposed residential development is exposed to vehicle traffic along New Street to the southeast and Guelph Line to the northeast, as shown in Figure 1. Based on the information provided, the development will be a 11-storey residential with 6-storey portions. Currently, the sites are occupied by commercial plazas with 1-storey commercial buildings.

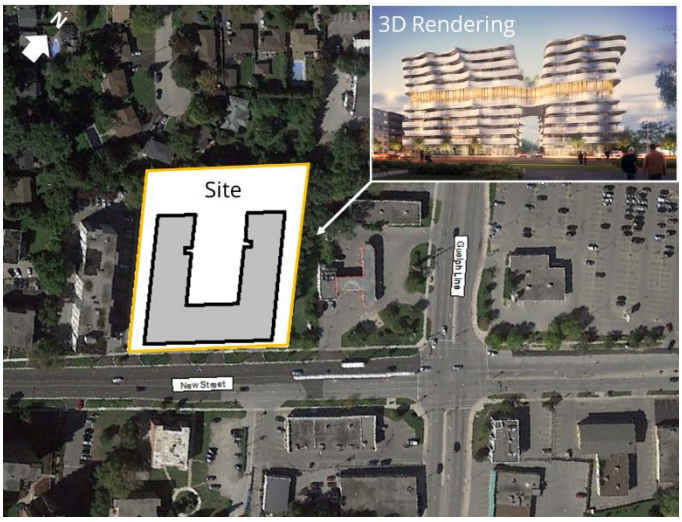


Figure 1: Proposed Residential Development

Existing commercial facilities are distant and are not anticipated to affect sound levels at the proposed residential development. A detailed vibration assessment was not conducted as there are no significant sources of vibration in proximity to the development. Noise impact potential associated with on-site mechanical equipment was not assessed as data is currently unavailable. However, on-site equipment must be designed to meet the applicable guidelines.

3 APPLICABLE GUIDELINES

The City of Burlington does not have specific noise criteria but has adopted the Ministry of Environment and Climate Change (MOECC) guidance. This assessment therefore considered the MOECC Environmental Noise Guideline NPC-300, Stationary and Transportation Sources – Approval and Planning (MOECC, 2013). Guidance from NPC-300 was used to assess environmental sound of transportation-related sources.

4 SOUND ON PROPOSED DEVELOPMENT

4.1 Transportation Sources

4.1.1 Transportation Source Assessment Criteria

Road traffic sound levels are assessed for the daytime 16-hour L_{EQ} and the nighttime 8-hour L_{EQ}. For assessing sound originating from transportation sources, NPC-300 defines sound level criteria as summarized in Table 1 for two types of locations: outdoor living areas, and indoor areas of sensitive uses. Outdoor sound level limits are specified for outdoor living areas (OLAs), which include terraces and balconies with a minimum depth of 4 m, and common amenity areas of a multi-unit dwelling. Indoor living areas include living rooms and sleeping quarters.

Levels at or below the limits presented in Table 1 are considered acceptable. Levels above the limits may be acceptable if adequate sound insulation is provided.

Table 1: NPC-300 Limits for Transportation Sources

Assessment Location	Time Period	NPC-300 Limit L_{EQ} (averaged over time period)
		Road
Outdoor Living Areas	Daytime 16-hr, 0700-2300h	55 dBA [1]
Indoor Living/Dining Areas	Daytime 16-hr, 0700-2300h	45 dBA
Indoor Sleeping Quarters	Nighttime 8-hr, 2300-0700h	40 dBA

Note: [1] Outdoor sound levels up to 5 dB over the limit may be acceptable if it is infeasible to reduce outdoor sound levels further, and future tenants are appropriately warned.

4.1.2 Traffic Data

Road Traffic Data

The two main roadways that have the greatest potential to influence the proposed residential development are New Street to the southeast, and Guelph Line to the northeast (see Figure 1). Other smaller roads in the area are minor, or distant, and are not expected to significantly affect the development.

The NPC-300 guidelines require that assessments be completed for a 10-year horizon. As such, all traffic data used in the analysis was forecasted for the horizon year 2027.

The most recent road traffic data for New Street and Guelph Line was obtained from the City of Burlington in 2017. The data included the 2015 Average Annual Daily Traffic (AADT) Turning Movement Counts (TMCs) at the intersection of New Street and Guelph Line and a traffic growth rate of 1.01% per annum for the area. The annual growth rate was used to estimate the AADT for the year 2027. The total commercial vehicle volume was provided, which was split into medium and heavy vehicles based on the breakdown from the Ontario Ministry of Transportation Environmental Guide for Noise (MTO Guide, 2006) as amended in 2008. The AADT was split into hourly counts to determine daytime and nighttime counts using a representative profile for a roadway presented in the Institute of Transportation Engineers Traffic Engineering Handbook (ITE. 2010).

Traffic data and calculations are included and summarized in Appendix B.

4.1.3 Representative Receptors for Transportation Sources

The selection of receptors affected by transportation sources is based on drawings provided on November 10, 2017 (see Appendix A) which show the intended use of areas for the proposed development.

OLAs

Only outdoor amenity areas (which include balconies and terraces) greater than 4 m in depth are applicable and considered as OLAs. In reviewing the 3D renderings, it was concluded that terraces for individual units would be less than 4 m in depth, and are not considered as OLAs. The two rooftop terraces on the 6th floor located at the north end of the building (identified as RA_o and RB_o) and an at grade outdoor patio (identified as RC_o) at the northwest corner of the lot qualify as OLAs, based on the drawings referenced above. These evaluated OLAs are shown in Figure 2.

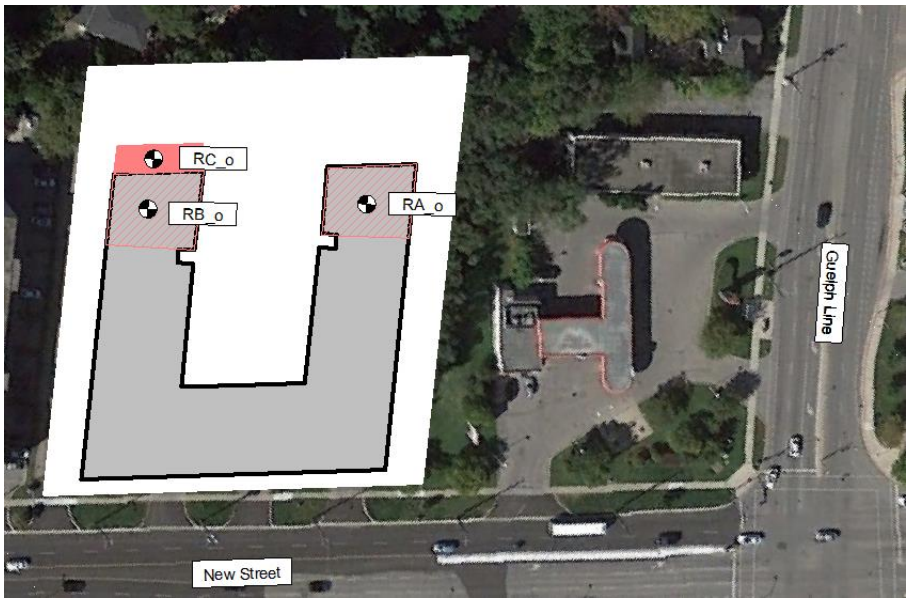


Figure 2: Representative OLAs for Transportation Sources

Façades

Noise-sensitive residential spaces are located on every floor, with exception of the ground level floor (which appears to be designated for commercial use). The transportation noise impacts were evaluated at the worst-case façade receptors locations and are shown in Figure 3. The 2nd floor façades were chosen to determine the worst-case noise exposure to the road traffic.

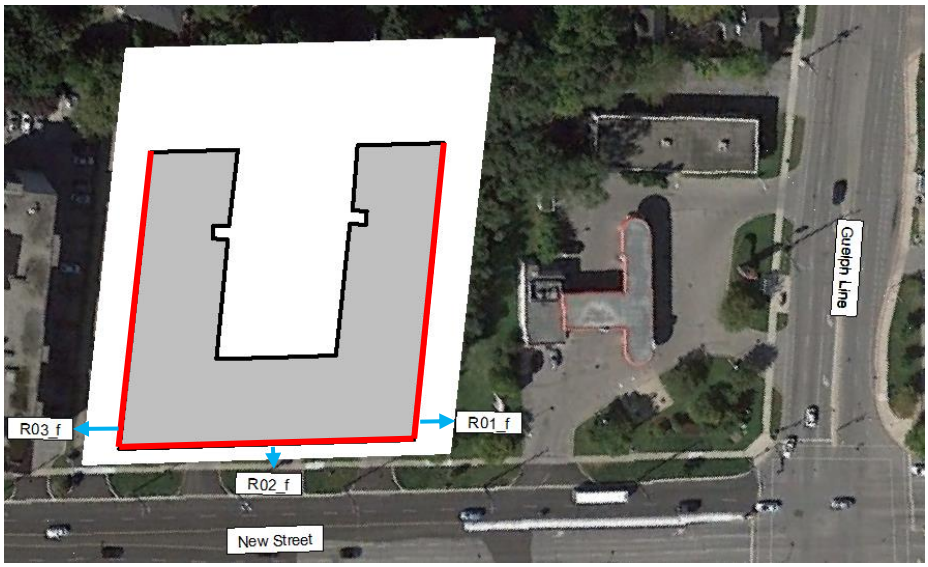


Figure 3: Representative Façade Receptors for Transportation Sources

4.1.4 Modelled Results

Road traffic modelling was carried out using a spreadsheet implementation of the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) (MOECC, 1989) algorithms. The sound level predictions are provided in Appendix C.

OLA Sound Levels

Table 2 summarizes the predicted road traffic sound levels as well as the applicable NPC-300 sound level criteria at each representative OLA. Parapets of 1.2 m height are typically required to protect the elevated OLAs (i.e., protect from falling from heights). The sound levels presented in Table 2 represent the values with the parapets in place for the elevated outdoor terrace (i.e. RA_o and RB_o).

Table 2: Predicted OLA Sound Levels – Road

Receptor	Location	Daytime $L_{EQ,16hr}$		Meets Criteria?
		Outdoor Sound Exposure	Sound Level Limit	
RA_o	North 6th floor outdoor terrace	52 dBA	55 dBA	***Yes***
RB_o	Northwest 6th floor outdoor terrace	49 dBA	55 dBA	***Yes***
RC_o	Northwest at grade outdoor terrace	56 dBA	55 dBA	***No***

As indicated in Table 2, sound levels are predicted to be below the limit (55 dBA) for representative receptors RA_o and RB_o. The sound level is predicted to exceed the limit at RC_o, but is below 60 dBA.

Sound levels between 55 dBA and 60 dBA may be acceptable provided that it is infeasible to reduce further, and occupants are made aware of the potential annoyance or excesses above the limit through appropriate warning clauses. Achieving levels of 55 dBA or less may be feasible with the implementation of a barrier. Warning clauses are provided in Section 4.3.

Façade and Indoor Sound Levels

Table 3 summarizes the predicted road traffic sound levels at each representative façade receptor. Sound levels at the upper floors will be slightly lower due to increased distance from the road.

Table 3: Predicted Façade Sound Levels – Road

Receptor	Location	Outdoor Sound Exposure	
		Daytime $L_{EQ,16hr}$	Nighttime $L_{EQ,8hr}$
R01_f	North 2nd floor façade	63 dBA	56 dBA
R02_f	South 2nd floor façade	64 dBA	57 dBA
R03_f	West 2nd floor façade	61 dBA	54 dBA

The NPC-300 limits are based on indoor sound levels, so values presented in Table 3 are used to calculate indoor sound levels. Indoor sound levels are estimated separately by adjusting levels predicted at the plane of windows/doors and accounting for sound attenuation through an open window. A 10 dB reduction in sound level from the exterior to interior was assumed based on standard industry practice. The estimated indoor sound levels are therefore summarized in Table 4.

Table 4: Estimated Indoor Sound Levels – Road

Receptor	Location	Indoor Sound Exposure[1]		Sound Level Limit		Meets Criteria? (Daytime/ Nighttime)
		Daytime $L_{EQ,16hr}$	Nighttime $L_{EQ,8hr}$	Daytime $L_{EQ,16hr}$	Nighttime $L_{EQ,8hr}$	
R01_f	North 2nd floor façade	53 dBA	46 dBA	45 dBA	40 dBA	***No*** / ***No***
R02_f	South 2nd floor façade	54 dBA	47 dBA	45 dBA	40 dBA	***No*** / ***No***
R03_f	West 2nd floor façade	51 dBA	44 dBA	45 dBA	40 dBA	***No*** / ***No***

Note: [1] Predicted indoor sound levels shown in this table include a 10 dB reduction due to a standard open window.

As indicated in Table 4, sound levels are expected to exceed the indoor sound level limits by 4-9 dB at the façades with open windows. Sound levels that exceed the limits by less than 10 dB are acceptable, if provision for installation of central air conditioning units is provided (see Section 4.2). In addition, occupants must be informed of the provision through appropriate warning clauses (see Section 4.3).

4.2 Addressing Excess Sound

4.2.1 Outdoor Noise from Transportation Sources

Sound levels at two of the OLAs (6th floor outdoor rooftop terraces) are predicted to meet the sound level limits with parapet walls.

- These parapet walls, with a minimum of 1.2 m, must be continuous, free of gaps or cracks, and must have a minimum face density of 10 kg/m^2. Any gaps under the wall for drainage purposes should be minimized such that the acoustical performance is maintained.

The sound level at one of the OLAs (at grade outdoor patio) is predicted to be greater than 55 dBA without sound attenuation measures.

- Noise control (i.e. noise barrier) may be applied to reduce the sound level to 55 dBA.
- If measures are not provided, prospective occupants must be warned of the potential for annoyance from road traffic noise, and outdoor sound levels above the MOECC limits. Sample wording is provided in Section 4.3.

In general,

- Future design changes to balconies and terraces should consider a depth of less than 4 m. Otherwise, if areas that qualify as OLAs are introduced into the design, noise impact potential at the OLAs will need to be assessed when data becomes available.

4.2.2 Indoor Noise from Transportation Sources

Sound levels at the three modelled façades are predicted to be greater than 55 dBA and less than or equal to 65 dBA at the exterior. Due to excess sound, the following sound attenuation measures are required to ensure feasibility of the proposed development:

- Provision for installation of central air conditioning in the future at the occupant's discretion.
- Warning clause Type C is required. Sample wording is provided in Section 4.3.

4.3 Warning Clauses

Warning clauses must be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. Warning clauses may be used individually or in combination.

The following warning clauses are recommended by the MOECC relating to transportation sources:

Type A: required for OLAs

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment and Climate Change."

Type C: required for indoor areas

"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 occupant in low and medium density 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 and Climate Change."

5 CONCLUSION

RWDI completed a noise feasibility study to assess the potential for noise impact from sources that surround the proposed residential development located at 2421 & 2431 New Street in Burlington, Ontario. Only road traffic noise from nearby transportation corridors was identified as the source of sound that can affect the development.

The development was found to be feasible with the following requirements:

- Provision for adding central air conditioning at the occupant's discretion;
- The inclusion of warning clauses in all development agreements, offers of purchase and agreements of purchase and sale or lease.

This feasibility assessment was based on the conceptual design provide on November 10, 2017. Should locations of outdoor living areas or façades adjacent to indoor living and sleeping areas change, this study should be updated to reflect the impacts to sound levels and recommended requirements.

The mechanical equipment on the development will be designed in consultation with an acoustical engineer to meet the required sound level limits at the building itself and on the surrounding environment.

6 REFERENCES

Institute of Transportation Engineers (ITE), 2010, Traffic Engineering Handbook, 6th Edition.

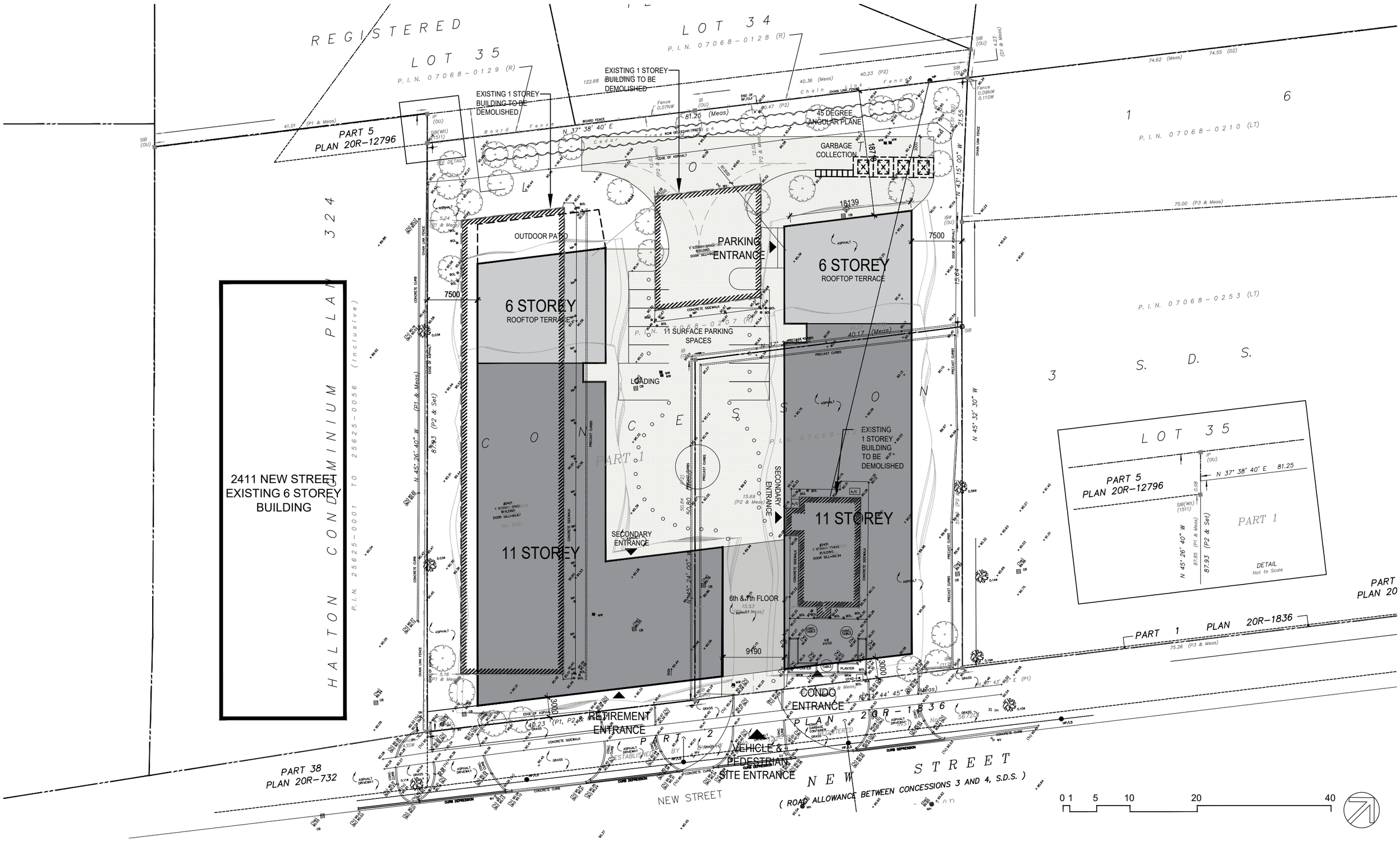
Ontario Ministry of the Environment and Climate Change (MOECC), August 2013, Publication NPC-300, *Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning*.

Ontario Ministry of Transportation (MTO), 2006, Environmental Guide for Noise Version 1.1 July 2008.

Ontario Ministry of the Environment and Climate Change (MOECC), 1989, ORNAMENT Ontario Road Noise Analysis Method for Environment and Transportation, Technical Publication.

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APPENDIX A



SITE PLAN

New Street Development, Burlington

November 2017, 6966

The Rosseau Group
EST. 2013

WZMH ARCHITECTS

APPENDIX B

Guelph Line @ New St

Annual Average Daily Traffic Diagram

Total Factor = Monthly Factor(0.94) x Daily Factor(1.02) x 24 Hour Factor(1.85) = 1.773780

Municipality: Burlington
Site #: 0000200953
Intersection: New St & Guelph Line
TFR File #: 1
Count date: 8-Jun-2015

Weather conditions:
Rain am, Cloudy/Dry pm

Person(s) who counted:
Eugene
Rick

**** Signalized Intersection ****

Major Road: New St runs W/E

North Leg Total:	16909			
North Entering:	7776			
North Peds:	197			
Peds Cross:	⋈			
Cyclists	5	21	5	32
Trucks	71	126	53	250
Cars	2466	3021	2008	7494
Totals	2542	3168	2066	
Cyclists	12			
Trucks	294			
Cars	8826			
Totals	9133			
East Leg Total:	16471			
East Entering:	9413			
East Peds:	183			
Peds Cross:	⧖			

Guelph Line

Cyclists	Trucks	Cars	Totals
27	239	8841	9107

New St

Cars	Trucks	Cyclists	Totals
2489	83	0	2572
5775	161	18	5955
857	25	5	887
9121	270	23	

N
W E
S

Cyclists	Trucks	Cars	Totals
2	71	2650	2723
9	117	4140	4266
4	16	543	562
14	204	7333	

New St

Cars	Trucks	Cyclists	Totals
6843	199	16	7058

Guelph Line

Peds Cross:	⧖			
West Peds:	153			
West Entering:	7551			
West Leg Total:	16658			
Cars	4420			
Trucks	167			
Cyclists	30			
Totals	4617			
Cars	600	3688	695	4983
Trucks	7	140	28	176
Cyclists	4	11	2	16
Totals	610	3838	725	
Peds Cross:	⋈			
South Peds:	62			
South Entering:	5174			
South Leg Total:	9791			

Comments

Turning Movement Count Convertor

11-Nov-17

Intersection: Guelph Line (north-south)

and New Street (east-west)

1. Turning Movement Count Summary Information

		Northbound (n/b)					Eastbound (e/b)					Soutbound (s/b)					Westbound (w/b)				
		Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total
AADT	Car	8827	600	3688	695	4983	6843	2650	4140	543	7333	4421	2008	3021	2466	7495	8641	857	5575	2489	8921
	Truck	294	7	140	28	175	216	71	117	16	204	167	71	126	53	250	221	25	161	83	269
	TOTAL		607	3828	723	5158		2721	4257	559	7537		2079	3147	2519	7745		882	5736	2572	9190

Notes:

Exits - traffic which will head in a particular direction after it clears the intersection. For example, westbound exists are w/b thru + n/b left + s/b right

Link volume - sum of the turning movements, or simply the sum of the exists plus opposite bound (e.g., north link is n/b exits + s/b total)

Trucks - Trucks consists of 5% medium trucks and 8% heavy trucks, for a total of 13%.

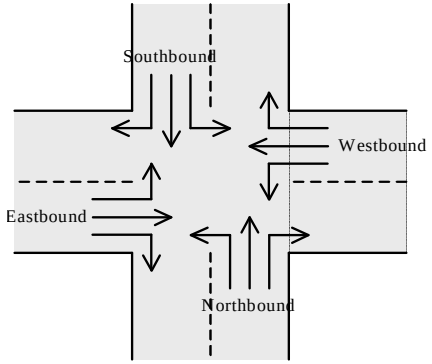
2. Resulting Traffic Volumes Per Link

West Link Volume

	AADT
Car	15974
Medium	163
Heavy	262
Total	16399

South Link Volume

	AADT
Car	9404
Medium	132
Heavy	210
Total	9746



General Turning Movement Diagram

North Link Volume

	AADT
Car	16322
Medium	209
Heavy	335
Total	16866

East Link Volume

	AADT
Car	15764
Medium	187
Heavy	298
Total	16249

Notes:

%Comm - Percent Commercial - the percentage of traffic composed of commercial trucks (medium and heavy)

%Bus - Percentage of the total as bus traffic (buses count as medium trucks)

%Trucks - Percentage of fleet made up by commerical vehicles and buses

4. Daytime Nighttime Distribution

% Traffic Distribution	Hourly Traffic Distribution (Hour starting)																							
Distribution Name	**0000**	**0100**	**0200**	**0300**	**0400**	**0500**	**0600**	**0700**	**0800**	**0900**	**1000**	**1100**	**1200**	**1300**	**1400**	**1500**	**1600**	**1700**	**1800**	**1900**	**2000**	**2100**	**2200**	**2300**
ITE % Traffic Distribution	1.5%	1.0%	0.5%	0.3%	0.2%	0.5%	2.7%	7.4%	9.0%	3.8%	3.5%	3.6%	3.7%	3.9%	4.1%	7.4%	9.3%	10.0%	8.5%	7.0%	4.2%	3.4%	2.5%	2.0%

Daytime	91%
Nighttime	9%

3. Conversion to AADT

AADT Traffic Data Estimations for Modelling

Roadway	Link	AADT[1]	2015 24-hr Volumes			2027 24-hr Volumes		
			Cars	Med	Heavy	Cars	Med	Heavy
Guelph Line	North	16866	16322	209	335	18300	235	375
	South	9746	9404	132	210	10544	147	236
	East	16249	15764	187	298	17675	209	335
New Street	West	16399	15974	163	262	17910.2	183	293

Notes:

[1] Uses Average AADT from above. Switch to appropriate estimate as required.

[2] Annual growth rate for the City of Burlington: 1.01% , total growth for 12 years 12.12%

APPENDIX C

ORNAMENT

Ontario Road Noise Analysis Method for Environment and Transportation

version 2.08

Job No. 1800708
Job Name 2421 and 2431 New Street

Scenario

ROAD CHARACTERISTICS | **SOURCE-RECEIVER-BARRIER-TOPOGRAPHY CHARACTERISTICS**

ID	Description	Time Period		Number of Vehicles			Speed (km/h)	Road Gradient (%)	Two Way? (y/n)	Pavement Type	Road Viewable Angle		Source-Receiver Distance (m)	Ground Type (Hard/Soft)	Topography Type	Source Height (m)	Road Elevation (m asl)	Receptor Height (m)	Receptor Elevation (m asl)	Barrier Height (m)	Barrier Elevation (m asl)	Barrier-Reciever Distance (m)	Barrier Viewable Angle		**Total Segment L_{eq} (dBA)**
				Autos	Medium	Heavy					Q_1	Q_2											Q_1	Q_2	
R01_f	Guelph Line	Daytime	16	16709	215	342	50	0	y	1	-90	90	96.0	Hard	A	1.2	0.0	4.5	0.0						58
R01_f	New Street	Daytime	16	16353	167	268	50	0	y	1	-90	0	21.0	Hard	A	1.1	0.0	4.5	0.0						61
R01_f	Total																								63
R01_f	Guelph Line	Nighttime	8	1592	20	33	50	0	y	1	-90	90	96.0	Hard	A	1.2	0.0	4.5	0.0						51
R01_f	New Street	Nighttime	8	1558	16	25	50	0	y	1	-90	0	21.0	Hard	A	1.1	0.0	4.5	0.0						54
R01_f	Total																								56
R02_f	New Street	Daytime	16	16353	167	268	50	0	y	1	-90	90	21.0	Hard	A	1.1	0.0	4.5	0.0						64
R02_f	New Street	Nighttime	8	1558	16	25	50	0	y	1	-90	90	21.0	Hard	A	1.1	0.0	4.5	0.0						57
R03_f	New Street	Daytime	16	16353	167	268	50	0	y	1	0	90	21.0	Hard	A	1.1	0.0	4.5	0.0						61
R03_f	New Street	Nighttime	8	1558	16	25	50	0	y	1	0	90	21.0	Hard	A	1.1	0.0	4.5	0.0						54
RA_o	Guelph Line	Daytime	16	16709	215	342	50	0	y	1	-90	30	105.0	Hard	A	1.2	0.0	1.5	18.0	1.2	18.0	8.0	-90	30	49
RA_o	New Street	Daytime	16	16353	167	268	50	0	y	1	-90	40	105.0	Hard	A	1.1	0.0	1.5	18.0	1.2	18.0	8.0	-90	40	48
	Total																								52
RB_o	Guelph Line	Daytime	16	16709	215	342	50	0	y	1	-90	10	153.0	Hard	A	1.2	0.0	1.5	18.0	1.2	18.0	8.0	-90	10	48
RB_o	New Street	Daytime	16	16353	167	268	50	0	y	1	0	50	80.0	Hard	A	1.1	0.0	1.5	18.0	1.2	18.0	8.0	0	50	43
RB_o	Total																								49
RC_o	Guelph Line	Daytime	16	16709	215	342	50	0	y	1	-90	0	153.0	Hard	A	1.2	0.0	1.5	18.0						53
RC_o	New Street	Daytime	16	16353	167	268	50	0	y	1	30	90	91.5	Hard	A	1.1	0.0	1.5	18.0						53
RC_o	Total																								56