Environmental Noise Feasibility Study

409 Brant Street

Proposed Mixed-use Development

City of Burlington

December 21, 2017
Project: 117-0659

Prepared for

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VALCOUSTICS

Canada Ltd.

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3.0	December 21, 2017	Final - Issued to Client (For submission)

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Environmental Noise Feasibility Study

409 Brant Street

Proposed Mixed-use Development

City of Burlington

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise Feasibility Study for the proposed development located at 409 Brant Street in the City of Burlington. The proposed development will consist of a 23-storey tower with a 4-storey podium. There will be retail/commercial uses on the ground floor and residential units above. Common indoor and outdoor amenity space will be provided on the second floor and the mechanical penthouse/roof level. The development will have five levels of underground parking.

The significant noise source in the vicinity is road traffic on Brant Street, James Street and John Street.

The sound levels on site have been determined and compared with the applicable Ministry of the Environment and Climate Change (MOE) noise guideline limits to determine the need for noise mitigation.

To meet the applicable transportation noise source guideline limits:

- All residential dwellings in the development require mandatory air conditioning; and
- Exterior wall construction meeting a Sound Transmission Class (STC) rating of 45 (expected to be met with typical spandrel wall construction) and exterior windows meeting STC 32 would be required.

Final requirements should be checked when detailed building plans are available. This is usually done as a condition for obtaining a building permit.

1.0 INTRODUCTION

VCL was retained to prepare an Environmental Noise Feasibility Study for the proposed development in support of the Re-zoning application submission to the City of Burlington.

The potential sound levels and noise mitigation measures needed for the proposed development to comply with the MOE noise guideline requirements are outlined herein.

1.1 THE SITE AND SURROUNDING AREA

The site is located at 409 Brant Street in the City of Burlington.

The site is bounded by:

- James Street, with existing low-rise commercial development beyond, to the north;
- John Street, with an existing 6-storey office building and surface parking lot beyond, to the east;
- an existing surface parking lot to the south; and
- Brant Street, with Burlington City Hall and an existing 3-storey commercial building beyond, to the west.

There are existing commercial developments on site that will be demolished as part of the development.

A Key Plan is included as Figure 1. The study is based on the Site Plan (plotted December 14, 2017) and the architectural drawing set, prepared by Graziani + Corazza Architects Inc., plotted December 7, 2017. The Site Plan is included as Figure 2.

1.2 THE PROPOSED DEVELOPMENT

The proposed development will consist of a 23-storey tower with a 4-storey podium. There will be retail/commercial uses on the ground floor and residential units above. Common indoor and outdoor amenity space will be provided on the second floor and the mechanical penthouse/roof level. The development will have five levels of underground parking.

2.0 NOISE SOURCES

The noise source with potential to impact the proposed development is road traffic on Brant Street, James Street and John Street. Traffic volumes on the other surrounding roadways are anticipated to be minor and no significant noise impact is expected at the subject site.

The traffic data is shown in Appendix A and summarized in Table 1.

There are also a few stationary noise sources (commercial/retails buildings) in the vicinity. The only noise sources at these facilities would be the rooftop mechanical equipment. However, these units are relatively small and would not be expected to cause any significant noise impact at the site. See Section 2.2.2 below.

2.1 ROAD TRAFFIC NOISE SOURCES

Road traffic volumes applicable to the year 2017 for Brant Street and James Street were obtained from turning movement count data provided by the City of Burlington. Road traffic volumes for John Street were obtained from a year 2015 turning movement count provided by the City of Burlington. For each roadway, a day/night split of 90%/10% was used, as is typical for

well-travelled roadways. A growth rate of 2%, compounded annually, was used to obtain future (year 2027) traffic volumes for all roadways. Truck percentages were obtained from the turning movement counts. The ratio of medium trucks to heavy trucks was assumed to be 60%/40%.

2.2 STATIONARY NOISE SOURCES

There are existing commercial developments to the north, south and west of the site. An existing office building is also located to the east of the site, and the Burlington City Hall building is located to the west of the site. All of these developments are separated from the subject site by a roadway or a surface parking lot. The main noise sources associated with these uses would be the rooftop mechanical equipment. Due to distance separation and the level of ambient noise from road traffic on the surrounding roadways, noise impact from these sources is not expected. Thus, these sources have not been considered further in this assessment.

3.0 ENVIRONMENTAL NOISE GUIDELINES

3.1 MOE PUBLICATION NPC-300

The applicable noise guidelines for new residential development are those in MOE Publication NPC-300, *"Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning"*.

The environmental noise guidelines of the MOE, as provided in Publication NPC-300, are discussed briefly below and summarized in Appendix B.

3.1.1 Transportation Noise Sources

3.1.1.1 Architectural Elements

In the daytime, the indoor criterion for road noise is $L_{eq\ Day}$(1) of 45 dBA for sensitive spaces such as living/dining rooms, dens and bedrooms. At night, the indoor criterion for road noise is $L_{eq\ Night}$(2) of 45 dBA for sensitive spaces such as living/dining rooms and dens and 40 dBA for bedrooms.

The architectural design of the building envelope (walls, windows, etc.) must provide adequate sound isolation to achieve these indoor sound level limits, based on the applicable outdoor sound level on the facades.

3.1.1.2 Ventilation

In accordance with the MOE noise guideline for road traffic sources, if the daytime sound energy level, $L_{eq\ Day}$, at the exterior face of a noise sensitive window is greater than 65 dBA, means must be provided so that windows can be kept closed for noise control purposes and central air conditioning is required. For daytime sound levels between 56 dBA and 65 dBA inclusive, there need only be the provision for adding air conditioning at a later date. A warning clause advising the occupant of the potential interference with some activities is also required. At nighttime, air

(1) $L_{eq\ Day}$ - 16 hour energy equivalent continuous sound level (0700-2300 hours).
(2) $L_{eq\ Night}$ - 8 hour energy equivalent continuous sound level (2300-0700 hours).

conditioning would be required when the sound level exceeds 60 dBA ($L_{eq\ Night}$) at a noise sensitive window (provision for adding air conditioning is required when greater than 50 dBA).

3.1.1.3 Outdoors

For outdoor amenity areas ("Outdoor Living Areas" - OLA's), the guideline is 55 dBA $L_{eq\ Day}$ (0700 to 2300 hours), with an excess not exceeding 5 dBA considered acceptable if it is technically not practicable to achieve the 55 dBA objective, providing warning clauses are registered on title. Note that for road traffic sources, a balcony is not considered an OLA, unless it is the only OLA for the occupant and it is:

- at least 4 m in depth; and
- unenclosed.

3.2 REGION OF HALTON

The site is not located adjacent to any Regional Roads. Thus, there are no regional requirements over and above those of the MOE that apply.

4.0 NOISE IMPACT ASSESSMENT

Using the road traffic data in Table 1, the sound levels, in terms of $L_{eq\ Day}$ and $L_{eq\ Night}$, were determined using STAMSON V5.04 – ORNAMENT, the computerized road traffic noise prediction model of the MOE.

The daytime and nighttime sound levels at the building facades were calculated at the top floor windows of the podium (12.8 m above grade) and the tower (71.5 m above grade). Daytime sound levels at the rooftop OLA were calculated at a height of 1.5 m above the roof. Since the OLA is "U"-shaped, with the mechanical penthouse and indoor amenity area in the centre, sound levels were calculated at the centre of each of the east, west and south areas. Inherent screening of the building due to its orientation to the noise source was taken into account. To be conservative, screening from the existing developments in the vicinity of the site was not included in the assessment.

At the podium, the highest unmitigated daytime/nighttime sound levels of 67 dBA/61 dBA are predicted to occur at the exterior plane of windows facing west towards Brant Street.

At the tower, the highest unmitigated daytime/nighttime sound levels of 66 dBA/60 dBA are also predicted to occur at the exterior plane of windows facing west towards Brant Street.

The highest unmitigated daytime OLA sound level of 51 dBA is predicted to occur at the west side of the rooftop amenity area.

All other private terraces and balconies as well as the common terrace on the 2nd floor are less than 4 m in depth and therefore are not considered OLA's under the MOE noise guidelines.

Table 2 summarizes the unmitigated daytime and nighttime sound level predictions.

5.0 NOISE ABATEMENT REQUIREMENTS

The noise control measures can generally be classified into two categories which are interrelated, but which the designer can treat separately for the most part:

(a) Architectural elements to achieve acceptable indoor noise guidelines;

(b) Design features to protect the OLA's.

Noise abatement requirements are summarized on Figure 2 and in Table 3 along with the notes to Table 3.

5.1 INDOORS

5.1.1 Architectural Elements

The indoor noise level guidelines can be achieved by using appropriate construction for exterior walls, windows and doors. In determining the worst-case architectural requirements for the residential units, wall and window areas were assumed to be 20% and 80%, respectively, at each facade of a corner room with both facades directly exposed or at an angle to the noise sources.

Based on the predicted sound levels, exterior wall construction meeting an STC of 45 (expected to be met with typical spandrel and stud/gypsum board back up wall construction) and exterior windows meeting STC 32 would be required to meet the indoor noise guideline criteria of the MOE.

The final sound isolation requirements should be reviewed when architectural plans are developed. Wall and window constructions should also be reviewed at this point to ensure that they will meet the required sound isolation performance. This is typically required by the City at the time of building permit application.

Note, the STC rating applies to the window as a whole, including frame elements, gasketing, etc. Acoustical test data from an accredited laboratory indicating the window assemblies can meet the required STC ratings need to be submitted by the window supplier for review.

5.1.2 Ventilation Requirements

Based on the predicted daytime and nighttime sound levels, all residential units in the development require mandatory air conditioning to allow windows to remain closed for noise control purposes.

5.2 OUTDOORS

The unmitigated daytime OLA sound levels at the rooftop amenity are predicted to be with the 55 dBA design objective. Thus, sound barriers are not required for noise control purposes.

5.3 WARNING CLAUSES

Warning clauses are a tool to inform prospective owners/occupants of potential annoyance due to existing noise sources. Where the guideline sound level limits are exceeded, appropriate warning clauses should be registered on title or included in the development agreement that is registered

on title. The warning clauses should also be included in agreements of Offers of Purchase and Sale and lease/rental agreements to make future occupants aware of the potential noise situation. Locations requiring warning clauses and the appropriate wording are given in Table 3 and in the notes to Table 3, respectively.

6.0 NOISE IMPACT TO NEIGHBOURING DEVELOPMENTS

The main source of noise associated with this development, with the potential for impact on surrounding buildings, is the mechanical equipment.

Mechanical equipment interfacing to the outdoors must comply with the MOE noise guideline limits in NPC-300. By proper engineering design, all requirements can be met and no significant noise impact would be created for surrounding uses. Appropriate choice of location, equipment type, and noise control features should be considered during detailed design for such items as rooftop equipment and air intakes and exhausts, including underground parking garage ventilation systems. Parking garage air shafts located immediately adjacent to residential uses may need special noise control treatment such as acoustically lining the shaft or providing silencers, in addition to appropriate choice of fan type.

For any emergency generators, appropriate steps should be taken to ensure that the equipment placement, treatment, and the routine testing schedule will not generate significant noise impact on neighbouring properties. The generator will require silencers on the intake and exhaust cooling air paths, as well as a muffler on the combustion exhaust.

An assessment of the noise impact from the building onto neighbouring developments should be done once the relevant mechanical and electrical details are known. This is typically done as part of the detailed design of the building.

7.0 CONCLUSIONS

With appropriate acoustical design of the development, a suitable acoustical environment can be provided and the applicable MOE noise guideline requirements met.

The approvals and administrative procedures are available to ensure that the acoustical requirements are implemented.

8.0 REFERENCES

1. PC STAMSON 5.04, “Computer Program for Road Traffic Noise Assessment", Ontario Ministry of the Environment and Climate Change.

2. Building Practice Note No. 56: “Controlling Sound Transmission into Buildings”, by J. D. Quirt, Division of Building Research, National Council of Canada, September 1985.

3. “Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning”, Ontario Ministry of the Environment, Publication NPC-300, August 2013.

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TABLE 1

ROAD TRAFFIC DATA

Roadway	AADT[1]	% Trucks		Speed Limit (kph)	Day/Night Split (%)
		Medium	Heavy		
Brant Street[2]	10 679	5.2	3.5	50	90/10
James Street[2]	7 720	5.2	3.5	50	90/10
John Street[2]	1 244	1.3	0.9	50	90/10

Notes:

(1) AADT - Annual Average Daily Traffic
(2) Obtained from the City of Burlington for the year 2017. Traffic volumes were projected to the year 2027 using a growth rate of 2%, compounded annually. The ratio of medium trucks to heavy trucks was assumed to be 60%/40%.
(3) Obtained from the City of Burlington for the year 2015. Traffic volumes were projected to the year 2027 using a growth rate of 2%, compounded annually. The ratio of medium trucks to heavy trucks was assumed to be 60%/40%.

TABLE 2

PREDICTED UNMITIGATED SOUND LEVELS AT BUILDING FACADE

Location[1]	Source	Distance (m)[2]	$L_{eq\ Day}$ (dBA)	$L_{eq\ Night}$ (dBA)
4-Storey Podium				
Northwest Corner (North Face)	Brant Street	13	64	58
	James Street	13	63	56
	John Street	57	45	38
	TOTAL	–	**67**	**60**
Northwest Corner (West Face)	Brant Street	13	67	61
Southwest Corner (South Face)	Brant Street	13	64	58
	John Street	57	45	38
	TOTAL	–	**64**	**58**
Northeast Corner (North Face)	Brant Street	57	58	51
	James Street	13	66	59
	John Street	13	52	45
	TOTAL	–	**66**	**60**
Northeast Corner (East Face)	James Street	13	63	56
	John Street	13	55	58
	TOTAL	–	**63**	**57**
Southeast Corner (East Face)	Brant Street	57	58	51
	John Street	13	52	45
	TOTAL	–	**59**	**52**
23-Storey Tower				
Northwest Corner (North Face)	Brant Street	17	63	57
	James Street	17	62	55
	John Street	53	45	38
	TOTAL	–	**65**	**59**
Northwest Corner (West Face)	Brant Street	17	66	60

cont...

TABLE 2 (continued)

PREDICTED UNMITIGATED SOUND LEVELS AT BUILDING FACADE

Location[1]	Source	Distance (m)[2]	$L_{eq\ Day}$ (dBA)	$L_{eq\ Night}$ (dBA)
23-Storey Tower				
Southwest Corner (South Face)	Brant Street	17	63	57
	John Street	53	45	38
	TOTAL	**–**	**63**	**57**
Northeast Corner (North Face)	Brant Street	54	58	52
	James Street	17	64	58
	John Street	16	51	44
	TOTAL	**–**	**65**	**59**
Southeast Corner (South Face)	Brant Street	54	58	52
	John Street	16	51	44
	TOTAL	**–**	**59**	**52**
Rooftop Amenity Area West Side (OLA)	Brant Street	20	51	–
	James Street	25	39	–
	TOTAL	**–**	**51**	**–**
Rooftop Amenity Area South Side (OLA)	Brant Street	35	40	–
	John Street	36	27	–
	TOTAL	**–**	**40**	**–**
Rooftop Amenity Area East Side (OLA)	James Street	25	43	–
	John Street	20	37	–
	TOTAL	**–**	**44**	**–**

Notes:

(1) See Figure 2.
(2) Distance indicated is taken from the centreline of the noise source to the point of reception.
(3) Receptors at the podium were assessed at a 4th storey height of 12.8 m above grade. Receptors at the tower were assessed at a 23rd storey height of 71.5 m above grade.

TABLE 3

MINIMUM NOISE ABATEMENT MEASURES

Location	Air Conditioning[1]	Exterior Wall[2]	Exterior Window[3]	Sound Barrier[4]	Warning Clauses[5]
All residential units	Mandatory	STC 45	STC 32	None	A + B + C

Notes:

(1) The provision of air condition allows windows to remain closed for noise control purposes.

(2) STC - Sound Transmission Class Rating (Reference ASTM-E413). The upgraded construction is only required on the three facades with exposure to the rail line.

The requirements are based on assumed percentages of wall and window area to associated floor area and should be checked once building plans are finalized.

(3) STC - Sound Transmission Class Rating (Reference ASTM-E413). A sliding glass walkout door should be considered as a window and be included in the percentage of glazing.

The requirements are based on assumed percentages of wall and window area to associated floor area and should be checked once building plans are finalized.

(4) Sound barriers must be of solid construction with no gaps, cracks or holes and must have a minimum surface density of 20 kg/m². A variety of materials are available including wood, masonry, composites, plastics, earth berms, or a combination of materials.

(5) Warning clauses to be registered on title and be included in Offers of Purchase and Sale for designated lots:

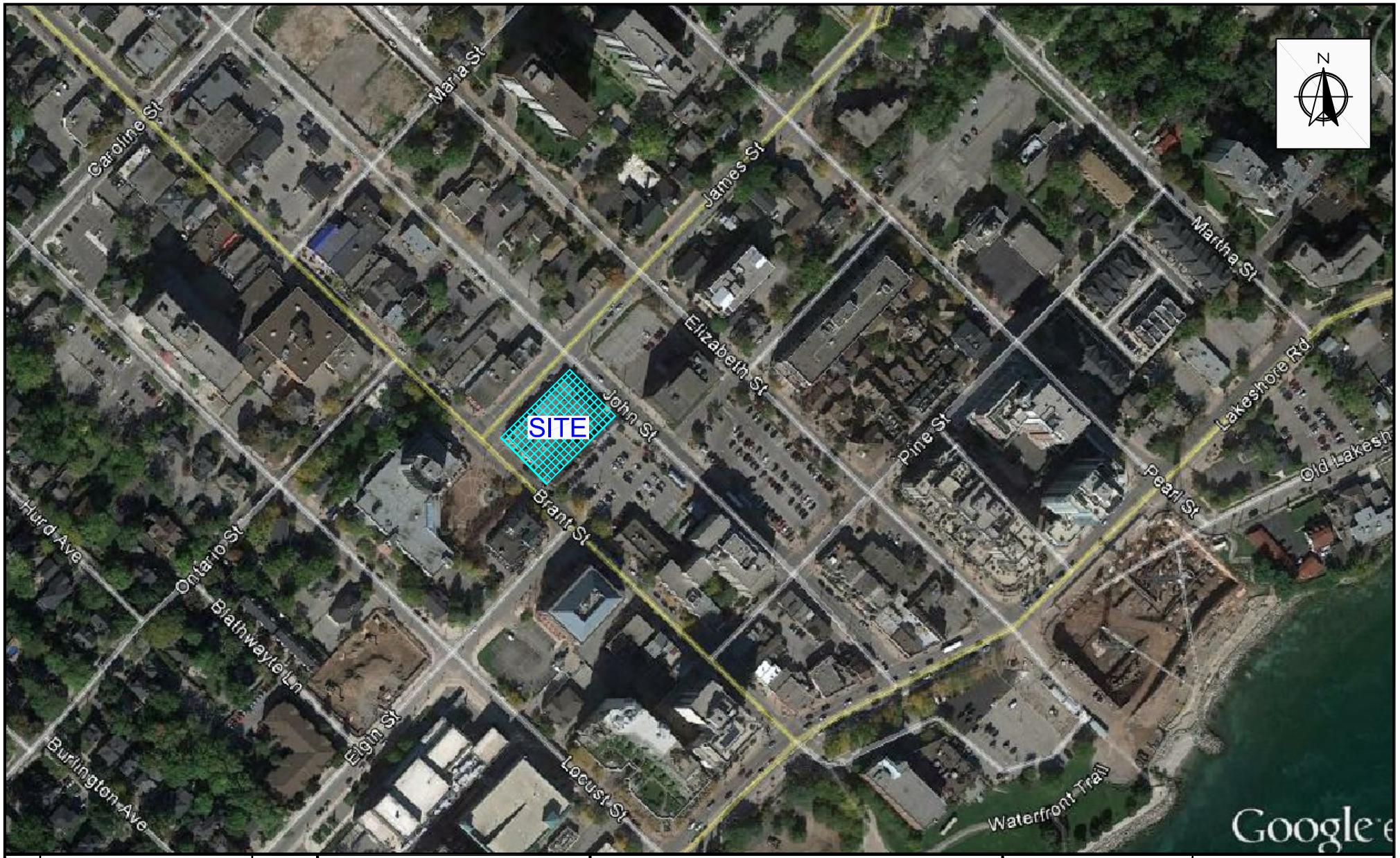
A. "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound level may exceed the sound level limits of the Municipality and the Ministry of the Environment."

B. "This dwelling has been supplied with an air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

C. "Purchasers/tenants are advised that due to the proximity of the existing commercial developments, sound levels from these facilities may at times be audible."

(6) Conventional ventilated attic roof construction meeting OBC requirements is satisfactory.

(7) All exterior doors shall be fully weatherstripped.



No.	Revision/Issue	Date

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Title: Key Plan

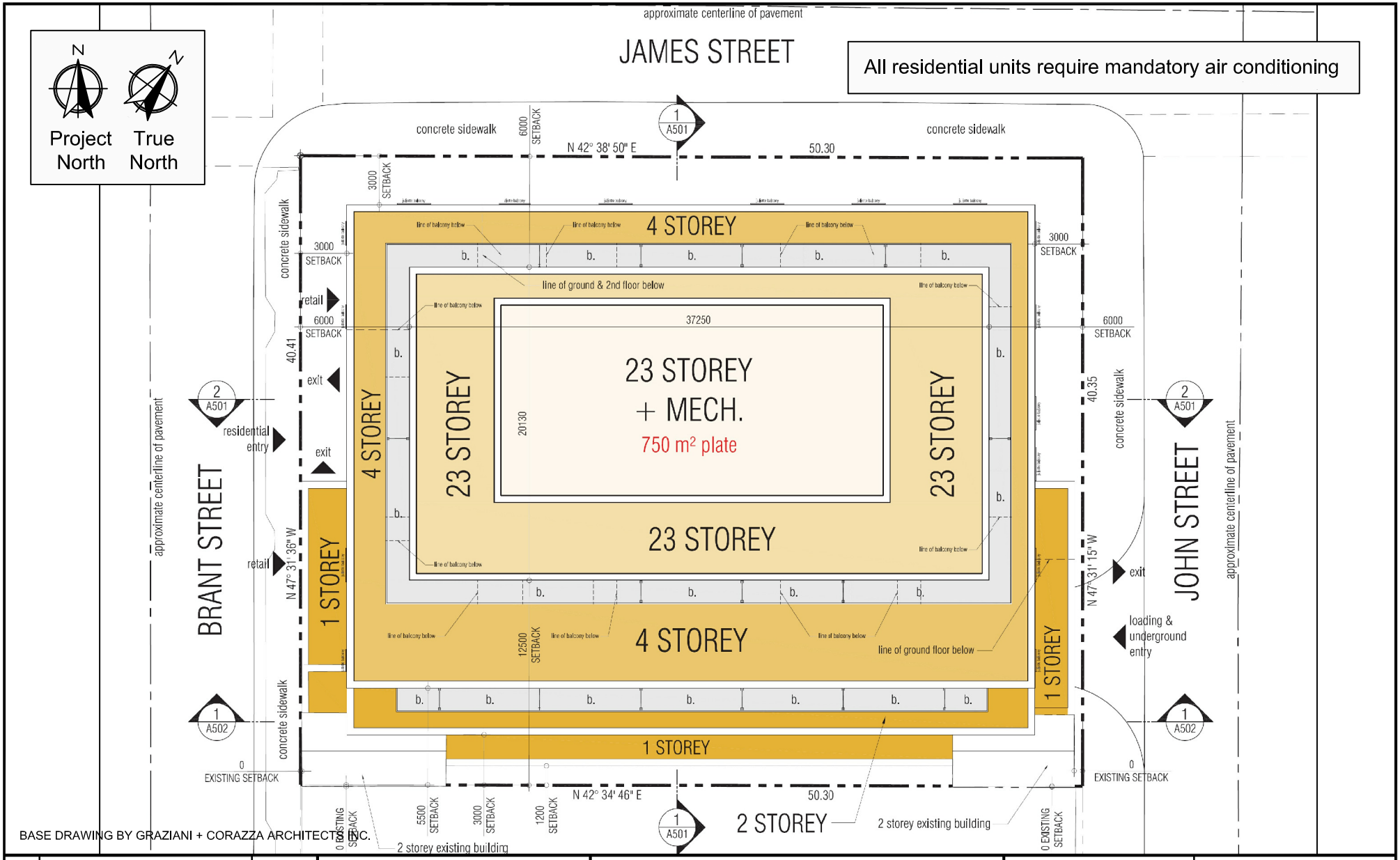
Project No.: 117-0659

Date: Dec. 14, 2017

Project Name: 409 Brant Street, Burlington

Scale: N.T.S.

Figure: 1



BASE DRAWING BY GRAZIANI + CORAZZA ARCHITECTS INC.

No.	Revision/Issue	Date

VALCOUSTICS Canada Ltd.
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Richmond Hill, Ontario
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Title	Project No.	Date
Site Plan	117-0659	Dec. 14, 2017
Project Name	**Scale**	**Figure**
409 Brant Street, Burlington	N.T.S.	2

APPENDIX A

ROAD TRAFFIC DATA

Brant St & James St

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

Municipality: Burlington
Site #: 0000200269
Intersection: Brant St & James St
TFR File #: 1
Count date: 2-Nov-2017

Weather conditions:
Cloudy

Person(s) who counted:
Mira

**** Signalized Intersection ****

Major Road: Brant St runs N/S

North Leg Total: 680
North Entering: 373
North Peds: 12
Peds Cross: ⋈

Cyclists	0	1	1
Trucks	14	19	33
Cars	170	169	339
Totals	184	189	

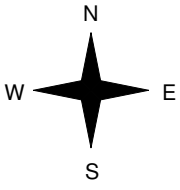
Cyclists	1
Trucks	44
Cars	262
Totals	307

East Leg Total: 493
East Entering: 182
East Peds: 15
Peds Cross: ⋈



Brant St

Cars	Trucks	Cyclists	Totals
75	13	0	88
89	5	0	94
164	18	0	



James St



Cars	Trucks	Cyclists	Totals
278	32	1	311

Brant St



Cars	259		
Trucks	19		
Cyclists	0		
Totals	278		



Cars	187	109	296
Trucks	31	13	44
Cyclists	1	0	1
Totals	219	122	

Peds Cross: ⋈
South Peds: 12
South Entering: 341
South Leg Total: 619

Comments

Brant St & James St

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 12:30:00
To: 13:30:00

Municipality: Burlington
Site #: 0000200269
Intersection: Brant St & James St
TFR File #: 1
Count date: 2-Nov-2017

Weather conditions:
Cloudy

Person(s) who counted:
Mira

**** Signalized Intersection ****

Major Road: Brant St runs N/S

North Leg Total: 820
North Entering: 432
North Peds: 33
Peds Cross: ⋈

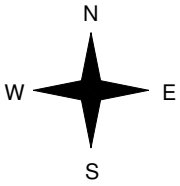
Cyclists	0	0	0
Trucks	16	14	30
Cars	279	123	402
Totals	295	137	

Cyclists	0
Trucks	37
Cars	351
Totals	388

East Leg Total: 495
East Entering: 293
East Peds: 85
Peds Cross: ⋈

Brant St

Cars	Trucks	Cyclists	Totals
138	11	0	149
128	14	2	144
266	25	2	



James St

Cars	Trucks	Cyclists	Totals
178	24	0	202

Brant St

Cars	407		
Trucks	30		
Cyclists	2		
Totals	439		

Cars	213	55	268
Trucks	26	10	36
Cyclists	0	0	0
Totals	239	65	

Peds Cross: ⋈
South Peds: 44
South Entering: 304
South Leg Total: 743

Comments

Brant St & James St

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Burlington
Site #: 0000200269
Intersection: Brant St & James St
TFR File #: 1
Count date: 2-Nov-2017

Weather conditions:
Cloudy

Person(s) who counted:
Mira

**** Signalized Intersection ****

Major Road: Brant St runs N/S

North Leg Total: 1038
North Entering: 473
North Peds: 15
Peds Cross: ⋈

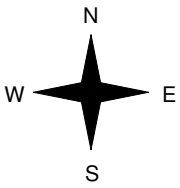
Cyclists	3	0	3
Trucks	22	10	32
Cars	266	172	438
Totals	291	182	

Cyclists	1
Trucks	35
Cars	529
Totals	565

East Leg Total: 915
East Entering: 678
East Peds: 56
Peds Cross: ⋈

Brant St

Cars	Trucks	Cyclists	Totals
272	19	1	292
350	36	0	386
622	55	1	



James St

Cars	Trucks	Cyclists	Totals
225	12	0	237

Brant St

Cars	616		
Trucks	58		
Cyclists	3		
Totals	677		

Cars	257	53	310
Trucks	16	2	18
Cyclists	0	0	0
Totals	273	55	

Peds Cross: ⋈
South Peds: 21
South Entering: 328
South Leg Total: 1005

Comments

Brant St & James St

Total Count Diagram

Municipality: Burlington
Site #: 0000200269
Intersection: Brant St & James St
TFR File #: 1
Count date: 2-Nov-2017

Weather conditions:
Cloudy

Person(s) who counted:
Mira

**** Signalized Intersection ****

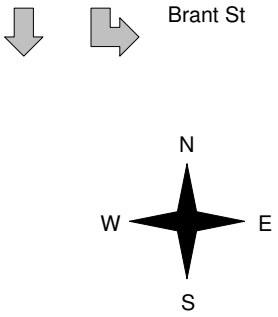
Major Road: Brant St runs N/S

North Leg Total: 6407
North Entering: 3229
North Peds: 149
Peds Cross: ⋈

Cyclists	8	1	9
Trucks	163	104	267
Cars	1861	1092	2953
Totals	2032	1197	

Cyclists	5		
Trucks	290		
Cars	2883		
Totals	3178		

East Leg Total: 4632
East Entering: 2812
East Peds: 405
Peds Cross: ⋈



	Cars	Trucks	Cyclists	Totals
	1166	114	3	1283
	1395	131	3	1529
	2561	245	6	

James St

	Cars	Trucks	Cyclists	Totals
	1661	156	3	1820

Brant St

Cars	3256		
Trucks	294		
Cyclists	11		
Totals	3561		

Cars	1717	569	2286
Trucks	176	52	228
Cyclists	2	2	4
Totals	1895	623	

Peds Cross: ⋈
South Peds: 172
South Entering: 2518
South Leg Total: 6079

Comments

Brant St & James St
Traffic Count Summary

Intersection: Brant St & James St | **Count Date:** 2-Nov-2017 | **Municipality:** Burlington

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	112	132	0	244	4	516
9:00:00	189	184	0	373	12	714
11:00:00	0	0	0	0	0	0
12:00:00	150	272	0	422	23	749
13:00:00	115	282	0	397	28	704
14:00:00	144	283	0	427	25	730
15:00:00	0	0	0	0	0	0
16:00:00	160	279	0	439	21	784
17:00:00	173	288	0	461	23	797
18:00:00	154	312	0	466	13	753
Totals:	1197	2032	0	3229	149	5747

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	140	132	272	5
9:00:00	0	219	122	341	12
11:00:00	0	0	0	0	0
12:00:00	0	266	61	327	20
13:00:00	0	241	66	307	46
14:00:00	0	245	58	303	30
15:00:00	0	0	0	0	0
16:00:00	0	287	58	345	20
17:00:00	0	262	74	336	22
18:00:00	0	235	52	287	17
Totals:	0	1895	623	2518	172

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	65	0	52	117	16	117
9:00:00	94	0	88	182	15	182
11:00:00	0	0	0	0	0	0
12:00:00	126	0	109	235	59	235
13:00:00	126	0	135	261	54	261
14:00:00	136	0	154	290	82	290
15:00:00	0	0	0	0	0	0
16:00:00	265	0	188	453	68	453
17:00:00	348	0	257	605	64	605
18:00:00	369	0	300	669	47	669
Totals:	1529	0	1283	2812	405	2812

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0
9:00:00	0	0	0	0	0
11:00:00	0	0	0	0	0
12:00:00	0	0	0	0	0
13:00:00	0	0	0	0	0
14:00:00	0	0	0	0	0
15:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0
17:00:00	0	0	0	0	0
18:00:00	0	0	0	0	0
Totals:	0	0	0	0	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00
Crossing Values:	74	118	169	200	191	306	393	399

James St @ John St

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

Municipality: Burlington
Site #: 0000201106
Intersection: James St & John St
TFR File #: 4
Count date: 25-Jun-2015

Weather conditions:
Cloudy/Dry

Person(s) who counted:
Armando

**** Non-Signalized Intersection ****

Major Road: James St runs W/E

North Leg Total: 65
North Entering: 45
North Peds: 3
Peds Cross: ⋈

Cyclists	0	1	1	2
Trucks	0	1	0	1
Cars	15	19	8	42
Totals	15	21	9	

Cyclists	1
Trucks	2
Cars	17
Totals	20

East Leg Total: 457
East Entering: 152
East Peds: 5
Peds Cross: ⧖

John St

Cyclists	Trucks	Cars	Totals
1	9	147	157

Cars	Trucks	Cyclists	Totals
7	0	0	7
131	4	1	136
6	3	0	9
144	7	1	

James St

N
W E
S

Cyclists	Trucks	Cars	Totals
0	0	8	8
1	11	271	283
1	3	9	13
2	14	288	

James St

Cars	Trucks	Cyclists	Totals
285	18	2	305

John St

Peds Cross: ⧖
West Peds: 6
West Entering: 304
West Leg Total: 461

Cars	1	2	6	9
Trucks	5	2	7	14
Cyclists	0	1	0	1
Totals	6	5	13	

Cars	34
Trucks	7
Cyclists	2
Totals	43

Peds Cross: ⋈
South Peds: 5
South Entering: 24
South Leg Total: 67

Comments

James St @ John St

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 12:45:00
To: 13:45:00

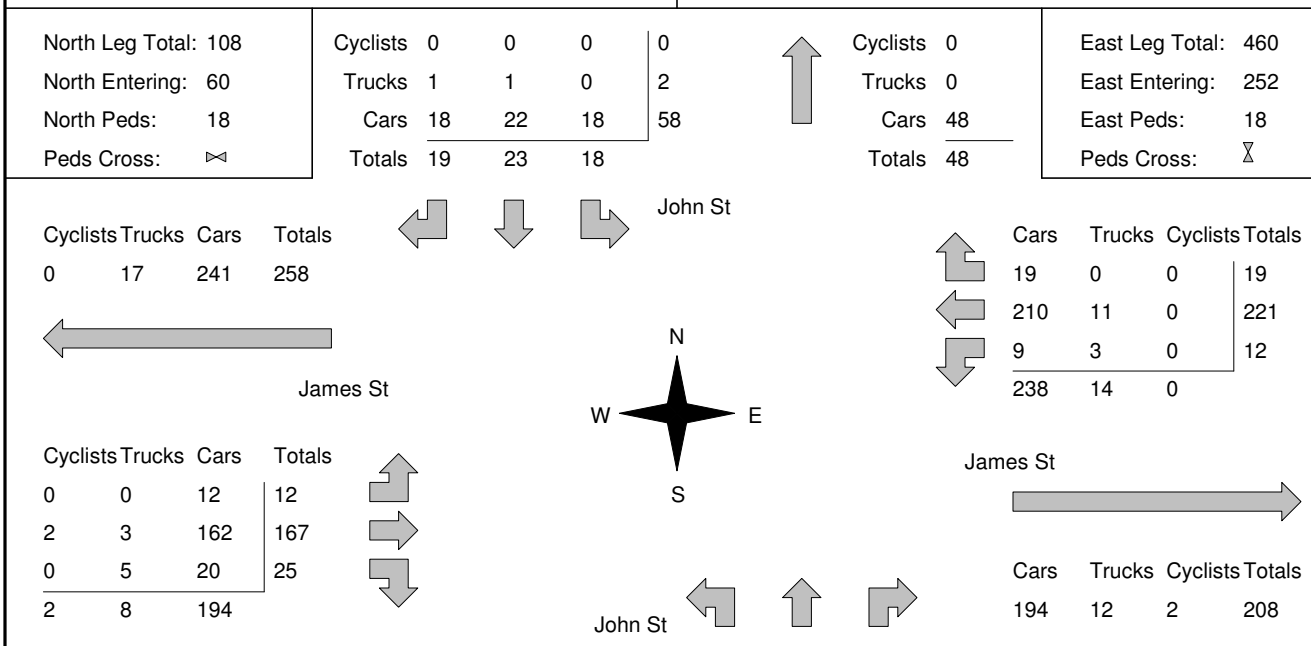
Municipality: Burlington
Site #: 0000201106
Intersection: James St & John St
TFR File #: 4
Count date: 25-Jun-2015

Weather conditions:
Cloudy/Dry

Person(s) who counted:
Armando

**** Non-Signalized Intersection ****

Major Road: James St runs W/E



Comments

James St @ John St

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

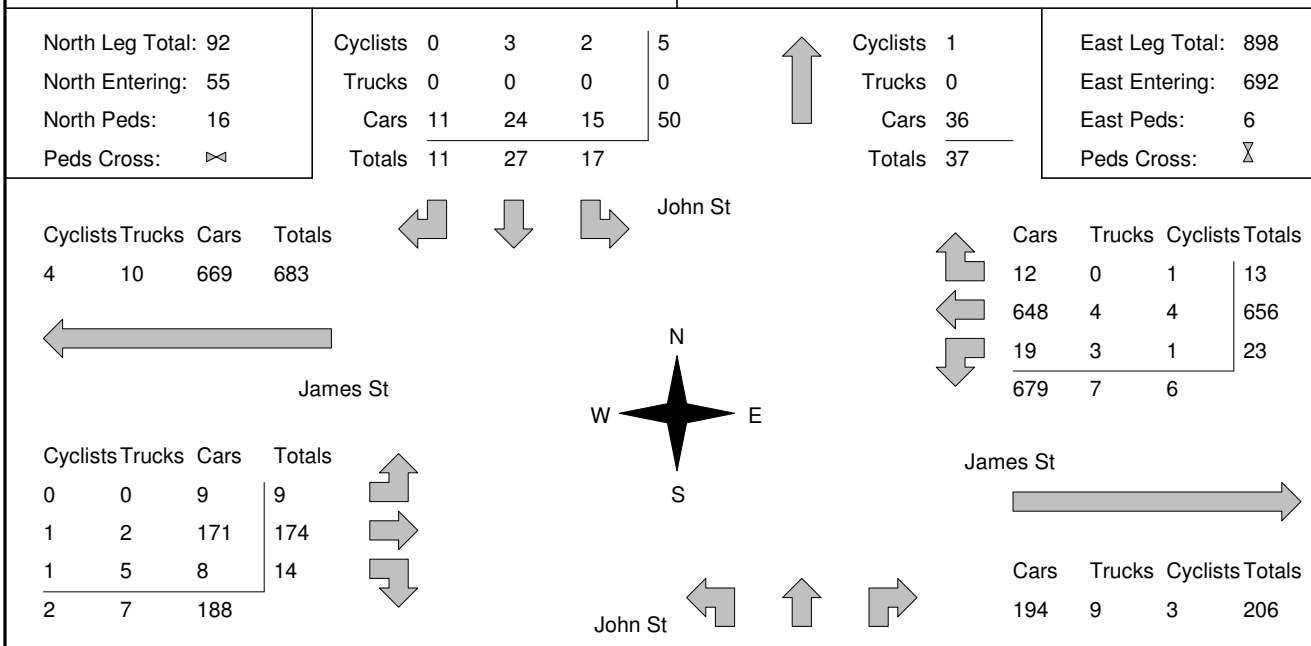
Municipality: Burlington
Site #: 0000201106
Intersection: James St & John St
TFR File #: 4
Count date: 25-Jun-2015

Weather conditions:
Cloudy/Dry

Person(s) who counted:
Armando

**** Non-Signalized Intersection ****

Major Road: James St runs W/E



Comments

James St @ John St

Total Count Diagram

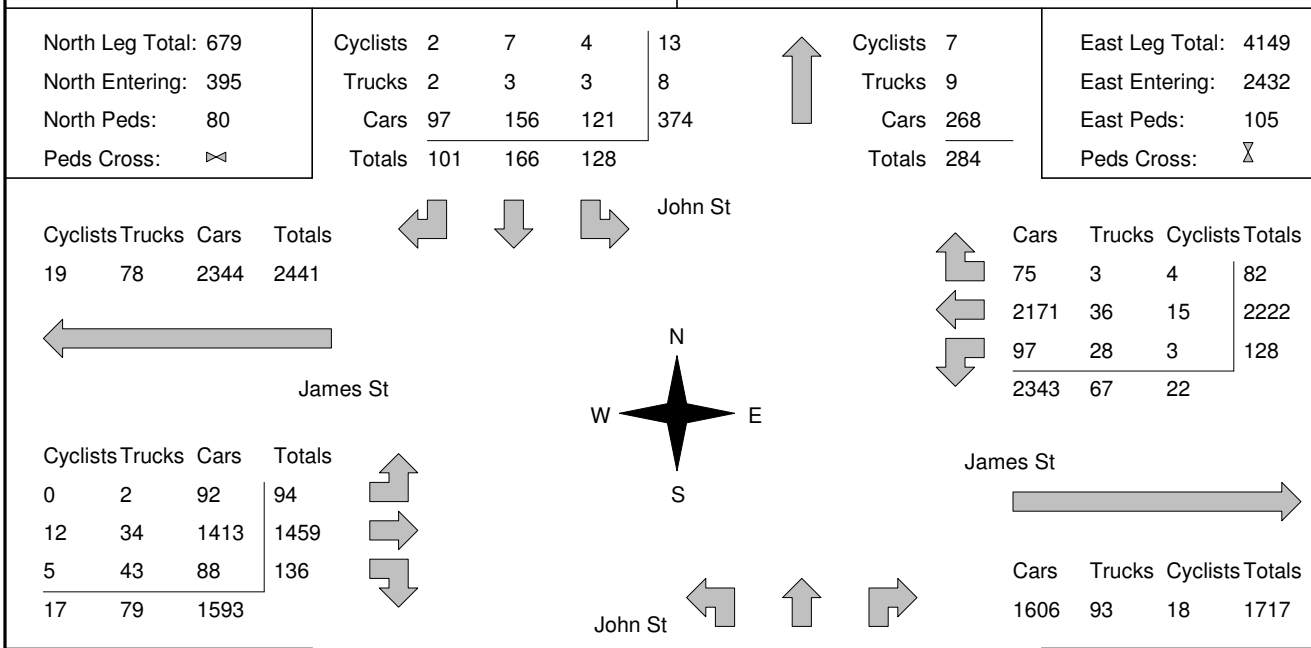
Municipality: Burlington
Site #: 0000201106
Intersection: James St & John St
TFR File #: 4
Count date: 25-Jun-2015

Weather conditions:
Cloudy/Dry

Person(s) who counted:
Armando

**** Non-Signalized Intersection ****

Major Road: James St runs W/E



Comments

James St @ John St

Annual Average Daily Traffic Diagram

Total Factor = Monthly Factor(0.94) x Daily Factor(0.91) x 24 Hour Factor(1.85) = 1.582490

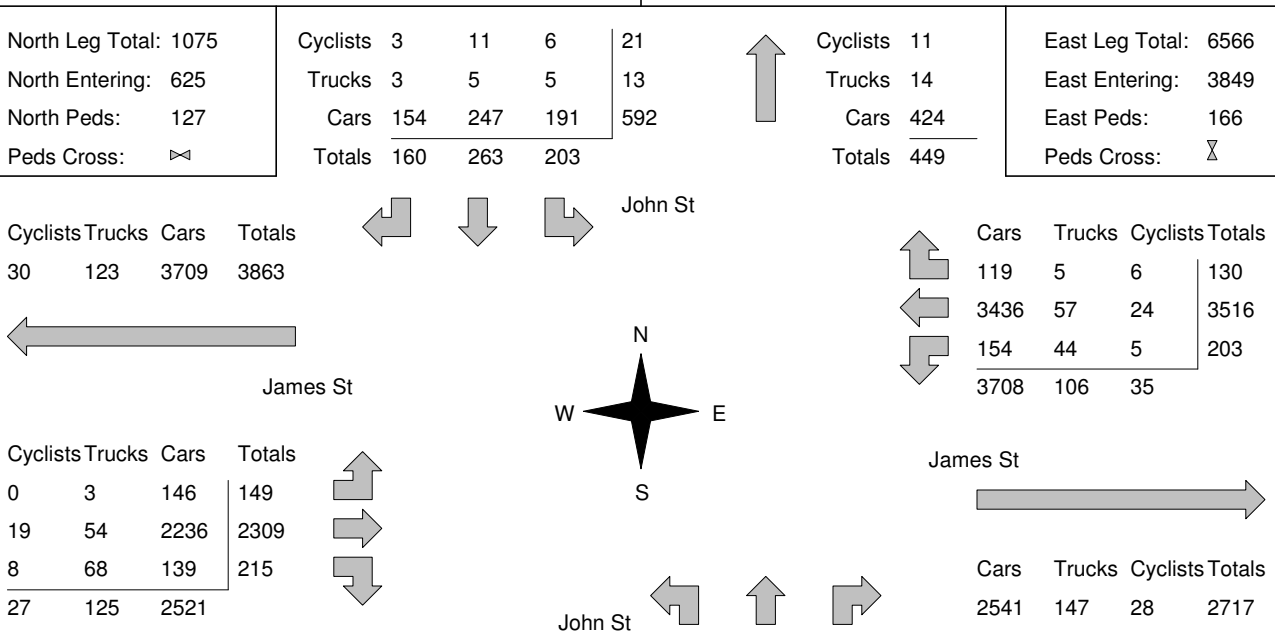
Municipality: Burlington
Site #: 0000201106
Intersection: James St & John St
TFR File #: 4
Count date: 25-Jun-2015

Weather conditions:
Cloudy/Dry

Person(s) who counted:
Armando

**** Non-Signalized Intersection ****

Major Road: James St runs W/E



Comments

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE (MOE)

Reference: MOE Publication NPC-300, August 2013: "Environmental Noise Guideline, Stationary and Transportation Source - Approval and Planning".

SPACE	SOURCE	TIME PERIOD	CRITERION
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	Road	23:00 to 07:00	45 dBA
	Rail	23:00 to 07:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Sleeping quarters	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 0
Sleeping quarters	Road	23:00 to 07:00	40 dBA
	Rail	23:00 to 07:00	35 dBA
	Aircraft	24-hour period	NEF/NEP 0
Outdoor Living Areas	Road and Rail	07:00 to 23:00	55 dBA
Outdoor Point of Reception	Aircraft	24-hour period	NEF/NEP 30#
	Stationary Source		
	Class 1 Area	07:00 to 19:00(1)	50* dBA
		19:00 to 23:00(1)	50* dBA
	Class 2 Area	07:00 to 19:00(2)	50* dBA
		19:00 to 23:00(2)	45* dBA
	Class 3 Area	07:00 to 19:00(3)	45* dBA
		19:00 to 23:00(3)	40* dBA
	Class 4 Area	07:00 to 19:00(4)	55* dBA
		19:00 to 23:00(4)	55* dBA

...../cont'd

SPACE	SOURCE	TIME PERIOD	CRITERION
Plane of a Window of Noise Sensitive Spaces	Stationary Source		
	Class 1 Area	07:00 to 19:00(1)	50* dBA
		19:00 to 23:00(1)	50* dBA
		23:00 to 07:00(1)	45* dBA
	Class 2 Area	07:00 to 19:00(2)	50* dBA
		19:00 to 23:00(2)	50* dBA
		23:00 to 07:00(2)	45* dBA
	Class 3 Area	07:00 to 19:00(3)	45* dBA
		19:00 to 23:00(3)	45* dBA
		23:00 to 07:00(3)	40* dBA
	Class 4 Area	07:00 to 19:00(4)	60* dBA
		19:00 to 23:00(4)	60* dBA
		23:00 to 07:00(4)	55* dBA

\# may not apply to in-fill or re-development.
* or the minimum hourly background sound level $L_{eq}(1)$, due to road traffic, if higher.
(1) Class 1 Area : Urban
(2) Class 2 Area : Urban during day; rural-like evening and night
(3) Class 3 Area : Rural
(4) Class 4 Area: Subject to land use planning authority's approval

Reference: MOE Publication ISBN 0-7729-2804-5, 1987: "Environmental Noise Assessment in Land-Use Planning".

EXCESS ABOVE RECOMMENDED SOUND LEVEL LIMITS (dBA)	CHANGE IN SUBJECTIVE LOUDNESS ABOVE	MAGNITUDE OF THE NOISE PROBLEM	NOISE CONTROL MEASURES (OR ACTION TO BE TAKEN)
No excess (<55 dBA)	—	No expected noise problem	None
1 to 5 inclusive (56 to 60 dBA)	Noticeably louder	Slight noise impact	If no physical measures are taken, then prospective purchasers or tenants should be made aware by suitable warning clauses.
6 to 10 inclusive (61 - 65 dBA)	Almost twice as loud	Definite noise impact	Recommended.
11 to 15 inclusive (66 - 70 dBA)	Almost three times as loud	Serious noise impact	Strongly Recommended.
16 and over (>70 dBA)	Almost four times as loud	Very serious noise impact	Strongly Recommended (may be mandatory).

APPENDIX C

SAMPLE STAMSON CALCULATION

```
STAMSON 5.04        NORMAL REPORT        Date: 13-12-2017 13:45:49
MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE / NOISE ASSESSMENT

Filename: nw_nf_4.te           Time Period: Day/Night 16/8 hours
Description: Podium - Northwest Corner - North Facade

Road data, segment # 1: Brant (day/night)
-----------------------------------------
Car traffic volume  : 10697/1189  veh/TimePeriod  *
Medium truck volume :   609/68    veh/TimePeriod  *
Heavy truck volume  :   410/46    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):  10679
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   5.20
    Heavy Truck  % of Total Volume     :   3.50
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Brant (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  :  13.00 / 13.00  m
Receiver height           :  12.80 / 12.80  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: James (day/night)
-----------------------------------------
Car traffic volume  :  7733/859   veh/TimePeriod  *
Medium truck volume :   440/49    veh/TimePeriod  *
Heavy truck volume  :   296/33    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):   7720
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   5.20
    Heavy Truck  % of Total Volume     :   3.50
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: James (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  :  13.00 / 13.00  m
Receiver height           :  12.80 / 12.80  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 3: John (day/night)
---------------------------------------
Car traffic volume  :  1389/154   veh/TimePeriod  *
Medium truck volume :    18/2     veh/TimePeriod  *
Heavy truck volume  :    13/1     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):   1244
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  12.00
    Medium Truck % of Total Volume     :   1.30
    Heavy Truck  % of Total Volume     :   0.90
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 3: John (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  :  57.00 / 57.00  m
Receiver height           :  12.80 / 12.80  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Brant (day)
--------------------------------

Source height = 1.37 m

ROAD (0.00 + 64.23 + 0.00) = 64.23 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  66.62   0.00   0.62  -3.01   0.00   0.00   0.00  64.23
-------------------------------------------------------------------------------

Segment Leq : 64.23 dBA

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

Source height = 1.37 m

ROAD (0.00 + 62.82 + 0.00) = 62.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  65.21   0.00   0.62  -3.01   0.00   0.00   0.00  62.82
-------------------------------------------------------------------------------

Segment Leq : 62.82 dBA
```

Results segment # 3: John (day)

Source height = 0.98 m

ROAD (0.00 + 45.17 + 0.00) = 45.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	53.98	0.00	-5.80	-3.01	0.00	0.00	0.00	45.17

Segment Leq : 45.17 dBA

Total Leq All Segments: 66.62 dBA

Results segment # 1: Brant (night)

Source height = 1.37 m

ROAD (0.00 + 57.73 + 0.00) = 57.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	60.12	0.00	0.62	-3.01	0.00	0.00	0.00	57.73

Segment Leq : 57.73 dBA

Results segment # 2: James (night)

Source height = 1.37 m

ROAD (0.00 + 56.30 + 0.00) = 56.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	58.69	0.00	0.62	-3.01	0.00	0.00	0.00	56.30

Segment Leq : 56.30 dBA

Results segment # 3: John (night)

Source height = 0.89 m

ROAD (0.00 + 38.17 + 0.00) = 38.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	46.98	0.00	-5.80	-3.01	0.00	0.00	0.00	38.17

Segment Leq : 38.17 dBA

Total Leq All Segments: 60.11 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.62
(NIGHT): 60.11