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Beverly Hills Apartments

644 Main Street West
Hamilton, Ontario

Noise Feasibility Study

RWDI # 1603916
February 9, 2017

SUBMITTED TO

Main Carling Investments Ltd.

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Noise Feasibility Study
Beverly Hills Apartments, Hamilton, ON
RWDI #1603916
February 9, 2017

EXECUTIVE SUMMARY

RWDI was retained to conduct an environmental noise feasibility study for the proposed residential tower to be located east of the existing Beverly Hills Apartments at 644 Main Street West in Hamilton, ON. The purpose of the noise assessment was to assess the impact of significant noise sources affecting the proposed development using the applicable guidelines, and determine if sound control measures would be required.

This study assessed sound impacts due to road-traffic noise surrounding the proposed tower. Road-traffic sound levels were predicted using the Ontario Road Noise Analysis Method for Environment and Transportation algorithms, the Ontario Ministry of the Environment and Climate Change (MOECC) approved model for road-traffic sound. The sound levels modelled for the road-traffic noise assessment were assessed using MOECC Publication NPC-300.

There are no significant sources of vibration in the area of the proposed development so a detailed vibration assessment was not required.

Sound due to road-traffic sources exceed the Publication NPC-300 sound level limits at the proposed tower. This report outlines requirements for addressing the excess sound and which Warning Clauses must apply to purchase or rental agreements. The proposed tower can meet the requirements of NPC-300 with the implementation of Warning Clauses and sound control measures installed at the proposed development, including appropriate window construction and the installation of a noise barrier around a designated outdoor living area.

The feasibility study was based on assumptions regarding building configuration and construction so the resulting recommendations are broad. As such, prior to the construction of the building, a detailed design study is required to ensure that appropriate noise control measures have been incorporated into the design.



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1. INTRODUCTION

RWDI was retained to conduct a noise feasibility study for the proposed residential tower to be located at 644 Main Street West in Hamilton, ON immediately east of the existing Beverly Hills Apartments. The purpose of the noise assessment was to assess the impact of all noise sources affecting the proposed development using the applicable guidelines, and determine appropriate control measures to mitigate noise impacts, if any. This noise feasibility study was based on the design drawings received December 13, 2016.

The City of Hamilton requires a noise assessment be conducted as part of the Site Plan Application for the proposed residential tower. This report is in support of the Site Plan Application and satisfies the requirements of the City of Hamilton.

The purpose of the feasibility study was to assess the impact of all noise sources affecting the proposed development. Ontario Ministry of the Environment and Climate Change (MOECC) noise guidelines are used to assess impacts and determine the appropriate noise control measures, if any. The relevant sources of sound for a noise impact assessment includes road traffic from Highway 403 to the east and south, Main Street West to the south, and King Street West to the north. A rail line, and industrial and commercial facilities are located to the east and west of the facility, but are not included within this assessment due to the relatively large separation distance in comparison to the adjacent major roadways.

The impact of the proposed development on the surrounding environment, and on itself was not assessed as part of this study since the proposed development is not anticipated to have sources of noise or vibration that would have significant impacts.

The objective of this feasibility study was to:

- assess outdoor and indoor acoustical environments of proposed residences resulting from sounds of vehicle traffic on Highway 403, Main Street West, and King Street West;
- determine the feasibility of the project with respect to NPC-300; and
- determine if sound control measures would be required.

The feasibility study made assumptions regarding building configuration and construction so the resulting recommendations are broad. As such, further study is required when detailed design drawings are available, prior to construction.

2. DESCRIPTION OF PROJECT AND SITE

The proposed 18-storey residential tower is to be located immediately east of the existing Beverly Hills Apartments. The residential tower will consist of enclosed parking on the first floor; an outdoor rooftop amenity and residential units on the second floor, and residential units on the remaining floors.

The proposed Beverly Hills Apartment is considered a Class 1 (urban) acoustic environment meaning the acoustic environment in the area is influenced by sounds of road traffic and human activity. Highway 403,

Main Street West, and King Street West are the nearest sources of road traffic noise. A rail line, and industrial and commercial facilities are located to the east and west of the facility, but are not included within this assessment due to the relatively large separation distance in comparison to the adjacent major roadways.

There are no significant sources of vibration in the area of the proposed developments so a detailed vibration assessment was not required.

3. APPLICABLE GUIDELINES

The detailed evaluation of transportation-related sources affecting the proposed development were assessed using the MOECC guidelines, as defined in Publication NPC-300 (MOECC, 2013). The relevant section of the guideline is Part C – Land Use Planning.

3.1 NPC-300 Part C - Land Use Planning

3.1.1 Road-Traffic Sources

For assessing sound originating from road-traffic sources, Publication NPC-300 defines sound level criteria for two types of locations: outdoor living areas (OLAs), and indoor areas of sensitive uses.

An OLA is defined as an outdoor area easily accessible from the building and designed for the quiet enjoyment of the outdoor environment. Courtyards, terraces and balconies (with a depth of more than four metres) are considered noise-sensitive OLAs. For elevated OLAs, the point of assessment is in the middle of the OLA at 1.5 m above grade or floor level. The daytime sound level limit for an OLAs is an equivalent sound level of 55 dBA averaged over the daytime hours (07:00h to 23:00h). Publication NPC-300 does not define a nighttime sound level limit for OLAs.

Indoor spaces have daytime and nighttime sound level limits relating to the type of usage, such as living/dining rooms or bedrooms. Indoor living areas within the proposed developments include dining/living rooms and bedrooms. The sound level criteria are based on all windows and doors being closed to the environment. The daytime sound level limit for indoor spaces is an L_{EQ} of 45 dBA averaged over 07:00h to 23:00h. The nighttime sound level limits for indoor spaces are L_{EQS} of 45 and 40 dBA averaged over 23:00h to 07:00h for an indoor living area and sleeping quarters, respectively.

The NPC-300 sound level criteria for transportation-related sources are summarized in Table 1.



Table 1: NPC-300 Transportation-related Source Sound Level Criteria for Sensitive Land Uses

Assessment Location	Time of Day	Time Period	Sound Level Limit ^[1]
Outdoor Living Area	Daytime	07:00 – 23:00h	55 dBA
Indoor Living Area	Daytime	07:00 – 23:00h	45 dBA
	Nighttime	23:00 – 07:00h	45 dBA
Sleeping Quarters	Daytime	07:00 – 23:00h	45 dBA
	Nighttime	23:00 – 07:00h	40 dBA

1. The average sound level over the time period at the assessment location must not exceed the sound level limit. OLA sound level limit is in the outdoor space. Indoor and sleeping quarters levels are evaluated indoors.

4. NOISE RECEPTORS

The selection of receptors is based on drawings received on December 13, 2016, which show the intended use of areas for the proposed tower. The locations of the receptors in relation to the development site plan are shown in Figure 1.

Three-worst case locations were used to assess the sound levels at the façade of the proposed tower:

- R01 - a southwest-facing window located on the 3rd storey,
- R02 - a southeast-facing window located on the 3rd storey, and
- R03 - a northeast-facing window located on the 3rd storey,

Receptors R01 through R03 were assessed at the 3rd floor facade. Sound levels at higher storeys will be lower. Receptors were located at the corners of the building, where exposure to the road traffic is the greatest. Sound levels elsewhere on the façade will be lower.

Sound levels for the facade were predicted at the exterior of the building assuming a closed window; however, the relevant criteria provide an indoor sound level limit. As such, for the road-traffic noise assessment, the sound levels were predicted at the exterior of the windows and a 20 dB reduction in sound level from the exterior to interior was assumed due to the window being closed and minimum Ontario Building Code (OBC) construction. This closed window sound level reduction is consistent with MOECC Publication NPC-300 estimates for OBC construction, based on comparisons of indoor and outdoor sound level criteria tables.

The proposed development includes an outdoor rooftop amenity area on the second floor. This area is assessed as an elevated OLA. This OLA was represented by R04, which was located was the middle of the OLA at 1.5 m above floor level. There are no other areas in the design that qualify as an OLA.

5. NOISE ASSESSMENT

5.1 Road-Traffic Noise Assessment

The three roadways that have the greatest potential to influence the proposed tower are Highway 403, Main Street West, and King Street West. Road-traffic noise modelling was carried out using a spreadsheet implementation of the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) (MOECC, 1989) algorithms. An aerial view illustrating the location of the proposed tower in relation to these major roadways is shown in Figure 2.

5.1.1 Traffic Data

Road traffic data for Main Street West and King Street West, and for Highway 403 were obtained from the City of Hamilton and the Ministry of Transportation, respectively, in August 2016. The data obtained for Highway 403 were a 7-day, 24-hourly directional traffic volume taken 0.6 km west of Main Street West in February 2015. Traffic data used for Main Street West were taken from a 24-hour, 15-minute increment eastbound directional traffic volume study east of Macklin Street in April 2009. Lastly, traffic data used for King Street West were taken from a 7-day 24-hourly traffic volume study taken west of Dundurn Street in 2008. For multi-day counts, the day that consisted of the largest cumulative 24-hour traffic volume in each count was used in this assessment. Vehicle count by class and hour of day was used from the separate reports. The data used within this assessment are included in Appendix A.

The assessment was completed for a 10-year growth prediction for the year 2026. The daytime and nighttime traffic volumes were scaled using a growth rate of 2% per annum for both Main Street West and King Street West and 1.62% for Highway 403. These growth rates were supplied from the City of Hamilton and Ministry of Transportation, respectively. Sound levels from road traffic on nearby side roads were assumed to be insignificant as compared to sound from these three major roadways. Traffic volumes at the date of the study and for 2026, utilizing a 10-year growth prediction, are detailed in Table 2.

Table 2: Road Traffic Data Used for Transportation-related Source Assessment

Roadway Link	Year Traffic Study was Conducted	Number of Vehicles During Study (Day / Night)	Annual Growth Rate %	Future 2026 Number of Vehicles (Day / Night)	Speed (km/hr)
Highway 403 (Northbound)	2015	46255 / 7771	1.62%	55079 / 9254	90
Highway 403 (Southbound)	2015	47832 / 4496	1.62%	56957 / 5354	100
Main Street West	2009	21080 / 1935	2%	29517 / 2709	60
King Street West	2008	30852 / 3936	2%	44064 / 5622	50

5.1.2 Noise Modelling Results

Sound levels due to road traffic were predicted using ORNAMENT at R01 through R04. The sound level calculations are provided in Appendix B. Table 3 summarizes the predicted road-traffic sound levels and the applicable NPC-300 sound level criteria for each receptor.

Table 3: Results of ORNAMENT Modelling for Traffic-Noise Assessment

Receptor	Outdoor / Indoor	Predicted Road-Traffic Sound Exposures (dBA)		Sound Level Limit (dBA)		Meets Criteria? (Yes/No)
		Daytime L _{EQ,16hr}	Night-time L _{EQ,8hr}	Daytime L _{EQ,16hr}	Night-time L _{EQ,8hr}	
R01	Indoor	55 dBA ^[1]	49 dBA	45 dBA	40 dBA	No
R02	Indoor	55 dBA ^[1]	49 dBA	45 dBA	40 dBA	No
R03	Indoor	52 dBA ^[1]	46 dBA	45 dBA	40 dBA	No
R04	Outdoor	68 dBA	N/A	55 dBA	N/A	No

1. Predicted indoor sound levels shown in this table include a 20 dB reduction in sound level predicted in ORNAMENT due to construction of the closed window.

As indicated in Table 3, sound levels are predicted to exceed sound level limits at the four modelled receptors. Noise control measures and warning clauses will be required to address the excess sound at each of the modelled receptors.

5.1.3 Addressing Excess Sound

Noise control measures in this section are recommended to bring the sound levels into compliance with the noise criteria, where possible. In some cases, where noise control measures become infeasible to appropriately lower sound levels to the criteria, an excess up to 5 dB may be permitted subject to justification and use of a Warning Clauses.

The sound level at R04 during the daytime is predicted to be in excess of the limits by more than 5 dB. As such, noise control measures are recommended for the outdoor living located to the north of the building. Noise control measures for R04 may include, but are not limited to, a perimeter barrier surrounding a designated outdoor area, modification of OLA location to reduce impacts, or construction of other building features that would act as sound barriers. It is anticipated that barrier features would be capable of reducing sound levels to 60 dBA or less in this area. Where sound levels cannot be reduced to below 55 dBA, Warning Clause B (Section 5.1.4) must be affixed to all purchase or rental agreements.

The sound levels at R01 through R03 during both the daytime and nighttime periods are also predicted to be in excess of the limits. As such, noise control measures are required at these representative receptors. Noise control requirements mid-façade, and at higher floors may be lower. The installation of a central air conditioning should be implemented with a warning clause Type D (see Section 5.1.4). In addition, building components including walls and windows, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table 3. Based on broad assumptions regarding

room and window dimensions, it is estimated that a window with an STC between 31 and 38 would likely be required. At the higher end of this requirement, a very large air space would be required for the window. Many different wall constructions would be capable of providing the required losses. Other design features such as limiting window dimensions and strategic location of noise sensitive spaces on the building façade could reduce façade design requirements. A detailed design study of suitable building components is necessary as the design of the proposed development progresses.

5.1.4 Warning Clauses

Warning Clauses must be included on all development agreements, offers of purchase and agreements of Purchase and Sales or Lease as indicated in Section 5.1.3. The following Warning Clauses are applicable:

Type B: “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 traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality’s and the Ministry of the Environment and Climate Change’s noise criteria.”

Type D: “This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.”

6. CONCLUSION

RWDI conducted a noise feasibility study to assess the impact of road noise sources affecting proposed tower located immediately east of the existing Beverly Hills Apartments. Road-traffic noise from Highway 403, Main Street West, and King Street West were identified as the primary sources of sound affecting the proposed development. The sound emissions were assessed at the proposed development using the guidance provided in MOECC Publication NPC-300.

Road-traffic noise was predicted to exceed the guideline limits at all modelled receptors. With the implementation of appropriate façade construction, the installation of a perimeter berm around a designated outdoor living area, and inclusion of Warning Clauses (as described in Section 5.1.4), the facility meets the requirements of NPC-300 for road-traffic sources. The development is therefore considered to be feasible.

Prior to the construction of the building, a detailed design study is required to ensure that appropriate noise control measures have been incorporated into the design.



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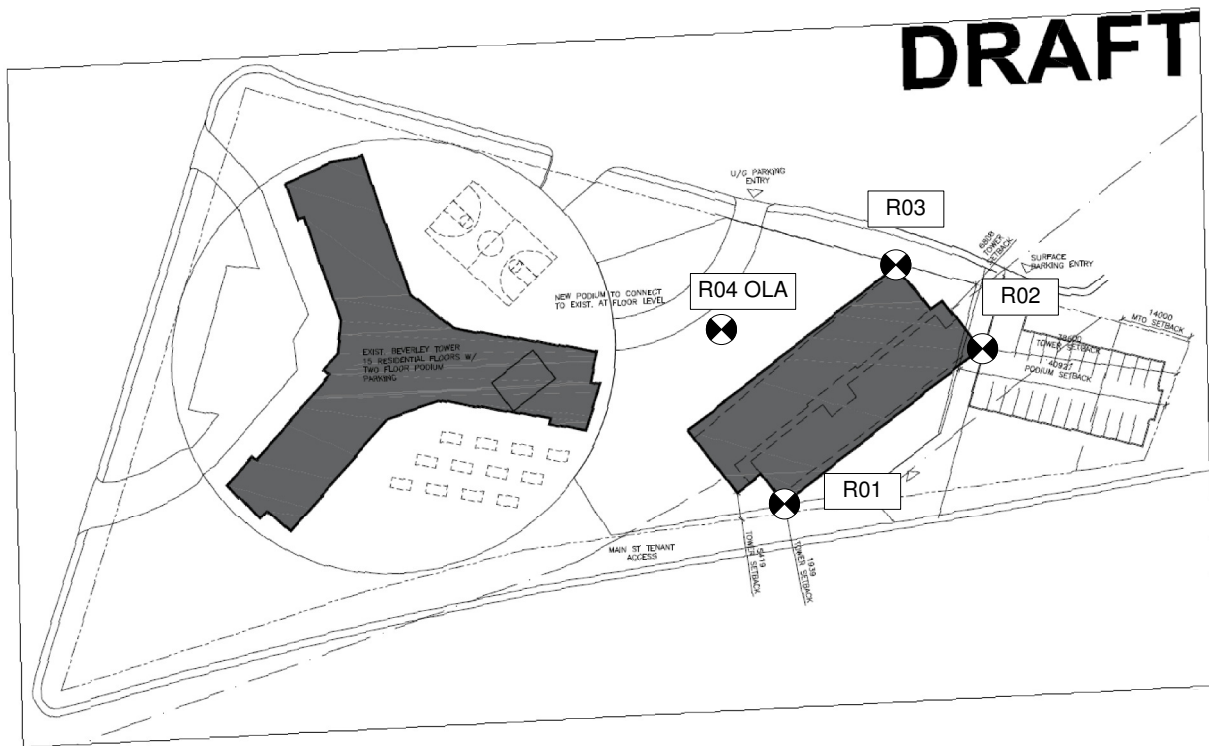
Page 7

7. REFERENCES

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

FIGURES



Aerial Photography from Google Earth Professional © 2016 Google

Site Plan of Proposed Tower and Modelled Receptors

True North



Drawn by: MMB Figure: **1**

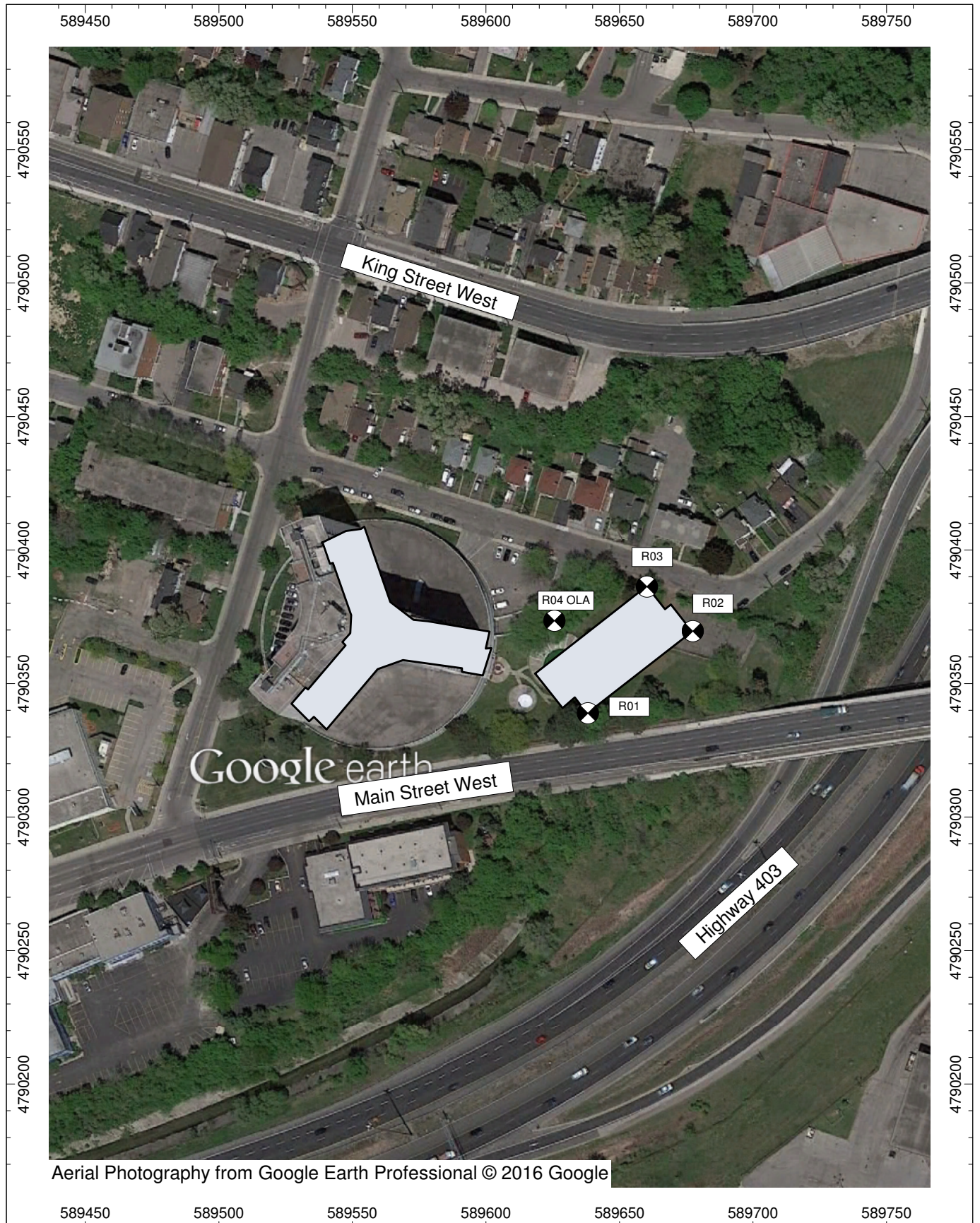
Scale: 1:1500

Date: Dec 20, 2016



Beverly Hills Apartments- Hamilton, Ontario

Project #1603916



Aerial View of Proposed Tower and Major Roadways

True North



Drawn by: MMB	Figure: 2
Scale:	1:2000
Date:	Dec 20, 2016



Beverly Hills Apartments- Hamilton, Ontario

Project #1603916

APPENDIX A



Weekly Volume Summary

Wed, Mar 25, 2015

Location: Hwy 403 0.60 km from Main St.

LHRS/Offset: 48312 / 0.60

Region: Central

Pattern Type: Urban Commuter

PCS#: 34

Hwy. TVIS#: 403325

Count Direction: EB

Report Dates: Feb 26, 2015 to Mar 4, 2015

Hour Interval	Thu 15/02/26	Fri 27	Sat 28	Sun 1	Mon 2	Tue 3	Wed 4	Thu 5
0:00- 1:00		322	486	590	288	293	257	323
1:00- 2:00		248	312	359	180	176	180	204
2:00- 3:00		193	231	264	154	160	139	159
3:00- 4:00		202	181	178	208	211	203	190
4:00- 5:00		491	293	233	579	554	538	551
5:00- 6:00		1,961	637	392	2,143	2,220	2,092	2,121
6:00- 7:00		3,564	971	542	3,901	3,884	3,746	3,858
7:00- 8:00		4,090	1,386	745	4,147	4,358	4,186	4,385
8:00- 9:00		3,773	2,080	1,149	3,924	3,895	3,863	3,990
9:00-10:00		3,028	2,564	1,731	3,146	3,000	3,077	3,232
10:00-11:00		2,752	2,927	2,335	2,489	2,277	2,526	2,698
11:00-12:00		2,812	3,384	2,709	2,460	2,086	2,521	2,612
AM Total	0	23,436	15,452	11,227	23,619	23,114	23,328	24,323
12:00-13:00	2,589	2,963	3,593	2,891	2,489	2,035	2,551	
13:00-14:00	2,679	2,961	3,379	2,975	2,505	1,927	2,548	
14:00-15:00	2,757	3,326	3,248	2,979	2,608	1,968	2,731	
15:00-16:00	3,024	3,429	3,351	3,016	2,694	2,249	3,109	
16:00-17:00	3,357	3,708	3,393	3,032	3,176	2,131	3,409	
17:00-18:00	3,332	3,587	3,061	2,688	3,306	2,163	3,238	
18:00-19:00	2,596	2,941	2,747	2,191	2,324	1,454	2,578	
19:00-20:00	1,990	2,477	2,025	2,169	1,666	1,048	1,853	
20:00-21:00	1,543	1,743	1,753	1,823	1,406	839	1,484	
21:00-22:00	1,359	1,508	1,394	1,327	1,301	785	1,395	
22:00-23:00	1,038	1,157	1,251	919	858	607	1,001	
23:00-24:00	644	790	872	492	523	422	594	
PM Total	26,908	30,590	30,067	26,502	24,856	17,628	26,491	0
24 Hr. Total	26,908	54,026	45,519	37,729	48,475	40,742	49,819	24,323
Noon - Noon	50,344	46,042	41,294	50,121	47,970	40,956	50,814	

Weekly Volume Summary

Wed, Mar 25, 2015

Location: Hwy 403 0.60 km from Main St.

LHRS/Offset: 48312 / 0.60

Region: Central

Pattern Type: Urban Commuter

PCS#: 34

Hwy. TVIS#: 403325

Count Direction: WB

Report Dates: Feb 26, 2015 to Mar 4, 2015

Hour Interval	Thu 15/02/26	Fri 27	Sat 28	Sun 1	Mon 2	Tue 3	Wed 4	Thu 5
0:00- 1:00		625	904	929	305	426	451	520
1:00- 2:00		289	492	568	208	245	279	280
2:00- 3:00		199	323	432	144	190	191	188
3:00- 4:00		205	228	254	131	187	203	218
4:00- 5:00		269	181	178	182	238	259	225
5:00- 6:00		417	232	181	465	472	447	447
6:00- 7:00		1,200	582	385	1,211	1,137	1,196	1,229
7:00- 8:00		2,463	1,063	710	2,742	2,736	2,675	2,780
8:00- 9:00		3,131	1,575	916	3,190	3,178	3,093	3,338
9:00-10:00		2,423	1,991	1,437	2,414	2,406	2,477	2,499
10:00-11:00		2,324	2,581	1,908	2,259	2,058	2,166	2,283
11:00-12:00		2,666	2,850	2,314	2,362	1,692	2,229	2,364
AM Total	0	16,211	13,002	10,212	15,613	14,965	15,666	16,371
12:00-13:00	2,639	2,770	3,229	2,846	2,501	1,910	2,517	
13:00-14:00	2,581	3,036	3,248	2,999	2,551	2,093	2,683	
14:00-15:00	3,104	3,500	3,440	3,012	3,057	2,090	3,031	
15:00-16:00	4,250	4,219	3,527	2,994	3,883	2,751	3,931	
16:00-17:00	4,926	3,864	3,435	3,044	4,763	3,234	4,636	
17:00-18:00	4,487	4,206	3,283	2,910	4,386	3,318	4,765	
18:00-19:00	3,584	4,362	2,877	2,411	3,703	2,969	3,590	
19:00-20:00	2,511	3,062	2,280	2,186	2,361	1,674	2,563	
20:00-21:00	2,052	2,240	1,773	1,952	1,690	1,083	2,012	
21:00-22:00	1,819	1,870	1,579	1,384	1,577	1,134	1,720	
22:00-23:00	1,361	1,696	1,591	994	1,047	786	1,315	
23:00-24:00	1,184	1,292	1,145	615	751	618	942	
PM Total	34,498	36,117	31,407	27,347	32,270	23,660	33,705	0
24 Hr. Total	34,498	52,328	44,409	37,559	47,883	38,625	49,371	16,371
Noon - Noon	50,709	49,119	41,619	42,960	47,235	39,326	50,076	

Weekly Volume Summary

Wed, Mar 25, 2015

Location: Hwy 403 0.60 km from Main St.

LHRS/Offset: 48312 / 0.60

Region: Central

Pattern Type: Urban Commuter

PCS#: 34

Hwy. TVIS#: 403325

Count Direction: EB/WB

Report Dates: Feb 26, 2015 to Mar 4, 2015

Hour Interval	Thu 15/02/26	Fri 27	Sat 28	Sun 1	Mon 2	Tue 3	Wed 4	Thu 5
0:00- 1:00		947	1,390	1,519	593	719	708	843
1:00- 2:00		537	804	927	388	421	459	484
2:00- 3:00		392	554	696	298	350	330	347
3:00- 4:00		407	409	432	339	398	406	408
4:00- 5:00		760	474	411	761	792	797	776
5:00- 6:00		2,378	869	573	2,608	2,692	2,539	2,568
6:00- 7:00		4,764	1,553	927	5,112	5,021	4,942	5,087
7:00- 8:00		6,553	2,449	1,455	6,889	7,094	6,861	7,165
8:00- 9:00		6,904	3,655	2,065	7,114	7,073	6,956	7,328
9:00-10:00		5,451	4,555	3,168	5,560	5,406	5,554	5,731
10:00-11:00		5,076	5,508	4,243	4,748	4,335	4,692	4,981
11:00-12:00		5,478	6,234	5,023	4,822	3,778	4,750	4,976
AM Total	0	39,647	28,454	21,439	39,232	38,079	38,994	40,694
12:00-13:00	5,228	5,733	6,822	5,737	4,990	3,945	5,068	
13:00-14:00	5,260	5,997	6,627	5,974	5,056	4,020	5,231	
14:00-15:00	5,861	6,826	6,688	5,991	5,665	4,058	5,762	
15:00-16:00	7,274	7,648	6,878	6,010	6,577	5,000	7,040	
16:00-17:00	8,283	7,572	6,828	6,076	7,939	5,365	8,045	
17:00-18:00	7,819	7,793	6,344	5,598	7,692	5,481	8,003	
18:00-19:00	6,180	7,303	5,624	4,602	6,027	4,423	6,168	
19:00-20:00	4,501	5,539	4,305	4,355	4,027	2,722	4,416	
20:00-21:00	3,595	3,983	3,526	3,775	3,096	1,922	3,496	
21:00-22:00	3,178	3,378	2,973	2,711	2,878	1,919	3,115	
22:00-23:00	2,399	2,853	2,842	1,913	1,905	1,393	2,316	
23:00-24:00	1,828	2,082	2,017	1,107	1,274	1,040	1,536	
PM Total	61,406	66,707	61,474	53,849	57,126	41,288	60,196	0
24 Hr. Total	61,406	106,354	89,928	75,288	96,358	79,367	99,190	40,694
Noon - Noon	101,053	95,161	82,913	93,081	95,205	80,282	100,890	
	ADT	AWD	AADT	AAWD	SADT	SAWDT	WADT	DHV
	92,655	94,358						



VEHICLE CLASSIFICATION

HWY 403 BTWN DESJARDIN CANAL BR(E & WB) & YORK BLVD IC - HAMILTON

Central

Geo ID: 483070000

Direction: Northbound

Date: Wednesday, August 19, 2015

Time/Class	1	2	3	4	5	Total
0:00	222	23	20	21	5	291
1:00	147	15	34	19	0	215
2:00	211	18	26	19	1	275
3:00	645	33	51	26	2	757
4:00	2,328	75	75	23	5	2,506
5:00	4,069	109	96	25	3	4,302
6:00	4,341	117	88	20	11	4,577
7:00	3,773	134	96	29	10	4,042
8:00	3,306	143	108	47	9	3,613
9:00	2,920	170	118	53	5	3,266
10:00	3,073	154	116	57	12	3,412
11:00	2,751	145	157	46	14	3,113
12:00	2,945	146	138	63	6	3,298
13:00	3,138	144	122	42	9	3,455
14:00	3,301	133	110	36	5	3,585
15:00	3,847	145	101	31	4	4,128
16:00	3,598	82	70	33	4	3,787
17:00	2,823	56	51	31	4	2,965
18:00	2,195	64	53	39	9	2,360
19:00	1,675	45	45	41	11	1,817
20:00	1,517	36	42	26	2	1,623
21:00	1,132	23	37	32	6	1,230
22:00	703	34	59	28	7	831
23:00	383	33	28	19	3	466
Daily Total	55,043	2,077	1,841	806	147	59,914

Class/Volume Report Graph

HI-Star ID: 4216
 Street: MAIN ST.
 State: ON
 City: HAMILTON
 Area: East of Macklin

Begin: 04/23/2009 12:00 AM
 Lane: EB
 Oper: MD
 Posted: 50
 AADT Factor: 1

End: 04/24/2009 12:00 AM
 Hours: 24:00
 Period: 15
 Raw Count: 23026
 AADT Count: 23026

NC97 - Meters	0.0 to 4.5	5.0 to 8.0	8.5 to 9.5	10.0 to 12.5	13.0 to 15.5	16.0 to 18.5	19.0 to 22.0	22.5 >	Total
04/23/2009 [12:00 AM-12:15 AM]	82	74	6	2	0	0	0	0	82
04/23/2009 [12:15 AM-12:30 AM]	64	52	8	1	2	0	0	0	63
04/23/2009 [12:30 AM-12:45 AM]	61	51	9	0	0	0	1	0	61
04/23/2009 [12:45 AM-01:00 AM]	48	42	4	0	2	0	0	0	48
	255	219	27	3	4	0	1	0	254
04/23/2009 [01:00 AM-01:15 AM]	43	39	2	1	1	0	0	0	43
04/23/2009 [01:15 AM-01:30 AM]	36	31	4	0	1	0	0	0	36
04/23/2009 [01:30 AM-01:45 AM]	48	44	3	1	0	0	0	0	48
04/23/2009 [01:45 AM-02:00 AM]	36	32	4	0	0	0	0	0	36
	163	146	13	2	2	0	0	0	163
04/23/2009 [02:00 AM-02:15 AM]	46	40	6	0	0	0	0	0	46
04/23/2009 [02:15 AM-02:30 AM]	43	39	3	1	0	0	0	0	43
04/23/2009 [02:30 AM-02:45 AM]	37	31	6	0	0	0	0	0	37
04/23/2009 [02:45 AM-03:00 AM]	26	24	1	0	0	1	0	0	26
	152	134	16	1	0	1	0	0	152
04/23/2009 [03:00 AM-03:15 AM]	39	35	4	0	0	0	0	0	39
04/23/2009 [03:15 AM-03:30 AM]	23	21	1	0	1	0	0	0	23
04/23/2009 [03:30 AM-03:45 AM]	17	16	1	0	0	0	0	0	17
04/23/2009 [03:45 AM-04:00 AM]	18	14	4	0	0	0	0	0	18
	97	86	10	0	1	0	0	0	97
04/23/2009 [04:00 AM-04:15 AM]	10	9	0	0	1	0	0	0	10
04/23/2009 [04:15 AM-04:30 AM]	20	18	2	0	0	0	0	0	20
04/23/2009 [04:30 AM-04:45 AM]	23	19	4	0	0	0	0	0	23
04/23/2009 [04:45 AM-05:00 AM]	22	18	3	1	0	0	0	0	22
	75	64	9	1	1	0	0	0	75
04/23/2009 [05:00 AM-05:15 AM]	39	33	5	1	0	0	0	0	39
04/23/2009 [05:15 AM-05:30 AM]	35	32	2	1	0	0	0	0	35
04/23/2009 [05:30 AM-05:45 AM]	59	48	9	2	0	0	0	0	59
04/23/2009 [05:45 AM-06:00 AM]	69	62	4	2	1	0	0	0	69
	202	175	20	6	1	0	0	0	202
04/23/2009 [06:00 AM-06:15 AM]	90	77	6	2	3	1	1	0	90
04/23/2009 [06:15 AM-06:30 AM]	128	108	16	0	2	1	1	0	128
04/23/2009 [06:30 AM-06:45 AM]	167	143	18	1	3	1	1	0	167
04/23/2009 [06:45 AM-07:00 AM]	175	151	16	0	7	0	0	0	174
	560	479	56	3	15	3	3	0	559
04/23/2009 [07:00 AM-07:15 AM]	225	188	28	1	6	2	0	0	225
04/23/2009 [07:15 AM-07:30 AM]	218	188	18	1	9	2	0	0	218
04/23/2009 [07:30 AM-07:45 AM]	304	253	36	3	7	2	3	0	304
04/23/2009 [07:45 AM-08:00 AM]	390	340	31	1	12	6	0	0	390
	1137	969	113	6	34	12	3	0	1137
04/23/2009 [08:00 AM-08:15 AM]	406	360	32	3	8	3	0	0	406
04/23/2009 [08:15 AM-08:30 AM]	454	393	42	6	8	2	2	0	453
04/23/2009 [08:30 AM-08:45 AM]	511	459	37	1	7	6	0	1	511
04/23/2009 [08:45 AM-09:00 AM]	448	394	40	4	6	0	2	1	447
	1819	1606	151	14	29	11	4	1	1817
04/23/2009 [09:00 AM-09:15 AM]	369	311	41	5	8	2	2	0	369
04/23/2009 [09:15 AM-09:30 AM]	302	251	40	1	4	2	3	0	301
04/23/2009 [09:30 AM-09:45 AM]	320	268	40	2	8	2	0	0	320
04/23/2009 [09:45 AM-10:00 AM]	314	268	29	5	10	1	1	0	314
	1305	1098	150	13	30	7	6	0	1304
04/23/2009 [10:00 AM-10:15 AM]	320	275	32	6	6	0	1	0	320
04/23/2009 [10:15 AM-10:30 AM]	300	258	34	4	2	1	1	0	300
04/23/2009 [10:30 AM-10:45 AM]	312	258	37	3	9	2	1	1	311
04/23/2009 [10:45 AM-11:00 AM]	299	243	45	2	5	2	1	1	299
	1231	1034	148	15	22	5	4	2	1230
04/23/2009 [11:00 AM-11:15 AM]	304	252	42	2	4	2	1	0	304
04/23/2009 [11:15 AM-11:30 AM]	301	265	30	1	4	0	1	0	301
04/23/2009 [11:30 AM-11:45 AM]	346	303	29	6	5	1	2	0	346
04/23/2009 [11:45 AM-12:00 PM]	334	291	31	1	6	3	1	0	333
	1285	1111	132	10	19	6	5	1	1284
04/23/2009 [12:00 PM-12:15 PM]	347	298	36	3	5	4	0	1	347

04/23/2009 [12:15 PM-12:30 PM]	370	322	37	1	7	2	1	0	0	370	████████████████████
04/23/2009 [12:30 PM-12:45 PM]	363	313	38	2	6	1	2	1	0	363	████████████████████
04/23/2009 [12:45 PM-01:00 PM]	352	305	36	0	6	3	1	0	1	352	████████████████████
	1432	1238	147	6	24	10	4	1	2	1432	
04/23/2009 [01:00 PM-01:15 PM]	367	330	25	2	7	0	1	2	0	367	████████████████████
04/23/2009 [01:15 PM-01:30 PM]	364	318	38	4	3	0	0	1	0	364	████████████████████
04/23/2009 [01:30 PM-01:45 PM]	362	321	28	4	4	3	1	1	0	362	████████████████████
04/23/2009 [01:45 PM-02:00 PM]	375	330	31	4	3	3	1	1	2	375	████████████████████
	1468	1299	122	14	17	6	3	5	2	1468	
04/23/2009 [02:00 PM-02:15 PM]	362	306	44	3	6	1	2	0	0	362	████████████████████
04/23/2009 [02:15 PM-02:30 PM]	339	299	27	4	6	3	0	0	0	339	████████████████████
04/23/2009 [02:30 PM-02:45 PM]	372	328	33	1	7	3	0	0	0	372	████████████████████
04/23/2009 [02:45 PM-03:00 PM]	407	365	30	3	5	1	1	1	0	406	████████████████████
	1480	1298	134	11	24	8	3	1	0	1479	
04/23/2009 [03:00 PM-03:15 PM]	442	370	57	4	8	3	0	0	0	442	████████████████████
04/23/2009 [03:15 PM-03:30 PM]	408	370	28	0	7	3	0	0	0	408	████████████████████
04/23/2009 [03:30 PM-03:45 PM]	412	354	42	3	9	3	1	0	0	412	████████████████████
04/23/2009 [03:45 PM-04:00 PM]	390	343	35	3	5	3	1	0	0	390	████████████████████
	1652	1437	162	10	29	12	2	0	0	1652	
04/23/2009 [04:00 PM-04:15 PM]	440	395	35	0	8	2	0	0	0	440	████████████████████
04/23/2009 [04:15 PM-04:30 PM]	428	380	36	1	6	2	2	1	0	428	████████████████████
04/23/2009 [04:30 PM-04:45 PM]	458	411	38	1	7	0	1	0	0	458	████████████████████
04/23/2009 [04:45 PM-05:00 PM]	450	393	45	1	10	1	0	0	0	450	████████████████████
	1776	1579	154	3	31	5	3	1	0	1776	
04/23/2009 [05:00 PM-05:15 PM]	418	375	27	2	8	5	0	0	1	418	████████████████████
04/23/2009 [05:15 PM-05:30 PM]	399	352	36	2	8	0	1	0	0	399	████████████████████
04/23/2009 [05:30 PM-05:45 PM]	382	331	38	3	7	3	0	0	0	382	████████████████████
04/23/2009 [05:45 PM-06:00 PM]	360	316	34	1	7	1	1	0	0	360	████████████████████
	1559	1374	135	8	30	9	2	0	1	1559	
04/23/2009 [06:00 PM-06:15 PM]	363	317	31	1	9	3	1	0	0	362	████████████████████
04/23/2009 [06:15 PM-06:30 PM]	337	298	29	1	6	2	1	0	0	337	████████████████████
04/23/2009 [06:30 PM-06:45 PM]	330	297	22	1	7	2	0	0	0	329	████████████████████
04/23/2009 [06:45 PM-07:00 PM]	318	291	20	1	1	4	1	0	0	318	████████████████████
	1348	1203	102	4	23	11	3	0	0	1346	
04/23/2009 [07:00 PM-07:15 PM]	268	234	23	1	7	0	2	0	0	267	████████████████████
04/23/2009 [07:15 PM-07:30 PM]	319	291	22	3	3	0	0	0	0	319	████████████████████
04/23/2009 [07:30 PM-07:45 PM]	234	210	17	2	3	1	1	0	0	234	████████████████████
04/23/2009 [07:45 PM-08:00 PM]	226	211	11	0	3	1	0	0	0	226	████████████████████
	1047	946	73	6	16	2	3	0	0	1046	
04/23/2009 [08:00 PM-08:15 PM]	225	200	16	0	7	1	1	0	0	225	████████████████████
04/23/2009 [08:15 PM-08:30 PM]	218	196	17	1	3	0	1	0	0	218	████████████████████
04/23/2009 [08:30 PM-08:45 PM]	243	218	18	3	3	1	0	0	0	243	████████████████████
04/23/2009 [08:45 PM-09:00 PM]	238	212	20	2	1	3	0	0	0	238	████████████████████
	924	826	71	6	14	5	2	0	0	924	
04/23/2009 [09:00 PM-09:15 PM]	240	214	21	2	3	0	0	0	0	240	████████████████████
04/23/2009 [09:15 PM-09:30 PM]	205	189	11	2	1	1	1	0	0	205	████████████████████
04/23/2009 [09:30 PM-09:45 PM]	243	213	22	1	6	1	0	0	0	243	████████████████████
04/23/2009 [09:45 PM-10:00 PM]	233	203	26	1	3	0	0	0	0	233	████████████████████
	921	819	80	6	13	2	1	0	0	921	
04/23/2009 [10:00 PM-10:15 PM]	209	185	19	1	3	1	0	0	0	209	████████████████████
04/23/2009 [10:15 PM-10:30 PM]	187	170	13	3	1	0	0	0	0	187	████████████████████
04/23/2009 [10:30 PM-10:45 PM]	148	129	15	2	1	0	1	0	0	148	████████████████████
04/23/2009 [10:45 PM-11:00 PM]	161	144	14	1	1	0	1	0	0	161	████████████████████
	705	628	61	7	6	1	2	0	0	705	
04/23/2009 [11:00 PM-11:15 PM]	121	110	7	1	3	0	0	0	0	121	████████████████████
04/23/2009 [11:15 PM-11:30 PM]	116	99	16	0	0	1	0	0	0	116	████████████████████
04/23/2009 [11:30 PM-11:45 PM]	122	112	8	1	1	0	0	0	0	122	████████████████████
04/23/2009 [11:45 PM-12:00 AM]	74	64	7	0	3	0	0	0	0	74	████████████████████
	433	385	38	2	7	1	0	0	0	433	

Daily Totals:	23026	20153	2124	157	392	117	53	12	7	23015	
Total Counted:	23026										
Total Classified:	23015	23026	20153	2124	157	392	117	53	12	7	23015
Total Unclassified:	11										

Report Percentages: 87.56% 9.23% 0.68% 1.70% 0.51% 0.23% 0.05% 0.03%

Peak Time (AM): 04/23/2009 [08:30 AM-08:45 AM] Peak Count: 511
Peak Time (PM): 04/23/2009 [04:30 PM-04:45 PM] Peak Count: 458

**Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: HAMILTON
Street: MAIN ST.**

A study of vehicle traffic was conducted with HI-STAR unit number 4216. The study was done in the EB lane on MAIN ST. in HAMILTON, ON in East of Macklin county. The study began on 04/23/2009 at 12:00 AM and concluded on 04/24/2009 at 12:00 AM, lasting a total of 24 hours. Data was recorded in 15 minute time periods. The total recorded volume of traffic showed 23,026 vehicles passed through the location with a peak volume of 511 on 04/23/2009 at 08:30 AM and a minimum volume of 10 on 04/23/2009 at 04:00 AM. The AADT Count for this study was 23,026.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin.

Chart 1

0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	90 to 99	100 to 109	110 to 119	120 to 129	130 to 139	140 >
0	49	235	863	4565	8121	6356	2073	474	173	54	35	17	0	0

At least half of the vehicles were traveling in the 50 - 59 km/h range or a lower speed. The average speed for all classified vehicles was 58 km/h with 75.1 percent exceeding the posted speed of 50 km/h. The HI-STAR found 3.27 percent of the total vehicles were traveling in excess of 88.5115 km/h. The mode speed for this traffic study was 50 km/h and the 85th percentile was 69.01 km/h.

CLASSIFICATION

Chart 2 lists the values of the eight classification bins and the total traffic volume accumulated for each bin.

Chart 2

0.0 to 4.5	5.0 to 8.0	8.5 to 9.5	10.0 to 12.5	13.0 to 15.5	16.0 to 18.5	19.0 to 22.0	22.5 >
20153	2124	157	392	117	53	12	7

Most of the vehicles classified during the study were Passenger Cars. The number of Passenger Cars in the study was 22,277 which represents 96.80 percent of the total classified vehicles. The number of Small Trucks in the study was 157 which represents 0.70 percent of the total classified vehicles. The number of Trucks/Buses in the study was 392 which represents 1.70 percent of the total classified vehicles. The number of Tractor Trailers in the study was 189 which represents 0.80 percent of the total classified vehicles.

HEADWAY

During the peak time period, on 04/23/2009 at 08:30 AM the average headway between the vehicles was 1.76 seconds. The slowest traffic period was on 04/23/2009 at 04:00 AM. During this slowest period, the average headway was 81.82 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 8 and 27 degrees Celsius. The HI-STAR determined that the roadway surface was Dry 100.00 percent of the time.

Class/Volume Report Graph

HI-Star ID: 3376
 Street: King Street W
 State: ON
 City: City of Hamilton
 Area: west of Dundurn St S

Begin: 07/02/2008 12:00 AM
 Lane: WB
 Oper: MD
 Posted: 50
 AADT Factor: 1

End: 07/09/2008 12:00 AM
 Hours: 168:00
 Period: 60
 Raw Count: 219140
 AADT Count: 31306

NC97 - Meters	Count	0.0 to 4.5	5.0 to 8.0	8.5 to 9.5	10.0 to 12.5	13.0 to 15.5	16.0 to 18.5	19.0 to 22.0	22.5 >	Total
07/02/2008 [12:00 AM-01:00 AM]	280	415	48	7	4	3	1	1	0	479
07/02/2008 [01:00 AM-02:00 AM]	257	219	25	3	3	0	4	0	1	255
07/02/2008 [02:00 AM-03:00 AM]	212	192	14	0	3	0	1	0	0	210
07/02/2008 [03:00 AM-04:00 AM]	170	150	12	2	3	2	1	0	0	170
07/02/2008 [04:00 AM-05:00 AM]	152	125	21	1	3	1	1	0	0	152
07/02/2008 [05:00 AM-06:00 AM]	621	524	72	3	17	2	0	1	2	621
07/02/2008 [06:00 AM-07:00 AM]	1292	1106	143	9	18	6	6	2	1	1291
07/02/2008 [07:00 AM-08:00 AM]	1743	1491	187	16	28	6	4	2	2	1736
07/02/2008 [08:00 AM-09:00 AM]	1839	1560	206	17	26	14	8	4	0	1835
07/02/2008 [09:00 AM-10:00 AM]	1498	1264	156	21	31	12	5	4	1	1494
07/02/2008 [10:00 AM-11:00 AM]	1610	1365	180	17	31	11	3	0	1	1608
07/02/2008 [11:00 AM-12:00 PM]	1724	1481	194	8	18	9	4	2	6	1722
07/02/2008 [12:00 PM-01:00 PM]	1896	1609	212	21	20	18	2	5	7	1894
07/02/2008 [01:00 PM-02:00 PM]	1872	1597	213	15	26	10	2	3	5	1871
07/02/2008 [02:00 PM-03:00 PM]	2035	1774	205	15	23	10	1	0	2	2030
07/02/2008 [03:00 PM-04:00 PM]	2240	1953	229	12	26	10	5	3	0	2238
07/02/2008 [04:00 PM-05:00 PM]	2911	2568	277	22	24	7	3	2	3	2906
07/02/2008 [05:00 PM-06:00 PM]	2741	2393	279	20	25	7	5	3	5	2737
07/02/2008 [06:00 PM-07:00 PM]	1793	1606	145	13	15	6	3	2	1	1791
07/02/2008 [07:00 PM-08:00 PM]	1459	1299	128	9	13	6	2	2	0	1459
07/02/2008 [08:00 PM-09:00 PM]	1149	1036	84	6	14	2	3	1	0	1146
07/02/2008 [09:00 PM-10:00 PM]	1154	1052	82	6	7	2	1	2	0	1152
07/02/2008 [10:00 PM-11:00 PM]	835	749	66	8	8	1	2	0	1	835
07/02/2008 [11:00 PM-12:00 AM]	528	464	46	1	8	4	4	1	0	528

Daily Totals: 32011 27992 3224 252 394 149 71 40 38 32160

07/03/2008 [12:00 AM-01:00 AM]	269	239	26	3	0	0	1	0	0	269
07/03/2008 [01:00 AM-02:00 AM]	184	153	21	1	3	3	0	1	0	182
07/03/2008 [02:00 AM-03:00 AM]	201	170	24	1	3	1	1	0	1	201
07/03/2008 [03:00 AM-04:00 AM]	118	95	17	3	0	1	0	0	0	116
07/03/2008 [04:00 AM-05:00 AM]	183	156	20	1	2	2	0	1	0	182
07/03/2008 [05:00 AM-06:00 AM]	680	550	88	5	18	6	4	2	2	675
07/03/2008 [06:00 AM-07:00 AM]	1423	1193	168	11	26	12	5	2	0	1417
07/03/2008 [07:00 AM-08:00 AM]	1898	1592	213	13	46	12	8	4	1	1889
07/03/2008 [08:00 AM-09:00 AM]	2126	1807	228	19	39	13	5	2	0	2113
07/03/2008 [09:00 AM-10:00 AM]	1860	1569	205	24	36	13	4	0	0	1851
07/03/2008 [10:00 AM-11:00 AM]	1646	1383	186	27	23	10	10	3	1	1643
07/03/2008 [11:00 AM-12:00 PM]	1801	1539	195	22	18	9	11	3	1	1798
07/03/2008 [12:00 PM-01:00 PM]	1975	1667	215	18	38	13	16	1	1	1969
07/03/2008 [01:00 PM-02:00 PM]	2003	1749	190	24	26	5	2	2	1	1999
07/03/2008 [02:00 PM-03:00 PM]	2140	1866	207	15	27	13	5	0	1	2134
07/03/2008 [03:00 PM-04:00 PM]	2510	2196	247	19	33	7	4	2	0	2508
07/03/2008 [04:00 PM-05:00 PM]	3106	2766	256	22	32	14	9	1	3	3103
07/03/2008 [05:00 PM-06:00 PM]	3026	2669	271	21	39	14	6	2	1	3023
07/03/2008 [06:00 PM-07:00 PM]	1993	1785	158	16	21	3	5	1	0	1989
07/03/2008 [07:00 PM-08:00 PM]	1489	1326	131	10	12	2	2	1	1	1485
07/03/2008 [08:00 PM-09:00 PM]	1355	1191	133	6	16	2	4	0	0	1352
07/03/2008 [09:00 PM-10:00 PM]	1223	1115	87	3	13	2	0	1	0	1221
07/03/2008 [10:00 PM-11:00 PM]	937	861	66	1	6	1	1	0	0	937
07/03/2008 [11:00 PM-12:00 AM]	597	531	51	2	8	2	0	1	2	597

Daily Totals: 34743 30168 3403 287 485 160 103 31 16 34653

07/04/2008 [12:00 AM-01:00 AM]	374	333	34	0	6	1	0	0	0	374
07/04/2008 [01:00 AM-02:00 AM]	240	201	27	3	6	2	1	0	0	240
07/04/2008 [02:00 AM-03:00 AM]	196	173	20	0	2	0	1	0	0	196
07/04/2008 [03:00 AM-04:00 AM]	139	118	17	0	3	0	0	0	0	138
07/04/2008 [04:00 AM-05:00 AM]	188	153	27	3	3	1	0	0	0	187
07/04/2008 [05:00 AM-06:00 AM]	648	541	77	5	16	5	2	0	0	646
07/04/2008 [06:00 AM-07:00 AM]	1364	1159	144	15	26	10	3	2	1	1360
07/04/2008 [07:00 AM-08:00 AM]	1824	1557	185	22	34	10	5	2	3	1818
07/04/2008 [08:00 AM-09:00 AM]	2072	1760	222	25	29	17	9	6	1	2069
07/04/2008 [09:00 AM-10:00 AM]	1767	1529	166	21	27	10	9	2	0	1764
07/04/2008 [10:00 AM-11:00 AM]	1801	1510	220	15	29	15	8	2	0	1799
07/04/2008 [11:00 AM-12:00 PM]	1938	1662	203	22	20	14	5	1	4	1931
07/04/2008 [12:00 PM-01:00 PM]	2055	1796	196	14	32	7	8	0	0	2053
07/04/2008 [01:00 PM-02:00 PM]	2081	1773	236	24	29	7	4	0	1	2074
07/04/2008 [02:00 PM-03:00 PM]	2268	1972	225	19	29	13	6	1	0	2265
07/04/2008 [03:00 PM-04:00 PM]	2463	2168	236	18	26	6	4	2	1	2461
07/04/2008 [04:00 PM-05:00 PM]	3036	2684	276	19	35	13	5	1	1	3034
07/04/2008 [05:00 PM-06:00 PM]	2698	2419	214	18	22	15	5	2	0	2695
07/04/2008 [06:00 PM-07:00 PM]	2001	1779	168	19	18	9	2	1	1	1997

07/04/2008 [07:00 PM-08:00 PM]	1493	1338	130	10	9	4	1	1	0	1493	████████████████████
07/04/2008 [08:00 PM-09:00 PM]	1208	1084	97	10	12	2	1	1	0	1207	████████████████████
07/04/2008 [09:00 PM-10:00 PM]	1210	1074	115	5	11	3	0	0	0	1208	████████████████████
07/04/2008 [10:00 PM-11:00 PM]	984	864	99	5	7	8	1	0	0	984	████████████████████
07/04/2008 [11:00 PM-12:00 AM]	795	700	73	7	9	2	1	1	2	795	████████████████████

Daily Totals: 34843 30347 3407 299 440 174 81 25 15 34788

07/05/2008 [12:00 AM-01:00 AM]	556	486	54	5	9	1	0	0	0	555	████████████████████
07/05/2008 [01:00 AM-02:00 AM]	415	370	38	3	3	0	0	0	0	414	████████████████████
07/05/2008 [02:00 AM-03:00 AM]	417	367	48	2	0	0	0	0	0	417	████████████████████
07/05/2008 [03:00 AM-04:00 AM]	234	206	23	3	2	0	0	0	0	234	████████████████████
07/05/2008 [04:00 AM-05:00 AM]	157	128	24	1	2	0	0	0	0	155	████████████████████
07/05/2008 [05:00 AM-06:00 AM]	333	282	36	2	12	0	1	0	0	333	████████████████████
07/05/2008 [06:00 AM-07:00 AM]	735	625	80	9	14	3	1	1	0	733	████████████████████
07/05/2008 [07:00 AM-08:00 AM]	986	855	94	7	19	5	4	2	0	986	████████████████████
07/05/2008 [08:00 AM-09:00 AM]	1245	1054	146	10	19	6	2	0	5	1242	████████████████████
07/05/2008 [09:00 AM-10:00 AM]	1309	1129	136	13	18	3	3	2	2	1306	████████████████████
07/05/2008 [10:00 AM-11:00 AM]	1519	1295	166	16	22	7	8	2	1	1517	████████████████████
07/05/2008 [11:00 AM-12:00 PM]	1661	1457	158	14	18	7	1	3	3	1661	████████████████████
07/05/2008 [12:00 PM-01:00 PM]	1782	1562	175	13	17	5	5	1	2	1780	████████████████████
07/05/2008 [01:00 PM-02:00 PM]	1761	1529	181	20	15	6	2	3	1	1757	████████████████████
07/05/2008 [02:00 PM-03:00 PM]	1796	1592	153	16	18	7	4	3	3	1796	████████████████████
07/05/2008 [03:00 PM-04:00 PM]	1690	1495	146	13	19	7	4	1	3	1688	████████████████████
07/05/2008 [04:00 PM-05:00 PM]	1721	1525	157	14	11	5	2	1	1	1716	████████████████████
07/05/2008 [05:00 PM-06:00 PM]	1758	1546	176	9	16	6	2	0	0	1755	████████████████████
07/05/2008 [06:00 PM-07:00 PM]	1373	1207	131	11	11	5	5	1	0	1371	████████████████████
07/05/2008 [07:00 PM-08:00 PM]	1241	1116	106	5	10	1	2	0	1	1241	████████████████████
07/05/2008 [08:00 PM-09:00 PM]	1069	945	102	9	6	3	0	0	1	1066	████████████████████
07/05/2008 [09:00 PM-10:00 PM]	1177	1055	97	7	14	2	0	0	0	1175	████████████████████
07/05/2008 [10:00 PM-11:00 PM]	1034	919	89	7	12	4	1	0	0	1032	████████████████████
07/05/2008 [11:00 PM-12:00 AM]	955	871	72	2	6	3	0	0	0	954	████████████████████

Daily Totals: 26924 23616 2588 211 293 86 47 20 23 26884

07/06/2008 [12:00 AM-01:00 AM]	853	751	90	3	4	1	1	1	0	851	████████████████████
07/06/2008 [01:00 AM-02:00 AM]	782	694	80	2	3	2	1	0	0	782	████████████████████
07/06/2008 [02:00 AM-03:00 AM]	708	630	69	3	4	2	0	0	0	708	████████████████████
07/06/2008 [03:00 AM-04:00 AM]	427	383	37	4	1	1	1	0	0	427	████████████████████
07/06/2008 [04:00 AM-05:00 AM]	152	129	19	0	4	0	0	0	0	152	████████████████████
07/06/2008 [05:00 AM-06:00 AM]	262	230	24	1	3	3	1	0	0	262	████████████████████
07/06/2008 [06:00 AM-07:00 AM]	497	432	44	9	7	2	1	0	0	495	████████████████████
07/06/2008 [07:00 AM-08:00 AM]	704	609	62	13	14	3	1	0	0	702	████████████████████
07/06/2008 [08:00 AM-09:00 AM]	962	842	91	4	17	6	0	0	0	960	████████████████████
07/06/2008 [09:00 AM-10:00 AM]	1068	940	94	12	13	5	1	0	0	1065	████████████████████
07/06/2008 [10:00 AM-11:00 AM]	1373	1207	130	8	16	5	1	3	0	1370	████████████████████
07/06/2008 [11:00 AM-12:00 PM]	1397	1257	118	6	8	5	2	0	0	1396	████████████████████
07/06/2008 [12:00 PM-01:00 PM]	1634	1466	125	11	15	6	4	0	0	1627	████████████████████
07/06/2008 [01:00 PM-02:00 PM]	1630	1456	154	4	11	4	1	0	0	1630	████████████████████
07/06/2008 [02:00 PM-03:00 PM]	1526	1376	109	16	19	2	2	0	0	1524	████████████████████
07/06/2008 [03:00 PM-04:00 PM]	1489	1323	125	19	11	4	5	1	0	1488	████████████████████
07/06/2008 [04:00 PM-05:00 PM]	1636	1453	154	9	13	5	0	1	0	1635	████████████████████
07/06/2008 [05:00 PM-06:00 PM]	1606	1427	137	14	18	4	2	1	0	1603	████████████████████
07/06/2008 [06:00 PM-07:00 PM]	1349	1219	102	18	5	3	2	0	0	1349	████████████████████
07/06/2008 [07:00 PM-08:00 PM]	1154	1024	103	9	9	1	3	0	0	1149	████████████████████
07/06/2008 [08:00 PM-09:00 PM]	1171	1054	94	6	13	0	0	1	1	1169	████████████████████
07/06/2008 [09:00 PM-10:00 PM]	1130	1030	83	4	9	2	0	1	0	1129	████████████████████
07/06/2008 [10:00 PM-11:00 PM]	855	769	69	3	9	2	1	0	0	853	████████████████████
07/06/2008 [11:00 PM-12:00 AM]	565	502	50	3	7	1	1	0	0	564	████████████████████

Daily Totals: 24930 22203 2163 181 233 69 31 9 1 24890

07/07/2008 [12:00 AM-01:00 AM]	298	257	32	5	3	1	0	0	0	298	████████████████████
07/07/2008 [01:00 AM-02:00 AM]	176	153	13	3	5	0	1	0	0	175	████████████████████
07/07/2008 [02:00 AM-03:00 AM]	171	146	21	1	1	1	0	0	0	170	████████████████████
07/07/2008 [03:00 AM-04:00 AM]	152	132	15	3	0	0	0	2	0	152	████████████████████
07/07/2008 [04:00 AM-05:00 AM]	198	162	30	0	1	2	3	0	0	198	████████████████████
07/07/2008 [05:00 AM-06:00 AM]	671	568	80	3	14	5	0	0	0	670	████████████████████
07/07/2008 [06:00 AM-07:00 AM]	1484	1284	144	10	29	10	4	2	0	1483	████████████████████
07/07/2008 [07:00 AM-08:00 AM]	1940	1663	200	21	29	8	10	3	2	1936	████████████████████
07/07/2008 [08:00 AM-09:00 AM]	2193	1867	225	33	36	15	5	3	6	2190	████████████████████
07/07/2008 [09:00 AM-10:00 AM]	1781	1507	189	29	27	10	8	2	0	1772	████████████████████
07/07/2008 [10:00 AM-11:00 AM]	1667	1413	184	23	24	9	7	1	2	1663	████████████████████
07/07/2008 [11:00 AM-12:00 PM]	1783	1544	175	22	26	3	5	3	1	1779	████████████████████
07/07/2008 [12:00 PM-01:00 PM]	1854	1621	171	25	24	7	4	0	0	1852	████████████████████
07/07/2008 [01:00 PM-02:00 PM]	1862	1607	185	21	21	14	6	3	1	1858	████████████████████
07/07/2008 [02:00 PM-03:00 PM]	2096	1839	185	21	23	5	15	1	2	2091	████████████████████
07/07/2008 [03:00 PM-04:00 PM]	2263	2011	183	22	25	12	5	1	1	2260	████████████████████
07/07/2008 [04:00 PM-05:00 PM]	2938	2612	246	28	28	9	4	5	0	2932	████████████████████
07/07/2008 [05:00 PM-06:00 PM]	2628	2355	197	18	26	13	6	2	2	2619	████████████████████
07/07/2008 [06:00 PM-07:00 PM]	1816	1603	160	13	20	11	6	1	2	1816	████████████████████
07/07/2008 [07:00 PM-08:00 PM]	1428	1277	119	13	9	6	1	2	1	1428	████████████████████
07/07/2008 [08:00 PM-09:00 PM]	1095	974	104	3	9	1	0	2	0	1093	████████████████████
07/07/2008 [09:00 PM-10:00 PM]	1057	933	90	9	14	2	4	1	2	1055	████████████████████

07/07/2008 [10:00 PM-11:00 PM]	837	746	78	2	7	2	1	1	0	837	
07/07/2008 [11:00 PM-12:00 AM]	575	513	50	3	7	1	1	0	0	575	
Daily Totals:	32963	28787	3076	331	408	147	96	35	22	32902	
07/08/2008 [12:00 AM-01:00 AM]	329	288	32	3	3	2	0	0	0	328	
07/08/2008 [01:00 AM-02:00 AM]	229	198	21	1	4	5	0	0	0	229	
07/08/2008 [02:00 AM-03:00 AM]	184	161	19	1	1	1	1	0	0	184	
07/08/2008 [03:00 AM-04:00 AM]	123	111	9	0	1	1	0	0	0	122	
07/08/2008 [04:00 AM-05:00 AM]	213	182	22	1	4	0	2	0	0	211	
07/08/2008 [05:00 AM-06:00 AM]	617	509	70	9	18	8	2	0	0	616	
07/08/2008 [06:00 AM-07:00 AM]	1278	1073	153	11	24	11	2	2	0	1276	
07/08/2008 [07:00 AM-08:00 AM]	1767	1493	200	20	26	13	8	2	2	1764	
07/08/2008 [08:00 AM-09:00 AM]	1912	1635	196	27	28	9	8	5	1	1909	
07/08/2008 [09:00 AM-10:00 AM]	1802	1531	189	17	30	15	10	4	1	1797	
07/08/2008 [10:00 AM-11:00 AM]	1710	1448	182	22	27	14	8	2	3	1706	
07/08/2008 [11:00 AM-12:00 PM]	1734	1478	182	15	28	13	6	4	2	1728	
07/08/2008 [12:00 PM-01:00 PM]	1920	1641	210	18	25	15	5	2	2	1918	
07/08/2008 [01:00 PM-02:00 PM]	1883	1618	206	12	23	12	6	2	1	1880	
07/08/2008 [02:00 PM-03:00 PM]	2034	1731	229	18	26	13	8	2	4	2031	
07/08/2008 [03:00 PM-04:00 PM]	2354	2100	192	15	19	13	4	2	6	2351	
07/08/2008 [04:00 PM-05:00 PM]	2861	2566	236	11	32	5	5	1	2	2858	
07/08/2008 [05:00 PM-06:00 PM]	2735	2437	239	13	28	5	6	4	0	2732	
07/08/2008 [06:00 PM-07:00 PM]	1915	1725	157	10	14	2	4	0	0	1912	
07/08/2008 [07:00 PM-08:00 PM]	1342	1202	113	6	8	9	1	0	0	1339	
07/08/2008 [08:00 PM-09:00 PM]	1137	1002	111	2	14	4	3	0	0	1136	
07/08/2008 [09:00 PM-10:00 PM]	1126	1033	74	2	12	3	1	1	0	1126	
07/08/2008 [10:00 PM-11:00 PM]	953	846	87	6	8	1	2	0	0	950	
07/08/2008 [11:00 PM-12:00 AM]	568	516	40	2	10	0	0	0	0	568	
Daily Totals:	32726	28524	3169	242	413	174	92	33	24	32671	
Total Counted:	219140										
Total Classified:	218948	219140	191637	21030	1803	2666	959	521	193	139	218948
Total Unclassified:	192										
Report Percentages:		87.53%	9.61%	0.82%	1.22%	0.44%	0.24%	0.09%	0.06%		

APPENDIX B



ORNAMENT

Ontario Road Noise Analysis Method for ENvironment and Transportation
version 2.05

Job No. 1603916
Job Name Beverly Hills Apartments 644 Main Street

Scenario Future (2026) - Daytime

ROAD CHARACTERISTICS

SOURCE-RECEIVER-BARRIER-TOPOGRAPHY CHARACTERISTICS

Receptor Location	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)	Topo-graphy Type	Source Height (m)	Road Elevation (m asl)	Receptor Height (m)	Receptor Elevation (m asl)	Total Segment L _{eq} (dBA)
			Autos	Medium	Heavy					θ ₁	θ ₂								
R01	King St. (Segment 1)	16	43166	527	371	50	0	N	1	71	78	114.0	Hard	A	1.2	0.0	8.1	0.0	46
R01	Main St. (Segment 1)	16	28760	505	252	60	0	N	1	-86	78	19.0	Hard	A	1.2	0.0	8.1	0.0	68
R01	HWY 403 East/North (Segment 1)	16	51059	2118	1902	90	0	N	1	7	90	134.0	Hard	A	1.2	0.0	8.1	0.0	66
R01	HWY 403 East/North (Segment 2)	16	51059	2118	1902	90	0	N	1	-53	40	103.0	Hard	A	1.2	0.0	8.1	0.0	67
R01	HWY 403 East/North (Segment 3)	16	51059	2118	1902	90	0	N	1	-48	-24	161.0	Hard	A	1.2	0.0	8.1	0.0	59
R01	HWY 403 West/South (Segment 1)	16	52800	2190	1967	100	0	N	1	13	78	109.0	Hard	A	1.2	0.0	8.1	0.0	66
R01	HWY 403 West/South (Segment 2)	16	52800	2190	1967	100	0	N	1	-63	46	76.0	Hard	A	1.2	0.0	8.1	0.0	70
R01	HWY 403 West/South (Segment 3)	16	52800	2190	1967	100	0	N	1	-48	-33	131.0	Hard	A	1.2	0.0	8.1	0.0	59
R02	King St. (Segment 1)	16	43166	527	371	50	0	N	1	-2	90	97.0	Hard	A	1.2	0.0	8.1	0.0	58
R02	King St. (Segment 2)	16	43166	527	371	50	0	N	1	-55	-9	98.0	Hard	A	1.2	0.0	8.1	0.0	55
R02	Main St. (Segment 1)	16	28760	505	252	60	0	N	1	-80	60	44.0	Hard	A	1.2	0.0	8.1	0.0	63
R02	HWY 403 East/North (Segment 1)	16	51059	2118	1902	90	0	N	1	23	71	150.0	Hard	A	1.2	0.0	8.1	0.0	63
R02	HWY 403 East/North (Segment 2)	16	51059	2118	1902	90	0	N	1	-45	55	93.0	Hard	A	1.2	0.0	8.1	0.0	68
R02	HWY 403 East/North (Segment 3)	16	51059	2118	1902	90	0	N	1	-90	-15	127.0	Hard	A	1.2	0.0	8.1	0.0	65
R02	HWY 403 West/South (Segment 1)	16	52800	2190	1967	100	0	N	1	30	71	127.0	Hard	A	1.2	0.0	8.1	0.0	64
R02	HWY 403 West/South (Segment 2)	16	52800	2190	1967	100	0	N	1	-56	62	66.0	Hard	A	1.2	0.0	8.1	0.0	71
R02	HWY 403 West/South (Segment 3)	16	52800	2190	1967	100	0	N	1	-90	-26	104.0	Hard	A	1.2	0.0	8.1	0.0	67
R03	King St. (Segment 1)	16	43166	527	371	50	0	N	1	5	81	76.0	Hard	A	1.2	0.0	8.1	0.0	58
R03	King St. (Segment 2)	16	43166	527	371	50	0	N	1	-80	4	88.0	Hard	A	1.2	0.0	8.1	0.0	58
R03	Main St. (Segment 1)	16	28760	505	252	60	0	N	1	45	75	63.0	Hard	A	1.2	0.0	8.1	0.0	55
R03	Main St. (Segment 2)	16	28760	505	252	60	0	N	1	-79	-71	41.0	Hard	A	1.2	0.0	8.1	0.0	51
R03	HWY 403 East/North (Segment 1)	16	51059	2118	1902	90	0	N	1	70	75	172.0	Hard	A	1.2	0.0	8.1	0.0	54
R03	HWY 403 East/North (Segment 2)	16	51059	2118	1902	90	0	N	1	-39	0	117.0	Hard	A	1.2	0.0	8.1	0.0	63
R03	HWY 403 East/North (Segment 3)	16	51059	2118	1902	90	0	N	1	-90	-8	146.0	Hard	A	1.2	0.0	8.1	0.0	65
R03	HWY 403 West/South (Segment 1)	16	52800	2190	1967	100	0	N	1	70	75	147.0	Hard	A	1.2	0.0	8.1	0.0	56
R03	HWY 403 West/South (Segment 2)	16	52800	2190	1967	100	0	N	1	-49	0	90.0	Hard	A	1.2	0.0	8.1	0.0	66
R03	HWY 403 West/South (Segment 3)	16	52800	2190	1967	100	0	N	1	-90	-17	124.0	Hard	A	1.2	0.0	8.1	0.0	67
R04 OLA	King St. (Segment 1)	16	43166	527	371	50	0	N	1	29	81	77.0	Hard	A	1.2	0.0	5.5	0.0	56
R04 OLA	King St. (Segment 2)	16	43166	527	371	50	0	N	1	-77	18	109.0	Hard	A	1.2	0.0	5.5	0.0	57
R04 OLA	Main St. (Segment 1)	16	28760	505	252	60	0	N	1	29	55	85.0	Hard	A	1.2	0.0	5.5	0.0	53
R04 OLA	Main St. (Segment 2)	16	28760	505	252	60	0	N	1	64	78	40.0	Hard	A	1.2	0.0	5.5	0.0	54
R04 OLA	HWY 403 West/South (Segment 1)	16	52800	2190	1967	100	0	N	1	39	72	147.0	Hard	A	1.2	0.0	5.5	0.0	62
R04 OLA	HWY 403 West/South (Segment 3)	16	52800	2190	1967	100	0	N	1	-61	-30	155.0	Hard	A	1.2	0.0	5.5	0.0	62
R04 OLA	HWY 403 East/North (Segment 1)	16	51059	2118	1902	90	0	N	1	39	72	171.0	Hard	A	1.2	0.0	5.5	0.0	60
R04 OLA	HWY 403 East/North (Segment 3)	16	51059	2118	1902	90	0	N	1	-57	-30	178.0	Hard	A	1.2	0.0	5.5	0.0	59



ORNAMENT

Ontario Road Noise Analysis Method for ENvironment and Transportation
version 2.05

Job No. 1603916

Job Name Beverly Hills Apartments 644 Main Street

Scenario Future (2026) - Nighttime

ROAD CHARACTERISTICS

SOURCE-RECEIVER-BARRIER-TOPOGRAPHY CHARACTERISTICS

Receptor Location	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)	Topo-graphy Type	Source Height (m)	Road Elevation (m asl)	Receptor Height (m)	Receptor Elevation (m asl)	Total Segment L _{eq} (dBA)
			Autos	Medium	Heavy					θ ₁	θ ₂								
R01	King St. (Segment 1)	8	5470	101	50	50	0	N	1	71	78	114.0	Hard	A	1.2	0.0	8.1	0.0	40
R01	Main St. (Segment 1)	8	2653	43	13	60	0	N	1	-86	78	19.0	Hard	A	1.2	0.0	8.1	0.0	60
R01	HWY 403 East/North (Segment 1)	8	8578	356	320	90	0	N	1	7	90	134.0	Hard	A	1.2	0.0	8.1	0.0	61
R01	HWY 403 East/North (Segment 2)	8	8578	356	320	90	0	N	1	-53	40	103.0	Hard	A	1.2	0.0	8.1	0.0	62
R01	HWY 403 East/North (Segment 3)	8	8578	356	320	90	0	N	1	-48	-24	161.0	Hard	A	1.2	0.0	8.1	0.0	55
R01	HWY 403 West/South (Segment 1)	8	4963	206	185	100	0	N	1	13	78	109.0	Hard	A	1.2	0.0	8.1	0.0	59
R01	HWY 403 West/South (Segment 2)	8	4963	206	185	100	0	N	1	-63	46	76.0	Hard	A	1.2	0.0	8.1	0.0	63
R01	HWY 403 West/South (Segment 3)	8	4963	206	185	100	0	N	1	-48	-33	131.0	Hard	A	1.2	0.0	8.1	0.0	52
R02	King St. (Segment 1)	8	5470	101	50	50	0	N	1	-2	90	97.0	Hard	A	1.2	0.0	8.1	0.0	52
R02	King St. (Segment 2)	8	5470	101	50	50	0	N	1	-55	-9	98.0	Hard	A	1.2	0.0	8.1	0.0	49
R02	Main St. (Segment 1)	8	2653	43	13	60	0	N	1	-60	81	44.0	Hard	A	1.2	0.0	8.1	0.0	55
R02	HWY 403 East/North (Segment 1)	8	8578	356	320	90	0	N	1	23	71	150.0	Hard	A	1.2	0.0	8.1	0.0	58
R02	HWY 403 East/North (Segment 2)	8	8578	356	320	90	0	N	1	-45	55	93.0	Hard	A	1.2	0.0	8.1	0.0	63
R02	HWY 403 East/North (Segment 3)	8	8578	356	320	90	0	N	1	-90	-15	127.0	Hard	A	1.2	0.0	8.1	0.0	61
R02	HWY 403 West/South (Segment 1)	8	4963	206	185	100	0	N	1	30	71	127.0	Hard	A	1.2	0.0	8.1	0.0	57
R02	HWY 403 West/South (Segment 2)	8	4963	206	185	100	0	N	1	-56	62	66.0	Hard	A	1.2	0.0	8.1	0.0	64
R02	HWY 403 West/South (Segment 3)	8	4963	206	185	100	0	N	1	-90	-26	104.0	Hard	A	1.2	0.0	8.1	0.0	59
R03	King St. (Segment 1)	8	5470	101	50	50	0	N	1	5	81	76.0	Hard	A	1.2	0.0	8.1	0.0	52
R03	King St. (Segment 2)	8	5470	101	50	50	0	N	1	-80	4	88.0	Hard	A	1.2	0.0	8.1	0.0	52
R03	Main St. (Segment 1)	8	2653	43	13	60	0	N	1	45	75	63.0	Hard	A	1.2	0.0	8.1	0.0	47
R03	Main St. (Segment 2)	8	2653	43	13	60	0	N	1	-79	-71	41.0	Hard	A	1.2	0.0	8.1	0.0	43
R03	HWY 403 East/North (Segment 1)	8	8578	356	320	90	0	N	1	70	75	172.0	Hard	A	1.2	0.0	8.1	0.0	49
R03	HWY 403 East/North (Segment 2)	8	8578	356	320	90	0	N	1	-39	0	117.0	Hard	A	1.2	0.0	8.1	0.0	58
R03	HWY 403 East/North (Segment 3)	8	8578	356	320	90	0	N	1	-90	-8	146.0	Hard	A	1.2	0.0	8.1	0.0	60
R03	HWY 403 West/South (Segment 1)	8	4963	206	185	100	0	N	1	70	75	147.0	Hard	A	1.2	0.0	8.1	0.0	49
R03	HWY 403 West/South (Segment 2)	8	4963	206	185	100	0	N	1	-49	0	90.0	Hard	A	1.2	0.0	8.1	0.0	59
R03	HWY 403 West/South (Segment 3)	8	4963	206	185	100	0	N	1	-90	-17	124.0	Hard	A	1.2	0.0	8.1	0.0	59