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Noise Feasibility Study

Marianneville (Glenway Golf Course Redevelopment), Newmarket, Ontario

For

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CONTENTS

1 INTRODUCTION AND SUMMARY

HGC Engineering was retained by The Kerbel Group Inc. to conduct a noise feasibility study for the redevelopment of the Glenway Golf Course to residential development. The lands are located on the south side of Davis Drive West (Highway 9), east of Bathurst and west of Eagle Street West, in the Town of Newmarket, Regional Municipality of York, Ontario. The surrounding area includes existing residences to the southeast and south of the proposed development, an existing bus terminal to the east and a mall to the north. A noise study is required by the municipality as part of the planning and approvals process.

Road traffic information for Davis Drive West, Bathurst Street and Yonge Street were obtained from the Region of York. The data was used to predict future traffic sound levels at the locations of the proposed residential dwelling facades. The predicted sound levels were compared to the guidelines of the Ministry of Environment (MOE) and the Region of York.

The current analysis is based on a review of the pertinent MOE guidelines, a review of the development concept plan prepared by Cole Engineering dated February 13, 2012, a site visit and review of an aerial photo of the area. The site visit was conducted during February 2012 to identify significant transportation and stationary noise sources in the vicinity of the proposed development. Reasonable assumptions have been used in the analysis to predict sound levels associated with nearby bus terminal operations. The predicted sound levels were compared to the guidelines of the Ministry of Environment (MOE) Guidelines for Noise Control in Land Use Planning.

It was found that the proposed development is feasible at this site. Road traffic noise exceeds the MOE plane-of-window sound level criteria at the residential units with exposure to Davis Drive West. Central air conditioning systems are recommended for the dwellings in the apartment block and the future townhouse blocks directly adjacent to Davis Drive so that the windows can remain closed against the road traffic noise. For the townhouse blocks further from Davis Drive and with some exposure to Davis Drive, forced air ventilation systems with ductwork sized for

the future installation of central air conditioning by the occupant is recommended. Upgraded building constructions are required for the apartment block and the future townhouse blocks closest to Davis Drive. For the remaining townhouse blocks, any building construction meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustic insulation for the indoor spaces. Noise warning clauses are recommended to inform future residents of the presence of the nearby roadways, future and existing commercial block and the existing GO terminal.

2 SITE DESCRIPTION AND NOISE SOURCES

Figure 1 is a key plan of the site. Figure 2 is the draft plan of subdivision prepared by Zelinka Priamo Ltd. dated March 2012. Prediction locations [A] to [E] are indicated on Figure 2 for reference purposes. The proposed residential development is to consist of single detached lots, townhouse blocks and apartment blocks, a commercial block and a stormwater management pond.

A site visit was made by HGC Engineering personnel in the month of February 2012 to make observations of the acoustical environment, inspect and perform sound level measurements of neighbouring bus terminal operations and background sound levels due to road traffic. Currently the subject site is part of the Glenway Golf Course. Figure 3 provides an aerial photo of the surrounding land uses. On the north side of Davis Drive, there are vacant lands, an existing house, existing residences to the northwest, and the Upper Canada Mall to the northeast. To the east of the subject site is an existing GO bus terminal with a retail plaza beyond.

3 ASSESSMENT OF ROAD TRAFFIC NOISE ON THE PROPOSED RESIDENTIAL BUILDINGS

3.1 Road Traffic Noise Criteria

Guidelines for acceptable levels of road traffic noise impacting indoor spaces are given in the MOE publication LU-131 "Noise Assessment Criteria in Land Use Planning, 1997", its Annex and its accompanying document “Requirements, Procedures and Implementation, 1997”. These criteria are listed in Table I below. The values in Table I are energy equivalent average sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MOE Road Traffic Noise Criteria (dBA)

Area	Daytime L_{EQ} (16 hour) Road	Nighttime L_{EQ}(8 hour) Road
Outside Bedroom Windows	55 dBA	50 dBA
Outdoor Living Area	55 dBA	--
Inside Living/Dining Rooms	45 dBA	--
Inside Bedrooms	--	40 dBA

Daytime refers to the period between 07:00 and 23:00, while nighttime refers to the period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace or other area where passive recreation is expected to occur. Balconies that are less than 4 m in depth are not considered to be outdoor living areas under MOE guidelines.

The MOE guidelines allow the daytime sound levels in an Outdoor Living Area (OLA) to be exceeded by up to 5 dBA, without mitigation, provided that a clause warning future occupants of the potential noise concern is included to advise future owners or tenants through all offers of purchase and sale, and rental agreements. Where OLA sound levels exceed 60 dBA, physical mitigation is recommended to reduce the OLA sound level to 60 dBA or less.

MOE guidelines require a central air conditioning or other ventilation system installed prior to occupancy as an alternative means of ventilation to open windows for dwellings where nighttime sound levels outside bedroom windows exceed 60 dBA or daytime sound levels exceed 65 dBA outside living room windows. Provision for air conditioning is required when nighttime sound levels at bedroom windows are in the range of 51 to 60 dBA. Sound attenuating building constructions are required when nighttime sound levels exceed 60 dBA at the plane of the bedroom window due to road noise. Warning clauses are required to notify future residents of possible sound level excesses are also required when nighttime sound levels exceed 50 dBA at the plane of the bedroom window due to road traffic.

3.2 Traffic Noise Assessment

3.2.1 Road Traffic Data

Ultimate road traffic volumes were obtained from the Region of York for Davis Drive West, Bathurst Street and Yonge Street and are provided in Appendix A. For Davis Drive West, an ultimate traffic volume of 35 000 vehicles per day was used. A commercial vehicle percentage of 5% was split into 2% medium trucks and 3% heavy trucks. Davis Drive has a gradient of up to 4%. A day/night split of 93%/7% along with a posted speed limit of 60 kph were used in the analysis.

Table II: Ultimate Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Davis Drive	Daytime	30 923	651	977	32 500
	Nighttime	2 327	49	73	2 450
	Total	**33 250**	**700**	**1 050**	**35 000**
Bathurst Street	Daytime	28 266	291	583	29 140
	Nighttime	1 804	19	37	1 860
	Total	30 070	310	620	31 000
Yonge Street	Daytime	36 084	372	744	37 200
	Nighttime	2 716	28	56	2 800
	Total	**38 800**	**400**	**800**	**40 000**

3.2.2 Road Traffic Noise Predictions

Prediction locations were chosen around the subject site to obtain a good representation of the future sound levels at the dwelling units. The predictions were made using STAMSON version 5.04, a computer algorithm developed by the MOE. Sample STAMSON output is included in Appendix B. The results of the predictions are presented in Table III.

Sound levels were predicted at the most impacted facades during the daytime and nighttime hours to investigate ventilation requirements. Typical dwelling setbacks of 5 m front yard setback from the Davis Drive right of way, 7 m rear yard setback, and a 7 m front yard setback from a single loaded road was used in the analysis.

Table III: Predicted Future Traffic Sound Levels

Prediction Location	Block No.	Description	Daytime – in OLA, $L_{EQ\,(16)}$	Daytime – At Façade, $L_{EQ\,(16)}$	Nighttime – At Façade, $L_{EQ\,(8)}$
[A]	--	Lots fronting onto Alex Doner Drive	<55	<55	<50
[B]	Block 166 (medium density)	Townhouse blocks with flanking exposure to Davis Drive	57	57	<50
[C]	Block 167 (medium density)	Townhouse block fronting onto single loaded road with exposure to Davis Drive	55+	57	49
	Block 167 (medium density)	Townhouse block fronting onto single loaded road, near SWM pond, with exposure to Davis Drive	<55	55	48
[D]	Block 167, Block 168 (medium density)	Townhouse block with fronting exposure to Davis Drive	59+	66	58
[E]	Block 171 (high density)	Apartment Block 171, at 8th floor	NA	69	60

Note: + Sound level in the rear yard of the end townhouse block.

3.3 Discussion and Recommendations

The sound level predictions indicate that road traffic sound levels exceed MOE criteria during the daytime and nighttime at the facades with exposure to the roadways. Recommendations are provided below.

3.3.1 Outdoor Living Areas

The predicted sound level (prediction location [A]) will be less than 55 dBA in the rear yards of the future lots fronting onto Alex Doner Drive. Physical mitigation in the form of acoustic barriers is not required.

Block 166 Medium Density Residential

If townhouse blocks (prediction location [B]) are proposed for Block 166 of the development concept plan, the predicted sound level in flanking rear yards will be 57 dBA due to road traffic noise on Davis Drive. Physical mitigation in the form of acoustic barriers is not required. The 2 dBA sound level excess is within the discretionary range acceptable to the MOE. Noise warning clauses will be required in the property and tenancy agreements to inform the occupants of the sound level excesses.

Blocks 167 & 168 Medium Density Residential

Townhouses with some exposure to Davis Drive

The predicted sound level in the rear yards of townhouse blocks (prediction location [C]) fronting onto a single loaded road, near the SWM pond, with exposure to Davis Drive will be 55 dBA or less in the rear yards of end units. Physical mitigation in the form of acoustic barriers is not required.

Townhouses with direct exposure to Davis Drive

The townhouses were assumed to be fronting onto Davis Drive with rear yards, if any on the shielded side of the townhouse units. The predicted sound level in the rear yards of townhouse blocks (prediction location [D]) directly fronting onto Davis Drive will be 59 dBA in the rear yards of end units. Physical mitigation in the form of acoustic barriers is not required. Noise warning clauses will be required in the property and tenancy agreements to inform the occupants of the sound level excesses.

Block 171 High Density Residential

An apartment was assumed for this block, 8-storeys in height with a 3-storey podium (prediction location [E]). If an amenity area is proposed on the roof of a 3-storey podium, a standard solid parapet 1.07 m in height will reduce the sound level to 60 dBA.

The apartment units may have balconies that are likely to be less than 4 m in depth. Such balconies are exempt from the definition of OLA under MOE guidelines. They are therefore, exempt from traffic noise assessment and physical mitigation will not be required.

Commercial Block (Block 172)

A commercial block is proposed on the south side of Davis Drive and east of the hydro corridor. The OLA's of some of the future lots may be adjacent to future commercial areas. These lots may require acoustical fences at certain locations to reduce the noise from the commercial facilities, specifically rooftop units or truck loading areas. The acoustic requirements for the residential dwellings should be determined by an acoustical consultant once commercial siting information is available. If large commercial establishments such as grocery or hardware stores are proposed, particularly those involving significant trucking activity or mechanical equipment such as refrigeration condensing units or rooftop cooling towers, individual noise studies should be required to ensure that the noise emissions from the facilities complies with MOE guidelines limits contained in NPC-205 "Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)".

3.3.2 Ventilation Requirements

Air Conditioning

The predicted sound levels at the future dwelling facades of the medium density blocks (Block 167 & 168) and the proposed apartment building (Block 171), prediction locations [D] and [E] are greater than 65 dBA during the daytime hours. To address these excesses, the MOE guidelines recommend that these dwellings be equipped with central air conditioning systems, so that the windows can be closed. Window or through-the-wall air conditioning units are not recommended because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall sound insulating properties of the envelope. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MOE publication NPC-216, Residential Air Conditioning Devices.

Provision for the Future Installation of Air Conditioning

The predicted nighttime sound levels at the plane of the bedroom windows of the future dwellings in the medium density blocks (prediction locations [B] and [C]) will be between 51 and 60 dBA. To address these excesses, the MOE guidelines recommend that these dwelling units be equipped with a forced air ventilation system with ducts sized to accommodate the future installation of air conditioning by the occupant. The guidelines also recommend warning clauses for these lots. Window or through-the-wall air conditioning units are not recommended for any residential units because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall noise insulating properties of the envelope. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MOE publication NPC-216, Residential Air Conditioning Devices.

The remaining dwellings in the development have no specific ventilation requirements.

3.3.3 Building Facade Constructions

High Density Block 171 and Medium Density Block Closest to Davis Drive

Future daytime road traffic sound levels outside the future dwellings of the high density block 171 and medium density block 167 and 168, closest to Davis Drive will exceed 65BA during the daytime hours. MOE guidelines recommend that the windows, walls and doors be designed so that the indoor sound levels comply with MOE noise criteria.

The building plans have not been reviewed by HGC Engineering at this time, but preliminary calculations have been performed to determine the building envelope constructions likely to be required to maintain indoor sound levels within MOE guidelines. The calculation methods were developed by the National Research Council (NRC). They are based on the predicted future sound levels at the building facades, the anticipated area of the facade components (walls, windows and doors) and the floor area of the adjacent room.

The minimum necessary specification for the windows and doors is Acoustical Insulation Factor, AIF-29 for living/dining rooms and AIF-25 for bedrooms. A well sealed thermopane unit having two 3 mm panes and a 13 mm inter-pane gap would provide sufficient noise insulation for the living/dining rooms of the dwellings, as long as the window area to room floor area ratio does not exceed 32%. For the bedrooms any Ontario Building Code construction will provide sufficient acoustic insulation. Any insulated metal exterior door would provide sufficient noise insulation for these dwellings. Any exterior wall construction meeting the minimum requirements of the Ontario Building Code (OBC) will be sufficient for adequate sound insulation.

When floor plans and elevations are available for the high density residential building in Block 171 and the townhouses in the medium density block (Block 167 and 168) closest Davis Drive, an acoustical consultant should determine the glazing constructions and acoustic requirements based on actual window to floor area ratios.

Remaining Dwelling Units

The remaining lots in the subdivision have predicted sound levels that are 60 dBA or less or daytime sound levels that are 65 dBA or less due to road traffic. Any exterior wall, and double glazed window construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation for the dwelling units.

3.3.4 Warning Clauses

The MOE noise guidelines recommend that warning clauses be included in the property and tenancy agreements for all dwellings, to inform prospective occupants of the potential traffic sound level excesses. The following sample warning clauses can be modified by the Municipality, as required.

Suggested wording for future dwellings with daytime OLA sound levels exceeding the MOE criteria by a minor amount, for which no physical noise mitigation has been provided is given below.

Type A:

> Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment's noise criteria.

Suggested wording for future dwellings with daytime OLA sound levels exceeding the MOE criteria by 6 dB or more, for which physical mitigation has been provided is given below.

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 occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment's noise criteria.

Suitable wording for future dwellings requiring forced air ventilation systems is given below.

Type C:

> This dwelling unit has been fitted with a forced air heating system and the ducting etc., was sized to accommodate central air conditioning. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the Municipality's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to minimize the noise impacts and comply with criteria of MOE publication NPC-216, Residential Air Conditioning Devices.)

Suitable wording for future dwellings requiring central air conditioning systems is given below.

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 Municipality's and the Ministry of the Environment's noise criteria.

Suitable wording for future dwellings adjacent to the existing GO Transit bus terminal and commercial facilities is given below.

Type E:

> Purchasers are advised of the proximity of adjacent GO Transit bus terminal and adjacent commercial facilities, the sound from which may at times be audible.

These sample clauses are provided by the MOE as examples and can be modified by the Municipality as required.

The reader is referred to Section 5 which contains a summary of the noise control recommendations for road traffic as well as stationary noise.

4 ASSESSMENT OF EXISTING STATIONARY SOURCES OF SOUND ON THE PROPOSED RESIDENTIAL BUILDINGS

Stationary and commercial sources of sound are assessed separately from traffic sources under MOE Guidelines.

A site visit was performed in February 2012 to investigate the sound levels at the subject site and the adjacent properties. To the east of the proposed development is an existing GO Transit (Newmarket) bus terminal. Buses typically enter and exit the terminal site from Davis Drive and Eagle Street West. Parking areas are located at the south and west of the terminal site. There is a single storey building with a bus lane around the building. To the east of the terminal is an existing one-storey commercial plaza which includes an animal hospital, restaurants (sushi, Wild Wing), Kitchens and Wall Units, Furnace/Fireplaces, chiropractor, variety store and cafe. An aerial photo of the subject site and surrounding land uses are shown in Figure 3. There are existing 2-storey residences on the south side of the bus terminal site. The rear yards of the residences have an approximately 2 m high masonry type wall. From the site visit and an inspection of the aerial photograph, there is no rooftop mechanical equipment associated with the bus terminal building. The bus terminal operates 24 hours a day.

4.1 MOE Guidelines for Land Use Compatibility and Distance Separation

MOE Guidelines D-1, ‘Land Use Compatibility’ and D-6 ‘Compatibility Between Industrial / Commercial Facilities and Sensitive Land Uses’ were prepared to address the potential incompatibility of industrial/commercial land uses and noise sensitive land uses in relation to land use approvals under the Planning Act. They recommend that studies be conducted to investigate the feasibility of providing sufficient mitigation when noise sensitive land uses are proposed within the potential zone of influence of an existing industry or stationary noise source. The mitigation can be provided at the source, or can be incorporated on the development lands where the industrial/commercial facility is operating in compliance with legislated Ministry requirements.

The subject lands under consideration are located on the south side of Davis Drive and to the west of the existing GO Transit bus terminal. The site is presently a golf course, as indicated in Figure 3. It should be noted that the lands to the south of the bus terminal are existing residences which are at approximately the same distance south as the proposed residential building to the west of the terminal.

Ministry of the Environment (MOE) guidelines D-1 and D-6 state the province's position on land use compatibility between industrial/commercial and other types of uses. Guideline D-6 is most relevant.

In planning a sensitive land use near an existing industrial/commercial area, guideline D-6 suggests certain potential zones of influence for the industry, depending on the characterization of that industry. For planning purposes for Greenfield sites, the potential zone of influence of a Class I industrial use is 75 m and the minimum recommended distance setback is 20 m. The potential zone of influence of a Class II industry is 300 m and the minimum recommended distance setback is 75 m. For infill projects or projects located in Transitional areas the recommended minimum distance setbacks can be reduced, based on the results of technical studies.

The GO Transit bus terminal exhibits characteristics of Class I and Class II industry. Typically, the recommended minimum distance setbacks apply between the property lines of the facilities, but exceptions can be made if portions of the residential or industrial/commercial lands are reserved for non- noise related uses, such as driveways or parking lots. In this case, the development concept plan for the subject site has been developed such that the parking lot of the subject site and the parking lot of the bus terminal do provide more than 75 m distance separation between the land uses.

4.1.1 MOE Guideline LU-131 "Noise Assessment Criteria in Land Use Planning"

LU-131 is the MOE Guideline specified in the D1-D6 Guidelines for use in investigating Land Use Compatibility issues with regard to noise. An industrial or commercial facility is classified in MOE guidelines as a stationary source of sound (as compared to sources such as traffic or construction, for example) for noise assessment purposes. The proposed development is considered to be a noise sensitive land use. In terms of background sound, the development is located in an urban (Type I) acoustical environment which is characterized by an acoustical environment dominated by road traffic and human activity.

LU-131 is intended for use in the planning of residential land uses and provides the acceptability limits for sound due to industrial or commercial operations in that regard. The facade of a residence (i.e., in the plane of a window), or any associated usable outdoor area is considered a sensitive point of reception. LU-131 stipulates that the non-impulsive sound level limit for a stationary noise source during daytime hours (07:00 to 19:00) is the greater of the minimum one-hour average background sound level, or 50 dBA. During nighttime hours (19:00 to 07:00), the limit is the greater of the background sound level or 45 dBA. During the intervening evening hours (19:00 to 23:00) a minimum limit of 47 dBA applies. The background sound level is defined as the sound level that occurs when the source under consideration is not operating, and may include traffic noise and natural sounds, but not occasional noise from rail or air passbys.

LU-131 also stipulates that a marginal excess (not exceeding 5 dB) is acceptable in some cases at the discretion of the Municipality since it is not feasible to achieve the criteria in all circumstances.

4.2 Traffic Sound Level Measurements and Observations

A site visit was performed during various times of the day during February 2012 to investigate the sound levels at the proposed development and also to note any beneficial acoustical shielding, identify operational profiles of the terminal, and to perform ambient sound level measurements.

Sound level measurements were conducted using a RION NL-3 Sound Level Meter using methods contained in MOE Guideline NPC-103 “Procedures”. The equipment was field calibrated before and after the measurements using a Bruel & Kjaer model 4231 acoustical calibrator. The weather conditions were suitable for measurement.

The sound level (L_{EQ}) at the subject site, at R1, at 10 am was in the range of 52 to 54 dBA, dominated by cars on Davis Drive. As discussed previously, the L_{EQ} is the relevant descriptor used to assess the impact of stationary sources of sound under MOE guidelines. It represents the energy equivalent (average) sound level recorded over the measurement period.

4.3 Minimum Hour Background Sound Levels at the Residential Receptors

Typical ambient sound levels can be determined through prediction of road traffic volumes in areas where traffic sound is dominant. Where it can be demonstrated that the hourly ambient sound levels are greater than the exclusionary minimum limits listed above, the criterion becomes the lowest predicted one-hour L_{EQ} sound level during each respective period. At locations where the ambient sound levels are low, the exclusionary minimum criteria of 50/45 apply.

Because background sound in the vicinity of the subject development is dominated by road traffic it is appropriate to predict hourly background sound from road traffic volumes in order to determine applicable limits for impact of stationary noise sources.

Hourly daytime traffic data was available for Davis Drive from the Region of York and is provided in Appendix A. The minimum traffic volume during the daytime hours occurs at 7 – 8 am. The minimum traffic volume during the nighttime hours occurs at 4 – 5 am. There are a large number of buses between 6 – 7 am also. A commercial vehicle percentage of 5% was used and split into 2% medium trucks and 3% heavy trucks along with a posted speed limit of 60 kph. The hourly traffic volumes for Davis Drive were then used to predict minimum traffic sound levels at the closest residential receptors (R1) during the quietest day/nighttime hours. The worst case locations are the third and fourth floors of the apartment buildings. During the quietest daytime hour, the sound level was found to be 52 dBA and during the quietest nighttime hour, the predicted sound level is 45 dBA.

Since the daytime sound levels (predicted and measured) are higher than the minimum exclusionary limit at the receptors, the predicted sound levels were used to set the daytime criteria. The minimum exclusionary nighttime crierion of 45 dBA was used. It is noted that background sound levels from road traffic will be even higher in the future, due to future growth of road traffic, as the area develops.

In each case, the limits apply at any point on the residential property, and outside the residential windows.

4.4 Noise Assessment

Predictive noise modelling was used to assess the potential sound impact of bus idling and bus passbys on the site at the closest future residential receptors. The noise prediction model was based on sound emission levels, assumed operational profiles (during the daytime and nighttime), and established engineering methods for the prediction of outdoor sound propagation. These methods include the effects of distance, air absorption, and acoustical screening by barrier obstacles.

Sound emission data for typical bus sound levels from HGC Engineering project files were used in the analysis. From observations during the site visit, it was assumed that the buses idle for 10 minutes each. The terminal is used by GO buses, VIVA, YRT and City buses. The schedules for each type of bus service was obtained and compared to determine the worst case hour of bus terminal activities.

The sound levels were used as input to a predictive computer model. The software used for this purpose (*Cadna-A version 4.1.137*) is a computer implementation of ISO Standard 9613-2.2 "Acoustics - Attenuation of Sound During Propagation Outdoors." The ISO method accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures such as barriers.

The assumed sound power levels are listed in the table below.

Table IV - Sound Power Level Specifications [dB re 10^{-12} W]

Item		Octave Band Centre Frequency [Hz]							
	32	63	125	250	500	1k	2k	4k	8K
Bus idling	115	107	100	94	91	93	93	88	78
Bus accelerating/passby	104	116	106	102	100	100	99	96	91

The operating profiles outlined above were assumed in determining the one-hour equivalent sound level, L_{EQ}, for a predictable worst case daytime and nighttime hour at the facades of the proposed residential development.

In this impact assessment, typical worst-case (busiest hour) scenarios for each time period were considered, as follows. During a worst case daytime hour, eight buses were assumed to idle for 10 minutes each at the terminal and during a worst case nighttime hour, one bus was assumed to idle for 10 minutes at the terminal.

The calculations consider the acoustical effects of distance and shielding by the buildings. The unmitigated sound levels due to bus idling and passbys at the closest neighbouring residences are summarized in the following table. Sound level contours are shown in Figures 4 and 5.

Table V: Predicted Sound Levels at Residential Receptors [dBA], Without Mitigation

Receptor	Criteria Day/Night	Daytime	Night-time
R1, southeast corner of proposed 8-storey residential building	52 / 45	49	43

These results indicate that the predicted sound levels are less than the MOE criteria at the closest future residential receptor, R1, to the west of the terminal. During the busiest nighttime hour, (6 – 7 am), the sound levels due to the terminal is 45 dBA at R1 also meeting the MOE limit.

Additional noise mitigation is not required with respect to the bus terminal for this site. A noise warning clause is recommended to be included in the property and tenancy agreement to inform the future occupants of the possibility of audibility of the bus terminal during periods of low background sound. A typical wording is:

Type E:

> Purchasers are advised that due to the proximity of the nearby existing bus terminal, sound levels from this facility may at times be audible.

5 SUMMARY OF NOISE CONTROL RECOMMENDATIONS

The following recommendations are provided with regard to noise mitigation for the proposed residential buildings. The results of the study indicate that the proposed residential/commercial development is feasible at this site. Sound excesses can be addressed through physical mitigation measures and warning clauses. The following list and Table VI summarizes the recommendations made in this report.

1. A minimum 1.07 m high solid parapet is required for any rooftop outdoor amenity areas associated with the apartment buildings on Block 171.

2. Central air conditioning is required for the apartment buildings in Block 171 and the townhouses fronting in the medium density block closest to Davis Drive (prediction lcoations [D] and [E]) so that windows can remain closed against the noise. It is likely that the developer will include central air conditioning systems.

3. Forced air ventilation systems with ductwork sized for the future installation of central air conditioning by the occupant are required for the townhouses with exposure to Davis Drive at prediction location [B] and [C].

4. Upgraded building constructions will be required for the apartment buildings on Block 171. Any building construction meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation for the indoor spaces for the townhouse units.

5. Noise warning clauses should be included in the property and tenancy agreements and offers of purchase and sale to inform the future owners/residents of the presence of the roadways and the existing GO Transit bus terminal and the existing and future commercial uses.

6. A detailed noise study should be performed for the development site (medium density block, high density block) when lot numbering and siting information is available.

7. When detailed floor plans and elevations are available for the apartment block 171 and the townhouses in the medium density block closest to Davis Drive, the glazing constructions should be determined by an acoustical consultant based on actual window to floor area ratios.

8. When siting information is available for the future commercial blocks, an acoustic consultant should determine if there are any acoustic requirements with regard to the impact of railway noise on the commercial units or potential noise impacts due to the commercial units at the residential dwelling units in accordance with LU-131and NPC-205.

Table VI: Summary of Noise Control Requirements and Noise Warning Clauses

Block No.	Acoustic Barrier+	Ventilation Requirements *	Type of Warning Clause	Upgraded Building Constructions
[A]	--	--	--	OBC
[B]	--	Forced Air	A, C, E	OBC
[C]	--	Forced Air	A, C	OBC
[D]	--	Central A/C	A, D, E	✓
[E]	+	Central A/C	A, D, E	✓

Notes:
-- no specific requirement
+ A 1.07 m high solid parapet is recommended if there is an outdoor amenity space on the podium closest to Davis Drive.
* The location, installation and sound rating of the air conditioning condensers must be compliant with MOE Guideline NPC-216.
OBC – meeting the minimum requirements of the Ontario Building Code

5.1 Implementation

To ensure that the noise control recommendations outlined above are fully implemented, it is recommended that:

1) Prior to the issuance of building permits for this development, a Professional Engineer qualified to perform acoustical services in the province of Ontario shall review the builder's plans to ensure that the sound control measures as recommended in this report and the detailed noise studies have been incorporated in their entirety.

2) Prior to the issuance of occupancy permits for this development, a Professional Engineer qualified to perform acoustical services in the province of Ontario or the Town building department shall review the builder's plans to certify that the sound control measures as approved have been incorporated, properly installed and constructed.

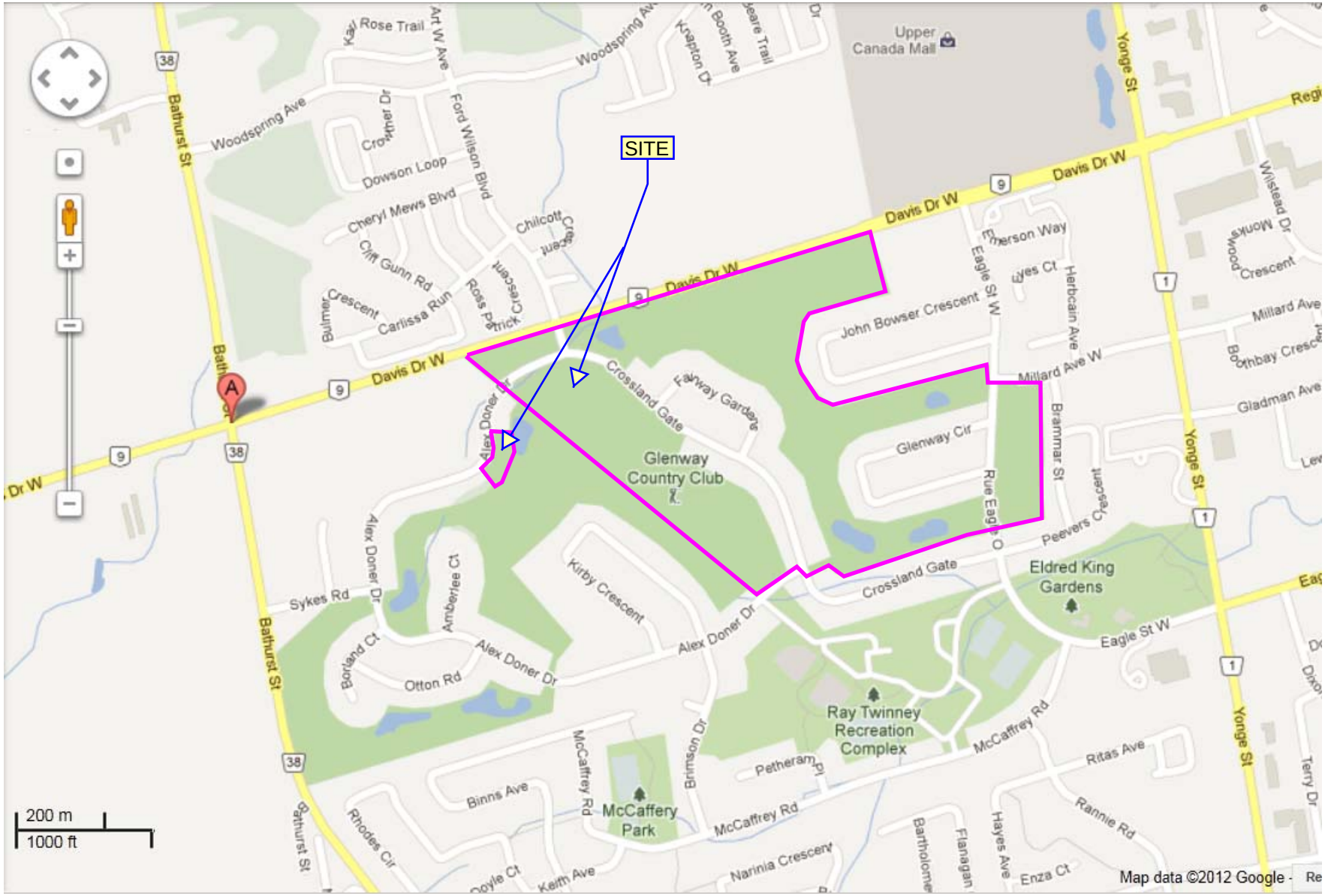
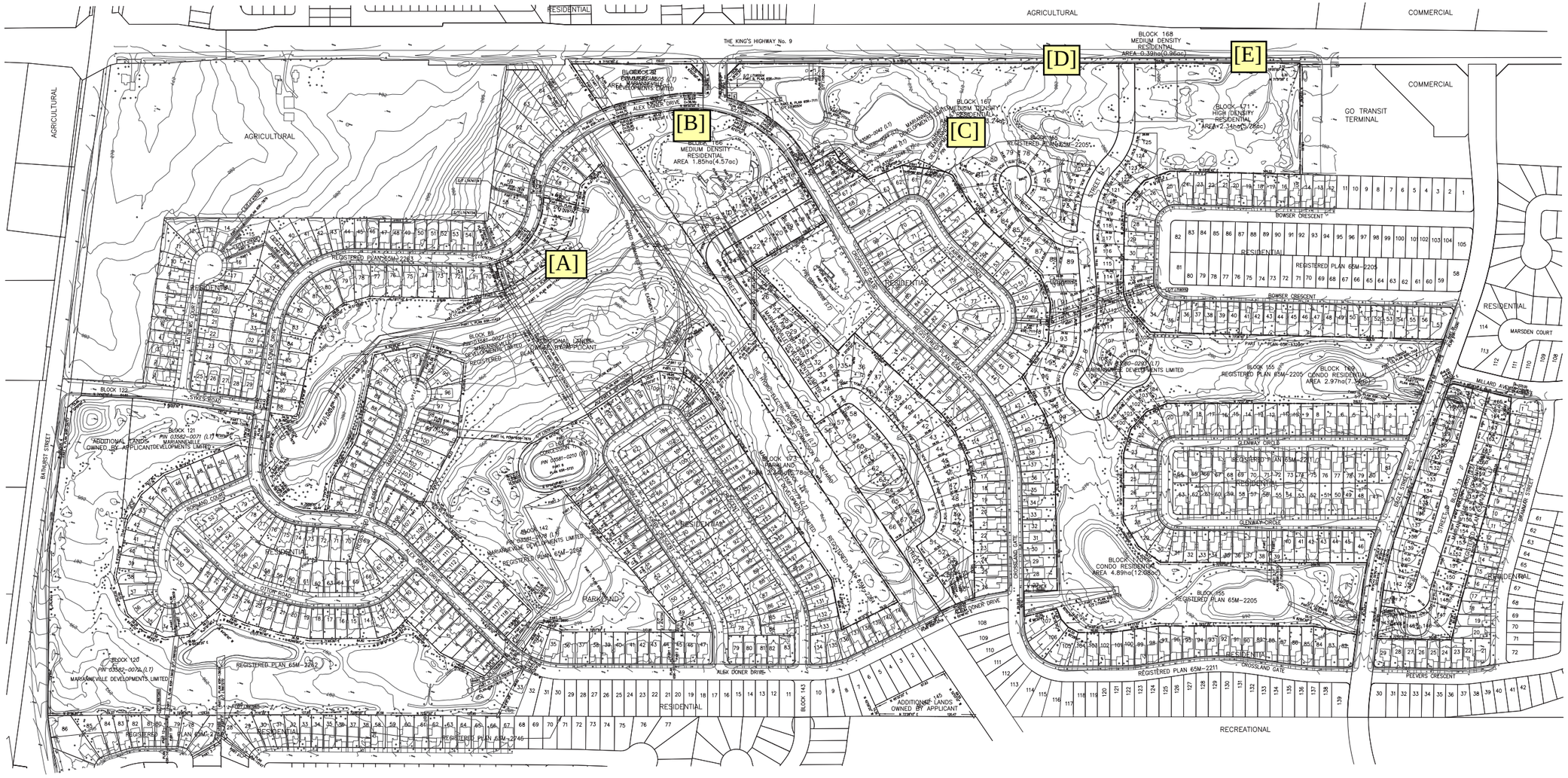
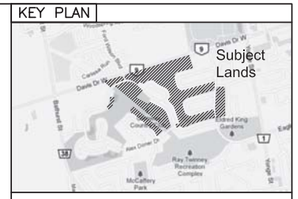


Figure 1 - Key Plan



KEY PLAN



DRAFT PLAN OF SUBDIVISION

OF PART OF
LOTS 60, 61, 64, 65, 66, 67
BLOCK 92, RP 65M-2212
AND ALL OF
BLOCK 91, RP 65M-2212
BLOCK 155, RP 65M-2205
BLOCKS 144 RP 65M-2261
BLOCK 89, RP 65M-2263
BLOCK 73, RP 65M-2284
TOWN OF NEWMARKET
REGIONAL MUNICIPALITY OF YORK

INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT

A) As shown	G) As shown
B) As shown	H) Municipal water supply available
C) As shown	I) Mix of Silty Sand & Silty Clay
D) As listed above	J) As shown
E) As shown	K) All municipal services to be available
F) As shown	L) As shown

PROPOSED LAND USES AND AREAS

RESIDENTIAL (LOTS 1-165)	165 units	11.807 ha
RESIDENTIAL, MEDIUM DENSITY (BLOCKS 166-168)	219 units	7.602 ha
RESIDENTIAL, CONDOS (BLOCKS 169-170)	54 units	7.853 ha
RESIDENTIAL, HIGH DENSITY (BLOCK 171)	292 units	2.335 ha
COMMERCIAL (BLOCK 172)		0.648 ha
PARKLAND (BLOCK 173)		2.339 ha
PROPOSED ROADS		3.714 ha
TOTAL	730 units	36.298 ha

OWNER'S CERTIFICATE

MARIANNEVILLE DEVELOPMENTS LIMITED
HEREBY CONSENTS TO THE FILING OF THIS PLAN IN DRAFT FORM

MARIANNEVILLE DEVELOPMENTS LTD., OWNER — DATED

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY SHOWN ON THIS PLAN.

Greg G. Robinson, ONTARIO LAND SURVEYOR
for J.D. BARNES LTD. — DATED

NO.	REVISION	DATE	INITIAL

ZELINKA PRIAMO LTD
A Professional Planning Practice
318 Wellington Road, London, Ontario N6C 4P4
Tel: (519) 474-7137 Fax: (519) 474-2284 e-mail: zp@zpplan.com

DRAWN BY	PROJECT NO.
CK	MVL/NMK/10-01
DATE	SCALE
MARCH 2012	1:2000

Figure 2 - Draft Plan of Subdivision Showing Prediction Locations

Figure 3 - Aerial Photo of Surrounding Land Uses

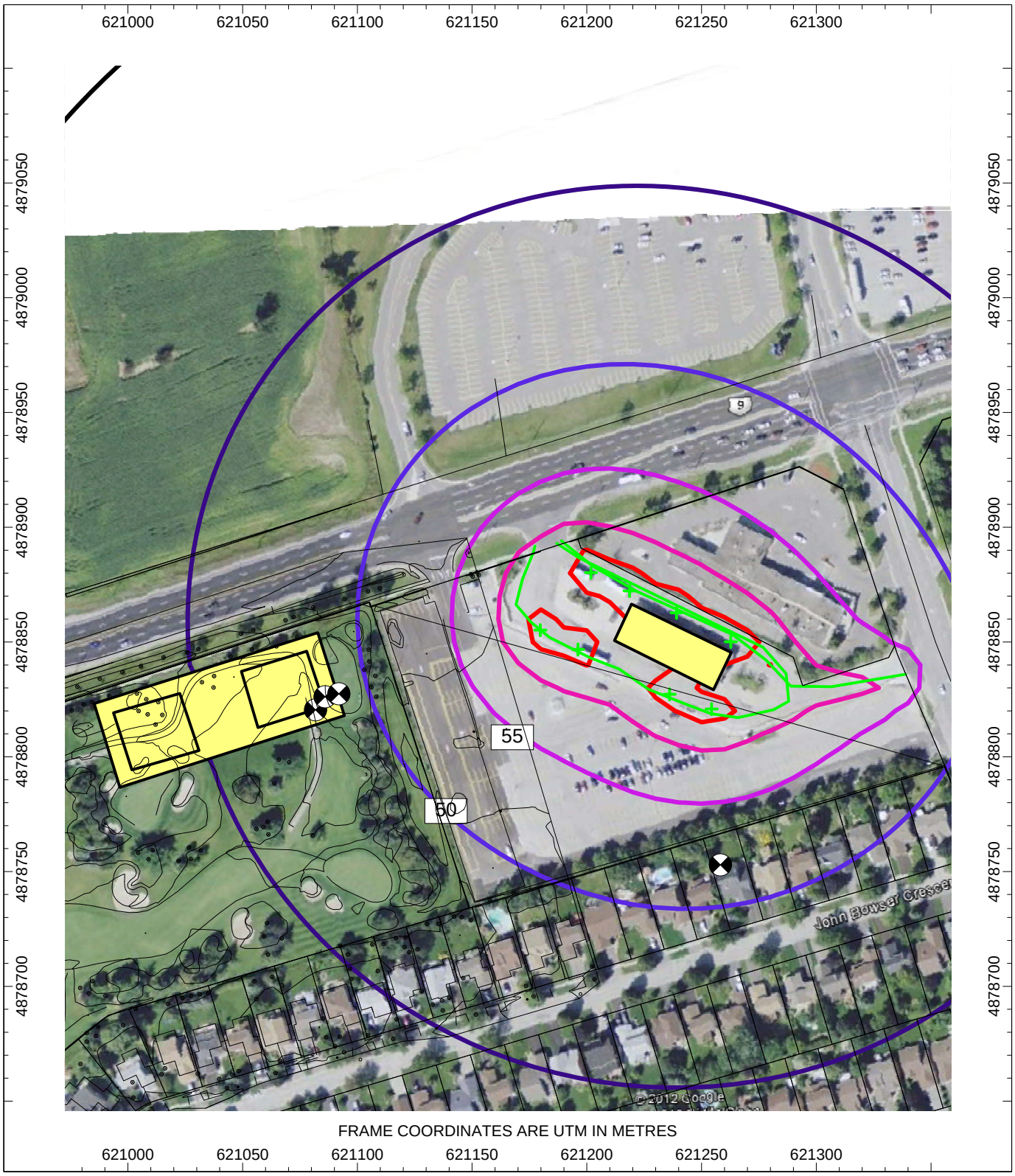


Figure 4 - Daytime Sound Level Contours

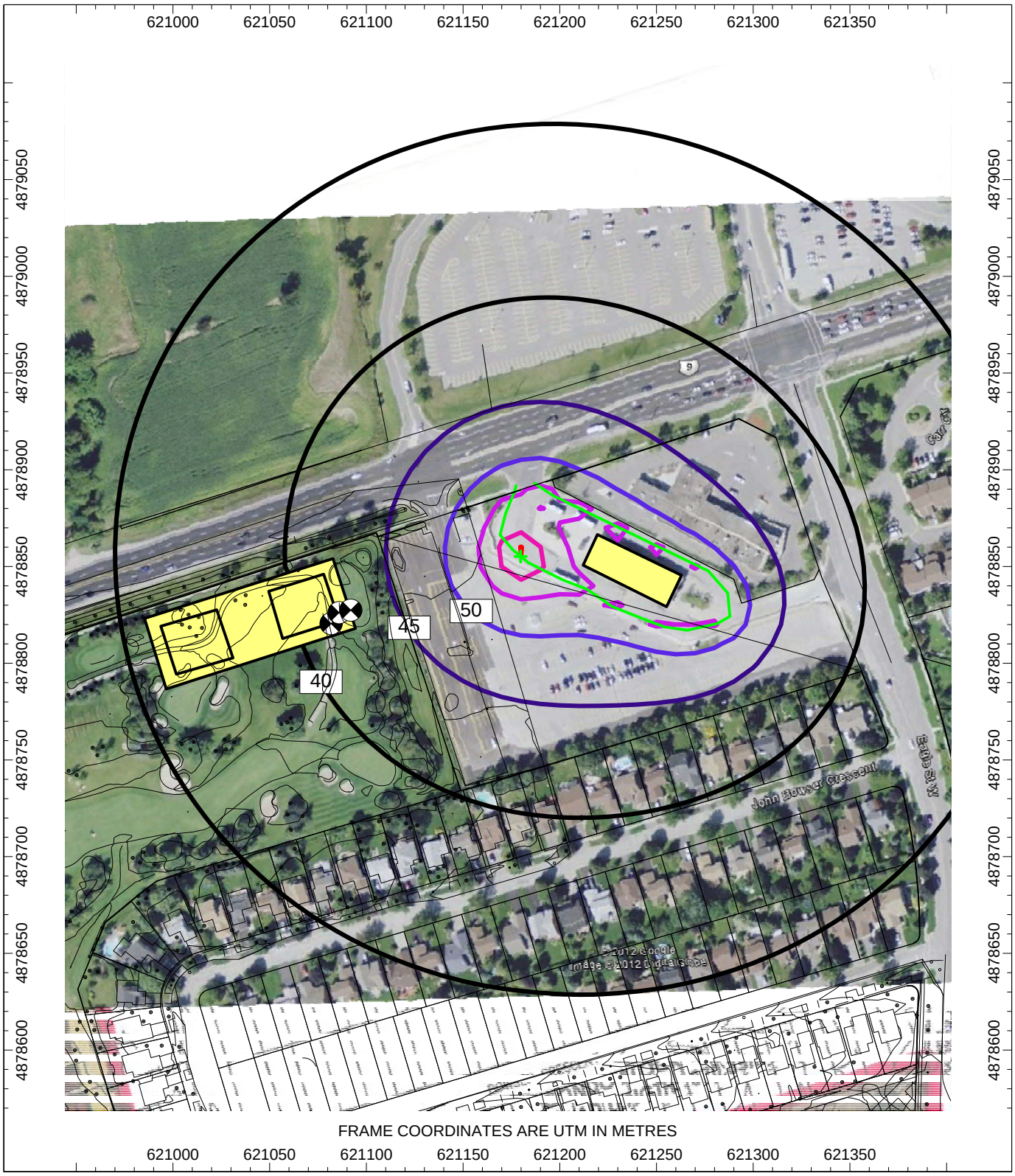


Figure 5 -Nighttime Sound Level Contours, at 6 m height

APPENDIX A

Road Traffic Data

York Region

Transportation and Community Planning Department
Infrastructure Planning Branch

February 17, 2012

Ms. Sheeba Paul
HGC Engineering
2000 Argentia Road
Plaza One, Suite 203
Mississauga, ON L5N 1P7

Dear Ms. Paul:

Re: Request for Traffic Data
File No. T09, Forecasts-Newmarket

As requested, the traffic data for your study is summarized below.

	Davis Drive West	Bathurst Street	Yonge Street
Section No.	31-24	38-28	01-28
Location	West of Yonge Street	South of Davis Drive West	South of Davis Drive
Existing AADT	25,160 (2007)	20,760 (2011)	34,370 (2010)
Ultimate AADT	35,000	31,000	40,000*
No. of Lanes	4	4	4 (future 6)
Posted Speed	60 km/hr	60 km/hr	60 km/hr
Trucks (Med/Heavy)	2% / 3%	1% / 2%	1% / 2%
Grade	Up to 4%	Up to 5%	Up to 4%
Day/Night Split	93/7	94/6	93/7
Planned ROW	Up to 43 m	Up to 36 m	Up to 45 m

Note:
*Widening from 4 to 6 lanes for the purpose of Rapid Transit Corridor and the additional lanes will be dedicated transit lanes. Ultimate 40,000 AADT is estimated for 4-lane general traffic.

I trust that this will be satisfactory for your study. The invoice will be mailed to you separately.

Sincerely,

Wenli Gao
Infrastructure Planning, Transportation Forecasting

WG/wg

YORK-#4085782-v1-120009_Paul-Davis_Bathurst_Yonge.DOC

Traffic Engineering Software

HOURLY AUTOMATIC TRAFFIC COUNT

17/02/2012

Highway 9 btwn Eagle St W & Yonge St

Midblock ID: M1579 **Municipality: Newmarket**

Date	Hour End	Day Factor	Month Factor	EB Count		WB Count		Both Directions	
				Raw	Factored	Raw	Factored	Raw	Factored
Thursday, April 19, 2007		**0.94**	**1.06**	**11,955**	**11,875**	**13,313**	**13,224**	**25,268**	**25,100**
	1			103	102	82	81	185	184
	2			71	71	51	51	122	121
	3			44	44	29	29	73	73
	4			28	28	24	24	52	52
	5			43	43	63	63	106	105
	6			101	100	250	248	351	349
	7			290	288	631	627	921	915
	8			559	555	820	815	1,379	1,370
	9			743	738	799	794	1,542	1,532
	10			654	650	710	705	1,364	1,355
	11			642	638	715	710	1,357	1,348
	12			629	625	771	766	1,400	1,391
	13			674	670	815	810	1,489	1,479
	14			683	678	766	761	1,449	1,439
	15			744	739	798	793	1,542	1,532
	16			801	796	915	909	1,716	1,705
	17			901	895	975	969	1,876	1,864
	18			1,076	1,069	980	973	2,056	2,042
	19			961	955	836	830	1,797	1,785
	20			714	709	754	749	1,468	1,458
	21			565	561	616	612	1,181	1,173
	22			469	466	466	463	935	929
	23			271	269	277	275	548	544
	24			189	188	170	169	359	357

Traffic Engineering Software

HOURLY AUTOMATIC TRAFFIC COUNT

17/02/2012

Highway 9 btwn Eagle St W & Yonge St

Midblock ID: M1579 **Municipality: Newmarket**

Date	Hour End	Day Factor	Month Factor	EB Count		WB Count		Both Directions	
				Raw	Factored	Raw	Factored	Raw	Factored
Friday, April 20, 2007		**0.90**	**1.06**	**12,702**	**12,106**	**14,097**	**13,436**	**26,799**	**25,542**
	1			117	112	91	87	208	198
	2			81	77	39	37	120	114
	3			65	62	54	51	119	113
	4			43	41	34	32	77	73
	5			30	29	62	59	92	88
	6			83	79	287	274	370	353
	7			283	270	613	584	896	854
	8			567	540	863	823	1,430	1,363
	9			756	721	738	703	1,494	1,424
	10			592	564	660	629	1,252	1,193
	11			609	580	653	622	1,262	1,203
	12			711	678	797	760	1,508	1,437
	13			680	648	889	847	1,569	1,495
	14			758	722	889	847	1,647	1,570
	15			804	766	1,005	958	1,809	1,724
	16			897	855	931	887	1,828	1,742
	17			1,052	1,003	1,058	1,008	2,110	2,011
	18			1,141	1,087	1,038	989	2,179	2,077
	19			998	951	914	871	1,912	1,822
	20			784	747	795	758	1,579	1,505
	21			609	580	659	628	1,268	1,209
	22			492	469	503	479	995	948
	23			341	325	320	305	661	630
	24			209	199	205	195	414	395

Traffic Engineering Software

HOURLY AUTOMATIC TRAFFIC COUNT

17/02/2012

Highway 9 btwn Eagle St W & Yonge St

Midblock ID: M1579 **Municipality: Newmarket**

Date	Hour End	Day Factor	Month Factor	EB Count		WB Count		Both Directions	
				Raw	Factored	Raw	Factored	Raw	Factored
Saturday, April 21, 2007		**1.13**	**1.06**	**10,549**	**12,646**	**12,008**	**14,395**	**22,557**	**27,041**
	1			204	245	169	203	373	447
	2			127	152	95	114	222	266
	3			91	109	65	78	156	187
	4			46	55	59	71	105	126
	5			35	42	48	58	83	99
	6			64	77	88	105	152	182
	7			112	134	148	177	260	312
	8			277	332	324	388	601	720
	9			450	539	539	646	989	1,186
	10			495	593	701	840	1,196	1,434
	11			640	767	853	1,023	1,493	1,790
	12			767	919	924	1,108	1,691	2,027
	13			788	945	1,009	1,210	1,797	2,154
	14			798	957	962	1,153	1,760	2,110
	15			817	979	957	1,147	1,774	2,127
	16			805	965	1,020	1,223	1,825	2,188
	17			804	964	937	1,123	1,741	2,087
	18			761	912	821	984	1,582	1,896
	19			685	821	592	710	1,277	1,531
	20			540	647	512	614	1,052	1,261
	21			396	475	388	465	784	940
	22			315	378	322	386	637	764
	23			293	351	290	348	583	699
	24			239	287	185	222	424	508

Traffic Engineering Software

HOURLY AUTOMATIC TRAFFIC COUNT

17/02/2012

Highway 9 btwn Eagle St W & Yonge St

Midblock ID: M1579 **Municipality: Newmarket**

Date	Hour End	Day Factor	Month Factor	EB Count		WB Count		Both Directions	
				Raw	Factored	Raw	Factored	Raw	Factored
Sunday, April 22, 2007		**1.27**	**1.06**	**8,592**	**11,510**	**9,447**	**12,656**	**18,039**	**24,166**
	1			200	268	199	267	399	535
	2			133	178	110	147	243	326
	3			80	107	52	70	132	177
	4			57	76	45	60	102	137
	5			35	47	32	43	67	90
	6			29	39	39	52	68	91
	7			54	72	94	126	148	198
	8			124	166	171	229	295	395
	9			200	268	271	363	471	631
	10			353	473	384	514	737	987
	11			491	658	598	801	1,089	1,459
	12			536	718	780	1,045	1,316	1,763
	13			660	884	857	1,148	1,517	2,032
	14			705	944	899	1,204	1,604	2,149
	15			745	998	856	1,147	1,601	2,145
	16			686	919	814	1,090	1,500	2,009
	17			748	1,002	788	1,056	1,536	2,058
	18			742	994	638	855	1,380	1,849
	19			499	668	465	623	964	1,291
	20			462	619	402	539	864	1,157
	21			393	526	374	501	767	1,028
	22			308	413	284	380	592	793
	23			223	299	185	248	408	547
	24			129	173	110	147	239	320

Traffic Engineering Software

HOURLY AUTOMATIC TRAFFIC COUNT

17/02/2012

Highway 9 btwn Eagle St W & Yonge St

Midblock ID: M1579 **Municipality: Newmarket**

Date	Hour End	Day Factor	Month Factor	EB Count		WB Count		Both Directions	
				Raw	Factored	Raw	Factored	Raw	Factored
Monday, April 23, 2007		**1.01**	**1.06**	**11,307**	**12,058**	**12,457**	**13,284**	**23,764**	**25,342**
	1			92	98	64	68	156	166
	2			55	59	41	44	96	102
	3			29	31	30	32	59	63
	4			27	29	39	42	66	70
	5			20	21	60	64	80	85
	6			125	133	253	270	378	403
	7			282	301	589	628	871	929
	8			603	643	806	860	1,409	1,503
	9			779	831	768	819	1,547	1,650
	10			654	697	713	760	1,367	1,458
	11			599	639	736	785	1,335	1,424
	12			585	624	786	838	1,371	1,462
	13			671	716	811	865	1,482	1,580
	14			681	726	795	848	1,476	1,574
	15			649	692	747	797	1,396	1,489
	16			790	842	813	867	1,603	1,709
	17			851	908	921	982	1,772	1,890
	18			1,020	1,088	845	901	1,865	1,989
	19			899	959	693	739	1,592	1,698
	20			627	669	608	648	1,235	1,317
	21			499	532	538	574	1,037	1,106
	22			384	410	430	459	814	868
	23			225	240	236	252	461	492
	24			161	172	135	144	296	316

Traffic Engineering Software

HOURLY AUTOMATIC TRAFFIC COUNT

17/02/2012

Highway 9 btwn Eagle St W & Yonge St

Midblock ID: M1579 **Municipality: Newmarket**

Date	Hour End	Day Factor	Month Factor	EB Count		WB Count		Both Directions	
				Raw	Factored	Raw	Factored	Raw	Factored
Tuesday, April 24, 2007		**0.93**	**1.06**	**11,934**	**11,690**	**13,148**	**12,879**	**25,082**	**24,570**
	1			96	94	82	80	178	174
	2			55	54	47	46	102	100
	3			59	58	35	34	94	92
	4			22	22	27	26	49	48
	5			32	31	60	59	92	90
	6			129	126	257	252	386	378
	7			276	270	594	582	870	852
	8			616	603	812	795	1,428	1,399
	9			763	747	775	759	1,538	1,507
	10			630	617	726	711	1,356	1,328
	11			638	625	716	701	1,354	1,326
	12			656	643	796	780	1,452	1,422
	13			690	676	788	772	1,478	1,448
	14			680	666	790	774	1,470	1,440
	15			673	659	816	799	1,489	1,459
	16			762	746	872	854	1,634	1,601
	17			904	886	989	969	1,893	1,854
	18			1,163	1,139	974	954	2,137	2,093
	19			977	957	824	807	1,801	1,764
	20			684	670	706	692	1,390	1,362
	21			528	517	616	603	1,144	1,121
	22			418	409	453	444	871	853
	23			269	264	263	258	532	521
	24			214	210	130	127	344	337

Traffic Engineering Software

HOURLY AUTOMATIC TRAFFIC COUNT

17/02/2012

Highway 9 btwn Eagle St W & Yonge St

Midblock ID: M1579 **Municipality: Newmarket**

Date	Hour End	Day Factor	Month Factor	EB Count		WB Count		Both Directions	
				Raw	Factored	Raw	Factored	Raw	Factored
Wednesday, April 25, 2007		**0.94**	**1.06**	**11,894**	**11,815**	**13,017**	**12,930**	**24,911**	**24,745**
	1			98	97	82	81	180	179
	2			61	61	48	48	109	108
	3			30	30	26	26	56	56
	4			23	23	30	30	53	53
	5			41	41	57	57	98	97
	6			98	97	271	269	369	367
	7			300	298	602	598	902	896
	8			616	612	777	772	1,393	1,384
	9			699	694	815	810	1,514	1,504
	10			678	673	773	768	1,451	1,441
	11			570	566	650	646	1,220	1,212
	12			612	608	740	735	1,352	1,343
	13			652	648	790	785	1,442	1,432
	14			718	713	789	784	1,507	1,497
	15			738	733	779	774	1,517	1,507
	16			786	781	846	840	1,632	1,621
	17			863	857	944	938	1,807	1,795
	18			1,089	1,082	978	971	2,067	2,053
	19			1,004	997	843	837	1,847	1,835
	20			733	728	705	700	1,438	1,428
	21			580	576	589	585	1,169	1,161
	22			458	455	440	437	898	892
	23			259	257	295	293	554	550
	24			188	187	148	147	336	334

Traffic Engineering Software

HOURLY AUTOMATIC TRAFFIC COUNT

17/02/2012

Highway 9 btwn Eagle St W & Yonge St

Midblock ID: M1579 **Municipality: Newmarket**

Date	Hour End	Day Factor	Month Factor	EB Count		WB Count		Both Directions	
				Raw	Factored	Raw	Factored	Raw	Factored
Thursday, April 26, 2007		**0.94**	**1.06**	**11,752**	**11,674**	**13,125**	**13,038**	**24,877**	**24,711**
	1			100	99	94	93	194	193
	2			85	84	41	41	126	125
	3			50	50	50	50	100	99
	4			34	34	33	33	67	67
	5			35	35	66	66	101	100
	6			105	104	269	267	374	372
	7			297	295	600	596	897	891
	8			582	578	817	812	1,399	1,390
	9			757	752	791	786	1,548	1,538
	10			696	691	707	702	1,403	1,394
	11			622	618	716	711	1,338	1,329
	12			630	626	734	729	1,364	1,355
	13			685	680	805	800	1,490	1,480
	14			666	662	823	818	1,489	1,479
	15			753	748	843	837	1,596	1,585
	16			828	822	892	886	1,720	1,709
	17			880	874	1,030	1,023	1,910	1,897
	18			1,066	1,059	999	992	2,065	2,051
	19			874	868	732	727	1,606	1,595
	20			691	686	696	691	1,387	1,378
	21			471	468	556	552	1,027	1,020
	22			389	386	404	401	793	788
	23			269	267	269	267	538	534
	24			187	186	158	157	345	343

APPENDIX B

Sample Stamson 5.04 Output

```
STAMSON 5.0        NORMAL REPORT        Date: 30-03-2012 14:23:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: d.te                 Time Period: Day/Night 16/8 hours
Description: Daytime and nighttime sound levels at prediction location
[D], Block 167,Block 168 (medium density), Townhouse block with fronting
exposure to Davis Drive

Road data, segment # 1: Davis (day/night)
----------------------------------------
Car traffic volume  : 15461/1164  veh/TimePeriod  *
Medium truck volume :   326/24    veh/TimePeriod  *
Heavy truck volume  :   488/37    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  17500
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  93.00

Data for Segment # 1: Davis (day/night)
---------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  27.00 / 27.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Davis (day/night)
----------------------------------------
Car traffic volume  : 15461/1164  veh/TimePeriod  *
Medium truck volume :   326/24    veh/TimePeriod  *
Heavy truck volume  :   488/37    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  17500
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  93.00
```

```
Data for Segment # 2: Davis (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  38.00 / 38.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.32 m

ROAD (0.00 + 63.56 + 0.00) = 63.56 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.66  69.25   0.00  -4.24  -1.46   0.00   0.00   0.00
63.56
-------------------------------------------------------------------------
---

Segment Leq : 63.56 dBA

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

Source height = 1.32 m

ROAD (0.00 + 61.09 + 0.00) = 61.09 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.66  69.25   0.00  -6.70  -1.46   0.00   0.00   0.00
61.09
-------------------------------------------------------------------------
---

Segment Leq : 61.09 dBA

Total Leq All Segments: 65.51 dBA

Results segment # 1: Davis (night)
----------------------------------

Source height = 1.32 m

ROAD (0.00 + 55.71 + 0.00) = 55.71 dBA
```

```
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.58  61.04   0.00  -4.02  -1.31   0.00   0.00   0.00
55.71
-------------------------------------------------------------------------
---

Segment Leq : 55.71 dBA

Results segment # 2: Davis (night)
----------------------------------

Source height = 1.32 m

ROAD (0.00 + 53.37 + 0.00) = 53.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.58  61.04   0.00  -6.36  -1.31   0.00   0.00   0.00
53.37
-------------------------------------------------------------------------
---

Segment Leq : 53.37 dBA

Total Leq All Segments: 57.71 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.51
                           (NIGHT): 57.71
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-03-2012 14:24:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: dola.te              Time Period: 16 hours
Description: Daytime sound level at prediction location [D], Block 167,
Block 168 (medium density), rear yard of end unit of Townhouse block with
fronting exposure to Davis Drive

Road data, segment # 1: Davis
------------------------------
Car traffic volume  : 15461 veh/TimePeriod  *
Medium truck volume :   326 veh/TimePeriod  *
Heavy truck volume  :   488 veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Davis
---------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  47.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Davis
------------------------------
Car traffic volume  : 15461 veh/TimePeriod  *
Medium truck volume :   326 veh/TimePeriod  *
Heavy truck volume  :   488 veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: Davis
---------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  64.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Davis
---------------------------

Source height = 1.32 m

ROAD (0.00 + 56.55 + 0.00) = 56.55 dBA
```

```
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      0   0.66  69.25   0.00  -8.23  -4.47   0.00   0.00   0.00
56.55
-------------------------------------------------------------------------
---

Segment Leq : 56.55 dBA

Results segment # 2: Davis
--------------------------

Source height = 1.32 m

ROAD (0.00 + 54.33 + 0.00) = 54.33 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      0   0.66  69.25   0.00 -10.46  -4.47   0.00   0.00   0.00
54.33
-------------------------------------------------------------------------
---

Segment Leq : 54.33 dBA

Total Leq All Segments: 58.59 dBA

TOTAL Leq FROM ALL SOURCES:       58.59
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-03-2012 14:24:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: e.te                 Time Period: Day/Night 16/8 hours
Description: Daytime and nighttime sound level at prediction location
[E], Block 171 (high density), Apartment Block 171, at 8th floor

Road data, segment # 1: Davis (day/night)
----------------------------------------
Car traffic volume  : 15461/1164  veh/TimePeriod  *
Medium truck volume :   326/24    veh/TimePeriod  *
Heavy truck volume  :   488/37    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  17500
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  93.00

Data for Segment # 1: Davis (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  29.00 / 29.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :  24.00 m
Reference angle           :   0.00

Road data, segment # 2: Davis (day/night)
----------------------------------------
Car traffic volume  : 15461/1164  veh/TimePeriod  *
Medium truck volume :   326/24    veh/TimePeriod  *
Heavy truck volume  :   488/37    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  17500
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  93.00
```

```
Data for Segment # 2: Davis (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  42.00 / 42.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :  24.00 m
Reference angle           :   0.00

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

Source height = 1.32 m

ROAD (0.00 + 66.39 + 0.00) = 66.39 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  69.25   0.00  -2.86   0.00   0.00   0.00   0.00
66.39
-------------------------------------------------------------------------
---

Segment Leq : 66.39 dBA

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

Source height = 1.32 m

ROAD (0.00 + 64.78 + 0.00) = 64.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  69.25   0.00  -4.47   0.00   0.00   0.00   0.00
64.78
-------------------------------------------------------------------------
---

Segment Leq : 64.78 dBA

Total Leq All Segments: 68.67 dBA

Results segment # 1: Davis (night)
----------------------------------

Source height = 1.32 m

ROAD (0.00 + 58.18 + 0.00) = 58.18 dBA
```

```
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  61.04   0.00  -2.86   0.00   0.00   0.00   0.00
58.18
-------------------------------------------------------------------------
---

Segment Leq : 58.18 dBA

Results segment # 2: Davis (night)
----------------------------------

Source height = 1.32 m

ROAD (0.00 + 56.57 + 0.00) = 56.57 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  61.04   0.00  -4.47   0.00   0.00   0.00   0.00
56.57
-------------------------------------------------------------------------
---

Segment Leq : 56.57 dBA

Total Leq All Segments: 60.46 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.67
                           (NIGHT): 60.46
```

STAMSON 5.0 NORMAL REPORT Date: 30-03-2012 14:25:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1d.te Time Period: 1 hours
Description: ***Minimum daytime hour at R1, southeast corner of proposed 8-storey residential building***

Road data, segment # 1: davis

Car traffic volume : 414 veh/TimePeriod
Medium truck volume : 9 veh/TimePeriod
Heavy truck volume : 13 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: davis

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 70.00 m
Receiver height : 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: davis

Source height = 1.31 m

ROAD (0.00 + 51.86 + 0.00) = 51.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.44	65.57	0.00	-9.64	-4.07	0.00	0.00	0.00	51.86

Segment Leq : 51.86 dBA

Total Leq All Segments: 51.86 dBA

TOTAL Leq FROM ALL SOURCES: 51.86

STAMSON 5.0 NORMAL REPORT Date: 30-03-2012 14:25:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1n.te Time Period: 1 hours
Description: ***Minimum nighttime hour at R1, southeast corner of proposed 8-storey residential building***

Road data, segment # 1: davis

Car traffic volume : 94 veh/TimePeriod
Medium truck volume : 2 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: davis

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 70.00 m
Receiver height : 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: davis

Source height = 1.32 m

ROAD (0.00 + 45.46 + 0.00) = 45.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.44	59.16	0.00	-9.64	-4.07	0.00	0.00	0.00	45.46

Segment Leq : 45.46 dBA

Total Leq All Segments: 45.46 dBA

TOTAL Leq FROM ALL SOURCES: 45.46