

PRELIMINARY ENVIRONMENTAL NOISE REPORT

PROPOSED RESIDENTIAL DEVELOPMENT
5426, 5452 and 5584 LAKESHORE ROAD
BALLANTRAE
TOWN OF WHITCHURCH - STOUFFVILLE
REGIONAL MUNICIPALITY OF YORK



PREPARED FOR
ALCORN & ASSOCIATES LIMITED

December 17, 2018
File: 18-085

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SUMMARY

The proposed residential development is located east of Treeview Avenue and on the north side of Lakeshore Road in the Town of Whitchurch-Stouffville. Aurora Road is approximately 210 m north of the development. The development is subject to road traffic noise from Lakeshore Road and Aurora Road. The site is not affected by aircraft traffic, rail traffic or industrial facilities.

The environmental noise guidelines of the Town of Whitchurch-Stouffville, the Region of York and the Ministry of the Environment, Conservation and Parks (MOE) set out sound level limits for both indoor and outdoor spaces.

Using the road traffic data obtained from the Region of York and BA Group, the sound levels for various locations in the development were determined. The 85th percentile speeds for Aurora Road were provided by an independent consultant. Sound levels due to the transportation sources were determined using ORNAMENT, the noise prediction model of the MOECC for road traffic.

It was found that, with appropriate mitigative measures, all residential lots in the development will meet the noise guidelines.

Lots 22, 42, 43, 49, 50, 57, 58 and 63 require the provision of adding central air conditioning by the occupants at a later date and warning clauses.

Lots 63 to 66 require a proximity warning clause due to exposure regarding the future pumping station.

It is predicted that standard exterior wall, window and exterior door construction will be acoustically satisfactory for all proposed lots.

Prior to issuance of building permits, the acoustical requirements should be reviewed to ensure compliance with the applicable guidelines. Prior to final occupancy, the lots should be inspected by an acoustical consultant to ensure the required mitigative measures have been incorporated.

1.0 INTRODUCTION

Jade Acoustics Inc. was retained to prepare a Preliminary Environmental Noise Report to investigate the potential impact of noise on the proposed development to the satisfaction of the Town of Whitchurch-Stouffville.

The proposed site is identified as:

Part of Lots 19 and 20
Concession 8
Town of Whitchurch-Stouffville
Regional Municipality of York

The site is bounded by open space to the east, Lakeshore Road to the south, existing residential to the west and open space and existing residential to the north.

The analysis was based on the following:

- Site visit conducted by Jade Acoustics Inc. staff on June 22, 2018;
- Draft plan of Subdivision prepared by Alcorn and Associates Limited dated November 11, 2018;
- Preliminary grading plan prepared by Sabourin Kimble and Associates Ltd., received on June 21, 2018; and
- Road traffic provided by the Region of York, BA Group and Horizon Data Services Ltd.

A Key Plan is attached as Figure 1.

The proposed residential development is comprised of single detached residential lots, stormwater pond blocks, a pumping station block, open space conservation blocks and new internal roads.

Figure 2 shows the proposed residential development and the minimum noise mitigation measures required to meet the guidelines.

The dwellings are expected to be a maximum of two storeys high.

2.0 NOISE AND VIBRATION SOURCES

2.1 Transportation Sources

The major noise sources external to the project of potentially adverse impact are the road traffic on Aurora Road and Lakeshore Road.

For Aurora Road, the ultimate road traffic data used in the analysis was provided by the Region of York. Information regarding the 85th percentile speed was provided by Horizon Data Services Ltd. and determined to be lower than the posted speed limit. As the posted speed is higher than the 85th percentile speed, the posted speed has been used in this analysis.

The ultimate annual average daily traffic (AADT) for Lakeshore Road was based on the Draft Transportation Impact Study prepared by BA Group and dated July 31, 2018. The study provided future total traffic volumes (Year 2025) at the intersection of Lakeshore Road and the site access road. On November 22, 2018, BA Group confirmed that the future peak hour total traffic volumes included in the July 31, 2018 Study are still valid and can be used for the noise calculations. Based on peak hour volumes, the average daily traffic for the future total traffic condition, extrapolated to Year 2028, was calculated accounting for the peak hour to be 9% of the average daily traffic. The ultimate AADT was calculated to be 2,420 vehicles.

It is expected that the new internal roads will have low traffic volumes and be acoustically insignificant; therefore, they were not considered further.

The site is not affected by aircraft or industrial noise sources.

Road traffic information is summarized in Table 1. Correspondence regarding the road traffic information is included in Appendix A.

2.2 Stationary Sources

Ballantrae Community Centre is located on the north side of Aurora Road, approximately 250 m from the closest proposed residential dwellings. The potential noise sources associated with the facility are HVAC mechanical equipment. Existing residential dwellings are located west of the facility and closer than the proposed development. Due to the separation distance and type of noise sources, the facility is expected to be acoustically insignificant at the proposed site and was not analyzed further.

Ballantrae Public School and Ballantrae Child Care Centre are located on the north side of Aurora Road, approximately 260 m and 300 m, respectively from the closet proposed

residential dwellings. The potential noise sources associated with the facilities are HVAC mechanical equipment. Due to the separation distances and type of noise sources, the school and child care centre are expected to be acoustically insignificant at the proposed site and were not analyzed further.

A future pumping station (Block 151) is proposed near the southeast corner of the proposed development. Detailed information regarding the noise sources associated with the pumping station is not available at this stage of the project. The proposed pumping station will have exposure to existing and future residential dwellings. Once the specific building and mechanical information is determined and the site plan is available, a detailed noise analysis should be prepared by the proponent of the pumping station to ensure the MOE noise guidelines are met at the proposed residential dwellings.

3.0 ENVIRONMENTAL NOISE AND VIBRATION CRITERIA

The most recent environmental noise guidelines (NPC-300) of the Ontario Ministry of the Environment (MOE) were used for this report.

The MOE document “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning, Publication NPC-300”, dated August, 2013, released October 21, 2013 (updated final version # 22) was used for the analysis. A summary of the NPC-300 guidelines is given in Appendix B and are also summarized below.

3.1 Transportation Sources

3.1.1 Indoors

If the nighttime (11:00 p.m. to 7:00 a.m.) sound level in terms of L_{eq} at the exterior face of a bedroom or living/dining room window is greater than 60 dBA or if the daytime (7:00 a.m. to 11:00 p.m.) sound level in terms of L_{eq} at the exterior face of a bedroom or living/dining room window is greater than 65 dBA, means must be provided so that windows can be kept closed for noise control purposes and central air conditioning is required. For nighttime sound levels ($L_{eqNight}$) greater than 50 dBA to less than or equal to 60 dBA on the exterior face of a bedroom or living/dining room window or daytime sound levels (L_{eqDay}) greater than 55 dBA to less than or equal to 65 dBA on the exterior face of a bedroom or living/dining room window, there need only be the provision for adding central air conditioning by the occupant at a later date. This typically involves a ducted heating system sized to accommodate the addition of central air conditioning by the occupant at a later date. A warning clause advising the occupant of the potential interference with some activities is also required.

In all cases, air cooled condenser units must not exceed an AHRI sound rating of 7.6 bels. As noted in MOE document NPC-300, the location and installation of the outdoor air conditioning device should comply with the sound level limits of Publication NPC-216 or should comply with other criteria specified by the municipality. The air cooled condenser units must be sited in accordance with the zoning by-laws with respect to setbacks as well as location.

As required by the MOE, indoor noise criteria for road traffic noise is 40 dBA ($L_{eq8hour}$) for the bedrooms during nighttime hours, 45 dBA ($L_{eq8hour}$) for living/dining rooms during nighttime hours and 45 dBA ($L_{eq16hour}$) for the living/dining rooms and bedrooms during daytime hours. These criteria are used to determine the architectural requirements.

3.1.2 Outdoors

Based on the MOE guidelines, for the outdoor amenity areas, a design goal of 55 dBA daytime (7:00 a.m. to 11:00 p.m.) sound level is used with an excess not greater than 5 dBA considered acceptable in some cases. Where the unmitigated sound level during the day exceeds 55 dBA (LeqDay) but is less than 60 dBA (LeqDay), a warning clause is required and mitigation should be considered. When the unmitigated sound level exceeds 60 dBA, sound barriers and warning clauses are generally required to achieve as close to 55 dBA as is technically, economically and administratively feasible.

For both indoor and outdoor conditions, where the acoustic criteria are exceeded, warning clauses must be placed in offers of purchase and sale or lease agreements and in the subdivision agreement.

3.2 Region of York's Requirements

The calculation procedures in Scenario C – Development Planning Applications of the Region of York Publication titled “Standard Operating Procedures (SOP's) for Traffic Noise Mitigation on Regional Roads” were followed in the preparation of the noise calculations.

The 85th percentile speed for Aurora Road was compared with and found to be lower than the posted speed limit; therefore, as per the Region of York Requirements, the posted speed was used for the analysis.

3.3 Town of Whitchurch-Stouffville By-law

The Town of Whitchurch-Stouffville has a by-law to regulate noise likely to disturb the inhabitants of the Town By-law No. 2015-172-RE. The by-law does not provide specific sound level limits but rather provide qualitative information with respect to sources and prohibitions by time and place.

4.0 NOISE IMPACT ASSESSMENT

4.1 Transportation Sources

For road traffic noise the sound level in terms of Leq, the energy equivalent continuous sound level for both day (LeqDay, 16 hours) and night (LeqNight, 8 hours) was determined using the MOE Traffic Noise Prediction Model ORNAMENT (road).

The analysis was based on the draft plan of subdivision and preliminary grading plan mentioned in Section 1.0. The topography between the source and the receiver has been taken into account. Shielding provided by the buildings has also been accounted for in the analysis.

Lot 83 has exposure to Aurora Road and the unmitigated sound level in the rear yard is predicted to be 49 dBA. The sound level at the rear wall (second storey) is predicted to be 50 dBA (daytime) and 42 dBA (nighttime).

Lots 22, 49, 50, 57 and 58 which are flanking Lakeshore Road, are predicted to have unmitigated daytime sound levels in the rear yard of up to 55 dBA. The sound levels at the side wall (second storey) are predicted to be up to 57 dBA (daytime) and up to 50 dBA (nighttime).

Lots 42 and 43, which are flanking Lakeshore Road across the single loaded road, are predicted to have an unmitigated sound level in the rear yard of 51 dBA. The sound levels at the side wall (second storey) are predicted to be 54 dBA (daytime) and 47 dBA (nighttime).

Table 2 provides a summary of the predicted sound levels outdoors due to road traffic at specific locations without any mitigative measures. Appendix C includes sample calculations.

Where the sound level limits are exceeded, mitigative measures and warning clauses are required.

5.0 NOISE ABATEMENT REQUIREMENTS

The noise mitigation requirements for both the indoor and outdoor locations are detailed below. Table 3 and Figure 2 provide a summary of the acoustical mitigative requirements for the residential lots in this development.

5.1 Transportation Sources

5.1.1 Indoors

Architectural Component Requirements

The indoor noise exposure criteria for road traffic can be achieved in all cases by using appropriate architectural elements for external wall and window construction. As required by the MOE, indoor criteria for road traffic noise of 40 dBA for the bedrooms during nighttime hours and 45 dBA for the living/dining rooms during daytime and nighttime hours and bedrooms during daytime hours, was used. The characteristic spectrum for the noise sources has been accounted for in the determination of the architectural components.

Based on the analysis, the difference between the predicted daytime and nighttime sound levels exceeds 5 dB. Considering that the difference between the daytime and nighttime indoor sound level limits is 5 dB, the predicted daytime sound levels represent the worst case scenario for the assessment of architectural component requirements.

In determining the architectural requirements, it has been assumed that the bedrooms would be fully exposed to the road traffic and the worst case would involve a corner bedroom. The exterior walls parallel and perpendicular to the noise source (arterial roads) would be 55% of the associated floor area. The windows would be located on both walls and be 25% each of the associated floor area.

Sample architectural component selection calculations are shown in Appendix D. With the incorporation of the mitigation outlined below, the MOE indoor sound level limits will be achieved.

For the worst case location, exterior walls having an STC 26 rating and windows and exterior doors having an STC 18 rating would be needed.

These STC ratings comply with the minimum structural and safety requirements provided by standard construction practices; therefore, standard window and exterior wall construction is acoustically acceptable for all proposed residential units.

Since house plans are not yet available, the final architectural choices cannot be made. Once house plans are available, the noise control requirements should be re-evaluated.

An STC 54 rating for the roof, normally met by most residential roof constructions with ventilated attic space, would be acoustically acceptable.

Where the sound level is greater than 60 dBA (LeqNight) at the outside face of a bedroom or living/dining room window or greater than 65 dBA (LeqDay) on the outside face of a bedroom or living/dining room window, the indoor noise criteria would not be met with open windows and provisions must be made to permit the windows to remain closed. In this case, the MOE guidelines require central air conditioning and a warning clause. Based on the predicted sound levels, no lots require central air conditioning.

Where the nighttime sound level (LeqNight) is greater than 50 dBA to less than or equal to 60 dBA and the daytime sound level (LeqDay) is greater than 55 dBA to less than or equal to 65 dBA, the provision for adding central air conditioning by the occupants must be made. Due to the predicted sound levels and their location, Lots 22, 42, 43, 49, 50, 57, 58 and 63 require the provision for adding central air conditioning by the occupant and a warning clause. See Table 3, Notes to Table 3 and Figure 2 for details.

The outdoor air conditioning condenser units must be sited in accordance with the Town's zoning by-laws and should comply with the second level limits of the MOE Publication NPC-216.

Warning clauses will also be required to be placed in offers of purchase and sale or lease agreements for all relevant lots to make future occupants aware of the potential noise situation.

5.1.2 Outdoors

The outdoor amenity area is required to be exposed to sound levels of no more than 55 dBA during the day where it is technically, economically and administratively feasible.

For all lots, the unmitigated predicted sound level in the rear yard is 55 dBA or less. Therefore, no acoustic barriers are required for the proposed residential development.

5.2 Stationary Sources

As discussed in Section 2.2, noise mitigation measures to address the existing stationary sources are not required.

Once the specific building and mechanical information for the future pumping station become available, a detailed noise analysis should be prepared by the proponent of the pumping station to ensure the MOE noise guidelines are met at the proposed residential dwelling. A warning clause advising purchasers and lessors that the proposed development is in proximity to the future pumping station is required for Lots 63 to 66.

6.0

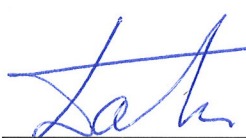
CONCLUSIONS AND RECOMMENDATIONS

Based on the acoustical analysis, with the incorporation of the noise abatement measures discussed in this noise report (see Section 5.0, Table 3 and Figure 2), the sound levels will be within the appropriate environmental noise criteria.

A detailed environmental noise report will need to be prepared if the plan changes to ensure the appropriate criteria are achieved.

Respectfully submitted,

JADE ACOUSTICS INC.

Per: 
Davor Sikic, P.Eng.



Per: 
Dalila C. Giusti, P.Eng.



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7.0 REFERENCES

1. “Model Municipal Noise Control By-Law”, Final Report, by the Ontario Ministry of the Environment, August, 1978.
2. “ORNAMENT – Ontario Road Noise Analysis Method for Environment and Transportation”, Ontario Ministry of the Environment, October, 1989.
3. “STEAM – Sound from Trains Environmental Analysis Method”, Ontario Ministry of the Environment, July, 1990.
4. “Building Practice Note No. 56: Controlling Sound Transmission into Buildings”, by J. D. Quirt, Division of Building Research, National Research Council of Canada, September, 1985.
5. “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning”, Ontario Ministry of the Environment, Publication NPC-300, August, 2013 (updated final version # 22).
6. “Standard Operating Procedures (SOP's) for Traffic Noise Mitigation on Regional Roads”, Region of York, Transportation Services, July, 2010.
7. Noise Control By-law Number 2015-172-RE, Amended April 3, 2018.

TABLE 1

PROPOSED RESIDENTIAL DEVELOPMENT

5426, 5452 and 5584 LAKESHORE ROAD, BALLANTRAE

TOWN OF WHITCHURCH-STOUFFVILLE

SUMMARY OF ROAD TRAFFIC DATA

Road	Aurora Road	Lakeshore Road
AADT*	18,000 (Ultimate)	2,420 (2028)
No. of Lanes	2	2
Posted Speed (km/h)	60**	40
Trucks (%)	6	6
Medium/Heavy Split (%)	50/50	17/83
Gradient (%)	Up to 2	Up to 2
Day/Night Split (%)	92/8	90/10
Planned R.O.W. (m)	Up to 36	25

* AADT: Annual Average Daily Traffic.

** 85th percentile vehicle speed was lower than posted speed and therefore, the posted speed was used in the analysis.

TABLE 2

PROPOSED RESIDENTIAL DEVELOPMENT

5426, 5452 and 5584 LAKESHORE ROAD, BALLANTRAE

TOWN OF WHITCHURCH-STOUFFVILLE

**SAMPLE OF PREDICTED UNMITIGATED SOUND LEVELS
OUTDOORS DUE TO ROAD TRAFFIC**

Lots	Location*	Source	Distance (m)	Leq (dBA)			
				Day		Night	
				Separate	Combined	Separate	Combined
22	Rear Yard	Lakeshore Road	19.5	55	-	-	-
	Side Wall	Lakeshore Road	16.5	57	-	50	-
42	Rear Yard	Lakeshore Road	36.5	51	-	-	-
	Side Wall	Lakeshore Road	30.5	54	-	47	-
63	Rear Yard	Lakeshore Road	26.5	52	-	-	-
	Side Wall	Lakeshore Road	21.0	55	-	49	-
83	Rear Yard	Aurora Road EB	206.0	46	49	-	-
		Aurora Road WB	215.0	46		-	-
	Rear Wall	Aurora Road EB Aurora Road WB	209.0 218.0	47 47	50	40 39	42

* Rear yard location taken 3.0 m from the centre of the rear wall and 1.5 m above grade. Wall locations were taken at 4.5 m above grade for two storey dwellings

TABLE 3

PROPOSED RESIDENTIAL DEVELOPMENT

5426, 5452 and 5584 LAKESHORE ROAD, BALLANTRAE

TOWN OF WHITCHURCH-STOUFFVILLE

SUMMARY OF MINIMUM NOISE ABATEMENT MEASURES

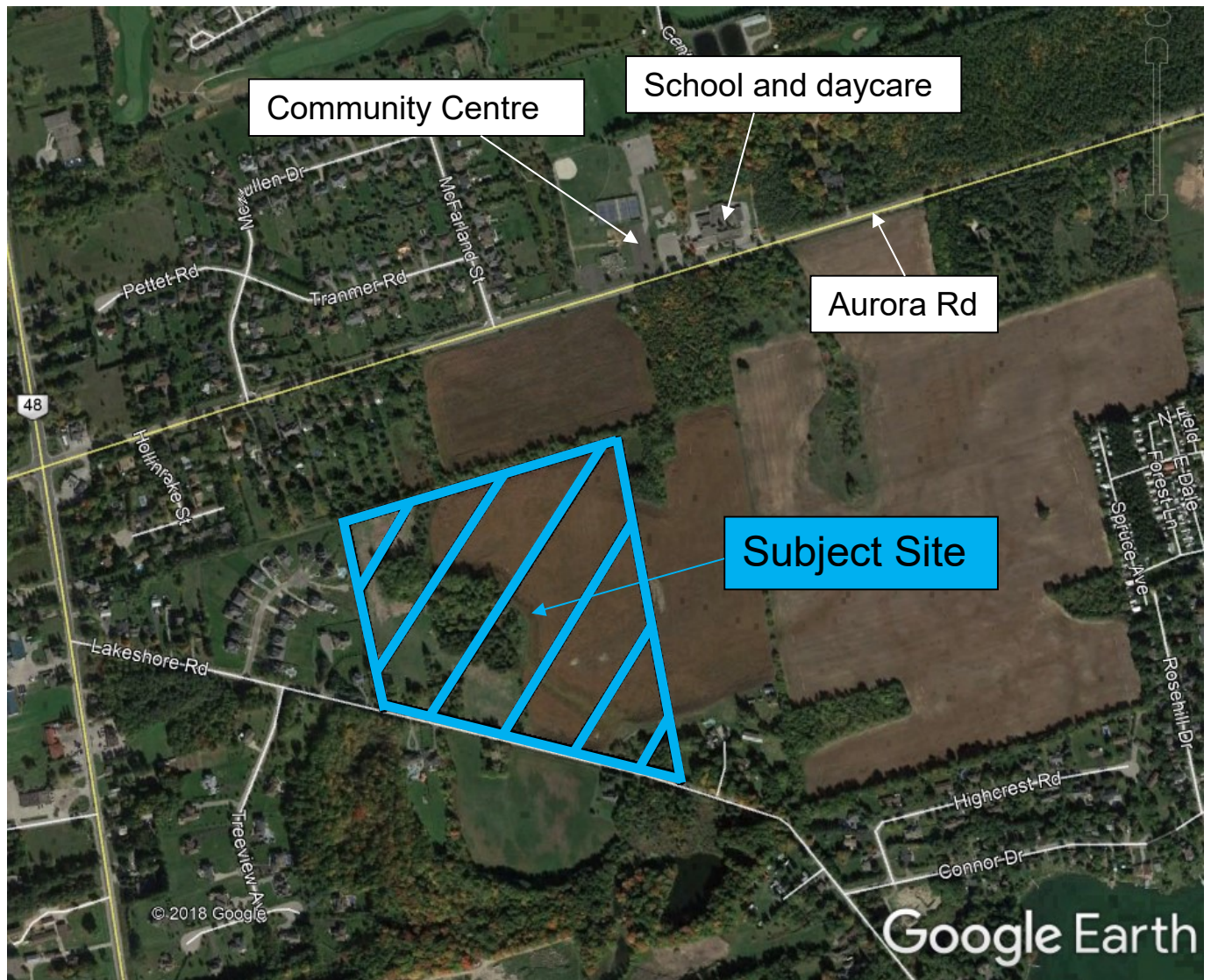
Lots	Air Conditioning⁽¹⁾	Exterior Wall⁽²⁾	Window⁽²⁾	Sound Barrier	Warning Clause⁽³⁾
Lots 22, 42, 43, 49, 50, 57 and 58	Provision for Adding	Standard*	Standard*	No	A, B
Lot 63	Provision for Adding	Standard*	Standard*	No	A, B, C
Lots 64 to 66	No	Standard*	Standard*	No	C
All other lots	No Special Requirements				

- * Upgraded construction not required. Construction meeting the minimum structural and safety requirements of standard construction is satisfactory.

See notes to Table 3 on following page.

NOTES TO TABLE 3

1. Provision for adding central air conditioning would involve a ducted heating system sized to accommodate the addition of central air conditioning by the occupant at a later date. Due consideration should be given to the noise factor when selecting the air cooled condenser unit location and sound rating. The air cooled condenser unit should be placed in a location which complies with municipal by-laws and the MOE Publication NPC-216.
2. Based on an exterior wall area of 55% and a window area of 25% of the associated floor area for the walls parallel and perpendicular to the noise source.
3. Warning Clauses to be placed in the subdivision agreement and to be included in offers of purchase and sale or lease on designated lots:
 - A. "Purchasers/tenants are advised that despite the inclusion of noise control features in this development area and within the building units, noise due to increasing road traffic, may continue to be of concern, occasionally interfering with the activities of the occupants as the sound levels may exceed the noise criteria of the Ministry of the Environment."
 - B. "Purchasers/tenants are advised that the dwelling unit can be fitted with a central air conditioning system at the owner's option and expense which will enable occupants to keep windows closed if road traffic noise interferes with the indoor activities. If central air conditioning is installed, the air condenser unit shall be located in accordance with the Town's zoning by-laws and should comply with the sound level limits of the MOE Publication NPC-216."
 - C. "Purchasers/tenants are advised that due to the proximity to a future pumping station noise from the equipment and/or activities taking place at the facility may at times be audible."



N.T.S.

**Proposed Residential Development
5426, 5452 and 5584 Lakeshore Road
Ballantrae
Town of Whitchurch-Stouffville**

Date: December 2018

File: 18-085

**KEY PLAN
FIGURE 1**



Agricultural / Open Space

Existing Residential



Agricultural

Legend:

- Provision for adding central air conditioning and a warning clause (see text and Table 3 for details)
- * Proximity warning clause "C" (see text and Table 3 for details)
- Analyzed Lots

N.T.S.

Proposed Residential Development
5426, 5452 and 5584 Lakeshore Road
Town of Whitchurch-Stouffville

Date: December 2018

Our File: 18-085



PLAN OF SUBDIVISION
SHOWING NOISE
ABATEMENT MEASURES

FIGURE 2



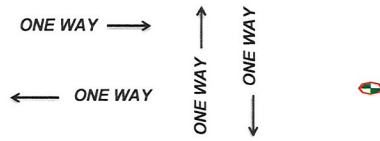
APPENDIX A

CORRESPONDENCE REGARDING ROAD TRAFFIC DATA

5452 Lakeshore Road Ballantrae

**Future Total
Weekday PM**
PM Heavies, Peds, Bikes, PHF

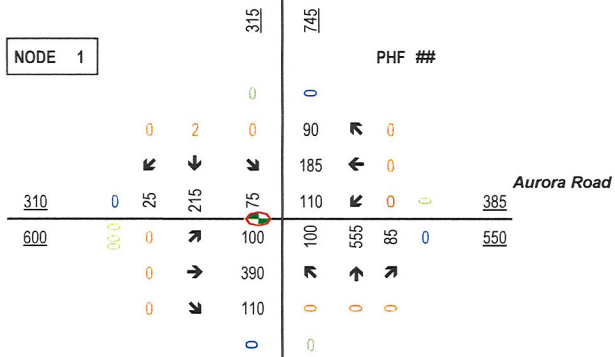
Denotes x



Hwy 48

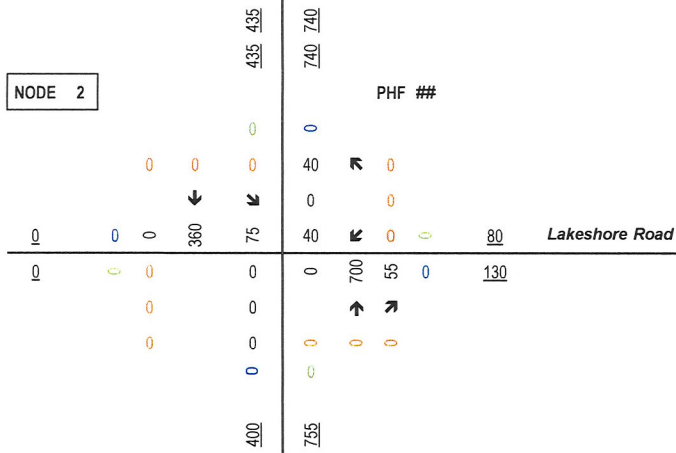
NODE 1

PHF ##



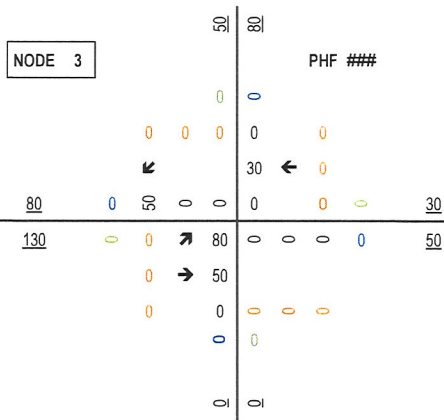
NODE 2

PHF ##



NODE 3

PHF ###



Aaron Keey

From: Gao, Wenli <Wenli.Gao@york.ca>
Sent: Wednesday, June 20, 2018 2:50 PM
To: Aaron Keey
Subject: RE: Traffic Data Request - Aurora Road - Jade File 16-030

Hi Aaron,

The traffic data for Aurora Rd east of McCowan Rd are applicable to the road segment of Aurora Rd east of Hwy 48. Please note the posted speed becomes 80 km/h at 5706 Aurora Rd towards Ninth Line.

Regards,

Wenli Gao | Transportation Technologist - Forecasting, Transportation and Infrastructure Planning, Transportation Services

The Regional Municipality of York | 17250 Yonge Street | Newmarket, ON L3Y 6Z1

O: 1-877-464-9675 ext. 75197 | Wenli.Gao@york.ca | york.ca

Our Values: Integrity, Commitment, Accountability, Respect, Excellence



Please consider the environment before printing this email.

From: Aaron Keey [<mailto:aaron@jadeacoustics.com>]
Sent: June-20-18 10:29 AM
To: Gao, Wenli
Subject: FW: Traffic Data Request - Aurora Road - Jade File 16-030

Hi Wenli,

Thanks again for the attached road traffic data. Jade Acoustics Inc. has another project not too far east from the one mentioned below. Please let me know if the attached traffic data would also be applicable to Aurora Road just east of Highway 48 in the Town of Whitchurch-Stouffville.

Please call or email me with any questions.

Aaron Keey, P. Eng
Jade Acoustics Inc.
P: 905-660-2444
F: 905-660-4110



From: Gao, Wenli [<mailto:Wenli.Gao@york.ca>]
Sent: Wednesday, June 13, 2018 3:58 PM
To: Aaron Keey
Cc: Subhani, Ahmad
Subject: RE: Traffic Data Request - Aurora Road - Jade File 16-030



Transportation Services Department
Transportation and Infrastructure Planning

June 13, 2018

Mr. Aaron Keey
Jade Acoustics Inc.
411 Confederation Parkway, Unit 19
Concord, ON L4K 0A8

Dear Mr. Keey:

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

As requested, the traffic data for your study are summarized below:

	<u>Aurora Road</u>
Section No.	15-38
Location	East of McCowan Road
Existing AADT	8,900 (2017)
Ultimate AADT	18,000
No. of Lanes	2
Posted Speed	60 km/h
Trucks (Med/Heavy)	3% / 3%
Grade	Up to 2%
Day/Night Split	92/8
Planned ROW	Up to 36 m

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

Sincerely,

Wenli Gao
Transportation Planning, Forecasting

WG/wg

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Report-2.1		Location : JA-18-005EW AURORA ROAD - 50 meters west of McFarland St															
		Direction : East Road : 0															
		Dates : 6/21/2018															
Speeds,km/h ----->		0	41	51	61	71	81	91	101	111	121	131	141	151	Pace		Number
		41	51	61	71	81	91	101	111	121	131	141	151	160	Total	Speed	in Pace
00:00	1:00	3	12	0	0	0	0	0	0	0	0	0	0	0	15	28.5-48.5	15
1:00	2:00	2	6	2	0	0	0	0	0	0	0	0	0	0	10	31.2-51.2	9
2:00	3:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1	9.9-29.9	1
3:00	4:00	0	2	0	0	0	1	0	0	0	0	0	0	0	3	26.1-46.1	2
4:00	5:00	6	6	1	0	0	0	0	0	0	0	0	0	0	13	25.2-45.2	11
5:00	6:00	14	25	2	1	0	0	0	0	0	0	0	0	0	42	32.7-52.7	39
6:00	7:00	46	50	1	0	0	0	0	0	0	0	0	0	0	97	30.4-50.4	95
7:00	8:00	144	23	1	0	0	0	0	0	0	0	0	0	0	168	26.4-46.4	163
8:00	9:00	212	23	0	0	0	0	0	0	0	0	0	0	0	235	25.8-45.8	226
9:00	10:00	118	53	2	0	0	0	0	0	0	0	0	0	0	173	27.6-47.6	169
10:00	11:00	80	61	4	0	0	0	0	0	0	0	0	0	0	145	31.7-51.7	139
11:00	12:00	131	40	2	0	0	0	0	0	0	0	0	0	0	173	28.5-48.5	170
12:00	13:00	170	27	1	0	0	0	0	0	0	0	0	0	0	198	25.2-45.2	192
13:00	14:00	158	39	4	0	0	0	0	0	0	0	0	0	0	201	27.5-47.5	193
14:00	15:00	174	66	2	0	0	0	0	0	0	0	0	0	0	242	27.9-47.9	235
15:00	16:00	173	109	5	0	0	0	0	0	0	0	0	0	0	287	28.1-48.1	278
16:00	17:00	224	213	2	0	0	0	0	0	0	0	0	0	0	439	30.6-50.6	435
17:00	18:00	244	149	2	0	0	0	0	0	0	0	0	0	0	395	28.3-48.3	387
18:00	19:00	110	145	4	0	0	0	0	0	0	0	0	0	0	259	31.3-51.3	255
19:00	20:00	76	108	6	0	0	0	0	0	0	0	0	0	0	190	33.7-53.7	189
20:00	21:00	72	67	2	0	0	0	0	0	0	0	0	0	0	141	31.0-51.0	138
21:00	22:00	55	42	1	0	0	0	0	0	0	0	0	0	0	98	31.7-51.7	98
22:00	23:00	32	29	3	0	0	0	0	0	0	0	0	0	0	64	27.4-47.4	61
23:00	00:00	13	18	2	0	0	0	0	0	0	0	0	0	0	33	33.1-53.1	33
Total		2258	1313	49	1	0	1	0	0	0	0	0	0	0	3622		
AM PEAK		62.3%	36.3%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	235		
period		212	61	4	1	0	1	0	0	0	0	0	0	0			
% of class		8:00	10:00	10:00	5:00	0	3:00	0	0	0	0	0	0	0			
		9.4%	4.6%	8.2%	100.0%		100.0%								6.5%		
PM PEAK		244	213	6	0	0	0	0	0	0	0	0	0	0	439		
period		17:00	16:00	19:00	0	0	0	0	0	0	0	0	0	0			
% of class		10.8%	16.2%	12.2%	0.0%		0.0%										
															12.1%		

15% Percentile :	10 KPH
50% Percentile :	33 KPH
85% Percentile :	47 KPH
95% Percentile :	50 KPH

20 KPH Pace Speed:	29.1-49.1 KPH
Number in Pace:	3458
Percent in Pace:	95.5 %
Number of Vehicles >60 KPH:	7
Percent of Vehicles >60 KPH:	0.2 %
Mean Speed(average):	40 KPH

Report-2.2	Location : JA-18-005EW AURORA ROAD - 50 meters west of McFarland St													
	Direction : West Road : 0													
	Dates : 6/21/2018													
Speeds,km/h ----->	0	41	51	61	71	81	91	101	111	121	131	141	151	
	41	51	61	71	81	91	101	111	121	131	141	151	160	Total Pace Speed Number in Pace
00:00 1:00	5	2	1	0	0	0	0	0	0	0	0	0	0	8 24.9-44.9 7
1:00 2:00	4	0	1	0	0	0	0	0	0	0	0	0	0	5 31.2-51.2 5
2:00 3:00	1	4	0	0	1	0	0	0	0	0	0	0	0	6 29.1-49.1 5
3:00 4:00	1	2	0	0	0	0	0	0	0	0	0	0	0	3 28.9-48.9 3
4:00 5:00	8	10	0	0	0	0	0	0	0	0	0	0	0	18 29.0-49.0 18
5:00 6:00	49	84	7	0	0	0	0	0	0	0	0	0	0	140 30.8-50.8 133
6:00 7:00	141	134	5	2	0	0	0	0	0	0	0	0	0	282 31.0-51.0 271
7:00 8:00	279	81	3	1	0	0	0	0	0	0	0	0	0	364 28.2-48.2 360
8:00 9:00	350	49	1	0	0	0	0	0	0	0	0	0	0	400 27.6-47.6 389
9:00 10:00	175	60	0	0	0	0	0	0	0	0	0	0	0	235 29.3-49.3 231
10:00 11:00	132	35	1	0	0	0	0	0	0	0	0	0	0	168 28.5-48.5 166
11:00 12:00	108	46	3	0	0	0	0	0	0	0	0	0	0	157 28.7-48.7 153
12:00 13:00	137	37	1	0	0	0	0	0	0	0	0	0	0	175 27.8-47.8 170
13:00 14:00	129	47	1	0	0	0	0	0	0	0	0	0	0	177 28.9-48.9 173
14:00 15:00	142	48	4	1	0	0	0	0	0	0	0	0	0	195 28.5-48.5 182
15:00 16:00	131	75	1	1	0	0	0	0	0	0	0	0	0	208 29.1-49.1 201
16:00 17:00	119	103	7	0	0	0	0	0	0	0	0	0	0	229 32.2-52.2 216
17:00 18:00	118	100	6	0	0	0	0	0	0	0	0	0	0	224 29.0-49.0 211
18:00 19:00	95	86	3	0	0	0	0	0	0	0	0	0	0	184 32.7-52.7 181
19:00 20:00	64	54	0	0	0	0	0	0	0	0	0	0	0	118 29.2-49.2 113
20:00 21:00	106	46	2	0	0	0	0	0	0	0	0	0	0	154 29.1-49.1 152
21:00 22:00	62	33	2	0	0	0	0	0	0	0	0	0	0	97 30.7-50.7 93
22:00 23:00	32	16	1	1	0	0	0	0	0	0	0	0	0	50 29.9-49.9 47
23:00 00:00	10	5	2	0	0	0	1	0	0	0	0	0	0	18 27.8-47.8 15
Total	2398	1157	52	6	1	0	1	0	0	0	0	0	0	3615
AM PEAK	66.3%	32.0%	1.4%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
period	350	134	7	2	1	0	0	0	0	0	0	0	0	400
8:00	6:00	5:00	6:00	2:00		0	0	0	0	0	0	0	0	8:00
% of class	14.6%	11.6%	13.5%	33.3%	100.0%		0.0%							11.1%
PM PEAK	142	103	7	1	0	0	1	0	0	0	0	0	0	229
period	14:00	16:00	16:00	14:00	0	0	23:00	0	0	0	0	0	0	16:00
% of class	5.9%	8.9%	13.5%	16.7%	0.0%		100.0%							6.3%

15% Percentile :	9 KPH
50% Percentile :	31 KPH
85% Percentile :	47 KPH
95% Percentile :	50 KPH

20 KPH Pace Speed:	29.1-49.1 KPH
Number in Pace:	3462
Percent in Pace:	95.8 %
Number of Vehicles >60 KPH:	13
Percent of Vehicles >60 KPH:	0.4 %
Mean Speed(average):	39 KPH

APPENDIX B

ENVIRONMENTAL NOISE CRITERIA

ONTARIO MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MOE)

Reference: "Environmental Noise Guidelines Stationary and Transportation Sources – Approval and Planning", Publication NPC-300, August, 2013, released October 21, 2013 (updated final version # 22).

SOUND LEVEL CRITERIA FOR ROAD AND RAIL NOISE

TABLE C-1
Sound Level Limit for Outdoor Living Areas
Road and Rail

Time Period	L_{eq} (16) (dBA)
16 hr, 07:00 - 23:00	55

TABLE C-2
Indoor Sound Level Limits
Road and Rail

Type of Space	Time Period	L_{eq} (dBA)	
		Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
	23:00 – 07:00	40	35

SOUND LEVEL CRITERIA FOR AIRCRAFT NOISE

TABLE C-3
Outdoor Aircraft Noise Limit

Time Period	NEF/NEP
24-hour	30

TABLE C-4
Indoor Aircraft Noise Limit
(Applicable over 24-hour period)

Type of Space	Indoor NEF/NEP*
Living/dining/den areas of residences, hospitals, nursing/retirement homes, schools, daycare centres, etc.	5
Sleeping Quarters	0

* The indoor NEF/NEP values in Table C-4 are used to determine acoustical insulation requirements based on the NEF/NEP contour maps.

SOUND LEVEL CRITERIA FOR STATIONARY SOURCES

TABLE C-5

**Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA)
Outdoor Points of Reception**

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	55
19:00 – 23:00	50	45	40	55

TABLE C-6

**Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA)
Plane of Window of Noise Sensitive Spaces**

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	60
19:00 – 23:00	50	50	40	60
23:00 – 07:00	45	45	40	55

TABLE C-7
Exclusion Limit Values for Impulsive Sound Level (L_{LM} , dBAI)
Outdoor Points of Reception

Time of Day	Actual Number of Impulses in Period of One-Hour	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 23:00	9 or more	50	50	45	55
	7 to 8	55	55	50	60
	5 to 6	60	60	55	65
	4	65	65	60	70
	3	70	70	65	75
	2	75	75	70	80
	1	80	80	75	85

TABLE C-8
Exclusion Limit Values of Impulsive Sound Level (L_{LM} , dBAI)
Plane of Window - Noise Sensitive Spaces (Day/Night)

Actual Number of Impulses in Period of One-Hour	Class 1 Area (07:00-23:00) / (23:00-07:00)	Class 2 Area (07:00-23:00) / (23:00-07:00)	Class 3 Area (07:00-19:00) / (19:00-07:00)	Class 4 Area (07:00-23:00) / (23:00-07:00)
9 or more	50/45	50/45	45/40	60/55
7 to 8	55/50	55/50	50/45	65/60
5 to 6	60/55	60/55	55/50	70/65
4	65/60	65/60	60/55	75/70
3	70/65	70/65	65/60	80/75
2	75/70	75/70	70/65	85/80
1	80/75	80/75	75/70	90/85

SUPPLEMENTARY SOUND LEVEL LIMITS

Indoor limits for transportation sources applicable to noise sensitive land uses are specified in Table C-2 and Table C-4. Table C-9 and Table C-10 are expanded versions of Table C-2 and Table C-4, and present guidelines for acceptable indoor sound levels that are extended to land uses and developments which are not normally considered noise sensitive. The specified values are maximum sound levels and apply to the indicated indoor spaces with the windows and doors closed. The sound level limits in Table C-9 and Table C-10 are presented as information, for good-practice design objectives.

TABLE C-9
Supplementary Indoor Sound Level Limits
Road and Rail

Type of Space	Time Period	L _{eq} (Time Period) (dBA)	
		Road	Rail
General offices, reception areas, retail stores, etc.	16 hours between 07:00 – 23:00	50	45
Living/dining areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc.	16 hours between 07:00 – 23:00	45	40
Sleeping quarters of hotels/motels	8 hours between 23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	8 hours between 23:00 – 07:00	40	35

TABLE C-10
Supplementary Indoor Aircraft Noise Limit
(Applicable over 24-hour period)

Type of Space	Indoor NEF/NEP*
General offices, reception areas, retail stores, etc.	15
Individual or semi-private offices, conference rooms, etc.	10
Living/dining areas of residences, sleeping quarters of hotels/motels, theatres, libraries, schools, daycare centres, places of worship, etc.	5
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	0

* The indoor NEF/NEP values in Table C-10 are not obtained from NEF/NEP contour maps. The values are representative of the indoor sound levels and are used as assessment criteria for the evaluation of acoustical insulation requirements.

APPENDIX C

SAMPLE CALCULATION OF PREDICTED UNMITIGATED SOUND LEVELS DUE TO TRANSPORTATION SOURCES

APPENDIX C-1
SAMPLE CALCULATION OF SOUND LEVEL

FILE: 18-085
NAME: Lakeshore Road and Treeview Avenue
REFERENCE DRAWINGS: Preliminary Grading Plan
LOCATION: Lot 22, 1.5 m above grade, **rear yard**

Noise Source:	Lakeshore Road
Angle of Exposure:	-59 to 90
Time Period:	16 hr. (day)
Distance (m):	19.5

CALCULATION OF SOUND LEVEL *

Reference Leq (dBA)*:	61.79
Height and/or Distance Correction (dBA):	-1.89
Finite Element Correction (dBA):	-1.89
Allowance for Screening (dBA):	-3.00
Allowance for Future Growth (dBA):	incl.

LeqDay (dBA):	55.00
---------------	-------

* Leq determined using the computerized model of the MOE Noise Assessment Guidelines, STAMSON Version 5.04 (ORNAMENT). See attached printouts.

Filename: 22ola.te Time Period: Day/Night 16/8 hours
Description: Lot 22, rear yard

Road data, segment # 1: Lakeshore Rd (day/night)

```
-----
Car traffic volume   : 4095/455   veh/TimePeriod  *
Medium truck volume : 44/5       veh/TimePeriod  *
Heavy truck volume  : 218/24     veh/TimePeriod  *
Posted speed limit  : 40 km/h
Road gradient       : 2 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 4840 (actual volume 2420)
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 1.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 90.00
```

Data for Segment # 1: Lakeshore Rd (day)

```
-----
Angle1 Angle2      : -59.00 deg  90.00 deg
Wood depth          : 0          (No woods)
No of house rows    : 0
Surface             : 1          (Absorptive ground surface)
Receiver source distance : 19.50 m
Receiver height     : 1.50 m
Topography          : 1          (Flat/gentle slope; no barrier)
Reference angle     : 0.00
```

Results segment # 1: Lakeshore Rd (day)

Source height = 1.50 m

ROAD (0.00 + 58.00 + 0.00) = 58.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-59	90	0.66	61.79	0.00	-1.89	-1.89	0.00	0.00	0.00	58.00

Segment Leq : 58.00 dBA - 3.00 dBA (volume correction) = 55.00 dBA

Total Leq All Segments: 55.00 dBA

APPENDIX C-2
SAMPLE CALCULATION OF SOUND LEVEL

FILE: 18-085
NAME: Lakeshore Road and Treeview Avenue
REFERENCE DRAWINGS: Preliminary Grading Plan
LOCATION: Lot 22, Corner Bedroom, **side wall**

Noise Source: Lakeshore Road

Angle of Exposure: -90 to 90

Time Period: 16 hr. (day)

Distance (m): 16.5

CALCULATION OF SOUND LEVEL *

Reference Leq (dBA)*: 61.79

Height and/or Distance Correction (dBA): -0.65

Finite Element Correction (dBA): -1.30

Volume Correction (dBA): -3.00

Allowance for Future Growth (dBA): incl.

LeqDay (dBA): 56.83

* Leq determined using the computerized model of the MOE Noise Assessment Guidelines, STAMSON Version 5.04 (ORNAMENT). See attached printouts.

APPENDIX C-3
SAMPLE CALCULATION OF SOUND LEVEL

FILE: 18-085
NAME: Lakeshore Road and Treeview Avenue
REFERENCE DRAWINGS: Preliminary Grading Plan
LOCATION: Lot 22, Corner Bedroom, **side wall**

Noise Source: Lakeshore Road

Angle of Exposure: -90 to 90

Time Period: 8 hr. (night)

Distance (m): 16.5

CALCULATION OF SOUND LEVEL *

Reference Leq (dBA)*: 55.22

Height and/or Distance Correction (dBA): -0.65

Finite Element Correction (dBA): -1.30

Volume Correction (dBA): -3.00

Allowance for Future Growth (dBA): incl.

LeqNight (dBA): 50.27

* Leq determined using the computerized model of the MOE Noise Assessment Guidelines, STAMSON Version 5.04 (ORNAMENT). See attached printouts.

Filename: 22sw.te Time Period: Day/Night 16/8 hours
Description: Lot 22, side wall

Road data, segment # 1: Lakeshore Rd (day/night)

```
-----
Car traffic volume   : 4095/455   veh/TimePeriod  *
Medium truck volume : 44/5       veh/TimePeriod  *
Heavy truck volume  : 218/24      veh/TimePeriod  *
Posted speed limit  : 40 km/h
Road gradient       : 2 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 4840 (actual volume 2420)
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 1.00
Heavy Truck % of Total Volume        : 5.00
Day (16 hrs) % of Total Volume      : 90.00
```

Data for Segment # 1: Lakeshore Rd (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 : 16.50 / 16.50 m
Receiver height     : 4.50 / 4.50 m
Topography          : 1           (Flat/gentle slope; no barrier)
Reference angle     : 0.00
```

Results segment # 1: Lakeshore Rd (day)

Source height = 1.50 m

ROAD (0.00 + 59.83 + 0.00) = 59.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	61.79	0.00	-0.65	-1.30	0.00	0.00	0.00	59.83

Segment Leq : 59.83 dBA - 3.00 dBA (volume correction) = 56.83 dBA

Total Leq All Segments: 56.83 dBA

Results segment # 1: Lakeshore Rd (night)

Source height = 1.49 m

ROAD (0.00 + 53.27 + 0.00) = 53.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	55.22	0.00	-0.65	-1.30	0.00	0.00	0.00	53.27

Segment Leq : 53.27 dBA - 3.00 dBA (volume correction) = 50.27 dBA

Total Leq All Segments: 50.27 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.83
 (NIGHT): 50.27

APPENDIX D

SAMPLE CALCULATION OF ARCHITECTURAL COMPONENT SELECTION

APPENDIX D-1
SAMPLE CALCULATION OF ARCHITECTURAL COMPONENT SELECTION*

FILE: 18-085
NAME: Lakeshore Road and Treeview Avenue
REFERENCE DRAWINGS: Preliminary Grading Plan
LOCATION: Lot 22, Corner Bedroom

ROAD

Wall area as a percentage of floor area:	Side: 55%	
	Rear: 55%	
Window area as a percentage of floor area:	Side: 25%	
	Rear: 25%	
Number of components:	4	
Outdoor LeqDay:	Side: 57 (+3 for reflections) = 60 dBA	
	Rear: 54 (+3 for reflections) = 57 dBA	
Indoor Leq:	45	
Noise Reduction (dBA):	Side: 15	
	Rear: 12	
Noise Spectrum:	Road/Distant Aircraft	Angle Correction: 0
Absorption:	Medium	

APPROPRIATE ELEMENTS

		STC Rating
Exterior Wall	Side	STC 26
	Rear	STC 23
Window	Side	STC 18
	Rear	STC 15

* Based upon "Controlling Sound Transmission into Buildings", Building Practice Note 56 by National Research Council of Canada, September, 1985.