APPENDIX I

NOISE AND VIBRATION ASSESSMENT REPORT

SS WILSON ASSOCIATES
Consulting Engineers

REPORT NO. WA04-104

NOISE AND VIBRATION IMPACT STUDY
TORONTO TRANSIT COMMISSION
ENVIRONMENTAL ASSESSMENT - SPADINA SUBWAY EXTENSION
DOWNSVIEW STATION TO STEELES AVENUE WEST
TORONTO

SUBMITTED TO:

URS CANADA INC.
75 COMMERCE VALLEY DRIVE EAST
THORNHILL, ONTARIO
L3T 7N9

PREPARED BY:

HAZEM GIDAMY, P. ENG.
PRINCIPAL

FEBRUARY 7, 2006

SSWA INC. 15 Wertheim Court, Suite 211, Richmond Hill, Ontario, L4B 3H7
Tel: (905) 707-5800 Fax: (905) 707-5801 e-mail: info@sswilsonassociates.com
www.sswilsonassociates.com & www.noisetraining.com

NOISE AND VIBRATION IMPACT STUDY
TORONTO TRANSIT COMMISSION
ENVIRONMENTAL ASSESSMENT - SPADINA SUBWAY EXTENSION
DOWNSVIEW STATION TO STEELES AVENUE WEST
TORONTO

1.0 INTRODUCTION

1.1 BACKGROUND

The services of SS Wilson Associates were retained by URS Canada Inc. to carry out a Noise and Vibration Impact Assessment Study for the proposed Spadina Subway Extension from Downsview Station to Steeles Avenue West as part of the overall Environmental Assessment (EA) of the project.

The new EA considered alternative alignments and station locations for the extension of the Spadina Subway from Downsview Station to York University, and a terminal station at Steeles Avenue in the context of a radial extension of the subway into York Region to the north of Steeles Avenue instead of a loop over to the Yonge Subway.

One of the stated purposes of the new EA is to minimize any negative environmental impacts, of which environmental noise and ground-borne vibration are components of.

The objectives of the study are to:

- Participate in the preparation of the Environmental Assessment (EA) Report for the proposed subway line.
- Identify the potential noise and vibration sensitive land uses.
- Determine the existing ambient noise and vibration levels in the vicinity of the proposed subway extension.
- Predict the approximate noise and vibration levels generated by the possible alignment and station alternatives.
- Calculate the potential noise and vibration impacts due to the selected preferred alternative at all potential points of reception.
- Study the feasibility of applying noise and vibration mitigation measures, where warranted, and recommend the necessary noise and vibration mitigation measures.

Figure 1 illustrates the general location of proposed subway extension.

This study is based on the collective efforts of the study team[1] and the TTC representatives. Overall direction on issues related to engineering and the environment were provided by the firms URS Canada Inc. (URS) and LGL Limited (LGL).

This study should, therefore be read in conjunction with the EA document and other background study reports prepared by URS/LGL.

[1] URS Canada Inc., LGL Limited, Golder Associates Ltd., Planning Partnership, Archaeological Services Inc and SS Wilson Associates.

1.2 OVERVIEW OF THE APPROACH

Noise is generally defined as any unwanted sound. In this case, the noise under consideration is the noise associated with the proposed undertaking associated with the Spadina Subway Extension. The Glossary section in Appendix A provides definitions of technical terms to assist in understanding the principles and terminology used in this report. The report considers two main sources of noise, the ground-borne noise due to the movement of the trains along the underground tracks and environmental noise due to bus movements. Noise impact is a comparative evaluation of the new or intruding noise versus the existing or ambient noise in the area. Noise impact is also a comparative evaluation of the new or intruding noise versus a present sound level limit criterion. The degree of noise impact varies depending on the difference between the intruding and existing sound levels, i.e. the higher the intruding sound level is above the existing sound level, the higher the impact.

A combination of quantitative and qualitative approaches to noise and vibration impact assessment has been used in this study to enable the TTC, the study team and the public to deal with the subject of noise and vibration control. The methods used for measurement and prediction as well as the evaluation criteria have been simplified. A single number, the hourly Leq (equivalent sound level) has been used to arrive at an objective and quantitative definition of the noise impact due to situations involving highly variable sound levels, and the “maximum” sound and vibration levels were also used to deal with pass-by situations involving repeatable events.

The preparation of noise and vibration impact assessment is primarily concerned with the documentation and assessment of the changes in noise and vibration as well as comparison with absolute criteria levels in accordance with the following general principles:

1. Assess the existing or future "do-nothing" environment.
2. Predict the future noise and vibration levels of the specific part of the undertaking.
3. Assess the impact relative to the applicable criteria.
4. Recommend noise and vibration control measures, where warranted and where technically and economically feasible.

Due to the nature of the potential sources of noise and vibration, the applicable noise/vibration criteria for the undertaking necessitated evaluation of each source independently as follows:

1. Subway line ground-borne vibration
2. Subway line noise generated inside buildings as a result of ground-borne vibration
3. Bus terminal stations noise generated by bus activities and movements within the property acquired as a bus terminal station property.
4. Added bus movements noise when moving on municipal arterial roads (Finch, Keele, etc.)

1.3 BRIEF DESCRIPTION OF THE UNDERTAKING AND THE STUDY AREA

For the full details on the study area and the existing/future transit and road systems as well as existing and future land uses, reference should be made to the Existing Conditions Report prepared by URS/LGL.

The Study Area

The study area is bounded by:

- Highway 7 to the north
- Sheppard Avenue to the south
- Keele Street, Dufferin Street and Wilmington Avenue to the east
- Black Creek and Edgely Blvd to the west.

Figure 1 illustrates the study area.

Subway Line

Spadina Subway Line presently terminates at Downsview Station in the Sheppard Avenue West/Allen Road area.

The existing section of the Spadina Subway Line will extend from Downsview Station to Steeles Avenue West. Figure 2 illustrates an overall view of the proposed subway extension alignment and proposed subway stations. Figures 3.1 to 3.4 illustrate the locations of the proposed subway and bus terminal stations. The recommended preferred alignment of the subway is shown on the Plan and Profile figures prepared by URS Canada Inc.; Figures 4.1 to 4.10.

Between subway stations, the subway lines will be constructed in twin tunnels that will run parallel to each other except in subway stations.

The invert of the tunnels will generally be 10 metres or more below the ground surface. The vertical alignment of the tunnels can also be seen on the Plan and Profile; Figures 4.1 to 4.10.

Subway Stations

Four underground subway stations are currently being proposed. These stations are shown on the Plan and Profile, Figures 4.4, 4.6, 4.9 and 4.10, and are known as Sheppard West Station, Finch West Station, York University Station and Steeles West Station.

Each station will have a centre platform (i.e. located between the two running tracks). These platforms will be roughly 10 metres wide between tracks and 150 metres long (sufficient to accommodate 6 subway cars).

Bus Terminal Stations

Two bus terminal stations are being proposed; Finch West Station and Steeles West Station where bus traffic will link with two of the subway stations; Finch West Station and Steeles West Station, respectively.

2.0 SOUND AND VIBRATION LEVELS CRITERIA

The proposed Spadina Subway Extension is comprised of two distinct sources of noise and/or vibration. Firstly, between the proposed underground subway stations, the subway trains will be moving in twin tunnels which radiate ground-borne vibration and noise that propagate through the soil to the near-by buildings. The resulting building vibration can cause intrusions in the form of mechanical motion or audible sound within the buildings. Secondly, the 2 proposed bus terminal stations and in particular, the bus movements within the proposed stations property line will produce noise that propagate through the air to the nearby buildings.

A secondary source is the potential additional noise created by the additional bus traffic heading to and from the bus terminal stations when moving along major bus transit routes on the nearby municipal arterial roads where residential buildings could be found.

For the purposes of meeting the Ministry of the Environment (MOE) and the Toronto Transit Commission (TTC) guidelines for the assessment of noise and vibration due to the proposed TTC undertaking, three different criteria have been considered.

Train movements on the subway lines are considered as a rail transit system which will be assessed on the basis of the MOE/TTC Protocol as well as other generally acceptable criteria.

The above-ground stations are considered by the MOE as "Stationary Sources" and the relevant MOE sound level criteria in NPC-205 will apply.

2.1 MOE/TTC SUBWAY NOISE AND VIBRATION LEVELS CRITERIA

The applicable criteria for noise and vibration for this specific section of the proposed extension of the Spadina Subway Line is the MOE/TTC Protocol For Noise and Vibration Assessment For the Proposed Yonge-Spadina Subway Loop", June 16, 1993, a copy of which is included in Appendix B.

Wayside noise and vibration criteria provide a basis for assessing impact and determining the type and extent of mitigation measures necessary to minimize any general community annoyance or minimize interference with any particularly sensitive nearby land use or activity. Noise sensitive land uses generally include existing residential developments, proposed residential developments which have received municipal approval, nursing homes, group homes, hospitals and institutional land uses where noise impact may be detrimental to the functions conducted within such buildings. For the purposes of this Environmental Assessment and in accordance with the MOE/TTC Protocol noise and vibration impacts on commercial and industrial areas generally need not be considered,

except where there are buildings that have vibration sensitive equipment.

In general, for at-grade rail transit operations, both wayside airborne noise and ground-borne vibration impacts need to be examined, although the ground-borne noise is generally masked by the wayside airborne noise. In areas where the rail transit line is in subway, both ground-borne noise and vibration may be perceptible.

The recommended criterion for the maximum ground-borne vibration velocity (rms) level due to rail transit train operations applicable to noise/vibration sensitive land uses is 0.10 mm/sec (A vibration velocity level, Lv, of 0.1 mm/second is equivalent to approximately 71.9 dB reference 10^{-6} inch/second). Due to the extensive data base available to TTC and SS Wilson Associates on previously measured vibration levels along the TTC subway lines, the vibration levels predicted/reported in this document are presented in Lv dB (re 10^{-6} inch/second). The criterion applies to the vertical vibration of the ground surface or floor surface, and it should be applied outdoors and referenced to the building or area under consideration. Ground-borne vibration which complies with the recommended design criterion will hardly be imperceptible in all cases. However, the level will be sufficiently low so that no significant intrusion or annoyance should occur.

With regards to the application of the vibration criterion, the MOE/TTC Protocol specifically excludes vibration due to maintenance activities on the subway line.

It is also important to note that while the MOE/TTC Protocol recognizes that ground-borne vibration can produce air-borne noise inside a structure, it does not provide any direction on such noise criteria and instead, relies on the above-noted vibration criterion.

Due to the presence of fairly noise-sensitive institutional land use in close proximity to the proposed subway, we are recommending that the objective criterion for ground-borne noise due to transit train operations applicable to noise-sensitive land uses be 35 dBA. Ground-borne sound levels which meet this criterion are likely to be audible in all cases, but should be low enough that no significant intrusion or annoyance would occur. The maximum ground-borne sound and vibration levels, recommended herein, are the averages of the maximum levels occurring as the vehicle passes by, usually a 1 to 4 second averaging time.

It is important to note that ground-borne noise impact on general non-sensitive commercial and industrial areas need not be considered as per the MOE direction.

Other Recommended Subway Line Sound and Vibration Levels Criteria

As stated above, the MOE/TTC June 16, 1993 Protocol does not address a number of applications which are of immediate concern to the TTC in this undertaking. The importance of this project to the TTC as far as noise and vibration are concerned stems from several critical considerations, which are briefly summarized as follows:

a) Unlike the recently constructed Sheppard Subway Line, where the entire alignment was selected and constructed below Sheppard Avenue (i.e. away from the nearby buildings); the proposed Spadina Subway Extension must pass directly under, or in very close proximity to numerous buildings.

b) There are a number of public institutional buildings which serve a vital key national role that are bound to be placed directly over the proposed alternative subway alignments with possible negative impacts due to noise and vibration.
c) The subway alignment is also bound to be under numerous industrial and commercial businesses in the large industrial parks, one or more of which may have a sensitive manufacturing or a lab process that is sensitive to noise and vibration.

Accordingly, the past practices of the TTC and other jurisdictions in North America were researched, based on which we are recommending the use of supplementary noise and vibration criteria to reduce the potential impacts on buildings that are sensitive to subway vibration and noise.

The following Table 1 lists the recommended supplementary criteria used in this study:

TABLE 1
RECOMMENDED SUPPLEMENTARY SUBWAY LINE
NOISE AND VIBRATION CRITERIA

Land Use	Recommended Vibration Velocity Level Criteria, Lv*[1]	Recommended Indoor Sound Criteria
Houses and Townhouses	70 dB	35 dBA
Apartment Building (concrete)	70 dB	35 dBA
Institutional	70 dB	35 dBA
Commercial	75 dB	40 dBA
Industrial	80 dB	45 dBA
Sensitive Buildings	65 dB	30 dBA

Note: Lv is in reference to 10^{-6} in/sec

2.2 BUS TERMINAL STATIONS SOUND LEVEL CRITERIA

All sources within a bus terminal station are to be treated as a Stationary Source that is subject to the MOE's Publication NPC-205 (i.e. the higher of either the ambient sound levels or the exclusion limits for hourly Leq sound levels included in NPC-205).

The MOE advises that daily operations within a terminal station, whether mobile or stationary, will be regarded as part of the stationary source.

The criteria used in this study are based on the guidelines prepared by the MOE for the assessment of planned "Stationary Sources" of sound, Publication NPC-205. A copy of the criteria is also included in Appendix B of this Report.

The predicted and/or measured 1 hour equivalent sound level (Leq) of existing or future-do-nothing road traffic is normally compared with the predicted and/or measured 1 hour equivalent sound level (Leq) from the facility. Other applicable criteria are also referred to in the MOE publication.

In situations where the ambient is not significant, then the Ministry exclusion limits criteria contained in their Publication NPC-205 apply.

2.3 SOUND LEVEL CRITERIA FOR BUS MOVEMENTS ON MUNICIPAL ROADS

MOE's recommendations for bus noise impact when moving on municipal roads is that the noise should be assessed on "an 16/8 hour (day/night) basis, 07:00 – 23:00 and 23:00 – 07:00". In addition, the MOE's criteria is Leq day 55 dBA and Leq night 50 dBA, or the ambient in either period, whichever is higher and that similar provisions to the MOE/MTO Noise Protocol also apply; i.e. "control measures need be applied only if the excess is more than 5 dBA". For the purposes of this project, the existing ambient is the existing or the future-do-nothing vehicular traffic on the municipal roads (vehicular traffic including associated bus traffic without the newly added bus terminal stations bus traffic).

2.4 GENERAL IMPACT ASSESSMENT GUIDELINES FOR NOISE

The sound level criteria are also related to the existing ambient noise and vibration. Should the projected TTC undertaking levels exceed the ambient, the impact on a noise-sensitive receptor may be determined by comparing the projected facility levels with the established ambient levels.

The following Table 2 outlines the generally accepted impact assessment ratings based on the significance of the excess above the established existing ambient levels:

TABLE 2
NOISE IMPACT ASSESSMENT

IMPACT ASSESSMENT TABLE	
EXCESS/CHANGE	**IMPACT RATING**
0 TO <3	Insignificant
=>3 TO <5 dBA	Noticeable
=5 To <10 dBA	Significant
=>10	Very Significant

3.0 PRELIMINARY ASSESSMENTS OF THE INDICATORS FOR NOISE/ VIBRATION AND ALTERNATIVE ALIGNMENTS

At the outset of the project, and in the absence of detailed and site specific information on the proposed alignment/locations, the potential sources of noise, receptor locations and to assist members of the study team, a set of quantifiable "indicators" were developed based on preliminary or rough estimates only of the resulting noise/vibration levels. The use of such indicators for noise became necessary in order to compare alternative alignments/locations of the various components of the Spadina Subway undertaking.

With knowledge of the applicable noise/vibration level criteria, typical noise/vibration emission levels from each system component and typical noise/vibration propagation factors, the indicators were presented in the form of conservative or "first-cut" distance setbacks to meet the objectives. It must be emphasized, however, that such distances were intended for comparative evaluations only.

3.1 INDICATORS FOR NOISE/VIBRATION IMPACTS

Section 2.0 of this Study contains the details related to the applicable noise/vibration levels criteria which is the first ingredient in the indicators.

With knowledge of typical noise/vibration levels generated by subway trains, buses, etc., it was possible to construct simple noise (or distance setback in this case) prediction models for such sources.

The following is a summary of the approximate range of distances from various sources of noise that correspond to different levels of impact ratings.

(i) Transformer Sub-Stations (Electrical)

Distance	Impact Rating
0 - 10m	Very Significant
10 - 15m	Significant
15 - 30m	Noticeable
30 - 60m	Marginal
Over 60m	No impact

(Distances are measured from the centre of a sub-station)

(ii) Bus Stations

Distance	Impact Rating
0 - 50m	Very Significant
50 - 100m	Significant
100 - 150m	Noticeable
150 - 200m	Marginal
Over 200m	No impact

(Distances are measured from the centre of the station site without any acoustic shielding by buildings)

(iii) Subway Trains Underground

Ground-borne vibration/noise are the issues in this case.

(a) Low Density Residential

Distance	Impact Rating
0 - 10m	Significant
10 - 25m	Noticeable
25 - 90m	Marginal
Over 90m	No impact

(b) High Density (Apartment) Residential/Institutional

Distance	Impact Rating
0 - 6m	Significant
6 - 20m	Noticeable
20 - 60m	Marginal
Over 60m	No impact

(c) Sensitive Type Commercial/Industrial Buildings

Distance	Impact Rating
0 - 6m	Very Significant
6-11m	Significant
11-18m	Noticeable
18-37m	Marginal
Over 37m	No impact

(All distance to be measured from centre line of subway alignment)

(iv) **Construction Sites At Stations (over the Box)**

Distance	**Impact Rating**
Less than 50m	Serious
50 - 100m	Very Significant
100 - 200m	Significant
200 - 250m	Noticeable
Over 250m	No impact

(Distances are measured from centre of subway station construction site).

With knowledge of the degree of impact (Impact Rating), the number and type of affected buildings, it was possible for the study team to compare the different alternative alignments and to also rank their order of preference.

3.2 RANKING, WEIGHTING FACTORS AND RATIONALE FOR DEVELOPING AND COMPARING ALTERNATIVES

It is not the intent of this section to provide full details on how the alternative alignments of the subway line or the bus terminal station locations were selected and ranked, nor how the selected preferred options were arrived at. The objective of this section is however, to provide background information on the rationale used to develop this work. For detailed information on this phase of the EA assignment, reference should be made to the reports prepared by URS and LGL.

1. EA Evaluations

The following Tables 3 and 4 illustrate the previously recommended inventory of existing and future conditions, factors/subfactors for noise and vibration assessment, and analysis of constraints:

TABLE 3
INVENTORY OF EXISTING AND FUTURE CONDITIONS FACTORS/SUB-FACTORS FOR NOISE AND VIBRATION ASSESSMENT ONLY

ENVIRONMENTAL FACTOR/SUB FACTOR	DATA TO BE COLLECTED	DATA SOURCE
1) Transportation System b) Roads	APPLIES TO ROAD NETWORK WHERE NEW BUS TRAFFIC WILL BE ADDED • Road data – Existing and planned r.o.w. and number of lanes – Existing and planned traffic parameters: ▪ Daily traffic volumes (split: day/night) ▪ Cars/trucks/bus percentages (day/night) ▪ Speed ▪ Specific area having substantial road gradients (>4%) • Number of residences fronting onto road • Number of residences backing onto road	– Traffic counts – Tentative bus schedules – Projections – Field investigations
1) Transportation System b) Future Transportation Links (Terminals and major stations/nodes)	APPLIES TO AREAS SURROUNDING POSSIBLE BUS TERMINALS/MAJOR STATIONS/NODES Preliminary Stage • Generic Terminal area requirement (Area is sufficient) • Expected bus movements (Day/night split) • Approximate location(s) or alternatives • Existing road and traffic parameters on the near-by arterial road(s). • Number of residences within: 0–100m 100–200m 200-300m Particular attention should be paid to apartment buildings within 300m from terminals. **Detailed Investigation Stage** • Possible Terminal property outline • Expected hourly bus movements/schedules • Existing road and traffic parameters on the near-by arterial roads • Detailed base maps to a scale of 1:1,000 showing outline of buildings within 500m radius from Terminal outlines	– TTC Files – Historic data on bus movements in Terminals – Field investigations – Existing hourly traffic counts – Historic schedules for buses in Terminals – Field investigations
2) Socio-Economic	**Preliminary Stage** • Identify the number of residential buildings within 100m	– Field investigations

ENVIRONMENTAL FACTOR/SUB FACTOR	DATA TO BE COLLECTED	DATA SOURCE
Environment b) Noise and Vibration	from the subway corridor • Identify the number of commercial/industrial buildings within 100m from the subway corridor • Identify community/recreation/institutional facilities within 100m from the subway corridor. Each category to be counted separately. **Detailed Investigation Stage** • Conduct measurements of baseline noise and vibration levels in the Primary study area as per TTC Exhibit 4 TOR. • Predict future subway noise/vibration levels at specific points of reception, especially very-sensitive receptors.	– Review of detailed base maps. – Field measurements – MOE/TTC Protocols – Prediction models developed by SSWA

TABLE 4
ANALYSIS OF CONSTRAINTS IN THE STUDY AREA

Constraints	Severity	Rationale	Analysis	Conclusions
Businesses	Absolute Relative	While the general principle is to isolate subways under vibration/noise sensitive businesses, there are several limited types of businesses, which are very sensitive to vibration such as those employing electron microscopes, metrology labs, precision manufacturers and studios. For such very sensitive uses, the Absolute rating could be a distance setback of 200± m, while for reasonable uses the Relative rating is acceptable with controls.	At this stage, there is no building specific information on the users. The use of a distance setback of 200m is acceptable for a start for the Absolute case.	All businesses were treated equally as having a certain degree of sensitivity to noise and vibration irrespective of their existing indoor ambient levels or use.
Residents/ Residences	Relative	Noise and vibration could be mitigated within the subway	The proposed Sheppard Avenue	The Keele Street station requires

Constraints	Severity	Rationale	Analysis	Conclusions
		and within the stations. For the subway, the number of residences within 100m can be mitigated. For stations, the impact may reach up to a distance of 300m. Mitigation measures could still be implemented for low/medium density. For high density, a minimum distance setback of 300m is recommended.	station and the station south of Finch Avenue could be mitigated, while in Keele Street (north of Finch) station the presence of numerous apartment buildings necessitates a large distance setback. The York University Campus station is also sensitive depending on proximity classes and offices.	immediate attention. The York University Campus station will also require more precision analysis of its location.
Community/ Recreational/ Institutional Facilities	Relative Absolute	The Absolute rating pertains to vibration/noise sensitive labs in York University in a like manner with the Business categories.	At this stage, there is no building specific information on the possible vibration/noise sensitive laboratories on campus.	Cannot screen out the laboratories in the first cut until further information on the specific labs; if any, become available.

Notes:

1. Two distinct categories in connection with traffic noise impacts:

   a) Traffic movements on local municipal streets, especially as one gets closer to the station and in particular on less busy streets that currently do not have bus traffic.
   b) Traffic movements within the stations themselves.

   The reason for this is that the MOE sound level criteria for roads are substantially different from the applicable criteria for noise due to stations.

2. The Comparative Evaluation criteria for road noise and stations noise are also different as follows:

   For Roads: The assessment is based on the number of residences along the first row of dwelling units that may be subject to level changes above the existing ambient noise by: Δ (or change)
   = 0 - 5 dBA increase
   = 6 – 10 dBA increase
   > 10 dBA increase

   For Bus Stations: The assessment is based on the number of residences in the various sound level zones around stations (e.g. 50 – 55, 56 – 60, 61 – 65 dBA, etc.), which are approximately related to the distances provided in other Tables e.g. 0-100m, 100-200m and 200-300m.

3. For the Sub-Factors "Noise & Vibration", the following was recommended for consideration:

   a) The more prominent factor is the "operation noise and vibration", followed by the less important factor which is "construction noise and vibration".

   The shown indicators "0-5 dBA Leq, 5-10 dBA, etc. are acceptable. The use of absolute sound levels based on the series of criteria in the MOE/MTO Protocol could also be stated in this simple form.

4.0 ANALYSIS AND RESULTS

4.1 AMBIENT NOISE AND VIBRATION – SUBWAY LINE IMPACT ASSESSMENT

1. Existing Conditions

For the proposed Spadina Subway Extension, the potential for higher levels of ground-borne vibration level, and the resulting low frequency "rumble" are two of the most important factors to consider for noise/vibration sensitive land uses located in close proximity to the subway alignment.

The general range of noise/vibration sensitive land uses encompasses residential dwellings/buildings, institutional facilities including heritage buildings (impact on the structures and/or the artifacts), hospitals, group homes, places of worship and certain commercial/industrial establishments.

The MOE and the joint MOE/TTC Protocol as well as the general EA practices for noise/vibration rely on a series of absolute and relative noise/vibration criteria. The relative criteria recognize the importance of the "existing" background/ambient noise/vibration conditions for impact assessment purposes.

The dominant sources of ambient noise in the study area are essentially the highways, major arterial roads and major collectors with existing bus traffic on these roads. Of less significance (more localized nature) is the noise due to the commercial/industrial buildings/establishments themselves. The dominant sources of vibration in the area are the bus movements on the arterial roads and collectors, rail traffic on the CN line and internally generated vibration levels in industrial buildings and offices.

The predominant vibration source is vehicular traffic on the municipal arterial roads and also other intersecting major arterial roads. The results of the ambient vibration levels measured by the TTC in 1983 and 1984 indicate vibration levels in the range of 38-42 dB re 1ug. The low vibration levels measured are typical of rubber tired vehicles and are probably imperceptible to most residents. However, locally higher vibration levels occur near the existing CN railway tracks when heavy rail vehicles are passing.

The actually measured ambient sound and vibration levels are presented in the section to follow related to the selected points of reception.

4.2 POINTS OF RECEPTION

The Existing Conditions Report prepared by URS and LGL contains detailed information on the existing land use, socio-economic environment and planned land use within the study area.

As far as the points of reception are concerned, the existing land uses in the study area show that approximately 65% of the study area is commercial/industrial while the remaining 35% of the area consists of well-established residential neighbourhoods. The study area also contains a number of schools and places of worship, heritage buildings, and several institutional buildings within the York University Campus and numerous apartment buildings.

It must be emphasized however, that not all the identified locations in the Existing Conditions Report are considered as “points of reception” for detailed assessment of the noise/vibration impacts as directed by the MOE criteria. Instead, the URS/LGL information was used to study the alternative alignments and locations of the various components of the undertaking and rank them as described earlier.

In summary, the overall study area contains the following land uses, which would be of immediate interest for noise/vibration assessment depending on their relative locations to the various sources:

- Community and Recreation Centres
- Buildings containing Emergency Services (police, fire, ambulance, emergency treatment centre in hospitals, etc.)
- Child care centres
- Schools (public, private and separate)
- Major learning institutions (York University)
- Places of worship
- Residential (low, medium and high density-buildings)

Other land uses in the study area which may be of concern are those that contain vibration-sensitive equipment which include institutional, commercial, industrial and mixed commercial/industrial land uses reported to have critical operations as confirmed by site-specific investigations.

All buildings/facilities in the study area have been identified and were given a “facility Number” in the Existing Conditions Report which were subsequently used for the evaluation of the alternatives by URS-LGL.

a. <u>Receptors along the subway line</u>

Receptors within a distance setback of 100 metres from the centreline of the closest subway track have been considered. Based on our detailed field investigation and for the purpose of implementing different criteria, the selected receptors included residential, commercial, industrial, institutional and mixed land uses.

As the study team approached all the businesses and facilities located within an area of influence from the subway line alignment alternatives, some of the businesses and facilities

indicated that their operations may be affected by the subway and requested site-specific inspections, measurements of their ambient noise/vibration and assessment of their potential impact.

Based on the feedback received by the study team from the businesses in the study area, a decision was made to visit specific businesses, to interview the owners/operators of such businesses and to also take ambient noise and vibration level readings.

Of all the reported businesses, it is our finding that a limited number of such businesses could be considered as potential noise/vibration sensitive which are listed below in Table 5:

TABLE 5
BUSINESSES/FACILITIES SELECTED FOR FURTHER INVESTIGATION

Address	Name	Nature of Business	Reason for Sensitivity to Noise/Vibration	Notes
30 St. Regis Crescent North	Incredible Printing	Printing Plant (industrial)	Machines sensitive to vibration	Investigated
3811 Keele Street	Sunoco Gas Station	Service Station (commercial)	Underground fuel tanks	Investigated
3720 Keele Street	Sunoco Gas Station	Service Station (commercial)	Underground fuel tanks	Investigated
333 Rimrock Road	Canadian Custom Packing Company	Chemical Plant (industrial)	Laboratories with sensitive scales	Investigated
156 St. Regis Crescent South	The Forever Group	Car Wash Products (commercial)	Computer/Server Room	Investigated
4000 Chesswood Drive	Chesswood Arena	Indoor hockey (commercial)	Hockey ice surface	Investigated
3725 Keele Street	DeMarco Funeral Home	Funeral Home (institutional)	Chapel/Visitation Rooms	Investigated
41 Toro Road	Arbor Tools Ltd.	Mechanical Shop (industrial)	Precision tools with small tolerances	Investigated
30 Tangiers Road	CAW Local 112	Union Office (commercial)	Meeting Halls/Rooms and Computers	Investigated
53 Bakersfield Street	Spring Air Canada	Mattress manufacturing Plant (industrial/ commercial	Computers/servers and precision machinery	Investigated
250-330 Rimrock Road	John Vince Foods	Food Packing & Distribution Plant (industrial)	Infra-red scanning devices and multiple storage racks	Investigated
14 Toro Road	International Glass and Mirror Co. Ltd.	Retail Outlet (commercial)	Stored large sheets of glass	Investigated
39 Kodiak Crescent	Tectrol Inc.	Computer Components Manufacturing Plant (industrial)	Precision machinery	Investigated

TABLE 5 CONT'D

Address	Name	Nature of Business	Reason for Sensitivity to Noise/Vibration	Notes
1 Whitehorse Road	The Music Lab	Repair Shop of Musical Instruments (commercial)	Not at the present time	Investigated
1315 Finch Avenue	n/a	Office & retail units (commercial)	n/a	Not Investigated
1230 Sheppard Avenue	n/a	Office building (commercial)	n/a	Not Investigated
3675 & 3685 Keele Street	n/a	Office & retail units (commercial)	n/a	Not Investigated
3645 Keele Street	n/a	Office & retail units (commercial)	n/a	Not Investigated
3701 Chesswood Drive	n/a	Office building (commercial)	n/a	Not Investigated
York University	Lumbers	Educational (institutional)	Lecture Halls and laboratories including electron microscopes	Investigated
York University	Stedman Lecture Halls	Educational (institutional)	Lecture Halls	Investigated
York University	Seymour Schulich Building	Educational (institutional)	Lecture Halls	Investigated
York University	Seneca @ York	Educational (institutional)	Lecture Halls & Test Centre	Investigated
York University	Winters Residence	Student Accommodation (residential)	Sleeping quarters and study rooms	Investigated
York University	York Lanes Retail Centre	Retail Units (commercial)	n/a	Not Investigated[1]
York University	Vanier College	Educational (institutional)	n/a	Not investigated[2]
York University	Farquharson Life Sciences	Educational (institutional)	Lecture Halls & Electron Microscopes	Not Investigated[2]

Notes:

[1] The existing uses in this building are retail uses which are not particularly sensitive to noise and vibration due to the existing high ambient levels, there are no vibration sensitive equipment and the fact that all visitors to the building are short term transient. Retail businesses are, in general, compatible with transportation corridors and they gain benefit from their proximity.

[2] Both buildings are located at considerable (acoustically speaking) distance setbacks from the proposed subway alignment. Both buildings are not envisaged to be exposed to noise and vibration impacts even when they were assessed based on very stringent noise and vibration criteria for the so called" sensitive buildings". These criteria are more stringent than the MOE criteria. The reason for not taking any noise and vibration ambient readings within these two buildings is owed to their distance setback and the previously predicted no noise or vibration levels when the alignment was set away from these two buildings.

The sensitivity of the above-noted buildings stems from several possible reasons which are summarized as follows:

i. Manufacturing processes using precision tools with small tolerances.
ii. Laboratories employing noise/vibration sensitive test equipment.
iii. Structural damage to some equipment such as underground fuel tanks.
iv. Video/audio conferencing facilities.
v. Lecture halls where speech communication is a vital component.
vi. Sound reproduction studios

The details of the investigations at the above-noted properties are included in Appendix D, the results of which are summarized in Table 6 below:

TABLE 6
MEASURED AMBIENT NOISE AND VIBRATION LEVELS

Address	Name	Range of Measured Ambient Levels	
		Vibration Velocity, dB (ref. 10^{-6} in/s)	Noise Level, dBA
30 St. Regis Crescent North	Incredible Printing	56 – Average (52-60) - Range	65 – Average (63-69) - Range
3811 Keele Street	Sunoco Gas Station	40 – Average (34-45) - Range	--
3720 Keele Street	Sunoco Gas Station	40 – Average (35-47) - Range	--
333 Rimrock Road	Canadian Custom Packing Company	44 – Average (35-51) - Range	56 – Average (49-63) - Range
156 St. Regis Crescent South	The Forever Group	45 – Average (39-48) - Range	59 – Average (59-61) - Range
4000 Chesswood Drive	Chesswood Arena	65 – Average (57-71) - Range	61 – Average (60-87) - Range
3725 Keele Street	DeMarco Funeral Home	39 – Average (34-47) - Range	46 – Average (42-56) - Range
41 Toro Road	Arbor Tools Ltd.	46 – Average (38-50) - Range	71 – Average (70-74) - Range
30 Tangiers Road	CAW Local 112	40 – Average (35-45) - Range	43 – Average (37-51) - Range

Address	Name	Range of Measured Ambient Levels	
		Vibration Velocity, dB (ref. 10^{-6} in/s)	Noise Level, dBA
53 Bakersfield Street	Spring Air Canada	50 – Average (47-53) - Range	76 – Average (67-81) - Range
250-330 Rimrock Road	John Vince Foods	43 – Average (39-45) - Range	61 – Average (42-69) - Range
14 Toro Road	International Glass and Mirror Co. Ltd.	34 – Average (34-46) - Range	61 – Average (49-72) - Range
39 Kodiak Crescent	Tectrol Inc.	60 – Average (41-69) - Range	Production Area: 64 – 72 dBA - Range Offices/Labs: 51 – 56 dBA - Range
York University	Lumbers	Summer: 41 – Average (35-46) – Range Fall: 41 – Average (35-45) - Range	54 – 63 dBA - Range
York University	Stedman Lecture Halls	Summer: 43 – Average (34-56) – Range	43 – 45 dBA - Range
York University	Seymour Schulich Building	Fall: 40 – Average (34-46) - Range	33 – 45 dBA - Range
York University	Seneca @ York	Fall: 38 – Average (34-43) - Range	43 dBA
York University	Winters Residence	Summer: 41 – Average (34-51) – Range Fall: 40 – Average (35-46) - Range	45 – 53 dBA - Range

b. <u>Receptors near the subway stations area</u>

For the purpose of studying the noise impact of each of the two stations two receptor locations have been selected around each station. Figures 3.2 and 3.4 show these receptor locations and also illustrate the tentative station arrangement without considering the sound attenuation due to the station building itself or due to other intervening buildings.

4.3 POTENTIAL SOURCES OF AIR-BORNE NOISE

This section describes the potential sources of environmental (air-borne) noise and the resulting sound levels as well as the potential for mitigation.

i. Subway Noise Emitted Through Ventilation Shafts

Since the entire subway line is underground, there should be no air-borne noise impacts from the subway vehicles. The only potential for hearing subway vehicle noise at the surface is from station ventilation fans and ventilation shafts. The only vent shaft noise complaints previously received by TTC have been where the shafts coincide with special trackwork and the shafts are very close to residential units located away from major roadways. The proposed subway alignment drawings show the locations of several ventilation shafts which are located in proximity of buildings that are mostly not sensitive to noise. While the ambient noise due to traffic is the dominant source of noise, the noise due to the subway may occasionally be audible through the proposed ventilation shafts in particular during traffic lulls.

These shafts can be acoustically treated to lower noise to acceptable levels. The acoustical treatment may involve the use of lined turns and bends, partial barriers/enclosure near the ground surface and the application of special sound absorbing material to the inside walls of the shaft. The issue of noise in this case is considered as a routine technical matter for detailed design purposes.

In addition, ventilation fans may be located at each station and at the emergency service buildings. The fans at the emergency service buildings are used only during train emergencies, so operating noise is not a relevant consideration. The fans at the stations, however, are used on a more regular basis. Noise from the fans at the stations may not be a problem and street level noise criteria can be met by the use of fan silencers and shaft attenuation materials. Locating fans near the tracks rather than at street level can also help if there are turns in the shafts. This is also considered as a routine technical design factor.

A brief overview of the stations is as follows:

a) Sheppard West Station

There are four ventilation shafts shown which will be of no concern due to the facts that there are no close-by residential receptors for a few hundred meters and also due to the high ambient noise from Sheppard Avenue West.

b) Finch West Station

There are four ventilation shafts shown of which two are located in commercial zones with very high ambient noise due to traffic in the Finch Avenue and Keele Street area and the commercial land use itself.

The other two shafts are located at shorter distance setbacks from a high-rise apartment building in the presence of high ambient noise due to Keele Street and to a lesser extent due to Finch Avenue. Both shafts could greatly benefit from the addition of straight-forward noise control measures described briefly above.

c) York University Station

There are two ventilation shafts shown which are not located in a noise-sensitive area and therefore there is no concern from these shafts.

d) Steeles West Station

The presence of ventilation shafts in the area of this station will not be of concern as there are no noise sensitive areas in close proximity to this station.

ii. Bus Terminal Stations Noise

Bus terminals are potential sources of noise when located in the proximity of noise-sensitive buildings.

Certain ancillary facilities will be provided at some of the subway stations in order to facilitate passenger arrivals and departures. The types of facilities proposed include bus platforms, terminals and passenger pick-up/drop off areas. The extent of these facilities will vary from station to station and is described in more detail in the following paragraphs.

The Finch Avenue bus terminal location is shown in Figure 4.6, which is dedicated to TTC buses only. The two primary sources of concern are the existing commercial/retail stores located immediately east of the station which are represented by receptor POR1. The receptor to the west is an apartment building located on the west side of Keele Street, denoted POR2. Both receptors POR1 and POR2 are also currently exposed to varying degrees of ambient noise levels due to road traffic.

The proposed Steeles Avenue West bus terminal station shown in Figure 4.10 is somewhat more complex as three bus terminal stations are planned to serve the Spadina Subway station at Steeles Avenue; TTC bus terminal station, GO Transit bus terminal facility and York Region Transit bus terminal facility. There are no residential buildings within several hundred metres from any of the bus facilities. The only potential points of reception are the building on York University Campus, denoted POR3 and the office component of an industrial building north of Steeles Avenue, denoted POR4.

In order to predict the future sound levels due to the above-noted bus facilities, we relied on the bus and vehicular traffic information supplied by URS (only the 1 hr am and 1 hr pm peak values were available) and the stationary sources noise calculation model developed by SS Wilson Associates to handle complex evaluations described below.

a) Sound Level Prediction Model for Bus Terminals

A 3-D computer program for multiple point and line sources and multiple receivers was used to calculate the sound levels. The program takes into account:

- Reference sound levels and reference distances for the bus moving, idling and accelerating in each area of the subject stations, i.e. sound emission levels.
- The Cartesian co-ordinates (x, y & z) of all sources and receivers.
- The number of buses or occurrences of the noise in a given time period and the time period of each event.
- Spherical divergence factor.
- Additional attenuation due to sound barriers; natural or man-made types (none was assumed).
- Additional attenuation due to ground (as modified by sources/receiver elevations, the presence of intervening barriers and the type of ground). The ground cover was assumed to be reflective in this case.
- Atmospheric attenuation due to air molecular absorption.

b) Bus and Road Traffic Data

Appendix C includes the traffic data provided by URS on the AM/PM peak hours bus volumes to and from the stations as well as the background vehicular traffic on the nearby municipal arterial roads.

The following is a summary of the bus and traffic volumes:

Finch West Station:
- Bus traffic AM/PM Peak Hours: ~100 buses
- Finch Avenue corresponding hour traffic: ~2500-2900 vehicles
- Keele Street corresponding hour traffic: ~2200-2500 vehicles

Steeles West Station:
- Bus traffic AM/PM Peak Hours: ~150 TTC buses and ~270 GO & YRT buses
- Steeles Avenue West corresponding hour traffic: ~3300-3600 vehicles

c) Results

The following Tables 7 and 8 contain a summary of the predicted ambient sound levels, the bus facility sound levels and the impact assessment. Sample calculations are included in Appendix E.

TABLE 7
FINCH WEST BUS TERMINAL STATION

Worst Case Selected Receptor Code	Predicted Bus Station Noise Leq 1 hr.	Predicted Ambient Noise Leq 1 hr.	Predicted Excess Sound Level	Significance of the Noise Impact
POR1	76 dBA	66 dBA	10 dBA	Significant
POR2	64 dBA	68 dBA	n/a	n/a

TABLE 8
STEELES WEST BUS TERMINAL STATION

Worst Case Selected Receptor Code	Predicted Bus Station Noise Leq 1 hr.	Predicted Ambient Noise Leq 1 hr.	Predicted Excess Sound Level	Significance of the Noise Impact
POR3	63 dBA	63 dBA	n/a	n/a
POR4	62 dBA	65 dBA	n/a	n/a

From the above results, the following is concluded:

Finch West Station: A significant impact is predicted at the adjacent commercial building to the east. The severity of this impact is lessened by the presence of high ambient noise due to Keele Street/Finch Avenue traffic and by the significant reductions in the bus station traffic during the off-peak hours. On the other hand, no noise impact is predicted at the residential apartment building located west of Keele Street due to its distance setback and the presence of high ambient noise levels.

Steeles West Station: No noise impacts are predicted at the nearby institutional and commercial/industrial buildings due to their distance setbacks and the presence of high ambient noise levels.

iii. On-Street Bus Noise

Bus noise on the near-by municipal arterial roads are predicted to increase as a result of the subway. The number of buses using some other streets, however are also likely to decrease and may marginally reduce the ambient sound levels.

In order to predict the potential traffic noise impacts due to the Spadina Subway undertaking, it was necessary to review the background traffic volumes and composition prior to the undertaking and the corresponding traffic volumes and composition as a result of the undertaking alone, and in particular the added bus traffic on the municipal streets in the immediate vicinity of the two bus terminal stations.

Appendix C contains the relevant URS traffic data used for noise assessment.

Due to the linearity of the road system near the stations and the presence of different types of residential land uses along these roads. The selected receptor locations assumed to be at a distance of 25m from the centre lines of the selected municipal arterial roads in proximity to the two bus terminal stations.

The MOE model for predicting road traffic noise, ORNAMENT, was used to predict the overall traffic sound levels prior to and with the undertaking.

a) Results

The following Table 9 summarizes the predicted traffic sound levels in close proximity to the Finch West bus station. Sample calculations are included in Appendix E.

TABLE 9
TRAFFIC NOISE IMPACT NEAR FINCH WEST BUS TERMINAL STATIONS

Predicted Leq Ambient Sound Level Due to Traffic Without the Station	Predicted Overall Sound Levels with the Station Bus Traffic	Predicted Excess Sound Level	Significance of the Noise Impact
72 dBA – Finch east of Keele	72 dBA	n/a	n/a
69 dBA – Finch west of Keele	70 dBA	1 dBA	Insignificant
69 dBA – Keele north of Finch	70 dBA	1 dBA	Insignificant
70 dBA – Keele south of Finch	70 dBA	n/a	n/a

From the above results, the following is concluded:

Finch West Station area: Insignificant impacts are predicted in the area surrounding this bus station. These impacts are due to the additional bus traffic on the sections of Keele Street and Finch Avenue leading to/from the station.

Steeles West Station area: No noise impacts are predicted in the area surrounding this bus station as there are no residential properties or other noise sensitive areas along the roads leading to/from the station.

iv. Electrical Substations

Electrical power will be distributed from the local hydro authority to both the stations and the track work system. In order to facilitate this, several indoor and outdoor electrical substations are being planned along the route to serve the system's power requirements. With a typical substation level of 68 dBA @ 1 metre, the calculated sound level is approximately 60 dBA at 10 metres (including a 5 dB correction for the tonal character of the transformer noise). This sound level may be audible at night during traffic lulls. The actual sound levels from the future transformer stations are dependent on the exact location of the stations, their design and layout. Any consideration for noise mitigation; where found necessary, could be easily accommodated during the detailed design process. The use of sound barriers, equipment orientation and distance setback are examples of such controls, if required.

4.4 ANALYSIS OF THE SUBWAY GROUND-BORNE SOUND AND VIBRATION LEVELS

1. INTRODUCTION

Operations of subway rail transit system results in ground-borne vibration which is transmitted from the track structure to the adjacent buildings through the intervening geological strata. The vibration of the rail is transmitted through the fastener into the transit structure and the vibration radiated from the structure propagates through the soil to the buildings located close to the subway.

The ground-borne vibration originates at the wheel/rail interface as a result of the vibration generated by the wheels rolling on the rails. Several factors affect the level of vibration including the degree of roughness or smoothness of the wheels and rails, the characteristic dynamics of the transit vehicle and its primary suspension, the speed of the train, the type of track fixation and the type of soil through which the vibration propagates.

The resulting building vibration can cause intrusion either because the mechanical motion is perceptible or because of an audible low frequency rumble caused by the sympathetic vibration of the building walls, ceilings and floors.

In areas where the transit line is in a subway, both ground-borne noise and vibration may be perceptible.

Other important factors which affect the level of generated ground-borne vibration and noise include the presence of switches normally used at crossovers due to the inherent gap and the presence of joints; if any, between adjoining sections of a track.

2. EVALUATION OF THE GROUND-BORNE SOUND AND VIBRATION LEVELS

The basis for evaluating expected ground-borne sound and vibration impacts along each segment of the proposed subway is the actual extensive operational data measured and reported by the TTC along the Yonge Subway Northern Extension (YSNE) and along the

Bloor-Danforth Subway (BDS), as well as the recent vibration measurements conducted by SS Wilson Associates along the Sheppard Subway line.

The extensive studies conducted by TTC and its consultants in connection with the YSNE and BDS provided valuable data related to the characteristics of the ground-borne vibration using information on the wheel/rail interface area relative to the following factors:

- Type of subway structure.
- Type of train and train speed.
- Geological conditions.
- Distance from the subway.
- Noise radiation characteristics of adjacent buildings.
- Dynamics of the rail/structure and rolling stock.
- Effects of rail and wheel conditions.
- Effects of vibration isolation measures.

It should be noted that the previous TTC vibration studies are all reported in terms of 1/1 and 1/3 Octave Bands RMS acceleration levels as well as overall un-weighted vibration acceleration levels in dB ref. 10^{-6}g.

The following paragraphs summarize the parts of the TTC results which are of interest to this proposed undertaking and which demonstrate the effectiveness of the various investigated vibration control measures:

a. The ground-borne vibration and noise from subway train operation has a very narrow band frequency characteristics indicating that the transmission path from the subway trains to the buildings has a filter like characteristic with maximum transmission at about 50 Hz. This was observed for all of the measurements.
b. Measurements of ground-borne vibration by TTC showed that one of the differences in the levels of vibration was the effect of subway structure type. Higher levels were measured adjacent to the lighter weight tunnel structure compared to the concrete double box structure. The results of our re-examination of the TTC data sets in terms of vibration velocity levels showed these variations to be somewhat insignificant at most of the distances of concern.
c. The vibration levels reduce with distance from the tunnel in a normal manner out to 45 metres but then propagate with relatively little further reduction from the 45m to 60m area to about 120m. Beyond 120m the levels then continue to reduce with distance in an expected manner. In terms of velocity levels, the results of our analysis showed an average reduction of 4 dB per doubling of distance when measured horizontally along the ground and approximately 5.5 to 6 dB per doubling of distance using the actual distance to the rail invert.
d. There is generally good correlation between measurements taken on the ground surface and in the buildings and that the vertical vibration levels showed the most consistent and repeatable correlation with in-house sound levels. Of course there are some cases where the building/ground coupling, building structure radiation characteristics, room shape and acoustical absorption could result in some differences

from those predicted. The coupling loss or amplification between the buildings and the ground are also dependent on the season of the year or ground condition; e.g. moist or frozen soil.
e. The TTC studies with various subway train operating speeds showed that the rate of increase in the level of ground-borne vibration due to an increase in train speed is 4 dB for doubling of train speed.
f. With regards to ground-borne vibration/noise control, the previous TTC studies also provided the following results:
   - The use of double thickness rail fastener pads results in an overall reduction of 5 to 8 dB in the ground-borne vibration for the lighter weight tunnel structure.
   - The Double Tie System is expected to reduce ground-borne sound and vibration levels by 12 to 14 dB.
   - The Continuous Floating Slab is expected to reduce ground-borne sound and vibration levels by 14 to 20 dB.
g. The subway train vibration is several orders of magnitude below the vibration levels which causes damage or potential physical damage to buildings. The subway levels at the worst locations may be 50 to 60 dB lower than typical vibration level damage criteria which is significantly below the levels of concern.

3. PREDICTION MODEL AND RESULTS

As the extensive TTC data for the YSNE and the BDS are available in vibration acceleration levels in 1/1 or 1/3 Octave Bands and the proposed TTC/MOE vibration criteria are specified in terms of overall vibration velocity re 10^{-6} in/s, the TTC data was converted to appropriate vertical vibration velocity levels using a computer model that took into consideration the detailed frequency spectrum of subway train pass-bys.

The TTC data sets at the following locations (TTC in tubes) Snowdon, Glencairn and Sheldrake as well as at the following locations (TTC in concrete boxes) Elm, Monarch and 5443 Yonge Street were re-analyzed and regression analyses were performed on the entire data sets and also on sub-sets of data for comparison purposes.

The prediction methodology has taken into account the effects of distance, rail discontinuities at crossover and turnout special trackwork, train speed and any vibration control measures. The end result is the estimated outdoor vibration levels at the sensitive building or area under consideration which can then be compared to the applicable criteria to determine the acceptability of the ground-borne noise and vibration.

The ground-borne vibration criterion has been applied outdoors and referenced to the sensitive building or area under consideration. Vibration sensitive land uses is the primary focus of the analysis. In addition, vibration impacts on commercial and industrial areas have also been addressed based on our detailed field examination of the sensitivity of some of these uses.

The analysis is based on up to 6 car subway trains traveling at a speed of 80 kph on standard track with standard TTC resilient direct fixation fasteners and with track vibration isolation (double tie). Near/at the station areas, maximum speeds of 55/35 kph have been assumed.

It is important to note that the TTC advises that the resilient track system (double tie) and where required, continuous floating slabs will be used throughout the entire subway alignment.

Table 10 illustrates the relevant data regarding the receptors along the preferred alignment of the subway line with the use of vibration isolation measures.

The results summarize the projected maximum ground-borne sound and vibration levels from 4 to 6 car train passbys. The projections are made at the closest building or group of buildings to the alignment. The table also shows the applicable ground-borne noise and vibration acceptability criterion, type of structure, distance from the centerline of the nearest set of tracks, expected train speed, distance from the receptor to cross-over switches, and other pertinent information.

The analysis summarized in Table 10 (based on up to 6 car subway trains traveling at a maximum design speed of 80 km/hr) shows the predicted excesses, if any above the recommended criteria for both ground-borne vibration and noise.

November 21 2005

SS WILSON ASSOCIATES
Consulting Engineers
Richmond Hill, Ontario

PREDICTION AND ASSESSMENT OF TTC SUBWAY VIBRATION AND NOISE
SPADINA SUBWAY EXTENSION, TORONTO

SSWA File No.:WA04-104 Revised Feb 8, 2006
With Rail Vibration Isolation

500m Signifies distance over 500m

Line #	Receptor Code Name	Address(s) Represented By Receptor Code	Select Type of Land Use	Type of Land Use, Select	Horiz'l Distance to Nearest Subway C.L., m	Depth of Track Invert, m	Approx Subway Train Speed, Km/Hr	Dist. to X over Switch, m	Added Effect of Tracks X-over, dB	Addit'l Red'n Due To Rail Vib'n Isolation, dB	Predicted Outdoor Vibration Level, Lv in dB re 10E-6 in/sec From-To		MOE and Other Recom'd Vibration Criteria, Lv in dB re 10E-6 in/sec (based on MOE-TTC)	Excess Above Vibration Level Criteria, dB re 10E-6 in/sec From To		Projected Indoor Sound Level, dBA From To		Recom'd Indoor Sound Level Criteria, dBA	Excess Above Indoor Sound Level Criteria, dBA From To		Range Of Impact Assessment Ratings For Noise		
Y	R1	3945-3965 Allen Road	1	Houses and Townhouses	35	10	80	40	0	-12	48	53	70	0	0	18	23	35	0	0	No Impact	to	No Impact
Y	R2	15 Kodiak Crescent (Ground Level)	4	Commercial	0	10	80	240	0	-12	59	64	75	0	0	29	34	40	0	0	No Impact	to	No Impact
Y	R2	15 Kodiak Crescent (Foundation Level)	4	Commercial	0	8	80	240	0	-12	61	66	75	0	0	31	36	40	0	0	No Impact	to	No Impact
Y	R3	23 Kodiak Crescent (Ground Level)	4	Commercial	0	10	80	150	0	-12	59	64	75	0	0	29	34	40	0	0	No Impact	to	No Impact
Y	R3	23 Kodiak Crescent (Foundation Level)	4	Commercial	0	7	80	150	0	-12	62	67	75	0	0	32	37	40	0	0	No Impact	to	No Impact
Y	R4	25-33 Kodiak Crescent (Ground Level)	4	Commercial	22	10	80	120	0	-12	51	56	75	0	0	21	26	40	0	0	No Impact	to	No Impact
Y	R4	25-33 Kodiak Crescent (Foundation Level)	4	Commercial	22	7	80	120	0	-12	52	57	75	0	0	22	27	40	0	0	No Impact	to	No Impact
Y	R5	39 Kodiak Crescent - Tectrol (Ground Level)	6	Sensitive Buildings	65	11	80	85	0	-12	43	48	65	0	0	13	18	30	0	0	No Impact	to	No Impact
Y	R5	39 Kodiak Crescent - Tectrol (Foundation Level)	6	Sensitive Buildings	65	8	80	85	0	-12	43	48	65	0	0	13	18	30	0	0	No Impact	to	No Impact
Y	R6	40 Kodiak Crescent	4	Commercial	0	11	80	500	0	-12	58	63	75	0	0	28	33	40	0	0	No Impact	to	No Impact
Y	R7-a	44 Kodiak Crescent	4	Commercial	0	12	80	500	0	-12	57	62	75	0	0	27	32	40	0	0	No Impact	to	No Impact
Y	R7-b	44A Kodiak Crescent	4	Commercial	0	12	80	70	0	-12	57	62	75	0	0	27	32	40	0	0	No Impact	to	No Impact
Y	R8	1 Whitehorse Road (Msic Lab)	6	Sensitive Buildings	35	11	80	100	0	-12	48	53	65	0	0	18	23	30	0	0	No Impact	to	No Impact
Y	R9-a	1170 Shepard Avenue West	4	Commercial	0	12	80	190	0	-12	57	62	75	0	0	27	32	40	0	0	No Impact	to	No Impact
Y	R9-b	1170 Shepard Avenue West	4	Commercial	25	12	80	260	0	-12	50	55	75	0	0	20	25	40	0	0	No Impact	to	No Impact
Y	R9-c	1170 Shepard Avenue West	4	Commercial	60	12	80	310	0	-12	43	48	75	0	0	13	18	40	0	0	No Impact	to	No Impact
Y	R10	77-81 Tuscan Gate	4	Commercial	10	16	80	500	0	-12	53	58	75	0	0	23	28	40	0	0	No Impact	to	No Impact
Y	R11	3655 Keele Street	4	Commercial	7	15	80	500	0	-12	54	59	75	0	0	24	29	40	0	0	No Impact	to	No Impact
Y	R12	3675-3677 Keele Street	4	Commercial	0	16	80	500	0	-12	55	60	75	0	0	25	30	40	0	0	No Impact	to	No Impact
Y	R13	3685 Keele Street	4	Commercial	0	15	80	500	0	-12	55	60	75	0	0	25	30	40	0	0	No Impact	to	No Impact
Y	R14	3695 Keele Street	4	Commercial	0	15	80	500	0	-12	55	60	75	0	0	25	30	40	0	0	No Impact	to	No Impact

TABLE 10

Y	R15	3701 Keele Street	4	Commercial	7	16	80	500	0	-12	54	59	75	0	0	24	29	40	0	0	No Impact	to	No Impact
Y	R16	3711 Keele Street	4	Commercial	23	15	80	500	0	-12	50	55	75	0	0	20	25	40	0	0	No Impact	to	No Impact
Y	R17	3700 Keele Street	2	Apartment Building (concrete)	30	15	80	500	0	-12	49	54	70	0	0	19	24	35	0	0	No Impact	to	No Impact
Y	R18	3710 Keele Street	2	Apartment Building (concrete)	30	14	80	500	0	-12	49	54	70	0	0	19	24	35	0	0	No Impact	to	No Impact
Y	R19	3720 Keele Street	4	Commercial	30	14	80	500	0	-12	49	54	75	0	0	19	24	40	0	0	No Impact	to	No Impact
Y	R20	3725 Keele Street	4	Commercial	20	10	80	400	0	-12	52	57	75	0	0	22	27	40	0	0	No Impact	to	No Impact
Y	R21	3747 Keele Street	4	Commercial	25	14	80	400	0	-12	50	55	75	0	0	20	25	40	0	0	No Impact	to	No Impact
Y	R22	3757 Keele Street	4	Commercial	25	14	80	400	0	-12	50	55	75	0	0	20	25	40	0	0	No Impact	to	No Impact
Y	R23	20 Broadoaks Drive	2	Apartment Building (concrete)	35	14	80	400	0	-12	48	53	70	0	0	18	23	35	0	0	No Impact	to	No Impact
Y	R24	3765 Keele Street	4	Commercial	33	15	80	400	0	-12	48	53	75	0	0	18	23	40	0	0	No Impact	to	No Impact
Y	R25	3809 Keele Street	4	Commercial	23	15	80	280	0	-12	50	55	75	0	0	20	25	40	0	0	No Impact	to	No Impact
Y	R26	3811 Keele Street - Gas Station	4	Commercial	15	10	80	240	0	-12	54	59	75	0	0	24	29	40	0	0	No Impact	to	No Impact
Y	R27	3875 Keele Street	4	Commercial	30	15	80	140	0	-12	49	54	75	0	0	19	24	40	0	0	No Impact	to	No Impact
Y	R28	2-30(even #) Council Cres	1	Houses and Townhouses	28	16	80	60	0	-12	49	54	70	0	0	19	24	35	0	0	No Impact	to	No Impact
Y	R29	Btween 3889& 3905 Keele Street	4	Commercial	30	16	80	100	0	-12	48	53	75	0	0	18	23	40	0	0	No Impact	to	No Impact
Y	R30	1, 50 & 52 Villata Gardens	1	Houses and Townhouses	25	16	80	100	0	-12	50	55	70	0	0	20	25	35	0	0	No Impact	to	No Impact
Y	R31	3915 Keele Street	4	Commercial	25	17	80	100	0	-12	49	54	75	0	0	19	24	40	0	0	No Impact	to	No Impact
Y	R32	3929 Keele Street	4	Commercial	25	18	80	80	0	-12	49	54	75	0	0	19	24	40	0	0	No Impact	to	No Impact
Y	R33	Townhouses N of 50 Villata Gdns	1	Houses and Townhouses	25	17	80	70	0	-12	49	54	70	0	0	19	24	35	0	0	No Impact	to	No Impact
Y	R34	3926-3932 Keele Street	4	Commercial	35	17	80	40	0	-12	47	52	75	0	0	17	22	40	0	0	No Impact	to	No Impact
Y	R35	3940 Keele Street	4	Commercial	25	18	55	40	0	-12	47	52	75	0	0	17	22	40	0	0	No Impact	to	No Impact
Y	R36	1 Four Winds Drive	2	Apartment Building (concrete)	35	18	55	100	0	-12	45	50	70	0	0	15	20	35	0	0	No Impact	to	No Impact
Y	R37	1300 Finch Avenue	4	Commercial	65	18	55	200	0	-12	40	45	75	0	0	10	15	40	0	0	No Impact	to	No Impact
Y	R38	3965 Keele Street	4	Commercial	30	18	55	200	0	-12	46	51	75	0	0	16	21	40	0	0	No Impact	to	No Impact
Y	R39a	5 Kodiak Crescent	4	Commercial	10	13	80	240	0	-12	55	60	75	0	0	25	30	40	0	0	No Impact	to	No Impact
Y	R39b	7 Kodiak Crescent	4	Commercial	10	13	80	240	0	-12	55	60	75	0	0	25	30	40	0	0	No Impact	to	No Impact
Y	R39c	9 Kodiak Crescent	4	Commercial	10	16	80	240	0	-12	53	58	75	0	0	23	28	40	0	0	No Impact	to	No Impact

TABLE 10 Cont'd

N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
Y	**R50-a**	Schulich Building-Lecture Hall N105	6	Sensitive Buildings	0	13	55	100	0	-12	54	59	65	0	0	24	29	30	0	0	No Impact to No Impact
Y	**R50-b**	Schulich Building-Classroom	6	Sensitive Buildings	30	13	55	100	0	-12	47	52	65	0	0	17	22	30	0	0	No Impact to No Impact
Y	**R50-c**	Schulich Building-Classroom S124	6	Sensitive Buildings	35	13	55	100	0	-12	45	50	65	0	0	15	20	30	0	0	No Impact to No Impact
Y	**R50-d**	Schulich Building - Auditorium W042	6	Sensitive Buildings	55	13	35	100	0	-12	39	44	65	0	0	9	14	30	0	0	No Impact to No Impact
Y	**R51**	York Lanes Retail Centre	6	Sensitive Buildings	0	17	55	100	0	-12	52	57	65	0	0	22	27	30	0	0	No Impact to No Impact
Y	**R52**	Vanier College	6	Sensitive Buildings	30	22	80	100	0	-12	48	53	65	0	0	18	23	30	0	0	No Impact to No Impact
Y	**R53**	Stedman Lecture Halls	6	Sensitive Buildings	40	13	80	100	0	-12	47	52	65	0	0	17	22	30	0	0	No Impact to No Impact
Y	**R54**	Lumbers	6	Sensitive Buildings	58	20	80	100	0	-12	43	48	65	0	0	13	18	30	0	0	No Impact to No Impact
Y	**R55**	Seneca @ York	6	Sensitive Buildings	190	20	55	100	0	-12	32	37	65	0	0	2	7	30	0	0	No Impact to No Impact
Y	**R56**	Winters Residence	6	Sensitive Buildings	145	20	55	100	0	-12	34	39	65	0	0	4	9	30	0	0	No Impact to No Impact
Y	**R57**	Farquharson Life Sciences	6	Sensitive Buildings	75	20	80	100	0	-12	41	46	65	0	0	11	16	30	0	0	No Impact to No Impact
Y	**R58**	Track and Field Centre	6	Sensitive Buildings	0	15	55	100	0	-12	53	58	65	0	0	23	28	30	0	0	No Impact to No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact
N																			No Impact	to	No Impact

TABLE 10 Cont'd

4. ANALYSIS OF THE GROUND-BORNE VIBRATION AND NOISE IMPACTS

TTC will use the "double tie" and "floating slab" systems throughout the proposed subway line. This installation will decrease the vibration levels (and consequently reduce the noise levels) by approximately 12 dB which is considered a significant reduction and improvement over the standard rail system.

The types of buildings assessed include commercial/industrial and institutional. It is worth noting that while the land use and zoning of many of the properties is industrial, for impact assessment purposes, they were all treated as commercial since invariably all these buildings contain office components which are certainly more sensitive than industrial as far as noise and vibration criteria are concerned.

With reference to the predicted levels listed in Table 10, there are no predicted noise and vibration excesses above the applicable criteria.

Therefore, with the application of the above noted vibration isolation measures, it is our finding that none of the land uses will be exposed to noise and vibration levels that are higher than the set criteria.

5.0 NOISE AND VIBRATION DUE TO CONSTRUCTION

5.1 GENERAL

This section deals with the potential environmental noise and vibration impacts during the construction phase of the proposed undertaking. The sources of noise and vibration may operate above or below ground or within tunnels.

Unlike operational noise, construction noise is temporary in nature depending on the type of work required and its location relative to the noise-sensitive receptors. A description of the potential receptors has been provided in Section 3 and representative locations are shown in Figures 4.1 to 4.10.

5.2 SOURCES OF NOISE AND VIBRATION

The primary sources of noise during construction are pile drivers, general excavation, construction activities and vehicular traffic.

The tunneling method using a Tunnel Boring Machine (TBM) is expected to transmit lower levels of noise and vibration to adjacent residences and buildings than the cut and cover method. However, the cut and cover method will be used for the station structures regardless of the method chosen to construct the running track sections.

TBM produce steady state variations in the vibration levels within a matter of a handful of days at each receptor location where the levels gradually rise over a period of a handful of days, remain steady for more-or-less a very limited number of days, following which the levels start to slowly fade away. The timing of each cycle (2 cycles only during the boring process at each receptor) and the resulting levels depend on the depth of the subway tunnel near the receptor, the lateral distance from the tunnel, the type of soil, the operational characteristics of the TBM and in particular, the thrust being applied by the TBM on the area to be excavated. The presence of high ambient noise due to proximity to major roadways and the internally generated noise inside buildings are also some of the reasons that influence the degree of human audibility of the ground-borne noise due to TBM's.

In general, except for activities at the access shaft(s) serving the tunnel construction, the general public in urban areas is not likely to be aware of the ongoing tunneling work since TBM excavation does not produce any audible "environmental" noise at street level. Community impacts, however, depend on the access shaft(s) locations.

Tunnel construction impacts are concentrated at the shaft(s) and can include the noise due to mobile construction equipment (dozers, loaders, dump trucks, etc.) and more-or-less fixed construction equipment at or near the shaft (cranes, generators, pumps, etc.). The

noise generated around the shafts can be controlled using several noise control measures which include physical and administrative controls. The physical measures include the use of fixed and/or temporary sound barrier walls/partial enclosures, traffic management and the use of quieter equipment.

Pile drivers used for construction at the station areas should be of the "quiet" hydraulic type rather than the noisier drop weight type.

One of the sources of concern is the potential impact of "mobilization sites" on the adjoining noise-sensitive land uses as such sites may be the centre for the following activities:

- Driving shafts
- Crane operations
- Construction equipment operated by gasoline, diesel and electric engines
- Stockpiling of construction materials
- Removal and stockpiling of excavated materials
- Areas for truck loading and unloading
- Parking facilities and other vehicle movements

5.3 IMPACT ASSESSMENT

The significance of the construction noise impact depends on the number of pieces of equipment, their types, time of operation and their proximity to the receptors in question.

For the project under consideration, we have estimated the significance of the ambient noise conditions as detailed in Appendix D. The existing high ambient sound levels are likely to reduce the significance of the noise during construction although the noise due to construction will be clearly audible during peak periods of construction.

One of the effective ways for mitigation of the noise impact due to this mobilization site is to construct an effective sound barrier to protect the residences based on knowledge of the expected construction equipment sound levels and the prevailing ambient noise due to vehicular traffic on nearby arterial roads. Other mitigation measures will also be discussed in the subsequent paragraphs.

Mobilization sites located in the industrial areas are expected to be of less concern due to their locations in noise-insensitive land uses.

5.4 CONTROL OF CONSTRUCTION NOISE

The following is a brief outline of the procedures to be followed in handling construction noise during the Detailed Design and Construction phases:

a. Noise sensitive receptors to be identified.

b. The City of Toronto noise control By-Laws will be examined. Where timing constraints or any other provisions of the municipal by-law may cause hardship to the TTC and its Contractors, an explanation of this will be outlined in a submission to the MOE and an exemption from such By-Law will be sought directly from the City of Toronto.

c. "General noise control measures" (not sound level criteria) will be referred to, or placed into contract documents.

d. Should the TTC or the Contractor receive any complaint from the public, the Contractor's staff should verify that the "general noise control measures" agreed to are in effect. The Contractor should investigate any noise concerns, the TTC to warn the contractor of any problems and enforce its contract.

e. If the "general noise control measures" are complied with, but the public still complain about noise, the TTC should require the contractor to comply with the MOE sound level criteria for construction equipment contained in the MOE's Model Municipal Noise Control By-Law and the City of Toronto Noise Control By-law. Subject to the results of field investigation, alternative noise control measures would be required, where these are reasonably available.

f. In selecting the appropriate construction noise control and mitigation measures, the TTC and the Contractor should give consideration to the technical, administrative, and economic feasibility of the various alternatives.

6.0 SUMMARY AND RECOMMENDATIONS

6.1 SUMMARY

A study has been carried out to research all aspects related to the potential noise and vibration impacts of the proposed Spadina Subway line on the noise and vibration sensitive receptor locations along the subway line and around the bus terminal stations. The study dealt with the documentation of the existing ambient sound levels by a combination of procedures; actual measurements and/or the use of prediction models.

The following potential sources of noise have been addressed in the study:

a. Subway vehicle movements within the underground sections resulting in ground-borne noise.
b. Bus activities and movements within the bus terminal stations.
c. Noise emitted through ventilation shafts.
d. Electrical substations.
e. Ventilation fans.
f. On-street bus movements

Following completion of selecting the preferred subway alignment route, further minor adjustments to the route were also made in order to reduce or eliminate the impact on some buildings which are considered to be very sensitive to vibration and noise as confirmed during our field investigations.

The following are our conclusions itemized for each potential source of noise and vibration addressed in this study:

SUBWAY GROUND-BORNE VIBRATION AND NOISE

a) Four receptor locations have been selected (namely R1, R28, R30 and R33) to represent the low and medium residential dwelling units having essentially similar exposure to the proposed subway line vibration and noise levels. The distance setback from these dwelling units to the subway alignment range from 25m to 35m, none of which is in close proximity to any cross-over switches. The predicted noise and vibration levels are considered well below the MOE/TTC Protocol criteria. In summary, while the impact rating is expected to be "no impact", it is quite possible that during certain hours of the night and during street traffic lulls, that the subway noise may be barely to just audible due to the expected amplification of the wood frame construction of the vibration signal.

b) Four receptor locations have been selected (namely R17, R18, R23 and R36) to represent four apartment buildings having exposure to the subway line. The distance setback from the subway alignment range from 30 to 35 meters. The predicted noise and vibration levels are also below the applicable criteria. With potential building decoupling, it is expected that the predicted levels would be lower than actually projected outside.

c) By far, the largest number of exposed receptors are the commercial and industrial areas where over 30 receptor locations were selected (namely R2-R4, R6, R7, R9-R16, R19-R22, R24-R27, R29, R31, R32, R34, R35 and R37-R39) to represent a number of industrial and commercial buildings in the study area. The distance setback from these buildings to the subway alignment range from 0 up to 65 meters (0 representing a building which is located directly over the subway alignment). Although the closest point to the subway was used for assessment purposes to an industrial/commercial building, it must be noted that not all the units, rooms or spaces will be affected due to the large size of such buildings. The predicted noise and vibration levels are also at or below the applicable criteria.

d) The last group of receptors has been selected to represent the institutional buildings within the York University Campus. For the purposes of this investigation, 9 receptor locations were considered to represent a number of buildings and facilities within the York Campus including the Seneca College building at York (namely R50 to R58). Due to the potential sensitivity of this major institutional land use, the applicable criteria selected are the most sensitive one to represent fairly sensitive buildings that may host communication activities and/or sensitive processes such as testing, electron microscopes, TV recording studios, etc. The distance setback from these buildings to the subway alignment ranged from 0 (immediately above the subway line) to 190 meters. In all cases, it is important to note that the closest distance to the building was used as the entry point for noise and vibration into the building, at which the noise and vibration levels were calculated. The predicted noise and vibration levels are also at or below the applicable criteria

e) The results of the vibration and noise predictions were adjusted to account for the use of railway vibration isolation such as using the double tie system and the use of floating slabs throughout the entire system as advised by the TTC. With the application of the reasonable reduction factor of 12 dB to the vibration levels. In summary, it is our conclusion that there will be no impact for all selected points of reception.

THE TWO BUS TERMINALS

Our detailed investigation into the potential impact of the bus terminal stations indicates that there are no impacts on residential land uses due to a combination of distance setbacks and high ambient noise levels due to existing traffic. The only non-residential land use that may be negatively impacted is the commercial building located immediately east of the proposed Finch-Keele bus terminal. The levels at the façade of this commercial/retail premises are significantly above the prevalent ambient noise. The recommendation section contains a recommended solution to remedy this situation.

CONSTRUCTION NOISE

The preliminary analysis of the noise during the construction phase indicates the potential for concern in the residential and/or industrial area adjacent to possible construction mobilization sites and possibly due to the use of the Tunnel Boring Machines (TBM) in proximity to a limited number of buildings.

6.2 RECOMMENDATIONS

1. It is important to install the double tie and floating slab systems in all sections of the subway line in order to reduce the ground-borne vibration and noise created by the train movements. As the TTC is committed to the use of this system throughout the entire line, it is our opinion that the impact will be minimized and that the final results would comply with the applicable criteria.

2. The following potential sources of noise should be the subject of further examination during the detailed design stage:

   a. Subway vehicle ventilation shafts.
   b. Ventilation fans.
   c. Electrical substations.
   d. Noise and vibration during construction and particularly close to mobilization sites.

3. Monitoring of noise and vibration due to construction should be undertaken at specific locations which are identified in this study as sensitive building including the York University buildings and the residential dwellings near both; the mobilization sites and the subway stations construction sites.

4. TTC should continue to follow their practices of their routine maintenance of train wheels to eliminate “wheel flats” based on their practice of remote “wheel flats” monitoring stations.

5. In order to control the Finch-Keele bus terminal noise impact on the adjacent retail/commercial building to the east, we recommend that the TTC construct a minimum 4.5m high sound barrier wall along the east perimeter of the station with a sound absorptive face treatment on the west side of the wall to reduce the effect of acoustic reflection to the apartment building on the west side of Keele Street. The detail design of this station can adequately address this as a straight forward design issue.

FIGURES

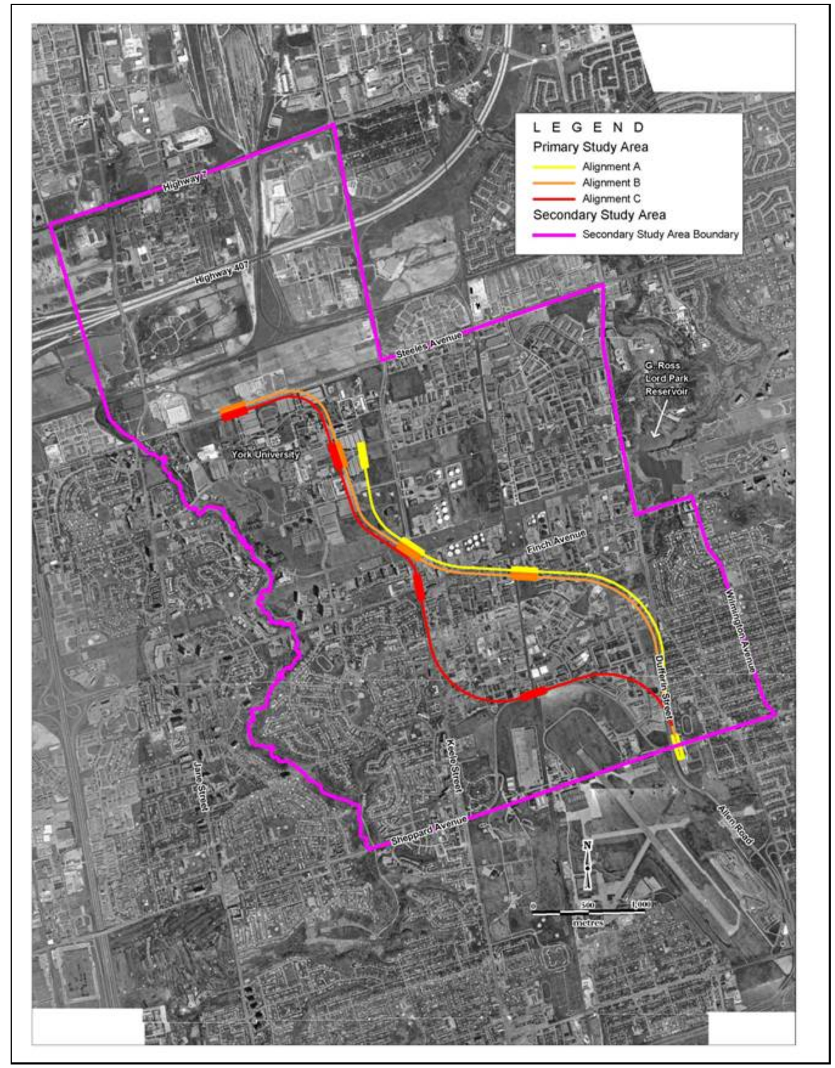


FIGURE 1: GENERAL LOCATION AND OUTLINE OF THE STUDY AREA

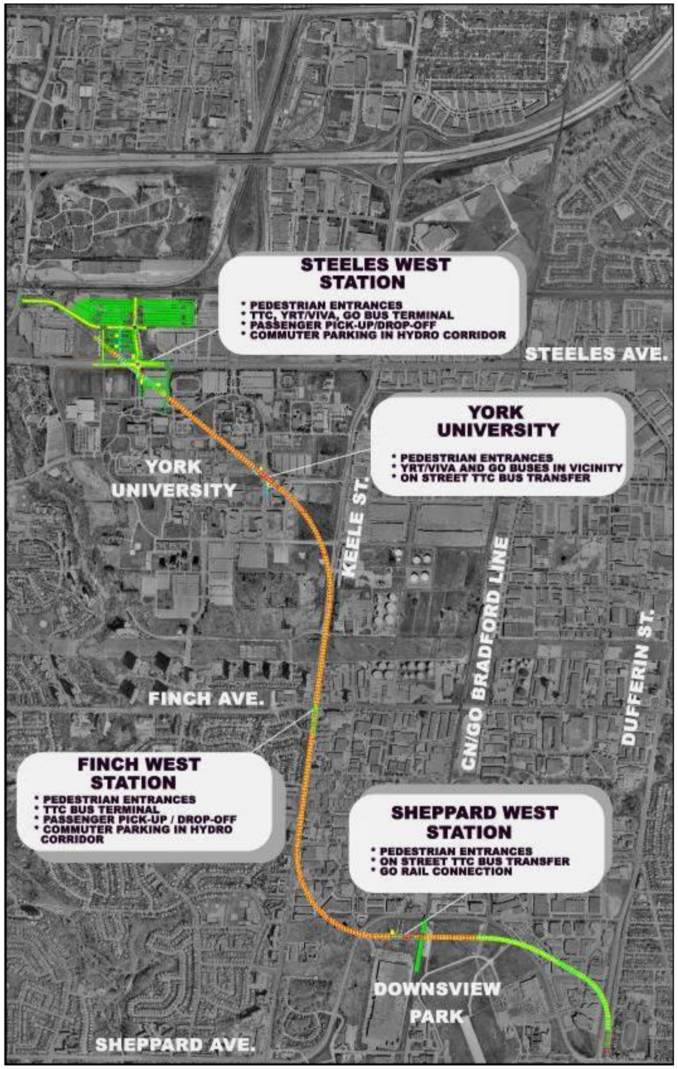


FIGURE 2: OVERALL VIEW OF THE PROPOSED SUBWAY EXTENSION ALIGNMENT AND PROPOSED SUBWAY STATIONS

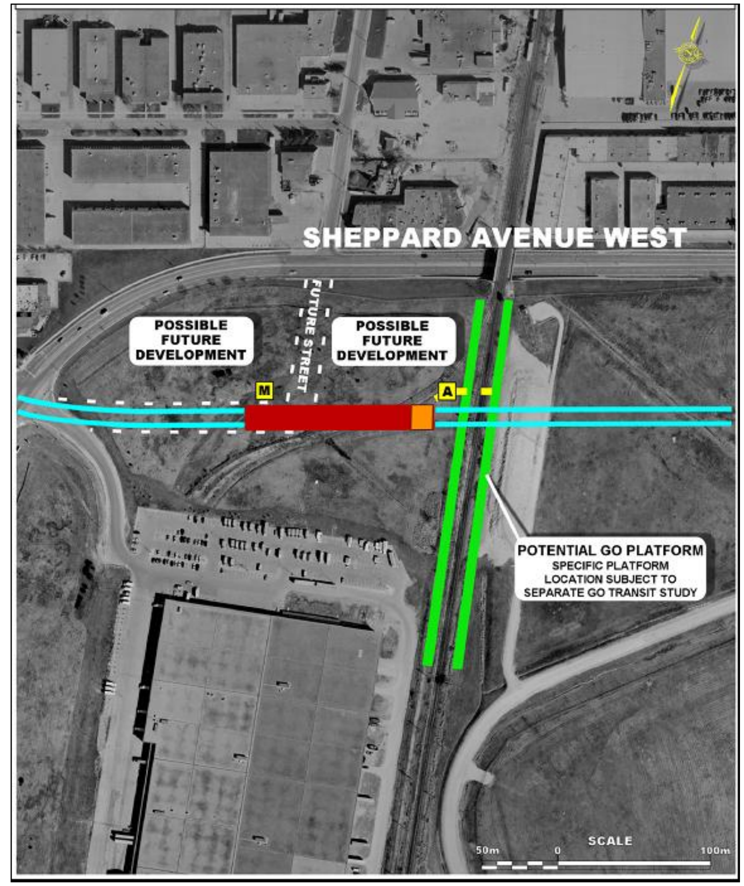


FIGURE 3.1: SHEPPARD AVENUE WEST SUBWAY STATION

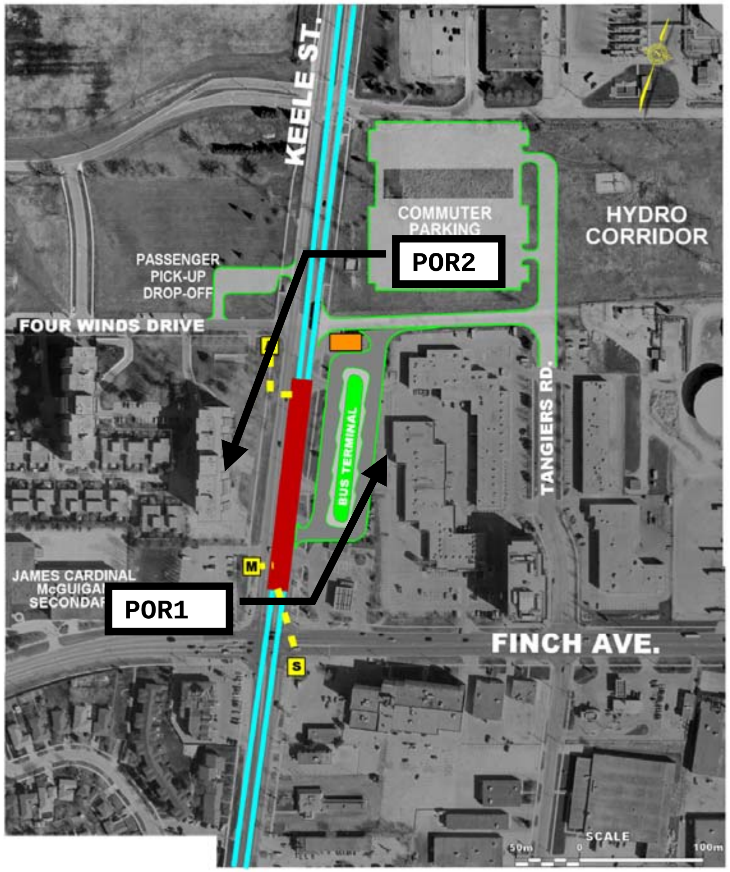


FIGURE 3.2: FINCH AVENUE WEST SUBWAY AND BUS TERMINAL STATIONS

FIGURE 3.3: YORK UNIVERSITY SUBWAY STATION

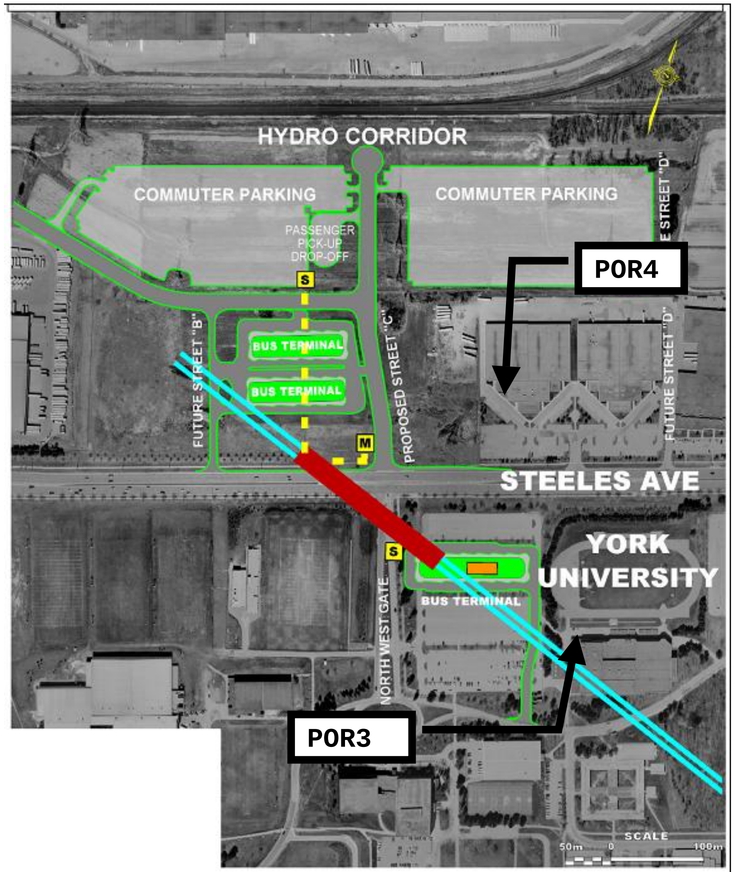


FIGURE 3.4: STEELES AVENUE WEST SUBWAY AND BUS TERMINALS STATIONS

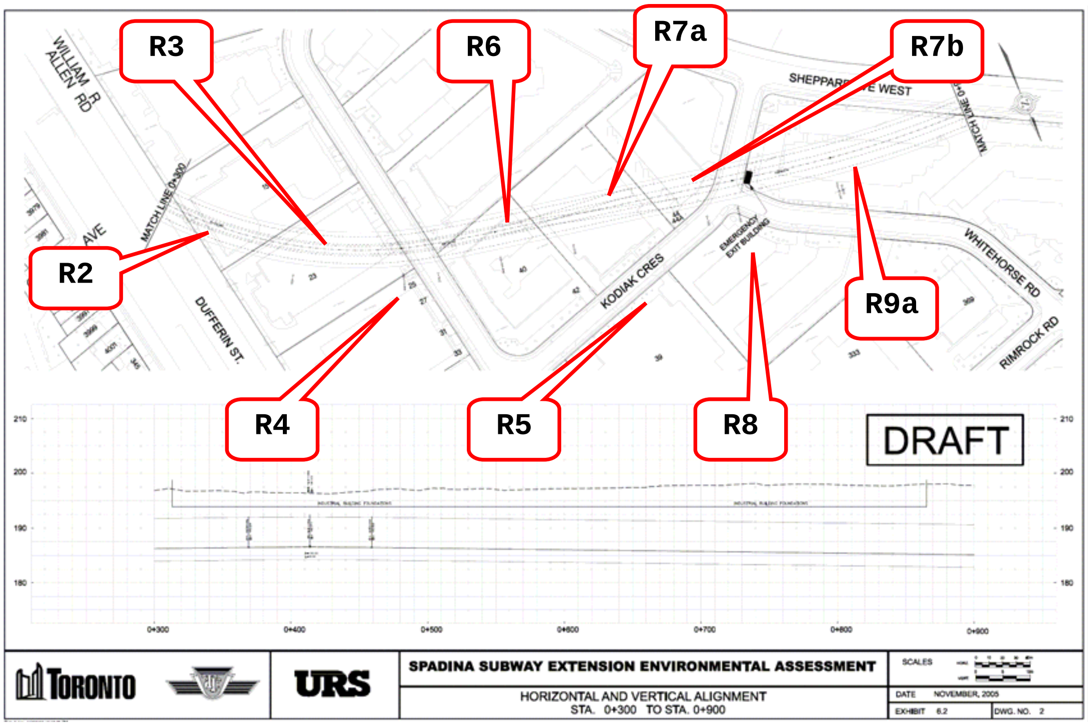


FIGURE 4.1 PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

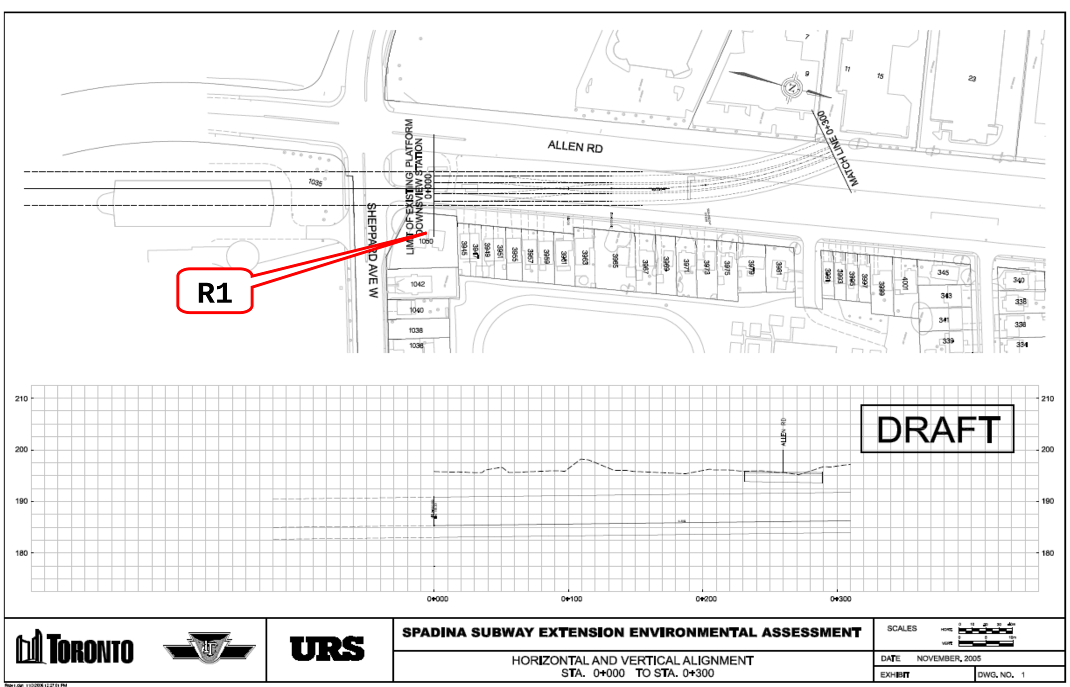


FIGURE 4.2: PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

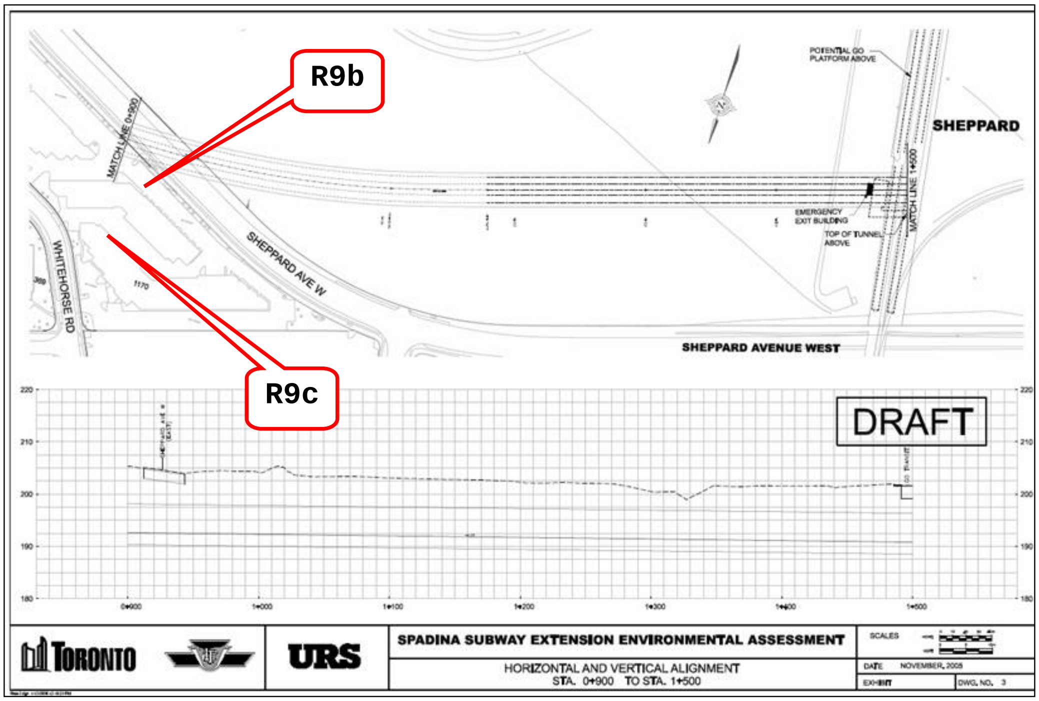


FIGURE 4.3: PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

51

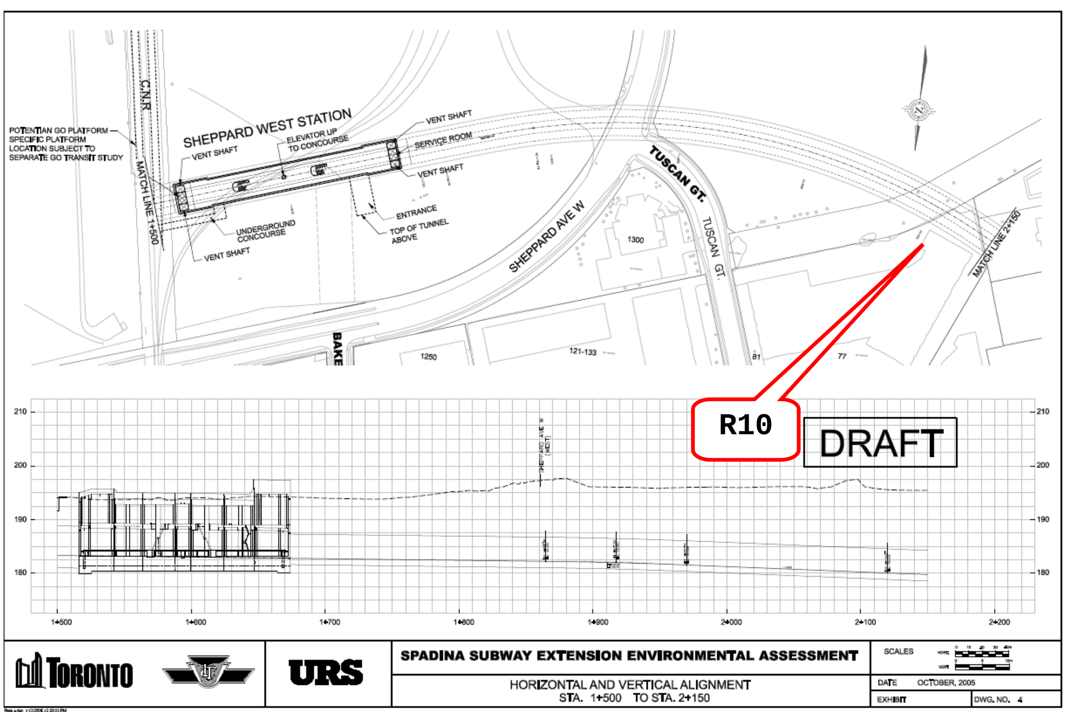


FIGURE 4.4: PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

52

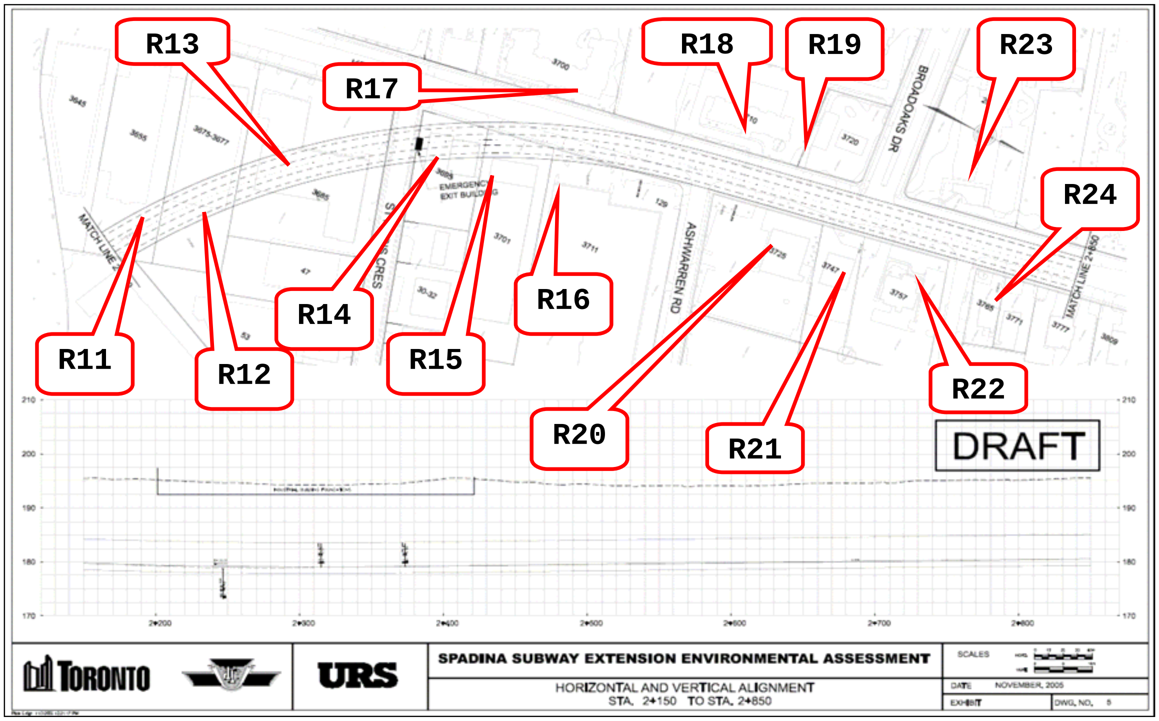


FIGURE 4.5: PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

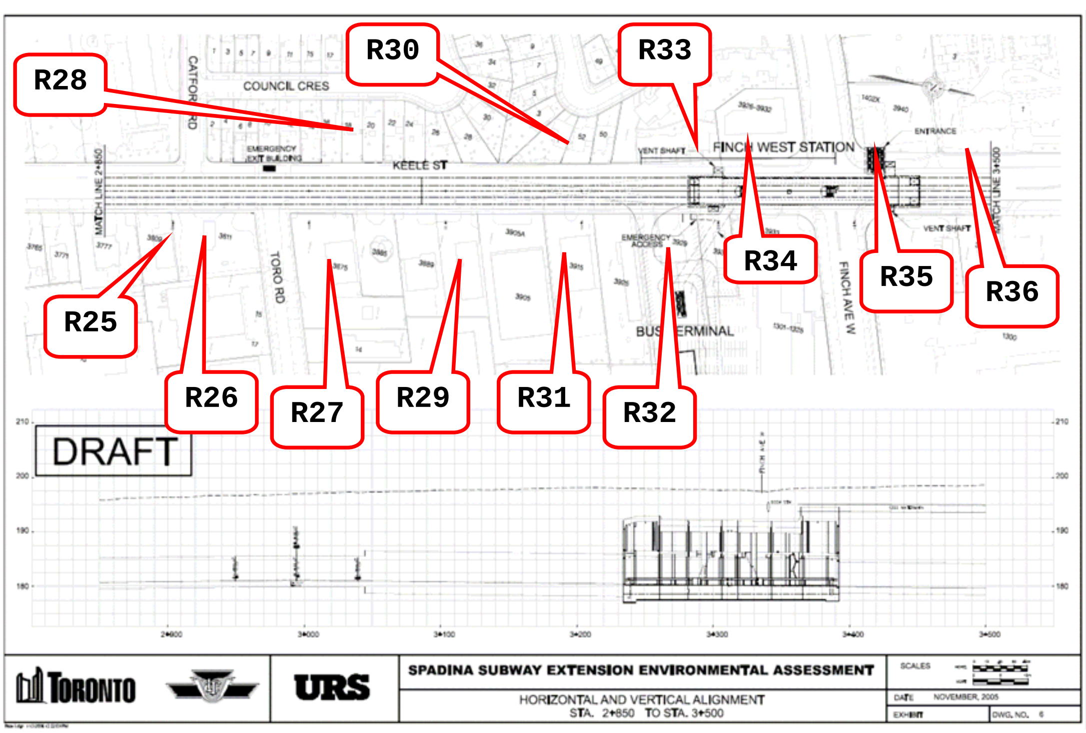


FIGURE 4.6: PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

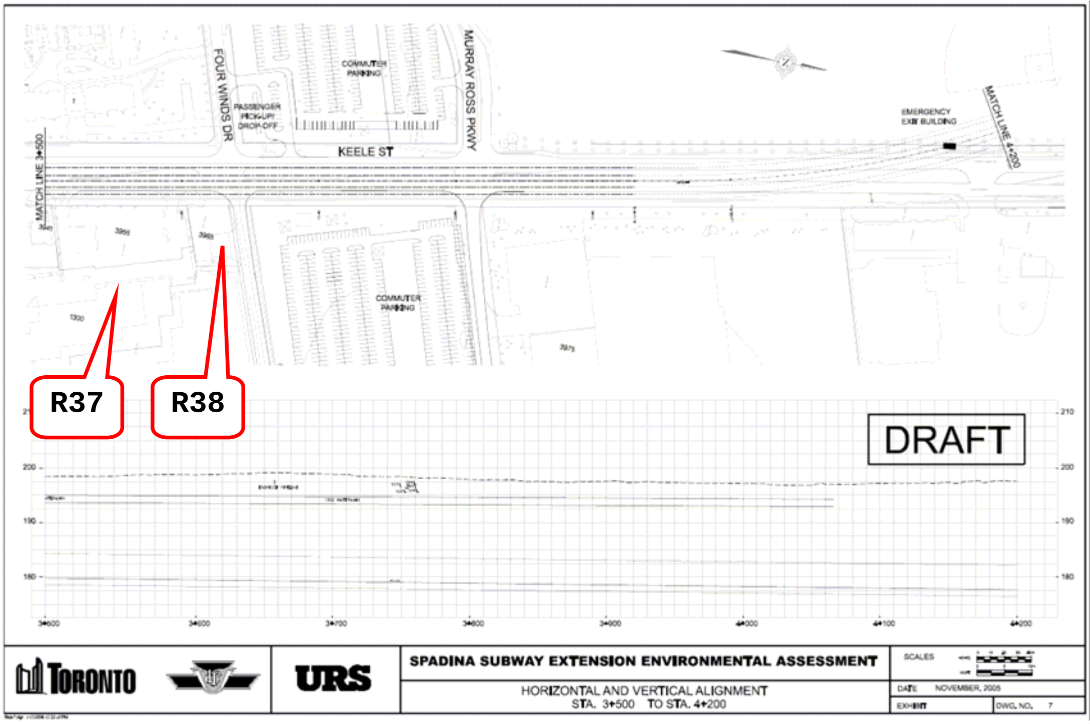


FIGURE 4.7: PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

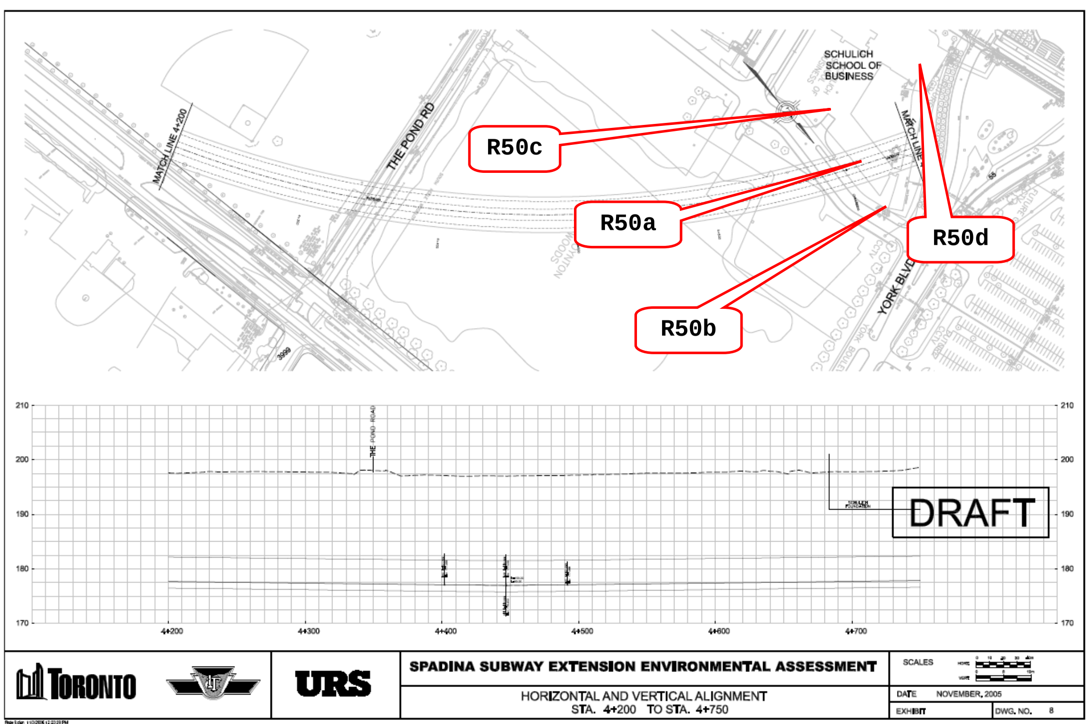


FIGURE 4.8: PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

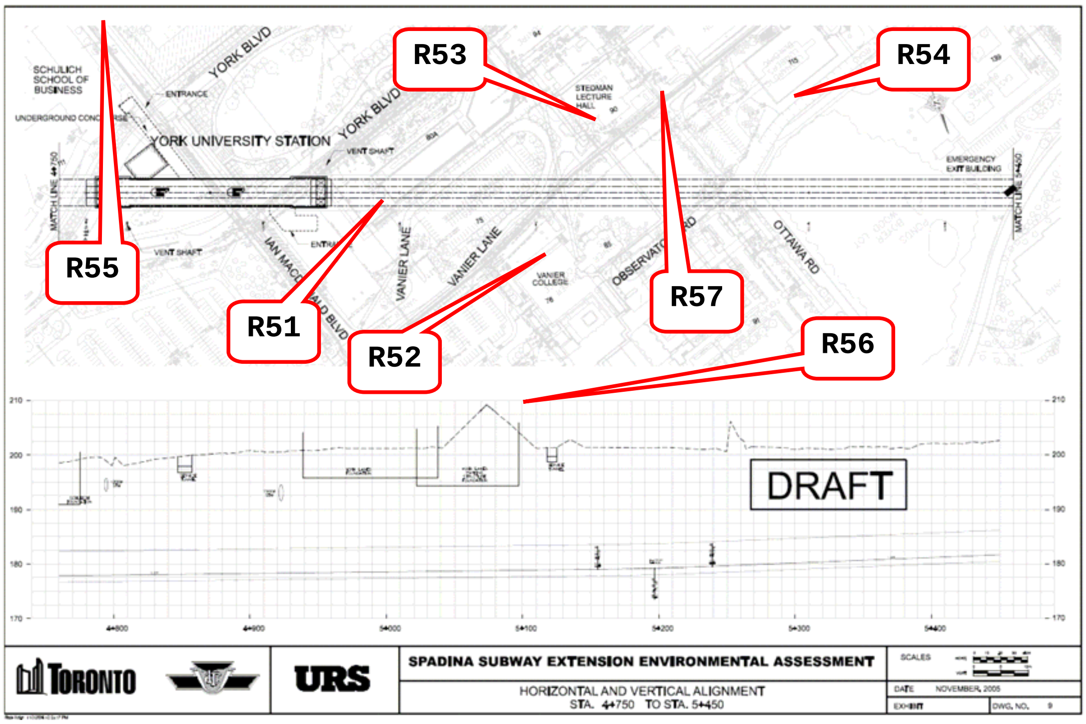


FIGURE 4.9: PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

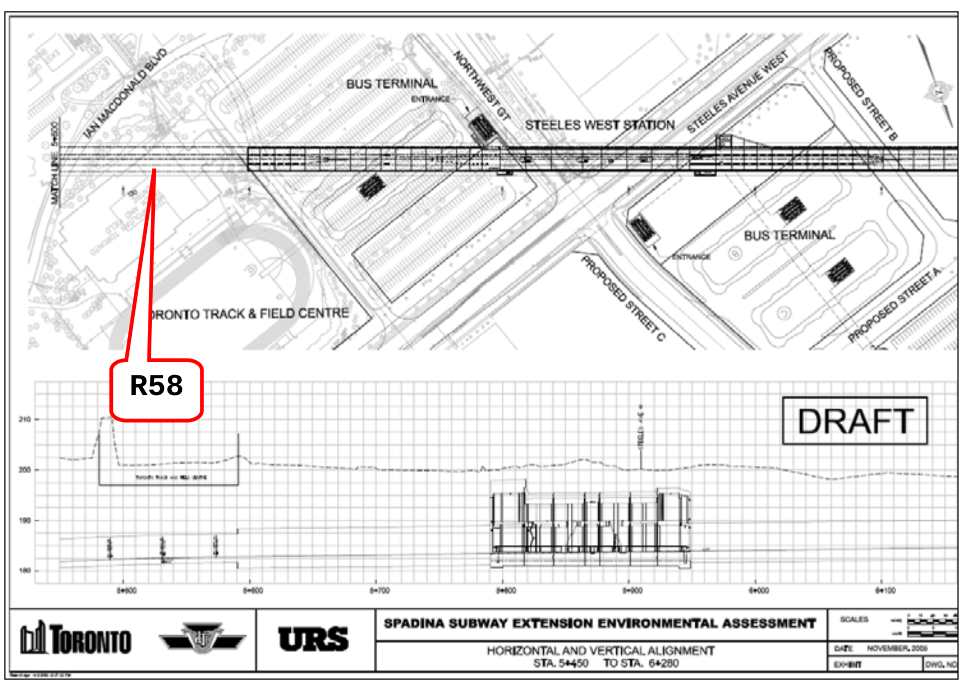


FIGURE 4.10: PLAN AND PROFILE OF THE PROPOSED SUBWAY ALIGNMENT

APPENDIX A

GLOSSARY

GLOSSARY

A weighted decibel; dBA A nationally and internationally standardized frequency weighting applied to the sound level (measured in decibels) spectrum to approximate the sensitivity of the human hearing mechanism as a function of frequency (pitch).

Airborne Sound is sound that reaches the point of interest by propagation through air.

Ambient/ Background Sound Level is the all-encompassing noise associated with a given environment and comprises a composite of sounds from many sources, other than the source of interest, near and far . In the context of this document, the ambient or existing noise level is the noise level which exists at a receptor as a result of existing traffic conditions without the addition of noise generated by the proposed undertaking or the new source of noise.

A-Weighted sound level The “A-weighted sound level” is a *sound pressure level* indicated by a measurement system that includes an *A-weighted* network. The resulting value is in *decibels* and commonly labelled *dBA*.

A-Weighting is a frequency weighting intended to approximate the relative sensitivity of the normal human ear to different frequencies (pitches of sound) .The specific variation of sensitivity with frequency to conform to IEC Publication 651.

dBA means the A-weighted sound pressure level.

Decibel is the common measure of sound level or sound pressure level. It is the term to identify 10 times the common logarithm of the ratio of two like quantities proportional to power or energy. The “decibel” is a dimensionless measure of sound level or sound pressure level; see sound pressure level.

Environmental Noise is noise transmitted through the outdoor environment as opposed to noise generated and contained within buildings.

Equivalent Sound Pressure Level denoted Leq is the level of a steady sound having the same time integral of the squared sound pressure, in the measurement interval, as the observed sound.

Indoor sound level is an estimated/calculated sound level in the central part of a room.

L_{eq} – The Energy Equivalent Continuous Sound Level is the constant sound level over the time period in question, that results in the same total sound energy as the actually varying sound. It must be associated with a time period. Leq is a measure of total sound energy dose over a specified time period.

Leq (T): Leq (16 hours), Leq (8 hours), Leq (1 hours) means the A-weighted level of a steady sound carrying the same total energy in the time period T as the observed fluctuating sound. The time period T is given in brackets.

Noise is defined as any unwanted sound.

Noise Sensitive Land Use means a land use that is sensitive to noise, whether inside and/or outside the property and that must be planned and/or designed using appropriate land use compatibility principles. Examples of sensitive land uses:

- residential developments;
- seasonal residential developments;
- hospitals, nursing/retirement homes, schools, day-care centres;
- other land uses that may contain outdoor and/or outdoor areas/spaces where an intruding noise may create an adverse effect.

In general, a noise-sensitive land use could be any type of land use where environmental noise is likely to cause an *adverse effect* or material discomfort whether inside or outside of a building.

Point of Reception means any point on the premises of a person where sound or vibration originating from other than those premises is received. For the purposes of noise impact assessment in the plane of a bedroom window, the point of assessment is typically 4.5 m above ground unless the dwelling is a multi-storey building. The point of reception is commonly used for assessment of *stationary sources* of noise

Sound is a fluctuation in pressure, particle displacement or particle velocity propagated in any medium; or the auditory sensation that may be produced by it.

Sound (Pressure) Level is the logarithmic ratio of the instantaneous energy of a sound to the energy at the threshold of hearing. It is measured in decibels (dB)

Sound Level is the A-weighted sound pressure level in dBA.

Stationary Source of Noise For the purpose of this document, a stationary source of noise is defined as: “Stationary source means all sources of sound/vibration; whether fixed or mobile, that exist/operate on the premises, property or facility, the combined sound/vibration levels of which are emitted beyond the property boundary of the premises, property or facility, unless the source(s) is (are) due to temporary “construction” as defined in the applicable municipal noise “By-Law”.”

Time Periods (MOE predefined time periods) "***Day-time***" is the 16-hour period between 07:00 and 23:00 hours. ***"Evening"*** is the 4-hour period between 19:00 and

23:00 hours. ***"Night-time"*** is the 8-hour period between 23:00 and 07:00 hours.

Vibration is a temporal and spatial oscillation of displacement, velocity or acceleration in a solid medium .

APPENDIX B

SOUND AND VIBRATION CRITERIA

MOEE/TTC
PROTOCOL FOR NOISE AND VIBRATION ASSESSMENT FOR THE PROPOSED YONGE-SPADINA SUBWAY LOOP

JUNE 16, 1993

TABLE OF CONTENTS

RTEP Profile #1411

PROTOCOL FOR NOISE AND VIBRATION ASSESSMENT

PART A. PURPOSE

The Toronto Transit Commission (TTC) and the Ministry of the Environment and Energy (MOEE) recognize that transit facilities produce noise and vibration which may affect neighbouring properties within urbanized areas. This document identifies the framework within which criteria will be applied for limiting wayside air-borne noise, ground-borne noise and vibration from the TTC's proposed Yonge-Spadina Subway Loop Line (the "Line"). The framework presented in this document is to be applied for planning purposes in order to address the requirements of the Environmental Assessment Act and is to be utilized during implementation of the Line.

The passby sound levels and vibration velocities in this protocol have been developed specifically for the Line and this protocol is not to be applied retroactively to existing TTC transit lines, routes or facilities nor to transit authorities other than TTC. Further, the criteria specified for this project are not precedent setting for future projects.

Prediction and measurement methods are being developed by the TTC. This will be done in consultation with MOEE and the Ministry of Transportation (MTO). Studies pertaining to noise and vibration levels are also being conducted by TTC. Upon completion of these studies, the TTC may revisit the assessment criteria and methods in this protocol to modify them as required in consultation with MOEE and the Ministry of Transportation (MTO).

PART B. GENERAL

During design of the Line, predicted wayside sound levels and vibration velocities are to be compared to criteria given in this protocol. This will permit an impact assessment and help determine the type or extent of mitigation measures to reduce that impact. Sound levels and vibration velocities will be predicted from sound levels and velocities of TTC's existing rail technologies.

The criteria presented in this document are based on good operating conditions and the impact assessment assumes this condition. Good operating conditions exist when well maintained vehicles operate on well maintained continuous welded rail without significant rail corrugation. It is recognised that wheel flats or rail corrugations will inevitably occur and will temporarily increase sound and vibration levels until they are corrected. Levels in this protocol do not reflect these occasional events, nor do they apply to maintenance activities on the Line. TTC recognizes that wheel rail squeal is a potential source of noise which may pose a concern to the community. TTC is investigating and will continue to investigate measures to mitigate wheel rail squeal and will endeavour to mitigate this noise source. TTC endeavours to minimize the noise and vibration impacts associated with its transit operations and is committed to providing good operating conditions to the extent technologically, economically and administratively feasible.

It is recognised that levels of sound and vibration at special trackwork, such as at crossovers and turnouts, are inevitably higher than along tangent track. Also, there is a limit to the degree of mitigation that is feasible at special trackwork areas. This is to be taken into account in predicting sound and vibration levels near these features and in applying the levels in this protocol. Special trackwork, such as at crossovers and turnouts, is encompassed within the framework of this document.

This protocol applies to existing and proposed residential development having municipal approval on the date of this protocol. The protocol also applies to existing and municipally approved proposed nursing homes, group homes, hospitals and other such institutional land uses where people reside. This protocol does not apply to commercial and industrial land uses.

This protocol does not apply closer than 15 m to the centreline of the nearest track. Any such cases shall be assessed on a case by case basis.

Part D of this document deals with air-borne noise from the Line and its construction. Part E deals with ground-borne noise and vibration from the Line.

PART C. DEFINITIONS

The following definitions apply to both parts D and E of this document.

Ancillary Facilities:

Subsidiary locations associated with either the housing of personnel or equipment engaged in TTC activities or associated with mainline revenue operations. Examples of ancillary facilities include, but are not limited to, subway stations, bus terminals, emergency services buildings, fans, fan and vent shafts, substations, mechanical equipment plants, maintenance and storage facilities, and vehicle storage and maintenance facilities.

Passby Time Interval:

The passby time interval of a vehicle or train is given by its total length and its speed. The start of the pass-by is defined as that point in time when the leading wheels pass a reference point. The end of the pass-by is defined as that point in time when the last wheels of the vehicle or train pass the same reference point. The reference point is to be chosen to give the highest level at the point of reception or point of assessment, i.e. usually at the point of closest approach. From a signal processing perspective, the passby time interval will be defined in the prediction and measurement methods being developed.

PART D. AIR-BORNE NOISE

1.0 DEFINITIONS

The following definitions are to be used only within the context of Part D of this document.

Ambient:

The ambient is the sound existing at the point of reception in the absence of all noise from the Line. In this protocol the ambient is taken to be the noise from road traffic and existing industry. The ambient specifically excludes transient noise from aircraft and railways, except for pre-existing TTC rail operations.

Daytime Equivalent Sound Level:

$L_{eq,16h}$ is the daytime equivalent sound level. The definition of equivalent sound level is provided in Reference 2. The applicable time period is from 07:00 to 23:00 hours.

Nighttime Equivalent Sound Level:

$L_{eq,8h}$ is the nighttime equivalent sound level. The applicable time period is from 23:00 to 07:00 hours.

Point of Reception:

<u>Daytime</u>: 07:00 - 23:00 hours

Any outdoor point on residential property, 15 m or more from the nearest track's centreline, where sound originating from the Line is received.

<u>Nighttime</u>: 23:00 - 07:00 hours

The plane of any bedroom window, 15 m or more from the nearest track's centreline, where sound originating from the Line is received. At the planning stage, this is usually assessed at the nearest facade of the premises.

Passby Sound Level, L_{passby} :

Within the context of this document, the passby sound level is defined as the A-weighted equivalent sound level, L_{eq} [Reference 2] over the passby time interval.

2.0 RAIL TRANSIT

In the assessment of noise impact, rail transit is considered to include the movement of trains between stations, the movement and idling of trains inside stations as well as the movement of trains between the mainline and ancillary facilities. Ancillary facilities are not considered part of the rail transit and are assessed as stationary sources. Trains idling in maintenance yards and storage facilities are part of the stationary source.

The assessment of noise impact resulting from Line is to be performed in terms of the following sound level descriptors:

1) Daytime equivalent sound level, $L_{eq,16h}$,
2) Nighttime equivalent sound level, $L_{eq,8h}$,
3) Passby Sound Level, L_{passby}.

The predicted daytime and nighttime equivalent sound levels include the effects of both passby sound level and frequency of operation and are used to assess the noise impact of the Line. The Passby Sound Level criterion is used to assess the sound levels received during a single train passby. The criteria and methods to be used are discussed in Sections 2.1 and 2.2.

2.1 Criteria

Noise impact shall be predicted and assessed during design of the Line using the following sound level criteria:

DAYTIME EQUIVALENT SOUND LEVEL:

The limit at a point of reception for the predicted daytime equivalent sound levels for rail transit operating alone (excluding contributions from the ambient) is 55 dBA or the ambient $L_{eq,16h}$, whichever is higher.

NIGHTTIME EQUIVALENT SOUND LEVEL:

The limit at a point of reception for the predicted nighttime equivalent sound levels for rail transit operating alone (excluding contributions from the ambient) is 50 dBA or the ambient $L_{eq,8h}$, whichever is higher.

PASSBY SOUND LEVEL:

The limit at a point of reception for predicted L_{passby} for a single train operating alone and excluding contributions from other sources is 80 dBA. This limit is based on vehicles operating on tangent track. It does not apply within 100m of special trackwork and excludes wheel rail squeal.

Mitigating measures will be incorporated in the design of the Line when predictions show that any of the above limits are exceeded by more than 5 dB. All mitigating measures shall ensure that the predicted sound levels are as close to, or lower than, the respective limits as is technologically, economically, and administratively feasible.

2.2 Prediction

In most cases, a reasonable estimate of the ambient sound level can be made using a road traffic noise prediction method such as that described in Reference 9, and the minimum sound levels in Table 106-2 of Reference 6. Prediction of road traffic L_{eq} is preferred to individual measurements in establishing the ambient. Prediction techniques for the L_{eq} from road traffic and the L_{eq} or L_{passby} from transit shall be compatible with one another. Any impact assessment following this protocol shall include a description of the prediction method and the assumptions and sound level data inherent in it. Prediction and measurement methods compatible with MOEE guidelines and procedures are being developed by the TTC at the date of this protocol in consultation with MTO and MOEE.

3.0 ANCILLARY FACILITIES

Predicted noise impacts from ancillary facilities shall be assessed during the design of the Line in accordance with the stationary source guidelines detailed in Reference 5. The predictions used shall be compatible with and at least as accurate as CSA Standard Z107.55.

4.0 BUSES IN MIXED TRAFFIC

Where buses are part of the road traffic there are no additional criteria requirements beyond those presented in the Ministry of Transportation of Ontario Protocol for dealing with noise concerns during the preparation, review and evaluation of Provincial Highways Environmental Assessments (Reference 1). Buses should be considered as medium trucks in the traffic noise prediction models.

5.0 CONSTRUCTION

Noise impacts from the construction of the Line are to be examined. For the purposes of impact assessment and identifying the need for mitigation, the Ministry of the Environment and Energy guidelines for construction presented in Reference 7 are to be referred to.

PART E. GROUND-BORNE VIBRATION

The assessment of ground-borne vibration impact is confined to the vibration that is produced by the operation of the Line and excludes vibration due to maintenance activities.

In recognition of the fact that the actual vibration response of a building is affected by its own structural characteristics, this document deals with the assessment of ground-borne vibration only on the outside premises. Structural characteristics of buildings are beyond the scope of this protocol and beyond the control of the TTC.

It is recognised that ground-borne vibration can produce air-borne noise inside a structure and there is a direct correlation between the two. The TTC can only control ground-borne noise by controlling ground-borne vibration. Accordingly, ground-borne noise will be predicted and assessed in terms of vibration measured at a point of assessment using the limit in Section 2.0, Vibration Assessment.

1.0 DEFINITIONS

The following definitions are to be used only within the context of Part E of this document.

Point of Assessment:

A point of assessment is any outdoor point on residential property, 15 m or more from the nearest track's centreline, where vibration originating from the Line is received.

Vibration Velocity:

Vibration Velocity is the root-mean-square (rms) vibration velocity assessed during a train pass-by. The unit of measure is metres per second (m/s) or millimetres per second (mm/s). For the purposes of this protocol only vertical vibration is assessed. The vertical component of transit vibration is usually higher than the horizontal. Human sensitivity to horizontal vibration at the frequencies of interest is significantly less than the sensitivity to vertical vibration.

2.0 VIBRATION ASSESSMENT

Vibration velocities at points of assessment shall be predicted during design of the Line. If the predicted rms vertical vibration velocity from the Line exceeds 0.1 mm/sec, mitigation methods shall be applied during the detailed design to meet this criterion to the extent technologically, economically, and administratively feasible. Where it is suitable, a double tie system or its equivalent will be the mitigation method of choice. This is a state of the art vibration isolation system developed by TTC and used where vibration isolation is required on new underground lines (see Reference 8).

Any impact assessment following this protocol shall include a description of the prediction method and the assumptions and data inherent in it. Prediction and measurement methods are being developed by the TTC at the date of this protocol in cooperation with MTO and MOEE.

References

1)A Protocol for Dealing With Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments, Ministry of Transportation, February 1986.

2)Model Municipal Noise Control By-Law, Final Report, Publication NPC-101 Technical Definitions, Ministry of the Environment, August 1978.

3)Model Municipal Noise Control By-Law, Final Report, Publication NPC-103 Procedures, Ministry of the Environment, August 1978.

4)Model Municipal Noise Control By-Law, Final Report, Publication NPC-104 Sound Level Adjustments, Ministry of the Environment, August 1978.

5)Model Municipal Noise Control By-Law, Final Report, Publication NPC-105 Stationary Sources, Ministry of the Environment, August 1978.

6)Model Municipal Noise Control By-Law, Final Report, Publication NPC-106 Sound Levels of Road Traffic, Ministry of the Environment, August 1978.

7)Noise Control Guideline For Class Environmental Assessment of Undertakings, February 1980, Ministry of the Environment.

8)Toronto Subway System Track Vibration Isolation System (Double Tie) - Technical Report, TTC Engineering Department, June 1982.

9)STAMSON 4.1, Ontario Ministry of the Environment Road and Rail Noise Prediction Software

SOUND LEVEL LIMITS FOR STATIONARY SOURCES IN CLASS 1 & 2 AREAS (URBAN)

PUBLICATION NPC-205

OCTOBER 1995

Ontario

Ministry
of the
Environment

Cette publication technique
n`est disponible qu`en anglais.

ISBN 0-7778-4922-4
PIBS 3406E

Ontario

MINISTRY OF THE ENVIRONMENT

Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)
Publication NPC-205

October 1995

This Publication establishes sound level limits for stationary sources such as industrial and commercial establishments or ancillary transportation facilities, affecting points of reception in Class 1 and 2 Areas (Urban). It replaces Publication NPC-105 "Stationary Sources" of the "Model Municipal Noise Control By-Law, Final Report, August 1978".

TABLE OF CONTENTS

1. SCOPE

This Publication establishes sound level limits for stationary sources such as industrial and commercial establishments or ancillary transportation facilities, affecting points of reception in Class 1 and 2 Areas (Urban). The limits apply to noise complaint investigations carried out in order to determine potential violation of Section 14 of the Environmental Protection Act. The limits also apply to the assessment of planned stationary sources of sound in compliance with Section 9 of the Environmental Protection Act, and under the provisions of the Aggregate Resources Act and the Environmental Assessment Act.

Ontario

MINISTRY OF THE ENVIRONMENT

This Publication does not address sound and vibration produced by blasting; blasting in quarries and surface mines is considered in Reference [7].

The Publication includes an Annex, which provides additional details, definitions and rationale for the sound level limits.

2. REFERENCES

Reference is made to the following publications:

[1] NPC-101 - Technical Definitions

[2] NPC-102 - Instrumentation

[3] NPC-103 - Procedures

[4] NPC-104 - Sound Level Adjustments

[6] NPC-206 - Sound Levels due to Road Traffic

[7] NPC-119 - Blasting

[8] NPC-216 - Residential Air Conditioning Devices

[9] NPC-232 - Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)

[10] NPC-233 - Information to be Submitted for Approval of Stationary Sources of Sound

[12] ORNAMENT, Ontario Road Noise Analysis Method for Environment and Transportation, Technical Document, Ontario Ministry of the Environment, ISBN 0-7729-6376, 1989

References [1] to [4] and [7] can be found in the
Model Municipal Noise Control By-Law, Ontario Ministry of the Environment, Final Report, August 1978.

3. TECHNICAL DEFINITIONS

"Ambient sound level"
means Background sound level.

"Background sound level"
is the sound level that is present in the environment, produced by noise sources other than the source under impact assessment. Highly intrusive short duration noise caused by a source such as an aircraft fly-over or a train pass-by is excluded from the determination of the background sound level.

"Class 1 Area"
means an area with an acoustical environment typical of a major population centre, where the background noise is dominated by the urban hum.

"Class 2 Area"
means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours.

Other characteristics which may indicate the presence of a Class 2 Area include:

- absence of urban hum between 19:00 and 23:00 hours;
- evening background sound level defined by natural environment and infrequent human activity; and
- no clearly audible sound from stationary sources other than from those under impact assessment.

"Class 3 Area"
means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

- a small community with less than 1000 population;
- agricultural area;
- a rural recreational area such as a cottage or a resort area; or
- a wilderness area.

Other technical terms are defined in Reference [1] and in the Annex to Publication NPC-205.

4. ESTABLISHMENT OF LIMITS - OBJECTIVE

The sound level limit at a point of reception must be established based on the principle of "predictable worst case" noise impact. In general, the limit is given by the background sound level at the point of reception. The sound level limit must represent the minimum background sound level that occurs or is likely to occur during the operation of the stationary source under impact assessment.

5. BACKGROUND SOUND LEVELS

The time interval between the background sound level measurement and the measurement of the sound level produced by the stationary source under impact assessment should be minimized as much as possible. Preferably, the two measurements should be carried out within one hour of each other.

6. SOUND LEVELS DUE TO STATIONARY SOURCES

(1) **Complaint Investigation of Stationary Sources**
The One Hour Equivalent Sound Level (L_{eq}) and/or the Logarithmic Mean Impulse Sound Level (L_{LM}) produced by the stationary sources shall be obtained by measurement performed in accordance with Section 7.

(2) **Approval of Stationary Sources**
The One Hour Equivalent Sound Level (L_{eq}) and/or the Logarithmic Mean Impulse Sound Level (L_{LM}) produced by the stationary sources shall be obtained by measurement or prediction. The estimation of the L_{eq} and/or L_{LM} of the stationary source under impact assessment shall reflect the principle of "predictable worst case" noise impact. The "predictable worst case" noise impact occurs during the hour when the difference between the predicted sound level produced by the stationary source and the background sound level of the natural environment is at a maximum.

7. PROCEDURES

All sound level measurements and calculations shall be made in accordance with References [3], [6]and [12].

Sound from existing adjacent stationary sources may be included in the determination of the background One Hour Equivalent Sound Level (L_{eq}) if such stationary sources of sound are not under consideration for noise abatement by the Municipality or the Ministry of Environment and Energy.

8. SOUND LEVEL LIMITS - GENERAL

(1) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source, the sound level limit expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}) is the background One Hour Equivalent Sound Level (L_{eq}) typically caused by road traffic as obtained pursuant to Section 6 for that point of reception.

(2) For sound from a stationary source, including Quasi-Steady Impulsive Sound but not including other impulsive sound, the sound level limit expressed in terms of the One Hour Equivalent Sound Level (L_{eq}) is the background One Hour Equivalent Sound Level (L_{eq}) typically caused by road traffic as obtained pursuant to Section 6 for that point of reception.

9. SOUND LEVEL LIMITS - SPECIFIC IMPULSIVE SOUNDS

(1) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source which is an industrial metal working operation (including but not limited to forging, hammering, punching, stamping, cutting, forming and moulding), the sound level limit at a point of reception expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}) is 60 dBAI, if the stationary source were operating before January 1, 1980, and otherwise is 50 dBAI.

(2) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source which is the discharge of firearms on the premises of a licensed gun club, the sound level limit at a point of reception expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}) is:

- 70 dBAI if the gun club were operating before January 1, 1980; or
- 50 dBAI if the gun club began to operate after January 1, 1980; or
- the L_{LM} prior to expansion, alteration or conversion.

(3) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source which is not a blasting operation in a surface mine or quarry, characterized by impulses which are so infrequent that they cannot normally be measured using the procedure for frequent impulses of Reference [3] the sound level limit at a point of reception expressed in terms of the impulse sound level is 100 dBAI.

10. SOUND LEVEL LIMITS - PEST CONTROL DEVICES

(1) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a pest control device employed solely to protect growing crops, the sound level limit at a point of reception expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}) is 70 dBAI.

(2) For sound, including Quasi-Steady Impulsive Sound but not including other impulsive sound, from a pest control device employed solely to protect growing crops, the sound level limit at a point of reception expressed in terms of the One Hour Equivalent Sound Level (L_{eq}) is 60 dBA.

11. PROHIBITION - PEST CONTROL DEVICES

The operation of a pest control device employed solely to protect growing crops outdoors during the hours of darkness, sunset to sunrise, is prohibited.

12. PRE-EMPTION

The least restrictive sound level limit of Sections 8, 9 and 10 applies.

13. EXCLUSION

No restrictions apply to a stationary source resulting in a One Hour Equivalent Sound Level (L_{eq}) or a Logarithmic Mean Impulse Sound Level (L_{LM}) lower than the minimum values for that time period specified in Table 205-1.

TABLE 205-1

Minimum Values of One Hour L_{eq} or L_{LM} by Time of Day

	One Hour L_{eq} (dBA) or L_{LM} (dBAI)	
Time of Day	Class 1 Area	Class 2 Area
0700 - 1900	50	50
1900 - 2300	47	45
2300 - 0700	45	45

May 21, 1999

Annex to Publication NPC-205
Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)

October 1995

A.1. GENERAL

In general, noises are annoying because they are heard over and above the level of the so-called "background" or surrounding environmental noise climate at a particular location. The standard for environmental noise acceptability of stationary sources is therefore expressed as the difference between noise from the source and the background noise.

The background noise is essentially made up of the road traffic noise which creates an "urban hum". It may also include contributions from existing industry or commercial activity adjacent to the stationary source under investigation. Contributions of these secondary noise sources are considered to be a part of urban hum and may be included in the measurements or calculation of the background sound levels, provided that they are not under consideration for noise abatement by the Municipality or the Ministry of Environment and Energy.

The sound level limits specified in Section 8 of Publication NPC-205 represent the general limitation on noise produced by stationary sources. Some noises, however, are annoying no matter where or in what kind of environment they exist. High level impulsive noises represent a special category and, consequently, are restricted by an absolute limitation. Sections 9 and 10 of this Publication provide criteria of acceptability for specific impulsive noise sources.

A.2. APPLICATION

The limits presented in Publication NPC-205 are designed for the control of noise from sources located in industrial, commercial or residential areas. The limits apply to points of reception located in Class 1 and Class 2 Areas.

Sound level limits contained in Publication NPC-205 do not apply to the excluded noise sources listed in Section A.3.(2) and neither do they apply to any equipment, apparatus or device used in agriculture for food crop seeding, chemical spraying or harvesting. In addition, several specific noise sources have been addressed in separate Publications. Limits for residential air conditioners are contained in Publication NPC-216 - Residential Air Conditioning Devices, Reference [8] and the limits for blasting operations in quarries and surface mines are contained in Publication NPC-119 - Blasting, Reference [7].

A.3. STATIONARY SOURCES

The objective of the definition of a stationary source of sound is to address sources such as industrial and commercial establishments or ancillary transportation facilities. In order to further clarify the scope of the definition, the following list identifies examples of installations, equipment, activities or facilities that are included and those that are excluded as stationary sources.

(1) Included Sources

Individual stationary sources such as:
- Heating, ventilating and air conditioning (HVAC) equipment;
- Rotating machinery;
- Impacting mechanical sources;
- Generators;
- Burners;
- Grain dryers.

Facilities, usually comprising many sources of sound. In this case, the stationary source is understood to encompass all the activities taking place within the property boundary of the facility. The following are examples of such facilities:
- Industrial facilities;
- Commercial facilities;
- Ancillary transportation facilities;
- Aggregate extraction facilities;
- Warehousing facilities;
- Maintenance and repair facilities;
- Snow disposal sites;
- Routine loading and unloading facilities (supermarkets, assembly plants, etc.).

Other sources such as:
- Car washes;
- Race tracks;
- Firearm Ranges.

(2) Excluded Sources

Secific sources or facilities:
- Construction activities;
- Transportation corridors, i.e. roadways and railways;
- Residential air conditioning devices including air conditioners and heat pumps;
- Gas stations;
- Auditory warning devices required or authorized by law or in accordance with good safety practices;
- Occasional movement of vehicles on the property such as infrequent delivery of goods to convenience stores, fast food restaurants, etc.

Other noise sources, normally addressed in a qualitative manner in municipal noise by-laws:
- The operation of auditory signalling devices, including but not limited to the ringing of bells or gongs and the blowing of horns or sirens or whistles, or the production, reproduction or amplification of any similar sounds by electronic means;
- Noise produced by animals kept as domestic pets such as dogs barking;
- Tools and devices used by occupants for domestic purposes such as domestic power tools, radios and televisions, etc., or activities associated with domestic situations such as domestic quarrels, noisy parties, etc;
- Noise resulting from gathering of people at facilities such as restaurants and parks.

Activities related to essential service and maintenance of public facilities such as but not limited to roadways, parks and sewers, including snow removal, road cleaning, road repair and maintenance, lawn mowing and maintenance, sewage removal, garbage collection, etc.

A.4. PREDICTABLE WORST CASE IMPACT

The assessment of noise impact requires the determination of the "predictable worst case" impact. The "predictable worst case" impact assessment should establish the largest noise excess produced by the source over the applicable limit. The assessment should reflect a planned and predictable mode of operation of the stationary source.

It is important to emphasize that the "predictable worst case" impact does not necessarily mean that the sound level of the source is highest; it means that the excess over the limit is largest. For example, the excess over the applicable limit at night may be larger even if the day-time sound level produced by the source is higher.

A.5. DEFINITIONS

In the interpretation of Publication NPC-205, the following definitions are of particular relevance:

- Ancillary Transportation Facilities
"Ancillary transportation facilities" mean subsidiary locations where operations and activities associated with the housing of transportation equipment (or personnel) take place. Examples of ancillary transportation facilities include, but are not limited to, substations, vehicle storage and maintenance facilities, fans, fan and vent shafts, mechanical equipment plants, emergency services buildings, etc;

- Construction
"Construction" includes erection, alteration, repair, dismantling, demolition, structural maintenance, painting, moving, land clearing, earth moving, grading, excavating, the laying of pipe and conduit whether above or below ground level, street and highway building, concreting, equipment installation and alteration and the structural installation of construction components and materials in any form or for any purpose, and includes any work in connection therewith; "construction" excludes activities associated with the operation at waste and snow disposal sites;

- Construction Equipment
"Construction equipment" means any equipment or device designed and intended for use in construction, or material handling including but not limited to, air compressors, pile drivers, pneumatic or hydraulic tools, bulldozers, tractors, excavators, trenchers, cranes, derricks, loaders, scrapers, pavers, generators, off-highway haulers or trucks, ditchers, compactors and rollers, pumps, concrete mixers, graders, or other material handling equipment;

- Conveyance
"Conveyance" includes a vehicle and any other device employed to transport a person or persons or goods from place to place but does not include any such device or vehicle if operated only within the premises of a person;

- Highway
"Highway" includes a common and public highway, street, avenue, parkway, driveway, square, place, bridge, viaduct or trestle designed and intended for, or used by, the general public for the passage of vehicles;

- Motor Vehicle
"Motor vehicle" includes an automobile, motorcycle,and any other vehicle propelled or driven otherwise than by muscular power, but does not include the cars of diesel, electric or steam railways, or other motor vehicles running only upon rails, or a motorized snow vehicle, traction engine, farm tractor, self-propelled implement of husbandry or road-building machine within the meaning of the Highway Traffic Act;

- Motorized Conveyance
"Motorized conveyance" means a conveyance propelled or driven otherwise than by muscular, gravitational or wind power;

- Noise
"Noise" means unwanted sound;

- Point of Reception
"Point of reception" means any point on the premises of a person where sound or vibration originating from other than those premises is received.

For the purpose of approval of new sources, including verifying compliance with Section 9 of the Environmental Protection Act, the point of reception may be located on any of the following existing or zoned for future use premises: permanent or seasonal residences, hotels/motels, nursing/retirement homes, rental residences, hospitals, camp grounds, and noise sensitive buildings such as schools and places of worship.

For equipment/facilities proposed on premises such as nursing/retirement homes, rental residences, hospitals, and schools, the point of reception may be located on the same premises;

- Stationary Source
"Stationary source" means a source of sound which does not normally move from place to place and includes the premises of a person as one stationary source, unless the dominant source of sound on those premises is construction or a conveyance;

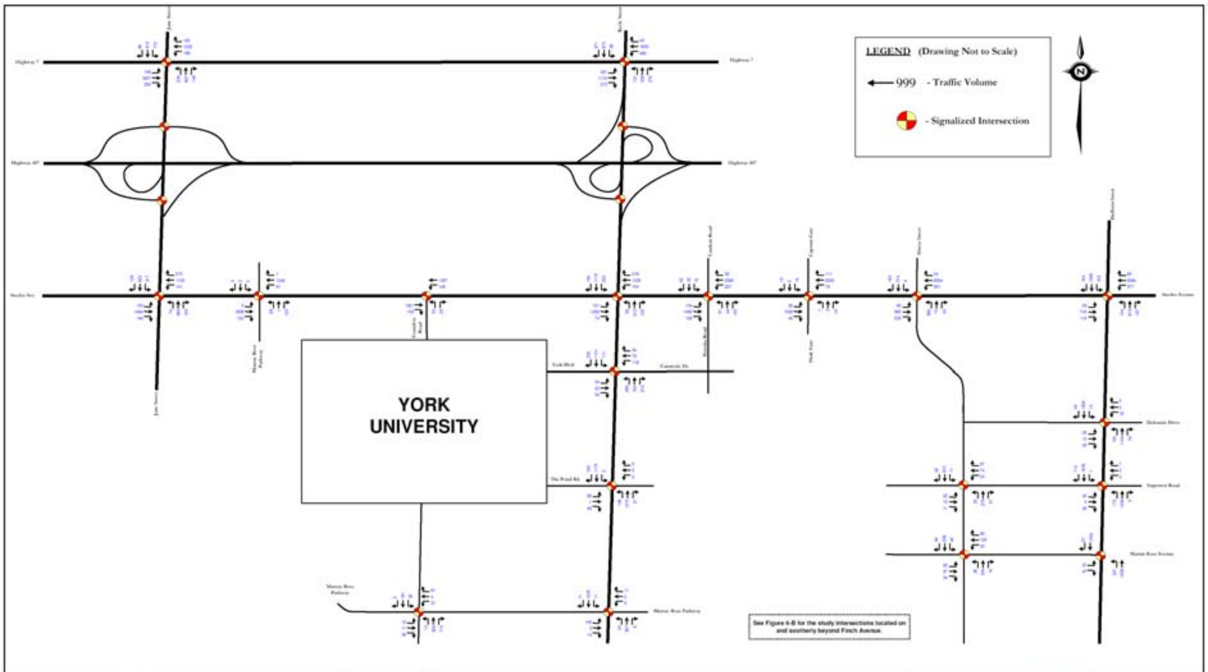
- Urban Hum
means aggregate sound of many unidentifiable, mostly road traffic related noise sources.

May 21, 1999

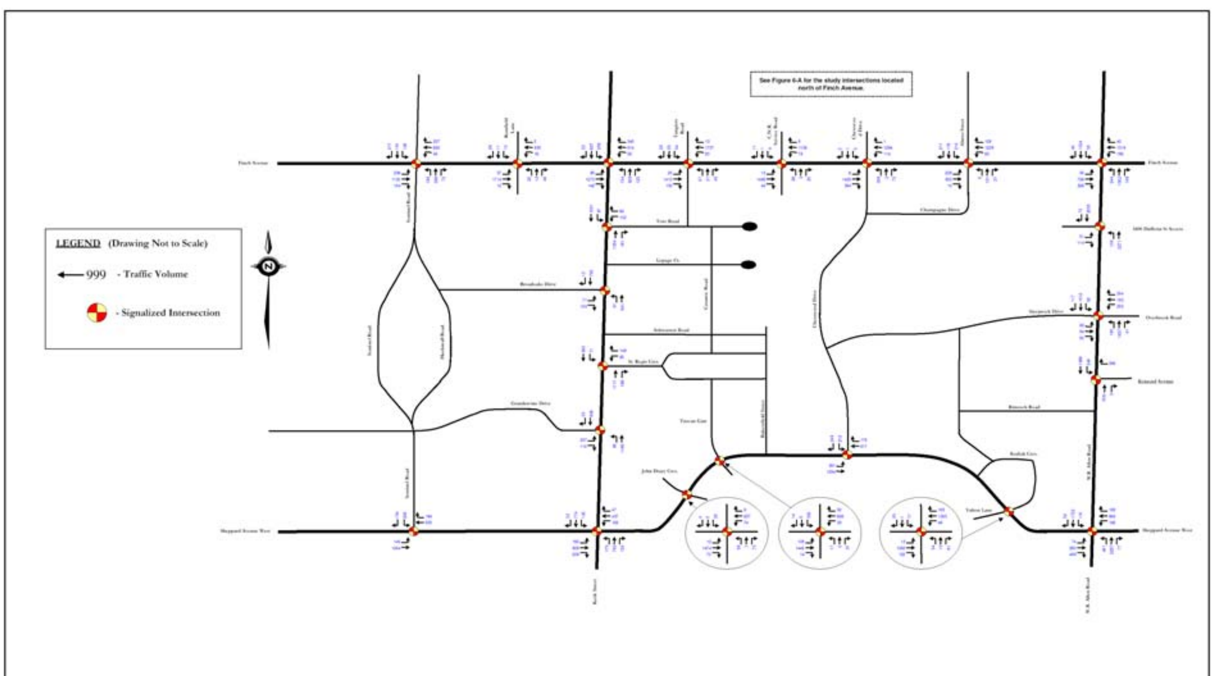
ISBN 0-7778-4922-4 PIBS 3406E

APPENDIX C

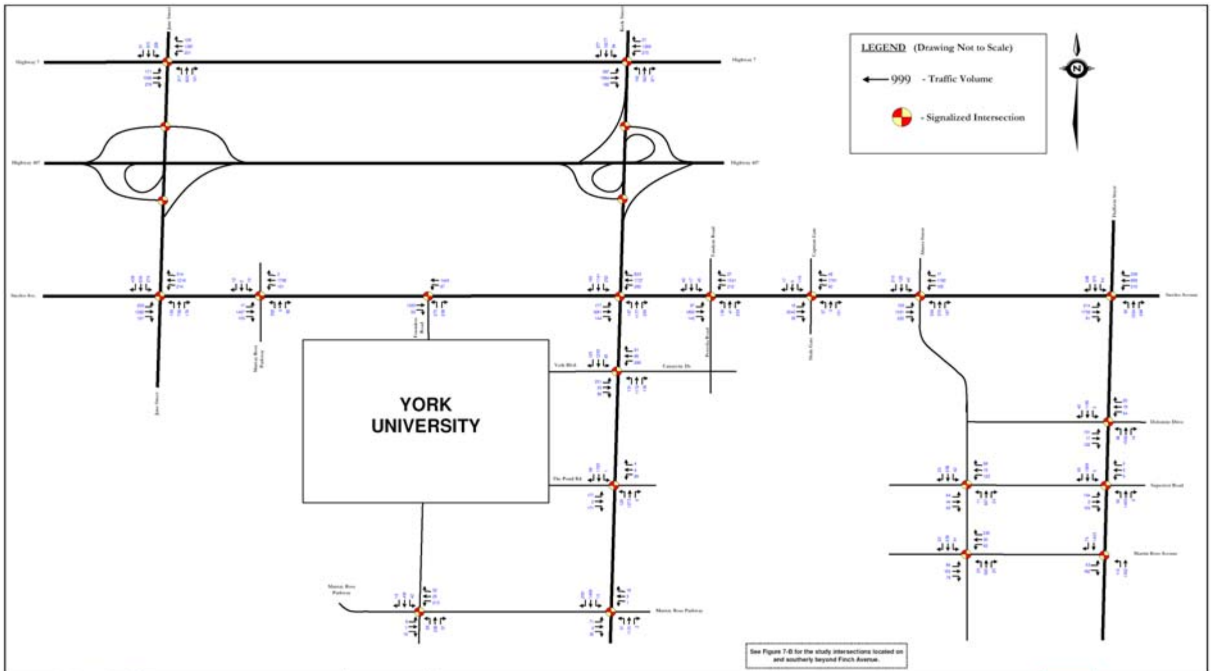
ROAD TRAFFIC DATA



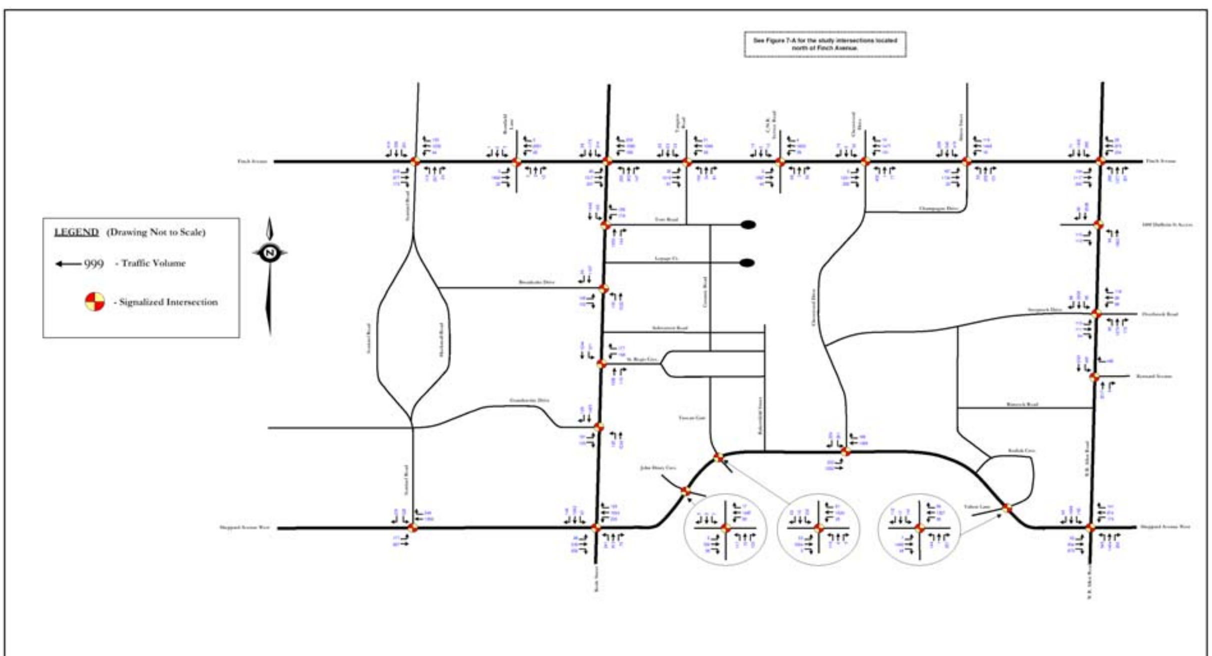
URS | TORONTO | Figure 6-A | Existing Traffic Volumes at the Study Intersections for A.M. Peak Hours
TTC Spadina Subway Extension



URS | TORONTO | Figure 6-B | Existing Traffic Volumes at the Study Intersections for A.M. Peak Hours
TTC Spadina Subway Extension

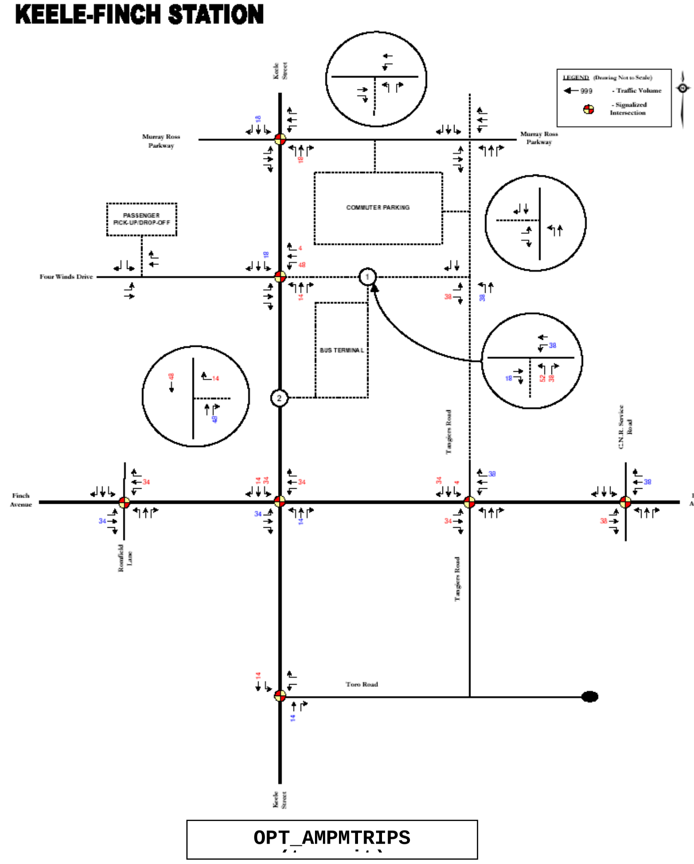


URS | TORONTO | Figure 7-A | Existing Traffic Volumes at the Study Intersections for P.M. Peak Hours
TTC Spadina Subway Extension



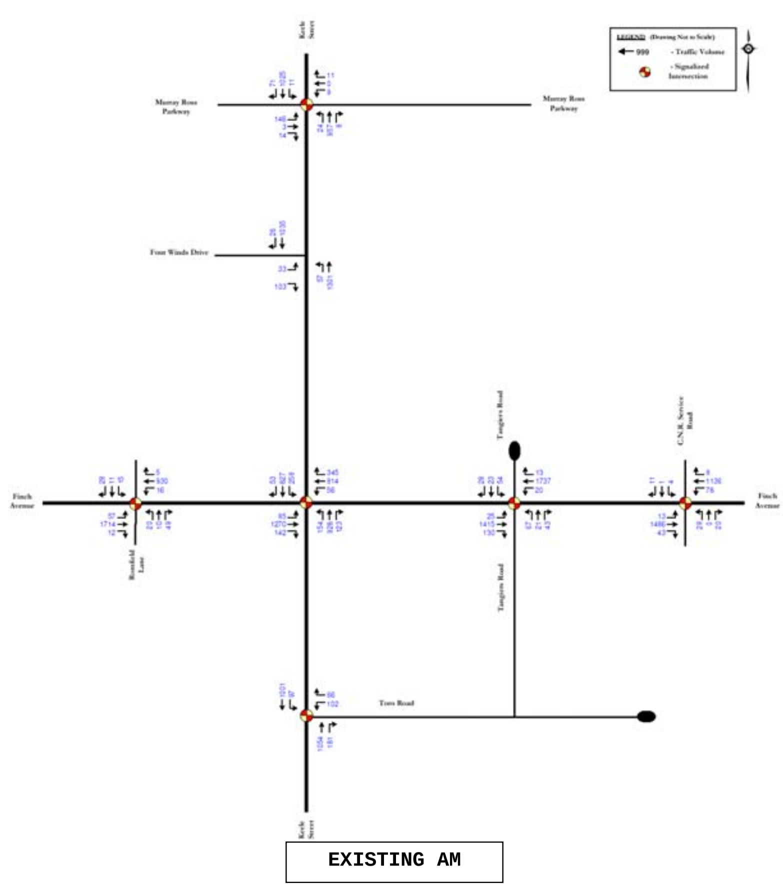
URS | TORONTO | Figure 7-B | Existing Traffic Volumes at the Study Intersections for P.M. Peak Hours
TTC Spadina Subway Extension

KEELE-FINCH STATION

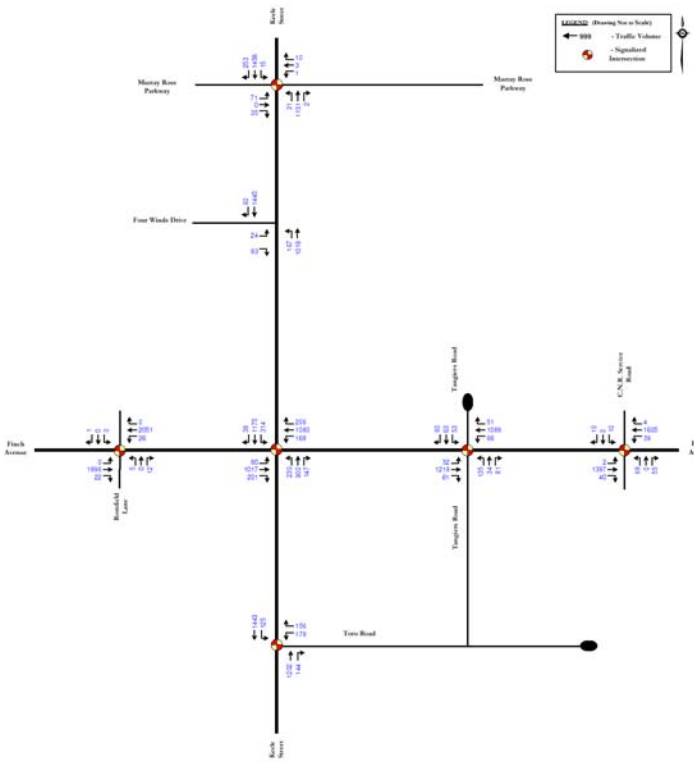


C-6

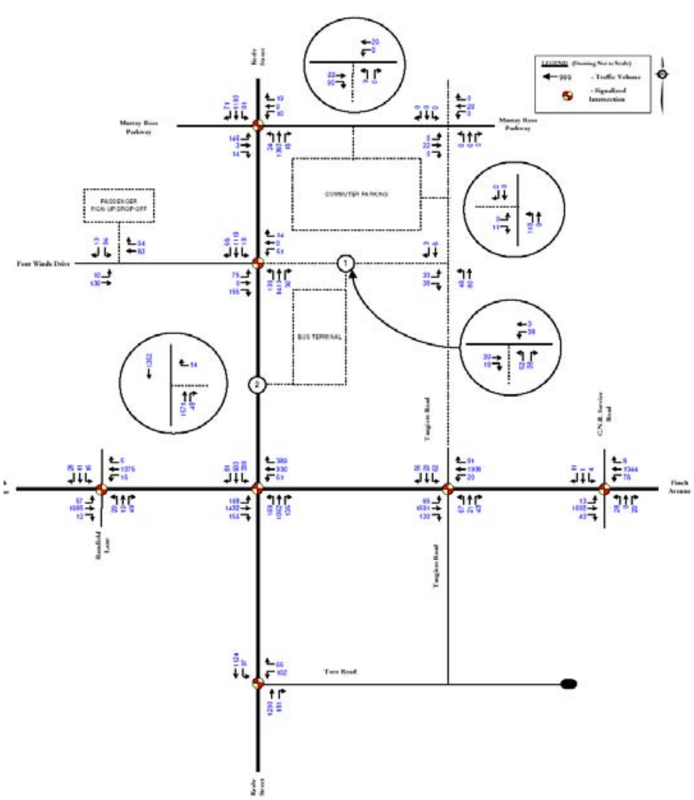
KEELE-FINCH STATION



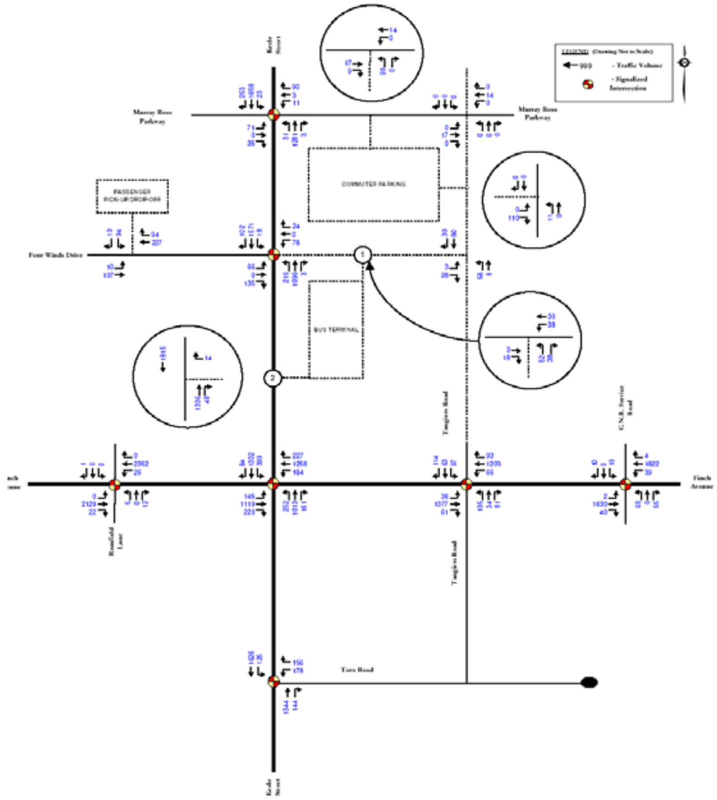
KEELE-FINCH STATION



EXISTING PM



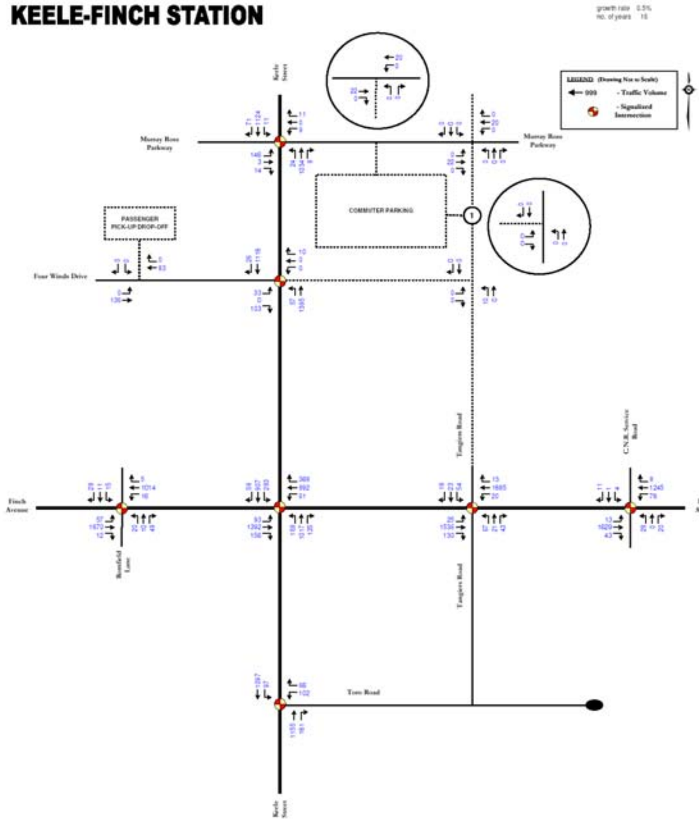
OPT2_TOTAL_AM



OPT1_TOTAL PM

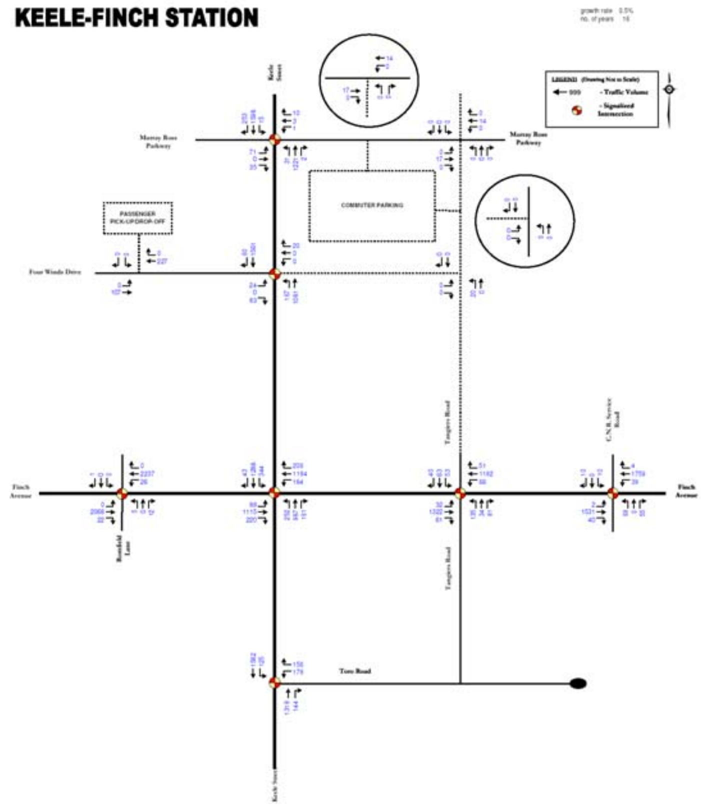
C-10

KEELE-FINCH STATION



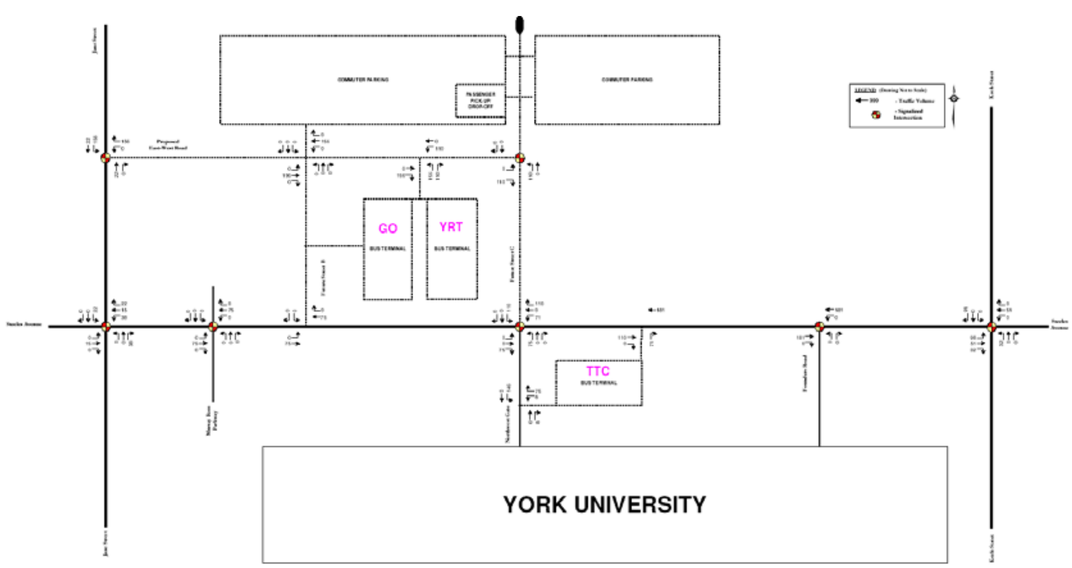
FUBG 2021 AM

C-11



FUBG 2021 PM (ADJ)

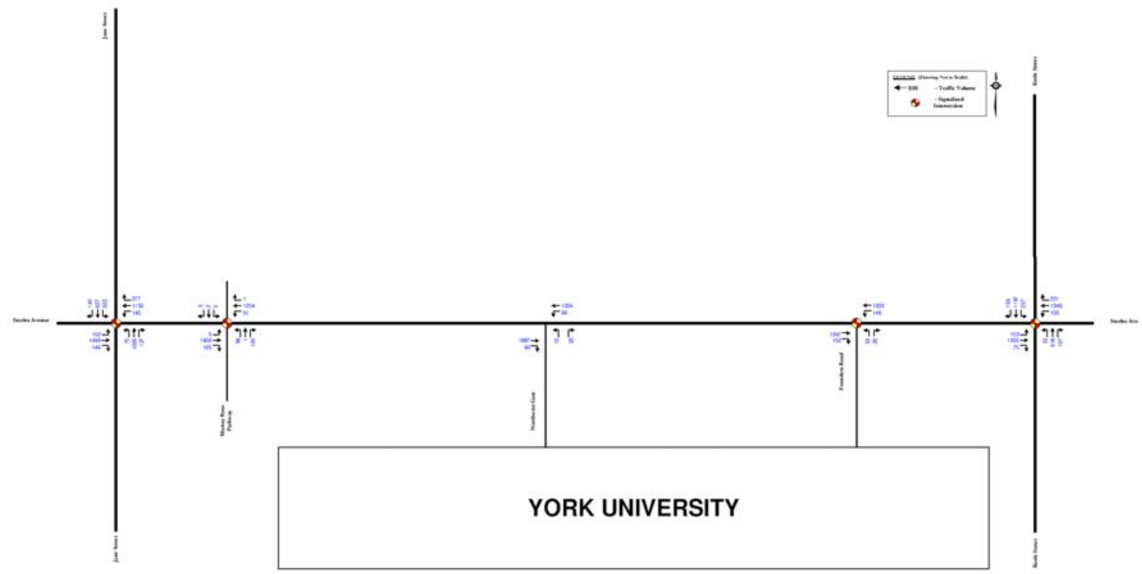
C-12



AMPM TRANSIT (OPT 1)

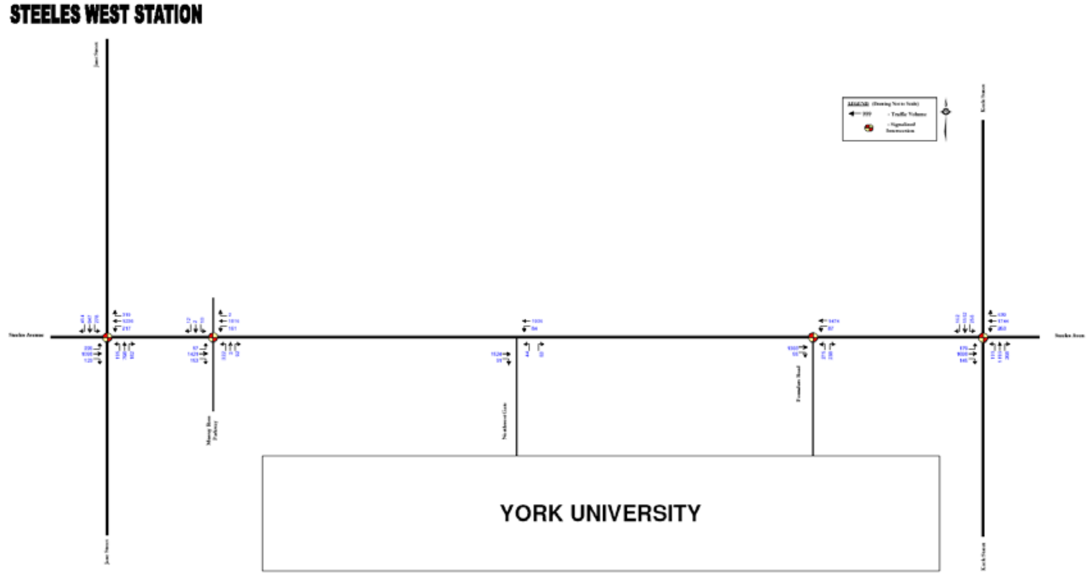
C-13

STEELES WEST STATION



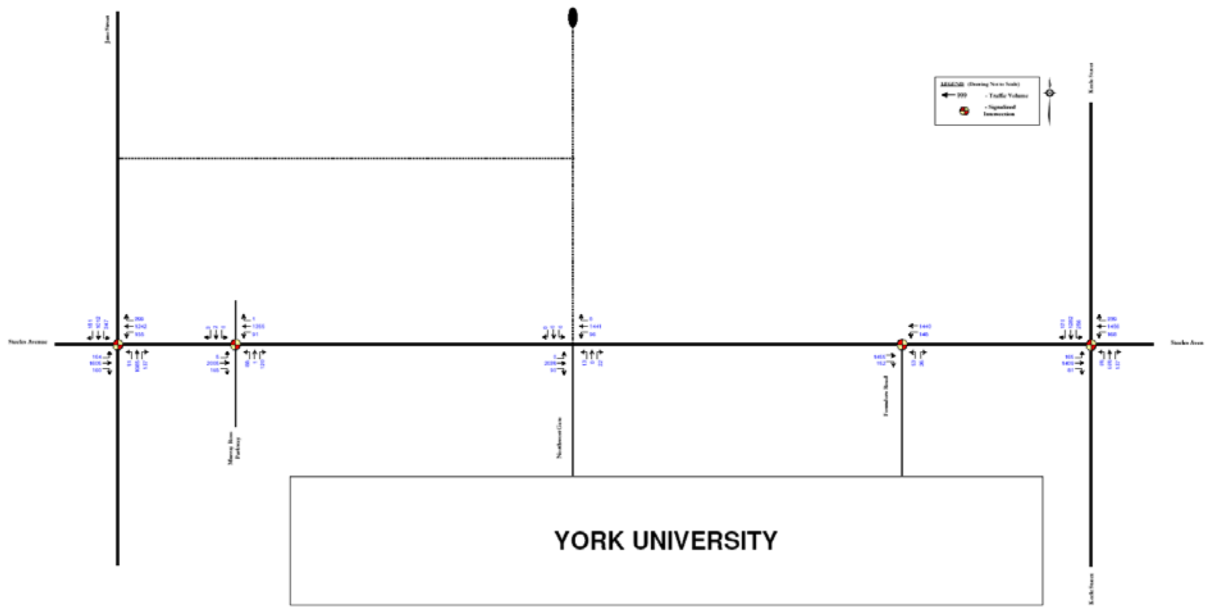
Existing BASE AM

STEELES WEST STATION



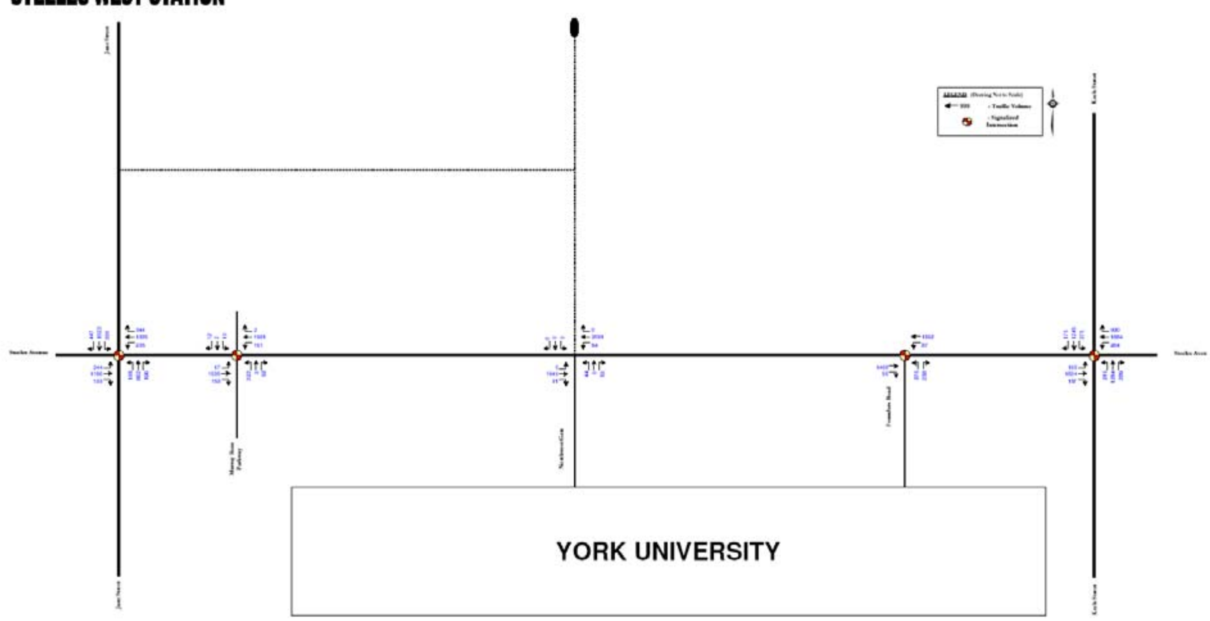
Existing BASE PM

STEELES WEST STATION



FuBG AM

STEELES WEST STATION



FuBG PM

Re: Request for Vehicular Traffic Data
Spadina Subway Extension Project EA
Your Ref - SSWA File No.: WA04-104

Keele/Finch Station

1. TTC Bus Terminal Bus Volumes:

- 24-hour and Weekly Day-by-Day predicted hourly bus volumes are not available;
- Future (year 2021) bus volumes are only available for A.M. peak hours, so for analysis purposes, A.M. and P.M. peak hour bus volumes are assumed to be the same.
- Predicted Hourly Bus Volume = 104 buses/hour, for A.M. and P.M. peak hour.

2. Finch Ave West – East of Keele Street;
3. Finch Ave West – West of Keele Street;
4. Keele Street – North of Finch Ave;
5. Keele Street – South of Finch Ave;

Existing/Current Hourly Traffic Counts for the above locations:
- 24-hour and Weekly Day-by-Day predicted hourly bus volumes are not available;
- Existing A.M. and P.M. peak hour traffic volumes are provided in the attached figures;
- Future total A.M. and P.M. peak hour traffic volumes are also provided in the attached figures. (This is existing traffic factored up to the 2021 year for just general background traffic growth, plus new buses, passenger pick-up and drop-off's and parking n' ride trips.)

- AADT for Existing and Future conditions can be calculated by the equation given in the following table.
- Truck % (overall truck % only, since medium/heavy trucks classification information is not available);
- No day/night traffic split % information available.

Parameter	Finch Ave				Keele Street			
	East of Keele		West of Keele		North of Finch		South of Finch	
	Existing	Future	Existing	Future	Existing	Future	Existing	Future
AADT**	(am+pm)*8	(am+pm)*8	(am+pm)*8	(am+pm)*8	(am+pm)*6	(am+pm)*6	(am+pm)*6	(am+pm)*6
Truck %	8%	8%	6%	6%	6%	6%	8%	8%
Posted Speed Limit (kph)	60	60	60	60	60	60	60	60

**For example: (A.M. link volume + P.M. link volume) x factor = AADT for the road section.

Attachments:
- Existing AM and PM traffic volumes; and
- Future Total AM and PM traffic volumes for Keele/Finch Station Options 1-5.

APPENDIX D

AMBIENT NOISE AND VIBRATION LEVELS

D.1 GENERAL

Noise and vibration impacts associated with the operation of the proposed subway line are most commonly experienced in the area surrounding the subway stations facilities and the subway line and itself.

D.2 MEASUREMENT LOCATIONS

The following list includes the properties where ambient noise and vibration measurements were conducted:

- Incredible Printing (20 St. Regis Crescent North)
- Sunoco Gas Stations (3720 and 3811 Keele Street)
- Canadian Custom Packing Company (333 Rimrock Road)
- The Forever Group (156 St. Regis Crescent South)
- Chesswood Arena (4000 Chesswood Drive)
- DeMarco Funeral Home (3725 Keele Street)
- Arbor Tools Ltd. (41 Toro Road)
- CAW Local 112 (30 Tangiers Road)
- Spring Air Canada (53 Bakersfield Street)
- John Vince Foods (250-330 Rimrock Road)
- International Glass and Mirror Co. Ltd. (14 Toro Road)
- Tectrol Inc. (39 Kodiak Crescent)
- The Music Lab (1 Whitehorse Road)
- Lumbers Building (York University)
- Stedman Lecture Halls (York University)
- Seymour Schulich Building (York University)
- Seneca @ York (York University)
- Winters Residence (York University)

D.3 MEASUREMENT PROCEDURES

The noise measurements were performed using the following equipment:

- Rion NA-27, Type 1 Precision Integrating Sound Level Meter and Real Time Frequency Analyzer fitted with 1/1 & 1/3 Octave Bands filters and a 1/2" condenser microphones c/w windscreen.
- Bruel & Kjaer Precision Calibrator Model B&K 4231.

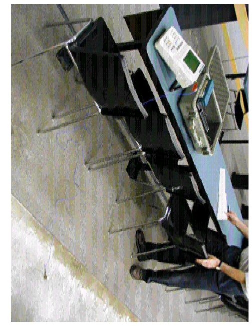
The vibration measurements were performed using the following equipment:

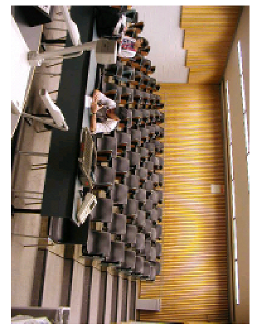
- PCB (ICP) accelerometer Model #353B33.
- Hewlett Packard Model 3569A, Type 1 Precision Real Time Frequency Analyzer fitted with Dual Channels, 1/1 and 1/3 Octave Bands filters.
- Bruel & Kjaer Calibration Exciter Type 4294.

The measurement procedures were primarily based on the Ministry of Environment procedures, the recommendations of the instrument manufactures and the best engineering practices to suit site specific conditions. The noise and vibration meters were checked and calibrated before and following completion of the measurement sessions without any appreciable change in the levels.

D.4 MEASUREMENT RESULTS

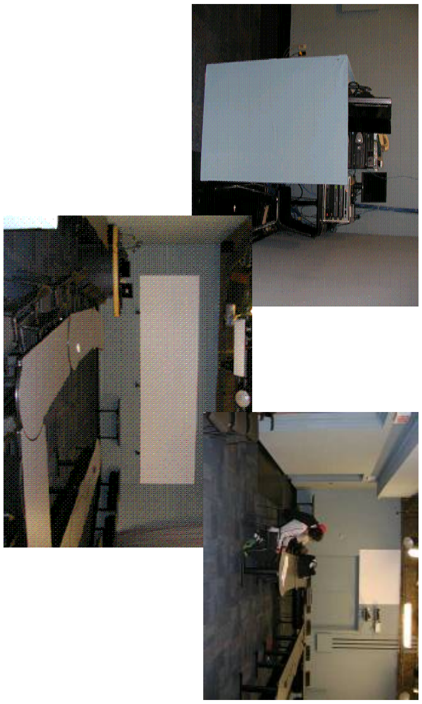
The sheets to follow include the results of the ambient noise and vibration measurements conducted at the above noted properties:





ACTUALLY MEASURED AMBIENT/BACKGROUND SOUND AND VIBRATION LEVELS

YORK UNIVERSITY



Proceed

SS WILSON ASSOCIATES

12/1/2005 11:41

SUMMARY OFAVERAGE MEASURED VIBRATION LEVELS - YORK UNIVERSITY - SCHULICH
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION
Source : WITHOUT STUDENTS

Total No.Of Events : 4

Observed Speed

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	Lecture Room N105		43.3	41.7	40.9	44.1	41.5	40.2	46.8	40.8	39.4	40.1	41.1	39.8	42.7	40.0	40.1	39.2	39.1	38.0	37.5	39.4	38.0	37.6	37.2	36.8	55	
1	Auditorial Room		46.3	37.9	45.2	42.3	44.4	42.6	41.3	38.4	40.9	41.8	41.7	39.2	41.3	42.1	40.5	42.0	39.3	40.0	39.1	39.6	38.9	38.1	38.2	37.8	55	
1	Room X 114		47.4	40.5	38.7	38.4	41.2	40.3	38.0	44.5	45.0	37.5	38.4	38.5	39.1	40.2	37.9	38.6	39.4	37.7	38.9	38.2	38.4	38.3	37.4	37.6	54	
1	Room X 005 (Basement)		42.6	43.0	45.5	41.8	43.3	45.6	39.4	37.8	40.8	39.8	40.6	40.4	40.8	38.9	38.7	38.7	38.6	39.8	38.4	38.1	38.3	38.3	38.1	37.4	61	
																											14	
																											14	
																											14	
																											14	
																											14	
																											14	
4	**Average Accel, dB**		45	41	43	42	43	43	43	41	42	40	41	40	41	40	39	40	39	39	39	39	38	38	38	37	55	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.09	
	Ave.Veloc,dB re10^-6 in/s						66.7	64.7	62.7	59.1	58.0	54.1	52.5	49.5	49.1	46.4	43.3	41.8	39.1	36.9	34.5	32.9	30.3	28.0			71	
	MOE- TTC Criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	
	Excess Over MOE - TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

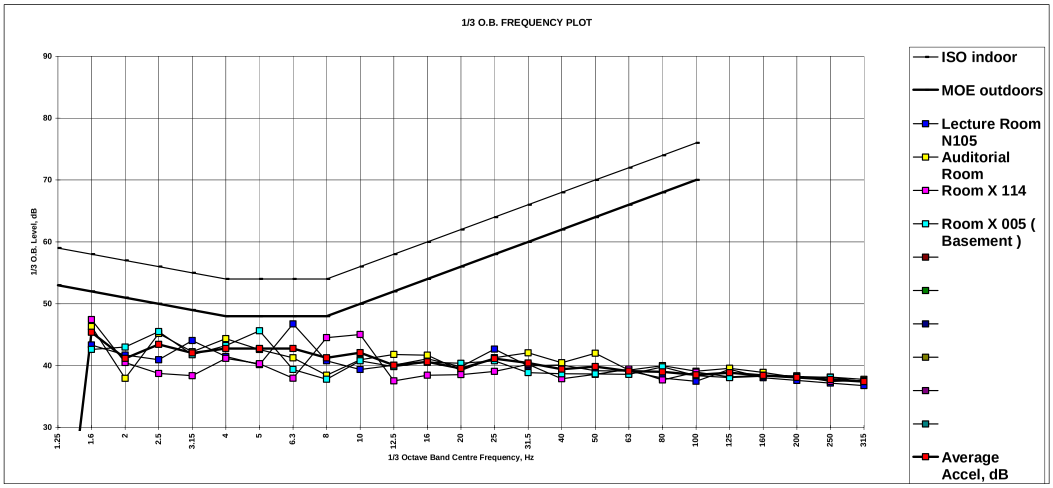
(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **40** dB re10^-6 in/s
Range, From **34** To **46**

COMMENTS :
....

SS WILSON ASSOCIATES

SUMMARY OFAVERAGE MEASURED VIBRATION LEVELS - YORK UNIVERSITY - SCHULICH
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)
SPADINA SUBWAY LINE EXTENTION



Proceed

SS WILSON ASSOCIATES

11/30/2005 18:25

SUMMARY OFaverage MEASURED VIBRATION LEVELS - YORK UNIVERSITY - LUMBERS BUILDING
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION
Source : WITHOUT STUDENTS

Total No.Of Events : 5

Observed Speed

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	Lab #7 Room 118		44.1	43.9	44.7	45.3	41.6	40.3	40.9	41.6	42.6	40.1	38.1	46.5	42.0	39.6	39.3	40.4	39.1	38.1	39.0	38.5	37.4	38.3	37.0	37.5	55	
1	Aquarium Room 119		43.9	45.9	36.6	41.5	42.8	42.1	42.9	42.3	39.8	43.9	47.2	44.2	41.2	42.4	39.5	40.1	38.9	38.6	38.9	43.7	38.5	38.9	38.7	38.0	56	
1	Autoclave Room 120A		47.9	34.5	39.4	38.6	40.3	41.2	41.1	46.4	44.2	37.3	37.4	37.6	41.0	38.8	39.5	38.0	39.7	38.1	39.6	39.8	38.4	37.2	38.0	37.3	55	
1	Master Preparation Room 112		43.8	43.1	44.6	48.4	44.2	42.5	38.6	37.1	36.2	37.5	38.2	41.0	38.3	38.2	38.1	38.0	40.5	37.6	39.2	42.2	38.4	38.0	37.2	36.8	61	
1	Out side the building		39.1	46.2	44.0	40.9	37.5	41.5	42.4	39.2	41.6	38.4	41.2	38.5	37.8	41.6	41.2	42.3	43.3	41.6	39.5	38.8	37.1	38.0	37.0	37.0	55	
																											14	
																											14	
																											14	
																											14	
																											14	
5	**Average Accel, dB**		45	44	43	44	42	42	41	42	42	40	42	43	40	40	40	40	41	39	39	41	38	38	38	37	55	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.05	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.08	
	Ave.Veloc,dB re10^-6 in/s						65.7	63.5	61.4	60.3	57.6	54.2	54.1	52.7	48.3	46.4	43.5	42.0	40.6	36.9	35.2	35.1	29.9	28.0			70	
	MOE - TTC Criteria,mm/sec						0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10			0.1	
	Excess Over MOE - TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

(Excess = Average Level- MOE outdoor Level)

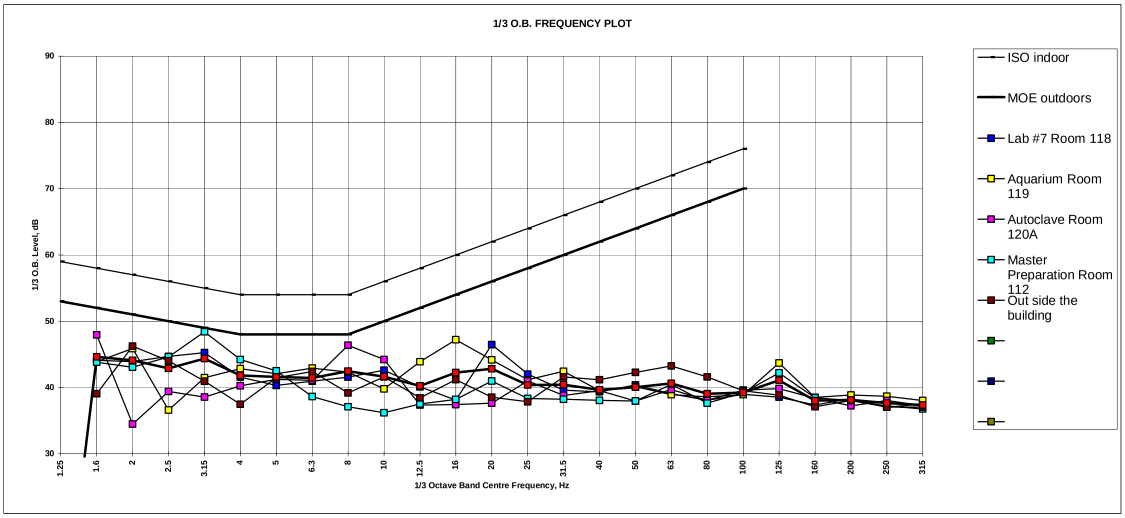
Average Velocity 31-125 Hz = **41** dB re10^-6 in/s
Range, From **35** To **46**

COMMENTS :

....

SS WILSON ASSOCIATES

SUMMARY OFaverage MEASURED VIBRATION LEVELS - YORK UNIVERSITY - LUMBERS BUILDING
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)
SPADINA SUBWAY LINE EXTENTION



Proceed

SS WILSON ASSOCIATES

11/30/2005 18:36

SUMMARY OF AVERAGE MEASURED VIBRATION LEVELS - YORK UNIVERSITY - STEDMAN BUILDING
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION
Source : WITHOUT STUDENTS

Total No.Of Events : 4

Observed Speed

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	Lecture Hall E		44.2	47.7	45.6	43.4	47.8	40.6	35.3	42.2	37.6	39.4	36.5	38.5	40.0	39.1	38.6	40.2	39.0	39.4	37.9	37.3	37.1	37.3	37.9	37.5	**55**	
1	Lecture Hall C		41.9	47.9	43.8	39.7	45.8	39.0	38.5	41.9	37.3	38.0	40.9	39.8	41.3	48.2	38.6	40.2	40.3	38.5	37.7	37.7	37.8	38.5	37.6	37.2	**56**	
1	Studio TV 120P		42.8	46.3	45.8	40.4	42.3	40.2	40.8	39.0	35.7	38.0	37.3	39.4	38.5	40.5	39.0	39.8	39.1	39.0	38.3	38.2	36.9	38.2	37.8	37.1	**54**	
1	Out side the building		36.4	43.9	44.2	40.8	38.5	39.6	42.4	37.2	39.2	40.4	47.2	59.9	58.8	55.5	45.8	46.7	46.8	38.3	38.9	37.8	36.8	37.2	37.5	37.5	**61**	
																											14	
																											14	
																											14	
																											14	
																											14	
																											14	
4	**Average Accel, dB**		**42**	**47**	**45**	**41**	**45**	**40**	**40**	**41**	**38**	**39**	**43**	**54**	**53**	**50**	**42**	**43**	**43**	**39**	**38**	**38**	**37**	**38**	**38**	**37**	**59**	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.07	0.03	0.03	0.02	0.01	0.01	0.01	0.04	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			**0.10**	
	Ave.Veloc,dB re10^-6 in/s						68.7	61.8	59.9	58.4	53.6	53.0	54.6	63.9	61.0	56.4	45.7	44.8	42.7	36.7	34.2	31.8	29.0	27.8			**72**	
	MOE-TTC Criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			**0.1**	
	Excess Over MOE- TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			0.00	

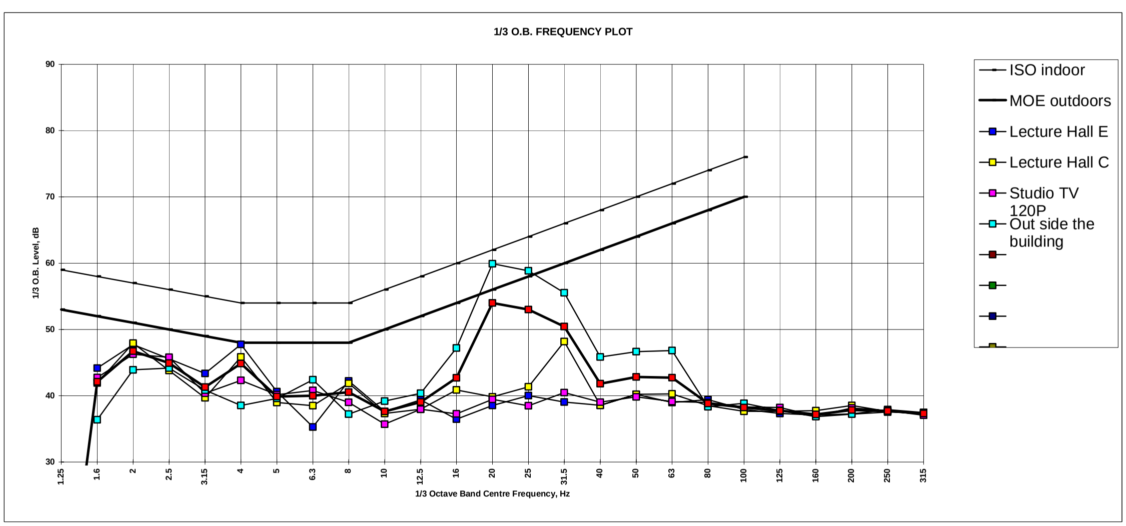
(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **43** dB re10^-6 in/s
Range, From **34** To **56**

COMMENTS :
....

SS WILSON ASSOCIATES

SUMMARY OF AVERAGE MEASURED VIBRATION LEVELS - YORK UNIVERSITY - STEDMAN BUILDING
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)
SPADINA SUBWAY LINE EXTENTION



Proceed

SS WILSON ASSOCIATES

11/30/2005 18:40

SUMMARY OFAVERAGE MEASURED VIBRATION LEVELS - YORK UNIVERSITY - WINTER COLLEGE RESIDENCE
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION
Source : WITHOUT STUDENTS

Observed Speed

Total No.Of Events : 3

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	Residence Lounge		41.0	37.9	41.6	45.8	44.7	40.2	45.9	40.1	42.8	41.2	40.3	40.2	43.6	47.7	39.4	38.9	38.9	38.1	38.4	38.0	37.5	37.3	37.8	37.3	56	
1	Residence Room 111E (Wash room)		38.0	48.7	45.9	43.8	31.9	39.2	37.7	40.6	40.6	41.1	38.9	41.5	38.2	39.4	37.7	39.6	36.5	38.6	38.5	38.4	36.9	38.3	37.6	37.5	55	
1	Out side the building		48.2	45.1	46.8	43.0	40.3	40.8	35.7	38.2	40.1	39.8	39.5	38.0	39.2	43.5	37.0	40.6	39.1	38.3	38.3	39.7	37.6	38.2	37.3	37.4	55	
																											61	
																											14	
																											14	
																											14	
																											14	
																											14	
																											14	
3	**Average Accel, dB**		44	46	45	44	41	40	42	40	41	41	40	40	41	45	38	40	38	38	38	39	37	38	38	37	55	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.05	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.07	
	Ave.Veloc,dB re10^-6 in/s						65.3	62.1	62.1	57.6	57.2	54.7	51.5	50.1	49.0	50.7	42.0	41.7	38.3	36.2	34.3	32.8	29.2	27.8			69	
	MOE- TTC Criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	
	Excess Over MOE - TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

(Excess = Average Level- MOE outdoor Level)

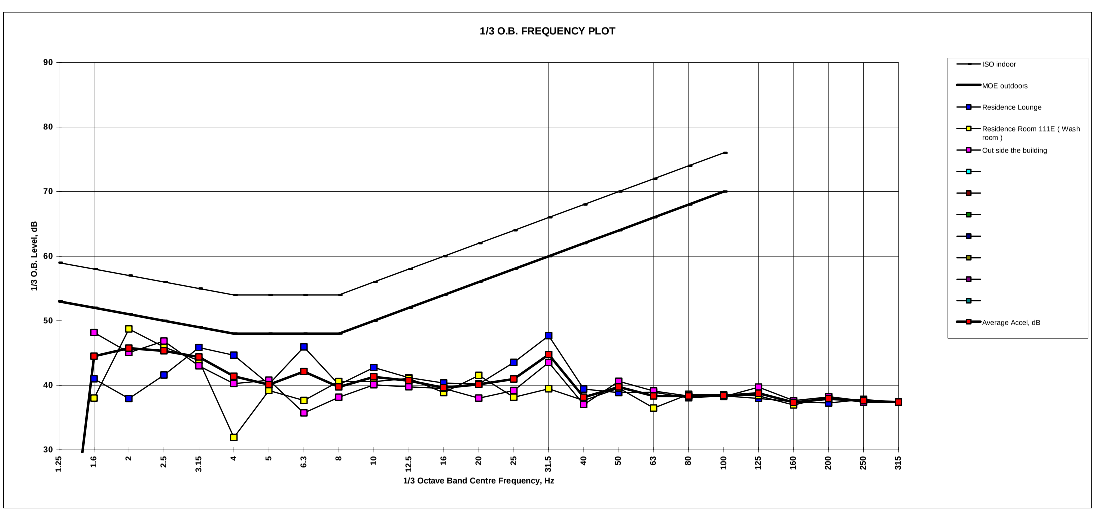
COMMENTS :

....

Average Velocity 31-125 Hz = **41** dB re10^-6 in/s
Range, From **34** To **51**

SS WILSON ASSOCIATES

SUMMARY OFAVERAGE MEASURED VIBRATION LEVELS - YORK UNIVERSITY - WINTER COLLEGE RESIDENCE
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)
SPADINA SUBWAY LINE EXTENTION



Proceed

SS WILSON ASSOCIATES

11/30/2005 19:14

SUMMARY OF AVERAGE MEASURED VIBRATION LEVELS- YORK UNIVERSITY, LUMBERS BUILDING

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENSION
Source : With Students

Total No.Of Events : 4

Observed Speed

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	Master Preparation 112		44.2	40.7	39.6	37.1	42.8	40.2	40.6	39.4	41.0	37.8	39.0	37.8	38.6	38.9	39.8	40.7	48.5	37.6	45.8	57.4	43.0	43.3	40.5	38.5	60	
1	Autoclave 120A		48.5	46.1	45.9	41.3	40.8	39.2	32.9	39.9	40.0	39.6	40.0	39.4	39.9	39.0	39.2	39.9	40.9	38.6	37.5	40.5	38.0	38.6	38.6	38.4	55	
1	Lab #7 Room 118		45.4	46.0	41.2	45.8	39.4	43.0	44.3	41.6	37.6	37.1	29.7	36.6	36.4	35.9	37.5	40.9	42.4	32.9	39.6	42.3	38.7	38.2	42.2	41.6	55	
1	Aquarium Room 119		37.3	42.7	38.2	43.6	40.2	37.0	37.3	37.5	37.6	42.0	36.7	40.5	38.3	34.2	36.0	40.2	43.7	38.4	40.8	47.0	40.9	42.0	46.4	50.8	61	
																											14	
																											14	
																											14	
																											14	
																											14	
																											14	
4	**Average Accel, dB**		**45**	**44**	**42**	**43**	**41**	**40**	**41**	**40**	**39**	**40**	**38**	**39**	**38**	**37**	**38**	**40**	**45**	**37**	**42**	**52**	**41**	**41**	**43**	**46**	**57**	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00			**0.07**	
	Ave.Veloc,dB re10^-6 in/s						64.9	62.3	60.5	57.7	55.2	53.5	49.6	48.7	46.4	43.4	42.3	42.4	44.9	35.2	38.1	46.0	32.5	31.0			**69**	
	MOE-TTC Criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			**0.1**	
	Excess Over MOE-TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

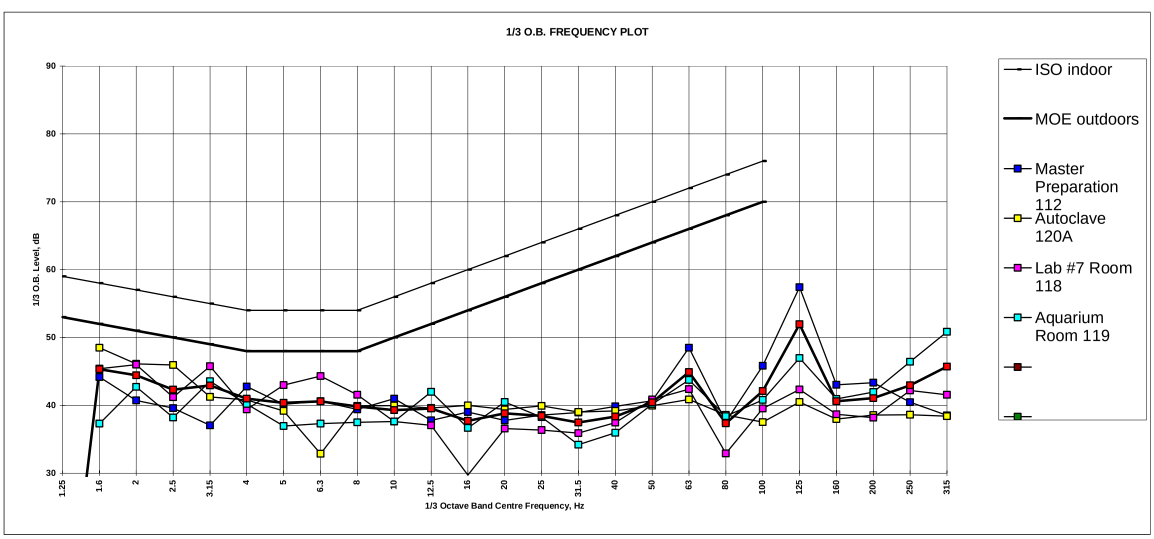
(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **41** dB re10^-6 in/s
Range, From **35** To **45**

COMMENTS : ....
....

SS WILSON ASSOCIATES

SUMMARY OF AVERAGE MEASURED VIBRATION LEVELS- YORK UNIVERSITY, LUMBERS BUILDING
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)
SPADINA SUBWAY LINE EXTENSION



11/30/2005 19:17

Proceed

SS WILSON ASSOCIATES

TABLE 1

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION

Source : YORK UNIVERSITY - Winters College Residence

Total No.Of Events : 1

Observed Speed

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	Lab #7 Room 118		44.1	43.9	44.7	45.3	41.6	40.3	40.9	41.6	42.6	40.1	38.1	46.5	42.0	39.6	39.3	40.4	39.1	38.1	39.0	38.5	37.4	38.3	37.0	37.5	55	
																											14	
																											14	
																											61	
																											14	
																											14	
																											14	
																											14	
																											14	
																											14	
1	**Average Accel, dB**		44	44	45	45	42	40	41	42	43	40	38	46	42	40	39	40	39	38	39	39	37	38	37	38	55	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.05	0.03	0.03	0.02	0.02	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.08	
	Ave.Veloc,dB re10^-6 in/s						65.5	62.3	60.9	59.4	58.5	54.1	50.0	56.4	50.0	45.6	43.2	42.3	39.0	35.9	34.9	32.5	29.2	28.2			70	
	MOE - TTC Criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	
	Excess Over MOE - TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **40** dB re10^-6 in/s
Range, From **35** To **46**

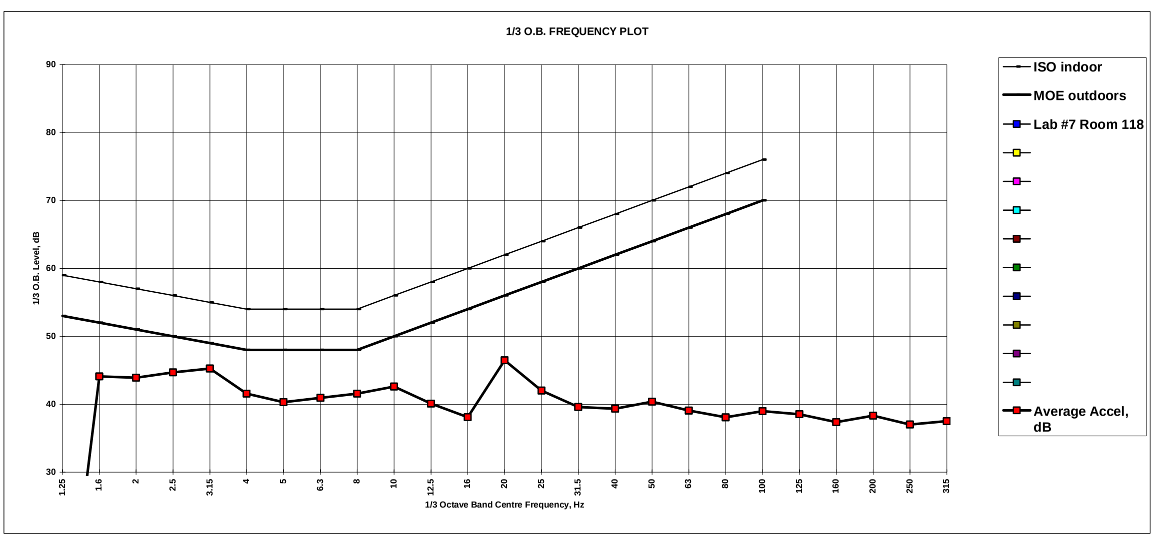
COMMENTS :

....

SS WILSON ASSOCIATES

FIGURE 1

SUMMARY OF MEASURED VIBRATION LEVELS
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)
SPADINA SUBWAY LINE EXTENTION



11/30/2005 19:22

Proceed

SS WILSON ASSOCIATES

TABLE 1

SUMMARY OF AVERAGE MEASURED VIBRATION LEVELS- SENECA COLLEGE (YORK CAMPUS)

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION

Source : With Students

Total No.Of Events : 1

Observed Speed

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	Test Room 1195		48.2	47.6	41.1	44.7	43.7	43.5	40.2	34.2	37.5	40.8	40.2	39.2	40.3	37.2	35.5	36.7	37.2	36.8	37.7	36.4	34.8	37.7	35.2	33.6	55	
																											14	
																											14	
																											61	
																											14	
																											14	
																											14	
																											14	
																											14	
																											14	
1	**Average Accel, dB**		48	48	41	45	44	43	40	34	37	41	40	39	40	37	36	37	37	37	38	36	35	38	35	34	55	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.06	0.05	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.09	
	Ave.Veloc,dB re10^-6 in/s						67.6	65.5	60.2	52.1	53.4	54.8	52.0	49.1	48.3	43.2	39.4	38.6	37.2	34.7	33.6	30.4	26.6	27.7			71	
	MOE-TTC Criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	
	Excess Over MOE-TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

(Excess = Average Level- MOE outdoor Level)

COMMENTS : ....

....

Average Velocity 31-125 Hz = **38** dB re10^-6 in/s

Range, From **34** To **43**

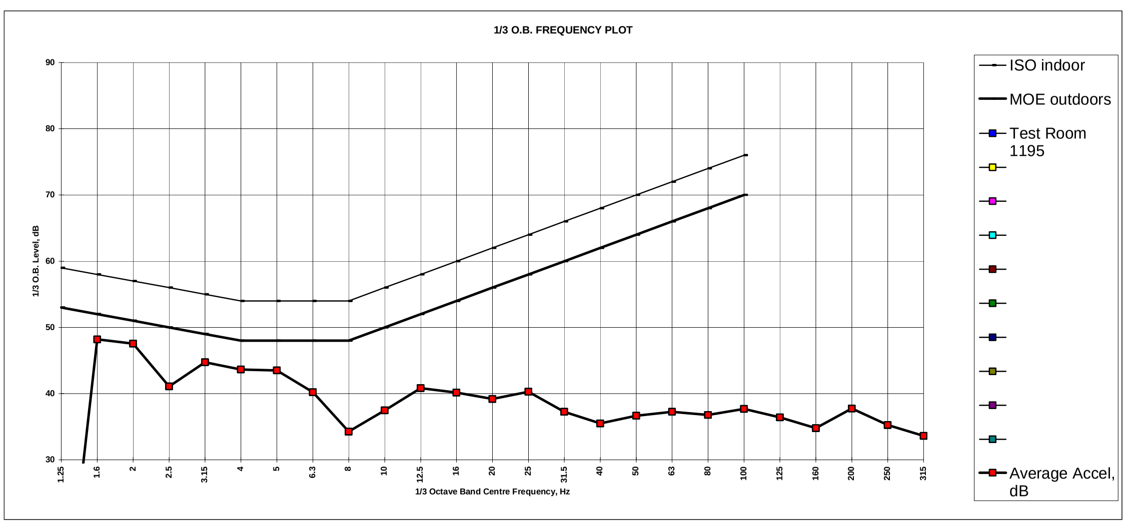
SS WILSON ASSOCIATES

FIGURE 1

SUMMARY OF AVERAGE MEASURED VIBRATION LEVELS- SENECA COLLEGE (YORK CAMPUS)

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)

SPADINA SUBWAY LINE EXTENTION



N5 Third Octave Bands Sound Levels & NC , Oct 2005 Proceed

11/30/2005 19:30

SS WILSON ASSOCIATES
YORK UNIVERSITY - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University - Lumbers Building - Average
Source: Ambient - August 24, 2005

Must Select Add or Average The Band Levels → None

LINEAR/UN-WEIGHTED SOUND LEVELS

Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-17	Leq: Room 118	50.9	48.2	46.4	48.4	52.9	52.1	49.9	56.8	49.5	48.9	49.5	49.5	48.5	46.4	42.9	43.0	41.8	41.0	41.7	40.7	38.7	38.0	38.1	35.8	37.0	36.6	33.5	62.6	53.7
M-18	Leq :Aquarium Room 119	59.9	48.4	43.7	54.1	58.0	62.2	57.1	63.6	52.7	49.6	52.9	52.6	54.4	53.5	54.6	52.9	53.5	51.5	48.7	53.6	47.6	45.8	41.3	45.1	50.1	53.9	44.1	69.7	62.9
M-19	Leq: Autovlave Room 120A	52.9	51.1	50.9	56.5	52.5	50.2	54.8	57.8	50.6	49.5	50.4	47.4	46.4	47.1	44.3	41.5	41.0	39.2	39.9	41.8	42.1	42.4	43.9	48.2	55.5	54.0	51.8	65.5	59.8
M-20	Leq:Master Preparation 112	58.7	47.0	46.7	49.0	56.0	46.2	51.5	63.2	50.5	49.0	53.1	49.3	48.5	52.2	46.8	45.5	46.1	48.5	44.9	43.7	44.4	42.3	36.5	36.6	35.5	32.0	28.7	66.6	57.4
M-21	Leq: Outside The Building	61.4	57.1	60.2	63.0	67.4	67.2	57.9	55.8	54.9	52.4	49.9	49.8	47.9	46.9	44.8	43.9	42.8	43.4	40.7	38.9	36.4	32.8	30.6	27.4	23.9	21.4	18.5	72.5	54.6
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

A-WEIGHTED SOUND LEVELS

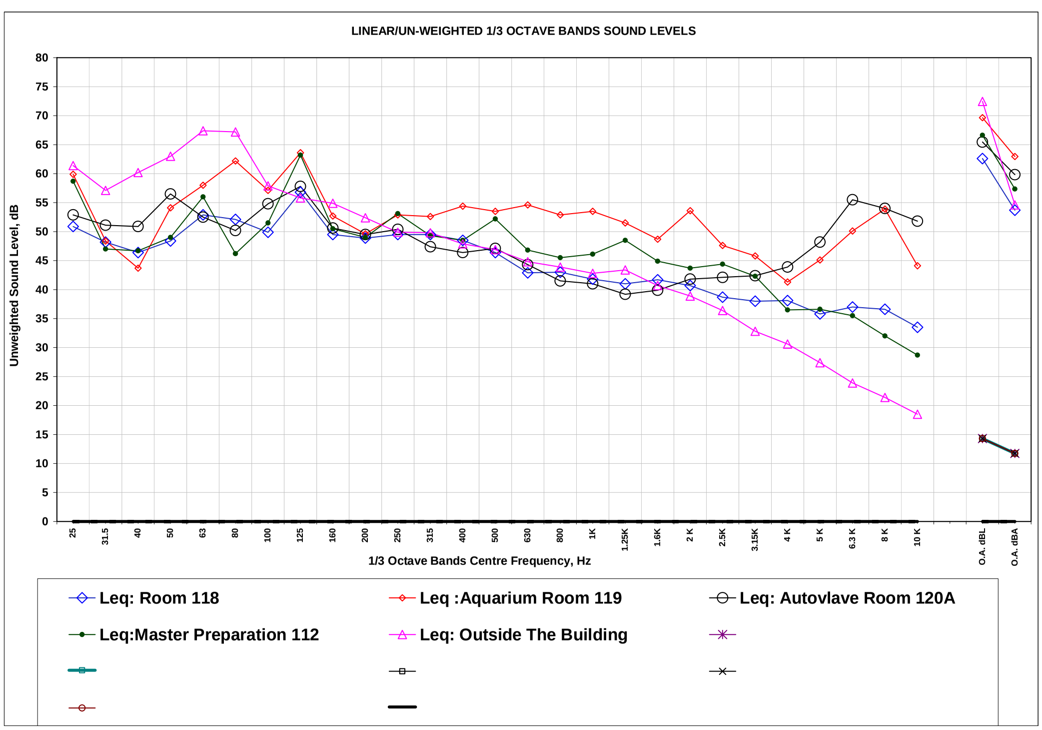
Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-17	Leq: Room 118	6.2	8.8	11.8	18.2	26.7	29.6	30.8	40.7	36.1	38.0	40.9	42.9	43.7	43.2	41.0	42.2	41.8	41.6	42.7	41.9	40.0	39.2	39.1	36.3	36.9	35.5	31.0	62.6	53.7
M-18	Leq :Aquarium Room 119	15.2	9.0	9.1	23.9	31.8	39.7	38.0	47.5	39.3	38.7	44.3	46.0	49.6	50.3	52.7	52.1	53.5	52.1	49.7	54.8	48.9	47.0	42.3	45.6	50.0	52.8	41.6	69.7	62.9
M-19	Leq: Autovlave Room 120A	8.2	11.7	16.3	26.3	26.3	27.7	35.7	41.7	37.2	38.6	41.8	40.8	41.6	43.9	42.4	40.7	41.0	39.8	40.9	43.0	43.4	43.6	44.9	48.7	55.4	52.9	49.3	65.5	59.8
M-20	Leq:Master Preparation 112	14.0	7.6	12.1	18.8	29.8	23.7	32.4	47.1	37.1	38.1	44.5	42.7	43.7	49.0	44.9	44.7	46.1	49.1	45.9	44.9	45.7	43.5	37.5	37.1	35.4	30.9	26.2	66.6	57.4
M-21	Leq: Outside The Building	16.7	17.7	25.6	32.8	41.2	44.7	38.8	39.7	41.5	41.5	41.3	43.2	43.1	43.7	42.9	43.1	42.8	44.0	41.7	40.1	37.7	34.0	31.6	27.9	23.8	20.3	16.0	72.5	54.6
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

N5 Third Octave Bands Sound Levels & NC , Oct 2005

11/30/2005 19:30

SS WILSON ASSOCIATES
YORK UNIVERSITY - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University - Lumbers Building - Average
Source: Ambient - August 24, 2005



N5 Third Octave Bands Sound Levels & NC , Oct 2005 Proceed

12/1/2005 13:03

SS WILSON ASSOCIATES

YORK UNIVERSITY - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University - Stedman Building - Lecture Hall E
Source: Ambient

Must Select Add or Average The Band Levels → None

LINEAR/UN-WEIGHTED SOUND LEVELS

Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-13	Leq: Stedman Building - Hall E	62.8	66.9	51.3	53.9	53.2	47.8	44.1	44.0	38.6	36.5	44.6	43.6	41.1	43.0	32.0	30.9	32.7	30.4	27.7	26.4	25.8	24.2	22.2	21.9	21.3	17.8	17.4	68.8	45.3
M-14	Leq :Lecture Hall C	51.2	61.7	43.1	40.0	38.0	40.0	36.7	39.6	38.7	34.5	40.4	41.2	38.6	39.8	31.3	28.4	29.2	27.8	27.1	25.4	24.1	22.2	20.6	20.4	19.8	16.5	16.0	62.4	42.4
M-15	Leq: T V Studio	57.6	53.0	56.8	53.5	50.4	48.1	47.3	43.7	41.1	41.3	38.8	40.6	37.6	37.8	34.8	29.7	26.9	26.4	24.1	23.5	22.0	21.2	25.1	20.2	18.6	10.7	7.2	62.5	42.5
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

A-WEIGHTED SOUND LEVELS

Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-13	Leq: Stedman Building - Hall E	18.1	27.5	16.7	23.7	27.0	25.3	25.0	27.9	25.2	25.6	36.0	37.0	36.3	39.8	30.1	30.1	32.7	31.0	28.7	27.6	27.1	25.4	23.2	22.4	21.2	16.7	14.9	68.8	45.3
M-14	Leq :Lecture Hall C	6.5	22.3	8.5	9.8	11.8	17.5	17.6	23.5	25.3	23.6	31.8	34.6	33.8	36.6	29.4	27.6	29.2	28.4	28.1	26.6	25.4	23.4	21.6	20.9	19.7	15.4	13.5	62.4	42.4
M-15	Leq: T V Studio	12.9	13.6	22.2	23.3	24.2	25.6	28.2	27.6	27.7	30.4	30.2	34.0	32.8	34.6	32.9	28.9	26.9	27.0	25.1	24.7	23.3	22.4	26.1	20.7	18.5	9.6	4.7	62.5	42.5
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

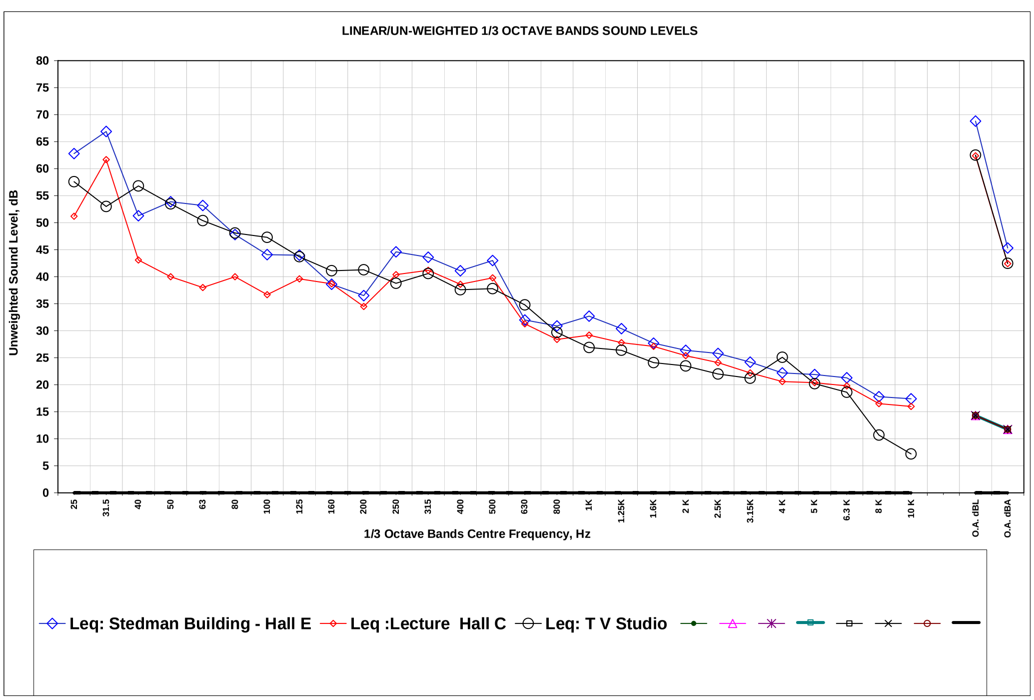
N5 Third Octave Bands Sound Levels & NC , Oct 2005

12/1/2005 13:03

SS WILSON ASSOCIATES

YORK UNIVERSITY - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University - Stedman Building - Lecture Hall E
Source: Ambient



N5 Third Octave Bands Sound Levels & NC , Oct 2005

11/30/2005 19:41

Proceed

SS WILSON ASSOCIATES
TECTROL INC. - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University - Winters College Residence
Source: Ambient _ August 24, 2005

Must Select Add or Average The Band Levels → None

LINEAR/UN-WEIGHTED SOUND LEVELS

Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-10	Leq: Winters College Residence	60.4	63.6	58.7	57.8	55.0	52.6	51.4	52.6	52.3	50.4	50.5	51.6	48.5	45.7	43.0	43.0	40.2	38.5	37.1	35.9	33.6	31.2	28.4	25.8	23.1	19.3	17.0	68.0	52.6
M-11	Leq : Room 111	50.9	55.1	51.8	53.1	58.3	59.4	55.9	49.7	44.0	35.2	39.0	42.5	39.2	40.5	29.2	26.3	27.5	26.9	25.3	24.7	23.2	21.5	21.8	19.8	18.8	15.6	16.1	64.6	45.1
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

A-WEIGHTED SOUND LEVELS

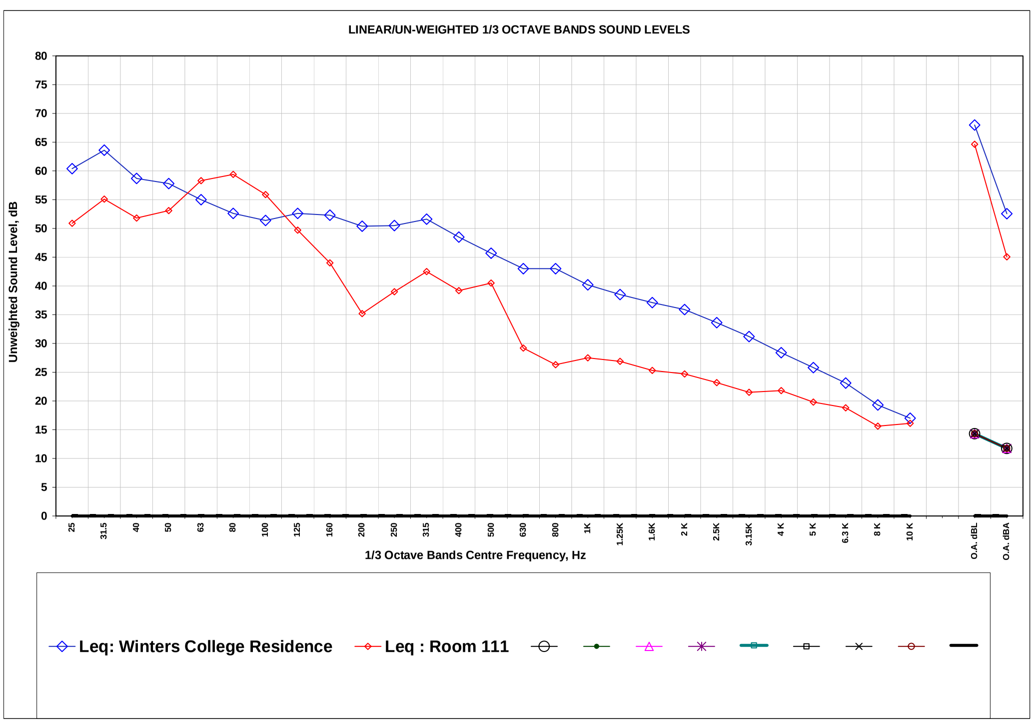
Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-10	Leq: Winters College Residence	15.7	24.2	24.1	27.6	28.8	30.1	32.3	36.5	38.9	39.5	41.9	45.0	43.7	42.5	41.1	42.2	40.2	39.1	38.1	37.1	34.9	32.4	29.4	26.3	23.0	18.2	14.5	68.0	52.6
M-11	Leq : Room 111	6.2	15.7	17.2	22.9	32.1	36.9	36.8	33.6	30.6	24.3	30.4	35.9	34.4	37.3	27.3	25.5	27.5	27.5	26.3	25.9	24.5	22.7	22.8	20.3	18.7	14.5	13.6	64.6	45.1
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

N5 Third Octave Bands Sound Levels & NC , Oct 2005

11/30/2005 19:41

SS WILSON ASSOCIATES
TECTROL INC. - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University - Winters College Residence
Source: Ambient _ August 24, 2005



N5 Third Octave Bands Sound Levels & NC , Oct 2005

11/30/2005 19:41

Proceed

SS WILSON ASSOCIATES
YORK UNIVERSITY - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University -Seneca Building - Room 1200 Ground Level
Source: Ambient - September 9, 2005

Must Select Add or Average The Band Levels → None

LINEAR/UN-WEIGHTED SOUND LEVELS

Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-14	Leq: Room 1200	41.7	39.1	48.2	42.9	43.4	42.1	44.5	50.9	43.9	46.2	45.5	40.0	38.2	34.3	29.4	26.2	26.8	25.7	24.4	23.7	20.7	17.8	17.8	16.5	22.9	13.9	10.4	56.3	43.4
M-14	L1: Room 1200	45.1	41.5	51.6	48.7	45.3	44.1	46.0	52.1	45.4	47.8	46.6	41.2	39.2	35.6	32.0	28.5	28.4	28.0	28.0	28.4	23.6	22.3	24.1	20.5	30.9	19.4	14.5	58.4	45.1
M-14	L10: Room 1200	44.2	40.8	50.7	46.7	44.9	43.4	45.6	51.5	44.9	47.5	46.4	41.0	38.9	35.2	30.4	27.2	27.7	26.6	25.5	25.9	22.4	19.7	20.5	19.0	29.1	17.7	13.2	57.7	44.4
M-14	L90: Room 1200	40.0	37.6	46.4	41.1	42.2	41.2	43.6	50.5	43.4	45.3	44.9	39.2	37.7	33.9	28.8	25.7	26.3	25.3	23.9	22.6	19.9	16.8	16.5	15.6	14.7	11.0	10.1	55.4	42.7
M-14	L95: Room 1200	39.8	37.4	46.1	40.4	41.9	41.0	43.4	50.4	43.2	45.0	44.7	39.1	37.6	33.8	28.7	25.6	26.2	25.2	23.9	22.4	19.8	16.7	16.4	15.6	14.5	10.8	10.1	55.1	42.5
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

A-WEIGHTED SOUND LEVELS

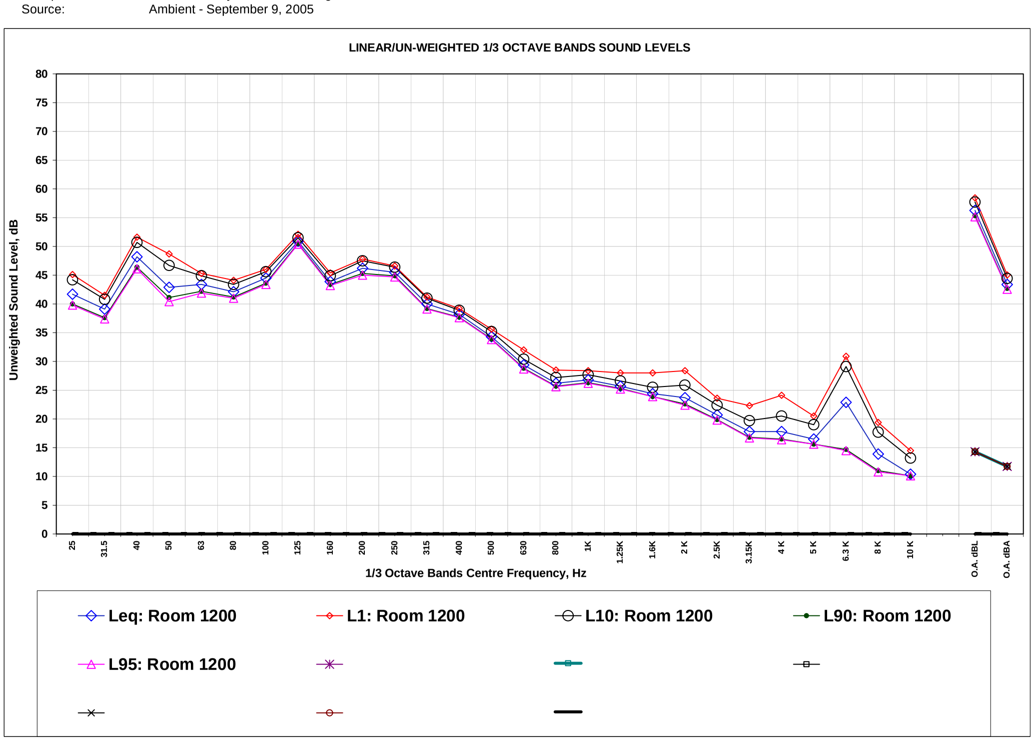
Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-14	Leq: Room 1200	-3.0	-0.3	13.6	12.7	17.2	19.6	25.4	34.8	30.5	35.3	36.9	33.4	33.4	31.1	27.5	25.4	26.8	26.3	25.4	24.9	22.0	19.0	18.8	17.0	22.8	12.8	7.9	56.3	43.4
M-14	L1: Room 1200	0.4	2.1	17.0	18.5	19.1	21.6	26.9	36.0	32.0	36.9	38.0	34.6	34.4	32.4	30.1	27.7	28.4	28.6	29.0	29.6	24.9	23.5	25.1	21.0	30.8	18.3	12.0	58.4	45.1
M-14	L10: Room 1200	-0.5	1.4	16.1	16.5	18.7	20.9	26.5	35.4	31.5	36.6	37.8	34.4	34.1	32.0	28.5	26.4	27.7	27.2	26.5	27.1	23.7	20.9	21.5	19.5	29.0	16.6	10.7	57.7	44.4
M-14	L90: Room 1200	-4.7	-1.8	11.8	10.9	16.0	18.7	24.5	34.4	30.0	34.4	36.3	32.6	32.9	30.7	26.9	24.9	26.3	25.9	24.9	23.8	21.2	18.0	17.5	16.1	14.6	9.9	7.6	55.4	42.7
M-14	L95: Room 1200	-4.9	-2.0	11.5	10.2	15.7	18.5	24.3	34.3	29.8	34.1	36.1	32.5	32.8	30.6	26.8	24.8	26.2	25.8	24.9	23.6	21.1	17.9	17.4	16.1	14.4	9.7	7.6	55.1	42.5
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

N5 Third Octave Bands Sound Levels & NC , Oct 2005

11/30/2005 19:41

SS WILSON ASSOCIATES
YORK UNIVERSITY - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University -Seneca Building - Room 1200 Ground Level
Source: Ambient - September 9, 2005



N5 Third Octave Bands Sound Levels & NC , Oct 2005

11/30/2005 19:47

Proceed

SS WILSON ASSOCIATES
YORK UNIVERSITY. - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University - Schulich Building - ELC
Source: Ambient -September 9, 2005

Must Select Add or Average The Band Levels → **None**

LINEAR/UN-WEIGHTED SOUND LEVELS

Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-10	Leq: Common Room X 114	38.6	42.3	48.1	39.4	38.8	32.1	33.0	35.3	28.9	32.3	30.8	28.6	23.7	25.6	27.2	24.0	22.4	20.1	17.4	16.9	13.6	12.5	10.5	10.0	15.1	10.3	9.6	50.7	33.0
M-11	Leq :Staff Room X 005	40.7	35.3	32.1	31.7	35.0	37.2	35.8	34.1	34.2	35.7	39.1	36.8	33.5	33.1	30.1	27.3	27.9	27.1	27.2	29.5	27.6	26.4	24.0	22.9	23.2	20.7	20.1	48.0	40.4
M-12	Leq: Lecture Room N 105	47.3	51.3	49.3	51.7	50.2	50.1	51.6	48.4	46.0	45.2	40.9	42.7	38.7	36.2	36.6	36.6	34.3	32.8	30.4	29.5	27.4	24.6	21.8	19.3	16.6	13.6	11.7	59.9	45.4
M-13	Leq:Auditorium Room	61.7	57.3	54.6	54.9	49.8	49.6	50.4	49.1	46.6	46.9	45.8	41.0	40.3	36.4	34.7	33.1	32.8	31.5	29.0	29.0	24.3	24.1	23.8	20.6	18.6	15.2	13.3	65.0	45.4
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
																													14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

A-WEIGHTED SOUND LEVELS

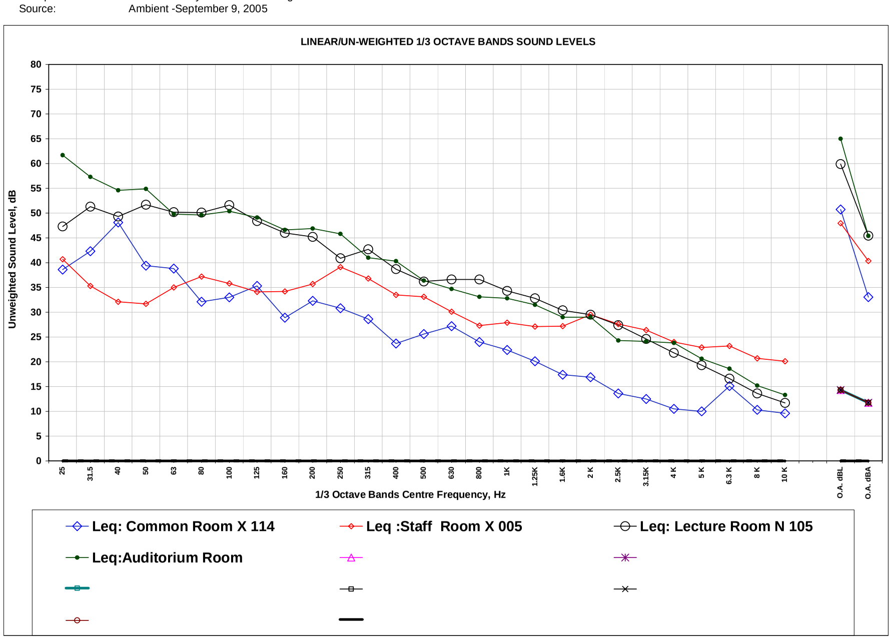
Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-10	Leq: Common Room X 114	-6.1	2.9	13.5	9.2	12.6	9.6	13.9	19.2	15.5	21.4	22.2	22.0	18.9	22.4	25.3	23.2	22.4	20.7	18.4	18.1	14.9	13.7	11.5	10.5	15.0	9.2	7.1	50.7	33.0
M-11	Leq :Staff Room X 005	-4.0	-4.1	-2.5	1.5	8.8	14.7	16.7	18.0	20.8	24.8	30.5	30.2	28.7	29.9	28.2	26.5	27.9	27.7	28.2	30.7	28.9	27.6	25.0	23.4	23.1	19.6	17.6	48.0	40.4
M-12	Leq: Lecture Room N 105	2.6	11.9	14.7	21.5	24.0	27.6	32.5	32.3	32.6	34.3	32.3	36.1	33.9	33.0	34.7	35.8	34.3	33.4	31.4	30.7	28.7	25.8	22.8	19.8	16.5	12.5	9.2	59.9	45.4
M-13	Leq:Auditorium Room	17.0	17.9	20.0	24.7	23.6	27.1	31.3	33.0	33.2	36.0	37.2	34.4	35.5	33.2	32.8	32.3	32.8	32.1	30.0	30.2	25.6	25.3	24.8	21.1	18.5	14.1	10.8	65.0	45.4
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	11.7
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

N5 Third Octave Bands Sound Levels & NC , Oct 2005

11/30/2005 19:47

SS WILSON ASSOCIATES
YORK UNIVERSITY. - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : York University - Schulich Building - ELC
Source: Ambient -September 9, 2005



ACTUALLY MEASURED AMBIENT/BACKGROUND SOUND AND VIBRATION LEVELS

OTHER BUILDINGS

11/30/2005 19:57

Proceed

SS WILSON ASSOCIATES

TABLE 1

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION

Source : 30 St. Regis Crescent N. (Incredible Printing Co.)

Observed Speed

Total No.Of Events : 1

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	Near Press Machine		36.4	42.1	37.3	42.1	39.4	42.8	37.8	38.8	37.3	37.5	37.2	43.4	38.9	46.1	50.1	57.8	59.6	58.7	58.4	53.2	58.0	70.3	54.3	52.7	72	
																											14	
																											14	
																											61	
																											14	
																											14	
																											14	
																											14	
																											14	
																											14	
1	**Average Accel, dB**		36	42	37	42	39	43	38	39	37	38	37	43	39	46	50	58	60	59	58	53	58	70	54	53	72	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.04	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.03			0.08	
	Ave.Veloc,dB re10^-6 in/s						63.3	64.8	57.8	56.7	53.3	51.5	49.1	53.3	46.9	52.1	54.0	59.7	59.5	56.6	54.3	47.2	49.9	60.2			70	
	MOE- TTC criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	
	Excess Over MOE- TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **56** dB re10^-6 in/s

Range, From **52** To **60**

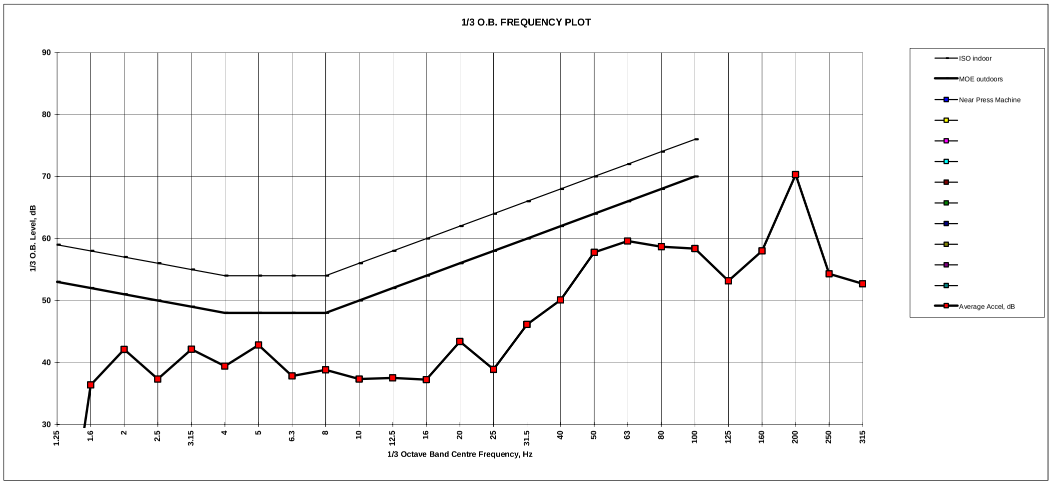
COMMENTS :

....

SS WILSON ASSOCIATES

FIGURE 1

SUMMARY OF MEASURED VIBRATION LEVELS
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)
SPADINA SUBWAY LINE EXTENTION



11/30/2005 20:01

Proceed

SS WILSON ASSOCIATES

TABLE 1

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION
Source : 14 Toro Road (International Glass & Mirror Co.)

Total No.Of Events : 1

Observed Speed

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	At Warehouse		41.6	45.4	45.5	47.0	42.8	44.4	41.3	39.6	39.7	41.2	39.8	39.4	41.7	40.3	38.1	40.1	39.2	36.6	38.3	38.2	38.1	38.0	38.5	37.4	55	
																											14	
																											14	
																											61	
																											14	
																											14	
																											14	
																											14	
																											14	
																											14	
1	**Average Accel, dB**		**42**	**45**	**46**	**47**	**43**	**44**	**41**	**40**	**40**	**41**	**40**	**39**	**42**	**40**	**38**	**40**	**39**	**37**	**38**	**38**	**38**	**38**	**38**	**37**	**55**	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.05	0.05	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			**0.09**	
	Ave.Veloc,dB re10^-6 in/s						66.7	66.4	61.2	57.5	55.6	55.2	51.7	49.4	49.7	46.3	42.0	42.1	39.2	34.5	34.3	32.2	29.9	27.9			**71**	
	MOE- TTC criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			**0.1**	
	Excess Over MOE- TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **40** dB re10^-6 in/s
Range, From **34** To **46**

COMMENTS :

....

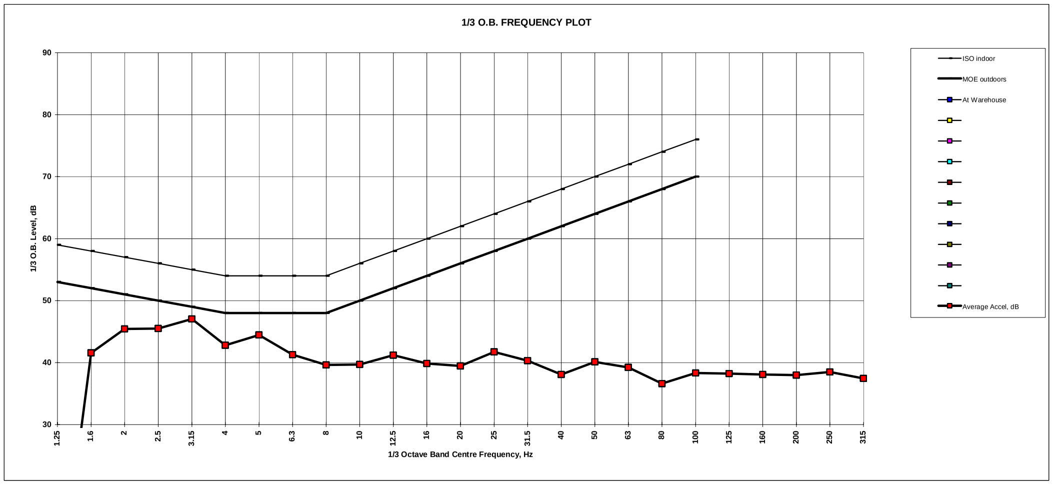
SS WILSON ASSOCIATES

FIGURE 2

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)

SPADINA SUBWAY LINE EXTENTION



11/30/2005 20:03

Proceed

SS WILSON ASSOCIATES

TABLE 1

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION

Source : Ambient - 30 Tangiers Road (CAW Local 112)

Observed Speed

Total No.Of Events : 2

1/3 O.B. CENTRE FREQUENCY, HZ

LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
At communication/ computer Room		44.6	38.5	43.9	44.1	45.2	43.1	45.2	37.6	34.0	41.5	39.5	42.0	42.3	38.8	39.4	40.3	38.8	37.9	39.0	38.0	38.3	38.1	38.2	37.0	55	
At president Office		42.0	40.4	40.6	40.8	45.5	37.3	41.8	39.5	41.5	39.8	39.2	39.6	38.9	38.9	37.9	37.9	38.4	37.6	39.2	39.7	38.0	38.0	38.1	38.0	54	
																										14	
																										14	
																										14	
																										14	
																										14	
																										14	
																										14	
																										14	
Average Accel, dB		**43**	**40**	**43**	**43**	**45**	**41**	**44**	**39**	**39**	**41**	**39**	**41**	**41**	**39**	**39**	**39**	**39**	**38**	**39**	**39**	**38**	**38**	**38**	**38**	**54**	
ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
Ave.Veloc mm/sec						0.07	0.04	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			**0.10**	
Ave.Veloc,dB re10^-6 in/s						69.2	63.0	63.8	56.5	55.1	54.7	51.2	50.9	48.9	44.8	42.6	41.2	38.6	35.6	35.0	32.9	30.0	28.0			**72**	
MOE- TTC criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			**0.1**	
Excess Over MOE- TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **40** dB re10^-6 in/s

Range, From **35** To **45**

COMMENTS : ....

....

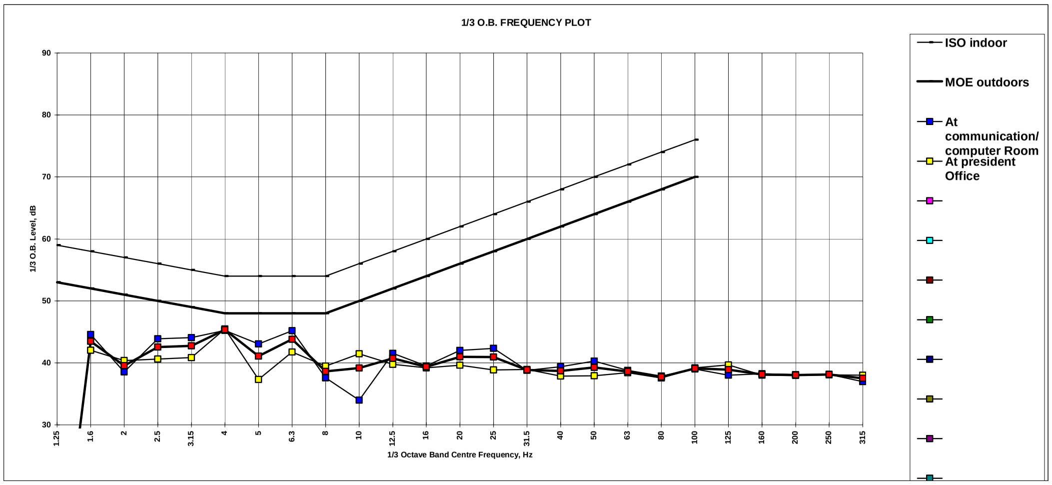
SS WILSON ASSOCIATES

FIGURE 1

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)

SPADINA SUBWAY LINE EXTENTION



11/30/2005 20:05

Proceed

SS WILSON ASSOCIATES

TABLE 1

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION

Source : Ambient - 330 Rimrock Road (Johnvince Foods)

Observed Speed

Total No.Of Events : **3**

1/3 O.B. CENTRE FREQUENCY, HZ

LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
Warehouse		45.0	40.7	40.0	44.6	42.2	37.3	38.4	38.4	39.0	38.2	38.2	41.3	40.5	39.3	40.1	46.4	46.5	47.8	47.0	52.9	55.3	48.6	41.3	43.1	**60**	
Sprinkler Room		50.8	39.4	48.0	44.3	35.7	37.3	41.3	38.6	37.8	37.4	38.4	38.7	36.4	38.7	37.1	38.8	39.0	39.0	37.9	37.8	38.0	38.1	37.7	37.9	**55**	
Server Room		51.1	47.5	37.0	40.3	36.7	38.5	38.3	41.3	38.3	37.6	38.5	38.9	39.8	39.8	39.2	39.9	40.2	37.5	38.5	38.6	37.6	37.9	38.2	37.6	**55**	
																										14	
																										14	
																										14	
																										14	
																										14	
																										14	
																										14	
Average Accel, dB		**50**	**44**	**44**	**43**	**39**	**38**	**40**	**40**	**38**	**38**	**38**	**40**	**39**	**39**	**39**	**43**	**43**	**44**	**43**	**48**	**51**	**45**	**39**	**40**	**58**	
ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
Ave.Veloc mm/sec						0.04	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			**0.06**	
Ave.Veloc,dB re10^-6 in/s						63.1	59.7	59.5	57.6	54.3	51.7	50.2	49.7	47.2	45.2	42.8	45.0	43.2	41.8	39.2	42.4	42.6	34.5			**67**	
MOE- TTC criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			**0.1**	
Excess Over MOE- TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			nil	

(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **43** dB re10^-6 in/s

Range, From **39** To **45**

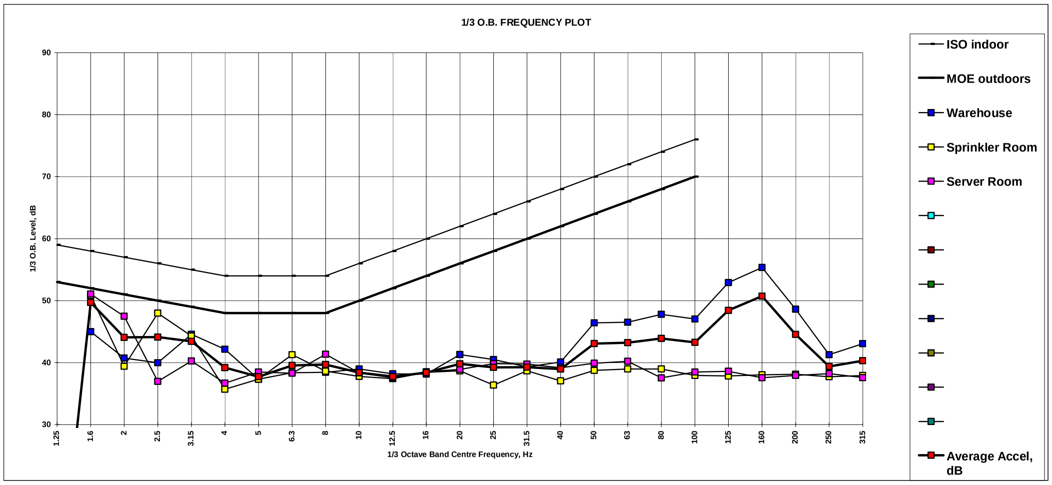
COMMENTS : ....

....

SS WILSON ASSOCIATES

FIGURE 1

SUMMARY OF MEASURED VIBRATION LEVELS
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)
SPADINA SUBWAY LINE EXTENTION



ACTUALLY MEASURED
AMBIENT/BACKGROUND
SOUND AND VIBRATION LEVELS

TECTROL INC

PHOTO 1: VIBRATION TEST NEAR MACHINE

PHOTO 2: MACHINE FLOOR SUPPORT

PHOTO 3: VIBRATION TEST NEAR MACHINE

PHOTO 4: MACHINE FLOOR SUPPORT

PHOTO 5: VIBRATION TEST NEAR TABLE

PHOTO 6: VIBRATION TEST NEAR VIBRATION TABLE

PHOTO 7: VIBRATION TEST NEAR TABLE

PHOTO 8: VIBRATION TEST NEAR WORK STATION

PHOTO 9: VIBRATION TEST NEAR WORK STATION

TECTROL INC. PHOTOGRAPHS

12/1/2005 12:23

Proceed

SS WILSON ASSOCIATES

TABLE 2

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION

Source : TECTROL INC.

Observed Speed

Total No.Of Events : 3

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	M37, Electrical Design Room		44.8	44.2	43.0	32.6	34.0	42.2	47.3	47.0	48.4	49.7	45.2	47.6	48.5	49.5	50.9	47.7	46.4	42.5	42.6	42.6	40.3	41.6	40.5	39.1	60	50
1	M38, Testing Engineering Office		45.5	45.7	41.7	42.6	38.7	44.0	38.4	35.7	41.2	41.7	36.1	39.0	39.7	40.7	41.0	50.7	57.8	46.1	46.9	56.7	42.6	41.1	41.4	41.3	62	50
1	M39, Prototype Testing Room		48.1	42.7	37.0	38.6	40.0	46.0	47.3	53.2	51.1	44.9	52.8	53.2	53.5	52.9	50.9	48.0	48.4	43.6	43.3	44.3	41.7	43.2	50.5	37.9	63	50
																											61	50
																											14	50
																											14	50
																											14	50
																											14	50
																											14	50
																											14	50
3	**Average Accel, dB**		46	44	41	40	38	44	46	49	48	47	49	50	50	50	49	49	54	44	45	52	42	42	47	40	62	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil							
	Ave.Veloc mm/sec						0.03	0.05	0.05	0.06	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00			0.12	
	Ave.Veloc,dB re10^-6 in/s						62.1	66.3	65.8	67.3	64.4	60.6	60.7	59.5	58.0	55.9	53.3	51.0	53.7	42.2	40.6	46.3	33.5	32.0			74	
	TTC Criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	
	Excess Over TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			0.02	

(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **49** dB re10^-6 in/s

Range, From **41** To **56**

COMMENTS : Tectrol Inc. Office/Laboratory Areas

....

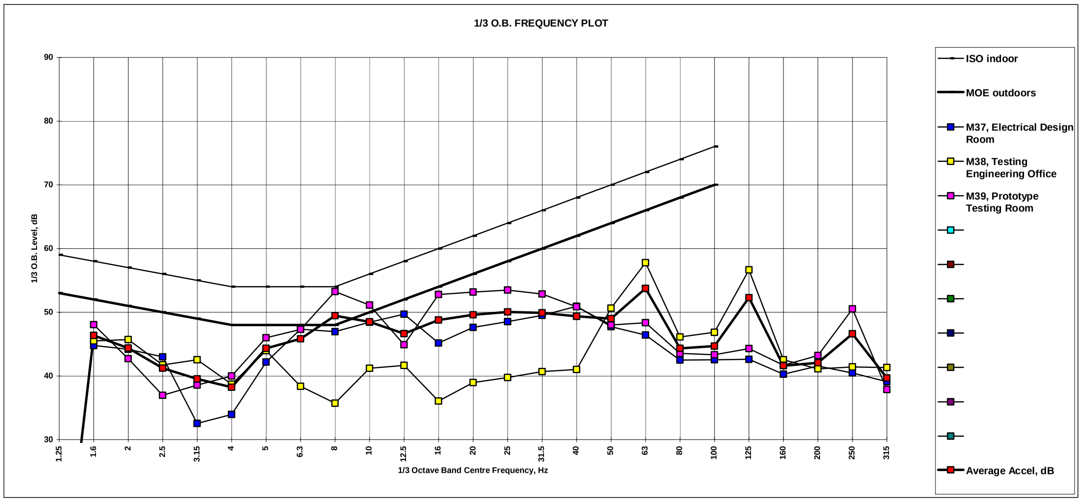
SS WILSON ASSOCIATES

FIGURE 2

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)

SPADINA SUBWAY LINE EXTENTION



Proceed

SS WILSON ASSOCIATES

12/1/2005 12:23

TABLE 1

SUMMARY OF MEASURED VIBRATION LEVELS

(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g **and** Velocity,mm/sec)

File No. : WA04-104 **Project :** SPADINA SUBWAY LINE EXTENTION

Source : TECTROL INC.

Total No.Of Events : 8

Observed Speed

1/3 O.B. CENTRE FREQUENCY, HZ

Count	LOCATION	1.25	1.6	2	2.5	3.15	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	overall	km/hr
1	M30, Auto Insertion VMP2000		40.9	37.9	40.5	42.3	42.5	39.2	40.1	37.3	37.5	42.8	43.5	41.5	45.7	45.0	46.5	47.4	49.7	50.0	44.5	40.4	40.8	41.4	41.1	41.4	58	
1	M31, Adhesive Dispenser (No Troly)		36.7	40.9	38.2	45.8	40.1	42.6	37.7	37.1	36.8	38.7	42.4	43.8	47.3	54.2	55.2	60.2	58.3	53.9	51.4	54.0	54.6	55.7	45.3	47.5	66	
1	M31, Adhesive Dispenser (With Troly)		44.0	37.9	41.6	32.5	40.8	42.2	43.1	37.3	41.8	41.4	41.4	46.6	49.3	51.3	55.6	57.7	56.1	54.8	52.3	53.3	56.3	62.0	48.3	46.7	67	
1	M32, SMD Placement		40.8	41.6	39.4	39.5	39.4	39.4	37.5	42.9	42.8	43.7	51.8	62.3	58.5	57.3	63.8	64.1	61.2	64.2	65.0	63.7	64.2	64.4	63.4	64.0	61	
1	M33, Axial Insertion		40.2	33.4	39.4	41.2	40.5	36.6	43.3	44.6	42.6	37.7	40.6	41.8	45.6	45.5	50.7	48.7	49.9	57.2	52.0	48.7	51.5	53.3	48.7	45.3	62	
1	M34, Final Assembley Aera		37.8	45.2	43.7	48.5	37.0	39.2	43.0	40.9	37.0	35.9	37.2	34.6	37.2	37.4	37.8	40.2	40.2	38.9	40.8	41.6	37.5	37.7	38.1	36.5	55	
1	M35, Final Assembley Aera		50.0	45.1	40.0	47.1	43.5	38.2	35.2	42.4	37.0	38.7	38.9	39.8	36.7	41.1	43.8	40.4	40.7	34.5	38.0	36.6	35.0	37.7	36.0	35.1	56	
1	M36, Chamber Room		46.2	43.0	40.0	39.2	44.0	41.7	42.3	43.0	37.0	41.8	40.1	34.6	47.2	57.7	58.8	70.9	77.9	55.3	53.7	52.0	54.7	51.9	50.6	48.3	79	
																											14	
																											14	
8	**Average Accel, dB**		**44**	**42**	**41**	**44**	**41**	**40**	**41**	**42**	**40**	**41**	**45**	**54**	**51**	**53**	**57**	**63**	**69**	**57**	**57**	**56**	**57**	**58**	**55**	**55**	**72**	
	ISO indoors	59	58	57	56	55	54	54	54	54	56	58	60	62	64	66	68	70	72	74	76							
	MOE outdoors	53	52	51	50	49	48	48	48	48	50	52	54	56	58	60	62	64	66	68	70							
	Excess Over MOE	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	3	nil	nil							
	Ave.Veloc mm/sec						0.05	0.03	0.03	0.02	0.02	0.01	0.02	0.04	0.02	0.02	0.03	0.05	0.07	0.01	0.01	0.01	0.01	0.01			**0.13**	
	Ave.Veloc,dB re10^-6 in/s						65.4	62.3	61.1	59.4	55.8	54.8	56.6	63.5	58.8	59.0	60.9	65.2	69.0	55.0	52.8	49.8	48.6	48.0			**74**	
	TTC Criteria,mm/sec						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			**0.1**	
	Excess Over TTC Criteria						nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil			0.03	

(Excess = Average Level- MOE outdoor Level)

Average Velocity 31-125 Hz = **60** dB re10^-6 in/s

Range, From **53** To **69**

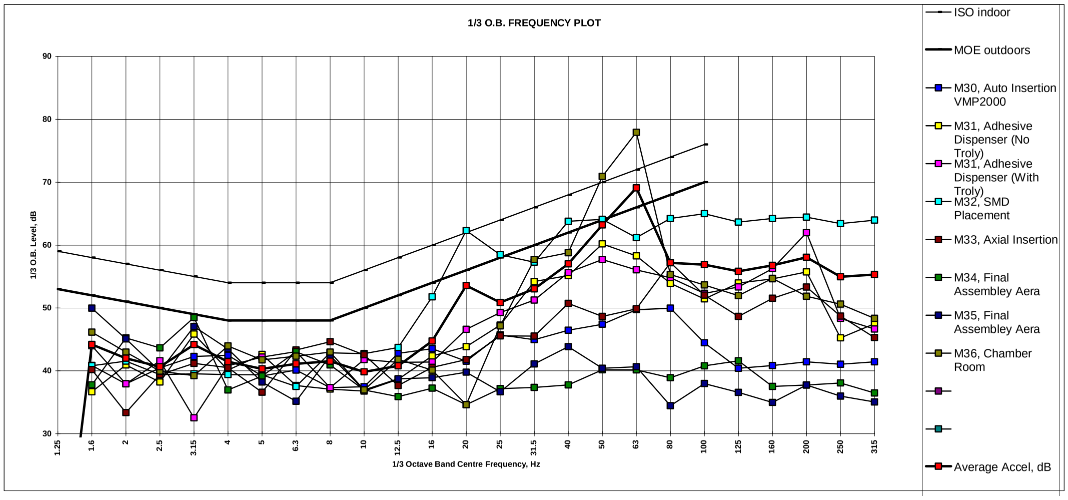
COMMENTS : Tectrol Inc. Production/Assembly Areas

....

SS WILSON ASSOCIATES

FIGURE 1

SUMMARY OF MEASURED VIBRATION LEVELS
(in Acceleration dB re 10^-5 m/sec.sq. or 10^-6 g and Velocity,mm/sec)
SPADINA SUBWAY LINE EXTENTION



N5 Third Octave Bands Sound Levels & NC , Oct 2005 Proceed

12/1/2005 12:51

SS WILSON ASSOCIATES
TECTROL INC. - INTERNAL AMBIENT NOISE MONITORING

File No. : WA04-104
Project : TTC Spadina Subway Line Extension
Receptor : Tectrol Inc. - Average Of All Results
Source: Internal Plant and Office Sources

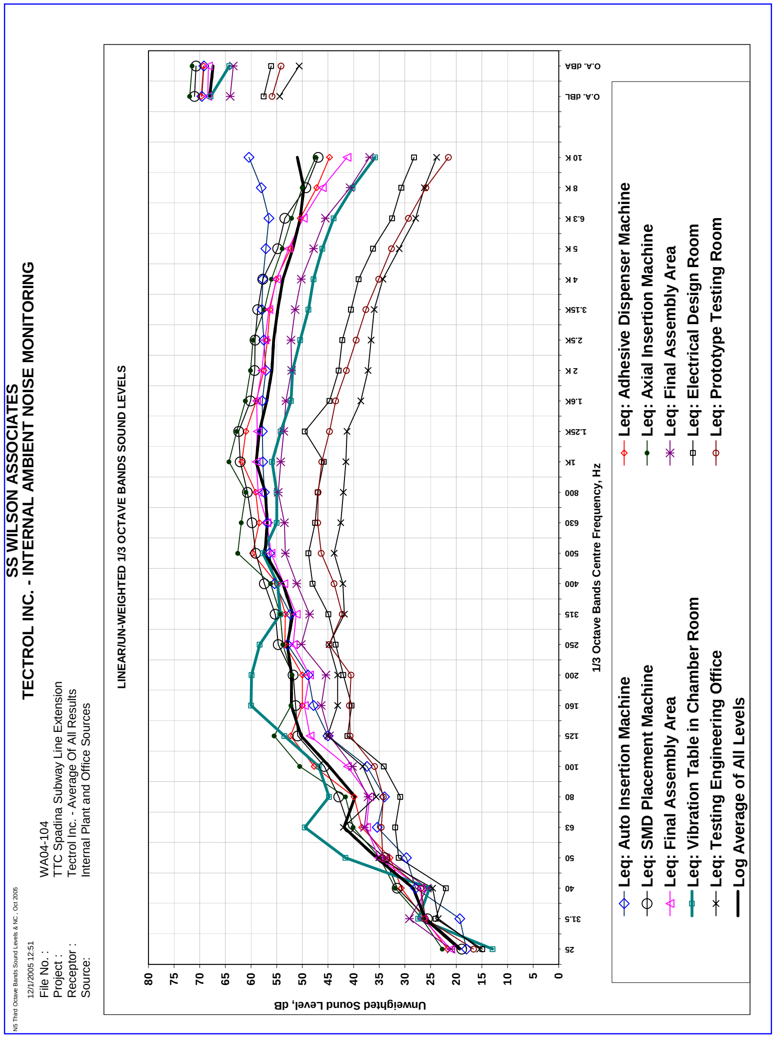
Must Select Add or Average The Band Levels → Average

LINEAR/UN-WEIGHTED SOUND LEVELS

Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-30	Leq: Auto Insertion Machine	18.0	19.3	27.9	29.7	35.4	34.0	37.4	45.0	47.8	48.9	52.9	52.3	55.4	56.4	56.8	57.4	57.7	57.8	57.8	57.1	57.5	57.9	57.7	57.1	56.5	58.0	60.4	69.6	69.2
M-31	Leq: Adhesive Dispenser Machine	21.7	26.2	30.7	32.9	38.4	39.9	47.7	52.3	50.0	50.0	53.4	53.3	55.0	59.7	58.4	59.1	61.8	61.0	59.0	57.5	56.8	56.3	55.1	52.3	50.4	47.2	44.7	69.7	69.3
M-32	Leq: SMD Placement Machine	18.9	25.6	31.5	33.9	40.9	42.9	45.7	50.9	51.3	51.8	54.7	55.3	57.4	59.1	59.8	60.7	62.1	62.4	60.1	59.3	59.2	58.7	57.7	54.8	53.4	49.3	46.9	71.0	70.7
M-33	Leq: Axial Insertion Machine	22.7	26.7	31.9	34.9	40.1	41.6	50.5	55.5	52.2	52.0	53.8	54.3	56.2	62.6	61.9	61.0	64.3	62.8	61.1	60.1	59.6	57.4	56.0	53.9	52.1	50.0	47.4	72.0	71.5
M-34	Leq: Final Assembly Area	21.1	26.5	26.9	35.1	37.5	36.9	41.2	48.5	49.6	48.6	51.8	51.2	53.6	56.1	56.9	58.6	59.0	58.8	58.9	57.9	57.3	56.5	55.0	52.7	49.8	46.1	41.3	68.4	68.3
M-35	Leq: Final Assembly Area	21.0	29.1	25.6	33.8	37.9	37.2	40.2	44.7	46.3	45.4	50.2	48.6	51.1	53.3	53.5	54.7	54.2	53.6	53.2	52.1	52.2	51.4	50.2	47.8	45.5	40.7	36.9	64.1	63.5
M-36	Leq: Vibration Table in Chamber Room	12.9	27.4	25.2	41.6	49.5	44.8	46.8	53.5	60.0	59.9	58.3	54.3	54.8	57.7	55.0	55.0	55.9	54.2	52.2	51.9	50.4	48.8	47.8	46.1	43.9	40.2	35.8	67.9	64.2
M-37	Leq: Electrical Design Room	14.9	24.0	22.0	31.2	31.9	30.9	34.1	41.2	40.4	42.0	43.5	44.9	48.0	48.8	47.5	47.0	45.8	49.5	44.7	42.9	42.2	40.5	39.0	36.2	32.5	30.7	28.2	57.5	56.1
M-38	Leq: Testing Engineering Office	15.4	23.5	24.6	35.1	42.0	35.6	38.2	45.1	43.1	43.1	44.8	41.8	42.1	43.8	42.5	42.0	41.5	41.3	38.6	37.2	36.6	36.0	34.3	31.1	27.9	26.2	23.8	54.4	50.6
M-39	Leq: Prototype Testing Room	16.6	26.0	26.9	34.3	34.6	34.2	35.9	40.7	40.8	40.5	44.8	42.2	43.8	46.3	47.0	46.9	46.2	44.7	43.5	41.4	39.5	37.6	35.1	32.6	29.3	25.9	21.5	55.9	54.1
	Log Average of All Levels	**19.3**	**26.0**	**28.4**	**35.5**	**41.9**	**39.7**	**44.7**	**50.3**	**52.1**	**52.1**	**52.9**	**51.8**	**53.8**	**57.3**	**56.8**	**57.2**	**59.0**	**58.4**	**56.9**	**55.9**	**55.6**	**54.8**	**53.8**	**51.8**	**50.4**	**49.7**	**51.0**	**68.0**	**67.4**

A-WEIGHTED SOUND LEVELS

Ref.	1/3 O.B.C. Frequency ,Hz	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2 K	2.5K	3.15K	4 K	5 K	6.3 K	8 K	10 K	O.A. dBL	O.A. dBA
M-30	Leq: Auto Insertion Machine	-26.7	-20.1	-6.7	-0.5	9.2	11.5	18.3	28.9	34.4	38.0	44.3	45.7	50.6	53.2	54.9	56.6	57.7	58.4	58.8	58.3	58.8	59.1	58.7	57.6	56.4	56.9	57.9	69.6	69.2
M-31	Leq: Adhesive Dispenser Machine	-23.0	-13.2	-3.9	2.7	12.2	17.4	28.6	36.2	36.6	39.1	44.8	46.7	50.2	56.5	56.5	58.3	61.8	61.6	60.0	58.7	58.1	57.5	56.1	52.8	50.3	46.1	42.2	69.7	69.3
M-32	Leq: SMD Placement Machine	-25.8	-13.8	-3.1	3.7	14.7	20.4	26.6	34.8	37.9	40.9	46.1	48.7	52.6	55.9	57.9	59.9	62.1	63.0	61.1	60.5	60.5	59.9	58.7	55.3	53.3	48.2	44.4	71.0	70.7
M-33	Leq: Axial Insertion Machine	-22.0	-12.7	-2.7	4.7	13.9	19.1	31.4	39.4	38.8	41.1	45.2	47.7	51.4	59.4	60.0	60.2	64.3	63.4	62.1	61.3	60.9	58.6	57.0	54.4	52.0	48.9	44.9	72.0	71.5
M-34	Leq: Final Assembly Area	-23.6	-12.9	-7.7	4.9	11.3	14.4	22.1	32.4	36.2	37.7	43.2	44.6	48.8	52.9	55.0	57.8	59.0	59.4	59.9	59.1	58.6	57.7	56.0	53.2	49.7	45.0	38.8	68.4	68.3
M-35	Leq: Final Assembly Area	-23.7	-10.3	-9.0	3.6	11.7	14.7	21.1	28.6	32.9	34.5	41.6	42.0	46.3	50.1	51.6	53.9	54.2	54.2	54.2	53.3	53.5	52.6	51.2	48.3	45.4	39.6	34.4	64.1	63.5
M-36	Leq: Vibration Table in Chamber Room	-31.8	-12.0	-9.4	11.4	23.3	22.3	27.7	37.4	46.6	49.0	49.7	47.7	50.0	54.5	53.1	54.2	55.9	54.8	53.2	53.1	51.7	50.0	48.8	46.6	43.8	39.1	33.3	67.9	64.2
M-37	Leq: Electrical Design Room	-29.8	-15.4	-12.6	1.0	5.7	8.4	15.0	25.1	27.0	31.1	34.9	38.3	43.2	45.6	45.6	46.2	45.8	50.1	45.7	44.1	43.5	41.7	40.0	36.7	32.4	29.6	25.7	57.5	56.1
M-38	Leq: Testing Engineering Office	-29.3	-15.9	-10.0	4.9	15.8	13.1	19.1	29.0	29.7	32.2	36.2	35.2	37.3	40.6	40.6	41.2	41.5	41.9	39.6	38.4	37.9	37.2	35.3	31.6	27.8	25.1	21.3	54.4	50.6
M-39	Leq: Prototype Testing Room	-28.1	-13.4	-7.7	4.1	8.4	11.7	16.8	24.6	27.4	29.6	36.2	35.6	39.0	43.1	45.1	46.1	46.2	45.3	44.5	42.6	40.8	38.8	36.1	33.1	29.2	24.8	19.0	55.9	54.1
	Log Average of All Levels	**-25.4**	**-13.4**	**-6.2**	**5.3**	**15.7**	**17.2**	**25.6**	**34.2**	**38.7**	**41.2**	**44.3**	**45.2**	**49.0**	**54.1**	**54.9**	**56.4**	**59.0**	**59.0**	**57.9**	**57.1**	**56.9**	**56.0**	**54.8**	**52.3**	**50.3**	**48.6**	**48.5**	**68.0**	**67.4**



APPENDIX E

SAMPLE SOUND LEVEL CALCULATIONS

AMBIENT NOISE


```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 09:26:44
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1am.te            Time Period: 1 hours
Description: POR1- Existing Ambient, Leq(1h) am

Road data, segment # 1: FINCH AVE.W
-----------------------------------
Car traffic volume  :  2367 veh/TimePeriod
Medium truck volume :    76 veh/TimePeriod
Heavy truck volume  :    76 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: FINCH AVE.W
---------------------------------
Angle1   Angle2           :   0.00 deg   60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 175.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: KEELE ST. N
-----------------------------------
Car traffic volume  :  2342 veh/TimePeriod
Medium truck volume :    75 veh/TimePeriod
Heavy truck volume  :    75 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: KEELE ST. N
---------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  75.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 09:30:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1pm.te            Time Period: 1 hours
Description: POR1- Existing Ambient, Leq(1h) pm


Road data, segment # 1: FINCH AVE.W
-----------------------------------
Car traffic volume  :  2501 veh/TimePeriod
Medium truck volume :    80 veh/TimePeriod
Heavy truck volume  :    80 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: FINCH AVE.W
---------------------------------
Angle1   Angle2           :   0.00 deg   60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 175.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: KEELE ST. N
-----------------------------------
Car traffic volume  :  2181 veh/TimePeriod
Medium truck volume :    70 veh/TimePeriod
Heavy truck volume  :    70 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: KEELE ST. N
---------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  75.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```



```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 09:39:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2am.te            Time Period: 1 hours
Description POR2- Existing Ambient, Leq(1h) am


Road data, segment # 1: FINCH AVE.E
-----------------------------------
Car traffic volume  :  2635 veh/TimePeriod
Medium truck volume :   115 veh/TimePeriod
Heavy truck volume  :   115 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: FINCH AVE.E
---------------------------------
Angle1   Angle2           : -60.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 145.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: KEELE ST. N
-----------------------------------
Car traffic volume  :  2342 veh/TimePeriod
Medium truck volume :    75 veh/TimePeriod
Heavy truck volume  :    75 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: KEELE ST. N
---------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  45.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 09:42:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2pm.te            Time Period: 1 hours
Description POR2- Existing Ambient, Leq(1h) pm


Road data, segment # 1: FINCH AVE.E
-----------------------------------
Car traffic volume  :  2644 veh/TimePeriod
Medium truck volume :   115 veh/TimePeriod
Heavy truck volume  :   115 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: FINCH AVE.E
---------------------------------
Angle1   Angle2           : -60.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 145.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: KEELE ST. N
-----------------------------------
Car traffic volume  :  2181 veh/TimePeriod
Medium truck volume :    70 veh/TimePeriod
Heavy truck volume  :    70 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: KEELE ST. N
---------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  45.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```



```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 09:44:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por3am.te            Time Period: 1 hours
Description POR3- Existing Ambient, Leq(1h) am


Road data, segment # 1: STEELES AVE.
------------------------------------
Car traffic volume  :  3139 veh/TimePeriod
Medium truck volume :   100 veh/TimePeriod
Heavy truck volume  :   100 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)


Data for Segment # 1: STEELES AVE.
----------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 190.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 09:49:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por3pm.te            Time Period: 1 hours
Description: por3- Existing Ambient, Leq(1h) pm


Road data, segment # 1: STEELES AVE.
------------------------------------
Car traffic volume  :  3381 veh/TimePeriod
Medium truck volume :   108 veh/TimePeriod
Heavy truck volume  :   108 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)


Data for Segment # 1: STEELES AVE.
----------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 190.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```



```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 09:57:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por4am.te            Time Period: 1 hours
Description: por4- Existing Ambient, Leq(1h) am



Road data, segment # 1: STEELES AVE.
------------------------------------
Car traffic volume  :  3139 veh/TimePeriod
Medium truck volume :   100 veh/TimePeriod
Heavy truck volume  :   100 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)


Data for Segment # 1: STEELES AVE.
----------------------------------
Angle1   Angle2           : -45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  90.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 09:59:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por4pm.te            Time Period: 1 hours
Description: por4- Existing Ambient, Leq(1h) pm


Road data, segment # 1: STEELES AVE.
------------------------------------
Car traffic volume  :  3381 veh/TimePeriod
Medium truck volume :   108 veh/TimePeriod
Heavy truck volume  :   108 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)


Data for Segment # 1: STEELES AVE.
----------------------------------
Angle1   Angle2           : -45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  90.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```


ROAD TRAFFIC NOISE

```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 11:00:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: finche.te            Time Period: Day/Night 16/8 hours

Description Finch Avenue East of Keele Street (2021) Without Subway Station

Road data, segment # 1: FINCH AVE. (day/night)
----------------------------------------------
Car traffic volume  : 41897/4655  veh/TimePeriod  *
Medium truck volume :  1822/202   veh/TimePeriod  *
Heavy truck volume  :  1822/202   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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


    24 hr Traffic Volume (AADT or SADT):  50600
    Percentage of Annual Growth       :   0.00
    Number of Years of Growth         :   0.00
    Medium Truck % of Total Volume    :   4.00
    Heavy Truck  % of Total Volume    :   4.00
    Day (16 hrs) % of Total Volume    :  90.00


Data for Segment # 1: FINCH AVE. (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```



```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 11:49:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: finchef.te           Time Period: Day/Night 16/8 hours

Description: Finch Avenue East of Keele Street (2021) With Subway Station


Road data, segment # 1: FINCH AVE. (day/night)
----------------------------------------------
Car traffic volume  : 43937/4882  veh/TimePeriod  *
Medium truck volume :  1910/212   veh/TimePeriod  *
Heavy truck volume  :  1910/212   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)


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


    24 hr Traffic Volume (AADT or SADT):  53064
    Percentage of Annual Growth       :   0.00
    Number of Years of Growth         :   0.00
    Medium Truck % of Total Volume    :   4.00
    Heavy Truck  % of Total Volume    :   4.00
    Day (16 hrs) % of Total Volume    :  90.00


Data for Segment # 1: FINCH AVE. (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 11:47:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: finchw.te            Time Period: Day/Night 16/8 hours
Description: Finch Avenue West of Keele Street (2021) Without Subway Station


Road data, segment # 1: FINCH AVE. (day/night)
----------------------------------------------
Car traffic volume  : 28740/3193  veh/TimePeriod  *
Medium truck volume :   917/102   veh/TimePeriod  *
Heavy truck volume  :   917/102   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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


    24 hr Traffic Volume (AADT or SADT):  33972
    Percentage of Annual Growth       :   0.00
    Number of Years of Growth         :   0.00
    Medium Truck % of Total Volume    :   3.00
    Heavy Truck  % of Total Volume    :   3.00
    Day (16 hrs) % of Total Volume    :  90.00


Data for Segment # 1: FINCH AVE. (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```



```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 11:53:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: finchwf.te           Time Period: Day/Night 16/8 hours

Description: Finch Avenue West of Keele Street (2021) With Subway Station


Road data, segment # 1: FINCH AVE. (day/night)
----------------------------------------------
Car traffic volume  : 30527/3392  veh/TimePeriod  *
Medium truck volume :   974/108   veh/TimePeriod  *
Heavy truck volume  :   974/108   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  36084
    Percentage of Annual Growth       :   0.00
    Number of Years of Growth         :   0.00
    Medium Truck % of Total Volume    :   3.00
    Heavy Truck  % of Total Volume    :   3.00
    Day (16 hrs) % of Total Volume    :  90.00


Data for Segment # 1: FINCH AVE. (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 11:55:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: keelen.te            Time Period: Day/Night 16/8 hours

Description: Keele Street North of Finch Avenue (2021) Without Subway Station


Road data, segment # 1: FINCH AVE. (day/night)
---------------------------------------------
Car traffic volume  : 28842/3205  veh/TimePeriod  *
Medium truck volume :   920/102   veh/TimePeriod  *
Heavy truck volume  :   920/102   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  34092
    Percentage of Annual Growth       :   0.00
    Number of Years of Growth         :   0.00
    Medium Truck % of Total Volume    :   3.00
    Heavy Truck  % of Total Volume    :   3.00
    Day (16 hrs) % of Total Volume    :  90.00


Data for Segment # 1: FINCH AVE. (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```



```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 12:01:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: keelenf.te           Time Period: Day/Night 16/8 hours

Description: Keele Street North of Finch Avenue (2021) With Subway Station

Road data, segment # 1: FINCH AVE. (day/night)
---------------------------------------------
Car traffic volume  : 31325/3481  veh/TimePeriod  *
Medium truck volume :  1000/111   veh/TimePeriod  *
Heavy truck volume  :  1000/111   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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


    24 hr Traffic Volume (AADT or SADT):  37027
    Percentage of Annual Growth       :   0.00
    Number of Years of Growth         :   0.00
    Medium Truck % of Total Volume    :   3.00
    Heavy Truck  % of Total Volume    :   3.00
    Day (16 hrs) % of Total Volume    :  90.00


Data for Segment # 1: FINCH AVE. (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 11:59:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: keeles.te            Time Period: Day/Night 16/8 hours

Description: Keele Street South of Finch Avenue (2021) Without Subway Station

Road data, segment # 1: FINCH AVE. (day/night)
----------------------------------------------
Car traffic volume  : 27508/3056  veh/TimePeriod  *
Medium truck volume :  1196/133   veh/TimePeriod  *
Heavy truck volume  :  1196/133   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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


    24 hr Traffic Volume (AADT or SADT):  33222
    Percentage of Annual Growth       :   0.00
    Number of Years of Growth         :   0.00
    Medium Truck % of Total Volume    :   4.00
    Heavy Truck  % of Total Volume    :   4.00
    Day (16 hrs) % of Total Volume    :  90.00


Data for Segment # 1: FINCH AVE. (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```



```
STAMSON 5.0        NORMAL REPORT        Date: 30-11-2005 12:04:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: keelesf.te           Time Period: Day/Night 16/8 hours

Description: Keele Street South of Finch Avenue (2021) With Subway Station


Road data, segment # 1: FINCH AVE. (day/night)
----------------------------------------------
Car traffic volume  : 28208/3134  veh/TimePeriod  *
Medium truck volume :  1226/136   veh/TimePeriod  *
Heavy truck volume  :  1226/136   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  34068
    Percentage of Annual Growth       :   0.00
    Number of Years of Growth         :   0.00
    Medium Truck % of Total Volume    :   4.00
    Heavy Truck  % of Total Volume    :   4.00
    Day (16 hrs) % of Total Volume    :  90.00


Data for Segment # 1: FINCH AVE. (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

BUS TERMINAL STATIONS

Modified N23- March 12, 2001

SS WILSON ASSOCIATES

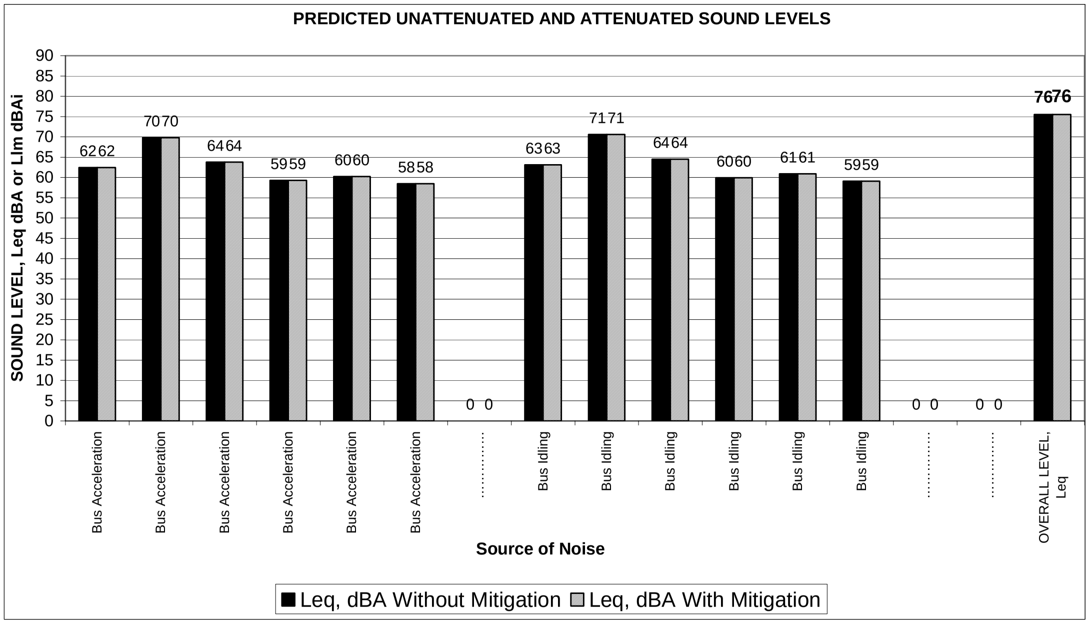
STATIONARY NOISE CALCULATIONS
PROPOSED FINCH WEST TTC STATION

DATE PREPARED : NOVEMBER 28, 2005

File Number : **WA04-104**
Project Name : **SPADINA SUBWAY EXTENSION, TORONTO**
Receptor Name : **POR 1 - COMMERCIAL BUILDING EAST OF KEELE STREET**

Ground Elevation at Receptor,m	0.0
Receptor Height above ground, m	1.5
Receptor Xr Co-Ordinates, m	0.0
Receptor Yr Co-Ordinates, m	0.0
Model (1=none,2=CMHC,3=ISO)	1.0
Stationary Noise Type	G — **General (non-impulsive) Source**

SOURCE NAME	Leq, dBA Without Mitigation	Rank No.	Leq, dBA With Mitigation	Rank No.	Lp, dBA	Ref.Dist	Lp @15m	Notes
Bus Acceleration	62	6	62	6	75	24	79	…………
Bus Acceleration	70	2	70	2	75	24	79	…………
Bus Acceleration	64	4	64	4	75	24	79	…………
Bus Acceleration	59	10	59	10	75	24	79	…………
Bus Acceleration	60	8	60	8	75	24	79	…………
Bus Acceleration	58	12	58	12	75	24	79	…………
……………	0	13	0	13	0	15	0	…………
Bus Idling	63	5	63	5	71	15	71	…………
Bus Idling	71	1	71	1	71	15	71	…………
Bus Idling	64	3	64	3	71	15	71	…………
Bus Idling	60	9	60	9	71	15	71	…………
Bus Idling	61	7	61	7	71	15	71	…………
Bus Idling	59	11	59	11	71	15	71	…………
……………	0	13	0	13	0	15	0	…………
……………	0	13	0	13	0	15	0	…………
OVERALL LEVEL, Leq	**76**	**dBA**	**76**	**dBA**				



DATE PREPARED : NOVEMBER 28, 2005

SS WILSON ASSOCIATES

Modified N23- March 12, 2001

STATIONARY NOISE CALCULATIONS
PROPOSED FINCH WEST TTC STATION

File Number : WA04-104 General (non-impulsive) Source
Project Name : SPADINA SUBWAY EXTENSION, TORONTO
Receptor Name : POR 1 - COMMERCIAL BUILDING EAST OF KEELE STREET
Source Name **Bus Acceleration**
L1 **Busses Accelerating**

Show Emission Data	Yes	Source Unattenuated Leq dBA			62	Source Attenuated Leq dBA			62		
Octave Band Centre Frequency, Hz	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBL**	**dBA**
Use Cartesian Co-Ordinates ?	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Receptor Xr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Yr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at Receptor,m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Height above ground, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Receptor Zr Co-Ordinates, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Source Xs Co-Ordinates, m	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0		
Source Ys Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at source, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Source Zs Co-Ordinates, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Point or Line Source (P or L) ?	L	L	L	L	L	L	L	L	L		
Spectrum, dBL	77.0	85.0	88.0	72.0	68.0	66.0	63.0	58.0	51.0	**90.1**	**74.6**
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Reference Dist. for Lp, m	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0		
Adjusted Spectrum, dBL	**77.0**	**85.0**	**88.0**	**72.0**	**68.0**	**66.0**	**63.0**	**58.0**	**51.0**	**90.1**	**74.6**
Calculated Source-Receptor Distance,m	35	35	35	35	35	35	35	35	35		
Geomtrical Spreading	....										
Consider Distance atten.?	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Distance Reduction Factor	20	20	20	20	20	20	20	20	20		
Reference Dist. for Lp, m	24	24	24	24	24	24	24	24	24		
Source-Receptor Distance,m	35	35	35	35	35	35	35	35	35		
Distance Error Flag	Ok										
Geometrical Spreading, dB	**-3.3**	**-3.3**	**-3.3**	**-3.3**	**-3.3**	**-3.3**	**-3.3**	**-3.3**	**-3.3**		
Lp With Geometric Spreading	73.7	81.7	84.7	68.7	64.7	62.7	59.7	54.7	47.7	**86.8**	**71.3**

No Ground Attenuation	....										
Model (1=none,2=CMHC,3=ISO)	**1**	1	1	1	1	1	1	1	1		
Use a Different Distance For Ground Atten.?	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***		
Distance used for calculation											
Selected Distance For Calculation	35	35	35	35	35	35	35	35	35		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Receptor Height above ground, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Barrier Height Factor(2xbh) (CMHC)	30	30	30	30	30	30	30	30	30		
P+T Factors (CMHC only)	0	0	0	0	0	0	0	0	0		
Calculated Ground Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Considered Ground Attenuation, dB	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**		
Lp With Geometric Spreading & Gnd.Atten.	73.7	81.7	84.7	68.7	64.7	62.7	59.7	54.7	47.7	**86.8**	**71.3**
Yes Atmospheric Attenuation	....										
Consider atm.atten.of a Standard Day(Y or N)?	**Y**	Y	Y	Y	Y	Y	Y	Y	Y		
Atmospheric Attenuation, dB	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**-0.1**	**-0.1**	**-0.3**	**-0.5**		
Sub-Total Propagation Attenuation,dB	-3.3	-3.3	-3.3	-3.3	-3.3	-3.3	-3.4	-3.6	-3.8		
Lp with Geom.Spreading,Gnd.&Atm.Atten.	73.7	81.7	84.7	68.7	64.7	62.7	59.6	54.4	47.2	**86.8**	**71.3**
Additional Adjustments (Watch +/- Signs)	....										
Tonal Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Total Adjustments, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjusted Lp @ Receptor, dBL	**73.7**	**81.7**	**84.7**	**68.7**	**64.7**	**62.7**	**59.6**	**54.4**	**47.2**	**86.8**	**71.3**
Leq Time Base , Minutes	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0		
Line Source Data :	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
- Length of Line Segment, m	50	50	50	50	50	50	50	50	50		
- Source Speed, Km/Hr	20	20	20	20	20	20	20	20	20		
- No. of Movements in Time Base	52	52	52	52	52	52	52	52	52		
-Segment integration time, min.	7.80	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
Linear Unattenuated Leq dBL	**64.9**	**72.9**	**75.8**	**59.8**	**55.8**	**53.8**	**50.7**	**45.6**	**38.4**	**78.0**	**62.4**
A-Weighted Unattenuated Leq dBA	25.5	46.7	59.7	51.2	52.6	53.8	51.9	46.6	37.3		
Noise Control Measures	....										
Sound Barrier(s) Case	**None**	None	None	None	None	None	None	None	None		
Is there a sound Barrier (Y or N) ?	N	N	N	N	N	N	N	N	N		

Source Sound Barrier 1........	Detail ...										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source-Barrier Distance	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Barrier Height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Barrier Gnd. Elev.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow		
Barrier Top Elevation	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Line-To-Point Source Barrier Adjust.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Result Sound Level (Barrier 1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Barrier 1 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Receptor Sound Barrier 2........	Detail ...										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source-Barrier Distance	#VALUE!	######	######	######	######	######	######	######	######		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ..	Detail ...	Detail ...		
Barrier Height	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Barrier Gnd. Elev.	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	#VALUE!	######	######	######	######	######	######	######	######		
Barrier Top Elevation	21.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Line-To-Point Source Barrier Adjust.	#VALUE!	######	######	######	######	######	######	######	######		
Receiver Barrier Attenuation, dB	#VALUE!	######	######	######	######	######	######	######	######		
Sub-Result Sound Level (Barrier 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Barrier 2 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Barrier(s) Results											
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver Barrier Attenuation, dB	#VALUE!	######	######	######	######	######	######	######	######		
Additional Attenuation Of Double Barrier	#VALUE!	######	######	######	######	######	######	######	######		
Calculated Overall Double Barrier Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Do You Want to Limit The Barrier Reduction ?	0	0	0	0	0	0	0	0	0		
Maximum Allowed Barrier Reduction	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0		
Selected Reduction(s) Due to Barrier(s)	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***		
Resultant Sound Level With Barrier(s)	***64.9***	***72.9***	***75.8***	***59.8***	***55.8***	***53.8***	***50.7***	***45.6***	***38.4***	**78.0**	**62.4**
Barrier(s) Reduction (IL)	**0.0** dBL		**0.0** dBA								
Sound Level Adjust.(Watch +/- Signs)	....										
Note Re Removal of Tonal Penalty	-	-	-	-	-	-	-	-	-		
Removal of Tonal Penalty	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.1	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.2	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Reduction, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Linear Attenuated Leq dBL	**64.9**	**72.9**	**75.8**	**59.8**	**55.8**	**53.8**	**50.7**	**45.6**	**38.4**	**78.0**	**62.4**
A-Weighted Attenuated Leq dBA	25.5	46.7	59.7	51.2	52.6	53.8	51.9	46.6	37.3		
Source Unattenuated Leq dBA	**62.4**	**dBA**	**Source Attenuated Leq dBA**					**62.4**	**dBA**		

Modified N23- March 12, 2001

SS WILSON ASSOCIATES

STATIONARY NOISE CALCULATIONS
PROPOSED FINCH WEST TTC STATION

DATE PREPARED : NOVEMBER 28, 2005

File Number : WA04-104 — General (non-impulsive) Source

Project Name : SPADINA SUBWAY EXTENSION, TORONTO

Receptor Name : POR 1 - COMMERCIAL BUILDING EAST OF KEELE STREET

Source Name: **Bus Idling**

P1 — **Buses Idling**

Show Emission Data	Yes	Source Unattenuated Leq dBA			63	Source Attenuated Leq dBA			63		
Octave Band Centre Frequency, Hz	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBL**	**dBA**
Use Cartesian Co-Ordinates ?	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Receptor Xr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Yr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at Receptor,m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Height above ground, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Receptor Zr Co-Ordinates, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Source Xs Co-Ordinates, m	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0		
Source Ys Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at source, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Source Zs Co-Ordinates, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Point or Line Source (P or L) ?	P	P	P	P	P	P	P	P	P		
Spectrum, dBL	86.0	80.0	71.0	67.0	66.0	67.0	63.0	57.0	46.0	**87.2**	**70.6**
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Reference Dist. for Lp, m	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Adjusted Spectrum, dBL	**86.0**	**80.0**	**71.0**	**67.0**	**66.0**	**67.0**	**63.0**	**57.0**	**46.0**	**87.2**	**70.6**
Calculated Source-Receptor Distance,m	35	35	35	35	35	35	35	35	35		
Geomtrical Spreading	....										
Consider Distance atten.?	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Distance Reduction Factor	20	20	20	20	20	20	20	20	20		
Reference Dist. for Lp, m	15	15	15	15	15	15	15	15	15		
Source-Receptor Distance,m	35	35	35	35	35	35	35	35	35		
Distance Error Flag	Ok										
Geometrical Spreading, dB	**-7.4**	**-7.4**	**-7.4**	**-7.4**	**-7.4**	**-7.4**	**-7.4**	**-7.4**	**-7.4**		
Lp With Geometric Spreading	78.6	72.6	63.6	59.6	58.6	59.6	55.6	49.6	38.6	**79.9**	**63.2**

No Ground Attenuation	....										
Model (1=none,2=CMHC,3=ISO)	**1**	1	1	1	1	1	1	1	1		
Use a Different Distance For Ground Atten.?	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***		
Distance used for calculation											
Selected Distance For Calculation	35	35	35	35	35	35	35	35	35		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Receptor Height above ground, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Barrier Height Factor(2xbh) (CMHC)	30	30	30	30	30	30	30	30	30		
P+T Factors (CMHC only)	0	0	0	0	0	0	0	0	0		
Calculated Ground Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Attenuation, dB	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**		
Lp With Geometric Spreading & Gnd.Atten.	78.6	72.6	63.6	59.6	58.6	59.6	55.6	49.6	38.6	**79.9**	**63.2**
Yes Atmospheric Attenuation	....										
Consider atm.atten.of a Standard Day(Y or N)?	**Y**	Y	Y	Y	Y	Y	Y	Y	Y		
Atmospheric Attenuation, dB	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**-0.1**	**-0.2**	**-0.5**	**-0.9**		
Sub-Total Propagation Attenuation,dB	-7.4	-7.4	-7.4	-7.4	-7.4	-7.5	-7.6	-7.9	-8.3		
Lp with Geom.Spreading,Gnd.&Atm.Atten.	78.6	72.6	63.6	59.6	58.6	59.5	55.4	49.1	37.7	**79.8**	**63.1**
Additional Adjustments (Watch +/- Signs)	....										
Tonal Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Total Adjustments, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjusted Lp @ Receptor, dBL	**78.6**	**72.6**	**63.6**	**59.6**	**58.6**	**59.5**	**55.4**	**49.1**	**37.7**	**79.8**	**63.1**
Leq Time Base , Minutes	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0		
Line Source Data :	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
- Length of Line Segment, m	50	50	50	50	50	50	50	50	50		
- Source Speed, Km/Hr	30	30	30	30	30	30	30	30	30		
- No. of Movements in Time Base	60	60	60	60	60	60	60	60	60		
-Segment integration time, min.	6.00	6	6	6	6	6	6	6	6		
Linear Unattenuated Leq dBL	**78.6**	**72.6**	**63.6**	**59.6**	**58.6**	**59.5**	**55.4**	**49.1**	**37.7**	**79.8**	**63.1**
A-Weighted Unattenuated Leq dBA	39.2	46.4	47.5	51.0	55.4	59.5	56.6	50.1	36.6		

Noise Control Measures	....										
Sound Barrier(s) Case	**None**	None	None	None	None	None	None	None	None		
Is there a sound Barrier (Y or N) ?	N	N	N	N	N	N	N	N	N		
Source Sound Barrier 1........	Detail ...										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source-Barrier Distance	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Barrier Height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Barrier Gnd. Elev.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow		
Barrier Top Elevation	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Line-To-Point Source Barrier Adjust.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Result Sound Level (Barrier 1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Barrier 1 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Receptor Sound Barrier 2........	Detail ...										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source-Barrier Distance	#VALUE!	######	######	######	######	######	######	######	######		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...		
Barrier Height	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Barrier Gnd. Elev.	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	#VALUE!	######	######	######	######	######	######	######	######		

Barrier Top Elevation	21.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Line-To-Point Source Barrier Adjust.	#VALUE!	######	######	######	######	######	######	######	######		
Receiver Barrier Attenuation, dB	#VALUE!	######	######	######	######	######	######	######	######		
Sub-Result Sound Level (Barrier 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Barrier 2 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Barrier(s) Results											
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver Barrier Attenuation, dB	#VALUE!	######	######	######	######	######	######	######	######		
Additional Attenuation Of Double Barrier	#VALUE!	######	######	######	######	######	######	######	######		
Calculated Overall Double Barrier Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Do You Want to Limit The Barrier Reduction ?	0	0	0	0	0	0	0	0	0		
Maximum Allowed Barrier Reduction	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0		
Selected Reduction(s) Due to Barrier(s)	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***		
Resultant Sound Level With Barrier(s)	***78.6***	***72.6***	***63.6***	***59.6***	***58.6***	***59.5***	***55.4***	***49.1***	***37.7***	**79.8**	**63.1**
Barrier(s) Reduction (IL)	**0.0** dBL		**0.0** dBA								
Sound Level Adjust.(Watch +/- Signs)	....										
Note Re Removal of Tonal Penalty	-	-	-	-	-	-	-	-	-		
Removal of Tonal Penalty	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.1	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.2	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Reduction, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Linear Attenuated Leq dBL	**78.6**	**72.6**	**63.6**	**59.6**	**58.6**	**59.5**	**55.4**	**49.1**	**37.7**	**79.8**	**63.1**
A-Weighted Attenuated Leq dBA	39.2	46.4	47.5	51.0	55.4	59.5	56.6	50.1	36.6		
Source Unattenuated Leq dBA	**63.1**	**dBA**	**Source Attenuated Leq dBA**					**63.1**	**dBA**		

SS WILSON ASSOCIATES

STATIONARY NOISE CALCULATIONS

DATE PREPARED : NOVEMBER 28, 2005 **PROPOSED FINCH WEST TTC STATION**

File Number : **WA04-104**

Project Name : **SPADINA SUBWAY EXTENSION, TORONTO**

Receptor Name : **POR 1 - COMMERCIAL BUILDING EAST OF KEELE STREET**

Linear Attenuated Leq dBL

#		31.5	63	125	250	500	1000	2000	4000	8000
1	Bus Acceleration	64.9	72.9	75.8	59.8	55.8	53.8	50.7	45.6	38.4
2	Bus Acceleration	72.2	80.2	83.2	67.2	63.2	61.2	58.2	53.2	46.2
3	Bus Acceleration	66.2	74.2	77.2	61.2	57.2	55.2	52.1	47.0	39.9
4	Bus Acceleration	61.8	69.8	72.7	56.7	52.7	50.6	47.5	42.1	34.6
5	Bus Acceleration	62.7	70.7	73.7	57.6	53.6	51.6	48.5	43.2	35.7
6	Bus Acceleration	60.9	68.9	71.9	55.9	51.9	49.8	46.6	41.2	33.5
7	……………	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Bus Idling	78.6	72.6	63.6	59.6	58.6	59.5	55.4	49.1	37.7
9	Bus Idling	86.0	80.0	71.0	67.0	66.0	67.0	63.0	57.0	46.0
10	Bus Idling	80.0	74.0	65.0	60.9	59.9	60.9	56.8	50.6	39.3
11	Bus Idling	75.5	69.5	60.5	56.5	55.5	56.4	52.2	45.7	34.0
12	Bus Idling	76.5	70.4	61.4	57.4	56.4	57.3	53.2	46.7	35.1
13	Bus Idling	74.7	68.7	59.7	55.7	54.6	55.5	51.3	44.7	32.9
14	……………	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	……………	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Overall Sound Level, dBL	**88.5**	**85.4**	**85.8**	**72.4**	**70.1**	**70.3**	**66.5**	**60.6**	**51.1**
	OVERALL LEVEL, Leq	**92**	**dBL**	**76**	**dBA**					

SS WILSON ASSOCIATES

STATIONARY NOISE CALCULATIONS

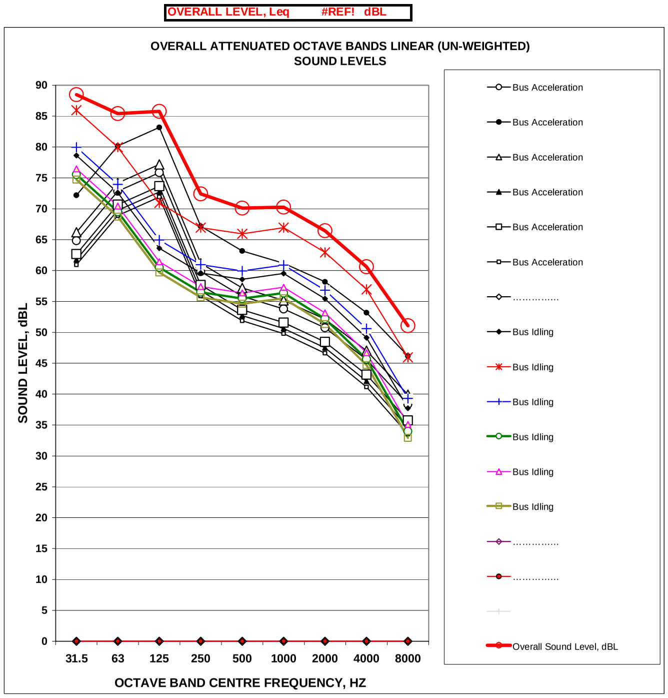
DATE PREPARED : NOVEMBER 28, 2005 **PROPOSED FINCH WEST TTC STATION**

File Number : **WA04-104**

Project Name : **SPADINA SUBWAY EXTENSION, TORONTO**

Receptor Name : **POR 1 - COMMERCIAL BUILDING EAST OF KEELE STREET**

OVERALL LEVEL, Leq #REF! dBL



Modified N23- March 12, 2001

SS WILSON ASSOCIATES

STATIONARY NOISE CALCULATIONS
PROPOSED FINCH WEST TTC STATION

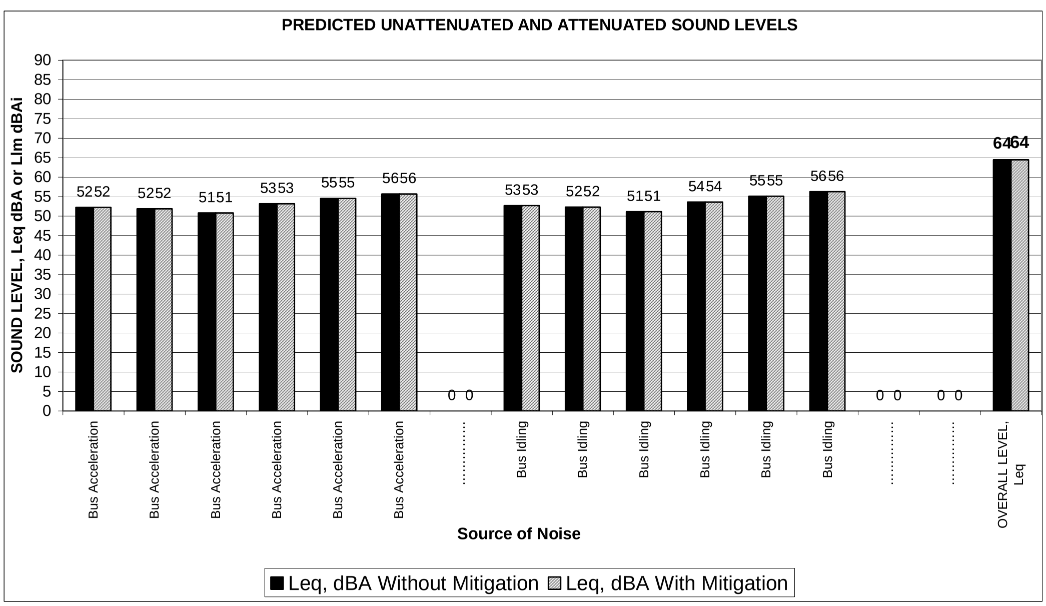
DATE PREPARED : NOVEMBER 28, 2005

File Number : **WA04-104**
Project Name : **SPADINA SUBWAY EXTENSION, TORONTO**
Receptor Name : **POR 2 - RESIDENTIAL APARTMENT BUILDING WEST OF KEELE STREET**

Ground Elevation at Receptor,m	0.0
Receptor Height above ground, m	1.5
Receptor Xr Co-Ordinates, m	0.0
Receptor Yr Co-Ordinates, m	0.0
Model (1=none,2=CMHC,3=ISO)	1.0
Stationary Noise Type	G

General (non-impulsive) Source

SOURCE NAME	Leq, dBA Without Mitigation	Rank No.	Leq, dBA With Mitigation	Rank No.	Lp, dBA	Ref.Dist	Lp @15m	Notes
Bus Acceleration	52	9	52	9	75	24	79	…………
Bus Acceleration	52	10	52	10	75	24	79	…………
Bus Acceleration	51	12	51	12	75	24	79	…………
Bus Acceleration	53	6	53	6	75	24	79	…………
Bus Acceleration	55	4	55	4	75	24	79	…………
Bus Acceleration	56	2	56	2	75	24	79	…………
……………	0	13	0	13	0	15	0	…………
Bus Idling	53	7	53	7	71	15	71	…………
Bus Idling	52	8	52	8	71	15	71	…………
Bus Idling	51	11	51	11	71	15	71	…………
Bus Idling	54	5	54	5	71	15	71	…………
Bus Idling	55	3	55	3	71	15	71	…………
Bus Idling	56	1	56	1	71	15	71	…………
……………	0	13	0	13	0	15	0	…………
……………	0	13	0	13	0	15	0	…………
OVERALL LEVEL, Leq	**64**	**dBA**	**64**	**dBA**				



DATE PREPARED : NOVEMBER 28, 2005

SS WILSON ASSOCIATES

Modified N23- March 12, 2001

STATIONARY NOISE CALCULATIONS
PROPOSED FINCH WEST TTC STATION

File Number :	WA04-104	General (non-impulsive) Source
Project Name :	SPADINA SUBWAY EXTENSION, TORONTO	
Receptor Name :	POR 2 - RESIDENTIAL APARTMENT BUILDING WEST OF KEELE STREET	
Source Name	**Bus Acceleration**	
L1	**Busses Accelerating**	

Show Emission Data	Yes	Source Unattenuated Leq dBA			52	Source Attenuated Leq dBA			52		
Octave Band Centre Frequency, Hz	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBL**	**dBA**
Use Cartesian Co-Ordinates ?	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Receptor Xr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Yr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at Receptor,m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Height above ground, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Receptor Zr Co-Ordinates, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Source Xs Co-Ordinates, m	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0		
Source Ys Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at source, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Source Zs Co-Ordinates, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Point or Line Source (P or L) ?	L	L	L	L	L	L	L	L	L		
Spectrum, dBL	77.0	85.0	88.0	72.0	68.0	66.0	63.0	58.0	51.0	**90.1**	**74.6**
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Reference Dist. for Lp, m	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0		
Adjusted Spectrum, dBL	**77.0**	**85.0**	**88.0**	**72.0**	**68.0**	**66.0**	**63.0**	**58.0**	**51.0**	**90.1**	**74.6**
Calculated Source-Receptor Distance,m	110	110	110	110	110	110	110	110	110		

Geomtrical Spreading	....										
Consider Distance atten.?	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Distance Reduction Factor	20	20	20	20	20	20	20	20	20		
Reference Dist. for Lp, m	24	24	24	24	24	24	24	24	24		
Source-Receptor Distance,m	110	110	110	110	110	110	110	110	110		
Distance Error Flag	Ok										
Geometrical Spreading, dB	**-13.2**	**-13.2**	**-13.2**	**-13.2**	**-13.2**	**-13.2**	**-13.2**	**-13.2**	**-13.2**		
Lp With Geometric Spreading	63.8	71.8	74.8	58.8	54.8	52.8	49.8	44.8	37.8	**76.9**	**61.4**
No Ground Attenuation	....										
Model (1=none,2=CMHC,3=ISO)	**1**	1	1	1	1	1	1	1	1		
Use a Different Distance For Ground Atten.?	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***		
Distance used for calculation											
Selected Distance For Calculation	110	110	110	110	110	110	110	110	110		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Receptor Height above ground, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Barrier Height Factor(2xbh) (CMHC)	30	30	30	30	30	30	30	30	30		
P+T Factors (CMHC only)	0	0	0	0	0	0	0	0	0		
Calculated Ground Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Considered Ground Attenuation, dB	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**		
Lp With Geometric Spreading & Gnd.Atten.	63.8	71.8	74.8	58.8	54.8	52.8	49.8	44.8	37.8	**76.9**	**61.4**
Yes Atmospheric Attenuation	....										
Consider atm.atten.of a Standard Day(Y or N)?	**Y**	Y	Y	Y	Y	Y	Y	Y	Y		
Atmospheric Attenuation, dB	**0.0**	**0.0**	**-0.1**	**-0.1**	**-0.2**	**-0.4**	**-0.8**	**-2.1**	**-3.9**		
Sub-Total Propagation Attenuation,dB	-13.2	-13.3	-13.3	-13.3	-13.4	-13.6	-14.1	-15.4	-17.1		
Lp with Geom.Spreading,Gnd.&Atm.Atten.	63.8	71.7	74.7	58.7	54.6	52.4	48.9	42.6	33.9	**76.8**	**61.1**
Additional Adjustments (Watch +/- Signs)	....										
Tonal Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Total Adjustments, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

Adjusted Lp @ Receptor, dBL	**63.8**	**71.7**	**74.7**	**58.7**	**54.6**	**52.4**	**48.9**	**42.6**	**33.9**	**76.8**	**61.1**
Leq Time Base , Minutes	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0		
Line Source Data :	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
- Length of Line Segment, m	50	50	50	50	50	50	50	50	50		
- Source Speed, Km/Hr	20	20	20	20	20	20	20	20	20		
- No. of Movements in Time Base	52	52	52	52	52	52	52	52	52		
-Segment integration time, min.	7.80	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
Linear Unattenuated Leq dBL	**54.9**	**62.9**	**65.9**	**49.8**	**45.7**	**43.5**	**40.1**	**33.8**	**25.1**	**68.0**	**52.3**
A-Weighted Unattenuated Leq dBA	15.5	36.7	49.8	41.2	42.5	43.5	41.3	34.8	24.0		
Noise Control Measures	....										
Sound Barrier(s) Case	**None**	None	None	None	None	None	None	None	None		
Is there a sound Barrier (Y or N) ?	N	N	N	N	N	N	N	N	N		
Source Sound Barrier 1........	Detail ...										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source-Barrier Distance	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Barrier Height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Barrier Gnd. Elev.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow		
Barrier Top Elevation	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Line-To-Point Source Barrier Adjust.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

Sub-Result Sound Level (Barrier 1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Barrier 1 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Receptor Sound Barrier 2........	Detail ...										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source-Barrier Distance	#VALUE!	######	######	######	######	######	######	######	######		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...		
Barrier Height	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Barrier Gnd. Elev.	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	#VALUE!	######	######	######	######	######	######	######	######		
Barrier Top Elevation	21.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Line-To-Point Source Barrier Adjust.	#VALUE!	######	######	######	######	######	######	######	######		
Receiver Barrier Attenuation, dB	#VALUE!	######	######	######	######	######	######	######	######		
Sub-Result Sound Level (Barrier 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Barrier 2 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Barrier(s) Results											
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver Barrier Attenuation, dB	#VALUE!	######	######	######	######	######	######	######	######		
Additional Attenuation Of Double Barrier	#VALUE!	######	######	######	######	######	######	######	######		
Calculated Overall Double Barrier Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Do You Want to Limit The Barrier Reduction ?	0	0	0	0	0	0	0	0	0		
Maximum Allowed Barrier Reduction	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0		
Selected Reduction(s) Due to Barrier(s)	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***		
Resultant Sound Level With Barrier(s)	***54.9***	***62.9***	***65.9***	***49.8***	***45.7***	***43.5***	***40.1***	***33.8***	***25.1***	68.0	52.3
Barrier(s) Reduction (IL)	**0.0** dBL		**0.0** dBA								
Sound Level Adjust.(Watch +/- Signs)	....										
Note Re Removal of Tonal Penalty	-	-	-	-	-	-	-	-	-		
Removal of Tonal Penalty	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.1	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.2	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Reduction, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Linear Attenuated Leq dBL	**54.9**	**62.9**	**65.9**	**49.8**	**45.7**	**43.5**	**40.1**	**33.8**	**25.1**	**68.0**	**52.3**
A-Weighted Attenuated Leq dBA	15.5	36.7	49.8	41.2	42.5	43.5	41.3	34.8	24.0		
Source Unattenuated Leq dBA	52.3	**dBA**	**Source Attenuated Leq dBA**					52.3	**dBA**		

Modified N23- March 12, 2001

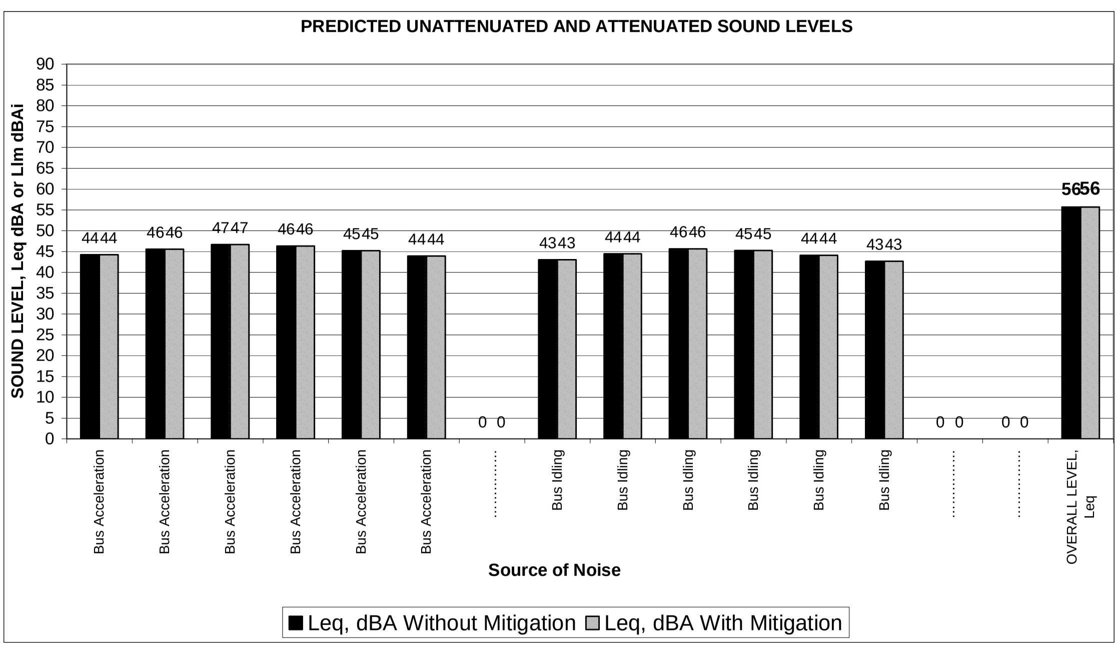
SS WILSON ASSOCIATES

STATIONARY NOISE CALCULATIONS
PROPOSED STEELES WEST GO STATION

DATE PREPARED : NOVEMBER 28, 2005
File Number : **WA04-104**
Project Name : **SPADINA SUBWAY EXTENSION, TORONTO**
Receptor Name : **POR 4 - COMMERCIAL BUILDING NORTH OF STEELES AVENUE**

Ground Elevation at Receptor,m	0.0
Receptor Height above ground, m	1.5
Receptor Xr Co-Ordinates, m	0.0
Receptor Yr Co-Ordinates, m	0.0
Model (1=none,2=CMHC,3=ISO)	1.0
Stationary Noise Type	G — **General (non-impulsive) Source**

SOURCE NAME	Leq, dBA Without Mitigation	Rank No.	Leq, dBA With Mitigation	Rank No.	Lp, dBA	Ref.Dist	Lp @15m	Notes
Bus Acceleration	44	8	44	8	75	24	79	…………
Bus Acceleration	46	4	46	4	75	24	79	…………
Bus Acceleration	47	1	47	1	75	24	79	…………
Bus Acceleration	46	2	46	2	75	24	79	…………
Bus Acceleration	45	6	45	6	75	24	79	…………
Bus Acceleration	44	10	44	10	75	24	79	…………
……………	0	13	0	13	0	15	0	…………
Bus Idling	43	11	43	11	71	15	71	…………
Bus Idling	44	7	44	7	71	15	71	…………
Bus Idling	46	3	46	3	71	15	71	…………
Bus Idling	45	5	45	5	71	15	71	…………
Bus Idling	44	9	44	9	71	15	71	…………
Bus Idling	43	12	43	12	71	15	71	…………
……………	0	13	0	13	0	15	0	…………
……………	0	13	0	13	0	15	0	…………
OVERALL LEVEL, Leq	**56**	**dBA**	**56**	**dBA**				



DATE PREPARED : NOVEMBER 28, 2005

SS WILSON ASSOCIATES

Modified N23- March 12, 2001

STATIONARY NOISE CALCULATIONS
PROPOSED STEELES WEST GO STATION

File Number : WA04-104 — General (non-impulsive) Source

Project Name : SPADINA SUBWAY EXTENSION, TORONTO

Receptor Name : POR 4 - COMMERCIAL BUILDING NORTH OF STEELES AVENUE

Source Name **Bus Acceleration**

L1 **Busses Accelerating**

Show Emission Data	Yes	Source Unattenuated Leq dBA			44	Source Attenuated Leq dBA			44		
Octave Band Centre Frequency, Hz	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBL**	**dBA**
Use Cartesian Co-Ordinates ?	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Receptor Xr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Yr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at Receptor,m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Height above ground, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Receptor Zr Co-Ordinates, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Source Xs Co-Ordinates, m	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0		
Source Ys Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at source, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Source Zs Co-Ordinates, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Point or Line Source (P or L) ?	L	L	L	L	L	L	L	L	L		
Spectrum, dBL	77.0	85.0	88.0	72.0	68.0	66.0	63.0	58.0	51.0	**90.1**	**74.6**
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Reference Dist. for Lp, m	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0		
Adjusted Spectrum, dBL	**77.0**	**85.0**	**88.0**	**72.0**	**68.0**	**66.0**	**63.0**	**58.0**	**51.0**	**90.1**	**74.6**
Calculated Source-Receptor Distance,m	300	300	300	300	300	300	300	300	300		

Geomtrical Spreading	....										
Consider Distance atten.?	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Distance Reduction Factor	20	20	20	20	20	20	20	20	20		
Reference Dist. for Lp, m	24	24	24	24	24	24	24	24	24		
Source-Receptor Distance,m	300	300	300	300	300	300	300	300	300		
Distance Error Flag	Ok										
Geometrical Spreading, dB	**-21.9**	**-21.9**	**-21.9**	**-21.9**	**-21.9**	**-21.9**	**-21.9**	**-21.9**	**-21.9**		
Lp With Geometric Spreading	55.1	63.1	66.1	50.1	46.1	44.1	41.1	36.1	29.1	**68.2**	**52.7**
No Ground Attenuation	....										
Model (1=none,2=CMHC,3=ISO)	**1**	1	1	1	1	1	1	1	1		
Use a Different Distance For Ground Atten.?	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***		
Distance used for calculation											
Selected Distance For Calculation	300	300	300	300	300	300	300	300	300		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Receptor Height above ground, m	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Barrier Height Factor(2xbh) (CMHC)	30	30	30	30	30	30	30	30	30		
P+T Factors (CMHC only)	0	0	0	0	0	0	0	0	0		
Calculated Ground Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Considered Ground Attenuation, dB	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**		
Lp With Geometric Spreading & Gnd.Atten.	55.1	63.1	66.1	50.1	46.1	44.1	41.1	36.1	29.1	**68.2**	**52.7**
Yes Atmospheric Attenuation	....										
Consider atm.atten.of a Standard Day(Y or N)?	**Y**	Y	Y	Y	Y	Y	Y	Y	Y		
Atmospheric Attenuation, dB	**0.0**	**-0.1**	**-0.2**	**-0.4**	**-0.6**	**-1.4**	**-2.7**	**-6.9**	**-12.4**		
Sub-Total Propagation Attenuation,dB	-21.9	-22.0	-22.1	-22.3	-22.6	-23.3	-24.6	-28.8	-34.3		
Lp with Geom.Spreading,Gnd.&Atm.Atten.	55.1	63.0	65.9	49.7	45.4	42.7	38.4	29.2	16.7	**68.0**	**52.0**
Additional Adjustments (Watch +/- Signs)	....										
Tonal Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

Sub-Total Adjustments, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjusted Lp @ Receptor, dBL	**55.1**	**63.0**	**65.9**	**49.7**	**45.4**	**42.7**	**38.4**	**29.2**	**16.7**	**68.0**	**52.0**
Leq Time Base , Minutes	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0		
Line Source Data :	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
- Length of Line Segment, m	50	50	50	50	50	50	50	50	50		
- Source Speed, Km/Hr	20	20	20	20	20	20	20	20	20		
- No. of Movements in Time Base	67	67	67	67	67	67	67	67	67		
-Segment integration time, min.	10.05	10.05	10.05	10.05	10.05	10.05	10.05	10.05	10.05		
Linear Unattenuated Leq dBL	**47.3**	**55.2**	**58.1**	**41.9**	**37.7**	**34.9**	**30.6**	**21.4**	**8.9**	**60.2**	**44.2**
A-Weighted Unattenuated Leq dBA	7.9	29.0	42.0	33.3	34.5	34.9	31.8	22.4	7.8		
Noise Control Measures	....										
Sound Barrier(s) Case	**None**	None	None	None	None	None	None	None	None		
Is there a sound Barrier (Y or N) ?	N	N	N	N	N	N	N	N	N		
Source Sound Barrier 1........	Detail ...										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source-Barrier Distance	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Barrier Height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Barrier Gnd. Elev.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	285.0	285.0	285.0	285.0	285.0	285.0	285.0	285.0	285.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow		
Barrier Top Elevation	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Line-To-Point Source Barrier Adjust.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Result Sound Level (Barrier 1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**

Barrier 1 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Receptor Sound Barrier 2........	Detail ...										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source-Barrier Distance	#VALUE!	######	######	######	######	######	######	######	######		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...	Detail ...		
Barrier Height	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Barrier Gnd. Elev.	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	#VALUE!	######	######	######	######	######	######	######	######		
Barrier Top Elevation	21.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		
Line-To-Point Source Barrier Adjust.	#VALUE!	######	######	######	######	######	######	######	######		
Receiver Barrier Attenuation, dB	#VALUE!	######	######	######	######	######	######	######	######		
Sub-Result Sound Level (Barrier 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Barrier 2 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Barrier(s) Results											
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver Barrier Attenuation, dB	#VALUE!	######	######	######	######	######	######	######	######		
Additional Attenuation Of Double Barrier	#VALUE!	######	######	######	######	######	######	######	######		
Calculated Overall Double Barrier Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Do You Want to Limit The Barrier Reduction ?	0	0	0	0	0	0	0	0	0		
Maximum Allowed Barrier Reduction	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0		
Selected Reduction(s) Due to Barrier(s)	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***		
Resultant Sound Level With Barrier(s)	***47.3***	***55.2***	***58.1***	***41.9***	***37.7***	***34.9***	***30.6***	***21.4***	***8.9***	60.2	44.2
Barrier(s) Reduction (IL)	**0.0** dBL		**0.0** dBA								
Sound Level Adjust.(Watch +/- Signs)	....										
Note Re Removal of Tonal Penalty	-	-	-	-	-	-	-	-	-		
Removal of Tonal Penalty	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.1	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.2	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Reduction, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Linear Attenuated Leq dBL	**47.3**	**55.2**	**58.1**	**41.9**	**37.7**	**34.9**	**30.6**	**21.4**	**8.9**	**60.2**	**44.2**
A-Weighted Attenuated Leq dBA	7.9	29.0	42.0	33.3	34.5	34.9	31.8	22.4	7.8		
Source Unattenuated Leq dBA	44.2	**dBA**	**Source Attenuated Leq dBA**					44.2	**dBA**		

Modified N23- March 12, 2001

SS WILSON ASSOCIATES

STATIONARY NOISE CALCULATIONS

PROPOSED STEELES WEST TTC STATION

DATE PREPARED : NOVEMBER 28, 2005

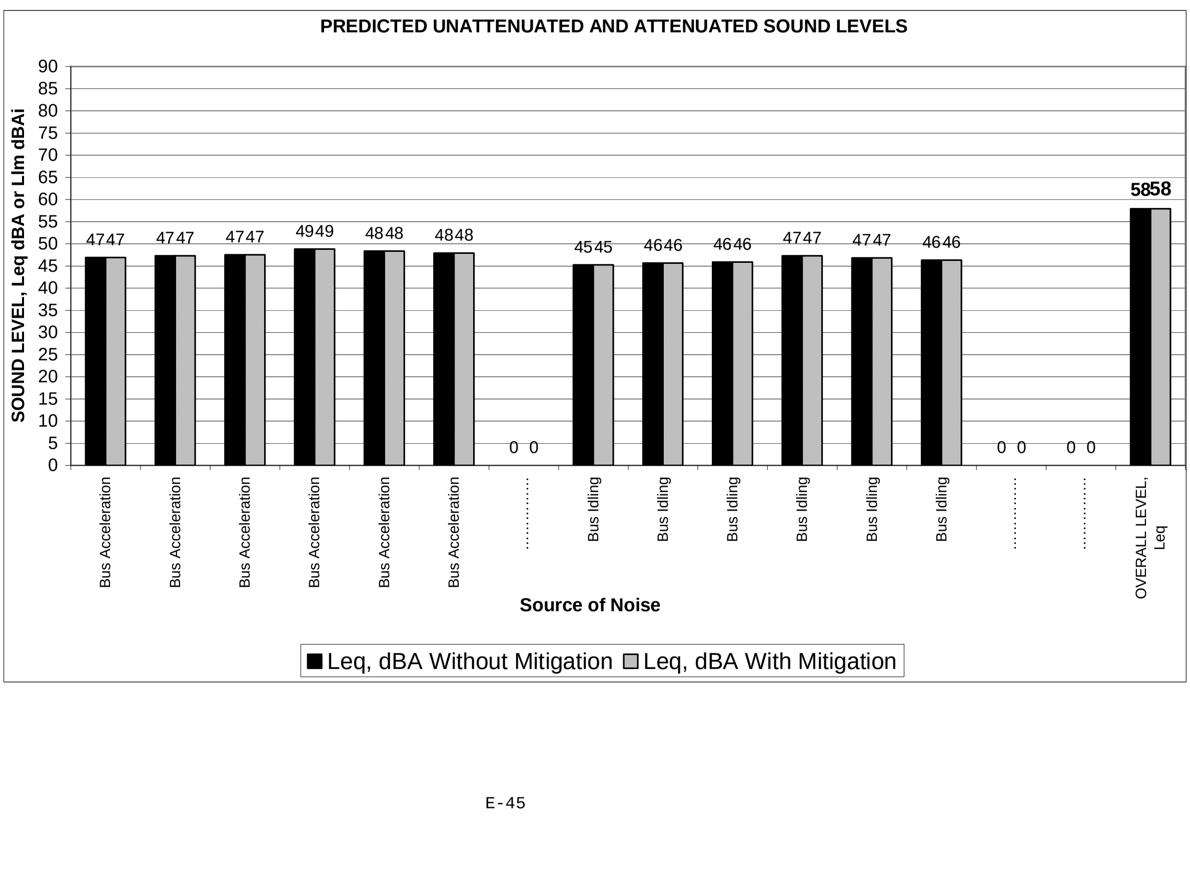
File Number : **WA04-104**

Project Name : **SPADINA SUBWAY EXTENSION, TORONTO**

Receptor Name : **POR 4 - COMMERCIAL BUILDING NORTH OF STEELES AVENUE**

Ground Elevation at Receptor,m	0.0
Receptor Height above ground, m	1.5
Receptor Xr Co-Ordinates, m	0.0
Receptor Yr Co-Ordinates, m	0.0
Model (1=none,2=CMHC,3=ISO)	1.0
Stationary Noise Type	G	**General (non-impulsive) Source**

SOURCE NAME	Leq, dBA Without Mitigation	Rank No.	Leq, dBA With Mitigation	Rank No.	Lp, dBA	Ref.Dist	Lp @15m	Notes
Bus Acceleration	47	7	47	7	75	24	79	....
Bus Acceleration	47	5	47	5	75	24	79	....
Bus Acceleration	47	4	47	4	75	24	79	....
Bus Acceleration	49	1	49	1	75	24	79	....
Bus Acceleration	48	2	48	2	75	24	79	....
Bus Acceleration	48	3	48	3	75	24	79	....
....	0	13	0	13	0	15	0	....
Bus Idling	45	12	45	12	71	15	71	....
Bus Idling	46	11	46	11	71	15	71	....
Bus Idling	46	10	46	10	71	15	71	....
Bus Idling	47	6	47	6	71	15	71	....
Bus Idling	47	8	47	8	71	15	71	....
Bus Idling	46	9	46	9	71	15	71	....
....	0	13	0	13	0	15	0	....
....	0	13	0	13	0	15	0	....
OVERALL LEVEL, Leq	**58**	**dBA**	**58**	**dBA**				



Modified N23- March 12, 2001

SS WILSON ASSOCIATES

STATIONARY NOISE CALCULATIONS
PROPOSED STEELES WEST YRT STATION

DATE PREPARED : NOVEMBER 28, 2005

File Number : **WA04-104**
Project Name : **SPADINA SUBWAY EXTENSION, TORONTO**
Receptor Name : **POR 4 - COMMERCIAL BUILDING NORTH OF STEELES AVENUE**

Ground Elevation at Receptor,m	0.0
Receptor Height above ground, m	1.5
Receptor Xr Co-Ordinates, m	0.0
Receptor Yr Co-Ordinates, m	0.0
Model (1=none,2=CMHC,3=ISO)	1.0
Stationary Noise Type	G

	General (non-impulsive) Source							
SOURCE NAME	Leq, dBA Without Mitigation	Rank No.	Leq, dBA With Mitigation	Rank No.	Lp, dBA	Ref.Dist	Lp @15m	Notes
Bus Acceleration	44	9	44	9	75	24	79	…………
Bus Acceleration	46	5	46	5	75	24	79	…………
Bus Acceleration	47	1	47	1	75	24	79	…………
Bus Acceleration	47	1	47	1	75	24	79	…………
Bus Acceleration	46	5	46	5	75	24	79	…………
Bus Acceleration	44	9	44	9	75	24	79	…………
……………	0	13	0	13	0	15	0	…………
Bus Idling	43	11	43	11	71	15	71	…………
Bus Idling	45	7	45	7	71	15	71	…………
Bus Idling	46	3	46	3	71	15	71	…………
Bus Idling	46	3	46	3	71	15	71	…………
Bus Idling	45	7	45	7	71	15	71	…………
Bus Idling	43	11	43	11	71	15	71	…………
……………	0	13	0	13	0	15	0	…………
……………	0	13	0	13	0	15	0	…………
OVERALL LEVEL, Leq	**56**	**dBA**	**56**	**dBA**