

**ENVIRONMENTAL NOISE AND VIBRATION
IMPACT STUDY**

“THE VANSITMART RESIDENTIAL DEVELOPMENT”

**Located at 121 Vansitmart Avenue
Hamilton ON**

Prepared for:

**1349010 Ontario Inc.
121 Vansitmart Avenue
Hamilton ON**

Prepared By:


**Frank Westaway, President
Since 1986 Acoustical Consultant**

Revised June 2017

Our File No: 2017-1029

**dba Acoustical Consultants Inc.
76 Chamomile Dr.,
Hamilton, ON
L8W 0C1**

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CN/GO Traffic Data

Email Adam Snow- GO Trains

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NPC-300 Stationary Noise Limit Tables

1.0 INTRODUCTION

dBA Acoustical Consultants Inc. has conducted a noise and vibration impact study for the proposed residential development on behalf of 1349010 Ontario Inc. known as “The Vansitmart Residential Development” located at 121 Vansitmart Ave Hamilton ON. The purpose of the noise and vibration study is to determine the noise and vibration impact for draft plan approval of the nearby Canadian National Railway (CN) Grimsby Subdivision Principal Rail Line, and the CN Railway yard, Hamilton ON.

Vehicular traffic from area roadways are not considered in this report due to low traffic volumes and distance separation from the proposed site. This study will detail noise and vibration impacts at the proposed development and recommend noise and vibration control measures necessary (if applicable) to meet MOE Publication 300, Stationary & Transportation Sources-Approval & Planning and CN guidelines, while satisfying the planning requirements of the City of Hamilton. Stationary noise from Dofasco is also addressed in this report.

2.0 SITE DESCRIPTION

Proposed are (4) four Blocks of Back-to-Back Townhouses, (41) totaling 41 residential units. Immediately north at 30m is the Canadian National Railway Grimsby Subdivision (CN) right of way and further to the north is Dofasco Industry. Dofasco Industry noise is completely contained within the building as is regulated by the MOE noise guidelines under a Certificate of Approval (Air & Noise). The closest CN Rail Metal Distribution tracks is located approximately 75 metres to the north of the front façade of the nearest residential unit. (See Figure 1 Key Plan).

Noise monitoring by dBA staff were able to obtain noise levels created by switching of train traffic on the property of CN Rail with permission and calculated the noise levels at the residential receptors for day and nighttime hours. Key Plan is attached as Figure 1. The site is situated within established 1 & 2.5 storey residential properties to the east, west and south of the proposed site. City of Hamilton prohibits train whistles throughout the City. Train whistles are not considered a noise issue due to extensive distance separation and shielding by existing residential homes and commercial properties. Ottawa Street North is located approximately 1.7km from the site and Kenilworth Ave is located approximately 422m from the site and both are not considered in this report for traffic data due to extensive distance separation and shielding from existing residential dwellings.

The CN Grimsby Subdivision Principal rail line consists of two tracks located approximately 15.24 metres parallel to the north property line of the proposed development. (See Figure 2 Site Plan) The CN Works yard consists of 10 tracks. The CN top of rail track is considered at grade level of the proposed development.

3.0 NOISE IMPACT ASSESSMENT

3.1 NOISE CRITERIA

The Ministry of Environment (MOE) specifies limits for road and rail noise relative to new residential developments. The MOE Publication 300, Stationary & Transportation Sources-Approval & Planning, specifies the criteria, summarized as follows:

TABLE 1 Rail Traffic Sound Levels Limits	
Time Period	Leq (dBA)
07:00 – 23:00 (16 hr.)	55 Outdoor Living area
23:00 – 07:00 (8 hr.)	50 Plane of Bedroom window

The OLA refers to an outdoor patio, a backyard, a terrace or other area where outdoor passive recreation is expected to occur on the residential property. As this is considered a daytime use (07:00 - 23:00) noise levels are calculated at the upper storey bedroom window to represent nighttime (23:00 - 07:00) periods.

Where noise levels estimated in the Outdoor Living Area (OLA) and at an upper storey window are equal to or less than the values listed in Table 1, no noise control measures are required. CN also publishes specific requirements for land use development next to their principle main line tracks (attached in Appendix “A”). The MOE and CN noise criteria are the same.

Where noise levels exceed Table 1 values, the following action is required:

Time Period	Noise Level Leq (dBA)	Action Required
07:00 - 23:00 Daytime (OLA)	55 to 60	Barrier or Warning Clause Type “A”
07:00 - 23:00 Daytime (OLA)	> 60	Barrier & Warning Clause Type “B”
07:00 – 23:00 Daytime (POW)	>55	Provision for A/C, Warning Clause “C”
07:00 – 23:00 Daytime (POW)	>65	Central A/C, Warning Clause “D”
07:00 – 23:00 Daytime (POW)	>65	Building Component Specification
23:00 to 07:00 Nighttime (POW)	> 50-60	Provision for A/C and Warning Clause Type “C”
23:00 to 07:00 Nighttime (POW)	> 60 > 60	Building Component Specification Central Air Conditioning and Warning Clause Type “D”

Where nighttime noise levels exceed 60 dBA, building components must be designed to meet the following Table 3 indoor sound level limits.

Indoor Location	Leq(dBA)	
	Road	Rail
Living/Dining 7:00 – 23:00	N/A	40
Bedroom 23:00 - 07:00	N/A	35

The values in Table 3 take into account the low frequency characteristic of train noise, important for designing acoustically better architectural components.

3.2 RAIL NOISE

Train traffic data dated May 25, 2016 obtained from CN (see Appendix “A”), was used to carry out prediction calculations using the MOE “Stamson, Version 5.4” computer program. GO trains were calculated as an assumption as Adam Snow was unable to confirm GO train traffic data at the report time. 20 Go trains per day and 10 per night have been added. Once GO train traffic is confirmed an Addendum will be supplied. The data is summarized in Table 4.

The CN Rail tracks are located north approximately 45.35m from the nearest façade running east to west of the site. The daily tracks for freight and Via passenger trains utilize the first two tracks located immediately north of the development. All other tracks are utilized by the CN Metal Distribution Center located on Parkdale Ave North. The two tracks are welded and most of, many of the tracks are shielded by existing 1 and 2.5 storey houses to the east and west of the development. Site Plan is attached as Figure 1. The residential area of the development has no noise control measures such as noise barriers or high earth berms or safety berms.

Type	Freight	Passenger/GO
Number of Trains 07:00 - 23:00	4	22
23:00 - 07:00	0	10
Number of Cars per Train	140	10
Number of Locomotives per Train	4	2
Maximum Train Speed (Km/H)	97 km	145 km

Calculations were performed for both daytime and nighttime periods. Receiver heights of 2.0m for first floor and 7.5m for third floor were used. An annual growth factor of 2.5% per annum was projected over 11 years.

Stamson calculation printouts are attached in Appendix “B”. The equivalent free field sound levels (L_{eq}) due to train noise were calculated for locations adjacent to the west and east building facade for proposed units which are representative of worst case noise impact and are summarized in Table 5. (See Figure 3 Receptor Locations).

Location from CN Rail	L_{eq} (dBA)	
	07:00 - 23:00	23:00 - 07:00
R1- Front Façade 1 st Floor (30m)	67 (2.0m)	65 (2.0m)
R1- Front Façade 3 rd Floor (30m)	68 (7.5m)	65 (7.5m)
R2- Side Facade 1 st Floor (40m)	59 (2.0m)	57 (2.0m)
R2- Side Facade 3 rd Floor (40m)	60 (7.5m)	57 (7.5m)

3.3 ROAD NOISE

Ottawa Street North is located approximately 1.7km from the site and Kenilworth Ave is located approximately 422m from the site and both are not considered in this report for traffic data due to extensive distance separation and shielding from existing residential dwellings.

4.0 RECOMMENDATIONS - NOISE CONTROL

4.1 OUTDOOR LIVING AREAS

Calculated rail noise levels exceed the 55 dBA criteria outlined in Table 1 for outdoor amenity space. The draft plan for the proposed development does not include any outdoor living areas. Mitigation to reduce outdoor noise levels is not required. The addition of a 5.5m high noise barrier combination would be rather an eye sore for the abutting existing residential properties. As the noise barrier is utilized for outdoor amenity spaces the need for a noise barrier is not required. In the past CN has allowed a small esthetic wooden fence to be installed on top of the 2.5m safety berm. Consideration for an esthetic wooden fence would be more pleasing to the neighbours. In addition to any recommended physical controls, specifically worded warning clauses are mandatory.

As this development is directly abutting the CN Rail, there is a requirement for the 2.5m berm safety barrier between the CN Rail and the proposed development to be constructed or an alternative (crash wall) as designed by Joblonsky, Ast and Partners and approved by CN Rail and the City of Hamilton.

4.2 INDOOR NOISE LEVELS

Specific building components (walls, windows etc.) must be designed and constructed to achieve indoor sound levels within the noise criteria. Predicted noise levels at the outside facade of specific Blocks were used to determine the appropriate building components to satisfy MOE indoor sound level limits. The building components were specified using the STC (Sound Transmission Class) method.

A 5-dB correction to account for the low frequency characteristic of the locomotive noise was added to the predicted levels before calculating the STC values. Building design specifications were not available at report time, therefore, STC calculations summarized in Table 7 following with minimum window, door, and wall construction specified for specific dwellings. Assessment was conservative from a noise impact perspective with worst-case design options modeled to satisfy MOE requirements for indoor sound levels. The draft STC value was calculated for each room type, based on typical window to floor ratios of 20% for bedrooms and 30% for living areas. Wall to floor ratio was factored at 100%. A maximum of two components were factored per room. Should final building designs include greater window and wall to floor ratios, current STC values calculations may not satisfy the criteria for noise reduction.

TABLE 7 –Door and Window Construction Requirements			
LOCATION	STC To Be Achieved	Door Construction	Window Glazing Example
R 1- Front of Block 1st Floor			
Bedrooms	38	D5-sd	3mm (80mm) 3mm
Living rooms	36	D5-sd	3mm (80 mm) 3mm
R1 – Front of Block 3rd Floor			
Bedroom	38	D5-sd	3mm (80mm) 3mm
Living room	36	D5-sd	3mm (80mm) 3mm
R2 – Side of Block 1st Floor			
Bedroom	36	D3-sd	3mm (80mm) 3mm
Living room	34	D3-sd	3mm (63mm) 3mm
R2 – Front of Block 3rd Floor			
Bedroom	36	D3-sd	3mm (80mm) 3mm
Living room	34	D3-sd	3mm (63mm) 3mm
All Other Residential Units			
Bedroom	28		3mm (40mm) 3mm
Living room	25	OBC	3mm (20mm) 3mm

* Double pane windows - first number denotes glass thickness, followed by spacing, and thickness of second pane, OBC denotes minimum requirements of the Ontario Building Code will suffice. Recommendations assume windows are well-fitted, weather-stripped units that can be opened.

STC calculations for exterior wall construction indicate a maximum requirement of EW5 construction or acoustically tested masonry equivalent for the first Block to the south of the CN Rail. Table 8 presents wall construction requirement.

TABLE 8 – Exterior Wall Construction	
Location	Wall Type
R1 & R2	EW-5 Brick Veneer or Acoustically Tested Masonry Equivalent

4.3 VENTILATION / WARNING CLAUSES

In addition to the inclusion of the specified minimum building components, specific locations will require central air conditioning with Type “B”, and “D” warning clauses. Central air is considered throughout the development. It is recommended that the appropriate warning clauses be inserted into all Offers and Agreements of Purchase and Sale or Lease. See the following for specific warning clause wording:

TYPE B: (R1 & R2)

“Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the buildings units, sound levels due to increasing rail traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality’s and the Ministry of the Environment’s noise criteria.”

TYPE D: (R1 & R2)

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

5.0 VIBRATION IMPACT ASSESSMENT

5.1 CRITERIA

The CNR criterion for vibration next to principal main line tracks is included in Appendix “A”. Specifically, ground borne vibration transmission is to be estimated through site testing and evaluation. The MOE proposes train vibration limits based on a minimum of three measurements the maximum of which is not to exceed the threshold of perception. CNR specifies this limit to be 0.14 mm/s RMS velocity at frequencies between 4 hz and 200 hz. An RMS velocity of 0.2 mm/s is considered to be a significant problem.

5.2 MEASUREMENT

5.2.1 PROCEDURE

MOE proposed recommendations require measurement of the RMS velocity, along the line of the proposed building structure closest to the railway track. A White model 2840 seismograph was used to measure the RMS velocity of the train vibration during the passing of four trains over a period of two days.

The instrument was shake table calibrated and is capable of measuring velocity between 2 hz and 250 hz with an RMS averaging constant of one second on three separate axis. The unit was partially buried, coupled to the ground using spikes, and situated at the north facade of the proposed structure for the building at 30 meters from the CNR property line. Freight train and passenger movements were monitored.

5.2.2 RESULTS

Table 9 following summarize train data and vibration results measured in the vertical direction:

TABLE 9 - Vibration Results – 30m						
Date	Time	Type	Maximum Speed	No. of Locomotives	No. of Cars	RMS Velocity (mm/s)
April 4, 2017	9:15	Passenger	90 kph	1	5	0.11
April 4, 2017	14:45	Freight	80 kph	3	114	0.16
April 6, 2017	17:26	Passenger	90 kph	1	5	0.14
April 6, 2017	13:58	Freight	80 kph	3	129	0.14

5.3 RECOMMENDATIONS – VIBRATION

The maximum measured RMS value during the site testing reached 0.16 mm/s, exceeding the 0.14 mm/s criteria. Vibration mitigation measures are required to reduce impact from ground borne vibration. Isolation pads, vibration absorptive material, or vibration dampening material applied to the north, east and west side of R1 foundation walls or to manufactures specifications to the footings must be applied. As well as vibration control measures, CNR requires the following warning clause be inserted into all Offers and Agreements of Purchase and Sale or Lease throughout the development:

“Warning: Canadian National Railway Company or its assigns or successors in interest have a rights-of-way within 300m from the land the subject hereof. There may be alterations to, or expansions of, the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way.”

6.0 STATIONARY NOISE ASSESSMENT CRITERIA

6.1 REGULATORY CONTEXT

Dofasco company operation building which is located at approximately 145m to the north of the proposed development and CN Rail, are classified as “*stationary noise sources*”. The areas of Dofasco surrounding the proposed building are indicative of a “Class 3 Area” as defined in MOE Publication NPC-300 Stationary & Transportation Sources-Approval & Planning guidelines. Dofasco is regulated by the MOE and has numerous noise control Certificates of Approval for this location that prohibits noise from the plant to exceed the MOE NPC-300 Stationary & Transportation Sources-Approval & Planning guidelines. Several site visits to the proposed development confirm that noise is not an issue from Dofasco.

6.2 CN WORKS YARD (Class 3)

The CN Metals Distribution Center facility is located on Parkdale Ave N., Hamilton at approximately 550m from the proposed development. The works yard has an area for trains to shunt and load and unload cars to be delivered later. This area consists of 10 tracks capable of utilizing several rail cars at a time. dBA staff spoke to the management in the Distribution Center and was permitted to acquire noise levels from the shunting activities and was informed that the afternoon hours from 1:00pm-3:00pm is the most active times daily however they do shunting at nighttime hours also. Nighttime hours noise levels are considered in this report.

7.0 NOISE MONITORING PROCEDURE

Sound level measurements were carried outside near the railway tracks on May 26, 2017. dBA Acoustical Consultants Inc. staff conducted noise monitoring using Larson Davis Model 820 sound level meter. Calibration was verified before and after use with a Larson Davis model CA250 acoustic calibrator, serial number 0495. The sound monitor was equipped with a tripod and wind screen. Meteorological conditions were ideal for sound level monitoring. All monitoring was conducted in accordance with MOE Publication NPC-103 entitled "Procedures". Noise levels were measured to be representative of worst-case scenario. Noise readings were measured from which the impulsive sound levels. (dBAI) is representative of the one-hour average sound level.

8.0 IMPULSIVE SOUND – Outdoors and Plane of Window

For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source, the sound level limit at a point of reception expressed in terms of the Logarithmic Mean Impulse Sound Level (LLM) is the higher of the applicable exclusion limit value given in Table 10A or Table 10B noted below, or the background sound level for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours). Sound level limits apply during the nighttime period (23:00 – 07:00) for the plane of the window of a noise sensitive space. In general, the outdoor points of reception will be protected during the nighttime as a consequence of meeting the sound level limits at the adjacent plane of window of noise sensitive spaces.

**TABLE 10A- Exclusion Limit Values for Impulsive Sound Level (LLM, dBAI)
Outdoor Points of Reception**

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

**TABLE 10B- Exclusion Limit Values for Impulsive Sound Level (LLM, dBAI)
Plane of Window-Noise Sensitive Spaces (Day/Night)**

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

As a result of the recorded noise monitoring of shunting impulses being only 1 impulse in a one-hour time period the sound level at the receptor exclusion limit value is 75 day time and 70 nighttime. Calculated impulse noise levels of the highest level recorded of 80 dBAI at a distance of 20m is as follows: $80 \div 20 = 4$ ($\log_x 20$) = -12 = 80 dBAI - 12 dBAI = 68 dBAI. Therefore, 1-3 impulses per hour are permitted in a Class 3 Area for daytime and nighttime noise levels to be achieved. For all other Blocks throughout the development shielding from proposed Blocks and existing residential homes to the east and west will reduce any noise from the rain traffic and impulse noise from the shunting yard therefore; no noise mitigation measures are required for those Blocks.

9.0 NOISE MONITORING RESULTS

Noise monitoring was conducted on May 26, 2017 between the hours of 10:00am-4:00pm. Please note that several times dBA staff attended on a daily basis and shutting activities did not occur during the times management of CN stated as they did say it was not every day. The noise level monitoring results are noted in the following Table 11. The noise levels recorded only occurred once or twice in a one-hour period.

The train shunting yard is also partially shielded by existing residential properties on local streets to the immediate east and west of the proposed development. The proposed development is setback approximately 75m from the nearest rail track for shunting activities with several tracks of rail cars blocking the sound of shunting. Shunting noise monitoring was conducted in the free field with no rail cars shielding the impulsive noise. Results are presented in Table 11 following.

Time of Trains	Activity	dBAI
May 26, 2017 at 10:35am	Eastbound train 3 locos, 19 cars, shunted twice cars into yard. 20m from train	79 dBAI 80 dBAI
May 26, 2017 at 11:30am	Westbound train, 3 locos, 1 car and picked up 6 cars then left yard. 75m from train	67 dBAI 69 dBAI
May 26, 2017 at 12:00noon	Westbound train, 3 locos, 3 cars, picked up 6 cars left at west end. 60m from train	67 dBAI 69 dBAI

10.0 SUMMARY OF RECOMMENDATIONS

The following noise control measures or equivalent are required to satisfy the indoor and outdoors noise level criterion:

- Specific double-glazed windows for living rooms and bedrooms (Table 7).
- R1 Central Air Conditioning (Section 4.3).
- All other Blocks require Provisions for Central Air.
- R1 Vibration control measures applied.
- R1 & R2 Registered warning clauses on title (Section 4.3).
- Brick Veneer or Masonry Equivalent for the entire building (R1 & R2).
- All other Blocks require OBC building components.

It is recommended that a qualified acoustical consultant certify that the required noise control measures have been incorporated into the builder's plans prior to issuance of a building permit. Prior to issuance of an occupancy permit, it is recommended the qualified acoustical consultant certify that the approved noise control measures have been properly installed.

11.0 CONCLUSIONS

dBA Acoustical Consultants Inc. has provided a noise and vibration impact study for the proposed residential development on behalf of 1349010 Ontario Inc. known as “The Vansitmart Residential Development” located at 121 Vansitmart Ave Hamilton ON. The purpose of the noise and vibration study determined the noise and vibration impact for draft plan approval of the nearby Canadian National Railway (CN) Grimsby Subdivision Principal Rail Line, and the CN Railway Metal Distribution Center yard, Hamilton ON. Stationary noise from the area Dofasco facility was addressed in the report and has no noise impact on the proposed development.

Vehicular traffic from area roadways are not considered in this report due to low traffic volumes and distance separation from the proposed site. This study detailed noise and vibration impacts at the proposed development and recommended noise and vibration control measures necessary to meet MOE Publication 300, Stationary & Transportation Sources-Approval & Planning and CN guidelines, while satisfying the planning requirements of the City of Hamilton.

For all other Blocks throughout the development shielding from proposed Blocks and existing residential homes to the east and west will reduce any noise from the rain traffic and impulse noise from the shunting yard therefore; no noise mitigation measures are required for those Blocks.

FIGURE 1
KEY PLAN

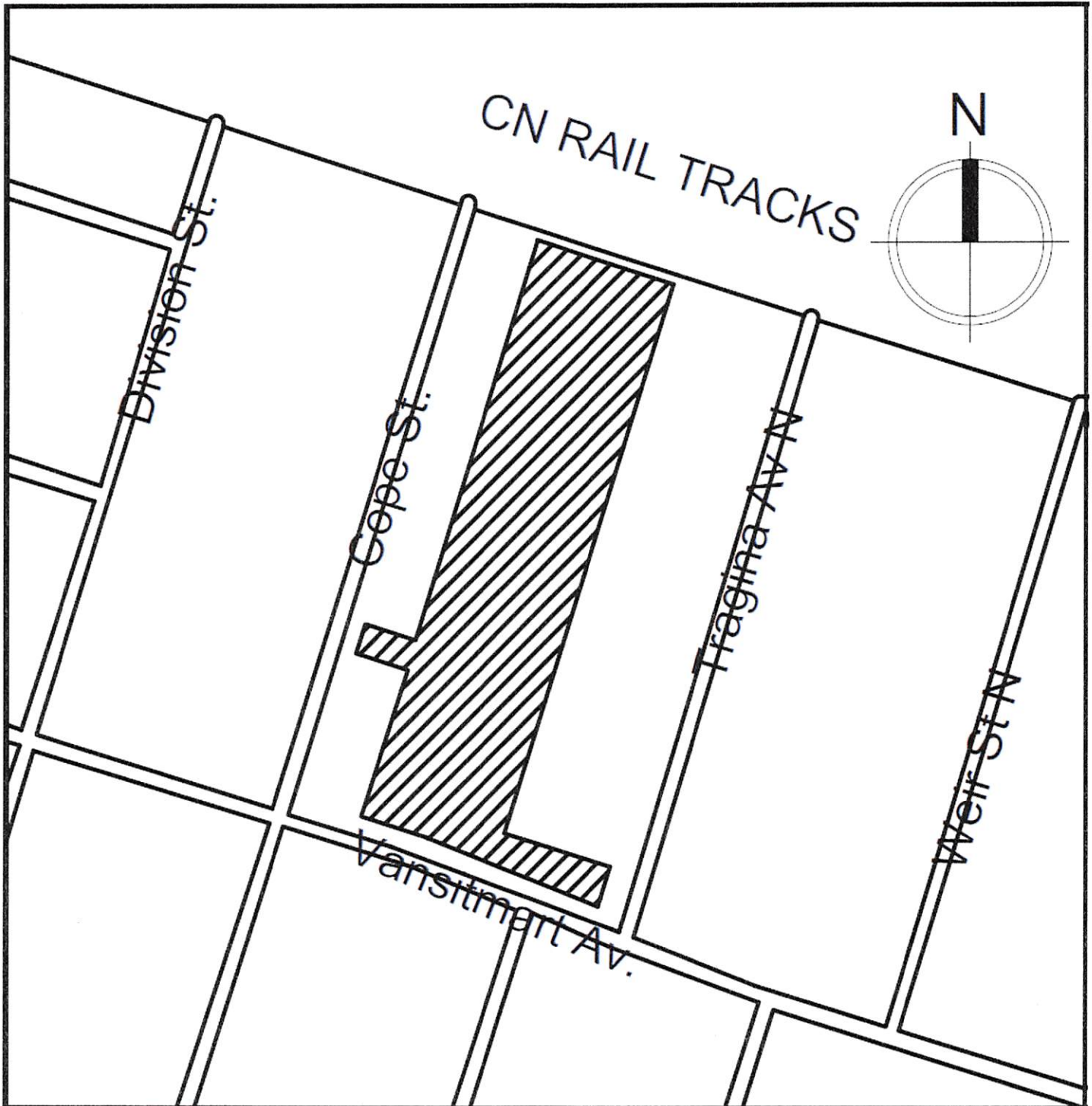
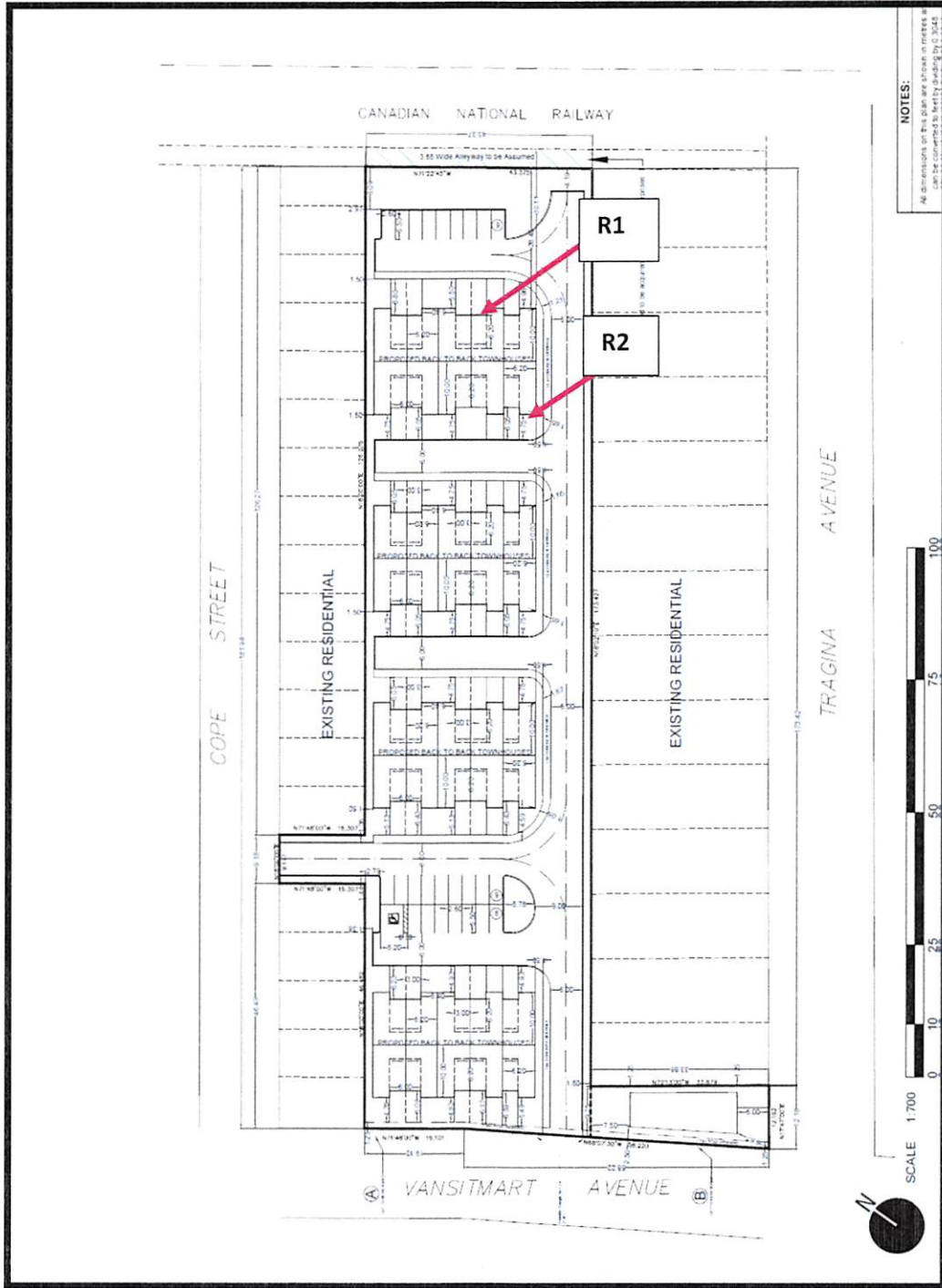


FIGURE 3 RECEPTOR LOCATIONS



APPENDIX "A"



Railway Properties

1 Administration Rd
Concord, ON L4K 1B9
Telephone: 514-399-7627
Fax: 514-399-4296

PRINCIPAL MAIN LINE REQUIREMENTS

- A. Safety setback of habitable buildings from the railway rights-of-way to be a minimum of 30 metres in conjunction with a safety berm. The safety berm shall be adjoining and parallel to the railway rights-of-way with returns at the ends, 2.5 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.
 - B. The Owner shall engage a consultant to undertake an analysis of noise. At a minimum, a noise attenuation barrier shall be adjoining and parallel to the railway rights-of-way, having returns at the ends, and a minimum total height of 5.5 metres above top-of-rail. Acoustic fence to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre of surface area. Subject to the review of the noise report, the Railway may consider other measures recommended by an approved Noise Consultant.
 - C. Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec RMS between 4 Hz and 200 Hz. The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, ± 3 dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.
 - D. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.
 - E. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way: "Warning: Canadian National Railway Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way."
 - F. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the Railway and be substantiated by a drainage report to the satisfaction of the Railway.
 - G. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the safety berm, fencing and vibration isolation measures implemented are not to be tampered with or altered and further that the Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of CN.
 - H. The Owner shall enter into an Agreement with CN stipulating how CN's concerns will be resolved and will pay CN's reasonable costs in preparing and negotiating the agreement.
 - I. The Owner shall be required to grant CN an environmental easement for operational noise and vibration emissions, registered against the subject property in favour of CN.
-



Train Count Data

4 Welding Way
off Administration Road
P.O. Box 1000
Concord, ON, L4K 1B9
T: 905.669.3264
F: 905.760.3406

TRANSMITTAL

To: **dba Environmental Services Inc.** Project: **GRM-40.48 – Kenilworth Ave, Hamilton, ON**
Destinataire: 625 Greenhill Ave Unit 3,
Hamilton ON
L8K 5W9

Att'n: **Frank Westaway** Routing: **frank@dbaservices.ca**
From: **Stefan Linder** Date: **May 25th, 2016**
Expéditeur: date:

Cc: **Raymond Beshro CN via e-mail**

Urgent For Your Use For Review For Your Information Confidential

Re: Train Traffic Data – CN Grimsby Subdivision near Kenilworth Ave in Hamilton, ON

Please find attached the requested Train Traffic Data; this data does not reflect GO Metrolinx Traffic. The application fee in the amount of **\$500.00 +HST** will be invoiced.

Should you have any questions, please do not hesitate to contact the undersigned at 905-669-3264.

Sincerely,
CN Design & Construction

Stefan Linder, B.Eng., MBA
Manager Public Works
stefan.linder@cn.ca

Date: 2016/05/25

Project Number: GRM-40.48 – Kenilworth Ave, Hamilton, ON

Dear Frank:

Re: Train Traffic Data – CN Grimsby Subdivision near Wellington Road in Hamilton, ON

The following is provided in response to Frank's request for information regarding rail traffic in the vicinity of Kenilworth Ave in Hamilton at approximately Mile 40.48 on CN's Grimsby Subdivision.

Typical daily traffic volumes are recorded below. However, traffic volumes may fluctuate due to overall economic conditions, varying traffic demands, weather conditions, track maintenance programs, statutory holidays and traffic detours that when required may be heavy although temporary. For the purpose of noise and vibration reports, train volumes must be escalated by 2.5% per annum for a 10-year period.

Typical daily traffic volumes at this site location are as follows:

*Maximum train speed is given in Miles per Hour

	0700-2300			
Type of Train	Volumes	Max. Consist	Max. Speed	Max. Power
Freight	4	140	60	4
Way Freight	0	25	60	4
Passenger	2	10	95	2

	2300-0700			
Type of Train	Volumes	Max. Consist	Max. Speed	Max. Power
Freight	0	140	60	4
Way Freight	0	25	60	4
Passenger	0	10	95	2

The volumes recorded reflect westbound and eastbound freight and passenger operations on CN's Grimsby Subdivision.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There is 2 at-grade crossing in the immediate vicinity of the study area at Mile 39.50 (Parkdale Ave), and at Mile 41.02 (Ottawa Street). Please note that engine warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

With respect to equipment restrictions, the gross weight of the heaviest permissible car is 286,000 lbs.

The double mainline track is considered to be continuously welded rail throughout the study area. The presence of 1 switch located at Mile 40.99 may exacerbate the noise and vibration caused by train movements.

The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and

environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, Mr. Raymond Beshro, Canadian National Railway Properties at 514-399-7627 should be contacted directly.

I trust the above information will satisfy your current request.

Sincerely,



Stefan Linder B. Eng., MBA
Manager Public Works, Eastern Region
Stefan.linder@cn.ca

cc. Raymond Beshro – CN – via e-mail

frank@dbaservices.ca

From: Adam Snow <Adam.Snow@metrolinx.com>
Sent: May 25, 2017 10:46 AM
To: 'frank'; 'Matt Johnston, MCIP, RPP'
Subject: RE: Train traffic data.....

Hi Frank - MLX Planning has put a hold on distribution of data for noise studies as forecast information is being updated. I have been promised that the new information will be available shortly...I will contact you when it becomes available.

Adam

From: frank [mailto:frank@dbaservices.ca]
Sent: May-24-17 5:06 PM
To: Adam Snow; Matt Johnston, MCIP, RPP
Subject: Train traffic data.....

Hi Adam..... I'm under the gun for completing the noise study for Vansimart Ave Hamilton. Can you advise when I could anticipate the GO train traffic data please. Thank you. Frank Westaway, Owner dBA Acoustical Consultants Inc. 905-741-7623.

Sent from my Bell Samsung device over Canada's largest network.

This e-mail is intended only for the person or entity to which it is addressed. If you received this in error, please contact the sender and delete all copies of the e-mail together with any attachments.

Rail data, segment # 3: Passenger (day/night)

```

-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type          !           ! (km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1. Passenger !   2.0/0.0   ! 145.0 !  2.0 ! 10.0 !Diesel! Yes
  
```

Data for Segment # 3: Passenger (day/night)

```

-----
Angle1  Angle2      : -45.00 deg   45.00 deg
Wood depth      :           0   (No woods.)
No of house rows :           0 / 0
Surface         :           1   (Absorptive ground surface)
Receiver source distance : 34.00 / 34.00 m
Receiver height :           2.00 / 2.00 m
Topography      :           1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle :           0.00
  
```

Train # 1: Freight, Segment # 1: Freight (day)

LOCOMOTIVE (0.00 + 62.36 + 0.00) = 62.36 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -45   45   0.57  71.21  -5.58  -3.28   0.00   0.00   0.00  62.36
  
```

WHEEL (0.00 + 55.58 + 0.00) = 55.58 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -45   45   0.66  64.80  -5.90  -3.32   0.00   0.00   0.00  55.58
  
```

Segment Leq : 63.19 dBA

Train # 1: Go Trains, Segment # 2: GO Trains (day)

LOCOMOTIVE (0.00 + 64.23 + 0.00) = 64.23 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -45   45   0.57  73.08  -5.58  -3.28   0.00   0.00   0.00  64.23
  
```

WHEEL (0.00 + 54.55 + 0.00) = 54.55 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -45   45   0.66  63.77  -5.90  -3.32   0.00   0.00   0.00  54.55
  
```

Segment Leq : 64.67 dBA

Train # 1: Passenger, Segment # 3: Passenger (day)

LOCOMOTIVE (0.00 + 53.05 + 0.00) = 53.05 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.57	61.91	-5.58	-3.28	0.00	0.00	0.00	53.05

WHEEL (0.00 + 43.38 + 0.00) = 43.38 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.66	52.60	-5.90	-3.32	0.00	0.00	0.00	43.38

Segment Leq : 53.49 dBA

Total Leq All Segments: 67.19 dBA

Train # 1: Freight, Segment # 1: Freight (night)

LOCOMOTIVE (0.00 + -8.86 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.57	0.00	-5.58	-3.28	0.00	0.00	0.00	-8.86

WHEEL (0.00 + -9.22 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.66	0.00	-5.90	-3.32	0.00	0.00	0.00	-9.22

Segment Leq : 0.00 dBA

Train # 1: Go Trains, Segment # 2: GO Trains (night)

LOCOMOTIVE (0.00 + 64.23 + 0.00) = 64.23 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.57	73.08	-5.58	-3.28	0.00	0.00	0.00	64.23

WHEEL (0.00 + 54.55 + 0.00) = 54.55 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.66	63.77	-5.90	-3.32	0.00	0.00	0.00	54.55

Segment Leq : 64.67 dBA

Train # 1: Passenger, Segment # 3: Passenger (night)

LOCOMOTIVE (0.00 + -8.86 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-45	45	0.57	0.00	-5.58	-3.28	0.00	0.00	0.00	-8.86
-----	----	------	------	-------	-------	------	------	------	-------

WHEEL (0.00 + -9.22 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-45	45	0.66	0.00	-5.90	-3.32	0.00	0.00	0.00	-9.22
-----	----	------	------	-------	-------	------	------	------	-------

Segment Leq : 0.00 dBA

Total Leq All Segments: 64.67 dBA

Rail data, segment # 3: Passenger (day/night)

```

-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type          !              ! (km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1. Passenger !   2.0/0.0   ! 145.0 !  2.0 ! 10.0 !Diesel! Yes
  
```

Data for Segment # 3: Passenger (day/night)

```

-----
Angle1  Angle2      : -45.00 deg   45.00 deg
Wood depth      :           0   (No woods.)
No of house rows :           0 / 0
Surface         :           1   (Absorptive ground surface)
Receiver source distance : 34.00 / 34.00 m
Receiver height :    7.50 / 7.50 m
Topography     :           1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle :    0.00
  
```

Train # 1: Freight, Segment # 1: Freight (day)

LOCOMOTIVE (0.00 + 63.02 + 0.00) = 63.02 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -45   45   0.41  71.21  -4.99  -3.20   0.00   0.00   0.00  63.02
  
```

WHEEL (0.00 + 56.18 + 0.00) = 56.18 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -45   45   0.51  64.80  -5.37  -3.25   0.00   0.00   0.00  56.18
  
```

Segment Leq : 63.84 dBA

Train # 1: Go Trains, Segment # 2: GO Trains (day)

LOCOMOTIVE (0.00 + 64.89 + 0.00) = 64.89 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -45   45   0.41  73.08  -4.99  -3.20   0.00   0.00   0.00  64.89
  
```

WHEEL (0.00 + 55.15 + 0.00) = 55.15 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -45   45   0.51  63.77  -5.37  -3.25   0.00   0.00   0.00  55.15
  
```

Segment Leq : 65.33 dBA

Train # 1: Passenger, Segment # 3: Passenger (day)

LOCOMOTIVE (0.00 + 53.72 + 0.00) = 53.72 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.41	61.91	-4.99	-3.20	0.00	0.00	0.00	53.72

WHEEL (0.00 + 43.98 + 0.00) = 43.98 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.51	52.60	-5.37	-3.25	0.00	0.00	0.00	43.98

Segment Leq : 54.16 dBA

Total Leq All Segments: 67.85 dBA

Train # 1: Freight, Segment # 1: Freight (night)

LOCOMOTIVE (0.00 + -8.19 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.41	0.00	-4.99	-3.20	0.00	0.00	0.00	-8.19

WHEEL (0.00 + -8.61 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.51	0.00	-5.37	-3.25	0.00	0.00	0.00	-8.61

Segment Leq : 0.00 dBA

Train # 1: Go Trains, Segment # 2: GO Trains (night)

LOCOMOTIVE (0.00 + 64.89 + 0.00) = 64.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.41	73.08	-4.99	-3.20	0.00	0.00	0.00	64.89

WHEEL (0.00 + 55.15 + 0.00) = 55.15 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.51	63.77	-5.37	-3.25	0.00	0.00	0.00	55.15

Segment Leq : 65.33 dBA

Train # 1: Passenger, Segment # 3: Passenger (night)

LOCOMOTIVE (0.00 + -8.19 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.41	0.00	-4.99	-3.20	0.00	0.00	0.00	-8.19

WHEEL (0.00 + -8.61 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.51	0.00	-5.37	-3.25	0.00	0.00	0.00	-8.61

Segment Leq : 0.00 dBA

Total Leq All Segments: 65.33 dBA

Rail data, segment # 3: Passenger (day/night)

Train Type	! Trains	! Speed !	!# loc !	!# Cars!	Eng !	Cont !
	!	!(km/h) !	!/Train!	/Train!	type !	weld !
1. Passenger	2.0/0.0	145.0	2.0	10.0	Diesel	Yes

Data for Segment # 3: Passenger (day/night)

Angle1	Angle2	:	-0.00 deg	20.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	44.00 / 44.00	m	
Receiver height	:	2.00 / 2.00	m	
Topography	:	1	(Flat/gentle slope; no barrier)	
No Whistle				
Reference angle	:	0.00		

Train # 1: Freight, Segment # 1: Freight (day)

LOCOMOTIVE (0.00 + 54.28 + 0.00) = 54.28 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.57	71.21	-7.34	-9.59	0.00	0.00	0.00	54.28

WHEEL (0.00 + 47.44 + 0.00) = 47.44 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.66	64.80	-7.76	-9.60	0.00	0.00	0.00	47.44

Segment Leq : 55.10 dBA

Train # 1: Go Trains, Segment # 2: GO Trains (day)

LOCOMOTIVE (0.00 + 56.15 + 0.00) = 56.15 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.57	73.08	-7.34	-9.59	0.00	0.00	0.00	56.15

WHEEL (0.00 + 46.41 + 0.00) = 46.41 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.66	63.77	-7.76	-9.60	0.00	0.00	0.00	46.41

Segment Leq : 56.59 dBA

Train # 1: Passenger, Segment # 3: Passenger (day)

LOCOMOTIVE (0.00 + 44.98 + 0.00) = 44.98 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.57	61.91	-7.34	-9.59	0.00	0.00	0.00	44.98

WHEEL (0.00 + 35.24 + 0.00) = 35.24 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.66	52.60	-7.76	-9.60	0.00	0.00	0.00	35.24

Segment Leq : 45.42 dBA

Total Leq All Segments: 59.11 dBA

Train # 1: Freight, Segment # 1: Freight (night)

LOCOMOTIVE (0.00 + -16.93 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.57	0.00	-7.34	-9.59	0.00	0.00	0.00	-16.93

WHEEL (0.00 + -17.36 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.66	0.00	-7.76	-9.60	0.00	0.00	0.00	-17.36

Segment Leq : 0.00 dBA

Train # 1: Go Trains, Segment # 2: GO Trains (night)

LOCOMOTIVE (0.00 + 56.15 + 0.00) = 56.15 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.57	73.08	-7.34	-9.59	0.00	0.00	0.00	56.15

WHEEL (0.00 + 46.41 + 0.00) = 46.41 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.66	63.77	-7.76	-9.60	0.00	0.00	0.00	46.41

Segment Leq : 56.59 dBA

Train # 1: Passenger, Segment # 3: Passenger (night)

LOCOMOTIVE (0.00 + -16.93 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-0	20	0.57	0.00	-7.34	-9.59	0.00	0.00	0.00	-16.93
----	----	------	------	-------	-------	------	------	------	--------

WHEEL (0.00 + -17.36 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-0	20	0.66	0.00	-7.76	-9.60	0.00	0.00	0.00	-17.36
----	----	------	------	-------	-------	------	------	------	--------

Segment Leq : 0.00 dBA

Total Leq All Segments: 56.59 dBA

Rail data, segment # 3: Passenger (day/night)

```

-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type          !              ! (km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1. Passenger !   2.0/0.0   ! 145.0 !  2.0 ! 10.0 !Diesel! Yes
  
```

Data for Segment # 3: Passenger (day/night)

```

-----
Angle1  Angle2      : -0.00 deg   20.00 deg
Wood depth      :          0   (No woods.)
No of house rows :          0 / 0
Surface         :          1   (Absorptive ground surface)
Receiver source distance : 44.00 / 44.00 m
Receiver height :    7.50 / 7.50 m
Topography      :          1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle :    0.00
  
```

Train # 1: Freight, Segment # 1: Freight (day)

LOCOMOTIVE (0.00 + 55.07 + 0.00) = 55.07 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -0    20    0.41  71.21  -6.57  -9.58   0.00   0.00   0.00  55.07
  
```

WHEEL (0.00 + 48.15 + 0.00) = 48.15 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -0    20    0.51  64.80  -7.06  -9.59   0.00   0.00   0.00  48.15
  
```

Segment Leq : 55.87 dBA

Train # 1: Go Trains, Segment # 2: GO Trains (day)

LOCOMOTIVE (0.00 + 56.94 + 0.00) = 56.94 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -0    20    0.41  73.08  -6.57  -9.58   0.00   0.00   0.00  56.94
  
```

WHEEL (0.00 + 47.12 + 0.00) = 47.12 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj  SubLeq
-----
  -0    20    0.51  63.77  -7.06  -9.59   0.00   0.00   0.00  47.12
  
```

Segment Leq : 57.37 dBA

Train # 1: Passenger, Segment # 3: Passenger (day)

LOCOMOTIVE (0.00 + 45.77 + 0.00) = 45.77 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.41	61.91	-6.57	-9.58	0.00	0.00	0.00	45.77

WHEEL (0.00 + 35.95 + 0.00) = 35.95 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.51	52.60	-7.06	-9.59	0.00	0.00	0.00	35.95

Segment Leq : 46.20 dBA

Total Leq All Segments: 59.88 dBA

Train # 1: Freight, Segment # 1: Freight (night)

LOCOMOTIVE (0.00 + -16.14 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.41	0.00	-6.57	-9.58	0.00	0.00	0.00	-16.14

WHEEL (0.00 + -16.64 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.51	0.00	-7.06	-9.59	0.00	0.00	0.00	-16.64

Segment Leq : 0.00 dBA

Train # 1: Go Trains, Segment # 2: GO Trains (night)

LOCOMOTIVE (0.00 + 56.94 + 0.00) = 56.94 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.41	73.08	-6.57	-9.58	0.00	0.00	0.00	56.94

WHEEL (0.00 + 47.12 + 0.00) = 47.12 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.51	63.77	-7.06	-9.59	0.00	0.00	0.00	47.12

Segment Leq : 57.37 dBA

Train # 1: Passenger, Segment # 3: Passenger (night)

LOCOMOTIVE (0.00 + -16.14 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.41	0.00	-6.57	-9.58	0.00	0.00	0.00	-16.14

WHEEL (0.00 + -16.64 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-0	20	0.51	0.00	-7.06	-9.59	0.00	0.00	0.00	-16.64

Segment Leq : 0.00 dBA

Total Leq All Segments: 57.37 dBA

APPENDIX “B”

If the background sound level is to be established by means of monitoring, the monitoring should be performed over a minimum period of 48 hours and should be conducted during times when the background sound level is at its lowest level. The lowest hourly L_{eq} value should be selected to represent the background sound level.

In general, the sound level data included in an impact assessment needs to be representative of the background conditions and the predictable worst case noise impact from the stationary source.

B6 Sound Levels Due to Stationary Sources

(1) 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 are to be obtained by measurement and/or prediction. The estimation of the L_{eq} and/or L_{LM} of the stationary source under impact assessment needs to reflect the principle of predictable worst case noise impact. The predictable worst case noise impact at a point of reception is defined in Part A of this guideline as the greatest noise impact relative to the limit in any hour.

(2) 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 existing stationary sources are to be obtained by measurements taken in accordance with the procedures described in Section B3.1.

B7 Sound Level Limits – General

Note that the sound level limits in this Part B are the same as those presented in Part C for the planning of new noise sensitive land uses.

In principle, the objective of complying with the plane of window limits in Table B-1 and Table B-2 is to be protective of noise sensitive spaces, i.e., indoor areas. This objective of protecting indoor areas should be considered in the noise impact assessment when the building façade includes ventilation devices or openings that may reduce the transmission loss and compromise the indoor noise environment.

B7.1 Steady and Varying Sound – Outdoors and Plane of Window

For sound from a stationary source including Quasi-Steady Impulsive Sound but not including other impulsive sound, the sound level limit at a point of reception, expressed in terms of the One-Hour Equivalent Sound Level (L_{eq}) is the higher of the applicable exclusion limit value given in Table B-1 or Table B-2, or the background sound level

for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours). Sound level limits apply during the nighttime period (23:00 – 07:00) for the plane of the window of a noise sensitive space. In general, the outdoor points of reception will be protected during the nighttime as a consequence of meeting the sound level limits at the adjacent plane of window of noise sensitive spaces.

Note that for Class 1, 2 and 3 areas, the plane of window limits apply to a window that is assumed to be open. For Class 4 areas, the plane of window limits apply to a window which is assumed to be closed. This distinction does not affect the prediction of plane of window sound levels.

Table B-1
Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA)
Outdoor Points of Reception

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

Table B-2
Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA)
Plane of Window of Noise Sensitive Spaces

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

B7.2 Impulsive Sound – Outdoors and Plane of Window

For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source, the sound level limit at a point of reception expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}) is the higher of the applicable exclusion limit value given in Table B-3 or Table B-4, or the background sound level for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours). Sound level limits apply during the nighttime period (23:00 – 07:00) for the plane of the window of a noise sensitive space. In general, the outdoor points of reception will be protected during the nighttime as a consequence of meeting the sound level limits at the adjacent plane of window of noise sensitive spaces.

Notwithstanding Publication NPC-103, Reference [29], the following sound level limits in Table B-3 and Table B-4 below apply to impulsive sound:

Table B-3
Exclusion Limit Values for Impulsive Sound Level (L_{LM} , dBAI)
Outdoor Points of Reception

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

Table B-4
Exclusion Limit Values for Impulsive Sound Level (L_{LM} , dBAI)
Plane of Window – Noise Sensitive Spaces (Day/Night)

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

B7.3 Sound Level Limits for Emergency Equipment

The sound level limits for noise produced by emergency equipment operating in non-emergency situations, such as testing or maintenance of such equipment, are 5 dB greater than the sound level limits otherwise applicable to stationary sources, described in Sections B7.1 and B7.2.

The noise produced by emergency equipment operating in non-emergency situations should be assessed independently of all other stationary sources of noise. Specifically, the emissions are not required to be included with the overall noise assessment of a stationary source facility.