



Sequoia Church

35 Highbury Park Drive, Nepean, Ontario

Noise & Vibration Impact Study

SACL #SW18408.A0

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1. Introduction

At the request of McDonald Brothers Construction Inc., Swallow Acoustic Consultants Ltd. (SACL) presents this Noise and Vibration Impact Study (NVIS) for the proposed 2-storey worship space and education centre (Project) to be located at 35 Highbury Park Drive in Nepean, Ontario. All other buildings in the immediate area are residential or commercial buildings between 1 and 2 storeys. A site plan and a satellite image of the surrounding area are provided in Appendix A, Figure 1 and Figure 2.

2. Noise Sources

This NVIS assesses noise impacts from nearby surface transportation sources on the Project. The surface transportation sources impacting the Project are road traffic on Greenbank Road and Highbury Park Drive, and bus traffic on a transitway to the east of the site. Greenbank Road is designated an Arterial Road and Highbury Park Drive is designated a Collector Road by Schedule E of the City of Ottawa Official Plan^[1]. There is also a bus transit corridor to the east of the site and a VIA Rail line to the northwest of the site.

Based on a site visit conducted by SACL on November 8, 2018, and a review of satellite photos of the area, there are no significant stationary noise sources nearby that may impact the Project.

3. Noise Assessment Criteria

The City of Ottawa requirements for environmental noise impact studies are outlined in the City's *Environmental Noise Control Guidelines*^[2] (ENCG) and are based on the Ontario Ministry of the Environment, Conservation, and Parks (MOECP) document *Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning*^[3] (NPC-300).

3.1 Surface Transportation Noise Assessment Criteria

Sound level limits outlined in ENCG for road traffic noise impacting on noise-sensitive areas applicable to the Project are summarized in Table 1. Sound level limits are given in A-weighted, equivalent sound levels (L_{eq} , dBA), defined in both ENCG and NPC-300.

Additionally, ENCG and NPC-300 provide requirements for building components, ventilation, and warning clauses to be used in sale and lease agreements. These requirements are based on calculated sound levels at OLAs and the plane-of-window of bedrooms and living/dining rooms. Sound level limits and associated requirements applicable to the Project are summarized in Table 2 and Table 3. Warning clause types are defined in NPC-300.

Table 1: Sound Level Limits for Noise-Sensitive Areas

Type of Space	Time Period	Maximum L_{eq} (dBA)
Outdoor Living Area	Daytime (07:00 to 23:00)	55
Living/dining, den areas of residences, hospitals, schools, places of worship, etc. (indoor)	Daytime (07:00 to 23:00)	45
	Nighttime (23:00 to 07:00)	45
Sleeping quarters of residences (indoor)	Daytime (07:00 to 23:00)	45
	Nighttime (23:00 to 07:00)	40
General offices, reception areas, retail stores, etc. (indoor)	Daytime (07:00 to 23:00)	50

Table 2: Building Component and Ventilation Requirements

Time Period	Sound Level, L_{eq} (dBA), at Bedroom or Living/Dining Room Plane-of-Window	Building Component Requirement	Ventilation Requirement
Daytime (07:00 – 23:00)	$55 < L_{eq} \leq 65$	Building components must be compliant with the Ontario Building Code (OBC)	Forced air heating with provision for central air conditioning
	$L_{eq} > 65$	Building components (walls, windows, etc.) should be designed to achieve indoor sound level criteria in Table 1	Central air conditioning
Nighttime (23:00 – 07:00)	$50 < L_{eq} \leq 60$	Building components must be compliant with the Ontario Building Code (OBC)	Forced air heating with provision for central air conditioning
	$L_{eq} > 60$	Building components (walls, windows, etc.) should be designed to achieve indoor sound level criteria in Table 1	Central air conditioning

Table 3: Warning Clause Requirements

Assessment Location	Time Period	Sound Level, L_{eq} (dBA)	Warning Clause Requirement
Bedroom or Living/Dining Room Plane-of-Window	Daytime (07:00 – 23:00)	$55 < L_{eq} \leq 65$	Type C Required
		$L_{eq} > 65$	Type D Required
	Nighttime (23:00 – 07:00)	$50 < L_{eq} \leq 60$	Type C Required
		$L_{eq} > 60$	Type D Required
Outdoor Living Areas	Daytime (07:00 – 23:00)	$55 < L_{eq} \leq 60$	If noise control measures are not provided, Type A is required
		$L_{eq} > 60$	Noise control measures must be provided to reduce levels to 60 dBA or lower, Type B is required

4. Sound Level Calculations

4.1 Points of Reception

Four points of reception (PORs) were chosen at the point on each of the four building façades that were determined to be most exposed to the noise sources identified in Section 2. The outdoor “Kids Program Patio” is considered to be Outdoor Living Areas (OLAs), subject to the requirements of Table 1 and Table 3. A site plan showing the locations of the PORs is provided in Appendix A, Figure 3. The locations of the PORs are summarized in Table 4.

Table 4: Points of Reception and Outdoor Living Areas

Point of Reception (POR)	Floor	POR Height (m)	Location	Notes/Comments
POR1	2	7.5	West façade, SW corner	Representative of highest plane-of-window levels on west face
POR2	2	7.5	South façade, SE corner	Representative of highest plane-of-window levels on south face
POR3	2	7.5	East façade, SE corner	Representative of highest plane-of-window levels on east face
POR4	2	7.5	North façade, NW corner	Representative of highest plane-of-window levels on north face
POR5	1	1.5	Kids Program Patio	Outdoor Living Area

4.2 Road Traffic Noise Parameters

The “ultimate” road and traffic data information for the road traffic noise sources identified in Section 2, including the Annual Average Daily Traffic (AADT), were obtained from the ENCG, based on the road classifications provided in the City of Ottawa Official Plan, and are summarized in Table 5.

Data on transitway traffic volumes was requested from OC Transpo, but has not been received as of the date of this report. Thus, the AADT and Day/Night Split were determined by counting the number of buses per day on this section of the transitway, based on schedule data for the nearby Longfields Station stop. The details of this stop are in Appendix B. All bus routes that stop at Longfields Station also pass by on the transitway to the east of the Project site. This includes, as of January 25, 2019, routes #95, 271, 273, 275, 305, 406, and 456. The present AADT on the transitway is 285 on weekdays, split into 81% daytime and 19% nighttime. The present AADT is increased by 2.5% each year for 15 years to arrive at an AADT of 413 in 2034, and is expected to be a conservative estimate of the future transitway traffic volumes.

Table 5: Traffic Parameters

Road	Implied Roadway Class	Speed Limit (km/h)	AADT (Vehicles per day)	Day/Night Split (%)	Medium Trucks (%)	Heavy Trucks (%)
Highbury Park Drive	2-Lane Urban Collector (2-UCU)	50	8,000	92/8	7	5
Greenbank Road	4-Lane Urban Arterial-Divided (4-UAD)	60	35,000	92/8	7	5
Bus Transitway	N/A	80	413	81/19	N/A	N/A

4.3 Rail Noise Parameters

The rail line which passes to the northwest of the site is used by VIA Rail passenger trains. These trains typically consist of 6 cars and 1 engine. This section of track is between the Smiths Falls and Fallowfield stations and is part of the VIA Rail Toronto-Kingston-Ottawa route. According to the most recent VIA Rail schedule, effective November 18, 2018, 20 trains travel this route Monday to Friday, 10 eastbound and 10 westbound. The complete schedule is presented in Appendix B. The present AADT for the railway is 20, split into 19 daytime and 1 nighttime. Applying a 2.5% per year increase for 15 years gives an ultimate AADT of 29, with 28 daytime and 1 nighttime. The speed of the trains is approximately 55 km/h, based on measurements by an SACL representative on November 8, 2018. Because the rail line has a bridge crossing at Greenbank Road and no other nearby ground-level crossings, it is assumed that the trains do not blow their whistles near the Project location.

4.4 Calculated Sound Levels

Sound levels were calculated at each POR using software developed by the MOECP for the assessment of road and rail noise, STAMSON 5.04. Details of these calculations are provided in Appendix C, and scaled site plans showing distances and angles used in STAMSON are provided in Appendix D.

Buses on the transitway are classified as an RT/Custom Bus source in STAMSON. The ground surrounding the Project is a combination of gravel, grass, and trees, and is considered an absorptive surface in the STAMSON calculations. The surrounding buildings are mainly 2-storey residential buildings, approximately 7.5m tall. These buildings were considered partial barriers for POR5 at the angles shown in Appendix D, Figure 10.

Table 6: Calculated Sound Levels at PORs

POR	Daytime L _{eq} (dBA)	Nighttime L _{eq} (dBA)	Building Component Requirement	Ventilation Requirement	Warning Clause Requirement
POR1	61	54	Building components must be compliant with the Ontario Building Code.	Forced air heating with provision for central air conditioning	Type C
POR2	61	55	Building components must be compliant with the Ontario Building Code.	Forced air heating with provision for central air conditioning	Type C
POR3	60	55	Building components must be compliant with the Ontario Building Code.	Forced air heating with provision for central air conditioning	Type C
POR4	58	51	Building components must be compliant with the Ontario Building Code.	Forced air heating with provision for central air conditioning	Type C
POR5	59	N/A	N/A	N/A	Type A

5. Noise Control Requirements

5.1 Building Component Requirements

The Project is classified as a place of worship in NPC-300 and is subject to a 45 dBA indoor sound level limit, according to Table 1. Based on the calculated plane-of-window sound levels for the 4 building façades (POR1 to POR4), the building components are not required to be specially



designed to meet interior sound levels. Any construction meeting the requirements of the OBC is expected to achieve the interior sound requirements for the building.

5.2 Ventilation Requirements

It is determined from the plane-of-window sound levels for the 4 building façades (POR1 to POR4) that the entire building should be designed with a minimum of forced-air heating and a provision for the installation of central air conditioning in the future.

5.3 Outdoor Living Area Mitigation

The Kids Program Patio outdoor living area to the northwest of the proposed building, represented by POR5, meets the minimum requirement for OLAs of 60 dBA, shown in Table 3, if a Type A warning clause is provided. If a Type A warning clause is not provided, a 2 m high noise barrier is required on all sides of the OLA which are exposed to Greenbank Road and Highbury Park Drive, in order to reduce the sound level below 55 dBA. The noise barrier should cover the south, west, and part of the north sides of the Kids Program Patio, and be approximately 24 m in length. The location of this proposed noise barrier is shown in Appendix A, Figure 4.

Of note, per ENCG requirements, all noise barriers must not contain any holes or gaps, and must have a minimum surface density of 20 kg/m². Transparent barriers can be used, as long as they meet the minimum density requirement of 20 kg/m². All acoustic barriers must comply with the requirements listed in the ENCG. A verification of wind/snow loads must also be undertaken by a third party professional.

5.4 Warning Clause Requirements

Warning clause Type C is required to be included in agreements of Offers of Purchase and Sale, lease and rental agreements. Warning Clause Type C is as follows:

“This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain close, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.”

If a 2m high noise barrier is not provided for POR5, as specified in section 5.3, the following Type A warning clause is also required:

“Purchasers/tenants are advised that sound levels due to increasing road and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment.”



6. Vibration Assessment Criteria

Vibration assessment criteria for environmental noise sources are provided by the CN Rail *Principal Main Line Requirements* (2002) and MOECP guideline *Environmental Noise Assessment in Land Use Planning* (1999).

6.1 CN Rail Vibration Criteria

The CN Rail criterion for train vibration on proposed new residential developments is an overall vertical vibration level of 0.14 mm/s (RMS) between 4 Hz and 200 Hz. The monitoring system used to measure vibrations should be capable of measuring frequencies between 4 Hz and 200 Hz, ± 3 dB with an RMS averaging time constant of 1 second. These recommended criteria reflect measurement guidelines and perceptibility curves outlined in ISO 2631-1, *Mechanical Vibration and Shock – Evaluation of Human Exposure to Whole-Body Vibration*.

6.2 MOECP Vibration Criteria

The MOECP criterion for an acceptable impact of ground-borne railway vibration is yet to be formally standardised. However, the MOECP guideline *Environmental Noise Assessment in Land Use Planning* (1999) states that, based on the currently available information including existing standards, scientific literature and past MOECP recommendations, the criterion should limit the vibration velocity to below about 0.10 mm/s RMS, in the frequency range of between 10 to 100 Hz.

7. Vibration Level Measurements

7.1 Vibration Measurement Instrumentation

Vibration levels were measured using PCB Peizotronics type 393A03 Accelerometers. Signals from the accelerometer were passed to a Siemens LMS 8 channel data acquisition system and analyzed with LMS Test Xpress software.

7.2 Vibration Measurement Results

Rail vibration measurements were performed on Thursday, November 8, 2018, at a location on site shown in Appendix E, approximately 224 m from the railway right-of-way. This location represents the northwest corner of the Project, which is the point of the proposed building which is closest to the railway.

Three VIA Rail passenger trains were measured passing by the site. The maximum measured vibration levels at the Project location were found to be much lower than both the CN and MOECP vibration criteria for all train pass-bys. The measurement results are shown in Appendix F and summarized in Table 7.

Table 7: Train Vibration Measurements

Measurement Number	Measurement Description Notes	Max RMS Velocity (mm/s) between 4 Hz and 200 Hz, 224 m from Railway Right-of-way
VIA 1	Passenger train, 6 cars & 1 engine, westbound, approx. 55 km/h	0.008
VIA 2	Passenger train, 6 cars & 1 engine, eastbound, approx. 55 km/h	0.005
VIA 3	Passenger train, 4 cars & 1 engine, westbound, approx. 50 km/h	0.006
Ambient	Ambient vibration level, no trains, average of 3 measurements	0.004

8. Vibration Control Requirements

Because the measured train vibration measurements shown in in Table 7 and Appendix F are much lower than the CN and MOECP vibration criteria, no vibration control is required for the Project.

9. Impact of the Project on Surrounding Area

Mechanical equipment within the Project may also be considered as a stationary noise source which may impact nearby noise-sensitive areas. Mechanical equipment selections have not yet been made, precluding a detailed analysis at this time. The final mechanical design will be required to comply with ENCG sound level limits from a stationary source at all nearby noise-sensitive areas.

10. Concluding Comments

The noise impact of Greenbank Road and Highbury Park Drive, and the nearby transitway and rail line on the proposed 2-storey worship space and education centre to be located at 35 Highbury Park Drive is expected to be such that building components meeting the Ontario Building Code minimum standard will be sufficient to achieve the interior sound level requirements of the City of Ottawa and MOECP. All rooms should be designed with a minimum of forced-air heating, with the provision for future installation of central air conditioning. A Type C warning clause should be included in all sale and lease agreements. For the Kids Program Patio at the northwest of the building, a Type A warning clause is also required if a 2 m high noise barrier is not provided on all sides of the patio which are exposed to Greenbank Road and Highbury Park Drive. If a Type A warning clause is provided, this barrier is not required. There are currently no significant stationary noise sources that impact the development. Vibration from the rail line to the northwest of the proposed building has been assessed and is well below the CN and MOECP railway



vibration criteria. SACL therefore recommends that the proposed building be approved from a noise and vibration perspective.

----- End -----



References

1. **City of Ottawa.** Official Plan, Schedule E – Urban Road Network. 2013.
2. **City of Ottawa.** Environmental Noise Control Guidelines. January 2016.
3. **Ontario Ministry of the Environment and Climate Change.** Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning, Publication NPC-300. August 2013

Appendix A: Site Plans

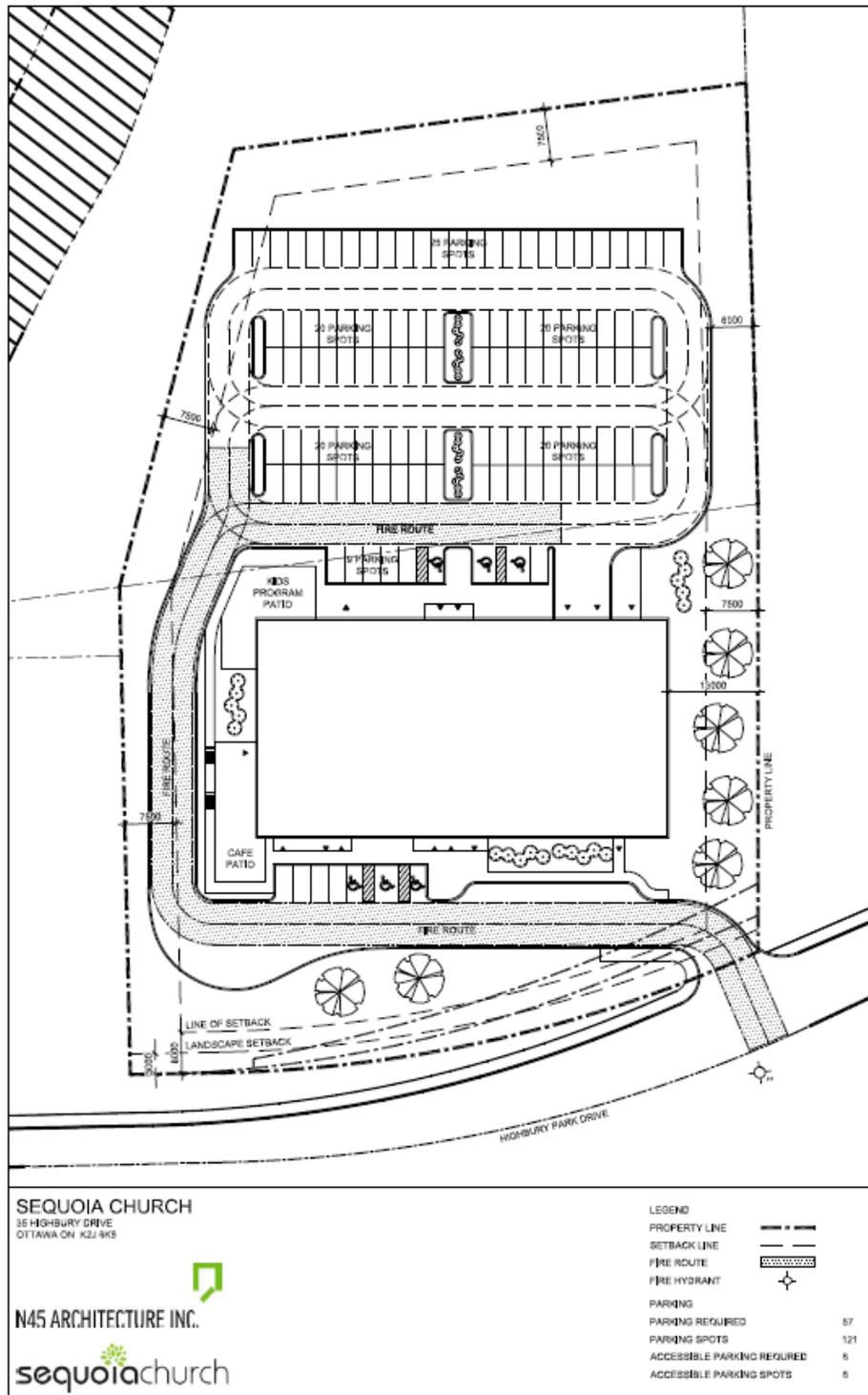


Figure 1: Site plan



Figure 2: Site plan overlaid on a satellite image of the surrounding area

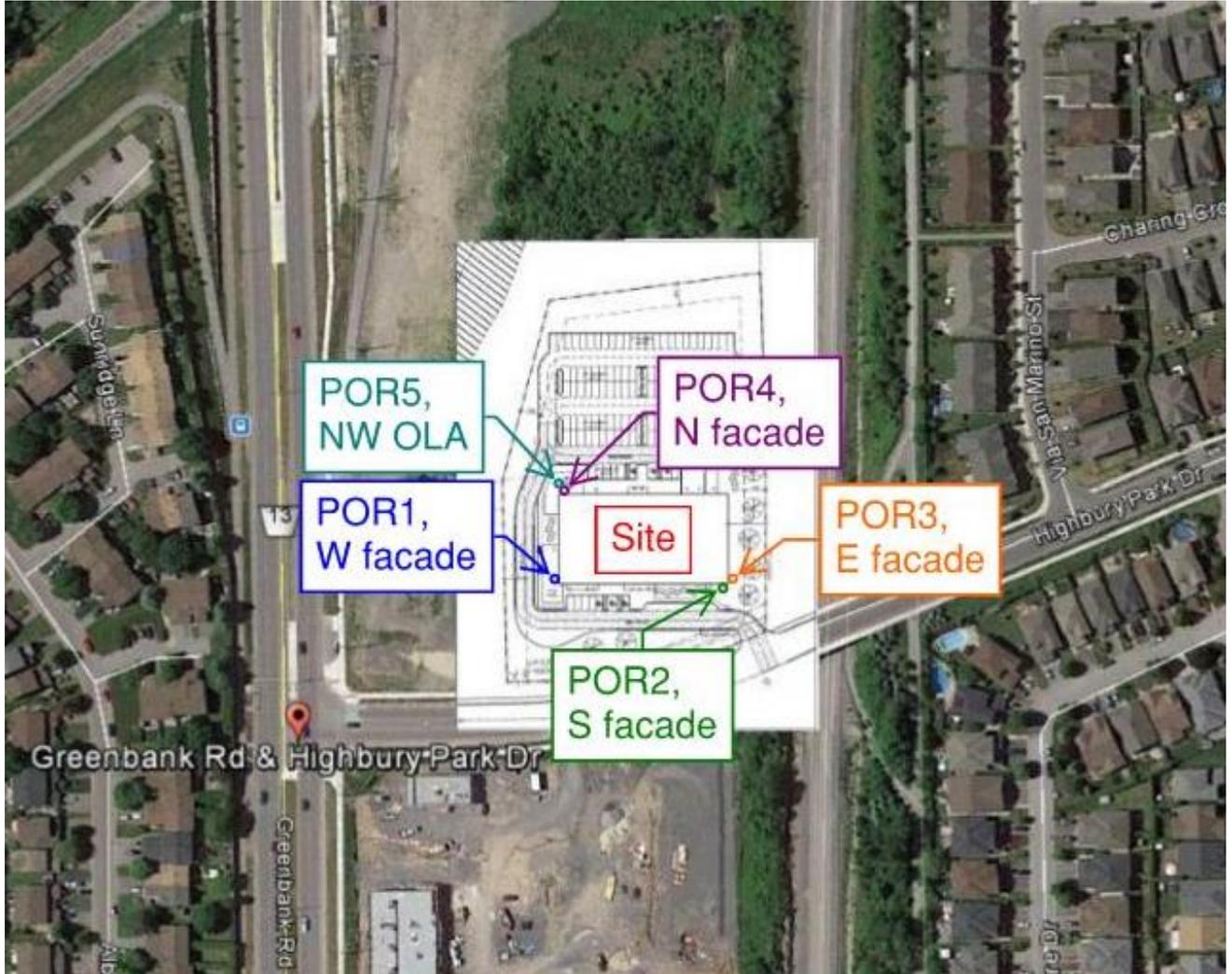


Figure 3: Point of reception (POR) locations

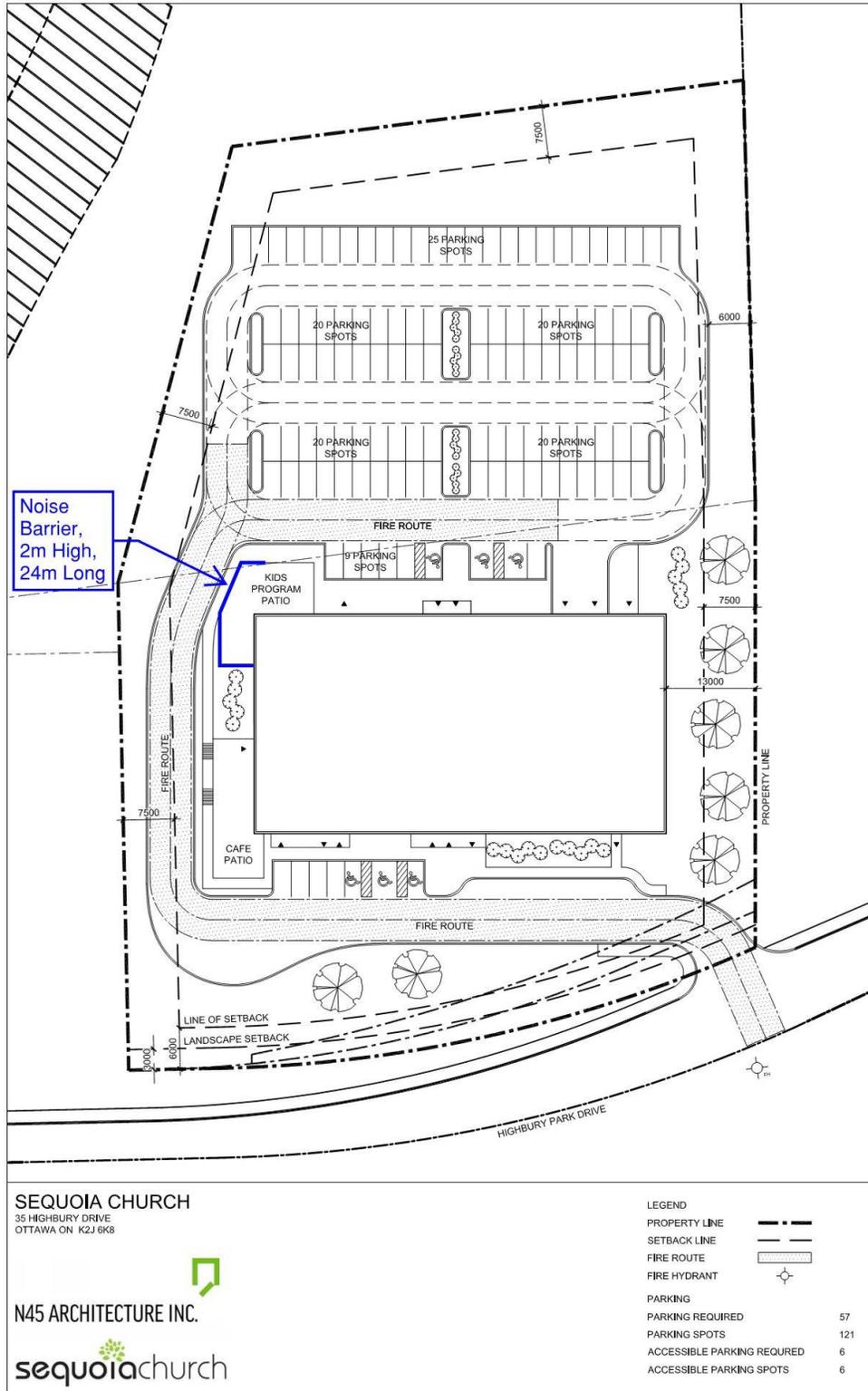
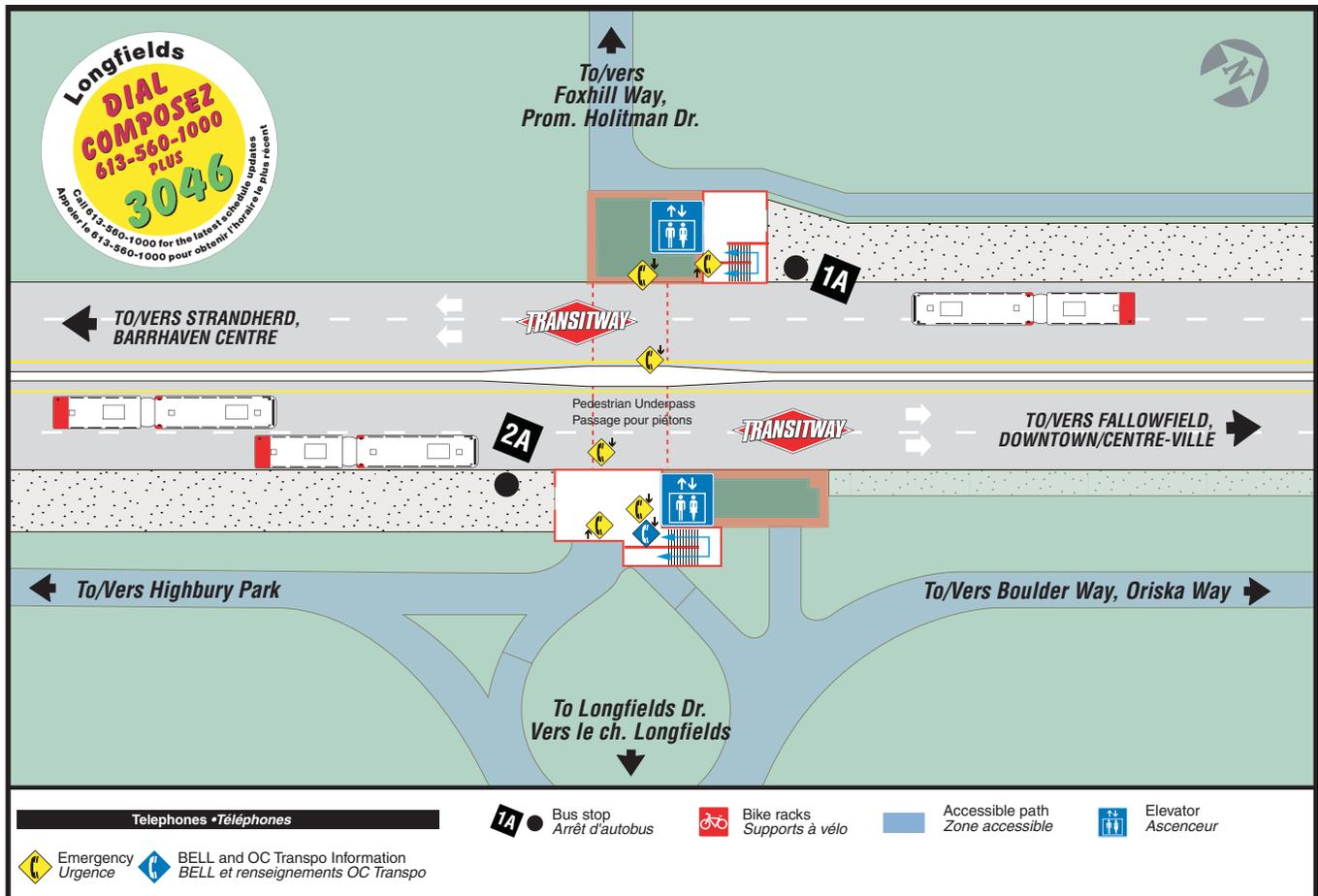


Figure 4: Proposed noise barrier location for POR5 (2m high, approximately 24m long)



Appendix B: Transitway and Rail Line Schedule Data

Longfields



ROUTES CIRCUITS	DESTINATIONS	STOP ARRÊT
95	Barrhaven Centre, Cambrian Orléans, Trim <i>via Downtown / Centre-ville</i>	1A 2A
271	Mackenzie King AM Stoneway	2A 1A
273	Mackenzie King AM Tartan PM	2A 1A
275	Mackenzie King AM Cambrian PM	2A 1A
305	Carlingwood AM North Gower, Kars, Manotick <i>(selected trips, Fridays only / périodes sélectionnées, le vendredi seulement)</i>	2A 1A
406	Centre Canadian Tire Centre <i>Selected time periods / Périodes sélectionnées</i>	2A
456	Lansdowne <i>Selected time periods / Périodes de pointe seulement</i>	2A



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BUSINESS AFFAIRES	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Toronto, ON DP	06:40	08:35	10:40	12:20	13:20	14:20	15:40	16:35	17:40	18:40	
Guildwood	07:00								17:58	18:58	
Oshawa	07:19	09:08		12:52	13:53	14:54	16:17	17:06	18:14	19:16	
Port Hope									18:40	19:43	
Cobourg	07:54	09:40			14:26		16:50		18:48	19:53	
Trenton Jct.									19:15	20:19	
Belleville	08:29				15:03			18:11	19:30	20:36	
Napanee									19:50	20:54	
Kingston AR	09:07	10:49	12:49	14:32	15:39	16:32	17:59		20:09	21:13	
DP	09:11	10:53	12:51	14:34	15:42	16:36	18:02		20:12	21:16	
Gananoque										21:38	
Brockville	10:08	11:48				17:20	18:47			22:03	
Smiths Falls	10:39					17:50				22:33	
Fallowfield	11:12	12:47	14:35	16:17	17:41	18:24	19:47	20:24	21:49	23:00	
Ottawa, ON AR	11:29	13:09	14:57	16:34	17:58	18:46	20:09	20:42	22:07	23:16	

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Legend / Légende

Days / Jours

- 1 Monday / Lundi
- 2 Tuesday / Mardi
- 3 Wednesday / Mercredi
- 4 Thursday / Jeudi
- 5 Friday / Vendredi
- 6 Saturday / Samedi
- 7 Sunday / Dimanche

Time Zone

- Atlantic Time AT / HA
- Eastern Time ET / HE
- Central Time CT / HC
- Mountain Time MT / HR
- Pacific Time PT / HP

Fuseaux horaires

- Heure de l'Atlantique
- Heure de l'Est
- Heure du Centre
- Heure des Rocheuses
- Heure du Pacifique

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Example: **12345**⁶⁷

Les chiffres en caractères gras indiquent les jours où les trains sont en service. Ceux en gris désignent les jours où il n'y a pas de service sur la liaison.

Exemple : **12345**⁶⁷

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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Ottawa, ON	DP	05:30	06:40	07:20	08:35	08:40	10:27	11:40	12:28	14:30	15:30	17:20	18:26
Fallowfield		05:55	06:59	07:40	08:55	09:01	10:46	12:00	12:49	14:55	15:49	17:39	18:52
Smiths Falls		06:22	07:26		09:24	09:29							19:25
Brockville		06:51	07:55		09:53	09:58			13:56		16:54		19:58
Gananoque									14:22				
Kingston	AR	07:31	08:35	09:10	10:33	10:38	12:24	13:35	14:41	16:32	17:34	19:18	20:38
	DP	07:34	08:38	09:13	10:36	10:41	12:26	13:39	14:45	16:35	17:38	19:20	20:41
Napanee						11:02							
Belleville		08:16	09:19			11:25		14:21	15:28	17:16	18:18		21:22
Trenton Jct.						11:37							21:32
Cobourg		08:51	09:54		11:46	12:03					18:52		22:00
Port Hope						12:11							
Oshawa		09:27	10:29			12:43		15:29	16:38	18:23	19:25	21:12	22:33
Guildwood			10:46		12:36	13:01			16:58				22:50
Toronto	AR	10:02	11:02	11:25	12:52	13:16	14:48	16:03	17:15	19:05	19:57	21:45	23:07

OTTAWA
TORONTO

No local service between Ottawa and Fallowfield, or Guildwood and Toronto. / Pas de service local entre Ottawa et Fallowfield, ainsi qu'entre Guildwood et Toronto.

Travel between Union Station and Pearson Airport on UP Express trains in 25 minutes, with departures every 15 minutes. / Voyagez entre la gare Union et l'aéroport Pearson à bord des trains UP Express. Trajet de 25 minutes et départs toutes les 15 minutes.

Checked baggage is available on this train at certain stations only. For more information, please call VIA Rail (1 888 842-7245) or visit our website (viarail.ca). / L'enregistrement des bagages est offert pour ce train à certaines gares seulement. Pour plus d'information, veuillez appeler VIA Rail (1 888 842-7245) ou visiter notre site Web (viarail.ca).



We'll email you a boarding pass with a bar code whenever you book a seat. You can present a printed version of this e-boarding pass or display its bar code on your mobile device, along with a photo ID upon request, at the boarding gate and on board the train. Skip the ticket counter – you can board the train directly.

Lorsque vous réserverez une place à bord d'un train, nous vous ferons parvenir par courriel une carte d'embarquement comportant un code-barres. Vous pourrez imprimer cette carte d'embarquement ou l'afficher sur votre appareil mobile et la présenter à la porte d'embarquement ou à bord du train, en l'accompagnant d'une carte d'identité avec photo. Plus besoin de passer à la billetterie, vous pourrez monter à bord directement.

You're mobile. So are we. / Vous êtes mobile, nous aussi.

VIA Rail is never very far from wherever you are. With the VIA mobile version of our booking engine, you can book a trip and consult arrivals and departures, all from your smartphone.

Où que vous soyez, VIA Rail n'est jamais bien loin. Grâce à la version mobile de notre moteur de réservation, réservez un voyage ou consultez les arrivées et les départs, le tout à l'aide de votre téléphone intelligent.

In all sections, schedules are linear and usually read from the top down. Schedules for some routes read from the bottom up. Arrows will indicate the direction to follow. In general, the schedule for each route indicates the departure time only. Stations at which the train stops are listed on the left. Locations in bold indicate a possible connection.

Les horaires de chaque section sont linéaires et se lisent généralement de haut en bas. Pour certaines liaisons, l'horaire se lit de bas en haut. Suivez le sens des flèches pour orienter votre lecture.

En général, l'horaire de chaque liaison n'indique que l'heure de départ. Le nom des localités desservies est inscrit à gauche. Les localités en gras indiquent une possibilité de correspondance.

Legend / Légende

Days / Jours

- 1 Monday / Lundi
- 2 Tuesday / Mardi
- 3 Wednesday / Mercredi
- 4 Thursday / Jeudi
- 5 Friday / Vendredi
- 6 Saturday / Samedi
- 7 Sunday / Dimanche

Time Zone

- Atlantic Time AT / HA
- Eastern Time ET / HE
- Central Time CT / HC
- Mountain Time MT / HR
- Pacific Time PT / HP

Fuseaux horaires

- Heure de l'Atlantique
- Heure de l'Est
- Heure du Centre
- Heure des Rocheuses
- Heure du Pacifique

Bold numbers indicate the days when train service is offered. Grey numbers indicate days when no service is offered on a given route.

Example: **12345**⁶⁷

Les chiffres en caractères gras indiquent les jours où les trains sont en service. Ceux en gris désignent les jours où il n'y a pas de service sur la liaison.

Exemple : **12345**⁶⁷

There is a seat assignment in Economy class in the Québec City – Windsor corridor, except on trains 650 and 651. / Il y a une assignation des sièges en classe Économie dans le corridor Québec – Windsor, sauf pour les trains 650 et 651.



Shuttle service runs between the station and the airport. / Service de navette assuré entre la gare et l'aéroport.

Telephone numbers / Numéros de téléphone

Canada or United States / Canada ou États-Unis

1 888 VIA-RAIL* – 1 888 842-7245* – viarail.ca

Montréal: Local call from 514, 450 and 438 area codes /

Appel local des indicatifs régionaux 514, 450 et 438 514 989-2626

Moncton: Local call / Appel local 506 857-9830

Reward Program / Programme de récompense

VIA Préférence 1 888 VIA-PREF* – 1 888 842-7733* – viapreference.ca

TTY / ATS 1 800 268-9503*

Amtrak 1 800 USA-RAIL* – 1 800 872-7245* – Amtrak.com

*toll-free / sans frais

Visit viarail.ca or call one of our telephone sales agents to find out when stations are open. / Pour connaître les heures d'ouverture des gares, consultez le site viarail.ca ou communiquez par téléphone avec un agent de VIA Rail.



Appendix C: STAMSON 5.04 Calculations

Filename: por1_sw.te Time Period: Day/Night 16/8 hours
 Description: POR1_SW - W facade, SW corner, 2nd floor

Rail data, segment # 1: Railway (day/night)

```

-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng !Cont
Type          !             !(km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1.          ! 28.0/1.0   ! 55.0 ! 1.0 ! 6.0 !Diesel! No
    
```

Data for Segment # 1: Railway (day/night)

```

-----
Angle1  Angle2      : -90.00 deg  39.00 deg
Wood depth      :          0   (No woods.)
No of house rows :          0 / 0
Surface         :          1   (Absorptive ground surface)
Receiver source distance : 251.00 / 251.00 m
Receiver height :    7.50 / 7.50 m
Topography      :          1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle :    0.00
    
```

↑
 Results segment # 1: Railway (day)

```

-----
LOCOMOTIVE (0.00 + 45.47 + 0.00) = 45.47 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
  -90   39    0.41  64.83 -17.19 -2.16  0.00  0.00  0.00  45.47
    
```

```

-----
WHEEL (0.00 + 37.32 + 0.00) = 37.32 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
  -90   39    0.51  58.11 -18.48 -2.31  0.00  0.00  0.00  37.32
    
```

Segment Leq : 46.09 dBA

Total Leq All Segments: 46.09 dBA

↑
 Results segment # 1: Railway (night)

POR1_SW

 LOCOMOTIVE (0.00 + 34.01 + 0.00) = 34.01 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	39	0.41	53.37	-17.19	-2.16	0.00	0.00	0.00	34.01

WHEEL (0.00 + 25.86 + 0.00) = 25.86 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	39	0.51	46.65	-18.48	-2.31	0.00	0.00	0.00	25.86

Segment Leq : 34.63 dBA

Total Leq All Segments: 34.63 dBA

↑

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

Car traffic volume : 28336/2464 veh/TimePeriod *

Medium truck volume : 2254/196 veh/TimePeriod *

Heavy truck volume : 1610/140 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): 35000

Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00

Medium Truck % of Total Volume : 7.00

Heavy Truck % of Total Volume : 5.00

Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Greenbank (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 97.00 / 97.00 m

Receiver height : 7.50 / 7.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

POR1_SW



Road data, segment # 2: Highbury (day/night)

```

-----
Car traffic volume : 6477/563   veh/TimePeriod *
Medium truck volume : 515/45    veh/TimePeriod *
Heavy truck volume  : 368/32    veh/TimePeriod *
Posted speed limit  : 50 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): 8000
Percentage of Annual Growth       : 0.00
Number of Years of Growth         : 0.00
Medium Truck % of Total Volume    : 7.00
Heavy Truck % of Total Volume     : 5.00
Day (16 hrs) % of Total Volume    : 92.00

```

Data for Segment # 2: Highbury (day/night)

```

-----
Angle1  Angle2      : 0.00 deg  57.00 deg
Wood depth      : 0          (No woods.)
No of house rows : 0 / 0
Surface         : 1          (Absorptive ground surface)
Receiver source distance : 48.00 / 48.00 m
Receiver height  : 7.50 / 7.50 m
Topography       : 1          (Flat/gentle slope; no barrier)
Reference angle  : 0.00

```



Results segment # 1: Greenbank (day)

Source height = 1.50 m

ROAD (0.00 + 60.54 + 0.00) = 60.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	73.68	0.00	-12.00	-1.14	0.00	0.00	0.00	60.54

Segment Leq : 60.54 dBA



Results segment # 2: Highbury (day)

POR1_SW

Source height = 1.50 m

ROAD (0.00 + 52.91 + 0.00) = 52.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	57	0.48	65.75	0.00	-7.48	-5.37	0.00	0.00	0.00	52.91

Segment Leq : 52.91 dBA

Total Leq All Segments: 61.23 dBA

↑
 Results segment # 1: Greenbank (night)

Source height = 1.50 m

ROAD (0.00 + 52.94 + 0.00) = 52.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	66.08	0.00	-12.00	-1.14	0.00	0.00	0.00	52.94

Segment Leq : 52.94 dBA

↑
 Results segment # 2: Highbury (night)

Source height = 1.50 m

ROAD (0.00 + 45.31 + 0.00) = 45.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	57	0.48	58.16	0.00	-7.48	-5.37	0.00	0.00	0.00	45.31

Segment Leq : 45.31 dBA

Total Leq All Segments: 53.63 dBA

↑

 TOTAL Leq FROM ALL SOURCES (DAY): 61.36
 (NIGHT): 53.69

POR1_SW



Filename: por2_se.te Time Period: Day/Night 16/8 hours
 Description: POR2_SE - S facade, SE corner, 2nd floor

Rail data, segment # 1: Railway (day/night)

```

-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng !Cont
Type          !             !(km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1.          ! 28.0/1.0   ! 55.0 ! 1.0 ! 6.0 !Diesel! No
    
```

Data for Segment # 1: Railway (day/night)

```

-----
Angle1  Angle2      : -90.00 deg  -51.00 deg
Wood depth      :          0   (No woods.)
No of house rows :          0 / 0
Surface         :          1   (Absorptive ground surface)
Receiver source distance : 289.00 / 289.00 m
Receiver height :    7.50 / 7.50 m
Topography      :          1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle :    0.00
    
```

↑
 Results segment # 1: Railway (day)

```

-----
LOCOMOTIVE (0.00 + 37.92 + 0.00) = 37.92 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
  -90   -51   0.41  64.83 -18.05  -8.85   0.00   0.00   0.00  37.92
    
```

```

-----
WHEEL (0.00 + 29.35 + 0.00) = 29.35 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
  -90   -51   0.51  58.11 -19.40  -9.36   0.00   0.00   0.00  29.35
    
```

Segment Leq : 38.49 dBA

Total Leq All Segments: 38.49 dBA

↑
 Results segment # 1: Railway (night)

POR2_SE

 LOCOMOTIVE (0.00 + 26.46 + 0.00) = 26.46 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-51	0.41	53.37	-18.05	-8.85	0.00	0.00	0.00	26.46

WHEEL (0.00 + 17.89 + 0.00) = 17.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-51	0.51	46.65	-19.40	-9.36	0.00	0.00	0.00	17.89

Segment Leq : 27.03 dBA

Total Leq All Segments: 27.03 dBA

↑

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

 Car traffic volume : 28336/2464 veh/TimePeriod *
 Medium truck volume : 2254/196 veh/TimePeriod *
 Heavy truck volume : 1610/140 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): 35000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Greenbank (day/night)

 Angle1 Angle2 : -90.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 157.00 / 157.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

POR2_SE



Road data, segment # 2: Highbury (day/night)

```

-----
Car traffic volume : 6477/563   veh/TimePeriod *
Medium truck volume : 515/45    veh/TimePeriod *
Heavy truck volume  : 368/32    veh/TimePeriod *
Posted speed limit  : 50 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): 8000
Percentage of Annual Growth       : 0.00
Number of Years of Growth         : 0.00
Medium Truck % of Total Volume    : 7.00
Heavy Truck % of Total Volume     : 5.00
Day (16 hrs) % of Total Volume   : 92.00

```

Data for Segment # 2: Highbury (day/night)

```

-----
Angle1  Angle2      : -90.00 deg  70.00 deg
Wood depth      : 0 (No woods.)
No of house rows : 0 / 0
Surface         : 1 (Absorptive ground surface)
Receiver source distance : 31.00 / 31.00 m
Receiver height  : 7.50 / 7.50 m
Topography      : 1 (Flat/gentle slope; no barrier)
Reference angle  : 0.00

```



Results segment # 1: Greenbank (day)

Source height = 1.50 m

ROAD (0.00 + 54.43 + 0.00) = 54.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.48	73.68	0.00	-15.09	-4.15	0.00	0.00	0.00	54.43

Segment Leq : 54.43 dBA



Results segment # 2: Highbury (day)

POR2_SE

Source height = 1.50 m

ROAD (0.00 + 59.68 + 0.00) = 59.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	70	0.48	65.75	0.00	-4.67	-1.40	0.00	0.00	0.00	59.68

Segment Leq : 59.68 dBA

Total Leq All Segments: 60.81 dBA

↑
 Results segment # 1: Greenbank (night)

Source height = 1.50 m

ROAD (0.00 + 46.84 + 0.00) = 46.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.48	66.08	0.00	-15.09	-4.15	0.00	0.00	0.00	46.84

Segment Leq : 46.84 dBA

↑
 Results segment # 2: Highbury (night)

Source height = 1.50 m

ROAD (0.00 + 52.09 + 0.00) = 52.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	70	0.48	58.16	0.00	-4.67	-1.40	0.00	0.00	0.00	52.09

Segment Leq : 52.09 dBA

Total Leq All Segments: 53.22 dBA

↑
 RT/Custom data, segment # 1: Transitway (day/night)

1 - Bus:
 Traffic volume : 336/77 veh/TimePeriod
 Speed : 80 km/h

POR2_SE

Data for Segment # 1: Transitway (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 / 33.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Results segment # 1: Transitway (day)

Source height = 0.50 m

RT/Custom (0.00 + 52.49 + 0.00) = 52.49 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.51	61.87	-5.17	-4.20	0.00	0.00	0.00	52.49

Segment Leq : 52.49 dBA

Total Leq All Segments: 52.49 dBA

↑

Results segment # 1: Transitway (night)

Source height = 0.50 m

RT/Custom (0.00 + 49.10 + 0.00) = 49.10 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.51	58.48	-5.17	-4.20	0.00	0.00	0.00	49.10

Segment Leq : 49.10 dBA

Total Leq All Segments: 49.10 dBA

↑

POR2_SE

TOTAL Leq FROM ALL SOURCES (DAY): 61.43
(NIGHT): 54.65

↑
↑

Filename: por3_se.te Time Period: Day/Night 16/8 hours
 Description: POR3_SE - E facade, SE corner, 2nd floor

Rail data, segment # 1: Railway (day/night)

```

-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng !Cont
Type          !             !(km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1.          ! 28.0/1.0   ! 55.0 ! 1.0 ! 6.0 !Diesel! No
  
```

Data for Segment # 1: Railway (day/night)

```

-----
Angle1  Angle2      : 39.00 deg  90.00 deg
Wood depth      :          0   (No woods.)
No of house rows :          0 / 0
Surface         :          1   (Absorptive ground surface)
Receiver source distance : 289.00 / 289.00 m
Receiver height :    7.50 / 7.50 m
Topography      :          1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle :    0.00
  
```

↑
 Results segment # 1: Railway (day)

LOCOMOTIVE (0.00 + 39.52 + 0.00) = 39.52 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
  39    90    0.41  64.83 -18.05  -7.25  0.00  0.00  0.00  39.52
  
```

WHEEL (0.00 + 31.06 + 0.00) = 31.06 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
  39    90    0.51  58.11 -19.40  -7.65  0.00  0.00  0.00  31.06
  
```

Segment Leq : 40.10 dBA

Total Leq All Segments: 40.10 dBA

↑
 Results segment # 1: Railway (night)

POR3_SE

 LOCOMOTIVE (0.00 + 28.06 + 0.00) = 28.06 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
39	90	0.41	53.37	-18.05	-7.25	0.00	0.00	0.00	28.06

WHEEL (0.00 + 19.59 + 0.00) = 19.59 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
39	90	0.51	46.65	-19.40	-7.65	0.00	0.00	0.00	19.59

Segment Leq : 28.64 dBA

Total Leq All Segments: 28.64 dBA

↑

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

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 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): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Highbury (day/night)

 Angle1 Angle2 : -90.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 31.00 / 31.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
Results segment # 1: Highbury (day)

Source height = 1.50 m

ROAD (0.00 + 58.45 + 0.00) = 58.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.48	67.27	0.00	-4.67	-4.15	0.00	0.00	0.00	58.45

Segment Leq : 58.45 dBA

Total Leq All Segments: 58.45 dBA

↑
Results segment # 1: Highbury (night)

Source height = 1.50 m

ROAD (0.00 + 50.86 + 0.00) = 50.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.48	59.67	0.00	-4.67	-4.15	0.00	0.00	0.00	50.86

Segment Leq : 50.86 dBA

Total Leq All Segments: 50.86 dBA

↑
RT/Custom data, segment # 1: Transitway (day/night)

1 - Bus:
Traffic volume : 336/77 veh/TimePeriod
Speed : 80 km/h

Data for Segment # 1: Transitway (day/night)

Angle1 Angle2 : -81.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 / 33.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)

POR3_SE

Reference angle : 0.00

↑
Results segment # 1: Transitway (day)

Source height = 0.50 m

RT/Custom (0.00 + 55.43 + 0.00) = 55.43 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-81	90	0.51	61.87	-5.17	-1.27	0.00	0.00	0.00	55.43

Segment Leq : 55.43 dBA

Total Leq All Segments: 55.43 dBA

↑
Results segment # 1: Transitway (night)

Source height = 0.50 m

RT/Custom (0.00 + 52.04 + 0.00) = 52.04 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-81	90	0.51	58.48	-5.17	-1.27	0.00	0.00	0.00	52.04

Segment Leq : 52.04 dBA

Total Leq All Segments: 52.04 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 60.25
(NIGHT): 54.51

↑
↑

Filename: por4_nw.te Time Period: Day/Night 16/8 hours
 Description: POR4_NW - N facade, NW corner, 2nd floor

Rail data, segment # 1: Railway (day/night)

```
-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng !Cont
Type          !             !(km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1.          ! 28.0/1.0   ! 55.0 ! 1.0 ! 6.0 !Diesel! No
```

Data for Segment # 1: Railway (day/night)

```
-----
Angle1  Angle2      : -51.00 deg  90.00 deg
Wood depth      :          0   (No woods.)
No of house rows :          0 / 0
Surface         :          1   (Absorptive ground surface)
Receiver source distance : 226.00 / 226.00 m
Receiver height :    7.50 / 7.50 m
Topography      :          1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle :    0.00
```

↑
 Results segment # 1: Railway (day)

```
-----
LOCOMOTIVE (0.00 + 46.51 + 0.00) = 46.51 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
  -51    90    0.41  64.83 -16.55 -1.77   0.00   0.00   0.00  46.51
-----
```

```
-----
WHEEL (0.00 + 38.41 + 0.00) = 38.41 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
  -51    90    0.51  58.11 -17.79 -1.91   0.00   0.00   0.00  38.41
-----
```

Segment Leq : 47.14 dBA

Total Leq All Segments: 47.14 dBA

↑
 Results segment # 1: Railway (night)

POR4_NW

 LOCOMOTIVE (0.00 + 35.05 + 0.00) = 35.05 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-51	90	0.41	53.37	-16.55	-1.77	0.00	0.00	0.00	35.05

 WHEEL (0.00 + 26.94 + 0.00) = 26.94 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-51	90	0.51	46.65	-17.79	-1.91	0.00	0.00	0.00	26.94

 Segment Leq : 35.67 dBA

Total Leq All Segments: 35.67 dBA

↑

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

 Car traffic volume : 28336/2464 veh/TimePeriod *
 Medium truck volume : 2254/196 veh/TimePeriod *
 Heavy truck volume : 1610/140 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): 35000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Greenbank (day/night)

 Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 97.00 / 97.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: Greenbank (day)

Source height = 1.50 m

ROAD (0.00 + 57.53 + 0.00) = 57.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.48	73.68	0.00	-12.00	-4.15	0.00	0.00	0.00	57.53

Segment Leq : 57.53 dBA

Total Leq All Segments: 57.53 dBA



Results segment # 1: Greenbank (night)

Source height = 1.50 m

ROAD (0.00 + 49.93 + 0.00) = 49.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.48	66.08	0.00	-12.00	-4.15	0.00	0.00	0.00	49.93

Segment Leq : 49.93 dBA

Total Leq All Segments: 49.93 dBA



RT/Custom data, segment # 1: Transitway (day/night)

1 - Bus:

Traffic volume : 336/77 veh/TimePeriod

Speed : 80 km/h

Data for Segment # 1: Transitway (day/night)

Angle1	Angle2	:	-68.00 deg	0.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	93.00 / 93.00	m	
Receiver height	:	7.50 / 7.50	m	
Topography	:	1	(Flat/gentle slope; no barrier)	

Filename: por5.te Time Period: Day/Night 16/8 hours
 Description: POR5 - NW OLA, 1st floor, houses as barriers

Rail data, segment # 1: Railway (day/night)

Train Type	! Trains !	! Speed !(km/h) !	!# loc !/Train!	!# Cars! /Train!	Eng type	!Cont !weld
1.	! 28.0/1.0 !	! 55.0 !	! 1.0 !	! 6.0 !	!Diesel!	No

Data for Segment # 1: Railway (day/night)

 Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 223.00 / 223.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 No Whistle
 Barrier angle1 : -90.00 deg Angle2 : -18.00 deg
 Barrier height : 7.50 m
 Barrier receiver distance : 168.00 / 168.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

↑
 Results segment # 1: Railway (day)

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m) !	! Barrier Height (m) !	! Elevation of Barrier Top (m) !
4.00 !	1.50 !	3.38 !	3.38
0.50 !	1.50 !	0.75 !	0.75

LOCOMOTIVE (0.00 + 38.53 + 42.94) = 44.29 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-18	0.14	64.83	-13.30	-4.45	0.00	0.00	-8.54	38.53

POR5

-18	90	0.58	64.83	-18.58	-3.30	0.00	0.00	0.00	42.94
WHEEL (0.00 + 27.67 + 35.24) = 35.94 dBA									
Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-18	0.24	58.11	-14.54	-4.78	0.00	0.00	-11.12	27.67
-18	90	0.66	58.11	-19.46	-3.41	0.00	0.00	0.00	35.24

Segment Leq : 44.88 dBA

Total Leq All Segments: 44.88 dBA

↑
Results segment # 1: Railway (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	3.38	3.38
0.50	1.50	0.75	0.75

LOCOMOTIVE (0.00 + 27.07 + 31.48) = 32.82 dBA									
Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-18	0.14	53.37	-13.30	-4.45	0.00	0.00	-8.54	27.07
-18	90	0.58	53.37	-18.58	-3.30	0.00	0.00	0.00	31.48

WHEEL (0.00 + 16.21 + 23.78) = 24.48 dBA									
Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-18	0.24	46.65	-14.54	-4.78	0.00	0.00	-11.12	16.21
-18	90	0.66	46.65	-19.46	-3.41	0.00	0.00	0.00	23.78

Segment Leq : 33.41 dBA

Total Leq All Segments: 33.41 dBA

POR5

↑

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Greenbank (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 97.00 / 97.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -63.00 deg
Barrier height : 7.50 m
Barrier receiver distance : 54.00 / 54.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

↑

Road data, segment # 2: Highbury (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

POR5

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Highbury (day/night)

 Angle1 Angle2 : 0.00 deg 42.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 84.00 / 84.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: Greenbank (day)

 Source height = 1.50 m

Barrier height for grazing incidence

 Source ! Receiver ! Barrier ! Elevation of
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
 -----+-----+-----+-----
 1.50 ! 1.50 ! 1.50 ! 1.50

ROAD (0.00 + 44.63 + 58.42) = 58.60 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 -63 0.21 73.68 0.00 -9.81 -9.77 0.00 0.00 -9.47 44.63

 -63 90 0.66 73.68 0.00 -13.46 -1.80 0.00 0.00 0.00 58.42

Segment Leq : 58.60 dBA

↑
 Results segment # 2: Highbury (day)

 Source height = 1.50 m

ROAD (0.00 + 46.74 + 0.00) = 46.74 dBA

POR5

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	42	0.66	65.75	0.00	-12.42	-6.59	0.00	0.00	0.00	46.74

Segment Leq : 46.74 dBA

Total Leq All Segments: 58.87 dBA

↑
Results segment # 1: Greenbank (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 37.03 + 50.82) = 51.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-63	0.21	66.08	0.00	-9.81	-9.77	0.00	0.00	-9.47	37.03
-63	90	0.66	66.08	0.00	-13.46	-1.80	0.00	0.00	0.00	50.82

Segment Leq : 51.00 dBA

↑
Results segment # 2: Highbury (night)

Source height = 1.50 m

ROAD (0.00 + 39.15 + 0.00) = 39.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	42	0.66	58.16	0.00	-12.42	-6.59	0.00	0.00	0.00	39.15

Segment Leq : 39.15 dBA

Total Leq All Segments: 51.27 dBA

POR5



RT/Custom data, segment # 1: Transitway (day/night)

1 - Bus:

Traffic volume : 336/77 veh/TimePeriod

Speed : 80 km/h

Data for Segment # 1: Transitway (day/night)

Angle1 Angle2 : -67.00 deg 4.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 93.00 / 93.00 m

Receiver height : 1.50 / 1.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00



Results segment # 1: Transitway (day)

Source height = 0.50 m

RT/Custom (0.00 + 44.00 + 0.00) = 44.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	4	0.66	61.87	-13.15	-4.71	0.00	0.00	0.00	44.00

Segment Leq : 44.00 dBA

Total Leq All Segments: 44.00 dBA



Results segment # 1: Transitway (night)

Source height = 0.50 m

RT/Custom (0.00 + 40.61 + 0.00) = 40.61 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	4	0.66	58.48	-13.15	-4.71	0.00	0.00	0.00	40.61

Segment Leq : 40.61 dBA

POR5

Total Leq All Segments: 40.61 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 59.18
(NIGHT): 51.70

↑

↑

Filename: por5_bar.te Time Period: Day/Night 16/8 hours
 Description: POR5_BAR - NW OLA, 1st floor, 2m barrier

Rail data, segment # 1: Railway (day/night)

```

-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng !Cont
Type          !             !(km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1.          ! 28.0/1.0   ! 55.0 ! 1.0 ! 6.0 !Diesel! No
    
```

Data for Segment # 1: Railway (day/night)

```

-----
Angle1  Angle2      : -90.00 deg  90.00 deg
Wood depth      :          0   (No woods.)
No of house rows :          0 / 0
Surface         :          1   (Absorptive ground surface)
Receiver source distance : 223.00 / 223.00 m
Receiver height :    1.50 / 1.50 m
Topography     :          2   (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -90.00 deg  Angle2 : 39.00 deg
Barrier height :    2.00 m
Barrier receiver distance : 4.00 / 4.00 m
Source elevation :    0.00 m
Receiver elevation :    0.00 m
Barrier elevation :    0.00 m
Reference angle :    0.00
    
```

↑
 Results segment # 1: Railway (day)

Barrier height for grazing incidence

```

-----
Source      ! Receiver   ! Barrier    ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
    4.00 !    1.50 !    1.54 !    1.54
    0.50 !    1.50 !    1.48 !    1.48
    
```

LOCOMOTIVE (0.00 + 39.50 + 38.33) = 41.96 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
  -90   39   0.47  64.83 -17.17 -2.25  0.00  0.00 -5.91  39.50
    
```

POR5_BAR

39	90	0.58	64.83	-18.58	-7.92	0.00	0.00	0.00	38.33
----	----	------	-------	--------	-------	------	------	------	-------

WHEEL (0.00 + 31.18 + 30.46) = 33.84 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	39	0.57	58.11	-18.40	-2.38	0.00	0.00	-6.14	31.18
39	90	0.66	58.11	-19.46	-8.18	0.00	0.00	0.00	30.46

Segment Leq : 42.58 dBA

Total Leq All Segments: 42.58 dBA

↑

Results segment # 1: Railway (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	1.54	1.54
0.50	1.50	1.48	1.48

LOCOMOTIVE (0.00 + 28.04 + 26.86) = 30.50 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	39	0.47	53.37	-17.17	-2.25	0.00	0.00	-5.91	28.04
39	90	0.58	53.37	-18.58	-7.92	0.00	0.00	0.00	26.86

WHEEL (0.00 + 19.71 + 19.00) = 22.38 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	39	0.57	46.65	-18.40	-2.38	0.00	0.00	-6.14	19.71
39	90	0.66	46.65	-19.46	-8.18	0.00	0.00	0.00	19.00

Segment Leq : 31.12 dBA

Total Leq All Segments: 31.12 dBA

POR5_BAR



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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Greenbank (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 97.00 / 97.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 2.00 m
Barrier receiver distance : 4.00 / 54.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



Road data, segment # 2: Highbury (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

POR5_BAR

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Highbury (day/night)

 Angle1 Angle2 : 0.00 deg 42.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 84.00 / 84.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 0.00 deg Angle2 : 42.00 deg
 Barrier height : 2.00 m
 Barrier receiver distance : 10.00 / 10.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

↑
 Results segment # 1: Greenbank (day)

 Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 53.97 + 0.00) = 53.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.54	73.68	0.00	-12.49	-1.25	0.00	0.00	-5.97	53.97

Segment Leq : 53.97 dBA

↑
 Results segment # 2: Highbury (day)

POR5_BAR

Source height = 1.50 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.50 !          1.50 !          1.50 !          1.50
  
```

ROAD (0.00 + 42.04 + 0.00) = 42.04 dBA

```

Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
      0     42   0.54  65.75   0.00 -11.52  -6.54   0.00   0.00  -5.65  42.04
  
```

Segment Leq : 42.04 dBA

Total Leq All Segments: 54.24 dBA

↑
Results segment # 1: Greenbank (night)

Source height = 1.50 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.50 !          1.50 !          1.50 !          1.50
  
```

ROAD (0.00 + 47.17 + 0.00) = 47.17 dBA

```

Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
    -90     90   0.54  66.08   0.00 -12.49  -1.25   0.00   0.00  -5.17  47.17
  
```

Segment Leq : 47.17 dBA

↑
Results segment # 2: Highbury (night)

Source height = 1.50 m

Barrier height for grazing incidence

POR5_BAR

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.50 !          1.50 !          1.50 !          1.50

```

```

ROAD (0.00 + 34.44 + 0.00) = 34.44 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
          0      42    0.54  58.16   0.00 -11.52  -6.54   0.00   0.00  -5.65  34.44
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----

```

Segment Leq : 34.44 dBA

Total Leq All Segments: 47.40 dBA

↑
RT/Custom data, segment # 1: Transitway (day/night)

```

-----
1 - Bus:
Traffic volume      :   336/77    veh/TimePeriod
Speed                :    80 km/h

```

Data for Segment # 1: Transitway (day/night)

```

-----
Angle1  Angle2      : -67.00 deg   4.00 deg
Wood depth      :          0   (No woods.)
No of house rows :          0 / 0
Surface         :          1   (Absorptive ground surface)
Receiver source distance : 93.00 / 93.00 m
Receiver height  :    1.50 / 1.50 m
Topography      :          1   (Flat/gentle slope; no barrier)
Reference angle  :    0.00

```

↑
Results segment # 1: Transitway (day)

Source height = 0.50 m

```

RT/Custom (0.00 + 44.00 + 0.00) = 44.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
      -67      4    0.66  61.87 -13.15  -4.71   0.00   0.00   0.00  44.00
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----

```

Segment Leq : 44.00 dBA

POR5_BAR

Total Leq All Segments: 44.00 dBA

↑

Results segment # 1: Transitway (night)

Source height = 0.50 m

RT/Custom (0.00 + 40.61 + 0.00) = 40.61 dBA

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

-67	4	0.66	58.48	-13.15	-4.71	0.00	0.00	0.00	40.61
-----	---	------	-------	--------	-------	------	------	------	-------

Segment Leq : 40.61 dBA

Total Leq All Segments: 40.61 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 54.90

(NIGHT): 48.31

↑

↑

Appendix D: Distances and Angles Used in STAMSON 5.04

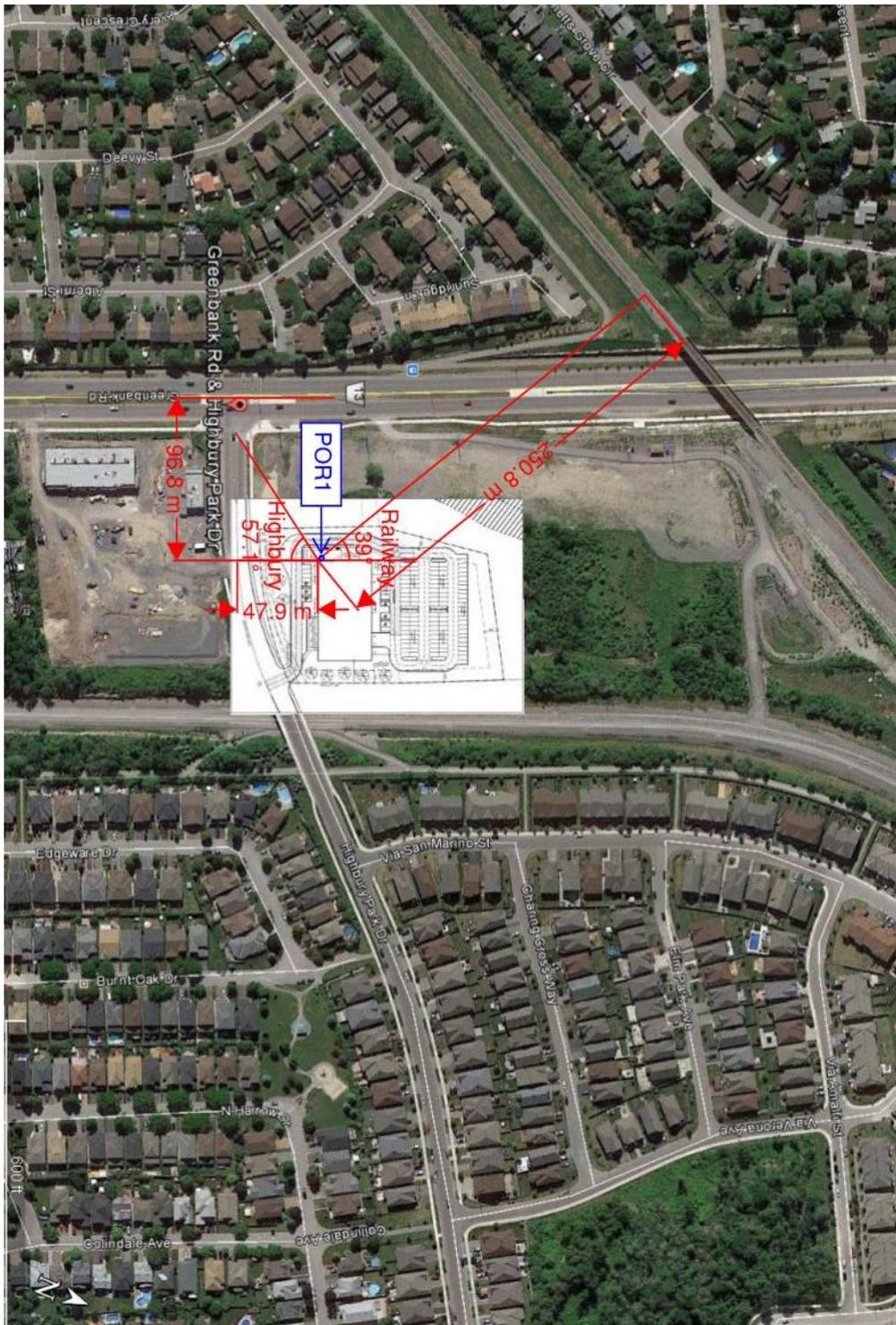


Figure 5: Distances and angles used in STAMSON 5.04 for POR1

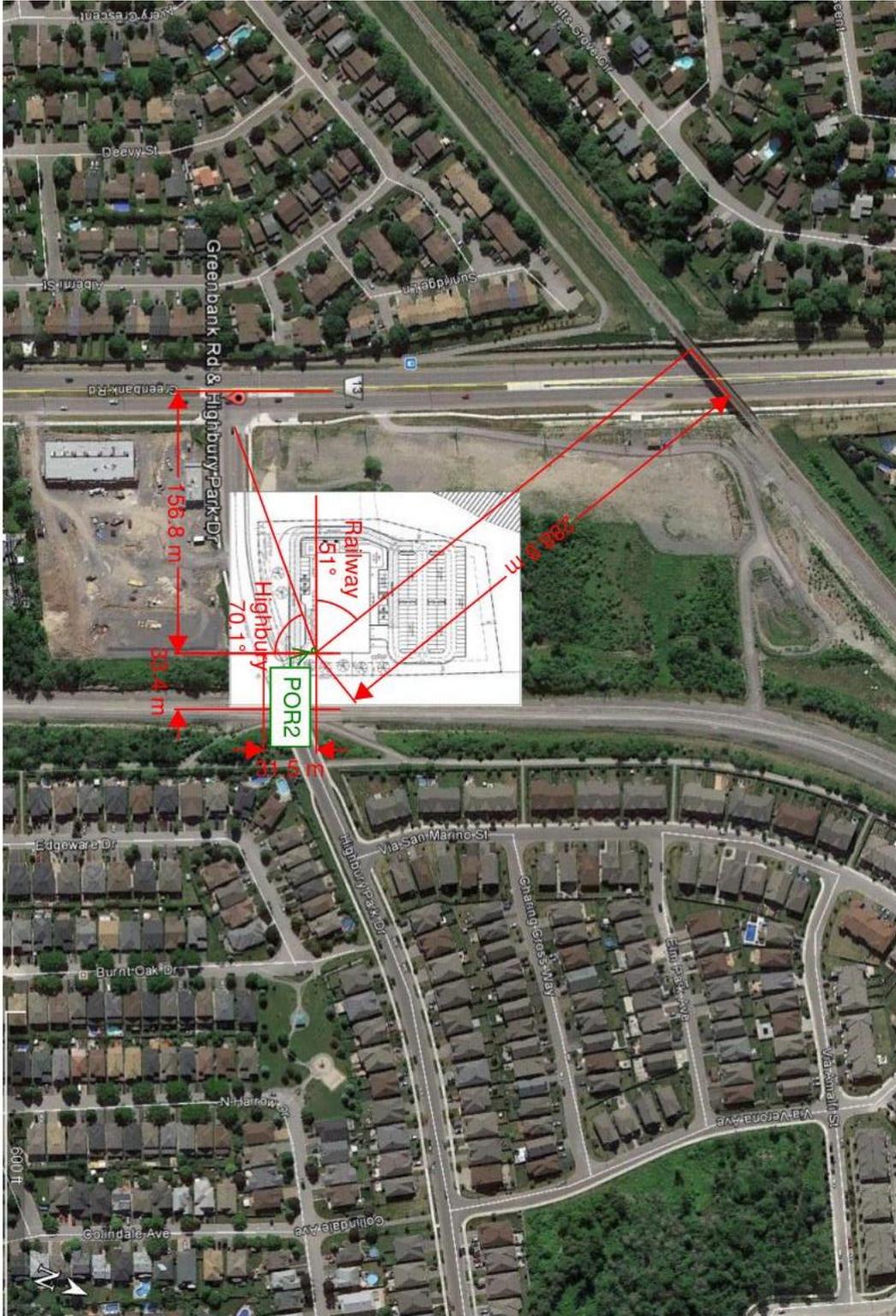


Figure 6: Distances and angles used in STAMSON 5.04 for POR2

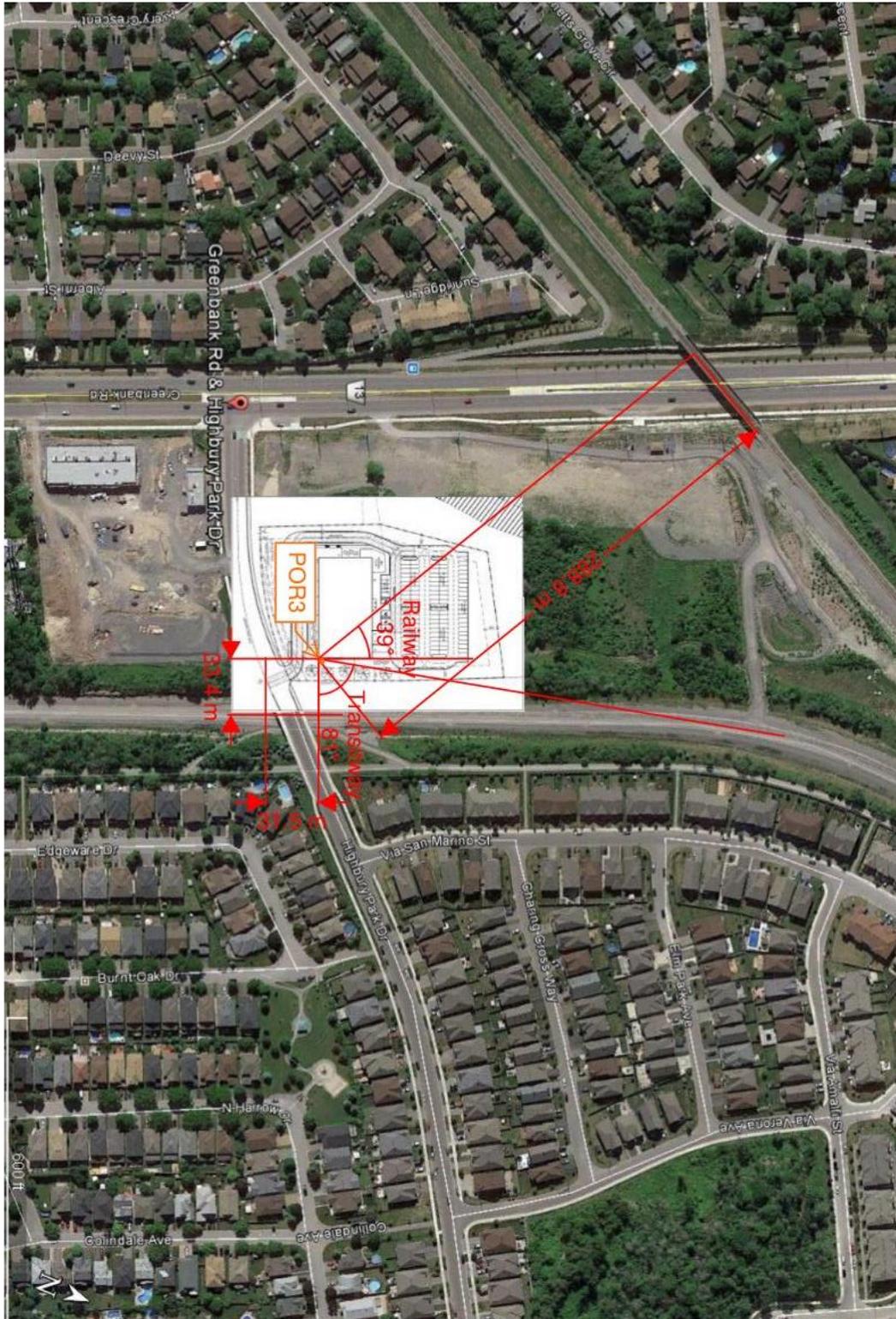


Figure 7: Distances and angles used in STAMSON 5.04 for POR3

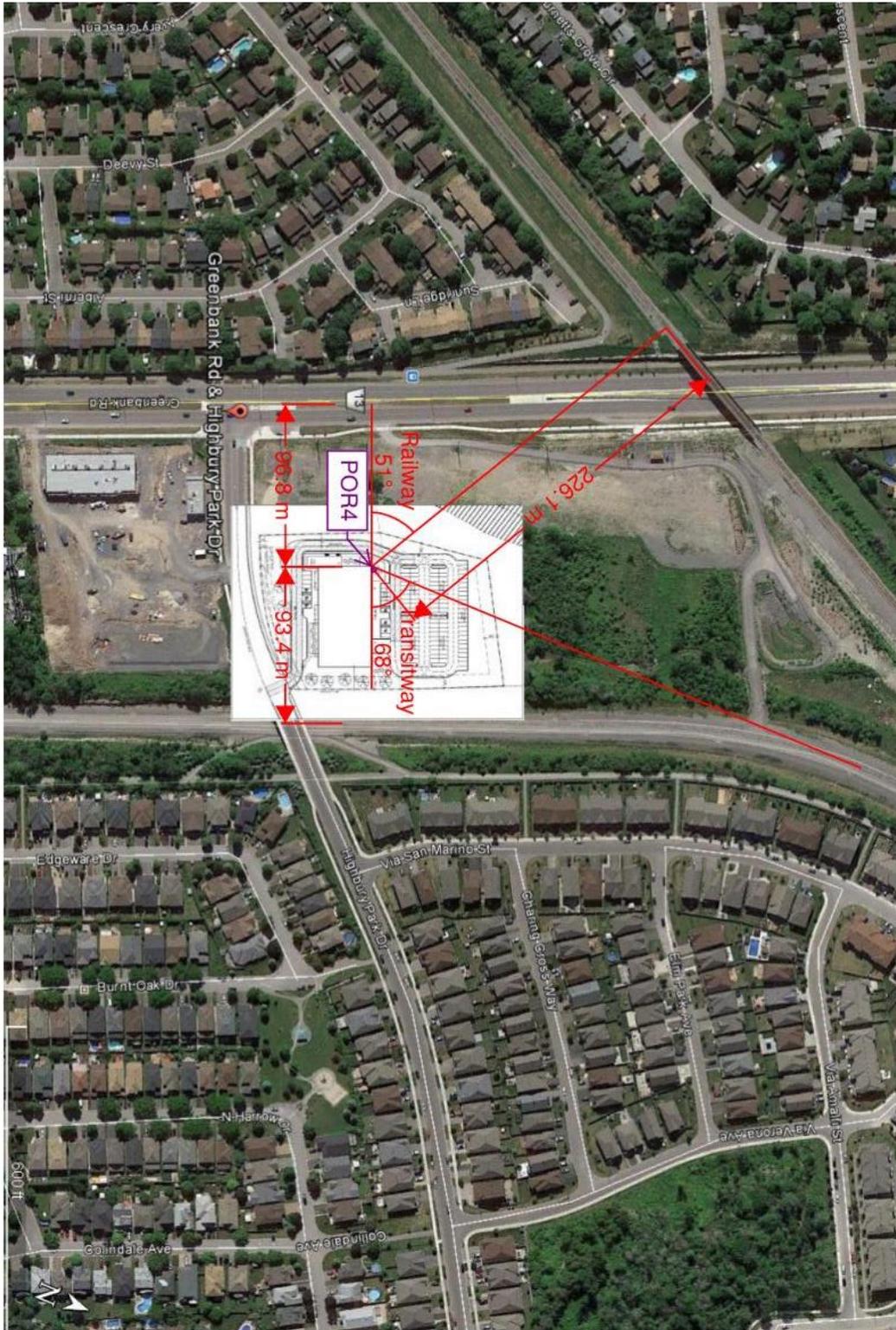


Figure 8: Distances and angles used in STAMSON 5.04 for POR4

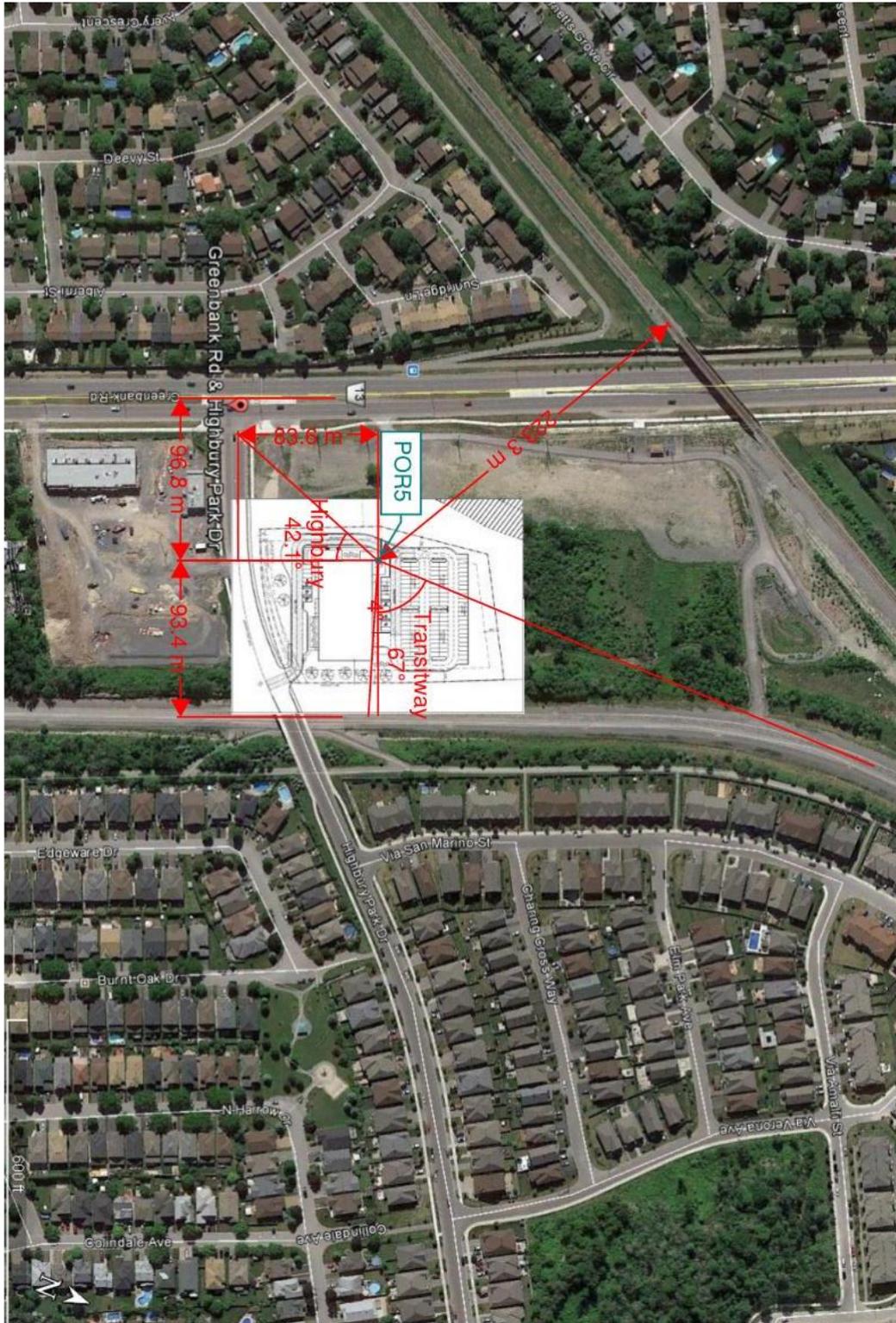


Figure 9: Distances and angles used in STAMSON 5.04 for POR5 (Noise Sources)

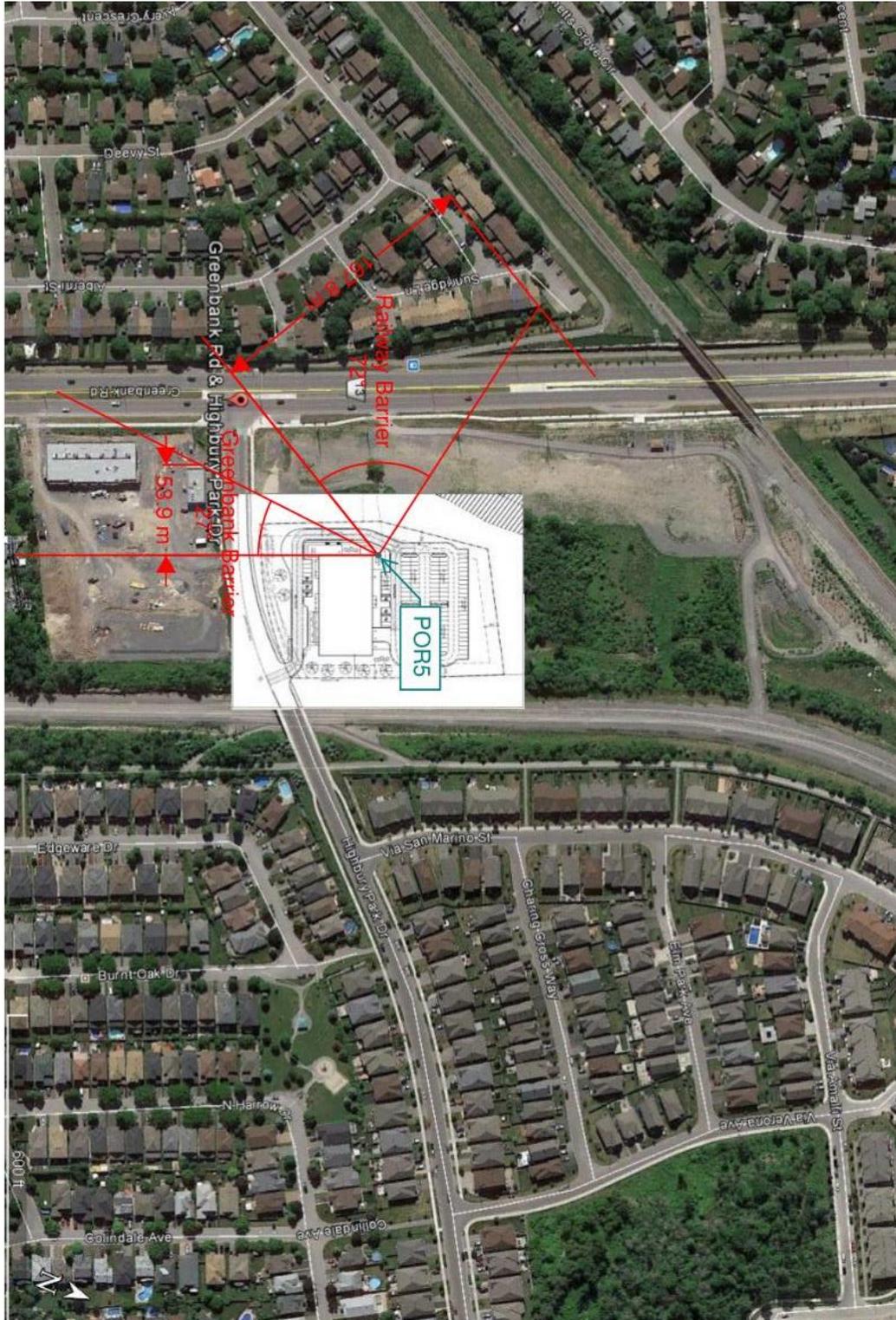


Figure 10: Distances and angles used in STAMSON 5.04 for POR5 (Barriers due to surrounding buildings)

Appendix E: Vibration Measurement Location

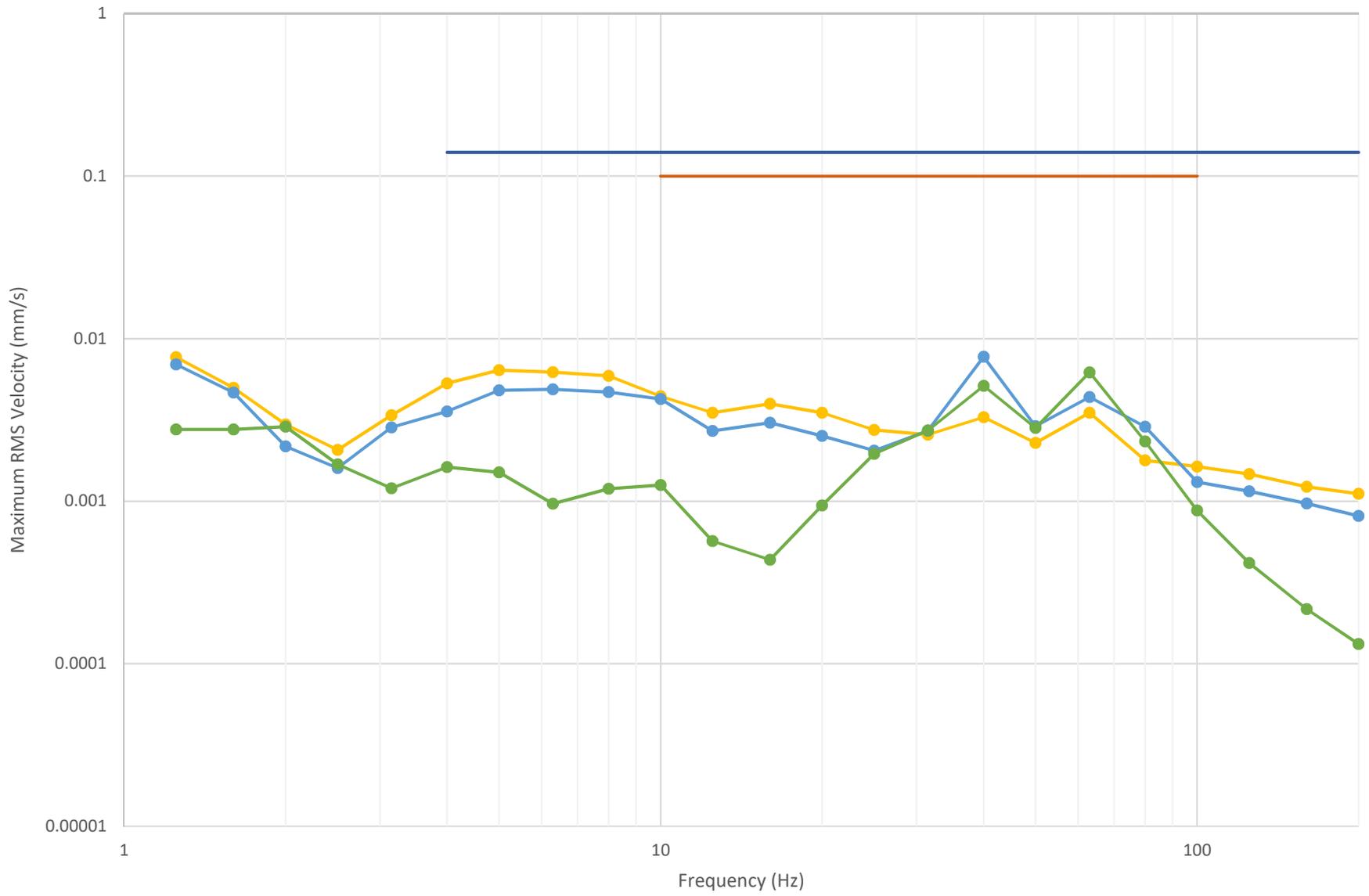


Figure 11: Location of rail vibration measurements



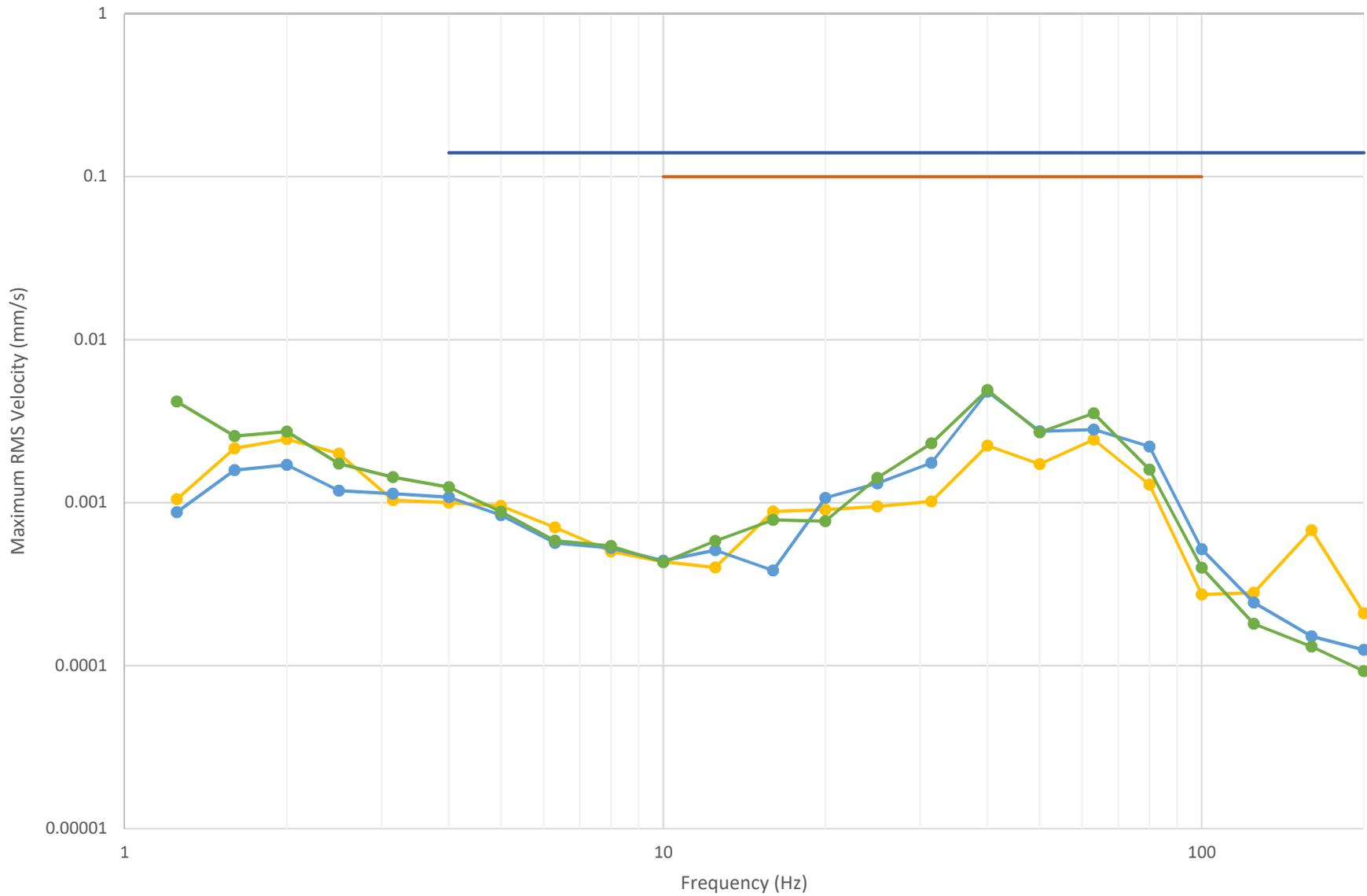
Appendix F: Vibration Measurement Data

Via Train 1 - Westbound, 6 Cars, Approx. 55 km/h



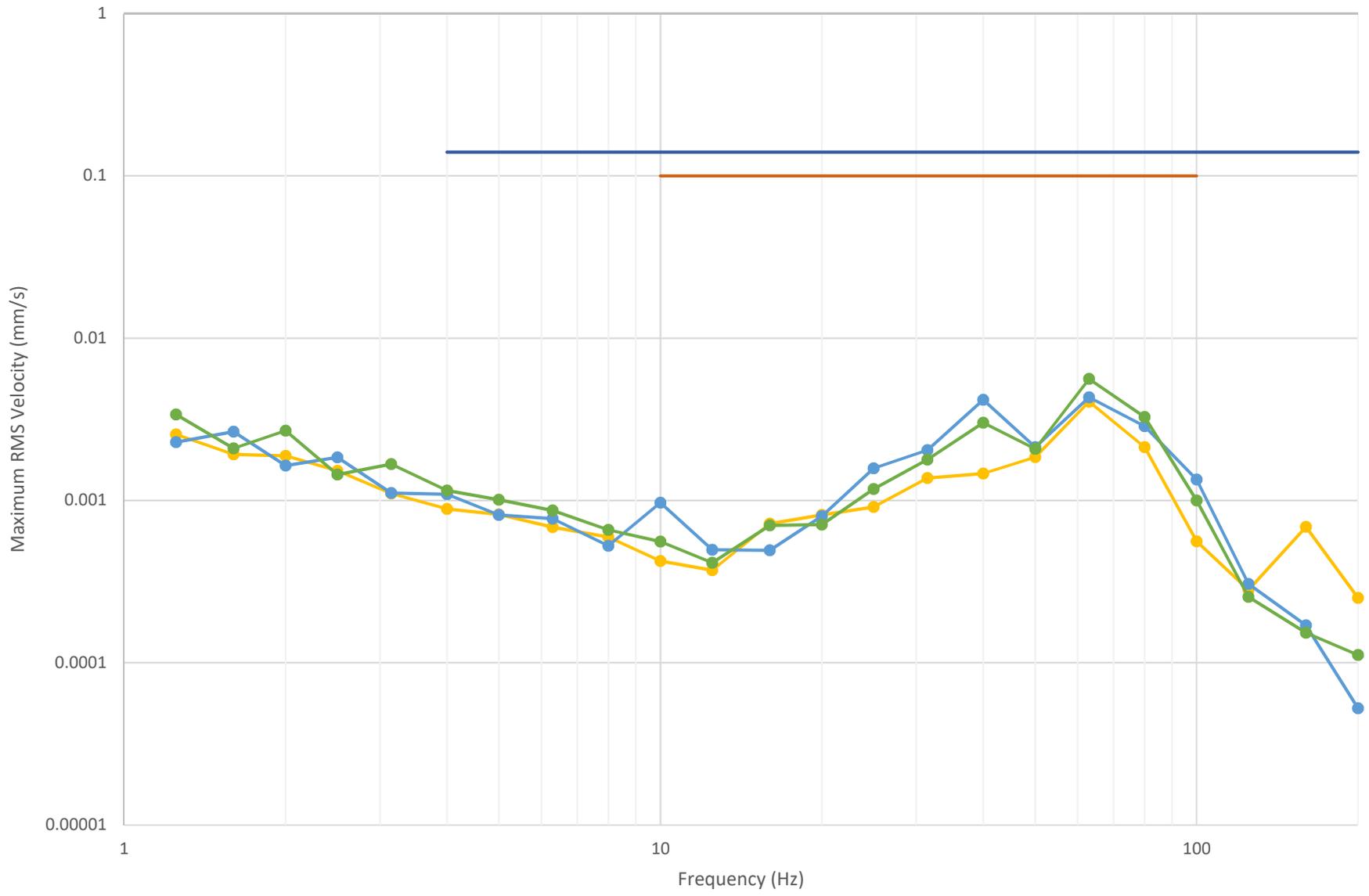
Vertical Transverse (E-W) Longitudinal (N-S) CN Criteria MOECP Criteria

Via Train 2 - Eastbound, 6 Cars, Approx. 55 km/h



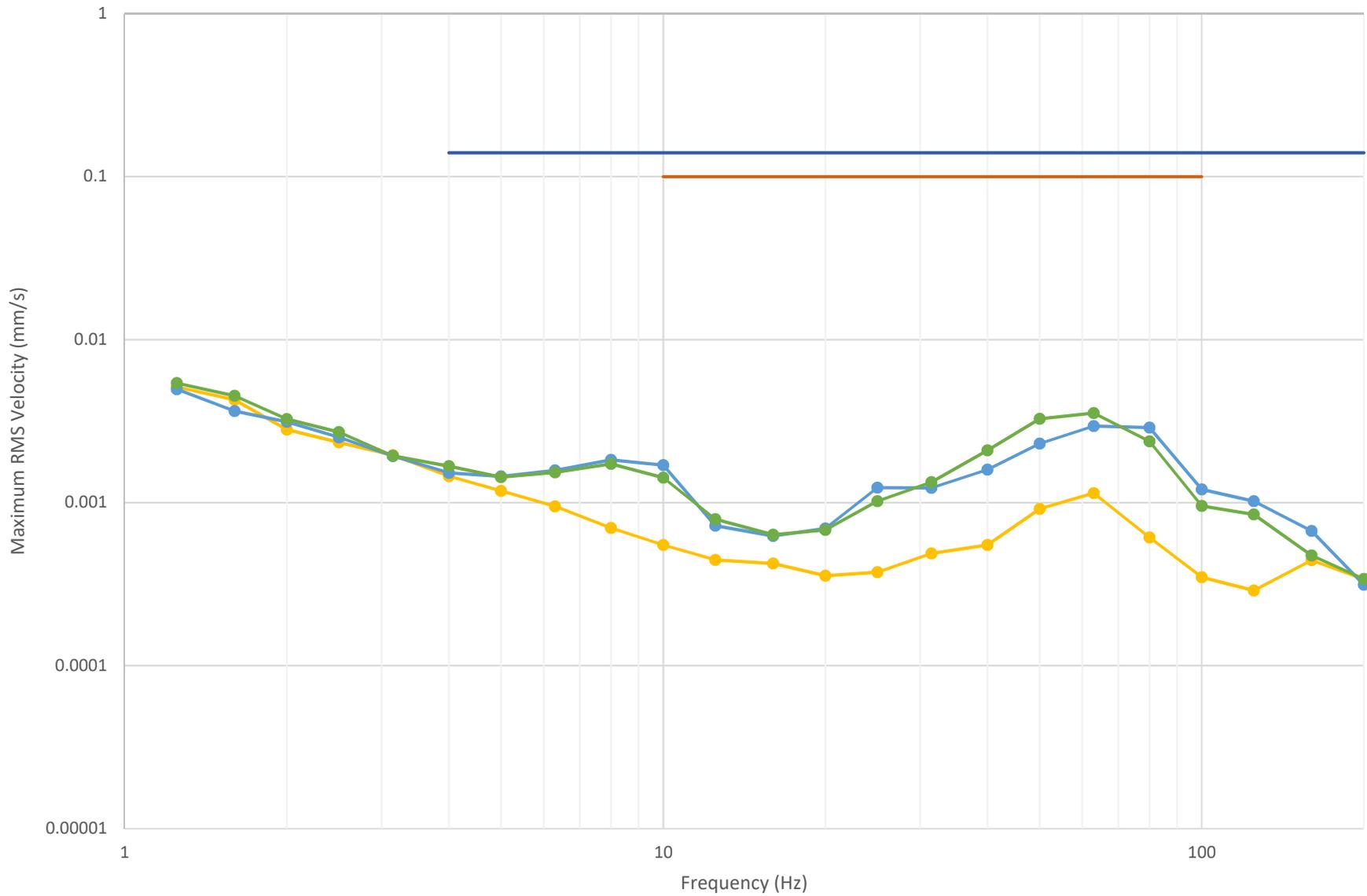
Vertical Transverse (E-W) Longitudinal (N-S) CN Criteria MOECP Criteria

Via Train 3 - Westbound, 4 Cars, Approx. 50 km/h



Vertical Transverse (E-W) Longitudinal (N-S) CN Criteria MOECP Criteria

Average Ambient Vibration Levels



Vertical Transverse (E-W) Longitudinal (N-S) CN Criteria MOECP Criteria