

October 15, 2024

Atten: Manni Japra
Home Life
3050 Jefferson Blvd.
Windsor, ON N8T 3G9
C: (519) 977-7927

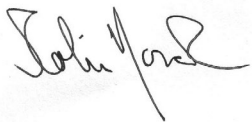
Re: Environmental Noise and Vibration Assessment for the Proposed Residential Development - 3161
Jefferson Blvd, City of Windsor

Dear Mr. Japra,

Please find enclosed a noise and vibration assessment report for the proposed residential development at 3161 Jefferson Blvd, in the City of Windsor. This assessment pertains to the noise and vibration impacts caused by the nearby road and railway line.

I trust that the enclosed information meets your requirements. Please do not hesitate to contact me if you have any questions.

Sincerely,



Colin Novak PhD, PEng

**Noise and Vibration Assessment for the proposed
Residential Development at 3161 Jefferson Blvd.
City of Windsor**



Manni Japra
Home Life
3050 Jefferson Blvd.
Windsor, ON N8T 3G9
C: (519) 977-7927

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Statement of Liability

Akoustik Engineering Limited prepared this report for Home Life. The material in it reflects Dr. Helen Ule's and Dr. Colin Novak's judgement considering the information available to them and Akoustik Engineering Limited at the time of the measurements and report preparation, under the stated test conditions. Any use that a Third Party makes of this report, or any reliance on decisions made based on it, is the responsibility of such Third Parties. Akoustik Engineering Limited accepts no responsibility for damages, if any, suffered by any Third Party resulting from decisions made or actions based on this report.

Introduction

This report is a noise and vibration assessment for the proposed residential development to be located at 3161 Jefferson Blvd, in the City of Windsor. The assessment pertains to the environmental noise and vibration impacts from nearby road and rail traffic. An illustration of the geographical area showing the proposed development area, including the development layout is given in Appendix A: Site Location. The expected noise impacts have been predicted using the Ministry of the Environment, Conservation and Parks (MECP) prediction software STAMSON and are based on available road and rail traffic volumes, which have been projected 10 years forward. Also taken into consideration are the guidelines given by the CN and Federation of Canadian Municipalities and Railway Association of Canada. Given that the road and rail traffic occurs during all periods of a 24-hour day, as defined by the applicable Noise Pollution Control documents (NPC-300), the assessment has been carried out for the entire 24-hour period. Given the close proximity of the railway to the proposed buildings, ground vibration measurements and assessment was conducted. Any recommended abatement to control the noise and/or vibration are included in this report.

Identification of Noise Sources

The proposed development is surrounded by residential housing to the north and west of the property and industrial property to the south and east. A CN Rail main line is located immediately south of the property and Jefferson Blvd is located to the east. The Ministry of the Environment (MECP) specifications for the identification of existing or future major sources of noise impact on a development is whether they are within 500 metres of the site. A zoning map of the study area is provided in Appendix B: Land-use Zoning Map of Area. The noise sources which could possibly produce an impact on the proposed development are Jefferson Blvd and the CN railway, located on the east and south property lines of the development, respectively. There are no other significant sources of noise or vibration which are expected to have an impact on the proposed development.

Ministry of the Environment and Climate Change Noise Criteria

In accordance with the MECP Guideline NPC-300, the following sound level limits for residential developments of Class 2 have been set and are shown for both roadway and rail noise in Table 1 and 2 below respectively. Select pages from the NPC-300 guideline have been included in Appendix C: NPC-300 Reference Pages for reference. The proposed development is classified as a Class 2 area, given that the region exhibits features of both a Class 1 and a Class 3 area, based on the environmental noise characteristics. It is worth noting that when the sound level limits presented in Table 1 and 2 are exceeded, noise control abatement is required.

Table 1: Ministry of the Environment, Conservation and Parks Noise Criteria for Roadway Noise

Location	Daytime L_{eq} [dBA]	Nighttime L_{eq} [dBA]
Outdoor Living Area (OLA)	55	--
Plane of Window (Indoor)	55 (45)	50 (40)

Table 2: Ministry of the Environment, Conservation and Parks Noise Criteria for Rail Noise

Location	Daytime L_{eq} [dBA]	Nighttime L_{eq} [dBA]
Outdoor Living Area (OLA)	55	--
Plane of Window (Indoor)	55 (40)	50 (35)

From Table 1 and 2, daytime refers to the period from 07:00 to 23:00 and nighttime refers to the period from 23:00 to 07:00 hours. An outdoor living area (OLA) refers to a location such as a patio, yard, or barbeque area. For this development, no OLA has been assessed for impacts as there are no designated yards, common or gathering areas. Given that the proposed balconies for the residential units have depths less than 4 m, they do not fall under the criteria for an OLA for noise assessment purposes.

The limits presented in Table 1 and 2 are the limits before noise control measures are required. The noise level limit in an OLA may be exceeded by up to 5 dBA if proper warning clauses are inserted in the titles, deeds, and any tenancy agreements relating to the property and only after barriers or other noise control measures have been found to be impractical or unfeasible. A noise attenuation barrier is required to protect and bring the sound level down to 55 dBA in the OLA if the noise level exceeds 60 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with the appropriate warning clause; in this situation, any excess above the noise limit will not be deemed acceptable if it exceeds 5 dB.

The guideline also recommends the provision for the installation of central air conditioning when the noise level outside the plane of a window exceeds 55 dBA for the daytime or 50 dBA for the nighttime. If the noise level exceeds 65 dBA for the daytime or 60 dBA for the nighttime, the installation of central air conditioning should be implemented. Further, building components including exterior walls, windows and doors should be designed to have sufficient Sound Transmission Class (STC) ratings to meet the indoor noise guidelines given in Tables 1 and 2.

Federation of Canadian Municipalities (FCM) and Railway Association of Canada (RAC)

In accordance with the FCM and RAC “Guideline for New Development in Proximity to Railway Operations”, the following figure 1 illustrates the minimum setback requirement for all dwellings. FCM and RAC suggest the use of multiple mitigation measures to minimize the potential impact of an existing railway on new development as seen in Figure 1 below. This includes the use of a minimum setback distance, earthen berm, acoustical and/or chain link security fence, as well as additional building material attenuation techniques. The minimum set back distance contributes to mitigation against the potential impact of a railway in terms of noise and vibration through distance separation.

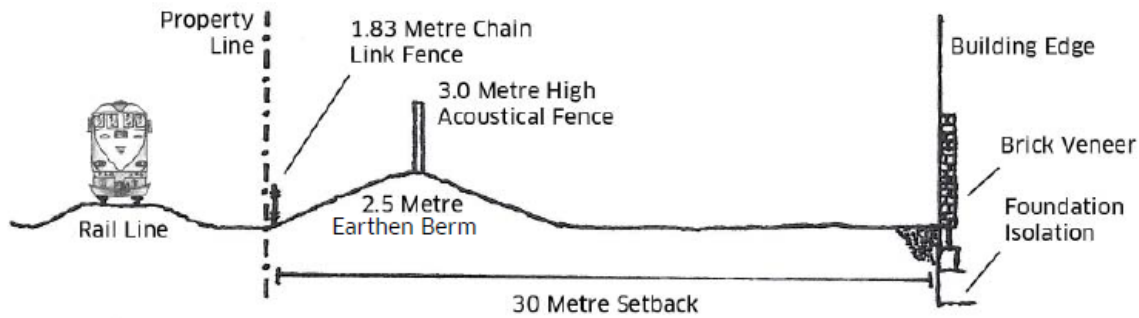


Figure 1: Standard Mitigation for New Residential Development in Proximity to a Main Line Railway

Noise Source Data

All assumptions used in this report and for the development of the model are itemized in Appendix D. Road traffic volume data was obtained from the City of Windsor Average Daily Traffic Volume document dated January 2020. It is assumed in this case that the annual average daily traffic (AADT) is equivalent to the average daily traffic (ADT). The projected road traffic volumes, including the assumed breakdown of vehicle types are given in Appendix E: Road Traffic Volume Data. Also, given in Appendix E are the distances between the representative receptor locations and the roadways that were used for the model. The posted speed for Jefferson Blvd is 50 km/h.

As only one year of traffic volume data is available from the traffic report document, a conservative 2.5% growth rate is assumed for the roadway. The day and night traffic volumes are calculated having an assumed 90%-day and 10%-night split as per the MECP STAMSON protocol. The volume of commercial truck traffic for Jefferson Blvd was taken as 10 percent with an equal mix of heavy and medium trucks.

Rail traffic volume data was obtained from the rail schedule provided by CN Rail. The rail volume (taken from August 2024) was projected 10 years, using a 2.5% increase per annum, as prescribed by CN Rail. As such, the predicted noise levels given in this report are for future traffic volumes for the year 2034. A letter from CN detailing the supplied rail volume information along with the subsequent projected rail data along and train schedules is included in Appendix F: Rail Traffic Volume Data. Also, given in Appendix F are the distances between the rail and the representative receptor locations.

Identification of the Representative Receptor Locations

Upon examination of the proposed residential development, the basement and second floor were evaluated for the east façade of the building facing Jefferson Blvd and the CN Rail line. The windows facing towards the south were not evaluated as they are situated in nonliving areas of the home (hallways, etc.). It should be noted that the basement unit was evaluated on the east façade however it should be noted that there is no line of sight from the basement façade as the basement is 1.2 metres below grade. The units selected were due to their proximity to the road and railway, as well as for orientation. The locations are as follows:

- POR 1A on east façade of south block, 0.5 m (basement)
- POR 1B on east façade of south block, 5 m (second floor)
- POR 2 on east façade of middle block, 5 m (second floor)
- POR 3 on east façade of north block, 5 m (second floor)

Assessment Approach

The predicted sound levels from the nearby road and rail traffic have been determined through the application of the prediction noise modelling software STAMSON 5.0. All input data pertaining to the lot layout parameters was based on the layout plan provided at the time of the study, as shown in Appendix A: Site Location. The input data used to calculate the predicted sound level exposures for the selected units impacted by the road and rail traffic noise and the resulting outputs is given in Appendix G: Noise Model Printout.

The prediction model used to predict the noise levels at the representative floor levels is used to determine the extent of the noise control measures required (if any). The MECP requires the calculation of the noise impacts at the OLA and plane of window of the dwellings. Since the balconies shown in the site plan are less than 4 metres in depth, they are not considered to be a dwelling OLA. Given that there are no other designated yards, common or gathering areas within the development, no OLAs have been assessed for impacts in this report.

To evaluate the railway vibration impacts, vibration monitoring equipment was setup on June 21, 22 and 24, 2024, near the southwest corner of the proposed development nearest to the rail track. The location of the monitoring equipment is shown in Appendix A: Site Location. A list of the measurement equipment is provided in Appendix H: Measurement Equipment List.

Results and Noise Control Requirements

The following section is a summary and assessment of the modeled results for the representative unit.

Road and Rail Noise

As specified by the MECP Environmental Noise Guideline NPC-300, the outdoor and indoor sound level limits (based on one-hour $L_{A_{eq}}$ values) at a residence for road and rail traffic noise are categorized into three (3) limits, based on the type of space assessed. The document also specifies the recommended noise control measures, if required, that should be followed for the OLA, plane of a window (ventilation requirements) and the indoor living area (building components) noise assessments. Select pages from the NPC-300 guideline are given in Appendix C: NPC-300 Reference Pages, which includes the stated warning clauses and other requirements based on the predicted noise levels.

The predicted noise level impacts for the daytime and nighttime periods for the representative levels with no control measures are given in Table 3. From this table, it is seen that the MECP noise limits are exceeded at all locations. To ensure that the exceeded noise levels predicted at the plane of the windows meet the required indoor noise levels given in Tables 1 and 2, the sound transmission class (STC) ratings for the

windows/patio doors and wall components are required to be specified. Further, warning clauses must be implemented in all development agreements, offers to Purchase, and agreements of Purchase or Sale or Lease of each dwelling unit as detailed below.

Table 3: Predicted Noise Levels – Plane of Window

POR	Daytime Period LAeq (dBA) – plane of window	Nighttime Period LAeq (dBA) – plane of window
1A	67	63
1B	67	63
2	66	61
3	66	61

*red text denotes exceedance

Notes taken from NPC-300:

Note A: Noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.

Note B: Noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B.

Note C: The dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant’s discretion. Warning clause Type C is also recommended.

Note D: Installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2.

Note E: Building components including windows, walls and doors, where applicable, need to be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) needs to be specified. In addition, the exterior walls of the first row of dwellings next to railway tracks are to be built to a minimum of brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic Leq (24-hour), estimated at a location of a nighttime receptor, is greater than 60 dBA, and when the first row of dwellings is within 100 metres of the tracks.

It is required that the following warning clauses be implemented in all development agreements, offers to Purchase, and agreements of Purchase or Sale or Lease of each dwelling unit:

Warning Clause(s):

Type A: “Purchasers/tenants are advised that sound levels due to increasing road traffic 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, Conservation and Parks.”

Type B: "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic and rail traffic may on occasions 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, Conservation and Parks."

Type C: “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 closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.”

Type D: “This dwelling unit has been equipped with central air conditioning in order to allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks. Air conditioning units are to be installed in a noise insensitive area.”

Additionally, given the proximity of the proposed development, it is required that the following warning clause be implemented in all development agreements, offers to Purchase, and agreements of Purchase or Sale or Lease of each affected dwelling unit.

CN/VIA Rail Warning Clause:

CN/VIA Rail Canada Inc. or its assigns or successors in interest has or have a right-of-way within 300 meters 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). CN/VIA 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.

STC Requirements

Given the excessive noise levels predicted for the proposed building, the calculation of the minimum sound transmission class (STC) for the window and building wall components is necessary. The STC building requirements were determined for a bedroom having exposure to both Jefferson Blvd and the nearby railway. The sound level at the plane of the window was assumed to be the worst case 67 dBA during the daytime and 63 dBA at night. Given that the greatest noise impacts are from rail noise, the STC

requirements are calculated to achieve a 40 dBA daytime indoor sound level limit and a 35 dBA nighttime indoor sound level limit for the sleeping quarters. The windows/patio doors are assumed to be openable thick double paned windows/patio doors. For these, the assessed bedroom has a floor area of 28.5 m² with a window area of 3.78 m² and a wall area of 3.15 m². The program inputs and results for the STC calculations are given in Appendix L: STC Output Results. The necessary minimum building component STC requirements are given in Table 4.

Table 4: Building Components STC Requirements.

Noise Source	Exterior Wall	Window, openable thick double or triple
Railway noise	27	25

Rail Vibration

The ground vibration velocity levels were measured for the pass-by of five trains; the minimum number of trains required by CN Rail.

A Brüel & Kjaer Type 4370 accelerometer vibration sensor was mounted at approximately the location of the south property line. Figure 1 is an illustration of the accelerometer mounting block integrated into a ground spike which is part of the measurement system. The spike was installed in undisturbed solid ground with the mounting block making firm contact to the ground. The mounting block design is based on the configuration used by blast vibration monitors and has been integrated in measuring rail vibration for more than 40 years.

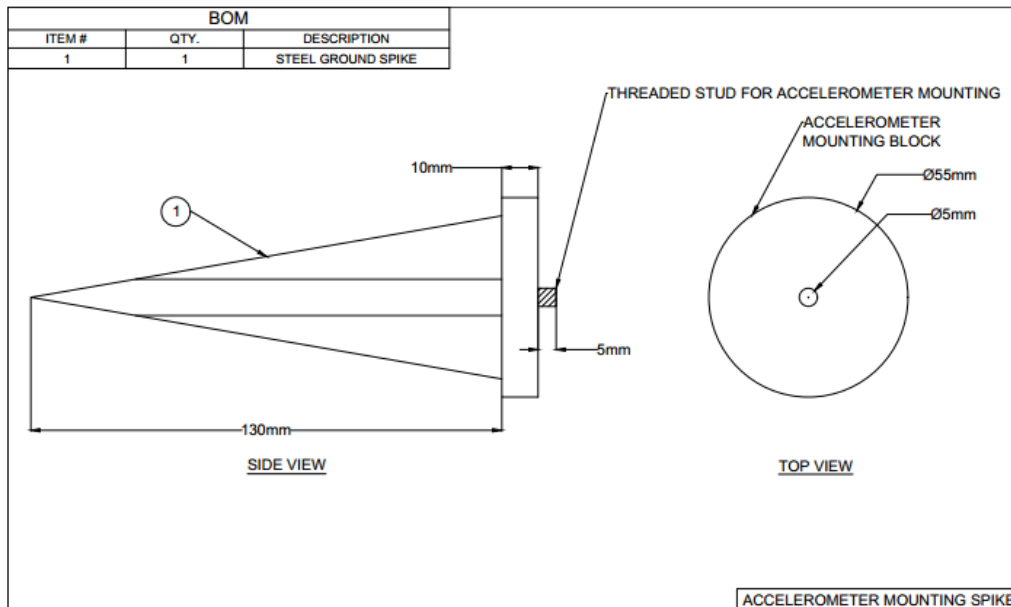


Figure 1: Accelerometer Ground Spike Assembly

The vibration accelerometer was connected to the Type 2511 vibration meter which was set to a lower limiting frequency of 3 Hz and the upper frequency limit was set to 1 kHz. These settings contain the lower and upper limits of 3 Hz and 100 Hz respectively, required by NPC-207. As such, the effective frequency range of measurement for the system was a more conservative 3 Hz to 1 kHz and the measured values are a composite value of all the frequency-based vibration velocity components inside this frequency range. As the measurement system spans a greater frequency range than that required by NPC-207, the values measured are conservative with respect to protection of the proposed development. A Type 4294 accelerometer calibrator was used to verify the calibration and proper working order of the vibration meter which was set to RMS with a 1 second response time.

The measurement system calibration and instrumentation batteries were checked at the beginning and end of each measurement series. Photos of the installed vibration sensor are given in Appendix I: Photographs of Vibration Measurement. The raw measured vibration data is provided in Appendix J: Ground Vibration Velocity Measurement. A list of the instrumentation equipment used is given in Appendix H: Measurement Equipment List.

As per Section C of the CN Principal Main Line Requirements, the CNR vibration criteria used for this investigation is 0.14 mm/s, RMS, 1 second averaging time for residential developments. Appendix K contains excerpts from the CN Rail Main Line Requirements. The values measured by the vibration meter are a composite value of all frequency based vibration velocity components. As the measurement system spans a greater frequency range than that required by CNR, the values measured are conservative with respect to protection of the proposed development. This is because, in general, the greater frequency range contributing to the overall measured level, the greater will be the overall maximum RMS level measured.

Table 5 gives the measured RMS vibration velocity levels for the five train pass-bys. The measured vibration levels for all trains at the measurement location do not exceed the limit of 0.14 mm/s RMS specified by CN Rail. As such, no abatement for railway vibration is required for this development.

Table 5: Railway Pass-by Ground Vibration Velocity Measurements (Vertical Direction)

Date	Time	Train Type	Duration of event (seconds)	RMS Vibration Velocity (mm/s)
June 21, 2024	18:20:00	Freight	93	0.100
June 22, 2024	15:41:00	Freight	355	0.090
June 24, 2024	15:13:00	Freight	56	0.085
June 24, 2024	16:42:00	Freight	54	0.075
June 24, 2024	17:32:00	Freight	85	0.090

Results Summary

Table 6 summarizes the required warning clauses and building requirements, if any, for all units within the proposed development. It is required that any necessary warning clauses be implemented in all development agreements, offers to Purchase, and agreements of Purchase or Sale or Lease for the development.

It should be noted again that the exterior walls of the first row of dwellings facing the railway tracks are to be built to a minimum of brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic Leq (24-hour), estimated at a location of a nighttime receptor, is greater than 60 dBA (as in the case here), and when the first row of dwellings is within 100 metres of the tracks. In general, it is acknowledged that pre-cast concrete or poured concrete sections of exterior walls are expected to be acoustically acceptable. For spandrel panel wall sections or similar, upgraded wall construction beyond a standard spandrel wall will be required. The upgraded spandrel wall sections should achieve a minimum STC rating of 54 as it is not always possible to build a multi-storey building with brick veneer.



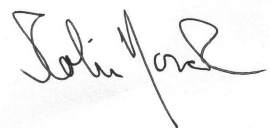
Table 6: Summary of Warning Clauses and Building Component Requirements

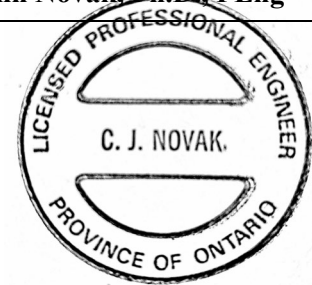
Lot(s)	Noise Barrier Required (Y/N)	Warning Clause(s)	Building Component Requirement(s)	Ventilation Requirement(s)
All units	N	Type B, D and CN/VIA Rail	Minimum STC Rating for the following Building Components: Exterior Wall – 27 Window – 25 Brick veneer or masonry equivalent construction on the first row of building (see above paragraph)	Installation of Central Air Conditioning

Conclusion

The noise impact on the proposed development has been shown in this report to exceed the limits set by the Ontario Ministry of the Environment, Conservation and Parks. The measured vibration levels were not found to exceed the recommended limit of 0.14 mm/s RMS. Given that the noise impacts can be mitigated through appropriate building material design (STC), the installation of central air conditioning and warning clauses, it is recommended that the development be given approval with the understanding that the stated noise control measures are implemented. Further, provided that the proposed mitigation measures and

warning clause inclusions are followed, the proposed development will also meet the CN and RAC/FCM guidelines.

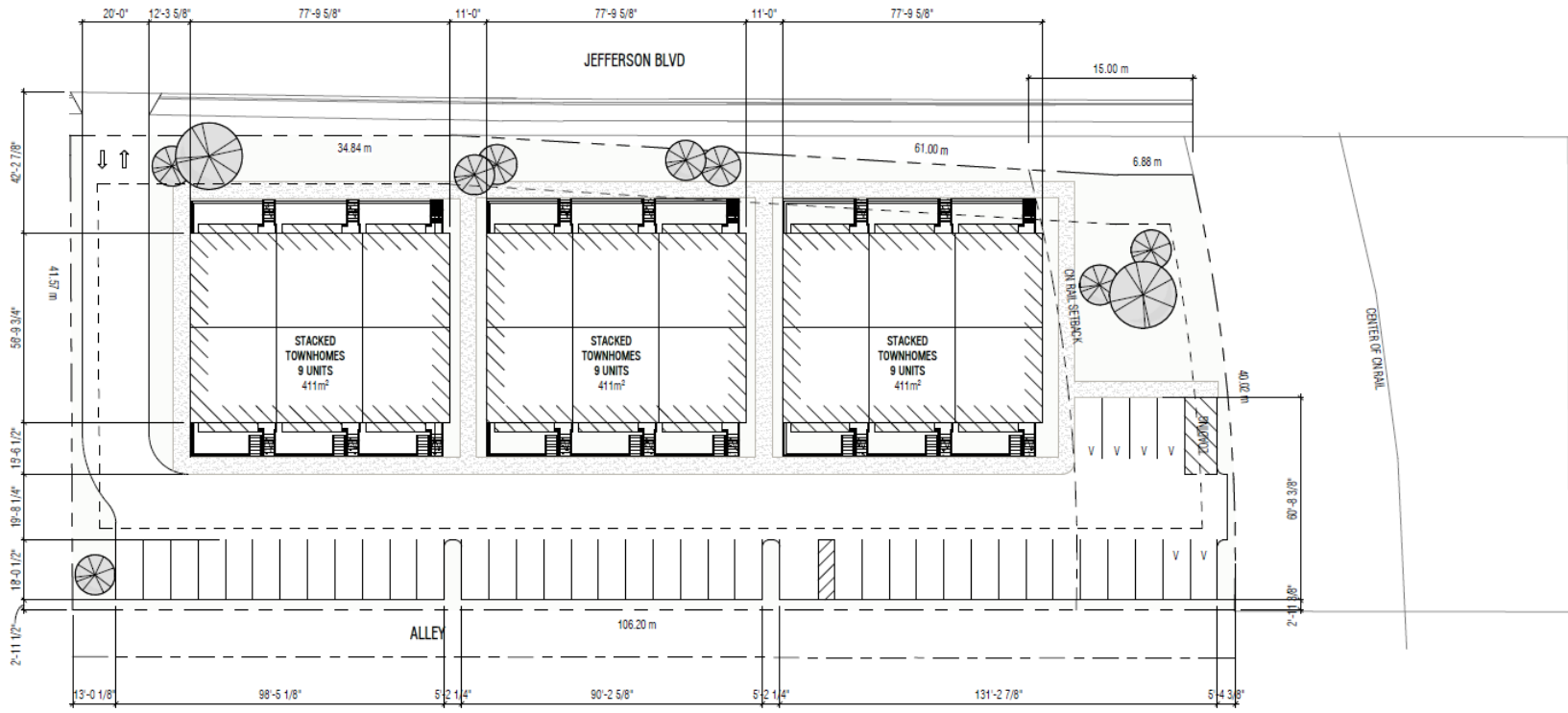
For 		
	Prepared by: Helen Ule, Ph.D., PEng	Reviewed by: Colin Novak, Ph.D., PEng



Appendix A: Site Location



A 1: General Location of Proposed Development and Surrounding Area



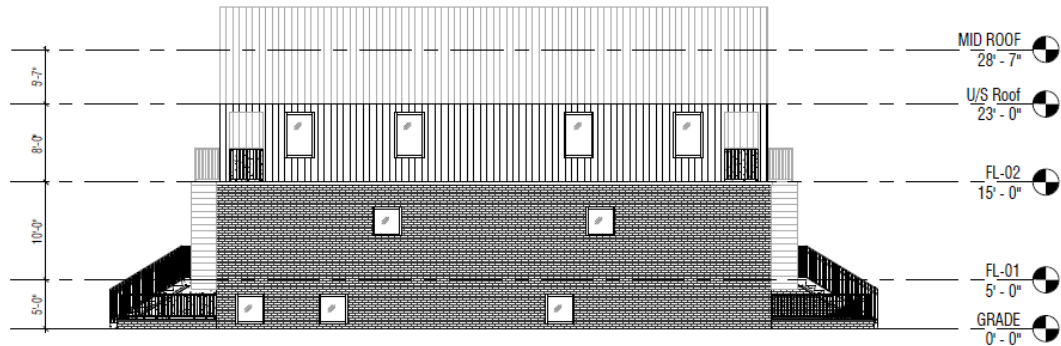
1 SITE PLAN
SK1 1" = 30'-0"



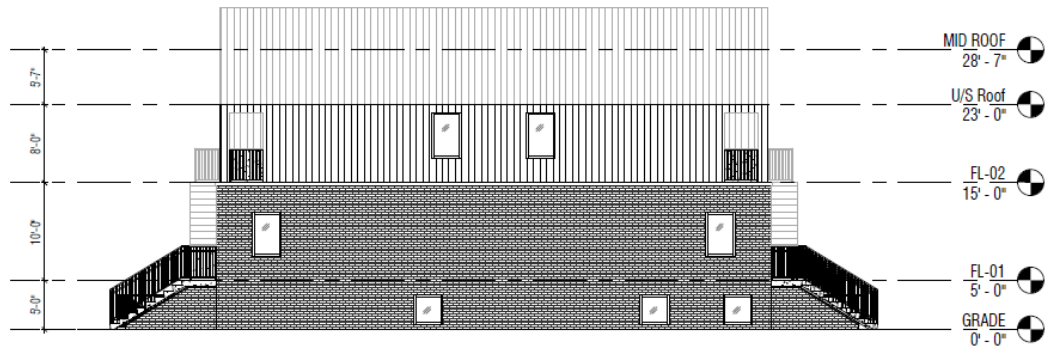
JEFFERSON DEVELOPMENT
SITE PLAN

SK1

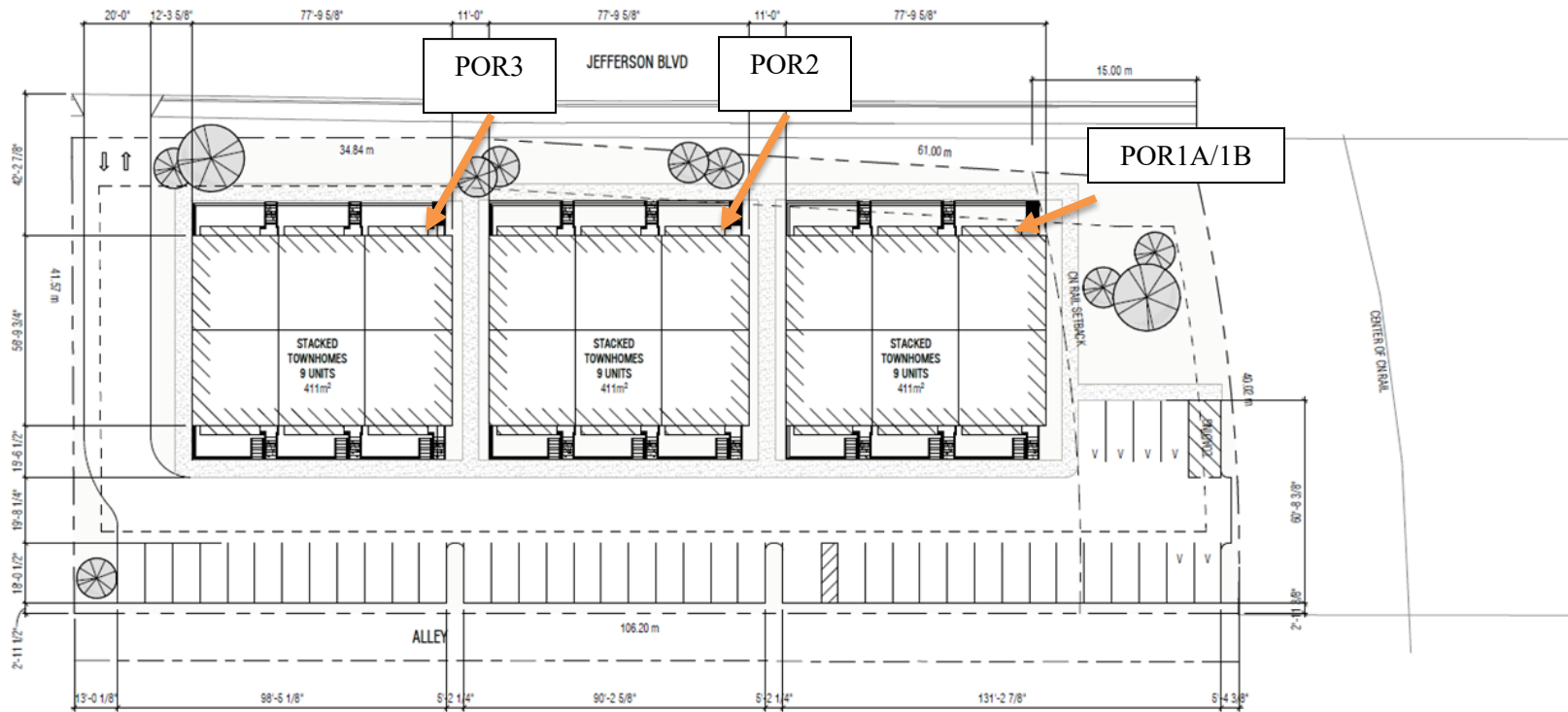
A 2: Proposed Development Site Plan



1 EAST ELEVATION
SK6 3/32" = 1'-0"



2 WEST ELEVATION
SK6 3/32" = 1'-0"



1 SITE PLAN
SK1 1" = 30'-0"

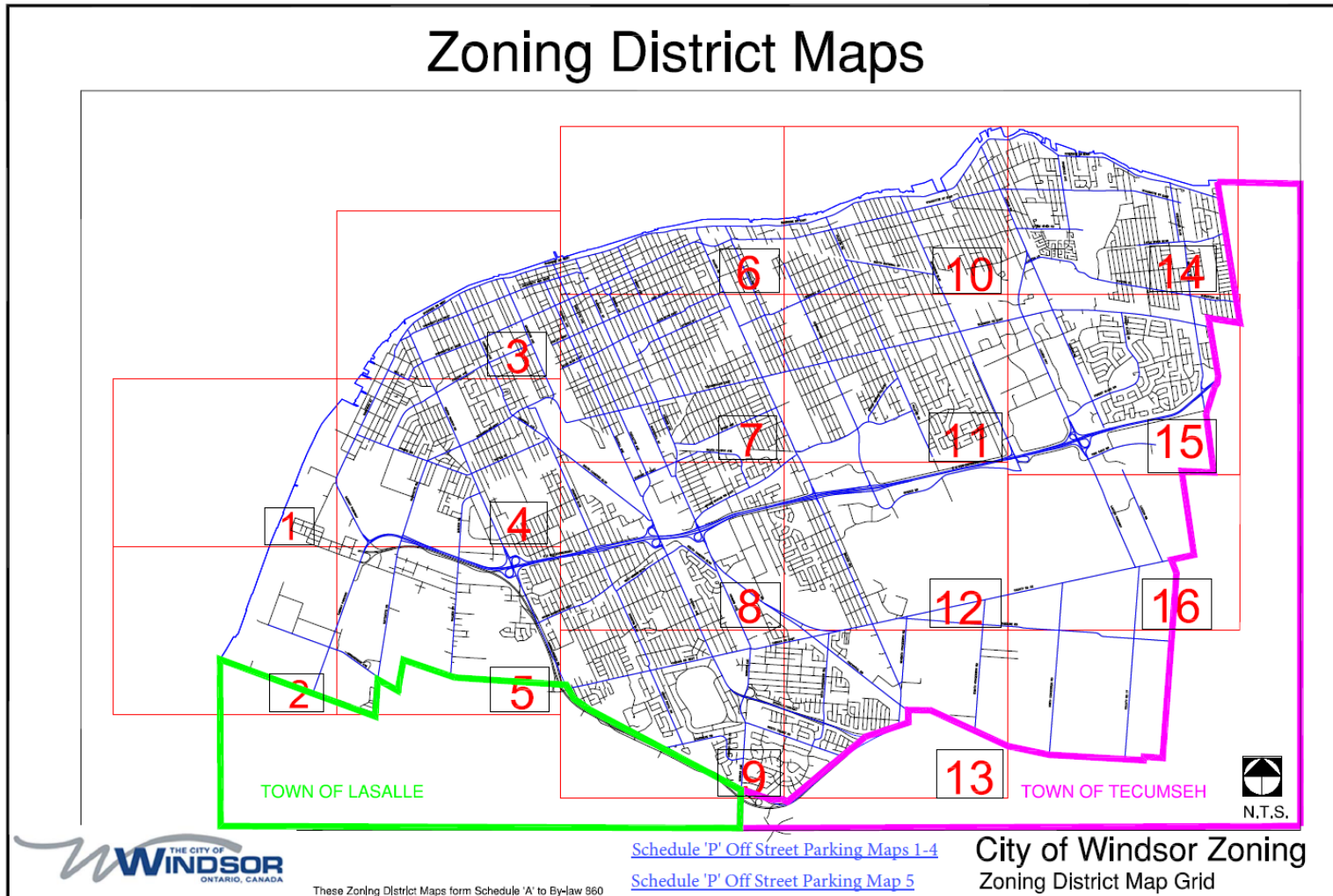


JEFFERSON DEVELOPMENT
SITE PLAN

SK1

A 4:POR Locations

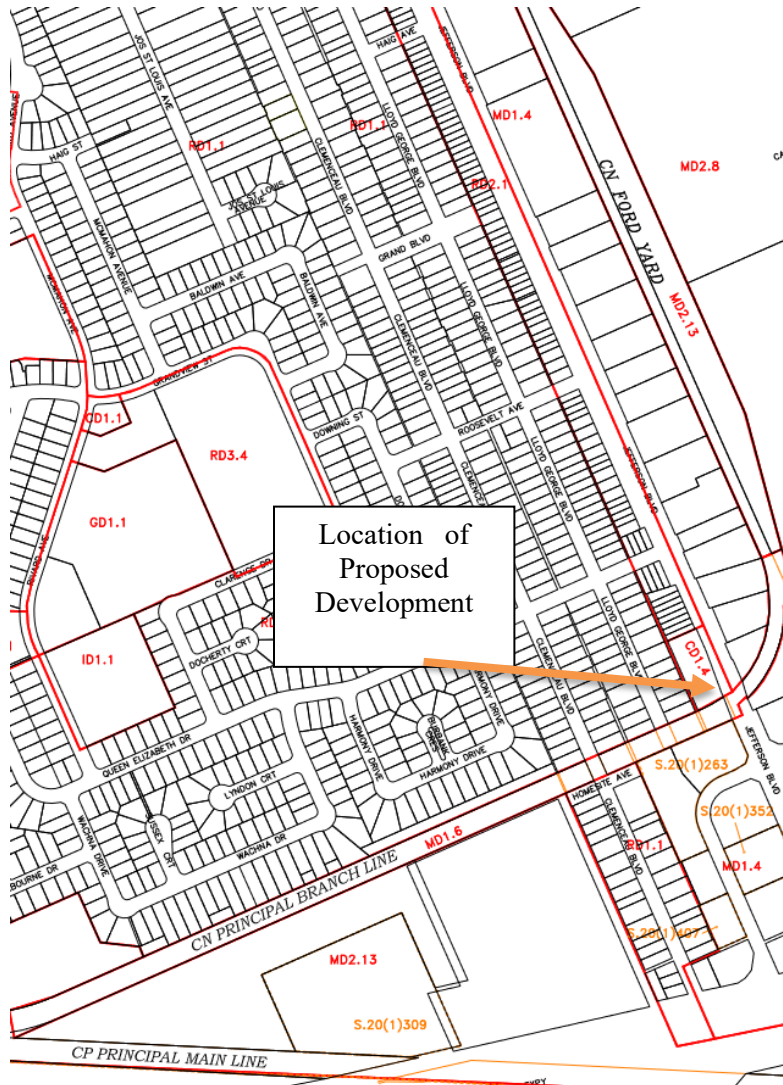
Appendix B: Zoning Maps



B 1:City of Windsor Zoning Map



B 2:City of Windsor Zoning Map, Map 11



B 3:City of Windsor Zoning Map, Map 11, development location

Appendix C: NPC-300 Reference Pages

L_{eq} (8). For complete description on assessing road traffic impacts, refer to ORNAMENT. Other traffic noise prediction models have been and are being developed by various authorities and may be adopted from time to time for use in Ontario by the MOE.

In order to be consistent with MOE guidelines, the sound level should be assessed in an OLA, such as a rear yard or a patio, and in indoor living areas, such as bedrooms and living rooms. Where the noise impact exceeds the applicable sound level limits, mitigation measures such as site planning, architectural design, noise barriers, building envelope elements (windows, exterior walls, doors) with upgraded sound isolation performance and/or central air conditioning may be required. Noise control measures are not required if the sound level estimated in the OLA is 55 dBA or less during the daytime and 50 dBA or less in the plane of bedroom windows during either daytime or nighttime.

C3.2.2 Daytime Outdoor Sound Level Limit

Table C-1 gives the equivalent sound level (L_{eq}) limit for designated OLAs. The limit applies to the entire daytime period from 07:00 to 23:00.

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

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

C3.2.3 Indoor Sound Level Limits

Table C-2 gives the equivalent sound level (L_{eq}) limits and the applicable time periods for the indicated types of indoor spaces. The specified indoor sound level limits are maxima and apply to the indicated indoor spaces with windows and doors closed.

Table C-2
Indoor Sound Level Limits
Road and Rail

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

Type of Space	Time Period	L _{eq} (dBA)	
	23:00 – 07:00	40	35

C3.3 Rail Traffic Noise

C3.3.1 Method

The assessment of rail traffic noise impact should be conducted using a prediction method entitled STEAM, Sound from Trains Environmental Analysis Method, published in 1990 by MOE, Reference [34]. The descriptors used in the assessment are the 16-hour daytime and the 8-hour nighttime equivalent sound levels, L_{eq} (16) and L_{eq} (8). Other traffic noise prediction models have been and are being developed by various authorities and may be adopted from time to time for use in Ontario by the MOE.

The impact of railway traffic noise and the requirement for noise control measures should be assessed similarly to road traffic noise. The sound level should be assessed in an OLA, such as a rear yard or a patio, and in indoor living areas, such as bedrooms and living rooms, and compared with MOE guidelines. Noise control measures are not required if the sound level estimated in the OLA is 55 dBA or less during the daytime and 50 dBA or less in the plane of bedroom windows during daytime or nighttime.

C3.3.2 Daytime Outdoor Sound Level Limit

The outdoor noise impact should be assessed in the OLA during daytime hours, 07:00 to 23:00, considering a combination of only two sources of rail traffic noise, namely the locomotive and the wheel-rail interaction. Whistle noise is not included in the outdoor noise impact assessment. Table C-1 gives the equivalent sound level (L_{eq}) limit for OLAs.

C3.3.3 Indoor Sound Level Limits

The indoor assessment should consider the combination of all three railway noise sources, i.e., locomotive, wheel-rail and whistle. Table C-2 gives the equivalent sound level (L_{eq}) limits for the indicated types of indoor space. The specified indoor sound level limits are maxima and apply to the indicated indoor spaces with windows and doors closed.

A major characteristic of railway noise is its high pass-by sound level for short periods and a major low frequency component produced by the operation of the diesel locomotive. This special character of the sound should be taken into account, particularly when assessing the indoor sound levels. Consequently, in order to account for the special character of railway sound, the indoor sound level limits for rail noise, Table C-2, are 5 dBA lower than the indoor sound level limits for road traffic noise.

This difference results in a requirement for acoustically superior architectural components such as windows and walls, for railway noise.

C3.4 Air Traffic Noise

C3.4.1 Method

Aircraft noise impact assessment is based on Noise Exposure Forecast/Noise Exposure Projection (NEF/NEP) contours determined by methods approved by Transport Canada.

Where the noise impact exceeds the applicable limits, warning clauses and mitigation measures for indoor spaces such as architectural design, special building components and/or central air conditioning may be required. The indoor NEF/NEP values, specified in Table C-4 and Table C-10, are related to the outdoor values and the acoustical insulation provided by the building. The indoor NEF values can be calculated by converting the indoor sound levels, expressed as $L_{eq}(24)$ (dBA), using the expression $NEF = L_{eq}(24) - 31$ dBA.

Section 1.6.7.2 of the 2005 Provincial Policy Statement, Reference [26], establishes the applicable development criterion. With the exception of redevelopment or infilling, Section 1.6.7.2 of the 2005 Provincial Policy Statement, Reference [26], prohibits new residential development and other sensitive land uses in aircraft noise zones above the NEF/NEP 30 contour. The noise impact on the proposed noise sensitive land use is determined based on the location of the noise sensitive land use with respect to the official NEF/NEP contours. NEF/NEP contours are usually available for major civil aviation airports from the airport authority. The more restrictive of the NEF and NEP contours would apply.

C3.4.2 Outdoor Limit

Table C-3 gives the aircraft noise limit in terms of an NEF/NEP value in any outdoor area, including the OLA. The limit applies to the entire 24-hour period. The distance separation from the airport and, consequently, the location of the noise sensitive land use with respect to the NEF/NEP contours, is the only measure that controls the outdoor noise impact.

Table C-3
Outdoor Aircraft Noise Limit

Time Period	NEF/NEP
24-hour	30

the emissions are not required to be included with the overall noise assessment of a stationary source facility.

In addition, sound level limits do not apply to emergency equipment operating in emergency situations.

C4.5.4 Sound Level Limits for Layover Sites

The sound level limit for noise from a layover site in any hour, expressed in terms of the One-Hour Equivalent Sound Level (L_{eq}) is the higher of either 55 dBA or the background sound level.

C5 Noise Impact Assessment – Multiple Sources

Impulse sources, non-impulse sources and emergency equipment are to be analyzed separately. Where there are multiple, non-impulse sources at a stationary source, the noise assessment should be based on the combined effect of all sources comprising the stationary source, added together on an energy basis.

C6 Noise Impact Assessment – Supplementary Noise Limits

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

**Table C-9
Supplementary Indoor Sound Level Limits
Road and Rail**

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

Table C-10
Supplementary Indoor Aircraft Noise Limits
(Applicable over 24-hour period)

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

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

C7 Noise Control Measures

The following sections provide MOE guidance for appropriate noise control measures. These sections constitute requirements that are applied to MOE approvals for stationary sources. This information is also provided as guidance which land use planning authorities may consider adopting.

The definition in Part A describes the various types and application of noise control measures. All the noise control measures described in the definition are appropriate to address the impact of noise of transportation sources (road, rail and aircraft) on planned sensitive land uses. Only some of the noise control measures described in the definition are appropriate to address the noise impact of stationary sources on planned sensitive land uses.

C7.1 Road Noise Control Measures

C7.1.1 Outdoor Living Areas

If the 16-Hour Equivalent Sound Level, $L_{eq}(16)$ in the OLA is greater than 55 dBA and less than or equal to 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.

If the 16-Hour Equivalent Sound Level, $L_{eq}(16)$ in the OLA is greater than 60 dBA, noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B. In the above situations, any excess above the limit will not be acceptable if it exceeds 5 dBA.

C7.1.2 Plane of a Window – Ventilation Requirements

C7.1.2.1 Daytime Period, 07:00 – 23:00 Hours

Noise control measures may not be required if the L_{eq} (16) daytime sound level in the plane of a bedroom or living/dining room window is less than or equal to 55 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 55 dBA and less than or equal to 65 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the daytime sound level in the plane of a bedroom or living/dining room window is greater than 65 dBA, installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.2.2 Nighttime Period, 23:00 – 07:00 Hours

Noise control measures may not be required if the L_{eq} (8) nighttime sound level in the plane of a bedroom or living/dining room window is less than or equal to 50 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 50 dBA and less than or equal to 60 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the nighttime sound level in the plane of a bedroom or living/dining room window is greater than 60 dBA, installation of central air conditioning should be implemented, with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.3 Indoor Living Areas – Building Components

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 60 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 65 dBA, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the

sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) should be specified.

C7.2 Rail Noise Control Measures

C7.2.1 Outdoor Living Areas

Whistle noise is not included in the determination of the outdoor daytime sound level due to railway trains. All the provisions of Section C7.1.1 apply also to noise control requirements for rail noise.

C7.2.2 Plane of a Window – Ventilation Requirements

Whistle noise is not included in the determination of the sound level in the plane of a window. All the provisions of Section C7.1.2 apply also to noise control requirements for rail noise.

C7.2.3 Indoor Living Areas – Building Components

The sound level, L_{eq} , during the daytime (16-hour) and nighttime (8-hour) periods is determined using the prediction method STEAM, Reference [34], immediately outside the dwelling envelope. Whistle noise is included in the determination of the sound level.

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 55 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 60 dBA, building components including windows, walls and doors, where applicable, need to be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) needs to be specified.

In addition, the exterior walls of the first row of dwellings next to railway tracks are to be built to a minimum of brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic L_{eq} (24-hour), estimated at a location of a nighttime receptor, is greater than 60 dBA, and when the first row of dwellings is within 100 metres of the tracks.

C7.3 Combination of Road and Rail Noise

The noise impact in the OLA and in the plane of a window, and the requirements for outdoor measures, ventilation measures and warning clauses, should be determined by combining road and rail traffic sound levels.

The assessment of the indoor sound levels and the resultant requirement for the acoustical descriptors of the building components should be done separately for road

In Class 4 areas, where windows for noise sensitive spaces are assumed to be closed, the use of central air conditioning may be acceptable if it forms an essential part of the overall building designs.

C7.9 Verification of Noise Control Measures

It is recommended that the implementation of noise control measures be verified by qualified individuals with experience in environmental acoustics.

C8 Warning Clauses

The use of warning clauses or easements in respect of noise are recommended when circumstances warrant. Noise warning clauses may be used to warn of potential annoyance due to an existing source of noise and/or to warn of excesses above the sound level limits. Direction on the use of warning clauses should be included in agreements that are registered on title to the lands in question. The warning clauses would be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations. Alternatively, the use of easements in respect of noise may be appropriate in some circumstances. Additional guidance on the use of noise warning clauses is provided in Section C7.1.1, Section C7.1.2.1, Section C7.1.2.2, Section C7.3 and Section C7.4.

C8.1 Transportation Sources

The following warning clauses may be used individually or in combination:

TYPE A: (see Section C7.1.1)

“Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air 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.”

TYPE B: (see Section C7.1.1 and Section C7.4)

“Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air traffic) may on occasions 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.”

TYPE C: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

“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 closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.”

TYPE D: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

“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 sound level limits of the Municipality and the Ministry of the Environment.”

C8.2 Stationary Sources

It is not acceptable to use warning clauses in place of physical noise control measures to identify an excess over the MOE sound level limits. Warning clause (Type E) for stationary sources may identify a potential concern due to the proximity of the facility but it is not acceptable to justify exceeding the sound level limits.

TYPE E: (see Section C7.6)

“Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times be audible.”

C8.3 Class 4 Area Notification

TYPE F: (see Section B9.2 and Section C4.4.2)

“Purchasers/tenants are advised that sound levels due to the adjacent industry (facility) (utility) are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed.”

Appendix D: Report and Model Assumptions

POR	Floor	Height (m)	Jefferson	
			Angle	Distance (m)
1	-1	0.5	-90-90	29
1	2	5	-90-90	29
2	2	5	-90-90	29
3	2	5	-90-90	29
OLA1	-1	-0.76	-90-90	23
OLA1	2	5	-90-90	23

POR	Floor	Height (m)	Rail	
			Angle	Distance (m)
1	-1	0.5	-90-0	30
1	2	5	-90-0	30
2	2	5	-90-0	57
3	2	5	-90-0	84
OLA1	-1	-0.76	-90-0	30
OLA1	2	5	-90-0	30

Jefferson			
50 km/h		2011	18200
		2034	32116

Day	28904.4	Auto	26014
		MT	1445
		HT	1445
Night	3211.6	Auto	2890
		MT	161
		HT	161

- Fully absorptive ground was used for all calculations.

RAIL

Rail		Freight - Day	Way Freight - Day	VIA - Day	Freight - Night	Way Freight - Night	VIA - Night
	2024	1	0	7	1	0	1
	2034	1.28	0	8.96	1.28	0	1.28

2024	07:00-23:00			
	Volumes	Max. Consist	Max. Speed (km/h)	Max. Power
Type of Train				
Freight	1	140	96.6	4
Way Freight	0	25	96.6	4
Passenger	7	10	152.8	2

2034	07:00-23:00			
	Volumes	Max. Consist	Max. Speed (km/h)	Max. Power
Type of Train				
Freight	1.28	140	96.6	4
Way Freight	0	25	96.6	4
Passenger	8.96	10	152.8	2

2024	23:00-07:00			
	Volumes	Max. Consist	Max. Speed (km/h)	Max. Power
Type of Train				
Freight	1	140	96.6	4
Way Freight	0	25	96.6	4
Passenger	1	10	152.8	2

2034	23:00-07:00			
	Volumes	Max. Consist	Max. Speed (km/h)	Max. Power
Type of Train				
Freight	1.28	140	96.6	4
Way Freight	0	25	96.6	4
Passenger	1.28	10	152.8	2

Appendix E: Road Traffic Volume Data

E 1: Predicted Jefferson Blvd (2.5% growth rate per annum)

Year	Road	Location	AADT
2024	Jefferson Blvd	North of Quality Way	18200
2034	Jefferson Blvd	North of Quality Way	32116 (Predicted)

E 2: Predicted Hourly Traffic Volumes per Period and Breakdown of Cars, Medium Trucks and Heavy Trucks

Period	Hourly Traffic Volume (Vehicles/hr)	Auto Traffic Volume (Vehicles/hr)	Medium Truck Traffic Volume (Vehicles/hr)	Heavy Truck Traffic Volume (Vehicles/hr)
Day	1807	1626	90	90
Night	401	361	20	20

Appendix F: Rail Traffic Volume Data

F 1: Letter from CN Rial regarding Train Count Data

Date: 2024/08/15

Project Number: CHM –103– Jefferson Blvd. Windsor ON

Dear Helen:

Re: Train Traffic Data – CN Chatham Subdivision near Jefferson Blvd, Windsor ON

The following report is provided in response to Amy's 2024/06/10 request for information regarding rail traffic in the vicinity of Jefferson Blvd., at approximately Mile 103 on CN's Chatham 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**

Type of Train	0700-2300			
	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	1	140	60	4
Way Freight	0	25	60	4
Passenger	7	10	95	2

Type of Train	2300-0700			
	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	1	140	60	4
Way Freight	0	25	60	4
Passenger	1	10	95	2

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

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There is one (1) at-grade crossing in the immediate vicinity of the study area at Mile 102.07 Lauzon parkway. Anti-whistling bylaws are in effect at this crossing. 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 single mainline track is considered continuously welded rail throughout the study area.

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, Adjacent Development, Canadian National Railway Properties at Proximity@cn.ca should be contacted directly.

I trust the above information will satisfy your current request.

Sincerely,

Sarangan Srikanth
Sarangan Srikanth
Officer Public Works – Eastern Canada
Sarangan.Srikanth@cn.ca

F 2: Predicted CN/VIA Rail Traffic Volumes (2.5% growth rate per annum)

Year	Railway	Day	Night
2024	CN/Via Rail Line	8	2
2034	CN/Via Rail Line	10 (Predicted)	3 (Predicted)

F 3: Train Volume Data Modelled for 2034

	Train Type	Number of Trains	Max Speed (km/h)	Number of Locomotive per Train	Number of Cars per Train	Engine Type
Day	Freight	1.28	96.56	4	140	Diesel
	Way-Freight	0	96.56	4	25	Diesel
	Passenger	8.96	152.8	2	10	Diesel
Night	Freight	1.28	96.56	4	140	Diesel
	Way-Freight	0	96.56	4	25	Diesel
	Passenger	1.28	152.8	2	10	Diesel

Appendix G: Noise Model Printout Sample

STAMSON 5.0 SUMMARY REPORT Date: 11-10-2024 12:32:13
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: POR1b.te Time Period: Day/Night 16/8 hours
 Description: POR1 Second Floor

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

```
-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type           !              ! (km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1.           !   1.3/1.3   !  95.0 !   4.0 !140.0 !Diesel! Yes
```

Data for Segment # 1: Freight (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 : 30.00 / 30.00 m
Receiver height  :   5.00 / 5.00 m
Topography      :           1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle  :           0.00
```

Rail data, segment # 2: Passenger (day/night)

```
-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type           !              ! (km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
  1.           !   9.0/1.3   ! 150.0 !   2.0 ! 10.0 !Diesel! Yes
```

Data for Segment # 2: Passenger (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 : 30.00 / 30.00 m
Receiver height  :   5.00 / 5.00 m
Topography      :           1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle  :           0.00
```

Result summary (day)

```
!   Loc   !   Wheel   ! Whistle ! Whistle !   Total
!   Leq   !   Leq     ! Left Leq ! Right Leq!   Leq
! (dBA)  ! (dBA)    ! (dBA)   ! (dBA)   ! (dBA)
```

1.Freight	!	56.47	!	49.52	!	--	!	--	!	57.27
*										
2.Passenger	!	60.04	!	50.25	!	--	!	--	!	60.47
*										
Total										62.17

dBa

* Bright Zone !

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Result summary (night)

	!	Loc	!	Wheel	!	Whistle	!	Whistle	!	Total
	!	Leq	!	Leq	!	Left Leq	!	Right Leq	!	Leq
	!	(dBA)	!	(dBA)	!	(dBA)	!	(dBA)	!	(dBA)
1.Freight	!	59.48	!	52.53	!	--	!	--	!	60.28
*										
2.Passenger	!	54.64	!	44.86	!	--	!	--	!	55.07
*										
Total										61.42

dBa

* Bright Zone !

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

Car traffic volume : 26014/2890 veh/TimePeriod
 Medium truck volume : 1445/161 veh/TimePeriod
 Heavy truck volume : 1445/161 veh/TimePeriod
 Posted speed limit : 50 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 29.00 / 29.00 m
 Receiver height : 5.00 / 5.00 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Result summary (day)

! source ! Road ! Total

	! height !	Leq !	Leq !
	! (m) !	(dBA) !	(dBA) !
1.Jefferson	! 1.50 !	65.72 !	65.72 !
	Total		65.72 dBA

Result summary (night)

	! source !	Road !	Total !
	! height !	Leq !	Leq !
	! (m) !	(dBA) !	(dBA) !
1.Jefferson	! 1.50 !	59.20 !	59.20 !
	Total		59.20 dBA

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TOTAL Leq FROM ALL SOURCES (DAY): 67.31
(NIGHT): 63.46

Appendix H: Measurement Equipment List

The following is the list of equipment used to perform the vibration measurements:

Type 2511 Brüel & Kjær Vibration Meter	Serial No. 1237766
Type 4370 Brüel & Kjær Accelerometer	Serial No. 1481123
Type 4294 Brüel & Kjær Calibration Excitor	Serial No. 1121439

All measurement systems were checked for calibration before and after the measurement period and were found to be within the acceptable calibration limits. The battery levels also remained within the acceptable levels during the measuring period.

Appendix I: Photographs of Vibration Measurement Sensor



I1: Vibration Measurement Equipment at Measurement Location



I2: Accelerometer Mounted at Measurement Location

Appendix J: Ground Vibration Velocity Measurement

RMS Ground Vibration Velocity Measurements (mm/s)				
Location: 3161 Jefferson Blvd, Windsor				
14m from the south property line; 30m from the roadway				
06-21-2024	06-22-2024	06-24-2024	06-24-2024	06-24-2024
Train 1 1 Engine 13 Car	Train 2 1 Engine 56 Cars	Train 3 1 Engine 6 Cars	Train 4 1 Engine 6 Cars	Train 5 1 Engine 8 Car
0.016	0.012	0.013	0.015	0.015
0.014	0.013	0.015	0.019	0.014
0.013	0.014	0.018	0.022	0.016
0.016	0.013	0.017	0.024	0.014
0.017	0.012	0.014	0.030	0.012
0.015	0.013	0.018	0.026	0.011
0.016	0.014	0.017	0.032	0.015
0.019	0.013	0.020	0.028	0.013
0.018	0.014	0.018	0.022	0.016
0.016	0.015	0.020	0.034	0.015
0.020	0.016	0.022	0.038	0.012
0.019	0.015	0.024	0.034	0.015
0.022	0.017	0.022	0.045	0.019
0.028	0.016	0.026	0.050	0.016
0.026	0.015	0.028	0.045	0.015
0.032	0.017	0.032	0.055	0.017
0.030	0.019	0.028	0.060	0.016
0.038	0.020	0.030	0.055	0.015
0.040	0.018	0.034	0.065	0.020
0.045	0.020	0.036	0.070	0.019
0.060	0.022	0.040	0.075	0.020
0.080	0.020	0.055	0.070	0.022
0.075	0.024	0.060	0.065	0.024
0.070	0.026	0.050	0.060	0.026
0.090	0.030	0.045	0.050	0.032
0.085	0.028	0.055	0.040	0.038
0.100	0.024	0.080	0.045	0.045
0.085	0.026	0.085	0.050	0.050
0.070	0.028	0.065	0.045	0.045
0.090	0.030	0.060	0.036	0.050
0.085	0.034	0.065	0.032	0.060
0.070	0.038	0.060	0.038	0.055
0.075	0.040	0.055	0.040	0.045
0.060	0.038	0.060	0.036	0.070
0.055	0.045	0.065	0.038	0.065
0.060	0.060	0.060	0.034	0.080
0.070	0.070	0.075	0.038	0.085
0.080	0.065	0.065	0.045	0.090
0.090	0.070	0.060	0.038	0.075
0.075	0.060	0.050	0.036	0.060
0.060	0.065	0.055	0.032	0.055
0.050	0.075	0.050	0.038	0.065
0.045	0.065	0.040	0.034	0.055
0.055	0.070	0.038	0.028	0.065

0.060	0.060	0.040	0.026	0.050
0.055	0.065	0.050	0.032	0.045
0.050	0.060	0.045	0.034	0.050
0.060	0.065	0.038	0.030	0.045
0.055	0.060	0.036	0.024	0.050
0.050	0.070	0.034	0.022	0.055
0.055	0.065	0.040	0.028	0.045
0.060	0.060	0.038	0.026	0.050
0.065	0.055	0.036	0.024	0.055
0.060	0.060	0.030	0.022	0.050
0.050	0.055	0.028	0.019	0.060
0.045	0.065	0.026	0.017	0.050
0.050	0.060	0.024	0.016	0.045
0.055	0.050	0.028	0.018	0.050
0.050	0.055	0.026	0.015	0.045
0.045	0.045	0.022	0.018	0.038
0.040	0.050	0.020	0.026	0.036
0.045	0.055	0.022	0.020	0.045
0.038	0.065	0.020	0.017	0.050
0.032	0.070	0.016	0.015	0.055
0.030	0.065	0.022	0.022	0.050
0.026	0.050	0.020	0.024	0.040
0.028	0.045	0.017	0.019	0.045
0.030	0.050	0.024	0.015	0.050
0.036	0.055	0.026	0.012	0.040
0.030	0.050	0.020	0.015	0.045
0.034	0.065	0.018	0.014	0.050
0.032	0.060	0.020	0.019	0.045
0.034	0.075	0.018	0.020	0.040
0.028	0.060	0.020	0.016	0.045
0.026	0.055	0.018	0.015	0.055
0.028	0.050	0.016	0.014	0.050
0.024	0.060	0.014	0.013	0.040
0.028	0.050	0.018	0.015	0.036
0.022	0.055	0.017	0.013	0.040
0.020	0.045	0.020	0.012	0.032
0.019	0.040	0.014	0.011	0.030
0.018	0.050	0.012	0.013	0.040
0.017	0.055	0.013	0.014	0.038
0.020	0.045	0.015	0.012	0.034
0.017	0.055	0.016	0.011	0.036
0.020	0.050	0.014	0.012	0.032
0.018	0.040	0.015		0.028
0.017	0.034	0.019		0.030
0.018	0.038	0.016		0.028
0.022	0.040	0.013		0.026
0.019	0.038	0.012		0.030
0.020	0.040	0.011		0.026
0.017	0.038	0.012		0.024
0.015	0.032	0.014		0.026

0.018	0.030	0.013		0.020
0.017	0.036	0.018		0.017
0.018	0.032	0.019		0.020
0.016	0.038	0.016		0.018
0.015	0.034	0.014		0.020
0.014	0.032			0.028
0.015	0.036			0.022
0.017	0.032			0.024
0.016	0.030			0.022
0.014	0.032			0.018
0.016	0.036			0.016
0.018	0.030			0.018
0.016	0.032			0.019
0.015	0.030			0.022
0.014	0.026			0.018
0.013	0.030			0.016
0.012	0.038			0.015
0.011	0.034			0.017
0.014	0.030			0.013
0.013	0.034			0.012
	0.032			0.013
	0.034			0.014
	0.038			0.013
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	0.012			
Max: 0.100	Max: 0.090	Max: 0.085	Max: 0.075	Max: 0.090

Appendix K: CN/VIA Rail Main Line Requirements

Railway Classification for Application of Standard Impact Mitigation Measures

Railway lines in Ontario are classified by the railway companies into five classes for the purpose of applying the Standard Impact Mitigation Measures, to be Incorporated in New Residential Developments Adjacent to Railways. The classification is based on the present and potential traffic using the lines, and other operating characteristics, and is described below.

Maps showing the classification of the various railway lines are available for reference.

1. Principal Main Line

Traffic: Includes heavy trains with 3 or 4 power units per train.
High speeds, frequently exceeding 80 k.p.h. (50 m.p.h.)
Volume generally exceeds 10 trains per day

Crossings, gradients etc. may increase normal railway noise and vibration.

2. Secondary Main Line

Traffic: Trains generally light or moderate weight, with 1 or 2 power units per train.
High speeds, frequently exceeding 80 k.p.h. (50 m.p.h.)
Volume generally exceeds 5 trains per day

Crossings, gradients etc. may increase normal railway noise and vibration.

3. Principal Branch Line

Traffic: Trains generally light or moderate weight, with 1 or 2 power units per train, but may include heavier trains with more units
Low speeds, generally limited to 50 k.p.h. (30 m.p.h.)
Regular scheduled traffic, usually less than 5 trains per day

4. Secondary Branch Line

Traffic: Intermittent, unscheduled traffic, usually less than 1 trains per day
Low speeds, generally limited to 50 k.p.h. (30 m.p.h.)
Trains generally of light to moderate weight with 1 power unit per train

5. Spur Line

Traffic: Unscheduled traffic on a demand basis
Low speeds, generally limited to 50 k.p.h. (30 m.p.h.)
Trains of light weight, with 1 power unit per train

Standard Impact Mitigation Measures, to be Incorporated in New Residential Developments Adjacent to Railways

The measures are graduated in accordance with the operating characteristics of the rail lines the dwellings are to be built close to. Five categories are established for the "normal" situation of a fairly flat tract of land with houses at roughly the same elevation as the railway tracks. Variations would then apply for the cases where the tracks were in cut or on embankment, with the houses at a higher or lower level.

All of the railway lines in Ontario will be classified by the railway companies into the five classes described in "Railway Classifications for Application of Standard Impact Mitigation Measures". Where the Standard Measures call for site testing and evaluation this will be scrutinized by the Ministry of the Environment to ensure that the appropriate measures are provided.

Standard Impact Mitigation Measures

Appropriate measures for residential development adjacent to railway corridors are outlined in the following Standard Impact Mitigation Measures for a Principal Main Line, a Secondary Main Line, a Principal Branch Line, a Secondary Branch Line and a Spur Line.

PRINCIPAL MAIN LINE REQUIREMENTS



- A. Safety setback of dwellings 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. 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 300 metres of the railway right-of-way: "Warning: VIA Rail Canada Inc. 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). VIA will not be responsible for any complaints or claims arising from the 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 of 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 VIA.
- H. The Owner enter into an Agreement stipulating how VIA's concerns will be resolved and will pay VIA's reasonable costs in preparing and negotiating the agreement.

K 3: VIA Rail Canada – Principal Main Line Requirements

SECONDARY MAIN LINE REQUIREMENTS



- A. Safety setback of dwellings 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, 2.0 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.
- B. 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 4.5 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 300 metres of the railway right-of-way: "Warning: VIA Rail Canada Inc. 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). VIA will not be responsible for any complaints or claims arising from the 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 of 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 VIA.
- H. The Owner enter into an Agreement stipulating how VIA's concerns will be resolved and will pay VIA's reasonable costs in preparing and negotiating the agreement.

K 4: VIA Rail Canada – Secondary Main Line Requirements

PRINCIPAL BRANCH LINE REQUIREMENTS



- A. Safety setback of dwellings from the railway rights-of-way to be a minimum of 15 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, 2.0 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.
- B. 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 4.0 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 300 metres of the railway right-of-way: “Warning: VIA Rail Canada Inc. 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). VIA will not be responsible for any complaints or claims arising from the 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 of 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 VIA.
- H. The Owner enter into an Agreement stipulating how VIA’s concerns will be resolved and will pay VIA’s reasonable costs in preparing and negotiating the agreement.

K 5: VIA Rail Canada – Principal Branch Line Requirements

SECONDARY BRANCH LINE REQUIREMENTS



- A. Safety setback of dwellings from the railway rights-of-way to be a minimum of 15 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, 2.0 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.
- B. 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.
- C. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.
- D. 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 300 metres of the railway right-of-way: "Warning: VIA Rail Canada Inc. 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). VIA will not be responsible for any complaints or claims arising from the use of such facilities and/or operations on, over or under the aforesaid rights-of-way."
- E. 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.
- F. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale of 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 VIA.
- G. The Owner enter into an Agreement stipulating how VIA's concerns will be resolved and will pay VIA's reasonable costs in preparing and negotiating the agreement.

K 6: VIA Rail Canada – Secondary Branch Line Requirements

SPUR LINE REQUIREMENTS



- A. Safety setback of dwellings from the railway rights-of-way to be a minimum of 15 metres.
- B. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.
- C. 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 300 metres of the railway right-of-way: “Warning: VIA Rail Canada Inc. 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). VIA will not be responsible for any complaints or claims arising from the use of such facilities and/or operations on, over or under the aforesaid rights-of-way.”
- D. 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.

K 7: VIA Rail Canada – Spur Line Requirements



PRINCIPAL MAIN LINE

- A. Noise berm, or combination berm and acoustic fence, adjoining and parallel to the railway right-of-way and having returns at the ends:
- (i) Minimum total height 5.5 metres above top-of-rail.
 - (ii) Acoustic fence to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre (4 lb./sq. ft.) of surface area.
- Note: The Railway may consider other measures recommended by an approved Noise Consultant satisfactory to the Railway.
- B. Safety setback of dwellings from the railway right-of-way to be a minimum of 30 metres in conjunction with the safety berm noted below. In the absence of a safety berm, we require a dwelling setback of 120 metres.
- C. Ground-borne vibration transmission to be estimated through site testing and evaluation to determine if dwellings within 75 metres of the Railway right-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. Safety berm adjoining and parallel to the railway right-of-way with returns at the ends, 2.5 metres above grade is required despite none being required to address the Railway's noise concerns.
- E. The following clause should be inserted in all offers to purchase, agreements of sale and purchase or lease and in the title deed or lease of each dwelling: "Warning: Canadian National Railway Company or its assigns or successors in interest has or have a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the rail facilities on such right-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 right-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 Developer shall install and maintain at his own expense, a chain link fence of minimum 1.83 metre (6 feet) height along the mutual property line, which shall be maintained by the Owner.
- H. 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 the sole responsibility for and shall maintain these measures to the satisfaction of CN Rail.
- I. Pursuant to the Planning Act, the Municipality shall provide this office of the Railway with written notice of the public meeting, by-law and passing of the by-law appropriately zoning the lands hereby proposed for subdivision.
- J. The Owner enter into an Agreement stipulating how CN Rail's concerns will be resolved and will pay CN Rail's reasonable costs in preparing and negotiating the agreement.

Appendix L: STC Output Results

Indoor sound level in dB(A) is 35
Room absorption category is: high absorption
Outdoor sound level is 63 dB(A) (plus 0 dB from Table 2)

Components:	After Step 2	From Table 3 (% energy)	From Table 4 (% floor area)	From Table 5 (spectrum)	STC
1. Exterior wall	28	+3 dB (50 %)	-11 dB (11 %)	+7 dB	27
2. Window, openable thick d 28	28	+3 dB (50 %)	-10 dB (13 %)	+4 dB	25

Calculation is for: Jefferson

L 1: STC Results for Railway Noise Source