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Noise and Vibration Feasibility Study
Proposed Residential Development
1134 & 1167 Plains Road
Burlington, Ontario

Prepared for:

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1 Introduction & Summary

Howe Gastmeier Chapnik Limited (HGC Engineering) was retained by Plains Road East Joint Venture to complete a Noise and Vibration Feasibility Study for the proposed residential development, to be located at the northwest corner of Plains Road and Fairview Street, in Burlington, Ontario. This study is based on architectural drawings prepared by Graziana + Corazza Architects Inc. dated April 13, 2021. The proposed development will consist of four residential buildings ranging from 20 – 35 storeys in height above two 2-storey podiums.

This study is required by the City of Burlington as part of a Zoning By-Law Amendment (ZBA) and Official Plan Amendment (OPA) application.

The primary noise sources impacting the development were determined to be road traffic on Fairview Street and The Queen Elizabeth Way (QEW); and rail traffic on the Canadian National (CN) railway subdivisions to the north. Traffic volumes for the roadways and rail lines were obtained from the relevant authorities and adjusted as warranted to account for future potential growth. The road and rail traffic data were used to estimate future sound levels (L_{EQ}) at the location of the proposed building façades. The estimated sound levels were evaluated with respect to the guidelines of the Ministry of the Environment, Conservation and Parks (MECP) and the railway authorities.

The sound level predictions indicate that the future road and rail traffic sound levels will exceed MECP guidelines at the buildings in the proposed development. The predicted sound level in the proposed outdoor amenity areas exceed MECP targets; consideration should be given in detail design to integrate some smaller structures, screens, or landscaping features to create quieter pockets or zones in these areas, as needed or incorporate acoustic barriers. Central air conditioning is required for the proposed buildings. Upgraded building and glazing constructions are also required for the proposed buildings. Warning clauses are recommended to inform the residents of the building of the traffic noise impacts and the presence of nearby commercial/office/retail facilities.

The impact of vibration from the rail corridor, located approximately 45 m west of the closest proposed building façade and 30 m west of the closest underground parking level wall, has also been assessed. Vibration associated with the rail corridor is expected to be within CN limits and vibration mitigation measures are not anticipated to be required.

As this project is at an early stage of development, a review should be conducted to verify and/or refine the acoustic recommendations when more detailed floor plans and elevations are available. In addition, an acoustical consultant should review the mechanical drawings and details of demising constructions, when available, to help ensure that the noise impact of the development on the environment, and of the development on itself, are maintained within acceptable levels.

2 Site Description

The subject property includes two parcels of land (Parcel A and Parcel B) and is located at the northwest corner of Plains Road and Fairview Street, in Burlington, Ontario. A key plan is attached as Figure 1a, and the proposed site plan is attached as Figure 2a. Surrounding uses are identified in Figure 1b.

The drawings indicate that Parcel A will consist of a 35-storey and 30-storey residential tower (Buildings A and B, respectively) above a common 2-storey podium and one level of underground parking. Parcel B will consist of a 25-storey and 20-storey residential tower (Buildings C and D, respectively) above a 2-storey podium and one level of underground parking.

A site visit was made by HGC Engineering personnel on August 2020, to make observations of the acoustical environment, identify the significant noise sources in the vicinity, and perform ground-borne vibration measurements from train pass-bys in the rail corridor.

The area is considered to be Class I (urban) in terms of its acoustical environment. The subject site is currently vacant. The surrounding land includes commercial and industrial uses, including an IKEA and Fortino's to the west of the QEW, Burlington Storage yard to the east, and Mapleview Shopping Centre to the south of Fairview Street. Sounds from these facilities were not audible at the time of the site visit due to high ambient sound from the surrounding roadways, regardless a warning clause is included in Section 8 of the report. Road traffic on Fairview Street

and the QEW, and rail traffic in the rail corridor to the north were confirmed to be the dominant sources of noise. There are no other significant sources of stationary noise within 500 m of the subject site.

There are no impulsive noise sources in the area. The proposed development is not located in a flight path associated with any airports nearby.

3 Noise Level and Vibration Criteria

3.1 Road and Rail Noise

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are given in the MECP publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", Part C release date October 21, 2013 and are listed in Table 1 below. The values in Table 1 are energy equivalent (average) sound levels [L_{EQ}] in units of A weighted decibels [dBA].

Table 1: Road and Rail Traffic Noise Criteria

Space	Daytime $L_{EQ(16\ hour)}$ Road / Rail	Nighttime $L_{EQ(8\ hour)}$ Road / Rail
Outdoor Living Areas	55 dBA	--
Inside Living/Dining Rooms	45 dBA / 40 dBA	45 dBA / 40 dBA
Inside Bedrooms	45 dBA / 40 dBA	40 dBA / 35 dBA

Daytime refers to the period between 07:00 and 23:00, while nighttime refers to the period between 23:00 and 07:00. Living areas include dining rooms, dens, studies, etc. Corridors and washrooms are not considered to be noise-sensitive areas.

The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace, a garden, or common areas associated with high-rise multi-unit buildings where passive outdoor recreation is expected to occur. Balconies and elevated terraces (e.g., rooftops) with a depth of less than 4 meters are not considered OLAs under MECP guidelines, and accordingly the noise criteria are not applicable there, unless they are the only OLA for the occupant.

The guidelines in the MECP publication allow the sound level in an OLA to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is required to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible. Note that not all OLA's necessarily require protection, if there are other protected outdoor areas accessible to future residents.

Indoor guidelines are 5 dBA more stringent for rail noise than for road noise, to account for the low frequency (rumbling) character of locomotive sound, and its greater potential to transmit through exterior wall/window assemblies.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels at the façade exceed 60 dBA or daytime sound levels at the façade exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning is required when nighttime sound levels at the façade are in the range of 51 to 60 dBA or when daytime sound levels at the façade are in the range of 56 to 65 dBA.

Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the sound level at the façade is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise and greater than 55 dBA in the nighttime or greater than 60 dBA during the daytime hours due to rail traffic noise.

Railway guidelines recommend brick exterior walls from foundation to rafters as a minimum construction for any dwellings with a 24 hour L_{EQ} that is greater than 60 dBA, and which are within 100 m of the right of way of the railway.

The railways also provide minimum requirements for safety as well as sound and vibration for proposed residential developments located adjacent to their rights-of-way. These refer to minimum required setbacks, berms, fencing and warning clauses. The reader is referred to a copy of CN and Metrolinx requirements for a new development adjacent to a principal main rail line, which is included in Appendix A.

3.2 Ground-Borne Vibration

CN and Metrolinx guidelines require measurements of ground-borne vibration when residential dwelling units are to be located within 75 metres of a principal mainline.

Vibration is typically measured in terms of oscillatory velocity or acceleration. The CN guidelines recommend that ground-borne vibration be limited to a vibratory velocity of 0.14 mm/s (-17 dB) between 10 and 100 Hz. The CN limits for acceptable ground-borne vibration are frequency dependent and are presented as a curve of maximum allowable vibratory acceleration versus frequency. The CN criteria have been overlaid on the graphs of measured vibration for easy reference (Figures 4 to 8).

4 Traffic Noise Predictions

4.1 Road Traffic Data

Traffic data for the QEW Ramp and Fairview Street in the site area was obtained from the City of Burlington Traffic Services and is contained within Appendix B. Traffic volumes were conservatively assumed to grow at a typical rate of 2.5%/yr on all roadways, and average future daytime (07:00 to 23:00) and night-time (23:00 to 07:00) hourly volumes that will exist in 10 years (2031) were then calculated. The resulting future traffic volumes are listed in Table 2, in addition to calculated commercial vehicle (truck). A posted speed limit of 100 km/hr and 50km/hr was used for QEW Ramp and Fairview Street, respectively. A 90%/10% day/night split was used for the roadways.

Road traffic data for the QEW was obtained from the Ministry of Transportation (Appendix B) and projected to the year 2031 at a conservative growth rate of 2.5%/yr. A 67%/33% day/night split was used in the analysis. A commercial vehicle percentage of 25% was used for both daytime and nighttime volumes. These vehicles were assumed to be travelling at the posted maximum speed of 100 km/hr. The projected road traffic volumes are shown in Table 2 below.

Table 2: Projected Road Traffic Data for 2031

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Fairview Street	Daytime	38 514	274	392	39 180
	Nighttime	4 279	30	44	4 353
	Total	**42 793**	**305**	**435**	**43 533**
QEW Ramp	Daytime	9 777	250	407	10 434
	Nighttime	1 086	28	45	1 159
	Total	**10 863**	**278**	**452**	**11 593**
QEW	Daytime	135 575	17 610	28 249	183 433
	Nighttime	70 872	9 072	14 552	94 496
	Total	**208 446**	**26 681**	**42 801**	**277 928**

4.2 Rail Traffic Data

Rail traffic data was recently obtained from both Metrolinx and CN representatives and is included in Appendix C. The data were projected to the year 2031 at an assumed growth of 2.5%/year, as required by MECP and CN guidelines. The GO Transit rail data is already expressed as 10 year future volumes. The rail volumes used in the analysis are summarized in Table 3.

Table 3: Rail Traffic Data Projected to Year 2031

Type of Train	Number of Trains Day/ Night	Number of locomotives	Number of cars	Max Speed (KPH)
CN – Oakville Subdivision				
Way Freight	5 / 3	4	25	97
Passenger	19 / 0	2	10	129
GO	197 / 47	1	12	153
CN – Halton Subdivision				
Freight	13 / 5	4	140	80
Way Freight	3 / 0	2	25	80

Note: All GO trains have been modeled as diesel trains as per recent direction from Metrolinx.

4.3 Prediction Results

To assess the levels of traffic noise that will impact the site, predictions were made using a numerical computer modelling package (*Cadna-A version 2021 MR1 (32 bit): build 183.5110)*. The model is based on the methods from ISO Standard 9613-2.2, "*Acoustics - Attenuation of Sound During Propagation Outdoors*" , which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures. The road and rail sources were included in the model using line sources, calibrated to levels predicted in STAMSON 5.04, a computer algorithm developed by the MECP.

The model was used to predict traffic noise levels at each of the building façades. The worst-case predicted sound levels at each of the building façades (for the extent of the total building height) calculated by Cadna-A are shown in Figures 3a and 3b. A breakdown of the partial maximum sound level contributions from road and rail traffic noise sources at each façade are shown in Table 4 below.

Table 4: Worst- Case Traffic Sound Level Predictions, Typical Daytime Hour [dBA] Levels for Road/Rail/Total

Building	Location Description	Daytime (16hr avg)			Night (8hr avg)		
		Road Traffic	Rail Traffic	Total	Road Traffic	Rail Traffic	Total
Podium A/B	North Façade	65	71	72	65	68	70
	East Façade	66	57	66	64	56	65
	South Façade	73	68	74	72	65	73
	West Façade	71	72	74	71	69	73
Tower A	North Façade	65	71	72	65	68	69
	East Façade	69	61	69	69	58	69
	South Façade	72	68	74	72	64	73
	West Façade	71	72	74	71	68	73
Tower B	North Façade	63	67	68	63	63	66
	East Façade	65	58	65	64	55	65
	South Façade	71	53	71	70	50	71
	West Façade	70	66	71	70	63	71
Podium C/D	North Façade	64	62	65	63	59	64
	East Façade	69	55	69	69	52	69
	South Façade	73	57	73	72	54	72
	West Façade	71	60	71	71	57	71
Tower C	North Façade	64	62	66	63	58	64
	East Façade	70	56	70	69	53	69
	South Façade	72	58	72	72	54	72
	West Façade	71	61	71	71	58	71
Tower D	North Façade	62	61	65	61	58	63
	East Façade	69	54	69	67	51	67
	South Façade	72	<50	72	71	<45	71
	West Façade	71	59	71	70	56	70

The preliminary plans indicate that there will be residential outdoor amenity spaces on the 3rd floor of the proposed buildings. Figure 2b shows the locations of the receivers used to predicted future noise levels in these areas. The results are summarized in Table 5.

Table 5: Predicted Sound Levels at OLA's*, [dBA]Error! Reference source not found.

Receiver	Parcel	Location	*Daytime L_{EQ} (16 hr)
R1	A	3/F	65
R2	A	3/F	67
R3	B	3/F	70
R4	B	3/F	68

Note:
* Assuming a standard 1.07 m high parapet or solid railing for elevated terraces, except as noted.

4.4 Recommendations

The following discussion outlines preliminary recommendations for building façade constructions to achieve the noise criteria stated in Table 1. Ventilation requirements and noise mitigation measures for outdoor amenity areas are also discussed below.

4.4.1 Outdoor Amenity Areas

The predicted sound levels in all proposed outdoor amenity areas will be greater than 60 dBA with a standard 1.07 m high parapet.

A barrier height table indicating the barrier heights needed to achieve 55 dBA in areas with projected sound level excesses is provided in Table 6. Acoustic barrier locations are indicated in Figure 2b.

Table 6: Acoustic Barrier Heights Required to Achieve Various Sound Levels, [m]

Receiver	55 dBA	56 dBA	57 dBA	58 dBA	59 dBA	60 dBA
R1	7.5+	7.5+	7.0	5.0	4.0	3.5
R2	7.5	6.5	5.5	5.0	4.0	3.7
R3	6.0	5.2	4.5	4.0	3.5	3.2
R4	7.5+	7.5+	7.5+	7.5+	7.5+	7.5+

Consideration should be given in detailed design to integrate smaller structures or landscaping features to create quieter pockets or zones. Alternatively, these outdoor amenity areas could be reduced in size or relocated to an area that experiences greater shielding from the proposed or adjacent buildings.

The residential units may have balconies that are less than 4 metres in depth (which are exempt from the definition of OLA under MECP guidelines).

4.4.2 Ventilation Requirements

Predicted sound levels at most of the building facades exceed 65 dBA during the day and/or 60 dBA during the night. Central air conditioning is required, and is expected to be provided. Window or through-the-wall air conditioning units are not recommended for any residential units because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall noise insulating properties of the envelope.

4.4.3 Building Facade Constructions

Predicted sound levels at the building facades were used to determine sound insulation requirements of the building envelope. The required acoustic insulation of the wall and window components was determined using methods developed by the National Research Council (NRC).

Exterior Wall Constructions

These calculations assume insignificant sound transmission through the walls in comparison with the windows. Exterior walls that are not glazed should have sufficient acoustical insulation value such that the noise transmitted through is negligible in comparison with the windows; to achieve this, exterior wall assemblies with a rating of at least 5-10 STC points above the surrounding

window STC requirements are typically required, depending on the amount of wall area relative to window. In most cases, the wall sound insulation is much higher than this; sections of poured or pre-cast concrete will typically have a sound insulation rating of STC-55 or more, and can be discounted. Insulated spandrel or metal panels backed by a drywall assembly generally have sound insulation ratings in the range of STC-45 to STC-60.

Acoustical Requirements for Glazing

Detailed floor plans and building elevations were not available for this development at the time of this report. Upgraded glazing requirements are required for the spaces in the proposed buildings. The window to floor area ratios of bedrooms and living/dining rooms were assumed to be 50% (40% fixed, 10% operable). If more glazing is incorporated, higher STC requirements may apply. The minimum acoustical requirement for the fixed glazing elements is provided in Table 7. Small leaks through operable doors and windows are assumed, however, tight weather seals should be provided to reduce such leakage to the extent feasible; awning windows and swing or sliding doors to balconies should have tight seals sufficient to achieve similar acoustical performance ratings.

Table 7: Minimum Glazing Requirements

Tower	Façade	Glazing STC
Podium A/B	North façade	STC-39
	East façade	STC-33
	South façade	STC-40
	West façade	STC-41
Tower A	North façade	STC-39
	East façade	STC-36
	South façade	STC-40
	West façade	STC-41
Tower B	North façade	STC-35
	East façade	OBC
	South façade	STC-36
	West façade	STC-38
Podium C/D	North façade	STC-33
	East façade	STC-34
	South façade	STC-38
	West façade	STC-37
Tower C	North façade	OBC
	East façade	STC-35
	South façade	STC-38
	West façade	STC-37
Tower D	North façade	OBC
	East façade	STC-33
	South façade	STC-37
	West façade	STC-36

Note: OBC – Ontario Building Code

The north and south façades of Podium A/B; and south and west façades of Tower A have significant STC requirements. It may be difficult to find suitable STC constructions. It is suggested that the window to floor area ratios be minimized as much as possible along these façades.

Note that acoustic performance varies with manufacturer's construction details, and these are only guidelines to provide some indication of the type of glazing likely to be required. Acoustical test data for the selected assemblies should be requested from the suppliers, to ensure that the stated acoustic performance will be achieved by their assemblies.

Further Analysis

When detailed floor plans and elevations are available for the proposed buildings, a detailed noise study should be performed to specify wall and window requirements with sufficient acoustical insulation for the dwelling units based on actual window to floor area ratios.

5 Vibration Assessment

To assess the potential ground-borne vibration impact on the development due to rail traffic, HGC Engineering measured vibration levels impacting the site. The vibration data was analyzed and compared to the criteria outlined in Section 3.2.

5.1 Site Measurements

CN and Metrolinx require an assessment of ground-borne vibration through measurement if residential building foundations are to be located within 75 metres of the right-of-way. The west foundation wall of Buildings A and B will be located 30 m from the CN railway corridor.

Measurements of ground-borne rail vibration were conducted at the location of the nearest foundation wall (M1), as shown in Figure 2a. Ground-borne vibration was measured for a total of five GO trains and freight trains on August 6, 2020.

The vibration measurements were conducted using a Hewlett Packard 3569A Real Time Frequency Analyzer outfitted with a Wilcoxon Research type 793V velocity transducer correctly field calibrated before and after the measurements.

The results are plotted as Figures 4 to 8. Table 8 shows the maximum RMS vibration velocity measurements during each of the train pass-bys.

Table 8: Maximum RMS Vibration Velocity Measurements of Train Pass-bys

Train Pass-by	Train Type	Measured Level at 30 m from right of way (mm/s)	Criteria (mm/s)
1	CN (Eastbound) + GO (Westbound)	0.03	0.14
2	CN (Eastbound)	0.04	
3	CN (Eastbound)	0.04	
4	CN (Westbound)	0.06	
5	GO (Westbound)	0.02	

Vibration levels are below the CN and Metrolinx limit of 0.14 mm/s at the proposed location of the closest building foundation wall. Thus, vibration mitigation measures are not required for this development.

6 Impact of the Development on Itself

Section 5.8.1.1 of the Ontario Building Code (OBC), released on January 1, 2020, specifies the minimum required sound insulation characteristics for demising partitions, in terms of Sound Transmission Class (STC) or Apparent Sound Transmission Class (ASTC) values. In order to maintain adequate acoustical privacy between separate suites in a multi-tenant building, inter-suite walls must meet or exceed STC-50 or ASTC-47. Suite separation from a refuse chute or elevator shaft must meet or exceed STC-55. In addition, it is recommended that the floor/ceiling constructions separating suites from any amenity or commercial spaces also meet or exceed STC-55. Tables 1 and 2 in Section SB-3 of the Supplementary Guideline to the OBC provide a comprehensive list of constructions that will meet the above requirements.

Tarion's Builder Bulletin B19R requires the internal design of condominium projects to integrate suitable acoustic features to insulate the suites from noise from each other and amenities in accordance with the OBC, and limit the potential intrusions of mechanical and electrical services of the buildings on its residents. If B19R certification is needed, an acoustical consultant is required to review the mechanical and electrical drawings and details of demising constructions and mechanical/electrical equipment, when available, to help ensure that the noise impact of the development on itself is maintained within acceptable levels.

7 Impact of the Development on the Environment

Sound levels from noise sources such as rooftop air-conditioners, cooling towers, exhaust fans, etc. should not exceed the minimum one-hour L_{EQ} ambient (background) sound level from road traffic, at any potentially impacted residential point of reception. Based on the levels observed during our site visit, the typical minimum ambient sound levels in the area are expected to be in the range of 50 dBA or more during the day and 45 dBA or more at night. Thus any electro-mechanical equipment associated with this development (e.g. emergency generator testing, fresh-air handling equipment, etc.) should be designed such that they do not result in noise impact beyond these ranges.

At the time of this study, the design of the proposed building was in its initial stages, and the mechanical systems had not yet been developed. The City typical requires neoprene/rubber gaskets or alternative measures for any grates located on the driveways that are in a vehicle's path.

Per the City of Burlington's comment, a preliminary noise impact assessment of the mechanical equipment associated with the proposed residential development at existing residences has been conducted based on information obtained from similar residential buildings. The potential sources of concern associated with this development are understood to be parking garage exhaust fans and cooling units located in the rooftop mechanical penthouse. Most of the mechanical units will likely be located inside the rooftop mechanical penthouse with an opening at the top for the cooling tower. The location of the parking garage exhaust fan well is indicated on the plans included in Appendix A.

There are existing residences to the surrounding the site and representative residences are considered to be the sensitive receptors in this assessment (R1 to R3). R1 is single-storey residence to the southwest, R2 is an 3-storey residential building to the east, R3 is a 2-storey building to the north. Receptor locations are shown on Figure 9. The exclusionary MECP daytime and night-time limits of 50 dBA and 45 dBA apply for all receptors.

An overall outdoor sound power level of 92 dBA was assumed for the rooftop mechanical

penthouse of each residential tower (cooling tower opening). The HVAC equipment was assumed to operate at 100% capacity during daytime hours and 50% during night-time hours. The parking garage exhaust fans are likely to be low pressure fans which will be connected to a carbon monoxide system and as such, the exhaust fans will only operate on an as needed basis. An overall sound power level of 79 dBA at the at-grade parking garage exhaust grates were assumed. The parking garage exhaust fans are assumed to operate at 50% capacity conservatively during daytime and night-time hours.

The source sound levels for typical mechanical equipment from our files were used as input to a predictive computer model (*Cadna-A version 2021 MR1 (32 bit): build 183.5110*), in order to estimate the sound levels at the neighbouring residential units. The source sound levels are provided in Appendix D. Cadna/A is a computer implementation of ISO Standard 9613-2, *"Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation*", which takes into account attenuation due to distance (geometrical spreading), shielding by intervening structures and air attenuation.

Calculations at the worst-case location at each receptor, 1st Floor at R1, 3rd floor at R2 and 2nd floor at R3, indicate that the predicted sound levels from the proposed development using the assumptions stated above, can meet the applicable MECP sound level limits at residential receptors. The highest predicted daytime and night-time sound levels for each residential building is also shown on Figures 10 and 11.

The mechanical systems should be designed not to exceed the sound level assumptions mentioned above. A Professional Engineer qualified to perform acoustical engineering services should review the design of the mechanical building systems and the equipment selections when they have been determined, to ensure that the noise levels emitted by the development to the environment will meet the applicable MECP sound level limits.

8 Warning Clauses

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all units/lots/blocks with anticipated traffic sound level excesses. Examples are provided below.

Suggested wording for buildings with sound level excesses the MECP criteria is given below:

Type A:

> 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 and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the noise criteria of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suitable wording for future dwellings requiring central air conditioning systems is given below.

Type B:

> 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 noise criteria of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suggested wording for future dwellings adjacent to commercial/retail facilities is given below.

Type C:

> Purchasers are advised that due to the proximity of the existing commercial, and retail facilities, sound levels from these facilities may at times be audible.

These sample clauses are provided by the MECP as examples and can be modified by the Municipality as required.

Suggested wording for future dwellings with private balconies less than 4.0 m in depth is given

below.

Type D:

> Purchasers/Tenants are advised that the private terraces of each unit are less than 4.0m deep and therefore are not required to have mitigation measures installed for noise as per the Ministry of the Environment, Conservations and Parks NPC-300. Sound levels due to road and rail traffic, increasing road and rail traffic, and no mitigation measures may interfere with some activities of eth dwelling occupants use of their private terrace.

CN requires a standard warning clause as this development is located near a principal mainline. The following sample clause is typical of those included in agreements of purchase and sale or lease on the Lands for all lots in the development.

Type E:

> Warning: Purchasers or tenants are to be advised that Canadian National Railway or its successors or assigns, have an operating right-of-way within 300 metres from the land subject hereof and there may be alterations to the right-of-way including the possibility that the Railway may expand its operations, which expansion may affect the living environment of the residents notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the subdivision and individual units, and that the Railway will not be responsible for complaints or claims arising from use of its facilities and/or operations.

GO Transit's standard warning clause for residential developments located within 300 m of a railway right-of-way (principal main line) is given below.

Type F:

> Warning: Metrolinx, carrying on business as GO Transit, and its assigns and successors in interest are the owners of lands within 300 metres from the land which is the subject hereof. In addition to the current use of the lands owned by Metrolinx, there may be alterations to or expansions of the rail and other facilities on such lands in the future including the possibility that GO Transit or any railway entering into an agreement with GO Transit to use the Metrolinx lands or Metrolinx and their respective assigns or successors as aforesaid may expand their 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 dwellings. Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under its lands.

9 Summary of Recommendations

The following list summarizes the recommendations made in this report:

1. Barriers greater than 3.0 m in height are required in the proposed outdoor amenity areas to reduce sound levels to less than 60 dBA during the day. Consideration should be given in detail design to integrate smaller structures or landscaping features to create quieter pockets or zones. Alternatively, these outdoor amenity areas could be reduced in size or relocated to an area that experiences greater shielding from the proposed or adjacent buildings.

2. Central air conditioning is required for the buildings in the proposed development. Window or through-the-wall air conditioning units are not recommended for any residential units because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall noise insulating properties of the envelope.

3. Upgraded building and glazing constructions are required for the buildings in the proposed development. When detailed floor plans and building elevations are available, a detailed noise study should be conducted to refine acoustic requirements.

4. Warning clauses should be included in the property and tenancy agreements and offers of purchase and sale to inform future residents of the traffic noise issues.

5. Tarion Builder's Bulletin B19R requires that the internal design of condominium projects integrates suitable acoustic features to insulate the suites from noise from each other and amenities in accordance with the OBC, and limit the potential intrusions of mechanical and electrical services of the buildings on its residents. If B19R certification is needed, an acoustical consultant is required to review the mechanical and electrical drawings and details of demising constructions and mechanical/electrical equipment, when available, to help ensure that the noise impact of the development on itself are maintained within acceptable levels. Outdoor sound emissions should also be checked to ensure compliance with the City's by-law.

9.1 Implementation

To ensure that the noise control recommendations outlined above are fully implemented, it is recommended that:

1) At the site plan stage, a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should review the architectural plans and building elevations to refine glazing requirement based on actual window to floor areas ratios.

2) Prior to the issuance of occupancy permits for this development, the City's building inspector or a Professional Engineer qualified to provide acoustical engineering services in the Province of Ontario should certify that the noise control measures for the development have been properly incorporated, installed and constructed.

10 CONCLUSION

The results of this study indicate that the proposed development is feasible on this site from a noise impact perspective, with the inclusion of appropriate acoustical features. Preliminary design recommendations are provided herein, and can be developed in greater detail as the design proceeds through tender and construction.



Figure 1: Key Plan



Figure 1b: Surrounding Uses

Job #:1572.17 - PHASE 1+2
Date: April 20, 2021
Project Statistics

	Permitted / Required	PHASE 1	PHASE 2	OVERAL T+2
01. Site Area		8019 m2 86310 ft2	7566 m2 81441 ft2	15585 m2 167751 ft2
02. G.C.A(m2)				
Residential		41,834	34,559	76393
Retail		791	207	998
Total		42,625	34,766	77391
03. F.S.I		5.32	4.60	5.0
04. Setbacks (m) *				
Above Grade				
North		7	0.6	
East		3	32	
South		17	16	
West		45	8.65	
Below Grade				
North		0	0	
East		0	0	
South		14	14	
West		15.8	6	
05. Unit Count **				
1 Bedroom		347	219	566
2 Bedroom		213	187	400
3 Bedroom		27	56	83
Total		**587**	**462**	**1049**
06. Barrier Free Unit Count **				
1 Bedroom	15%	42	33	75
2 Bedroom	15%	34	29	63
3 Bedroom	15%	9	9	18
Total				
Total Barrier Free units included in Total unit count above		**85**	**71**	**156**
07. Parking Provided				
Residential	(1.0 per unit)	549	459	1008
Visitor/Retail	(0.2 per unit)	118	93	211
Total		**667**	**552**	**1219**
08. Bike Parking				
Residential		TBA	TBA	TBA
Visitor				
Total				
09. Lockers		TBA		
10. Building Height		30-35 STY	22-30 STY	
11.Amenity Space(m2)				
Indoor		2590	2033	4623
Outdoor		2908	2108	5016
Terraces/Balconies		8846	5810	14656
Total	20m2/ unit	**14344**	**9951**	**24295**

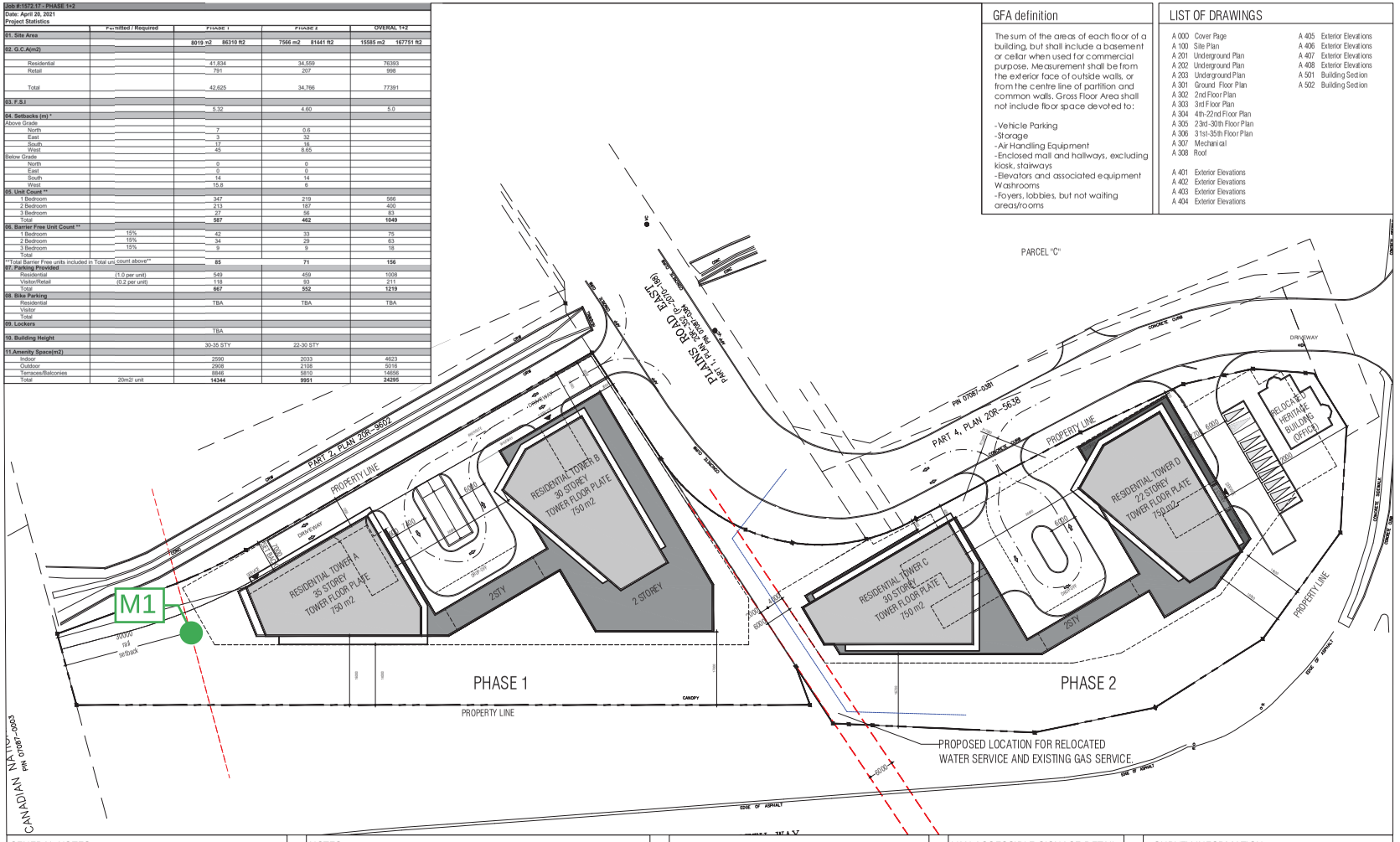
GFA definition

The sum of the areas of each floor of a building, but shall include a basement or cellar when used for commercial purpose. Measurement shall be from the exterior face of outside walls, or from the centre line of partition and common walls. Gross Floor Area shall not include floor space devoted to:

- Vehicle Parking
- Storage
- Air Handling Equipment
- Enclosed mall and hallways, excluding kiosk, stairways
- Elevators and associated equipment
- Washrooms
- Foyers, lobbies, but not waiting areas/rooms

LIST OF DRAWINGS

A 000	Cover Page
A 100	Site Plan
A 201	Underground Plan
A 202	Underground Plan
A 203	Underground Plan
A 301	Ground Floor Plan
A 302	2nd Floor Plan
A 303	3rd Floor Plan
A 304	4th-22nd Floor Plan
A 305	23rd-30th Floor Plan
A 306	31st-35th Floor Plan
A 307	Mechanical
A 308	Roof
A 401	Exterior Elevations
A 402	Exterior Elevations
A 403	Exterior Elevations
A 404	Exterior Elevations
A 405	Exterior Elevations
A 406	Exterior Elevations
A 407	Exterior Elevations
A 408	Exterior Elevations
A 501	Building Section
A 502	Building Section



GENERAL NOTES

1. For landscaping, refer to landscape drawings.
2. For proposed grading, refer to landscape drawings and approved grading plan.
3. All perimeter existing information indicated taken from survey.
4. All work to be done in conformance with the 2012 Ontario Building Code (O.B.C., as amended)
5. All driveway with access onto City owned roadway conform to City of Burlington standards.

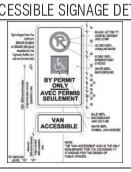
NOTES

1. Fire access route to existing buildings will be maintained during construction.
2. Accessibility for all pathway to Go Station, Wal-Mart during construction will be maintained.
3. The fire access route will be designed to support a load of not less than 11,363 kg per axle and have a change in gradient of not more than 1 in 12.5 over a minimum distance of 15m.
4. Fire Department access route will be constructed of hard surface material such as asphalt, concrete or lockstone.

KEY PLAN



VAN ACCESSIBLE SIGNAGE DETAIL



SURVEY INFORMATION

PLAN OF SURVEY OF
PART OF LOT 14 (REGISTERED PLAN 99
PART OF HAMILTON & NELSON ROAD SHOWN
REGISTERED PLAN 99
IN THE CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON

A.T. McLaren LIMITED
69 JOHN STREET SOUTH, SUITE 230
HAMILTON, ONTARIO
L8N 2B9
telephone (905) 527-8559

This drawing, as an instrument of service is provided by and is the property of Graziani + Corazza Architects Inc. The contractor must verify and accept responsibility for all dimensions and conditions on site and must notify Graziani + Corazza Architects Inc. of any variations from the supplied information. Graziani + Corazza Architects Inc. is not responsible for the accuracy of survey, structural, mechanical, electrical, etc., engineering information shown on this drawing. Refer to the appropriate engineering drawings before proceeding with the work. Construction must conform to all applicable codes and requirements of the authorities having jurisdiction. Unless otherwise noted, no investigation has been undertaken or reported on by this office in regard to the environmental condition of this site.

This drawing is not to be scaled. All architectural symbols indicated on this drawing are graphic representations only.

Conditions for electronic information transfer

Electronic information is supplied to the other associated firms to assist them in the execution of their work/review. The recipient firms must determine the completeness/appropriateness/relevance of the information in respect to their particular responsibility.

Graziani + Corazza Architects Inc. shall not be responsible for:
1. Errors, omissions, incompleteness due to loss of information in whole or part when information is transferred.
2. Transmission of any virus or damage to the receiving electronic system when information is transferred.

issued for revisions

GRAZIANI + CORAZZA ARCHITECTS INC.
1320 Dorsan Drive, Suite 100 Mississauga Ontario L4W 1C3
Phone 905.795.2601 Fax 905.795.2644 www.gc-architects.com

Residential Development

PLAINS RD
MASTER PLAN

Burlington — Ontario

Project Architect:	B. Graziani
Assistant Designer:	S. Saleri/R. Alani
Drawn By:	S. Saleri/R. Alani
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
Job #	1572.17

SITE PLAN

1:450

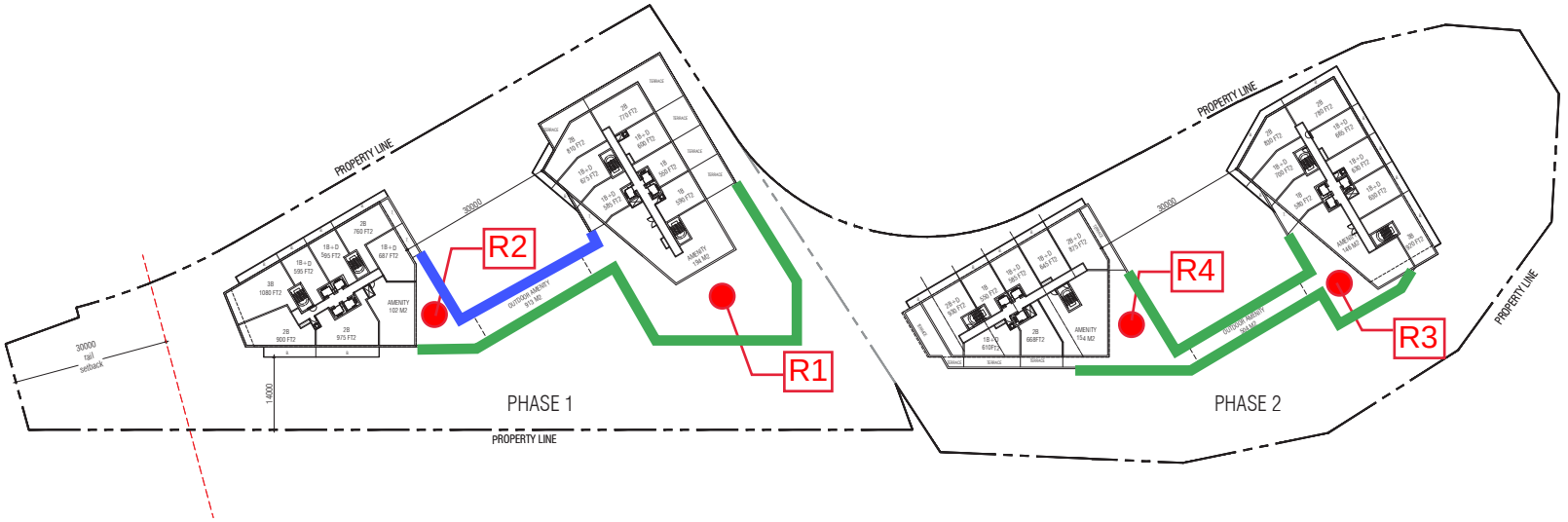
A101

TITLEBLOCK SIZE: 610 x 900

Figure 2a: Proposed Site Plan

LEGEND

- Standard 1.07m solid parapet or guard
- Acoustic barrier with heights to be selected by the City



This drawing, as an instrument of service, is provided by and is the property of Graziani + Corazza Architects Inc. The contractor must verify and accept responsibility for all dimensions and conditions on site and must notify Graziani + Corazza Architects Inc. of any variations from the supplied information. Graziani + Corazza Architects Inc. is not responsible for the accuracy of survey, structural, mechanical, electrical, etc., engineering information shown on this drawing. Refer to the appropriate engineering drawings before proceeding with the work. Construction must conform to all applicable codes and requirements of the authorities having jurisdiction. Unless otherwise noted, no investigation has been undertaken or reported on by this office in regards to the environmental condition of this site.

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1320 Shawson Drive, Suite 100, Mississauga Ontario L4W 1C3
Phone: 905.795.2601 Fax:905.795.2644 www.gc-architects.com

Residential Developement

PLAINS RD
MASTER PLAN

Burlington Ontario

Project Architect:	B. Graziani
Assistant Designer:	S. Salari/R. Alani
Drawn By:	S. Salari/R. Alani
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
Job #	1572.17

3RD FLOOR

1:450 A303

TITLEBLOCK SIZE: 610 x 900

Figure 2b: Proposed 3rd Floor Plan Showing Receptor Locations



Figure 3a: Maximum Predicted Daytime Sound Level Predictions at Buildings A and B from Transportation Noise Sources

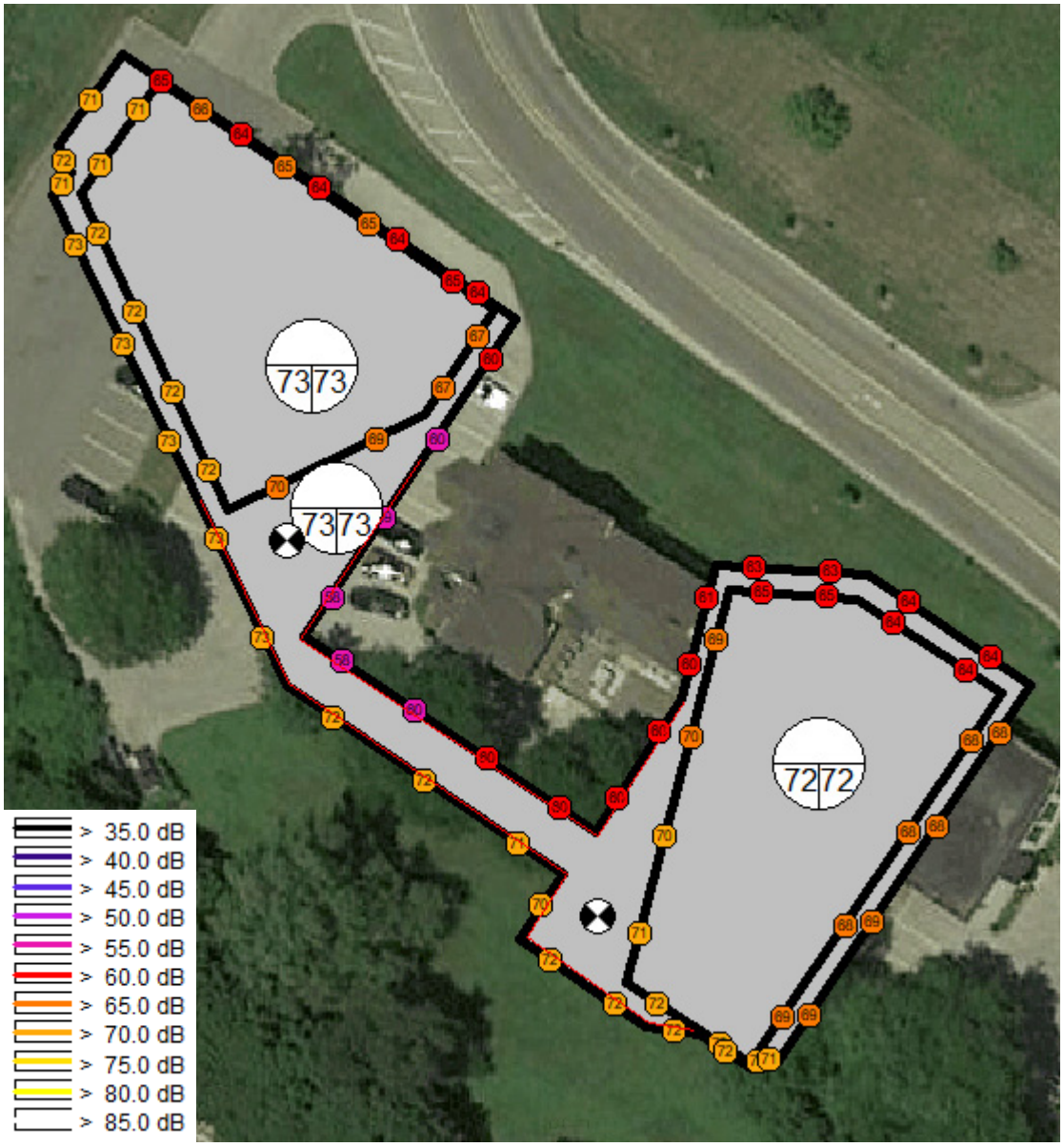


Figure 3b: Maximum Predicted Sound Level Predictions at Buildings C and D from Transportation Noise Sources

Figure 4a: Pass-by 1
Measured Vibratory Velocity Level

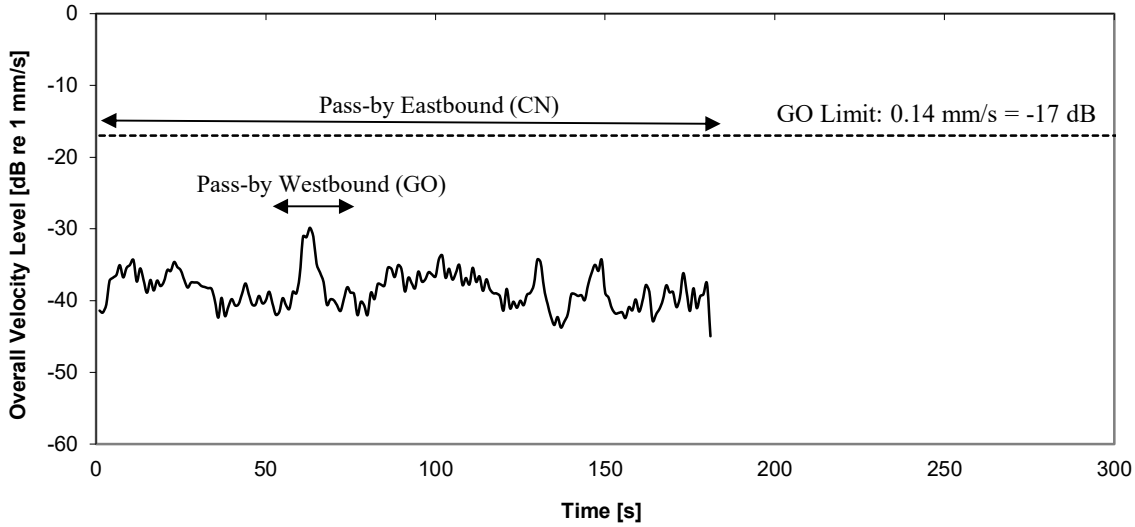


Figure 4b: Pass-by 1
Acceleration Spectrum @ Peak Level (1 sec. Duration)

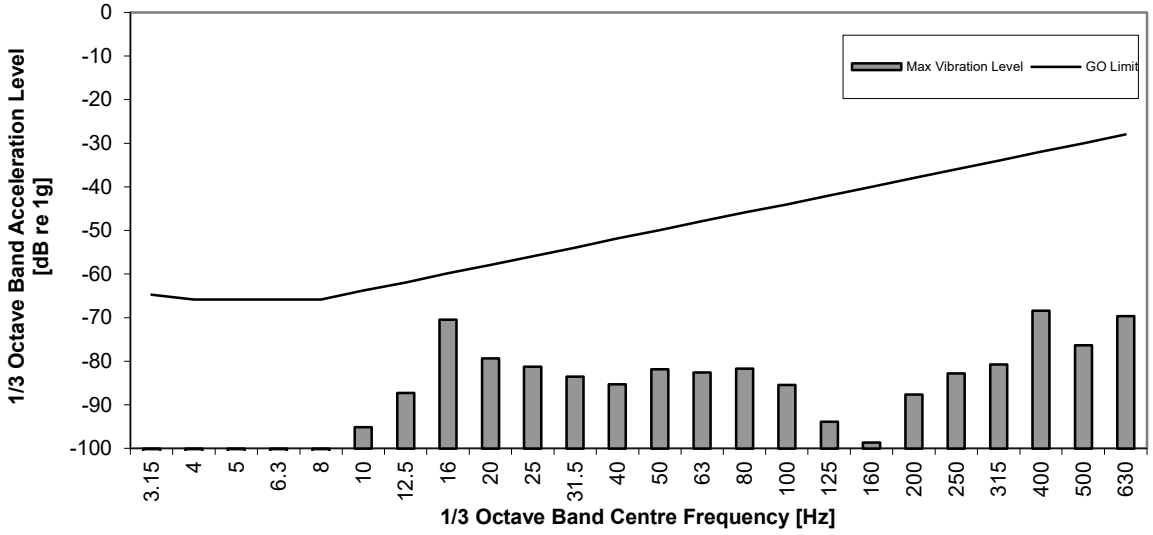


Figure 5a: Pass-by 2
Measured Vibratory Velocity Level

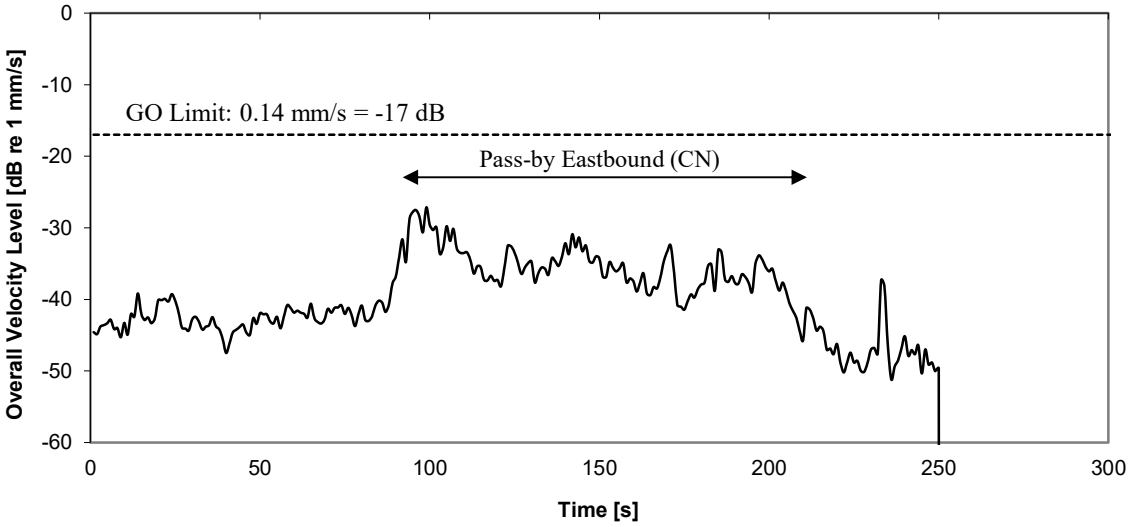


Figure 5b: Pass-by 2
Acceleration Spectrum @ Peak Level (1 sec. Duration)

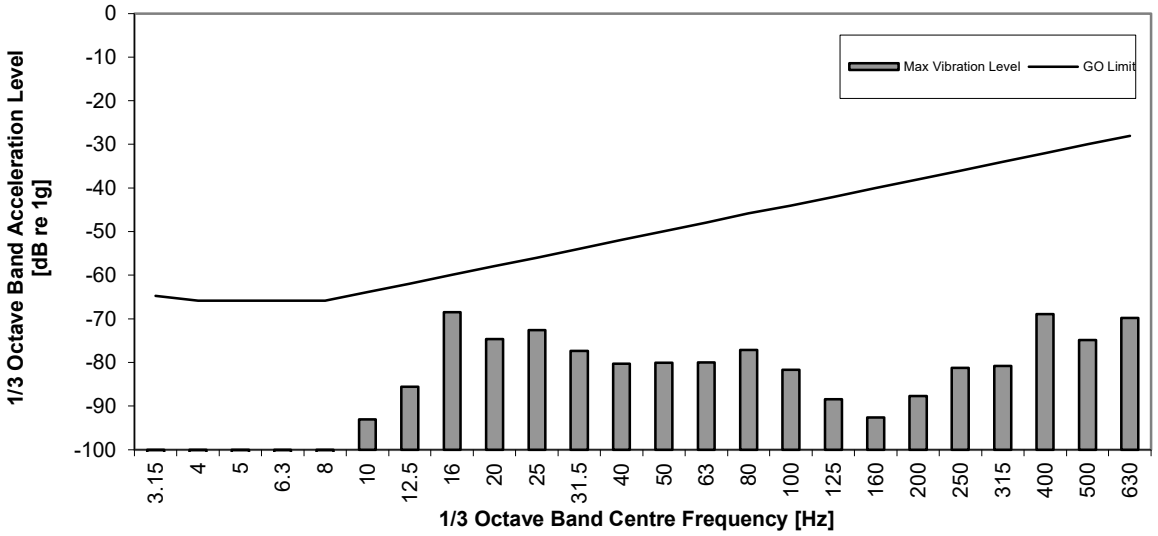


Figure 6a: Pass-by 3
Measured Vibratory Velocity Level

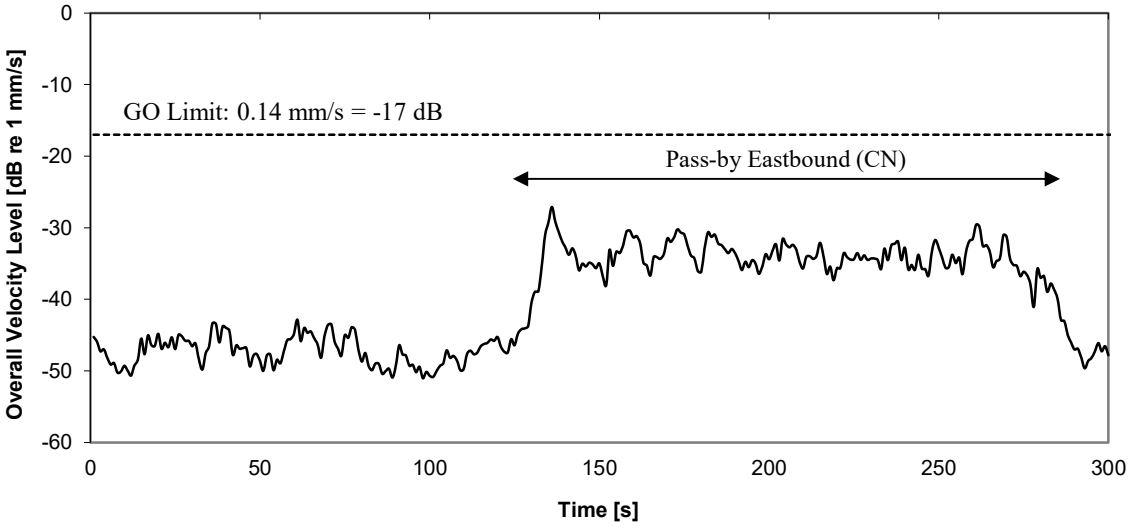


Figure 6b: Pass-by 3
Acceleration Spectrum @ Peak Level (1 sec. Duration)

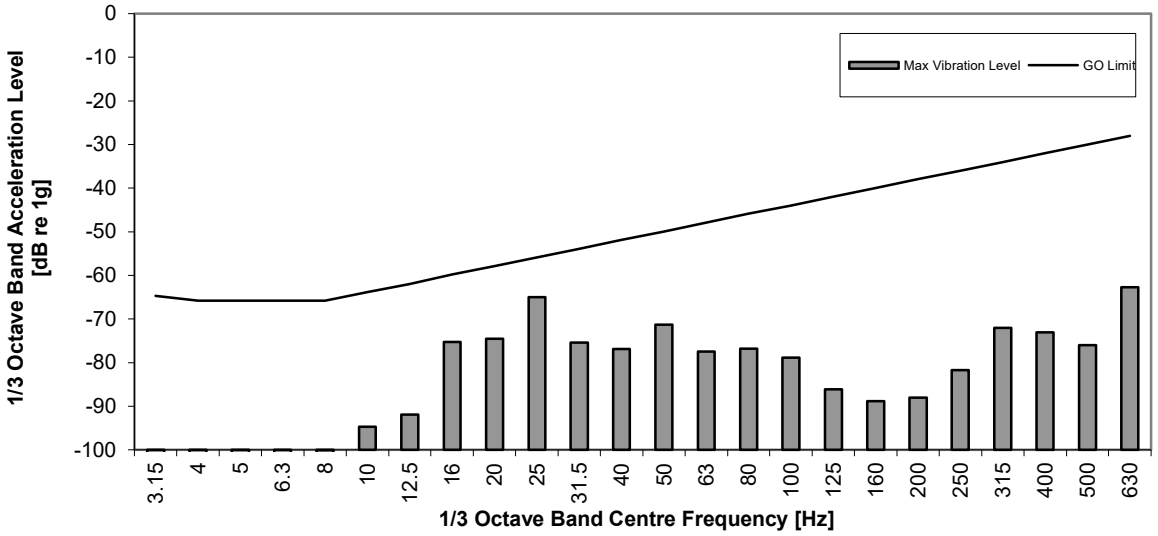


Figure 7a: Pass-by 4
Measured Vibratory Velocity Level

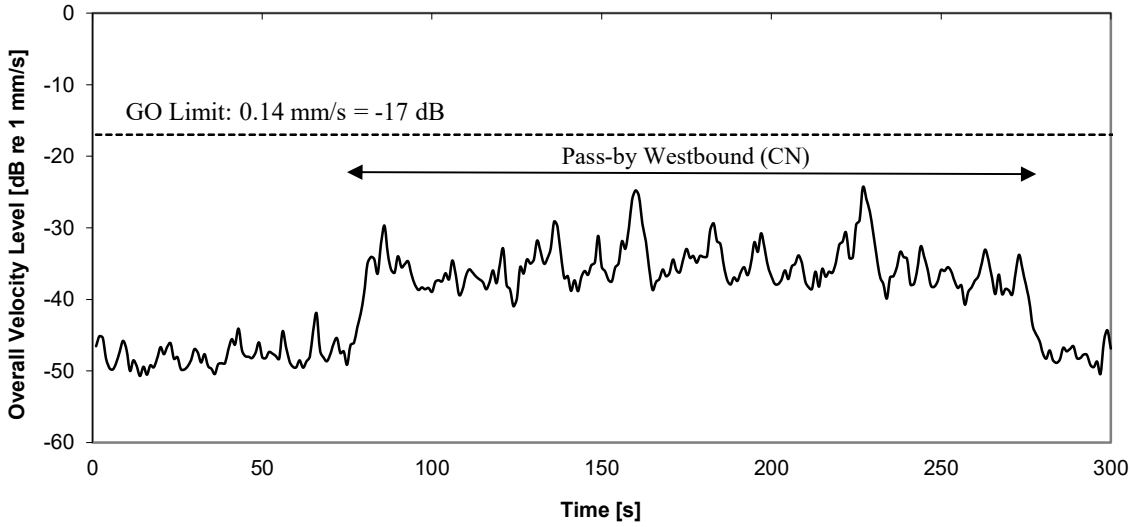


Figure 7b: Pass-by 4
Acceleration Spectrum @ Peak Level (1 sec. Duration)

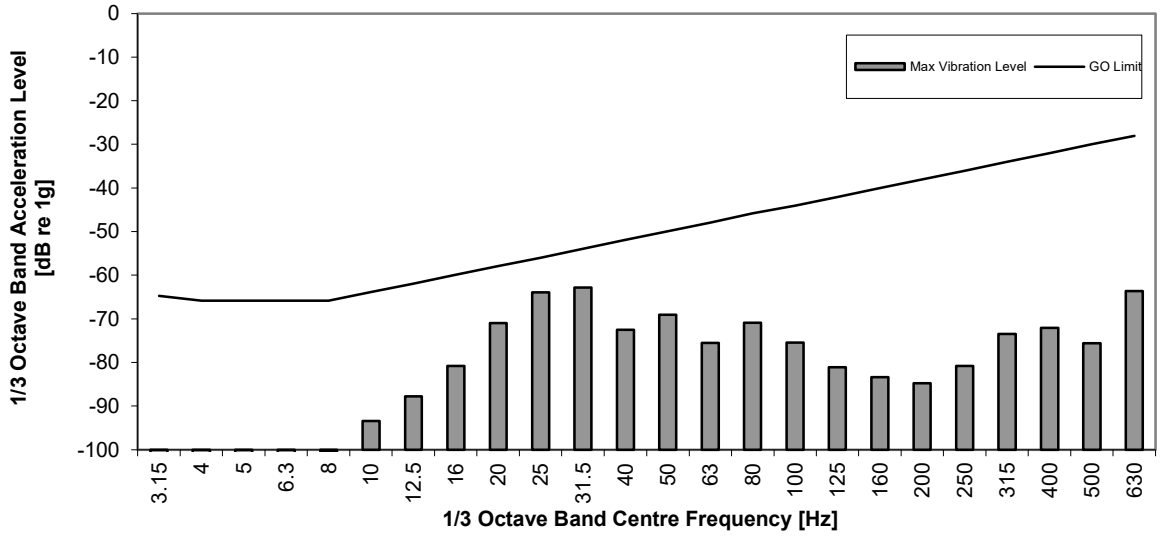


Figure 8a: Pass-by 5
Measured Vibratory Velocity Level

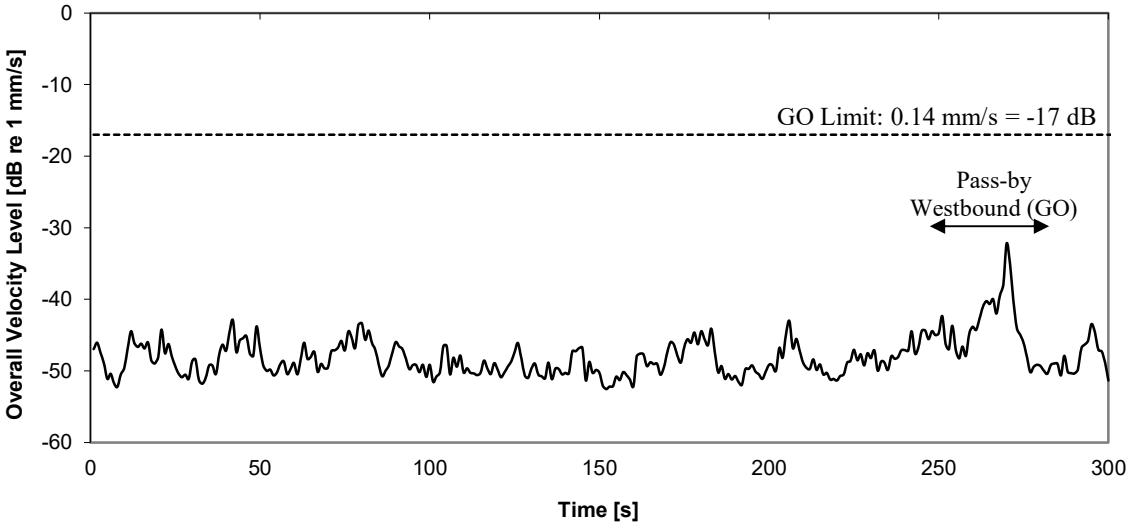


Figure 8b: Pass-by 5
Acceleration Spectrum @ Peak Level (1 sec. Duration)

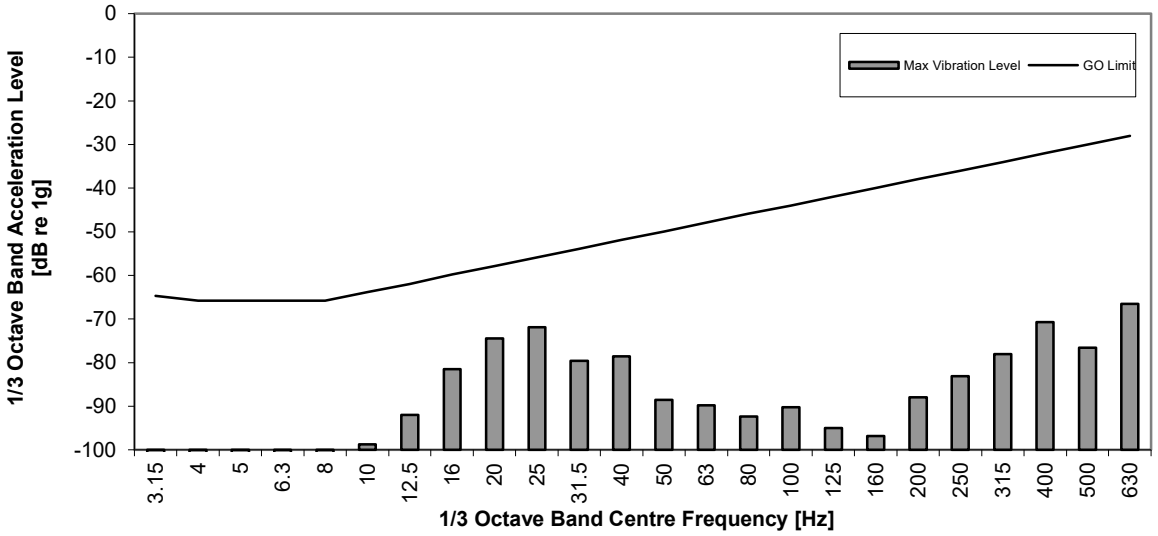




Figure 9: Proposed Noise Source Locations

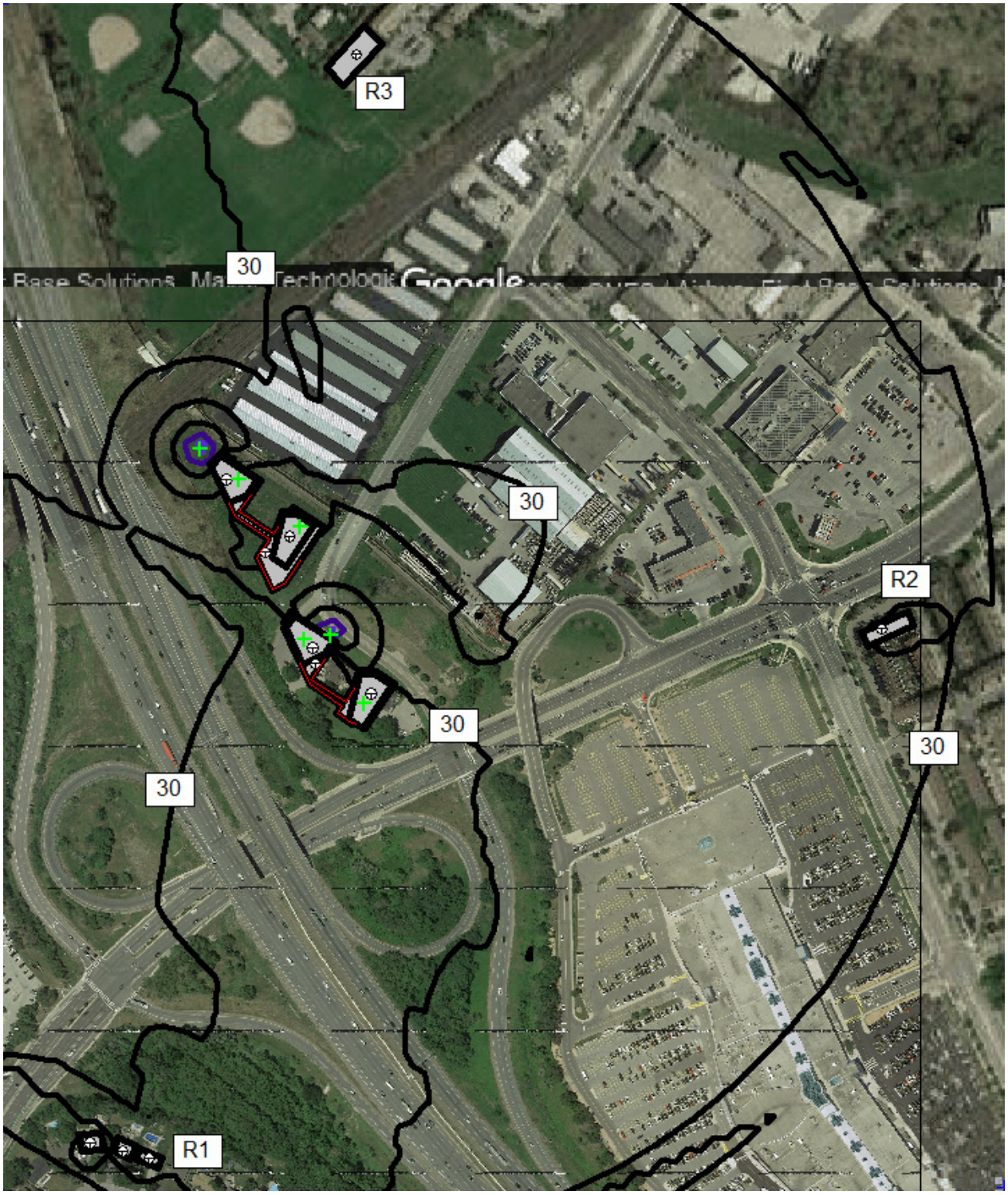


Figure 10: Predicted Daytime Stationary Noise Sound Levels, dBA

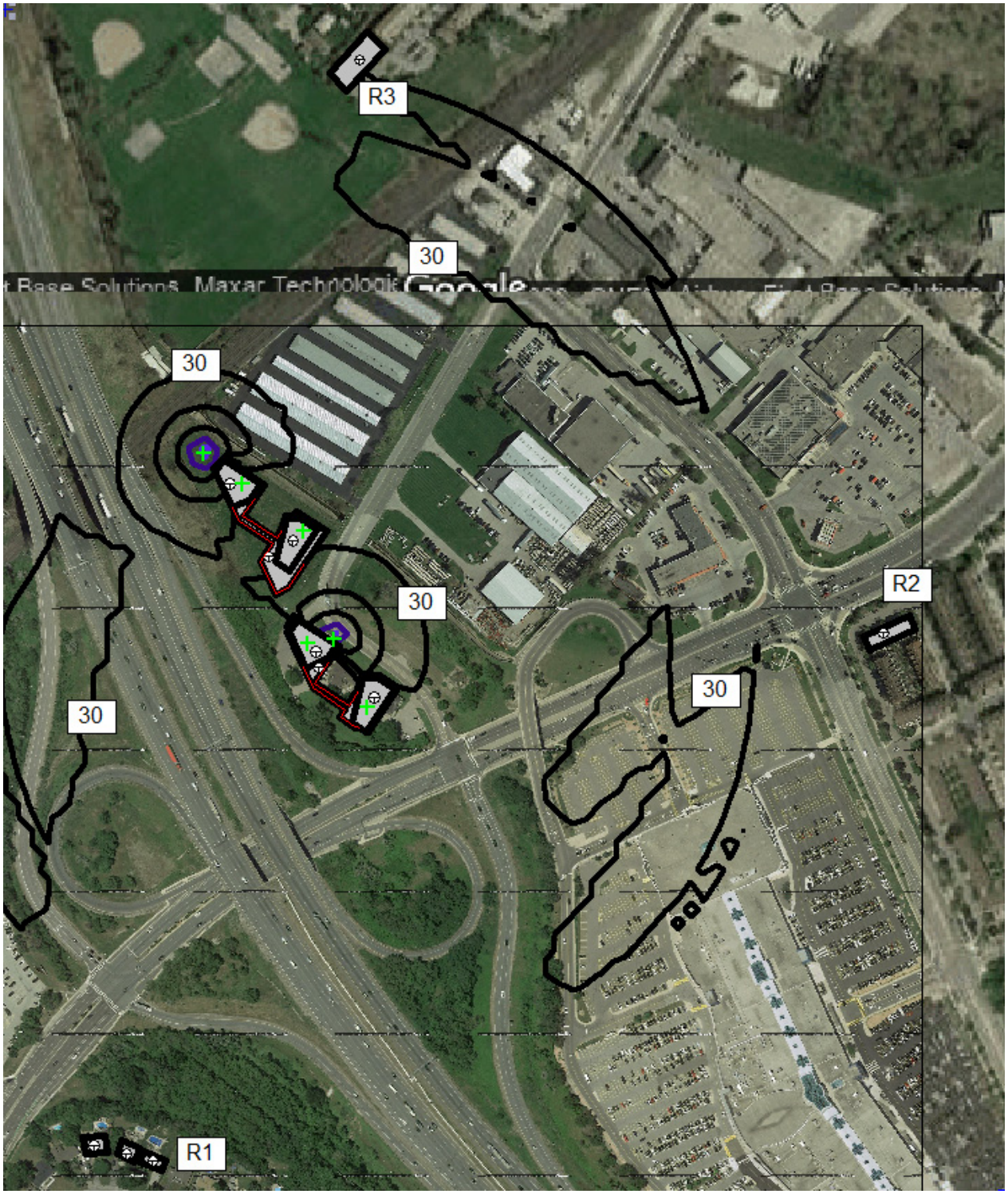


Figure 11: Predicted Nighttime Stationary Noise Sound Levels, dBA

APPENDIX A

CN and Metrolinx Principle Mainline Requirements

Canadian National Railway Properties Inc.
Propriétés ferroviaires du Canadien National Inc.

277 Front Street West
Floor 8
Toronto, Ontario
M5V 2X7

Telephone: (416) 217-6961
Facsimile: (416) 217-6743

277, rue Front ouest
8e étage
Toronto (Ontario)
M5V 2X7

Téléphone: (416) 217-6961
Télécopieur: (416) 217-6743

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. The Owner shall engage a consultant to undertake an analysis of noise. At a minimum, a noise attenuation barrier shall be adjoining and parallel to the railway rights-of-way, having returns at the ends, and a minimum total height of 5.5 metres above top-of-rail. Acoustic fence to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre of surface area. Subject to the review of the noise report, the Railway may consider other measures recommended by an approved Noise Consultant.

C. Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec RMS between 4 Hz and 200 Hz. The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, ±3 dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.

D. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.

E. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way: "Warning: Canadian National Railway Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way."

F. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the Railway and be substantiated by a drainage report to the satisfaction of the Railway.

G. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the safety berm, fencing and vibration isolation measures implemented are not to be tampered with or altered and further that the Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of CN.

H. The Owner enter into an Agreement stipulating how CN's concerns will be resolved and will pay CN's reasonable costs in preparing and negotiating the agreement.

I. The Owner may be required to grant CN an environmental easement for operational noise and vibration emissions, registered against the subject property in favour of CN.

A wholly owned subsidiary of Canadian National Railway Company / Une filiale en propriété exclusive de la Compagnie des chemins de fer nationaux du Canada

PRINCIPAL MAIN LINE REQUIREMENTS FOR NEW DEVELOPMENT

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, GO Transit 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, $\pm$ 3 dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.

D. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.

E. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way.

> **Warning:** Metrolinx, carrying on business as GO Transit, and its assigns and 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 GO Transit or any railway entering into an agreement with GO Transit to use the right-of-way or their assigns or successors as aforesaid may expand their 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). Metrolinx 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 the railway right-of-way must receive prior concurrence from GO Transit and be substantiated by a drainage report to the satisfaction of GO Transit.

G. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the safety berm, fencing and vibration isolation measures implemented are not to be tampered with or altered and further that the Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of GO Transit.

H. The Owner enter into an Agreement stipulating how GO Transit's concerns will be resolved and will pay GO Transit's reasonable costs in preparing and negotiating the agreement.

I. The Owner may be required to grant GO Transit an environmental easement for operational emissions, registered on title against the subject property in favour of GO.

APPENDIX B

Road Traffic Data

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			2014	CR	155,300	183,200	181,700	132,000	N/A
			2015	CR	158,300	186,800	185,200	134,600	N/A
			2016	CR	161,300	190,300	188,700	137,100	N/A
QEW	FAIRVIEW ST IC-99	1.0	1988	IC	68,000	78,800	76,800	59,800	0.7
			1989	IC	76,600	88,000	86,500	68,100	0.8
			1990	IC	80,500	91,700	90,100	71,600	0.8
			1991	IC	82,900	93,600	91,900	73,700	1.1
			1992	IC	83,500	94,300	93,500	74,300	0.8
			1993	IC	84,100	93,300	92,500	76,500	0.6
			1994	IC	92,100	102,700	103,500	81,600	0.8
			1995	IC	95,900	106,900	108,400	85,000	0.3
			1996	IC	99,700	111,200	112,700	88,300	0.4
			1997	IC	103,600	115,500	117,100	91,200	0.4
			1998	IC	107,400	119,800	120,700	95,200	0.3
			1999	IC	111,300	124,100	125,100	98,600	0.6
			2000	IC	115,100	128,300	129,400	102,000	0.4
			2001	IC	118,900	133,200	133,200	104,600	0.3
			2002	IC	122,800	136,900	138,000	108,200	0.4
			2003	IC	126,600	140,500	141,800	111,400	0.3
			2004	IC	130,400	145,300	146,700	115,500	0.4
			2005	IC	134,300	149,300	150,800	118,400	0.5
			2006	IC	138,100	153,400	154,900	122,300	0.5
			2007	IC	141,900	157,600	162,500	125,400	0.4
			2008	IC	145,800	161,500	156,300	128,600	0.4
			2009	IC	149,600	165,800	167,300	132,600	0.4
			2010	IC	153,400	169,800	171,200	136,000	0.3
			2011	IC	157,300	173,000	179,300	141,500	N/A
			2012	IC	157,200	174,500	168,200	139,900	N/A
			2013	IC	153,000	169,800	168,300	136,200	N/A
			2014	IC	165,700	183,900	182,200	147,400	N/A
			2015	IC	169,300	187,900	186,200	150,700	N/A
			2016	IC	172,900	191,900	190,200	153,900	N/A
QEW	HWY 403/407 IC-100	0.8	1988	C	90,800	100,800	100,800	81,700	1.1

Yvonne Lo

From: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Sent: Wednesday, July 22, 2020 11:56 AM
To: Yvonne Lo
Cc: Bee, Christopher (MTO)
Subject: Fw: Bee, Christopher (MTO) shared "QEW at Fairview St(Plains Rd) (East Ramp)" with you.
Attachments: QEW at Fairview St(Plains Rd) (East Ramp).pdf; QEW at Fairview St(Plains Rd) (West Ramp).pdf

To Yvonne Lo:

The "% commercial" at QEW and Fairview was 25% for 2016, and several years before.
This includes small trucks, large trucks, cars with trailer, and specials, but NOT REGULAR CARS. There is no further breakdown.

This is a relatively large number, but does not imply the "% commercial" on the on-ramp is the same.

Christopher Bee
MTO CR Traffic Office
STIRCS

From: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Sent: Wednesday, July 22, 2020 11:50 AM
To: Banger, Kamal (MTO) <Kamal.Banger@ontario.ca>
Cc: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Subject: Fw: Bee, Christopher (MTO) shared "QEW at Fairview St(Plains Rd) (East Ramp)" with you.

Thanks Kamal.

Chris

From: Banger, Kamal (MTO) <Kamal.Banger@ontario.ca>
Sent: Wednesday, July 22, 2020 11:40 AM
To: Yvonne Lo <ylo@hgcengineering.com>
Cc: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Subject: RE: Bee, Christopher (MTO) shared "QEW at Fairview St(Plains Rd) (East Ramp)" with you.

Hi Yvonne,

Attached are the TMC data you requested.

Thanks,

Kamal

From: Yvonne Lo <ylo@hgcengineering.com>
Sent: July 22, 2020 8:13 AM
To: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Cc: Banger, Kamal (MTO) <Kamal.Banger@ontario.ca>; Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Subject: RE: Bee, Christopher (MTO) shared "QEW at Fairview St(Plains Rd) (East Ramp)" with you.

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Christopher,

Thanks for coordination. I look forward to getting the volume data associated with the onramp. Can you please also provide "% commercial" on QEW in the vicinity of the on-ramp location?

Thank you!

Best,

Yvonne Lo, BASc, PEng
Project Consultant

HGC Engineering **NOISE | VIBRATION | ACOUSTICS**
Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203, Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044 **e:** ylo@hgcengineering.com
Visit our website: www.hgcengineering.com **Follow Us** – LinkedIn | Twitter | YouTube

From: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Sent: Tuesday, July 21, 2020 6:58 PM
To: Yvonne Lo <ylo@hgcengineering.com>
Cc: Banger, Kamal (MTO) <Kamal.Banger@ontario.ca>; Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Subject: Fw: Bee, Christopher (MTO) shared "QEW at Fairview St(Plains Rd) (East Ramp)" with you.

To Yvonne Lo, HGC:

RE: % commercial + volume at on- ramp from Plains Road/Fairview to QEW

Sorry about the delay.

Re the above, unfortunately we do not have "% commercial" at the indicated on-ramp. But we have "% commercial" on QEW in the vicinity of the on-ramp location. I assume that is not what you want.

Re volume at the on-ramp, the latest we have is 2015. We do not have the on-ramp volumes, but we have the TMCs at both ramp terminals at QEW and Fairivew. From the TMCs, you can infer the on-ramp volume. The TMC data are on shared drive, and my computer cannot send the data to you. I have sent the data to Kamal Banger, who will forward both ramp terminal TMCs to you (please see email below).

Thanks

Christopher Bee
MTO CR Traffic Office
STIRCS

Fairview St & QEW E Ramp

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

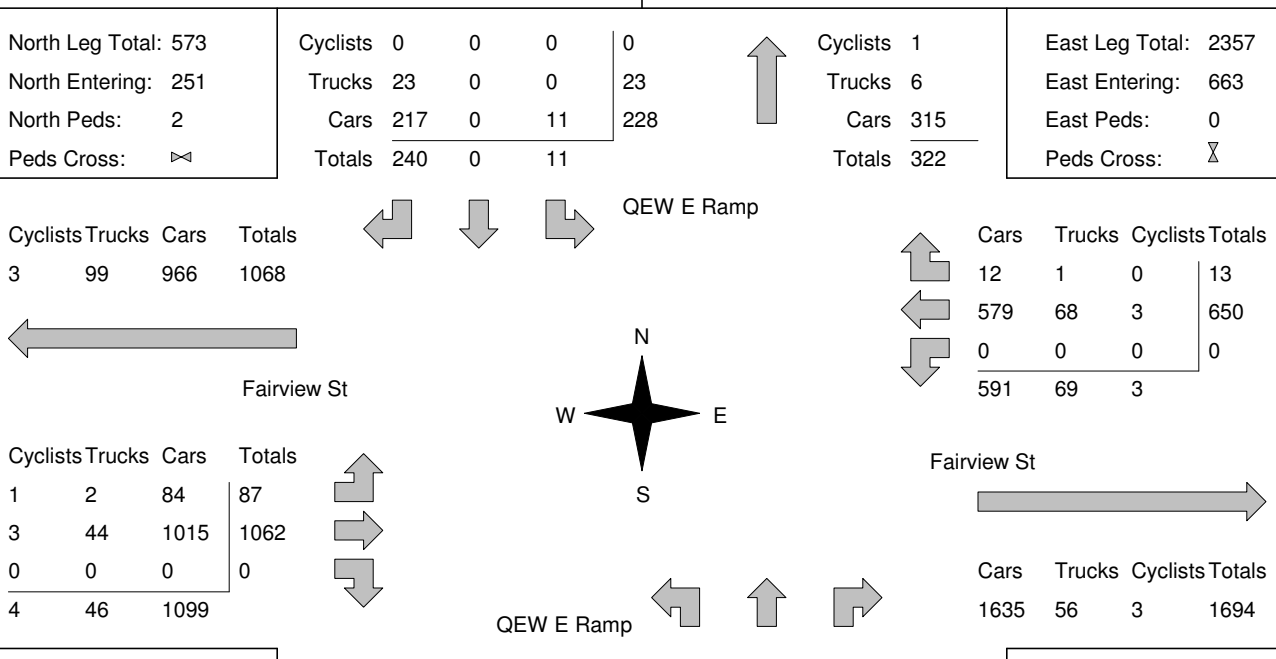
Municipality: Burlington
Site #: 0000201936
Intersection: Fairview St & QEW E Ramp
TFR File #: 1
Count date: 15-Nov-2017

Weather conditions:
Cloudy

Person(s) who counted:
Nikola
Mike

**** Signalized Intersection ****

Major Road: Fairview St runs W/E



Comments

Fairview St & QEW E Ramp

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 12:30:00
To: 13:30:00

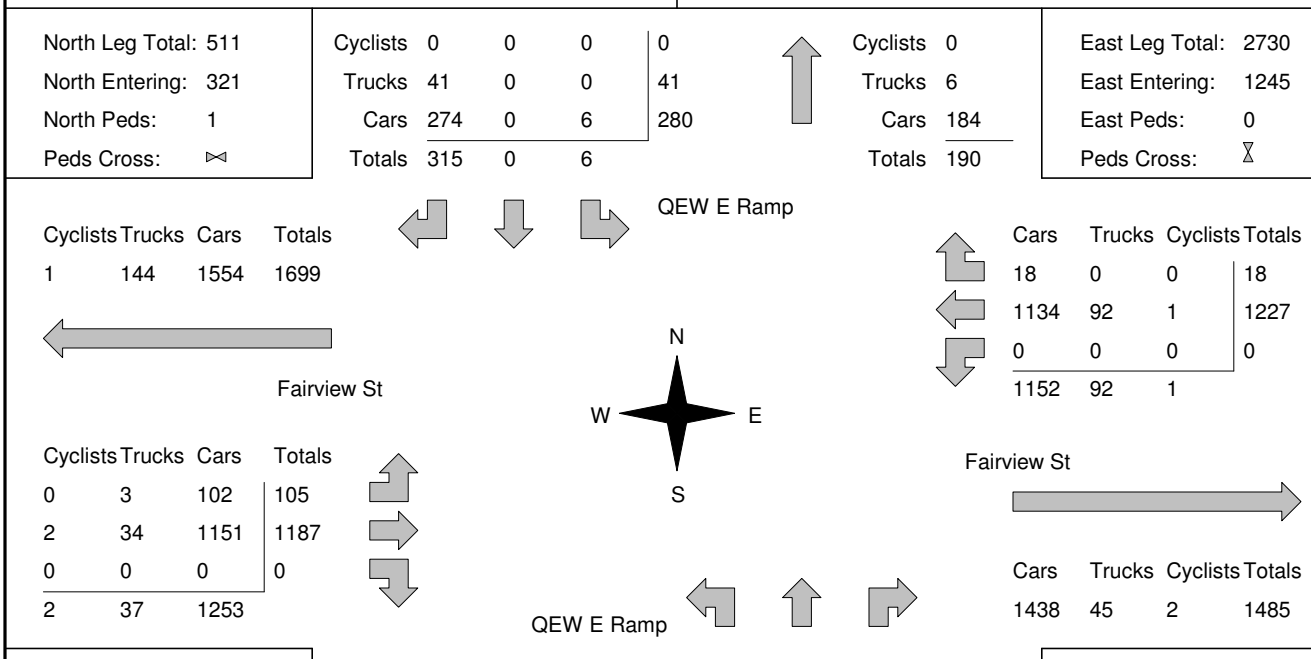
Municipality: Burlington
Site #: 0000201936
Intersection: Fairview St & QEW E Ramp
TFR File #: 1
Count date: 15-Nov-2017

Weather conditions:
Cloudy

Person(s) who counted:
Nikola
Mike

**** Signalized Intersection ****

Major Road: Fairview St runs W/E



Comments

Fairview St & QEW E Ramp

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Burlington
Site #: 0000201936
Intersection: Fairview St & QEW E Ramp
TFR File #: 1
Count date: 15-Nov-2017

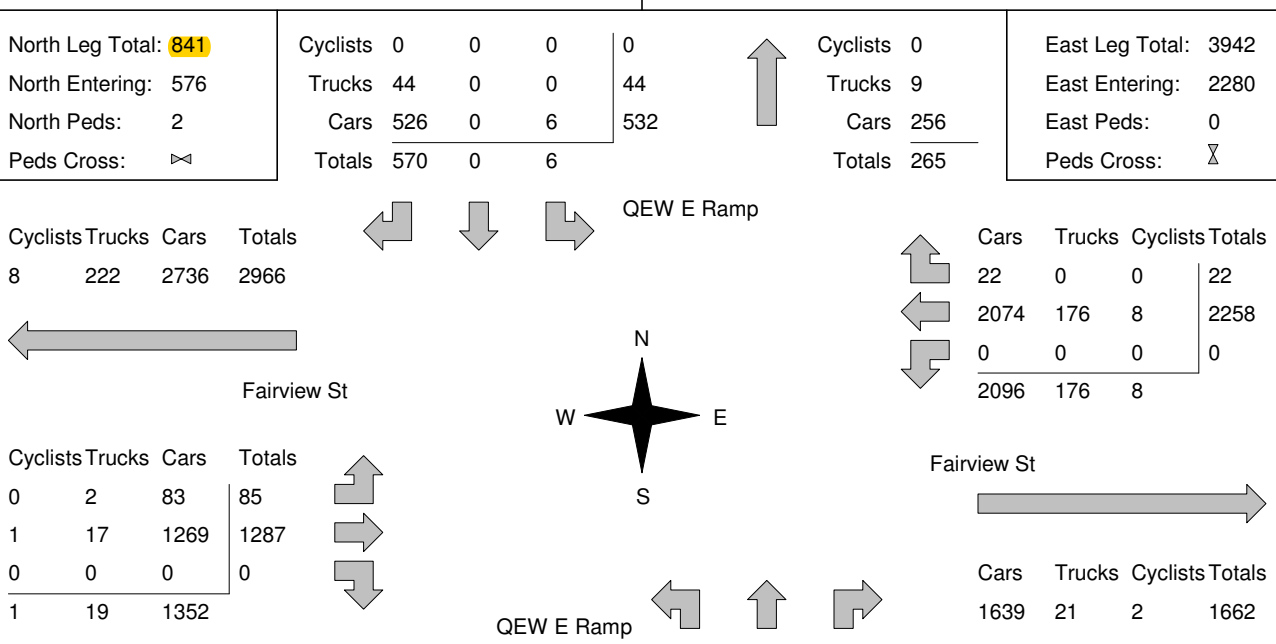
Weather conditions:
Cloudy

Person(s) who counted:
Nikola
Mike

** Signalized Intersection **

(44+9)/841 = 6.3%

Major Road: Fairview St runs W/E



(222+19)/4338 = 5.6%

Comments

Fairview St & QEW E Ramp

Total Count Diagram

Municipality: Burlington
Site #: 0000201936
Intersection: Fairview St & QEW E Ramp
TFR File #: 1
Count date: 15-Nov-2017

Weather conditions:
Cloudy

Person(s) who counted:
Nikola
Mike

**** Signalized Intersection ****

Major Road: Fairview St runs W/E

North Leg Total:	4957			
North Entering:	2978			
North Peds:	28			
Peds Cross:	⋈			
Cyclists	0	0	0	0
Trucks	268	0	3	271
Cars	2648	0	59	2707
Totals	2916	0	62	
Cyclists	1			
Trucks	74			
Cars	1904			
Totals	1979			
East Leg Total:	23269			
East Entering:	11059			
East Peds:	8			
Peds Cross:	⧖			

QEW E Ramp

Cyclists	Trucks	Cars	Totals
22	1218	13844	15084

Cars	Trucks	Cyclists	Totals
116	4	0	120
10036	881	22	10939
0	0	0	0
10152	885	22	

Fairview St

N
W E
S

Cyclists	Trucks	Cars	Totals
1	30	766	797
31	234	8868	9133
0	0	0	0
32	264	9634	

Fairview St

Cars	Trucks	Cyclists	Totals
11870	308	32	12210

QEW E Ramp

Peds Cross:	⧖			
West Peds:	0			
West Entering:	9930			
West Leg Total:	25014			
Cars	0			
Trucks	0			
Cyclists	0			
Totals	0			
Cars	1160	1022	2943	5125
Trucks	69	40	71	180
Cyclists	0	0	1	1
Totals	1229	1062	3015	
Peds Cross:	⋈			
South Peds:	61			
South Entering:	5306			
South Leg Total:	5306			

Comments

Fairview St & QEW E Ramp
Traffic Count Summary

Intersection: Fairview St & QEW E Ramp | **Count Date:** 15-Nov-2017 | **Municipality:** Burlington

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	10	0	187	197	0	1298
9:00:00	9	0	257	266	4	1088
11:00:00	0	0	0	0	0	0
12:00:00	4	0	284	288	9	824
13:00:00	12	0	311	323	1	890
14:00:00	7	0	318	325	3	841
15:00:00	0	0	0	0	0	0
16:00:00	6	0	440	446	5	929
17:00:00	9	0	562	571	5	1218
18:00:00	5	0	557	562	1	1196
Totals:	62	0	2916	2978	28	8284

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	155	276	670	1101	2
9:00:00	176	177	469	822	2
11:00:00	0	0	0	0	0
12:00:00	138	68	330	536	5
13:00:00	178	65	324	567	13
14:00:00	151	75	290	516	12
15:00:00	0	0	0	0	0
16:00:00	138	101	244	483	10
17:00:00	149	151	347	647	7
18:00:00	144	149	341	634	10
Totals:	1229	1062	3015	5306	61

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	558	6	564	0	1520
9:00:00	0	678	11	689	0	1921
11:00:00	0	0	0	0	0	0
12:00:00	0	1082	8	1090	2	2285
13:00:00	0	1181	18	1199	0	2470
14:00:00	0	1244	18	1262	1	2530
15:00:00	0	0	0	0	0	0
16:00:00	0	1847	20	1867	5	3173
17:00:00	0	2138	18	2156	0	3488
18:00:00	0	2211	21	2232	0	3602
Totals:	0	10939	120	11059	8	20989

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	73	883	0	956	0
9:00:00	112	1120	0	1232	0
11:00:00	0	0	0	0	0
12:00:00	98	1097	0	1195	0
13:00:00	113	1158	0	1271	0
14:00:00	116	1152	0	1268	0
15:00:00	0	0	0	0	0
16:00:00	100	1206	0	1306	0
17:00:00	99	1233	0	1332	0
18:00:00	86	1284	0	1370	0
Totals:	797	9133	0	9930	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00
Crossing Values:	441	362	212	255	234	250	309	298

APPENDIX C

Rail Traffic Data

Victor Garcia

From: Rail Data Requests <RailDataRequests@metrolinx.com>
Sent: March 15, 2019 10:32 AM
To: Victor Garcia
Cc: Brandon Gaffoor
Subject: RE: Rail Traffic Data Verification

Good Morning Victor,

I apologize for the delay in our response.

Further to your request dated December 19, 2018 (attached below), the subject site (1335 Plains Road East, Burlington) is located within 300 metres of CNR's Halton Subdivision which carries Lakeshore West GO Train service.

It's anticipated that GO service on this line will be comprised of a mix of both diesel and electric trains within (at least) a 10-year time horizon. The combined preliminary midterm weekday train volume forecast at this location, including both revenue and equipment trips is in the order of 238 trains (54 diesel: 45 day, 9 night; 184 electric: 147 day, 37 night). Trains will be comprised of a single locomotive and up to 12 passenger cars.

The current maximum design speed on this corridor is 95 mph (153 km/h).

With respect to future electrified rail service, Metrolinx is committed to finding the most sustainable solution for electrifying the GO rail network and we are currently working towards the next phase. Metrolinx has not made a final decision regarding the electric train technology or technologies to be deployed. We can, however, provide the following interim information which may be helpful;

1. At lower speeds, train noise is dominated by the powertrain. At higher speeds, train noise is dominated by the wheel- track interaction. Hence, at higher speeds, the noise level and spectrum of electric trains is expected to be very similar, if not identical, to those of equivalent diesel trains.

2. Along with electrification, Metrolinx will intensify service levels along all of its corridors to deliver the promised GO Expansion service. Everything else being equal, this will likely result in an overall increase in train noise emissions.

Given the above considerations, it would be prudent, for the purposes of acoustical analyses, to assume that the acoustical characteristics of electrified and diesel trains are equivalent. In light of the aforementioned information, acoustical models should employ diesel train parameters as the basis for analyses. We anticipate that additional information regarding specific operational parameters for electrified trains will become available in the future.

Operational information is subject to change and may be influenced by, among other factors, service planning priorities, operational considerations, funding availability, and passenger demand.

It should be noted that CNR and VIA operate trains in this area and it would be prudent to contact them directly for rail traffic information.

I trust this information is useful. Should you have any questions, please feel free to contact me.

Best Regards,

IVAN CHEUNG, M.Sc, B.URPl
Intern | Third Party Projects Review
Pre-Construction Services | Capital Projects Group
Metrolinx
20 Bay Street, Suite 600 | Toronto | Ontario | M5J 2W3
T: 416-202-5920

System Engineering
Engineering Services

1 Administration Road
Concord, ON, L4K 1B9
T: 905.669.3264
F: 905.760.3406

Train Count Data

TRANSMITTAL

To: *Destinataire :*	HGC Engineering 2000 Argentia Rd, Plaza One, Suite 203, Mississauga, ON L5N 1P7	*Project :*	OAK-32.23 - Plains Rd, Burlington, ON
Att'n:	Victor Garcia	*Routing:*	vgarcia@hgcengineering.com
From: *Expéditeur :*	Michael Vallins	*Date:*	02/05/2019
Cc:	Adjacent Development CN via e-mail		

☐ Urgent ☐ For Your Use ☐ For Review ■ For Your Information ☐ Confidential

Re: Train Traffic Data – CN Oakville Subdivision near Plains Road in Burlington, ON

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

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

Sincerely,
CN Design & Construction

Michael Vallins P.Eng
Manager of Public Works
public_works_gld@cn.ca

Date: 2019/01/16 Project Number: OAK-32.23 - Plains Rd, Burlington, ON

Dear Victor:

Re: Train Traffic Data – CN Oakville Subdivision near Plains Road in Burlington, ON

The following is provided in response to Victor's 2018/12/19 request for information regarding rail traffic in the vicinity of Plains Road in Burlington, ON at approximately Mile 32.23 on CN's Oakville Subdivision.

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

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

***Maximum train speed is given in Miles per Hour**

	0700-2300			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	0	140	60	4
Way Freight	4	25	60	4
Passenger	13	10	80	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	0	140	60	4
Way Freight	2	25	60	4
Passenger	0	10	80	2

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

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There are no at-grade crossing in the immediate vicinity of the study area at Mile 32.23 (Plains Road). 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 triple mainline track is considered to be continuously welded rail throughout the study area. The presence of eleven (11) switches located at Mile 32.08, 32.15, 32.17,

32.18, 32.25, 32.33, 32.40, 32.48, 33.18, 33.23 and 33.31 may exacerbate the noise and vibration caused by train movements.

The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, 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,

Michael Vallins P.Eng
Manager of Public Works
public_works_gld@cn.ca

APPENDIX D

Supporting Drawings

Job #:1572.17 - PHASE 1+2
Date: April 20, 2021
Project Statistics

	Permitted / Required	PHASE 1	PHASE 2	OVERAL T+2
01. Site Area		8019 m2 86310 ft2	7566 m2 81441 ft2	15585 m2 167751 ft2
02. G.C.A(m2)				
Residential		41,834	34,559	76393
Retail		791	207	998
Total		42,625	34,766	77391
03. F.S.I		5.32	4.60	5.0
04. Setbacks (m) *				
Above Grade				
North		7	0.6	
East		3	32	
South		17	16	
West		45	8.65	
Below Grade				
North		0	0	
East		0	0	
South		14	14	
West		15.8	6	
05. Unit Count **				
1 Bedroom		347	219	566
2 Bedroom		213	187	400
3 Bedroom		27	56	83
Total		**587**	**462**	**1049**
06. Barrier Free Unit Count **				
1 Bedroom	15%	42	33	75
2 Bedroom	15%	34	29	63
3 Bedroom	15%	9	9	18
Total				
Total Barrier Free units included in Total unit count above		**85**	**71**	**156**
07. Parking Provided				
Residential	(1.0 per unit)	549	459	1008
Visitor/Retail	(0.2 per unit)	118	93	211
Total		**667**	**552**	**1219**
08. Bike Parking				
Residential		TBA	TBA	TBA
Visitor				
Total				
09. Lockers		TBA		
10. Building Height		30-35 STY	22-30 STY	
11.Amenity Space(m2)				
Indoor		2590	2033	4623
Outdoor		2908	2108	5016
Terraces/Balconies		8846	5810	14656
Total	20m2/ unit	**14344**	**9951**	**24295**

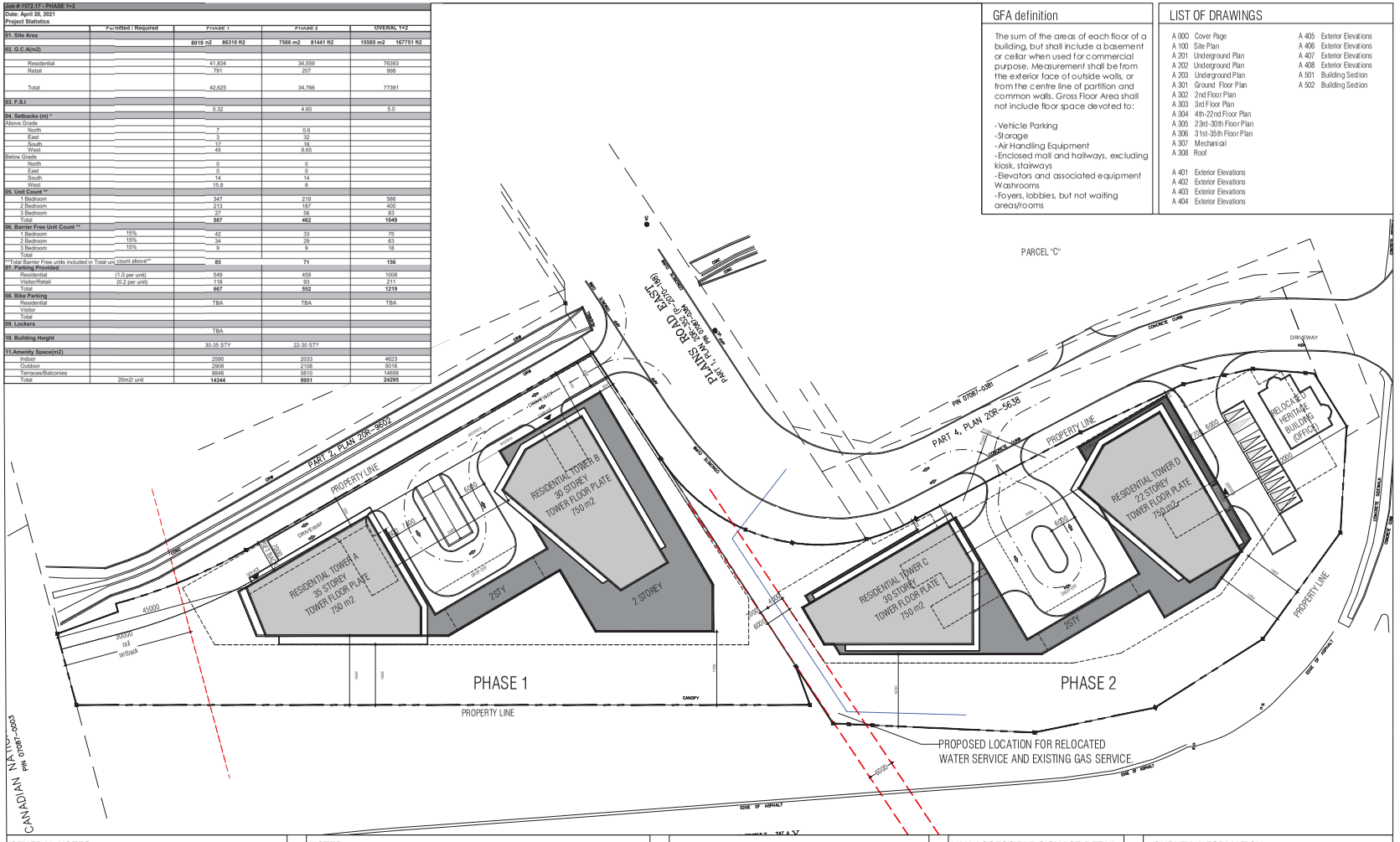
GFA definition

The sum of the areas of each floor of a building, but shall include a basement or cellar when used for commercial purpose. Measurement shall be from the exterior face of outside walls, or from the centre line of partition and common walls. Gross Floor Area shall not include floor space devoted to:

- Vehicle Parking
- Storage
- Air Handling Equipment
- Enclosed mall and hallways, excluding kiosk, stairways
- Elevators and associated equipment
- Washrooms
- Foyers, lobbies, but not waiting areas/rooms

LIST OF DRAWINGS

A 000	Cover Page	A 405	Exterior Elevations
A 100	Site Plan	A 406	Exterior Elevations
A 201	Underground Plan	A 407	Exterior Elevations
A 202	Underground Plan	A 408	Exterior Elevations
A 203	Underground Plan	A 501	Building Section
A 301	Ground Floor Plan	A 502	Building Section
A 302	2nd Floor Plan		
A 303	3rd Floor Plan		
A 304	4th-22nd Floor Plan		
A 305	23rd-30th Floor Plan		
A 306	31st-35th Floor Plan		
A 307	Mechanical		
A 308	Roof		
A 401	Exterior Elevations		
A 402	Exterior Elevations		
A 403	Exterior Elevations		
A 404	Exterior Elevations		



GENERAL NOTES

1. For landscaping, refer to landscape drawings.
2. For proposed grading, refer to landscape drawings and approved grading plan.
3. All perimeter existing information indicated taken from survey.
4. All work to be done in conformance with the 2012 Ontario Building Code (O.B.C., as amended)
5. All driveway with access onto City owned roadway conform to City of Burlington standards.

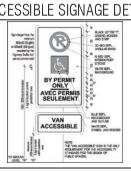
NOTES

1. Fire access route to existing buildings will be maintained during construction.
2. Accessibility for all pathway to Go Station, Wal-Mart during construction will be maintained.
3. The fire access route will be designed to support a load of not less than 11,363 kg per axle and have a change in gradient of not more than 1 in 12.5 over a minimum distance of 15m.
4. Fire Department access route will be constructed of hard surface material such as asphalt, concrete or lockstone.

KEY PLAN



VAN ACCESSIBLE SIGNAGE DETAIL



SURVEY INFORMATION

PLAN OF SURVEY OF
PART OF LOT 14 (REGISTERED PLAN 99
PART OF HAMILTON & NELSON ROAD SHOWN
REGISTERED PLAN 99
IN THE CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON

A.T. McLaren LIMITED
69 JOHN STREET SOUTH, SUITE 230
HAMILTON, ONTARIO
L8N 2B9
telephone (905) 527-8559

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This drawing is not to be scaled. All architectural symbols indicated on this drawing are graphic representations only.

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issued for revisions

GRAZIANI + CORAZZA ARCHITECTS INC.
1320 Cornwall Drive, Suite 100 Mississauga Ontario L4W 1K3
Phone 905.795.2601 Fax 905.795.2664 www.gc-architects.com

Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

Project Architect:	B. Graziani
Assistant Designer:	S. Saleri/R. Aloni
Drawn By:	S. Saleri/R. Aloni
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
Job #	1572.17

SITE PLAN

1:450

A101

TITLEBLOCK SIZE: 610 x 900

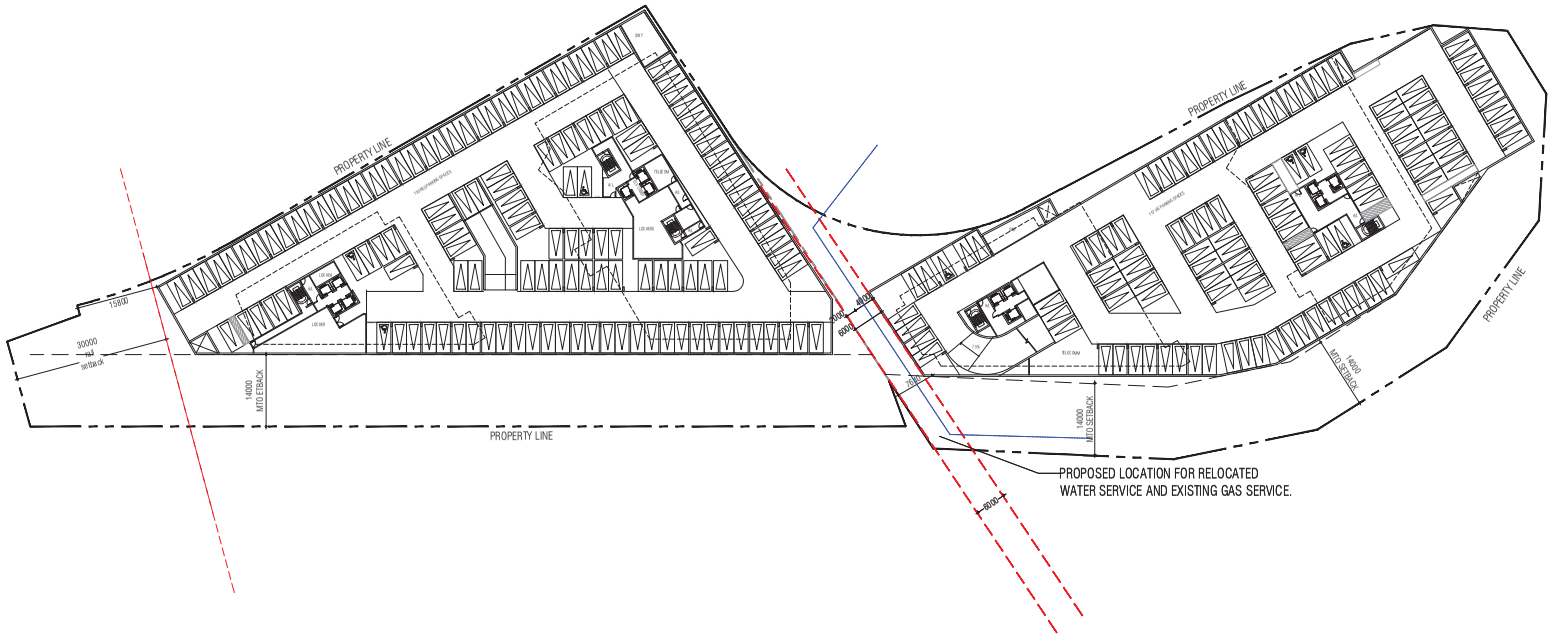
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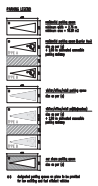
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1320 Dorsan Drive, Suite 100 Mississauga Ontario L4W 1C3
Phone 905.795.2601 Fax 905.795.2644 www.gc-architects.com

Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

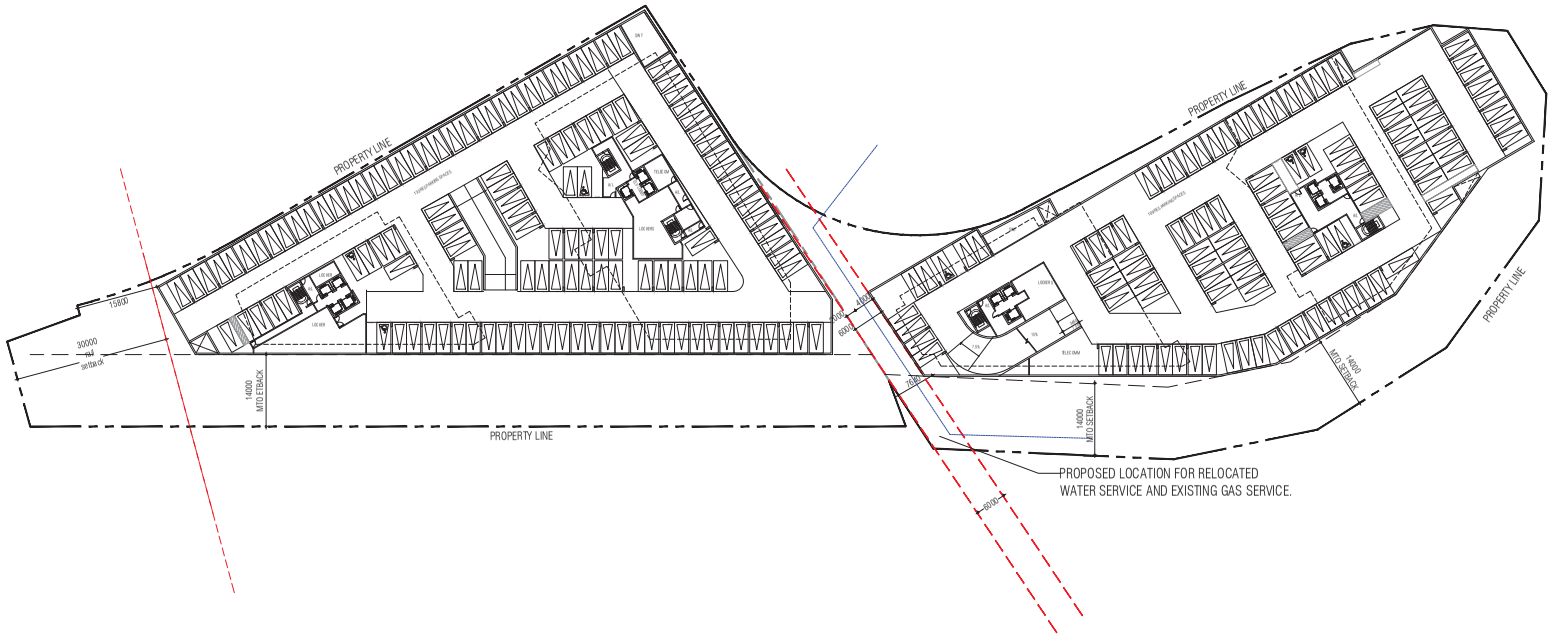
Project Architect:	B. Graziani
Assistant Designer:	S. Saleri/R. Aloni
Drawn By:	S. Saleri/R. Aloni
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
Job #	1572.17

P5

1:450

A201

TITLEBLOCK SIZE: 610 x 900



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Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

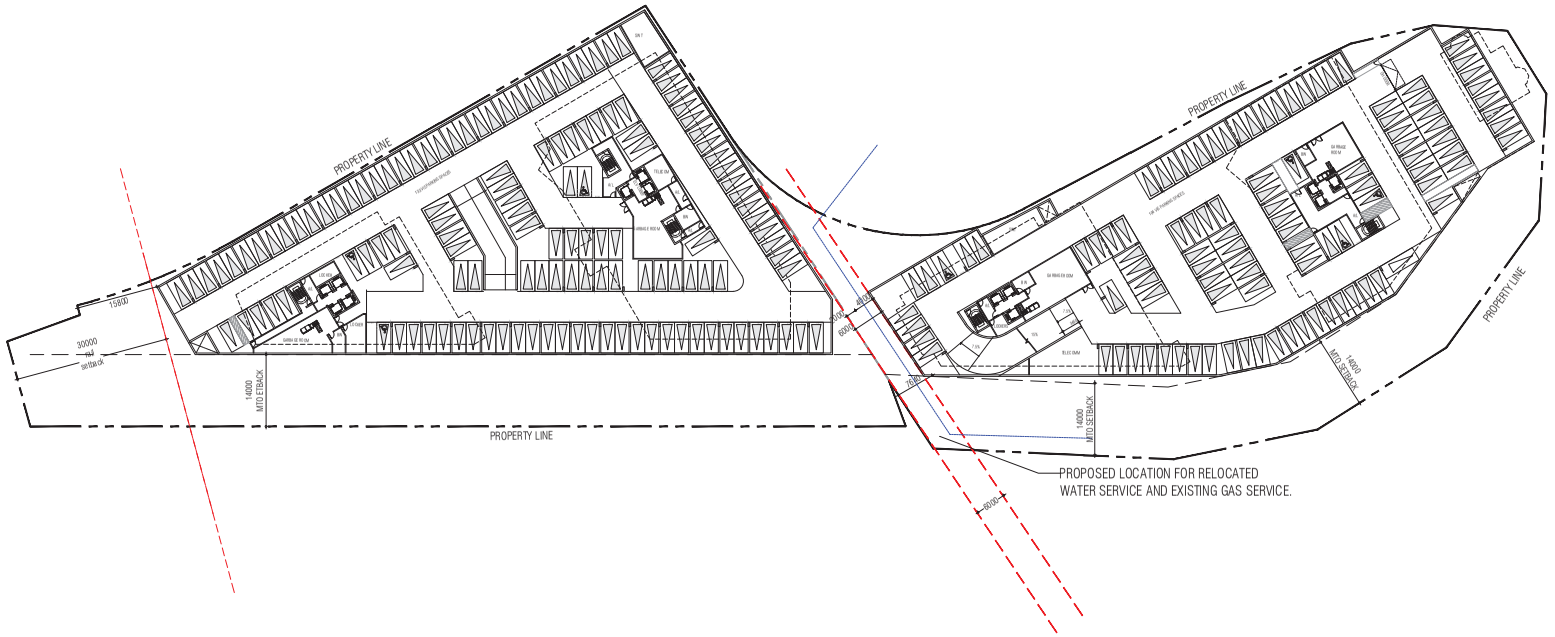
Project Architect:	B. Graziani
Assistant Designer:	S. Saleri/R. Aloni
Drawn By:	S. Saleri/R. Aloni
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Plot Date:	Apr. 13, 2021
Job #	1572.17

P2-P4

1:450

A202

TITLEBLOCK SIZE: 610 x 900



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Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

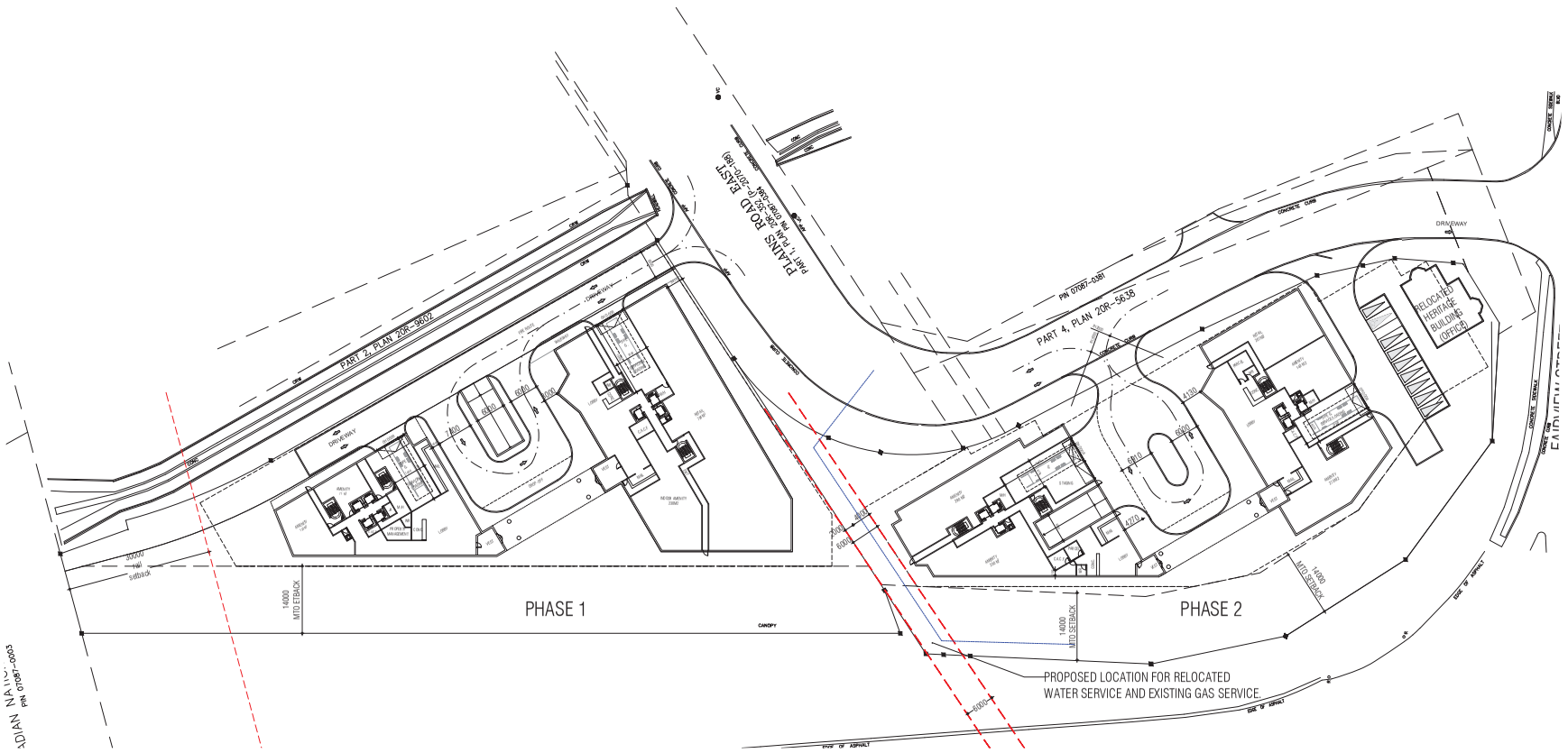
Project Architect:	B. Graziani
Assistant Designer:	S. Saleri/R. Aloni
Drawn By:	S. Saleri/R. Aloni
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
Job #	1572.17

P1

1:450

A203

TITLEBLOCK SIZE: 610 x 900



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Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

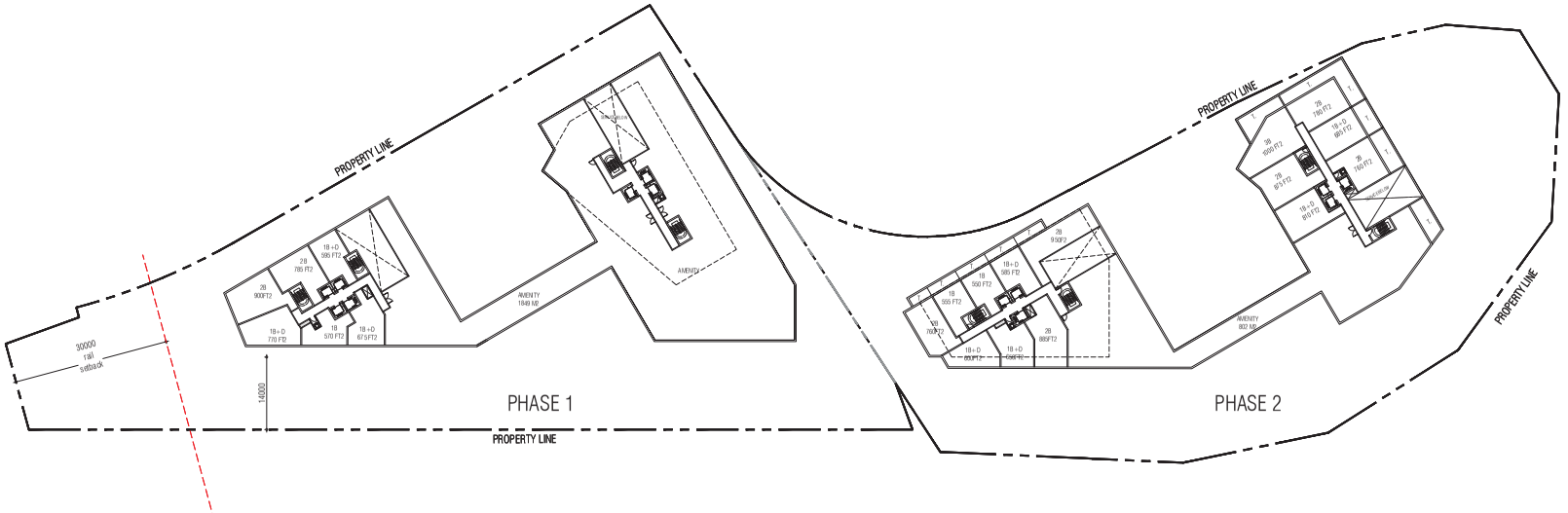
Project Architect:	B. Graziani
Assistant Designer:	S. Salari/R. Alani
Drawn By:	S. Salari/R. Alani
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
Job #	1572.17

GROUND FLOOR

1:450

A301

TITLEBLOCK SIZE: 610 x 900



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Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

Project Architect:	B. Graziani
Assistant Designer:	S. Salari/R. Alani
Drawn By:	S. Salari/R. Alani
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
Job #	1572.17

2ND FLOOR

1:450

A302

TITLEBLOCK SIZE: 610 x 900

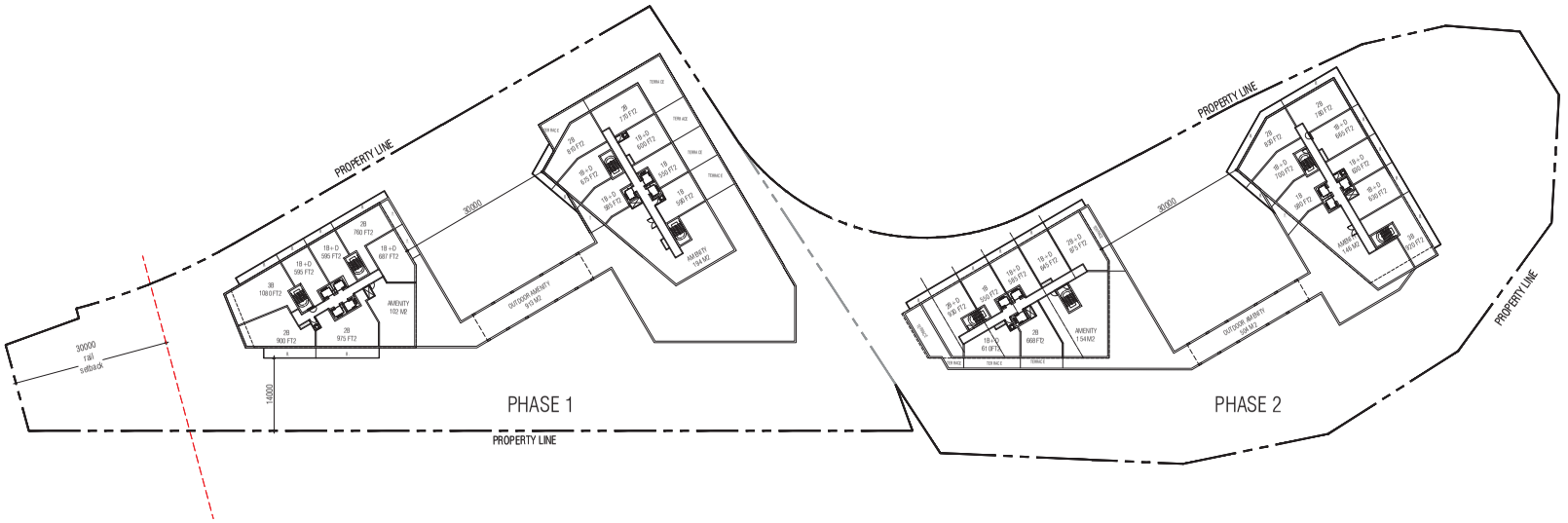
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Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

Project Architect:	B. Graziani
Assistant Designer:	S. Salari/R. Alani
Drawn By:	S. Salari/R. Alani
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
Job #	1572.17

3RD FLOOR

1:450

A303

TITLEBLOCK SIZE: 610 x 900

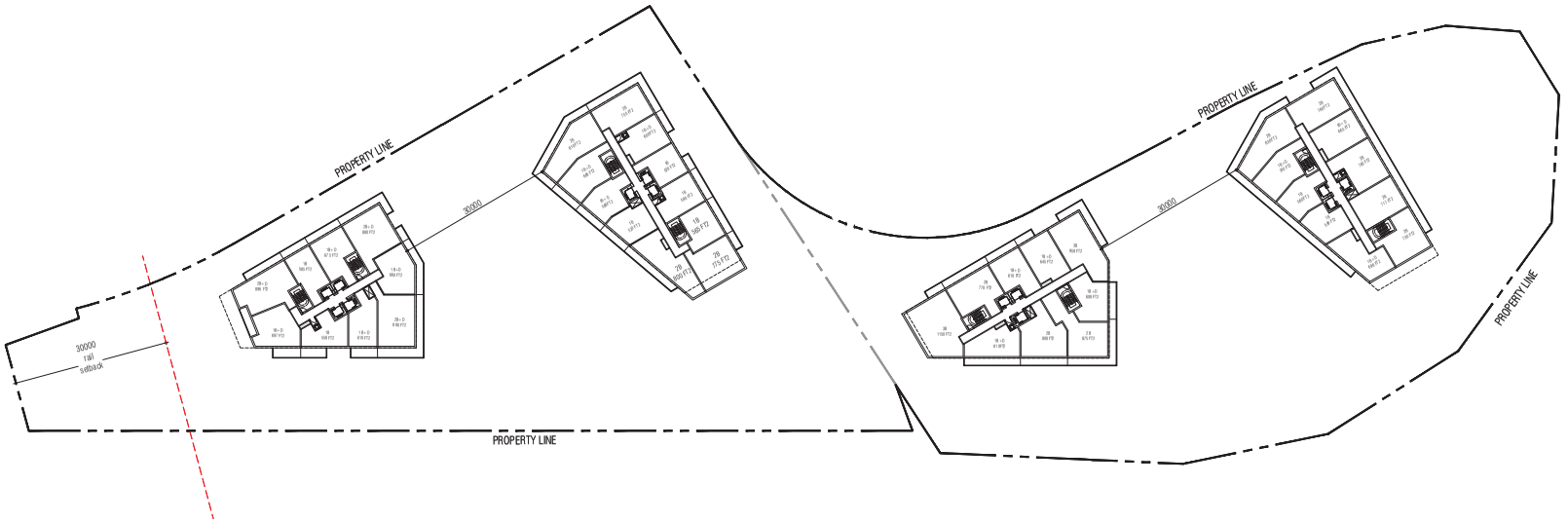
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Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

Project Architect:	B. Graziani
Assistant Designer:	S. Salari/R. Alani
Drawn By:	S. Salari/R. Alani
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
Job #	1572.17

4TH- 22ND FLOOR

1:450

A304

TITLEBLOCK SIZE: 610 x 900

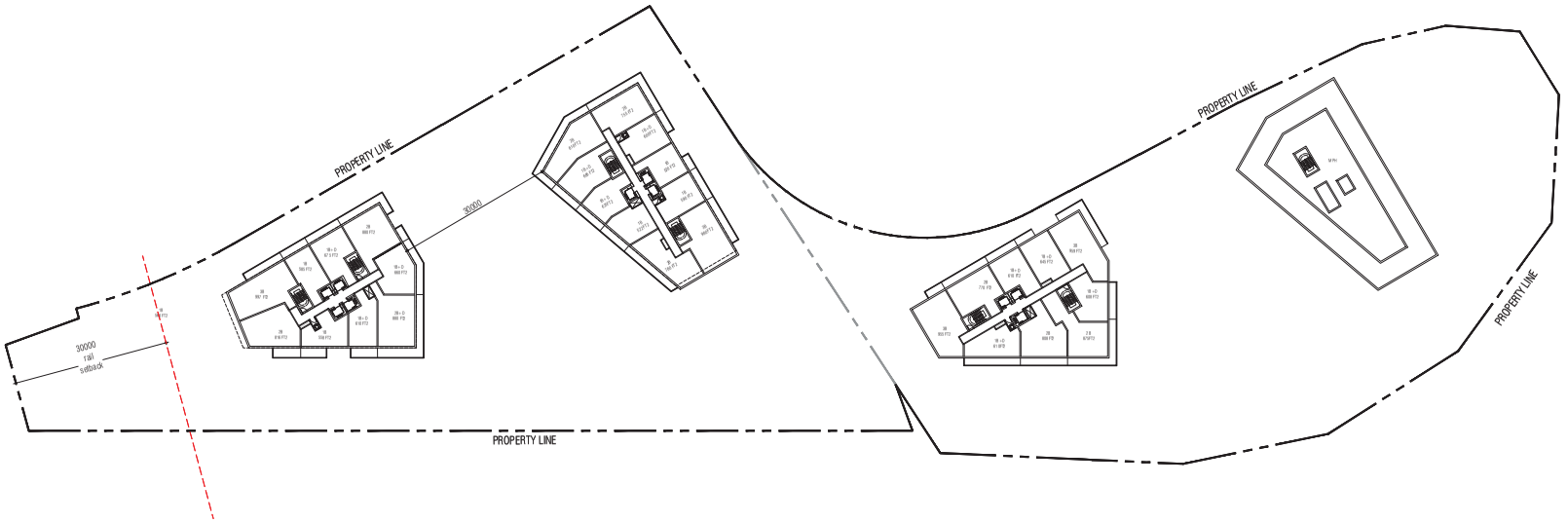
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Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

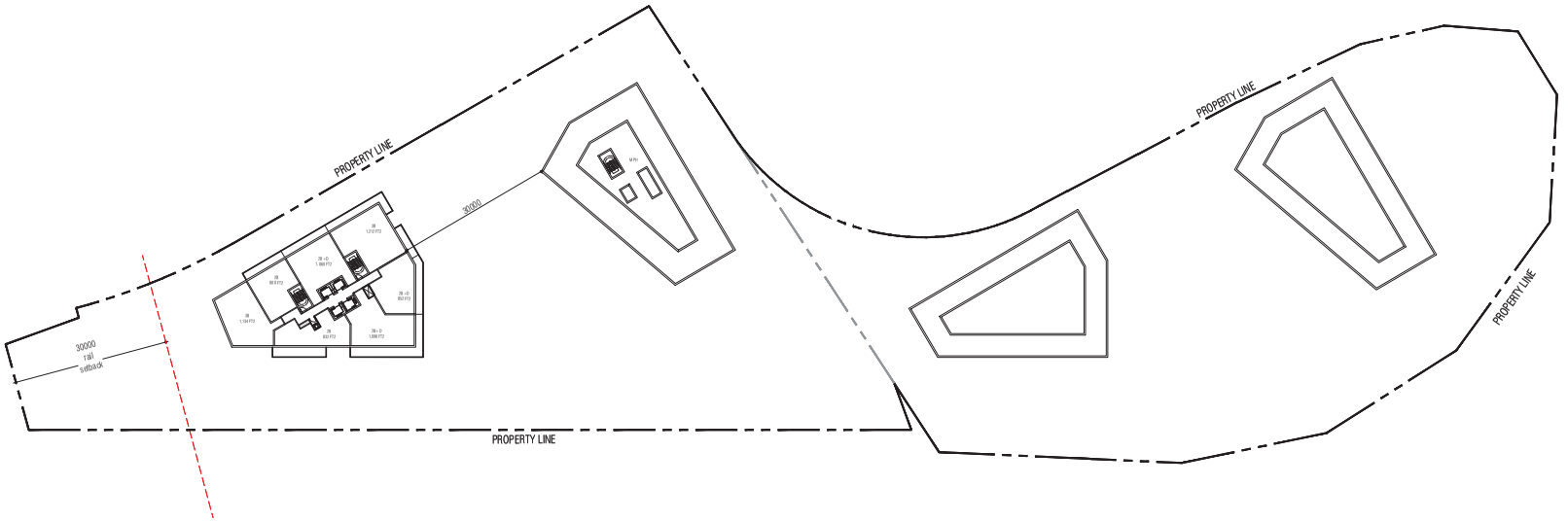
Project Architect:	B. Graziani
Assistant Designer:	S. Salari/R. Alani
Drawn By:	S. Salari/R. Alani
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
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23RD- 30TH FLOOR

1:450

A305

TITLEBLOCK SIZE: 610 x 900



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Residential Development

PLAINS RD
MASTER PLAN

Burlington, Ontario

Project Architect:	B. Graziani
Assistant Designer:	S. Salari/R. Alani
Drawn By:	S. Salari/R. Alani
Checked By:	D. Biase
Plot Date:	Apr. 13, 2021
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31ST-35TH FLOOR

1:450

A306

TITLEBLOCK SIZE: 610 x 900

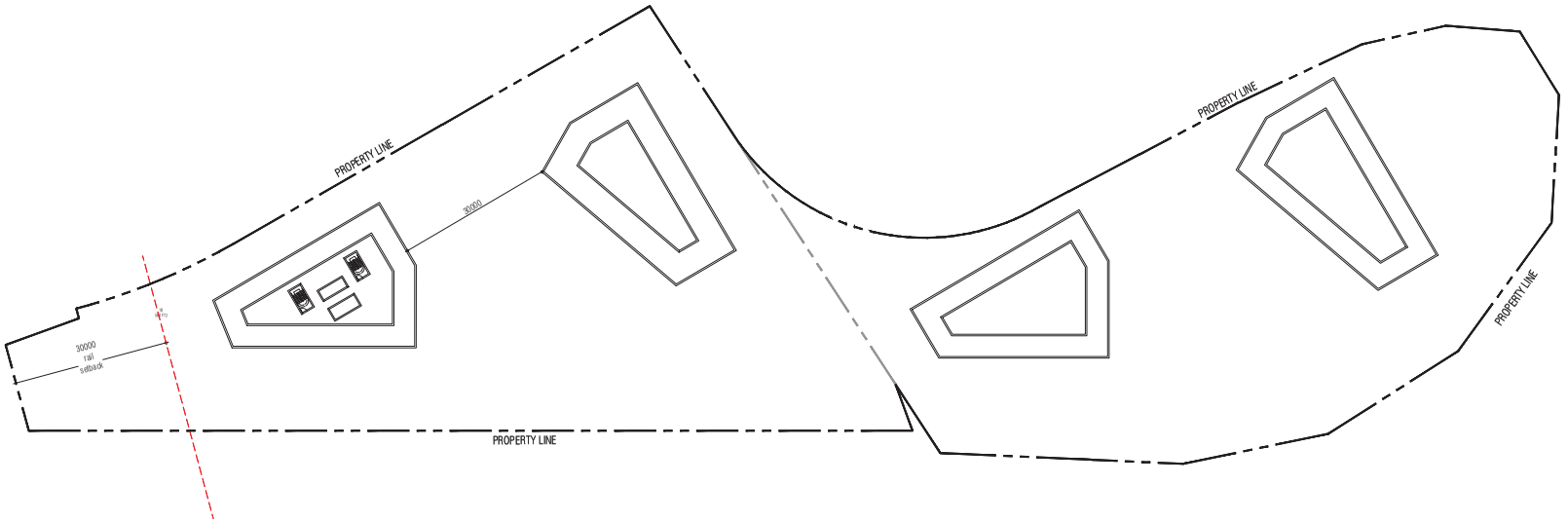
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Drawn By:	S. Salari/R. Alani
Checked By:	D. Biase
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Job #	1572.17

MECHANICAL FLOOR

1:450

A307

TITLEBLOCK SIZE: 610 x 900

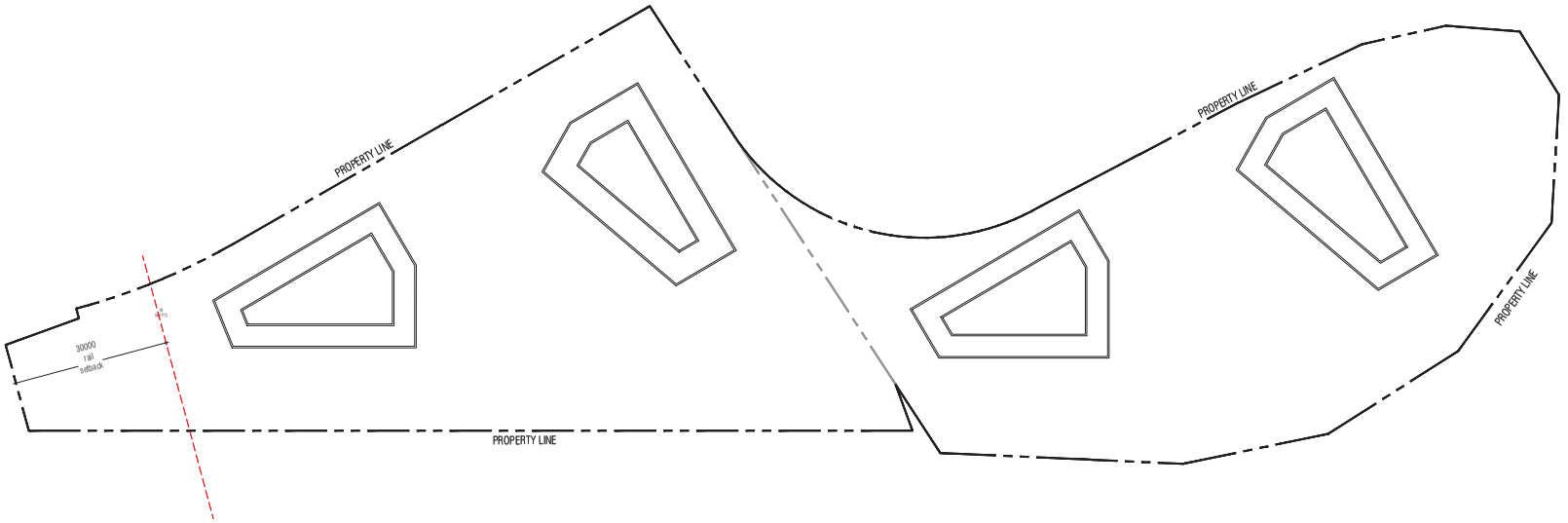
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ROOF

1:450

A308

TITLEBLOCK SIZE: 610 x 900