DILLON CONSULTING

1027458 ONTARIO INC.

Noise and Vibration Assessment

Banwell and McHugh Mixed Use Developments

Windsor, Ontario

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1.0 Introduction

1.1 Purpose and Objectives

Dillon Consulting Limited (Dillon) was retained by 1027458 Ontario Inc. (the Developer) to complete a noise and vibration assessment as requested by the City of Windsor for proposed mixed-use developments. The proposed developments are located at the corners of Banwell Road and McHugh Street, and Banwell Road and Leathorne Street, in Windsor, Ontario. This study has been completed in support of Zoning By-law and Official Plan Amendments application for the proposed development.

The noise and vibration assessment presented herein was prepared in accordance with the guidelines and requirements of the City of Windsor, the Ontario Ministry of Environment, Conservation and Parks (MECP) noise publication NPC-300 and MECP's land-use compatibility guidelines (D-series). This assessment focuses on the noise and vibration impacts from nearby transportation sources and stationary sources (i.e., nearby industrial operations) on the proposed development.

1.2 The Project and Surrounding Areas

The proposed developments are located at two lots:

- **North 'B' Site** – the parcel located on the west side of Banwell Road, between the south side of the unassumed section of Leathorne Street and the north side of McHugh Street.
- **South Site** – the parcel located north of the VIA Railway corridor at the southwest corner of the Banwell Road and McHugh Street intersection.

There are residential dwellings and light industrial facilities in the immediate vicinity of the proposed development parcel. The north site is bordered by a condominium complex to the north, residential dwellings to the east (across Banwell Road) and west, and McHugh Street to the south. The south site is bordered by McHugh Street to the north, a church to the east (across Banwell Road), residential dwellings to the west, and a VIA Rail right-of-way to the south.

The subject site and surrounding area is shown in **Figure 1**. The conceptual development plan for both sites is shown in **Appendix A**.

The proposed development land parcels are currently vacant. The proposed development at the McHugh site consists of:

- Two 10-storey multiple residential dwellings;
- One eight-storey multiple residenaàl dwelling;
- One six-storey multiple residential dwellings;
- One two-storey business office; and
- One respite home.

The proposed development at the Leathorne site consists of five (5) six-storey multiple residential dwellings.

2.0 Impacts from the Environment on the Proposed Development

This section investigates noise impacts from nearby transportation sources and stationary sources on the proposed development.

2.1 Transportation Noise Assessment

The transportation sources with the potential to impact the proposed development include rail traffic from VIA Rail's right-of-way and road traffic along Banwell Road, McHugh Street, and Tecumseh Road East. Impacts from rail and road were predicted and compared against the applicable criteria in the Ontario Ministry of Environment, Conservation and Parks (MECP) noise guideline publication, *NPC 300 – Environmental Noise Guideline – Stationary and Transportation Sources – Approvals and Planning* (2013). NPC-300 outlines noise level criteria for sensitive land uses, which assist in determining requirements for façade construction, ventilation requirements, warning clauses, and potential noise barriers for the proposed development.

2.1.1 Noise Criteria

The applicable transportation noise criteria, as outlined in Part C of NPC-300, is presented in **Table 1** through **Table 5**. **Table 1** summarizes the indoor sound level limits based on the type of space assessed, time of day, transportation noise source, and the maximum allowable equivalent sound levels from railway sources. The indoor noise levels are based on the assumption of closed windows and doors.

Table 1: Indoor Sound Level Limits for Road and Rail

Type of Space	Time Period	Equivalent Sound Level - L_{eq}	
		Road	Rail
General offices, reception areas, retail stores, etc.	Daytime 07:00 - 23:00	50 dBA	45 dBA
Living/dining areas of residences, hospitals, nursing homes, schools, daycares, etc.	Daytime 07:00 - 23:00	45 dBA	40 dBA
Living/dining areas of residences, hospitals, nursing homes, etc. (except schools and daycares)	Night-time 23:00 - 07:00	45 dBA	40 dBA
Sleeping quarters of residences	Daytime 07:00 - 23:00	45 dBA	40 dBA
	Night-time 23:00 - 07:00	40 dBA	35 dBA
Sleeping quarters of hotels	Night-time 23:00 - 07:00	45 dBA	40 dBA

Table 2 outlines the maximum equivalent plane-of-window sound levels for road and rail where if exceeded, a detailed building component design assessment is required to ensure the indoor sound level limits (see **Table 1**) are achieved.

Table 2: Requirements for Building Component Assessment

Assessment Location	Time Period	Equivalent Sound Level - L_{eq}	
		Road	Rail[1]
Plane of window for living area or sleeping quarters	Daytime (07:00 - 23:00)	65 dBA	60 dBA
	Night-time (23:00 - 07:00)	60 dBA	55 dBA

Note: [1] Whistle noise is included for the building component and indoor noise assessment.

MECP's NPC-300 Noise Guideline outlines façade construction requirements for proposed residential developments within 100 metres of rail tracks, shown in **Table 3**. These requirements apply only to the first row of dwellings.

Table 3: Facade Construction Requirements

Assessment Location	Equivalent Sound Level – L_{eq} 24hr[1]	Façade Construction Requirement
Plane of window for living area or sleeping quarters	> 60 dBA	Brick veneer or acoustical equivalent
	≤ 60 dBA	No requirement

Note: [1] Whistle noise is included for façade construction requirements.

Table 4 summarizes potential noise warning clauses and ventilation requirements that should be used to warn of potential annoyance due to existing noise sources related to road and rail. Whistle noise is not included in the determination of warning clause requirements.

Table 4: Ventilation and Warning Clause Requirements for Road and Rail

Assessment Location	Time Period	Equivalent Sound Level - L_{eq} Road/Rail[1]	Ventilation and Warning Clause Requirements[2]
Plane of window for living area or sleeping quarters	Daytime (07:00 - 23:00)	≤ 55 dBA	No Requirement
		> 55 dBA and ≤ 65 dBA	Provision for the installation of central air conditioning with a Type C warning clause
		> 65 dBA	Installation of central air conditioning with a Type D warning clause

Assessment Location	Time Period	Equivalent Sound Level - L_{eq} Road/Rail[1]	Ventilation and Warning Clause Requirements[2]
Plane of window for living area or sleeping quarters	Nighttime (23:00 - 7:00)	≤ 50 dBA	No Requirement
		> 50 dBA and ≤ 60 dBA	Provision for the installation of central air conditioning with a Type C warning clause
		> 60 dBA	Installation of central air conditioning with a Type D warning clause

Note: [1] Whistle noise is not included in combined road/rail assessments for warning clause requirements.
[2] Warning clause types and requirements are provided in **Appendix C**.

The applicable noise criteria for Outdoor Living Areas (OLAs) specific to surface transportation are presented in **Table 5**. If the 16-Hour Equivalent Sound Level (Leq 16hr) at an 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. Otherwise, prospective purchasers or tenants should be informed of potential elevated noise levels by way of warning clause Type A. For a Leq 16h of greater than 60 dBA, noise mitigation measures are required to reduce the noise levels to 55 dBA or less. Whistle noise is not included in the determination of the rail outdoor sound level.

Table 5: OLA Level Limits for Road and Rail Noise

Assessment Location	Equivalent Sound Level - L_{eq} 16hr[1],[2] Road/Rail	Noise Control Measures and Warning Clause Requirements
Outdoor Living Area	≤ 55 dBA	No requirement
	> 55 dBA and ≤ 60 dBA	Installation of noise control measure OR a Type A warning clause [1]
	> 60 dBA	Installation of noise control measure with a Type B warning clause

Notes: [1] Daytime only (07:00 - 23:00)
[2] Whistle noise is not included in assessment of rail noise for warning clause requirements.

2.1.2 Transportation Sources

In assessing potential transportation noise impacts on the proposed development, VIA Rail's Chatham subdivision, Banwell Road, McHugh Street, and Tecumseh Street East were analyzed as surface transportation sources. All traffic data used in modelling road and rail traffic is included in **Appendix B**.

Rail Noise Sources

The south site of the proposed development is located directly north of VIA Rail's Chatham subdivision. Daily passenger and freight rail traffic in the area was obtained from VIA Rail as of February 21st, 2023. Daily passenger rail traffic for the year 2034 was projected based on a per annum growth of 2.5%. The City of Windsor's anti-whistling by-law is in effect in the development area; however, during a site visit completed by Dillon staff on March 15th, 2023, whistle noise was observed during train passbys. As there is an at-grade crossing at Banwell Road, trains may use their whistles in an emergency or to warn trespassers. As per the anti-whistling by-law, whistle noise was not considered as a transportation noise source. Rail traffic data forecasted to 2034 is presented in **Table 6**.

Table 6: Future (2034) Rail Traffic Data

Train Type	Daytime Cars (07:00-23:00)	Nighttime Cars (23:00-07:00)	Daytime Locomotives (07:00-23:00)	Nighttime Locomotives (23:00-07:00)	24hr Locomotives	Speed [km/h]
Passenger	66	22	17	6	88	128
Freight	193	193	6	6	386	96

Road Noise Sources

The development area is located west of Banwell Road, north of Tecumseh Road East, and is bisected by McHugh Street. Average annual daily traffic (AADT) for each roadway was determined through two methods:

1. Historic AADT counts provided by the City of Windsor; and
2. Peak hour turning movement counts (TMC) were gathered in 2023 for the intersections of Banwell Street and McHugh Street, and Banwell Street and Tecumseh Road East. A peak hour TMC to AADT factor of 11 was applied to determine associated AADTs for each roadway.

The maximum AADTs were selected to represent the roadways. A 90% and 10% split for daytime and nighttime traffic volumes, respectively, were used in the analysis. The future traffic volumes were assumed to have a 1.0% annual compound growth rate. The percentage of heavy and medium trucks was taken from the peak hour turning movement counts. The forecasted future (2034) road traffic data is presented in **Table 7**.

Table 7: Future (2034) Road Traffic Data

Roadway	2033 AADT	Medium Trucks (%)	Heavy Trucks (%)	Speed (km/h)
Banwell Road	18,857	1.5	1.41	50

Roadway	2033 AADT	Medium Trucks (%)	Heavy Trucks (%)	Speed (km/h)
McHugh Street	11,726	1.59	1.38	50
Tecumseh Road East	25,837	1.18	1.1	60

2.1.3 Predicted Sound Level

The noise analysis was completed using Cadna/A, a noise propagation software. The Cadna/A software includes the implementation of the Transportation Noise Model (TNM) roadway algorithms, as well as the Federal Transit Administration/Federal Railroad Administration (FTA/FRA) railway algorithms. The model is capable of incorporating various site specific features, such as elevation, berms, absorptive grounds, and barriers to accurately predict noise levels at specific receptors, pertaining to noise emissions from a particular noise source. The model accounts for reduction in sound level due to increased distance and geometrical spreading, air absorption, ground attenuation, and acoustical shielding by intervening structures and topography. The model is considered conservative as it represents atmospheric conditions that promote propagation of sound from source to receptor.

Railway Analysis

The railway noise impact assessment was conducted using the FRA algorithm using Cadna/A. The model's inputs are outlined in **Section 2.1.2**.

In order to confirm the modelling results of FRA protocol implemented through Cadna/A a comparative analysis was completed for rail traffic noise modelling, in which the results from FRA in Cadna/A were compared against those of STEAM implemented through STAMSON Version 5.04. This comparative analysis is discussed in **Sub-section 2.1.5**.

Roadway Analysis

The assessment for roadway impact noise was completed using the TNM, developed by the Federal Highway Administration (FHWA), implemented through Cadna/A. The model inputs used for the TNM algorithm are outlined in **Section 2.1.2**.

In order to confirm the modelling results of TNM protocol implemented through Cadna/A a comparative analysis was completed for road traffic noise modelling, in which the results from TNM in Cadna/A were compared against those of ORNAMENT implemented through STAMSON Version 5.04. This comparative analysis is discussed in **Section 2.1.5**.

Sensitive Receptor Locations

For the purposes of this study, the Building Evaluation feature was used in Cadna/A to assess the worst-case façade impacts throughout the proposed development. Based on the preliminary site plan for the proposed development, no Outdoor Living Areas (OLAs) have been identified that require assessment of impact due to transportation noise. The private balconies of the proposed development are assumed to be less than 4m in depth, and therefore are not considered OLAs per MECP NPC-300.

Transportation Noise Impacts – Plane of Window

Table 8 summarizes the predicted building façade noise levels from rail noise sources at the sensitive receptors within the proposed development.

Table 8: Combined Road and Rail Noise Prediction Summary Table - Facade Impacts

Buidling	Equivalent Sound Level - L_{eq}[1],[2] [dBA]						
	Road Impacts		Railway Impacts		Combined Road and Rail[3]		24hr Railway Impacts[4]
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	
Building 'A' (McHugh)	62	56	55	**56**	**63**	**58**	N/A
Building 'B' (McHugh)	62	56	**61**	**62**	**63**	**62**	**61**
Building 'C' (McHugh)	53	46	56	**57**	**57**	**57**	N/A
Building 'D' (McHugh)	55	48	**60**	**61**	**61**	**62**	**61**
Respite Home (McHugh)	58	51	46	47	**58**	**52**	N/A
Building 'E' (Leathorne)	62	56	51	52	**63**	**57**	N/A
Building 'F' (Leathorne)	63	57	50	51	**63**	**57**	N/A
Building 'G' (Leathorne)	64	57	48	50	**64**	**57**	N/A
Building 'H' (Leathorne)	64	58	48	49	**65**	**58**	N/A
Building 'I' (Leathorne)	65	59	47	48	**65**	**59**	N/A

Notes: [1] L_{eq} represents maximum predicted impacts along façade.
[2] Predicted noise levels that exceed the applicable limits are presented in **bold**.
[3] Combined impacts may not be equal to road plus rail, as maxima may be in different locations along the façade.
[4] 24hr railway impacts are only assessed at the first row of residences that are within 100 m of the railway.

The predicted transportation sound levels for combined road and rail impacts at the building façades of the proposed development are presented in **Figure 2** and **Figure 3**, for the Banwell site and the Leathorne site, respectively.

2.1.4 Noise Control Measures

Façade Construction Recommendations

Based on the predicted façade sound levels shown in **Table 8**, and the threshold criteria outlined in **Table 2**, a detailed building component design analysis is required for Buildings 'A', 'B', 'C', and 'D'. Additionally, based on the threshold criteria for 24-hour rail noise set in **Table 3**, the south façades of Buildings 'B' and 'D' are to be built to a minimum of brick veneer or masonry equivalent construction (an acoustical equivalent of STC 54). An initial building component analysis is shown in **Table 9**. As detailed floor plans are not yet available, typical unit layouts were assumed. The predicted maximum impacts for road, locomotive, and train car noise were used to assess the required glazing for each building.

Table 9: Building Component Analysis Using Maximum Impacts

Building	Maximum Required Glazing (STC)	
	Living/Dining Area	Sleeping Quarters
Building 'A' (McHugh)	25	27
Building 'B' (McHugh)	28	32
Building 'C' (McHugh)	23	26
Building 'D' (McHugh)	27	31

For all other buildings with the proposed development, windows conforming to the Ontario Building Code (OBC) are anticipated to be sufficient to ensure the indoor sound level criteria is met (as outlined in **Table 1**). Windows which meet the structural and energy saving requirements of the OBC typically have STC29 / STC30 ratings.

The above mentioned STC ratings are conservatively calculated and represent the recommended minimum STC ratings for the windows. Windows should be carefully selected to ensure the entire assembly (frame and glazing) meets the specified minimum STC ratings. It is recommended that manufacturer tests and specifications be reviewed by an Acoustical Consultant upon selection.

Sensitive spaces located on corners of buildings, which have multiple façade exposure and potential contribution from multiple sources may require an STC increase of 3. As the design progresses, the

façade and glazing requirements should by reviewed by an Acoustical Consultant, ideally at the Site Plan Approval (SPA) stage, to confirm or update the above recommended STC ratings.

Ventilation Requirements and Warning Clauses

Based on the predicted façade sound levels shown in **Table 8**, and the threshold criteria outlined in **Table 4**, Buildings 'B' and 'D' will require installation of central air conditioning and a Type D warning clause. The remainder of the proposed development requires a provision for the installation of central air conditioning and Type C warning clause.

Additionally, VIA requires that a warning clause regarding the potential for noise and vibration impacts be applied to all sensitive locations within the 300m of the railway right-of-way.

All warning clauses should be included in agreements that are registered on Title for all Offers of Purchase and Sale, lease/rental agreements, and condominium declarations. The list of applicable warning clauses required for the proposed development are provided in **Appendix C**.

2.1.5 TNM/FTA Protocol Confirmation

In order to demonstrate appropriate implementation of Transportation Noise Model (TNM) through Cadna/A, noise modelling results obtained through the TNM protocol were compared against traffic noise modelling using MECP's ORNAMENT implemented through STAMSON version 5.04. Building G, 6th floor, east façade was used for this comparative analysis. The comparison results are presented in **Table 10.**

Table 10: TNM Protocol in Cadna/A and ORNAMENT Comparison

Assessment Location	TNM Cadna/A Result	ORNAMENT STAMSON Result	TNM Cadna/A Modelling Parameters	ORNAMENT STAMSON Modelling Parameters
Building 'G', South Façade, 6th floor	64 dBA	64 dBA	Ground Absorption = 0.2	Absorptive Ground Surface

Similarly, noise modeling results obtained through FRA protocol through Cadna/A were compared against rail modelling using MECP's STEAM implemented through STAMSON version 5.04. The comparison results are shown in **Table 11.**

Table 11: FTA/FRA Protocol in Cadna/A and STEAM Comparison

Assessment Location	FTA/FRA Cadna/A Result	STEAM STAMSON Result	FTA/FRA Cadna/A Modelling Parameters	STEAM STAMSON Modelling Parameters
Building 'D', South Façade, 2nd floor	58 dBA	58 dBA	Ground Absorption = 0.6	Absorptive Ground Surface

The results indicate that the predicted noise impacts obtained through TNM and FRA protocols in Cadna/A and those of ORNAMENT and STEAM are equivalent. The receptor locations assessed in this comparative study are presented in **Figure 4**.

The STAMSON model output is provided in **Appendix D.**

2.2 Stationary Noise Assessment

A review of the site and surrounding area has been conducted to identify potential stationary sources (e.g., industrial / commercials) that have the potential to impact the proposed sensitive use. A site visit was completed by Dillon staff on March 15th, 2023 for the purpose of classifying facilities in proximity to the proposed developments, identifying potential sources of noise, and classifying the acoustic environment.

2.2.1 MECP Guideline D-6 Compability between Industrial Facilities

The MECP's land-use compatibility guidelines (D-series) are intended to prevent or minimize the encroachment of sensitive land uses upon industrial/commercial land uses and vice versa, as these two types of land uses are normally incompatible, due to possible adverse effects (e.g., noise) on the sensitive land use. As per the guideline, potential noise impact from commercial / industrial establishments within the potential influence area/or recommended minimum separation distance, as outlined in D-6 (see **Table 12**), should be assessed.

Table 12: Guideline D-6 Potential Influence Area and Recommended Minimum Separation Distance

Industrial Classification [1]	Area of Influence	Recommended Minimum Separation Distance
Class I	70 m	20 m
Class II	300 m	70 m
Class III	1000 m	300 m

Note: [1] Industrial classification are outlined in Guideline D-6, and presented in **Appendix E**.

2.2.2 Facilities

The land use planning guide, *D-6 Compatibility between Industrial Facilities*, was used for the classification of the surrounding industrial facilities and the compatible proximities for the proposed sensitive land use. The criteria for classification of industrial categories are presented in **Appendix E.**

Table 13 describes the industries that were identified with the potential to have noise impacts on the proposed development.

Table 13: Facilities with Proximity to Proposed Development

Facility and Address	Industrial Classification	Descripon` of Operations	Environmental Compliance Approval
Ideas Cabinets and Countertops, 11210 Tecumseh Road E	Class 1	Material cutting, delivery truck movements	No
DonTrans Trucking Facility, 11000 Tecumseh Road E	Class 1	Idling trucks, truck maintenance (pneumatic tools)	No

2.2.3 Staonaà ry Noise Criteria and Area Classificaon`

MECP Publication NPC-300 outlines applicable noise criteria for the proposed development associated with surrounding industrial and commercial stationary noise sources. The noise criteria are defined using area classifications (not to be confused with the D-6 industrial classifications), which are based on the receptor's existing acoustical environment. NPC-300 classification are as follows:

- Class 1 – Urban Area;
- Class 2 – Semi-Urban / Semi – Rural;
- Class 3 – Rural Area; and
- Class 4 – Areas of Redevelopment and Infill.

Different noise guideline limits apply to each area classification, as shown below in **Table 14.**

Table 14: Exclusionary Limits for Stationary Noise Sources

Assessment Location	Time Period	Exclusionary Sound Level Limit - L_{eq} 1hr			
		Class 1	Class 2	Class 3	Class 4
Plane of window for living area or sleeping quarters	Daytime (07:00 - 19:00)	50 dBA	50 dBA	45 dBA	60 dBA
	Evening (19:00 - 23:00)	50 dBA	50 dBA	40 dBA	60 dBA
	Nighttime (23:00 - 07:00)	45 dBA	45 dBA	40 dBA	55 dBA
Outdoor points of reception	Daytime (07:00 - 19:00)	50 dBA	50 dBA	45 dBA	55 dBA
	Evening (19:00 - 23:00)	50 dBA	45 dBA	40 dBA	55 dBA

During the site visit conducted on March 15th, 2023, it was observed that the acoustic environment surrounding the proposed development is dominated by transportation noise and general urban hum during daytime. Based on the nature of the area, the Class 1 urban sound level limits would apply.

2.2.4 Staonaà ry Sources

The noise sources associated with the industries identified in **Section 2.2.2** are outlined below in **Table 15.** The facilities and their corresponding location are presented in **Figure 5.**

Table 15: Stationary Noise Sources

Noise Source[1]	Associated Facility	# of Sources	Source Type
Circular saw cutting concrete	Ideas Cabinets and Countertops	1	Point source, steady
Truck movements	Ideas Cabinets and Countertops	1	Line source, steady
Pneumatic tools	DonTrans Trucking Facility	1	Point source, quasi-steady
Idling truck	DonTrans Trucking Facility	2	Point source, steady

Note: [1] Sound power level and spectrum of noise sources are provided in **Appendix F**.

MECP's publication, *NPC-104 – Sound Level Adjustments*, specifies sound level adjustments (penalties) to be applied to the observed sound level of a source based on its sound quality. NPC-104 specifies that a penalty of +5 dB be applied to any sound that has a pronounced audible tonal quality or cyclical variation, and that a +10 dB penalty be applied to a quasi-steady impulsive sound. "Quasi-steady" is a sequence of impulsive sounds emitted from a source having a time interval of less than 0.5 s, per

MECP's *NPC-101 – Technical Definitions*. Sound level penalties are not accumulated when more than one sound quality applies. Instead, the largest of the applicable penalties shall be used.

The operation of pneumatic tools at the Trucking Depot is assumed to operate as a quasi-steady state impulsive sound. A +10 dB penalty was applied to this noise source.

2.2.5 Noise Sensitive Points of Reception

As per the MECP noise guidelines NPC-300, a Point of Reception (POR), as it applies to impact assessments of stationary sources, means any location on a noise sensitive land use where noise from a stationary source is received. Noise sensitive land uses include the following lands:

- Permanent, seasonal, or rental residences;
- Hotels, motels, and campgrounds;
- Schools, universieą s, libraries, and daycare centres;
- Hospitals and clinics, nursing / rerement` homes; and
- Places of worship.

The residential buildings and respite home within the McHugh proposed development were considered noise sensitive receptors. The noise sensitive receptors of the Leathorne site were determined to be outside of the Potenal Influence` Area of the identified facilities.

2.2.6 Predicted Sound Levels - Stationary

The noise analysis was completed using CADNA/A, an outdoor noise propagation model, based on ISO Standard 9613, Part 1: Calculation of the absorption of sound by the atmosphere, 1993 and Part 2: General method of calculation (ISO-9613-2:1996). The model is capable of incorporating various site specific features, such as elevation, berms, absorptive grounds, and barriers to accurately predict noise levels at specific receptors, pertaining to noise emissions from a particular source / sources. The ISO based model accounts for reduction in sound level due to increased distance and geometrical spreading, air absorption, ground attenuation, and acoustical shielding by intervening structures and topography. The model is considered conservative as it represents atmospheric conditions that promote propagation of sound from the source to the receiver.

The following assumptions were incorporated in the noise propagation modelling:

- A global ground absorption coefficient of 0.50, representing reflective grounds between sources and receptors, and 0.2, representing paved areas were incorporated in the noise model;
- A second order reflecon` was incorporated in the noise model;
- The ground within the study area is considered to be generally flat with the exception of an exisng` berm located between the McHugh site and the rail right of way; and
- Nearby industries were assumed to only operate during the daytime and evening periods (07:00-19:00).

For the purposes of the staonary assessment,` the Building Evaluaon feature` in Cadna/A was used to determine building facades with the worst-case noise impacts.

Impacts from the stationary noise sources were predicted through noise propagation modelling. The predicted receptor noise levels (at the proposed development site) were compared against the applicable criteria, as specified in NPC-300 (see **Table 14**).

Table 16 summarizes the predicted building façade daytime noise levels from stationary noise sources from the surrounding industries at the proposed development.

Table 16: Stationary Noise Impact Summary Table – Surrounding Industries on Proposed Development

Building	Maximum Façade Leq (1 hour) (dBA)[1]	MECP Compliance
Building 'A' (McHugh)	42	Yes
Building 'B' (McHugh)	47	Yes
Building 'C' (McHugh)	48	Yes
Building 'D' (McHugh)	50	Yes
Respite Home (McHugh)	37	Yes

Note: [1] Values in exceedance of MECP limits are shown in **bold**.

The predicted stationary noise impacts from the surrounding industries at the proposed development façades are shown in **Figure 5**.

The predicted impacts from the nearby stationary sources meet the MECP NPC-300 Class 1 exclusionary limits at the proposed development.

2.3 Rail Vibraon` Assessment

The proposed development is located approximately 55 m from the VIA Chatham Subdivision principal mainline right-of-way. As the proposed development is located within the vibration influence area of 75 metres, per VIA, and the Guidelines for New Development in Proximity to Railway Operations (FCM/RAC, 2013), a vibration assessment for the proposed development is required.

2.3.1 Rail Vibraon Criteriaà

There are no MECP guidelines with respect to railway vibration and proposed sensitive land-uses. Applicable guidelines for vibration impacts due to railway operations are those published in the *Guidelines for New Development in Proximity to Railway Operations* (FCM/RAC, 2013).

Overall vibration levels from railway activities are recommended not to exceed 0.14 mm/s RMS between 4 Hz and 200 Hz on and above the first floor of all dwellings. This criterion is based on the human

perception of ground-borne vibration, published in the International Standard ISO 2631-2. Vibration levels from railway operations meeting this criterion will generally not be perceptible by the occupants.

2.3.2 Rail Vibraon Meaà surements

On March 15th and March 16th, 2023, Dillon staff visited the site of the proposed Banwell and McHugh development to measure rail vibration levels from the ROW. Measurements were conducted 30 m from the ROW using the Instantel Minimate® Plus seismograph. The vibration measurement location is shown in **Figure 6**. The instrument is capable of measuring vibrations between 4 and 200 Hz within ± 3 VdB. Measurements were conducted for four passenger train passbys and two freight train passbys between 18:30 on March 15th and 11:00 on March 16th.

The results of the measurements are shown below in **Table 17**.

Table 17: Summary of Rail Vibration Measurements

Date	Time of Passby	Train Type	Max RMS velocity @ 30 m (mm/s)
March 15th, 2023	18:35	Freight	0.124
March 15th, 2023	22:08	Passenger	0.004
March 15th, 2023	23:55	Passenger	0.004
March 16th, 2023	03:11	Freight	0.069
March 16th, 2023	05:55	Passenger	0.004
March 16th, 2023	10:59	Passenger	0.005

2.3.3 Rail Vibraon Impaà cts

The maximum measured vertical ground-borne vibration level, 0.124 mm/s RMS, is below the 0.14 mm/s RMS FCM/RAC criterion. As the measurements were completed at 30 metres from the railway right-of-way, and the nearest foundation setback is proposed at approximately 55 m, impacts are expected to be less than what is presented in **Table 17**.

Additionally, further reduction of ground-borne vibration levels are expected due to the coupling-loss of the proposed building foundations, which will result in lower vibration levels within the residential units. As such, no vibration mitigation measures are deemed necessary to meet the applicable criterion.

VIA requires that a warning clause regarding the potential for noise and vibration impacts be applied to all residential locations within 300 metres of their right-of-way.

All warning clauses should be included in agreements that are registered on Title for all Offers of Purchase and Sale, lease/rental agreements, and condominium declarations. The list of applicable warning clause requirements for the proposed development are provided in **Appendix C**.

3.0 Conclusions

Dillon Consulting Limited (Dillon) was retained by 1027458 Ontario Inc. to complete a Noise and Vibration Assessment as requested by the City of Windsor for the proposed mixed use developments located at Banwell Street and McHugh Street. This study has been completed in support of Zoning By-law Amendment and Official Plan Amendment applications for the proposed development.

The noise and vibration assessment focuses on the noise impacts from nearby transportation sources and stationary sources (i.e., nearby industrial operations) on the proposed development and vibration impacts from the nearby railway on the proposed development.

Transportation Noise Assessment

As outlined in Section 2.1.4, the results of the transportation noise assessment confirm that the noise impacts on the proposed development can be sufficiently controlled by:

- Buildings 'B' and 'D' require an upgraded glazing of STC 32 and 31, respectively, for sleeping quarters;
- Buildings 'B' and 'D' require a brick veneer or acoustical equivalent (STC 54) façade construction;
- Buildings 'B' and 'D' require the installation of central air conditioning with a Type D warning clause; and
- Buildings 'A', 'C', 'E', 'F', 'G', 'H', and 'I' require the provision for the installation of central air conditioning with a Type C warning clause.

Stationary Noise Assessment

The noise impacts from surrounding commercial and industrial properties on the development were assessed through modelling of stationary sources in Cadna/A using ISO:9613 standards. It was determined that the noise impacts from the surrounding commercial and industrial properties will not exceed MECP requirements.

Rail Vibration Assessment

The maximum measured vertical ground-borne vibration level, 0.124 mm/s RMS, is below the 0.14 mm/s RMS FCM/RAC criterion. As such, no vibration mitigation measures are deemed necessary to meet the applicable criterion.

VIA requires that a warning clause regarding the potential for noise and vibration impacts be applied to all sensitive receptor locations within 300 metres of their right-of-way.

4.0 Closure

This noise and vibration assessment has been prepared based on the information provided and/or approved by 1027458 Ontario Inc. This report is intended to provide a reasonable review of available information within an agreed work scope, schedule, and budget. This report was prepared by Dillon for the sole benefit of the 1027458 Ontario Inc. The material in the report reflects Dillon's judgement in light of the information available to Dillon at the time of this report preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that the report is to your satisfaction. Please do not hesitate to contact the undersigned if you have any further questions on this report.

Respectfully Submitted:

DILLON CONSULTING LIMITED

Callum Heggart, EIT

Thom Wright, EIT

Lucas Arnold, P.Eng
Associate

Attachments
Attachment A: Development Site Plan
Attachment B: Road/Rail Traffic Data
Attachment C: Warning Clauses
Attachment D: Stamson Modelling
Attachment E: D-6 Classification Criteria
Attachment F: Stationary Source Data

Figures

Scale 1: 8,000

Figure 1

Project # 22-5144

Mar 2023

Subject Site and Surrounding Area

McHugh St and Banwell Rd, Windsor, Ontario

DILLON CONSULTING

Scale 1: 2,000

Figure 2

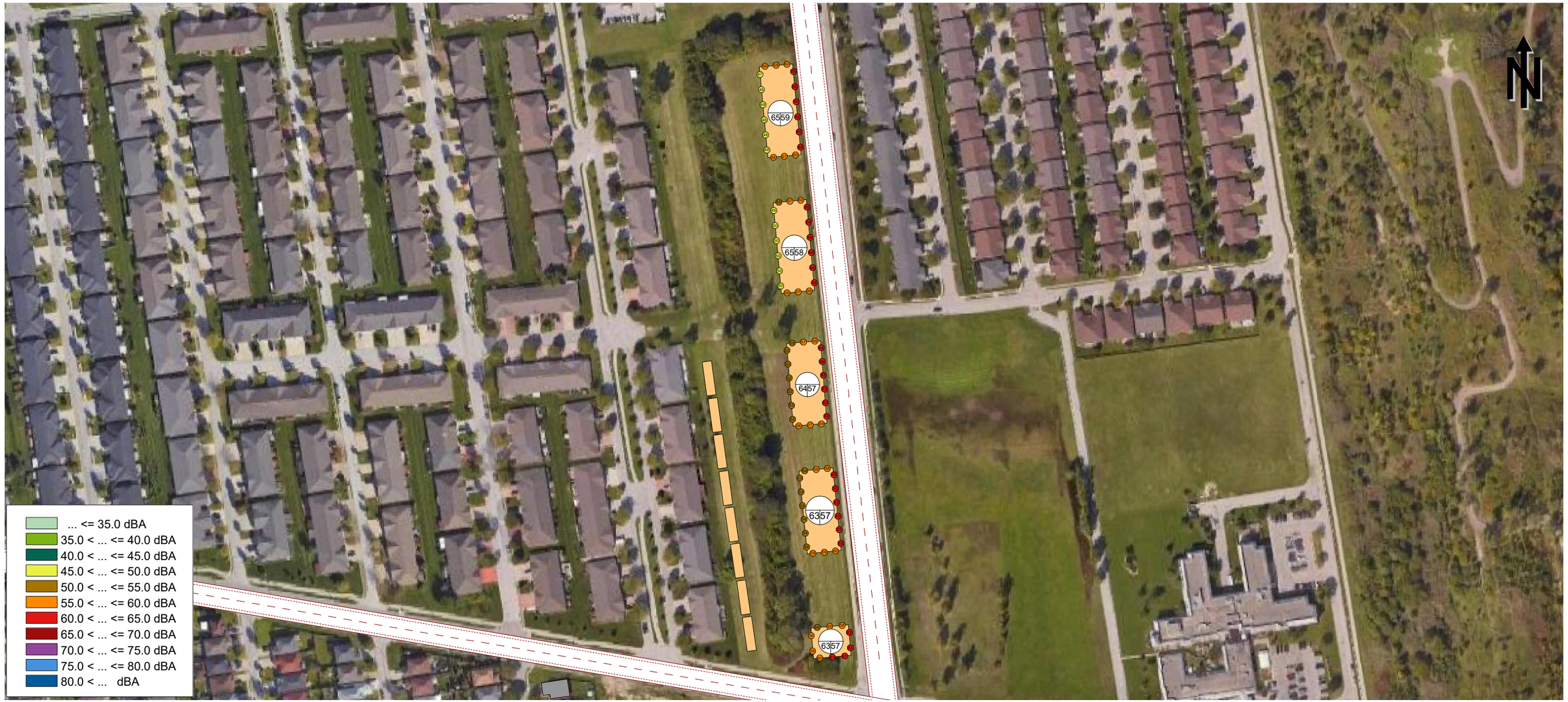
Project # 22-5144

Mar 2023

Transportation Impacts, McHugh Site
Rail and Road - Daytime Plus Max Nighttime

McHugh St and Banwell Rd, Windsor, Ontario

DILLON CONSULTING



Scale 1: 2,500

Figure 3

Project # 22-5144

Mar 2023

Transportation Impacts, Leathorne Site
Rail and Road - Daytime Plus Max Nighttime

Leathorne St and Banwell Rd, Windsor, Ontario

DILLON CONSULTING

Scale 1: 5,000

Figure 4

Project # 22-5144

Mar 2023

STAMSON Comparison Calculation Sites

McHugh St and Banwell Rd, Windsor, Ontario

DILLON CONSULTING

Scale 1: 2,750

Figure 5

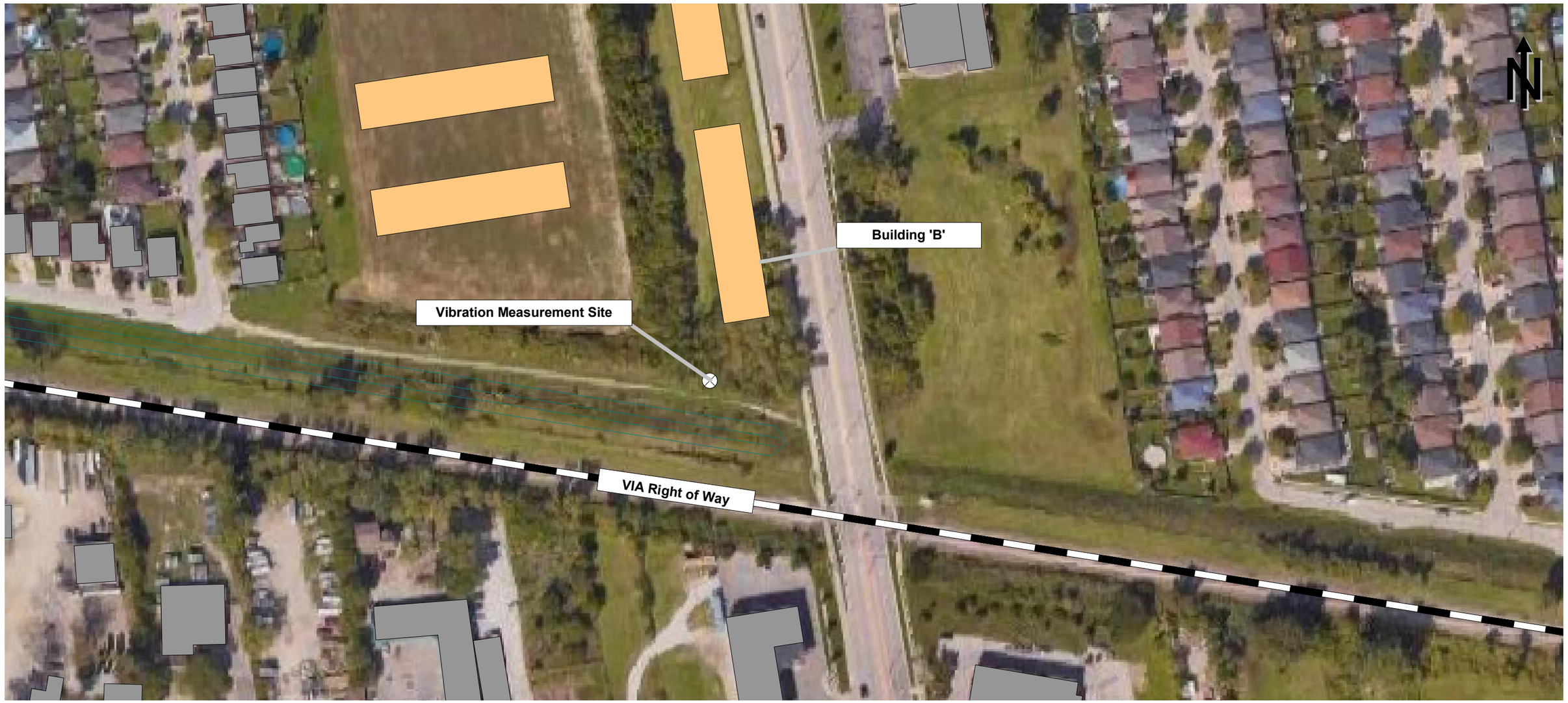
Project # 22-5144

Mar 2023

Impacts of Stationary Sources
McHugh Site

McHugh St and Banwell Rd, Windsor, Ontario

DILLON CONSULTING



Scale 1: 1,500

Figure 6

Project # 22-5144

Mar 2023

Location of Vibration Measurements
McHugh Site

McHugh St and Banwell Rd, Windsor, Ontario

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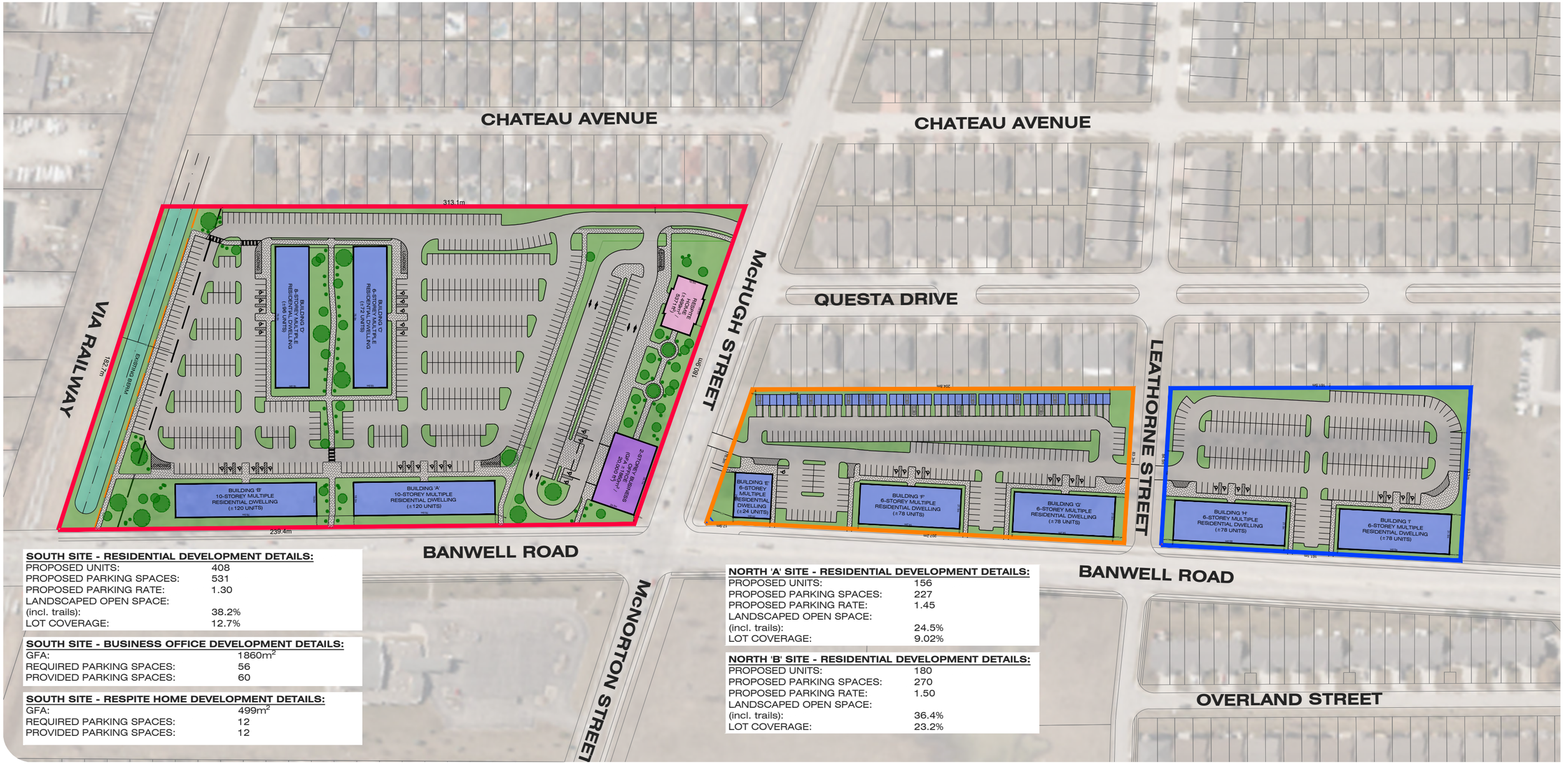
Appendix A

Development Site Plan

DILLON CONSULTING



SOUTH SITE - RESIDENTIAL DEVELOPMENT DETAILS:

PROPOSED UNITS:	408
PROPOSED PARKING SPACES:	531
PROPOSED PARKING RATE:	1.30
LANDSCAPED OPEN SPACE:	
(incl. trails):	38.2%
LOT COVERAGE:	12.7%

SOUTH SITE - BUSINESS OFFICE DEVELOPMENT DETAILS:

GFA:	1860m^2
REQUIRED PARKING SPACES:	56
PROVIDED PARKING SPACES:	60

SOUTH SITE - RESPITE HOME DEVELOPMENT DETAILS:

GFA:	499m^2
REQUIRED PARKING SPACES:	12
PROVIDED PARKING SPACES:	12

NORTH 'A' SITE - RESIDENTIAL DEVELOPMENT DETAILS:

PROPOSED UNITS:	156
PROPOSED PARKING SPACES:	227
PROPOSED PARKING RATE:	1.45
LANDSCAPED OPEN SPACE:	
(incl. trails):	24.5%
LOT COVERAGE:	9.02%

NORTH 'B' SITE - RESIDENTIAL DEVELOPMENT DETAILS:

PROPOSED UNITS:	180
PROPOSED PARKING SPACES:	270
PROPOSED PARKING RATE:	1.50
LANDSCAPED OPEN SPACE:	
(incl. trails):	36.4%
LOT COVERAGE:	23.2%

1027458 ONTARIO LTD.
BANWELL AND McHUGH -
MIXED USE DEVELOPMENTS

CONCEPTUAL DEVELOPMENT PLAN
FEBRUARY 13, 2023

BANWELL AND McHUGH - SOUTH SITE (± 5.35 ha / 13.23 ac)

BANWELL AND McHUGH - NORTH 'A' SITE (±1.43 ha / 3.54 ac)

BANWELL AND McHUGH - NORTH 'B' SITE (±1.66 ha / 4.11 ac)

30m BUFFER FROM RAILWAY

EXTENT OF BERM

EXISTING BERM

PROPOSED MULTI-UNIT RESIDENTIAL

PROPOSED LANDSCAPED OPEN SPACE

PROPOSED BUSINESS OFFICES

PROPOSED RESPITE HOME

File Location:
c:\pw working directory\projects 2022\dillon_32mru\dms63328\22-5144 - banwell and mchugh - v7 - 2022.12.13.dwg
March, 16, 2023 9:55 AM

SOURCE: THE COUNTY OF ESSEX INTERACTIVE MAPPING (2021)

MAP/DRAWING INFORMATION
THIS DRAWING IS FOR INFORMATION PURPOSES ONLY. ALL DIMENSIONS AND BOUNDARY INFORMATION SHOULD BE VERIFIED BY AN O.L.S PRIOR TO CONSTRUCTION.
CREATED BY: MRU
CHECKED BY: TJO
DESIGNED BY: MRU

SCALE: 1: 2000 (11X17)

DILLON CONSULTING

PROJECT: 22-5144
STATUS: DRAFT
DATE: 02/13/2023

Appendix B

Road/Rail Traffic Data

DILLON CONSULTING

65 Front St. West,
Union Station, Rm G-C-021
Toronto, Ontario M5J 1E7

REAL ESTATE

BY EMAIL

21 February 2023

Mr. Thom Wright
Dillon Consulting Limited
235 Yorkland Blvd, Suite 800
Toronto, Ontario M2J 4Y8

Dear Sir:

RE: Train Traffic Data – Mile 100.08 VIA's Chatham Subd. - City of Windsor

Further to your request for train traffic information in the vicinity of Banwell Road in the City of Windsor, please find below a summary of typical daily rail traffic.

Train Type	Frequency Day (0700-2300)	Frequency Night (2300-0700)	Max. Cars	Locomotives	Speed (mph)
Passenger	6	1	8	2	80
Freight	1	1	140	4	60
Way Freight	0	0	0	0	0

On site observations and measurements are recommended to capture actual noise and vibration levels from pass-by train operations.

Please note that rail traffic is subject to change due to varying economic and weather conditions, track maintenance work, holiday periods and emergencies. For the purpose of noise and vibration analysis, train volumes should be escalated 2.5% per annum for a 10-year period.

The above chart identifies 7 scheduled passenger trains, which is 1 less than our pre-COVID schedule. Without being able to confirm the return of the deferred train, please use the info in the chart as above in your study. For your info, VIA is in the process of replacing our corridor rail fleet with new equipment starting later this year, however we do not anticipate any schedule changes in the Toronto-Windsor Corridor at this time.

Anti-whistling by-laws are in effect throughout the City of Windsor, however all engines must sound their bells when occupying at-grade road crossings and they may still use their whistles in an emergency or to warn trespassers. It is noted that Clover Ave. and Lesperance Road level crossings are in close proximity to the subject site.

The mainline track at this location consists of continuously welded rail (CWR) while portions of the service track is bolted rail. Equipment loads are not to exceed 268,000 lbs.

VIA is not in favour of incompatible land uses such as Residential being introduced in close proximity to our busy Chatham Subdivision due to potential safety and environmental conflicts. Development adjacent to our rail corridor is not appropriate without satisfactory noise, vibration and safety mitigation measures as per the attached.

Should you have any questions, please feel free to contact me at 416-956-7669.

Yours truly,

John C. Walsh, P. Eng.
Senior Property Manager
Real Estate - Central Region

PRINCIPAL MAIN LINE

VIA Rail Canada

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: VIA Rail Canada Inc. 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). 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 right-of-way."

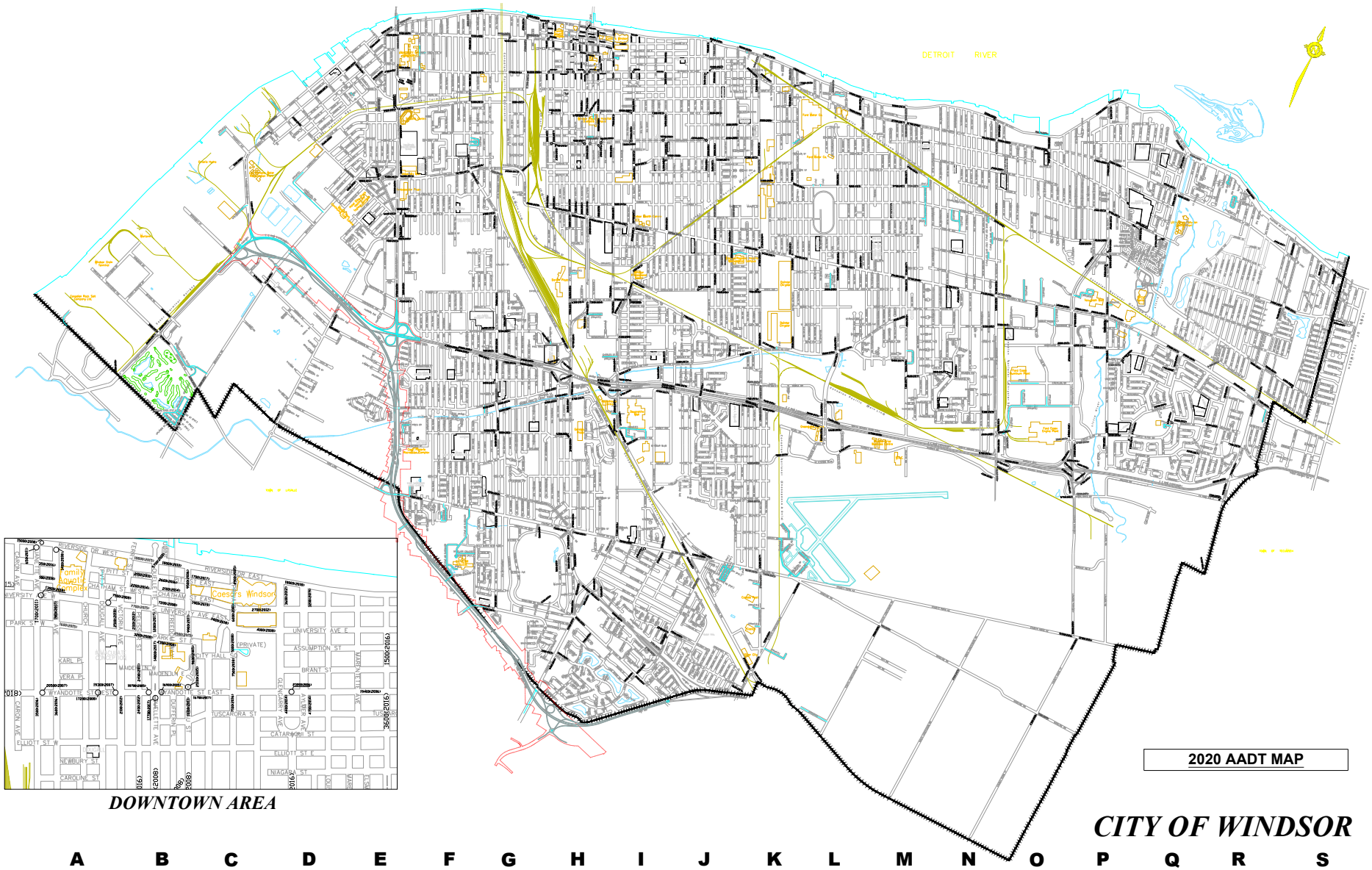
F. Any proposed alterations to the existing drainage pattern affecting Railway property must receive prior concurrence from the Railway and be substantiated by a drainage report to the satisfaction of the Railway.

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 VIA 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 VIA Rail's concerns will be resolved and will pay VIA Rail's reasonable costs in preparing and negotiating the agreement.


A B C D E F G H I J K L M N O P Q R S
1 2 3 4 5 6 7 8 9 10 11
DETROIT RIVER
2020 AADT MAP
CITY OF WINDSOR
DOWNTOWN AREA

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

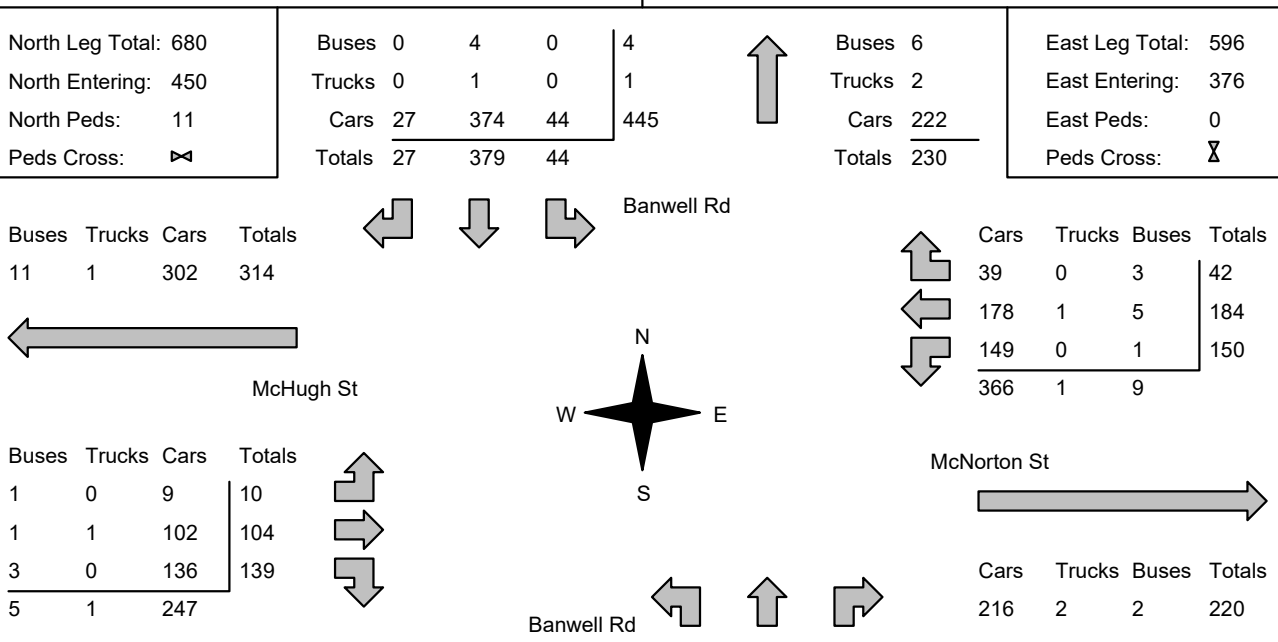
Municipality: Windsor
Site #: 2302900003
Intersection: Banwell Rd & McHugh St
TFR File #: 1
Count date: 16-Feb-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Banwell Rd runs N/S



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Afternoon Peak Diagram

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

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

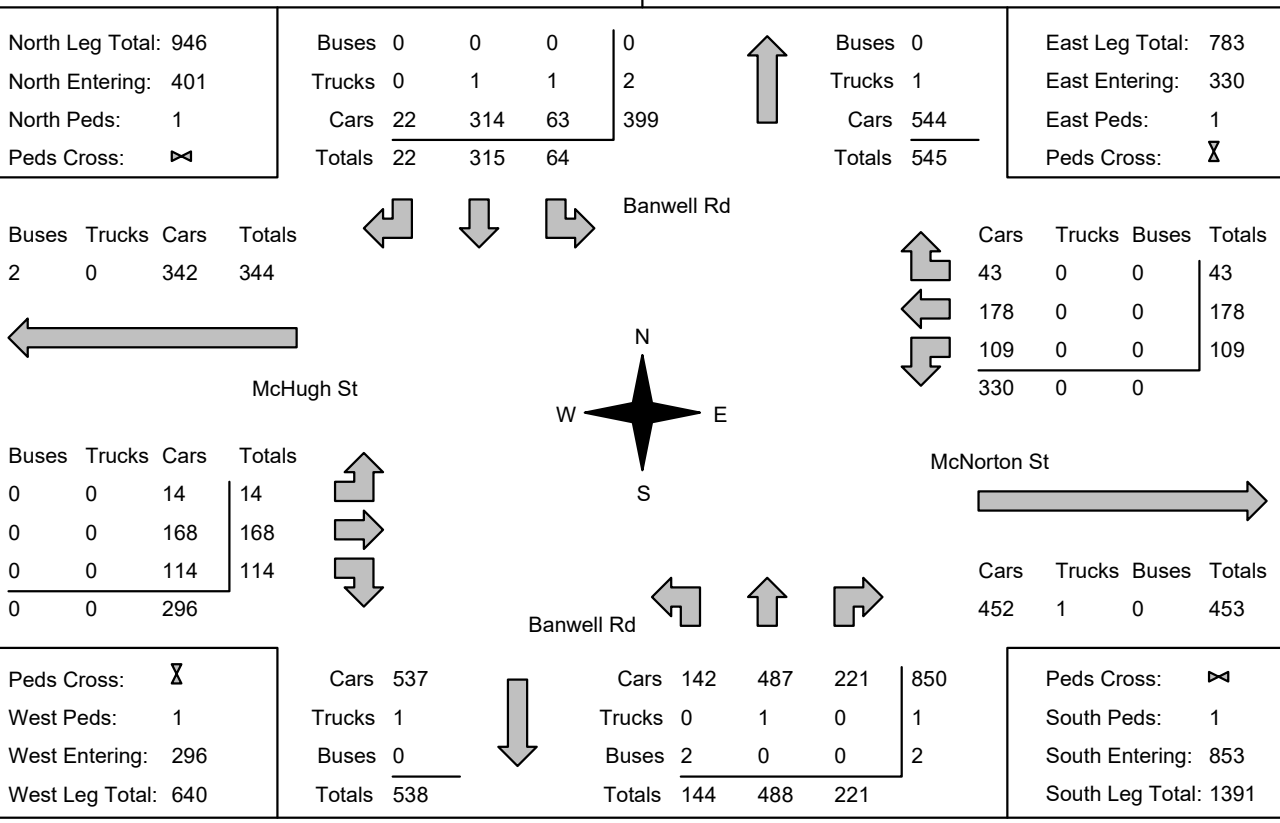
Municipality: Windsor
Site #: 2302900003
Intersection: Banwell Rd & McHugh St
TFR File #: 1
Count date: 16-Feb-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Banwell Rd runs N/S



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Total Count Diagram

Municipality: Windsor
Site #: 2302900003
Intersection: Banwell Rd & McHugh St
TFR File #: 1
Count date: 16-Feb-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Banwell Rd runs N/S

North Leg Total:	4445			
North Entering:	2332			
North Peds:	37			
Peds Cross:	⋈			
Buses	0	13	3	16
Trucks	2	7	1	10
Cars	116	1886	304	2306
Totals	118	1906	308	
Buses	27			
Trucks	11			
Cars	2075			
Totals	2113			
East Leg Total:	3731			
East Entering:	1874			
East Peds:	10			
Peds Cross:	⧖			

Banwell Rd

Buses	Trucks	Cars	Totals
28	5	1663	1696

McHugh St

Cars	Trucks	Buses	Totals
258	0	8	266
878	1	10	889
718	0	1	719
1854	1	19	

N
W E
S

Buses	Trucks	Cars	Totals
3	0	101	104
16	1	745	762
9	3	675	687
28	4	1521	

McNorton St

Cars	Trucks	Buses	Totals
1832	3	22	1857

Banwell Rd

Peds Cross:	⧖			
West Peds:	3			
West Entering:	1553			
West Leg Total:	3249			
Cars	3279			
Trucks	10			
Buses	23			
Totals	3312			
Cars	669	1716	783	3168
Trucks	2	11	1	14
Buses	18	16	3	37
Totals	689	1743	787	
Peds Cross:	⋈			
South Peds:	21			
South Entering:	3219			
South Leg Total:	6531			

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Traffic Count Summary

Intersection: Banwell Rd & McHugh St | **Count Date:** 16-Feb-23 | **Municipality:** Windsor

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	30	364	16	410	6
9:00:00	44	379	27	450	11
10:00:00	48	246	23	317	6
15:00:00	0	0	0	0	0
16:00:00	64	297	16	377	10
17:00:00	60	310	12	382	3
18:00:00	62	310	24	396	1
Totals:	308	1906	118	2332	37

North/South Total Approaches: 5551

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	50	114	33	197	0
9:00:00	103	178	72	353	5
10:00:00	78	152	72	302	1
15:00:00	0	0	0	0	0
16:00:00	158	379	200	737	14
17:00:00	147	454	204	805	1
18:00:00	153	466	206	825	0
S Totals:	689	1743	787	3219	21

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	125	103	37	265	1
9:00:00	150	184	42	376	0
10:00:00	98	89	37	224	3
15:00:00	0	0	0	0	0
16:00:00	121	160	56	337	4
17:00:00	110	175	47	332	1
18:00:00	115	178	47	340	1
Totals:	719	889	266	1874	10

East/West Total Approaches: 3427

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	6	75	114	195	0
9:00:00	10	104	139	253	1
10:00:00	10	80	89	179	1
15:00:00	0	0	0	0	0
16:00:00	42	186	133	361	0
17:00:00	19	159	109	287	1
18:00:00	17	158	103	278	0
W Totals:	104	762	687	1553	3

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00
Crossing Values:	0	240	360	204	0	373	308	311

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 16-Feb-23 Site #: 2302900003

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Buses - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	4	4	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	11	7	116	66	2	2	0	0	1	1	0	0	0	0	0	0	0	0	6	6
7:45:00	16	5	229	113	10	8	0	0	2	1	0	0	0	0	0	0	0	0	6	0
8:00:00	30	14	361	132	16	6	0	0	2	0	0	0	0	0	1	1	0	0	6	0
8:15:00	44	14	468	107	20	4	0	0	3	1	0	0	0	0	3	2	0	0	9	3
8:30:00	54	10	545	77	26	6	0	0	3	0	0	0	0	0	4	1	0	0	11	2
8:45:00	62	8	635	90	34	8	0	0	3	0	0	0	0	0	4	0	0	0	16	5
9:00:00	74	12	735	100	43	9	0	0	3	0	0	0	0	0	5	1	0	0	17	1
9:15:00	95	21	805	70	46	3	0	0	3	0	0	0	0	0	8	3	0	0	18	1
9:30:00	103	8	872	67	53	7	0	0	3	0	1	1	0	0	9	1	0	0	18	0
9:45:00	113	10	924	52	60	7	0	0	3	0	1	0	0	0	9	0	0	0	22	4
10:00:00	122	9	977	53	65	5	0	0	3	0	1	0	0	0	9	0	0	0	23	1
10:15:00	122	0	977	0	65	0	0	0	3	0	1	0	0	0	9	0	0	0	23	0
15:00:00	122	0	977	0	65	0	0	0	3	0	1	0	0	0	9	0	0	0	23	0
15:15:00	135	13	1063	86	68	3	0	0	3	0	1	0	0	0	9	0	0	0	29	6
15:30:00	153	18	1128	65	74	6	0	0	3	0	1	0	0	0	9	0	0	0	31	2
15:45:00	169	16	1195	67	77	3	0	0	4	1	1	0	0	0	10	1	0	0	32	1
16:00:00	185	16	1272	77	80	3	0	0	4	0	2	1	1	1	10	0	0	0	33	1
16:15:00	197	12	1348	76	81	1	0	0	5	1	2	0	2	1	13	3	0	0	36	3
16:30:00	207	10	1436	88	84	3	0	0	5	0	2	0	3	1	13	0	0	0	36	0
16:45:00	227	20	1509	73	89	5	0	0	5	0	2	0	3	0	13	0	0	0	36	0
17:00:00	243	16	1578	69	92	3	0	0	5	0	2	0	3	0	13	0	0	0	36	0
17:15:00	261	18	1667	89	95	3	1	1	6	1	2	0	3	0	13	0	0	0	36	0
17:30:00	278	17	1742	75	101	6	1	0	6	0	2	0	3	0	13	0	0	0	37	1
17:45:00	290	12	1823	81	111	10	1	0	6	0	2	0	3	0	13	0	0	0	37	0
18:00:00	304	14	1886	63	116	5	1	0	7	1	2	0	3	0	13	0	0	0	37	0
18:15:00	304	0	1886	0	116	0	1	0	7	0	2	0	3	0	13	0	0	0	37	0
18:15:15	304	0	1886	0	116	0	1	0	7	0	2	0	3	0	13	0	0	0	37	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 16-Feb-23 Site #: 2302900003

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Buses - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	18	18	12	12	4	4	0	0	0	0	0	0	0	0	1	1	0	0	0	0
7:30:00	42	24	34	22	13	9	0	0	0	0	0	0	0	0	1	0	1	1	1	1
7:45:00	93	51	71	37	20	7	0	0	0	0	0	0	0	0	1	0	5	4	1	0
8:00:00	125	32	102	31	32	12	0	0	0	0	0	0	0	0	1	0	5	0	1	0
8:15:00	167	42	143	41	45	13	0	0	1	1	0	0	0	0	2	1	6	1	1	0
8:30:00	206	39	186	43	51	6	0	0	1	0	0	0	1	1	4	2	6	0	1	0
8:45:00	236	30	242	56	57	6	0	0	1	0	0	0	1	0	5	1	7	1	1	0
9:00:00	274	38	280	38	71	14	0	0	1	0	0	0	1	0	6	1	8	1	1	0
9:15:00	306	32	310	30	78	7	0	0	1	0	0	0	1	0	6	0	8	0	3	2
9:30:00	330	24	331	21	83	5	0	0	1	0	0	0	1	0	6	0	8	0	4	1
9:45:00	350	20	347	16	96	13	0	0	1	0	0	0	1	0	6	0	8	0	4	0
10:00:00	372	22	369	22	108	12	0	0	1	0	0	0	1	0	6	0	8	0	4	0
10:15:00	372	0	369	0	108	0	0	0	1	0	0	0	1	0	6	0	8	0	4	0
15:00:00	372	0	369	0	108	0	0	0	1	0	0	0	1	0	6	0	8	0	4	0
15:15:00	406	34	417	48	120	12	0	0	1	0	0	0	1	0	7	1	8	0	4	0
15:30:00	443	37	459	42	133	13	0	0	1	0	0	0	1	0	8	1	8	0	4	0
15:45:00	466	23	493	34	146	13	0	0	1	0	0	0	1	0	8	0	8	0	6	2
16:00:00	493	27	526	33	164	18	0	0	1	0	0	0	1	0	9	1	8	0	8	2
16:15:00	526	33	564	38	178	14	0	0	1	0	0	0	1	0	10	1	8	0	9	1
16:30:00	559	33	607	43	193	15	0	0	1	0	0	0	1	0	10	0	8	0	9	0
16:45:00	581	22	653	46	201	8	0	0	1	0	0	0	1	0	10	0	8	0	9	0
17:00:00	603	22	700	47	211	10	0	0	1	0	0	0	1	0	10	0	8	0	9	0
17:15:00	630	27	743	43	224	13	0	0	1	0	0	0	1	0	10	0	8	0	9	0
17:30:00	658	28	784	41	233	9	0	0	1	0	0	0	1	0	10	0	8	0	10	1
17:45:00	690	32	831	47	244	11	0	0	1	0	0	0	1	0	10	0	8	0	10	0
18:00:00	718	28	878	47	258	14	0	0	1	0	0	0	1	0	10	0	8	0	10	0
18:15:00	718	0	878	0	258	0	0	0	1	0	0	0	1	0	10	0	8	0	10	0
18:15:15	718	0	878	0	258	0	0	0	1	0	0	0	1	0	10	0	8	0	10	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 16-Feb-23 Site #: 2302900003

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Buses - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	10	10	18	18	7	7	0	0	1	1	0	0	0	0	3	3	0	0	0	0
7:30:00	21	11	42	24	15	8	0	0	1	0	0	0	3	3	5	2	0	0	0	0
7:45:00	37	16	65	23	26	11	0	0	2	1	0	0	4	1	7	2	0	0	0	0
8:00:00	46	9	104	39	33	7	0	0	2	0	0	0	4	0	8	1	0	0	0	0
8:15:00	64	18	155	51	44	11	0	0	2	0	1	1	5	1	8	0	1	1	1	1
8:30:00	86	22	194	39	64	20	0	0	3	1	1	0	6	1	8	0	1	0	1	0
8:45:00	119	33	235	41	87	23	0	0	4	1	1	0	9	3	10	2	1	0	5	4
9:00:00	143	24	278	43	103	16	0	0	4	0	1	0	10	1	10	0	1	0	5	0
9:15:00	162	19	313	35	115	12	0	0	6	2	1	0	11	1	10	0	1	0	5	0
9:30:00	176	14	354	41	135	20	0	0	6	0	1	0	12	1	10	0	1	0	6	1
9:45:00	195	19	392	38	152	17	0	0	6	0	1	0	12	0	10	0	1	0	6	0
10:00:00	217	22	427	35	175	23	1	1	7	1	1	0	13	1	10	0	1	0	6	0
10:15:00	217	0	427	0	175	0	1	0	7	0	1	0	13	0	10	0	1	0	6	0
15:00:00	217	0	427	0	175	0	1	0	7	0	1	0	13	0	10	0	1	0	6	0
15:15:00	265	48	507	80	229	54	1	0	9	2	1	0	14	1	10	0	1	0	13	7
15:30:00	298	33	595	88	278	49	1	0	9	0	1	0	14	0	12	2	1	0	19	6
15:45:00	325	27	705	110	322	44	2	1	9	0	1	0	15	1	14	2	1	0	20	1
16:00:00	372	47	799	94	373	51	2	0	9	0	1	0	15	0	15	1	3	2	20	0
16:15:00	410	38	903	104	417	44	2	0	9	0	1	0	16	1	16	1	3	0	20	0
16:30:00	442	32	1008	105	460	43	2	0	9	0	1	0	16	0	16	0	3	0	20	0
16:45:00	485	43	1125	117	519	59	2	0	10	1	1	0	16	0	16	0	3	0	20	0
17:00:00	517	32	1250	125	577	58	2	0	11	1	1	0	17	1	16	0	3	0	21	1
17:15:00	548	31	1374	124	630	53	2	0	11	0	1	0	17	0	16	0	3	0	21	0
17:30:00	585	37	1512	138	689	59	2	0	11	0	1	0	18	1	16	0	3	0	21	0
17:45:00	627	42	1612	100	740	51	2	0	11	0	1	0	18	0	16	0	3	0	21	0
18:00:00	669	42	1716	104	783	43	2	0	11	0	1	0	18	0	16	0	3	0	21	0
18:15:00	669	0	1716	0	783	0	2	0	11	0	1	0	18	0	16	0	3	0	21	0
18:15:15	669	0	1716	0	783	0	2	0	11	0	1	0	18	0	16	0	3	0	21	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 16-Feb-23 Site #: 2302900003

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Buses - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	1	1	14	14	19	19	0	0	0	0	0	0	0	0	1	1	0	0	0	0
7:30:00	3	2	27	13	41	22	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7:45:00	6	3	48	21	80	39	0	0	0	0	0	0	0	0	3	2	0	0	0	0
8:00:00	6	0	70	22	114	34	0	0	0	0	0	0	0	0	5	2	0	0	0	0
8:15:00	8	2	88	18	160	46	0	0	0	0	0	0	0	0	6	1	0	0	0	0
8:30:00	8	0	118	30	187	27	0	0	0	0	0	0	0	0	6	0	1	1	0	0
8:45:00	9	1	146	28	218	31	0	0	1	1	0	0	0	0	6	0	1	0	1	1
9:00:00	15	6	172	26	250	32	0	0	1	0	0	0	1	1	6	0	3	2	1	0
9:15:00	18	3	194	22	273	23	0	0	1	0	0	0	1	0	7	1	3	0	1	0
9:30:00	18	0	208	14	297	24	0	0	1	0	0	0	1	0	7	0	3	0	2	1
9:45:00	21	3	235	27	320	23	0	0	1	0	0	0	1	0	7	0	3	0	2	0
10:00:00	25	4	251	16	338	18	0	0	1	0	1	1	1	0	7	0	3	0	2	0
10:15:00	25	0	251	0	338	0	0	0	1	0	1	0	1	0	7	0	3	0	2	0
15:00:00	25	0	251	0	338	0	0	0	1	0	1	0	1	0	7	0	3	0	2	0
15:15:00	40	15	321	70	381	43	0	0	1	0	2	1	2	1	9	2	5	2	2	0
15:30:00	51	11	357	36	408	27	0	0	1	0	2	0	2	0	10	1	6	1	2	0
15:45:00	58	7	396	39	435	27	0	0	1	0	3	1	3	1	13	3	6	0	2	0
16:00:00	65	7	431	35	464	29	0	0	1	0	3	0	3	0	13	0	8	2	2	0
16:15:00	72	7	466	35	494	30	0	0	1	0	3	0	3	0	14	1	9	1	2	0
16:30:00	77	5	512	46	520	26	0	0	1	0	3	0	3	0	15	1	9	0	2	0
16:45:00	82	5	547	35	538	18	0	0	1	0	3	0	3	0	16	1	9	0	2	0
17:00:00	84	2	587	40	572	34	0	0	1	0	3	0	3	0	16	0	9	0	3	1
17:15:00	88	4	629	42	607	35	0	0	1	0	3	0	3	0	16	0	9	0	3	0
17:30:00	93	5	669	40	628	21	0	0	1	0	3	0	3	0	16	0	9	0	3	0
17:45:00	96	3	715	46	652	24	0	0	1	0	3	0	3	0	16	0	9	0	3	0
18:00:00	101	5	745	30	675	23	0	0	1	0	3	0	3	0	16	0	9	0	3	0
18:15:00	101	0	745	0	675	0	0	0	1	0	3	0	3	0	16	0	9	0	3	0
18:15:15	101	0	745	0	675	0	0	0	1	0	3	0	3	0	16	0	9	0	3	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

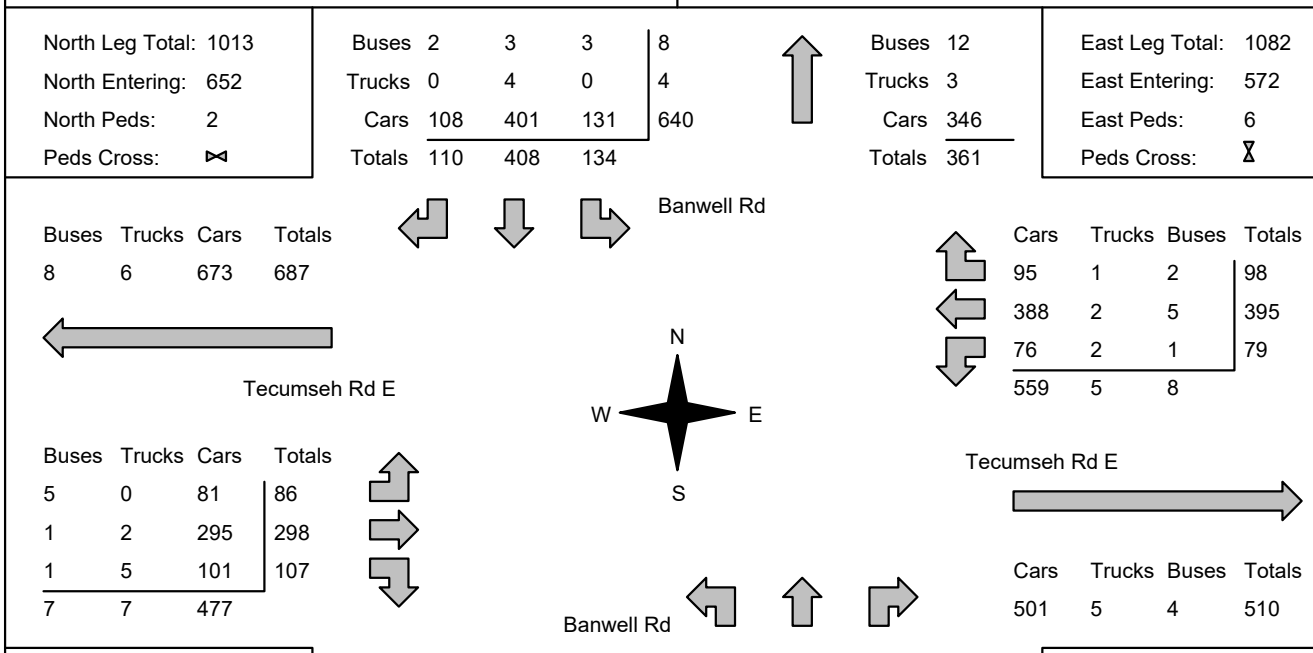
Municipality: Windsor
Site #: 2302900004
Intersection: Tecumseh Rd E & Banwell Rd
TFR File #: 1
Count date: 16-Feb-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Tecumseh Rd E runs W/E



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Afternoon Peak Diagram

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

One Hour Peak
From: 16:30:00
To: 17:30:00

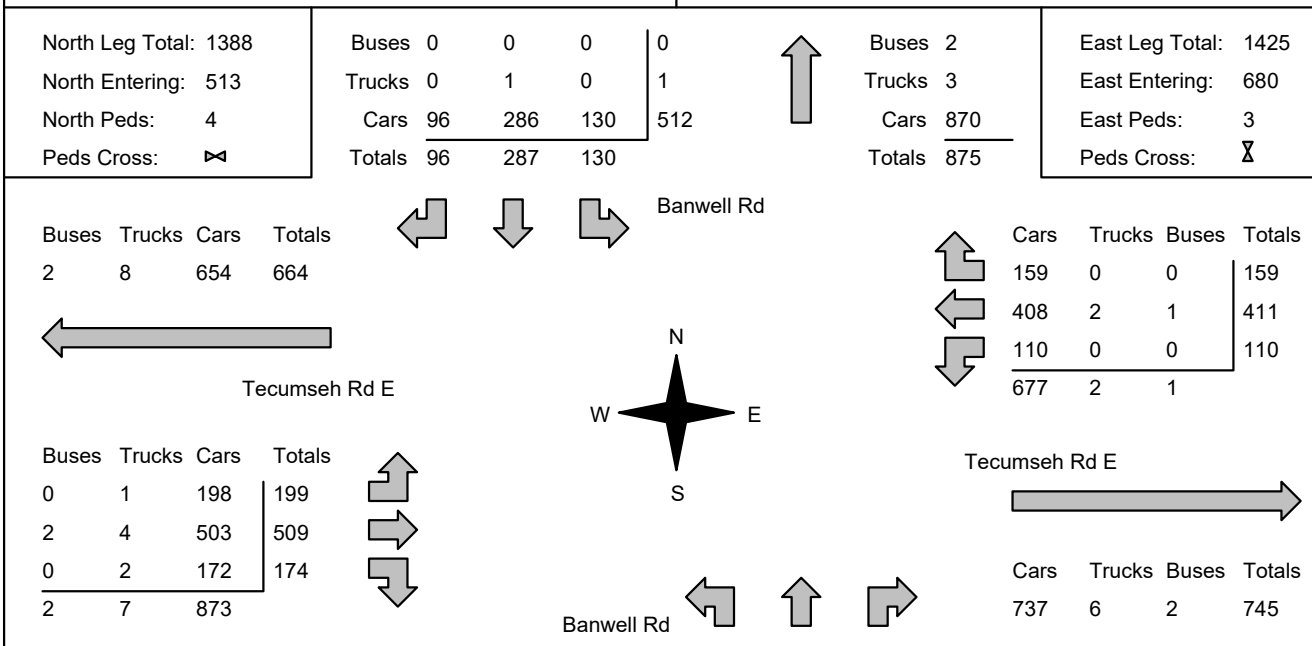
Municipality: Windsor
Site #: 2302900004
Intersection: Tecumseh Rd E & Banwell Rd
TFR File #: 1
Count date: 16-Feb-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Tecumseh Rd E runs W/E



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Total Count Diagram

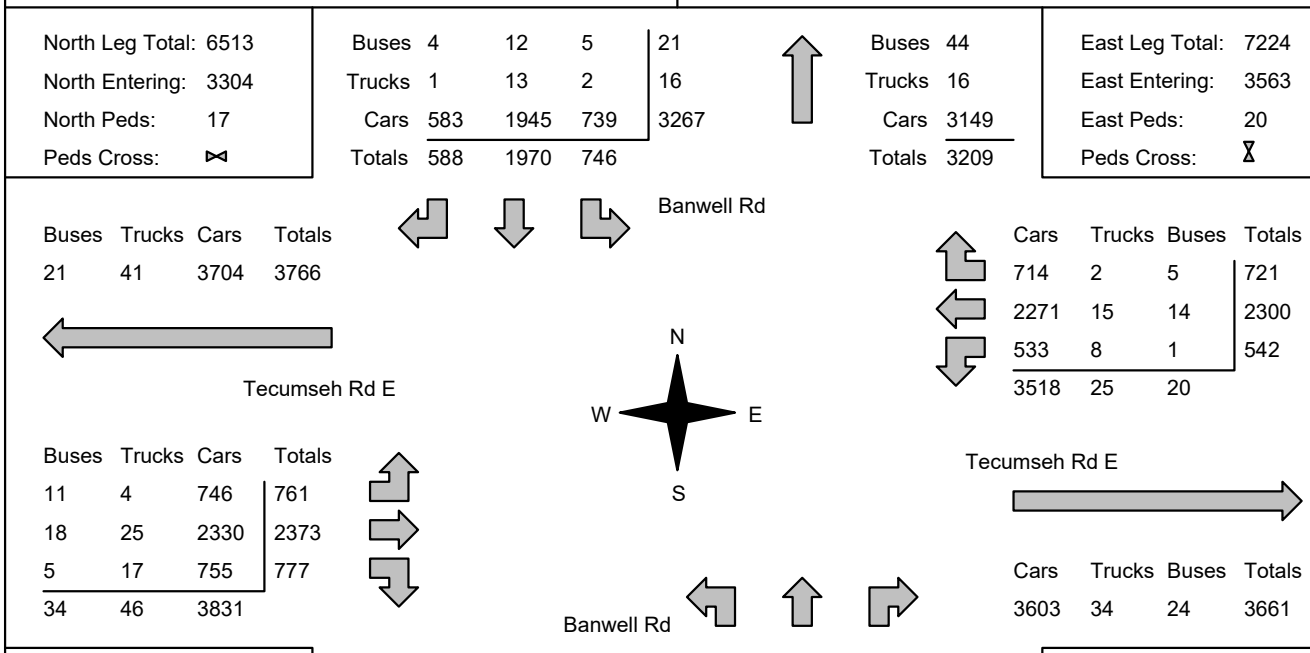
Municipality: Windsor
Site #: 2302900004
Intersection: Tecumseh Rd E & Banwell Rd
TFR File #: 1
Count date: 16-Feb-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Tecumseh Rd E runs W/E



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Traffic Count Summary

Intersection: Tecumseh Rd E & Banwell Rd | **Count Date:** 16-Feb-23 | **Municipality:** Windsor

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	*0*	*0*	*0*	*0*	*0*
8:00:00	*96*	*417*	*82*	*595*	*0*
9:00:00	*134*	*408*	*110*	*652*	*2*
10:00:00	*108*	*247*	*80*	*435*	*0*
15:00:00	*0*	*0*	*0*	*0*	*0*
16:00:00	*157*	*279*	*107*	*543*	*10*
17:00:00	*110*	*331*	*98*	*539*	*3*
18:00:00	*141*	*288*	*111*	*540*	*2*
Totals:	746	1970	588	3304	17

North/South Total Approaches: 6451

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	*0*	*0*	*0*	*0*	*0*
8:00:00	*109*	*114*	*50*	*273*	*0*
9:00:00	*182*	*177*	*78*	*437*	*3*
10:00:00	*148*	*134*	*75*	*357*	*3*
15:00:00	*0*	*0*	*0*	*0*	*0*
16:00:00	*140*	*378*	*119*	*637*	*2*
17:00:00	*156*	*446*	*110*	*712*	*1*
18:00:00	*143*	*478*	*110*	*731*	*1*
S Totals:	878	1727	542	3147	10

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	*0*	*0*	*0*	*0*	*0*
8:00:00	*65*	*264*	*53*	*382*	*0*
9:00:00	*79*	*395*	*98*	*572*	*6*
10:00:00	*64*	*378*	*89*	*531*	*5*
15:00:00	*0*	*0*	*0*	*0*	*0*
16:00:00	*123*	*413*	*165*	*701*	*4*
17:00:00	*109*	*439*	*167*	*715*	*1*
18:00:00	*102*	*411*	*149*	*662*	*4*
Totals:	542	2300	721	3563	20

East/West Total Approaches: 7474

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	*0*	*0*	*0*	*0*	*0*
8:00:00	*36*	*217*	*49*	*302*	*0*
9:00:00	*86*	*298*	*107*	*491*	*0*
10:00:00	*78*	*310*	*99*	*487*	*0*
15:00:00	*0*	*0*	*0*	*0*	*0*
16:00:00	*183*	*563*	*194*	*940*	*4*
17:00:00	*193*	*483*	*169*	*845*	*1*
18:00:00	*185*	*502*	*159*	*846*	*1*
W Totals:	761	2373	777	3911	6

Calculated Values for Traffic Crossing Major Street

Hours Ending:	*7:00*	*8:00*	*9:00*	*10:00*	*15:00*	*16:00*	*17:00*	*18:00*
Crossing Values:	*0*	*622*	*730*	*508*	*0*	*683*	*714*	*767*

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 16-Feb-23 Site #: 2302900004

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Buses - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	16	16	58	58	16	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	36	20	129	71	29	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	61	25	279	150	53	24	0	0	1	1	0	0	0	0	0	0	0	0	0	0
8:00:00	96	35	415	136	82	29	0	0	1	0	0	0	0	0	1	1	0	0	0	0
8:15:00	136	40	541	126	108	26	0	0	3	2	0	0	2	2	1	0	0	0	0	0
8:30:00	164	28	622	81	136	28	0	0	4	1	0	0	3	1	1	0	2	2	1	1
8:45:00	184	20	717	95	162	26	0	0	4	0	0	0	3	0	1	0	2	0	2	1
9:00:00	227	43	816	99	190	28	0	0	5	1	0	0	3	0	4	3	2	0	2	0
9:15:00	253	26	893	77	215	25	0	0	5	0	0	0	4	1	5	1	2	0	2	0
9:30:00	281	28	959	66	236	21	0	0	5	0	0	0	4	0	6	1	2	0	2	0
9:45:00	303	22	1013	54	254	18	0	0	5	0	0	0	4	0	6	0	2	0	2	0
10:00:00	334	31	1060	47	270	16	0	0	6	1	0	0	4	0	6	0	2	0	2	0
10:15:00	334	0	1060	0	270	0	0	0	6	0	0	0	4	0	6	0	2	0	2	0
15:00:00	334	0	1060	0	270	0	0	0	6	0	0	0	4	0	6	0	2	0	2	0
15:15:00	379	45	1131	71	305	35	0	0	7	1	1	1	4	0	6	0	3	1	4	2
15:30:00	420	41	1206	75	327	22	0	0	8	1	1	0	4	0	6	0	4	1	7	3
15:45:00	452	32	1269	63	349	22	0	0	10	2	1	0	4	0	7	1	4	0	12	5
16:00:00	491	39	1332	63	374	25	0	0	10	0	1	0	4	0	9	2	4	0	12	0
16:15:00	516	25	1420	88	403	29	1	1	10	0	1	0	5	1	12	3	4	0	12	0
16:30:00	553	37	1512	92	431	28	1	0	11	1	1	0	5	0	12	0	4	0	13	1
16:45:00	571	18	1586	74	454	23	1	0	11	0	1	0	5	0	12	0	4	0	14	1
17:00:00	599	28	1659	73	472	18	1	0	11	0	1	0	5	0	12	0	4	0	15	1
17:15:00	643	44	1736	77	500	28	1	0	12	1	1	0	5	0	12	0	4	0	15	0
17:30:00	683	40	1798	62	527	27	1	0	12	0	1	0	5	0	12	0	4	0	17	2
17:45:00	715	32	1873	75	554	27	2	1	12	0	1	0	5	0	12	0	4	0	17	0
18:00:00	739	24	1945	72	583	29	2	0	13	1	1	0	5	0	12	0	4	0	17	0
18:15:00	739	0	1945	0	583	0	2	0	13	0	1	0	5	0	12	0	4	0	17	0
18:15:15	739	0	1945	0	583	0	2	0	13	0	1	0	5	0	12	0	4	0	17	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 16-Feb-23 Site #: 2302900004

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Buses - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	12	12	33	33	11	11	0	0	0	0	0	0	0	0	0	0	1	1	0	0
7:30:00	26	14	93	60	21	10	1	1	1	1	0	0	0	0	1	1	2	1	0	0
7:45:00	40	14	172	79	39	18	1	0	3	2	0	0	0	0	2	1	2	0	0	0
8:00:00	64	24	259	87	51	12	1	0	3	0	0	0	0	0	2	0	2	0	0	0
8:15:00	80	16	340	81	74	23	1	0	3	0	0	0	0	0	3	1	3	1	1	1
8:30:00	99	19	438	98	92	18	1	0	3	0	0	0	0	0	4	1	3	0	1	0
8:45:00	126	27	553	115	117	25	2	1	3	0	1	1	0	0	6	2	4	1	2	1
9:00:00	140	14	647	94	146	29	3	1	5	2	1	0	1	1	7	1	4	0	6	4
9:15:00	157	17	729	82	167	21	5	2	5	0	1	0	1	0	7	0	4	0	7	1
9:30:00	170	13	817	88	193	26	5	0	7	2	1	0	1	0	8	1	4	0	8	1
9:45:00	186	16	923	106	218	25	5	0	9	2	1	0	1	0	9	1	4	0	10	2
10:00:00	202	16	1018	95	235	17	5	0	9	0	1	0	1	0	10	1	4	0	11	1
10:15:00	202	0	1018	0	235	0	5	0	9	0	1	0	1	0	10	0	4	0	11	0
15:00:00	202	0	1018	0	235	0	5	0	9	0	1	0	1	0	10	0	4	0	11	0
15:15:00	233	31	1133	115	278	43	5	0	10	1	2	1	1	0	10	0	4	0	13	2
15:30:00	265	32	1214	81	319	41	5	0	10	0	2	0	1	0	10	0	4	0	13	0
15:45:00	299	34	1315	101	361	42	5	0	11	1	2	0	1	0	11	1	5	1	15	2
16:00:00	324	25	1427	112	398	37	6	1	12	1	2	0	1	0	11	0	5	0	15	0
16:15:00	351	27	1539	112	442	44	6	0	12	0	2	0	1	0	11	0	5	0	16	1
16:30:00	381	30	1657	118	483	41	6	0	12	0	2	0	1	0	12	1	5	0	16	0
16:45:00	411	30	1763	106	528	45	6	0	12	0	2	0	1	0	12	0	5	0	16	0
17:00:00	433	22	1864	101	565	37	6	0	12	0	2	0	1	0	13	1	5	0	16	0
17:15:00	463	30	1974	110	603	38	6	0	12	0	2	0	1	0	13	0	5	0	16	0
17:30:00	491	28	2065	91	642	39	6	0	14	2	2	0	1	0	13	0	5	0	19	3
17:45:00	514	23	2163	98	679	37	7	1	14	0	2	0	1	0	14	1	5	0	20	1
18:00:00	533	19	2271	108	714	35	8	1	15	1	2	0	1	0	14	0	5	0	20	0
18:15:00	533	0	2271	0	714	0	8	0	15	0	2	0	1	0	14	0	5	0	20	0
18:15:15	533	0	2271	0	714	0	8	0	15	0	2	0	1	0	14	0	5	0	20	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 16-Feb-23 Site #: 2302900004

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Buses - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	15	15	17	17	8	8	1	1	1	1	0	0	0	0	3	3	0	0	0	0
7:30:00	41	26	44	27	17	9	2	1	1	0	0	0	0	0	6	3	0	0	0	0
7:45:00	66	25	73	29	28	11	2	0	2	1	0	0	0	0	8	2	0	0	0	0
8:00:00	106	40	102	29	50	22	2	0	2	0	0	0	1	1	10	2	0	0	0	0
8:15:00	144	38	147	45	69	19	4	2	3	1	1	1	1	0	12	2	0	0	1	1
8:30:00	182	38	191	44	89	20	5	1	4	1	2	1	1	0	12	0	0	0	1	0
8:45:00	237	55	238	47	108	19	5	0	4	0	2	0	2	1	14	2	0	0	2	1
9:00:00	283	46	272	34	125	17	6	1	4	0	3	1	2	0	15	1	0	0	3	1
9:15:00	322	39	305	33	144	19	9	3	6	2	4	1	2	0	16	1	0	0	4	1
9:30:00	359	37	330	25	158	14	11	2	6	0	4	0	2	0	16	0	0	0	4	0
9:45:00	392	33	358	28	181	23	12	1	6	0	4	0	2	0	17	1	0	0	6	2
10:00:00	425	33	401	43	199	18	12	0	7	1	4	0	2	0	17	0	0	0	6	0
10:15:00	425	0	401	0	199	0	12	0	7	0	4	0	2	0	17	0	0	0	6	0
15:00:00	425	0	401	0	199	0	12	0	7	0	4	0	2	0	17	0	0	0	6	0
15:15:00	462	37	486	85	231	32	14	2	7	0	4	0	2	0	18	1	0	0	6	0
15:30:00	483	21	577	91	266	35	16	2	7	0	4	0	2	0	19	1	0	0	7	1
15:45:00	522	39	662	85	291	25	17	1	8	1	4	0	2	0	20	1	0	0	8	1
16:00:00	560	38	772	110	317	26	17	0	8	0	4	0	2	0	23	3	1	1	8	0
16:15:00	595	35	861	89	344	27	18	1	8	0	4	0	2	0	25	2	1	0	8	0
16:30:00	626	31	959	98	369	25	19	1	8	0	4	0	2	0	25	0	1	0	8	0
16:45:00	667	41	1080	121	400	31	21	2	9	1	6	2	2	0	26	1	1	0	9	1
17:00:00	710	43	1213	133	425	25	23	2	10	1	6	0	2	0	26	0	1	0	9	0
17:15:00	744	34	1333	120	448	23	24	1	10	0	6	0	3	1	26	0	1	0	9	0
17:30:00	776	32	1472	139	473	25	25	1	10	0	6	0	3	0	27	1	1	0	9	0
17:45:00	818	42	1579	107	505	32	25	0	10	0	6	0	3	0	27	0	1	0	9	0
18:00:00	850	32	1689	110	534	29	25	0	10	0	7	1	3	0	28	1	1	0	10	1
18:15:00	850	0	1689	0	534	0	25	0	10	0	7	0	3	0	28	0	1	0	10	0
18:15:15	850	0	1689	0	534	0	25	0	10	0	7	0	3	0	28	0	1	0	10	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 16-Feb-23 Site #: 2302900004

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Buses - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	6	6	34	34	7	7	0	0	2	2	0	0	0	0	0	0	0	0	0	0
7:30:00	13	7	78	44	15	8	1	1	3	1	1	1	2	2	0	0	0	0	0	0
7:45:00	17	4	146	68	34	19	1	0	5	2	1	0	3	1	2	2	0	0	0	0
8:00:00	32	15	209	63	48	14	1	0	5	0	1	0	3	0	3	1	0	0	0	0
8:15:00	46	14	281	72	63	15	1	0	5	0	1	0	3	0	3	0	1	1	0	0
8:30:00	65	19	345	64	90	27	1	0	5	0	1	0	5	2	3	0	1	0	0	0
8:45:00	91	26	412	67	121	31	1	0	5	0	5	4	8	3	3	0	1	0	0	0
9:00:00	113	22	504	92	149	28	1	0	7	2	6	1	8	0	4	1	1	0	0	0
9:15:00	125	12	574	70	177	28	1	0	8	1	8	2	9	1	6	2	3	2	0	0
9:30:00	149	24	650	76	201	24	1	0	9	1	8	0	9	0	7	1	3	0	0	0
9:45:00	169	20	719	69	225	24	1	0	12	3	9	1	9	0	9	2	3	0	0	0
10:00:00	189	20	800	81	243	18	2	1	15	3	9	0	9	0	10	1	3	0	0	0
10:15:00	189	0	800	0	243	0	2	0	15	0	9	0	9	0	10	0	3	0	0	0
15:00:00	189	0	800	0	243	0	2	0	15	0	9	0	9	0	10	0	3	0	0	0
15:15:00	241	52	932	132	301	58	3	1	16	1	12	3	9	0	12	2	3	0	1	1
15:30:00	279	38	1077	145	344	43	3	0	17	1	12	0	10	1	12	0	3	0	1	0
15:45:00	329	50	1217	140	387	43	3	0	19	2	12	0	11	1	12	0	3	0	4	3
16:00:00	369	40	1355	138	432	45	3	0	20	1	13	1	11	0	13	1	4	1	4	0
16:15:00	419	50	1478	123	485	53	3	0	21	1	13	0	11	0	13	0	4	0	4	0
16:30:00	461	42	1608	130	528	43	3	0	21	0	13	0	11	0	13	0	5	1	4	0
16:45:00	508	47	1710	102	566	38	3	0	21	0	14	1	11	0	13	0	5	0	5	1
17:00:00	562	54	1837	127	598	32	3	0	21	0	15	1	11	0	13	0	5	0	5	0
17:15:00	601	39	1983	146	654	56	3	0	23	2	15	0	11	0	15	2	5	0	5	0
17:30:00	659	58	2111	128	700	46	4	1	25	2	15	0	11	0	15	0	5	0	6	1
17:45:00	702	43	2211	100	725	25	4	0	25	0	16	1	11	0	17	2	5	0	6	0
18:00:00	746	44	2330	119	755	30	4	0	25	0	17	1	11	0	18	1	5	0	6	0
18:15:00	746	0	2330	0	755	0	4	0	25	0	17	0	11	0	18	0	5	0	6	0
18:15:15	746	0	2330	0	755	0	4	0	25	0	17	0	11	0	18	0	5	0	6	0

Appendix C

Warning Clauses

DILLON CONSULTING

Warning Clauses

Warning clauses should be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations.

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."

Type D: "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."

VIA Rail Warning Clause: "Warning: VIA Rail Canada Inc. 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). 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 right-of-way."

Appendix D

Stamson Modelling

DILLON CONSULTING

STAMSON 5.0 NORMAL REPORT Date: 28-03-2023 09:21:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: banrail.te Time Period: 16 hours
Description:

Rail data, segment # 1:

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Pass	1.0/1.0	128.0	17.0	66.0	Diesel	Yes

Data for Segment # 1:

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 78.50 m	
Receiver height	: 4.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	: 0.00	

Rail data, segment # 2:

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	1.0/1.0	96.0	6.0	193.0	Diesel	Yes

Data for Segment # 2:

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 78.50 m	
Receiver height	: 4.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	: 0.00	

Results segment # 1:

LOCOMOTIVE (0.00 + 55.38 + 0.00) = 55.38 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	67.30	-10.75	-1.17	0.00	0.00	0.00	55.38

WHEEL (0.00 + 44.28 + 0.00) = 44.28 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	57.13	-11.50	-1.35	0.00	0.00	0.00	44.28

Segment Leq : 55.70 dBA

Results segment # 2:

LOCOMOTIVE (0.00 + 53.42 + 0.00) = 53.42 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	65.33	-10.75	-1.17	0.00	0.00	0.00	53.42

WHEEL (0.00 + 46.12 + 0.00) = 46.12 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	58.97	-11.50	-1.35	0.00	0.00	0.00	46.12

Segment Leq : 54.16 dBA

Total Leq All Segments: 58.01 dBA

TOTAL Leq FROM ALL SOURCES: 58.01

STAMSON 5.0 NORMAL REPORT Date: 24-03-2023 11:26:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: banwell.te Time Period: 16 hours
Description:

Road data, segment # 1: Banwell

Car traffic volume : 16491 veh/TimePeriod
Medium truck volume : 255 veh/TimePeriod
Heavy truck volume : 239 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Banwell

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 17.00 m
Receiver height : 16.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Banwell

Source height = 1.09 m

ROAD (0.00 + 64.27 + 0.00) = 64.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.22	65.52	0.00	-0.66	-0.59	0.00	0.00	0.00	64.27

Segment Leq : 64.27 dBA

Total Leq All Segments: 64.27 dBA

TOTAL Leq FROM ALL SOURCES: 64.27

Appendix E

D-6 Classification Criteria

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Category	Outputs	Scale	Process	Operations/Intensity	Possible Examples
Class I	• Noise: Sound not audible off property • Dust and/or Odour: Infrequent and not intense • Vibration: No ground borne vibration on plant property	• No outside storage • Small scale plant or scale is irrelevant in relation to all other criteria for this Class	• Self-contained plant or building which produces/stores a packaged product. Low probability of fugitive emissions	• Daytime operations only • Infrequent movement of products and/or heavy trucks	• Electronics manufacturing and repair • Furniture repair and refinishing • Beverages bottling • Auto parts supply • Packaging and crafting services • Distribution of dairy products • Laundry and linen supply
Class II	• Noise: Sound occasionally audible off property • Dust and/or Odour: Frequent and occasionally intense • Vibration: Possible groundborne vibration, but cannot be perceived off property	• Outside storage permitted • Medium level of production allowed	• Open process • Periodic outputs of minor annoyance • Low probability of fugitive emissions	• Shift operations permitted • Frequent movement of products and/or heavy trucks with the majority of movements during daytime hours	• Magazine printing • Paint spray booths • Metal command • Electrical production manufacturing • Manufacturing of dairy products • Dry cleaning services • Feed packing plant
Class III	• Noise: sound frequently audible off property • Dust and/or Odour: Persistent and/or intense • Vibration: Ground-borne vibration can frequently be perceived off property	• Outside storage of raw and finished products • Large production levels	• Open process • Frequent outputs of major annoyances • High probability of fugitive emissions	• Continuous movement of products and employees • Daily shift operations permitted	• Manufacturing of paint and varnish • Organic chemicals manufacturing • Breweries • Solvent recovery plants • Soaps and detergent manufacturing • Manufacturing of resins and costing • Metal manufacturing

Appendix F

Staonaà ry Source Data

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Stationary Source	Spectrum Type	Spectrum [dB]									Total Sound Power Level [dBA]
		31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
Circular Saw Cutting Concrete	L_p(10 m)		85	74	72	70	72	76	82	77	113
Truck Movements	L_w	112.2	112	110.9	105.9	102.3	100.9	101	96	90.6	107.1
Pneumatic Tools	L_w	93.6	88.9	93.4	86.8	90.3	89.4	96.6	96.1	95.9	102
Truck Idling	L_w	99.5	100.8	96.2	92.8	95.3	95.2	92.8	86.6	79.1	99.3

References

Ontario Ministry of Environment Publication NPC-300, Environmental Noise Guideline, Stationary and Transportation Sources- Approval and Planning, October 2013.

US FTA Transit Noise and Vibration Impact Assessment Manual, 2018

Guidelines for New Development in Proximity to Railway Operations, Railway Association of Canada and Federation of Canadian Municipalities, May 2013.