

Appendix H:

Noise Impact Assessment

September 18, 2025

Prepared for:

City of Hamilton
Public Works – Engineering
Services
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Hamilton, Ontario L8P1A2

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**Noise and Vibration Impact
Assessment Report**

West 5th Street Corridor
Improvements from Stone
Church Road West to Rymal
Road West – Municipal Class
Environmental Assessment

Project Number: 165001381



Sign-off Page

The conclusions in the Report titled Noise and Vibration Impact Assessment Report West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West – Municipal Class Environmental Assessment are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.


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NOISE AND VIBRATION IMPACT ASSESSMENT REPORT

West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West – Municipal Class Environmental Assessment

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Executive Summary

The City of Hamilton (the City) retained Stantec Consulting Ltd. (Stantec) to undertake a Municipal Class Environmental Assessment (EA) for the West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West in Hamilton, Ontario (the Project). This noise and vibration impact assessment report has been prepared to support the Project's Municipal Class EA Phases 3 and 4.

West 5th Street from Stone Church Road West to Rymal Road West is currently a rural cross-section road surrounded by urban growth. This segment of West 5th Street is undergoing significant neighbourhood changes, influenced by the recently built William Connell Park and planned high-density developments, including those at 1400 Upper James Street, 1029 West 5th Street, and 1187 West 5th Street.

Improvements to West 5th Street are required to accommodate existing and future transportation needs for pedestrians, cyclists, transit, and vehicles. The Preferred design includes up to a 1m widening of the right-of-way (ROW) to accommodate a new two-way centre turn lane, sidewalks for pedestrians, and dedicated bike paths.

This assessment evaluates potential noise impacts from Project operations (road traffic) and construction noise and vibration, including mitigation investigation. This report does not assess vibration from Project operations, as road traffic typically generates negligible vibration impacts at sensitive receptors.

This noise and vibration impact assessment report was completed based on the Preferred design, as shown in Appendix A.

Operations Noise Assessment

Noise impact at noise sensitive areas (NSAs) in the study area was assessed with the Ontario Ministry of the Environment Conservation and Parks (MECP), formerly known as Ministry of the Environment (MOE), / Ministry of Transportation (MTO) "Joint Protocol", A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highway's Environmental Assessments. It is commonly adopted in Ontario for assessing regional and municipal road improvement projects.

To assess the noise impact at the NSAs, future noise levels with the Project (Future Build) and without the Project (Future No-build) were predicted for the 2039 horizon year, which is 10 years after the Project is expected to be constructed. The Joint Protocol requires mitigation consideration where predicted Future Build noise levels exceed 55 dBA and increase more than 5 dB over Future No-build noise levels. For the



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mitigation to be implemented, it must be technically, economically, and administratively feasible.

The future noise levels were assessed in terms of the 16-hour equivalent noise level ($L_{eq-16hr}$), as required by the guidelines, for the daytime period (07:00 - 23:00), when road traffic volumes and noise levels are higher than at nighttime (23:00 - 07:00).

This assessment considers ten (10) receptors representing the outdoor living areas (OLAs) of the existing dwellings identified for the Project. The receptors were identified through a review of aerial imagery, Stantec's site observations, and local land use zoning maps (The City of Hamilton 2005). As part of the municipal land use planning process, the developer evaluates road traffic noise impacts and mitigation requirements for noise sensitive developments. Accordingly, this report does not evaluate road traffic noise impacts or noise mitigation measures for these developments.

Road traffic data for this assessment was derived from data presented in the Project's Multimodal Transportation Assessment Report (Stantec Consulting Ltd. 2025a), herein referred to as the "Transportation Report". Future No-Build and Future Build road traffic conditions were assumed to be similar to the future traffic volume scenarios presented in the Transportation report, which consider the Project corridor growth with and without the planned developments.

The results show Future Build noise levels are up to 1 dB higher than Future No-Build noise levels at the assessed NSAs. Such changes, being less than 3 dB, are generally not perceptible to the human ear.

The increase in Future noise levels due to Project operations are below the 5 dB threshold for noise mitigation consideration under the Joint Protocol (i.e., applicable provincial noise guidelines), even though noise levels at some receptors exceed 55 dBA.

Construction Noise Assessment

The City of Hamilton noise by-law (By-Law Number 11-285) restricts the operation of construction equipment to permitted hours but does not specify noise limits.

Construction noise for the Project was assessed in accordance with the applicable MECP Publications NPC-115 and NPC-118. Most planned construction equipment for the Project is expected to comply with the MECP limits. However, some equipment, such as paving machines, may exceed these limits. Once the equipment inventory and construction schedules are finalized, sound levels should be reviewed to verify compliance. If the limits are exceeded, appropriate noise control measures should be implemented. Methods to reduce construction noise impacts are included in the Construction Code of Practice, as outlined in Section 6.2.



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Construction Vibration Assessment

A vibration impact assessment was conducted for the most impactful construction source (vibratory roller) using the method outlined in the US Federal Transit Administration (FTA) Manual. The recommended setback distances to prevent building damage for typical and heritage buildings are summarized in Table 7.1 of this report.

Under the assumed worst-case operating scenario, vibration-sensitive areas, including a heritage building, fall within the vibration zone of influence (ZOI) shown in Figure 7-1. Buildings within these ZOIs may experience vibration levels above the thresholds for structural damage identified in this report.

The minimum setback distances should be confirmed based on the actual construction equipment to be used for the Project, as determined by the contractor. It is recommended that the minimum setback distance from each piece of equipment be maintained to prevent potential building damage from vibration. If this is not feasible, vibration monitoring should be conducted at the affected buildings to verify that levels remain below the applicable limits and to identify any required mitigation measures.



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Acronyms/Units

AADT	Annual Average Daily Traffic
dB	Decibel
dBA	Decibel, A-weighted
EA	Environmental Assessment
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
Leq-16	16-hour Energy Equivalent Noise Level (Daytime Noise Level)
m	Metre
mm/s	Millimeters per second
MECP	Ontario Ministry of the Environment, Conservation and Parks
MOE	Ontario Ministry of the Environment
MTO	Ontario Ministry of Transportation
NPC	Noise Pollution Control
NSA	Noise Sensitive Area
OLA	Outdoor Living Area
ORNAMENT	Ontario Road Noise Analysis Method for Environment and Transportation
PPV	Peak Particle Velocity
ROW	Right-of-way
TNM	Traffic Noise Model



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1.0 Introduction

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West 5th Street from Stone Church Road West to Rymal Road West is currently a rural cross-section road surrounded by urban growth. This segment of West 5th Street is undergoing significant neighbourhood changes influenced by the recently built William Connell Park and planned high-density developments, including those at 1400 Upper James Street, 1029 West 5th Street, and 1187 West 5th Street.

Improvements to West 5th Street are required to accommodate existing and future transportation needs for pedestrians, cyclists, transit, and vehicles. The Preferred design includes up to a 1m widening of the right-of-way (ROW) to accommodate a new two-way centre turn lane, sidewalks for pedestrians, and dedicated bike paths.

This assessment evaluates potential noise impacts from Project operations (road traffic) and construction noise and vibration impacts, including mitigation investigation. This report does not assess vibration from Project operations, as road traffic typically generates negligible vibration impacts at sensitive receptors.

This noise and vibration impact assessment report was completed based on the Preferred design, as shown in Appendix A.

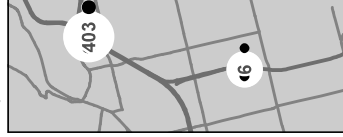
The Project extent and surrounding area is shown in Figure 1-1.





Notes

- 1. Coordinate System: UTM
- 2. Base features provided by the City of Hamilton
- 3. Orthorectified imagery from 2013



Project Location
City of Hamilton

Client/Project
CITY OF HAMILTON
NOISE AND VIBRATION
CORRIDOR IMPACT
ROAD WEST - M

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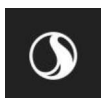
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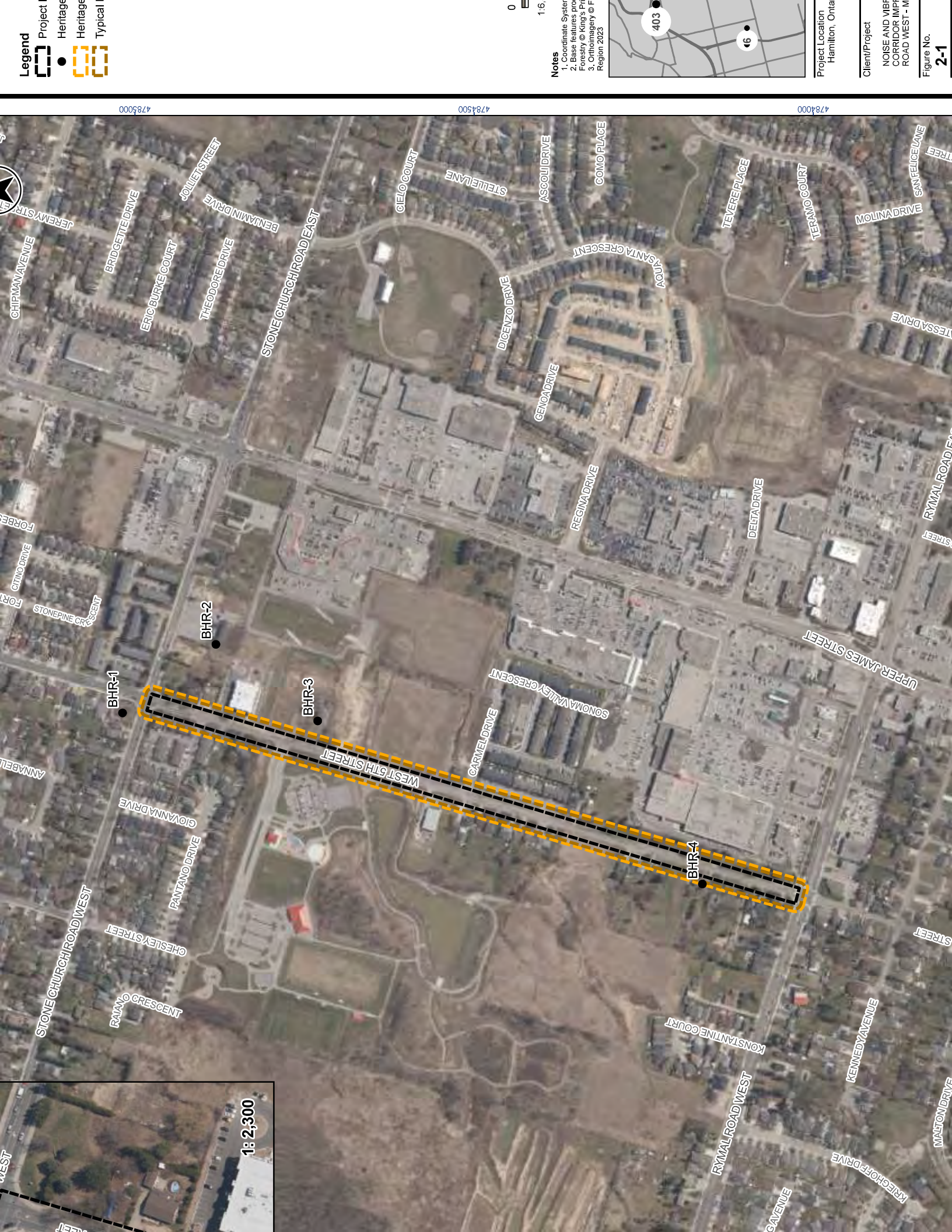
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2.0 Study Area

The Study Area for this assessment is within the City of Hamilton, along West 5th Street between Stone Church Road West Rymal Road West. The Study Area encompasses the area within which noise sensitive areas (NSAs) may be impacted from the Project.

The Study Area considered for the noise impact assessment is 600 m on either side of Project extent and 100 m extended from both ends of the Project extent. The Study Area along with the receptors considered in the assessment are shown in Figure 2-1.





Legend

- Project
- Heritage
- Heritage
- Typical

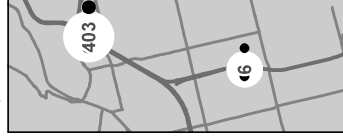
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Notes

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3.0 Applicable Guidelines

Operational noise (road traffic noise) and construction noise are assessed with applicable Provincial guidelines. There are no Provincial construction vibration limits applicable to this Project. Although the City of Hamilton does not have specific noise or vibration limits applicable to the Project, its noise bylaw restricts construction equipment operating hours and has been considered in this assessment. In the absence of municipal or provincial construction vibration limits, criteria from the City of Toronto and the US Federal Transit Administration (FTA) Manual are adopted for this assessment.

The applicable noise and vibration guidelines for the Project are discussed in detail in the following subsections.

3.1 Operational Noise

Ontario has several guidelines and documents related to assessing road traffic noise impacts. The document most relevant to assessing potential impacts of municipal roadway improvement projects on existing NSAs is the Ontario Ministry of Environment (MOE¹) / Ministry of Transportation (MTO) “Joint Protocol,” A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highway’s Environmental Assessments (MOE/MTO 1986); this document is referred to as the “MOE/MTO Joint Protocol”.

Although the MTO Environmental Guide for Noise (MTO 2022) superseded the MOE/MTO Joint Protocol, it has not been strictly adopted by the MECP for municipal projects. Therefore, the Joint Protocol has been used in this study.

In accordance with the Joint Protocol, the Project noise impact is assessed at NSAs by comparing the predicted future noise level with the Project (Future Build) and without the Project (Future No-build). Noise levels are forecasted at least 10 years after the Project is constructed.

Where predicted Future Build noise levels exceed 55 dBA and increase is more than 5 dB over Future No-build noise levels, mitigation measures are to be investigated. Noise level is predicted at the outdoor living area (OLA) in accordance with the guidelines. For the mitigation to be implemented, it must be technically, economically, and administratively feasible.

¹ Now known as the Ontario Ministry of the Environment, Conservation and Parks (MECP)



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For the noise mitigation measure(s) to be considered technically feasible, it must provide a minimum 5 dB noise level reduction averaged over the first row of receptors².

3.2 Construction Noise

Construction noise impacts are temporary in nature, and largely unavoidable. For some periods and types of work construction noise may be noticeable, and with adequate controls, impacts can be reduced. This section of the report provides an overview of the criteria and applicable City of Hamilton noise by-law.

The relevant local noise by-laws and applicable criteria are discussed in the following subsections.

3.2.1 Local Noise Control By-Law

The local noise control by-law for the City of Hamilton, By-Law Number 11-285 (City of Hamilton 2021), provides only the periods during which construction activities are prohibited. No noise level limits are provided for construction activities in the by-law. The prohibited periods for construction activities are from 22:00 to 07:00 the next day, for all days of the week.

In certain situations, a contract may require work that does not align with local noise control by-laws. A noise by-law exception permit is required for construction during the prohibited hours.

3.2.2 MECP Model Municipal Noise Control By-law

The MECP stipulates limits on noise emissions from construction equipment, rather than an overall construction noise limit at a receptor. If persistent noise complaints arise, sound emission of construction equipment used on the project should be verified through measurements to confirm compliance with the limits specified in MECP Publication NPC-115 (MOE 1978) and NPC-118 (MOE 1982), as summarized in Table 3.1.

² First Row Receptors means the line of adjacent receptors closest to the road, usually running parallel to each other.



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Table 3.1: Construction Noise Emission Limits (NPC-115 and NPC-118)

Type of Unit	Maximum Allowed Sound Pressure Level ^a (dBA)	Distance at Which Sound Levels are Measured (m)	Power Rating (kW)
Excavation Equipment ^b	83	15	Less than 75 kW
	85	15	75 kW or Greater
Pneumatic Equipment ^c	85	7	Any
Portable Compressors	76	7	Any
Track Drills	100	15	Any
Heavy Vehicles with Governed Diesel Engines	95	15	Any

Notes:

^a Maximum permissible sound levels presented here are for equipment manufactured after Jan 1, 1981

^b Excavation equipment includes bulldozers, backhoes, front end loaders, graders, excavators, steam rollers and other equipment capable of being used for similar applications

^c Pneumatic equipment includes pavement breakers

3.3 Construction Vibration

In the absence of specific construction vibration limits from the Province of Ontario or the City of Hamilton, established guidelines from other jurisdictions have been adopted for this Project:

- **City of Toronto Vibration Limit:** A limit of 5 mm/s in terms of peak particle velocity (PPV) is applied for typical buildings. This threshold is aimed at preventing cosmetic or structural damage to conventional structures during project construction activities. (City of Toronto 2008)
- **US FTA Vibration Limit:** A more stringent limit of 3 mm/s (PPV) is applied for heritage buildings, recognizing their increased sensitivity to vibration-induced damage due to age, materials, and structural characteristics. (Federal Transit Administration 2018)

These adopted thresholds provide a balanced approach to mitigating potential vibration impacts, prioritizing structural safety and addressing the specific sensitivities of heritage properties.



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The recommended vibration limits for the Project construction are summarized in Table 3.2.

Table 3.2: Construction Vibration Limits

Building Type	Recommended Vibration Limit (mm/s) - PPV	Reference
Typical Buildings	5	City of Toronto Bylaw 514-2008
Heritage Buildings	3	US FTA Manual



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4.0 Noise Sensitive Areas (Receptors)

The Joint Protocol does not provide definition of NSAs (also referred to as receptors in this report); therefore, this assessment adopts the NSA definition from the MTO Guide.

The MTO Guide considers two types of NSAs for operations noise impact assessment: Traditional NSAs and Special Land Use NSAs. Where a roadway improvement is planned, Special Land Use NSAs need to be next to a Traditional NSA to qualify as an NSA.

Traditional NSAs include the following land uses, provided they have an OLA associated with them:

- Private homes (single family units and townhouses)
- Multiple unit buildings
- Hospitals and nursing homes

Special land use NSAs include the following land uses (with an associated OLA):

- Schools, educational facilities, and daycare centres
- Campgrounds with overnight accommodation
- Hotels/motels
- Places of worship

Apartment balconies, cemeteries, parks and picnic areas that are not part of OLAs, as well as commercial and industrial properties, do not qualify as NSAs. As part of the municipal land use planning process, the developer evaluates road traffic noise impacts and mitigation requirements for noise sensitive developments. Accordingly, this report does not evaluate road traffic noise impacts at noise sensitive developments.

This assessment considers ten (10) receptors representing the OLA of existing dwellings within the Study Area. The dwellings were identified from a review of aerial imagery, Stantec's site observations, and local land use zoning maps (The City of Hamilton 2005).

The receptors considered for the assessment are listed in Table 4.1 and are shown in Figure 2-1. The receptors representing the OLA are located at 1.5 m above the existing ground, 3 m away from the dwelling, and are typically located in the backyard.



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Table 4.1: Receptors Summary

Receptor ID ^a	Municipal Address
R1	Dwelling - 72 Stone Church Road West
R2	Dwelling - 72 Stone Church Road West
R3	Dwelling - 72 Stone Church Road West
R4	Dwelling - 1030 West 5 th Street
R5	Dwelling - 1030 West 5 th Street
R6	Dwelling - 1030 West 5 th Street
R7	Dwelling - 1142 West 5 th Street
R8	Dwelling - 1183 West 5 th Street
R9	Dwelling - 1268 West 5 th Street
R10	Dwelling - 19 Christie Street

Note:

- a. The receptors represent the OLA of the dwelling and are located at 1.5 m above the existing ground and 3 m from the dwelling wall

5.0 Operations Noise Assessment

In accordance with the Joint Protocol, the operations noise assessment is based on road traffic noise levels projected to the year 2039, which is 10 years after the Project is expected to be constructed.

The Project is not expected to introduce significant changes to traffic volumes and speeds, horizontal or vertical alignments, and road width for West 5th Street or other local roads.

This assessment considers road traffic noise from West 5th Street and key crossroads, such as Stone Church Road, Rymal Road and Christie Street. Based on proximity to the receptors (Section 4.0) and site observations, these roadways notably contribute to road traffic noise levels at the NSAs. Daytime (07:00 to 23:00) equivalent noise levels ($L_{eq-16hr}$), are modelled for the Project operations as required by the guidelines.

This assessment considers existing noise barriers identified from site observations. To effectively reduce noise levels at a receptor, the barrier must be free of gaps/cracks and break the line of sight to the noise source. Accordingly, existing noise barriers were identified along West 5th Street just south of Rymal Road, as shown in Figure 2-1. These noise barriers are made of wood and are approximately 2 m tall.



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5.1 Assessment Methods

Road Traffic Data

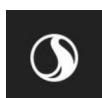
This assessment uses road traffic data derived from data presented in the Project's Multimodal Transportation Assessment Report (Stantec Consulting Ltd. 2025a), herein referred to as the "Transportation Report". Future No-Build and Future Build road traffic conditions were assumed to be similar to the future traffic volume scenarios presented in the Transportation report, which consider the Project corridor growth with and without the planned developments.

The Annual Average Daily Traffic (AADT) for the assessed roadways was derived from the 2031 peak hour traffic volumes reported in the Transportation Report. The AADT for the 2039 horizon year was calculated from 2031 data, assuming an AADT to peak hour volume ratio of 10 and applying a 2% annual traffic growth rate, as advised by the Project team.

Medium and heavy truck volumes were estimated from turning movement count data included in the Transportation Report, assuming a 40% / 60% split, respectively, based on truck compositions referenced in the MTO Guide.

Traffic volumes during the daytime were assumed to be 90% of the AADT based on the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) (MOE 1989).

A summary of the road traffic data used in this assessment is provided in Table 5.1.



c Data Summary

Way	Future No-Build	Future Build	Modelled Traffic Speed ^c (km/h)	Traffic Volumes as a Percentage of AADT			
	2039 AADT ^a	2039 AADT ^b		Daytime Traffic Volume ^d (%)	Autos (%)	Total Trucks (%)	Medium Trucks ^f (%)
Stone Church Road	16029	16720	50	90.0	99.0	1.0	0.4
f Stone Church Road	11049	13299	50	90.0	98.3	1.7	0.7
st of West 5 th Street	13463	13978	50	90.0	97.7	2.3	0.9
st of West 5 th Street	15466	16509	50	90.0	98.0	2.0	0.8
est 5 th Street	17247	17493	60	90.0	97.2	2.8	1.1
est 5 th Street	20575	21032	60	90.0	96.2	3.8	1.5
Rymal Road	3293	3293	40	90.0	97.6	2.4	1.0

2031 peak hour traffic volumes presented in the Transportation Report for “Future Traffic Volume – Corridor Growth”

2031 peak hour traffic volumes presented in the Transportation Report for “Future Traffic Volume – Corridor Growth and Study Area Development”

in the recommended day-night traffic volume ratios provided in the ORNAMENT Technical Document

g movement counts provided in the Transportation Report

medium to heavy truck ratio per the MTO Guide

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Road Traffic Noise Modelling

The MECP recommends the latest version of the United States Federal Highway Administration Traffic Noise Model (FHWA TNM©) for assessing road traffic noise in the released “Methods to Determine Sound Levels Due to Road and Rail Traffic – Publication NPC-306”, which is dated February 2020 and in draft form (MECP 2021).

The most current version of the US FHWA Traffic Noise Model (TNM v3.2) was used to assess noise impacts (FHWA 2023). The road traffic noise model considers key inputs, such as road traffic volumes and speed, roadway geometry, pavement type, ground absorption, local topography, and shielding from intervening features (e.g., noise barriers and buildings).

This study uses key TNM parameters, as summarized in Table 5.2.

Table 5.2: Summary of Key TNM Parameters

Parameter	Value/Setting	Rationale
Ground Type	Lawn	Based on review of local aerial imagery and site visit observations. This is also the TNM default setting
Pavement Type	Average	Based on review of local aerial imagery and site visit observations. This is also the TNM default setting
Topography	Flat	Based on site visit observations.
Temperature	10°C	Ontario Standard Condition
Relative Humidity	70%	Ontario Standard Condition

5.2 Results

Road traffic noise levels were predicted for the Future Build scenario for the 2039 horizon year. Table 5.3 lists the predicted noise levels and identifies whether noise mitigation should be investigated, per the Joint Protocol.



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Table 5.3: Predicted Noise Levels and Mitigation Requirements

Receptor ID	Predicted Road Traffic Noise Level, L_{eq-16} (dBA)		Predicted Noise Impact			
	Future No-Build	Future Build	Change in Noise Level ^a (dB)	Change in Noise Level greater or equal to +5 dB? (Y/N)	Future Build Noise Level greater than 55 dBA? (Y/N)	Mitigation Investigation Required? (Y/N)
R1	55	55	0	N	Y	N
R2	58	58	0	N	Y	N
R3	59	59	0	N	Y	N
R4	53	53	0	N	N	N
R5	50	51	1	N	N	N
R6	48	49	1	N	N	N
R7	42	43	1	N	N	N
R8	42	42	0	N	N	N
R9	55	56	1	N	Y	N
R10	46	46	0	N	N	N

Note:

^a Change in noise level is calculated as the difference between Future Build and Future No-build road traffic noise levels.



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The results show that Future Build Noise Levels increase by less than 5 dB over Future No-Build sound levels at all modelled receptors. Therefore, mitigation is not required for any of these receptors, even though sound levels at some exceed 55 dBA.

Sample input and output tables from the noise model are included in Appendix B.



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West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West – Municipal Class Environmental Assessment

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6.0 Construction Noise Assessment

This section of the report provides an evaluation of construction equipment noise and outlines the Code of Practice to reduce construction noise impacts.

Construction activities will vary temporally and spatially as the Project progresses from one end to the other. Noise levels from construction at a given receptor location will also vary over time depending on the type of activities underway and their location within the right-of-way.

6.1 Construction Noise Levels

Table 6.1 lists the construction equipment considered for the assessment and compares their noise emissions to the applicable NPC-115 (MOE 1978) and NPC-118 (MOE 1982) noise limits. Since a detailed construction plan or equipment list is not currently available, Table 6.1 represents typical equipment expected for this type of work. The final construction equipment list will be developed by the construction contractor. Noise emissions for the listed construction equipment are based on Stantec's database of field measurements, supplemented with reference noise levels from the FHWA Roadway Construction Noise Model Guide User's Guide (FHWA 2006).

Table 6.1: Construction Equipment Sound Level Assessment

Type of Equipment	Typical Range of Maximum Sound Levels at 15 m (dBA)	NPC-115/118 Sound Level at 15 m (dBA)	Meets NPC-115/118 Sound Level? (Y/N)
Front-End Loaders	77 – 85	85	Y
Backhoe	66 – 80	85	Y
Dump Trucks	76 – 88	95 ^b	Y
Concrete Trucks	77 – 85	85	Y
Concrete Pump and Boom	77 – 82	85	Y
Vibratory Rollers	79 – 83	85	Y
Paving Machines ^a	77 – 89	85	N
Cranes	73 – 83	85	Y
Grader	79 – 85	85	Y



NOISE AND VIBRATION IMPACT ASSESSMENT REPORT

West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West – Municipal Class Environmental Assessment

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Notes:

^a This equipment has potential to exceed the applicable MECP limits, and precautions or noise control measures should be investigated if they are used near sensitive receptors.

^b Refers to the NPC-118 Sound Level at 15 m.

The typical sound levels presented in Table 6.1 show that most equipment expected for this type of Project can operate in compliance with the MECP NPC-115/118 limits. However, paving machines have the potential to generate sound levels exceeding the permissible limits. Once equipment and construction schedules are finalized, the equipment sound levels should be reviewed during detailed design to confirm compliance. If the sound levels are higher than the limits, noise control options should be explored.

6.2 Construction Code of Practice

The following best practices for construction should be considered to minimize disturbances outside of the noise by-law requirements:

- All construction equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order.
- There should be explicit indication that Contractors are expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work done by Contractors.
- The Contract documents should contain a provision that any initial noise complaint will trigger verification of construction noise and typical noise control measures.
- In the presence of persistent noise complaints, all construction equipment should be verified to ensure compliance with MECP NPC-115 and NPC-118 guidelines.
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative, and economic feasibility of the various alternatives.



NOISE AND VIBRATION IMPACT ASSESSMENT REPORT

West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West – Municipal Class Environmental Assessment

September 18, 2025

7.0 Construction Vibration Assessment

A vibration impact assessment for the most impactful construction equipment was conducted using the methodology outlined in the FTA Manual. Heritage buildings considered in this assessment were identified from the Project Cultural Heritage Report (Stantec Consulting Ltd. 2025b).

7.1 Assessment Methods

Construction vibration impacts for the Project were evaluated by establishing equipment-specific vibration zone of influence (ZOI), which define setback distances within which vibration levels may exceed thresholds.

The construction vibration ZOIs were calculated based on the applicable vibration limits for building damage identified in Table 3.2. ZOIs were calculated using building damage vibration limits: 5 mm/s for typical construction (e.g., non-engineered timber and masonry buildings) in accordance with the City of Toronto limit and 3 mm/s for heritage structures, based on the FTA limit.

Construction vibration ZOIs were calculated based on the vibration propagation equation provided in the US FTA Manual:

$$PPV_{(point\ of\ reception)} = PPV_{(point\ of\ reception)} * (D_{ref} / D_{point\ of\ reception})^{1.5}$$

Where:

- $PPV_{(point\ of\ reception)}$ = the vibration level of the piece of equipment at the point of reception (mm/s);
- $PPV_{(point\ of\ reception)}$ = the vibration level of the piece of equipment at a reference distance (mm/s);
- D_{ref} = the reference distance provided in PPV_{ref} (m); and
- $D_{point\ of\ reception}$ = the straight-line distance from the equipment to the point of reception (m).

Among the equipment listed in Table 6.1, the vibratory roller has the highest reference vibration level as presented in the FTA Manual and was used to calculate the vibration ZOI for this assessment.



NOISE AND VIBRATION IMPACT ASSESSMENT REPORT

West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West – Municipal Class Environmental Assessment

September 18, 2025

7.2 Vibration Assessment

The vibration ZOIs were determined for the vibratory roller and are presented in Table 7.1. The ZOIs are expressed as recommended setback distances to prevent damage to typical and heritage buildings.

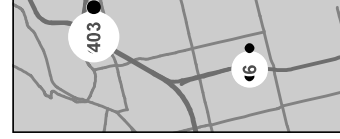
Table 7.1: Construction Vibration Setback Distance for Vibratory Roller

Building Type	Recommended Setback Distance (m)	Applied Guideline
Typical Buildings	8	City of Toronto By-law 514
Heritage Buildings	12	US FTA Manual

Figure 7-1 illustrates the vibration ZOIs for a vibratory roller operating at the edge of the Project extent, representing a worst-case operating condition based on the equipment list in Table 6.1. Residential buildings such as those southwest of the Stone Church Road intersection and heritage building BHR-4 fall within the vibration ZOI. Under the assumed worst-case scenario, these vibration sensitive buildings could experience vibration levels exceeding the damage thresholds listed in Table 3.2.

Minimum setback distances should be confirmed based on the actual construction equipment that will be used for the Project, as determined by the contractor. Maintaining these setbacks is recommended to prevent potential building damage from construction vibration. If maintaining the setbacks is not feasible, vibration monitoring should be conducted at the affected buildings to verify levels remain below the applicable limits and to identify any mitigation requirements.





Project Location
Hamilton, Ontario

Client/Project

NOISE AND VIBRATION
CORRIDOR IMPACT
ROAD WEST - M

Figure No.

7-1

Legend

Project I

Heritage

Vibration Zone c

Typical I

Heritage

Notes

- Notes**
1. Coordinate System
 2. Base features provided
 3. Forestry © King's Printer
 3. Orthoimagery © FRC
 4. Note: Heritage Building
 - "Cultural Heritage Resource
 - Assessment - Municipal
 - West 5th Street" dated

4784500

DICENZO DRIVE

GENOA DRIVE

REGINA DRIVE

DELTA DRIVE

MES STREET

An aerial photograph showing the intersection of Sonoma Valley Crescent and Ralane. The streets are labeled with white text on a dark background. Sonoma Valley Crescent runs diagonally from the top left towards the bottom right. Ralane runs vertically from the top towards the bottom, intersecting Sonoma Valley Crescent. The surrounding area appears to be a mix of residential and commercial buildings.

SANTA BARBARA LANE

CARMEL DRIVE

WEST 5TH STREET

STONE CHURCH ROAD EAST

BHR-2

BHR-3

BHR-4

ALEXIA COURT

KONSTANTINE COURT

RYMAL ROAD WEST

GIOVANNA D.

PANTANO DRIVE

CHESTLEY ST

CENT

4784500

NOISE AND VIBRATION IMPACT ASSESSMENT REPORT

West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West – Municipal Class Environmental Assessment

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8.0 Conclusion and Closure

The noise and vibration impacts from the Project were assessed. Road traffic (operational) noise and construction noise and vibration impacts were considered in the assessment.

For the operational noise, Future Build noise levels (with the Project) are up to 1 dB higher than Future No-Build sound levels at the assessed NSAs. Such changes, being less than 3 dB, are generally not perceptible to the human ear.

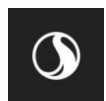
The increase in Future noise levels due to Project operations are below the 5 dB threshold for noise mitigation consideration under the Joint Protocol (i.e., applicable provincial noise guidelines), even though noise levels at some receptors exceed 55 dBA.

Most of the construction equipment typical for this type of Project is expected to operate in compliance with the MECP limits. However, some equipment (e.g., paving machines) may exceed permissible sound levels. Once equipment and construction schedules are finalized, equipment sound levels should be reviewed to ensure compliance. If the limits are exceeded, noise control options should be explored. Methods to reduce construction noise impacts are included in the Construction Code of Practice, as outlined in Section 6.2.

A vibration impact assessment for the most impactful construction source (vibratory roller) was conducted using the method outlined in the FTA Manual. The recommended setback distances to prevent building damage to both typical and heritage buildings are summarized in Table 7.1 of this report.

Under the assumed worst-case operating scenario, residential buildings southwest of the Stone Church Road intersection and heritage building BHR-4 fall within the vibration ZOIs. Buildings within the vibration ZOIs may experience vibration levels exceeding the building damage thresholds.

Minimum setback distances should be confirmed based on the actual construction equipment that will be used for the Project, as determined by the contractor. Maintaining these setbacks is recommended to prevent potential building damage from construction vibration. If maintaining the setbacks is not feasible, vibration monitoring should be conducted at the affected buildings to ensure levels remain within the applicable limits and to identify any mitigation requirements.



NOISE AND VIBRATION IMPACT ASSESSMENT REPORT

West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West – Municipal Class Environmental Assessment

September 18, 2025

9.0 References

For Ontario Ministry of Environment, Conservation and Parks, see MECP.

For Ontario Ministry of the Environment, see MOE.

For Ontario Ministry of Transportation, see MTO.

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MTO. 2022. *Environmental Guide for Noise*. Ontario Ministry of Transportation.



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Stantec Consulting Ltd. 2025a. "Multimodal Transportation Assessment Municipal Class
Environmental Assessment – West 5th Street Hamilton, ON."

Stantec Consulting Ltd. 2025b. "Cultural Heritage Report: Existing Conditions and
Preliminary Assessment - Municipal Class Environmental Assessment, West 5th
Street."

The City of Hamilton. 2005. "Zoning By-Law No. 05-200."

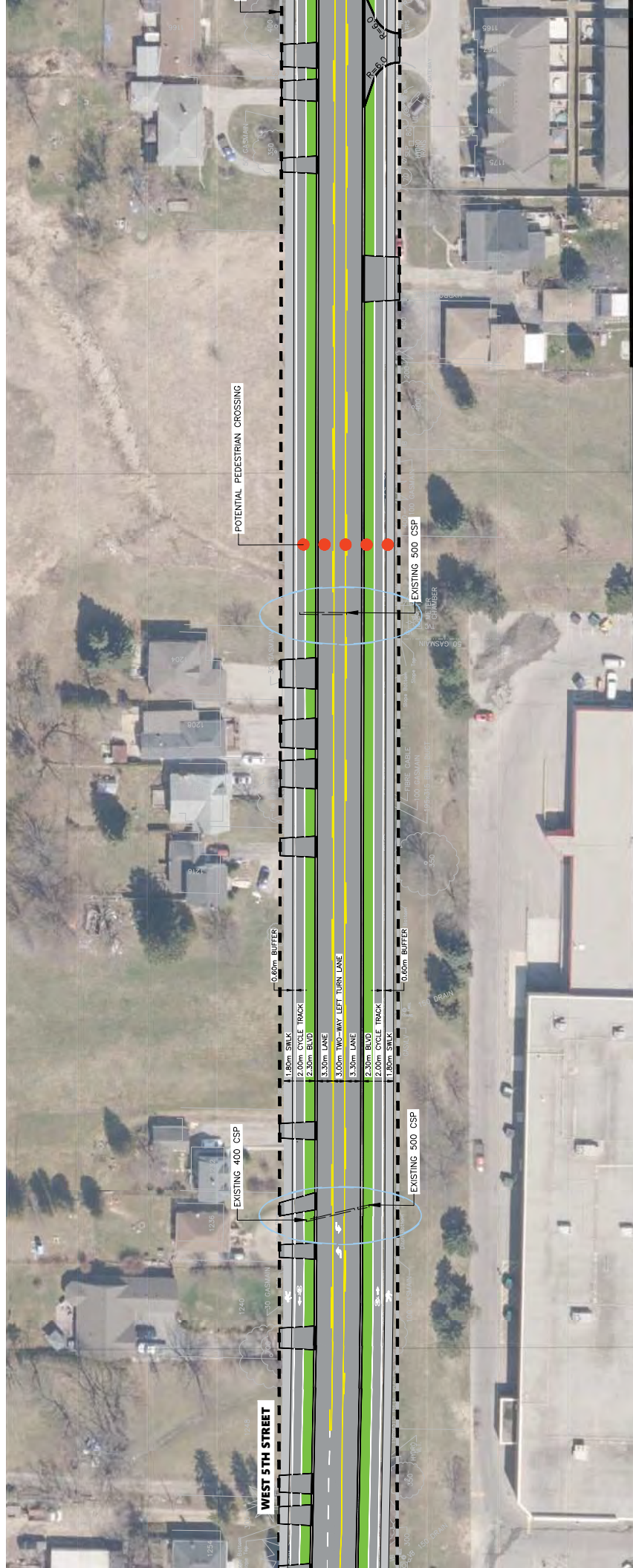


Appendix A

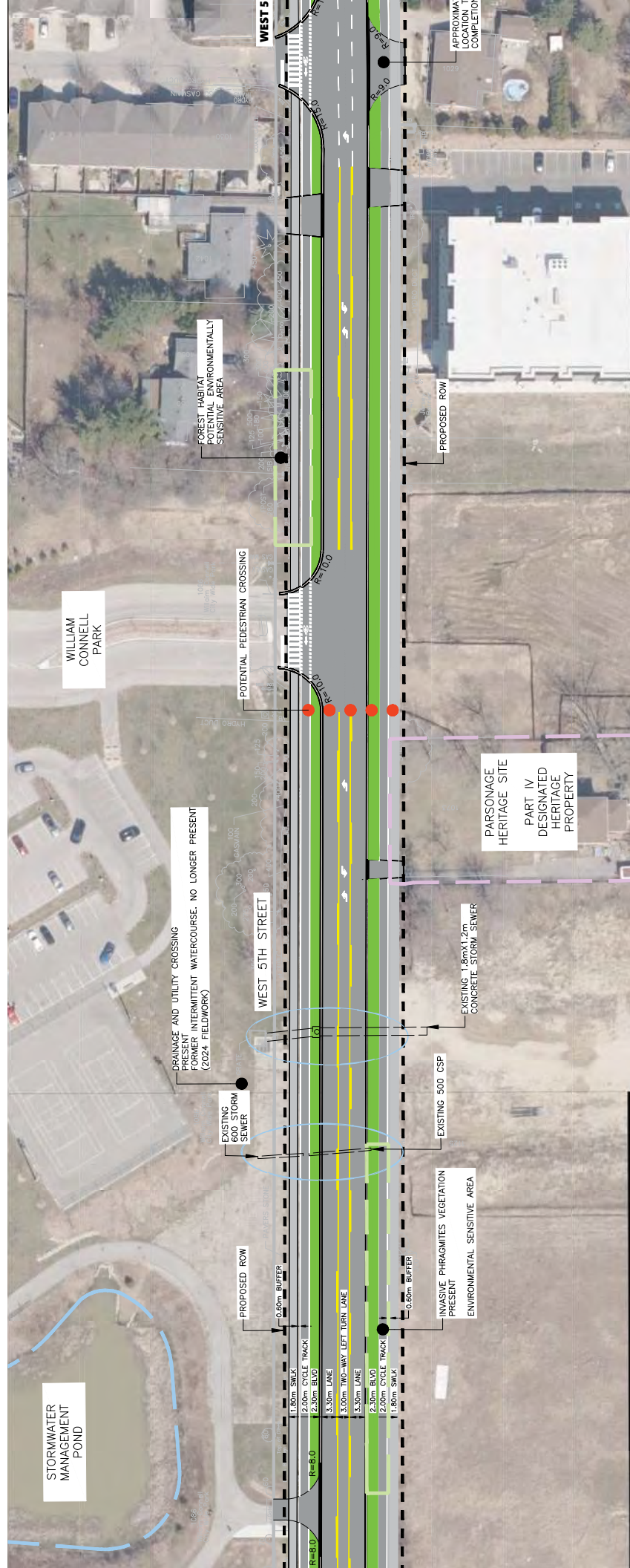
Preferred Design Drawings



STREET



STREET



Appendix B

TNM Input and Output Tables



REPORT:

INPUT ROADWAYS

TNM VERSION:

3.2.8741.34338

REPORT DATE:

25 August 2025

CALCULATED WITH:

TNM v3.2.8741.34338

CALCULATION DATE:

8/23/2025 11:31:42 AM

CASE:

Future No-Build

ORGANIZATION:

Stantec

ANALYSIS BY:

fa

PROJECT/CONTRACT:

West 5th Street Corridor Improvements from
Stone Church Road West to Rymal Road West -
Municipal Class Environmental Assessment

Roadway Name	Roadway Notes	Road Segment		Coordinates (pavement)				Width		Point Notes	Road Segment		
		Name	Start Point Number	X [m]	Y [m]	Z [m]					Road Category	Pavement Type	On Structure
Christie Street		1		8	589409.30	4783505.00	0.00	8.60			Mainline	Average	No
		2		7	589446.40	4783620.00	0.00	8.60			Mainline	Average	No
		3		6	589486.90	4783747.00	0.00	8.60			Mainline	Average	No
		4		5	589530.70	4783884.00	0.00	8.60			Mainline	Average	No
		5		4	589538.40	4783908.00	0.00	8.60			Mainline	Average	No
		6		3	589548.10	4783941.00	0.00	8.60			Mainline	Average	No
		7		2	589558.10	4783973.00	0.00	8.60			Mainline	Average	No
		8		1	589570.10	4784011.00	0.00	8.60			Mainline	Average	No
West 5th Street - South of Stone Church		1		34	589572.10	4784018.00	0.00	11.90			Mainline	Average	No
		2		33	589574.60	4784026.00	0.00	11.90			Mainline	Average	No
		3		32	589580.30	4784044.00	0.00	11.90			Mainline	Average	No
		4		31	589592.90	4784090.00	0.00	11.90			Mainline	Average	No
		5		30	589602.00	4784122.00	0.00	11.90			Mainline	Average	No
		6		29	589612.20	4784157.00	0.00	11.90			Mainline	Average	No
		7		28	589617.00	4784174.00	0.00	11.90			Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment		Coordinates (pavement)			Width		Point Notes	Road Segment		
		Name	Start Point Number	X [m]	Y [m]	Z [m]				Road Category	Pavement Type	On Structure
West 5th Street - South of Stone Church		8	27	589628.90	4784214.00	0.00	11.90			Mainline	Average	No
		9	26	589645.10	4784270.00	0.00	11.90			Mainline	Average	No
		10	25	589663.80	4784334.00	0.00	11.90			Mainline	Average	No
		11	24	589673.90	4784365.00	0.00	11.90			Mainline	Average	No
		12	23	589694.40	4784432.00	0.00	11.90			Mainline	Average	No
		13	22	589702.60	4784458.00	0.00	11.90			Mainline	Average	No
		14	21	589710.40	4784485.00	0.00	11.90			Mainline	Average	No
		15	20	589722.10	4784523.00	0.00	11.90			Mainline	Average	No
		16	19	589735.90	4784572.00	0.00	11.90			Mainline	Average	No
		17	18	589749.20	4784620.00	0.00	11.90			Mainline	Average	No
		18	17	589761.10	4784659.00	0.00	11.90			Mainline	Average	No
		19	16	589772.80	4784696.00	0.00	11.90			Mainline	Average	No
		20	15	589782.70	4784729.00	0.00	11.90			Mainline	Average	No
		21	14	589789.00	4784750.00	0.00	11.90			Mainline	Average	No
		22	13	589798.10	4784780.00	0.00	11.90			Mainline	Average	No
		23	12	589810.60	4784821.00	0.00	11.90			Mainline	Average	No
		24	11	589824.80	4784869.00	0.00	11.90	starts to widen		Mainline	Average	No
		25	10	589857.20	4784970.00	0.00	11.90			Mainline	Average	No
		26	9	589859.90	4784979.00	0.00	11.90			Mainline	Average	No
		1	45	589861.30	4784989.00	0.00	11.90			Mainline	Average	No
		2	44	589864.60	4784999.00	0.00	11.90			Mainline	Average	No
		3	43	589879.60	4785051.00	0.00	11.90			Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment			Road Segment					Road Segment																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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Roadway Name	Roadway Notes	Road Segment		Coordinates (pavement)				Width	Point Notes	Road Segment		
		Start Point		X [m]	Y [m]	Z [m]	Road Category			Pavement Type	On Structure	
		Name	Number									
Raymal Road - West of West 5th		3	64	589444.20	4784055.00	0.00	18.50			Mainline	Average	No
		4	63	589386.80	4784074.00	0.00	18.50			Mainline	Average	No
		5	62	589318.30	4784094.00	0.00	18.50			Mainline	Average	No
		6	61	589236.10	4784117.00	0.00	18.50			Mainline	Average	No
		7	60	589165.10	4784141.00	0.00	18.50			Mainline	Average	No
		8	59	589024.50	4784187.00	0.00	18.50			Mainline	Average	No
		9	58	588843.10	4784245.00	0.00	18.50			Mainline	Average	No
		1	75	590528.10	4784754.00	0.00	11.90			Mainline	Average	No
		2	74	590426.90	4784789.00	0.00	11.90			Mainline	Average	No
		3	73	590316.40	4784829.00	0.00	11.90			Mainline	Average	No
		4	72	590246.90	4784853.00	0.00	11.90			Mainline	Average	No
		5	71	590208.80	4784864.00	0.00	11.90			Mainline	Average	No
		6	70	590142.10	4784889.00	0.00	11.90			Mainline	Average	No
		7	69	590049.60	4784919.00	0.00	11.90			Mainline	Average	No
		8	68	589951.10	4784952.00	0.00	11.90			Mainline	Average	No
		9	67	589860.30	4784983.00	0.00	11.90			Mainline	Average	No
		1	82	589859.70	4784984.00	0.00	11.90			Mainline	Average	No
		2	81	589776.60	4785010.00	0.00	11.90			Mainline	Average	No
Stone Church - West of West 5th		3	80	589704.60	4785033.00	0.00	11.90			Mainline	Average	No
		4	79	589544.20	4785086.00	0.00	11.90			Mainline	Average	No
		5	78	589521.40	4785094.00	0.00	11.90			Mainline	Average	No
		6	77	589347.40	4785148.00	0.00	11.90			Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment		Coordinates (pavement)			Width		Point Notes	Road Segment		
		Name	Start Point Number	X [m]	Y [m]	Z [m]				Road Category	Pavement Type	On Structure
Stone Church - West of West 5th		7	76	589078.30	4785229.00	0.00	11.90			Mainline	Average	No

REPORT:

TNM VERSION:

CALCULATED WITH:

CASE:

ANALYSIS BY:

3.2.8741.34338

TNM v3.2.8741.34338

Future No-Build

fa

West 5th Street Corridor Improvements from
Stone Church Road West to Rymal Road West
-Municipal Class Environmental Assessment

INPUT TRAFFIC FOR TNM VEHICLES (LAeq)

REPORT DATE:

CALCULATION DATE:

ORGANIZATION:

PROJECT/CONTRACT:

25 August 2025

8/23/2025 11:31:42 AM

Stantec

Roadway Name	Road Segment		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
	Name	Start Point No.	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
			[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]
Christie Street	1	8	181	40	2	40	3	40	0	0	0	0
	2	7	181	40	2	40	3	40	0	0	0	0
	3	6	181	40	2	40	3	40	0	0	0	0
	4	5	181	40	2	40	3	40	0	0	0	0
	5	4	181	40	2	40	3	40	0	0	0	0
	6	3	181	40	2	40	3	40	0	0	0	0
	7	2	181	40	2	40	3	40	0	0	0	0
	8	1	181	40	2	40	3	40	0	0	0	0
West 5th Street - South of Stone Church	1	34	611	50	4	50	6	50	0	0	0	0
	2	33	611	50	4	50	6	50	0	0	0	0
	3	32	611	50	4	50	6	50	0	0	0	0
	4	31	611	50	4	50	6	50	0	0	0	0
	5	30	611	50	4	50	6	50	0	0	0	0
	6	29	611	50	4	50	6	50	0	0	0	0
	7	28	611	50	4	50	6	50	0	0	0	0

Roadway Name	Road Segment		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle		
	Name	Start Point No.	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	
West 5th Street - South of Stone Church	8		27	611	50	4	50	6	50	0	0	0	0
	9		26	611	50	4	50	6	50	0	0	0	0
	10		25	611	50	4	50	6	50	0	0	0	0
	11		24	611	50	4	50	6	50	0	0	0	0
	12		23	611	50	4	50	6	50	0	0	0	0
	13		22	611	50	4	50	6	50	0	0	0	0
	14		21	611	50	4	50	6	50	0	0	0	0
	15		20	611	50	4	50	6	50	0	0	0	0
	16		19	611	50	4	50	6	50	0	0	0	0
	17		18	611	50	4	50	6	50	0	0	0	0
	18		17	611	50	4	50	6	50	0	0	0	0
	19		16	611	50	4	50	6	50	0	0	0	0
	20		15	611	50	4	50	6	50	0	0	0	0
	21		14	611	50	4	50	6	50	0	0	0	0
	22		13	611	50	4	50	6	50	0	0	0	0
	23		12	611	50	4	50	6	50	0	0	0	0
	24		11	611	50	4	50	6	50	0	0	0	0
	25		10	611	50	4	50	6	50	0	0	0	0
26		9	611	50	4	50	6	50	0	0	0	0	
West 5th Street - North of Stone Church	1		45	893	50	4	50	5	50	0	0	0	0
	2		44	893	50	4	50	5	50	0	0	0	0
	3		43	893	50	4	50	5	50	0	0	0	0
	4		42	893	50	4	50	5	50	0	0	0	0

Roadway Name	Road Segment		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle		
	Name	Start Point No.	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	
West 5th Street - North of Stone Church	5		41	893	50	4	50	5	50	0	0	0	0
	6		40	893	50	4	50	5	50	0	0	0	0
	7		39	893	50	4	50	5	50	0	0	0	0
	8		38	893	50	4	50	5	50	0	0	0	0
	9		37	893	50	4	50	5	50	0	0	0	0
	10		36	893	50	4	50	5	50	0	0	0	0
	11		35	893	50	4	50	5	50	0	0	0	0
	1		57	1113	60	18	60	26	60	0	0	0	0
	2		56	1113	60	18	60	26	60	0	0	0	0
	3		55	1113	60	18	60	26	60	0	0	0	0
	4		54	1113	60	18	60	26	60	0	0	0	0
Raymal Road - East of West 5th	5		53	1113	60	18	60	26	60	0	0	0	0
	6		52	1113	60	18	60	26	60	0	0	0	0
	7		51	1113	60	18	60	26	60	0	0	0	0
	8		50	1113	60	18	60	26	60	0	0	0	0
	9		49	1113	60	18	60	26	60	0	0	0	0
	10		48	1113	60	18	60	26	60	0	0	0	0
	11		47	1113	60	18	60	26	60	0	0	0	0
	12		46	1113	60	18	60	26	60	0	0	0	0
	1		66	943	60	11	60	16	60	0	0	0	0
	2		65	943	60	11	60	16	60	0	0	0	0
	3		64	943	60	11	60	16	60	0	0	0	0
Raymal Road - West of West 5th													

Roadway Name	Road Segment		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
	Start Point	Name	No.	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume
Raymal Road - West of West 5th	4		63	943	60	11	60	16	60	0	0	0
	5		62	943	60	11	60	16	60	0	0	0
	6		61	943	60	11	60	16	60	0	0	0
	7		60	943	60	11	60	16	60	0	0	0
	8		59	943	60	11	60	16	60	0	0	0
	9		58	943	60	11	60	16	60	0	0	0
	1		75	853	50	7	50	10	50	0	0	0
	2		74	853	50	7	50	10	50	0	0	0
	3		73	853	50	7	50	10	50	0	0	0
Stone Church Road - East of West 5th	4		72	853	50	7	50	10	50	0	0	0
	5		71	853	50	7	50	10	50	0	0	0
	6		70	853	50	7	50	10	50	0	0	0
	7		69	853	50	7	50	10	50	0	0	0
	8		68	853	50	7	50	10	50	0	0	0
	9		67	853	50	7	50	10	50	0	0	0
	1		82	740	50	7	50	10	50	0	0	0
	2		81	740	50	7	50	10	50	0	0	0
	3		80	740	50	7	50	10	50	0	0	0
Stone Church - West of West 5th	4		79	740	50	7	50	10	50	0	0	0
	5		78	740	50	7	50	10	50	0	0	0
	6		77	740	50	7	50	10	50	0	0	0
	7		76	740	50	7	50	10	50	0	0	0

REPORT:

TNM VERSION:

CALCULATED WITH:

CASE:

ANALYSIS BY:

INPUT ROADWAYS

3.2.8741.34338

TNM v3.2.8741.34338

Future Build

fa

REPORT DATE:

CALCULATION DATE:

ORGANIZATION:

PROJECT/CONTRACT:

25 August 2025

8/23/2025 11:53:09 AM

Stantec

West 5th Street Corridor Improvements from
Stone Church Road West to Rymal Road West-
Municipal Class Environmental Assessment

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width		Point Notes	Road Segment		
		Name	Number	X [m]	Y [m]	Z [m]				Road Category	Pavement Type	On Structure
Christie Street		1	8	589409.30	4783505.00	0.00	8.60			Mainline	Average	No
		2	7	589446.40	4783620.00	0.00	8.60			Mainline	Average	No
		3	6	589486.90	4783747.00	0.00	8.60			Mainline	Average	No
		4	5	589530.70	4783884.00	0.00	8.60			Mainline	Average	No
		5	4	589538.40	4783908.00	0.00	8.60			Mainline	Average	No
		6	3	589548.10	4783941.00	0.00	8.60			Mainline	Average	No
		7	2	589558.10	4783973.00	0.00	8.60			Mainline	Average	No
		8	1	589570.10	4784011.00	0.00	8.60			Mainline	Average	No
West 5th Street - South of Stone Church		1	34	589572.10	4784018.00	0.00	11.90			Mainline	Average	No
		2	33	589574.60	4784026.00	0.00	11.90			Mainline	Average	No
		3	32	589580.30	4784044.00	0.00	11.90			Mainline	Average	No
		4	31	589592.90	4784090.00	0.00	11.90			Mainline	Average	No
		5	30	589602.00	4784122.00	0.00	11.90			Mainline	Average	No
		6	29	589612.20	4784157.00	0.00	11.90			Mainline	Average	No
		7	28	589617.00	4784174.00	0.00	11.90			Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment		Coordinates (pavement)			Width		Point Notes	Road Segment		
		Name	Start Point	Number	X [m]	Y [m]	Z [m]	[m]		Road Category	Pavement Type	On Structure
West 5th Street - South of Stone Church		8		27	589628.90	4784214.00	0.00	11.90		Mainline	Average	No
		9		26	589645.10	4784270.00	0.00	11.90		Mainline	Average	No
		10		25	589663.80	4784334.00	0.00	11.90		Mainline	Average	No
		11		24	589673.90	4784365.00	0.00	11.90		Mainline	Average	No
		12		23	589694.40	4784432.00	0.00	11.90		Mainline	Average	No
		13		22	589702.60	4784458.00	0.00	11.90		Mainline	Average	No
		14		21	589710.40	4784485.00	0.00	11.90		Mainline	Average	No
		15		20	589722.10	4784523.00	0.00	11.90		Mainline	Average	No
		16		19	589735.90	4784572.00	0.00	11.90		Mainline	Average	No
		17		18	589749.20	4784620.00	0.00	11.90		Mainline	Average	No
		18		17	589761.10	4784659.00	0.00	11.90		Mainline	Average	No
		19		16	589772.80	4784696.00	0.00	11.90		Mainline	Average	No
		20		15	589782.70	4784729.00	0.00	11.90		Mainline	Average	No
		21		14	589789.00	4784750.00	0.00	11.90		Mainline	Average	No
		22		13	589798.10	4784780.00	0.00	11.90		Mainline	Average	No
		23		12	589810.60	4784821.00	0.00	11.90		Mainline	Average	No
		24		11	589824.80	4784869.00	0.00	11.90	starts to widen	Mainline	Average	No
		25		10	589857.20	4784970.00	0.00	11.90		Mainline	Average	No
		26		9	589859.90	4784979.00	0.00	11.90		Mainline	Average	No
		1		45	589861.30	4784989.00	0.00	11.90		Mainline	Average	No
		2		44	589864.60	4784999.00	0.00	11.90		Mainline	Average	No
		3		43	589879.60	4785051.00	0.00	11.90		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment		Coordinates (pavement)				Point Notes	Road Segment		
		Start Point		X [m]	Y [m]	Z [m]	Road Category		Pavement Type	On Structure	
		Name	Number								
West 5th Street - North of Stone Church		4	42	589903.90	4785136.00	0.00	11.90		Mainline	Average	No
		5	41	589918.70	4785187.00	0.00	11.90		Mainline	Average	No
		6	40	589925.40	4785210.00	0.00	11.90		Mainline	Average	No
		7	39	589947.40	4785287.00	0.00	11.90		Mainline	Average	No
		8	38	589965.50	4785352.00	0.00	11.90		Mainline	Average	No
		9	37	590001.80	4785481.00	0.00	11.90		Mainline	Average	No
		10	36	590055.50	4785668.00	0.00	11.90		Mainline	Average	No
		11	35	590093.70	4785803.00	0.00	11.90		Mainline	Average	No
		1	57	590371.80	4783752.00	0.00	18.50		Mainline	Average	No
		2	56	590278.50	4783782.00	0.00	18.50		Mainline	Average	No
		3	55	590192.10	4783811.00	0.00	18.50		Mainline	Average	No
Raymal Road - East of West 5th		4	54	590131.40	4783833.00	0.00	18.50		Mainline	Average	No
		5	53	590069.50	4783852.00	0.00	18.50		Mainline	Average	No
		6	52	589929.30	4783899.00	0.00	18.50		Mainline	Average	No
		7	51	589890.10	4783912.00	0.00	18.50		Mainline	Average	No
		8	50	589840.00	4783926.00	0.00	18.50		Mainline	Average	No
		9	49	589795.80	4783940.00	0.00	18.50		Mainline	Average	No
		10	48	589728.10	4783963.00	0.00	18.50		Mainline	Average	No
		11	47	589618.80	4783998.00	0.00	18.50		Mainline	Average	No
		12	46	589571.70	4784013.00	0.00	18.50		Mainline	Average	No
		1	66	589570.40	4784014.00	0.00	18.50		Mainline	Average	No
		2	65	589560.20	4784016.00	0.00	18.50		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment			Road Segment					Road Segment									
		Start Point		Number	Coordinates (pavement)			Point Notes	Road Category	Pavement Type	On Structure								
		Name			X	Y	Z					Width							
					[m]	[m]	[m]												
Raymal Road - West of West 5th		3		64	589444.20	4784055.00	0.00	18.50		Mainline	Average	No							
		4		63	589386.80	4784074.00	0.00	18.50		Mainline	Average	No							
		5		62	589318.30	4784094.00	0.00	18.50		Mainline	Average	No							
		6		61	589236.10	4784117.00	0.00	18.50		Mainline	Average	No							
		7		60	589165.10	4784141.00	0.00	18.50		Mainline	Average	No							
		8		59	589024.50	4784187.00	0.00	18.50		Mainline	Average	No							
		9		58	588843.10	4784245.00	0.00	18.50		Mainline	Average	No							
		1		75	590528.10	4784754.00	0.00	11.90		Mainline	Average	No							
		2		74	590426.90	4784789.00	0.00	11.90		Mainline	Average	No							
Stone Church Road - East of West 5th		3		73	590316.40	4784829.00	0.00	11.90		Mainline	Average	No							
		4		72	590246.90	4784853.00	0.00	11.90		Mainline	Average	No							
		5		71	590208.80	4784864.00	0.00	11.90		Mainline	Average	No							
		6		70	590142.10	4784889.00	0.00	11.90		Mainline	Average	No							
		7		69	590049.60	4784919.00	0.00	11.90		Mainline	Average	No							
		8		68	589951.10	4784952.00	0.00	11.90		Mainline	Average	No							
		9		67	589860.30	4784983.00	0.00	11.90		Mainline	Average	No							
		1		82	589859.70	4784984.00	0.00	11.90		Mainline	Average	No							
		2		81	589776.60	4785010.00	0.00	11.90		Mainline	Average	No							
Stone Church - West of West 5th		3		80	589704.60	4785033.00	0.00	11.90		Mainline	Average	No							
		4		79	589544.20	4785086.00	0.00	11.90		Mainline	Average	No							
		5		78	589521.40	4785094.00	0.00	11.90		Mainline	Average	No							
		6		77	589347.40	4785148.00	0.00	11.90		Mainline	Average	No							

Roadway Name	Roadway Notes	Road Segment		Coordinates (pavement)			Width		Point Notes	Road Segment		
		Name	Start Point Number	X [m]	Y [m]	Z [m]				Road Category	Pavement Type	On Structure
Stone Church - West of West 5th		7	76	589078.30	4785229.00	0.00	11.90			Mainline	Average	No

REPORT:

3.2.8741.34338

25 August 2025

TNM VERSION:

3.2.8741.34338

8/23/2025 11:53:09 AM

CALCULATED WITH:

Future Build

Stantec

CASE:

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West 5th Street Corridor Improvements from
Stone Church Road West to Rymal Road West
-Municipal Class Environmental Assessment

ANALYSIS BY:

TrfTNMLaeq1h

25 August 2025

INPUT TRAFFIC FOR TNM VEHICLES (LAeq)

REPORT DATE:

CALCULATION DATE:

ORGANIZATION:

PROJECT/CONTRACT:

Roadway Name	Road Segment		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
			Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
	Name	No.	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]
Christie Street	1	8	181	40	2	40	3	40	0	0	0	0
	2	7	181	40	2	40	3	40	0	0	0	0
	3	6	181	40	2	40	3	40	0	0	0	0
	4	5	181	40	2	40	3	40	0	0	0	0
	5	4	181	40	2	40	3	40	0	0	0	0
	6	3	181	40	2	40	3	40	0	0	0	0
	7	2	181	40	2	40	3	40	0	0	0	0
	8	1	181	40	2	40	3	40	0	0	0	0
West 5th Street - South of Stone Church	1	34	735	50	5	50	8	50	0	0	0	0
	2	33	735	50	5	50	8	50	0	0	0	0
	3	32	735	50	5	50	8	50	0	0	0	0
	4	31	735	50	5	50	8	50	0	0	0	0
	5	30	735	50	5	50	8	50	0	0	0	0
	6	29	735	50	5	50	8	50	0	0	0	0
	7	28	735	50	5	50	8	50	0	0	0	0

Roadway Name	Road Segment		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle		
	Name	Start Point No.	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	
West 5th Street - South of Stone Church	8		27	735	50	5	50	8	50	0	0	0	0
	9		26	735	50	5	50	8	50	0	0	0	0
	10		25	735	50	5	50	8	50	0	0	0	0
	11		24	735	50	5	50	8	50	0	0	0	0
	12		23	735	50	5	50	8	50	0	0	0	0
	13		22	735	50	5	50	8	50	0	0	0	0
	14		21	735	50	5	50	8	50	0	0	0	0
	15		20	735	50	5	50	8	50	0	0	0	0
	16		19	735	50	5	50	8	50	0	0	0	0
	17		18	735	50	5	50	8	50	0	0	0	0
	18		17	735	50	5	50	8	50	0	0	0	0
	19		16	735	50	5	50	8	50	0	0	0	0
	20		15	735	50	5	50	8	50	0	0	0	0
	21		14	735	50	5	50	8	50	0	0	0	0
	22		13	735	50	5	50	8	50	0	0	0	0
	23		12	735	50	5	50	8	50	0	0	0	0
	24		11	735	50	5	50	8	50	0	0	0	0
	25		10	735	50	5	50	8	50	0	0	0	0
26		9	735	50	5	50	8	50	0	0	0	0	
West 5th Street - North of Stone Church	1		45	931	50	4	50	6	50	0	0	0	0
	2		44	931	50	4	50	6	50	0	0	0	0
	3		43	931	50	4	50	6	50	0	0	0	0
	4		42	931	50	4	50	6	50	0	0	0	0

Roadway Name	Road Segment		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
			Start Point		Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
	Name	No.										
West 5th Street - North of Stone Church	5	41	931	50	4	50	6	50	0	0	0	0
	6	40	931	50	4	50	6	50	0	0	0	0
	7	39	931	50	4	50	6	50	0	0	0	0
	8	38	931	50	4	50	6	50	0	0	0	0
	9	37	931	50	4	50	6	50	0	0	0	0
	10	36	931	50	4	50	6	50	0	0	0	0
	11	35	931	50	4	50	6	50	0	0	0	0
	1	57	1138	60	18	60	27	60	0	0	0	0
	2	56	1138	60	18	60	27	60	0	0	0	0
	3	55	1138	60	18	60	27	60	0	0	0	0
	4	54	1138	60	18	60	27	60	0	0	0	0
Raymal Road - East of West 5th	5	53	1138	60	18	60	27	60	0	0	0	0
	6	52	1138	60	18	60	27	60	0	0	0	0
	7	51	1138	60	18	60	27	60	0	0	0	0
	8	50	1138	60	18	60	27	60	0	0	0	0
	9	49	1138	60	18	60	27	60	0	0	0	0
	10	48	1138	60	18	60	27	60	0	0	0	0
	11	47	1138	60	18	60	27	60	0	0	0	0
	12	46	1138	60	18	60	27	60	0	0	0	0
	1	66	956	60	11	60	17	60	0	0	0	0
	2	65	956	60	11	60	17	60	0	0	0	0
	3	64	956	60	11	60	17	60	0	0	0	0
Raymal Road - West of West 5th												

Roadway Name	Road Segment		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
	Name	No.	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
			[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]
Raymal Road - West of West 5th	4	63	956	60	11	60	17	60	0	0	0	0
	5	62	956	60	11	60	17	60	0	0	0	0
	6	61	956	60	11	60	17	60	0	0	0	0
	7	60	956	60	11	60	17	60	0	0	0	0
	8	59	956	60	11	60	17	60	0	0	0	0
	9	58	956	60	11	60	17	60	0	0	0	0
	1	75	910	50	7	50	11	50	0	0	0	0
	2	74	910	50	7	50	11	50	0	0	0	0
	3	73	910	50	7	50	11	50	0	0	0	0
Stone Church Road - East of West 5th	4	72	910	50	7	50	11	50	0	0	0	0
	5	71	910	50	7	50	11	50	0	0	0	0
	6	70	910	50	7	50	11	50	0	0	0	0
	7	69	910	50	7	50	11	50	0	0	0	0
	8	68	910	50	7	50	11	50	0	0	0	0
	9	67	910	50	7	50	11	50	0	0	0	0
	1	82	768	50	7	50	11	50	0	0	0	0
	2	81	768	50	7	50	11	50	0	0	0	0
	3	80	768	50	7	50	11	50	0	0	0	0
Stone Church - West of West 5th	4	79	768	50	7	50	11	50	0	0	0	0
	5	78	768	50	7	50	11	50	0	0	0	0
	6	77	768	50	7	50	11	50	0	0	0	0
	7	76	768	50	7	50	11	50	0	0	0	0

REPORT: Results: Sound Levels - Input Heights

REPORT DATE: 25 August 2025

REPORT DATE: 25 August 2025

TNM VERSION: 3.2.8741.34338

TNM v3.2.8741.34338

CALCULATED WITH: Future Build

Future Build

CASE: ANALYSIS BY: fa

Stantec

DEFAULT GROUND TYPE: Lawn

West 5th Street Corridor Improvements from Stone Church Road West to Rymal Road West - Municipal Class Environmental Assessment

ATMOSPHERICS: 10°C, 70%

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PAVEMENT TYPE(S) USED: Average

Average

Average pavement type shall be used unless a state highway agency substantiates the use of a different type with approval of FHWA.

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Results for:		DUs	Noise Reduction			Barrier Cost		
			Min	Avg	Max	Area / Volume	Lineal	Total
			dB	dB	dB	\$	\$	\$
Receivers in the Barrier Design:		All	0.0	0.0	0.0	0	0	0
		All Impacted	0.0	0.0	0.0	0	0	0
Meeting Noise Reduction Goal:		All	---	---	---	0	0	---
		All Impacted	---	---	---	0	0	---

Receiver				Modeled Traffic Noise Levels									
				All Abatement Barriers at Zero Height					With Abatement Barriers				
Name	No.	DUs	Existing LAeq dBA	LAeq		Increase over Existing		Type of Impact	Calc. LAeq		Noise Reduction		Calc. Minus Goal dBA
				Calc. dBA	Absolute Criterion dBA	Calc. dBA	Relative Criterion dBA		Calc. dBA	Goal dBA	Calc. dBA	Goal dBA	
				dBA	dBA	dBA	dBA		dBA	dBA	dBA	dBA	
R1	1	1	---	55.3	56.0	---	---	None	55.3	0.0	5.0	5.0	-5.0
R2	2	1	---	57.9	56.0	---	---	Sound Level	57.9	0.0	5.0	5.0	-5.0
R3	4	1	---	59.1	56.0	---	---	Sound Level	59.1	0.0	5.0	5.0	-5.0
R4	5	1	---	53.4	56.0	---	---	None	53.4	0.0	5.0	5.0	-5.0
R5	6	1	---	51.3	56.0	---	---	None	51.3	0.0	5.0	5.0	-5.0
R6	7	1	---	49.4	56.0	---	---	None	49.4	0.0	5.0	5.0	-5.0
R7	9	1	---	43.3	56.0	---	---	None	43.3	0.0	5.0	5.0	-5.0
R8	11	1	---	42.4	56.0	---	---	None	42.4	0.0	5.0	5.0	-5.0
R9	14	1	---	55.8	56.0	---	---	None	55.8	0.0	5.0	5.0	-5.0
R10	16	1	---	46.1	56.0	---	---	None	46.1	0.0	5.0	5.0	-5.0