# Appendix H:
## Noise Impact Assessment

September 18, 2025

Prepared for:

City of Hamilton
Public Works – Engineering Services
100 King Street West
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**

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Environmental Planner

# 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

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.

## 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 |
| $L_{eq-16}$ | 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 |

# 1.0 Introduction

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.

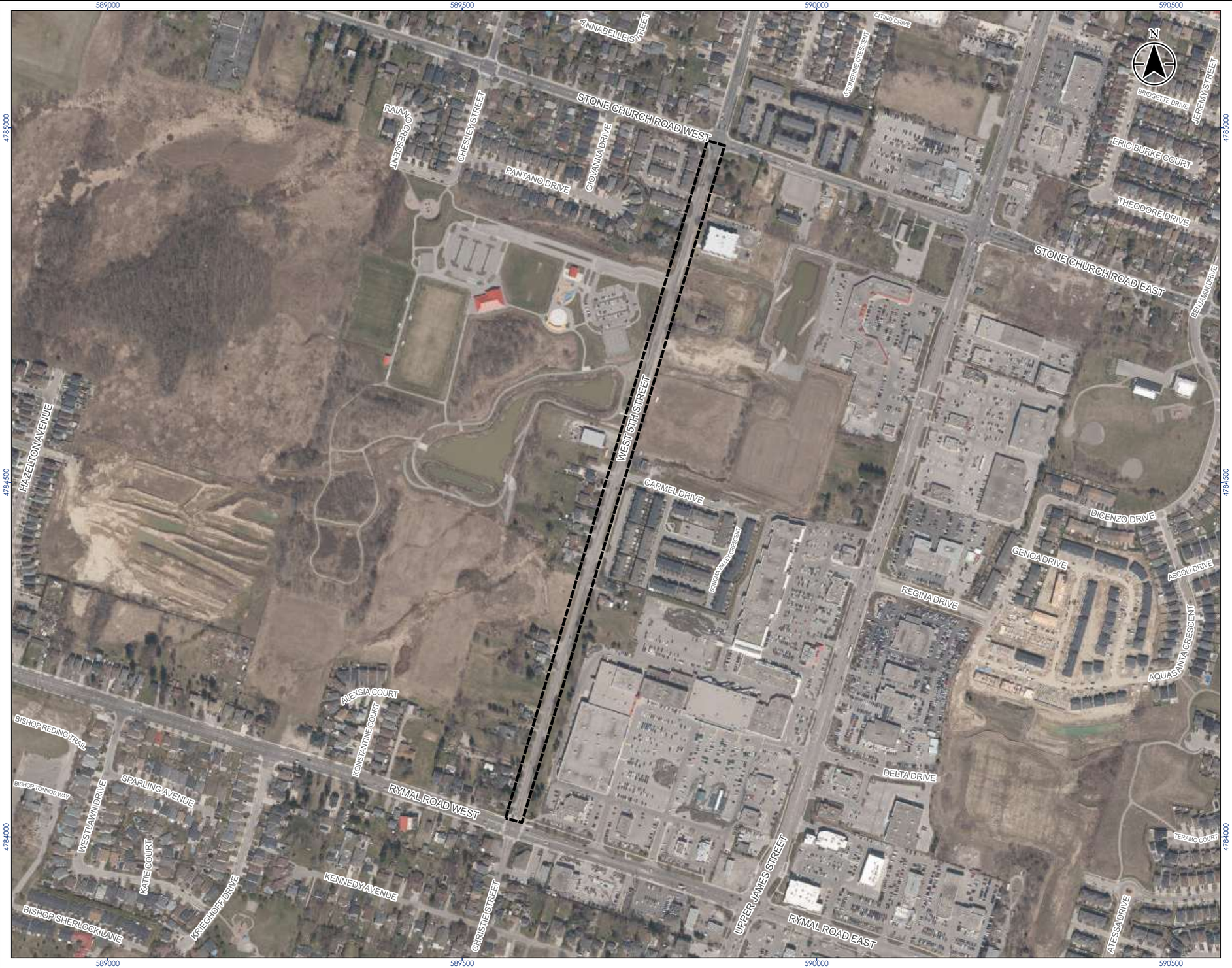
West 5th Street from Stone Church Road West to Rymal Road West is currently a rural cross-section road surrounded by urban growth. This segment of West 5th Street is undergoing significant neighbourhood changes influenced by the recently built William Connell Park and planned high-density developments,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




Stantec

**Legend**

Project Extent

0 100 200 Metres

1:5,500 (At original document size of 11x17)

**Notes**

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.
3. Orthoimagery © First Base Solutions, 2024. Hamilton Wentworth Region 2023


Project Location
City of Hamilton

165001381
Prepared by ipodrug on 2025-09-18
Technical Review by ABC on yyyy-mm-dd

Client/Project
CITY OF HAMILTON
NOISE AND VIBRATION IMPACT ASSESSMENT - WEST 5TH STREET CORRIDOR IMPROVEMENT FROM STONE CHURCH ROAD WEST TO RYMAL ROAD WEST - MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
**1-1**

Title
**Project Extent**

# 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.


Stantec

**Legend**

- Project Extent
- Heritage Buildings
- Heritage Buildings - 12 m
- Typical Buildings - 8 m

0 100 200 Metres

1:6,500 (At original document size of 11x17)

**Notes**

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.
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NOISE AND VIBRATION IMPACT ASSESSMENT - WEST 5TH STREET CORRIDOR IMPROVEMENT FROM STONE CHURCH ROAD WEST TO RYMAL ROAD WEST - MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.

**2-1**

Title

**Study Area, Receptors, and Existing Noise Barriers**

# 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 (MOE[1]) / 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)

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 receptors[2].

# 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.

**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.

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 |

# 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.

**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 5th Street |
| R5 | Dwelling - 1030 West 5th Street |
| R6 | Dwelling - 1030 West 5th Street |
| R7 | Dwelling - 1142 West 5th Street |
| R8 | Dwelling - 1183 West 5th Street |
| R9 | Dwelling - 1268 West 5th 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.

# 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.

**Table 5.1: Road Traffic Data Summary**

| Roadway | 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 [e] (%) | Medium Trucks [f] (%) | Heavy Trucks [f] (%) |
| West 5th Street - north of Stone Church Road | 16029 | 16720 | 50 | 90.0 | 99.0 | 1.0 | 0.4 | 0.6 |
| West 5th Street - south of Stone Church Road | 11049 | 13299 | 50 | 90.0 | 98.3 | 1.7 | 0.7 | 1.0 |
| Stone Church Road - west of West 5th Street | 13463 | 13978 | 50 | 90.0 | 97.7 | 2.3 | 0.9 | 1.4 |
| Stone Church Road - east of West 5th Street | 15466 | 16509 | 50 | 90.0 | 98.0 | 2.0 | 0.8 | 1.2 |
| Rymal Road - west of West 5th Street | 17247 | 17493 | 60 | 90.0 | 97.2 | 2.8 | 1.1 | 1.7 |
| Rymal Road - east of West 5th Street | 20575 | 21032 | 60 | 90.0 | 96.2 | 3.8 | 1.5 | 2.3 |
| Christie Street - south of Rymal Road | 3293 | 3293 | 40 | 90.0 | 97.6 | 2.4 | 1.0 | 1.4 |

Notes:

a. Derived from the 2031 peak hour traffic volumes presented in the Transportation Report for “Future Traffic Volume – Corridor Growth”
b. Derived from the 2031 peak hour traffic volumes presented in the Transportation Report for “Future Traffic Volume – Corridor Growth and Study Area Development”
c. Posted speed limit
d. Estimated based on the recommended day-night traffic volume ratios provided in the ORNAMENT Technical Document
e. Derived from turning movement counts provided in the Transportation Report
f. Based on a 40/60 medium to heavy truck ratio per the MTO Guide

### 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.

**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.

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.

# 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 |

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.

# 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.

## 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.


Stantec

Legend

- Project Extent
- Heritage Buildings

Vibration Zone of Influence (ZOI) - Vibratory Roller

- Typical Buildings - 8 m
- Heritage Buildings - 12 m

0 100 200 Metres

1:4,500 (At original document size of 11x17)

**Notes**

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.
3. Orthoimagery © First Base Solutions, 2024. Hamilton Wentworth Region 2023.
4. Note: Heritage Buildings were identified from the report titled "Cultural Heritage Report: Existing Conditions and Preliminary Assessment - Municipal Class Environmental Assessment, West 5th Street" dated July 2025 and prepared by Stantec.


Project Location
Hamilton, Ontario

Prepared by ipodrug on 2025-09-18
Technical Review by ABC on yyyy-mm-dd

Client/Project

NOISE AND VIBRATION IMPACT ASSESSMENT - WEST 5TH STREET CORRIDOR IMPROVEMENT FROM STONE CHURCH ROAD WEST TO RYMAL ROAD WEST - MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
**7-1**

Title
**Construction Vibration Zone of Influence - Vibratory Roller**



\\ca0224-wpfs01\work_group\01650\active\165001381\preliminary\gis\Maps\Noise\165001381_Noise.aprx\165001381_Noise_Fig07_Vibration Revised: 2025-09-18 By: ipodrug

# 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.

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

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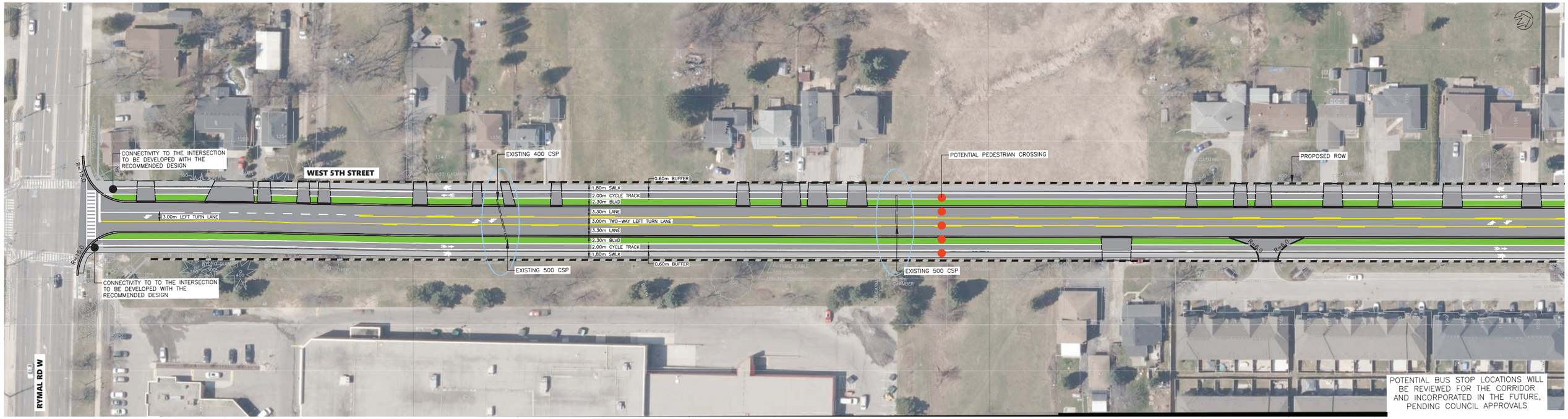
The City of Hamilton. 2005. "Zoning By-Law No. 05-200."

# Appendix A
# Preferred Design Drawings

# WEST 5TH STREET

STUDY AREA

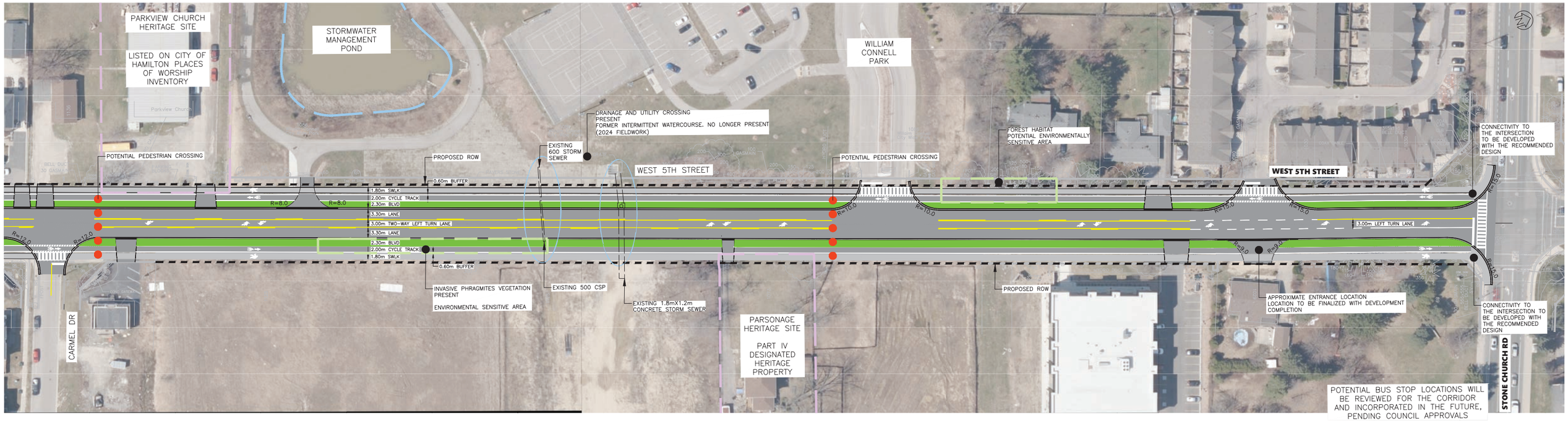



LEGEND:

- POTENTIAL ENVIRONMENTAL SENSITIVE AREA
- HERITAGE AREA
- WATER FEATURE
- POTENTIAL PEDESTRIAN CROSSING

# WEST 5TH STREET

STUDY AREA




LEGEND:

- POTENTIAL ENVIRONMENTAL SENSITIVE AREA
- HERITAGE AREA
- WATER FEATURE
- POTENTIAL PEDESTRIAN CROSSING

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

REPORT: **INPUT TRAFFIC FOR TNM VEHICLES (LAeq)**

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 | Road Segment Start Point | | Auto | | Medium Truck | | Heavy Truck | | Bus | | Motorcycle | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Name | 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] |
| 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 Start Point | | 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] |
| 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 Start Point | | Auto | | Medium Truck | | Heavy Truck | | Bus | | Motorcycle | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Name | 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 |
| Raymal Road - East of West 5th | 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 |
| | 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 |
| Raymal Road - West of West 5th | 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 |

| Roadway Name | Road Segment Start Point | | 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 | 943 | 60 | 11 | 60 | 16 | 60 | 0 | 0 | 0 | 0 |
| | 5 | 62 | 943 | 60 | 11 | 60 | 16 | 60 | 0 | 0 | 0 | 0 |
| | 6 | 61 | 943 | 60 | 11 | 60 | 16 | 60 | 0 | 0 | 0 | 0 |
| | 7 | 60 | 943 | 60 | 11 | 60 | 16 | 60 | 0 | 0 | 0 | 0 |
| | 8 | 59 | 943 | 60 | 11 | 60 | 16 | 60 | 0 | 0 | 0 | 0 |
| | 9 | 58 | 943 | 60 | 11 | 60 | 16 | 60 | 0 | 0 | 0 | 0 |
| Stone Church Road - East of West 5th | 1 | 75 | 853 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 2 | 74 | 853 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 3 | 73 | 853 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 4 | 72 | 853 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 5 | 71 | 853 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 6 | 70 | 853 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 7 | 69 | 853 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 8 | 68 | 853 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 9 | 67 | 853 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| Stone Church - West of West 5th | 1 | 82 | 740 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 2 | 81 | 740 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 3 | 80 | 740 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 4 | 79 | 740 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 5 | 78 | 740 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 6 | 77 | 740 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |
| | 7 | 76 | 740 | 50 | 7 | 50 | 10 | 50 | 0 | 0 | 0 | 0 |

| | | | |
|---|---|---|---|
| REPORT: | **Results: Sound Levels - Input Heights** | | |
| TNM VERSION: | 3.2.8741.34338 | REPORT DATE: | 25 August 2025 |
| CALCULATED WITH: | TNM v3.2.8741.34338 | CALCULATION DATE: | 8/25/2025 5:09:10 PM |
| 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 |
| DEFAULT GROUND TYPE: | Lawn | | |
| ATMOSPHERICS: | 10°C, 70% | Average pavement type shall be used unless a state highway agency | |
| PAVEMENT TYPE(S) USED: | Average | substantiates the use of a different type with approval of FHWA. | |

| | | | Noise Reduction | | | Barrier Cost | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Avg | Max | Area / Volume | Lineal | Total | Total/DUs |
| Results for: | | DUs | dB | dB | dB | $ | $ | $ | $ |
| Receivers in the Barrier Design: | All | 10 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| | All Impacted | 2 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| Meeting Noise Reduction Goal: | All | 0 | --- | --- | --- | 0 | 0 | 0 | --- |
| | All Impacted | 0 | --- | --- | --- | 0 | 0 | 0 | --- |

| Receiver | | | | Modeled Traffic Noise Levels | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | All Abatement Barriers at Zero Height | | | | | With Abatement Barriers | | | |
| | | | | LAeq | | Increase over Existing | | | | Noise Reduction | | Calc. |
| Name | No. | DUs | Existing LAeq | Calc. | Absolute Criterion | Calc. | Relative Criterion | Type of Impact | Calc. LAeq | Calc. | Goal | Minus Goal |
| | | | dBA | dBA | dBA | dBA | dBA | | dBA | dBA | dBA | dBA |
| R1 | 1 | 1 | --- | 55.0 | 56.0 | --- | --- | None | 55.0 | 0.0 | 5.0 | -5.0 |
| R2 | 2 | 1 | --- | 57.6 | 56.0 | --- | --- | Sound Level | 57.6 | 0.0 | 5.0 | -5.0 |
| R3 | 4 | 1 | --- | 58.8 | 56.0 | --- | --- | Sound Level | 58.8 | 0.0 | 5.0 | -5.0 |
| R4 | 5 | 1 | --- | 52.9 | 56.0 | --- | --- | None | 52.9 | 0.0 | 5.0 | -5.0 |
| R5 | 6 | 1 | --- | 50.5 | 56.0 | --- | --- | None | 50.5 | 0.0 | 5.0 | -5.0 |
| R6 | 7 | 1 | --- | 48.4 | 56.0 | --- | --- | None | 48.4 | 0.0 | 5.0 | -5.0 |
| R7 | 9 | 1 | --- | 42.4 | 56.0 | --- | --- | None | 42.4 | 0.0 | 5.0 | -5.0 |
| R8 | 11 | 1 | --- | 41.7 | 56.0 | --- | --- | None | 41.7 | 0.0 | 5.0 | -5.0 |
| R9 | 14 | 1 | --- | 55.3 | 56.0 | --- | --- | None | 55.3 | 0.0 | 5.0 | -5.0 |
| R10 | 16 | 1 | --- | 46.0 | 56.0 | --- | --- | None | 46.0 | 0.0 | 5.0 | -5.0 |

| | | | |
|---|---|---|---|
| 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 11:53:09 AM |
| CASE: | Future 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 Start Point | | Coordinates (pavement) | | | Width | Point Notes | Road Segment | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Name | Number | X | Y | Z | | | Road Category | Pavement Type | On Structure |
| | | | | [m] | [m] | [m] | [m] | | | | |
| 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 Start Point | | Coordinates (pavement) | | | Width | Point Notes | Road Segment | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Name | Number | X | Y | Z | | | Road Category | Pavement Type | On Structure |
| | | | | [m] | [m] | [m] | [m] | | | | |
| 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 |
| West 5th Street - North of Stone Church | | 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 Start Point | | Coordinates (pavement) | | | Width | Point Notes | Road Segment | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Name | Number | X | Y | Z | | | Road Category | Pavement Type | On Structure |
| | | | | [m] | [m] | [m] | [m] | | | | |
| 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 |
| Raymal Road - East of West 5th | | 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 |
| | | 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 |
| Raymal Road - West of West 5th | | 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 Start Point | | Coordinates (pavement) | | | Width | Point Notes | Road Segment | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Name | Number | X | Y | Z | | | Road Category | Pavement Type | On Structure |
| | | | | [m] | [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 |
| Stone Church Road - East of West 5th | | 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 |
| Stone Church - West of West 5th | | 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 |
| | | 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 Start Point | | Coordinates (pavement) | | | Width | Point Notes | Road Segment | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Name | Number | X | Y | Z | | | Road Category | Pavement Type | On Structure |
| | | | | [m] | [m] | [m] | [m] | | | | |
| Stone Church - West of West 5th | | 7 | 76 | 589078.30 | 4785229.00 | 0.00 | 11.90 | | Mainline | Average | No |

| | | | |
|---|---|---|---|
| REPORT: | **INPUT TRAFFIC FOR TNM VEHICLES (LAeq)** | | |
| TNM VERSION: | 3.2.8741.34338 | REPORT DATE: | 25 August 2025 |
| CALCULATED WITH: | TNM v3.2.8741.34338 | CALCULATION DATE: | 8/23/2025 11:53:09 AM |
| CASE: | Future 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 | Road Segment Start Point | | Auto | | Medium Truck | | Heavy Truck | | Bus | | Motorcycle | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Name | 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] |
| 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 Start Point | | Auto | | Medium Truck | | Heavy Truck | | Bus | | Motorcycle | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Name | 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 Start Point | | 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] |
| 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 |
| Raymal Road - East of West 5th | 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 |
| | 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 |
| Raymal Road - West of West 5th | 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 |

| Roadway Name | Road Segment Start Point | | 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 |
| Stone Church Road - East of West 5th | 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 |
| | 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 |
| Stone Church - West of West 5th | 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 |
| | 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** | | |
| TNM VERSION: | 3.2.8741.34338 | REPORT DATE: | 25 August 2025 |
| CALCULATED WITH: | TNM v3.2.8741.34338 | CALCULATION DATE: | 8/25/2025 5:06:36 PM |
| CASE: | Future 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 |
| DEFAULT GROUND TYPE: | Lawn | | |
| ATMOSPHERICS: | 10°C, 70% | Average pavement type shall be used unless a state highway agency | |
| PAVEMENT TYPE(S) USED: | Average | substantiates the use of a different type with approval of FHWA. | |

| | | | Noise Reduction | | | Barrier Cost | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Avg | Max | Area / Volume | Lineal | Total | Total/DUs |
| Results for: | | DUs | dB | dB | dB | $ | $ | $ | $ |
| Receivers in the Barrier Design: | All | 10 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| | All Impacted | 2 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| Meeting Noise Reduction Goal: | All | 0 | --- | --- | --- | 0 | 0 | 0 | --- |
| | All Impacted | 0 | --- | --- | --- | 0 | 0 | 0 | --- |

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