Road Traffic Noise Impact Study

Highway 410 interchange with Hurontario Street,
Valleywood Boulevard and Spine Road
Project # TPB166090
The Corporation of the Town of Caledon

Prepared for:

The Corporation of the Town of Caledon

6311 Old Church Road, Caledon, ON L7C 1J6

11/16/2018

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11/16/2018

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Senior Transportation Planner
Policy & Sustainability
Community Services Department
The Corporation of the Town of Caledon
6311 Old Church Road
Caledon, ON L7C 1J6

Dear Mr. Chawla,

Re: Road Traffic Noise Impact Study in Support of a Municipal Class Environmental Assessment for Widening of McLaughlin Road and Construction of East-West Spine Road – Highway 410 Interchange

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood), formerly Amec Foster Wheeler, is pleased to provide the attached Road Traffic Noise Impact Study to be used in support of a Municipal Class Environmental Assessment for the improvements and widening of McLaughlin Road and Construction of East-West Spine Road. This report specifically addresses the noise impacts of the proposed improvements and re-alignment of the Highway 410 interchange with Hurontario Street, Valleywood Boulevard and the proposed Spine Road.

Should you have any questions regarding the study or its findings, please do not hesitate to contact us.

Yours truly,

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited

Buddy Ledger, P.Eng., M.A.Sc., INCE
Department Head & Senior Engineer
Acoustics & Vibration

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Executive Summary

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood), formerly Amec Foster Wheeler, was retained by the Corporation of the Town of Caledon (the Town of Caledon) to complete a Road Traffic Noise Impact Study (Noise Impact Study) to be used in support of a Municipal Class Environmental Assessment for the improvements and widening of McLaughlin Road and construction of East-West Spine Road. This report specifically addresses the noise impacts of the proposed improvements and re-alignment of the Highway 410 interchange with Hurontario Street, Valleywood Boulevard and the proposed of East-West Spine Road.

The noise guideline applicable to the project is The Ontario Ministry of Transportation (MTO) "Environmental Noise Guide" *[1]* (MTO Noise Guide).

The results presented in Table 3 indicate that the predicted noise are all below the 5 dB criterion but the overall Future "build" sound levels at five receivers (R071, R128, R133, R135 and R143) are above the 65 dBA criterion. As discussed in Section 5.1 the exceedances of the 65 dBA criterion represent the values at the most exposed façade. However, according to the MTO Noise Guide the need for mitigation must be determined based on the OLA sound levels. In each case for R071, R128, R133, R135 and R143 the OLA sound levels are expected to be below the 65 dBA criterion. Therefore based on the noise modelling results consideration for noise mitigation is not a requirement for the project.

Construction noise impacts are temporary and largely unavoidable. However, the contract documents should identify the contractor's responsibilities with respect to controlling noise, as well as recording, investigating and if possible addressing complaints. The contract documents should also explicitly state that compliance with all applicable law is an expectation of the contract including adherence to the Town of Caledon Noise By-Law 86-110 [2] and MOECC Publication NPC-115.

Table of Contents

List of Tables

List of Appendices

1.0 Introduction

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood), formerly Amec Foster Wheeler, was retained by the Corporation of the Town of Caledon (the Town of Caledon) to complete a Road Traffic Noise Impact Study (Noise Impact Study) to be used in support of a Municipal Class Environmental Assessment for the improvements and widening of McLaughlin Road and construction of East-West Spine Road. This report specifically addresses the noise impacts of the proposed improvements and re-alignment of the Highway 410 interchange with Hurontario Street, Valleywood Boulevard and the proposed East-West Spine Road.

1.1 Definition of Study Area

The study area encompasses the Hwy 410 interchange with Hurontario Street, Valleywood Boulevard and the proposed East-West Spine Road. A figure showing the study area is presented in Appendix A.

1.2 Description of Scenarios

Three scenarios were considered as part of this noise impact study:

1. Existing (2017);
2. Future "no-build" (2031);
3. Future "build" (2031);

Existing (2017): Consists of the existing road network and Highway 410 interchange alignments with the existing traffic volume estimates. Figures for this scenario are provided in Appendix B.

Future "no-build" (2031): Consists of the existing road network and Highway 410 interchange alignments with the projected future "no-build" 2031 traffic volume estimates. Figures for this scenario are provided in Appendix B.

Future "build" (2031): Consists of the proposed road network and Highway 410 interchange alignments with the projected future "build" 2031 traffic volume estimates. Figures for this scenario are provided in Appendix C.

2.0 Environmental Noise Guidelines

Environmental noise is typically assessed based on noise or sound levels. The term "noise level" in this context typically refers to the equivalent continuous sound pressure level (L_{eq}) expressed in A-weighted decibels (dBA referenced to 20µPa) having the same total sound energy as a time-varying sound pressure level over a specified time period. It is important to note that, although environmental noise is reported in A-weighted decibels (dBA), the difference between two A-weighted values is reported in decibels (dB).

Road traffic noise impact assessments for road widenings (under the Municipal Class EA process) typically consider outdoor noise levels only. This limitation is a result of the fact that the only practical noise mitigation measure under such circumstances are retrofit noise barriers as alterations to existing residential building envelopes is not considered practical or feasible. Therefore, this road traffic noise assessment is limited to the assessment of Outdoor Living Areas (OLA).

2.1 Noise Guidelines which are Applicable to this Project

The following sections describe the noise guidelines which are both applicable within the projects geographical area and appropriate for a project of this type.

2.1.1 Provincial – MTO Environmental Noise Guide

The Ontario Ministry of Transportation (MTO) "Environmental Noise Guide" [1] (MTO Noise Guide) states that it was developed to provide guidance for MTO personnel and consultants in the analysis of highway noise and its effects. The MTO noise guide establishes that if predicted noise impact is less than 5 dB and the overall sound level is less than 65 dBA, then noise mitigation need not be considered. Conversely if the noise impact is found to be greater than or equal to 5 dB or the overall sound level is greater than or equal to 65 dBA, then noise mitigation must be considered. Noise impact is defined as the difference between the future noise level with and without the proposed roadway improvements ("build" and "no-build" scenarios, respectively). To be economically feasible (cost effective), the guide states that noise control measures should achieve a minimum attenuation of 5 dB when averaged over the first row of receivers.

The MTO Noise Guide applies to projects involving provincial highways and freeways under MTO jurisdiction and therefore applies to the Highway 410 interchange re-alignment and improvements.

3.0 Project Noise Criteria

This section outlines the specific noise criteria drawn from the documents discussed in Section 2.1 which apply to this project. Table 1 provides a summary of the criteria consideration of noise mitigation which are applicable to this project.

Table 1. PROJECT NOISE CRITERIA

Daytime $L_{eq\text{-}16hr}$ (dBA)	Logical Relation	Noise Impact (dB)	Mitigation Effort Required
< 65 dBA	and	< 5 dB	• None
≥ 65 dBA	or	≥ 5 dB	• Investigate noise control measures on right-of-way; • Introduce noise control measures within right-of-way and mitigate to ambient if technically, economically and administratively feasible; and • Noise control measures, where introduced, should achieve a minimum of 5 dB attenuation, over first row receivers.

4.0 Noise Impact Assessment Methodology

This section outlines the noise impact methodology which was applied to the assessment of this project.

4.1 Road Traffic Data

Road traffic data was provided from the project transportation engineer. Estimated Average Annual Daily Traffic Volume (AADT), day/night traffic split percentages, percentages of heavy and medium trucks and posted speeds for each roadway segment were provided for each of the assessment scenarios existing, future "no-build" and future "build".

A summary of the traffic data used for the Noise Impact Study is provided in Appendix D.

4.2 Noise Modelling

The noise modelling for this project was completed using the United States Federal Highway Administration's (FHWA) Traffic Noise Model (TNM), Version 2.5 [3]. The MTO accepts the use of the FHWA implementation of TNM 2.5 for use on projects under MTO jurisdiction. CadnaA was also used as a pre- and post-processor for this work in order to pre-process geometry files and post-process (present) results. However, all calculations were completed using the TNM 2.5 executable published by the FHWA.

Based on the traffic data, daytime noise levels were calculated at the most exposed façade for each receiver. Existing noise barriers were included in the noise predictions. The digital terrain model of the area was obtained from the Town of Caledon and this was used to model the terrain within the study area.

4.3 Location of Noise Sensitive Areas

The focus of this assessment was to predict the noise levels at properties adjacent to Highway 410, Hurontario Street, Valleywood Boulevard, the new East-West Spine Road and the various existing and proposed interchange ramps.

One hundred forty-eight (148) representative receptors were selected to predict the future noise levels as a result of the Project. These locations are expected to be the most affected by the noise associated with the interchange improvements. Predicted noise levels were assessed at the most exposed façade of each receptor location. The receptors were modelled at 1.2 metres (m) high in accordance with the MTO Noise

Guide. Table 2 summarizes the receptor numbers and their locations and illustrations of their locations are provided in Appendix B and C.

Table 2. RECEPTOR LOCATIONS AND ELEVATIONS

Location	Coordinates[1] (m)		Elevations[2] (m)	
	Northing	Easting	Receptor	Ground
R001	594021.67	4843186.35	260.20	259.00
R002	594028.87	4843197.02	260.20	259.00
R003	594035.69	4843206.47	260.20	259.00
R004	594043.88	4843215.92	260.20	259.00
R005	594052.00	4843224.15	260.20	259.00
R006	594056.80	4843234.51	260.20	259.00
R007	594064.19	4843246.09	260.20	259.00
R008	594069.87	4843256.15	260.20	259.00
R009	594079.43	4843263.47	260.20	259.00
R010	594085.95	4843273.52	260.20	259.00
R011	594093.19	4843283.58	260.20	259.00
R012	594100.77	4843293.64	260.20	259.00
R013	594108.58	4843301.57	260.20	259.00
R014	594117.07	4843310.40	260.20	259.00
R015	594124.69	4843319.85	260.20	259.00
R016	594134.64	4843328.08	260.20	259.00
R017	594140.32	4843338.45	260.20	259.00
R018	594148.55	4843347.90	260.20	259.00
R019	594288.98	4843527.12	258.20	257.00
R020	594291.99	4843538.09	258.20	257.00
R021	594298.89	4843546.93	258.20	257.00
R022	594305.14	4843556.99	258.20	257.00
R023	594309.75	4843566.13	258.20	257.00
R024	594316.87	4843574.36	258.20	257.00
R025	594324.45	4843582.90	258.20	257.00
R026	594330.93	4843591.43	258.20	257.00
R027	594339.12	4843600.57	258.20	257.00
R028	594332.49	4843611.55	258.20	257.00
R029	594294.01	4843648.12	259.32	258.12
R030	594284.30	4843658.49	259.51	258.31
R031	594275.49	4843667.94	259.69	258.49
R032	594265.70	4843680.13	259.89	258.69
R033	594254.81	4843691.10	260.06	258.86
R034	594243.30	4843712.13	260.20	259.00
R035	594250.31	4843732.55	260.20	259.00
R036	594259.49	4843745.35	260.20	259.00
R037	594270.43	4843756.94	260.20	259.00
R038	594278.12	4843767.91	260.20	259.00
R039	594288.30	4843781.63	260.20	259.00
R040	594293.55	4843788.94	260.20	259.00
R041	594303.61	4843799.91	260.20	259.00
R042	594311.88	4843810.89	260.20	259.00
R043	594320.11	4843821.55	260.20	259.00
R044	594329.06	4843831.92	260.20	259.00

Location	Coordinates[1] (m)		Elevations[2] (m)	
	Northing	Easting	Receptor	Ground
R045	594340.45	4843844.11	260.20	259.00
R046	594351.62	4843855.08	260.20	259.00
R047	594363.62	4843865.14	260.22	259.02
R048	594408.77	4843866.06	259.77	258.57
R049	594375.39	4843874.59	260.47	259.27
R050	594413.30	4843878.55	260.11	258.91
R051	594397.00	4843884.04	260.22	259.02
R052	594416.92	4843891.35	260.41	259.21
R053	594422.18	4843905.07	260.61	259.41
R054	594425.49	4843919.09	260.73	259.53
R055	594435.82	4843931.89	260.63	259.43
R056	594442.49	4843945.91	260.85	259.65
R057	593468.31	4843947.44	264.20	263.00
R058	594454.07	4843957.50	260.91	259.71
R059	594221.70	4843966.94	261.72	260.52
R060	594463.56	4843969.99	260.90	259.70
R061	594206.61	4843970.60	262.12	260.92
R062	594193.81	4843972.43	262.20	261.00
R063	594177.81	4843978.53	262.20	261.00
R064	594164.20	4843979.44	262.20	261.00
R065	594146.98	4843980.05	262.20	261.00
R066	594472.51	4843980.96	260.93	259.73
R067	594105.99	4843984.62	262.25	261.05
R068	594129.11	4843984.93	262.20	261.00
R069	594091.32	4843995.60	262.46	261.26
R070	594079.62	4844014.49	262.20	261.00
R071	594516.82	4844027.60	260.20	259.00
R072	594076.19	4844030.65	262.12	260.92
R073	594267.99	4844034.61	261.74	260.54
R074	594077.45	4844048.02	262.07	260.87
R075	593618.76	4844049.54	265.20	264.00
R076	593628.14	4844049.85	265.20	264.00
R077	593607.87	4844055.95	265.20	264.00
R078	593638.42	4844057.47	265.05	263.85
R079	593600.32	4844059.60	265.20	264.00
R080	593646.23	4844062.04	264.81	263.61
R081	594077.76	4844065.09	261.88	260.68
R082	593590.80	4844066.00	265.20	264.00
R083	593650.04	4844070.58	264.55	263.35
R084	593584.74	4844070.88	264.96	263.76
R085	593656.33	4844073.62	264.27	263.07
R086	593662.24	4844076.37	264.20	263.00
R087	593577.58	4844077.59	264.79	263.59
R088	594073.37	4844077.89	261.69	260.49
R089	593668.07	4844079.42	264.20	263.00
R090	594015.08	4844079.42	261.20	260.00
R091	594260.18	4844081.85	262.20	261.00
R092	593572.13	4844081.85	264.62	263.42

Location	Coordinates[1] (m)		Elevations[2] (m)	
	Northing	Easting	Receptor	Ground
R093	593674.31	4844083.99	264.20	263.00
R094	593563.75	4844087.04	264.42	263.22
R095	594273.89	4844089.47	262.20	261.00
R096	593704.68	4844090.08	264.20	263.00
R097	594286.89	4844092.52	262.29	261.09
R098	594073.98	4844094.35	261.37	260.17
R099	593558.07	4844095.57	264.20	263.00
R100	594299.50	4844101.06	262.09	260.89
R101	593739.43	4844102.58	264.06	262.86
R102	594310.62	4844106.54	262.20	261.00
R103	593554.07	4844108.07	263.77	262.57
R104	593787.13	4844116.60	263.42	262.22
R105	593553.23	4844116.60	263.65	262.45
R106	594323.23	4844116.91	262.17	260.97
R107	593822.45	4844118.43	263.26	262.06
R108	593876.89	4844124.53	262.81	261.61
R109	593906.95	4844126.96	262.36	261.16
R110	593963.38	4844131.54	261.73	260.53
R111	593556.36	4844132.45	263.76	262.56
R112	593995.31	4844135.50	262.08	260.88
R113	594445.95	4844138.85	262.21	261.01
R114	593560.55	4844140.07	263.78	262.58
R115	594480.36	4844149.52	262.38	261.18
R116	593570.00	4844153.48	263.84	262.64
R117	594422.18	4844154.09	262.21	261.01
R118	594068.69	4844154.40	261.68	260.48
R119	593574.87	4844157.44	263.87	262.67
R120	594409.38	4844168.11	262.20	261.00
R121	594495.06	4844169.94	262.57	261.37
R122	594380.38	4844173.60	261.64	260.44
R123	594390.52	4844180.91	261.85	260.65
R124	594507.94	4844186.40	262.70	261.50
R125	593586.30	4844195.85	262.79	261.59
R126	594517.70	4844199.51	263.01	261.81
R127	594527.87	4844213.53	263.12	261.92
R128	593415.58	4844220.54	256.71	255.51
R129	594542.12	4844227.55	263.35	262.15
R130	593168.96	4844232.42	256.51	255.31
R131	594552.56	4844238.52	263.66	262.46
R132	594563.57	4844254.07	263.86	262.66
R133	593380.68	4844258.64	257.15	255.95
R134	594574.24	4844269.92	264.20	263.00
R135	593358.01	4844270.52	257.20	256.00
R136	594592.45	4844281.50	264.20	263.00
R137	594616.57	4844293.08	263.85	262.65
R138	594636.49	4844310.15	263.20	262.00
R139	594646.82	4844321.43	263.20	262.00
R140	594665.07	4844333.92	263.20	262.00

Location	Coordinates[1] (m)		Elevations[2] (m)	
	Northing	Easting	Receptor	Ground
R141	594681.75	4844354.65	263.20	262.00
R142	594686.06	4844376.90	263.20	262.00
R143	593160.31	4844380.56	259.86	258.66
R144	594677.75	4844404.03	261.01	259.81
R145	594658.74	4844420.49	260.07	258.87
R146	593078.81	4844435.12	258.95	257.75
R147	593282.68	4844586.60	262.12	260.92
R148	593245.69	4844612.51	263.06	261.86

Notes:

1. Northing and Easting coordinates are provided in the UTM coordinate projection using datum NAD83 zone 17N.
2. The receptor and ground elevations provided are the elevations above sea level. All receptors were modeled at a relative elevation of 1.2 m above ground.

5.0 Results

The following sections describe the noise prediction results, noise impact assessment results and the resulting noise mitigation recommendations.

5.1 Noise Modelling Results

The predicted average sound levels for the Existing, Future "no-build" and Future "build" scenarios are summarized in Table 3.

Table 3. NOISE LEVEL PREDICTIONS

Location	Existing Daytime (16-hr) L_{eq} (dBA)	Future "no-build" Daytime (16-hr) L_{eq} (dBA)	Future "build" Daytime (16-hr) L_{eq} (dBA)	Noise Impact[1] (dB)	Noise Impact ≥ 5 dB (Yes/No)	Future "build" ≥ 65 dBA [2] (Yes/No)
R001	43.6	44.8	47.4	2.6	No	No
R002	43.9	45.1	47.6	2.5	No	No
R003	43.9	45.2	47.9	2.7	No	No
R004	44.2	45.4	48.0	2.6	No	No
R005	44.4	45.7	48.2	2.5	No	No
R006	44.7	45.9	48.3	2.4	No	No
R007	45.1	46.3	48.5	2.2	No	No
R008	45.4	46.6	48.9	2.3	No	No
R009	45.7	46.9	49.0	2.1	No	No
R010	46.1	47.3	49.3	2.0	No	No
R011	46.5	47.7	49.7	2.0	No	No
R012	46.9	48.2	50.0	1.8	No	No
R013	47.4	48.7	50.4	1.7	No	No
R014	47.9	49.1	50.8	1.7	No	No
R015	48.4	49.7	51.3	1.6	No	No
R016	49.1	50.4	51.8	1.4	No	No
R017	49.8	51.1	52.5	1.4	No	No
R018	50.8	52.0	53.2	1.2	No	No
R019	47.6	48.8	50.5	1.7	No	No

Location	Existing Daytime (16-hr) L_{eq} (dBA)	Future "no-build" Daytime (16-hr) L_{eq} (dBA)	Future "build" Daytime (16-hr) L_{eq} (dBA)	Noise Impact[1] (dB)	Noise Impact ≥ 5 dB (Yes/No)	Future "build" ≥ 65 dBA [2] (Yes/No)
R020	47.4	48.6	50.4	1.8	No	No
R021	47.1	48.4	50.2	1.8	No	No
R022	47.0	48.2	50.0	1.8	No	No
R023	46.9	48.2	50.0	1.8	No	No
R024	46.9	48.2	49.9	1.7	No	No
R025	46.9	48.2	50.0	1.8	No	No
R026	47.0	48.2	50.0	1.8	No	No
R027	47.1	48.3	50.0	1.7	No	No
R028	47.3	48.5	50.3	1.8	No	No
R029	47.9	49.1	51.0	1.9	No	No
R030	48.5	49.7	51.7	2.0	No	No
R031	49.0	50.2	52.3	2.1	No	No
R032	49.7	51.0	53.0	2.0	No	No
R033	50.4	51.6	53.7	2.1	No	No
R034	51.1	52.4	54.4	2.0	No	No
R035	50.7	51.9	54.1	2.2	No	No
R036	51.0	52.2	54.4	2.2	No	No
R037	51.6	52.9	54.9	2.0	No	No
R038	52.0	53.2	55.3	2.1	No	No
R039	52.5	53.7	55.8	2.1	No	No
R040	52.7	53.9	56.0	2.1	No	No
R041	53.5	54.7	56.9	2.2	No	No
R042	54.0	55.3	57.3	2.0	No	No
R043	54.6	55.8	57.8	2.0	No	No
R044	55.2	56.4	58.4	2.0	No	No
R045	55.8	57.1	59.0	1.9	No	No
R046	56.0	57.3	59.2	1.9	No	No
R047	55.8	57.0	59.0	2.0	No	No
R048	53.6	54.9	56.7	1.8	No	No
R049	55.9	57.1	59.0	1.9	No	No
R050	54.1	55.4	57.3	1.9	No	No
R051	55.0	56.2	58.1	1.9	No	No
R052	54.7	55.9	57.8	1.9	No	No
R053	55.2	56.4	58.3	1.9	No	No
R054	55.8	57.0	58.9	1.9	No	No
R055	55.8	57.0	58.9	1.9	No	No
R056	56.4	57.6	59.4	1.8	No	No
R057	54.7	55.9	56.5	0.6	No	No
R058	56.7	57.9	59.7	1.8	No	No
R059	54.8	56.1	58.6	2.5	No	No
R060	56.9	58.1	59.9	1.8	No	No
R061	54.4	55.7	58.2	2.5	No	No
R062	53.9	55.2	57.7	2.5	No	No
R063	53.5	54.8	57.1	2.3	No	No
R064	53.3	54.6	56.9	2.3	No	No
R065	52.9	54.2	56.5	2.3	No	No

Location	Existing Daytime (16-hr) L_{eq} (dBA)	Future "no-build" Daytime (16-hr) L_{eq} (dBA)	Future "build" Daytime (16-hr) L_{eq} (dBA)	Noise Impact[1] (dB)	Noise Impact ≥ 5 dB (Yes/No)	Future "build" ≥ 65 dBA [2] (Yes/No)
R066	57.1	58.3	60.1	1.8	No	No
R067	52.3	53.6	55.7	2.1	No	No
R068	52.7	54.0	56.2	2.2	No	No
R069	52.4	53.7	55.6	1.9	No	No
R070	52.1	53.3	54.6	1.3	No	No
R071	**62.9**	**64.2**	**66.0**	**1.8**	**No**	**Yes**
R072	52.2	53.4	53.9	0.5	No	No
R073	55.1	56.3	58.3	2.0	No	No
R074	51.9	53.1	53.2	0.1	No	No
R075	56.2	57.4	58.6	1.2	No	No
R076	56.0	57.2	58.3	1.1	No	No
R077	56.4	57.6	58.8	1.2	No	No
R078	55.1	56.3	57.3	1.0	No	No
R079	56.5	57.7	59.0	1.3	No	No
R080	54.3	55.5	56.4	0.9	No	No
R081	51.5	52.7	52.5	-0.2	No	No
R082	57.1	58.3	59.6	1.3	No	No
R083	53.9	55.1	55.9	0.8	No	No
R084	57.1	58.3	59.5	1.2	No	No
R085	53.3	54.5	55.3	0.8	No	No
R086	53.0	54.2	55.0	0.8	No	No
R087	57.4	58.6	59.7	1.1	No	No
R088	51.3	52.5	51.8	-0.7	No	No
R089	52.7	53.9	54.7	0.8	No	No
R090	56.1	57.2	51.7	-5.5	No	No
R091	52.3	53.5	55.3	1.8	No	No
R092	57.4	58.6	59.8	1.2	No	No
R093	52.4	53.6	54.5	0.9	No	No
R094	57.6	58.8	60.0	1.2	No	No
R095	52.1	53.3	55.2	1.9	No	No
R096	53.1	54.3	55.5	1.2	No	No
R097	52.5	53.7	55.5	1.8	No	No
R098	50.6	51.8	51.1	-0.7	No	No
R099	58.0	59.2	60.2	1.0	No	No
R100	52.6	53.8	55.6	1.8	No	No
R101	51.6	52.8	54.1	1.3	No	No
R102	53.1	54.3	56.2	1.9	No	No
R103	60.5	61.7	62.5	0.8	No	No
R104	50.2	51.4	52.6	1.2	No	No
R105	61.9	63.1	63.8	0.7	No	No
R106	53.2	54.4	56.3	1.9	No	No
R107	49.9	51.1	51.9	0.8	No	No
R108	48.8	50.0	51.3	1.3	No	No
R109	48.8	49.9	50.9	1.0	No	No
R110	49.0	50.2	50.5	0.3	No	No
R111	61.3	62.5	63.3	0.8	No	No

Location	Existing Daytime (16-hr) L_{eq} (dBA)	Future "no-build" Daytime (16-hr) L_{eq} (dBA)	Future "build" Daytime (16-hr) L_{eq} (dBA)	Noise Impact[1] (dB)	Noise Impact ≥ 5 dB (Yes/No)	Future "build" ≥ 65 dBA [2] (Yes/No)
R112	50.4	51.6	50.6	-1.0	No	No
R113	53.4	54.6	56.5	1.9	No	No
R114	60.3	61.5	62.3	0.8	No	No
R115	55.1	56.3	58.2	1.9	No	No
R116	58.6	59.8	60.5	0.7	No	No
R117	54.0	55.2	57.0	1.8	No	No
R118	49.8	51.0	50.1	-0.9	No	No
R119	58.2	59.4	60.0	0.6	No	No
R120	52.8	54.0	55.8	1.8	No	No
R121	55.1	56.3	58.1	1.8	No	No
R122	51.8	53.0	54.9	1.9	No	No
R123	51.6	52.8	54.6	1.8	No	No
R124	54.9	56.2	57.9	1.7	No	No
R125	55.5	56.7	57.3	0.6	No	No
R126	55.1	56.3	58.0	1.7	No	No
R127	54.7	56.0	57.7	1.7	No	No
R128	**66.6**	**67.8**	**68.4**	**0.6**	**No**	**Yes**
R129	54.7	56.0	57.7	1.7	No	No
R130	55.2	56.4	56.4	0.0	No	No
R131	54.8	56.1	57.7	1.6	No	No
R132	54.4	55.6	57.2	1.6	No	No
R133	**65.9**	**67.0**	**67.7**	**0.7**	**No**	**Yes**
R134	54.0	55.2	56.9	1.7	No	No
R135	**68.0**	**69.2**	**69.3**	**0.1**	**No**	**Yes**
R136	54.4	55.6	57.2	1.6	No	No
R137	55.4	56.6	58.2	1.6	No	No
R138	55.0	56.2	57.8	1.6	No	No
R139	54.8	56.0	57.6	1.6	No	No
R140	55.1	56.3	57.9	1.6	No	No
R141	53.9	55.1	56.7	1.6	No	No
R142	56.0	57.2	58.7	1.5	No	No
R143	**64.5**	**65.7**	**65.5**	**-0.2**	**No**	**Yes**
R144	53.9	55.1	56.7	1.6	No	No
R145	50.5	51.8	53.4	1.6	No	No
R146	60.8	62.0	61.6	-0.4	No	No
R147	51.3	52.5	52.3	-0.2	No	No
R148	51.8	52.9	52.7	-0.2	No	No

Notes:

1. The noise impact is defined as the Future "build" noise level minus the Future "no-build" noise level. A positive value indicates an increased impact and a negative value indicates a decreased impact.

The predicted noise impacts from Table 3 are all below the 5 dB criterion. However, the overall Future "build" sound levels at five receivers (R071, R128, R133, R135 and R143) are above the 65 dBA criterion.

Receiver R071 represents the most exposed façade of dwelling adjacent to Highway 410 on the south side. The OLA for this dwelling is currently protected by a 2.5 metre high sound barrier. The sound level

in the OLA would be similar to that of R066 which is located in the same area, has similar setback from Highway 410 and is also protected by a 2.5 metre high sound barrier. The sound level in the OLA of R066 is 60.1 dBA and is below the 65 dBA criterion. Therefore, no further mitigation investigation is warranted for R071.

Receivers R128, R133, R135 and R143 represent dwellings with frontage exposure onto Hurontario Street north of the Highway 410 interchange. The predicted sound levels in the front yards are 66.6, 65.9, 68.0 and 64.5 for R128, R133, R135 and R143, respectively. All of these dwellings have outdoor lining areas in the rear yards and the building structures provide noise attenuation in those areas. The sound levels in the outdoor living areas in the rear yard locations will, therefore, be below the 65 dBA criterion. Therefore, no further mitigation investigation is warranted for R128, R133, R135 and R143.

5.2 Mitigation Recommendations

The results presented in Table 3 indicate that the predicted noise are all below the 5 dB criterion but the overall Future "build" sound levels at five receivers (R071, R128, R133, R135 and R143) are above the 65 dBA criterion. As discussed in Section 5.1 the exceedances of the 65 dBA criterion represent the values at the most exposed façade. However, according to the MTO Noise Guide the need for mitigation must be determined based on the OLA sound levels. In each case for R071, R128, R133, R135 and R143 the OLA sound levels are expected to be below the 65 dBA criterion. Therefore, based on the noise modelling results, consideration for noise mitigation is not a requirement for the project.

6.0 Construction Noise

The following sections describe policies to consider with respect to the generation and mitigation of construction noise related to the project.

6.1 Local By-Laws

All construction activities should comply with the Town of Caledon By-Law 86-110 [2] "A by-law to control noise".

6.2 MOECC Sound Emission Standards

MOECC Publication NPC-115 [4] provides sound emission standards for various types of construction equipment. Due to the temporary and unavoidable nature of construction, these MOECC guidelines stipulate limits on individual pieces of equipment instead of a site limit. Table 4 illustrates maximum noise emission levels which should be adhered to for typical construction equipment per NPC-115.

Table 4. NPC-115 NOISE EMISSION LIMITS FOR CONSTRUCTION EQUIPMENT

Type of Equipment	Maximum Sound Level (dBA)(1)	Power Rating (kW)
Excavation equipment, bulldozers, loaders, backhoes or other equipment	83	Less than 75
	85	75 and greater
Pneumatic Pavement Breakers	85	-
Portable Air Compressors	70	-

(1) Maximum Sound Level (dBA) as determined using Publication NPC – 103 – Procedures, Section 6

6.3 Contract Documentation

The construction contract should include provisions relating to the adequate control of noise, compliance with related laws, establishment of a complaints process and outline the responsibilities with respect to investigations of noise up to and including remedial measures.

The contract documents should also explicitly state that compliance with all applicable law is an expectation of the contract including adherence to the Town of Caledon Noise By-Law 86-110 and MOECC Publication NPC-115.

7.0 Conclusions and Recommendations

The results presented in Table 3 indicate that the predicted noise are all below the 5 dB criterion but the overall Future "build" sound levels at five receivers (R071, R128, R133, R135 and R143) are above the 65 dBA criterion. As discussed in Section 5.1 the exceedances of the 65 dBA criterion represent the values at the most exposed façade. However, according to the MTO Noise Guide the need for mitigation must be determined based on the OLA sound levels. In each case for R071, R128, R133, R135 and R143 the OLA sound levels are expected to be below the 65 dBA criterion. Therefore based on the noise modelling results consideration for noise mitigation is not a requirement for the project.

Construction noise impacts are temporary and largely unavoidable. However, the contract documents should identify the contractor's responsibilities with respect to controlling noise, as well as recording, investigating and if possible addressing complaints. The contract documents should also explicitly state that compliance with all applicable law is an expectation of the contract including adherence to the Town of Caledon Noise By-Law 86-110 and MOECC Publication NPC-115.

8.0 Closure

This road traffic noise impact study was completed by Wood for the sole benefit of the Town of Caledon, and is based on information available at the time of this study. We have relied on information provided to us by others and therefore are not liable or responsible for incomplete, incorrect and inadequate information. The material in it reflects Wood's judgment in light of the information available to us at the time of preparation.

Yours truly,
Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited

Written by: Buddy Ledger, P.Eng., M.A.Sc., INCE
Department Head & Senior Engineer
Acoustics & Vibration

Signature: _____ Date: November 16, 2018

Reviewed by: Alfredo Rodrigues, EngSci.
Senior Specialist
Acoustics & Vibration

Signature: _____ Date: November 16, 2018

9.0 References

[1] Ontario Ministry of Transportation, "Environmental Guide for Noise," October 2006 (Version 1.1 updated July 2008).

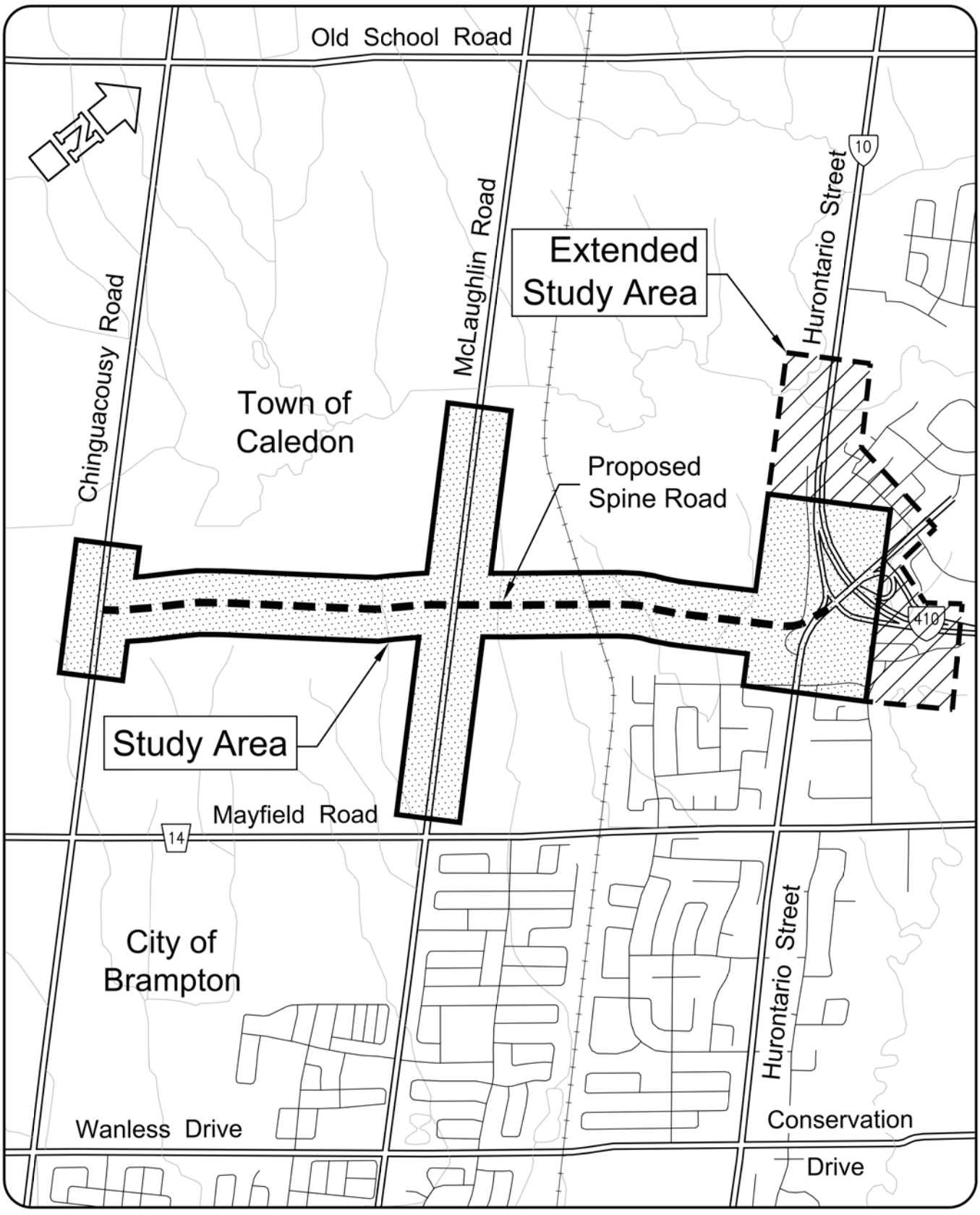
[2] The Corporation of the Town of Caledon, *By-Law No. 86-110 - A by-law to control noise,* Caledon, ON, 1986.

[3] M. C. Lau, C. S. Lee, J. L. Rochat, E. R. Boeker and G. G. Fleming, "FHWA Traffic Noise Model® User's Guide (Version 2.5 Addendum)," Federal Highway Administration, Washington, D.C., 2004.

[4] Ontario Ministry of the Environment and Climate Change, *Publication NPC-115 Construction Equipment*.

Appendix A:

Study Area Figure

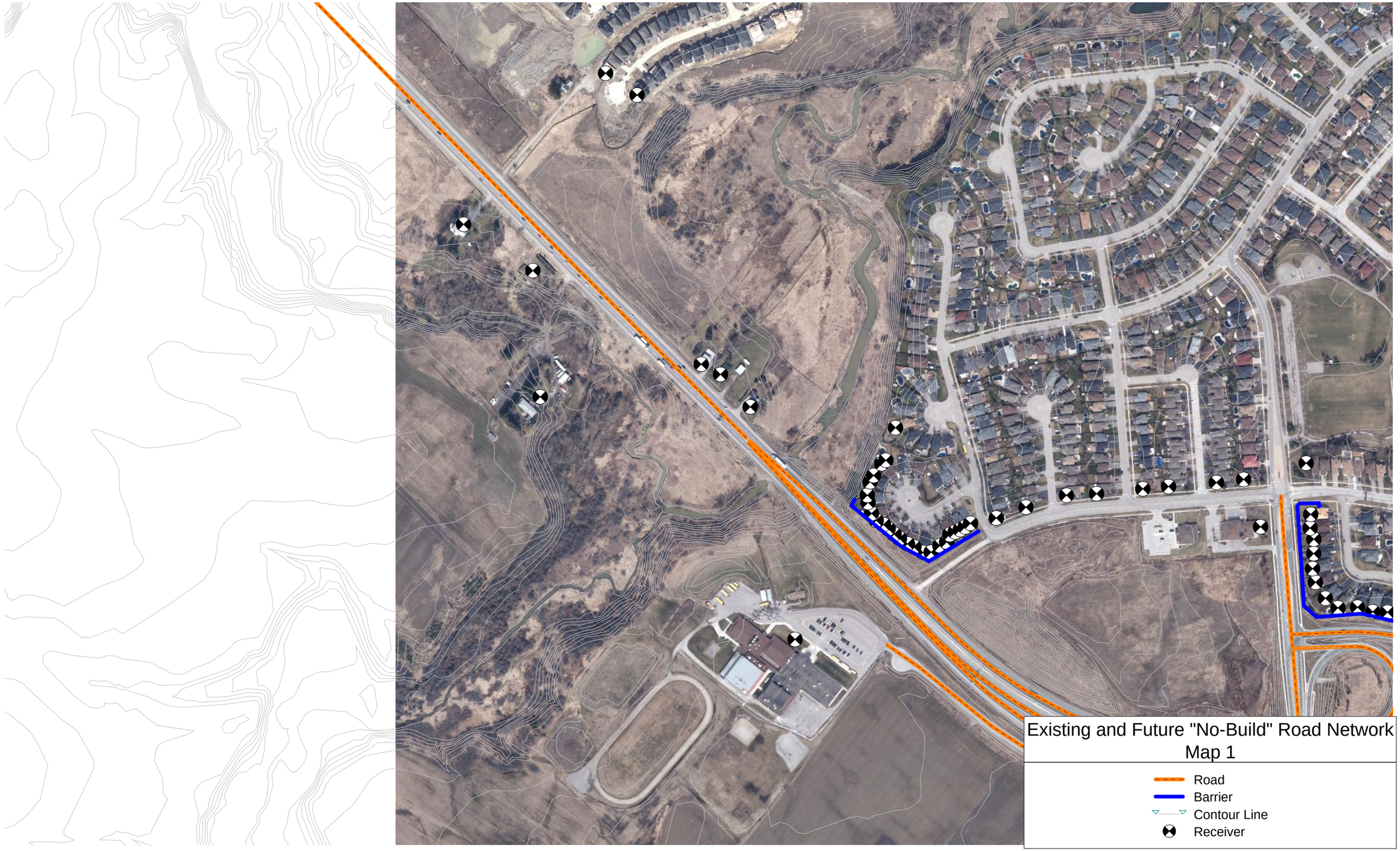

Old School Road
Chinguacousy Road
McLaughlin Road
Hurontario Street
10
Extended Study Area
Town of Caledon
Proposed Spine Road
410
Study Area
Mayfield Road
14
City of Brampton
Hurontario Street
Wanless Drive
Conservation Drive

Appendix B:

Existing and Future "No-Build" Road Network

592600 592700 592800 592900 593000 593100 593200 593300 593400 593500 593600 593700 593800 593900 594000 594100

4844600 4844500 4844400 4844300 4844200 4844100 4844000 4843900 4843800



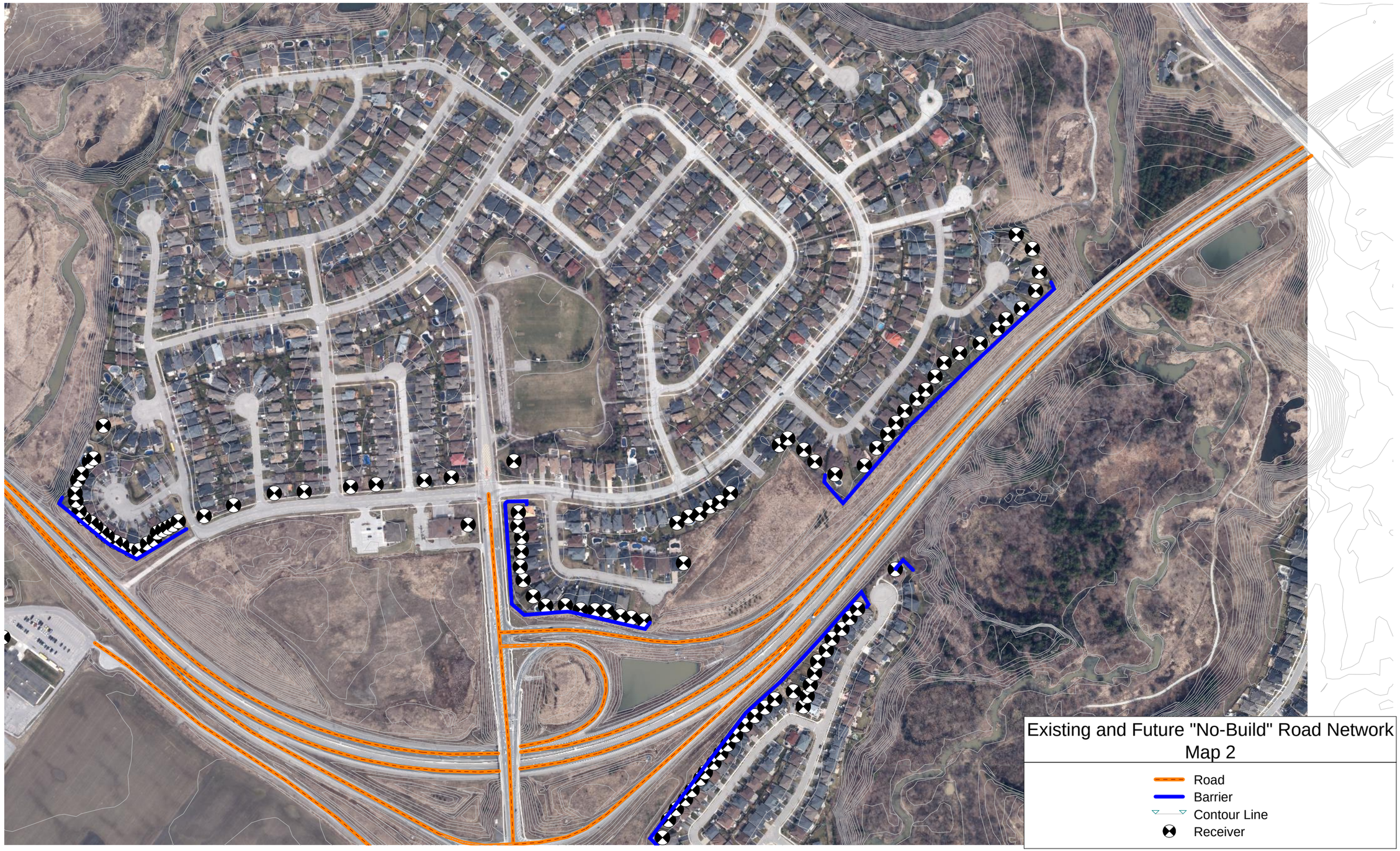
Existing and Future "No-Build" Road Network
Map 1

- Road
- Barrier
- Contour Line
- Receiver

592600 592700 592800 592900 593000 593100 593200 593300 593400 593500 593600 593700 593800 593900 594000 594100

593500 593600 593700 593800 593900 594000 594100 594200 594300 594400 594500 594600 594700 594800 594900 595000

4844600 4844500 4844400 4844300 4844200 4844100 4844000 4843900 4843800



593500 593600 593700 593800 593900 594000 594100 594200 594300 594400 594500 594600 594700 594800 594900 595000

4844600 4844500 4844400 4844300 4844200 4844100 4844000 4843900 4843800

593500 593600 593700 593800 593900 594000 594100 594200 594300 594400 594500 594600 594700 594800 594900 595000

4843600 4843500 4843400 4843300 4843200 4843100 4843000 4842900 4842800

Existing and Future "No-Build" Road Network
Map 3

- Road
- Barrier
- Contour Line
- Receiver

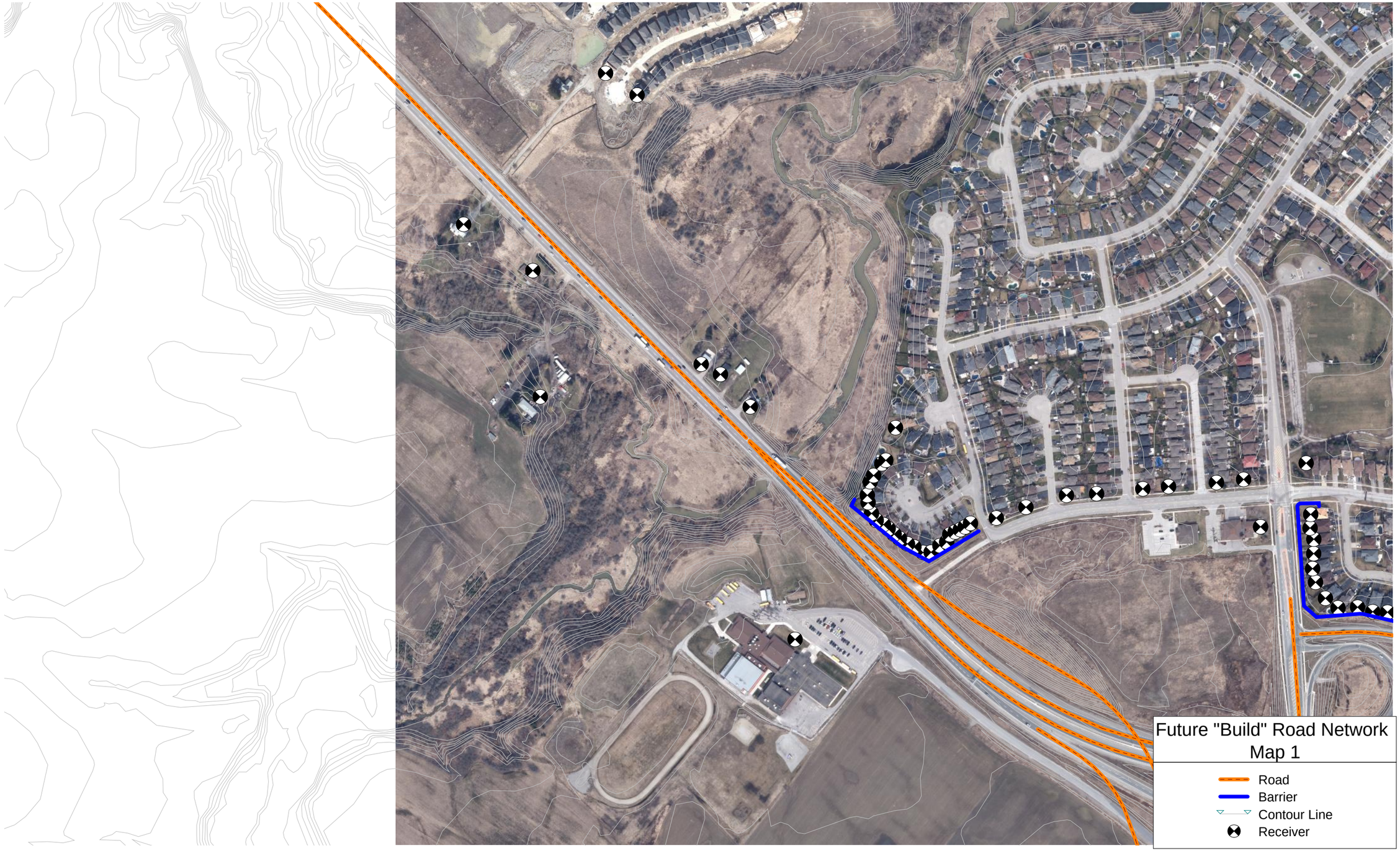
593500 593600 593700 593800 593900 594000 594100 594200 594300 594400 594500 594600 594700 594800 594900 595000

Appendix A:

Future “Build” Road Network

592600 592700 592800 592900 593000 593100 593200 593300 593400 593500 593600 593700 593800 593900 594000 594100

4844600 4844500 4844400 4844300 4844200 4844100 4844000 4843900 4843800



Future "Build" Road Network
Map 1

- Road
- Barrier
- Contour Line
- Receiver

592600 592700 592800 592900 593000 593100 593200 593300 593400 593500 593600 593700 593800 593900 594000 594100

593500 593600 593700 593800 593900 594000 594100 594200 594300 594400 594500 594600 594700 594800 594900 595000

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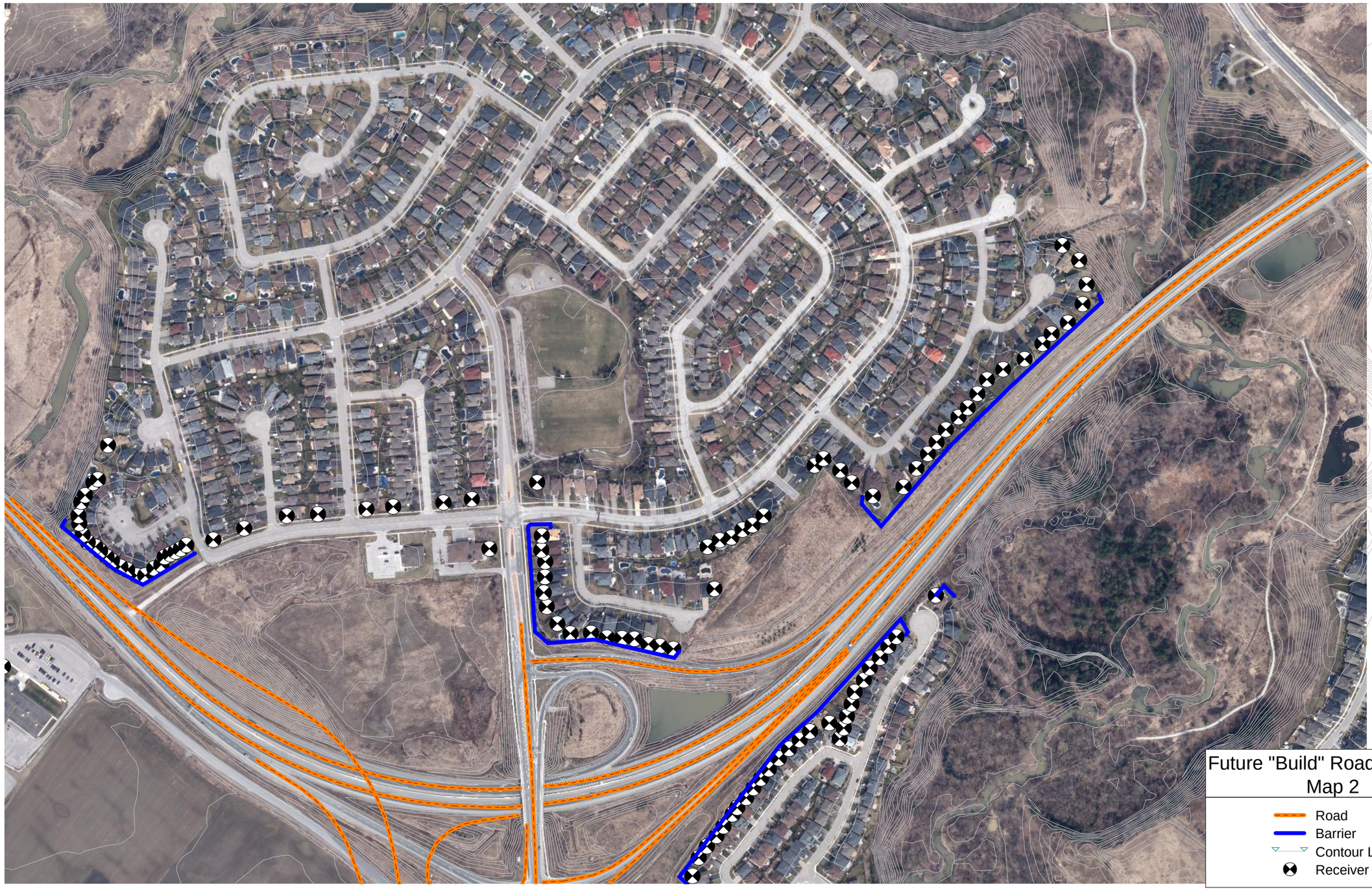

Future "Build" Road Network
Map 2

- Road
- Barrier
- Contour Line
- Receiver

593500 593600 593700 593800 593900 594000 594100 594200 594300 594400 594500 594600 594700 594800 594900 595000

593500 593600 593700 593800 593900 594000 594100 594200 594300 594400 594500 594600 594700 594800 594900 595000

4843600 4843500 4843400 4843300 4843200 4843100 4843000 4842900 4842800

Future "Build" Road Network
Map 3

- Road
- Barrier
- Contour Line
- Receiver

593500 593600 593700 593800 593900 594000 594100 594200 594300 594400 594500 594600 594700 594800 594900 595000

Appendix B:

Summary of Traffic Data

Existing (2017)

ID	Road	Road Segment	Estimated AADT	Traffic Split				Speed (km/h)	Average Vehicles/hour				Day-time			
				Day (% of AADT)	Night (% of AADT)	Heavys (% of AADT)	Medium (% of AADT)		Day		Night					
									7:00	23:00	23:00	7:00				
									16	hours	8	hours	Autos	Heavy	Medium	Total
1a	WB Valleywood Blvd.	North of Interchange	7,390	80%	20%	1.00%	1.00%	50	370		185		363	4	4	371
1b	EB Valleywood Blvd.	North of Interchange	7,560	80%	20%	2.00%	2.00%	50	378		189		363	8	8	379
1c	WB & EB Valleywood Blvd.	North of Interchange	14,950	-	-	-	-	-	748		374		726	12	12	750
2	Proposed On-Ramp	NB Hurontario St. to NB Hwy 410	0	80%	20%	4.00%	2.50%	50	0		0		0	0	0	0
3	Proposed On-Ramp	WB Valleywood Blvd. to SB Hwy 410	0	80%	20%	1.50%	1.00%	30	0		0		0	0	0	0
4	Proposed On-Ramp	NB Hurontario St. to SB Hwy 410	0	80%	20%	1.50%	1.00%	50	0		0		0	0	0	0
4	Proposed On-Ramp	EB Spine Rd. to SB Hwy 410	1,980	80%	20%	1.50%	1.00%	70	99		50		97	1	1	99
5	Proposed Off-Ramp	SB Hwy 410 to SB Hurontario St.	5,180	80%	20%	2.50%	2.00%	50	259		130		247	6	5	258
6	Existing Off-Ramp	NB Hwy 410 to Valleywood Blvd	6,890	80%	20%	1.25%	0.50%	70	345		172		339	4	2	345
7	Existing On-Ramp	Valleywood Blvd. to NB Hwy 410	4,160	80%	20%	4.00%	2.50%	30	208		104		194	8	5	207
8a	NB Hwy 410	North of Interchange	20,580	80%	20%	4.00%	4.00%	80	1029		515		947	41	41	1029
8b	SB Hwy 410	North of Interchange	20,900	80%	20%	4.00%	4.00%	80	1045		523		961	42	42	1045
8c	NB & SB Hwy 410	North of Interchange	41,480	-	-	-	-	-	2074		1038		1908	83	83	2074
9a	NB Hwy 410	South of Interchange	23,070	80%	20%	4.00%	4.00%	80	1154		577		1062	46	46	1154
9b	SB Hwy 410	South of Interchange	21,040	80%	20%	4.00%	4.00%	80	1052		526		968	42	42	1052
9c	NB & SB Hwy 410	South of Interchange	44,110	-	-	-	-	-	2206		1103		2030	88	88	2206
10a	NB Hurontario St	South of Interchange	8,260	80%	20%	2.50%	2.50%	50	413		207		392	10	10	412
10b	SB Hurontario St	South of Interchange	10,100	80%	20%	2.50%	2.50%	50	505		253		480	13	13	506
10c	NB & SB Hurontario St	South of Interchange	18,360	-	-	-	-	-	918		460		872	23	23	918

Future "No-Build" (2031)

ID	Road	Road Segment	Estimated AADT	Traffic Split				Speed (km/h)	Average			Day-time			
				Day (% of AADT)	Night (% of AADT)	Heavys (% of AADT)	Medium (% of AADT)		Day 7:00 16 hours	Day 23:00 hours	Night 23:00 8 hours	Night 7:00 hours	Autos	Heavy	Medium	Total
1a	WB Valleywood Blvd.	North of Interchange	9,751	80%	20%	1.00%	1.00%	50	488		244		478	5	5	488
1b	EB Valleywood Blvd.	North of Interchange	9,975	80%	20%	2.00%	2.00%	50	499		249		479	10	10	499
1c	WB & EB Valleywood Blvd.	North of Interchange	19,726	-	-	-	-	-	987		493		957	15	15	987
2	Proposed On-Ramp	NB Hurontario St. to NB Hwy 410	0	80%	20%	4.00%	2.50%	50	0		0		0	0	0	0
3	Proposed On-Ramp	WB Valleywood Blvd. to SB Hwy 410	0	80%	20%	1.50%	1.00%	30	0		0		0	0	0	0
4	Proposed On-Ramp	NB Hurontario St. to SB Hwy 410	0	80%	20%	1.50%	1.00%	50	0		0		0	0	0	0
4	Proposed On-Ramp	EB Spine Rd. to SB Hwy 410	2,613	80%	20%	1.50%	1.00%	70	131		65		128	2	1	131
5	Proposed Off-Ramp	SB Hwy 410 to SB Hurontario St.	6,835	80%	20%	2.50%	2.00%	50	342		171		327	9	7	343
6	Existing Off-Ramp	NB Hwy 410 to Valleywood Blvd	9,091	80%	20%	1.25%	0.50%	70	455		227		447	6	2	455
7	Existing On-Ramp	Valleywood Blvd. to NB Hwy 410	5,489	80%	20%	4.00%	2.50%	30	274		137		256	11	7	274
8a	NB Hwy 410	North of Interchange	27,155	80%	20%	4.00%	4.00%	80	1358		679		1249	54	54	1357
8b	SB Hwy 410	North of Interchange	27,577	80%	20%	4.00%	4.00%	80	1379		689		1269	55	55	1379
8c	NB & SB Hwy 410	North of Interchange	54,732	-	-	-	-	-	2737		1368		2518	109	109	2736
9a	NB Hwy 410	South of Interchange	30,440	80%	20%	4.00%	4.00%	80	1522		761		1400	61	61	1522
9b	SB Hwy 410	South of Interchange	27,762	80%	20%	4.00%	4.00%	80	1388		694		1277	56	56	1389
9c	NB & SB Hwy 410	South of Interchange	58,202	-	-	-	-	-	2910		1455		2677	117	117	2911
10a	NB Hurontario St	South of Interchange	10,899	80%	20%	2.50%	2.50%	50	545		272		518	14	14	546
10b	SB Hurontario St	South of Interchange	13,327	80%	20%	2.50%	2.50%	50	666		333		633	17	17	667
10c	NB & SB Hurontario St	South of Interchange	24,226	-	-	-	-	-	1211		605		1151	31	31	1213

Future "Build" (2031)

ID	Road	Road Segment	Estimated AADT	Traffic Split				Speed (km/h)	Average				Day-time			
				Day (% of AADT)	Night (% of AADT)	Heavys (% of AADT)	Medium (% of AADT)		Day 7:00 16 hours		Night 23:00 8 hours		Autos	Heavy	Medium	Total
1a	WB Valleywood Blvd.	North of Interchange	23,070	80%	20%	1.00%	1.00%	50	1154		577		1131	12	12	1155
1b	EB Valleywood Blvd.	North of Interchange	14,160	80%	20%	2.00%	2.00%	50	708		354		680	14	14	708
1c	WB & EB Valleywood Blvd.	North of Interchange	37,230	-	-	-	-	-	1862		931		1811	26	26	1863
2	Proposed On-Ramp	NB Hurontario St. to NB Hwy 410	9,890	80%	20%	4.00%	2.50%	50	495		247		463	20	12	495
3	Proposed On-Ramp	WB Valleywood Blvd. to SB Hwy 410	940	80%	20%	1.50%	1.00%	30	47		24		46	1	0	47
4	Proposed On-Ramp	NB Hurontario St. to SB Hwy 410	2,960	80%	20%	1.50%	1.00%	50	148		74		144	2	1	147
4	Proposed On-Ramp	EB Spine Rd. to SB Hwy 410	9,640	80%	20%	1.50%	1.00%	70	482		241		470	7	5	482
5	Proposed Off-Ramp	SB Hwy 410 to SB Hurontario St.	9,200	80%	20%	2.50%	2.00%	50	460		230		439	12	9	460
6	Existing Off-Ramp	NB Hwy 410 to Valleywood Blvd	22,910	80%	20%	1.25%	0.50%	70	1146		573		1126	14	6	1146
7	Existing On-Ramp	Valleywood Blvd. to NB Hwy 410	0	80%	20%	4.00%	2.50%	30	0		0		0	0	0	0
8a	NB Hwy 410	North of Interchange	32,980	80%	20%	4.00%	4.00%	80	1649		825		1517	66	66	1649
8b	SB Hwy 410	North of Interchange	30,330	80%	20%	4.00%	4.00%	80	1517		758		1396	61	61	1518
8c	NB & SB Hwy 410	North of Interchange	63,310	-	-	-	-	-	3166		1583		2913	127	127	3167
9a	NB Hwy 410	South of Interchange	46,010	80%	20%	4.00%	4.00%	80	2301		1150		2117	92	92	2301
9b	SB Hwy 410	South of Interchange	38,540	80%	20%	4.00%	4.00%	80	1927		964		1773	77	77	1927
9c	NB & SB Hwy 410	South of Interchange	84,550	-	-	-	-	-	4228		2114		3890	169	169	4228
10a	NB Hurontario St	South of Interchange	16,190	80%	20%	2.50%	2.50%	50	810		405		770	20	20	810
10b	SB Hurontario St	South of Interchange	14,160	80%	20%	2.50%	2.50%	50	708		354		673	18	18	709
10c	NB & SB Hurontario St	South of Interchange	30,350	-	-	-	-	-	1518		759		1443	38	38	1519
11a	WB Spine Road	South of Interchange	19,730	80%	20%	1.00%	1.00%	50	987		493		967	10	10	987
11b	EB Spine Road	South of Interchange	13,100	80%	20%	1.00%	1.00%	50	655		328		642	7	7	656
11c	WB & EB Spine Road	South of Interchange	32,830	-	-	-	-	-	1642		821		1609	17	17	1643