

DIXIE MALL REDEVELOPMENT

MISSISSAUGA, ONTARIO

NOISE AND VIBRATION IMPACT STUDY

RWDI #2100834

December 6, 2022

SUBMITTED TO

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VERSION HISTORY

Index	Date	Description	Prepared by	Reviewed by
1	November 30, 2022	Draft	KD	GER
2	December 6, 2022	Final	KD	GER



EXECUTIVE SUMMARY

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed Dixie Mall Redevelopment located in Mississauga, Ontario. The proposed development will consist of 4 blocks. Block 1 is a public park. Block 2 consists of a 6-storey building. Block 3 consists of an 18-storey and 25-storey building. Block 4 consists of a 9-storey and 12-storey building. This assessment was completed to support the Official Plan Amendment (OPA) and Re-Zoning Application (RZA) submission as required by the City of Mississauga.

The following noise control measures are recommended for the proposed development:

1. Installation of central air-conditioning so that all suites' windows can remain closed.
2. The inclusion of noise warning clauses related to transportation sound levels at the building façade and in the outdoor amenity areas.
3. Minimum sound isolation performance:
 - a. Suite bedroom window glazing with minimum sound isolation performance of STC-38.
 - b. Suite exterior balcony door with minimum sound isolation performance of STC-35.
4. Construction of perimeter noise barriers along the outdoor amenity areas if feasible, with the applicable warning clause.

Rail is located further than 500 m away from the proposed development, therefore no noise or vibration impacts from rail are expected.

Existing industrial or commercial facilities are distant and are not anticipated to affect sound levels at the development. Thus, stationary sources were not assessed.

At this stage in design the noise levels produced by the development on itself and its surroundings could not be quantitatively assessed. However, the effect on both the building itself and its surroundings is expected to be feasible to meet the applicable criteria. We recommend that the building design is evaluated prior to building permit to ensure that the acoustical design is adequately implemented in order to meet the applicable criteria.

Based on the results of the analysis including implementation of the recommendations included with this assessment, the proposed development is feasible to meet the applicable sound and vibration criteria.



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1 INTRODUCTION

Slate Asset Management retained RWDI to prepare a Noise and Vibration Impact Study for the proposed Dixie Mall Redevelopment located in Mississauga, Ontario. The proposed development will consist of 4 blocks. Block 1 is a public park. Block 2 consists of a 6-storey building. Block 3 consists of an 18-storey and 25-storey building. Block 4 consists of a 9-storey and 12-storey building. The context site plan is shown in **Figure 1**.

The site is exposed to noise from road traffic from: the North Service Road, South Service Road and the QEW to the north and Dixie Road to the east.

Rail is located further than 500 m away from the proposed development, therefore no noise or vibration impacts from rail are expected.

Existing industrial or commercial facilities are distant and are not anticipated to affect sound levels at the development. Thus, stationary sources were not assessed.

This assessment was completed to support the Official Plan Amendment (OPA) and Re-Zoning Application (RZA), and draft plan of subdivision submissions as required by the City of Mississauga. This assessment was based on design drawings dated November 22, 2022. A copy of the drawings are included in **Appendix A**.

2 APPLICABLE CRITERIA

Applicable criteria for transportation noise sources (road) are adopted from the Ontario Ministry of the Environment, Conservation and Parks (MECP) NPC-300 Environmental Noise Guideline (MOE, 2013), with a summary of the applicable criteria included with **Appendix B**.

3 THE EFFECTS OF THE ENVIRONMENT ON THE PROPOSED DEVELOPMENT

3.1 Transportation Source Assessment

3.1.1 Road Traffic Volume Data

The North Service Road, South Service Road, Queen Elizabeth Way (QEW) and Dixie Road traffic volumes were obtained from The City of Mississauga. The other smaller roads in the area are minor, or distant and are not expected to significantly affect the development.

The NPC-300 guidelines require that assessments be completed for a 10-year horizon. However, the Region of Peel General Guidelines for the Preparation of Acoustical Reports required the Ultimate Annual Daily Traffic (UADT) numbers based on the number of lanes of traffic to be used. These UADT values were used for the North Service Road, South Service Road and Dixie Road. Traffic data for the provincial highway QEW was forecasted for the horizon year 2032. A 90%/10% daytime/nighttime split was applied for North Service Road and South Service Road.

Truck percentages were obtained from the Turning Movement Counts (TMCs) at the intersections of North Service Road and Cawthra Road, and South Service Road and Cawthra Road. In the absence of specific data for Dixie Road, truck percentages at Cawthra Road were applied to Dixie Road.

The most recent road traffic data for the QEW was obtained from the Ontario Ministry of Transportation in 2020. The data included Average Annual Daily Traffic (AADT) volumes from 2010 to 2016. The AADT for 2032 was linearly extrapolated from the given list of AADTs. The truck percentages were based on recommended values from the Ontario Road Noise Analysis Method for Environment and Transportation, Technical Publication (MECP, 1989). An 85%/15% daytime/nighttime freeway split was applied for the QEW and Dixie Road. The day-night split was drawn from data of similarly sized major highways within the Greater Toronto Area.

A summary of the traffic data used is included in **Table 1** below with more detailed information included in **Appendix C**.

Table 1: Road Traffic Volumes

Roadway	2032 Future Traffic (AADT or UADT)	% Day/Night	Speed Limit (km/hr)	% Trucks
North Service Road	16,200	90% / 10%	60	1.9%
South Service Road	16,200	90% / 10%	60	2.1%
QEW	225,713	85% / 15%	100	15%
Dixie Road	8,100	85% / 15%	60	3.8%

3.1.2 Representative Receptors

The selection of receptors affected by transportation noise sources was based on the drawings reviewed for this assessment. Using the “building evaluation” feature of Cadna/A, each façade of the residential buildings was assessed.

Outdoor Living Areas (OLAs) would include outdoor areas intended and designed for the quiet enjoyment of the outdoor environment and which are readily accessible from the building. OLAs may include any common outdoor amenity spaces associated with a multi-unit residential development (e.g. courtyards, roof-top terraces), and/or private backyards and terraces with a minimum depth of 4m provided they are the only outdoor living area for the occupant. In absence of detailed drawings, the locations and number of OLAs are estimated based off the drawings. Daytime sound levels were assessed at the following identified OLAs:

- OLA_01: Block 4, 3-Storey Outdoor Amenity Area
- OLA_02: Block 2, 3-Storey Outdoor Amenity Area
- OLA_03: Block 3, 6-Storey Outdoor Amenity Area
- OLA_04: Block 4, At-Grade Outdoor Amenity Area
- OLA_05: Block 2, At-Grade Outdoor Amenity Area
- OLA_06: Block 3, At-Grade Outdoor Amenity Area

The OLAs are indicated in **Figure 2**.

3.1.3 Analysis and Results

Sound levels due to the adjacent transportation (road) sources were predicted using the RLS-90 standard (RLS,1990) as implemented in the Cadna/A software package.

To assess the effect of transportation noise on suites, the maximum sound level on each façade was determined with the results summarized in **Table 2**.

Table 2: Predicted Ground Transportation Source Sound Levels – Plane of Window

Building	Façade	Road		Notes
		Day L _{EQ} , 16hr	Night L _{EQ} , 8hr	
Block 4: Podium	West Façade	68	64	1
Block 4: 9-Storey Building	West Façade	67	62	1
Block 4: 12-Storey Building	North Façade	73	68	1
Block 2: Podium	North Façade	78	73	1
Block 2: 4-Storey Building	North Façade	77	73	1
Block 2: 22-Storey Building	North Façade	78	73	1
Block 3: Podium	North Façade	77	73	1
Block 3: 6-Storey Building	North Façade	77	73	1
Block 3: 18-Storey Building	North Façade	77	73	1
Block 3: 25-Storey Building	North Façade	77	72	1

Note(s):

1. The acoustical performance of building components must be specified to meet the indoor sound level criteria. Installation of air conditioning to allow for windows and doors to remain closed, warning clause "Type D". Refer to **Appendix D** for guidance regarding air-conditioning as a noise mitigation measure.

To assess the effect of transportation noise on the qualifying OLAs for the development, predicted sound level results are summarized in **Table 3**.

Table 3: Transportation Sound Levels in Outdoor Living Areas (OLAs)

Receptor	Description	Daytime L _{EQ} , 16hr	Notes
OLA_01	Block 4, Podium Outdoor Amenity Area	60 dBA	2
OLA_02	Block 2, Podium Outdoor Amenity Area	68 dBA	1
OLA_03	Block 3, Podium Outdoor Amenity Area	67 dBA	1
OLA_04	Block 4, At-Grade Outdoor Amenity Area	56 dBA	2
OLA_05	Block 2, At-Grade Outdoor Amenity Area	75 dBA	1
OLA_06	Block 3, At-Grade Outdoor Amenity Area	70 dBA	1

Note(s):

- Noise mitigation is recommended to meet the ≤55 dBA OLA sound level criterion. If noise controls are not feasible to meet the 55 dBA criterion for technical, economic or administrative reasons, an exceedance of 5 dB may be acceptable (to a maximum sound level of 60 dBA). In this case, a warning clause "Type B" is recommended.
- For OLA sound levels >55 dBA and ≤60 dBA, noise controls may be applied to meet the 55 dBA criterion. If noise control measures are not provided, a warning clause "Type A" is recommended.

3.2 Recommendations

Based on the noise and vibration assessment results, the following recommendations were determined for the project. Recommendations are provided for both transportation sources and stationary sources.

3.2.1 Transportation Sources

The following recommendations are provided to address transportation sources.

3.2.1.1 Building Façade Components

Due to the elevated transportation sound levels in the area, acoustical design of the façade components including spandrel, window glazing, and exterior doors, are recommended to be specified for the proposed development.

To assess the development's feasibility, preliminary window glazing, and exterior balcony door sound isolation requirements were determined. These were based on following assumptions:

- Typical residential living room:
 - Glazing 60% of façade, Door: 20% of façade
 - 55% Façade to floor area Ratio
- Typical residential bedroom:
 - Glazing 80% of façade, Door: N/A
 - 81% Façade to floor area Ratio
- Acoustical character of rooms: High absorption finishes/furniture for bedrooms and intermediate absorption finishes/furniture for living rooms.

Based on the predicted plane of window sound levels and the assumptions listed above, recommendations for the minimum sound insulation ratings for the building components were determined using the National Research Council of Canada “BPN-56 method” (NRCC, 1985). The reported results are in terms of Sound Transmission Class (STC) ratings as summarized in **Table 4**.

Table 4: Recommended Façade Component Minimum Sound Insulation Rating

Portion of Development	Façade	Window Glazing	Exterior Door	Façade Wall
Block 4: Podium	West Façade	STC-28	OBC	OBC
Block 4: 9-Storey Building	West Façade	STC-27	OBC	OBC
Block 4: 12-Storey Building	North Façade	STC-32	STC-31	OBC
Block 2: Podium	North Façade	STC-38	STC-35	OBC
Block 2: 4-Storey Building	North Façade	STC-38	STC-32	OBC
Block 2: 22-Storey Building	North Façade	STC-38	STC-35	OBC
Block 3: Podium	North Façade	STC-38	STC-32	OBC
Block 3: 6-Storey Building	North Façade	STC-38	STC-32	OBC
Block 3: 18-Storey Building	North Façade	STC-38	STC-32	OBC
Block 3: 25-Storey Building	North Façade	STC-38	STC-32	OBC

Note(s):

1. “OBC” denotes that the noise insulation design is not required to be specified. Building envelope assemblies meeting the minimum Ontario Building Code (OBC) requirements will also exhibit sufficient noise reduction to meet the interior sound level criteria.

The maximum requirement for the window glazing was determined to be STC-38, and STC-35 for the exterior door, which is considered feasible as this can be achieved by various double-glazed configurations of insulated glazing units.

Taking into account the assumptions used as a basis to determine the glazing requirements, the applicable indoor transportation source sound level criteria are predicted to be achieved.

We recommend that the façade construction is reviewed during detailed design to ensure that the indoor sound level limits will be met, and that the window/door supplier is requested to provide STC laboratory test reports as part of shop drawing submittal to confirm that the glazing/door components will meet the minimum STC requirements.

3.2.1.2 Ventilation Recommendations

Due to the transportation sound levels at the plane of the façade, central air conditioning is recommended for the proposed development to allow for windows and doors to remain closed as a noise mitigation measure. Further, prospective purchasers or tenants should be informed by a warning clause “Type D”.

3.2.1.3 Outdoor Living Areas

Due to exposure to transportation sources along the nearby QEW sound levels in OLAs are predicted to be elevated. The road daytime average sound levels for the OLAs included in the assessment are in the range of 56-75 dBA. To reduce the transportation sound levels in OLAs to meet the applicable criteria, noise barriers are recommended.

The recommended geometry of the noise barriers are included with **Figure 3a** (to meet 55 dBA) and **Figure 3b** (to meet 60 dBA). Although the barriers are not shown in the current design plans, they will be included in the drawings for Site Plan Approval (SPA) application. The barrier heights are summarized in **Table 5**. General guidance with respect to noise barrier design is included with **Appendix D**.

Table 5: Barrier Height Recommendations for OLAs

Receptor	Description	Predicted OLA Sound Level	Barrier Height (m) to Meet Sound Level Criterion	
		Daytime L_{EQ} , 16hr	≤ 55 dBA ¹	≤ 60 dBA ²
OLA_01	Block 4, Podium Outdoor Amenity Area	60 dBA	4.0 m ^[3]	-
OLA_02	Block 2, Podium Outdoor Amenity Area	68 dBA	> 5.0 m ^[4]	3.0 m
OLA_03	Block 3, Podium Outdoor Amenity Area	67 dBA	4.6 m	2.1 m
OLA_04	Block 4, At-Grade Outdoor Amenity Area	56 dBA	2.75 m ^[3]	-
OLA_05	Block 2, At-Grade Outdoor Amenity Area	75 dBA	> 5.0 m ^[4]	> 5.0 m ^[5]
OLA_06	Block 3, At-Grade Outdoor Amenity Area	70 dBA	> 5.0 m ^[4]	4.5 m

Note(s):

1. Refer to Figure 3a for barrier geometry to meet 55 dBA.
2. Refer to Figure 3b for barrier geometry to meet 60 dBA. A warning clause "Type B" is recommended in cases where the OLA sound level is >55 dBA (to a maximum of 60 dBA).
3. If noise control measures are not provided, a warning clause "Type A" is recommended.
4. 55 dBA criterion cannot be met with a 5.0 m barrier, therefore achieving 55 dBA criterion is not feasible.

The 55 dBA criterion cannot be met with a 5.0 m barrier for OLA_02, or OLA_06. In this case, achieving 55 dBA criterion would not be feasible and a warning clause "Type B" is recommended. The feasibility of barriers above 4.0 m for OLA_01 and OLA_03 will be investigated further at SPA. The location of OLA_05 is directly facing the QEW, making achieving even the 60 dBA limit infeasible. We would recommend relocating this barrier to a location to the south of the residential buildings as part of the SPA application. Relocation of OLA_06 may also be desirable given the required barrier height to achieve 60 dBA.

3.2.2 Warning Clauses

The following warning clauses are recommended for the proposed development:

1. NPC-300 Type A or B to address transportation sound levels in Outdoor Living Areas (OLAs)
2. NPC-300 Type D to address transportation sound levels at the plane of window



Warning clauses are recommended to be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. The wording of the recommended warning clauses is included with **Appendix E**.

4 THE EFFECTS OF THE PROPOSED DEVELOPMENT ON ITS SURROUNDINGS AND ON ITSELF

On-site stationary sources for the development are expected to consist of HVAC related equipment in the roof-top mechanical penthouse as well as various exhaust fans. Further, consideration should be given to control airborne and structure-borne noise generated within the proposed development.

Within the development itself the main sources of noise that are likely to affect the uses of the building are the mechanical systems. The potential noise effect of the commercial component of the development is recommended to be reviewed during detailed design, to ensure the applicable criteria will be met.

Provided that best practices for the acoustical design of the building are followed, noise from building services equipment associated with the development are expected to be feasible to meet the applicable sound level criteria due to the nature (residential) of the proposed development.

We recommend that the potential noise effect of the proposed development is reviewed during detailed design to ensure the applicable sound level criteria will be achieved.

5 CONCLUSIONS

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed mixed-use development located in Mississauga, Ontario.

The following noise control measures are recommended for the proposed development:

1. Installation of central air-conditioning so that all suites' windows can remain closed.
2. The inclusion of noise warning clauses related to transportation sound levels at the building façade and in the outdoor amenity areas
3. Minimum sound isolation performance:
 - a. Suite bedroom window glazing with minimum sound isolation performance of STC-38.
 - b. Suite exterior balcony door with minimum sound isolation performance of STC-35.
4. Construction of perimeter noise barriers along the outdoor amenity areas if feasible, with the applicable warning clause.

Rail is located further than 500 m away from the proposed development, therefore no noise or vibration impacts from rail are expected.



Existing industrial or commercial facilities are distant and are not anticipated to affect sound levels at the development. Thus, stationary sources were not assessed.

At this stage in design the noise levels produced by the development on itself and its surroundings could not be quantitatively assessed. However, the effect on both the building itself and its surroundings is expected to be feasible to meet the applicable criteria. We recommend that the building design is evaluated prior to building permit to ensure that the acoustical design is adequately implemented in order to meet the applicable criteria.

Based on the results of the analysis including implementation of the recommendations included with this assessment, the proposed development is feasible to meet the applicable sound and vibration criteria.

6 REFERENCES

1. Ontario Ministry of the Environment (MOE), August 2013, Publication NPC-300, Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning (MOE, 2013).
2. Richtlinien für den Lärmschutz an Strassen (RLS). BM für Verkehr, Bonn, 1990 (RLS, 1990).
3. Controlling Sound Transmission into Buildings (BPN-56), National Research Council Canada (NRCC, 1985).
4. City of Mississauga, Noise Control By-Law 360-79 ([Link](#), accessed 2022-11-28).

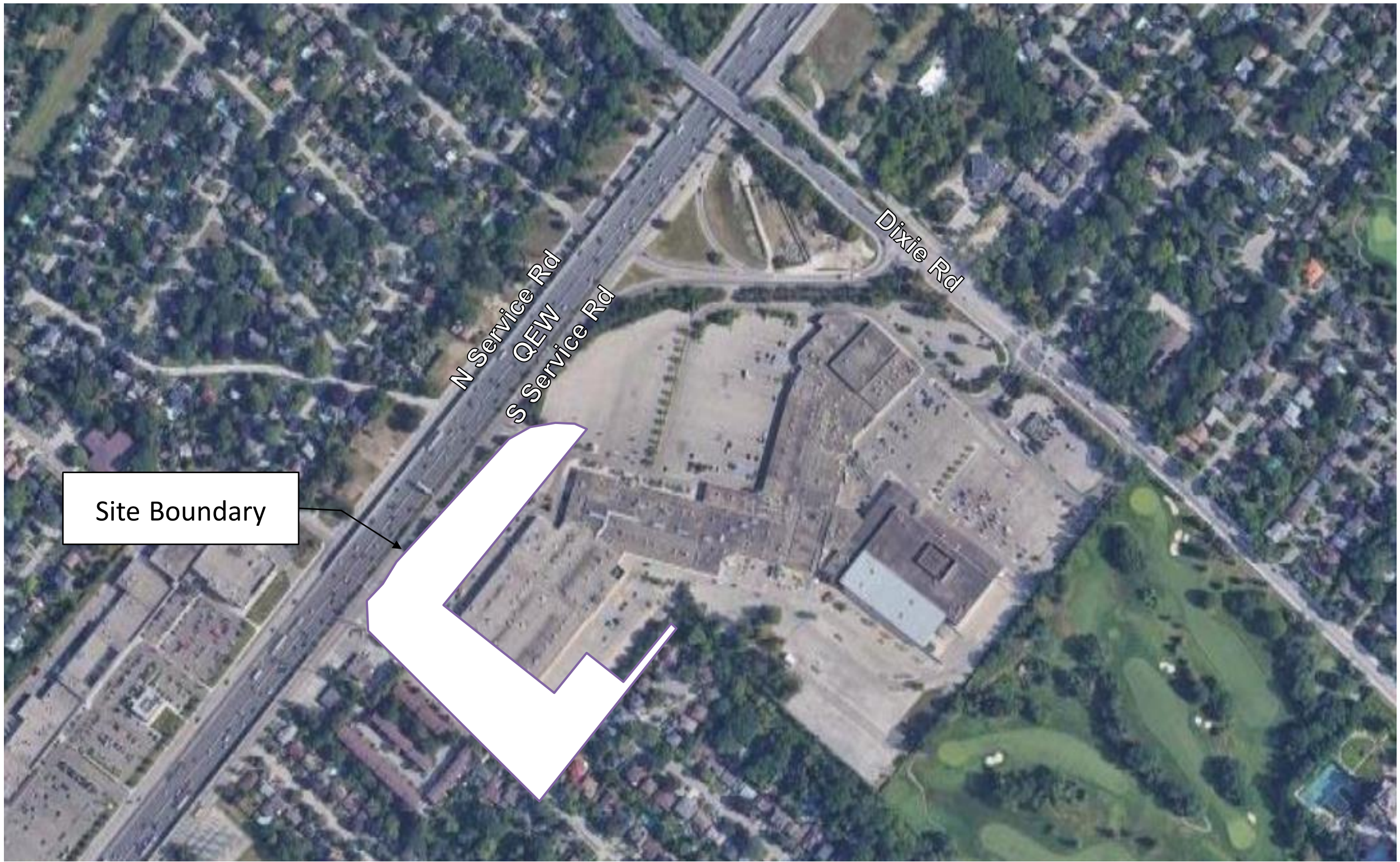
7 STATEMENT OF LIMITATIONS

This report entitled Dixie Mall Redevelopment was prepared by Rowan Williams Davies & Irwin Inc. ("RWDI") for Slate Asset Management ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

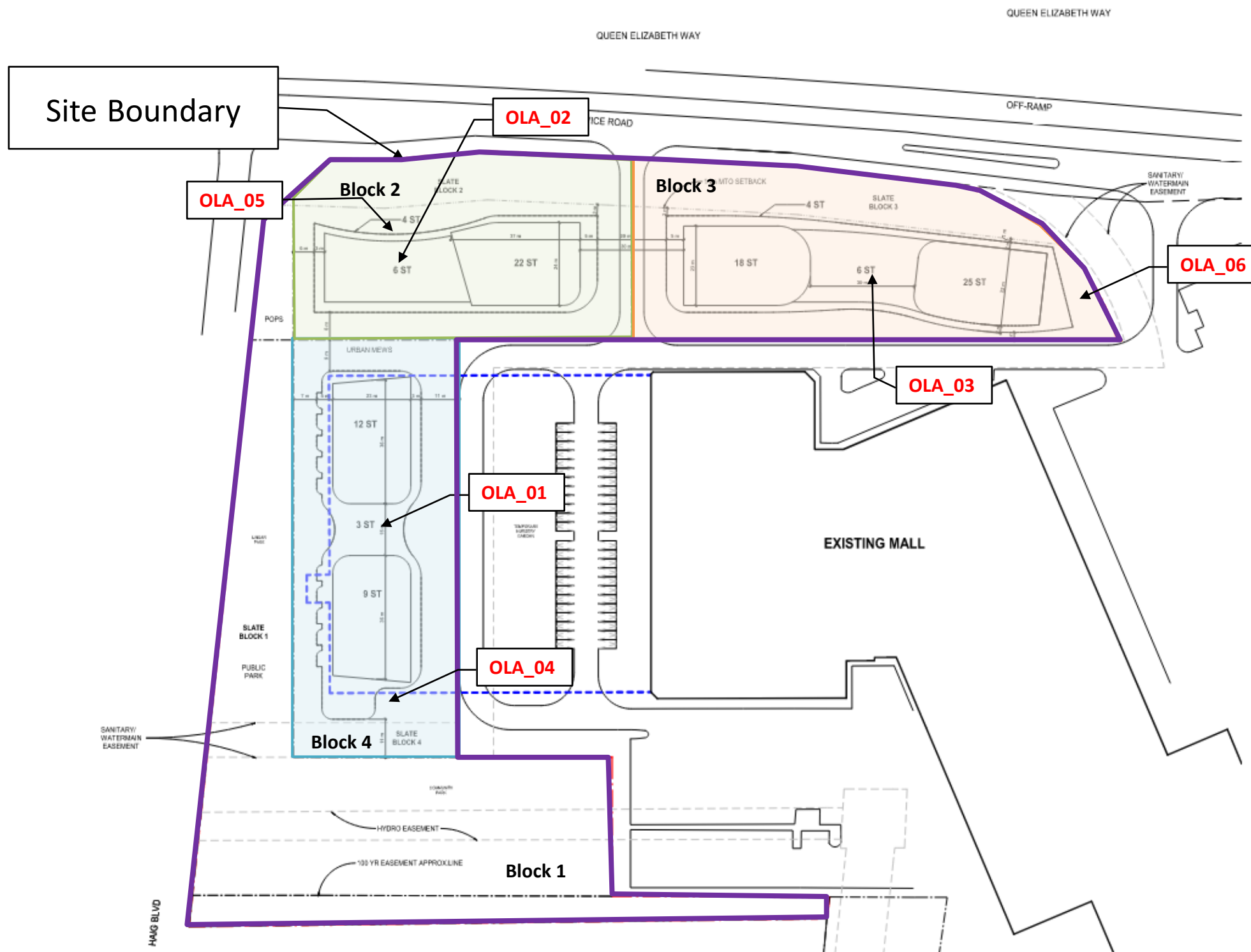
The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

FIGURES



Site Plan - Overview	Drawn by: KD	Figure: 1	
	Project #: 2100834		
	Date: 2022-12-06		
Dixie Mall Redevelopment – Phase 1 – Mississauga, Ontario			



Outdoor Living Areas (OLAs) Locations

Location of Common Outdoor Amenity Areas

Dixie Mall Redevelopment – Phase 1 – Mississauga, Ontario

Drawn by: KD

Figure: 2

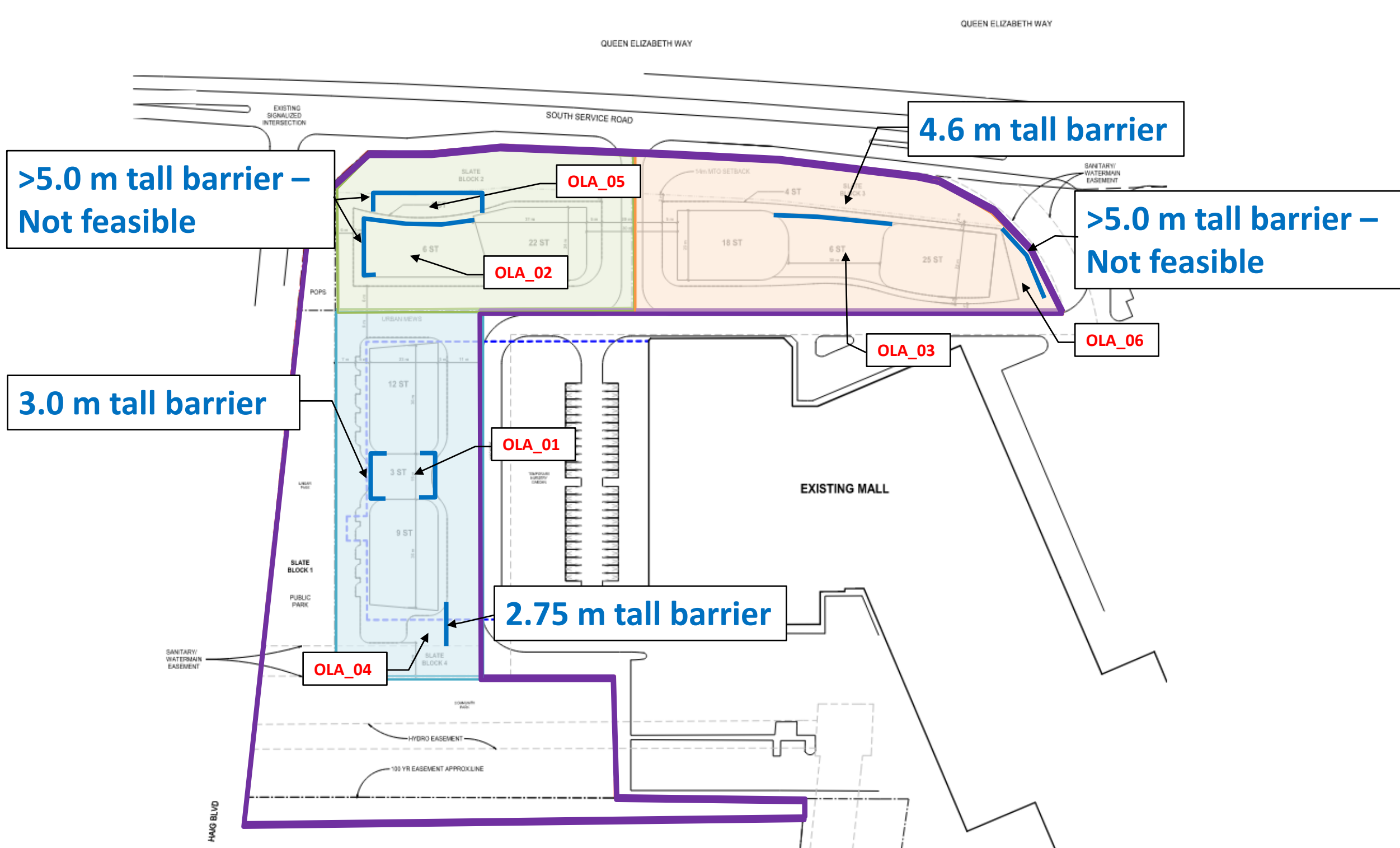
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Outdoor Living Areas (OLAs) Mitigation to 55 dBA

Recommended Barrier Geometry and Height to meet 55 dBA

Dixie Mall Redevelopment – Phase 1 – Mississauga, Ontario

Drawn by: KD

Figure: 3a

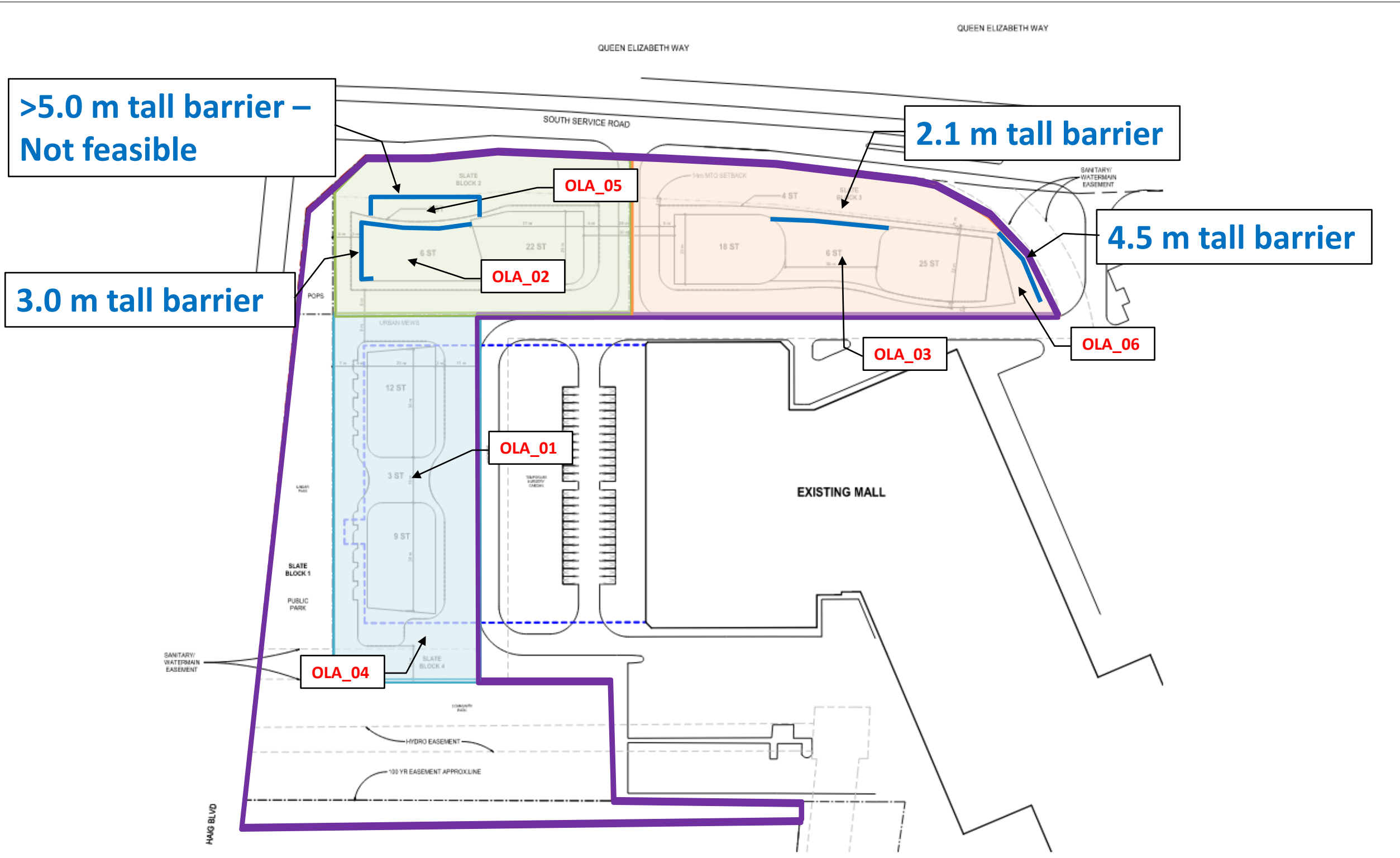
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Outdoor Living Areas (OLAs) Mitigation to 60 dBA

Recommended Barrier Geometry and Height to meet 60 dBA

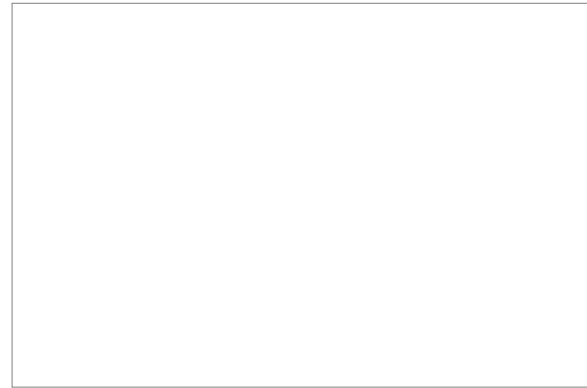
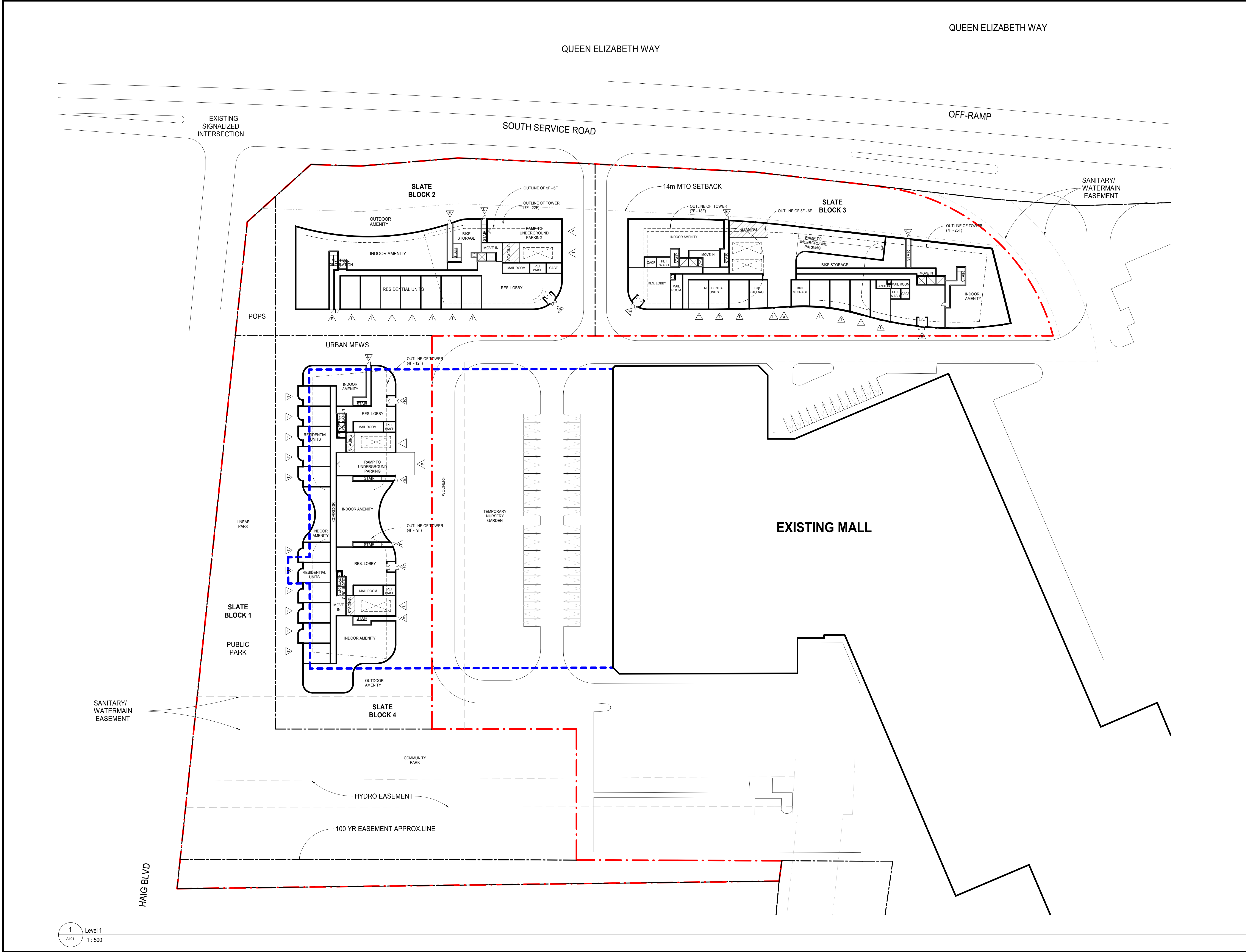
Dixie Mall Redevelopment – Phase 1 – Mississauga, Ontario

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APPENDIX A



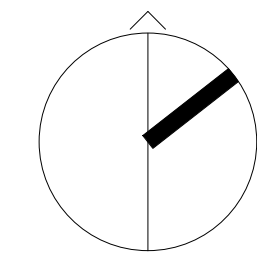
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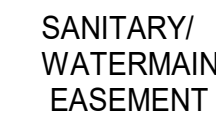
GROUND FLOOR PLAN

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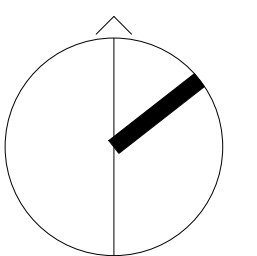
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5TH FLOOR PLAN

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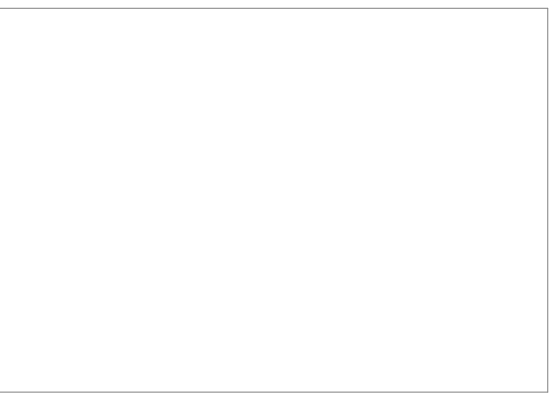
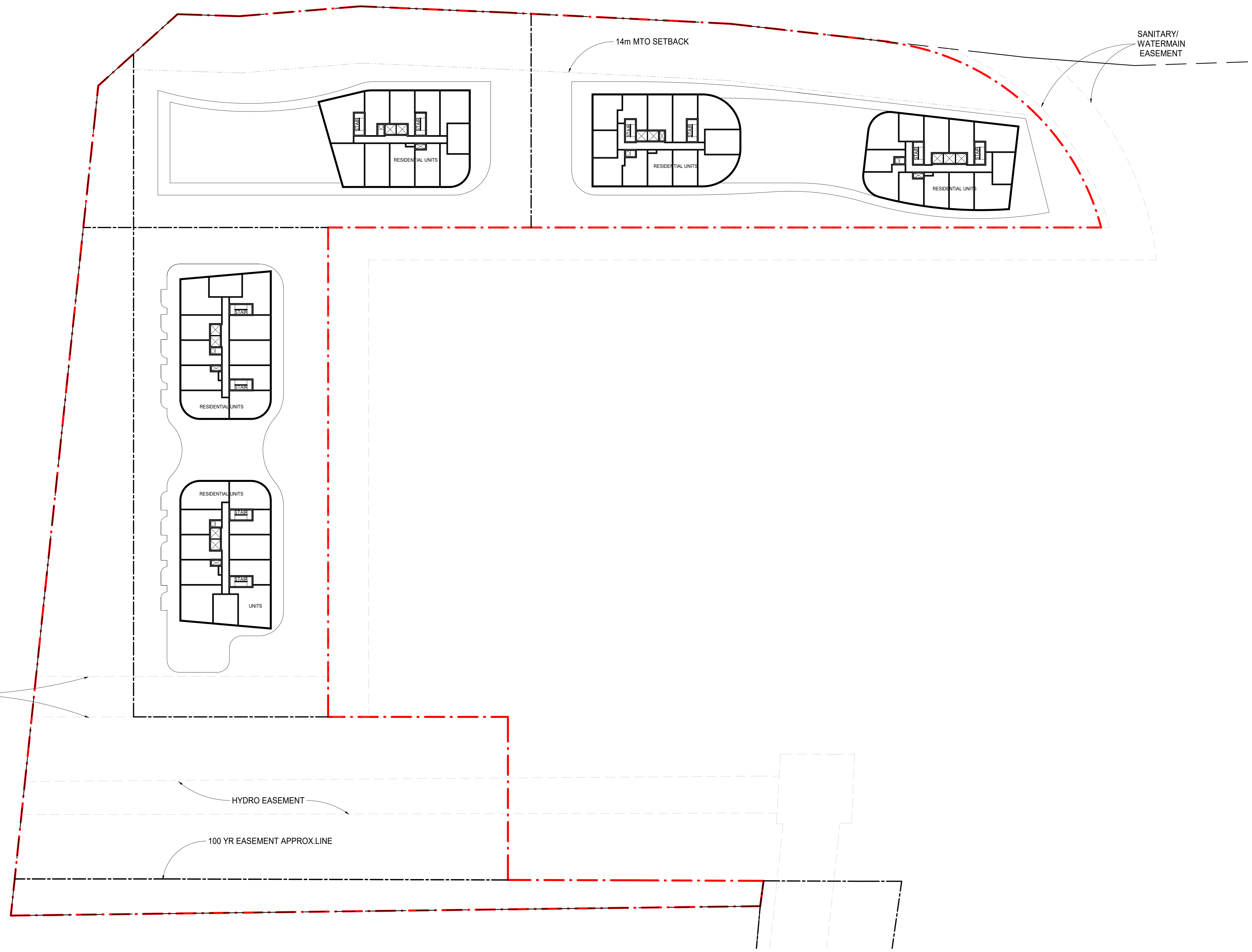
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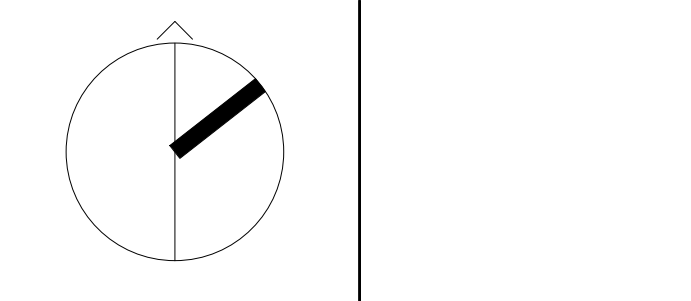
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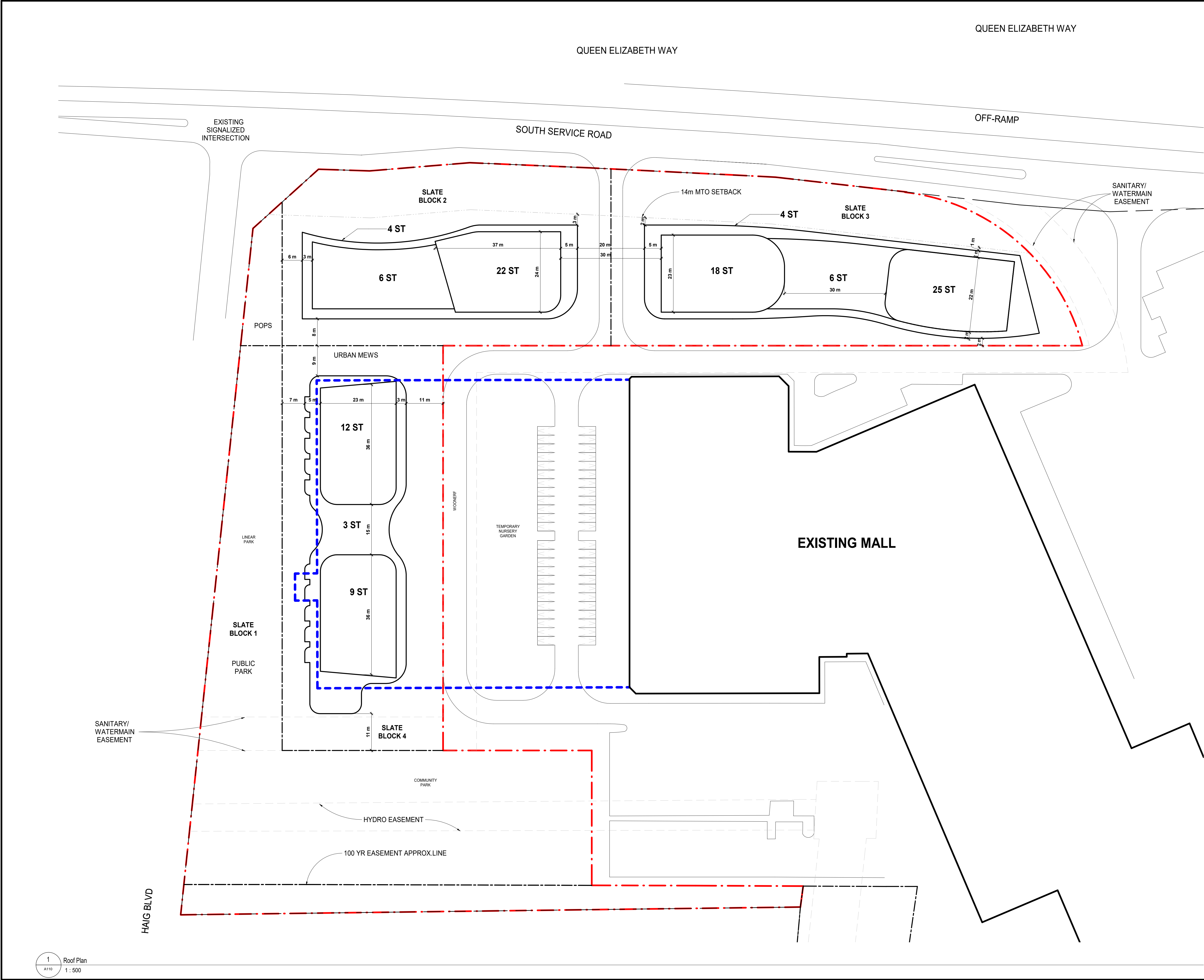
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DIXIE MALL REDEVELOPMENT Mississauga, ON L5E 1V4, L5E 3E5

TYPICAL TOWER PLAN

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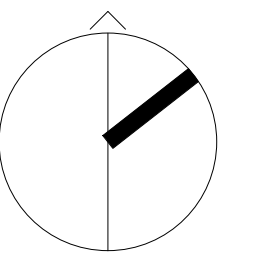
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**DIXIE MALL
REDEVELOPMENT**
Mississauga, ON
L5E 1V4, L5E 3E5

**ROOF PLAN & TOWER
SEPARATIONS**

DRAWN BY: GPA
CHECKED BY: GPA
PROJECT START DATE: 10/27/20
PROJECT NO.: 18197
SHEET NUMBER

A110

A large decorative graphic on the left side of the page, featuring a blue triangle at the top left and a large, light gray curved shape that dominates the lower half of the page.

APPENDIX B

CRITERIA

Transportation Sources

Guidance from the Ontario Ministry of the Environment, Conservation and Parks (MECP) NPC-300 Environmental Noise Guideline was used to assess environmental noise generated by transportation-related sources. There are three aspects to consider, which include the following:

- i. Transportation source sound levels in indoor living areas (living rooms and sleeping quarters), which determines building façade elements (windows, exterior walls, doors) sound insulation design recommendations.
- ii. Transportation source sound levels at the plane of the window, which determines air-conditioning and ventilation system recommendations and associated warning clauses which inform the future occupants that windows and doors must be closed in order to meet the indoor sound level criteria.
- iii. Transportation source sound levels in Outdoor Living Areas (OLAs), which determines OLA noise mitigation and related warning clause recommendations.

Road and Rail

Indoor Sound Level Criteria

For assessing sound originating from transportation sources, NPC-300 defines sound level criteria as summarized in **Table 1** for indoor areas of sensitive uses. The specified values are maximum sound levels and apply to the indicated indoor spaces with the windows and doors closed.

Table 1: Indoor Sound Level Criteria for Road and Rail Sources

Type of Space	Source	Sound Level Criteria (Indoors)	
		Daytime Leq,16-hr 07:00h – 23:00h	Nighttime Leq,8-hr 23:00h – 07:00h
Living Quarters Examples: Living, dining and den areas of residences, hospitals, nursing homes, schools and daycare centres	Road	45 dBA	
	Rail	40 dBA	
Sleeping Quarters	Road	45 dBA	40 dBA
	Rail	40 dBA	35 dBA

NPC-300 also provides guidelines for acceptable indoor sound levels that are extended to land uses and developments which are not normally considered noise sensitive. The guideline sound level criteria presented in **Table 2** are provided to inform good-practice design objectives.

Table 2: Supplementary Indoor Sound Level Criteria for Road and Rail Sources

Type of Space	Source	Sound Level Criteria (Indoors)	
		Daytime $L_{eq,16-hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8-hr}$ 23:00h – 07:00h
General offices, reception areas, retail stores, etc.	Road	50 dBA	-
	Rail	45 dBA	-
Theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc.	Road	45 dBA	-
	Rail	40 dBA	-
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	Road	-	40 dBA
	Rail	-	35 dBA
Sleeping quarters of hotels/motels	Road	-	45 dBA
	Rail	-	40 dBA

Outdoor Living Areas (OLAs)

Outdoor Living Areas (OLAs) would include outdoor areas intended and designed for the quiet enjoyment of the outdoor environment and which are readily accessible from the building.

OLAs may include any common outdoor amenity spaces associated with a multi-unit residential development (e.g. courtyards, roof-top terraces), and/or private backyards and terraces with a minimum depth of 4m provided they are the only outdoor living area for the occupant. The sound level criteria for outdoor living areas is summarized in **Table 3**.

Table 3: Sound Level Criteria – Outdoor Living Area

Assessment Location	Sound Level Criteria (Outdoors)	
	Daytime $L_{eq,16-hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8-hr}$ 23:00h – 07:00h
Outdoor Living Area (OLA) (Combined Road and Rail)	55 dBA	-

Outdoor and Plane of Window Sound Levels

In addition to the sound level criteria, noise control measures and requirements for ventilation and warning clauses requirements are recommended for residential land-uses based on predicted transportation source sound levels incident in the plane of window at bedrooms and living/dining rooms, and/or at outdoor living areas. These recommendations are summarized in **Table 4** below.

Table 4: Ventilation, Building Component, and Warning Clauses Recommendations for Road/Rail Sources

Assessment Location	Transportation Sound Level (Outdoors)		Recommendations
	Daytime $L_{eq,16-hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8-hr}$ 23:00h – 07:00h	
Plane of Window (Road)	> 65 dBA	> 60 dBA	<p>Installation of air conditioning to allow windows to remained closed.</p> <p>The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria.</p> <p>Warning clause “Type D” is recommended.</p>
	> 55 dBA	> 50 dBA	<p>Applicable for low and medium density development: Forced-air ventilation system to allow for the future installation of air-conditioning. Warning clause “Type C” is recommended.</p> <p>Applicable for high density development: Air conditioning to allow windows to remained closed. Warning clause “Type D” is recommended.</p>
Plane of Window (Rail ^{1,2})	> 60 dBA	> 55 dBA	<p>The acoustical performance of building façade components should be specified such that the indoor sound level limits are predicted to be achieved.</p> <p>Warning clause “Type D” is recommended.</p>
	> 60 dBA ($L_{eq, 24hr}$) and < 100m from tracks		<p>Exterior walls consisting of a brick veneer or masonry equivalent for the first row of dwellings.</p> <p>Warning clause “Type D” is recommended.</p>
Outdoor Living Area (Combined Road and Rail ³)	≤ 60 dBA > 55 dBA	-	<p>If sound levels are predicted to exceed 55 dBA, but are less than 60 dBA, noise controls may be applied to reduce the sound level to 55 dBA.</p> <p>If noise control measures are not provided, a warning clause “Type A” is recommended.</p>
	> 60 dBA	-	<p>Noise controls (barriers) should be implemented to meet the 55 dBA criterion.</p> <p>If mitigation is not feasible to meet the 55 dBA criterion for technical, economic or administrative reasons, an exceedance of 5 dB may be acceptable (to a maximum sound level of 60 dBA). In this case a warning clause “Type B” would be recommended.</p>

Note(s):

1. Whistle noise is included (if applicable) in the determination of the sound level at the plane of window.
2. Some railway companies (e.g. CN, CP) may require that the exterior walls include a brick veneer or masonry equivalent for the façade facing the railway line, regardless of the sound level.
3. Whistle noise is not included in the determination of the sound level at the OLA.

Rail Layover Sites

NPC-300 provides a sound level limit for rail layover sites to be the higher of the background sound level or 55 dBA $L_{eq,1-hr}$, for any one-hour period.

Rail Vibration Criteria

An assessment of rail vibration is generally recommended for developments within 75m of a rail corridor or rail yard, and adjacent to or within a setback of 15m of a transit (subway or light-rail) rail line.

The generally accepted vibration criterion for sensitive land-uses is the threshold of perception for human exposure to vibration, being a vibration velocity level of 0.14 mm/s RMS in any one-third octave band centre frequency in the range of 4 Hz to 200 Hz.

This vibration criterion is based on a one-second exponential time-averaged maximum hold root-mean-square (RMS) vibration velocity level and is consistent with the Railway Associations of Canada (RAC, 2013) guideline, the U.S. Federal Transit Authority (FTA, 2018) criterion for residential land-uses, the Toronto Transit Commission (TTC) guidelines for the assessment of potential vibration impact of future expansion (MOEE/TTC, 1993).

Aircraft

Land-use compatibility in the vicinity of airports is addressed in Ministry of the Environment, Conservation, and Parks (MECP) Guideline NPC-300 (MOE, 2013). The guideline provides recommendations for ventilation, and noise control for different Noise Exposure Forecast (NEF) values, which would be based on NEF contour maps available from the airport authority. The NEF values can be expressed as $L_{Aeq,24hr}$ sound levels by using the expression $NEF = L_{Aeq,24hr} - 32$ dBA.

Table 5: Indoor Sound Level Criteria for Aircraft Sources

Assessment Location	Indoor Sound Level Criteria NEF ($L_{eq, 24hr}$) ¹
Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, etc.	NEF- 5 (37 dBA)
Sleeping quarters	NEF-0 (32 dBA)

NPC-300 also provides guidelines for acceptable indoor sound levels that are extended to land uses and developments which are not normally considered noise sensitive. The guideline sound level criteria presented in **Table 6** are provided to inform good-practice design objectives.

Table 6: Supplementary Indoor Sound Level Criteria for Aircraft Sources

Assessment Location	Indoor Sound Level Criteria ¹
General offices, reception areas, retail stores, etc.	NEF-15 (47 dBA)
Individual or semi-private offices, conference rooms, etc.	NEF-10 (42 dBA)
Sleeping quarters of hotels/motels, theatres, libraries, places of worship, etc.	NEF-5 (37 dBA)

Table 7: NPC-300 Sound Level Criteria for Aircraft (Outdoors)

Assessment Location	Outdoor Sound Level Criteria ¹
Outdoor areas, including OLA	NEF-30 (62 dBA)

Table 8: Ventilation, Building Component, and Warning Clauses Recommendations for Aircraft Sources

Assessment Location	Aircraft Sound Level	NPC-300 Requirements
	NEF ($L_{EQ,24-hr}$)	
Outdoors	\geq NEF 30	<p>Air conditioning to allow windows to remained closed.</p> <p>The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria.</p> <p>Warning clauses "Type D" and "Type B" are recommended.</p>
	$<$ NEF 30 \geq NEF 25	<p>The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria.</p> <p>Applicable for low and medium density development: Forced-air ventilation system to allow for the future installation of air-conditioning. Warning clause "Type C" is recommended.</p> <p>Applicable for high density development: Air conditioning to allow windows to remained closed. Warning clause "Type D" is recommended.</p>
	$<$ NEF 25	Further assessment not required

Stationary Sources

NPC-300 Sound Level Criteria – Stationary Sources

Guidance from the MECP NPC-300 Environmental Noise Guideline is used to assess environmental noise generated by stationary sources, for example industrial and commercial facilities.

Noise from stationary sources is treated differently from transportation sources and requires sound levels be assessed for the predictable worst-case one-hour average sound level (L_{eq}) for each period of the day. For assessing sound originating from stationary sources, NPC-300 defines sound level criteria for two types of Points of Reception (PORs): outdoor and plane of window.

The assessment criteria for all PORs is the higher of either the exclusion limit per NPC-300 or the minimum background sound level that occurs or is likely to occur at a POR. The applicable exclusion limit is determined based on the level of urbanization or "Class" of the area. The NPC-300 exclusion limits for continuously operating stationary sources are summarized in **Table 9**.

Table 9: NPC-300 Exclusion Limits – Continuous and Quasi-Steady Impulsive Stationary Sources (LAeq-1hr)

Time Period	Class 1 Area		Class 2 Area		Class 3 Area		Class 4 Area	
	Outdoor	Plane of Window	Outdoor	Plane of Window	Outdoor	Plane of Window	Outdoor	Plane of Window
Daytime 0700-1900h	50 dBA	50 dBA	50 dBA	50 dBA	45 dBA	45 dBA	55 dBA	60 dBA
Evening 1900-2300h	50 dBA	50 dBA	45 dBA	50 dBA	40 dBA	40 dBA	55 dBA	60 dBA
Nighttime 2300-0700h	--	45 dBA	--	45 dBA	--	40 dBA	--	55 dBA

Note(s):

1. The applicable sound level criterion is the background sound level or the exclusion limit, whichever is higher.
2. Class 1, 2 and 3 sound level criteria apply to a window that is assumed to be open.
3. Class 4 area criteria apply to a window that is assumed closed. Class 4 area requires formal designation by the land-use planning authority.
4. Sound level criteria for emergency backup equipment (e.g. generators) operating in non-emergency situations such as testing or maintenance are 5 dB greater than the applicable sound level criteria for stationary sources.

For impulsive sound, other than quasi-steady impulsive sound, from a stationary source, the sound level criteria at a POR is expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}), and is summarized in **Table 10**.

Table 10: NPC-300 Exclusion Limits – Impulsive Stationary Sources (L_{LM})

Time Period	Number of Impulses in Period of One-Hour	Class 1 and 2 Areas		Class 3 Areas		Class 4 Areas	
		Outdoor	Plane of Window	Outdoor	Plane of Window	Outdoor	Plane of Window
Daytime (0700-2300h)	9 or more	50 dBAI	50 dBAI	45 dBAI	45 dBAI	55 dBAI	60 dBAI
Nighttime (2300-0700h)		-	45 dBAI	-	40 dBAI	-	55 dBAI
Daytime (0700-2300h)	7 to 8	55 dBAI	55 dBAI	50 dBAI	50 dBAI	60 dBAI	65 dBAI
Nighttime (2300-0700h)		-	50 dBAI	-	45 dBAI	-	60 dBAI
Daytime (0700-2300h)	5 to 6	60 dBAI	60 dBAI	55 dBAI	55 dBAI	65 dBAI	70 dBAI
Nighttime (2300-0700h)		-	55 dBAI	-	50 dBAI	-	65 dBAI
Daytime (0700-2300h)	4	65 dBAI	65 dBAI	60 dBAI	60 dBAI	70 dBAI	75 dBAI
Nighttime (2300-0700h)		-	60 dBAI	-	55 dBAI	-	70 dBAI
Daytime (0700-2300h)	3	70 dBAI	70 dBAI	65 dBAI	65 dBAI	75 dBAI	80 dBAI
Nighttime (2300-0700h)		-	65 dBAI	-	60 dBAI	-	75 dBAI
Daytime (0700-2300h)	2	75 dBAI	75 dBAI	70 dBAI	70 dBAI	80 dBAI	85 dBAI
Nighttime (2300-0700h)		-	70 dBAI	-	65 dBAI	-	80 dBAI
Daytime (0700-2300h)	1	80 dBAI	80 dBAI	75 dBAI	75 dBAI	85 dBAI	90 dBAI
Nighttime (2300-0700h)		-	75 dBAI	-	70 dBAI	-	85 dBAI

Note(s):

1. The applicable sound level criterion is the background sound level or the exclusion limit, whichever is higher.

D-Series Guidelines

The MECP D-series guidelines (MOE, 1995) provide direction for land use planning to maximize compatibility of industrial uses with adjacent land uses. The goal of Guideline D-6 is to minimize encroachment of sensitive land uses on industrial facilities and vice versa, in order to address potential incompatibility due to adverse effects such as noise, odour and dust.

For each class of industry, the guideline provides an estimate of potential influence area and states that this influence area shall be used in the absence of the recommended technical studies. Guideline D-6 also recommends a minimum separation distance between each class of industry and sensitive land uses (see **Table 11**). Section 4.10 of D-6 identifies exceptional circumstances with respect to redevelopment, infill and mixed-use areas. In these cases, the guideline suggests that separation distances at, or less than, the recommended minimum separation distance may be acceptable if a justifying impact assessment is provided.

Table 11: Summary of Guideline D-6

Industry Class	Definition	Potential Influence Area	Recommended Minimum Separation Distance (property line to property line)
Class I	Small scale, self-contained, daytime only, infrequent heavy vehicle movements, no outside storage.	70 m	20 m
Class II	Medium scale, outdoor storage of wastes or materials, shift operations and frequent heavy equipment movement during the daytime.	300 m	70 m
Class III	Large scale, outdoor storage of raw and finished products, large production volume, continuous movement of products and employees during daily shift operations.	1000 m	300 m

Guideline D-6 provides criteria for classifying industrial land uses, based on their outputs, scale of operations, processes, schedule and intensity of operations. **Table 12** provides the classification criteria and examples.

Table 12: Guideline D-6 Industrial Categorization Criteria

Criteria	Class I	Class II	Class III
Outputs	<ul style="list-style-type: none"> • Sound not audible off property • Infrequent dust and/ or odour emissions and not intense • No ground-borne vibration 	<ul style="list-style-type: none"> • Sound occasionally audible off property • Frequent dust and/ or odour emissions and occasionally intense • Possible ground-borne vibration 	<ul style="list-style-type: none"> • Sound frequently audible off property • Persistent and intense dust and/ or odour emissions • Frequent ground-borne vibration
Scale	<ul style="list-style-type: none"> • No outside storage • Small scale plant or scale is irrelevant in relation to all other criteria 	<ul style="list-style-type: none"> • Outside storage permitted • Medium level of production 	<ul style="list-style-type: none"> • Outside storage of raw and finished products • Large production levels
Process	<ul style="list-style-type: none"> • Self-contained plant or building which produces / stores a packaged product • Low probability of fugitive emissions 	<ul style="list-style-type: none"> • Open process • Periodic outputs of minor annoyance • Low probability of fugitive emissions 	<ul style="list-style-type: none"> • Open process • Frequent outputs of major annoyances • High probability of fugitive emissions
Operation / Intensity	<ul style="list-style-type: none"> • Daytime operations only • Infrequent movement of products and/or heavy trucks 	<ul style="list-style-type: none"> • Shift operations permitted • Frequent movements of products and/or heavy trucks with majority of movements during daytime hours 	<ul style="list-style-type: none"> • Continuous movement of products and employees • Daily shift operations permitted
Examples	<ul style="list-style-type: none"> • Electronics Manufacturing • Furniture refinishing • Beverage bottling • Auto parts • Packaging services • Dairy distribution • Laundry and linen supply 	<ul style="list-style-type: none"> • Magazine printing • Paint spray booths • Metal command • Electrical production • Dairy product manufacturing • Feed packing plant 	<ul style="list-style-type: none"> • Paint and varnish manufacturing • Organic chemicals manufacturing • Breweries • Solvent recovery plant • Soap manufacturing • Metal manufacturing

The background features a large, light grey circle on the right side and a blue triangle on the left side, separated by a white curved line.

APPENDIX C



Intersection Layout Sheet

Version: 1.0 Feb 1, 2016

Contract # 9015-E-0009
Work Order # 054

Date: MAY 31 / 2016 Day: TUES / Hrs: 06 - 10 + 15 - 19 + -
Location: HWY 1 @ CANTHRA RD IC -134 Ramps: NORTH / 61
Reg/Mun: CR Town/City: Mississauga Area: -
File Name: 1101510000 Device: Gretch / Jamar Unit # 8 / Interval 1: AM / NN / PM
Observer: OXANA VYATKINA Weather: Clear / Road Condition: CLOSED LINE /

LHRS & O/S: 10151 - 0

GPS: G-STAR N

Datum: WGS 84 Y / N

Lat: 43.584396

Long: -79.584393

Comments:

NORTHBOUND TRAFFIC END OF 06-10 PERIOD
BEGINNING OF 15-19 PERIOD
SB LEFT LANE CLOSED

SIGNALIZED Y / N

If intersection is unsignalized:

Sign Type: Stop / Yield

Sign Size: cm x cm

Sign Condition:

NA: New / Good / Poor / Missing

SA: New / Good / Poor / Missing

WA: New / Good / Poor / Missing

EA: New / Good / Poor / Missing

Photograph all approach's
including all Signs Y / N

50
(km/hr)

CANTHRA RD

(sign)



INDICATE LOCATION &
DIRECTION OF VEHICLE

Vehicle N S E W

Hwy / Street Name

QEW N RAMP 40
61 (km/hr)

HWY 1

(km/hr)

Hwy / Street Name

Note:

Show all lanes approaching and
leaving the intersection.

Show all channelization

If there are two or more through
lane in one direction, indicate
if these lanes are not continuous

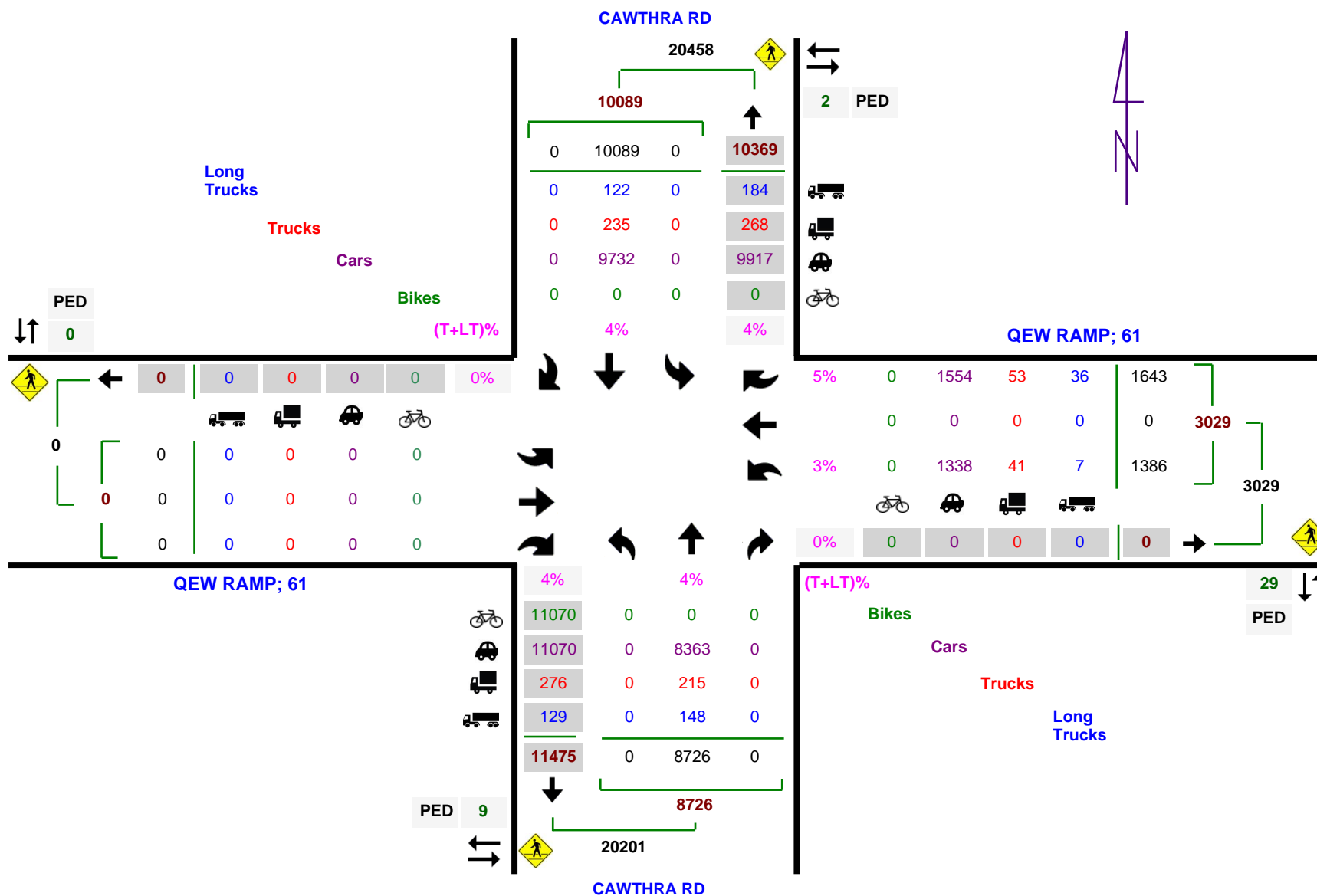
Show pedestrian crosswalks

Hwy / Street Name

CANTHRA RD

50
(km/hr)

Layout of "Special Condition"





Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: **QEW @ CAWTHRA RD (NRT)**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date: **31-May-2016 (Tue)**

I/C Side: **N**

LHRS: **10151**

End Date: **31-May-2016 (Tue)**

Int. Type: **T - E**

Offset: **0**

Schedule Summary: **TUES-THURS, 06:00-10:00, 15:00-19:00**

Start Time	Major Road Approaches																		Minor Road Approaches																		Total Veh.
	North CAWTHRA RD										South CAWTHRA RD								East QEW RAMP: Ramp(s): 61										Not Configured								
	Cars ← ↑ →			Trucks ← ↑ →			Long Trucks ← ↑ →			Ped ← ↑ →	Cars ← ↑ →			Trucks ← ↑ →			Long Trucks ← ↑ →			Ped ← ↑ →	Cars ← ↑ →			Trucks ← ↑ →			Long Trucks ← ↑ →			Ped ← ↑ →							
Period 1																																					
06:00	0	148	0	0	4	0	0	3	0	0	0	115	0	0	0	0	0	0	0	10	0	42	1	0	2	0	0	0	0	325							
06:15	0	229	0	0	4	0	0	1	0	0	0	150	0	0	0	0	4	0	0	16	0	32	0	0	0	0	0	1	1	437							
06:30	0	219	0	0	5	0	0	2	0	0	0	179	0	0	2	0	3	0	0	30	0	34	1	0	0	0	0	0	0	475							
06:45	0	271	0	0	8	0	0	4	0	0	0	167	0	0	3	0	3	0	0	37	0	61	4	0	3	0	0	0	0	561							
07:00	0	282	0	0	10	0	0	3	0	0	0	180	0	0	3	0	2	0	0	29	0	56	1	0	0	0	0	4	0	570							
07:15	0	270	0	0	9	0	0	4	0	0	0	201	0	0	5	0	4	0	1	34	0	50	2	0	2	0	0	1	0	582							
07:30	0	264	0	0	8	0	0	14	0	0	0	268	0	0	8	0	4	0	1	30	0	32	0	0	3	0	0	0	0	631							
07:45	0	398	0	0	14	0	0	8	0	0	0	303	0	0	11	0	2	0	2	32	0	36	0	0	3	0	0	1	1	808							
08:00	0	378	0	0	13	0	0	3	0	1	0	315	0	0	9	0	8	0	0	32	0	39	2	0	1	0	0	1	1	801							
08:15	0	399	0	0	12	0	0	7	0	0	0	339	0	0	7	0	7	0	0	40	0	36	4	0	0	2	0	2	2	855							
08:30	0	316	0	0	11	0	0	6	0	0	0	337	0	0	5	0	7	0	0	44	0	34	1	0	3	0	0	1	2	765							
08:45	0	248	0	0	10	0	0	4	0	0	0	356	0	0	18	0	5	0	0	34	0	38	2	0	1	0	0	3	1	719							
09:00	0	227	0	0	10	0	0	2	0	0	0	270	0	0	8	0	4	0	0	38	0	60	2	0	4	0	0	2	0	627							
09:15	0	245	0	0	12	0	0	4	0	0	0	280	0	0	4	0	5	0	0	26	0	57	1	0	6	3	0	3	1	646							
09:30	0	204	0	0	5	0	0	2	0	1	0	237	0	0	5	0	2	0	0	46	0	68	5	0	2	0	0	1	6	577							
09:45	0	242	0	0	13	0	0	2	0	0	0	243	0	0	11	0	6	0	0	30	0	70	4	0	6	1	0	1	0	629							
Period 2																																					
15:00	0	301	0	0	11	0	0	9	0	0	0	297	0	0	11	0	6	0	0	59	0	47	1	0	1	0	0	2	0	745							
15:15	0	320	0	0	9	0	0	4	0	0	0	297	0	0	6	0	17	0	0	64	0	50	1	0	3	0	0	3	6	774							
15:30	0	340	0	0	11	0	0	2	0	0	0	264	0	0	6	0	5	0	0	52	0	36	3	0	1	0	0	0	3	720							
15:45	0	330	0	0	11	0	0	9	0	0	0	281	0	0	10	0	3	0	0	58	0	35	1	0	1	0	0	4	0	743							
16:00	0	362	0	0	7	0	0	4	0	0	0	311	0	0	9	0	11	0	0	47	0	57	0	0	3	0	0	1	2	812							



Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: **QEW @ CAWTHRA RD (NRT)**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date: **31-May-2016 (Tue)**

I/C Side: **N**

LHRS: **10151**

End Date: **31-May-2016 (Tue)**

Int. Type: **T - E**

Offset: **0**

Schedule Summary: **TUES-THURS, 06:00-10:00, 15:00-19:00**

Start Time	Major Road Approaches																	Minor Road Approaches																	Total Veh.	
	North									South									East									Not Configured								
	CAWTHRA RD									CAWTHRA RD									QEW RAMP: Ramp(s): 61																	
	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped						
←	↑	→	←	↑	→	←	↑	→	←		↑	→	←	↑	→	←	↑	→	←		↑	→	←	↑	→	←	↑	→								
16:15	0	372	0	0	7	0	0	4	0	0	0	272	0	0	7	0	0	7	0	4	0	48	0	52	0	0	1	0	0	1	0	771				
16:30	0	362	0	0	5	0	0	0	0	0	0	305	0	0	6	0	0	8	0	0	0	46	0	70	0	0	0	0	0	0	802					
16:45	0	320	0	0	4	0	0	5	0	0	0	243	0	0	3	0	0	3	0	0	0	62	0	63	0	0	4	0	0	1	0	708				
17:00	0	335	0	0	5	0	0	1	0	0	0	294	0	0	4	0	0	1	0	0	0	47	0	75	1	0	1	1	0	0	2	765				
17:15	0	282	0	0	4	0	0	4	0	0	0	261	0	0	7	0	0	3	0	0	0	62	0	79	0	0	0	0	0	0	0	702				
17:30	0	364	0	0	3	0	0	3	0	0	0	255	0	0	6	0	0	2	0	0	0	41	0	34	0	0	0	0	0	0	0	708				
17:45	0	364	0	0	2	0	0	3	0	0	0	236	0	0	5	0	0	3	0	0	0	49	0	32	1	0	1	0	0	0	0	696				
18:00	0	386	0	0	1	0	0	1	0	0	0	307	0	0	13	0	0	4	0	1	0	36	0	42	0	0	1	0	0	0	1	791				
18:15	0	363	0	0	2	0	0	0	0	0	0	295	0	0	6	0	0	2	0	0	0	58	0	42	0	0	0	0	0	1	0	769				
18:30	0	325	0	0	2	0	0	3	0	0	0	256	0	0	7	0	0	6	0	0	0	47	0	53	2	0	0	0	0	1	0	702				
18:45	0	266	0	0	3	0	0	1	0	0	0	249	0	0	10	0	0	1	0	0	0	54	0	42	1	0	0	0	0	1	0	628				



AdHoc Turning Movement Total Count and Peak Summary Report

Hwy: **QEW**

LHRS: 10151

Offset: 0

Schedule Summary: TUES-THURS, 06:00-10:00, 15:00-19:00



TVIS II - Traffic Volume Information System

Traffic Signal Warrant

Description: **QEW @ CAWTHRA RD (NRT)**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date:

I/C Side: **N**

LHRS: **10151**

End Date:

Intersection Type: **T - E**

Offset: **0**

Schedule Summary: **Tuesday, Wednesday, Thursday AM 06:00-10:00, PM 15:00-19:00**
Currently this schedule was used by Central Region for data collected in Spring

Intersection Configuration:

MAJOR ROADS

Approach	Name	Channel Right	Pattern
N	CAWTHRA RD	<input type="checkbox"/>	UNCL
S	CAWTHRA RD	<input type="checkbox"/>	UNCL

☐ 2 or more approach Lanes

MINOR ROADS

Approach	Name	Channel Right	Pattern
E	QEW RAMP	<input type="checkbox"/>	UNCL
	Ramps 61		
		<input type="checkbox"/>	
	Ramps		

☐ 2 or more approach Lanes

Intersection Type

T - E

Traffic Control

Traffic Signal

Flow Condition

Restricted

Justification 1 - Minimum Vehicle Volume:

1A: All approach lanes:

1B: Minor road approaches:

Calculated using raw data

	Major Road Approaches					Minor Road Approaches				
	North Approach		South Approach			East Approach		Not configured		
Time	←	↑	→	←	↑	→	←	↑	→	←
06:00	0	898	0	0	626	0	99	0	0	0
07:00	0	1284	0	0	991	0	128	0	0	0
08:00	0	1407	0	0	1413	0	161	0	0	0
09:00	0	968	0	0	1075	0	156	0	0	0
15:00	0	1357	0	0	1203	0	239	0	0	0
16:00	0	1452	0	0	1185	0	203	0	0	0
17:00	0	1370	0	0	1077	0	202	0	0	0
18:00	0	1353	0	0	1156	0	198	0	0	0
TotalsTM	0	10089	0	0	8726	0	1386	0	0	0
Approach	10089		8726			1386		0		

1A	
Min. Req.	%
900	100
720	80
Total	%
1623	100
2403	100
2981	100
2199	100
2799	100
2840	100
2649	100
2707	100
20201	800
Section %	100

1B	
Min. Req.	%
255	100
204	80
Total	%
99	39
128	39
161	39
156	39
239	39
203	39
202	39
198	39
1386	530
Section %	66

Justification 1 Minimum Compliance: **66 %**

TVIS II - Traffic Volume Information System

Traffic Signal Warrant

Description: **QEW @ CAWTHRA RD (NRT)**

Region: **CENTRAL**

Start Date:

End Date:

Survey Type: **TM – Interchange**

I/C Side: **N**

Intersection Type: **T - E**

Hwy: **QEW**

LHRS: **10151**

Offset: **0**













Schedule Summary: **Tuesday, Wednesday, Thursday AM 06:00-10:00, PM 15:00-19:00**
Currently this schedule was used by Central Region for data collected in Spring

Justification 2 - Delay to Cross Traffic:

Calculated using raw data

2A: Major road approaches:

2B: Minor road approaches:

	Major Road Approaches						Minor Road Approaches						
	North Approach			South Approach			East Approach			Not configured			
Time													
06:00	0	898	0	0	626	0	99	0	0	0	0	0	
07:00	0	1284	0	0	991	0	128	0	0	0	0	0	
08:00	0	1407	0	0	1413	0	161	0	0	0	0	0	
09:00	0	968	0	0	1075	0	156	0	0	0	0	0	
15:00	0	1357	0	0	1203	0	239	0	0	0	0	0	
16:00	0	1452	0	0	1185	0	203	0	0	0	0	0	
17:00	0	1370	0	0	1077	0	202	0	0	0	0	0	
18:00	0	1353	0	0	1156	0	198	0	0	0	0	0	
Totals: TM	0	10089	0	0	8726	0	1386	0	0	0	0	0	
Approach	10089			8726			1386			0			

2A	
Min. Req.	%
900	100
720	80

Total	%
1524	100
2275	100
2820	100
2043	100
2560	100
2637	100
2447	100
2509	100
18815	800
Section %	100

2B	
Min. Req.	%
75	100
60	80

Total	%
99	100
132	100
162	100
157	100
239	100
207	100
202	100
199	100
1397	800
Section %	100

* Pedestrians crossing major road

Justification 2 Minimum Compliance: 100 %

Justification 3 - Volume / Delay Combination:

Calculated using raw data

Minimum Compliance (%)

Justification 1 - Minimum Vehicle Volume: 66 %

Justification 2 - Delay to Cross Traffic: 100 %

Justification 3 Minimum Compliance: 66 %

TVIS II - Traffic Volume Information System

Traffic Signal Warrant

Description: **QEW @ CAWTHRA RD (NRT)**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date:

I/C Side: **N**

LHRS: **10151**

End Date:

Intersection Type: **T - E**

Offset: **0**

Schedule Summary: **Tuesday, Wednesday, Thursday AM 06:00-10:00, PM 15:00-19:00**
Currently this schedule was used by Central Region for data collected in Spring

Justification 5 - Collision Experience

Warrant Threshold *		
		%
		5 100
Preceding Months	Number of Collisions **	%
1 - 12	0	0
13 - 24	0	0
25 - 36	0	0
Totals	0	0
Justification 5 Compliance:		0 %

* Per twelve-month period.

** Include only collisions that are susceptible to correction

Calculation Options - Use raw data

Factors for major road approaches

North Approach	South Approach
Factor 1.0	Factor 1.0
Factor for pedestrian crossing major road 1.0	

Factors for minor road approaches

East Approach	Not Configured
Factor 1.0	Factor

CONCLUSION: TRAFFIC SIGNALS ARE WARRANTED



Ministry of Transportation
Ministère des Transports

Intersection Layout Sheet

Version: 1.0 Feb 1, 2016

Contract # 9015-E-0009
Work Order # 056

Date: MAY 31 / 2016 Day: TUES Hrs: 06 - 10 + 15 - 19 + - -
Location: CAWTHRA RD TO 134 - NORTH SERVICE RD Ramps: - /
Reg/Mun: CR Town/City: MISSISSAUGA Area: -
File Name: 0101510000 Device: Gretch / Jamar Unit # 8 / Interval 1: AM / NN / PM
Observer: OXANA NYATKINA Weather: Clear Road Condition: GOOD /

LHRS & O/S: 10151-0

Comments:

GPS: G-STAR N

Datum: WGS 84 (Y) / N

Lat: 43.58515

Long: -79.58610

SIGNALIZED (Y) / N

If intersection is unsignalized;

Sign Type: Stop / Yield

Sign Size: cm x cm

Sign Condition:

NA: New / Good / Poor / Missing

SA: New / Good / Poor / Missing

WA: New / Good / Poor / Missing

EA: New / Good / Poor / Missing

Photograph all approach's
including all Signs (Y) / N

50
(km/h)

CAWTHRA RD

(sign)

(sign)



INDICATE LOCATION &
DIRECTION OF VEHICLE

Vehicle

N S E W

Hwy / Street Name

NORTH SERVICE RD

60
(km/h)

60
(km/h)

NORTH SERVICE RD

Note: Hwy / Street Name

Show all lanes approaching and
leaving the intersection.

Show all channelization

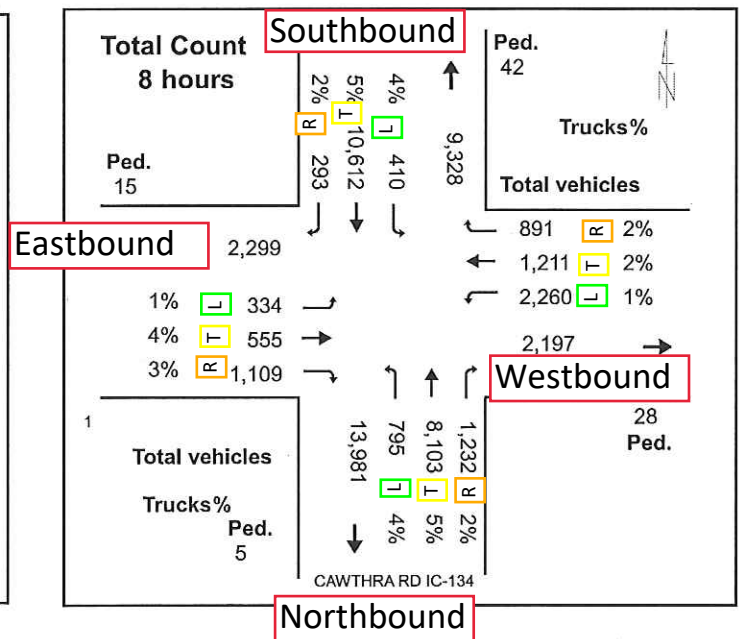
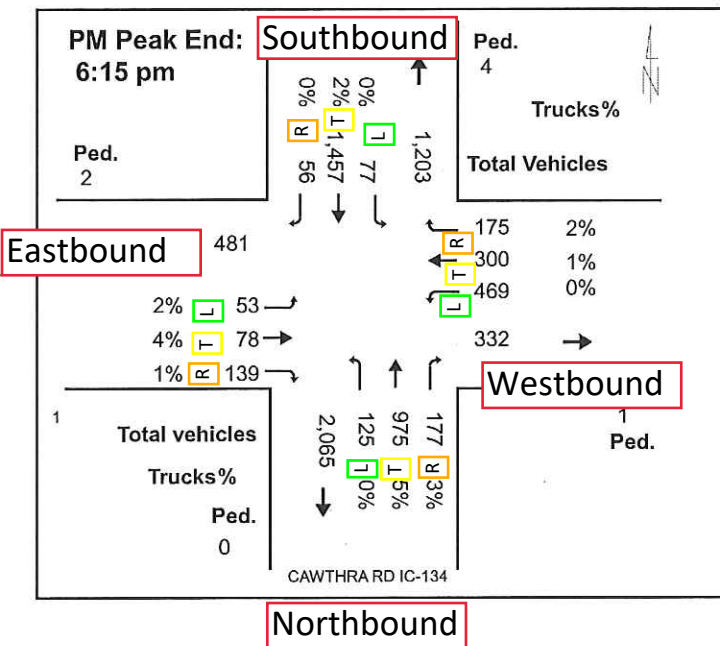
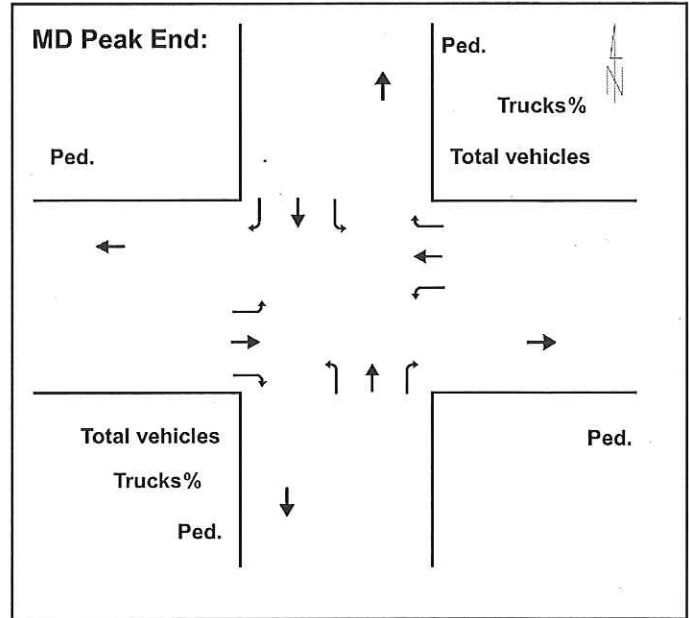
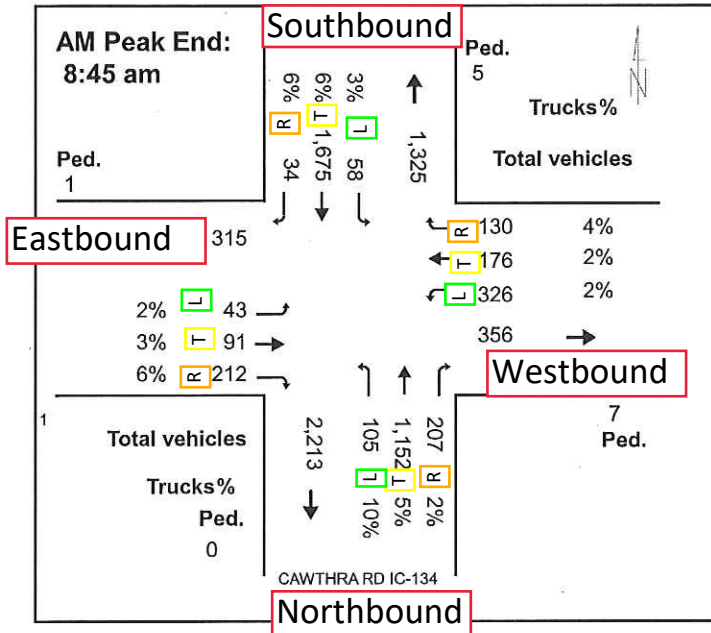
If there are two or more through
lane in one direction, indicate
if these lanes are not continuous

Show pedestrian crosswalks

CAWTHRA RD

50
(km/h)

Layout of "Special Condition"



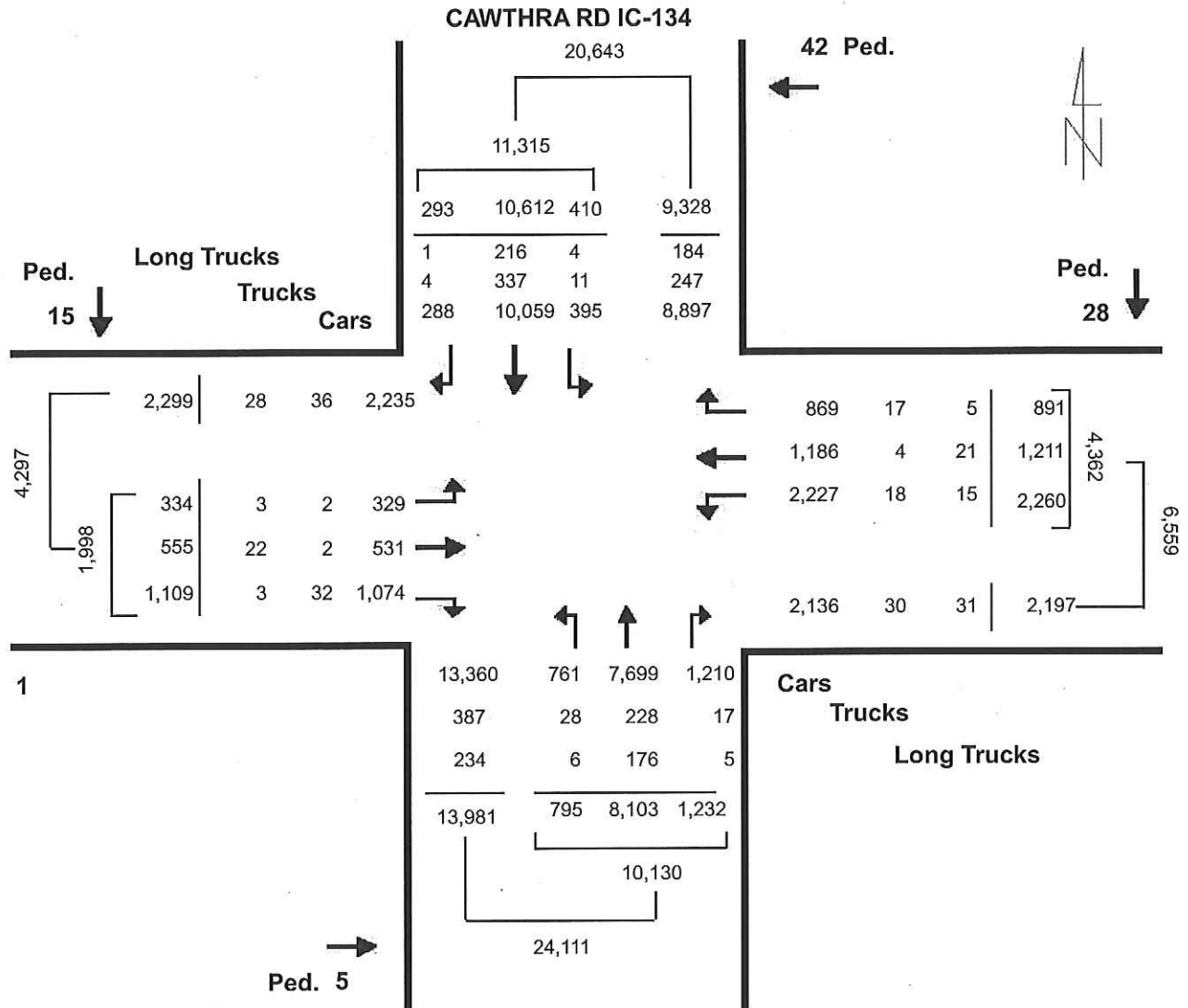
COUNT TOTAL

HWY 1 @ CAWTHRA RD IC-134

Central

Intersection ID:101510000

Date: 31-May-2016



15 MIN REPORT

Intersection ID:101510000

HWY 1 @ CAWTHRA RD IC-134

Municipality: Central

Date: 31-May-2016

NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										
Time	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Total									
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right											
Period1																																								
6:15	3	160	1	0	3	0	0	2	0	0	10	1	6	0	0	0	0	0	0	2	16	119	8	2	0	0	0	0	7	3	24	0	0	0	0	1	1	0	369	
6:30	1	191	7	0	5	0	0	2	0	0	25	2	2	0	0	0	0	1	0	0	5	150	9	0	0	0	0	5	8	3	36	0	0	2	0	0	0	0	454	
6:45	6	235	7	0	4	0	0	3	0	0	20	3	8	1	0	0	0	1	0	0	7	165	18	0	2	0	1	2	13	7	36	0	0	0	0	1	0	0	540	
7:00	4	238	1	1	14	0	1	6	0	1	17	4	10	1	0	1	0	0	0	0	12	174	5	1	5	0	1	3	9	11	38	0	0	1	0	1	0	1	561	
7:15	4	249	3	0	11	0	0	7	0	1	30	4	14	2	0	0	1	1	0	0	14	190	13	0	3	0	0	5	6	17	30	0	0	0	0	1	0	0	607	
7:30	8	274	8	0	14	1	0	9	0	1	52	14	27	0	0	0	0	1	0	0	10	224	19	1	6	0	0	6	16	12	35	0	0	1	0	0	1	1	741	
7:45	3	352	7	0	15	0	0	18	0	0	62	30	30	0	0	0	0	1	0	1	15	242	30	2	8	0	0	3	16	13	45	0	0	0	0	1	0	0	894	
8:00	11	380	5	1	11	1	0	9	0	4	73	47	33	1	0	2	1	0	1	2	15	277	38	2	10	0	0	7	6	21	55	0	0	5	0	0	0	0	1018	
8:15	10	426	8	0	15	0	0	8	1	0	89	45	33	0	0	0	0	1	0	3	22	275	49	3	8	2	1	5	11	17	50	0	1	3	0	1	0	0	1088	
8:30	17	403	7	1	16	0	0	13	0	0	66	29	27	0	1	0	1	0	0	1	31	297	53	1	5	1	1	10	15	23	51	0	0	2	0	1	0	1	1074	
8:45	18	364	12	0	20	0	0	10	0	1	92	52	32	0	0	1	3	1	1	1	27	244	63	2	6	0	0	8	10	27	44	0	0	2	1	0	0	0	1042	
9:00	17	259	13	0	12	0	1	7	0	0	64	54	27	0	0	0	0	1	0	1	38	310	70	1	15	1	1	8	10	18	35	0	0	2	0	1	0	0	966	
9:15	16	288	5	2	26	0	1	7	0	1	47	29	32	1	0	1	0	0	0	0	22	264	38	0	12	1	0	6	7	13	31	0	0	0	0	1	0	0	851	
9:30	19	253	10	0	14	0	0	7	0	2	35	14	24	1	0	0	0	1	0	1	19	259	46	1	10	0	0	5	11	14	19	0	0	0	0	0	0	2	770	
9:45	6	240	8	2	19	0	0	10	0	0	43	8	23	0	0	1	2	1	0	3	13	253	35	0	9	0	0	1	11	18	25	0	0	0	0	1	0	1	733	
10:00	10	219	10	0	16	1	0	7	0	0	43	16	20	1	0	0	0	0	0	0	13	222	50	2	15	1	0	6	11	19	32	1	0	0	0	0	0	1	716	
Period2																																								
15:15	13	298	6	1	10	0	0	10	0	6	53	31	24	1	0	1	0	1	0	2	22	278	46	1	11	1	0	8	9	20	24	0	0	2	1	3	1	0	885	
15:30	16	342	15	0	9	0	0	3	0	4	73	38	28	1	0	1	1	1	0	3	28	280	44	0	7	1	0	17	7	17	22	0	0	2	0	0	0	0	963	
15:45	16	333	11	0	11	1	0	8	0	1	92	43	45	1	1	1	0	0	0	2	20	236	43	2	5	1	0	5	5	13	37	1	0	2	0	0	0	3	939	
16:00	9	361	12	1	19	0	0	8	0	3	76	57	24	0	0	1	3	1	0	2	29	235	50	2	11	0	0	7	12	29	30	0	0	2	0	1	0	0	985	
16:15	15	377	8	0	12	0	0	6	0	3	98	47	27	1	0	0	0	0	0	1	28	298	31	1	10	0	1	10	8	22	34	0	0	2	0	1	0	0	1041	
16:30	18	386	10	0	11	0	1	8	0	2	91	50	35	1	0	0	0	1	2	1	28	260	51	1	6	0	0	8	8	32	28	0	0	1	0	0	0	2	1042	
16:45	10	402	14	0	9	0	0	3	0	1	91	57	21	0	0	0	0	1	0	0	34	264	49	0	6	0	0	8	6	21	27	0	0	0	0	1	0	0	1025	
17:00	13	378	8	1	10	0	0	7	0	0	83	48	22	0	1	2	0	0	0	0	38	252	30	2	5	1	0	4	7	13	21	0	1	0	0	1	0	0	948	
17:15	16	334	12	0	5	0	0	6	0	2	110	60	29	0	0	2	0	1	1	1	31	279	39	0	4	0	0	1	10	15	31	0	0	1	0	0	0	0	991	
17:30	11	351	13	0	4	0	0	5	0	0	95	48	37	0	0	0	0	1	0	0	40	258	47	0	7	1	0	4	22	21	30	0	0	1	0	1	0	0	997	
17:45	23	388	14	0	4	0	0	5	0	3	123	87	38	1	0	1	2	1	0	1	31	200	38	0	4	1	0	3	9	18	22	0	0	1	1	1	0	2	1022	
18:00	20	318	13	0	4	0	0	4	0	1	128	92	43	1	0	2	0	0	0	0	20	217	42	0	6	1	0	5	14	24	46	0	0	0	0	1	0	0	1002	
18:15	23	367	16	0	3	0	0	4	0	0	119	70	54	0	0	0	0	1	0	0	34	255	45	0	13	2	0	3	7	12	39	0	0	0	0	0	0	0	1067	
18:30	13	321	8	1	3	0	0	2	0	4	97	44	29	1	0	0	1	1	0	0	35	244	43	0	4	1	0	4	15	17	42	0	0	0	0	1	0	0	931	
18:45	15	290	11	0	5	0	0	10	0	1	65	31	33	0	0	0	0	0	0	0	38	272	35	1	6	1	0	7	10	7	29	0	0	0	0	0	0	1	868	
19:00	11	282	5	0	3	0	0	2	0	0	65	31	32	2	1	0	0	1	0	0	26	206	33	0	9	0	0	2	13	14	26	0	0	0	0	1	0	0	765	



Ministry of Transportation
Ministère des Transports

Intersection Layout Sheet

Version: 1.0 Feb 1, 2016

Contract # 1015-E-0001
Work Order # 055

Date: MAY 31 / 2016 Day: TUES / Hrs: 06 - 10 + 15 - 19 + - -
Location: HWY 1 @ CANTARA RD IC-B34 Ramps: SOUTH / 51
Reg/Mun: CR Town/City: MISSISSAUGA Area: _____
File Name: 2101510000 Device: Gretch / Jamar Unit # 8 / Interval 1: AM / NN / PM
Observer: OXANA VYATKINA Weather: Clear / Road Condition: LANE CLOSED

LHRS & O/S: 10151 - 0

Comments:

GPS: G-STAR IV

Datum: WGS 84 (Y / N)

Lat: 43.582171

Long: -79.581948

SIGNALIZED Y / N

If intersection is unsignalized;

Sign Type: Stop / Yield

Sign Size: _____ cm x _____ cm

Sign Condition:

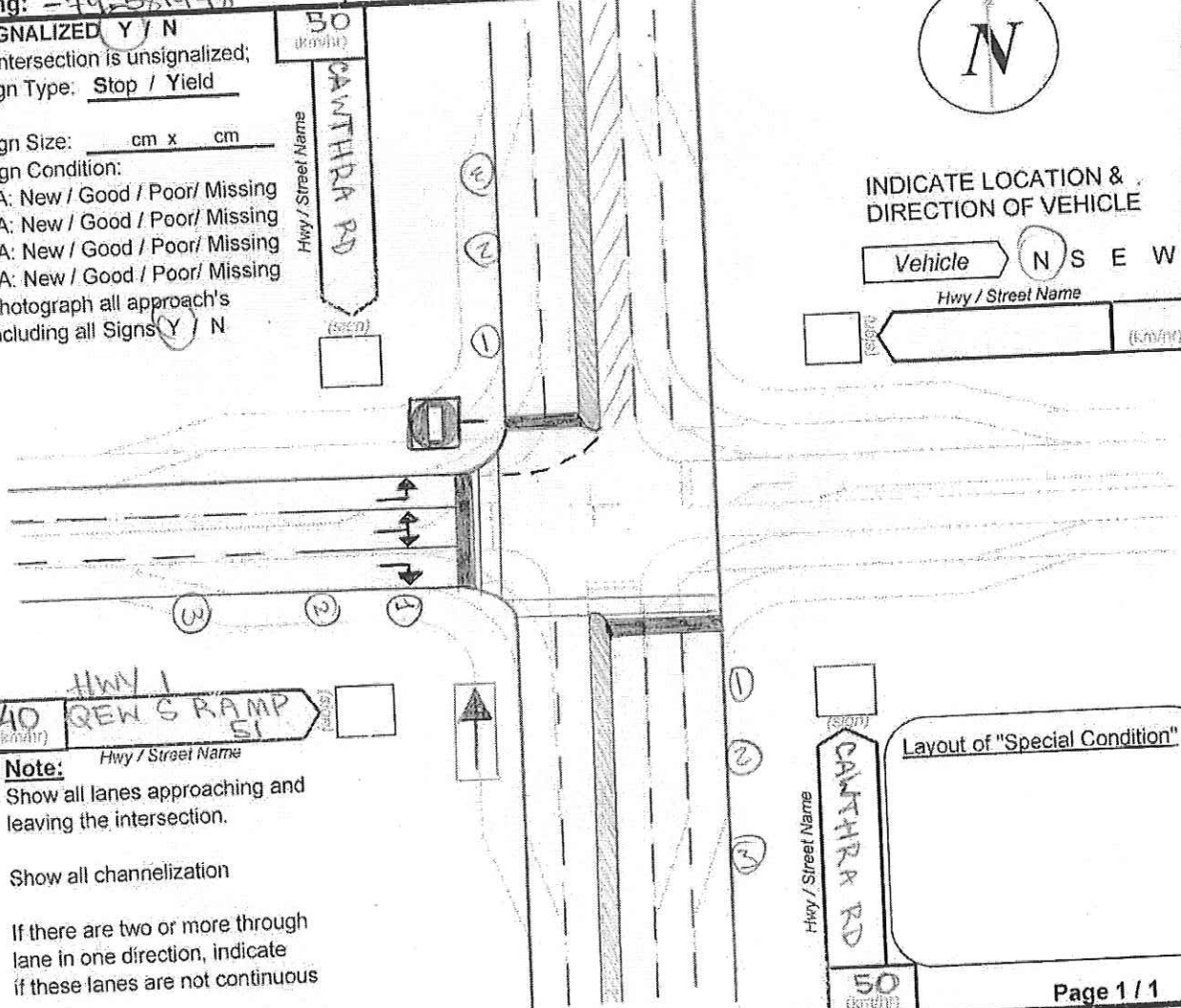
NA: New / Good / Poor / Missing

SA: New / Good / Poor / Missing

WA: New / Good / Poor / Missing

EA: New / Good / Poor / Missing

Photograph all approach's
including all Signs Y / N



HWY 1
40 (road) NEW GRAMP 51

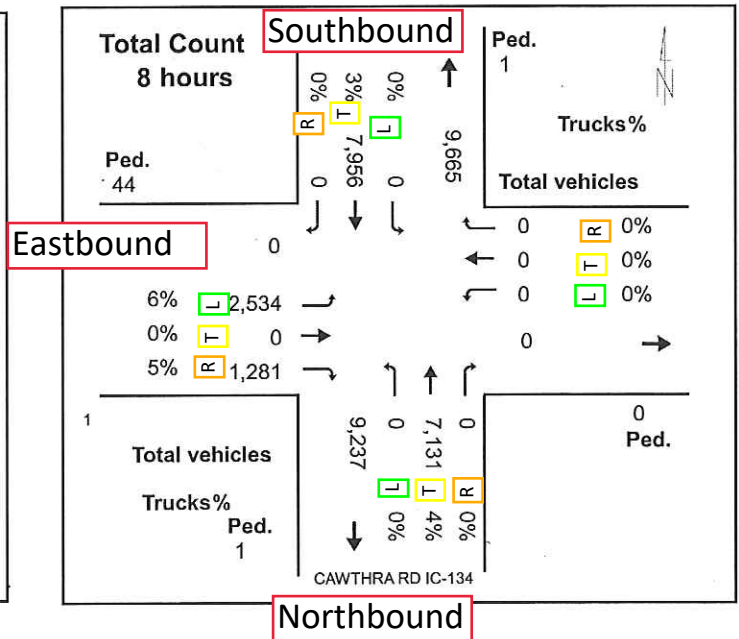
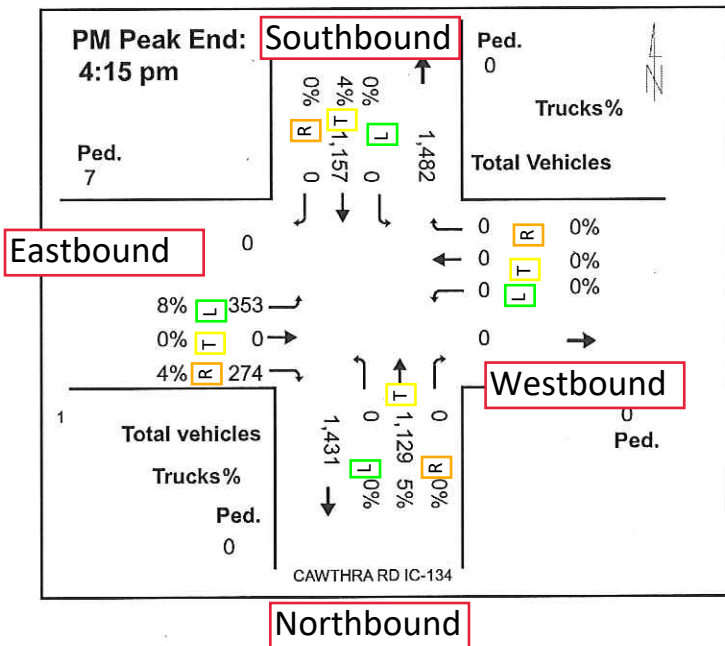
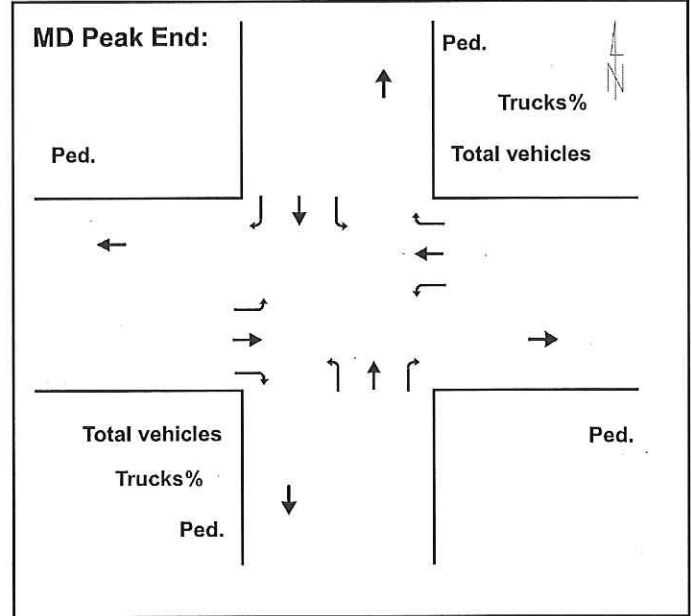
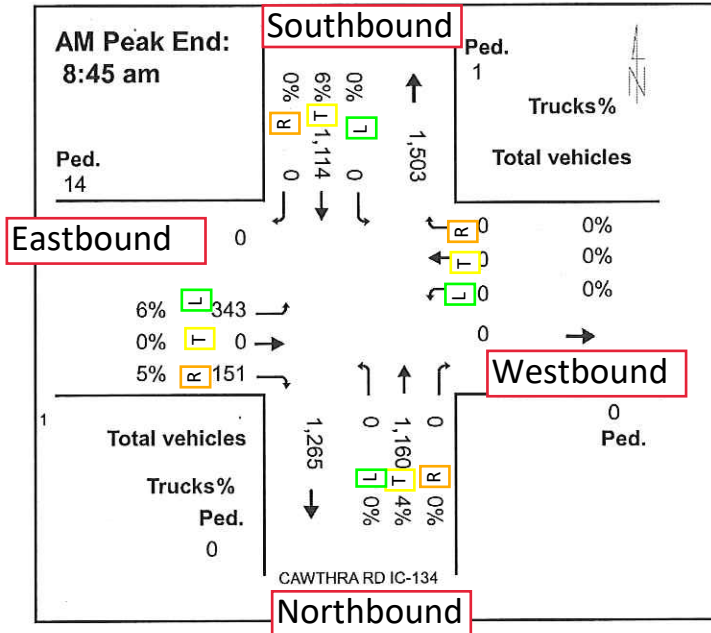
Note:

Show all lanes approaching and leaving the intersection.

Show all channelization

If there are two or more through lane in one direction, indicate if these lanes are not continuous

Show pedestrian crosswalks



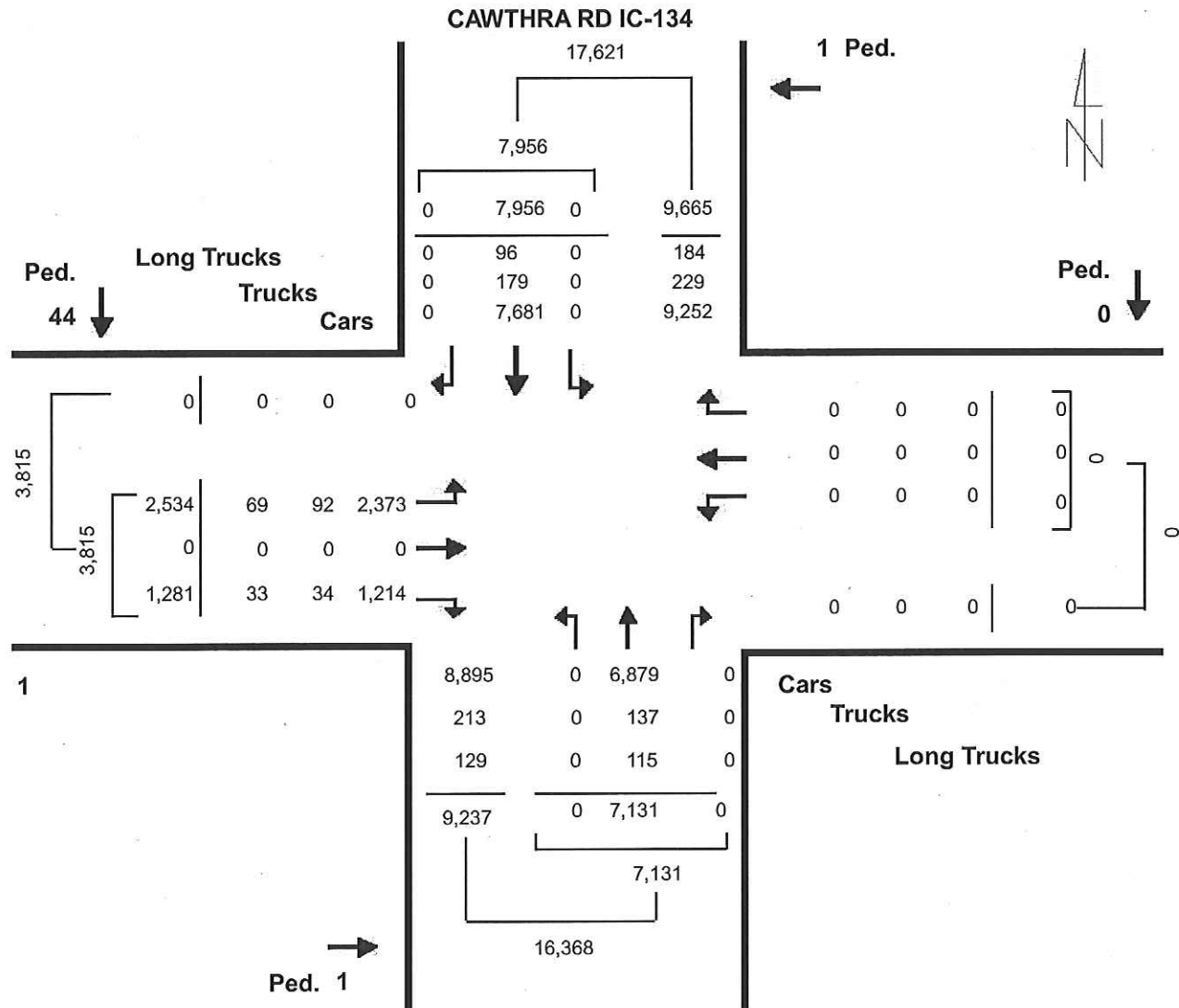
COUNT TOTAL

HWY 1 @ CAWTHRA RD IC-134

Central

Intersection ID:101510000(--S--)

Date: 31-May-2016





Ministry of Transportation
Ministère des Transports

Intersection Layout Sheet

Version: 1.0 Feb 1, 2016

Contract # 9015-E-0009

Work Order # 057

Date: MAY 31 / 2016 Day: TUES / Hrs: 06 - 10 + 15 - 19 + -

Location: CANTHRA RD IC-134 - SOUTH SERVICE RD Ramps: - /

Reg/Mun: CR Town/City: MISSISSAUGA Area: -

File Name: 010510000 Device: Gretch / Jamar Unit # 8 / Interval 1: AM / NN / PM

Observer: OXANA VYATKINA Weather: CLEAR / Road Condition: GOOD /

LHRS & O/S: 10151 - 0

Comments:

GPS: G-STAR IN

Datum: WGS 84 (Y) / N

Lat: 43.580812

Long: -79.581068

SIGNALIZED (Y) / N

If intersection is unsignalized:

Sign Type: Stop / Yield

Sign Size: cm x cm

Sign Condition:

NA: New / Good / Poor / Missing

SA: New / Good / Poor / Missing

WA: New / Good / Poor / Missing

EA: New / Good / Poor / Missing

Photograph all approach's
including all Signs (Y) / N

50
(km/h)

CANTHRA RD

(sign)



INDICATE LOCATION &
DIRECTION OF VEHICLE

Vehicle N S E W

Hwy / Street Name

SOUTH SERVICE RD 40
(km/h)

40
(km/h)

SOUTH SERVICE RD

Note:

Show all lanes approaching and
leaving the intersection.

Show all channelization

If there are two or more through
lane in one direction, indicate
if these lanes are not continuous

Show pedestrian crosswalks

Hwy / Street Name

CANTHRA RD

50
(km/h)

Layout of "Special Condition"

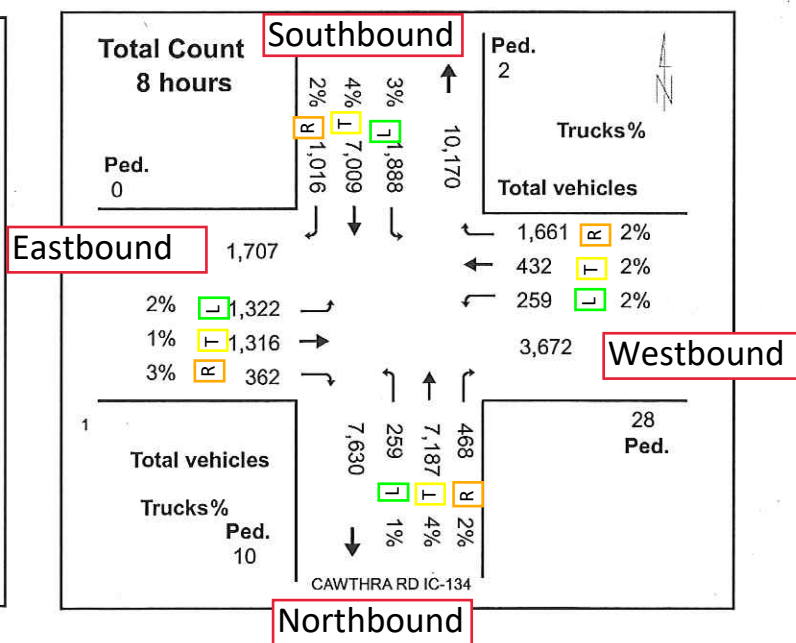
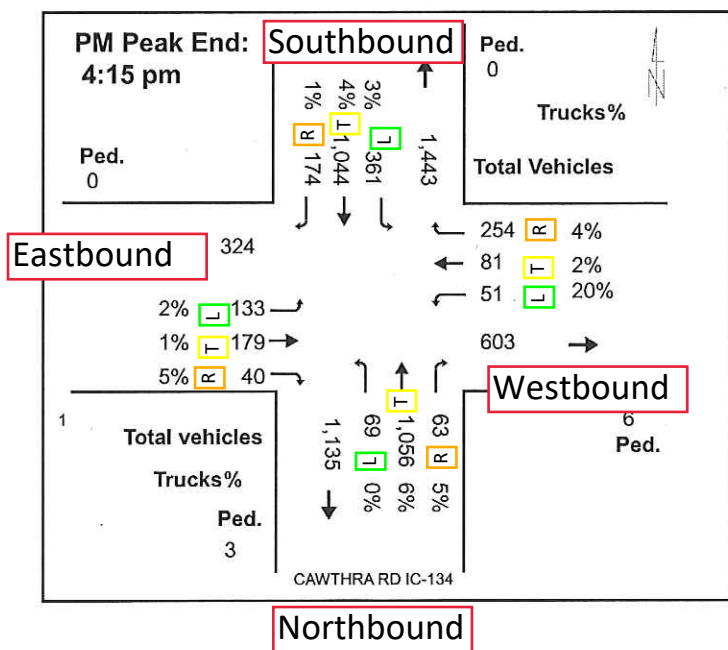
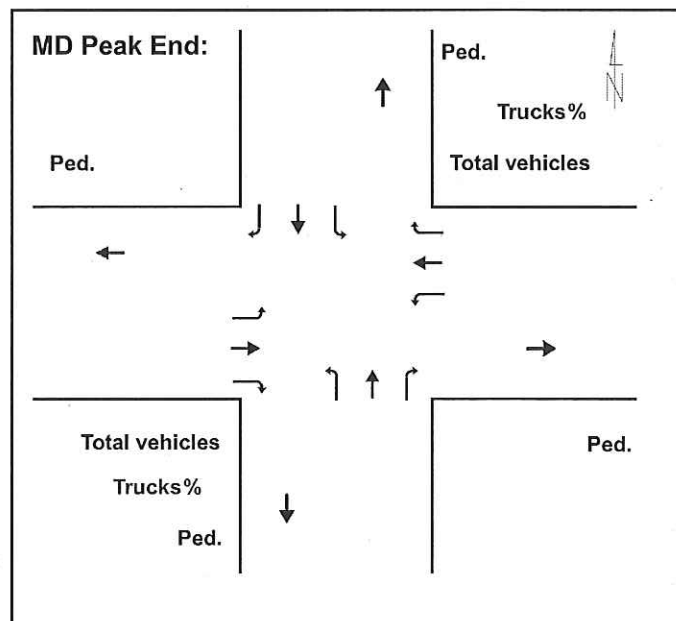
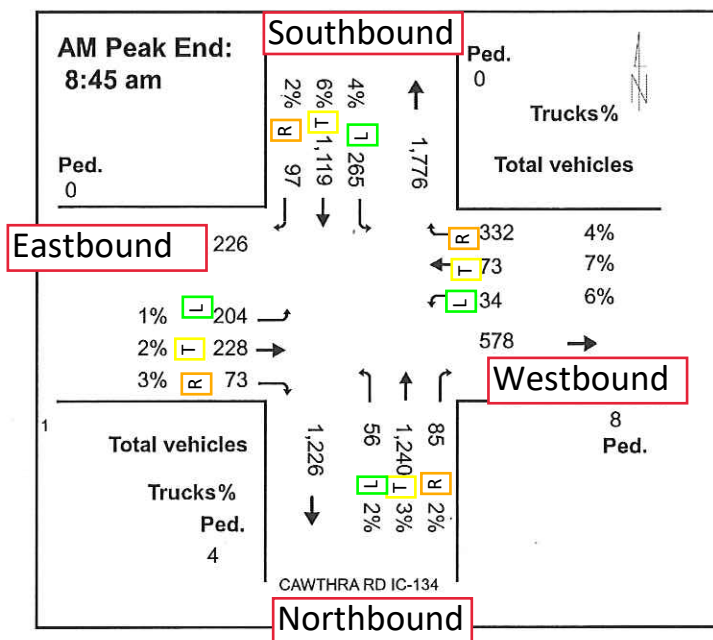
HWY 1 @ CAWTHRA RD IC-134

Central

Intersection ID:101510000

Count Day: Tuesday

Count Date: 31-May-2016



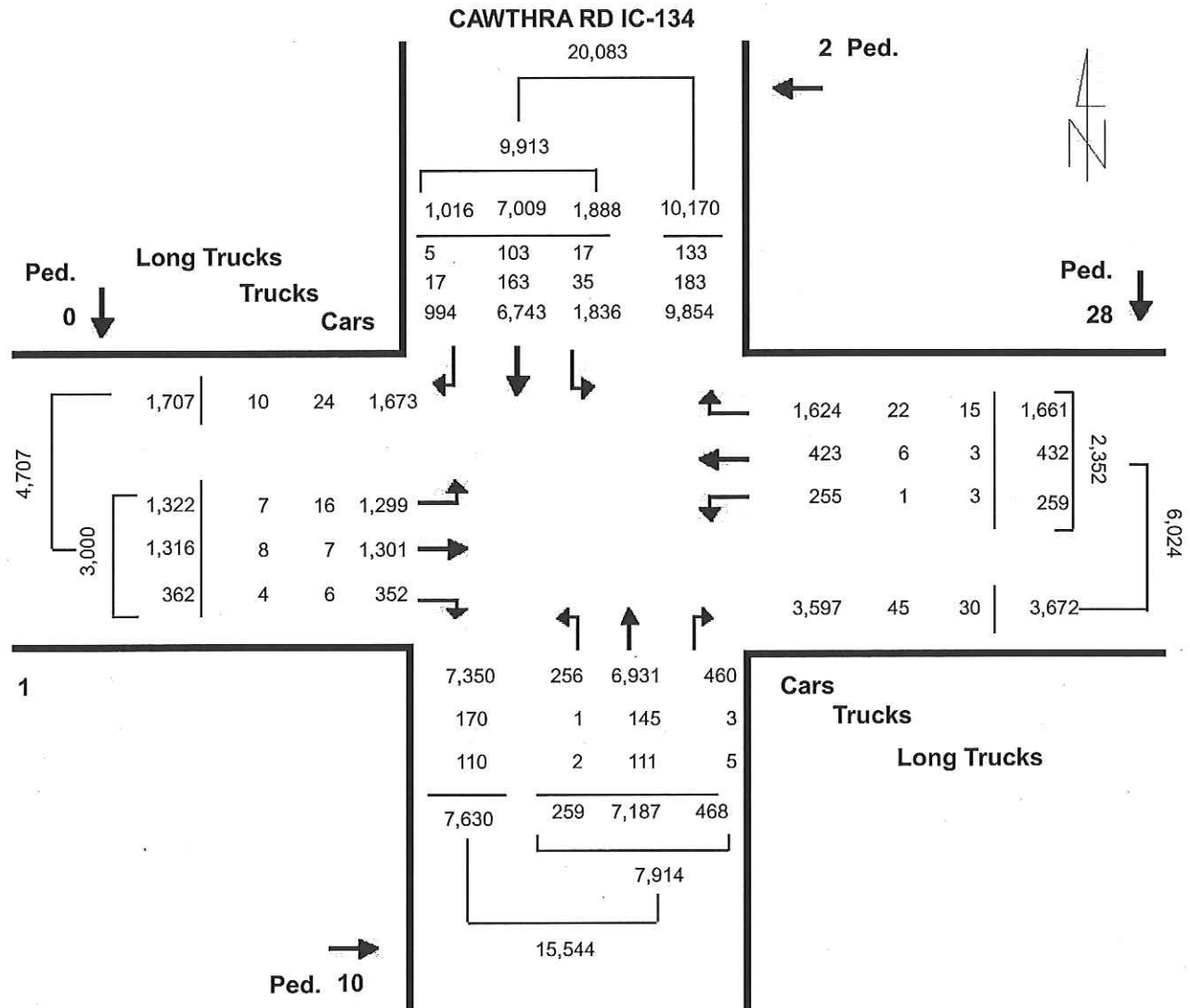
COUNT TOTAL

HWY 1 @ CAWTHRA RD IC-134

Central

Intersection ID:101510000

Date: 31-May-2016



15 MIN REPORT

Intersection ID:101510000

HWY 1 @ CAWTHRA RD IC-134

Municipality: Central

Date: 31-May-2016

NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										
Time	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Total									
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right											
Period1																																								
6:15	12	62	5	0	1	0	1	1	0	0	0	1	8	0	0	0	0	0	0	0	0	111	5	0	0	0	0	28	3	4	0	0	0	0	0	242				
6:30	22	80	1	0	0	0	0	2	0	0	1	3	27	0	0	0	0	0	0	0	1	139	8	0	1	0	0	22	35	6	0	0	0	0	0	349				
6:45	23	93	5	0	1	1	0	1	1	0	2	2	32	0	0	0	0	0	1	0	1	183	20	0	1	0	0	34	32	3	0	0	0	0	0	439				
7:00	29	129	5	0	6	1	0	3	0	0	4	0	19	0	0	0	0	0	1	0	3	182	25	0	2	0	0	43	59	11	0	1	0	0	0	526				
7:15	43	115	12	0	2	0	1	0	1	0	2	3	36	0	0	0	0	0	1	0	0	232	16	0	4	0	0	40	59	10	0	0	1	1	0	0	581			
7:30	44	134	14	0	4	0	1	2	0	0	5	1	35	0	0	0	0	0	1	3	0	256	26	0	7	1	0	58	69	10	0	0	0	0	0	673				
7:45	77	167	16	3	6	0	6	7	0	0	1	9	55	0	0	1	0	0	3	0	5	274	21	0	7	0	0	45	41	9	0	0	0	0	0	756				
8:00	86	211	22	5	10	0	1	6	0	0	5	14	85	0	2	3	2	2	4	0	11	282	20	0	5	0	0	56	72	10	1	1	0	0	2	1	921			
8:15	84	256	18	1	10	0	0	3	0	0	5	23	89	0	1	3	0	0	1	4	11	262	19	0	4	0	1	49	68	26	1	0	0	0	1	0	953			
8:30	45	330	34	1	12	1	0	7	0	0	8	19	77	0	0	2	0	0	0	3	19	340	21	0	4	0	0	48	46	24	0	0	0	0	0	1	1047			
8:45	40	259	21	2	10	0	0	5	1	0	14	12	67	0	0	1	0	0	0	1	14	318	23	0	5	0	0	49	38	11	0	0	0	0	0	0	897			
9:00	31	163	18	0	8	1	0	5	0	0	7	10	41	0	0	0	0	0	0	1	6	266	13	0	14	0	0	40	33	9	0	0	0	0	0	0	672			
9:15	38	154	25	1	11	0	0	4	0	0	3	12	36	0	0	0	0	0	0	1	2	183	19	0	7	0	0	48	21	8	0	0	1	1	2	0	580			
9:30	57	167	10	1	10	0	0	6	1	1	2	5	46	0	0	0	0	0	0	2	3	188	16	0	5	0	0	54	28	10	0	0	0	0	0	0	614			
9:45	49	158	12	0	6	1	1	2	0	0	6	6	31	0	0	0	0	0	0	0	7	185	15	0	3	0	0	35	14	11	1	0	0	1	0	545				
10:00	56	148	25	3	10	2	0	6	0	0	6	6	31	0	0	0	0	0	0	3	1	157	9	0	10	0	0	23	21	9	0	0	0	0	1	534				
Period2																																								
15:15	60	259	33	2	9	0	1	10	0	0	10	17	57	0	0	0	0	0	1	0	12	242	8	1	3	0	0	23	11	6	0	0	0	1	0	769				
15:30	65	251	52	4	6	0	1	4	0	0	13	15	61	0	1	4	0	0	1	3	16	279	16	0	6	0	0	26	17	10	0	1	0	0	0	871				
15:45	95	238	38	1	9	0	0	4	0	0	12	19	66	0	0	1	0	0	0	2	15	241	11	0	9	0	0	22	21	6	0	0	0	0	0	1	817			
16:00	125	286	43	3	8	1	0	5	1	0	11	26	75	0	1	2	0	0	1	1	25	176	18	0	3	2	0	39	74	11	1	0	0	0	0	943				
16:15	66	225	39	1	6	0	0	2	0	0	14	19	43	0	0	0	1	0	0	0	13	301	15	0	9	0	0	43	66	11	1	0	0	1	0	883				
16:30	71	264	53	0	3	3	2	2	0	1	7	16	56	0	0	0	0	1	0	1	5	176	10	0	6	0	1	37	38	10	4	0	0	1	1	773				
16:45	50	255	44	0	2	1	0	0	0	0	14	7	49	0	0	0	0	0	0	1	10	236	12	0	2	0	0	25	30	9	0	0	0	0	0	751				
17:00	71	269	55	1	2	0	0	4	0	0	11	21	52	0	0	1	0	0	0	0	5	205	7	0	3	0	0	40	37	15	1	1	0	0	0	802				
17:15	62	251	49	2	2	0	0	2	0	0	13	22	58	0	1	1	0	0	0	0	18	198	12	0	0	0	0	21	28	15	1	1	0	0	0	760				
17:30	54	263	54	0	0	1	0	4	0	0	9	25	68	0	0	1	0	0	0	0	7	196	13	0	4	0	0	31	36	15	0	0	1	0	0	784				
17:45	64	255	57	1	2	2	0	1	0	0	17	27	54	0	0	0	0	0	0	0	7	200	5	0	3	0	0	57	74	16	0	1	0	0	1	848				
18:00	63	272	75	0	3	1	0	1	0	0	11	24	41	0	0	1	0	0	0	0	7	182	11	0	3	0	0	93	91	16	0	0	1	1	0	900				
18:15	78	260	48	0	0	0	0	1	0	0	10	17	60	0	0	0	0	0	0	0	11	193	9	0	7	0	0	57	45	10	3	0	1	0	0	812				
18:30	66	294	49	0	0	1	1	0	0	0	10	15	59	1	0	0	0	0	0	2	9	202	16	0	1	0	0	39	40	14	0	0	0	0	0	821				
18:45	56	250	33	3	1	0	0	2	0	0	10	12	55	0	0	0	0	0	0	0	8	189	9	0	5	0	0	35	31	5	0	0	0	0	0	706				
19:00	54	225	29	0	3	0	1	1	0	0	12	15	55	0	0	1	0	0	0	0	4	157	12	0	2	0	0	39	23	12	2	1	1	0	0	650				

A large decorative graphic on the left side of the page, featuring a blue triangle at the top left and a large, light gray curved shape that dominates the lower half of the page.

APPENDIX D

NOISE MITIGATION GUIDANCE

Acoustic/Noise Barrier

Generally, noise controls to attenuate transportation sound levels at Outdoor Living Areas (OLAs) would consist of the implementation of acoustic/noise barriers with materials that would meet the guidance included in NPC-300, for example:

- A wall, berm, wall/berm combination or similar structure, used as a noise control measure, and high enough to break the line-of-sight between the source and the receptor.
- The minimum surface density (face weight) is 20 kg/m²
 - Many materials could satisfy the surface density requirement, e.g. wood, glass, concrete, Plexiglas, Acrylite.
 - The required thickness can be determined by dividing the 20 kg/m² face weight by the material density (kg/m³). Typically, this would imply:
 - 50 mm (2") thickness of wood
 - 13 mm (0.5") thickness of lighter plastic (like Plexiglas or PVC)
 - 6 mm (0.25") thickness of heavier material (like aluminum, glass, concrete)
- The barrier should be structurally sound, appropriately designed to withstand wind and snow load, and constructed without cracks or surface gaps. Joints between panels may need to be overlapped to ensure surfaces are free of gaps, particularly for wood construction.
- Any gaps under the barrier that are necessary for drainage purposes should be minimized and localized, so that the acoustical performance of the barrier is maintained.
- If a sound absorptive face is to be included in the barrier design, the minimum noise reduction coefficient is recommended to be NRC 0.7.

Building Ventilation and Air Conditioning

The use of air conditioning itself is not a noise control measure; however, it allows for windows and doors to remain closed, thereby reducing the indoor sound levels.

NPC-300 provides the following guidance with respect to implementation of building ventilation and air conditioning:

- a. the noise produced by the proposed ventilation system in the space served does not exceed 40 dBA. In practice, this condition usually implies that window air conditioning units are not acceptable;
- b. the ventilation system complies with all national, provincial and municipal standards and codes;
- c. the ventilation system is designed by a heating and ventilation professional; and
- d. the ventilation system enables the windows and exterior doors to remain closed.

Air conditioning systems also need to comply with Publication NPC-216, and/or any local municipal noise by-law that has provisions relating to air conditioning equipment.

A decorative background graphic featuring a large, light gray circular shape on the right side of the page. On the left side, there is a blue triangular shape pointing towards the center, separated from the gray circle by a thin white curved line.

APPENDIX E

WARNING CLAUSES

Warning clauses are recommended to be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. Warning clauses may be used individually or in combination.

The following warning clauses are recommended based on the applicable guidelines; however, wording may be modified/customized during consultation with the planning authority to best suit the proposed development:

Transportation Sources

NPC-300 Type A: Recommended to address surface transportation sound levels in OLAs if sound level is in the range of >55 dBA but ≤ 60 dBA, and noise controls have not been provided.

"Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

NPC-300 Type B: Recommended to address surface transportation sound levels in OLAs if the sound level is in the range of >55 dBA but ≤ 60 dBA, and noise controls have been provided. Recommended to address outdoor aircraft sound levels ≥NEF 30.

"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

NPC-300 Type C: Applicable for low and medium density developments only, recommended to address transportation sound levels at the plane of window.

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

NPC-300 Type D: Recommended to address transportation sound levels at the plane of window.

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

Proximity to Railway Line: Metrolinx/CN/CP/VIA Warning Clause for developments that are within 300 metres of the right-of-way

"Warning: [Canadian National Railway Company] [Metrolinx / GO] [Canadian Pacific Railway Company] [VIA Rail Canada Inc.] or its assigns or successors in interest has or have a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR/Metrolinx/GO/CPR/VIA will not responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way."

Stationary Sources

NPC-300 Type E: Recommended to address proximity to commercial/industrial land-use

"Purchasers/tenants are advised that due to the proximity of the adjacent industrial/commercial land-uses, noise from the industrial/commercial land-uses may at times be audible."

NPC-300 Type F: Recommended to for Class 4 Area Notification

"Purchasers/tenants are advised that sound levels due to the adjacent industry (facility) (utility) are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed."