REPORT

CHEO 1DOOR4CARE

OTTAWA, ONTARIO

NOISE AND VIBRATION IMPACT STUDY

RWDI #2201400

November 7, 2022

SUBMITTED TO

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STATEMENT OF LIMITATIONS

This report entitled CHEO 1 Door4Care was prepared by RWDI Air Inc. ("RWDI") for B+H Architects ("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.

EXECUTIVE SUMMARY

RWDI was retained to prepare a Noise and Vibration Impact Study (NVIS) for the proposed institutional development located just southeast of the existing Children's Hospital of Eastern Ontario (CHEO) in Ottawa, Ontario. The proposed development will consist of a 200,000ft^2 building and a 330,000 ft^2 parking structure on an existing parking lot. This assessment was completed to support the Phase 1 submission as required by the City of Ottawa under the Noise Control Guidelines.

In accordance with Ottawa's Noise Control Guidelines, this NVIS focused on the environmental effects on the proposed building, which is considered the sensitive space. The parking structure is not a sensitive space but its effects on surroundings should be assessed at a later stage as the design of the overall project progresses. In accordance with provincial guidelines (NPC-300), passenger vehicle traffic within parking structures is not considered a stationary source of sound and thus was not evaluated, nor is it required to be as design progresses.

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.

Rail is further than 500m from the proposed development and therefore was not further assessed.

The potential noise levels from stationary sources of sound were evaluated. Based on the site visit, noise modeling results and setback distances, the land use compatibility of the proposed development with respect to the nearby land-uses are considered acceptable from the noise assessment perspective.

At this stage in design the noise levels produced by the development, including the parking structure, 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

RWDI was retained to prepare a Noise and Vibration Impact Study (NVIS) for the proposed CHEO 1Door4Care development located just southeast of the existing Children's Hospital of Eastern Ontario (CHEO) in Ottawa, Ontario. CHEO 1Door4Care is part of a larger master plan.

The proposed development will consist of a 200,000ft^2 building and a 330,000 ft^2 parking structure on an existing parking lot. This assessment was completed to support the Phase 1 submission as required by the City of Ottawa under their Noise Control Guidelines.

This NVIS focuses on the environmental effects on the medical building and not on the parking structure that is part of the overall master plan. The parking structure is not a sensitive receptor, therefore, the effects of the environment on that part of the development do not need to be assessed at this stage of the design. The parking structure may feature mechanical equipment. The sound levels of any such equipment, and the effects on nearby sensitive spaces, should be assessed at detail design as the work progresses.

The context site plan is shown in **Figure 1**.

The site is exposed to noise from road traffic from: Smyth Road and Ring Road at South Haven Place / General Hospital Entrance W (Ring Road).

Rail is further than 500m from the proposed development and was not further assessed.

A screening level assessment of nearby stationary sources was conducted. A site visit was also conducted to review the impact of existing stationary sources on the development.

This assessment was completed to support the Phase 1 Noise Control Feasibility Study submission as required by the City of Ottawa. This assessment was based on design drawings dated March 25, 2022.

2 APPLICABLE CRITERIA

Applicable criteria for transportation noise sources (road and rail), stationary noise sources and rail vibration are adopted from the City of Ottawa's Environmental Noise Control Guidelines (Guide), as well as the Ontario Ministry of the Environment, Conservation and Parks (MECP) NPC-300 Environmental Noise Guideline (MOE, 2013). A summary of the NPC-300 applicable criteria is included with **Appendix A**. City of Ottawa's requirements have been outlined throughout the report where necessary, and they mostly reflect NPC-300.

The proposed development site would be characterized as a "Class 1 Area", which is defined according to NPC-300 as an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as "urban hum."

3 ASSESSMENT OF THE ENVIRONMENT ON THE PROPOSED DEVELOPMENT

3.1 Transportation Source Assessment

3.1.1 Road Traffic Volume Data

Smyth Road and South Haven Place / General Hospital Entrance W traffic volumes were obtained from The City of Ottawa. A Mature State of Development was assumed for Smyth Road, thus ultimate volumes found in Appendix B of Ottawa's Guide were utilized for a 4-lane roadway. A 92%/8% daytime/nighttime split was applied for Smyth Road and South Haven Place / General Hospital Entrance W as per the City's Guide.

Turning Movement Counts (TMCs) at the intersection of Smyth Road and South Haven Place / General Hospital Entrance W provided detailed traffic volumes for the two peak time periods: 07:45 to 08:45 and 15:30 to 16:30. The TMCs were used to determine the traffic volume and types of vehicles through the General Hospital Entrance during the AM and PM peaks and 8-hour interval which were assumed to be 9%, 10% and 60% of the Annual Average Daily Traffic (AADT), respectively. The maximum AADTs obtained from the approximation of each of these three time periods was used for the AADT for General Hospital Entrance.

The volumes for the General Hospital Entrance were increased at a rate of 2% per year to represent the predicted 10-year horizon volumes as per NPC-300 in an attempt to bring the traffic closer to the Mature State of Development for Smyth Road.

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

A sample ORNAMENT calculation was conducted as comparison to the Cadna/A and RLS-90 prediction results. The results were found to be within 3 dB. Sample calculations for both Cadna/A and ORNAMENT are provided in **Appendix D** for road impact for the west façade of northern portion of the development.

Table 1: Road Traffic Volumes

Roadway	2032 Future Traffic / Mature State of Development (AADT)	% Day/Night	Speed Limit (km/hr.)	% Trucks
South Haven Place / General Hospital Entrance W	13,749	92 / 8	40	3.9
Smyth Road	30,000	92 / 8	50	12

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. The most impacted building façade (most westerly one) was used for comparison with STAMSON's implementation of ORNAMENT.

Outdoor Living Areas (OLAs) associated with the institutional development were not assessed as they are not considered sensitive receptors as per the City's Guide.

3.1.3 Transportation Source Assessment - 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	
1Door4Care	North	62	55	1
	East	57	49	--
	South	60	52	1
	West	65	57	1,2

Note(s):
1. Installation of air-conditioning to allow for windows and doors to remain closed, City Guide Table A1 warning clause related to surface transportation / NPC-300 "Type D". Refer to **Appendix C** for guidance regarding air-conditioning as a noise mitigation measure.
2. Façade used for comparison with ORNAMENT

3.2 Stationary Source Assessment

Stationary sources could be grouped into two categories: Those that have a permit with the Ontario Ministry of the Environment, Conservation and Parks (MECP) through an Environmental Compliance Approval (ECA) or Environmental Activity and Sector Registry (EASR); and those that are exempt from ECA or EASR permit requirements.

In the case where a stationary source has an ECA or EASR permit with the MECP, and would be put in a position where it is no longer in compliance with the applicable sound level criteria due to the encroachment of the proposed new development, source specific mitigation and/or formal classification of the proposed development lands as a "Class 4 Area" (refer to C.4.4.2 "Class 4 Area" in NPC-300) would be required. In this case, coordination and agreements between the stationary source owner, proposed new development owner, the land-use planning authority and potentially the MECP would be needed.

In the case where a stationary source is exempt from ECA or EASR permit requirements with the MECP, the noise provisions of the applicable Municipal Code and guidance from NPC-300 would be applicable. In this case, mitigation of sound levels due to stationary sources would be from a due diligence perspective to avoid nuisance complaints from future occupants of the proposed new development. Mitigation could be in the form of mitigation at the source (with agreement from the stationary source owner) and/or mitigation at the receptor through site and building element design (building orientation, acoustical barriers, façade sound insulation design).

3.2.1 Land-Use Compatibility Review (D-6 Guideline Assessment)

The proposed institutional development will be located on institutional lands, next to an existing institutional building and residential zone already exposed to similar institutional sources of noise. The effects of the proposed building on the nearby residences will need to be assessed as design progresses as Phase 2 under the City's Guide to ensure sound levels are within the acceptable criteria.

3.2.2 Stationary Source Modeling

RWDI conducted a site visit on September 20, 2022, to observe activities in the area and take sound level measurements in the vicinity of the proposed building. Some rooftop mechanical ventilation at CHEO was observed to be audible where the proposed building will be constructed. However, traffic was consistent and short-term sound level measurements of the traffic indicated that ambient sound levels in the area are at, or above, sound from nearby stationary sources of noise. RWDI anticipates that ambient sound levels in the area could mask any stationary sources of noise at the proposed development as well as across the street at the nearest residential receptors. This should be confirmed through detailed modelling, and at-source noise measurements, at detail design and in support of Phase 2 Noise Control Detailed Study required for the City.

3.3 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.

3.3.1 Transportation Sources

The following recommendations are provided to address transportation sources.

3.3.1.1 Building Façade Components

Typical OBC rated windows will meet indoor sound levels.

3.3.1.2 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, a warning clause related to surface transportation / NPC-300 "Type D" is recommended.

3.3.2 Stationary Sources

Detailed, at-source, sound level measurements are recommended to determine the effects of the existing CHEO sources on the proposed development. Field survey suggests that ambient sound levels due to traffic may be at, or above, those of stationary sources. This can be completed as part of the Phase 2 Noise Control Detailed Study.

In addition, a detailed assessment of the ambient conditions is also recommended. This can be accomplished either through long-term monitoring, or a detailed hourly road traffic assessment.

3.3.3 Warning Clauses

The City Guide includes generic warning clause language that can be modified for use. As this development is institutional, text related to outdoor amenity spaces is not relevant, thus not included in this example text.

Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment.

Generic NPC-300 Warning Clause Type D language is included in **Appendix B**.

4 ASSESSMENT 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. NPC-300 does not consider passenger vehicle traffic within parking lots as a stationary source of sound and thus was not assessed, nor should it be as design progresses. However, mechanical systems associated with the parking structure (e.g., elevator, ventilation, standby generator, etc.) can be considered stationary sources of noise.

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/mixed-use) of the proposed development.

We recommend that the potential noise effect of the proposed development, inclusive of the parking structure mechanical systems, is reviewed during detailed design to ensure the applicable sound level criteria will be achieved. This can be completed as the Phase 2 noise study.

5 CONCLUSIONS

RWDI was retained to prepare a Noise and Vibration Impact Study (NVIS) for the proposed development located in Ottawa, Ontario. The proposed development will consist of a 2000,000ft^2 building and a 330,000 ft^2 parking structure on an existing parking lot.

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

3. Installation of central air-conditioning so that all suites' windows can remain closed.
4. The inclusion of noise warning clauses related to transportation sound levels.

Rail is further than 500m from the proposed development and therefore was not further assessed.

The potential noise levels from stationary sources of sound were evaluated. Based on the site visit, noise modeling results and setback distances, the land use compatibility of the proposed development with respect to the nearby land-uses are considered acceptable from the noise assessment perspective.

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).
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4. Ontario Ministry of the Environment (MOE), 1989, ORNAMENT Ontario Road Noise Analysis Method for Environment and Transportation, Technical Publication (MOE, 1989)
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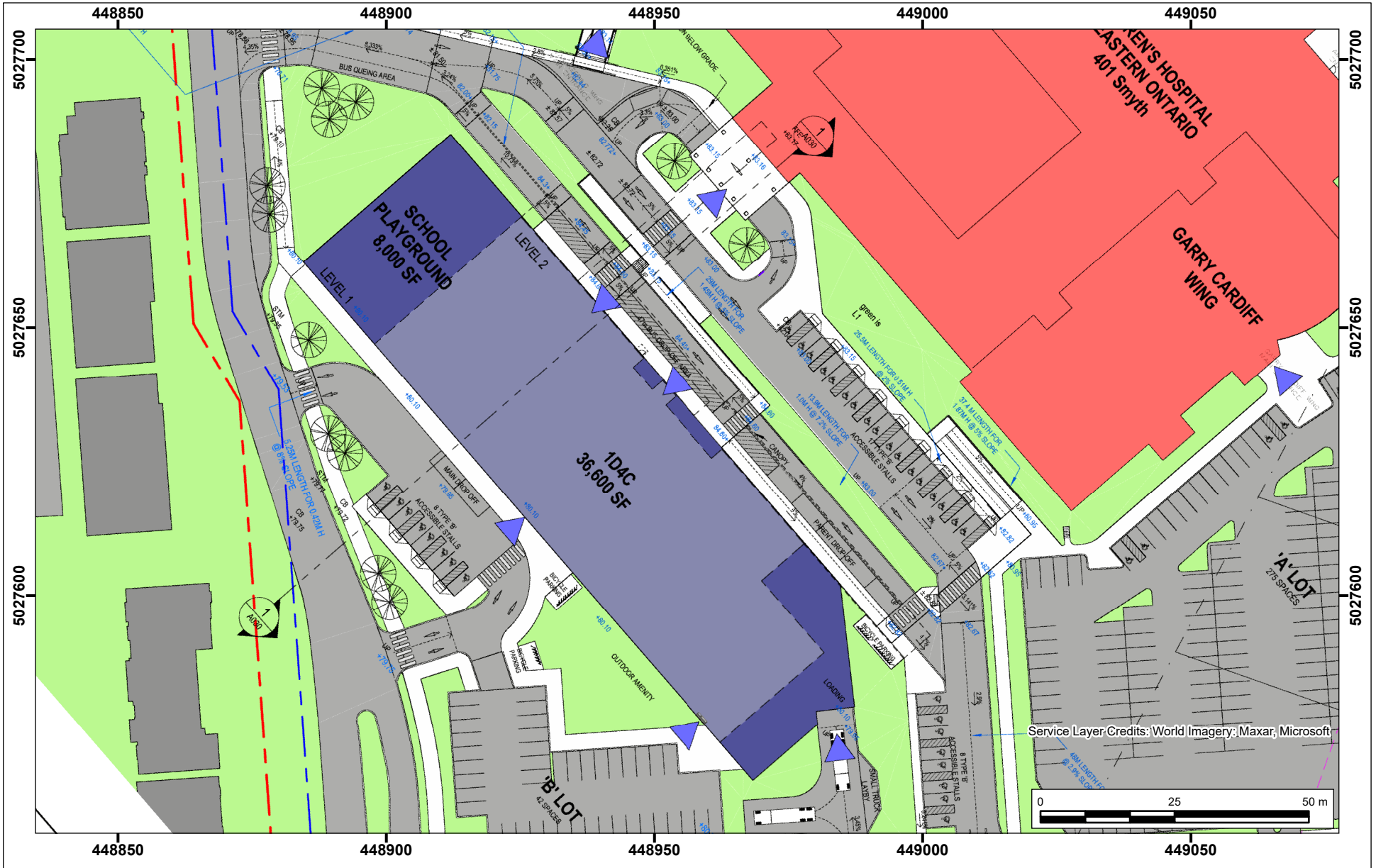
FIGURE



Site Context Plan

Map Projection: NAD 1983 UTM Zone 18N

CHEO 1 Door4Care - Ottawa, Ontario

True North

Project #: 2201400

Drawn by:	KD	Figure:	1
Approx. Scale:	1:1,000		
Date Revised:	Sep 29, 2022		

Map Document: \\rwdgroup\guelph\Jobs_3\2201400\03\Workitems\20Environmental\Noise\Analysis\ArcGIS\CHEO\CHEO.aprx

APPENDIX A

APPENDIX A: CRITERIA

A.1 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.

A.1.1 Road and Rail

A.1.1.1 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 $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 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 $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 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

A.1.1.2 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 $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h
Outdoor Living Area (OLA) (Combined Road and Rail)	55 dBA	-

A.1.1.3 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 $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h	
Plane of Window (Road)	> 65 dBA	> 60 dBA	Installation of air conditioning to allow windows to remained closed. The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria. Warning clause "Type D" is recommended.
	> 55 dBA	> 50 dBA	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. Applicable for high density development: Air conditioning to allow windows to remained closed. Warning clause "Type D" is recommended.

Assessment Location	Transportation Sound Level (Outdoors)		Recommendations
	Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h	Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h	
Plane of Window (Rail [1, 2])	> 60 dBA	> 55 dBA	The acoustical performance of building façade components should be specified such that the indoor sound level limits are predicted to be achieved. Warning clause "Type D" is recommended.
	> 60 dBA ($L_{eq,\ 24hr}$) and < 100m from tracks		Exterior walls consisting of a brick veneer or masonry equivalent for the first row of dwellings. Warning clause "Type D" is recommended.
Outdoor Living Area (Combined Road and Rail [3])	≤ 60 dBA > 55 dBA	-	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. If noise control measures are not provided, a warning clause "Type A" is recommended.
	> 60 dBA	-	Noise controls (barriers) should be implemented to meet the 55 dBA criterion. 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.

Notes:

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.

A.1.1.4 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 $L_{eq,1\text{-}hr,}$ for any one-hour period.

A.1.1.5 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).

A.1.2 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 $L_{A,eq,24hr}$ 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 ($L_{EQ,24\text{-}hr}$)	
Outdoors	≥NEF 30	Air conditioning to allow windows to remained closed. The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria. Warning clauses “Type D” and “Type B” are recommended.
	< NEF 30 ≥ NEF 25	The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria. 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. Applicable for high density development: Air conditioning to allow windows to remained closed. Warning clause “Type D” is recommended.
	< NEF 25	Further assessment not required

A.2 Stationary Sources

A.2.1 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

Notes:

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	60dBAI	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

Notes:

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

A.2.2 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	• Sound not audible off property • Infrequent dust and/ or odour emissions and not intense • No ground-borne vibration	• Sound occasionally audible off property • Frequent dust and/ or odour emissions and occasionally intense • Possible ground-borne vibration	• Sound frequently audible off property • Persistent and intense dust and/ or odour emissions • Frequent ground-borne vibration
Scale	• No outside storage • Small scale plant or scale is irrelevant in relation to all other criteria	• Outside storage permitted • Medium level of production	• Outside storage of raw and finished products • Large production levels
Process	• Self-contained plant or building which produces / stores a packaged product • Low probability of fugitive emissions	• Open process • Periodic outputs of minor annoyance • Low probability of fugitive emissions	• Open process • Frequent outputs of major annoyances • High probability of fugitive emissions
Operation / Intensity	• Daytime operations only • Infrequent movement of products and/or heavy trucks	• Shift operations permitted • Frequent movements of products and/or heavy trucks with majority of movements during daytime hours	• Continuous movement of products and employees • Daily shift operations permitted
Examples	• Electronics Manufacturing • Furniture refinishing • Beverage bottling • Auto parts • Packaging services • Dairy distribution • Laundry and linen supply	• Magazine printing • Paint spray booths • Metal command • Electrical production • Dairy product manufacturing • Feed packing plant	• Paint and varnish manufacturing • Organic chemicals manufacturing • Breweries • Solvent recovery plant • Soap manufacturing • Metal manufacturing

APPENDIX B

APPENDIX B: 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:

B.1 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."

B.2 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."

APPENDIX C

APPENDIX C: NOISE MITIGATION GUIDANCE

C.1 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/m^2
    - 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/m^2 face weight by the material density (kg/m^3). 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.

C.2 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.

APPENDIX D

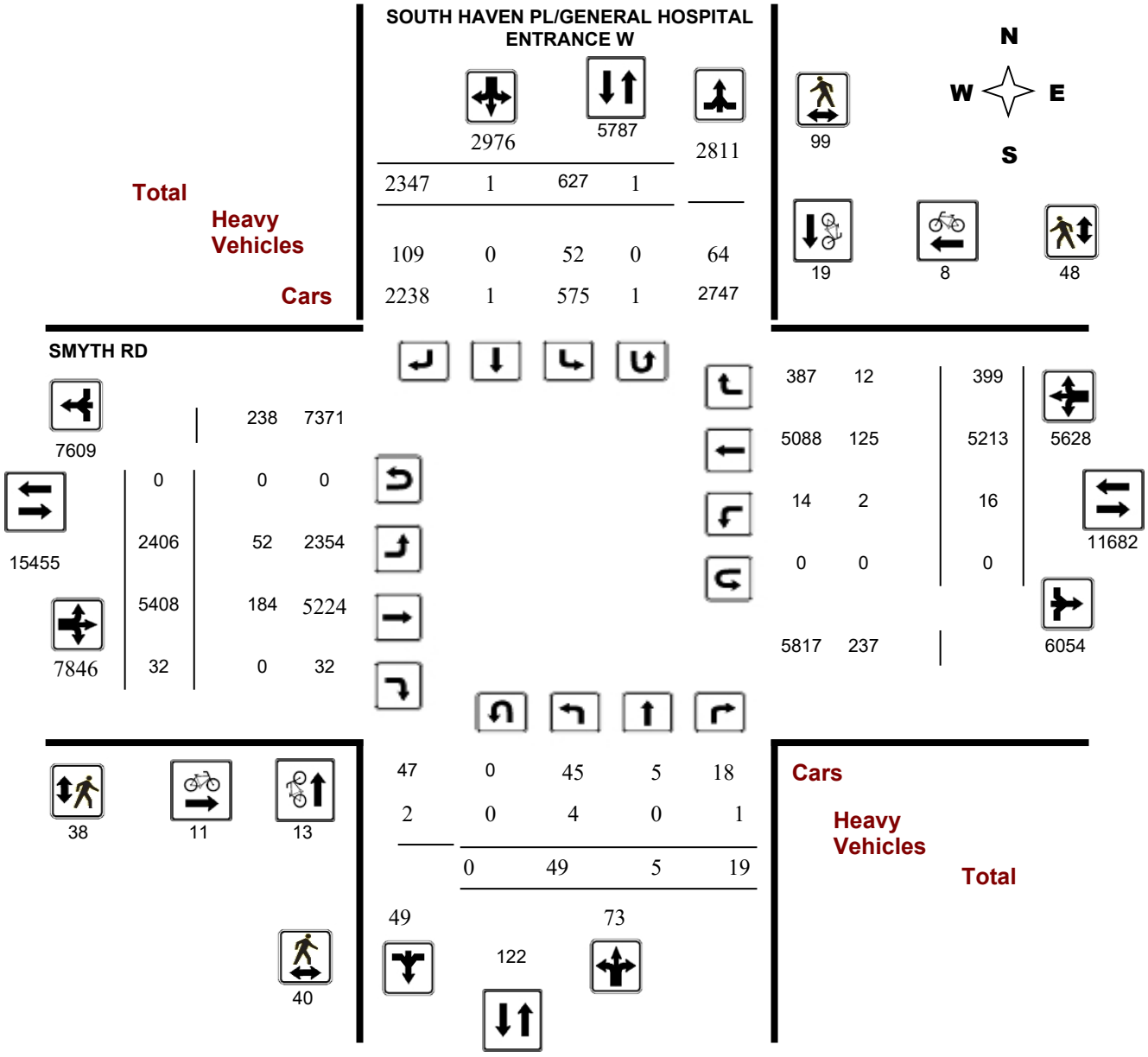
Transportation Services - Traffic Services

Turning Movement Count - Study Results

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017
Start Time: 07:00
WO No: 36888
Device: Miovision

Full Study Diagram



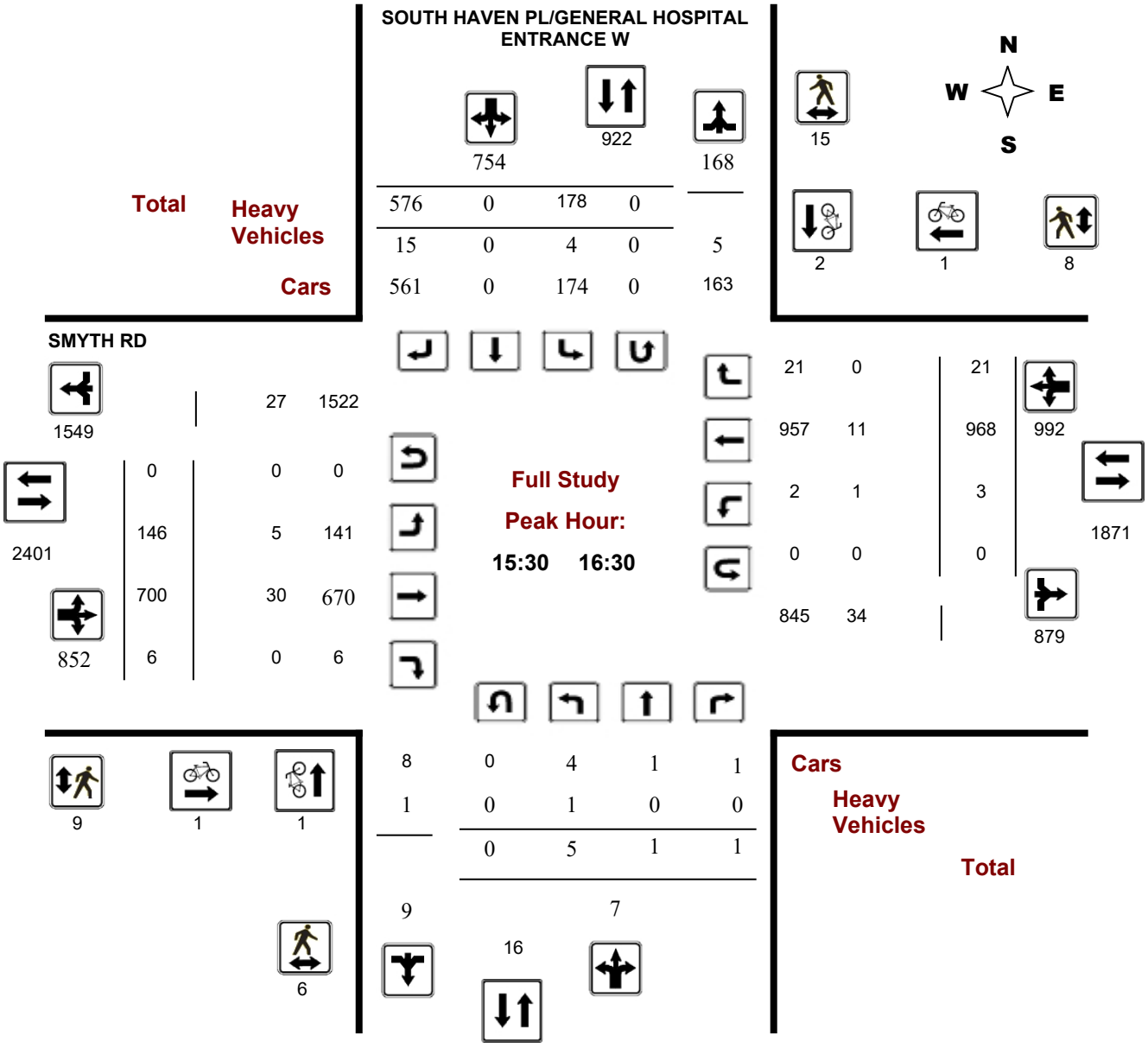
Transportation Services - Traffic Services

Turning Movement Count - Study Results

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017
Start Time: 07:00
WO No: 36888
Device: Miovision

Full Study Peak Hour Diagram



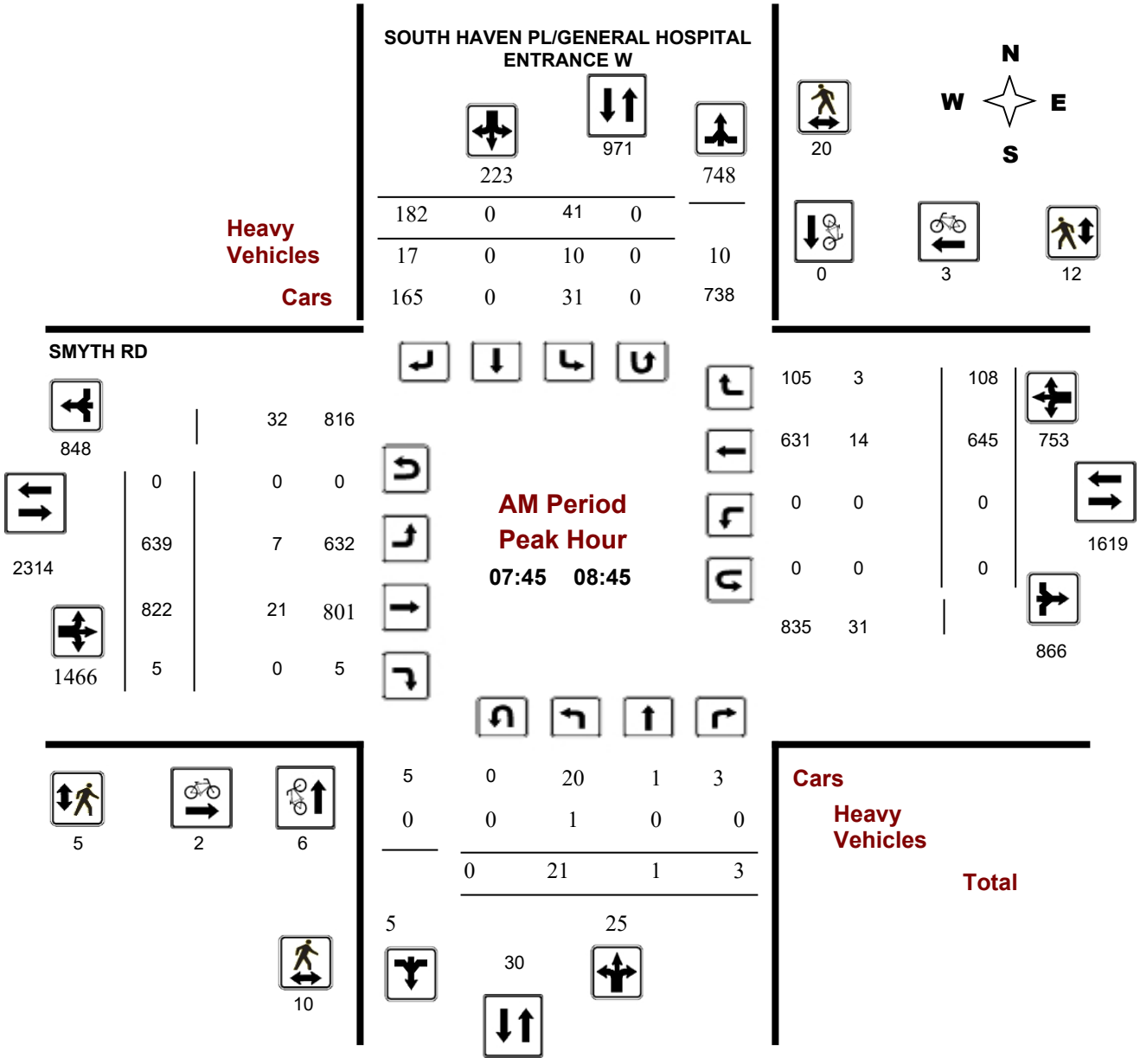
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017
Start Time: 07:00

WO No: 36888
Device: Miovision



Comments

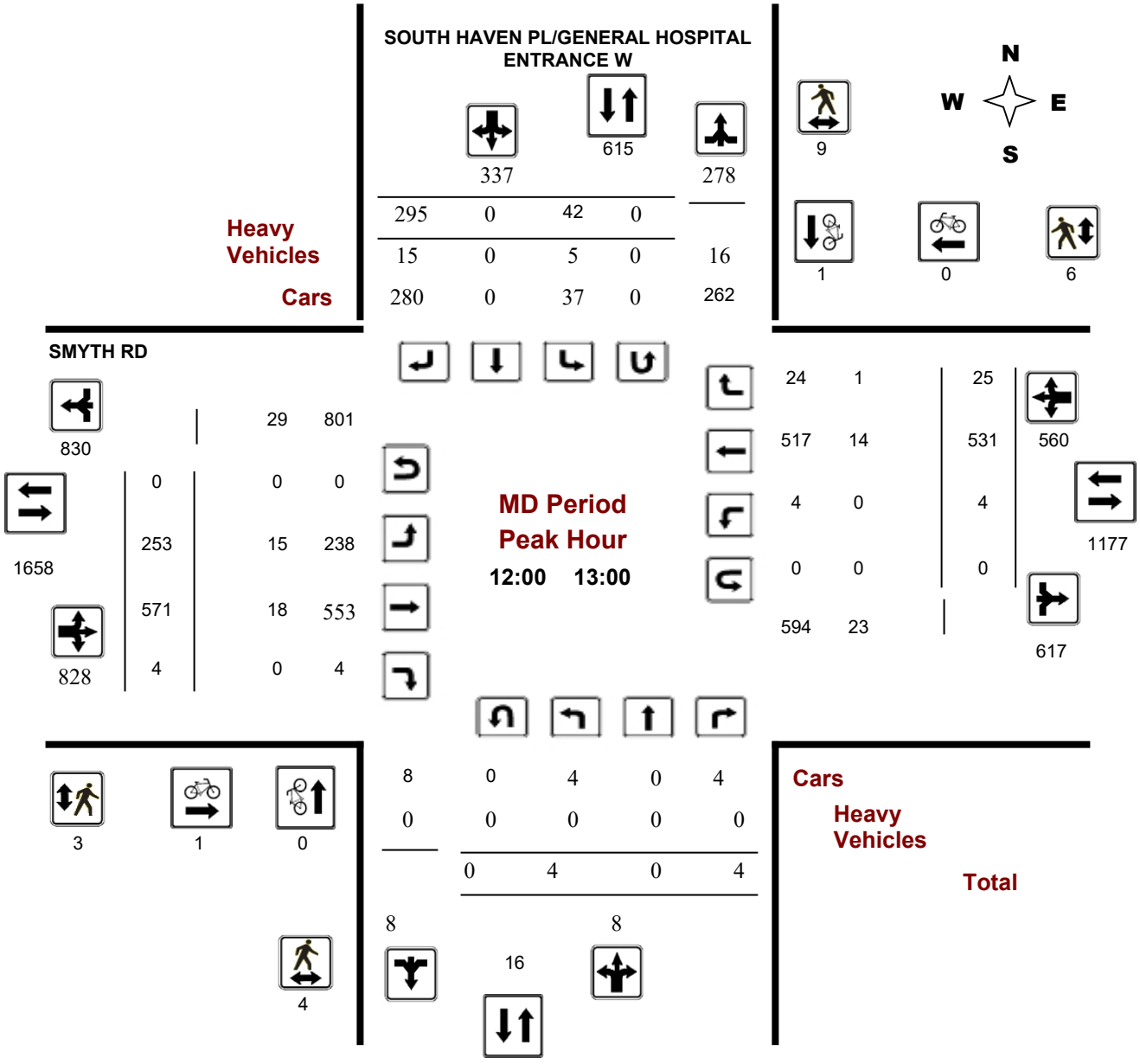
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017 **WO No:** 36888

Start Time: 07:00 **Device:** Miovision



Comments

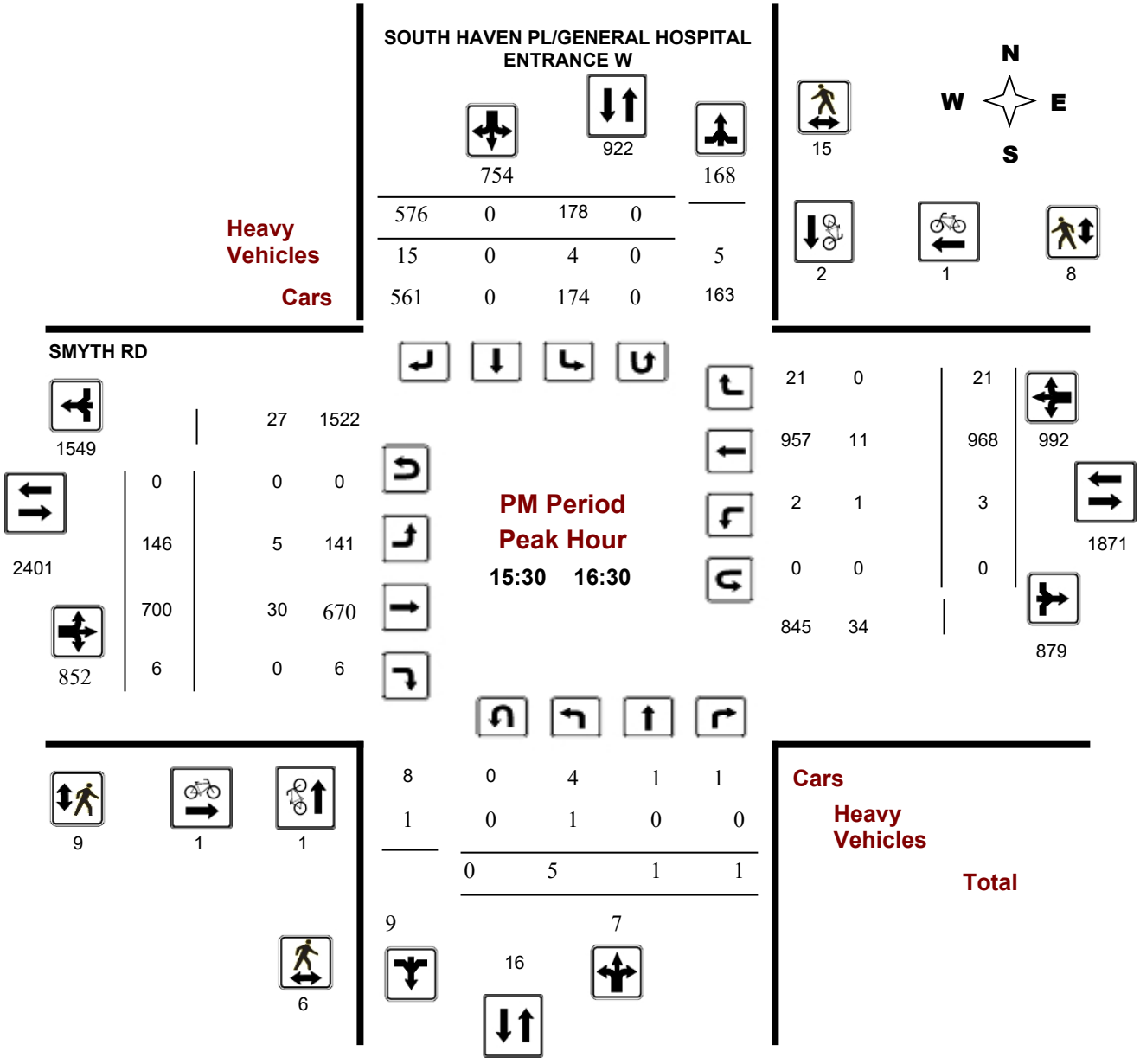
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017
Start Time: 07:00

WO No: 36888
Device: Miovision



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017 **WO No:** 36888

Start Time: 07:00 **Device:** Miovision

Full Study Summary (8 HR Standard)

Survey Date: Tuesday, April 11, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 1

Eastbound: 0 Westbound: 0

AADT Factor

1.25

	SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W									SMYTH RD									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	15	2	5	**22**	35	0	142	**177**	**199**	538	931	3	**1472**	2	536	131	**669**	**2141**	**2340**
08:00 09:00	15	1	3	**19**	30	0	174	**204**	**223**	615	804	5	**1424**	1	671	101	**773**	**2197**	**2420**
09:00 10:00	4	1	3	**8**	43	1	167	**211**	**219**	369	675	1	**1045**	2	560	55	**617**	**1662**	**1881**
11:30 12:30	4	0	3	**7**	50	0	293	**343**	**350**	188	535	6	**729**	3	533	22	**558**	**1287**	**1637**
12:30 13:30	2	0	2	**4**	58	0	227	**285**	**289**	286	551	1	**838**	3	533	29	**565**	**1403**	**1692**
15:00 16:00	3	1	1	**5**	150	0	534	**684**	**689**	159	666	5	**830**	2	934	19	**955**	**1785**	**2474**
16:00 17:00	5	0	2	**7**	181	0	512	**693**	**700**	136	646	6	**788**	2	810	26	**838**	**1626**	**2326**
17:00 18:00	1	0	0	**1**	80	0	298	**378**	**379**	115	600	5	**720**	1	636	16	**653**	**1373**	**1752**
Sub Total	49	5	19	**73**	627	1	2347	**2975**	**3048**	2406	5408	32	**7846**	16	5213	399	**5628**	**13474**	**16522**
U Turns				**0**				**1**	**1**				**0**				**0**	**0**	**1**
Total	49	5	19	**73**	627	1	2347	**2976**	**3049**	2406	5408	32	**7846**	16	5213	399	**5628**	**13474**	**16523**
EQ 12Hr	68	7	26	**101**	872	1	3262	**4137**	**4238**	3344	7517	44	**10906**	22	7246	555	**7823**	**18729**	**22967**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	61	6	24	**91**	784	1	2936	**3723**	**3814**	3010	6765	40	**9815**	20	6521	499	**7041**	**16856**	**20670**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**0.9**					
AVG 24Hr	80	8	31	**120**	1028	2	3846	**4877**	**4997**	3943	8863	52	**12858**	26	8543	654	**9223**	**22081**	**27078**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017 **WO No:** 36888

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute Increments

SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W — Northbound / Southbound

SMYTH RD — Eastbound / Westbound

Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	0	2	2	5	0	23	28	181	116	226	0	342	0	102	35	137	181	509
07:15	07:30	4	0	1	5	8	0	28	36	207	130	247	1	378	0	127	35	162	207	581
07:30	07:45	5	2	0	7	6	0	45	51	220	121	224	2	347	2	166	35	203	220	608
07:45	08:00	6	0	2	8	16	0	46	62	267	171	234	0	405	0	141	26	167	267	642
08:00	08:15	3	1	1	5	8	0	41	49	254	171	207	1	379	0	173	27	200	254	633
08:15	08:30	4	0	0	4	6	0	44	50	254	172	170	3	345	0	147	25	172	254	571
08:30	08:45	8	0	0	8	11	0	51	62	226	125	211	1	337	0	184	30	214	226	621
08:45	09:00	0	0	2	2	5	0	38	43	212	147	216	0	363	1	167	19	187	212	595
09:00	09:15	4	0	1	5	13	0	38	52	172	96	158	0	254	0	170	18	188	172	499
09:15	09:30	0	0	1	1	12	0	37	49	161	95	179	1	275	0	148	15	163	161	488
09:30	09:45	0	1	0	1	8	1	52	61	167	92	177	0	269	1	124	10	135	167	466
09:45	10:00	0	0	1	1	10	0	40	50	150	86	161	0	247	1	118	12	131	150	429
11:30	11:45	0	0	0	0	17	0	64	81	137	48	122	2	172	0	129	6	135	137	388
11:45	12:00	1	0	1	2	18	0	60	78	129	43	130	1	174	1	142	4	147	129	401
12:00	12:15	1	0	1	2	10	0	86	96	150	46	138	2	186	1	143	3	147	150	431
12:15	12:30	2	0	1	3	5	0	83	88	153	51	145	1	197	1	119	9	129	153	417
12:30	12:45	1	0	2	3	21	0	79	100	164	54	134	0	188	2	127	5	134	164	425
12:45	13:00	0	0	0	0	6	0	47	53	164	102	154	1	257	0	142	8	150	164	460
13:00	13:15	0	0	0	0	17	0	50	67	148	72	133	0	205	0	129	9	138	148	410
13:15	13:30	1	0	0	1	14	0	51	65	132	58	130	0	188	1	135	7	143	132	397
15:00	15:15	1	0	0	1	38	0	140	178	230	44	164	0	208	0	259	7	266	230	653
15:15	15:30	0	0	0	0	31	0	111	142	187	41	147	2	190	0	190	2	192	187	524
15:30	15:45	1	1	0	2	39	0	145	184	222	31	187	0	218	0	255	4	259	222	663
15:45	16:00	1	0	1	2	42	0	138	180	236	43	168	3	214	2	230	6	238	236	634
16:00	16:15	2	0	0	2	58	0	147	205	250	33	170	2	205	1	256	7	264	250	676
16:15	16:30	1	0	0	1	39	0	146	185	230	39	175	1	215	0	227	4	231	230	632
16:30	16:45	2	0	1	3	54	0	126	180	231	37	148	2	187	0	181	9	190	231	560
16:45	17:00	0	0	1	1	30	0	93	123	159	27	153	1	181	1	146	6	153	159	458
17:00	17:15	0	0	0	0	26	0	99	125	164	34	154	3	191	0	184	2	186	164	502
17:15	17:30	0	0	0	0	23	0	81	104	140	31	157	1	189	0	149	4	153	140	446
17:30	17:45	1	0	0	1	15	0	56	71	104	25	133	0	158	1	152	6	159	104	389
17:45	18:00	0	0	0	0	16	0	62	78	108	25	156	1	182	0	151	4	155	108	415
Total:		49	5	19	73	627	1	2347	2976	5909	2406	5408	32	7846	16	5213	399	5628	5909	16,523

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017 **WO No:** 36888

Start Time: 07:00 **Device:** Miovision

Full Study Cyclist Volume

		SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W			SMYTH RD			
Time Period		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	1	0	1	0	0	0	1
07:15	07:30	0	0	0	0	0	0	0
07:30	07:45	2	0	2	0	0	0	2
07:45	08:00	3	0	3	0	0	0	3
08:00	08:15	2	0	2	0	1	1	3
08:15	08:30	1	0	1	1	0	1	2
08:30	08:45	0	0	0	1	2	3	3
08:45	09:00	0	0	0	3	0	3	3
09:00	09:15	0	0	0	1	0	1	1
09:15	09:30	0	1	1	1	0	1	2
09:30	09:45	1	1	2	0	0	0	2
09:45	10:00	1	0	1	0	1	1	2
11:30	11:45	0	1	1	0	0	0	1
11:45	12:00	0	0	0	0	0	0	0
12:00	12:15	0	0	0	0	0	0	0
12:15	12:30	0	0	0	1	0	1	1
12:30	12:45	0	0	0	0	0	0	0
12:45	13:00	0	1	1	0	0	0	1
13:00	13:15	0	0	0	0	0	0	0
13:15	13:30	0	0	0	0	0	0	0
15:00	15:15	0	1	1	0	0	0	1
15:15	15:30	0	1	1	0	0	0	1
15:30	15:45	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	1	1	1
16:00	16:15	0	1	1	1	0	1	2
16:15	16:30	1	1	2	0	0	0	2
16:30	16:45	1	2	3	0	1	1	4
16:45	17:00	0	2	2	0	0	0	2
17:00	17:15	0	4	4	0	1	1	5
17:15	17:30	0	2	2	0	0	0	2
17:30	17:45	0	0	0	1	1	2	2
17:45	18:00	0	1	1	1	0	1	2
Total		13	19	**32**	11	8	19	51

Transportation Services - Traffic Services

Turning Movement Count - Study Results

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017 **WO No:** 36888

Start Time: 07:00 **Device:** Miovision

Full Study Pedestrian Volume

	SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W			SMYTH RD			
Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	**Total**	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	**Total**	**Grand Total**
07:00 07:15	0	2	**2**	1	0	**1**	**3**
07:15 07:30	3	4	**7**	2	2	**4**	**11**
07:30 07:45	1	4	**5**	4	0	**4**	**9**
07:45 08:00	2	2	**4**	0	2	**2**	**6**
08:00 08:15	4	5	**9**	1	3	**4**	**13**
08:15 08:30	4	8	**12**	4	4	**8**	**20**
08:30 08:45	0	5	**5**	0	3	**3**	**8**
08:45 09:00	3	1	**4**	4	1	**5**	**9**
09:00 09:15	0	1	**1**	0	0	**0**	**1**
09:15 09:30	0	4	**4**	1	1	**2**	**6**
09:30 09:45	0	2	**2**	0	1	**1**	**3**
09:45 10:00	1	1	**2**	1	1	**2**	**4**
11:30 11:45	0	2	**2**	0	1	**1**	**3**
11:45 12:00	0	1	**1**	0	1	**1**	**2**
12:00 12:15	0	0	**0**	0	0	**0**	**0**
12:15 12:30	3	5	**8**	1	3	**4**	**12**
12:30 12:45	1	3	**4**	2	3	**5**	**9**
12:45 13:00	0	1	**1**	0	0	**0**	**1**
13:00 13:15	0	2	**2**	0	0	**0**	**2**
13:15 13:30	1	1	**2**	0	2	**2**	**4**
15:00 15:15	3	4	**7**	0	4	**4**	**11**
15:15 15:30	0	2	**2**	0	0	**0**	**2**
15:30 15:45	0	0	**0**	1	3	**4**	**4**
15:45 16:00	4	3	**7**	4	2	**6**	**13**
16:00 16:15	1	5	**6**	2	1	**3**	**9**
16:15 16:30	1	7	**8**	2	2	**4**	**12**
16:30 16:45	2	3	**5**	0	1	**1**	**6**
16:45 17:00	1	5	**6**	0	3	**3**	**9**
17:00 17:15	2	3	**5**	4	1	**5**	**10**
17:15 17:30	0	4	**4**	0	2	**2**	**6**
17:30 17:45	2	6	**8**	1	1	**2**	**10**
17:45 18:00	1	3	**4**	3	0	**3**	**7**
Total	40	99	**139**	38	48	**86**	**225**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017 **WO No:** 36888

Start Time: 07:00 **Device:** Miovision

Full Study Heavy Vehicles

SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W — Northbound / Southbound

SMYTH RD — Eastbound / Westbound

Time Period		Northbound				Southbound					Eastbound				Westbound					
		LT	ST	RT	**N TOT**	LT	ST	RT	**S TOT**	**STR TOT**	LT	ST	RT	**E TOT**	LT	ST	RT	**W TOT**	**STR TOT**	**Grand Total**
07:00	07:15	0	0	0	**0**	1	0	2	**4**	**4**	0	4	0	**13**	0	7	1	**13**	**26**	**15**
07:15	07:30	0	0	0	**0**	1	0	3	**7**	**7**	2	4	0	**12**	0	3	1	**9**	**21**	**14**
07:30	07:45	1	0	0	**2**	3	0	3	**8**	**10**	2	4	0	**17**	1	7	0	**15**	**32**	**21**
07:45	08:00	0	0	0	**0**	5	0	2	**8**	**8**	1	6	0	**12**	0	3	0	**14**	**26**	**17**
08:00	08:15	0	0	0	**0**	1	0	4	**7**	**7**	2	6	0	**14**	0	2	0	**9**	**23**	**15**
08:15	08:30	1	0	0	**1**	0	0	2	**7**	**8**	3	6	0	**16**	0	4	2	**12**	**28**	**18**
08:30	08:45	0	0	0	**0**	4	0	9	**15**	**15**	1	3	0	**18**	0	5	1	**13**	**31**	**23**
08:45	09:00	0	0	1	**1**	1	0	3	**7**	**8**	3	13	0	**24**	0	5	0	**20**	**44**	**26**
09:00	09:15	0	0	0	**0**	2	0	3	**6**	**6**	0	3	0	**17**	0	11	1	**17**	**34**	**20**
09:15	09:30	0	0	0	**0**	3	0	3	**11**	**11**	3	6	0	**16**	0	4	2	**15**	**31**	**21**
09:30	09:45	0	0	0	**0**	2	0	7	**12**	**12**	2	6	0	**19**	0	4	1	**13**	**32**	**22**
09:45	10:00	0	0	0	**0**	3	0	2	**7**	**7**	1	4	0	**9**	0	2	1	**10**	**19**	**13**
11:30	11:45	0	0	0	**0**	1	0	3	**5**	**5**	1	6	0	**14**	0	4	0	**11**	**25**	**15**
11:45	12:00	0	0	0	**0**	1	0	3	**6**	**6**	2	7	0	**21**	0	9	0	**17**	**38**	**22**
12:00	12:15	0	0	0	**0**	1	0	3	**7**	**7**	2	2	0	**12**	0	5	1	**9**	**21**	**14**
12:15	12:30	0	0	0	**0**	2	0	4	**11**	**11**	5	4	0	**15**	0	2	0	**8**	**23**	**17**
12:30	12:45	0	0	0	**0**	1	0	3	**5**	**5**	1	6	0	**13**	0	3	0	**10**	**23**	**14**
12:45	13:00	0	0	0	**0**	1	0	5	**13**	**13**	7	6	0	**22**	0	4	0	**11**	**33**	**23**
13:00	13:15	0	0	0	**0**	1	0	6	**8**	**8**	1	3	0	**15**	0	5	0	**9**	**24**	**16**
13:15	13:30	0	0	0	**0**	2	0	3	**5**	**5**	0	8	0	**14**	0	3	0	**13**	**27**	**16**
15:00	15:15	1	0	0	**1**	3	0	4	**8**	**9**	1	11	0	**23**	0	6	0	**20**	**43**	**26**
15:15	15:30	0	0	0	**0**	2	0	0	**3**	**3**	1	8	0	**12**	0	3	0	**13**	**25**	**14**
15:30	15:45	0	0	0	**0**	1	0	5	**9**	**9**	3	7	0	**18**	0	3	0	**11**	**29**	**19**
15:45	16:00	0	0	0	**1**	1	0	3	**4**	**5**	0	8	0	**16**	1	5	0	**15**	**31**	**18**
16:00	16:15	1	0	0	**1**	1	0	5	**7**	**8**	1	7	0	**15**	0	1	0	**9**	**24**	**16**
16:15	16:30	0	0	0	**0**	1	0	2	**4**	**4**	1	8	0	**13**	0	2	0	**11**	**24**	**14**
16:30	16:45	0	0	0	**0**	1	0	3	**9**	**9**	5	10	0	**21**	0	3	0	**14**	**35**	**22**
16:45	17:00	0	0	0	**0**	2	0	3	**6**	**6**	0	5	0	**10**	0	2	1	**10**	**20**	**13**
17:00	17:15	0	0	0	**0**	1	0	2	**4**	**4**	1	5	0	**12**	0	4	0	**10**	**22**	**13**
17:15	17:30	0	0	0	**0**	1	0	4	**5**	**5**	0	3	0	**9**	0	2	0	**6**	**15**	**10**
17:30	17:45	0	0	0	**0**	1	0	3	**4**	**4**	0	3	0	**8**	0	2	0	**6**	**14**	**9**
17:45	18:00	0	0	0	**0**	1	0	2	**3**	**3**	0	2	0	**4**	0	0	0	**3**	**7**	**5**
Total:	None	4	0	1	**7**	52	0	109	**225**	**232**	52	184	0	**474**	2	125	12	**376**	**850**	**541**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

SMYTH RD @ SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W

Survey Date: Tuesday, April 11, 2017 **WO No:** 36888

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute U-Turn Total

Time Period		SOUTH HAVEN PL/GENERAL HOSPITAL ENTRANCE W		SMYTH RD		
		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	1	0	0	1
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	1	0	0	1

Appendix B: Table of Traffic and Road Parameters To Be Used For Sound Level Predictions

Table B1 Traffic And Road Parameters To Be Used For Sound Level Predictions

Row Width (m)	Implied Roadway Class	AADT Vehicles/Day	Posted Speed Km/Hr	Day/Night Split %	Medium Trucks %	Heavy Trucks % [1]
NA [2]	Freeway, Queensway, Highway	18,333 per lane	100	92/8	7	5
37.5-44.5	6-Lane Urban Arterial-Divided (6 UAD)	50,000	50-80	92/8	7	5
34-37.5	4-Lane Urban Arterial-Divided (4-UAD)	35,000	50-80	92/8	7	5
23-34	4-Lane Urban Arterial-Undivided (4-UAU)	30,000	50-80	92/8	7	5
23-34	4-Lane Major Collector (4-UMCU)	24,000	40-60	92/8	7	5
30-35.5	2-Lane Rural Arterial (2-RAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Urban Arterial (2-UAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Major Collector (2-UMCU)	12,000	40-60	92/8	7	5
30-35.5	2-Lane Outer Rural Arterial (near the extremities of the City) (2-RAU)	10,000	50-80	92/8	7	5
20-30	2-Lane Urban Collector (2-UCU)	8,000	40-50	92/8	7	5

[1] The MOE Vehicle Classification definitions should be used to estimate automobiles, medium trucks and heavy trucks.

[2] The number of lanes is determined by the future mature state of the roadway.

STAMSON 5.0 NORMAL REPORT Date: 28-09-2022 10:39:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: cheo.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: SOUTH HAVEN (day/night)

Car traffic volume : 12157/1057 veh/TimePeriod
Medium truck volume : 189/16 veh/TimePeriod
Heavy truck volume : 303/26 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: SOUTH HAVEN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 2.50 / 2.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: SMYTH (day/night)

Car traffic volume : 24288/2112 veh/TimePeriod
Medium truck volume : 1932/168 veh/TimePeriod
Heavy truck volume : 1380/120 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: SMYTH (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 206.00 / 206.00 m
Receiver height : 2.50 / 2.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: SOUTH HAVEN (day)

Source height = 1.24 m

ROAD (0.00 + 63.45 + 0.00) = 63.45 dBA

```
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  63.45   0.00   0.00   0.00   0.00   0.00   0.00
63.45
-------------------------------------------------------------------------
---

Segment Leq : 63.45 dBA

Results segment # 2: SMYTH (day)
--------------------------------

Source height = 1.50 m

ROAD (0.00 + 57.10 + 0.00) = 57.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
     0     90   0.00  71.49   0.00 -11.38  -3.01   0.00   0.00   0.00
57.10
-------------------------------------------------------------------------
---

Segment Leq : 57.10 dBA

Total Leq All Segments: 64.36 dBA

Results segment # 1: SOUTH HAVEN (night)
----------------------------------------

Source height = 1.24 m

ROAD (0.00 + 55.81 + 0.00) = 55.81 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  55.81   0.00   0.00   0.00   0.00   0.00   0.00
55.81
-------------------------------------------------------------------------
---

Segment Leq : 55.81 dBA

Results segment # 2: SMYTH (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 49.51 + 0.00) = 49.51 dBA
```

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	63.89	0.00	-11.38	-3.01	0.00	0.00	0.00	49.51

Segment Leq : 49.51 dBA

Total Leq All Segments: 56.72 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.36
(NIGHT): 56.72