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37 Years

Hunt Club Development Phase 2
Proposed Residential Building

Noise Impact Assessment Report

Engineering excellence. Planning precision. Inspired landscapes.

HUNT CLUB DEVELOPMENT
PHASE 2
PROPOSED RESIDENTIAL BUILDING

NOISE IMPACT ASSESSMENT REPORT

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Kanata, Ontario
K2M 1P6

May 8th, 2020

Ref No.: R-2020-062
Novatech File No. 117036

NOVATECH
Engineers, Planners & Landscape Architects

May 8, 2020

City of Ottawa
Planning and Infrastructure Approvals
110 Laurier Ave. West, 4th Floor
Ottawa, ON
K1P 1J1

Attention: **Jean-Charles Renaud, Planner II**

Reference: **Noise Impact Assessment Report**
Proposed Residential Building - Hunt Club Development (Phase 2)
1026-1054 Hunt Club Road
Our File No.: 117036

Enclosed for your review is the Noise Impact Assessment Report for the residential building proposed as Phase 2 of the Hunt Club development located on the corner of Hunt Club Road and the Airport Parkway.

This report is submitted in support of the site plan control application and assesses the impact of traffic noise on the proposed building.

Trusting the enclosed is satisfactory. Should you have any questions or require additional information please contact me.

Yours truly,

NOVATECH

Greg MacDonald, P. Eng.
Director | Land Development and Public Sector Infrastructure

cc: Vincent Denomme, Claridge Homes

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Table of Contents

TABLES

FIGURES

APPENDICES

DRAWINGS

1.0 INTRODUCTION

Novatech has been retained by Claridge Homes to prepare this noise impact assessment report for the proposed residential development located on the corner of Hunt Club Road and the Airport Parkway, in the City of Ottawa. This report assesses the environmental impact of noise on the proposed development and outlines the recommended noise mitigation measures. It is submitted in support of the site plan control application for the proposed development.

1.1 Project Description

The subject site is approximately 0.9 hectares in area and is located at the southwest corner of the intersection of Hunt Club Road and the Airport Parkway, as shown on **Figure 1 (Key Plan)**. The site is located across five properties: 1026, 1038, 1040, 1050 and 1054 Hunt Club Road. The topography generally slopes northeast, before dropping 2-4 metres over a sloped bank down to the intersection of Hunt Club Road and the Airport Parkway on-ramp.

Development of the site is being phased as shown in **Figure 2 (Phasing Plan)**. Phase 1 is under construction and consists of an 8-storey retirement home with 150 units. Phase 2 is proposed to consist of a 7-storey residential apartment building with 77 units. A noise impact assessment report for the Phase 1 retirement home building was prepared by Novatech and approved by the City of Ottawa in 2017-2018.

2.0 BACKGROUND

2.1 Noise Sources

The City of Ottawa's *Official Plan* (OP) and *Environmental Noise Control Guidelines* (ENCG) (2016) require a noise impact assessment when a new noise-sensitive development is located within certain proximities to surface transportation (road or rail), stationary, or aircraft noise sources.

A noise study is required for this proposed development as the following distances to noise sources are applicable to the site:

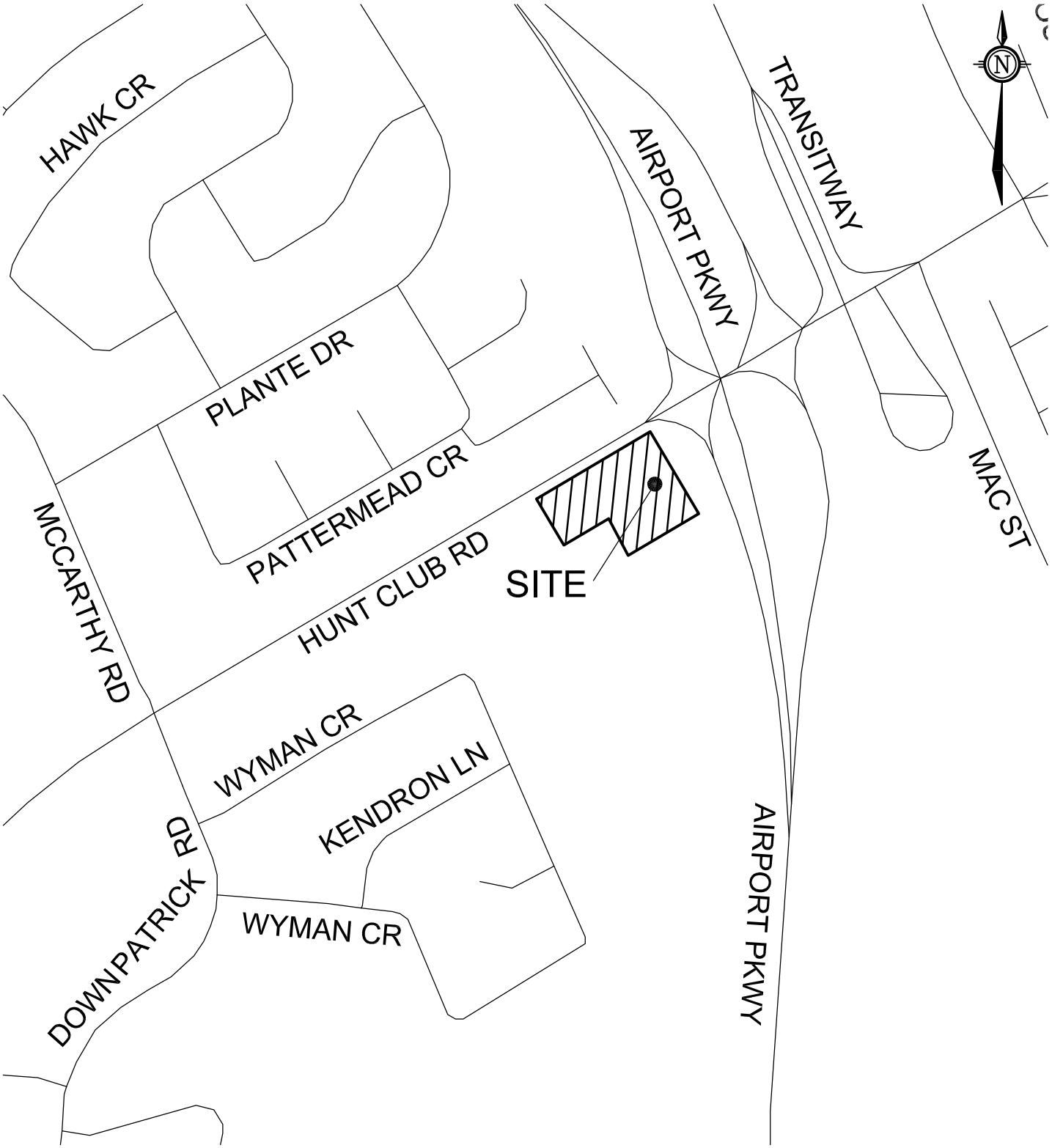
- Within 100 metres from the right-of-way of an existing arterial road
- Within 100 metres from a proposed bus transit priority corridor

The surface transportation noise sources considered for the purpose of this study are Hunt Club Road, the Airport Parkway and the Airport Parkway southbound on-ramp adjacent to the site. Schedule E and Section 7, Annex 1 of the City of Ottawa's OP classify these roads as follows:

- Hunt Club Road – Urban Arterial with a 44.5m right-of-way
- Airport Parkway (incl. on-ramp) – Urban Arterial with an existing protected corridor

The City of Ottawa's *Transportation Master Plan* (TMP) shows that the Airport Parkway is proposed to be widened between Hunt Club Road and MacDonald-Cartier International Airport between 2023-2031 as part of the 2031 Affordable Network. The TMP details that when this widening from two to four lanes is complete, the two outside lanes are proposed to be used as bus / high occupancy vehicle lanes. Map 11 (Road Network – 2031 Affordable Network) from the TMP is included in **Appendix A**.

In addition, the TMP shows a proposed bus transit priority corridor along Hunt Club Road between Uplands Drive and Albion Road as part of the 2031 Rapid Transit and Transit Priority



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KEY PLAN

HUNT CLUB DEVELOPMENT CITY OF OTTAWA

1026-1054 WEST HUNT CLUB RD

DATE	JOB	FIGURE
APR 2020	117036	1

M:\2017\117036\CAD\Design\Figures\Noise\2020\FIG1-KEY PLAN.dwg, Sheet 8x11 Keyplan, Apr 22, 2020 - 12:26pm, Ibolam

SHT8X11.DWG - 216mmx279mm

HUNT CLUB ROAD

EX CONC SIDEWALK

EX CONC SIDEWALK

PHASE 1
RETIREMENT HOME
8-STOREYS
(UNDER CONSTRUCTION)

ENTRANCE

SIAMESE

EXIT

EXIT

U/G PARKING LIMITS

RAMP DOWN

RAMP UP

U/G PARKING LIMITS

PHASE 2
PROPOSED
RESIDENTIAL
BUILDING
7-STOREYS
FFE=93.20

EXIT

WATER ENTRY

HYDRO VAULT

ENTRANCE

EXIT

RAMP DOWN

RAMP UP

PARKING

U/G PARKING LIMITS

RETAINING WALL

AIRPORT PARKWAY ONRAMP

AIRPORT PARKWAY

M:\2017\11\17036\CAD\Design\Figures\Noise\2020\FIG2-3.dwg, FIG 2 - 11x17, May 07, 2020 - 4:47pm, lbodam

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HUNT CLUB DEVELOPMENT

PHASING PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE MAY 2020 | JOB 117036 | FIGURE 2

SHT11X17.DWG - 279mmX432mm

(RTTP) Network. Map 5 (RTTP Network – 2031 Affordable Network) from the TMP is included in **Appendix A**. It is detailed that this bus transit priority corridor will be provided by the road widening along Hunt Club Road between Albion Road and Uplands Drive shown in the 2031 Concept Network. However, this road widening is not included as part of the 2031 Affordable Network.

Roadway and traffic characteristics for Hunt Club Road, the Airport Parkway and the Airport Parkway on-ramp adjacent to the site are provided in **Table 1**. Traffic parameters are as per Table B1 from Appendix B of the ENCG, for the proposed road condition as per the 2031 Affordable Network Plans (Map 5 and Map 11) of the City of Ottawa's TMP. The ENCG does not define the characteristics of on/off ramps. This report assumes a traffic volume of 25% of the Airport Parkway average annual daytime traffic (AADT) at half the posted speed limit.

Table 1: Roadway and Traffic Parameters

	Hunt Club Road	**Airport Parkway**	**Airport Parkway On-Ramp**
Roadway Classification	4-Lane Urban Arterial-Divided	4-Lane Urban Arterial-Undivided	N/A
Annual Average Daily Traffic (AADT)	35,000 vehicles/day [1]	30,000 vehicles/day	7,500 vehicles/day [2]
Day / Night Split (%)	92 / 8	92 / 8	92 / 8
Medium Trucks (%)	7	7	7
Heavy Trucks (%)	5	5	5
Posted Speed	60 km/hr	80 km/hr	40 km/hr [2]

1 - Assumed to be equally split between NE/SW travel direction.
2 - Assumed variable for on-ramp.

Refer to **Appendix A** for all excepts from the City of Ottawa's OP, ENCG, and TMP.

The proposed Light Rail Transit (LRT) corridor as per Schedule D of the City of Ottawa's OP is more than 100 metres from the site. There are no main railway lines, railway corridors or highways within 500 metres of the site. There are no stationary noise sources that affect this site.

The site is located within the Ottawa Airport Vicinity Development Zone (AVDZ) but outside of the 25 Noise Exposure Forecast/Noise Exposure Projection (NEF/NEP) line. Therefore, noise from aircraft is not required to be assessed. Refer to **Appendix A** for a plan excerpt from the City of Ottawa's OP showing the location of the site relative to the 25 NEF/NEP line.

3.0 CITY OF OTTAWA NOISE CONTROL GUIDELINES

3.1 Sound Level Criteria

The City of Ottawa is concerned with noise from aircraft, roads, transitways, and railways, as expressed in the following tables from the ENCG:

- Table 2.2a: Sound Level Limit for Outdoor Living Areas – Road and Rail,
- Table 2.2b: Sound Level Limit for Indoor Living Areas Road and Rail, and
- Table 2.2c: Supplementary Sound Level Limits for Indoor Spaces – Road and Rail

A copy of these tables from the ENCG is included in **Appendix A**. The maximum suggested sound levels pertinent to the proposed residential development for outdoor and indoor living areas and for indoor bedrooms from the ENCG are summarised below in **Table 2.**

Table 2: Sound Level Criteria

Type of Space	Time Period	Allowable Leq (dBA)
		Road
Outdoor Living Area (OLA)	7am – 11pm (Daytime)	55
Plane of Window (POW): Residential Living/Dining Areas, Dens	7am – 11pm (Daytime)	45
	11pm – 7am (Nighttime)	45
Plane of Window (POW): Residential Sleeping Quarters	7am – 11pm (Daytime)	45
	11pm – 7am (Nighttime)	40

Plane of Window and Outdoor Living Area receivers are defined as:

- **Plane of Window (POW):** The indoor living space where the sound levels will affect the living room area during daytime hours and bedrooms during nighttime hours. POW noise levels are considered 1.5m above the finished floor of the respective room in multi-storey residential buildings.

- **Outdoor Living Area (OLA):** The outdoor amenity area provided for quiet enjoyment of the outdoor environment during the daytime period (i.e., backyards, terraces and decks). OLA noise levels are considered 3.0m from the building façade, 1.5m above grade.

3.2 Alternative Methods for Noise Attenuation

When OLA sound levels are predicted to be approximately equal to or less than 55 dBA attenuation measures are not required. If the predicted noise levels are found to exceed 55 dBA, physical forms of mitigation are suggested and which may also include the provision of warning clauses to inform purchasers of the expected noise levels and specific mitigation measures.

These attenuation measures may include any or all of the following:

- Distance setback with soft ground;
- Insertion of noise insensitive land uses between the source and sensitive receptor;
- Orientation of building to provide sheltered zones;
- Construction of sound or acoustic barriers;
- Installation of air conditioning and ventilation; and
- Enhanced construction techniques and construction quality.

3.3 Ventilation Requirements

A forced air heating system with provision for a central air conditioning system is required if the plane of window daytime noise levels are between 55 dBA and 65 dBA and/or the nighttime noise levels are between 50 dBA and 60 dBA.

The installation of a central air conditioning system is required when the daytime noise level exceeds 65 dBA and/or the nighttime noise level exceeds 60 dBA.

Refer to **Appendix A** for relevant extracts from the MOE's *Environmental Noise Guideline (NPC-300).*

3.4 Building Component Assessment

When plane of window noise levels exceeds 65 dBA (daytime) or 60 dBA (nighttime) the exterior cladding system of the building envelope must be acoustically assessed to ensure indoor sound criteria are achieved. This includes analysis of the exterior wall, door, and/or glazing system specifications as appropriate.

The NRC research *Acoustic Insulation Factor: A Rating for the Insulation of Buildings against Noise* (June 1980, JD Quirt) is used to assess the building components and the required acoustic insulation factor (AIF). This method is recognized by the City of Ottawa.

The required AIF is based on the Outside L_{eq}, Indoor L_{eq} required, and the number of exterior façade components.

Minimum Required AIF = Outside L_{eq} – Indoor L_{eq} + 10 $\log_{10}$ (Number of Components) + 2dB

Where, N = Number of components (walls, windows and roof);

L = Sound Level expressed on a common decibel scale.

3.5 Warning Clauses

When predicted noise levels exceed the specified criteria, the City of Ottawa and the MOE recommend warning clauses be registered as a notice on title and incorporated into the lease/rental/sale agreements to warn potential purchaser/buyers/tenants of the possible elevated noise levels.

Typical warning clauses extracted from Part 4, Appendix A the City of Ottawa's ENCG have been provided in **Appendix A** of this report**.** As stated in the City of Ottawa's ENCG, due to the variation of noise impacts for any given site, it may be necessary to amend the example warning clauses to recognize the site conditions in each development.

For units with multiple types of warning clauses, similar/identical wording can be combined as to not duplicate wording/information. Specific warning clauses will be identified for each unit during detailed design.

4.0 PREDICTION OF OUTDOOR NOISE LEVELS

4.1 Noise Level Analysis

The noise levels from Hunt Club Road, the Airport Parkway and the Airport Parkway on-ramp adjacent to the site were analyzed for the proposed development using Version 5.03 of the STAMSON computer program issued by the MOE.

Receiver locations and distances to noise sources are shown on **Figure 3 (Receiver Location Plan).**

Proposed grades for the site were obtained from the attached **Grading and Erosion Sediment Control Plan - Phase II (117036-GR2)** and proposed floor heights were taken from the latest

architectural plans. Existing grades for the analysed roadways were taken from 1:2000 City of Ottawa topographic mapping contours, as shown on **Figure 3 (Receiver Location Plan).**

The proposed development is not considered to have any Outdoor Living Areas (OLAs) as the proposed balconies do not have minimum depths of 4m.

In the STAMSON modelling, Hunt Club Road has been considered as two segments as the roadway is divided and is six lanes wide adjacent to the site due to the presence of two turning lanes. One segment is for north-east bound traffic lanes and one segment is for south-west bound traffic lanes. The Airport Parkway has been considered as one segment. As the alignment of the future proposed road widening is unknown, the existing centreline alignment has been used for measuring perpendicular source-receiver distances. It is considered likely that the proposed widening may by adding two lanes to the eastern side, in which case the alignment of the centreline of the existing roadway is conservative as it is closer to the proposed development.

4.2 Noise Level Results

The predicted noise levels at the selected receiver locations within the proposed development are summarized in **Table 3.**

Table 3: Simulation Results - Unattenuated Noise Levels

Receiver Name	Location		Calculated Unattenuated Noise Level (dBA)	
	Building Face	Floor	Daytime (7am-11pm)	Nighttime (11pm-7am)
POW 1	West	1	67.23	59.64
		7	68.35	60.76
POW 2	North	1	70.25	62.65
		7	71.85	64.25
POW 3	North	1	70.13	62.53
		7	71.97	64.37
POW 4	East	1	68.08	60.48
		7	71.06	63.46
POW 5	East	1	66.16	58.56
		7	70.42	62.83
POW 6	South	1	63.43	55.83
		7	67.57	59.97

Detailed STAMSON modeling results and figures showing angles and distances used in the modelling calculations are included in **Appendix B.**

Predicted noise levels for the proposed development exceed the allowable noise level criteria, resulting in the requirement for indoor noise mitigation, which may include the installation of forced air ventilation, air conditioning and warning clauses. Where noise levels exceed 65 dBA (daytime), the exterior cladding system of the building envelope must be acoustically assessed to ensure the indoor noise criteria is met.

HUNT CLUB ROAD

SW

NE

91.00

90.9±

90.4±

92.00

93.00

94.00

89.00

90.00

35.4m

37.2m

41.8m

23.0m

25.0m

29.7m

EX CONC SIDEWALK

PHASE 1
RETIREMENT HOME
8-STOREYS
(UNDER CONSTRUCTION)

ENTRANCE

EXIT

RAMP DOWN

RAMP UP

PHASE 2
PROPOSED
RESIDENTIAL
BUILDING
7-STOREYS

FFE=93.20

4.2m

15.0m

POW 1

POW 2

POW 3

POW 4

POW 5

POW 6

PARKING

RETAINING WALL

APPROX. C/L
OF TWO
ON-RAMP
ENTRIES

32.1m

61.5m

89.4±

94.9±

42.2m

31.3m

55.8m

95.2±

AIRPORT PARKWAY ONRAMP

AIRPORT PARKWAY

M:\2017\117036\CAD\Design\Figures\Noise\2020\FIG2-3.dwg, FIG 3 - 11x17, May 08, 2020 - 1:53pm, lbolam

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HUNT CLUB DEVELOPMENT PHASE 2

RECEIVER LOCATION PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE MAY 2020 | JOB 117036 | FIGURE 3

SHT11X17.DWG - 279mmX432mm

4.3 Noise Level Attenuation

The Acoustic Insulation Factor (AIF) method, recognized by the City of Ottawa as an appropriate analysis technique for assessing the building envelope materials, has been used to assess wall and window requirements.

The required AIF is based on the Outside L_{eq}, Indoor L_{eq} required, and the number of exterior façade components.

Required AIF = Outside L_{eq} (24 h) – Indoor L_{eq} (24 h) + 10 $\log_{10}$(N) + 2dBA

Where: Outside Leq (24hr) = The maximum unattenuated noise level (from Table 3).
Indoor Leq (24hr) = The maximum allowable noise level (from Table 1).
N = The number of components forming the exterior.

A sample AIF calculation is provided below.

Sample Calculation at receiver POW 3 on the 7th floor assuming 2 exterior components:

$AIF_{(Daytime)}$ = 72.0 dBA – 45 dBA + 10log(2) + 2dBA = 32 (rounded)

$AIF_{(Nighttime)}$ = 64.4 dBA – 40 dBA + 10log(2) + 2dBA = 29 (rounded)

The higher of the two AIF values (daytime verses nighttime) is considered. The AIF for POW 3 on the 7th floor is therefore 32.

Table 4 summarizes the minimum required AIFs for each receiver location. ˚

Table 4: Minimum Required Acoustic Insulation Factor (AIF)

Receiver Name	Location		Minimum Required AIF Value
	Building Face	Floor	2 Components
POW 1	West	1	27
		7	28
POW 2	North	1	30
		7	32
POW 3	North	1	30
		7	32
POW 4	East	1	28
		7	31
POW 5	East	1	26
		7	30
POW 6	South	1	23
		7	28

The AIF values listed in **Table 4** are used to determine the type of window and wall assembles required to attenuate the noise levels. This is done by using tables from the NRC research

Acoustic Insulation Factor: A Rating for the Insulation of Buildings Against Outdoor Noise (June 1980, JD Quirt). Table 5 (Acoustic Insulation Factor for Various Types of Windows) and Table 6.3 (Acoustic Insulation Factor for Various Types of Exterior Wall) from this document can be used to select or verify the adequacy of window assemblies and wall constructions respectively. Table 11 (Approximate Conversion from STC to AIF for Windows and Doors) and Table 12 (Approximate Conversion from STC to AIF for Exterior Walls) can be used to convert AIF values to Sound Transmission Class, or STC values. These tables are included in **Appendix C** for reference.

Once detailed design drawings are provided by the architect, these calculations will be performed and window/door and wall assemblies will be selected and verified.

In addition to the above-noted attenuation measure, the following warning clause is to be included in the Agreement of Purchase and Sale.

"Purchasers/tenants are advised that sound levels due to increasing road/rail/light-rail/transitway traffic will interfere with outdoor activities as the sound levels exceed the sound level limits of the City of Ottawa and the Ministry of the Environment."

"To help address the need for sound attenuation this development includes multi-pane glass and high sound transmission class exterior walls."

"To ensure provincial sound level limits are not exceeded it is important to maintain these sound attenuation features".

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

Due to the site being located within the OAVDZ, the following warning clause is to be included in the Agreement of Purchase and Sale.

"Purchasers/tenants are advised that due to the proximity of the airport, noise from the airport and individual aircraft may at times interfere with outdoor or indoor activities."

5.0 CONCLUSIONS

An analysis of the impact of noise levels from traffic on Hunt Club Road, the Airport Parkway and the Airport Parkway on-ramp adjacent to the site indicates attenuation measures will be necessary for the proposed residential building.

The following is a summary of the attenuation measures and notice requirements to be placed on title for all appropriate units:

- Construction of window/door and wall assembles to satisfy the calculated AIF levels in Table 4 of this report. These calculations will be performed once final architectural drawings are received, and this report will be updated accordingly.

- Provide Central Air Conditioning.

- Provision of the following Warning Clauses in Purchase and Sale Agreements and Rental Agreements.

"Purchasers/tenants are advised that sound levels due to increasing road/rail/light-rail/transitway traffic will interfere with outdoor activities as the sound levels exceed the sound level limits of the City of Ottawa and the Ministry of the Environment."

"To help address the need for sound attenuation this development includes multi-pane glass and high sound transmission class exterior walls."

"To ensure provincial sound level limits are not exceeded it is important to maintain these sound attenuation features".

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

"Purchasers/tenants are advised that due to the proximity of the airport, noise from the airport and individual aircraft may at times interfere with outdoor or indoor activities."

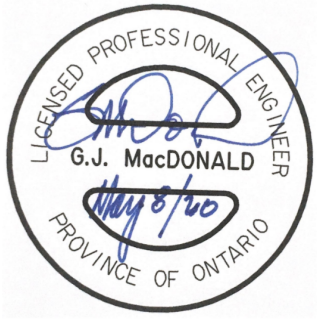
In closing, Novatech requests that the City of Ottawa accept the findings of this Noise Impact Assessment Report as part of the site plan control application submission for the Hunt Club Development Phase 2 building.

NOVATECH

Prepared by:

Lydia Bolam, P.Eng.
Project Engineer

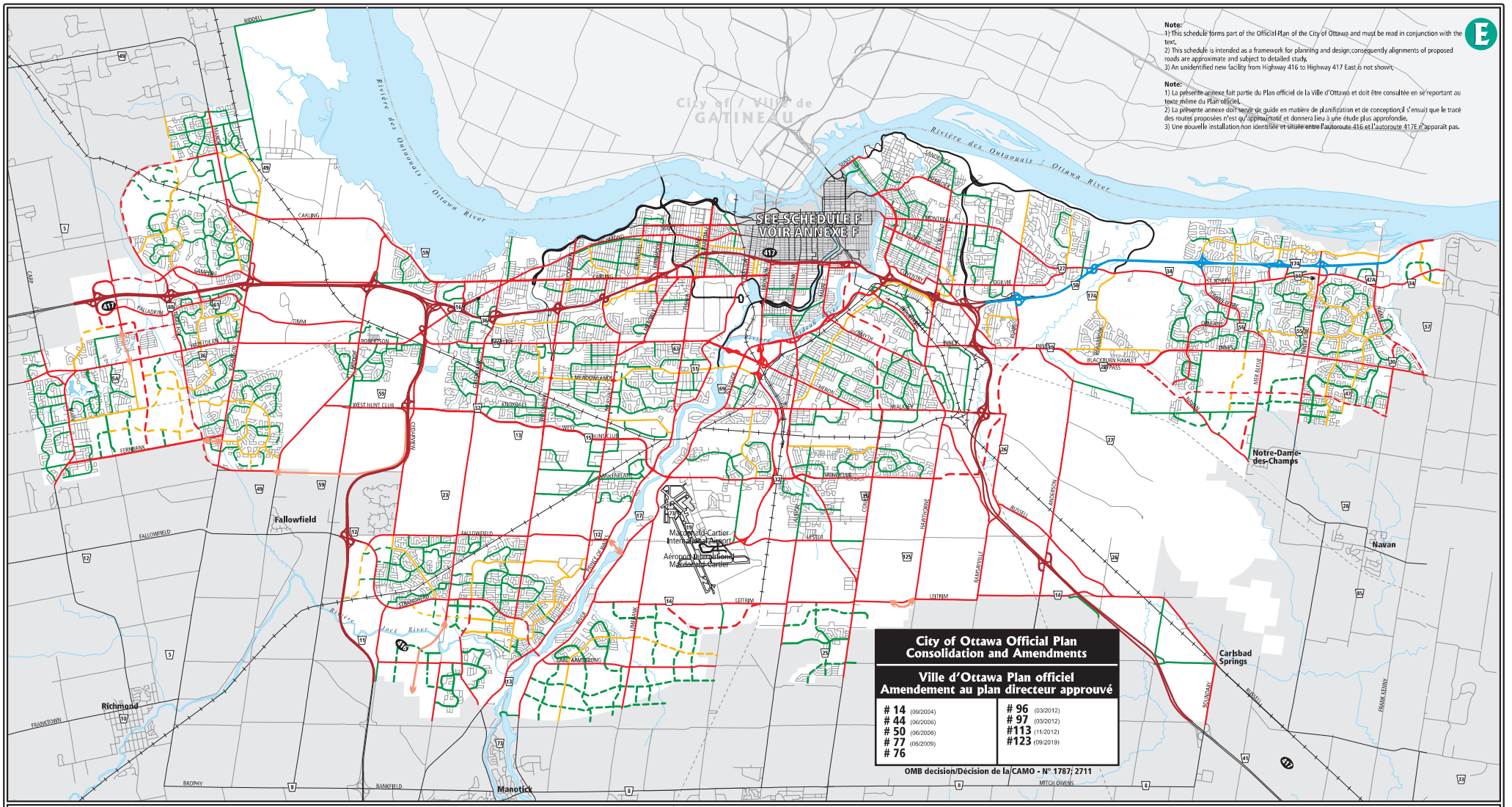
Reviewed by:



Greg MacDonald, P.Eng.
Director
Land Development and Public Sector Infrastructure

APPENDIX A

City of Ottawa Official Plan, ENCG, and Transportation Master Plan Excerpts



Official Plan - Schedule E
Urban Road Network

Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit

Plan officiel - Annexe E
Routes Arterial - Urbain

Preparé par : Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques

Provincial Highway / City Freeway	Route provinciale / Autoroute de ville
Federally Owned Road: Existing, Proposed (Alignment defined)	Chemins de propriété fédéral: Établie, Proposé (Alignement déterminée)
Arterials: Existing, Proposed (Alignment Defined), Conceptual (Alignment Undefined)	Artère: Établie, Proposé (Alignement déterminée), Conceptuelle (Alignement à déterminée)
Major Collectors: Existing, Proposed	Grande collectrice: Établie, Proposé
Collectors: Existing, Proposed	Collectrice: Établie, Proposé

Ottawa

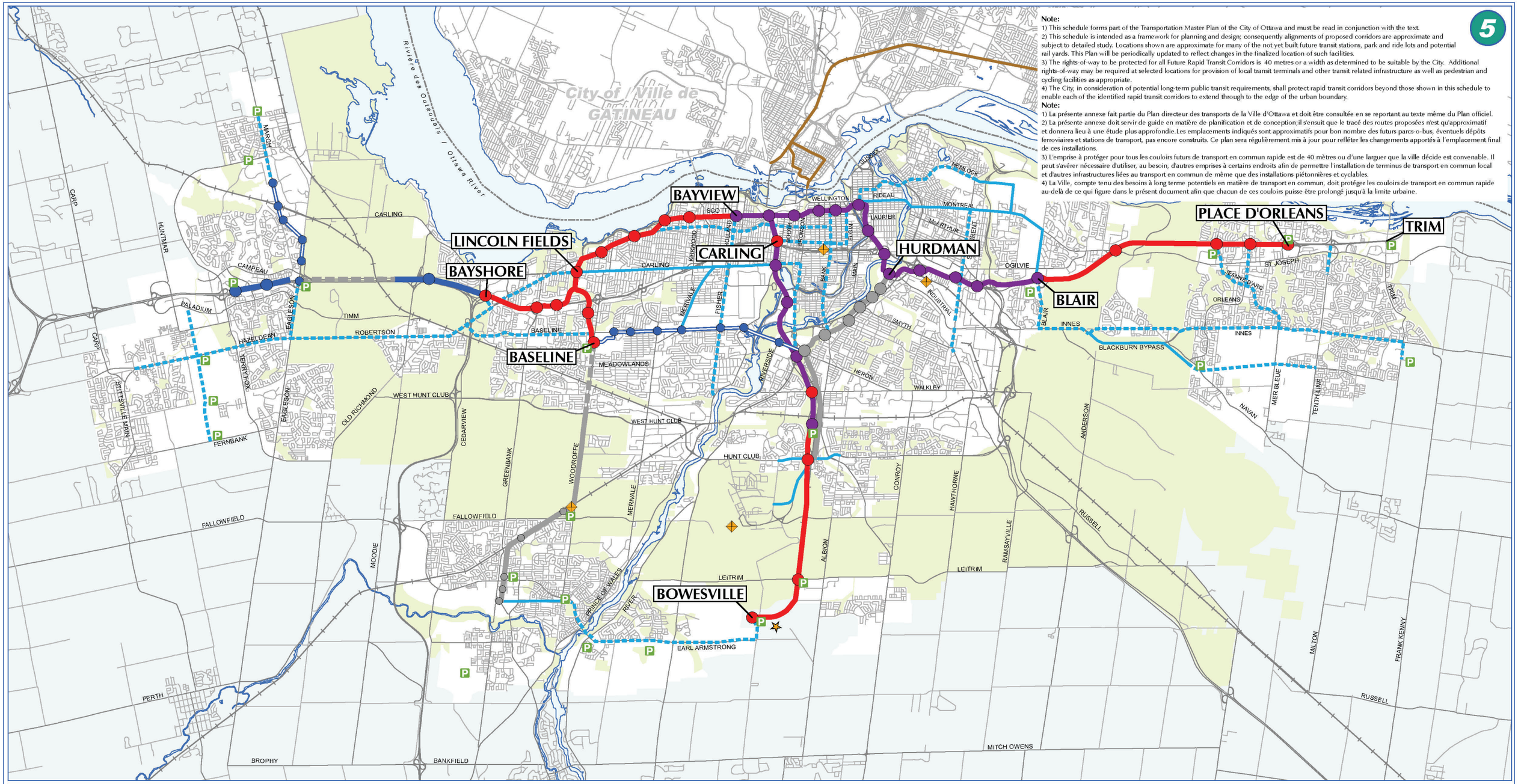
5

Note:

1) This schedule forms part of the Transportation Master Plan of the City of Ottawa and must be read in conjunction with the text.
2) This schedule is intended as a framework for planning and design; consequently alignments of proposed corridors are approximate and subject to detailed study. Locations shown are approximate for many of the not yet built future transit stations, park and ride lots and potential rail yards. This Plan will be periodically updated to reflect changes in the finalized location of such facilities.
3) The rights-of-way to be protected for all Future Rapid Transit Corridors is 40 metres or a width as determined to be suitable by the City. Additional rights-of-way may be required at selected locations for provision of local transit terminals and other transit related infrastructure as well as pedestrian and cycling facilities as appropriate.
4) The City, in consideration of potential long-term public transit requirements, shall protect rapid transit corridors beyond those shown in this schedule to enable each of the identified rapid transit corridors to extend through to the edge of the urban boundary.

Note:

1) La présente annexe fait partie du Plan directeur des transports de la Ville d'Ottawa et doit être consultée en se reportant au texte même du Plan officiel.
2) La présente annexe doit servir de guide en matière de planification et de conception;il s'ensuit que le tracé des routes proposées n'est qu'approximatif et donnera lieu à une étude plus approfondie.Les emplacements indiqués sont approximatifs pour bon nombre des futurs parcs-o-bus, éventuels dépôts ferroviaires et stations de transport, pas encore construits. Ce plan sera régulièrement mis à jour pour refléter les changements apportés à l'emplacement final de ces installations.
3) L'emprise à protéger pour tous les couloirs futurs de transport en commun rapide est de 40 mètres ou d'une larguer que la ville décide est convenable. Il peut s'avérer nécessaire d'utiliser, au besoin, d'autres emprises à certains endroits afin de permettre l'installation de terminus de transport en commun local et d'autres infrastructures liées au transport en commun de même que des installations piétonnières et cyclables.
4) La Ville, compte tenu des besoins à long terme potentiels en matière de transport en commun, doit protéger les couloirs de transport en commun rapide au-delà de ce qui figure dans le présent document afin que chacun de ces couloirs puisse être prolongé jusqu'à la limite urbaine.



RAPID TRANSIT
Existing Bus Rapid Transit (BRT)
Existing Bus Lanes
Existing / Committed Rail
Future Rail
Future Bus Rapid Transit (BRT)
Future Bus Rapid Transit (BRT) - At-Grade Crossings

TRANSIT PRIORITY
Transit Priority Corridor (Continuous Lanes)
Transit Priority Corridor (Isolated Measures)

TRANSPORT EN COMMUN RAPIDE
Transport en commun rapide par autobus actuel
Voies actuelles réservées aux autobus
Réseau de transport ferroviaire actuel/prévu
Réseau ferroviaire futur
Transport en commun rapide par autobus (TCRA) futur
Transport en commun rapide par autobus (TCRA) - passages à niveau futur

PRIORITÉ AU TRANSPORT EN COMMUN
Corridor donnant priorité au transport en commun (voies continues)
Corridor donnant priorité au transport en commun (mesures isolées)

Existing Transit Station - Bus
Existing / Committed Transit Station - Rail
Future Transit Station - Rail
Future Transit Station - Bus
Inter-regional Stations
Potential Rail Yard
Gatineau Rapibus
Park and Ride

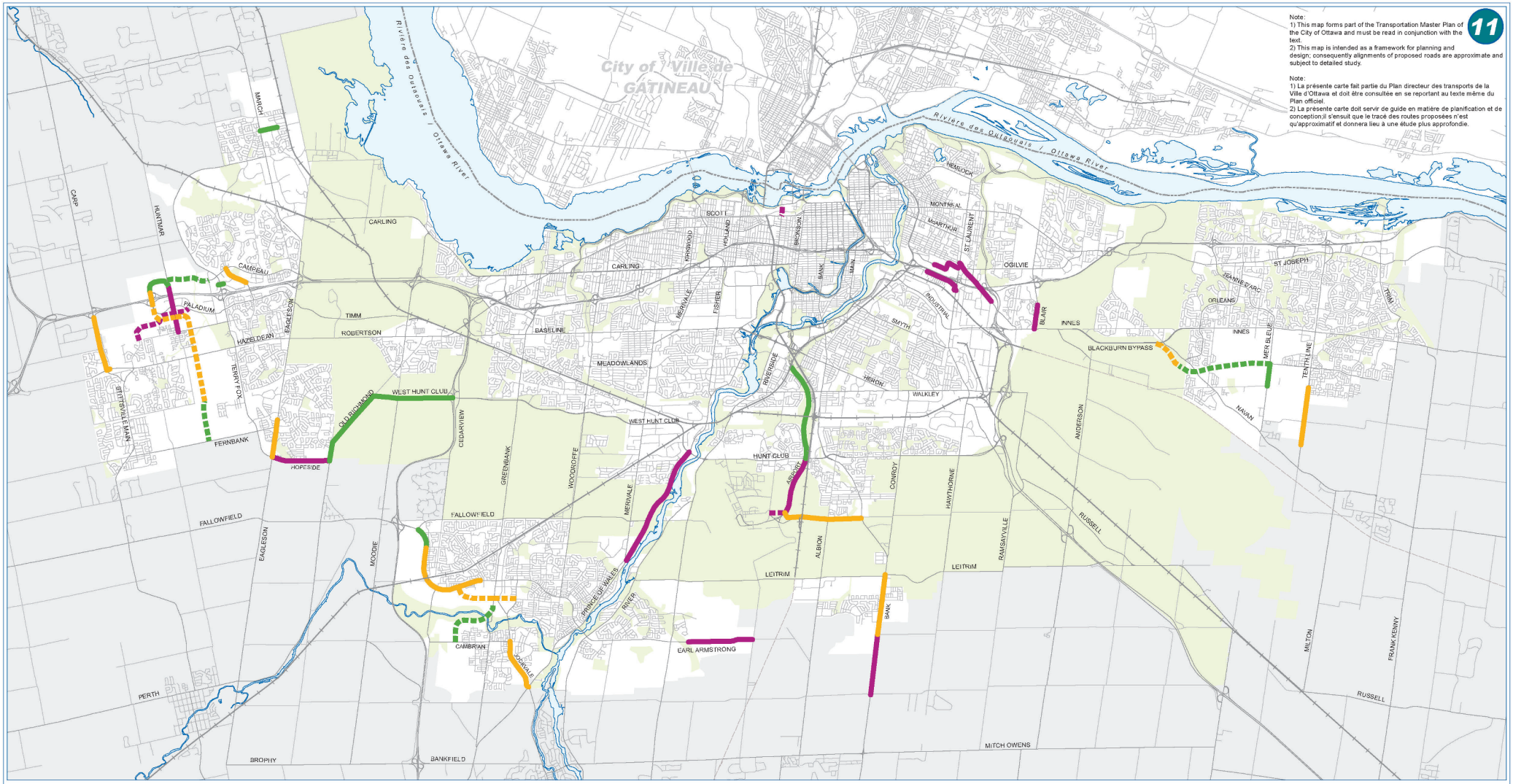
Station de transport en commun actuelle – autobus
Station de transport en commun actuelle/prévue – train
Station de transport en commun future – train
Station de transport en commun future – autobus
Stations interrégionales
Cour de tirage possible pour trains
Rapibus de Gatineau
Parc-O-Bus

1 0.5 0 1 2 3 km

Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit, 2015 Revision
Préparé par: Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques, Révision 2015

TRANSPORTATION MASTER PLAN - Map 5
RAPID TRANSIT AND TRANSIT PRIORITY NETWORK - 2031 AFFORDABLE NETWORK

PLAN DIRECTEUR DES TRANSPORTS - Carte 5
RÉSEAU DE TRANSPORT EN COMMUN RAPIDE ET DE TRANSPORT EN COMMUN PRIORITAIRE – RÉSEAU ABORDABLE 2031



Note:
1) This map forms part of the Transportation Master Plan of the City of Ottawa and must be read in conjunction with the text.
2) This map is intended as a framework for planning and design; consequently alignments of proposed roads are approximate and subject to detailed study.

Note:
1) La présente carte fait partie du Plan directeur des transports de la Ville d'Ottawa et doit être consultée en se reportant au texte même du Plan officiel.
2) La présente carte doit servir de guide en matière de planification et de conception;il s'ensuit que le tracé des routes proposées n'est qu'approximatif et donnera lieu à une étude plus approfondie.

11

Ottawa

1 0.5 0 1 2 3 km

Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit, 2015 Revision
Préparé par: Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques, Révision 2015

Phase 1 (2014 - 2019) Widening
Phase 1 (2014 - 2019) New Road
Phase 1 (2014 - 2019) Élargissement
Phase 1 (2014 - 2019) Nouvelle route

Phase 2 (2020 - 2025) Widening
Phase 2 (2020 - 2025) New Road
Phase 2 (2020 - 2025) Élargissement
Phase 2 (2020 - 2025) Nouvelle route

Phase 3 (2026 - 2031) Widening
Phase 3 (2026 - 2031) New Road
Phase 3 (2026 - 2031) Élargissement
Phase 3 (2026 - 2031) Nouvelle route

TRANSPORTATION MASTER PLAN - Map 11

ROAD NETWORK – 2031 AFFORDABLE NETWORK

PLAN DIRECTEUR DES TRANSPORTS - Carte 11

RÉSEAU ROUTIER - RÉSEAU ABORDABLE 2031

OFFICIAL PLAN - ANNEX 10
Land Use Constraints Due to Aircraft Noise

Prepared by: City of Ottawa,
Department of Planning, Transit and the Environment,
September 2011

PLAN OFFICIEL - APPENDICE 10
Contraintes limitant l'utilization en raison du brut des avions

Preparé par : Ville d'Ottawa ,
Le Service de l'urbanisme , du transport en commun et de l'environnement ,
septembre 2011

Airport Vicinity Development Zone
Zone d'aménagement dans le voisinage de l'aéroport

25 Line (Composite of 25 NEF/NEP)
Ligne 25 (ensemble des courbes NEF et NEP 25)

35 Line Noise Exposure Protection (NEP 2023)
Ligne 35 : prévisions à long terme de l'ambiance sonore (NEP 2023)

Airport Zoning Regulations
Règlements de zonage applicables à de l'Aéroport

Airport Operating Influence Zone
Zone d'influence d'exploitation de l'aéroport

Note:
The boundaries of the Ottawa Airport Operating Influence Zone and the Airport Vicinity Development Zone, are not subject to interpretation and their precise locations should be read from a map at a scale of 1:50,000 available from the City of Ottawa and the Ottawa International Airport Authority.

Site Location

Scale / Échelle
1km 0 1 2 3 km

Ottawa

N

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

ENVIRONMENTAL NOISE CONTROL GUIDELINES:

Introduction and Glossary

January 2016

Table 2.2a: Sound Level Limit for Outdoor Living Areas - Road and Rail
(from NPC-300, 2013 Table C-1)

Time Period	Required Leq (16) (dBA)
16-hour, 07:00 – 23:00	55

Table 2.2b: Sound Level Limit for Indoor Living Areas Road and Rail
(from NPC-300, 2013 Table C-2)

Type of Space	Time Period	Required Leq (dBA) Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
	23:00 – 07:00	40	35

The Province also provides for supplementary indoor sound level limits for land uses not generally considered noise sensitive (see Table 2.2c below). These good practice design objectives should be addressed in any noise study prepared for the City. These supplementary sound level limits are based on the windows and doors to an indoor space being closed.

Table 2.2c: Supplementary Sound Level Limits for Indoor Spaces - Road and Rail (adapted from NPC-300 Table C-9)

Type of Space	Time Period	Required Leq (dBA) Road	Rail
General offices, reception areas, retail stores, etc.	16 hours between 07:00 – 23:00	50	45
Theatres, places of worship, libraries, individual or semi- private offices, conference rooms, reading rooms, etc.	16 hours between 07:00 – 23:00	45	40
Sleeping quarters of hotels/motels	8 hours between 23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	8 hours between 23:00 – 07:00	40	35

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.

Appendix A: Warning Clauses

Under the Official Plan and this guideline warning clauses may be required to be incorporated into development through development agreements, registration on title and inclusion in Agreements of Purchase and Sale. This requirement may be included in any development, regardless of whether it is considered a noise sensitive land use.

A warning clause provides recognition for the City, Province landowner or tenants that noise may be a concern, that noise may be audible at times or even quite loud, and, depending on the type of development, provincial guidelines for noise may be exceeded. Warning clauses also recognize that environmental noise is a potential health hazard that does impact people and neighbourhoods. It is for this reason that, unless a non-noise sensitive land use is established, a warning clause should also include noise mitigation.

A warning clause is not considered a form of noise mitigation. It is not acceptable therefore to use warning clauses in place of physical noise control measures to identify an excess over the MOE or City noise limits. The reason for a warning clause on all development is twofold. Firstly, it is important to note that a land use that although the development may not be considered noise sensitive it may include employees or tenants that are personally sensitive to noise. A warning clause provides protection against complaints to the ministry of Environment should provincial guidelines be exceeded. Secondly, a warning clause on title could obviate the need for a new noise study in the future. In a redevelopment scenario the warning clause would provide recognition of the extent noise conditions.

Given the variation in potential intensity and impact of noise it will often be necessary to amend warning clauses to recognize the site specific conditions in each development. Final wording of any warning clause is to be approved by the City.

The following subsections provide example text to be adapted into warning clauses.

Surface Transportation Warning Clauses

Table A1 Surface Transportation Warning Clauses

Type	Example	Notes
Generic	*Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway 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.* *To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area that is within provincial guidelines. Measures for sound attenuation include:* • *A setback of buildings from the noise source and* • *An acoustic barrier.* *To ensure that provincial sound level limits are not exceeded it is important to maintain sound attenuation features.* *The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original.* *Additionally this development includes trees and shrubs to screen the source of noise from occupants.*	The generic warning clause outlines that MOE sound levels may be exceeded but the indoor environment and outdoor amenity areas are within guidelines. Mitigation measures are described including urban design features. Mention is also made of landscaping to screen the development visually from the source of noise.
Extensive mitigation of indoor and	*"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units,*	The warning clause makes reference to MOE sound levels

Table A1 Surface Transportation Warning Clauses

Type	Example	Notes
outdoor amenity area	*sound levels due to increasing road/rail/Light Rail/transitway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.* *To help address the need for sound attenuation this development includes:* • *multi-pane glass;* • *double brick veneer;* • *an earth berm; and* • *an acoustic barrier.* *To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.* *The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original.* *This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.*	being exceeded from time to time and that there are sound attenuation features and landscaping within the development that should be maintained. An option for air conditioning is noted as well as landscaping to screen the source of noise.

Table A1 Surface Transportation Warning Clauses

Type	Example	Notes
	Additionally this development includes trees and shrubs to screen the source of noise from occupants.	
No outdoor amenity area	*Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic will interfere with outdoor activities as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.* *To help address the need for sound attenuation this development includes:* • *multi-pane glass;* • *double brick veneer;* • *high sound transmission class walls.* *To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.* *This dwelling unit has been supplied with a central air conditioning system and other measures 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 City and the Ministry of the Environment*	This warning clause notes that only an indoor environment is being provided for.

Stationary Source Warning Clauses

The Province notes that it is not acceptable to use warning clauses in place of physical noise control measures to identify an excess over the MOE sound level limits for stationary sources. The generic warning clause for stationary sources (called Type E in NPC-300) may identify a potential concern due to the proximity of the facility but it is not possible to justify exceeding the sound level limits.
The wording of the generic stationary noise warning clause may also be used as the basis for new development adjacent to areas licensed for mineral aggregate extraction.

Environmental Noise Guideline

Stationary and Transportation Sources – Approval and Planning

Publication NPC-300

Ontario

Table C-10
Supplementary Indoor Aircraft Noise Limits
(Applicable over 24-hour period)

Type of Space	Indoor NEF/NEP*
General offices, reception areas, retail stores, etc.	15
Individual or semi-private offices, conference rooms, etc.	10
Living/dining areas of residences, sleeping quarters of hotels/motels, theatres, libraries, schools, daycare centres, places of worship, etc.	5
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	0

* The indoor NEF/NEP values listed in Table C-10 are not obtained from NEF/NEP contour maps. The values are representative of the indoor sound levels and are used as assessment criteria for the evaluation of acoustical insulation requirements.

C7 Noise Control Measures

The following sections provide MOE guidance for appropriate noise control measures. These sections constitute requirements that are applied to MOE approvals for stationary sources. This information is also provided as guidance which land use planning authorities may consider adopting.

The definition in Part A describes the various types and application of noise control measures. All the noise control measures described in the definition are appropriate to address the impact of noise of transportation sources (road, rail and aircraft) on planned sensitive land uses. Only some of the noise control measures described in the definition are appropriate to address the noise impact of stationary sources on planned sensitive land uses.

C7.1 Road Noise Control Measures

C7.1.1 Outdoor Living Areas

If the 16-Hour Equivalent Sound Level, L_{eq} (16) in the OLA is greater than 55 dBA and less than or equal to 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.

If the 16-Hour Equivalent Sound Level, L_{eq} (16) in the OLA is greater than 60 dBA, noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B. In the above situations, any excess above the limit will not be acceptable if it exceeds 5 dBA.

C7.1.2 Plane of a Window – Ventilation Requirements

C7.1.2.1 Daytime Period, 07:00 – 23:00 Hours

Noise control measures may not be required if the L_{eq} (16) daytime sound level in the plane of a bedroom or living/dining room window is less than or equal to 55 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 55 dBA and less than or equal to 65 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the daytime sound level in the plane of a bedroom or living/dining room window is greater than 65 dBA, installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.2.2 Nighttime Period, 23:00 – 07:00 Hours

Noise control measures may not be required if the L_{eq} (8) nighttime sound level in the plane of a bedroom or living/dining room window is less than or equal to 50 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 50 dBA and less than or equal to 60 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the nighttime sound level in the plane of a bedroom or living/dining room window is greater than 60 dBA, installation of central air conditioning should be implemented, with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.3 Indoor Living Areas – Building Components

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 60 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 65 dBA, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the

sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) should be specified.

C7.2 Rail Noise Control Measures

C7.2.1 Outdoor Living Areas

Whistle noise is not included in the determination of the outdoor daytime sound level due to railway trains. All the provisions of Section C7.1.1 apply also to noise control requirements for rail noise.

C7.2.2 Plane of a Window – Ventilation Requirements

Whistle noise is not included in the determination of the sound level in the plane of a window. All the provisions of Section C7.1.2 apply also to noise control requirements for rail noise.

C7.2.3 Indoor Living Areas – Building Components

The sound level, L_{eq}, during the daytime (16-hour) and nighttime (8-hour) periods is determined using the prediction method STEAM, Reference [34], immediately outside the dwelling envelope. Whistle noise is included in the determination of the sound level.

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 55 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 60 dBA, building components including windows, walls and doors, where applicable, need to be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) needs to be specified.

In addition, the exterior walls of the first row of dwellings next to railway tracks are to be built to a minimum of brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic L_{eq} (24-hour), estimated at a location of a nighttime receptor, is greater than 60 dBA, and when the first row of dwellings is within 100 metres of the tracks.

C7.3 Combination of Road and Rail Noise

The noise impact in the OLA and in the plane of a window, and the requirements for outdoor measures, ventilation measures and warning clauses, should be determined by combining road and rail traffic sound levels.

The assessment of the indoor sound levels and the resultant requirement for the acoustical descriptors of the building components should be done separately for road

In Class 4 areas, where windows for noise sensitive spaces are assumed to be closed, the use of central air conditioning may be acceptable if it forms an essential part of the overall building designs.

C7.9 Verification of Noise Control Measures

It is recommended that the implementation of noise control measures be verified by qualified individuals with experience in environmental acoustics.

C8 Warning Clauses

The use of warning clauses or easements in respect of noise are recommended when circumstances warrant. Noise warning clauses may be used to warn of potential annoyance due to an existing source of noise and/or to warn of excesses above the sound level limits. Direction on the use of warning clauses should be included in agreements that are registered on title to the lands in question. The warning clauses would be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations. Alternatively, the use of easements in respect of noise may be appropriate in some circumstances. Additional guidance on the use of noise warning clauses is provided in Section C7.1.1, Section C7.1.2.1, Section C7.1.2.2, Section C7.3 and Section C7.4.

C8.1 Transportation Sources

The following warning clauses may be used individually or in combination:

TYPE A: (see Section C7.1.1)

> "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."

TYPE B: (see Section C7.1.1 and Section C7.4)

> "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."

TYPE C: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

> "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."

TYPE D: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

"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."

C8.2 Stationary Sources

It is not acceptable to use warning clauses in place of physical noise control measures to identify an excess over the MOE sound level limits. Warning clause (Type E) for stationary sources may identify a potential concern due to the proximity of the facility but it is not acceptable to justify exceeding the sound level limits.

TYPE E: (see Section C7.6)

"Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times be audible."

C8.3 Class 4 Area Notification

TYPE F: (see Section B9.2 and Section C4.4.2)

"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 B

STAMSON Noise Modelling Results

NOVATECH
Engineers, Planners & Landscape Architects

STAMSON MODELLING RESULTS

POW 1 – 1ST FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:53:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow1.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -4.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 / 23.00 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.10 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (day/night)

Angle1 Angle2 : -4.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 35.00 / 35.00 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.10 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	63.62	63.62
2.HC SW	1.50	64.74	64.74
Total			67.23 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	56.03	56.03
2.HC SW	1.50	57.15	57.15
Total			59.64 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.23
(NIGHT): 59.64

POW 1 – 7TH FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:55:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow1b.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -4.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 / 23.00 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.10 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (day/night)

Angle1 Angle2 : -4.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 35.00 / 35.00 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.10 m
Reference angle : 0.00

Result summary (day)

source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	65.87	65.87
2.HC SW	1.50	64.74	64.74
Total		68.35 dBA

Result summary (night)

source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	58.27	58.27
2.HC SW	1.50	57.15	57.15
Total		60.76 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.35
(NIGHT): 60.76

POW 2 – 1ST FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:55:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow2.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 / 23.00 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.10 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (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 : 35.00 / 35.00 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.10 m
Reference angle : 0.00

Road data, segment # 3: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: AP ONRAMP (day/night)

Angle1 Angle2 : 60.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 51.30 / 51.30 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 3.55 m
Reference angle : 0.00

Road data, segment # 4: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: AP (day/night)

Angle1 Angle2 : 29.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.70 / 80.70 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	66.38	66.38
2.HC SW	1.50	67.57	67.57
3.AP ONRAMP	1.50	44.84	44.84
4.AP	1.50	57.08	57.08
Total			70.25 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	58.78	58.78
2.HC SW	1.50	59.97	59.97
3.AP ONRAMP	1.50	37.25	37.25
4.AP	1.50	49.48	49.48
Total			62.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.25
(NIGHT): 62.65

POW 2 – 7TH FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 14:27:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow2b.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 / 23.00 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.10 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (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 : 35.00 / 35.00 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.10 m
Reference angle : 0.00

Road data, segment # 3: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: AP ONRAMP (day/night)

Angle1 Angle2 : 60.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 51.30 / 51.30 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 3.55 m
Reference angle : 0.00

Road data, segment # 4: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: AP (day/night)

Angle1 Angle2 : 29.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.70 / 80.70 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	68.69	68.69
2.HC SW	1.50	67.57	67.57
3.AP ONRAMP	1.50	51.23	51.23
4.AP	1.50	63.15	63.15
Total			71.85 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	61.09	61.09
2.HC SW	1.50	59.97	59.97
3.AP ONRAMP	1.50	43.64	43.64
4.AP	1.50	55.56	55.56
Total			64.25 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.85
(NIGHT): 64.25

POW 3 – 1ST FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:56:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow3.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.65 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (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 : 37.20 / 37.20 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.65 m
Reference angle : 0.00

Road data, segment # 3: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: AP ONRAMP (day/night)

Angle1 Angle2 : 51.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 36.30 / 36.30 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 3.55 m
Reference angle : 0.00

Road data, segment # 4: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: AP (day/night)

Angle1 Angle2 : 24.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 57.30 / 57.30 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	65.87	65.87
2.HC SW	1.50	67.30	67.30
3.AP ONRAMP	1.50	48.89	48.89
4.AP	1.50	59.96	59.96
Total			70.13 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	58.27	58.27
2.HC SW	1.50	59.70	59.70
3.AP ONRAMP	1.50	41.30	41.30
4.AP	1.50	52.36	52.36
Total			62.53 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.13
(NIGHT): 62.53

POW 3 – 7TH FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:56:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow3b.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.65 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (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 : 37.20 / 37.20 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.65 m
Reference angle : 0.00

Road data, segment # 3: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: AP ONRAMP (day/night)

Angle1 Angle2 : 51.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 36.30 / 36.30 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 3.55 m
Reference angle : 0.00

Road data, segment # 4: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: AP (day/night)

Angle1 Angle2 : 24.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 57.30 / 57.30 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	68.40	68.40
2.HC SW	1.50	67.30	67.30
3.AP ONRAMP	1.50	53.88	53.88
4.AP	1.50	65.04	65.04
Total			71.97 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	60.80	60.80
2.HC SW	1.50	59.70	59.70
3.AP ONRAMP	1.50	46.28	46.28
4.AP	1.50	57.44	57.44
Total			64.37 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.97
(NIGHT): 64.37

POW 4 – 1ST FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:56:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow4.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -90.00 deg -11.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 29.70 / 29.70 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.65 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (day/night)

Angle1 Angle2 : -90.00 deg -11.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 41.80 / 41.80 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.65 m
Reference angle : 0.00

Road data, segment # 3: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: AP ONRAMP (day/night)

Angle1 Angle2 : -46.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 32.10 / 32.10 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 3.55 m
Reference angle : 0.00

Road data, segment # 4: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: AP (day/night)

Angle1 Angle2 : -67.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 61.50 / 61.50 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	60.90	60.90
2.HC SW	1.50	63.22	63.22
3.AP ONRAMP	1.50	57.13	57.13
4.AP	1.50	64.11	64.11
Total			68.08 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	53.30	53.30
2.HC SW	1.50	55.62	55.62
3.AP ONRAMP	1.50	49.53	49.53
4.AP	1.50	56.52	56.52
Total			60.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.08
(NIGHT): 60.48

POW 4 – 7TH FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:56:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow4b.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -90.00 deg -11.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 29.70 / 29.70 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.65 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (day/night)

Angle1 Angle2 : -90.00 deg -11.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 41.80 / 41.80 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.65 m
Reference angle : 0.00

Road data, segment # 3: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: AP ONRAMP (day/night)

Angle1 Angle2 : -46.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 32.10 / 32.10 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 3.55 m
Reference angle : 0.00

Road data, segment # 4: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: AP (day/night)

Angle1 Angle2 : -67.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 61.50 / 61.50 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	64.06	64.06
2.HC SW	1.50	63.22	63.22
3.AP ONRAMP	1.50	59.83	59.83
4.AP	1.50	68.54	68.54
Total			71.06 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	56.47	56.47
2.HC SW	1.50	55.62	55.62
3.AP ONRAMP	1.50	52.24	52.24
4.AP	1.50	60.94	60.94
Total			63.46 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.06
(NIGHT): 63.46

POW 5 – 1ST FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:57:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow5.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -90.00 deg -22.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 71.90 / 71.90 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.55 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (day/night)

Angle1 Angle2 : -90.00 deg -22.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 84.00 / 84.00 m
Receiver height : 1.75 / 1.75 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.55 m
Reference angle : 0.00

Road data, segment # 3: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: AP ONRAMP (day/night)

Angle1 Angle2 : -67.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 31.30 / 31.30 m
Receiver height : 1.65 / 1.65 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.15 m
Reference angle : 0.00

Road data, segment # 4: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: AP (day/night)

Angle1 Angle2 : -72.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.80 / 55.80 m
Receiver height : 1.65 / 1.65 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.15 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	53.90	53.90
2.HC SW	1.50	53.42	53.42
3.AP ONRAMP	1.50	57.65	57.65
4.AP	1.50	64.89	64.89
Total			66.16 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	46.30	46.30
2.HC SW	1.50	45.82	45.82
3.AP ONRAMP	1.50	50.05	50.05
4.AP	1.50	57.29	57.29
Total			58.56 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.16
(NIGHT): 58.56

POW 5 – 7TH FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:57:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow5b.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: HC NE (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: HC NE (day/night)

Angle1 Angle2 : -90.00 deg -22.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 71.90 / 71.90 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.55 m
Reference angle : 0.00

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

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: HC SW (day/night)

Angle1 Angle2 : -90.00 deg -22.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 84.00 / 84.00 m
Receiver height : 20.54 / 20.54 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.55 m
Reference angle : 0.00

Road data, segment # 3: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: AP ONRAMP (day/night)

Angle1 Angle2 : -67.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 31.30 / 31.30 m
Receiver height : 20.44 / 20.44 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.15 m
Reference angle : 0.00

Road data, segment # 4: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: AP (day/night)

Angle1 Angle2 : -72.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.80 / 55.80 m
Receiver height : 20.44 / 20.44 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.15 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	59.50	59.50
2.HC SW	1.50	59.39	59.39
3.AP ONRAMP	1.50	60.42	60.42
4.AP	1.50	69.12	69.12
Total			70.42 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HC NE	1.50	51.90	51.90
2.HC SW	1.50	51.80	51.80
3.AP ONRAMP	1.50	52.82	52.82
4.AP	1.50	61.52	61.52
Total			62.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.42
(NIGHT): 62.83

POW 6 – 1ST FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:57:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow6.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: AP ONRAMP (day/night)

Angle1 Angle2 : -90.00 deg 8.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 31.30 / 31.30 m
Receiver height : 1.65 / 1.65 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.15 m
Reference angle : 0.00

Road data, segment # 2: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg 10.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.80 / 55.80 m
Receiver height : 1.65 / 1.65 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.15 m
Reference angle : 0.00

Result summary (day)
---

source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.AP ONRAMP	1.50	55.42	55.42
2.AP	1.50	62.68	62.68
Total		63.43 dBA

Result summary (night)
---

source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.AP ONRAMP	1.50	47.82	47.82
2.AP	1.50	55.08	55.08
Total		55.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.43
(NIGHT): 55.83

POW 6 – 7TH FLOOR

STAMSON 5.0 SUMMARY REPORT Date: 08-05-2020 13:58:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow6b.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: AP ONRAMP (day/night)

Car traffic volume : 6072/528 veh/TimePeriod *
Medium truck volume : 483/42 veh/TimePeriod *
Heavy truck volume : 345/30 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: AP ONRAMP (day/night)

Angle1 Angle2 : -90.00 deg 8.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 31.30 / 31.30 m
Receiver height : 20.44 / 20.44 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.15 m
Reference angle : 0.00

Road data, segment # 2: AP (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 : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg 10.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.80 / 55.80 m
Receiver height : 20.44 / 20.44 m
Topography : 3 (Elevated; no barrier)
Elevation : 2.15 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.AP ONRAMP	1.50	58.36	58.36
2.AP	1.50	67.01	67.01
Total			67.57 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.AP ONRAMP	1.50	50.76	50.76
2.AP	1.50	59.41	59.41
Total			59.97 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.57
(NIGHT): 59.97

HUNT CLUB ROAD

SW

NE

+90°

-4°

-90°

35.4m

37.2m

41.8m

23.0m

25.0m

29.7m

42.2m

4.2m

15.0m

32.1m

61.5m

31.3m

55.8m

APPROX. C/L OF TWO ON-RAMP ENTRIES

AIRPORT PARKWAY ONRAMP

AIRPORT PARKWAY

PHASE 1
RETIREMENT HOME
8-STOREYS
(UNDER CONSTRUCTION)

PHASE 2
PROPOSED
RESIDENTIAL
BUILDING
7-STOREYS

FFE=93.20

POW 1

POW 2

POW 3

POW 4

POW 5

POW 6

ENTRANCE

EXIT

RAMP DOWN

RAMP UP

PARKING

RETAINING WALL

EX CONC SIDEWALK

91.00 90.9± 90.4± 92.00 93.00 94.00 90.00 89.00 89.4± 94.9± 95.2± 92.00 90.00 95.00

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HUNT CLUB DEVELOPMENT PHASE 2

RECEIVER ANGLES

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE MAY 2020 | JOB 117036 | FIGURE POW1

M:\2017\117036\CAD\Design\Figures\Noise\2020\FIG2-3.dwg, POW1, May 08, 2020 - 1:53pm, lbolam

SHT11X17.DWG - 279mmX432mm

HUNT CLUB ROAD

SW

NE

+29˚

A.P.

+60˚

A.P. ON-RAMP

APPROX. C/L OF TWO ON-RAMP ENTRIES

35.4m

37.2m

41.8m

23.0m

25.0m

29.7m

42.2m

-90˚

+90˚

4.2m

15.0m

32.1m

61.5m

31.3m

55.8m

91.00

90.9±

90.4±

92.00

93.00

94.00

90.00

89.00

89.4±

94.9±

90.9±

95.2±

EX CONC SIDEWALK

PHASE 1
RETIREMENT HOME
8-STOREYS
(UNDER CONSTRUCTION)

ENTRANCE

EXIT

RAMP DOWN

RAMP UP

PHASE 2
PROPOSED
RESIDENTIAL
BUILDING
7-STOREYS

FFE=93.20

POW 1

POW 2

POW 3

POW 4

POW 5

POW 6

PARKING

RETAINING WALL

AIRPORT PARKWAY ON-RAMP

AIRPORT PARKWAY

96.00

92.00

95.00

M:\2017\117036\CAD\Design\Figures\Noise\2020\FIG2-3.dwg, POW2, May 08, 2020 - 1:53pm, lbolam

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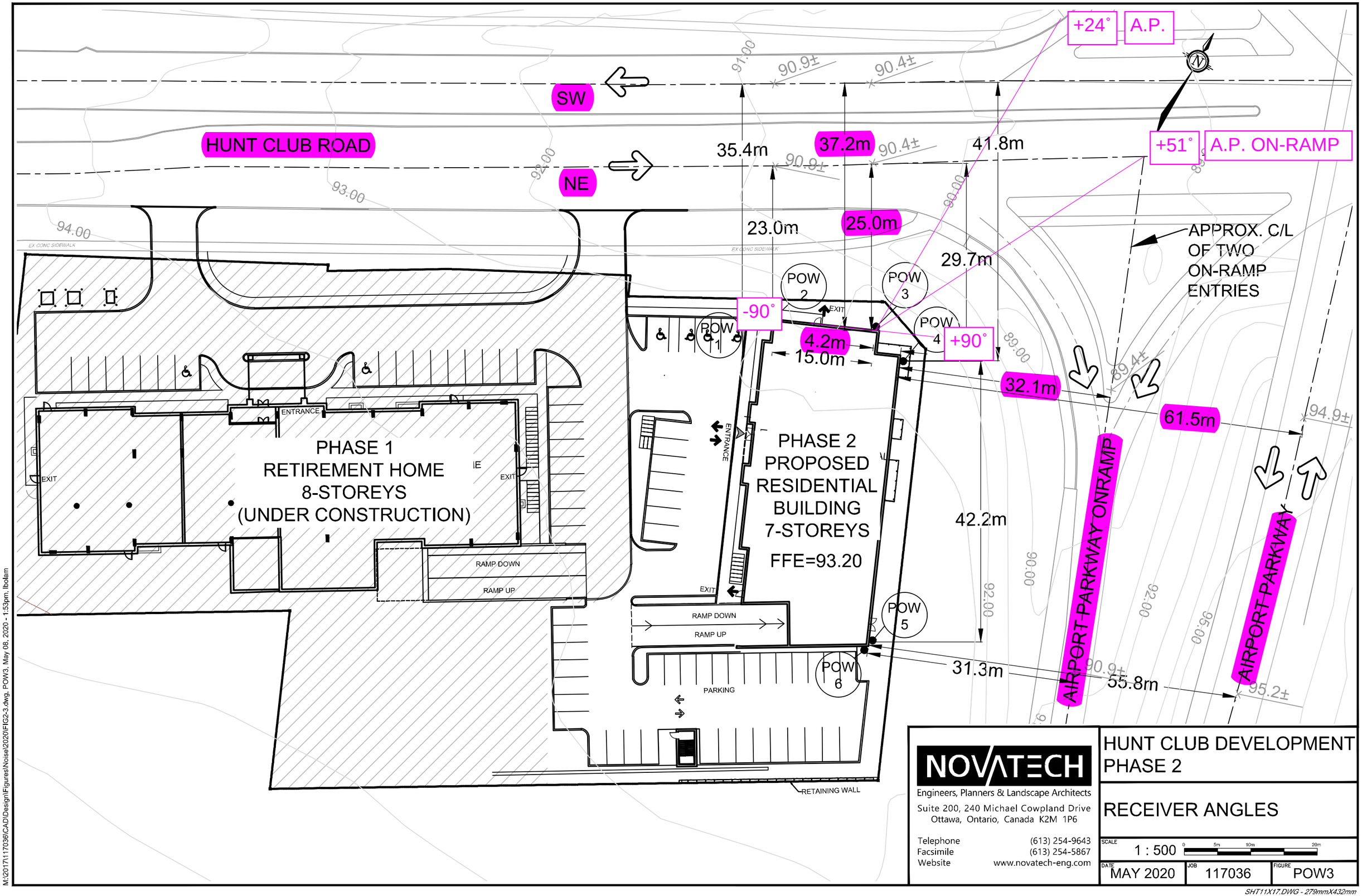
HUNT CLUB DEVELOPMENT PHASE 2

RECEIVER ANGLES

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE MAY 2020 | JOB 117036 | FIGURE POW2

SHT11X17.DWG - 279mmX432mm



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HUNT CLUB DEVELOPMENT PHASE 2

RECEIVER ANGLES

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE MAY 2020 | JOB 117036 | FIGURE POW3

M:\2017\117036\CAD\Design\Figures\Noise\2020\FIG2-3.dwg, POW3, May 08, 2020 - 1:53pm, lbolam

SHT11X17.DWG - 279mmX432mm

HUNT CLUB ROAD

SW

NE

EX CONC SIDEWALK

PHASE 1
RETIREMENT HOME
8-STOREYS
(UNDER CONSTRUCTION)

ENTRANCE

EXIT

RAMP DOWN

RAMP UP

PHASE 2
PROPOSED
RESIDENTIAL
BUILDING
7-STOREYS

FFE=93.20

ENTRANCE

EXIT

RAMP DOWN

RAMP UP

PARKING

RETAINING WALL

POW 1

POW 2

POW 3

POW 4

POW 5

POW 6

35.4m

37.2m

23.0m

25.0

4.2m

15.0m

-67˚

A.P.

-46˚

A.P. ON-RAMP

-90˚

+90˚

-11˚

41.8m

29.7m

32.1m

61.5m

42.2m

31.3m

55.8m

APPROX. C/L
OF TWO
ON-RAMP
ENTRIES

HUNT CLUB
(NE & SW)

AIRPORT PARKWAY ON-RAMP

AIRPORT PARKWAY

91.00

90.9±

90.4±

92.00

93.00

94.00

90.00

89.00

89.4±

94.9±

90.9±

95.2±

96.00

95.00

M:\2017\117036\CAD\Design\Figures\Noise\2020\FIG2-3.dwg, POW4, May 08, 2020 - 1:53pm, lbolam

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HUNT CLUB DEVELOPMENT PHASE 2

RECEIVER ANGLES

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE MAY 2020 | JOB 117036 | FIGURE POW4

SHT11X17.DWG - 279mmX432mm

HUNT CLUB ROAD

SW

NE

PHASE 1
RETIREMENT HOME
8-STOREYS
(UNDER CONSTRUCTION)

ENTRANCE

EXIT

RAMP DOWN

RAMP UP

PHASE 2
PROPOSED
RESIDENTIAL
BUILDING
7-STOREYS

FFE=93.20

PARKING

RETAINING WALL

POW 1

POW 2

POW 3

POW 4

POW 5

POW 6

35.4m

37.2m

41.8m

23.0m

25.0m

29.7m

42.2m

31.3m

4.2m

15.0m

32.1m

61.5m

55.8m

-72˚

A.P.

-67˚

A.P. ON-RAMP

APPROX. C/L
OF TWO
ON-RAMP
ENTRIES

-90˚

+90˚

-22˚

HUNT CLUB
(NE & SW)

AIRPORT PARKWAY ONRAMP

AIRPORT PARKWAY

EX CONC SIDEWALK

91.00

90.9±

90.4±

92.00

93.00

94.00

90.00

89.00

89.4±

94.9±

95.2±

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HUNT CLUB DEVELOPMENT PHASE 2

RECEIVER ANGLES

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE MAY 2020 | JOB 117036 | FIGURE POW5

M:\2017\117036\CAD\Design\Figures\Noise\2020\FIG2-3.dwg, POW5, May 08, 2020 - 1:53pm, lbolam

SHT11X17.DWG - 279mmX432mm

HUNT CLUB ROAD

SW

NE

PHASE 1
RETIREMENT HOME
8-STOREYS
(UNDER CONSTRUCTION)

ENTRANCE

EXIT

RAMP DOWN

RAMP UP

PHASE 2
PROPOSED
RESIDENTIAL
BUILDING
7-STOREYS

FFE=93.20

ENTRANCE

EXIT

RAMP DOWN

PARKING

RETAINING WALL

POW 1

POW 2

POW 3

POW 4

POW 5

POW 6

35.4m

37.2m

41.8m

23.0m

25.0m

29.7m

42.2m

4.2m

15.0m

32.1m

61.5m

31.3m

55.8m

+90˚

-90˚

A.P. +10˚

A.P. ON-RAMP +8˚

APPROX. C/L
OF TWO
ON-RAMP
ENTRIES

AIRPORT PARKWAY ON-RAMP

AIRPORT PARKWAY

91.00 90.9± 90.4± 92.00 93.00 94.00 89.00 90.00 92.00 95.00 89.4± 94.9± 90.9± 95.2±

EX CONC SIDEWALK

M:\2017\117036\CAD\Design\Figures\Noise\2020\FIG2-3.dwg, POW6, May 08, 2020 - 1:53pm, Ibolam

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HUNT CLUB DEVELOPMENT PHASE 2

RECEIVER ANGLES

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE MAY 2020 | JOB 117036 | FIGURE POW6

SHT11X17.DWG - 279mmX432mm

APPENDIX C

Tables from Tables from the NRC research *Acoustic Insulation Factor: A Rating for the Insulation of Buildings against Noise* (June 1980, JD Quirt)

TABLE 5: Acoustic Insulation Factor for Various Types of Windows

Window area as a percentage of total floor area of room[1]													
4	5	6	8	10	13	16	20	25	32	40	50	63	80
Acoustic Insulation Factor (AIF)[2]													
35	34	33	32	31	30	29	28	27	26	25	24	23	22
36	35	34	33	32	31	30	29	28	27	26	25	24	23
37	36	35	34	33	32	31	30	29	28	27	26	25	24
38	37	36	35	34	33	32	31	30	29	28	27	26	25
39	38	37	36	35	34	33	32	31	30	29	28	27	26
40	39	38	37	36	35	34	33	32	31	30	29	28	27
41	40	39	38	37	36	35	34	33	32	31	30	29	28
42	41	40	39	38	37	36	35	34	33	32	31	30	29
43	42	41	40	39	38	37	36	35	34	33	32	31	30
44	43	42	41	40	39	38	37	36	35	34	33	32	31
45	44	43	42	41	40	39	38	37	36	35	34	33	32
46	45	44	43	42	41	40	39	38	37	36	35	34	33
47	46	45	44	43	42	41	40	39	38	37	36	35	34
48	47	46	45	44	43	42	41	40	39	38	37	36	35
49	48	47	46	45	44	43	42	41	40	39	38	37	36
50	49	48	47	46	45	44	43	42	41	40	39	38	37

Single glazing	Double glazing of indicated glass thickness					Triple Glazing	
	2mm and 2mm glass	3mm and 3mm glass	4mm and 4mm glass	3mm and 6mm glass	6mm and 6mm glass	3mm, 3mm and 3mm glass	3mm, 3mm and 6mm glass
Thickness	Interpane spacing in mm[3]					Interpane spacings in mm[5]	
2mm	6						
	13						
3mm	15	6					
4mm, 6mm	19	13	6				
	22	16	13	6	6	6,6	
9mm[4]	28	20	16	13	13	6,10	6,6
	35	25	20	16	16	6,15	6,10
12mm[4]	42	32	25	20	20	6,20	6,15
	50	40	32	25	24	6,30	6,20
	63	50	40	32	30	6,40	6,30
	80	63	50	40	37	6,50	6,40
	100	80	63	55	50	6,65	6,50
	125	100	80	75	70	6,80	6,65
	150	125	100	95	90	6,100	6,80
		150	125	110	100		6,100
			150	135	125		

Source: National Research Council, Division of Building Research, June 1980.

Explanatory Notes:

1) Where the calculated percentage window area is not presented as a column heading, the nearest percentage column in the table values should be used.
2) AIF data listed in the table are for well-fitted weatherstripped units that can be opened. The AIF values apply only when the windows are closed. For windows fixed and sealed to the frame, add three (3) to the AIF given in the table.
3) If the interpane spacing or glass thickness for a specific double glazed window is not listed in the table, the nearest listed values should be used.
4) The AIF ratings for 9mm and 12mm glass are for laminated glass only; for solid glass subtract two (2) from the AIF values listed in the table.
5) If the interpane spacings for a specific triple-glazed window are not listed in the table, use the listed case whose combined spacings are nearest the actual combined spacing.
6) The AIF data listed in the table are for typical windows, but details of glass mounting, window seals, etc. may result in slightly different performance for some manufacturers' products. If laboratory sound transmission loss data (conforming to ASTM test method E-90) are available, these should be used to calculate the AIF.

Table 6.3 - Acoustic Insulation Factor for Various Types of Exterior Wall

Percentage of exterior wall area to total floor area of room												Type of Exterior Wall
	16	20	25	32	40	50	63	80	100	125	160	
Acoustic Insulation Factor	39	38	37	36	35	34	33	32	31	30	29	EW1
	41	40	39	38	37	36	35	34	33	32	31	EW2
	44	43	42	41	40	39	38	37	36	35	34	EW3
	47	46	45	44	43	42	41	40	39	38	37	EW4
	48	47	46	45	44	43	42	41	40	39	38	EW1R
	49	48	47	46	45	44	43	42	41	40	39	EW2R
	50	49	48	47	46	45	44	43	42	41	40	EW3R
	55	54	53	52	51	50	49	48	47	46	45	EW5
	56	55	54	53	52	51	50	49	48	47	46	EW4R
	58	57	56	55	54	53	52	51	50	49	48	EW6
	59	58	57	56	55	54	53	52	51	50	49	EW7 or EW5R
	63	62	61	60	59	58	57	56	55	54	53	EW8

Source : National Research Council, Division of Building Research, December 1980.

Explanatory Notes :

1) Where the calculated percentage wall area is not presented as a column heading, the nearest percentage column in the table should be used.
2) The common structure of walls EW1 to EW5 is composed of 12.7 mm gypsum board, vapour barrier, and 38 x 89 mm studs with 50 mm (or thicker) mineral wool or glass fibre batts in inter-stud cavities.
3) EW1 denotes exterior wall as in Note 2), plus sheathing, plus wood siding or metal siding and fibre backer board.
   EW2 denotes exterior wall as in Note 2), plus rigid insulation (25-30 mm), and wood siding or metal siding and fibre backer board.
   EW3 denotes simulated mansard with structure as in Note 2), plus sheathing, 28 x 89 mm framing, sheathing, and asphalt roofing material.
   EW4 denotes exterior wall as in Note 2), plus sheathing and 20 mm stucco.
   EW5 denotes exterior wall as in Note 2), plus sheathing, 25 mm air space, 100 mm brick veneer.
   EW6 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25-50 mm), 100 mm back-up block, 100 mm face brick.
   EW7 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25-50 mm), 140 mm back-up block, 100 mm face brick.
   EW8 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25-50 mm), 200 mm concrete.
4) R signifies the mounting of the interior gypsum board on resilient clips.
5) An exterior wall conforming to rainscreen design principles and composed of 12.7 mm gypsum board, 100 mm concrete block, rigid insulation (25-50 mm), 25 mm air space, and 100 mm brick veneer has the same AIF as EW6.
6) An exterior wall described in EW1 with the addition of rigid insulation (25-50 mm) between the sheathing and the external finish has the same AIF as EW2.

TABLE 11: Approximate conversion from STC to AIF for windows and doors:

Window (or door) area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
80	STC-5
63	STC-4
50	STC-3
40	STC-2
32	STC-1
25	STC
20	STC+1
16	STC+2
12.5	STC+3
10	STC+4
8	STC+5
6.3	STC+6
5	STC+7
4	STC+8

Note: For area percentages not listed in the table use the nearest listed value.

Examples: For a window whose area = 20% of the room floor area and STC = 32 the AIF is 32 + 1 = 33.

For a window whose area = 60% of the room floor area and STC = 29 the AIF is 29 - 4 = 25.

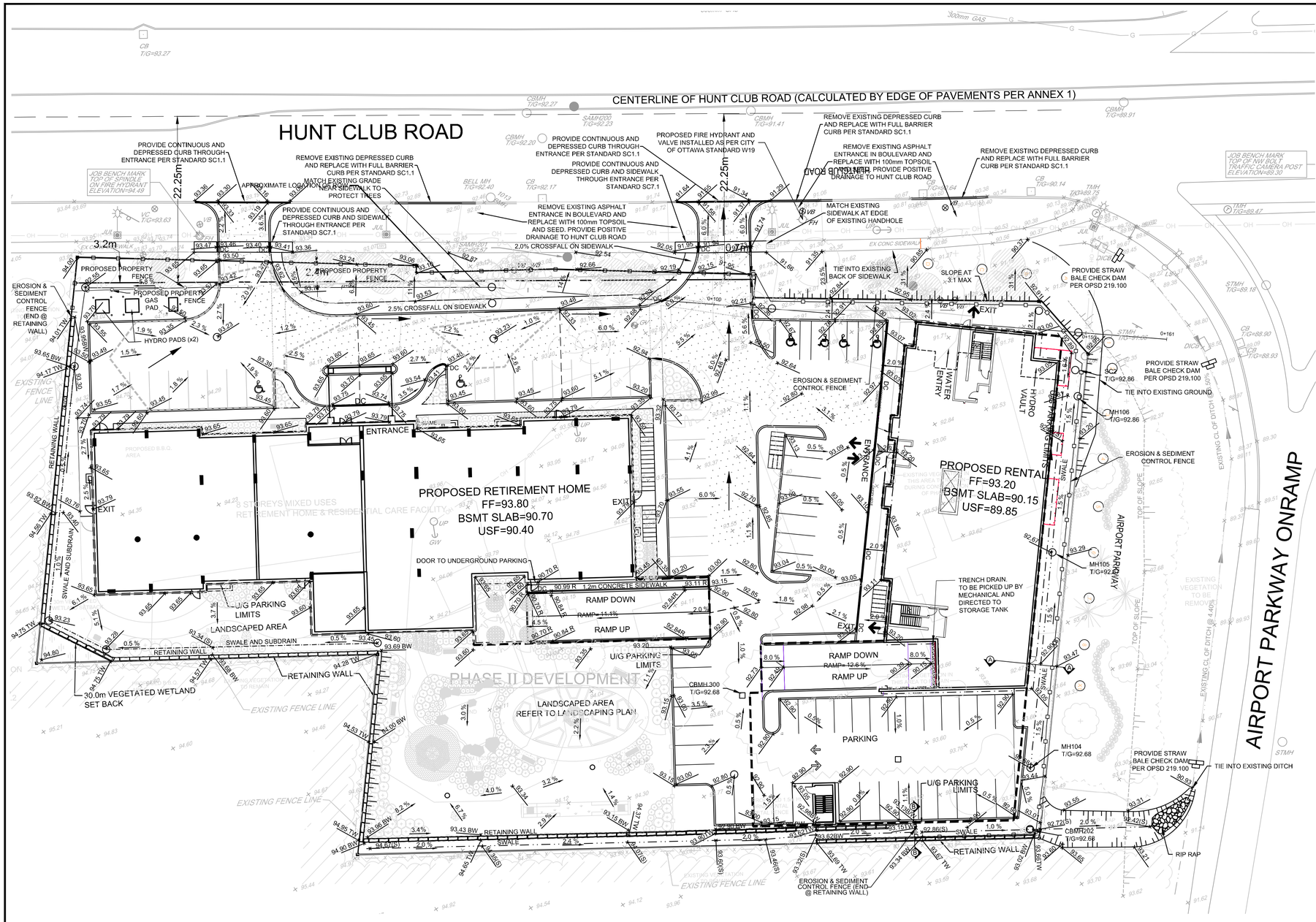
TABLE 12: Approximate conversion from STC to AIF for exterior walls:

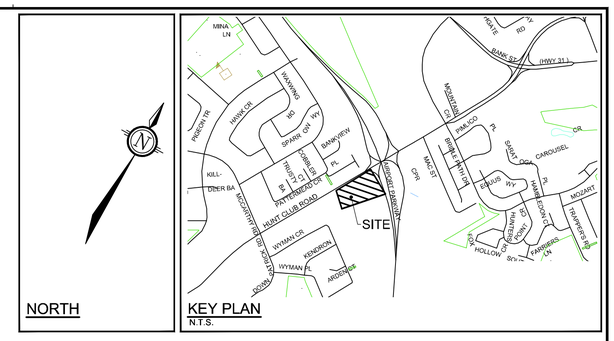
Exterior wall area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
200	STC-10
160	STC-9
125	STC-8
100	STC-7
80	STC-6
63	STC-5
50	STC-4
40	STC-3
32	STC-2
25	STC-1
20	STC
16	STC+1
12.5	STC+2
10	STC+3
8	

Note: For area percentages not listed in the table use the nearest listed value.

Example: For a wall whose area = 120% of room floor area and STC = 48 the AIF is 48 - 8 = 40.

ATTACHED DRAWING





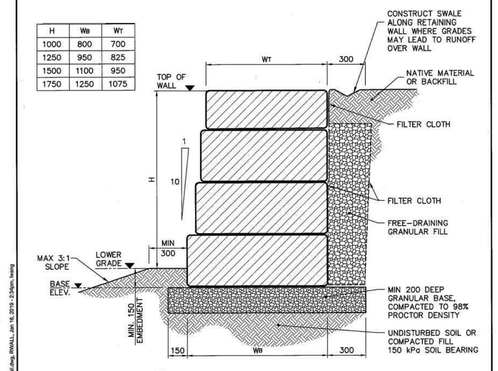
LEGEND

- PROPOSED PROPERTY LINE
- EXISTING LEGAL ADJACENT LINE
- EXISTING ELEVATION
- PROPOSED GRADES
- PROPOSED SWALE GRADES
- PROPOSED TOP OF RETAINING WALL
- PROPOSED BOTTOM OF RETAINING WALL
- PROPOSED UNDERGROUND PARKING RAMP GRADES
- PROPOSED SLOPE AND FLOW DIRECTION
- PROPOSED FINISHED FLOOR ELEVATION
- PROPOSED DEPRESSED CURB
- TRENCH DRAIN
- PROPOSED TERRACING SLOPE 3:1 MAX
- PROPOSED PONDING AREA
- OVERLAND FLOW ARROWS
- EXISTING STANDARD IRON BAR
- EXISTING CATCHBASIN
- EXISTING DITCH INLET CATCHBASIN
- EXISTING GAS VALVE
- EXISTING GAS MAIN
- EXISTING ABANDONED GAS MAIN
- EXISTING BELL CONDUIT
- EXISTING OVER HEAD WIRE
- EXISTING TRAFFIC CONDUIT
- EXISTING HYDRO/UTILITY POLE
- EXISTING GUY WIRE
- EXISTING TRAFFIC MANHOLE
- EXISTING JOINT USE STREET LIGHT
- EXISTING STREET LIGHT
- EXISTING TRAFFIC HAND HOLE
- EXISTING TRAFFIC SIGN

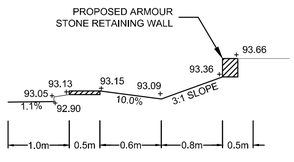
CONSTRUCTION NOTES

ARMOUR STONE:
- USE QUARRIED STONE, WITHOUT FISSURES OR CRACKS
- DO NOT USE SHALE OR SILT STONE
- MINIMUM COURSE HEIGHT = 400
- VOIDS NOT TO EXCEED 25% OF WALL VOLUME

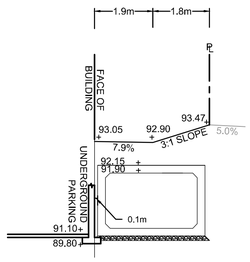
H	Wb	Wt
1000	800	700
1250	950	825
1500	1100	950
1750	1250	1075



1 DETAIL – ARMOUR STONE RETAINING WALL
SCALE 1:20



SECTION 'B'
SCALE: N.T.S



SECTION 'A'
SCALE: 1:100

CLARIDGE HOMES
BUILDING QUALITY & VALUE FOR OVER 25 YEARS

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

REFER TO 117036-ND FOR ADDITIONAL NOTES

ARMOUR STONE RETAINING WALL
JAN. 2019 117036 FIG1

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APPROVED ☐ REFUSED ☐

THIS _____ DAY OF _____, 20____

DON HERWEYER, MCIP, RPP, MANAGER
DEVELOPMENT REVIEW SOUTH
PLANNING, INFRASTRUCTURE AND

No.	REVISION	DATE	BY
9.	RE-ISSUED FOR SITE PLAN APPLICATION	APR 29/20	GJM
8.	RE-ISSUED FOR COORDINATION	APR 09/20	GJM
7.	ISSUED FOR COORDINATION	APR 02/20	GJM
6.	ISSUED FOR TENDER	DEC 14/18	GJM
5.	REVISED PER ARCHITECTS SITE PLAN CHANGES	AUG 31/18	GJM
4.	REVISED GRADING ALONG FRONTAGE	DEC 20/17	GJM
3.	REVISED RETAINING WALL AND WEST PARKING LOT	NOV 24/17	GJM
2.	REVISED PER CITY COMMENTS	SEPT 7/17	GJM
1.	ISSUED FOR SITE PLAN APPLICATION	MAY 25/17	GJM

SCALE 1:300 (1:300 0 3 6 9 12)

DESIGN GJM
CHECKED GJM
DRAWN MWC
CHECKED GJM
APPROVED GJM

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER G.J. MacDONALD PROVINCE OF ONTARIO

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LOCATION
1026 - 1054 CITY OF OTTAWA
HUNT CLUB DEVELOPMENT

DRAWING NAME
GRADING AND EROSION SEDIMENT CONTROL PLAN - PHASE II

PROJECT No. 117036-00
REV REV # 9
DRAWING No. 117036-GR2

D07-12-17-0068

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