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32 Years

Block 14

(Bridlewood Trails Phase 2 Subdivision)

Noise Control Study

BLOCK 14
(BRIDLEWOOD TRAILS PHASE 2 SUBDIVISION)

NOISE CONTROL STUDY

Prepared By:

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

Novatech File: 114013
Ref: Report R-2014-143

Submitted: September 17, 2014

NOVATECH
Engineers, Planners & Landscape Architects

September 17, 2014

City of Ottawa
Planning and Growth Management Department
Infrastructure Approvals Division
110 Laurier Street West, 4th Floor
Ottawa, ON
K1P 1J1

Attention: **Mr. Damien Whittaker**

Reference: **Block 14 (Bridlewood Trails Phase 2 Subdivision)**
Noise Control Study - Our File No.: 114013

Enclosed for your review are three (3) copies of the Noise Control Study for the Block 14 located in Bridlewood Trails Phase 2 subdivision.

This study evaluates the impact of noise and outlines noise attenuation measures to mitigate the impacts.

Please contact the undersigned should you have any questions or comments pertaining to the enclosed report.

Yours truly,

NOVATECH

Drew Blair

Drew Blair, P. Eng.
Project Engineer

Cc: Shawn Malhotra, Claridge Homes

TABLE OF CONTENTS

Appendices

Tables

Figures

1.0 INTRODUCTION

This report is submitted on behalf of the developer, Claridge Homes Inc. as part of the Site Plan Application process for the proposed Block 14 development located in Bridlewood Trails Phase 2 subdivision. This study assesses the environmental impact of noise on the proposed development and outlines the recommended mitigation measures if required.

2.0 BACKGROUND

2.1 Project Description

The subject site is 0.93ha and located in the Bridlewood Trails Phase 2 subdivision and is bounded by Terry Fox Drive to the southwest, vacant lands to the north and east and Bridlewood Trails Phase 2 to the northwest as shown in Figure 1 – Key Plan. The development will consist of six (6) Blocks containing 12 units in each building with a combined floor ground floor space of approximately 500 square meters. On-site parking will be provided with access to the site from Overberg Way and Tulum Street. A site plan of the proposed development is shown in Figure 2 – Site Plan.

Figure 1 – Key Plan

2.2 Noise Sources

The City of Ottawa Official Plan stipulates that a noise study shall be prepared when a new development is proposed within 100 metres of an arterial or major collector roadway, or a rapid-transit corridor.

The potential surface road noise source for this site that was considered for the purposes of this study is Terry Fox Drive as all other roadways within the zone of influence were not

FUTURE
COMMERCIAL
(DIR LANDS)

ARRITA STREET

BLOCK 3

1.8m CONCRETE SIDEWALK

MOUNTABLE CURB

BRIDLEWOOD TRAILS
PHASE 2

TULUM CRESENT

OVERBERG WAY

BLOCK 14
(BRIDLEWOOD TRAILS
PHASE 2)

BLOCK A

BLOCK B

BLOCK C

BLOCK D

BLOCK E

BLOCK F

BARRIER CURB

FUTURE
COMMERCIAL
(CLARIDGE LANDS)

CENTRELINE OF DITCH

600mmø CSP CULVERT

400mmø CSP CULVERT

EDGE OF PAVEMENT
PAVED SHOULDER
SOLID WHITE LINE
EDGE OF PAVEMENT
ASPHALT PATHWAY

TERRY FOX DRIVE

M:\2014\114013\CAD\Design\Figures\Noise\114013-FIG2.dwg, 11x17 landscape, Sep 15, 2014 - 6:36pm, szorgel

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BLOCK 14
(BRIDLEWOOD TRAILS PHASE 2)

SITE PLAN

SEPT 2014 114013 FIGURE 2

SHT11X17.DWG - 279mmX432mm

arterial or major collector roadways. For the purposes of this report, Terry Fox Drive will be considered the primary noise source.

Terry Fox Drive is classified as a 4-lane urban arterial-divided roadway with a 44.5m ROW in the City of Ottawa Transportation Master Plan and Official Plan with an AADT level of 35,000 veh/day.

There is no railway ROW within 250m that impacts the site.

There is no airport noise affecting this site.

There are no stationary noise sources that affect this site.

It should be noted that the City of Ottawa has accepted and approved the *Bridlewood Trails Phase 2 Noise Control Study, dated November 30, 2012, Prepared by Novatech* which was based on Terry Fox Drive considered as a 4-lane urban arterial-divided roadway within its 44.5m protected ROW and a proposed posted speed of 60km/hr.

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 City of Ottawa Official Plan (May 2003) since it can affect the quality of life of residents. To protect residents from unacceptable levels of noise, the City of Ottawa has specific environmental noise control guidelines, which are based on the technical guidelines and recommendations prepared by the Ontario Ministry of Environment. The City of Ottawa's Environmental Noise Control Guidelines (ENCG), Final Draft - May 10, 2006 has been used for the purpose of this report.

The quantitative sound level criteria, which require that specific outdoor and indoor living areas of residential developments meet certain energy equivalent sound levels (Leq), are summarized in Table 1 and Table 2. Compliance with the outdoor sound level criteria will generally ensure compliance with the indoor sound level criteria.

Table 1: City of Ottawa Outdoor Noise Level Criteria (Road and/or Rail Noise)

Time Period	Receiver Location	Noise Level Criteria (Leq)
Daytime (07:00 – 23:00)	Outdoor Living Area (OLA)	55 dBA
Daytime (07:00 – 23:00)	Plane of Window (POW) at Living/Dining Rooms	55 dBA
Nighttime (23:00 – 07:00)	Plane of Window (POW) at Bedrooms/Sleeping Quarter	50 dBA

The outdoor living area is defined as that part of an outdoor amenity area, which is provided for the quiet enjoyment of the outdoor environment during the daytime period. These

amenity areas are typically backyards, gardens, terraces and patios. For the purposes of this report, there are no outdoor living areas considered as amenity areas as there are no specific areas designated as amenity space and the outdoor balcony areas are below the minimum square footage required for analysis as per the City of Ottawa Environmental Noise Control Guidelines.

Table 2: City of Ottawa Indoor Noise Level Criteria

Time Period	Receiver Location	Noise Level Criteria (Leq)
Daytime (07:00 – 23:00)	General offices, reception areas, retail stores, etc.	50 dBA
Daytime (07:00 – 23:00)	Living/Dining Rooms of residential dwelling units, theatres, places of worship, school, individual or semi-private offices, conference rooms, reading rooms, classrooms, etc	45 dBA
Nighttime (23:00 – 07:00)	Sleeping quarters of residential units, hospitals, nursing homes, senior citizen homes, etc	40 dBA

3.2 Noise Attenuation Requirements

When sound levels are predicted to be less than the specified criteria for the daytime and nighttime conditions, no attenuation measures are required by the proponent. As the noise criteria is exceeded, a combination of attenuation measures are recommended by the City of Ottawa to modify the development environment. These attenuation measures may include:

- Construction of a noise barrier wall and/or berm;
- Installation of a forced air ventilation system with provision for central air conditioning;
- Installation of central air conditioning;
- Custom building design, construction and/or acoustic insulation.

If noise levels are expected to exceed the applicable sound level criteria, the City of Ottawa recommends a warning clause be registered on title. This warning clause serves to alert potential buyers and/or renters of the possible noise condition and of any limitations that may exist on his/her property rights. The warning clause shall be registered on title and incorporated in the Subdivision Agreement and in the Agreement of Purchase and Sale.

Noise attenuation requirements at an Outdoor Living Area (OLA) and a Plane of Window (POW) are outlined in Table 3.

Table 3: City of Ottawa Noise Attenuation Requirements

Noise Level (dBA)				Noise Attenuation Requirements
Daytime (07:00-23:00)		Nighttime (23:00-07:00)		
Unattenuated	Attenuated	Unattenuated	Attenuated	
OUTDOOR LIVING AREA (OLA)				
OLA < 55				None
55 < OLA < 60				Noise Clause Type A
OLA > 60	OLA < 55			Noise Barrier
OLA > 60	OLA > 55			Noise Barrier Noise Clause Type B
PLANE OF WINDOW (POW)				
POW < 55		POW < 50		None
55 < POW < 65		50 < POW < 60		Forced Air Ventilation Noise Clause Type C
POW > 65		POW > 60		Central Air Conditioning Noise Clause Type D Building Façade Analysis

The wording of the warning clauses to be placed on title and included in the Site Plan, Condominium Agreement and the Offer of Purchase and Sale are as follows:

Type A

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of Environment's noise criteria."

Type B

"Purchasers/tenants are advised that despite the inclusion of noise control features in this development and within the building units, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

Type C

"This dwelling unit is fitted with a forced air heating system and the ducting, etc. was sized to accommodate a central air conditioning system. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.)"

Type D

"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 City's and the Ministry of Environment's noise criteria."

4.0 PREDICTION OF OUTDOOR NOISE LEVELS

4.1 Roadway Traffic

Noise levels from Terry Fox Drive were assessed using the ultimate road and traffic parameters below from "Table 1.7 of the City of Ottawa's Environmental Noise Control Guidelines". The posted speed is consistent with the approved *Bridlewood Trails Phase 2 Noise Control Study, dated November 30, 2012, Prepared by Novatech.* The traffic and roadway parameters used for sound level predictions are shown in Table 4.

Table 4: Traffic and Roadway Parameters

	Beechwood Avenue
Roadway Classification	4 Lane Urban Arterial-Divided
Annual Average Daily Traffic (AADT)	35,000 vehicles/day
Day/Night Split (%)	92/8
Medium Trucks (%)	7
Heavy Trucks (%)	5
Posted Speed	60 km/hr

4.2 Noise Level Analysis

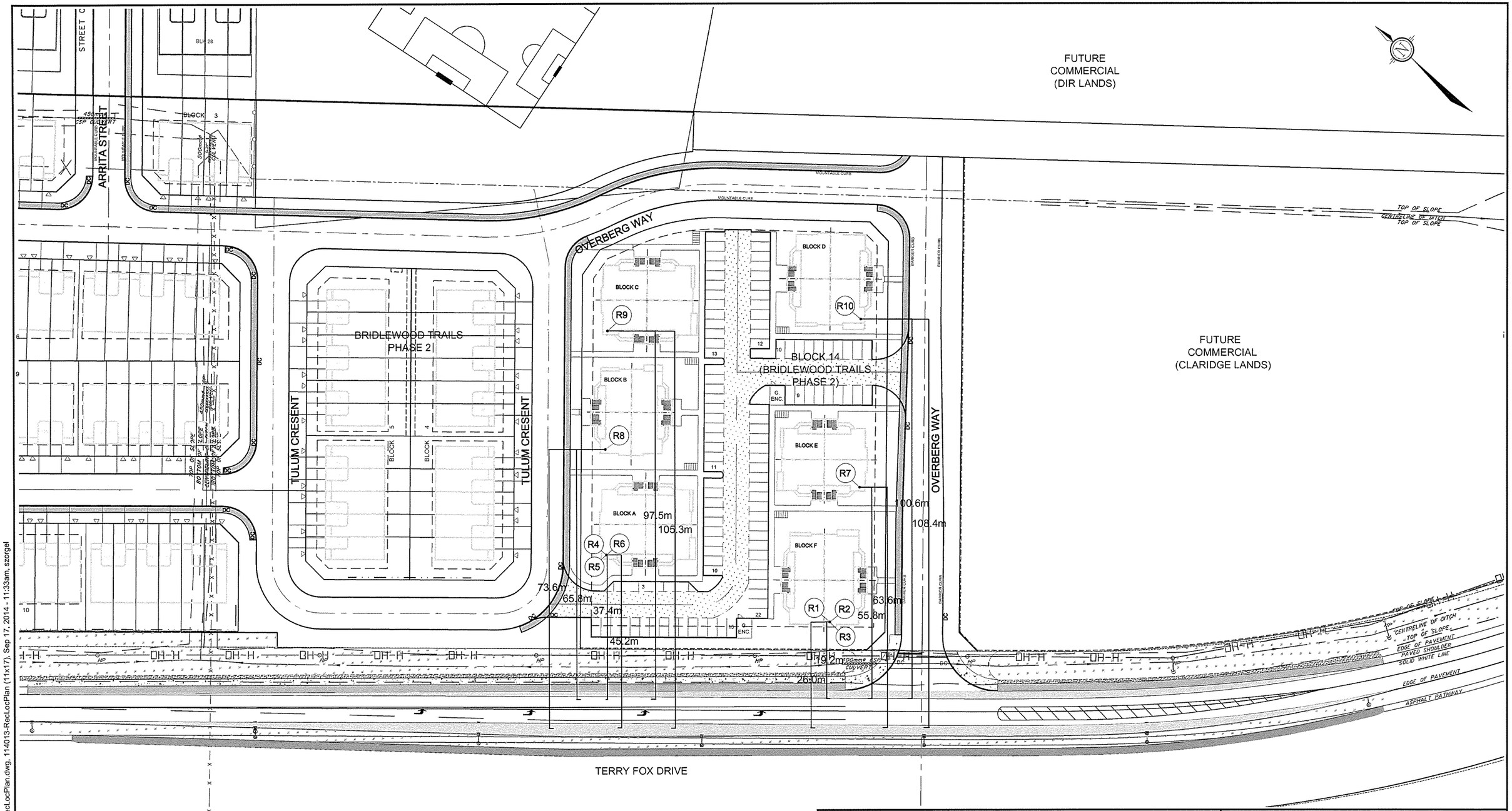
The noise levels were analyzed using Version 5.03 of the STAMSON computer program issued by the MOE. Proposed grades were required for the software and were obtained from elevations provided by the architect and the Grading Plan (114013-GR), both of which are included in the appendix of this report.

Receiver locations used in the noise simulations are shown on Figure 3 – Receiver Location Plan.

4.3 Noise Level Results

Simulated noise levels for the units adjacent to Terry Fox Drive exceed the allowable noise level criteria, resulting in the requirement for a building façade analysis and warning clauses.

The predicted noise levels at the selected receiver locations within the development are illustrated in Table 5. Daytime and nighttime noise levels are shown.



LEGEND

R1 RECEIVER LOCATION.

NOTE: UNIT NUMBERS ASSIGNED TO BLOCKS ARE IN REFERENCE TO THE NOISE CONTROL STUDY / REPORT ONLY.

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BLOCK 14
(BRIDLEWOOD TRAILS PHASE 2)

RECEIVER LOCATION PLAN

SEPT 2014 114013 FIGURE 3

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Table 5: Simulation Results

		Noise Levels Leq (dBA)	
Location	**File/Receiver Name**	**Daytime**	**Night-time**
Block F Ground Floor	R1	71.99	64.40
Block F Middle Floor	R2	71.99	64.40
Block F Top Floor	R3	71.99	64.40
Block A Ground Floor	R4	69.32	61.72
Block A Middle Floor	R5	69.32	61.72
Block A Top Floor	R6	69.32	61.72
Block E Top Floor	R7	65.69	58.09
Block B Top Floor	R8	61.85	54.26
Block C Top Floor	R9	57.83	50.23
Block D Top Floor	R10	62.63	55.03

4.4 Implementation

The City of Ottawa ENCG requires that noise clauses be applied when noise levels are above minimum requirements outlined in Table 3, and wall & window construction be reviewed when noise levels exceed minimum requirements outlined in Table 1. The acoustical insulation factor (AIF) method recognized by the City of Ottawa is used to assess the wall and window requirements.

The Acoustic Insulation Factor (AIF) is used as a measure of the reduction of outdoor noise provided by the elements of the outer surface of a building. The difference between the indoor noise criterion and the outdoor noise level establishes the acoustical insulation requirement for the exterior shell. The exterior shell is comprised of primarily two components; windows and walls (patio doors are treated as windows). Canada Mortgage and Housing (CMHC) Standards [1] require that no component transmit more than 1/N of the total sound power that would give the maximum acceptable noise level inside the room. Thus, in a room with two exterior components, neither should transmit more than one-half of the total allowable sound power.

Mathematically, this Acoustical Insulation Factor can be expressed as:

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

Where, N = Number of components;
L = Sound Level expressed on a common decibel scale.

The largest acoustical insulation factors for the building are calculated as follows:

[1] Road and Rail Noise: Effects on Housing, CMHC, Ottawa. Publication NHA #185 1/78, 1978

- $AIF_{Residential(day)}$ = 72 dBA – 45 dBA + 10log(2) dBA + 2dBA = 32 dBA
- $AIF_{Residential(night)}$ = 65 dBA – 40 dBA + 10log(2) dBA + 2dBA = 30 dBA

Tables from the document entitled "Acoustic Insulation Factor: A Rating for the Insulation of Buildings Against Outdoor Noise", produced by the Division of Building Research, National Research Council of Canada, June 1980 (J.D. Quirt) were used to assess the exterior facade against the required AIF. This reference material is included in Appendix B.

In order to assess the façade against the required AIF respective Leq values, the number of components in a wall, the calculated required AIF, percentage of window to room areas and exterior wall to room areas are required. Exterior facade analysis data is presented in Table 6.

Table 6: Exterior Façade Analysis Data

Description	Residential Living Room	Residential Bedroom
Number and Type of Components Forming Building Envelope.	2 – Windows and Exterior Walls	2 – Windows and Exterior Walls
Percentage of Window Area to Total Floor Area of Room.	23%	12%
Percentage of Wall Area to Total Floor Area of Room.	65%	69%

Architect unit floor plans were reviewed to calculate the window and wall to floor ratios (as seen above). The architect plans are included in Appendix C.

Using the percentage of window area to room area, and the required acoustical insulation factor (AIF), Table 5 in Appendix B was used to identify the various window assemblies that would satisfy the required AIF. Similarly, Table 6.3 in Appendix B was used to select the typical wall assembly that would satisfy the required AIF. The results of this analysis requiring the largest attenuation measures are provided in Table 7.

Table 7: Selected Window and Wall Assemblies to Meet Maximum Attenuation Requirements

Description	AIF	Double Pane Window Assembly Options	Typical Wall Assembly
Typical Residential Unit	32	▪ 2 mm – 28 mm – 2 mm ▪ 3 mm – 20 mm – 3 mm ▪ 4 mm – 16mm – 4 mm ▪ 3 mm – 13 mm – 6 mm ▪ 3 mm – 13 mm – 6 mm	EW1

Notes:

I. EW1 type wall consisting of 12.7mm gypsum board, vapour barrier, 38x89mm studs with 50mm (or thicker) mineral wool or glass fibre batts in inter stud cavities plus sheathing, wood siding or metal siding and fibre backer board.

II. "2 mm – 63 mm – 2 mm" denotes 2 mm glass, 63 mm air space and 2 mm glass.

The above results specify the smallest wall assembly available. If the proposed building requires larger wall assemblies such as concrete which has higher attenuation effects, the window assembly options may be reduced. In order to determine the reduction of the required window specification, the proposed wall assembly would need to be determined.

Tables 11 and 12 in Appendix B were used to convert the AIF values to Sound Transmission Class or STC values. The largest STC results are summarized in Table 8.

Table 8: Equivalent Sound Transmission Class, STC Values

		Windows		Walls	
	AIF	Conversion	STC	Conversion	STC
Typical Residential Unit	32	STC = AIF	32	STC -5 = AIF	37

The attenuation measures required to satisfy the City of Ottawa noise criteria and the noise clauses that are to be included on title and in the Agreement of Purchase and Sale for the various dwelling units are summarized in Table 9. Noise attenuation measures can be seen per Block in Figure 4 – Noise Attenuation Measures Plan.

Table 9 - Required Noise Attenuation Measures

Buildings	Attenuation Measure	Notice on Title
Block B, Block C and Block D	Forced Air Ventilation with Provision for Central Air	C
Block A, Block E and Block F	Central Air Conditioning. Acoustically selected walls and windows for all rooms.	D

FUTURE
COMMERCIAL
(DIR LANDS)

ARRITA STREET

1.8m CONCRETE SIDEWALK

OVERBERG WAY

BRIDLEWOOD TRAILS
PHASE 2

TULUM CRESENT

BLOCK C

BLOCK D

BLOCK B

BLOCK A

BLOCK E

BLOCK F

BLOCK 14
(BRIDLEWOOD TRAILS
PHASE 2)

R1 R2 R3 R4 R5 R6 R7 R8 R9 R10

FUTURE
COMMERCIAL
(CLARIDGE LANDS)

TOP OF SLOPE
CENTRELINE OF DITCH
TOP OF SLOPE

CENTRELINE OF DITCH
TOP OF SLOPE
EDGE OF PAVEMENT
PAVED SHOULDER
SOLID WHITE LINE
EDGE OF PAVEMENT
ASPHALT PATHWAY

100mm GSP CULVERT

TERRY FOX DRIVE

LEGEND

R1 RECEIVER LOCATION.

PROVIDE CENTRAL AIR CONDITIONING, NOISE CLAUSE 'D' REQUIRED

PROVIDE FORCED AIR VENTILATION, NOISE CLAUSE 'C' REQUIRED

NOTE: UNIT NUMBERS ASSIGNED TO BLOCKS ARE IN REFERENCE TO THE NOISE CONTROL STUDY / REPORT ONLY.

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NTS

CITY OF OTTAWA

BLOCK 14
(BRIDLEWOOD TRAILS PHASE 2)

NOISE ATTENUATION MEASURES PLAN

SEPT 2014 114013 FIGURE 4

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5.0 CONCLUSIONS

An analysis of the roadway traffic along Terry Fox Drive indicates attenuation measures will be necessary for the Block 14 (Bridlewood Trails Phase 2) project.

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

Residential – Blocks B, C and D

- Provide forced air ventilation with provision for central air conditioning;
- Notice on title: "This dwelling unit is fitted with a forced air heating system and the ducting, etc. was sized to accommodate a central air conditioning system. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.)"

Residential – Blocks A, E and F

- Provide central air conditioning;
- Provide window assembly to meet a sound transmission class, STC of 32.
- Provide wall assembly to meet a sound transmission class, STC of 37.
- Notice on title: "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 City's and the Ministry of Environment's noise criteria."

In closing, Novatech respectfully requests the City of Ottawa accept the findings of this Noise Control Study for Block 14 within Bridlewood Trails Phase 2 as part of the Site Plan Approval submission.

NOVATECH

Authored by:

Steve Zorgel, E.I.T
Engineering Intern

Reviewed by:

Drew Blair, P.Eng.
Project Engineer

APPENDIX A

SOUND LEVEL CALCULATIONS

STAMSON 5.0 SUMMARY REPORT Date: 10-09-2014 10:52:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (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 : 19.20 / 19.20 m
Receiver height : 0.75 / 0.75 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (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	: 26.00 / 26.00	m
Receiver height	: 0.75 / 0.75	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	69.59	69.59
2.Terry Fox S	1.50	68.28	68.28
Total			71.99 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	62.00	62.00
2.Terry Fox S	1.50	60.68	60.68
Total			64.40 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.99
(NIGHT): 64.40

STAMSON 5.0 SUMMARY REPORT Date: 10-09-2014 10:56:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r260KM.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (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	: 19.20 / 19.20	m
Receiver height	: 3.00 / 3.00	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (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	: 26.00 / 26.00	m
Receiver height	: 3.00 / 3.00	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	69.59	69.59
2.Terry Fox S	1.50	68.28	68.28
Total			71.99 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	62.00	62.00
2.Terry Fox S	1.50	60.68	60.68
Total			64.40 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.99
(NIGHT): 64.40

STAMSON 5.0 SUMMARY REPORT Date: 15-09-2014 14:08:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r360km.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (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 : 19.20 / 19.20 m
Receiver height : 6.00 / 6.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (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  :  26.00 / 26.00  m
Receiver height           :   6.00 / 6.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	69.59	69.59
2.Terry Fox S	1.50	68.28	68.28
Total			71.99 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	62.00	62.00
2.Terry Fox S	1.50	60.68	60.68
Total			64.40 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.99
(NIGHT): 64.40

STAMSON 5.0 SUMMARY REPORT Date: 10-09-2014 11:00:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r460KM.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (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	: 37.40 / 37.40	m
Receiver height	: 0.75 / 0.75	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (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	:	45.20 / 45.20	m
Receiver height	:	0.75 / 0.75	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	66.70	66.70
2.Terry Fox S	1.50	65.88	65.88
Total			69.32 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	59.10	59.10
2.Terry Fox S	1.50	58.28	58.28
Total			61.72 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.32
(NIGHT): 61.72

STAMSON 5.0 SUMMARY REPORT Date: 10-09-2014 11:01:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r560KM.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (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 : 37.40 / 37.40 m
Receiver height : 3.00 / 3.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (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	:	45.20 / 45.20	m
Receiver height	:	3.00 / 3.00	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	66.70	66.70
2.Terry Fox S	1.50	65.88	65.88
Total			69.32 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	59.10	59.10
2.Terry Fox S	1.50	58.28	58.28
Total			61.72 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.32
(NIGHT): 61.72

STAMSON 5.0 SUMMARY REPORT Date: 15-09-2014 14:13:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r660km.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (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	: 37.40 / 37.40	m
Receiver height	: 6.00 / 6.00	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (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	: 45.20 / 45.20	m
Receiver height	: 6.00 / 6.00	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	66.70	66.70
2.Terry Fox S	1.50	65.88	65.88
Total			69.32 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	59.10	59.10
2.Terry Fox S	1.50	58.28	58.28
Total			61.72 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.32
(NIGHT): 61.72

STAMSON 5.0 SUMMARY REPORT Date: 15-09-2014 14:28:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r760km.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 40	%
Surface	: 2	(Reflective ground surface)
Receiver source distance	: 55.80 / 55.80	m
Receiver height	: 6.00 / 6.00	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (day/night)

```
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     40 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  63.60 / 63.60  m
Receiver height           :   6.00 / 6.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	62.95	62.95
2.Terry Fox S	1.50	62.39	62.39
Total			65.69 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	55.35	55.35
2.Terry Fox S	1.50	54.80	54.80
Total			58.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.69
(NIGHT): 58.09

STAMSON 5.0 SUMMARY REPORT Date: 15-09-2014 15:20:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r860km.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 75	%
Surface	: 2	(Reflective ground surface)
Receiver source distance	: 65.80 / 65.80	m
Receiver height	: 6.00 / 6.00	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 75 %	
Surface	: 2	(Reflective ground surface)
Receiver source distance	: 73.60 / 73.60	m
Receiver height	: 6.00 / 6.00	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	59.06	59.06
2.Terry Fox S	1.50	58.60	58.60
Total			61.85 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	51.47	51.47
2.Terry Fox S	1.50	51.01	51.01
Total			54.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.85
(NIGHT): 54.26

STAMSON 5.0 SUMMARY REPORT Date: 15-09-2014 15:57:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r960km.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 90 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 97.50 / 97.50 m
Receiver height : 6.00 / 6.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (day/night)

```
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     90 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 105.30 / 105.30 m
Receiver height           :   6.00 / 6.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	54.95	54.95
2.Terry Fox S	1.50	54.68	54.68
Total			57.83 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	47.35	47.35
2.Terry Fox S	1.50	47.08	47.08
Total			50.23 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.83
(NIGHT): 50.23

STAMSON 5.0 SUMMARY REPORT Date: 15-09-2014 16:00:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1060km.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Terry Fox N (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: Terry Fox N (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 50 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 100.60 / 100.60 m
Receiver height : 6.00 / 6.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (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 # 2: Terry Fox S (day/night)

```
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 108.40 / 108.40 m
Receiver height           :   6.00 / 6.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	59.77	59.77
2.Terry Fox S	1.50	59.46	59.46
Total			62.63 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Terry Fox N	1.50	52.17	52.17
2.Terry Fox S	1.50	51.86	51.86
Total			55.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.63
(NIGHT): 55.03

APPENDIX B

ACCOUSTIC INSULATION FACTOR TABLES

Living Room - Residential

TABLE 5: Acoustic Insulation Factor for Various Types of Windows

Window area as a percentage of total floor area of room[1]														Single glazing	Double glazing of indicated glass thickness					Triple Glazing	
4	5	6	8	10	13	16	20	25	32	40	50	63	80		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
Acoustic Insulation Factor (AIF)[2]														Thickness	Interpane spacing in mm[3]					Interpane spacings in mm[5]	
35	34	33	32	31	30	29	28	27	26	25	24	23	22	2mm	6						
36	35	34	33	32	31	30	29	28	27	26	25	24	23		13						
37	36	35	34	33	32	31	30	29	28	27	26	25	24	3mm	15	6					
38	37	36	35	34	33	32	31	30	29	28	27	26	25	4mm, 6mm	18	13	6				
39	38	37	36	35	34	33	32	31	30	29	28	27	26		22	16	13	6	6	6,6	
40	39	38	37	36	35	34	33	32	31	30	29	28	27	9mm[4]	28	20	16	13	13	6,10	6,6
41	40	39	38	37	36	35	34	33	32	31	30	29	28		35	25	20	16	16	6,15	6,10
42	41	40	39	38	37	36	35	34	33	32	31	30	29	12mm[4]	42	32	25	20	20	6,20	6,15
43	42	41	40	39	38	37	36	35	34	33	32	31	30		50	40	32	25	24	6,30	6,20
44	43	42	41	40	39	38	37	36	35	34	33	32	31		63	50	40	32	30	6,40	6,30
45	44	43	42	41	40	39	38	37	36	35	34	33	32		80	63	50	40	37	6,50	6,40
46	45	44	43	42	41	40	39	38	37	36	35	34	33		100	80	63	55	50	6,65	6,50
47	46	45	44	43	42	41	40	39	38	37	36	35	34		125	100	80	75	70	6,80	6,65
48	47	46	45	44	43	42	41	40	39	38	37	36	35		150	125	100	95	90	6,100	6,80
49	48	47	46	45	44	43	42	41	40	39	38	37	36			150	125	110	100		6,100
50	49	48	47	46	45	44	43	42	41	40	39	38	37				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.

Residential - Living Room

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.

AIF = STC

STC = 32

Residential - Bedroom

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	18	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.

Residential - Bedroom

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.

AIF = STC + 3

30 = STC + 3

STC = 27

Residential - Living Room

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 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.

AIF = STC -5

32 = STC -5

STC = 37

Residential - Bedroom

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.

Residential - Bedroom

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.

AIF = STC-5

30 = STC-5

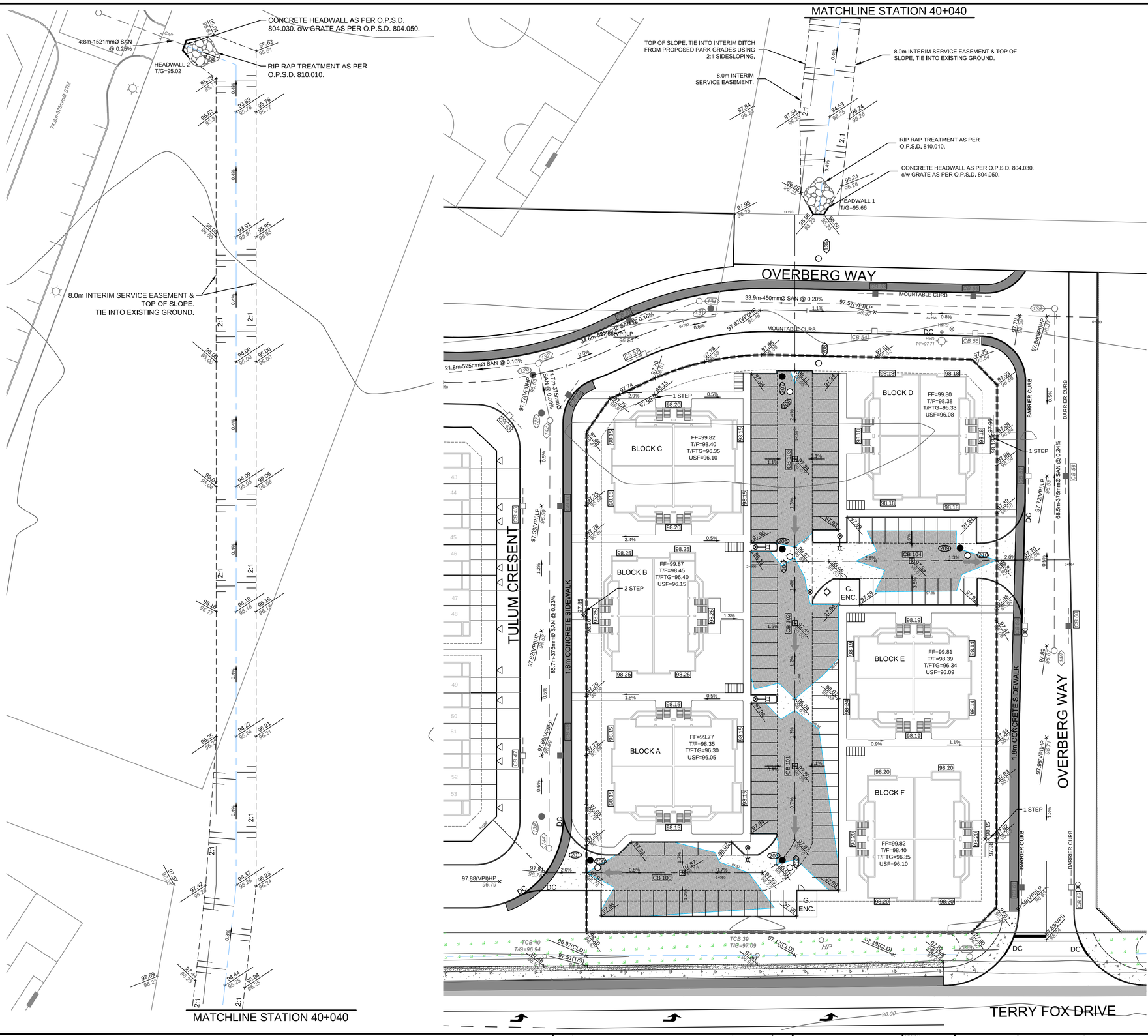
STC = 35

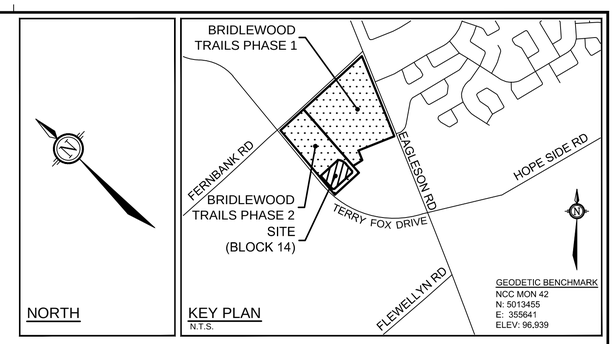
APPENDIX C

ARCHITECT ELEVATIONS AND FLOOR PLAN

APPENDIX D

GRADING PLAN – 114013-GR





LEGEND

- PROPOSED ELEVATION / EXISTING ELEVATION (AS BUILT)
- PROPOSED POINT OF VERTICAL INFLECTION
- PROPOSED POINT OF VERTICAL INFLECTION (HIGH POINT)
- PROPOSED POINT OF VERTICAL INFLECTION (LOW POINT)
- PROPOSED CENTRELINE OF DITCH
- PROPOSED TOP OF SLOPE
- PROPOSED TOP OF CURB
- PROPOSED TOP OF NOISE BARRIER
- FF= FINISHED FLOOR ELEVATION
- T/F= TOP OF FOUNDATION ELEVATION
- USF= UNDERSIDE OF FOOTING ELEVATION
- MUSF= MINIMUM UNDERSIDE OF FOOTING ELEVATION
- PROPOSED TERRACE ELEVATION
- MAXIMUM 3:1 SIDESLOPE
- PROPOSED CENTRELINE SWALE
- PROPOSED GRADE AND DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED HYDRANT LOCATION
- T/F=127.55 PROPOSED TOP OF BOTTOM FLANGE
- PROPOSED VALVE AND VALVE BOX
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED SERVICE LOCATION (REFER TO DETAIL)
- PROPOSED COMMUNITY MAIL BOX
- PROPOSED STREET LIGHT
- PROPOSED SILT FENCE
- PONDING AREA WITH SPILLWAY ELEVATION
- *EXISTING CONTOUR LINE AND CONTOUR ELEVATION*
- *EXISTING OVERHEAD HYDRO*
- *EXISTING FIRE HYDRANT*
- *EXISTING SANITARY MANHOLE*
- *EXISTING STORMMANHOLE*
- *EXISTING VALVE*
- *EXISTING HYDRO POLE*
- *EXISTING ROADSIDE CATCH BASIN WITH 3.0m SUBDRAIN IN TWO DIRECTIONS (PARALLEL WITH CURB FACE)*
- *EXISTING ROADSIDE CATCH BASIN WITH INLET CONTROL DEVICE*

REFER TO 114013-NL DRAWING FOR ADDITIONAL NOTES

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.

CLARIDGE CONDOS
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Ottawa, Ontario K2P 0Y6
Tel : (613) 233 6030
Fax : (613) 233 8290

No.	REVISION	DATE	BY
1.	ISSUED FOR SITE PLAN APPLICATION	SEPT. 17/14	JAG

SCALE 1:400 (1:400 0 4 8 12 16)

DESIGN JAG/SAZ
CHECKED DDB
DRAWN RBG
CHECKED JAG
APPROVED DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER D.D. BLAIR 100122737 Sept. 17/2014 PROVINCE OF ONTARIO

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LOCATION
CITY or TOWNSHIP
NAME OF DEVELOPMENT

DRAWING NAME
GRADING & EROSION AND SEDIMENT CONTROL PLAN

PROJECT No. 114013
REV REV # 1
DRAWING No. 114013-GR

M:\2014\114013\CAD\Design\114013-GR.dwg, 114013-GR, Sep 19, 2014 - 8:50am, rgraydon
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