ENVIRONMENTAL NOISE IMPACT STUDY

236 PLAINS ROAD EAST
TOWNHOUSE BLOCK
PART OF LOT 5
BROKEN FRONT CONCESSION
GEOGRAPHIC TOWNSHIP OF EAST FLAMBOROUGH
NOW IN THE CITY OF BURLINGTON, ON
REGIONAL MUNICIPALITY OF HALTON

Prepared for:

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Our File No: 23-4063

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1.0 INTRODUCTION

dBA Acoustical Consultants Inc. has been asked to provide a noise impact study on behalf of 676690 Ontario Inc. for the proposed 3-Storey Condo Townhouse Block located at 236 Plains Road East in Burlington, ON.

The purpose of the study is to determine, for OPA/ZBA approval, the traffic noise impact from Plains Road East, Burlington. The proposed development is a 3-storey condo townhouse complex consisting of 6 residential units.

This study will detail noise impact relative to the proposed site plan and recommend the noise control measures necessary (if applicable) to meet Ministry of Environment, Conservation and Parks (MECP) guidelines, while satisfying the planning requirements of the City of Burlington.

Rail noise was not considered in this report as there are no CN/GO rail lines within the immediate area. CN/GO Rail tracks are located approximately 570m north of the proposed development and extensive shielding by existing townhouses and 2 storey single family dwellings and will have no acoustical impact on the proposed development. CN Rail Aldershot Yard is located 575m north of the proposed development and is noted in this noise study Section 3.4.

Aircraft noise was not considered in this report as the development is located outside the 25 NEF of any area airports. Vibration is not considered in this report due to no industry in the area. (See Attached Figure 1 Site Location).

2.0 SITE DESCRIPTION

The proposed development is in an area largely comprised of residential properties to the north, south, and west. Plains Road East is approximately 30m north and is the main vehicular traffic noise in the site area. Other local streets like Shadeland Avenue, Filman Place, Gallagher Road, northeast across from Plains Road East, Townsend Ave which is south approximately 400m, are not considered in this report due to low traffic volumes and speed limits and/or distance separations and will not have an acoustical impact on the from the proposed development.

Plains Road East is approximately 25m immediately north of the proposed development. Plains Road East runs east and west of the proposed development and is a 4-lane roadway with a center turn lane with a speed limit of 60km/hr. See Figure 2 Site Plan.

3.0 NOISE IMPACT ASSESSMENT

3.1 NOISE CRITERIA

The Publication NPC-300, Stationary & Transportation Sources-Approval & Planning, specifies limits for road noise relative to new residential developments and specifies the noise criteria as summarized as follows:

TABLE 1 - Road Traffic Sound Levels Limits	
Time Period	L_{eq} (dBA)
07:00 – 23:00 (16 hr.)	55 Outdoor Living Area (OLA)
23:00 – 07:00 (8 hr.)	50 Plane of Bedroom Window (POW)

The OLA refers to an outdoor patio, a backyard, a terrace or other area where outdoor passive recreation is expected to occur on the residential property. Noise levels are calculated at the upper storey bedroom window to represent nighttime (23:00 - 07:00) periods.

Where noise levels estimated in the Outdoor Living Area (OLA) and at an upper storey window (POW) are equal to or less than the values listed in Table 1, no noise control measures are required. Where noise levels exceed Table 1 values, the following action is required:

TABLE 2 –Noise Control Requirements		
Time Period	Noise Level Leq (dBA)	Action Required
07:00 - 23:00 Daytime (OLA)	55 to 60	Barrier or Warning Clause Type "A"
07:00 - 23:00 Daytime (OLA)	> 60	Barrier & Warning Clause Type "B"
07:00 – 23:00 Daytime (POW)	>55	Provision for A/C, Warning Clause "C"
	>65	Central A/C, Warning Clause "D"
	>65	Building Component Specification
23:00 to 07:00 Nighttime (POW)	> 50-60	Provision for A/C and Warning Clause Type "C"
23:00 to 07:00 Nighttime (POW)	> 60 > 60	Building Component Specification Central Air Conditioning and Warning Clause Type "D"

Where nighttime noise levels exceed 60 dBA, building components must be designed to meet the following Table 3 indoor sound level limits.

TABLE 3 - Indoor Road Sound Levels Limits	
Indoor Location	Leq (dBA)
	Road
Living/Dining 7:00 – 23:00	45
Bedroom 23:00 - 07:00	40

3.2 ROAD NOISE

Predicted road traffic noise levels were calculated for Plains Road East, the major road noise source in the site area. Road traffic volumes were sourced supplied from the City of Burlington relative to the roadway. MECP computer program STAMSON version 5.04 was used to carry out prediction calculations (See Appendix "A" Attached). Traffic data is summarized in Table 4.

The daytime/night-time volume ratio relative for Plains Road East is calculated using a 90/10 split and a 16/8-hour assessment as required by the MECP. The 2017 AADT (Annual Average Daily Traffic) volumes were forecasted over 26 years and reflective of the worst-case scenario. Truck volumes were factored at 2% medium and 2% heavy of the total vehicle volumes for Plains Road East.

TABLE 4 – Future Road Traffic Volumes (2043)			
Plains Road East	Forecasted AADT Vehicles		
	Cars	Medium Trucks	Heavy Trucks
Day	29948	624	624
Night	3328	69	69

Table 5 summarizes the "free field" traffic noise prediction results, modeled at 8 receptor locations representative of the outdoor living areas (OLA) and 1st & 3rd floor building facades within the proposed development. (See Figure 3 Receptor Locations).

TABLE 5 – Predicted Future Traffic Noise (dBA) Free Field		
Location	07:00 – 23:00	23:00 – 07:00
R1 –Unit 1 North Façade	66 dBA (1.5m)	60 dBA (7.5m)
R2 – Unit 2 East & West Façades	61 dBA (1.5m)	55 dBA (7.5m)
R3 – Unit 3 West Façade	58 dBA (1.5m)	52 dBA (7.5m)
R4 – Unit 6 West Façade	49 dBA (1.5m)	46 dBA (7.5m)
R5 – Unit 3 East Facade	61 dBA (1.5m)	55 dBA (7.5m)
R6 – Unit 6 East Facade	55 dBA (1.5m)	49 dBA (7.5m)
R7 – Unit 1 OLA (3.0m Noise Barrier)	55 dBA (1.5m)	N/A
R8 – Unit 2 & 3 OLA (2.43m Noise Barrier)	44 dBA (1.5m)	N/A

3.3 CN RAIL ALDERSHOT YARD

To the north located approximately 575m of the proposed development is the CN Rail Aldershot Yard. The Aldershot Yard is a layover yard and is active during the day and nighttime hours. In May 2013 the FCM & Railway Association of Canada and other Agencies developed "Guidelines for New Development in Proximity to Rail Operations" of which we have referenced in this noise study. CN/GO trains are more than the Stamson 5.04 limits of 500mm for train noise calculations and therefore, the CN/GO trains have no noise impact on the proposed development. However, the Aldershot Rail Yard is considered a working yard and has stationary noise levels from shunting trains and coupling of trains and cars for staging for pick up and deliveries.

The minimum area of noise influence to be considered for railway corridors when undertaking a noise study is as follows:

Section 3.4 Noise Mitigation

3.4.1 Guidelines

- Freight Rail Yards: 1,000 metres
- Principal Main Lines: 300 metres
- Secondary Main Lines: 250 metres
- Principal Branch Lines: 150 metres
- Secondary Branch Lines: 75 metres
- Spur Lines: 75 metres

Whereas the Aldershot works yard is located within 1000m from the site development several day and night site visits have confirmed that the background noise level from area traffic is the predominant sound. The CN/GO rail and Aldershot works yard are not audible at the proposed site development. Separating the rail lines are numerous large buildings and 2-3 storey residential dwellings.

4.0 RECOMMENDATIONS - NOISE CONTROL

4.1 OUTDOOR LIVING AREAS

Calculated road noise levels exceed 55 dBA daytime criteria as outlined in Table 1. Proposed for the Townhouse development are rear yard outdoor amenity areas (OLA's) as defined in the MECP noise guidelines. The OLA's for R1 (Unit 1) requires a 3m noise barrier and Unit 2 & Unit 3 require a 2.43m noise barrier or equivalent to meet the MECP NPC-300 OLA noise criteria. Unit 4, Unit 5, & Unit 6 require on a 1.83m aesthetic fence. See Figure 4 - Noise Barrier Locations.

In compliance with MECP guidelines, the noise barrier must have a minimum surface density of 20 kg/m^2 and be designed and constructed with no cracks or gaps. Any gap under the noise barrier that is necessary for drainage purposes must be minimized and must not distract from the acoustical performance. In addition to the recommended physical controls, specifically worded warning clauses may be mandatory.

4.2 INDOOR NOISE LEVELS

Calculated road noise levels at the Plane of Window (POW) exceed the 50 dBA criteria outlined in Table 1 for indoor spaces for all receptor locations. Specific building components (walls, windows, doors etc.) are required and confirmed using the STC (Sound Transmission Class) methods and are summarized in Table 6 following with minimum window door and wall construction specified for all residential units throughout the development.

The STC values were calculated for each room type, based on typical window to floor ratios of 20% for bedrooms and 30% for living room areas. Wall-to-floor ratio was factored at 80%. A maximum of two components were factored per room. All windows throughout the Townhouse development must meet STC-33 values with acoustical ratings.

Acoustically tested windows must be verified by a letter from the appropriate window company to confirm the STC values have been achieved. It is recommended that all windows throughout the proposed development have an STC-33 rating or higher. dBA has taken the highest traffic noise level (66 dBA) and applied the STC-33 rating to all windows throughout all townhouses as it is cost efficient for all the windows have the same STC value will ensure that the proper windows are professionally installed which eliminates any errors.

TABLE 6 – Recommended Door, Wall, and Window Construction

LOCATION	Window STC To Be Used	Exterior Wall STC Construction	Patio Door STC Construction
All Units	Example	Example	Example
Bedroom	33	40	33
Living room	33	40	33

Recommendations assume windows are well-fitted, weather-stripped units that can be opened.

5.0 VENTILATION / WARNING CLAUSES

Ventilation and Warning Clause requirements are required for this project as noted in Table 7 following. It is recommended that the appropriate warning clauses be inserted into all Offers and Agreements of Purchase and Sale or Lease.

TABLE 7 - Ventilation and Warning Clause Requirements

LOCATION	VENTILATION	WARNING CLAUSE
Units 1, 2 & 3 (R1, R2, & R5)	Central Air Conditioning	Type "B" and "D"
Units 4, 5, & 6	Provisions for Central Air Conditioning	Type "A" & "C"

TYPE A: (Unit 4, Unit 5, & Unit 6)

"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 Municipality's and the MECP's noise criteria."

TYPE B: (Unit 1, Unit 2 & Unit 3)

"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the buildings 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 Municipality's and the MECP's noise criteria."

TYPE C: (Unit 4, Unit 5, & Unit 6)

"This dwelling unit had been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. 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 Municipality's and the MECP'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 MECP 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: (Unit 1, Unit 2, & Unit 3)

"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 Municipality's and the MECP's noise criteria."

6.0 SUMMARY OF RECOMMENDATIONS

The following noise control measures are required to satisfy the indoor and outdoor noise level criterion:

- Window, door, and wall construction as recommended in Section 4.
- Central Air conditioners for Unit 1, Unit 2 & Unit 3 as shown in Table 7.
- Provisions for Central Air for Unit 4, Unit 5, & Unit 6, as shown in Table 7.
- Specific Warning Clauses inserted into all Offers and Agreements of Purchase and Sale or Lease for all units. (Section 5.0)
- R1 (Unit 1) Outdoor Amenity Area requires a 3.0 m (10 ft) noise barrier or equivalent.
- R2 (Unit 2) and R5 (Unit 3 & Unit 4) require a 2.43m (8ft) noise barrier or equivalent.
- Unit 4, Unit 5, & Unit 6 require a 1.83m aesthetic board on board fence.
- Appropriate STC-33 rating for all windows, walls, and patio doors, throughout the development for all Townhouses.
- A Letter from the window supplier indicating the proposed windows STC-33 construction has been achieved.
- Qualified Acoustical Consultant certifies that the required noise control measures have been incorporated into the builder's plans prior to issuance of a building permit.
- Prior to issuance of an occupancy permit or equivalent, it is recommended the Qualified Acoustical Consultant certify that the approved noise control measures have been professionally installed.

7.0 CONCLUSIONS

dBA Acoustical Consultants Inc. has provided a noise impact study on behalf of 676690 Ontario Inc. for the proposed 3-Storey Condo Townhouse Block located at 236 Plains Road East in Burlington, ON.

The study determined, for OPA/ZBA approval, the traffic noise impact from Plains Road East, Burlington and CN/GO rail and the Aldershot Rail Yard. The proposed development is a 3-storey condo townhouse complex consisting of 6 residential units.

This study detailed noise impact relative to the proposed site plan and recommended rear yard noise barriers and Warning Clauses for noise control measures necessary to meet Ministry of Environment, Conservation and Parks (MECP) guidelines, while satisfying the planning requirements of the City of Burlington.

FIGURE 1
SITE LOCATION

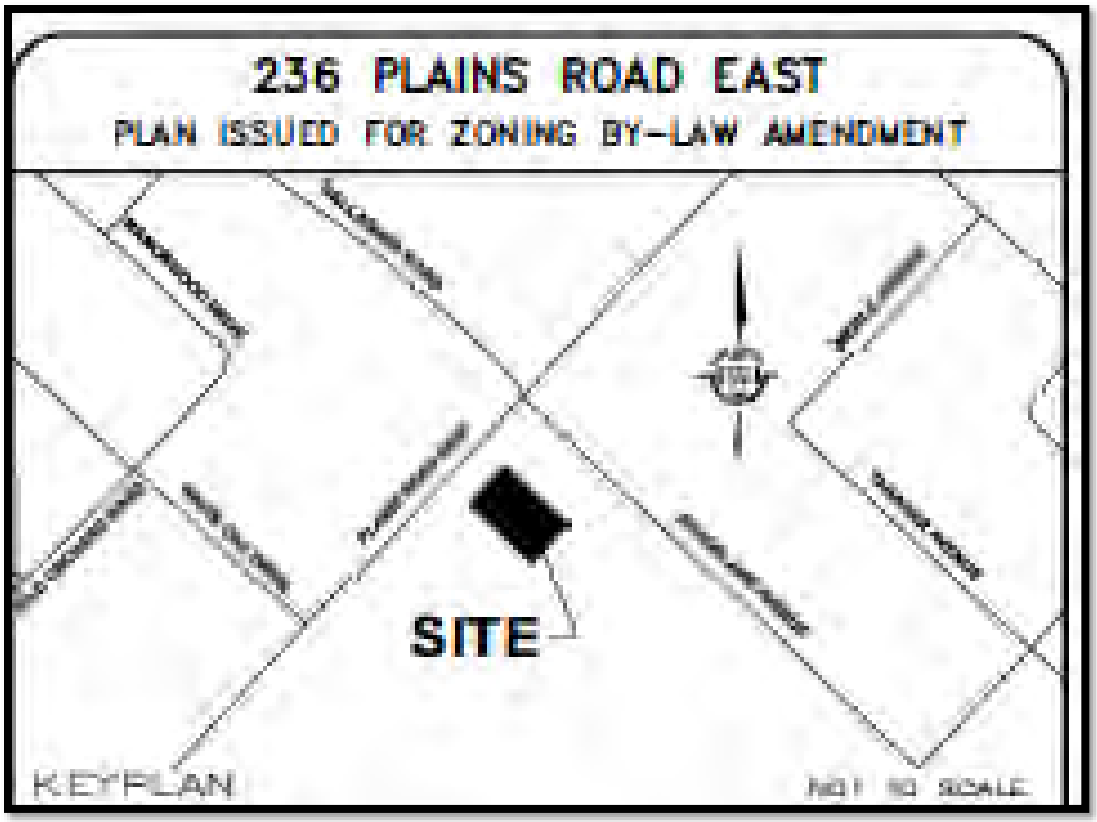


FIGURE 2
SITE PLAN

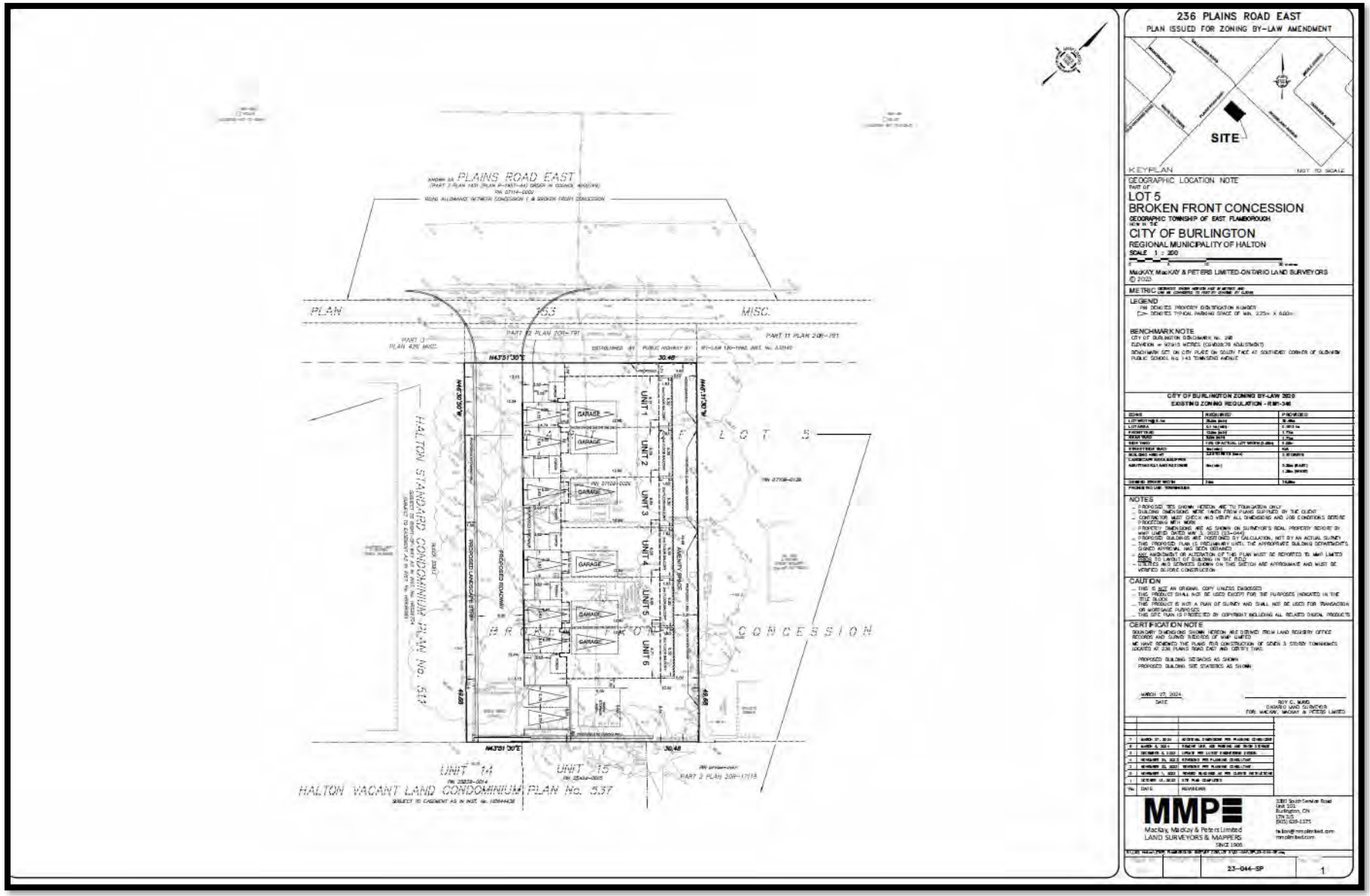


FIGURE 3
RECEPTOR LOCATIONS

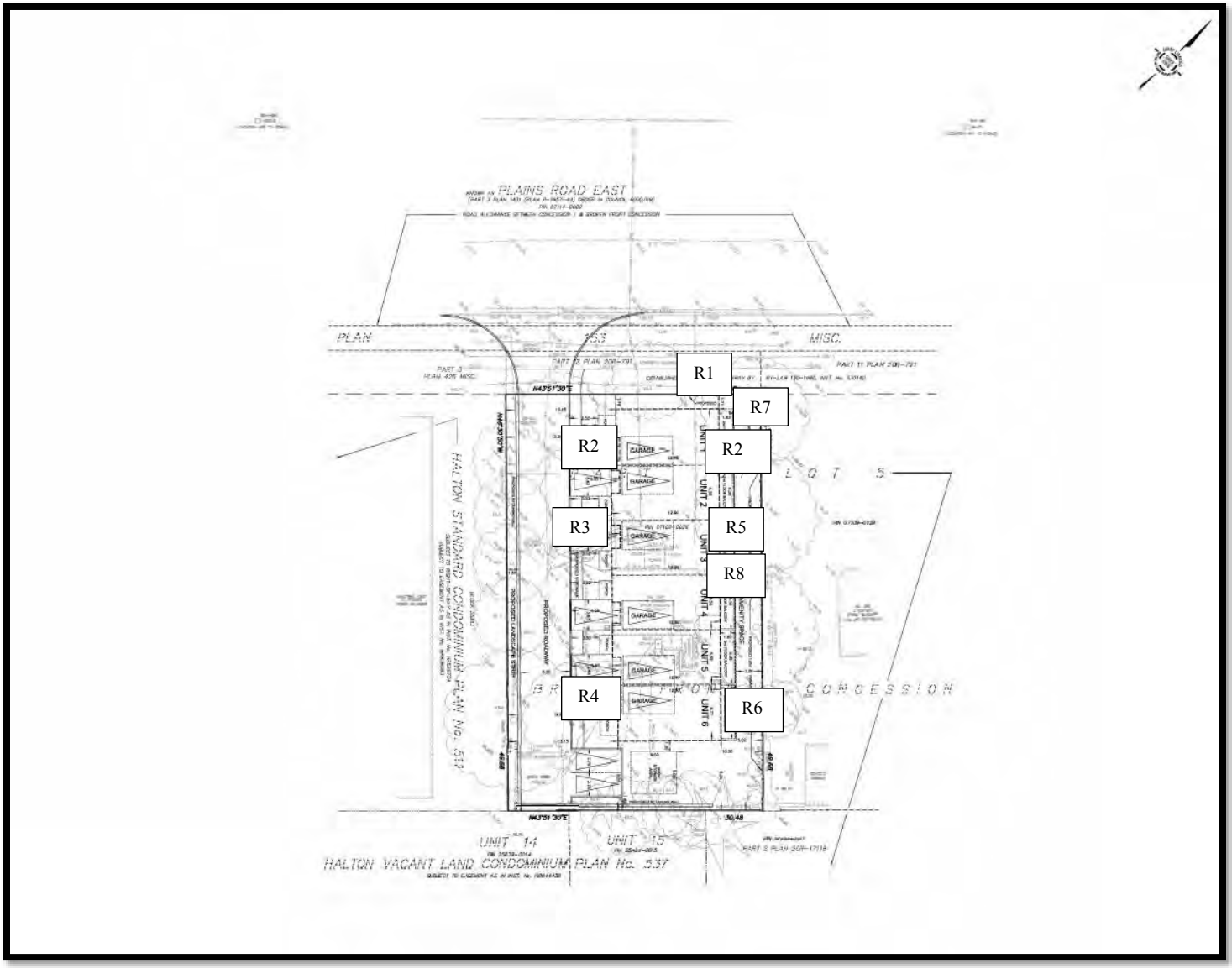
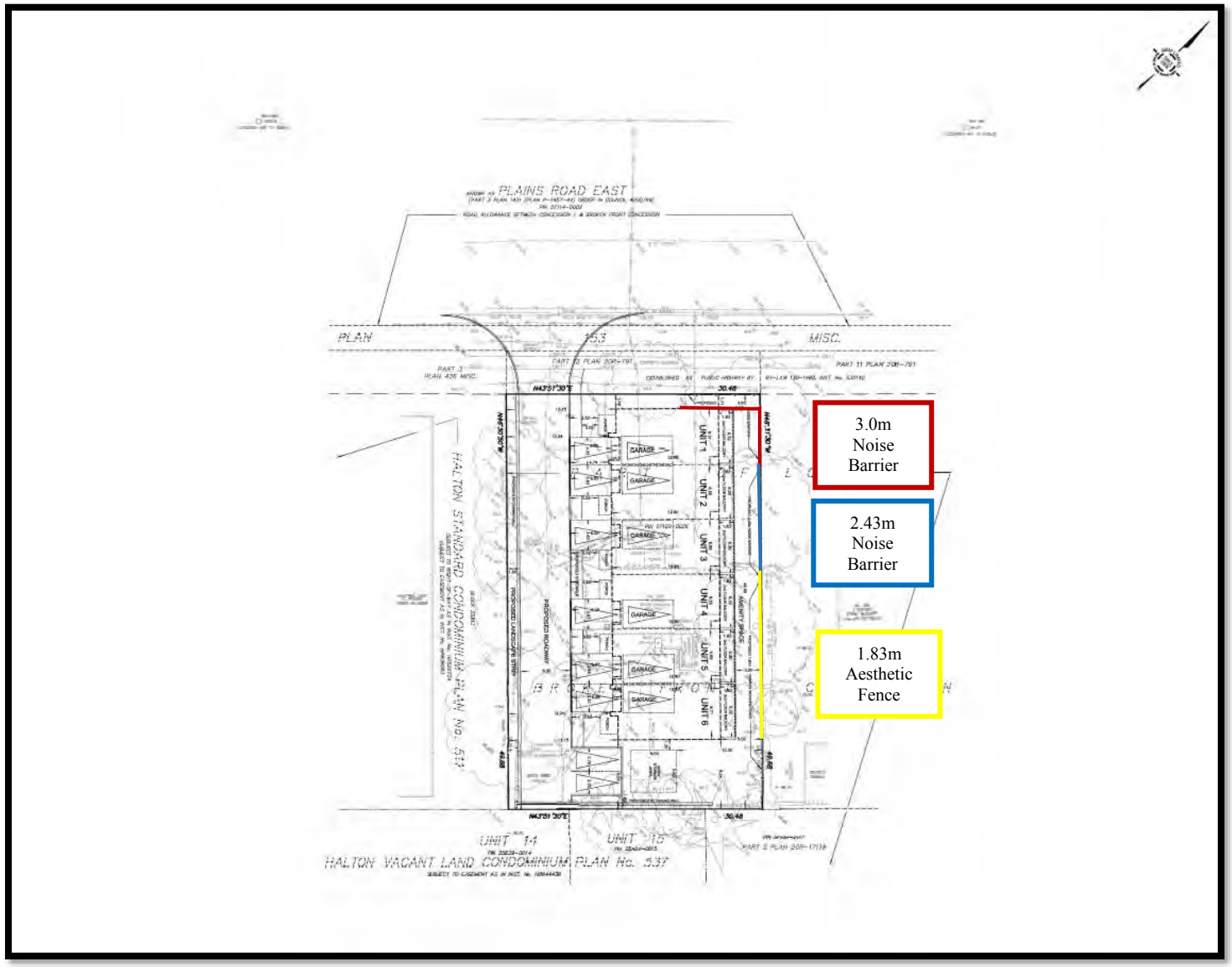
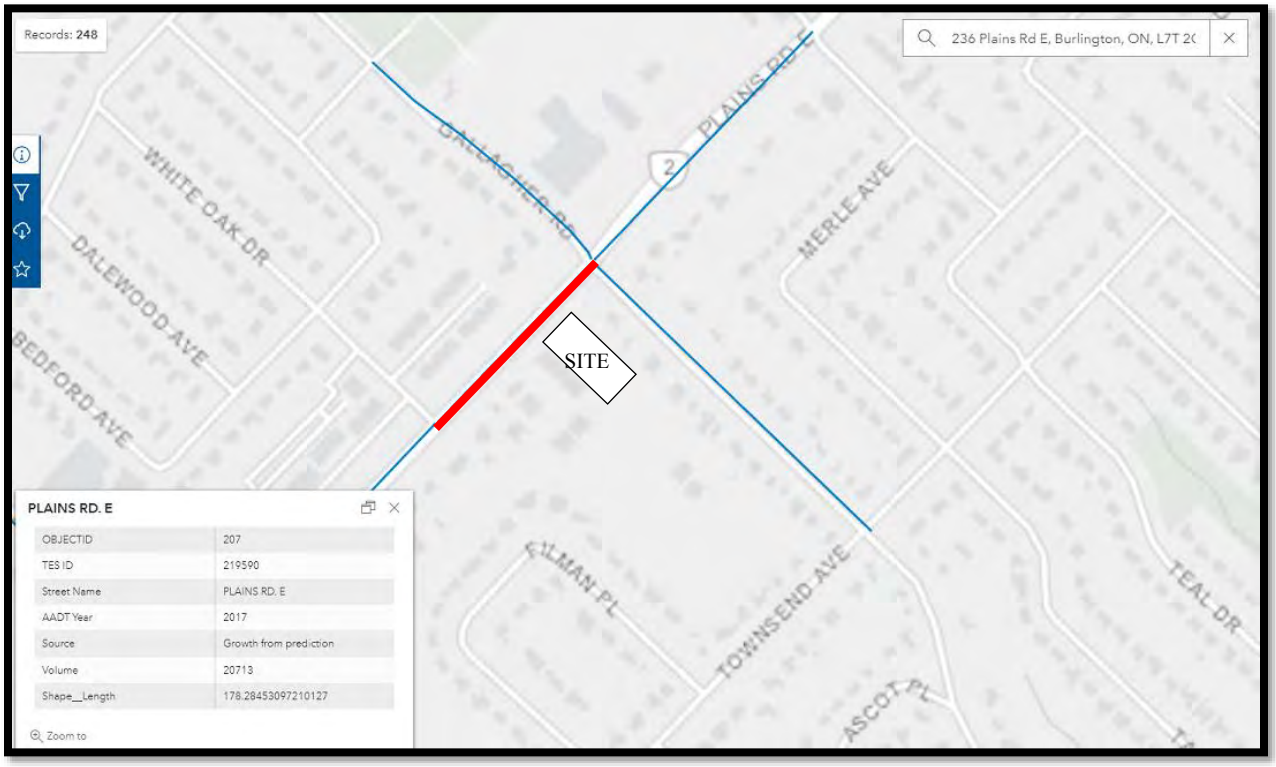


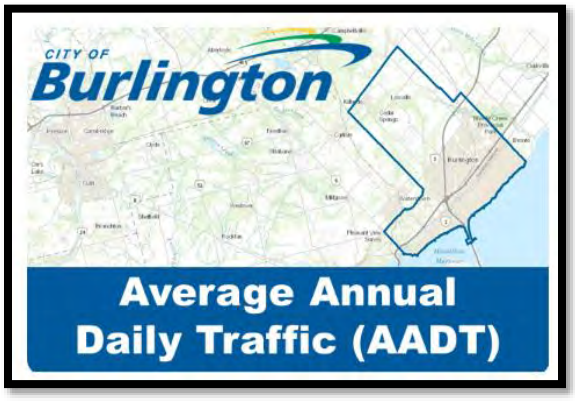
FIGURE 4
NOISE BARRIER LOCATIONS



APPENDIX "A"

2017 AADT PLAINS ROAD EAST
CITY OF BURLINGTON





STAMSON CALCULATIONS

```
STAMSON 5.04        SUMMARY REPORT        Date: 07-08-2023 16:45:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R1Plain.te           Time Period: Day/Night 16/8 hours
Description: R1- Plains Rd E Free Field North Facade Unit 1
                        TOTAL Leq FROM ALL SOURCES        (DAY): 65.53
                                                          (NIGHT): 59.67

Road data, segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Car traffic volume  : 29948/3328  veh/TimePeriod  *
Medium truck volume :   624/69    veh/TimePeriod  *
Heavy truck volume  :   624/69    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):  20713
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  26.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Plains Rd E (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  :  25.00 / 25.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    65.53 !    65.53
--------------------+---------+---------+---------
                      Total                  65.53 dBA
Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    59.67 !    59.67
--------------------+---------+---------+---------
                      Total                  59.67 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 07-08-2023 16:56:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2plain.te           Time Period: Day/Night 16/8 hours
Description: R2- Plains Rd E Free Field East & West Facades Unit 1
                 TOTAL Leq FROM ALL SOURCES        (DAY): 61.21
                                                   (NIGHT): 55.48
Road data, segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Car traffic volume  : 29948/3328  veh/TimePeriod  *
Medium truck volume :   624/69    veh/TimePeriod  *
Heavy truck volume  :   624/69    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):  20713
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  26.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Angle1   Angle2           :  -0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  30.00 / 30.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    61.21 !    61.21
--------------------+---------+---------+---------
                      Total                  61.21 dBA

Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    55.48 !    55.48
--------------------+---------+---------+---------
                      Total                  55.48 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 07-08-2023 17:00:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3plain.te           Time Period: Day/Night 16/8 hours
Description: R3- Plains Rd E Free Field West Facade Unit 2
                 TOTAL Leq FROM ALL SOURCES              (DAY): 58.03
                                                        (NIGHT): 52.22
Road data, segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Car traffic volume  : 29948/3328  veh/TimePeriod  *
Medium truck volume :   624/69    veh/TimePeriod  *
Heavy truck volume  :   624/69    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):  20713
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  26.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Angle1   Angle2           :  -0.00 deg   45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  36.00 / 36.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    58.03 !    58.03
--------------------+---------+---------+---------
                      Total                  58.03 dBA
Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    52.22 !    52.22
--------------------+---------+---------+---------
                      Total                  52.22 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 07-08-2023 17:03:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4plain.te           Time Period: Day/Night 16/8 hours
Description: R4- Plains Rd E Free Field West Facade Unit 6
           TOTAL Leq FROM ALL SOURCES                (DAY): 49.06
                                                     (NIGHT): 45.75
Road data, segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Car traffic volume  : 29948/3328  veh/TimePeriod  *
Medium truck volume :   624/69    veh/TimePeriod  *
Heavy truck volume  :   624/69    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):  20713
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  26.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Angle1   Angle2           :  -0.00 deg   30.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  96.00 / 96.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    49.06 !    49.06
--------------------+---------+---------+---------
                      Total                  49.06 dBA
Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    45.75 !    45.75
--------------------+---------+---------+---------
                      Total                  45.75 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 07-08-2023 17:07:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5plain.te           Time Period: Day/Night 16/8 hours
Description: R5- Plains Rd E Free Field East Facade Unit 1
                 TOTAL Leq FROM ALL SOURCES              (DAY): 60.52
                                                        (NIGHT): 54.86
Road data, segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Car traffic volume  : 29948/3328  veh/TimePeriod  *
Medium truck volume :   624/69    veh/TimePeriod  *
Heavy truck volume  :   624/69    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):  20713
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  26.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Angle1   Angle2           :  -0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  33.00 / 33.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    60.52 !    60.52
--------------------+---------+---------+---------
                      Total                  60.52 dBA
Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    54.86 !    54.86
--------------------+---------+---------+---------
                      Total                  54.86 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 07-08-2023 17:11:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6plain.te           Time Period: Day/Night 16/8 hours
Description: R6- Plains Rd E Free Field East Facade Unit 6
                 TOTAL Leq FROM ALL SOURCES              (DAY): 54.51
                                                        (NIGHT): 49.47
Road data, segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Car traffic volume  : 29948/3328  veh/TimePeriod  *
Medium truck volume :   624/69    veh/TimePeriod  *
Heavy truck volume  :   624/69    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):  20713
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  26.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Angle1   Angle2           :  -0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  76.00 / 76.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    54.51 !    54.51
--------------------+---------+---------+---------
                      Total                  54.51 dBA
Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    49.47 !    49.47
--------------------+---------+---------+---------
                      Total                  49.47 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 07-08-2023 17:38:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7plain.te          Time Period: Day/Night 16/8 hours
Description: R7- Plains Rd E Unit 1 with 3.0m Noise Barrier
                 TOTAL Leq FROM ALL SOURCES              (DAY): 55.30 (OLA)

Road data, segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Car traffic volume  : 29948/3328  veh/TimePeriod  *
Medium truck volume :   624/69    veh/TimePeriod  *
Heavy truck volume  :   624/69    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):  20713
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  26.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Plains Rd E (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  :  25.00 / 25.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :   3.00 /
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    55.30 !    55.30
--------------------+---------+---------+---------
                      Total                  55.30 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 07-08-2023 18:22:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8plain.te          Time Period: Day/Night 16/8 hours
Description: R8- Plains Rd E Unit 3 with 2.43m Noise Barrier
                 TOTAL Leq FROM ALL SOURCES              (DAY): 44.48 (OLA)

Road data, segment # 1: Plains Rd E (day/night)
-----------------------------------------------
Car traffic volume  : 29948/3328  veh/TimePeriod  *
Medium truck volume :   624/69    veh/TimePeriod  *
Heavy truck volume  :   624/69    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):  20713
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  26.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Plains Rd E (day/night)
---------------------------------------------
Angle1   Angle2           :  -0.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  76.00 / 76.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -0.00 deg   Angle2 : 50.00 deg
Barrier height            :   2.43 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Plains Rd E      !     1.19 !    44.48 !    44.48
--------------------+---------+---------+---------
                      Total                  44.48 dBA
```

EXTERIOR WALL STC RATINGS

EXTERIOR WALL STC RATINGS

Wall Configuration	EW1	EW2	EW3	EW4	EW1R	EW2R	EW3R	EW5	EW4R	EW6	EW7 EW5R	EW8
STC Rating	**38**	**40**	**43**	**46**	**47**	**48**	**49**	**54**	**55**	**57**	**58**	**62**

Source: National Research Council, Division of Building Research

NOTES:

1 The common structure of walls EW1 to EW5 is composed of 12.7mm gypsum board, vapour barrier and 38x89 mm studs with 50 mm (or thicker) mineral wool or glass fibre batts in inter-stud cavities.

- EW1 denotes the common structure, plus sheathing, plus wood siding or metal siding and fibre backer board
- EW2 denotes the common structure, plus rigid insulation (25 to 30 mm), and wood siding or metal siding and fibre backer board.
- EW3 denotes simulated mansard with the common structure, plus sheathing, 28 X89 mm framing, sheathing and asphalt roofing material
- EW4 denotes the common structure, plus sheathing and 20 mm stucco.
- EW5 denotes the common structure, plus sheathing, 25 mm air space, 100mm brick veneer.
- EW6 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25 to 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 to 50 mm), 140mm back-up block, 100 mm face brick.
- EW8 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25 to 50 mm), 200 mm concrete.

2 R signifies the mounting of the interior gypsum board on resilient clips.

3 An exterior wall conforming to rainscreen design principles and composed of 12.7 mm gypsum board, 100 mm concrete block, rigid insulation (25 to 50 mm), 25 mm air space, and 100 mm brick veneer has the same STC as EW6.

4 An exterior wall described in EW1 with the addition of rigid insulation (25 to 50 mm) between the sheathing and the external finish has the same STC as EW2.