ENVIRONMENTAL NOISE IMPACT STUDY

"MULTI-RESIDENTIAL DEVELOPMENT"
PART OF LOT 44
CONCESSION 2
154 WILSON STREET EAST
GEOGRAPHICAL TOWNSHIP OF ANCASTER
NOW THE CITY OF HAMILTON

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1.0 INTRODUCTION

dBA Acoustical Consultants Inc. has been retained to conduct a noise impact study for the proposed "Multi-Residential Development", known as 154 Wilson Street East, Part of Lot 44, Concession 2, Geographic Township of Ancaster, now in the City of Hamilton.

The purpose of the noise study is to determine the noise impact from Wilson Street East and area stationary noise sources (Hamilton Golf Course). This study will detail noise impacts at the proposed development and recommend noise control measures necessary (if applicable) to meet MOE Publication NPC-300, Stationary & Transportation Sources-Approval & Planning guidelines, while satisfying the planning requirements of the City of Hamilton. Vibration is not a concern as there are no railway lines in the vicinity.

2.0 SITE DESCRIPTION

Proposed for the site development is a three storey multi-residential building with the first and second floors consisting of 24 apartment style residential units and the third floor consisting of a total of 7 apartment style residential units. Also proposed is an at grade parking garage and lobby with vehicle access on the north east portion of the building.

Also proposed for the units are balconies measuring less than 4m in depth. Note that balconies less than 4m in depth are not considered an outdoor amenity space and as such, require no noise control measures. Proposed for the top floor is a large rooftop terrace located on the south and east portion of the proposed development. The first-floor apartments on the east side have proposed OLA's.

The site property is located on the south side of Wilson Street East, approximately 650m east of Fiddlers Green Road and 610m west of Sulphur Springs Road, Ancaster ON. The proposed site is situated within a residential/commercial area. There are established 1-2 storey commercial properties located to the west and east of the proposed development. Located to the immediate south east are 2 storey residential dwellings. To the north and south of the proposed building are 2 storey residential dwellings.

To the south of the proposed development located approximately 40m from the southern limit of the property site is the Hamilton Golf and Country Club seasonal storage and maintenance buildings. Confirmed by an onsite inspection, shielding the property from storage sheds and mechanical maintenance sheds is an existing 1.8m wooden privacy fence. The maintenance shed contains lawn manicure equipment, and tools required to maintain and repair golf carts. Typical maintenance of golf carts and lawn care are conducted at low customer peak times during the warmer seasonal months. Site visit confirms small utility vehicles are utilized for the Golf Cource and have no noise impact on the proposed development.

Located approximately 20m north of the proposed development is Wilson Street East and is considered the major noise source for vehicular traffic in this noise study. Wilson Street East is a 2-lane roadway with a centre-lane turn adjacent to the site with designated curb side bicycle paths and a posted speed limit of 50km/hr for all vehicles running east and west of the proposed site.

3.0 NOISE IMPACT ASSESSMENT

3.1 NOISE CRITERIA

The Ministry of Environment (MOE) specifies limits for road and rail noise relative to new residential developments. The MOE Publication 300 NPC-300, Stationary & Transportation Sources-Approval & Planning guidelines specifies the criteria, summarized as follows:

TABLE1- Road Traffic Sound Levels Limits	
Time Period	**Leq (dBA)**
07:00 – 23:00 (16 hr.)	55 Outdoor Living area
07:00 – 23:00 (16 hr.)	55 Plane of Window
23:00 – 07:00 (8 hr.)	50 Plane of Bedroom window

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. As this is considered a daytime use (07:00 - 23:00) 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 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)	56 to 60	Barrier or Warning Clause Type “A”
	> 60	Barrier & Warning Clause Type “B”
07:00 – 23:00 Daytime (POW)	>55	Provision for A/C, Warning Clause “C”
	>60	Central A/C, Warning Clause “D”
	>65	Building Component Specification
23:00 to 07:00 Nighttime (POW)	> 50	Provision for A/C & Warning Clause Type “C”
	> 55	Building Component Specification
	> 60	Central Air and Warning Clause Type “D”

Where nighttime noise levels exceed 55 dBA, building components must be designed to meet 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

Road traffic noise levels were calculated for Wilson Street East relative to the proposed development. Wilson Street East 2017 traffic data was sourced from the online City of Hamilton Transportation Data Management System for the Annual Average Daily Traffic (AADT) and is presented in Appendix “A”. The traffic data was used to carry out prediction calculations using the MOE “Stamson - Version 5.4” computer program reflective of the worst-case scenario.

The daytime/nighttime volume ratio relative to Wilson Street East is typically calculated using a 90/10 split as required by the MOE and the City of Hamilton. The maximum posted speed for all vehicles are 50 km/h.

The percentage of annual growth for Wilson Street East was figured at 2.0% over 11 years till 2028. Road traffic for area roadways has no noise impact due to minimal vehicular volumes. Truck volumes were factored at 2% medium and 3% heavy of the total vehicle volumes for Wilson Street East, with a road gradient and a topography elevation between the road and proposed development of 3m. Table 4 summarizes future traffic volumes and Table 5 represents the "free field" traffic noise prediction results, modeled at specified receptor locations representative of facades throughout the proposed development (See Figure 3 Receptor Locations).

First floor receptor noise levels are shielded due to existing residential and commercial dwellings surrounding the proposed development on Wilson Street East and the elevation difference between the proposed site and Wilson Street East. Wilson Street East was considered one segment east and westbound traffic from Fiddlers Green Road to Sulphur Springs Road.

TABLE 4 – Future Wilson Street East Traffic Volumes

Wilson Street East	AADT 25069 Vehicles		
	Cars	Medium Trucks	Heavy Trucks
Day	21434	451	677
Night	2382	50	75

Free field predicted Wilson Street East noise levels at the east and west building facade is summarized in Table 5.

TABLE 5- Predicted Traffic Noise Levels-Free Field

Location	L_{eq} (dBA)	
	07:00 - 23:00	23:00 - 07:00
R1- 1st Floor East & West Façade	51(1.5m)	46 (1.5m)
R2- Top Floor East Façade	54 (9m)	50 (9m)
R3- 1st Floor East & West OLA	53(1.5m)	45 (1.5m)
R4- Top Floor East & West OLA	53 (9m)	45 (9m)

4.0 RECOMMENDATIONS - NOISE CONTROL

4.1 OUTDOOR LIVING AREAS

For all receptors for the building, calculated road noise levels did not exceed the 55 dBA criteria outlined in Table 1 for outdoor amenity spaces or the rooftop terrace located on the south portion of the development. The roofline of the proposed development shields the south portion of the terrace. The draft plan for the proposed development includes an outdoor living area located on the south and east portion of the first floors and top floor of the building.

Also proposed are standard balconies for units on the second floor and units on the west side of the third floor. Detailed building designs were not made available at the time of this report. Mitigation to reduce outdoor noise levels is not required. It is recommended that a Type "A" Warning Clause would suffice for all units. In addition to any recommended physical controls, specifically worded warning clauses are mandatory.

4.2 INDOOR NOISE LEVELS

Specific building components (walls, windows etc.) must be designed and constructed to achieve indoor sound levels within the noise criteria. Predicted noise levels at the outside facade for all receptors were used to determine the appropriate building components to satisfy MOE indoor sound level limits using the STC (Sound Transmission Class).

Building design specifications were not made available at report time, therefore, STC calculations summarized in Table 6 following with minimum window, door, and wall construction specified for specific dwellings. Assessment was conservative from a noise impact perspective with worst-case design options modeled to satisfy MOE requirements for indoor sound levels.

The STC was calculated for each room type, based on typical window to floor ratios of 20% for bedrooms and 30% for living areas. Wall to floor ratio was factored at 100%. A maximum of two components were factored per room. Should final building designs include greater window and wall to floor ratios, current STC calculations may not satisfy the criteria for noise reduction.

TABLE 6 –Door and Window Construction Requirements

LOCATION	STC (Acoustically Tested)	Door Construction	Window Glazing* Example
All Floors – All Windows			
Bedroom	Less Than 25	OBC	3mm (16mm) 3mm
Living room	Less Than 25	OBC	3mm (16mm) 3mm

** Double pane windows - first number denotes glass thickness, followed by spacing, and thickness of second pane, OBC denotes minimum requirements of the Ontario Building Code will suffice. Recommendations assume windows are well-fitted, weather-stripped units that can be opened.*

4.3 VENTILATION / WARNING CLAUSES

In addition to the inclusion of the specified minimum building components (OBC), for all units as noted in Table 6 Warning Clauses are not required.

Prior to issuance of an occupancy permit, it is recommended the qualified acoustical consultant certify that the approved noise control measures have been properly installed.

It is recommended that the appropriate warning clauses be inserted into all Offers and Agreements of Purchase and Sale or Lease. See the following for specific warning clause wording:

5.0 SUMMARY OF RECOMMENDATIONS

The following noise control measures or equivalent are required to satisfy the indoor and outdoors noise level criterion:

- Specific double-glazed acoustically tested windows for living rooms and bedrooms (Table 6).
- OBC for door construction.

It is recommended that a qualified acoustical consultant certify 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, it is recommended the qualified acoustical consultant certify that the approved noise control measures have been properly installed.

6.0 CONCLUSIONS

dBA Acoustical Consultants Inc. has completed a noise impact study for the proposed "Multi-Residential Development", known as 154 Wilson Street East, Geographic Township of Ancaster, Now City of Hamilton.

This noise study determined the noise impact from Wilson Street East and area stationary noise sources. This study detailed noise impacts at the proposed development and recommend noise control measures necessary to meet MOE Publication NPC-300, Stationary & Transportation Sources-Approval & Planning guidelines, while satisfying the planning requirements of the City of Hamilton.

FIGURE 1
KEY PLAN

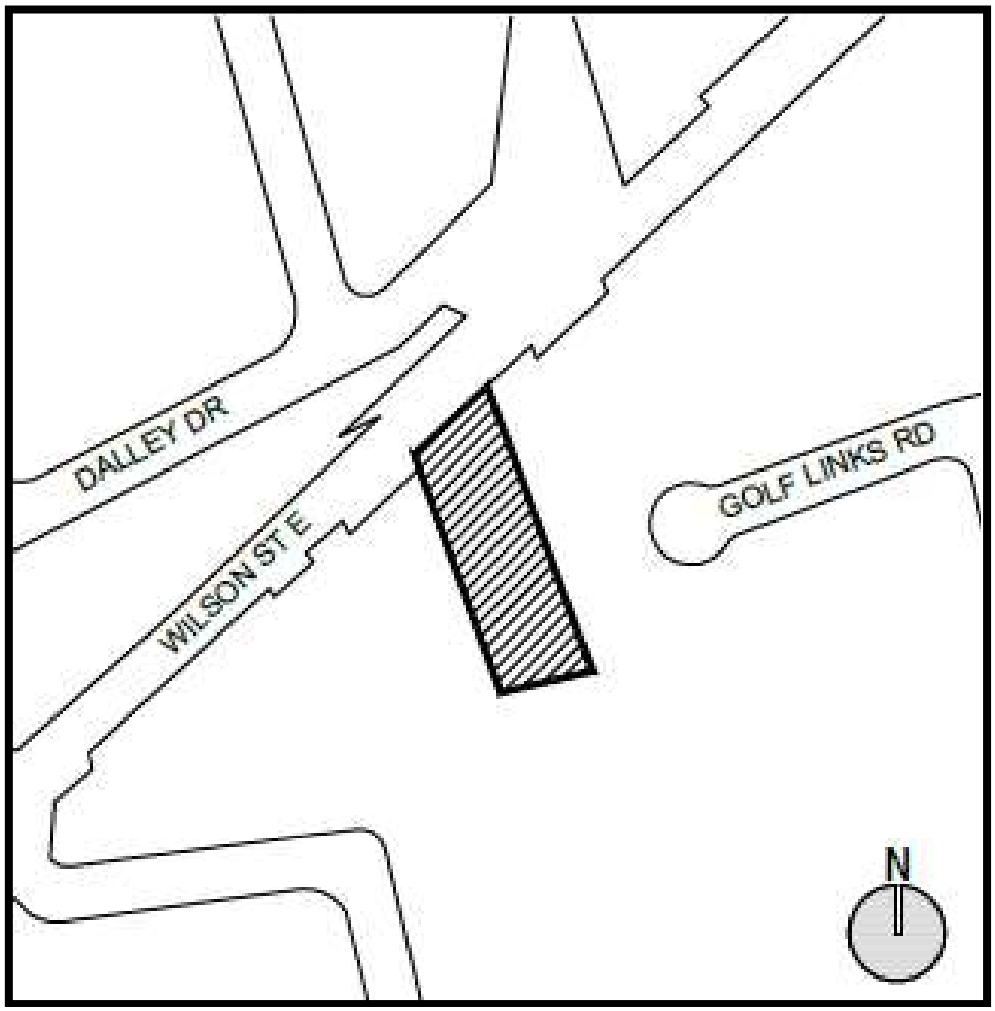


FIGURE 2
SITE PLAN

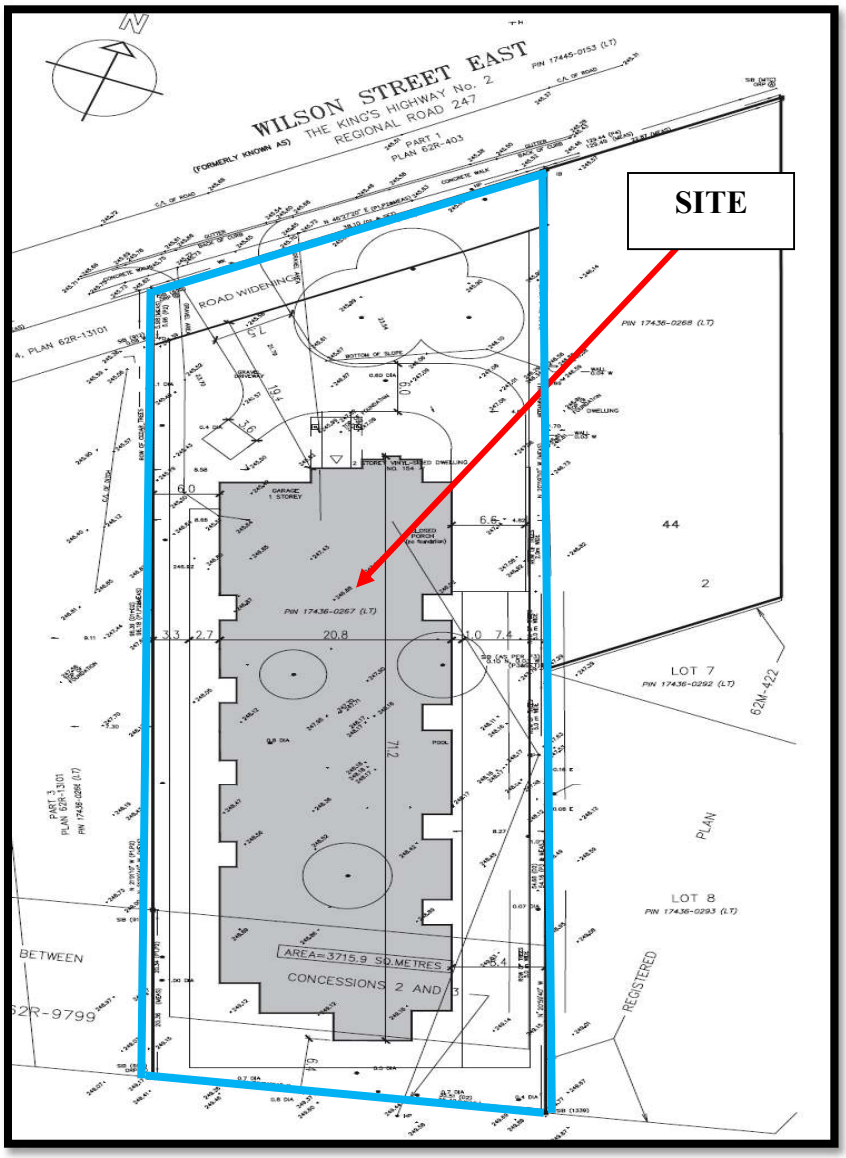
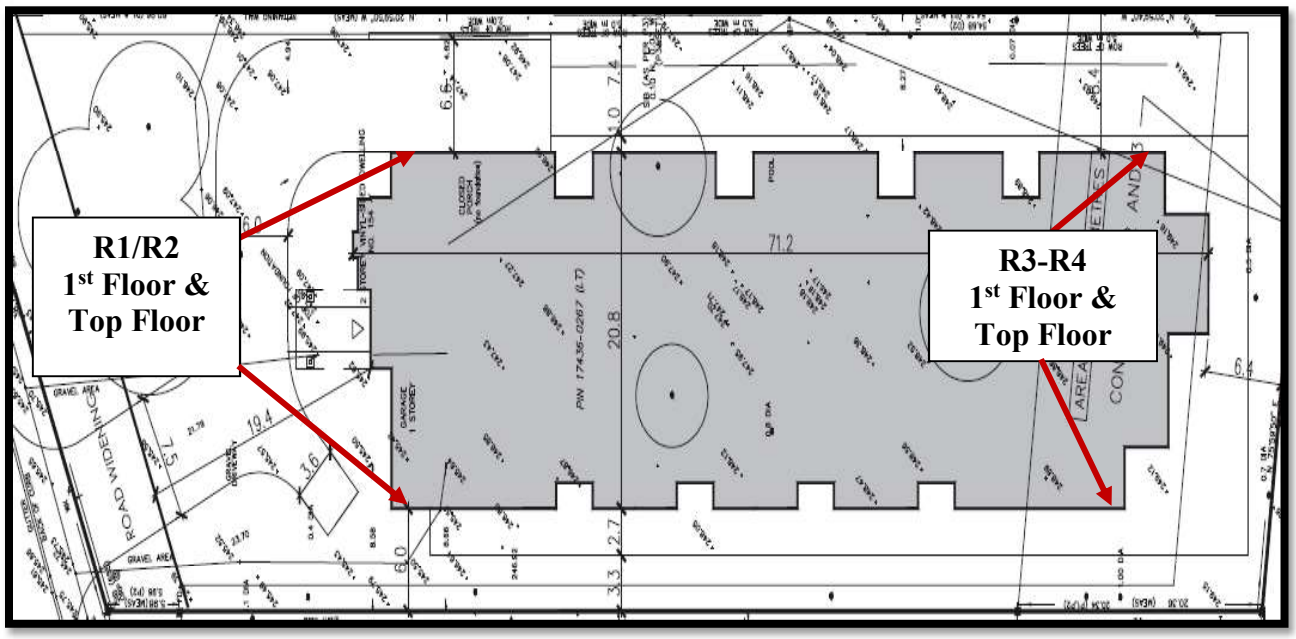
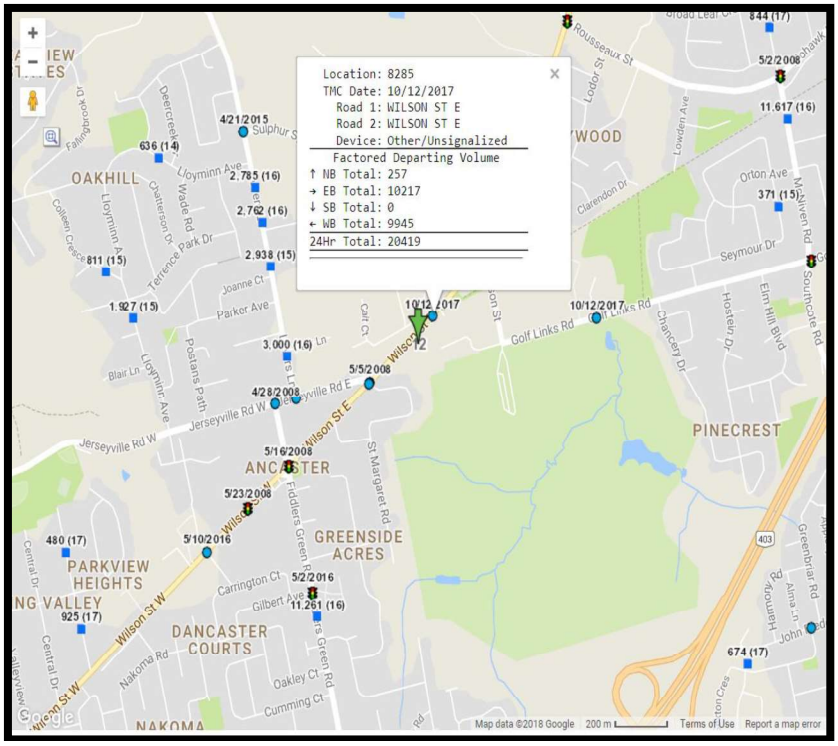


FIGURE 3
RECEPTOR LOCATIONS



APPENDIX "A"

2017 CITY OF HAMILTON
TRAFFIC DATA



```
STAMSON 5.04        SUMMARY REPORT        Date: 20-06-2018 12:18:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wilsonr1.te          Time Period: Day/Night 16/8 hours
Description: R1-East & West Side Facade OLA
                  TOTAL Leq FROM ALL SOURCES         (DAY): 50.59 (OLA)
                                                     (NIGHT): 46.45
Road data, segment # 1: Wilson St E (day/night)
-----------------------------------------------
Car traffic volume  : 21434/2382  veh/TimePeriod  *
Medium truck volume :   451/50    veh/TimePeriod  *
Heavy truck volume  :   677/75    veh/TimePeriod  *
Posted speed limit  :    50 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):  20162
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  11.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Wilson St E (day/night)
---------------------------------------------
Angle1   Angle2           : -35.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   2.79 m
Reference angle           :   0.00

Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Wilson St E       !     1.32 !    50.59 !    50.59
--------------------+---------+---------+---------
                       Total                  50.59 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Wilson St E       !     1.32 !    46.45 !    46.45
--------------------+---------+---------+---------
```

```
                    Total                    46.45 dBA



STAMSON 5.04        SUMMARY REPORT        Date: 20-06-2018 12:19:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wilsonr2.te          Time Period: Day/Night 16/8 hours
Description: R2- Top Floor East Side Facade OLA
                 TOTAL Leq FROM ALL SOURCES        (DAY): 53.80
                                                   (NIGHT): 49.66
Road data, segment # 1: Wilson St E (day/night)
-----------------------------------------------
Car traffic volume  : 21434/2382  veh/TimePeriod  *
Medium truck volume :   451/50    veh/TimePeriod  *
Heavy truck volume  :   677/75    veh/TimePeriod  *
Posted speed limit  :    50 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):  20162
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  11.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Wilson St E (day/night)
-----------------------------------------------
Angle1   Angle2           : -35.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   9.00 / 9.00   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   2.79 m
Reference angle           :   0.00

Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Wilson St E       !     1.32 !    53.80 !    53.80
--------------------+---------+---------+---------
                       Total                    53.80 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
```

```
--------------------+---------+---------+---------
 1.Wilson St E      !     1.32 !    49.66 !    49.66
--------------------+---------+---------+---------
                      Total                  49.66 dBA

STAMSON 5.04        SUMMARY REPORT        Date: 20-06-2018 12:27:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wilsonr3.te          Time Period: Day/Night 16/8 hours
Description: R3- 1st Floor East & West Side Facade OLA
                       TOTAL Leq FROM ALL SOURCES   (DAY): 53.19 (OLA)
                                                    (NIGHT): 46.65
Road data, segment # 1: Wilson St E (day/night)
-----------------------------------------------
Car traffic volume  : 21434/2382  veh/TimePeriod  *
Medium truck volume :   451/50    veh/TimePeriod  *
Heavy truck volume  :   677/75    veh/TimePeriod  *
Posted speed limit  :    50 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):  20162
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  11.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Wilson St E (day/night)
-----------------------------------------------
Angle1   Angle2           : -35.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 100.00 / 100.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   3.77 m
Reference angle           :   0.00

Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Wilson St E       !     1.32 !    53.19 !    53.19
--------------------+---------+---------+---------
                      Total                  53.19 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
```

```
 1.Wilson St E      !     1.32 !    46.65 !    46.65
--------------------+---------+---------+---------
                      Total                   46.65 dBA


STAMSON 5.04        SUMMARY REPORT        Date: 20-06-2018 12:25:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wilsonr4.te          Time Period: Day/Night 16/8 hours
Description: R4- top Floor East & West Side Facade OLA
                       TOTAL Leq FROM ALL SOURCES        (DAY): 53.19
                                                         (NIGHT): 46.65
Road data, segment # 1: Wilson St E (day/night)
-----------------------------------------------
Car traffic volume  : 21434/2382  veh/TimePeriod  *
Medium truck volume :   451/50    veh/TimePeriod  *
Heavy truck volume  :   677/75    veh/TimePeriod  *
Posted speed limit  :    50 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):  20162
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  11.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Wilson St E (day/night)
-----------------------------------------------
Angle1   Angle2           : -35.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 100.00 / 100.00 m
Receiver height           :   9.00 / 9.00   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   3.37 m
Reference angle           :   0.00

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Wilson St E      !     1.32 !    53.19 !    53.19
--------------------+---------+---------+---------
                      Total                   53.19 dBA
Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
```

```
 1.Wilson St E       !     1.32 !    46.65 !    46.65
--------------------+---------+---------+---------
                       Total                  46.65 dBA
```

GRADING PLANS