

ENVIRONMENTAL NOISE IMPACT STUDY
Project: 17169.00

**Residential Development
415 Mill Street South,
Newcastle, Ontario**

Prepared for:

Landmark Capital Ltd.

Attn: Dave Martino

Prepared by:



Iwona Stasiewicz, Sr.Eng./Arch.Tech.



Bob Rimrott, P.Eng.

October 17, 2017

Revised: December 13, 2018
November 12, 2019

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1 Introduction

Landmark Capital Ltd. has retained the services of Aercoustics Engineering Limited (Aercoustics) to prepare an Environmental Noise Impact Study. The proposed residential development, consisting of four townhouse blocks is to be located at 415 Mill Street South in Newcastle, Ontario. Figure 1 provides a key plan showing the proposed development location.

The purpose of this study is to examine the existing and future noise environment in the development area and evaluate their impact potential on the future residential receptors. This report also investigates the noise control features that are required for the development in order to meet the noise guidelines of the Ontario Ministry of the Environment Conservation and Parks (MECP) and to satisfy the requirements of the Municipality.

The noise impact potential of the surrounding land uses on the proposed project has been examined and is further discussed in this document in accordance with the MECP noise guidelines outlined in their publication, NPC-300.

This report/ Revision 2 is based on the information provided by the Client via email. Namely, the updated site plan provided to Aercoustics. Also, this revision addresses comments raised by the Region of Durham in their letter of February 7, 2019.

The dominant transportation sources in the subject study area are Mill Street South and Highway 401.

No other significant sources of noise have been noted in the vicinity of the subject site. Similarly, no significant sources of located in close proximity to the proposed development. The observations have been made during Aercoustics' site visit conducted on July 14, 2017.

2 Guidelines and Criteria

The dominant transportation noise sources in the area include road traffic on Mill Street South and Highway 401.

2.1 Road Traffic Noise - Outdoor Living Area (OLA)

MECP Guidelines recommend that equivalent noise levels (Leq) in outdoor living areas should not exceed 55 dBA. Predicted noise levels between 55 dBA and 60 dBA may be acceptable, provided that the future occupants of the buildings are made aware of the potential noise problems through appropriate warning clauses. Noise levels above 60 dBA are generally not acceptable.

All unenclosed balconies that are less than 4 m in depth and outside the exterior of the building façade are exempt from meeting the MECP outdoor noise criteria with regards to transportation noise sources. Should the depth of any future balconies and terraces be greater than 4 m, they will be subject to the MECP noise level limit of 55 dBA.

2.2 Road Traffic Noise - Indoor Living Spaces

Indoor noise levels are also examined with respect to the MECP Guidelines. According to NPC-300, bedrooms are normally required to meet an indoor Leq of 40 dBA. The recommended indoor sound limit for living or dining rooms is an Leq of 45 dBA.

To achieve these levels, the MECP Guidelines provide a basis for the type of windows, exterior walls and doors that will be required based on projected outdoor noise levels.

It is also an MECP requirement that a central air conditioning system be installed for the dwelling(s) when the nighttime or daytime outdoor noise levels at the façade of the dwelling are above 60 dBA and 65 dBA, respectively. The provision for adding central air conditioning must be made if the night time sound level is greater than 50 dBA and less than or equal to 60 dBA on the outside face of a bedroom windows or greater than 55 dBA and less than or equal to 65 dBA on the outside face of a living/dining room window. This provision involves a ducted heating system sized to accommodate the addition of central air conditioning by the occupant.

The required limits as per NPC-300 are summarized in Table 2.1 below.

Table 2.1: Noise Criteria – Road Traffic

Type of Space	Time Period	Road Minimum LEQ (dBA)
Living/dining, den areas of residences, hospitals, nursing homes, schools, day-care centres (Indoor)	07:00 – 23:00	45 dBA
Living/dining, den areas of residences, hospitals, nursing homes (Indoor)	23:00 – 07:00	45 dBA
Sleeping quarters (Indoor)	07:00 – 23:00	45 dBA
	23:00 – 07:00	40 dBA
Outdoor Living Areas (OLA)	07:00 – 23:00	55 dBA

3 Noise Level Predictions

3.1 Road Noise Calculations Procedure

Noise level calculations were performed in accordance with the Ministry of the Environment and Climate Change Guidelines outlined in Reference 1, and by the Guidelines of the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT). Sample copies of the traffic noise predictions from MECP’s Road and Rail Traffic Noise Prediction Model STAMSON (Version 5.04) are included in Appendix A. Note the predictions include acoustic barriers, where applicable to address shielding provided by the townhouse blocks as well as existing topography.

The equivalent sound levels (Leq’s) due to road traffic were calculated at receptors 1, 2, 3, 4 and 5 as shown in Figure 2 of this report. The calculations were performed for both daytime and night time conditions at critical receive locations represented by the top floor windows of the proposed residences. It should be noted that Aercoustics has been advised that there will not be any common or private outdoor living areas (OLAs) associated with this project.

3.2 Road Traffic Data

Predictions of road traffic noise were based on the ultimate road traffic data outlined in Table 3.1 below. The future road traffic AADT on Mill Street South as well as speed and truck percentages were based on the traffic information obtained from Durham Region. Traffic information volumes on Highway 401 have been provided by Ministry of Transportation. Copies of the correspondence from the Region and MTO are included in Appendix A.

Table 3.1: Road Traffic Volumes

	Mill Street South Forecasted	Highway 401 Ultimate
AADT	10 000	82000
Day/Night Split (%)	80/20	66/33
Percentage of Trucks (%)	7	20
Heavy/Medium Ratio	50/50	50:50
Posted Speed (km/hr)	50	100

4 Results of Road Noise Predictions

Table 4.1 below lists the daytime and night time Leq's due to road traffic as predicted at critical locations within the development, as shown on the site plan in Figure 2.

Table 4.1: Calculated Noise Levels Due to Road Traffic

Calculation Location	Description	Leq (dBA) Day		Leq (dBA) Night	
		Receptor Height=1.5m	Receptor Height=7.5m	Receptor Height=1.5m	Receptor Height=7.5m
1	West Side Facing Mill St S	64	67	64	66
2	South Side Facing Hwy 401	67	69	66	69
3	North Side Shielded from Hwy 401	57	59	56	59
4	South Side PartiallyShielded from Hwy 401	60	62	64	67
5	West Side Facing Mill St S	64	66	62	65

Note that there are no outdoor living areas associated with this project.

The noise levels listed in the table above were used to determine the window glazing as well as exterior wall requirements for each designated point of reception. These requirements consist of estimated window to room floor area percentages based the similar projects. It has been assumed that the windows to floor area ratios are about 30%. Glazing requirements should be verified once floor plans and architectural drawings are finalized.

5 Noise Control Recommendations

5.1 Outdoor Living Areas

It is our understanding that there will not be any outdoor amenity areas associated with this project. It is further understood that the Municipality of Clarington does not require outdoor amenity areas for some residential projects with 15 or fewer units.

5.2 Indoor Living Spaces

Indoor sound levels have been examined with respect to MECP Guidelines as summarized in Section 2.2 of this report. Based on the latest floor plans, it has been estimated that the maximum window-to-floor ratios for the resident suites is about 30% for both, the daytime and the nighttime indoor living spaces.

Table 5.1: Recommended Window and or Sliding Door Glazing

Façade	Daytime Window STC	Nighttime Window STC
West façades of Blocks A B and C facing Mill Street South	<30	33
East façade of Block A	<30	33
South façade of Block A facing Hwy 401	31	36
North façade of Block A East façade of Blocks B and C	<30	<30
North façade of Blocks B and C South façade of Block C	<30	<30
South façade of Block B facing Hwy 401	<30	34

Note: The above listed STC ratings should be reviewed/confirmed once the final design of the future dwellings becomes available.

Central air conditioning is mandatory for this residential development as the predicted daytime noise levels exceed 65 dBA and the nighttime noise levels are above 60 dBA.

Warning clauses are required and sample wording is provided in Section 7 of this document.

6 Conclusions

Window/sliding door glazing and wall construction has to be upgraded to ensure that the indoor noise levels are in compliance with the MECP guidelines, and the Municipality requirements are satisfied. Similarly, all of the dwelling units within the proposed development must be equipped with central air conditioning. Section 5.2 of the report discusses the building envelope components.

With the incorporation of the noise controls discussed in this report, the sound levels at the sensitive receptors of the proposed residential development will comply with the noise guidelines of the MECP. As indicated in the Municipality's and MECP implementation guidelines, where mitigation is required or noise may be a concern, future occupants will be advised through warning clauses.

Section 7 of the report provides notes and sample wording of the warning clauses.

7 Notes and Warning Clauses

1. Purchase and/or lease agreements for all the units located within the proposed development shall include the following warning clauses:

Warning Clause 1:

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

Warning Clause 2:

"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 sound level limits of the Municipality and the Ministry of Environment."

2. The general architectural plans, configuration/layout and grading of the site are integral parts of the noise control system. Any major deviations will require further analysis for verification purposes.

8 References

1. ORNAMENT – "Ontario Road Noise Analysis Method for Environmental and Transportation", Ontario Ministry of the Environment, October, 1989.
2. "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning", Ontario Ministry of the Environment and Climate Change, Publication NPC-300, August 2013 (updated final version #22).

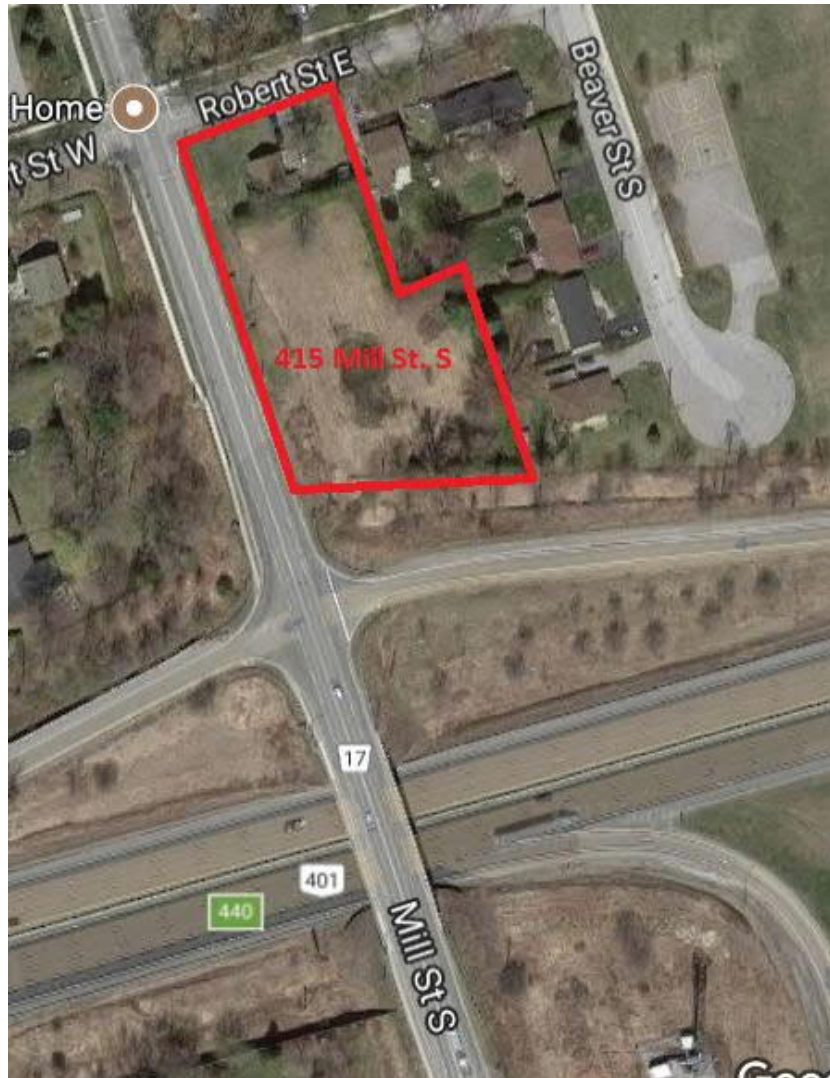


Figure 1: Key Plan Showing Site Location

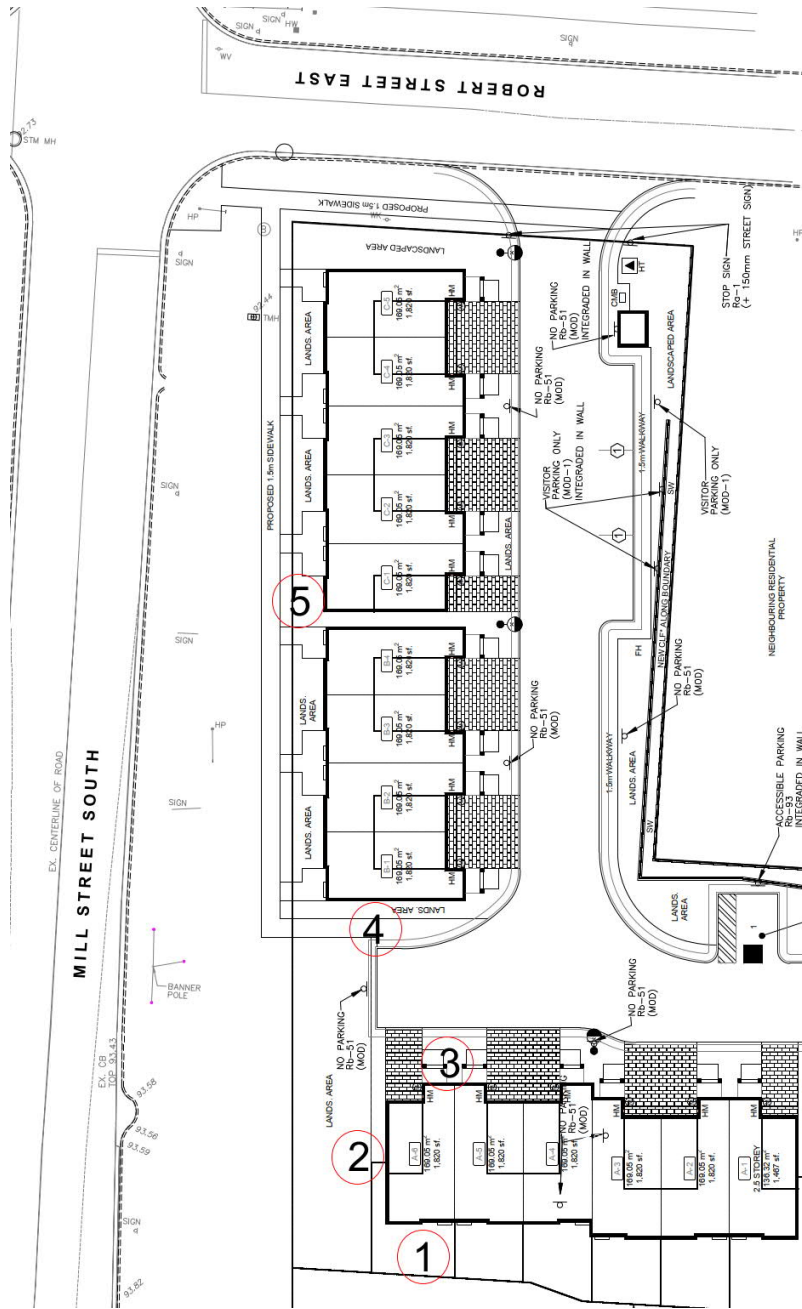


Figure 2: Site Plan Showing Calculation Locations

Appendix A

Road Traffic Data,
and
Sample Printouts of Noise Predictions



The Regional Municipality of Durham

Planning and Economic
Development Department

Planning Division

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Brian Bridgeman, MCIP, RPP
Commissioner of Planning and
Economic Development

ROAD SEGMENT TRAFFIC FORECASTS FOR NOISE ANALYSES

This information is to be used as the basis for assessing the potential impacts of noise, generated by traffic on Provincial Highways and arterial roads, on proposed land uses that are sensitive (e.g., residential subdivisions). Arterial roads include existing and future Type A, B and C, as designated in the Durham Regional Official Plan.

Noise assessment reports recommend specific measures to be integrated into the design of sensitive developments to reduce road noise impacts to acceptable levels.

Provided For:

Name / Name of Firm: Iwona Stasiewicz, Aercoustics
Address: 1004 Middlegate Rd., Suite 1100, Mississauga, ON
Telephone: (416) 249-3361 Fax:

Location of Proposal:

East of Mill Street, north of Highway 401, Newcastle. Highway 401 data should be obtained from MTO.

Municipality: Clarington Lot(s): Concession:
Durham Region File No. (if available):
Name of Property Owner (if available):

Date Request Received: June-20-17 Received By: Chris Leitch

Date Forecast Sent: June-23-17

Name of Road Segment	Forecasted AADT*	No. of Lanes	% of Trucks	Heavy : Medium		Speed (km/h)
				Truck	Truck Ratio	
Mill Street, north of Highway 401	10,000	2	7	50	50	50
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0

* Average Annual Daily Traffic. Forecast based on ultimate development according to the Durham Regional Official Plan.

Iwona Stasiewicz

From: Alam, Ahsan (MTO) <Ahsan.Alam@ontario.ca>
Sent: Monday, November 4, 2019 4:14 PM
To: Iwona Stasiewicz
Cc: Tai, Arthur (MTO)
Subject: RE: Traffic data for Highway 401 in Newcastle

Good Afternoon Iwona,

In response to your request please find below the information available from this office for Highway 401 between Mill St and Hwy 35/115. I am assuming the construction period will end by 2021 and therefore I am giving you the traffic volume estimate for 2031.

2016 AADT = 60,500
2016 SADT = 71,300
Ultimate AADT = 82,000
Ultimate SADT = 96,000
Existing Number of Through lanes = 6 lanes
Posted Speed = 100 km/hr
Percentage of Trucks = 20%

Please note that the above information is estimated based upon our current knowledge of the area, which may be subject to change in the future. Other information related to ROW and gradient will be available from Central Region Traffic Office.

If you require further information, please don't hesitate to contact me.

Thanks,
Ahsan

From: Iwona Stasiewicz <IwonaS@aercoustics.com>
Sent: November-04-19 12:23 PM
To: Alam, Ahsan (MTO) <Ahsan.Alam@ontario.ca>
Subject: RE: Traffic data for Highway 401 in Newcastle

Good Afternoon Ahsan,

I would like to follow up on our request. Please advise when we can expect to receive the data.
Thank you,
Iwona



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Please not that some of the existing topographical features (overpass, exit ramps) have been modeled as barriers in the prediction model.

Similarly, the proposed townhouse blocks have been treated as acoustic barriers where applicable.

STAMSON 5.0 NORMAL REPORT Date: 11-11-2019 13:16:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 17169_1z.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: hwy401_house (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 1: hwy401_house (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 108.00 / 108.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with
barrier)
Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
Barrier height : 10.00 m
Barrier receiver distance : 0.50 / 0.50 m
Source elevation : 88.00 m
Receiver elevation : 93.00 m
Barrier elevation : 93.00 m
Reference angle : 0.00

Road data, segment # 2: hwy401_ovrps (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 2: hwy401_ovrps (day/night)

Angle1 Angle2 : 0.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 108.00 / 108.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 45.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 40.00 / 40.00 m
Source elevation : 89.00 m
Receiver elevation : 93.00 m
Barrier elevation : 88.00 m
Reference angle : 0.00

Road data, segment # 3: hwy401_ramp (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00

Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 3: hwy401_ramp (day/night)

Angle1 Angle2 : 45.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 108.00 / 108.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with
barrier)
Barrier angle1 : 45.00 deg Angle2 : 90.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 60.00 / 60.00 m
Source elevation : 89.00 m
Receiver elevation : 93.00 m
Barrier elevation : 89.00 m
Reference angle : 0.00

Road data, segment # 4: millsts_open (day/night)

Car traffic volume : 7440/1860 veh/TimePeriod *
Medium truck volume : 280/70 veh/TimePeriod *
Heavy truck volume : 280/70 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): 10000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 3.50
Heavy Truck % of Total Volume : 3.50
Day (16 hrs) % of Total Volume : 80.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 28.00 / 24.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no
barrier)
Reference angle : 0.00

Results segment # 1: hwy401_house (day)

Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	7.50	7.45	100.45

ROAD (0.00 + 54.46 + 0.00) = 54.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-90	0	0.00	82.28	0.00	-8.57	-3.01	0.00	0.00	-16.24

SubLeq
54.46

Segment Leq : 54.46 dBA

Results segment # 2: hwy401_ovrps (day)

Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	7.50	8.90	96.90

ROAD (0.00 + 63.43 + 0.00) = 63.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
0	45	0.11	82.28	0.00	-9.53	-6.07	0.00	0.00	0.00

SubLeq
66.68*
63.43

* Bright Zone !

Segment Leq : 63.43 dBA

Results segment # 3: hwy401_ramp (day)

Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	7.50	6.10	95.10

ROAD (0.00 + 61.38 + 0.00) = 61.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------

SubLeq

45 90 0.29 82.28 0.00 -11.07 -7.49 0.00 0.00 -1.04
62.68*
45 90 0.47 82.28 0.00 -12.62 -8.28 0.00 0.00 0.00
61.38

* Bright Zone !

Segment Leq : 61.38 dBA

Results segment # 4: millsts_open (day)

Source height = 1.37 m

ROAD (0.00 + 59.53 + 0.00) = 59.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------

SubLeq

-90 90 0.48 64.69 0.00 -4.02 -1.14 0.00 0.00 0.00
59.53

Segment Leq : 59.53 dBA

Total Leq All Segments: 66.77 dBA

Results segment # 1: hwy401_house (night)

Source height = 1.78 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.78 !          7.50 !          7.45 !          100.45
  
```

ROAD (0.00 + 54.46 + 0.00) = 54.46 dBA

```

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq
-----

```

```

-----
-90      0    0.00  82.28   0.00  -8.57  -3.01   0.00   0.00  -16.24
54.46
-----

```

Segment Leq : 54.46 dBA

Results segment # 2: hwy401_ovrps (night)

Source height = 1.78 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.78 !          7.50 !          8.90 !          96.90
  
```

ROAD (0.00 + 63.42 + 0.00) = 63.42 dBA

```

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq
-----

```

```

-----
0       45    0.11  82.28   0.00  -9.53  -6.07   0.00   0.00   0.00
66.68*
0       45    0.47  82.28   0.00 -12.62  -6.24   0.00   0.00   0.00
63.42
-----

```

* Bright Zone !

Segment Leq : 63.42 dBA

Results segment # 3: hwy401_ramp (night)

Source height = 1.78 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.78 !          7.50 !          6.10 !          95.10
  
```

ROAD (0.00 + 61.38 + 0.00) = 61.38 dBA

```

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

```

-----
      45      90      0.29  82.28      0.00 -11.07  -7.49      0.00      0.00  -1.04
62.68*
      45      90      0.47  82.28      0.00 -12.62  -8.28      0.00      0.00      0.00
61.38
-----
  
```

* Bright Zone !

Segment Leq : 61.38 dBA

Results segment # 4: millsts_open (night)

Source height = 1.37 m

ROAD (0.00 + 57.51 + 0.00) = 57.51 dBA

```

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

```

-----
     -90      90      0.48  61.68      0.00  -3.03  -1.14      0.00      0.00      0.00
57.51
-----
  
```

Segment Leq : 57.51 dBA

Total Leq All Segments: 66.45 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.77
(NIGHT): 66.45

Filename: 17169_2z.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: hwy401_ramp (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 1: hwy401_ramp (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 104.00 / 104.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with
barrier)
Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
Barrier height : 4.00 m
Barrier receiver distance : 30.00 / 30.00 m
Source elevation : 88.00 m
Receiver elevation : 93.00 m
Barrier elevation : 88.00 m
Reference angle : 0.00

Road data, segment # 2: hwy401_ovrps (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 2: hwy401_ovrps (day/night)

Angle1 Angle2 : 0.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 104.00 / 104.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 45.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 48.50 / 48.50 m
Source elevation : 89.00 m
Receiver elevation : 93.00 m
Barrier elevation : 88.00 m
Reference angle : 0.00

Road data, segment # 3: hwy401_ramp (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 3: hwy401_ramp (day/night)

Angle1 Angle2 : 45.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 104.00 / 104.00 m

Receiver height : 7.50 / 7.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 45.00 deg Angle2 : 90.00 deg
 Barrier height : 3.00 m
 Barrier receiver distance : 60.00 / 60.00 m
 Source elevation : 89.00 m
 Receiver elevation : 93.00 m
 Barrier elevation : 89.00 m
 Reference angle : 0.00

Road data, segment # 4: millsts_hse (day/night)

 Car traffic volume : 7440/1860 veh/TimePeriod *
 Medium truck volume : 280/70 veh/TimePeriod *
 Heavy truck volume : 280/70 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): 10000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 10.00
 Medium Truck % of Total Volume : 3.50
 Heavy Truck % of Total Volume : 3.50
 Day (16 hrs) % of Total Volume : 80.00

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

 Angle1 Angle2 : -90.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 30.00 / 30.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
 Barrier height : 10.00 m
 Barrier receiver distance : 3.00 / 3.00 m
 Source elevation : 93.60 m
 Receiver elevation : 93.00 m
 Barrier elevation : 93.60 m
 Reference angle : 0.00

Road data, segment # 5: millsts_open (day/night)

 Car traffic volume : 7440/1860 veh/TimePeriod *
 Medium truck volume : 280/70 veh/TimePeriod *
 Heavy truck volume : 280/70 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): 10000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 10.00
 Medium Truck % of Total Volume : 3.50
 Heavy Truck % of Total Volume : 3.50
 Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 5: millsts_open (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 : 30.00 / 30.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 3 (Elevated; no barrier)
 Elevation : 2.00 m
 Reference angle : 0.00

Results segment # 1: hwy401_ramp (day)

 Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	7.50	9.41	97.41

ROAD (0.00 + 65.78 + 0.00) = 65.78 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
SubLeq									

-90	0	0.23	82.28	0.00	-10.36	-3.62	0.00	0.00	-0.12
68.18*									
-90	0	0.47	82.28	0.00	-12.38	-4.13	0.00	0.00	0.00
65.78									

* Bright Zone !

Segment Leq : 65.78 dBA

Results segment # 2: hwy401_ovrps (day)

Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	7.50	7.97	95.97

ROAD (0.00 + 63.67 + 0.00) = 63.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
0	45	0.11	82.28	0.00	-9.35	-6.07	0.00	0.00	-0.25
0	45	0.47	82.28	0.00	-12.38	-6.24	0.00	0.00	0.00

SubLeq

66.61*

63.67

* Bright Zone !

Segment Leq : 63.67 dBA

Results segment # 3: hwy401_ramp (day)

Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	7.50	5.89	94.89

ROAD (0.00 + 61.62 + 0.00) = 61.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
45	90	0.29	82.28	0.00	-10.86	-7.49	0.00	0.00	-1.16
45	90	0.47	82.28	0.00	-12.38	-8.28	0.00	0.00	0.00

SubLeq

62.77*

61.62

* Bright Zone !

Segment Leq : 61.62 dBA

Results segment # 4: millsts_hse (day)

Source height = 1.37 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
1.37 ! 7.50 ! 6.35 ! 99.95

ROAD (0.00 + 42.64 + 0.00) = 42.64 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

-90 0 0.00 64.69 0.00 -3.01 -3.01 0.00 0.00 -16.03
42.64

Segment Leq : 42.64 dBA

Results segment # 5: millsts_open (day)

Source height = 1.37 m

ROAD (0.00 + 56.37 + 0.00) = 56.37 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

0 90 0.42 64.69 0.00 -4.29 -4.04 0.00 0.00 0.00
56.37

Segment Leq : 56.37 dBA

Total Leq All Segments: 69.04 dBA

Results segment # 1: hwy401_ramp (night)

Source height = 1.78 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.78 !          7.50 !          9.41 !          97.41
  
```

ROAD (0.00 + 65.77 + 0.00) = 65.77 dBA

```

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

```

-----
-90      0   0.23  82.28   0.00 -10.36  -3.62   0.00   0.00  -0.12
68.18*
-90      0   0.47  82.28   0.00 -12.38  -4.13   0.00   0.00   0.00
65.77
-----
  
```

* Bright Zone !

Segment Leq : 65.77 dBA

Results segment # 2: hwy401_ovrps (night)

Source height = 1.78 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.78 !          7.50 !          7.97 !          95.97
  
```

ROAD (0.00 + 63.67 + 0.00) = 63.67 dBA

```

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

```

-----
0        45   0.11  82.28   0.00  -9.35  -6.07   0.00   0.00  -0.25
66.61*
0        45   0.47  82.28   0.00 -12.38  -6.24   0.00   0.00   0.00
63.67
-----
  
```

* Bright Zone !

Segment Leq : 63.67 dBA

Results segment # 3: hwy401_ramp (night)

Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
1.78 !	7.50 !	5.89 !	94.89

ROAD (0.00 + 61.62 + 0.00) = 61.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------

SubLeq

45 90 0.29 82.28 0.00 -10.86 -7.49 0.00 0.00 -1.16
62.77*
45 90 0.47 82.28 0.00 -12.38 -8.28 0.00 0.00 0.00
61.62

* Bright Zone !

Segment Leq : 61.62 dBA

Results segment # 4: millsts_hse (night)

Source height = 1.37 m

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
1.37 !	7.50 !	6.35 !	99.95

ROAD (0.00 + 39.63 + 0.00) = 39.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------

SubLeq

-90 0 0.00 61.68 0.00 -3.01 -3.01 0.00 0.00 -16.03
39.63

Segment Leq : 39.63 dBA

Results segment # 5: millsts_open (night)

Source height = 1.37 m

ROAD (0.00 + 53.36 + 0.00) = 53.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------

SubLeq

0 90 0.42 61.68 0.00 -4.29 -4.04 0.00 0.00 0.00
53.36

Segment Leq : 53.36 dBA

Total Leq All Segments: 68.91 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.04
 (NIGHT): 68.91

Filename: 17169_3z.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: hwy401_house (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 1: hwy401_house (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 114.00 / 114.00 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 : 10.00 m
Barrier receiver distance : 0.50 / 0.50 m
Source elevation : 89.00 m
Receiver elevation : 93.00 m
Barrier elevation : 93.00 m
Reference angle : 0.00

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

Car traffic volume : 7440/1860 veh/TimePeriod *
Medium truck volume : 280/70 veh/TimePeriod *
Heavy truck volume : 280/70 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): 10000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 3.50
Heavy Truck % of Total Volume : 3.50
Day (16 hrs) % of Total Volume : 80.00

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

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
Barrier height : 10.00 m
Barrier receiver distance : 0.50 / 0.50 m
Source elevation : 94.00 m
Receiver elevation : 93.00 m
Barrier elevation : 93.00 m
Reference angle : 0.00

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

Car traffic volume : 7440/1860 veh/TimePeriod *
Medium truck volume : 280/70 veh/TimePeriod *
Heavy truck volume : 280/70 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): 10000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 3.50
Heavy Truck % of Total Volume : 3.50
Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 3: millst_open (day/night)

Angle1 Angle2 : 0.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m

Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 4: millst_house (day/night)

 Car traffic volume : 7440/1860 veh/TimePeriod *
 Medium truck volume : 280/70 veh/TimePeriod *
 Heavy truck volume : 280/70 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): 10000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 10.00
 Medium Truck % of Total Volume : 3.50
 Heavy Truck % of Total Volume : 3.50
 Day (16 hrs) % of Total Volume : 80.00

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

 Angle1 Angle2 : 60.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 30.00 / 30.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 60.00 deg Angle2 : 90.00 deg
 Barrier height : 10.00 m
 Barrier receiver distance : 15.00 / 15.00 m
 Source elevation : 94.00 m
 Receiver elevation : 93.00 m
 Barrier elevation : 93.00 m
 Reference angle : 0.00

Results segment # 1: hwy401_house (day)

 Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78 !	1.50 !	1.48 !	94.48

ROAD (0.00 + 54.23 + 0.00) = 54.23 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
 SubLeq

```
-----
-----
-90      90      0.05  82.28   0.00  -9.26  -0.15   0.00   0.00 -18.64
54.23
-----
-----
```

Segment Leq : 54.23 dBA

Results segment # 2: millst_hse (day)

Source height = 1.37 m

Barrier height for grazing incidence

```
-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.37 !          7.50 !          7.41 !          100.41
-----
```

ROAD (0.00 + 42.17 + 0.00) = 42.17 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
 SubLeq

```
-----
-----
-90      0      0.00  64.69   0.00  -3.01  -3.01   0.00   0.00 -16.50
42.17
-----
-----
```

Segment Leq : 42.17 dBA

Results segment # 3: millst_open (day)

Source height = 1.37 m

ROAD (0.00 + 55.04 + 0.00) = 55.04 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
 SubLeq

```
-----
-----
0        60      0.48  64.69   0.00  -4.47  -5.19   0.00   0.00  0.00
55.04
-----
```

Segment Leq : 55.04 dBA

Results segment # 4: millst_house (day)

Source height = 1.37 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.37	7.50	4.93	97.93

ROAD (0.00 + 42.05 + 0.00) = 42.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
SubLeq									

60	90	0.00	64.69	0.00	-3.01	-7.78	0.00	0.00	-11.85
42.05									

Segment Leq : 42.05 dBA

Total Leq All Segments: 57.90 dBA

Results segment # 1: hwy401_house (night)

Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	7.50	7.46	100.46

ROAD (0.00 + 57.28 + 0.00) = 57.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
SubLeq									

-90	90	0.00	82.28	0.00	-8.81	0.00	0.00	0.00	-16.20
57.28									

Segment Leq : 57.28 dBA

Results segment # 2: millst_hse (night)

Source height = 1.37 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.37	7.50	7.41	100.41

ROAD (0.00 + 39.16 + 0.00) = 39.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-90	0	0.00	61.68	0.00	-3.01	-3.01	0.00	0.00	-16.50

SubLeq
39.16

Segment Leq : 39.16 dBA

Results segment # 3: millst_open (night)

Source height = 1.37 m

ROAD (0.00 + 52.03 + 0.00) = 52.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
0	60	0.48	61.68	0.00	-4.47	-5.19	0.00	0.00	0.00

SubLeq
52.03

Segment Leq : 52.03 dBA

Results segment # 4: millst_house (night)

Source height = 1.37 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.37	7.50	4.93	97.93

ROAD (0.00 + 39.04 + 0.00) = 39.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------

SubLeq

60	90	0.00	61.68	0.00	-3.01	-7.78	0.00	0.00	-11.85
39.04									

Segment Leq : 39.04 dBA

Total Leq All Segments: 58.52 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.90
(NIGHT): 58.52

Filename: 17169_4z.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: hwy401_ramp (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 1: hwy401_ramp (day/night)

Angle1 Angle2 : -90.00 deg -60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 130.00 / 130.00 m
Receiver height : 1.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with
barrier)
Barrier angle1 : -90.00 deg Angle2 : -60.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 88.00 m
Receiver elevation : 93.00 m
Barrier elevation : 93.00 m
Reference angle : 0.00

Road data, segment # 2: hwy401_ovrps (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 2: hwy401_ovrps (day/night)

Angle1 Angle2 : -60.00 deg 25.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 130.00 / 130.00 m
Receiver height : 1.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -60.00 deg Angle2 : 25.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 89.00 m
Receiver elevation : 93.00 m
Barrier elevation : 93.00 m
Reference angle : 0.00

Road data, segment # 3: hwy401_hse (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 3: hwy401_hse (day/night)

Angle1 Angle2 : 25.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 130.00 / 130.00 m

Receiver height : 1.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 25.00 deg Angle2 : 90.00 deg
Barrier height : 10.00 m
Barrier receiver distance : 15.00 / 15.00 m
Source elevation : 89.00 m
Receiver elevation : 93.00 m
Barrier elevation : 93.00 m
Reference angle : 0.00

Road data, segment # 4: millsts_hse (day/night)

Car traffic volume : 7440/1860 veh/TimePeriod *
Medium truck volume : 280/70 veh/TimePeriod *
Heavy truck volume : 280/70 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): 10000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 3.50
Heavy Truck % of Total Volume : 3.50
Day (16 hrs) % of Total Volume : 80.00

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

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 28.00 / 28.00 m
Receiver height : 1.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
Barrier height : 10.00 m
Barrier receiver distance : 0.50 / 0.50 m
Source elevation : 93.60 m
Receiver elevation : 93.00 m
Barrier elevation : 93.00 m
Reference angle : 0.00

Road data, segment # 5: millsts_open (day/night)

Car traffic volume : 7440/1860 veh/TimePeriod *
Medium truck volume : 280/70 veh/TimePeriod *
Heavy truck volume : 280/70 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): 10000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 10.00
 Medium Truck % of Total Volume : 3.50
 Heavy Truck % of Total Volume : 3.50
 Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 5: millsts_open (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 : 28.00 / 28.00 m
 Receiver height : 1.50 / 7.50 m
 Topography : 3 (Elevated; no barrier)
 Elevation : 2.00 m
 Reference angle : 0.00

Results segment # 1: hwy401_ramp (day)

 Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	1.50	1.39	94.39

ROAD (0.00 + 49.37 + 0.00) = 49.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
SubLeq									

-90	-60	0.65	82.28	0.00	-15.49	-11.85	0.00	-5.57	0.00
49.37									
-90	-60	0.65	82.28	0.00	-15.49	-11.85	0.00	0.00	-0.87
54.07*									
-90	-60	0.65	82.28	0.00	-15.49	-11.85	0.00	0.00	0.00
54.94									

 * Bright Zone !

Segment Leq : 49.37 dBA
 Results segment # 2: hwy401_ovrps (day)

 Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	1.50	1.41	94.41

ROAD (0.00 + 54.59 + 0.00) = 54.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
SubLeq									

-60	25	0.65	82.28	0.00	-15.49	-3.67	0.00	-8.53	0.00
54.59									
-60	25	0.65	82.28	0.00	-15.49	-3.67	0.00	0.00	0.00
63.12*									
-60	25	0.65	82.28	0.00	-15.49	-3.67	0.00	0.00	0.00
63.12									

 * Bright Zone !

Segment Leq : 54.59 dBA
 Results segment # 3: hwy401_hse (day)

 Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	1.50	1.07	94.07

ROAD (0.00 + 51.87 + 0.00) = 51.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
SubLeq									

25	90	0.05	82.28	0.00	-9.86	-4.63	0.00	0.00	-15.92
51.87									

Segment Leq : 51.87 dBA

Results segment # 4: millsts_hse (day)

Source height = 1.37 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
1.37 ! 1.50 ! 1.51 ! 94.51

ROAD (0.00 + 39.90 + 0.00) = 39.90 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

-90 0 0.06 64.69 0.00 -2.88 -3.20 0.00 0.00 -18.71
39.90

Segment Leq : 39.90 dBA

Results segment # 5: millsts_open (day)

Source height = 1.37 m

ROAD (0.00 + 55.97 + 0.00) = 55.97 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

0 90 0.60 64.69 0.00 -4.35 -4.37 0.00 0.00 0.00
55.97

Segment Leq : 55.97 dBA

Total Leq All Segments: 59.70 dBA

Results segment # 1: hwy401_ramp (night)

Source height = 1.78 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

```

-----+-----+-----+-----
          1.78 !           7.50 !           7.25 !           100.25

ROAD (0.00 + 57.66 + 0.00) = 57.66 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-----
-----
-90     -60    0.47  82.28   0.00 -13.80 -10.82   0.00   0.00  -0.05
57.60*
-90     -60    0.47  82.28   0.00 -13.80 -10.82   0.00   0.00   0.00
57.66
-----
-----

```

* Bright Zone !

Segment Leq : 57.66 dBA
Results segment # 2: hwy401_ovrps (night)

Source height = 1.78 m
Barrier height for grazing incidence

```

Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.78 !           7.50 !           7.28 !           100.28

ROAD (0.00 + 64.92 + 0.00) = 64.92 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-----
-----
-60     25    0.47  82.28   0.00 -13.80 -3.56   0.00   0.00   0.00
64.92*
-60     25    0.47  82.28   0.00 -13.80 -3.56   0.00   0.00   0.00
64.92
-----
-----

```

* Bright Zone !

Segment Leq : 64.92 dBA
Results segment # 3: hwy401_hse (night)

Source height = 1.78 m
Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.78 !          7.50 !          6.38 !          99.38

```

ROAD (0.00 + 57.93 + 0.00) = 57.93 dBA

```

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

```

```

-----
          25      90      0.00  82.28      0.00  -9.38  -4.42      0.00      0.00 -10.55
57.93
-----

```

Segment Leq : 57.93 dBA
Results segment # 4: millsts_hse (night)

Source height = 1.37 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.37 !          7.50 !          7.40 !          100.40

```

ROAD (0.00 + 39.39 + 0.00) = 39.39 dBA

```

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

```

```

-----
         -90      0      0.00  61.68      0.00  -2.71  -3.01      0.00      0.00 -16.57
39.39
-----

```

Segment Leq : 39.39 dBA
Results segment # 5: millsts_open (night)

Source height = 1.37 m

ROAD (0.00 + 53.79 + 0.00) = 53.79 dBA

```

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

```

```

-----
          0      90      0.42  61.68      0.00  -3.86  -4.04      0.00      0.00      0.00
53.79
-----

```


Segment Leq : 53.79 dBA

Total Leq All Segments: 66.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.70
(NIGHT): 66.59

Filename: 17169_5z.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: hwy401_house (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 1: hwy401_house (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 155.00 / 155.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with
barrier)
Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
Barrier height : 10.00 m
Barrier receiver distance : 0.50 / 0.50 m
Source elevation : 88.00 m
Receiver elevation : 93.50 m
Barrier elevation : 93.40 m
Reference angle : 0.00

Road data, segment # 2: hwy401_ovrps (day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 2: hwy401_ovrps (day/night)

Angle1 Angle2 : 0.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 155.00 / 155.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 45.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 40.00 / 40.00 m
Source elevation : 89.00 m
Receiver elevation : 93.50 m
Barrier elevation : 88.00 m
Reference angle : 0.00ad data, segment # 3: hwy401_ramp
(day/night)

Car traffic volume : 43736/21864 veh/TimePeriod *
Medium truck volume : 5467/2733 veh/TimePeriod *
Heavy truck volume : 5467/2733 veh/TimePeriod *
Posted speed limit : 100 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): 82000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 10.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 3: hwy401_ramp (day/night)

Angle1 Angle2 : 45.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 155.00 / 155.00 m
Receiver height : 7.50 / 7.50 m

Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 45.00 deg Angle2 : 90.00 deg
 Barrier height : 4.00 m
 Barrier receiver distance : 60.00 / 60.00 m
 Source elevation : 89.00 m
 Receiver elevation : 93.50 m
 Barrier elevation : 89.00 m
 Reference angle : 0.00

Road data, segment # 4: millsts_open (day/night)

 Car traffic volume : 7440/1860 veh/TimePeriod *
 Medium truck volume : 280/70 veh/TimePeriod *
 Heavy truck volume : 280/70 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): 10000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 10.00
 Medium Truck % of Total Volume : 3.50
 Heavy Truck % of Total Volume : 3.50
 Day (16 hrs) % of Total Volume : 80.00

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

 Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 20.00 / 20.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: hwy401_house (day)

 Source height = 1.78 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.78	7.50	7.56	100.96

ROAD (0.00 + 53.11 + 0.00) = 53.11 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
 SubLeq

```
-----
-----
-90      0    0.00  82.28   0.00 -10.14  -3.01   0.00   0.00 -16.02
53.11
-----
-----
```

Segment Leq : 53.11 dBA

Results segment # 2: hwy401_ovrps (day)

Source height = 1.78 m

Barrier height for grazing incidence

```
-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.78 !          7.50 !          10.36 !          98.36
```

ROAD (0.00 + 61.12 + 0.00) = 61.12 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
 SubLeq

```
-----
-----
  0      45    0.11  82.28   0.00 -11.27  -6.07   0.00   0.00   0.00
64.93*
  0      45    0.47  82.28   0.00 -14.93  -6.24   0.00   0.00   0.00
61.12
-----
-----
```

* Bright Zone !

Segment Leq : 61.12 dBA

Results segment # 3: hwy401_ramp (day)

Source height = 1.78 m

Barrier height for grazing incidence

```
-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.78 !          7.50 !          8.04 !          97.04
```


45 90 0.47 82.28 0.00 -14.93 -8.28 0.00 0.00 0.00
59.07

* Bright Zone !

Segment Leq : 59.07 dBA

Results segment # 4: millsts_open (night)

Source height = 1.37 m

ROAD (0.00 + 58.69 + 0.00) = 58.69 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

-90 90 0.48 61.68 0.00 -1.85 -1.14 0.00 0.00 0.00
58.69

Segment Leq : 58.69 dBA

Total Leq All Segments: 64.84 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.78
(NIGHT): 64.84