

Final

Cawthra Road Class EA Environmental Noise Study

Region of Peel



Prepared for Region of Peel
by IBI Group
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1 Introduction

The Region of Peel retained IBI Group to undertake the Class EA Schedule 'B' for proposed improvements to Cawthra Road from Eastgate Parkway to the Queen Elizabeth Way. The proposed improvements are required to meet the needs of the Region to 2031, including satisfying travel demand to and across the study area. The study area extends approximately 5.5 kilometres.

The subject section of Cawthra Road exists as a four-lane arterial road, with several sections that include a third southbound lane. Adjacent land use is primarily residential, with commercial lands located along several sections of road.

The technically preferred improvements to Cawthra Road maintain Cawthra Road with four-lanes of through traffic, but makes improvements at intersections with turn lanes and adds cycling facilities.

The purpose of this subject Environmental Noise Study is to determine the existing noise levels, and to forecast future noise levels under the proposed improvements to Cawthra Road, in order to identify if noise mitigation measures are required, and if so to recommend these measures.

It is worthy to note that the following public noise enquiries have been received by the Region of Peel for Cawthra Road:

- [REDACTED]: Request for a better sound barrier fence in the yard for property that backs onto Cawthra Road. The noise wall was identified in the Region's Private Noise Wall conversion program. Replacement will be coordinated with the Cawthra Road improvements (Received October 2018);
- [REDACTED]: Request for sound deflection for the property that backs onto the west side of Cawthra Road, north of Bloor Street. For example, bushes or cedars taller than the 5 ft. fence installed by the property owner (shared with IBI in August 2018);
- **Two other noise enquiries:** Regional Staff noted two other noise enquiries on Cawthra Road, outside (south) of the Study Area.

2 Noise Criteria

Environmental noise assessments for road improvement projects typically consider noise levels at Outdoor Living Areas (OLAs) since noise mitigation at existing buildings is not typically practical given the building exists and its receiver locations are typically elevated.

The Region of Peel has adopted a policy for noise mitigation on municipal roads. This policy is documented in a June 1996 Council Report (W30-04). This policy was utilized to determine where noise walls are warranted. Accordingly, noise attenuation using noise walls will be considered for OLAs for existing residential properties under the following conditions:

- When forecasted noise levels are predicted to be above 60 dBA (16-hour LEQ);
- If the proposed noise wall will provide a reduction of 5 dB or more over the 0700 to 2300 time period; and
- If the outdoor living area (OLA) for each residential lot has side-yard and rear-yard exposure to Cawthra Road.

3 Noise Prediction Methods

The MECP’s noise modeling software, STAMSON v5.04 which incorporates ‘Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT)’, was used to determine the noise levels generated for existing and future conditions. This software is recognized for the purposes of traffic (vehicular and rail) noise modelling in Ontario.

STAMSON output for the scenarios modelled in this study is included in **Appendix A**.

4 Traffic Data

Year 2015, 24-hour vehicle classification counts provided by the Region of Peel were used as input to this Environmental Noise Study. The data contained detailed information on annual average daily traffic (AADT) for Cawthra Road and other associated data.

The traffic data were divided into six sections, and are summarized in Table 1. The locations of the traffic counts are as follows:

- **Section 1:** Station ID 01707065, Cawthra Road, 1.0 km north of Burnhamthorpe Road;
- **Section 2:** Station ID 01705114, Cawthra Road, 0.2 km north of Bloor Street;
- **Section 3:** Station ID 01704419, Cawthra Road, 0.5 km north of Silvercreek Boulevard;
- **Section 4:** Station ID 01703127, Cawthra Road, 0.2 km north of Queensway (RR20);
- **Section 5:** Station ID 01702699, Cawthra Road, 0.1 km north of Tedwyn Drive; and
- **Section 6:** Station ID 01701301, Cawthra Road, 0.1 km north of Arbor Street.

Table 1 – Traffic Data

ITEM	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6
2015 Average Annual Daily Traffic (AADT)	31,100	35,000	38,700	35,400	37,700	26,200
Annual Growth Rate (%)	0.83	0.83	0.83	0.83	0.83	0.83
Years of Growth (2015-2031)	16	16	16	16	16	16
Medium Trucks (%)	4.4	5.1	5.3	4.9	5.7	4.6
Heavy Trucks (%)	2.7	3.4	3.3	2.7	5.2	2.8
Road Grade (%)	< 2	< 2	< 2	< 2	< 2	< 2
Posted Speed Limit (km/h)	50	50	50	50	50	50
Day / Night Split (%)	90/10	90/10	90/10	90/10	90/10	90/10

5 Noise Sensitive Points of Reception

For this study, noise sensitive “points of reception” were identified along Cawthra Road using aerial photographs and property information provided by the Region of Peel.

A “worst-case” representative Outdoor Living Area (OLA) receiver location was identified within Section 3. This OLA receiver is located 3.0m from the face of the residential building as per MECP guidelines. This receiver location is considered to be ‘worst-case’ location as it is closest and most exposed to Cawthra Road, and experiences the highest traffic volume. This receiver location will represent all receiver locations and be used to determine the effectiveness of a noise wall in reducing future noise levels at the OLA (refer to Section 6.2).

6 Results

6.1 Free-Field Analysis

A free-field analysis was completed using STAMSON to determine the maximum limits (distance) of impact from Cawthra Road on adjacent residential properties. This analysis is an assessment of noise impacts without consideration for any physical mitigation that would provide for reduction of noise. All residential properties found within the free-field area with daytime noise level in excess of 60 dBA would be further investigated to determine if they should be considered for the implementation of noise mitigation measures.

The existing and future conditions 60dBA free-field limits for each of the six sections of Cawthra road are provided in Table 2 and shown on Figures N1 to N13 (included in Appendix B).

Table 2 – Free-Field Limits (60 dBA)

Location	Existing (2015) 60 dBA Free-Field Limit (m)	Future (2031) 60 dBA Free-Field Limit (m)
Section 1	47.9	51.8
Section 2	55.6	60.2
Section 3	58.0	62.8
Section 4	50.7	55.0
Section 5	71.3	77.2
Section 6	43.7	47.4

From these results, and based on the Region of Peel criteria, all OLAs on rear-facing and side-facing residential lots within the free-field limits should be considered for noise wall attenuation.

6.2 Receivers

In order to facilitate investigation, a typical worst-case receiver location was established to represent the OLA for the residential properties along Cawthra Road. The worst case location was established to be 25.0m from the centreline of Cawthra Road. The distance from the OLA receiver location to a potential noise wall at the rear property line (the road right-of-way limit) is 10.0m.

The existing and future conditions of the typical receiver location were modelled in STAMSON. The results are summarized in Table 3 and shows the difference between the current and future noise levels for the worst case OLA receiver location.

Table 3 – OLA Sound Levels for Unmitigated Conditions

POINT OF RECEPTION	SOUND LEVEL (DBA)		DIFFERENCE (dBA)
	EXISTING (2015)	FUTURE (2031)	
OLA	66.0	66.6	0.6

The use of noise walls for noise mitigation at the OLAs was modelled in STAMSON for future conditions. Table 4 provides the results of using a 2.5m high noise wall to reduce the noise levels at the representative OLA.

Table 4 – OLA Sound Levels for Future Unmitigated and Mitigated Conditions

POINT OF RECEPTION	SOUND LEVEL (DBA)		DIFFERENCE (DBA)
	FUTURE (2031)	FUTURE (2031) – WITH BARRIER	
OLA	66.6	59.9	6.7

Given noise levels at the OLA locations are above 60 dBA, and as the noise level reduction utilizing a 2.5m noise wall is greater than 5 dBA, based on Region of Peel criteria, noise mitigation in the form of a noise wall is warranted.

7 Noise Wall Locations

7.1 Existing

Along the subject road corridor sections of existing noise wall and privacy fence exist – these are shown on Figures N1 to N13. The locations shown are based on a review of inventories provided by the Region of Peel as well as review of aerial imagery. A summary of the existing noise walls and fences within the Study Area follows:

- Approximately 820 m of private noise walls;
- Approximately 1840 m of Regional noise walls;
- Approximately 160 m of privacy fences (not considered to effectively reduce noise).

7.2 Proposed

As demonstrated in the preceding discussion, noise mitigation is warranted in the form of a noise wall constructed along the right-of-way limit.

Noise barriers are proposed for residential properties with rear-yards or side-yards facing Cawthra Road. On residential properties which front Cawthra Road, noise barriers are not proposed as the OLA is in the rear yard and thus the building would act as a noise barrier.

Further, on these fronting properties, the barrier would not be practical as it would block access to the existing driveway, and a gap for the driveway would make the barrier ineffective.

Although noise walls for single lots with rear-yard or side-yard exposure to Cawthra Road do not warrant noise walls as per Regional policy, existing noise walls for individual lots that require replacement will be considered on an individual basis.

The locations for the proposed noise walls are shown on Figure N1 to N13. The following notes are made:

- Front-facing lots that do not warrant a noise wall are labelled on the Figures with an 'F' symbol;
- Several residential lots have rear-yards facing Cawthra Road and are adjacent to front-facing lots. Noise walls would be effective for these rear-facing lots only if the noise wall wrapped around the side yards of the lot.

As per Region's policy, eligible private noise walls will be replaced with new walls to be located on property line. These new walls become Regional assets so maintenance becomes the Region's responsibility.

Details of walls that wrap around side-yards are not covered under the Region's policy and project specific discussions would be required during detailed design to address these situations. For example, existing or newly proposed noise walls that wrap around may be constructed by the Region but maintenance would be the responsibility of the landowner. Alternatively, an easement could be provided and the Region would assume responsibility for maintenance.

Decisions regarding replacement or construction of specific noise walls would therefore be subject to further discussions between the Region and property owners, and further analysis during detailed design.

8 Construction Noise

The construction of the proposed improvements on Cawthra Road will cause construction noise. This noise is temporary in nature and typically difficult to control. Accordingly, MECP does not require mitigation of construction and instead imposes noise emission standards on the construction equipment. The MECP NPC-115 guidelines provide noise emission standards as summarized in Table 5.

Table 5 – NPC-115 Noise Emission Limits for Construction Equipment

EQUIPMENT TYPE	MAXIMUM SOUND POWER LEVEL (DBA)	POWER RATING (KW)
Excavators, loaders, bulldozers, backhoes	83	< 75
	85	> 75
Pneumatic Pavement Breakers	85	-
Portable Air Compressors	70	-

Further, City of Mississauga noise bylaws will have further restrictions on noise generation, typically including time periods for when construction can occur.

The Contractor should follow the MECP and City of Mississauga requirements for construction noise.

9 Recommendations

Based on the results of this study, mitigation measures are warranted for noise sensitive Outdoor Living Areas per the Region of Peel construction noise guidelines. The following recommendations are made:

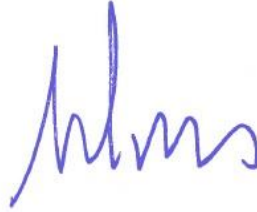
1. Noise walls should be constructed at the limits of the Cawthra Road right-of-way for those residential properties backing onto Cawthra Road. Refer to Figures N1 to N13 for the existing and proposed noise wall locations.
2. At time of final road design, the location of the noise walls should be verified, and cost-sharing and maintenance responsibilities should be identified.
3. Construction noise should adhere to the City of Mississauga noise by-law requirements, and the Construction Equipment should adhere to MECP's NPC-115.

All of which is respectfully submitted.

IBI GROUP

A handwritten signature in blue ink, appearing to be 'JP' with a large loop at the end.

John Perks, MBA, P.Eng.
Associate Director

A handwritten signature in blue ink, appearing to be 'AK' with a large loop at the end.

Andy Kroess, M.Eng., P.Eng.
Engineer

Appendix A – STAMSON Model Output

Filename: secl.te Time Period: Day/Night 16/8 hours
 Description: **Section 1: Existing Free-Field Limits Daytime**

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

 Car traffic volume : 26003/2889 veh/TimePeriod *
 Medium truck volume : 1232/137 veh/TimePeriod *
 Heavy truck volume : 756/84 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): 31100
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 4.40
 Heavy Truck % of Total Volume : 2.70
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Cawthra Rd (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 : 46.87 / 46.87 m
 Receiver height : 1.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

 Source height = 1.28 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.67	0.00	-8.21	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

 Source height = 1.28 m

ROAD (0.00 + 54.02 + 0.00) = 54.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.14	0.00	-7.80	-1.31	0.00	0.00	0.00	54.02

Segment Leq : 54.02 dBA

Total Leq All Segments: 54.02 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

STAMSON 5.0 NORMAL REPORT Date: 12-09-2019 11:15:36
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: sec2.te Time Period: Day/Night 16/8 hours
 Description: **Section 2: Existing Free-Field Limits Daytime**

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

Car traffic volume	: 28823/3203	veh/TimePeriod	*
Medium truck volume	: 1607/179	veh/TimePeriod	*
Heavy truck volume	: 1071/119	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):	35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 5.10
Heavy Truck % of Total Volume	: 3.40
Day (16 hrs) % of Total Volume	: 90.00

Data for Segment # 1: Cawthra Rd (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	:	55.08 / 55.67	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

Results segment # 1: Cawthra Rd (day)

Source height = 1.36 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.83	0.00	-9.38	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.36 m

ROAD (0.00 + 54.03 + 0.00) = 54.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	64.30	0.00	-8.97	-1.31	0.00	0.00	0.00	54.03

Segment Leq : 54.03 dBA

Total Leq All Segments: 54.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

STAMSON 5.0 NORMAL REPORT Date: 12-09-2019 11:18:49
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: sec3.te Time Period: Day/Night 16/8 hours
 Description: **Section 3: Existing Free-Field Limits Daytime**

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

Car traffic volume : 31835/3537 veh/TimePeriod *

Medium truck volume : 1846/205 veh/TimePeriod *

Heavy truck volume : 1149/128 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): 38700

Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00

Medium Truck % of Total Volume : 5.30

Heavy Truck % of Total Volume : 3.30

Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Cawthra Rd (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 : 58.16 / 58.04 m
 Receiver height : 1.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

 Source height = 1.35 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.66 71.23 0.00 -9.77 -1.46 0.00 0.00 0.00 60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

 Source height = 1.35 m

ROAD (0.00 + 54.14 + 0.00) = 54.14 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.57 64.70 0.00 -9.25 -1.31 0.00 0.00 0.00 54.14

Segment Leq : 54.14 dBA

Total Leq All Segments: 54.14 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

STAMSON 5.0 NORMAL REPORT Date: 12-09-2019 11:21:20
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: sec4.te Time Period: Day/Night 16/8 hours
 Description: **Section 4: Existing Free-Field Limits Daytime**

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

 Car traffic volume : 29439/3271 veh/TimePeriod *
 Medium truck volume : 1561/173 veh/TimePeriod *
 Heavy truck volume : 860/96 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): 35400
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 4.90
Heavy Truck % of Total Volume : 2.70
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Cawthra Rd (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 : 51.29 / 50.76 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

Source height = 1.28 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.32	0.00	-8.86	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.28 m

ROAD (0.00 + 54.14 + 0.00) = 54.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.80	0.00	-8.35	-1.31	0.00	0.00	0.00	54.14

Segment Leq : 54.14 dBA

Total Leq All Segments: 54.14 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

Filename: sec5.te Time Period: Day/Night 16/8 hours
 Description: **Section 5: Existing Free-Field Limits Daytime**

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

 Car traffic volume : 30232/3359 veh/TimePeriod *
 Medium truck volume : 1934/215 veh/TimePeriod *
 Heavy truck volume : 1764/196 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): 37700
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 5.70
 Heavy Truck % of Total Volume : 5.20
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Cawthra Rd (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 : 67.93 / 71.36 m
 Receiver height : 1.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

 Source height = 1.51 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.34	0.00	-10.89	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

 Source height = 1.51 m


```
-----
-90      90      0.66  69.04   0.00  -7.58  -1.46   0.00   0.00   0.00  60.00
-----
```

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.29 m

ROAD (0.00 + 53.86 + 0.00) = 53.86 dBA

```
-----
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
-90      90      0.58  62.50   0.00  -7.33  -1.31   0.00   0.00   0.00  53.86
-----
```

Segment Leq : 53.86 dBA

Total Leq All Segments: 53.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

STAMSON 5.0 NORMAL REPORT Date: 12-09-2019 11:11:40
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: reclf.te Time Period: Day/Night 16/8 hours
 Description: **Section 1: Future Free-Field Limits Daytime**

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

```
-----
Car traffic volume   : 29679/3298   veh/TimePeriod  *
Medium truck volume : 1406/156    veh/TimePeriod  *
Heavy truck volume  : 863/96     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): 31100
Percentage of Annual Growth       : 0.83
Number of Years of Growth         : 16.00
Medium Truck % of Total Volume    : 4.40
Heavy Truck % of Total Volume     : 2.70
Day (16 hrs) % of Total Volume    : 90.00
```

Data for Segment # 1: Cawthra Rd (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 : 50.76 / 15.00 m
 Receiver height : 1.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

Source height = 1.28 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.24	0.00	-8.79	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.28 m

ROAD (0.00 + 62.40 + 0.00) = 62.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.71	0.00	0.00	-1.31	0.00	0.00	0.00	62.40

Segment Leq : 62.40 dBA

Total Leq All Segments: 62.40 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

STAMSON 5.0 NORMAL REPORT Date: 12-09-2019 11:17:39
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec2f.te Time Period: Day/Night 16/8 hours
 Description: **Section 2: Future Free-Field Limits Daytime**

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

Car traffic volume : 32898/3655 veh/TimePeriod *
 Medium truck volume : 1834/204 veh/TimePeriod *
 Heavy truck volume : 1222/136 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): 35000
Percentage of Annual Growth : 0.83
Number of Years of Growth : 16.00
Medium Truck % of Total Volume : 5.10
Heavy Truck % of Total Volume : 3.40
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Cawthra Rd (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 : 59.64 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

Source height = 1.36 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 71.40 0.00 -9.95 -1.46 0.00 0.00 0.00 60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.36 m

ROAD (0.00 + 63.57 + 0.00) = 63.57 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.57 64.88 0.00 0.00 -1.31 0.00 0.00 0.00 63.57

Segment Leq : 63.57 dBA

Total Leq All Segments: 63.57 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

Filename: rec3f.te Time Period: Day/Night 16/8 hours
Description: **Section 3: Future Free-Field Limits Daytime**

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

Car traffic volume : 36336/4037 veh/TimePeriod *
Medium truck volume : 2107/234 veh/TimePeriod *
Heavy truck volume : 1312/146 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): 38700
Percentage of Annual Growth : 0.83
Number of Years of Growth : 16.00
Medium Truck % of Total Volume : 5.30
Heavy Truck % of Total Volume : 3.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Cawthra Rd (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 : 63.01 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

Source height = 1.35 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 71.80 0.00 -10.35 -1.46 0.00 0.00 0.00 60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.35 m


```
-----
-90      90      0.66  70.90   0.00  -9.44  -1.46   0.00   0.00   0.00  60.00
-----
```

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.28 m

ROAD (0.00 + 63.05 + 0.00) = 63.05 dBA

```
-----
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
-90      90      0.58  64.36   0.00   0.00  -1.31   0.00   0.00   0.00  63.05
-----
```

Segment Leq : 63.05 dBA

Total Leq All Segments: 63.05 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

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Filename: sec5f.te Time Period: Day/Night 16/8 hours
 Description: **Section 5: Future Free-Field Limits Daytime**

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

```
-----
Car traffic volume : 34506/3834 veh/TimePeriod *
Medium truck volume : 2207/245 veh/TimePeriod *
Heavy truck volume : 2014/224 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): 37700
Percentage of Annual Growth : 0.83
Number of Years of Growth : 16.00
Medium Truck % of Total Volume : 5.70
Heavy Truck % of Total Volume : 5.20
Day (16 hrs) % of Total Volume : 90.00
```

Data for Segment # 1: Cawthra Rd (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 : 73.49 / 71.36 m
 Receiver height : 1.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

Source height = 1.51 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.91	0.00	-11.45	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.51 m

ROAD (0.00 + 54.45 + 0.00) = 54.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	66.38	0.00	-10.63	-1.30	0.00	0.00	0.00	54.45

Segment Leq : 54.45 dBA

Total Leq All Segments: 54.45 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

STAMSON 5.0 NORMAL REPORT Date: 12-09-2019 12:37:52
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec6f.te Time Period: Day/Night 16/8 hours
 Description: **Section 6: Future Free-Field Limits Daytime**

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

Car traffic volume : 24922/2769 veh/TimePeriod *
 Medium truck volume : 1238/138 veh/TimePeriod *
 Heavy truck volume : 754/84 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): 26200
Percentage of Annual Growth : 0.83
Number of Years of Growth : 16.00
Medium Truck % of Total Volume : 4.60
Heavy Truck % of Total Volume : 2.80
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Cawthra Rd (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 : 46.50 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

Source height = 1.29 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.62	0.00	-8.16	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.29 m

ROAD (0.00 + 61.78 + 0.00) = 61.78 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.09	0.00	0.00	-1.31	0.00	0.00	0.00	61.78

Segment Leq : 61.78 dBA

Total Leq All Segments: 61.78 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

Filename: rec3r.te Time Period: Day/Night 16/8 hours
Description: **Typical Section: Existing Daytime**

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

Car traffic volume : 31835/3537 veh/TimePeriod *
Medium truck volume : 1846/205 veh/TimePeriod *
Heavy truck volume : 1149/128 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): 38700
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 5.30
Heavy Truck % of Total Volume : 3.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Cawthra Rd (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

Source height = 1.35 m

ROAD (0.00 + 66.09 + 0.00) = 66.09 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 71.23 0.00 -3.68 -1.46 0.00 0.00 0.00 66.09

Segment Leq : 66.09 dBA

Total Leq All Segments: 66.09 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.35 m


```
-----
-90      90      0.66  71.80   0.00  -3.68  -1.46   0.00   0.00   0.00  66.66
-----
```

Segment Leq : 66.66 dBA

Total Leq All Segments: 66.66 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.35 m

```
ROAD (0.00 + 60.47 + 0.00) = 60.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
-90      90      0.57  65.27   0.00  -3.49  -1.31   0.00   0.00   0.00  60.47
-----
```

Segment Leq : 60.47 dBA

Total Leq All Segments: 60.47 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.66

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Filename: rec3rw.te Time Period: Day/Night 16/8 hours
 Description: **Typical Receiver: Future Daytime with Wall**

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

```
-----
Car traffic volume : 36336/4037 veh/TimePeriod *
Medium truck volume : 2107/234 veh/TimePeriod *
Heavy truck volume : 1312/146 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): 38700
Percentage of Annual Growth : 0.83
Number of Years of Growth : 16.00
Medium Truck % of Total Volume : 5.30
Heavy Truck % of Total Volume : 3.30
Day (16 hrs) % of Total Volume : 90.00
```

Data for Segment # 1: Cawthra Rd (day/night)

```
-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
```

Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 2.50 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Cawthra Rd (day)

Source height = 1.35 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.35	1.50	1.44	1.44

ROAD (0.00 + 59.93 + 0.00) = 59.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	71.80	0.00	-3.36	-1.20	0.00	0.00	-7.31	59.93

Segment Leq : 59.93 dBA

Total Leq All Segments: 59.93 dBA

Results segment # 1: Cawthra Rd (night)

Source height = 1.35 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.35	4.50	2.40	2.40

ROAD (0.00 + 59.20 + 0.00) = 59.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.42	65.27	0.00	0.00	-1.03	0.00	0.00	-5.05	59.20

Segment Leq : 59.20 dBA

Total Leq All Segments: 59.20 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 59.93

Appendix B – Noise Wall Locations

FIGURE N1: STA 9+500 TO STA 9+960

FIGURE N2: STA 9+960 TO STA 10+440

FIGURE N3: STA 10+440 TO STA 10+920

FIGURE N4: STA 10+920 TO STA 11+400

FIGURE N5: STA 11+400 TO STA 11+900

FIGURE N6: STA 11+900 TO STA 12+380

FIGURE N7: STA 12+380 TO STA 12+860

FIGURE N8: STA 12+860 TO STA 13+340

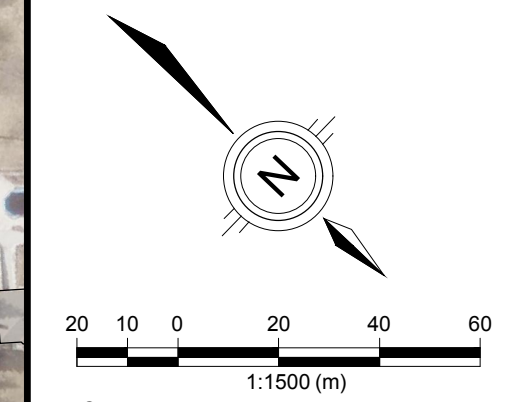
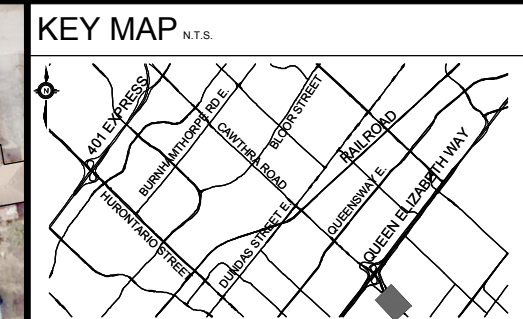
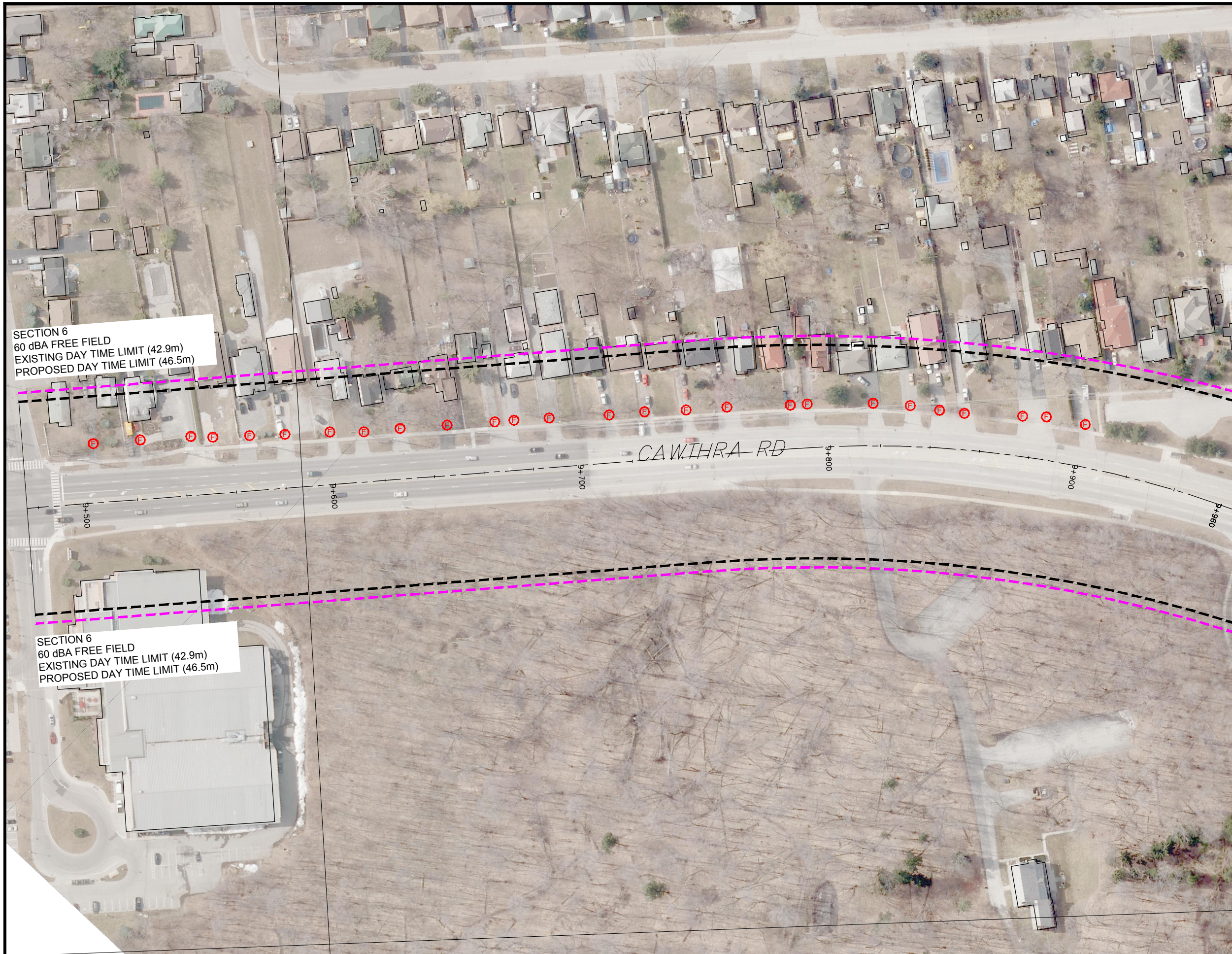
FIGURE N9: STA 13+340 TO STA 13+820

FIGURE N10: STA 13+820 TO STA 14+320

FIGURE N11: STA 14+320 TO STA 14+800

FIGURE N12: STA 14+800 TO STA 15+280

FIGURE N13: STA 15+280 TO STA 15+600



- LEGEND**
- Ⓡ FRONT YARD ABUTTING ROAD
 - EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - PROPERTY LINE
 - PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - ROAD CENTRELINE
 - ▭ BUILDING FOOTPRINT
 - EXISTING NOISE WALL
 - PROPOSED NOISE WALL
 - EXISTING PRIVACY FENCE

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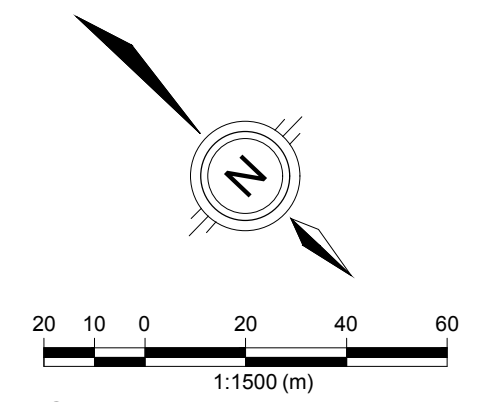
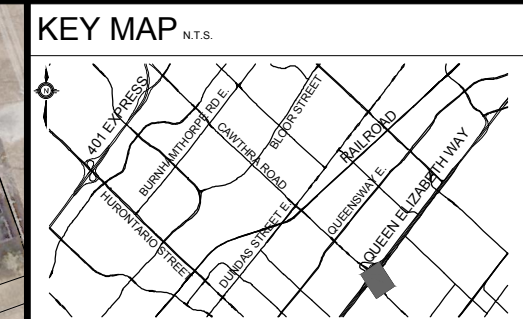
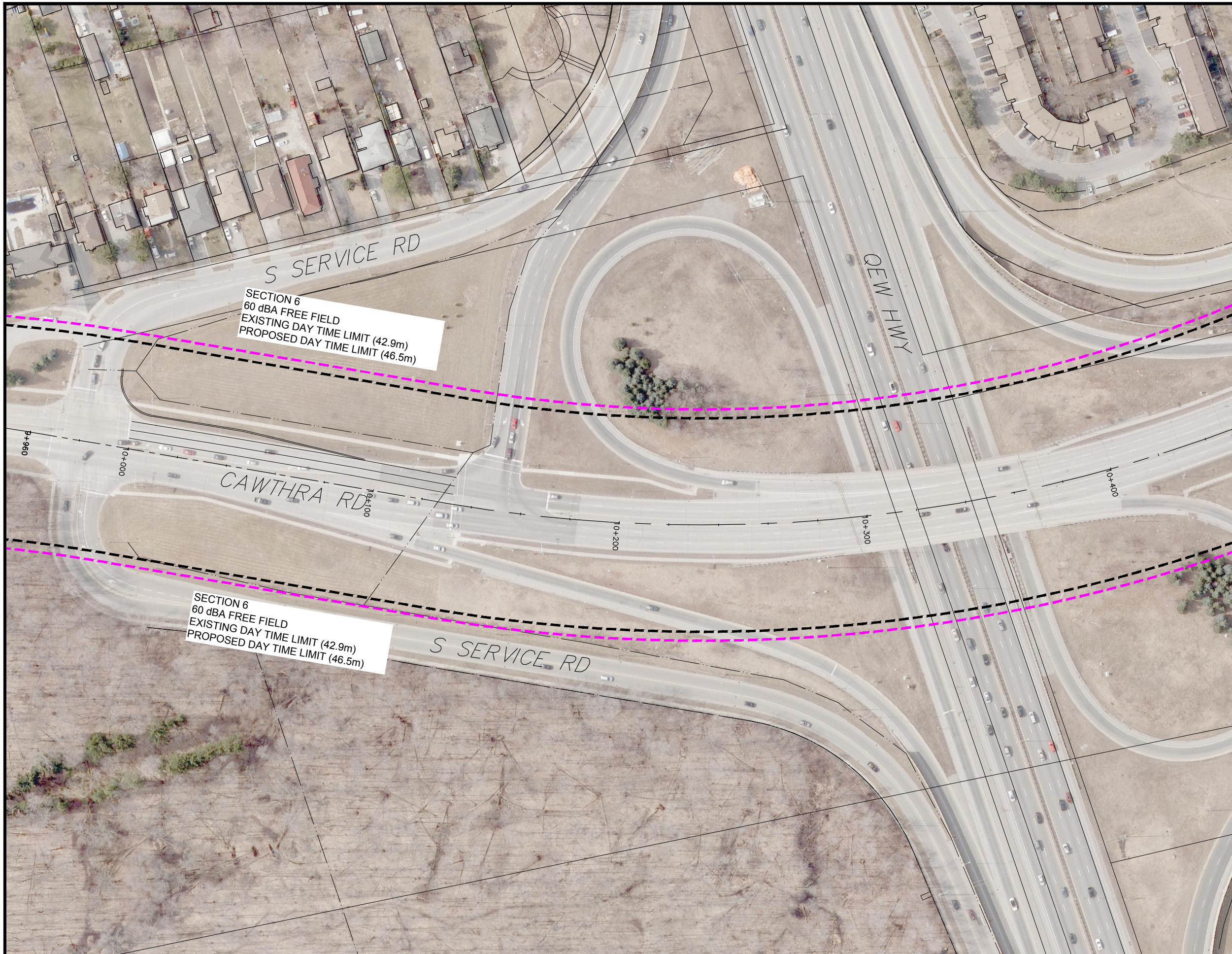
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 DATE SEPTEMBER 2019
 PROJECT No. 107341

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 CITY OF MISSISSAUGA

REGION OF PEEL
 10 Peel Centre Drive, Brampton

NOISE INFORMATION PLAN
 ROAD TRAFFIC
 STA 9+500 TO STA 9+960

FIGURE N1



LEGEND

	FRONT YARD ABUTTING ROAD
	EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
	PROPERTY LINE
	PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
	ROAD CENTRELINE
	BUILDING FOOTPRINT
	EXISTING NOISE WALL
	PROPOSED NOISE WALL
	EXISTING PRIVACY FENCE

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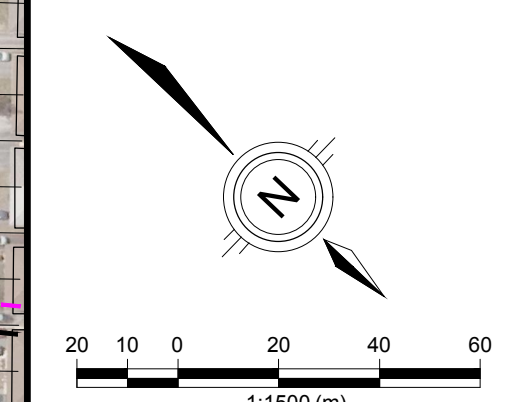
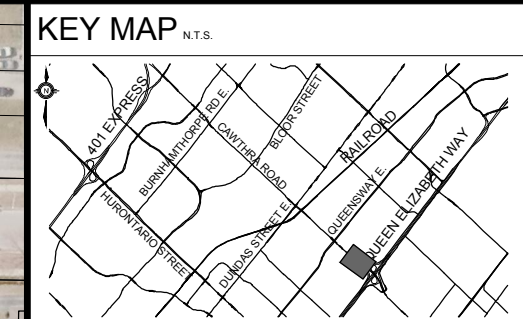
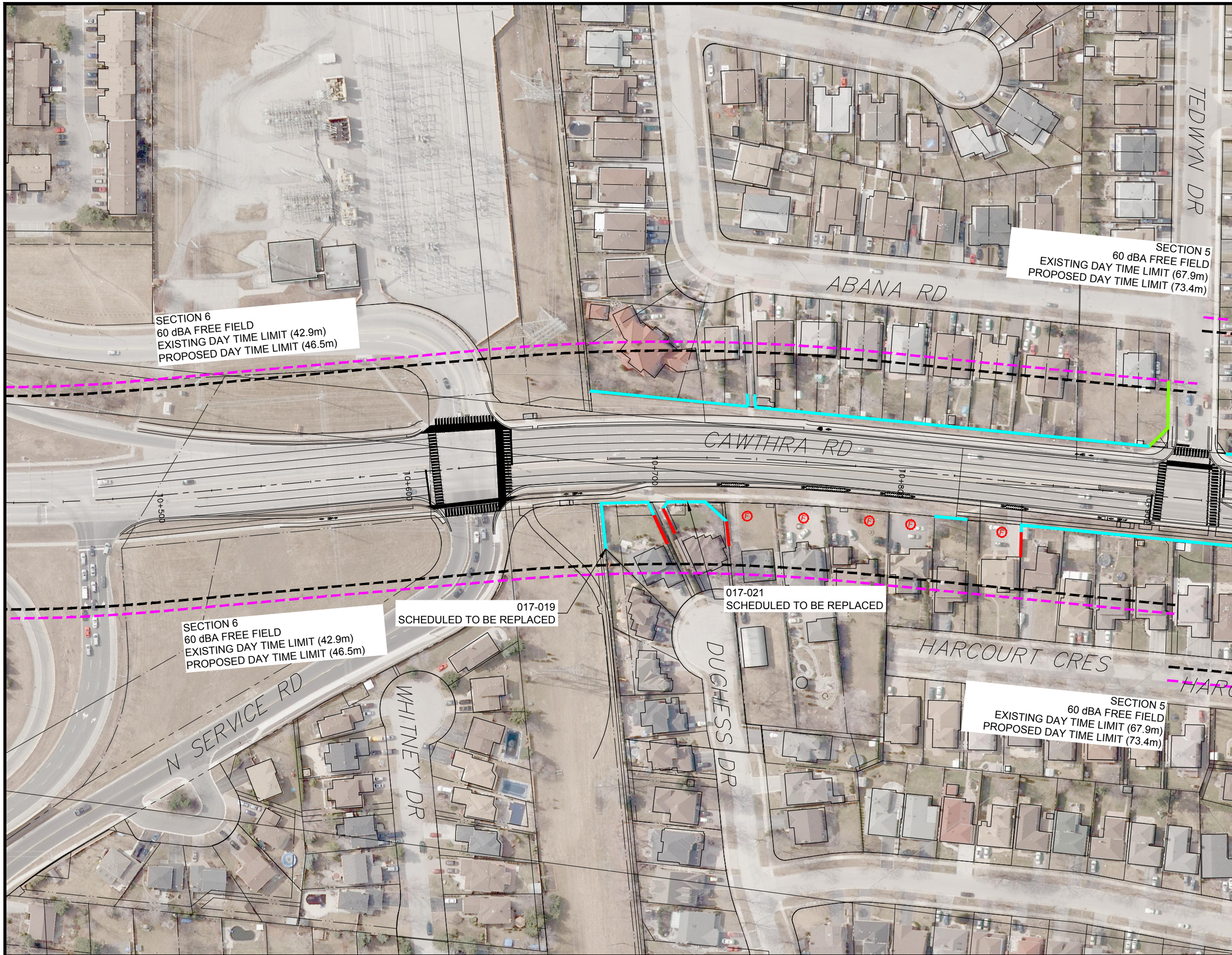
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PROJECT No.	107341

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ROAD TRAFFIC
STA 9+960 TO STA 10+440

FIGURE N2



- LEGEND**
- Ⓡ FRONT YARD ABUTTING ROAD
 - EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - PROPERTY LINE
 - - - PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - ROAD CENTRELINE
 - ▭ BUILDING FOOTPRINT
 - EXISTING NOISE WALL
 - PROPOSED NOISE WALL
 - EXISTING PRIVACY FENCE

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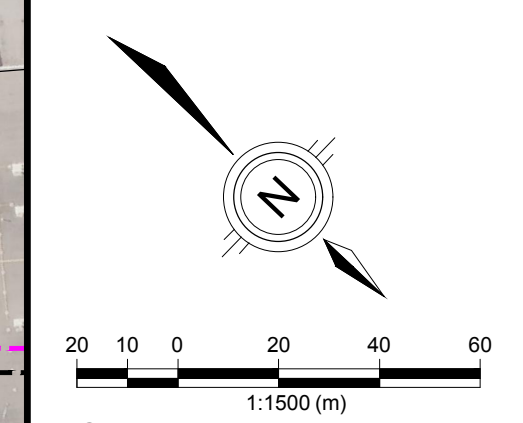
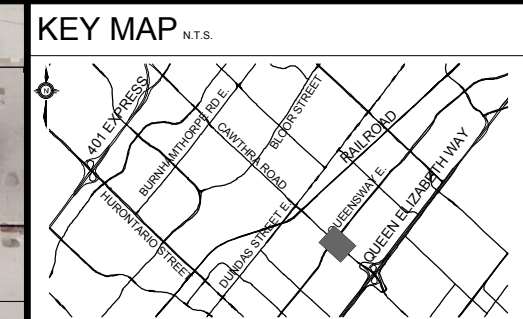
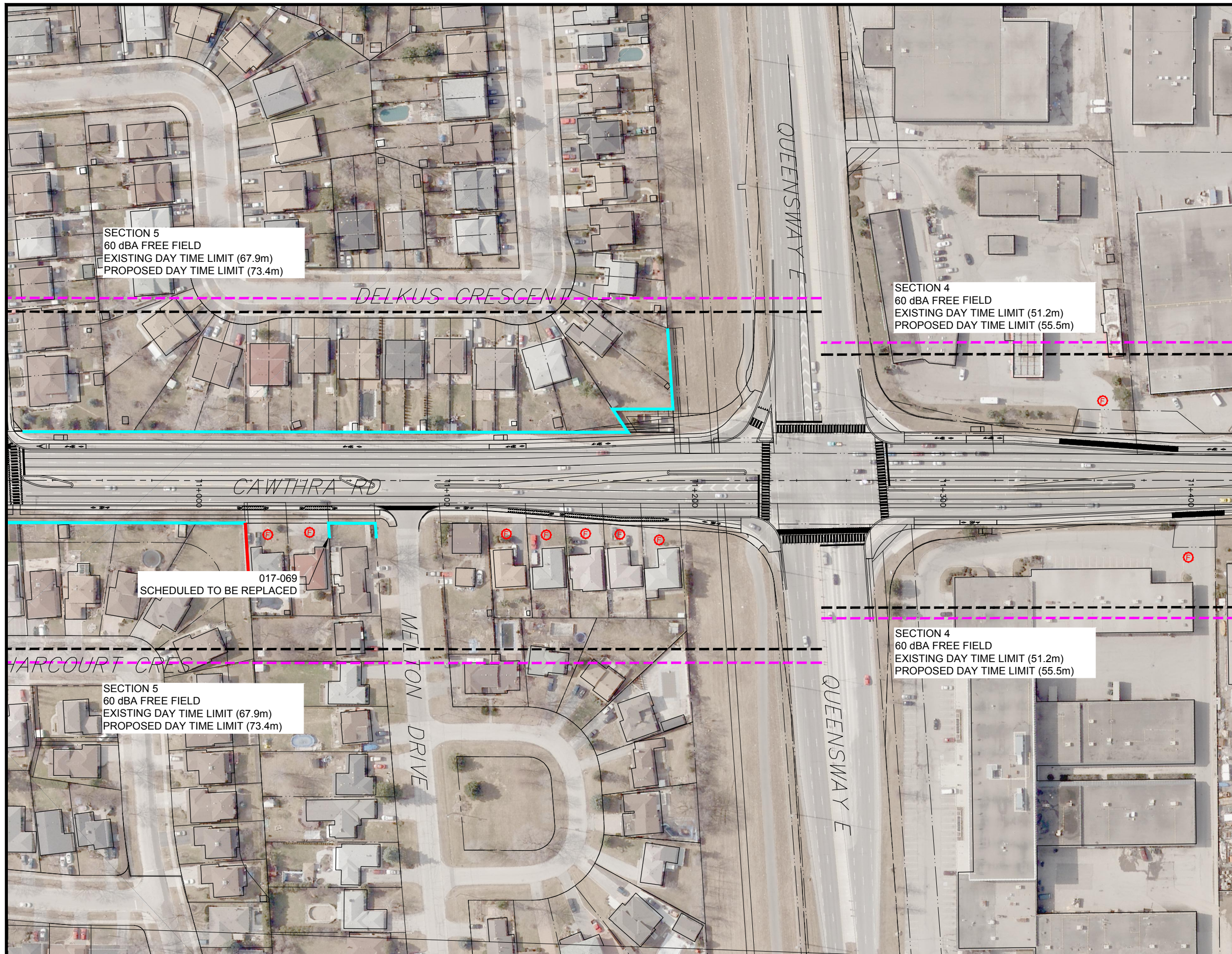
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NOISE INFORMATION PLAN
 ROAD TRAFFIC
 STA 10+440 TO STA 10+920

FIGURE N3



LEGEND

- ⓔ FRONT YARD ABUTTING ROAD
- EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
- PROPERTY LINE
- PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
- ROAD CENTRELINE
- BUILDING FOOTPRINT
- EXISTING NOISE WALL
- PROPOSED NOISE WALL
- EXISTING PRIVACY FENCE

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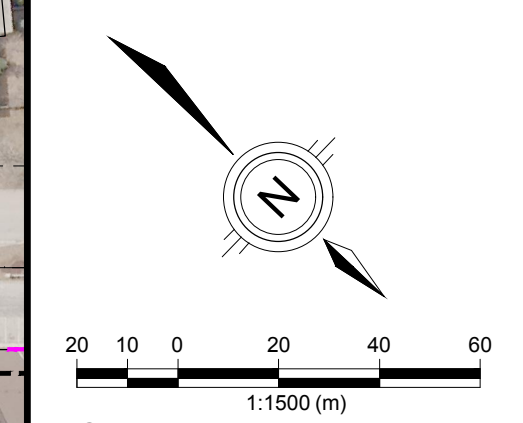
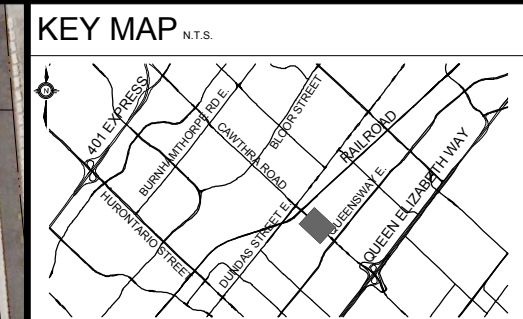
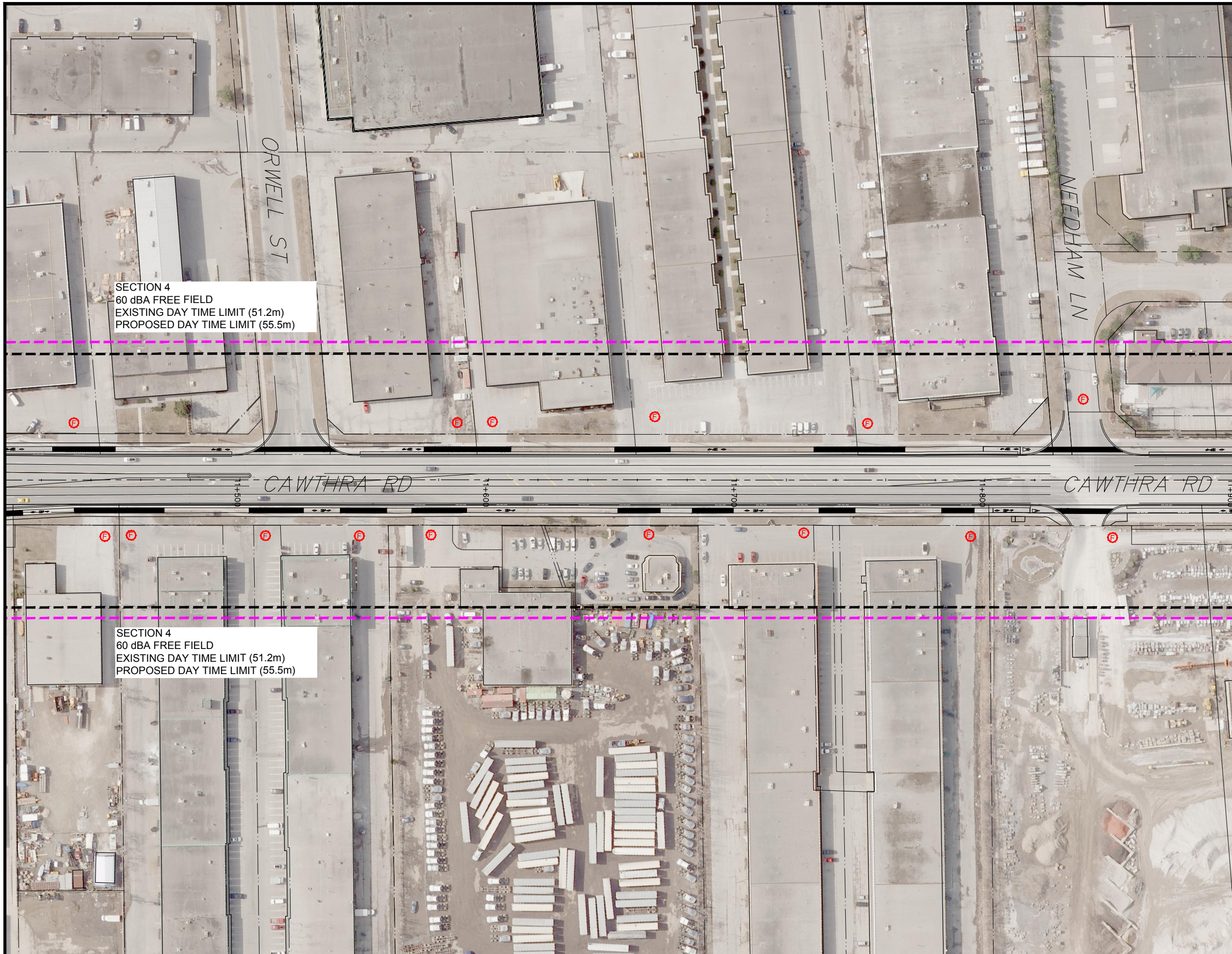
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 CITY OF MISSISSAUGA

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NOISE INFORMATION PLAN
 ROAD TRAFFIC
 STA 10+920 TO STA 11+400

FIGURE N4



- LEGEND**
- Ⓡ FRONT YARD ABUTTING ROAD
 - EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - PROPERTY LINE
 - PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - ROAD CENTRELINE
 - ▭ BUILDING FOOTPRINT
 - ▬ EXISTING NOISE WALL
 - ▬ PROPOSED NOISE WALL
 - ▬ EXISTING PRIVACY FENCE

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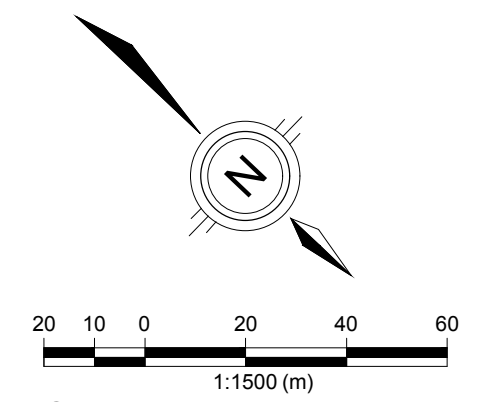
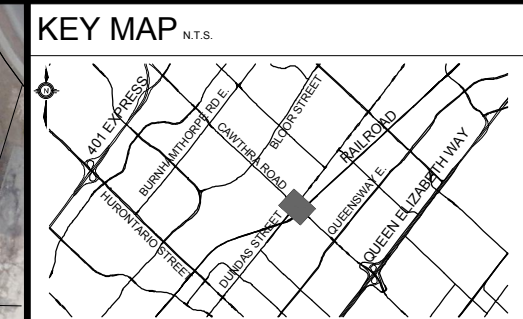
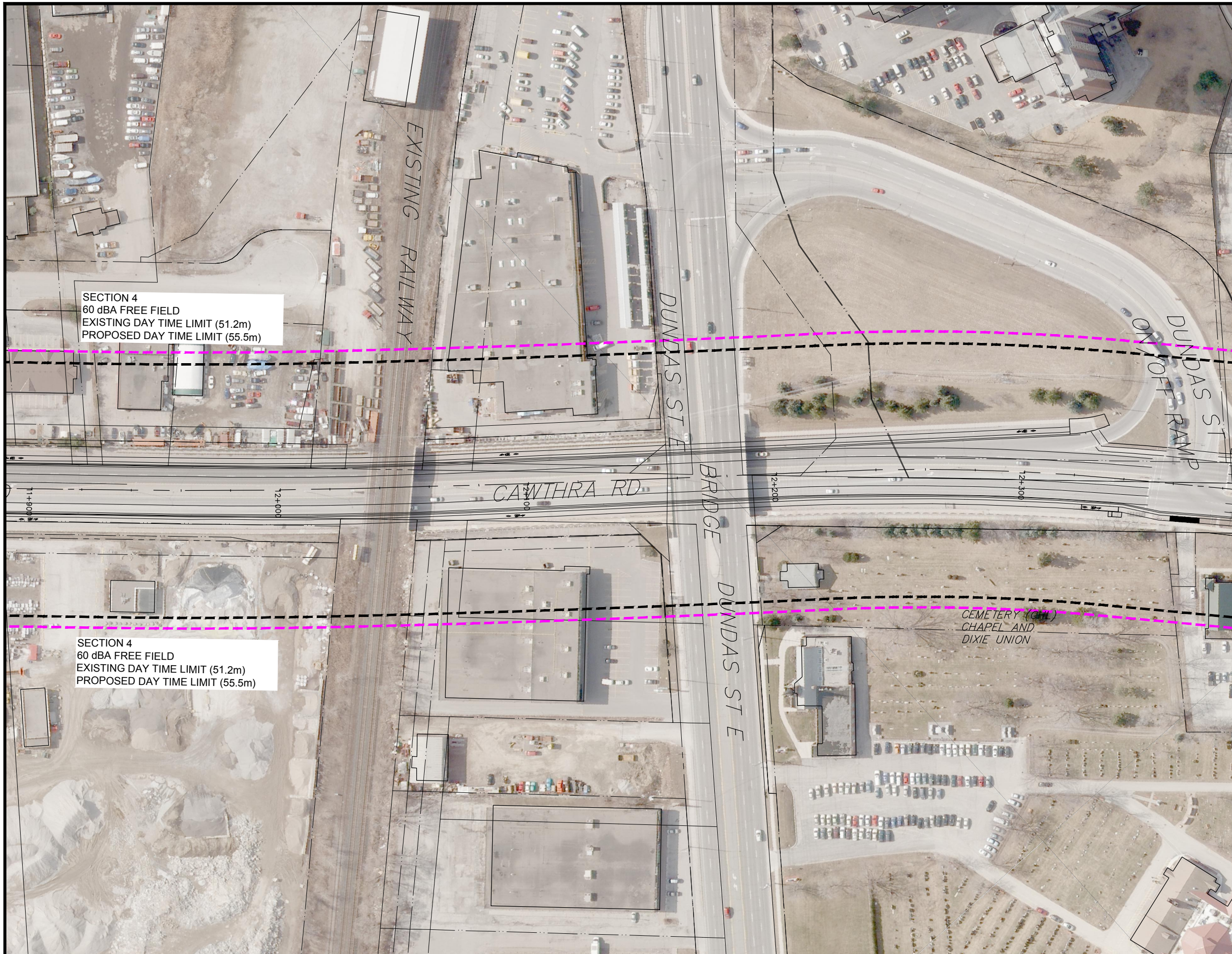
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NOISE INFORMATION PLAN
 ROAD TRAFFIC
 STA 11+400 TO STA 11+900

FIGURE N5



- LEGEND**
- FRONT YARD ABUTTING ROAD
 - EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - PROPERTY LINE
 - PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - ROAD CENTRELINE
 - BUILDING FOOTPRINT
 - EXISTING NOISE WALL
 - PROPOSED NOISE WALL
 - EXISTING PRIVACY FENCE

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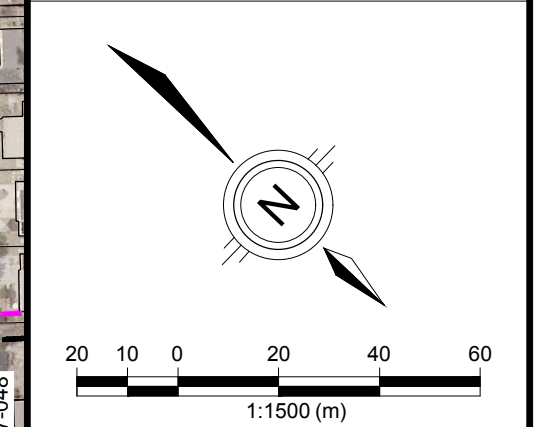
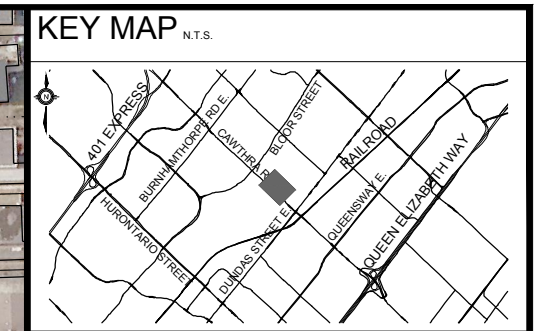
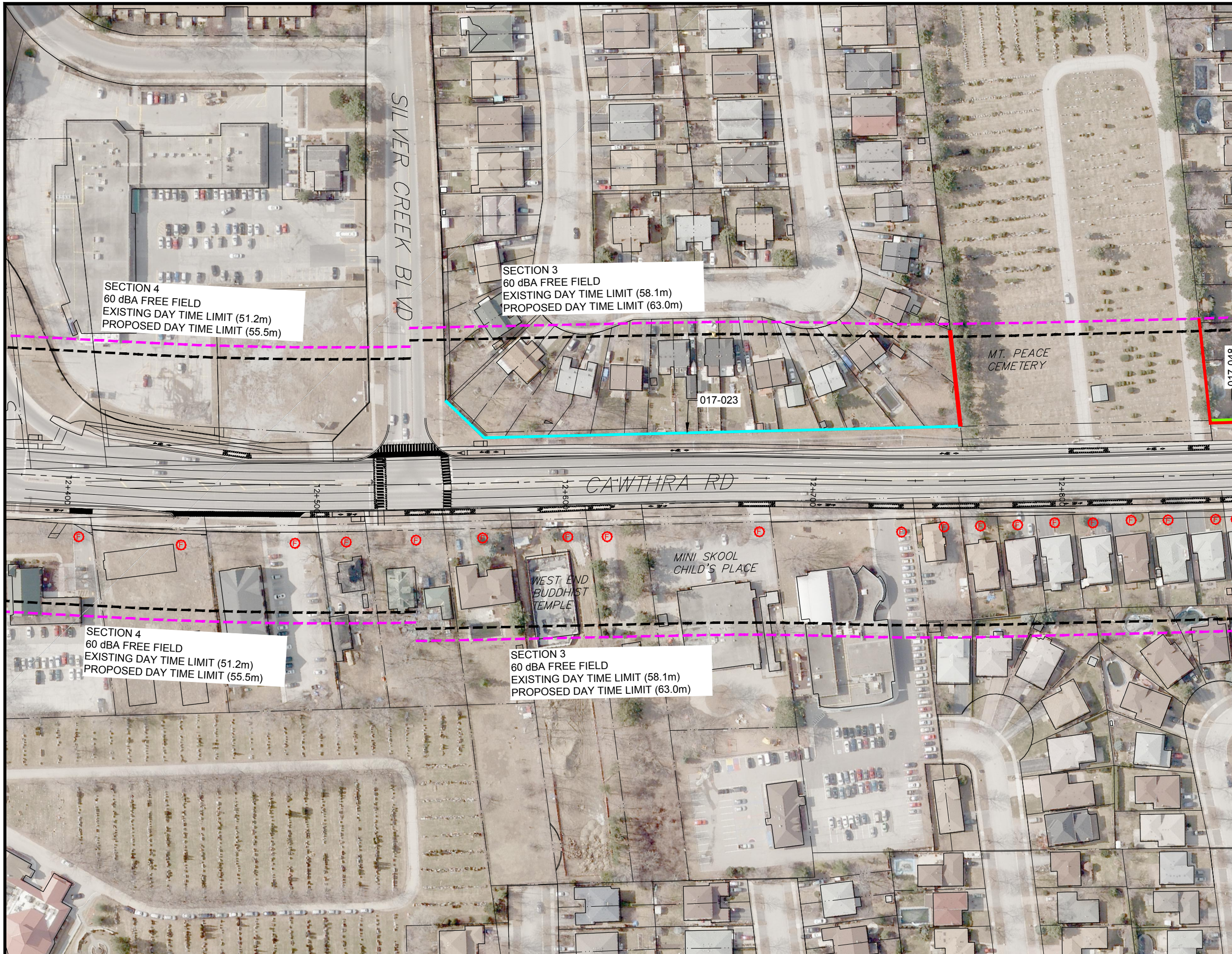
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 CITY OF MISSISSAUGA

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NOISE INFORMATION PLAN
 ROAD TRAFFIC
 STA 11+900 TO STA 12+380

FIGURE N6



LEGEND

- FRONT YARD ABUTTING ROAD
- EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
- PROPERTY LINE
- PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
- ROAD CENTRELINE
- BUILDING FOOTPRINT
- EXISTING NOISE WALL
- PROPOSED NOISE WALL
- EXISTING PRIVACY FENCE

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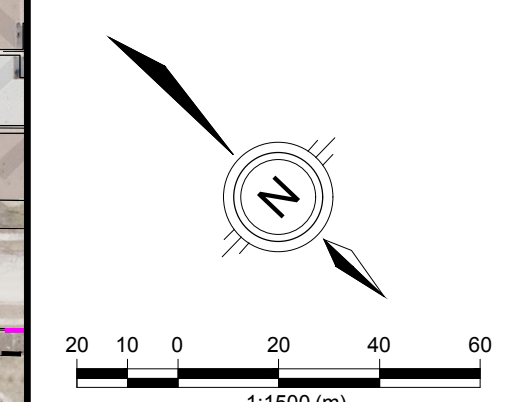
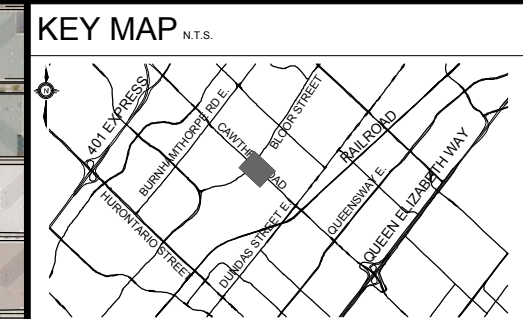
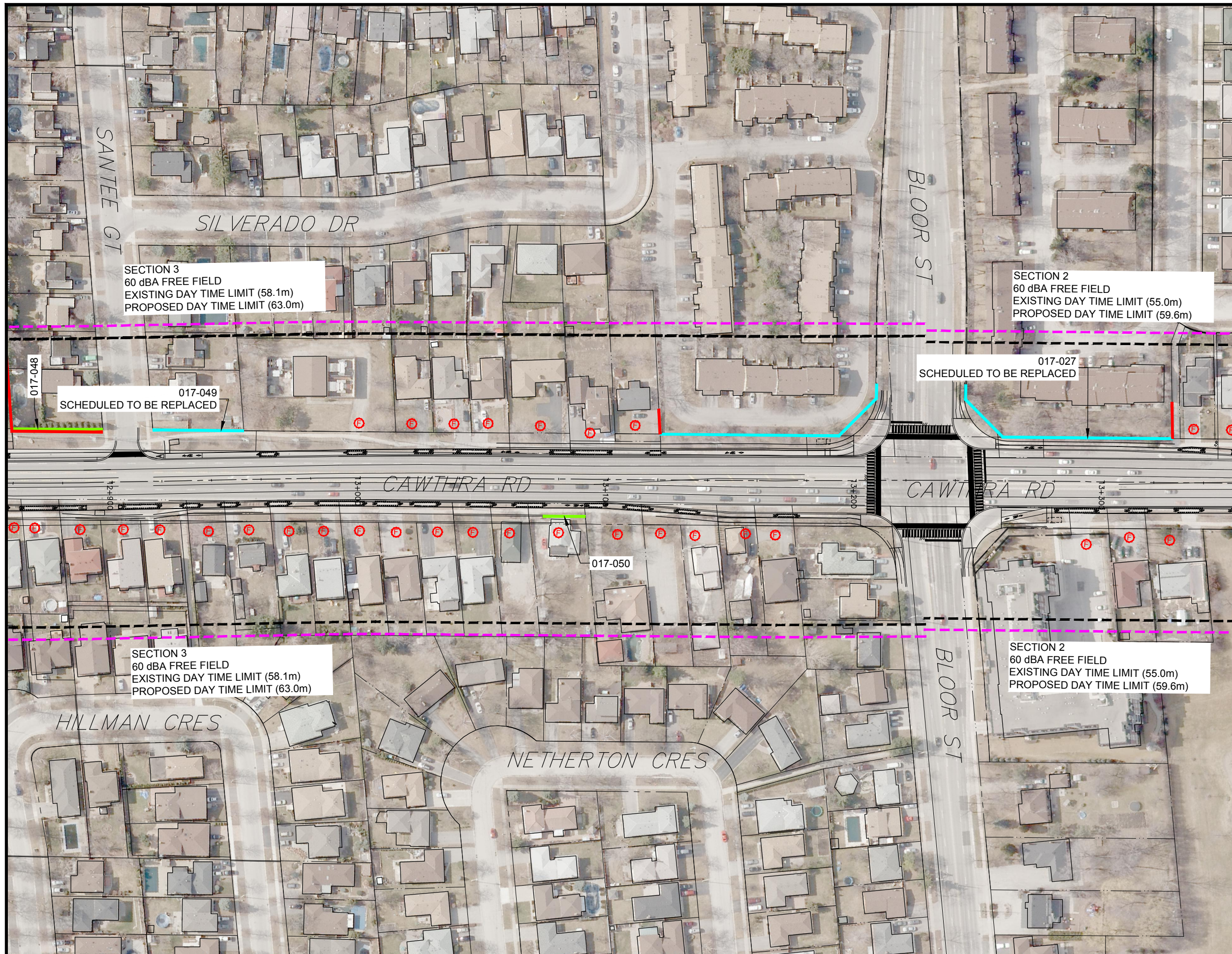
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 ROAD TRAFFIC
 STA 12+380 TO STA 12+860

FIGURE N7



- LEGEND**
- ⊙ FRONT YARD ABUTTING ROAD
 - EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - PROPERTY LINE
 - PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - ROAD CENTRELINE
 - ▭ BUILDING FOOTPRINT
 - EXISTING NOISE WALL
 - PROPOSED NOISE WALL
 - EXISTING PRIVACY FENCE

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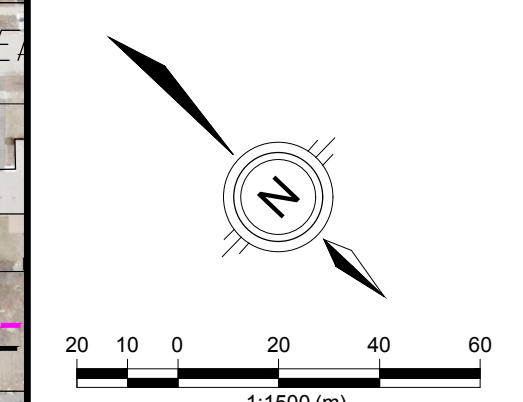
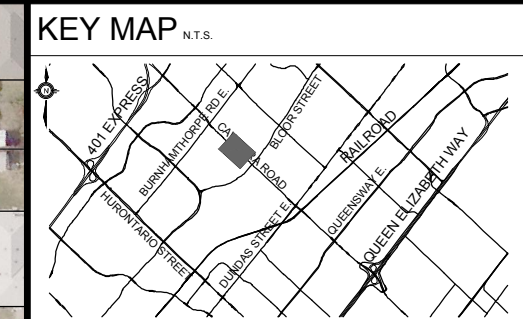
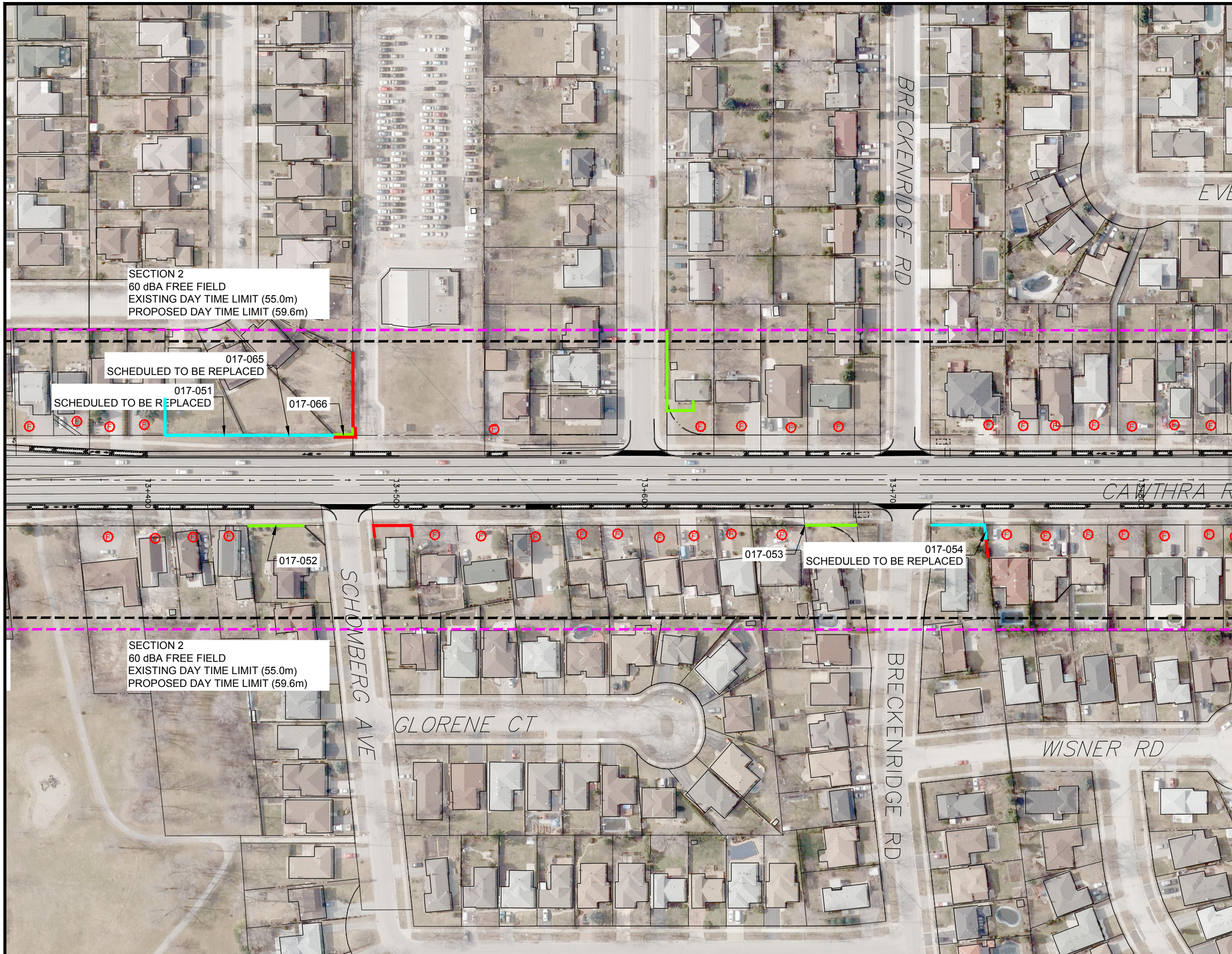
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NOISE INFORMATION PLAN
 ROAD TRAFFIC
 STA 12+860 TO STA 13+340

FIGURE N8



- LEGEND**
- ⊙ FRONT YARD ABUTTING ROAD
 - EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - PROPERTY LINE
 - PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - ROAD CENTRELINE
 - BUILDING FOOTPRINT
 - EXISTING NOISE WALL
 - PROPOSED NOISE WALL
 - EXISTING PRIVACY FENCE

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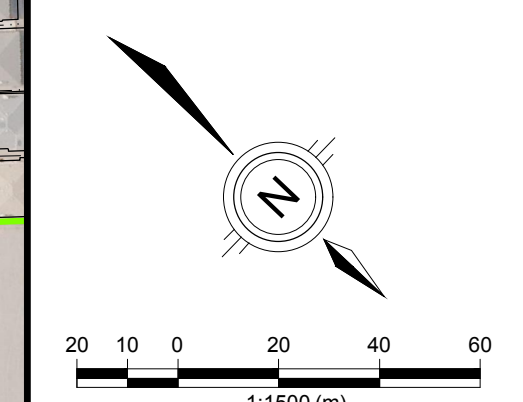
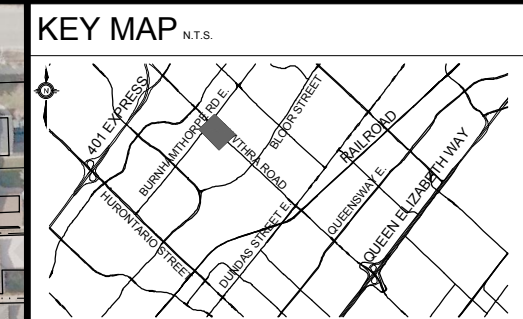
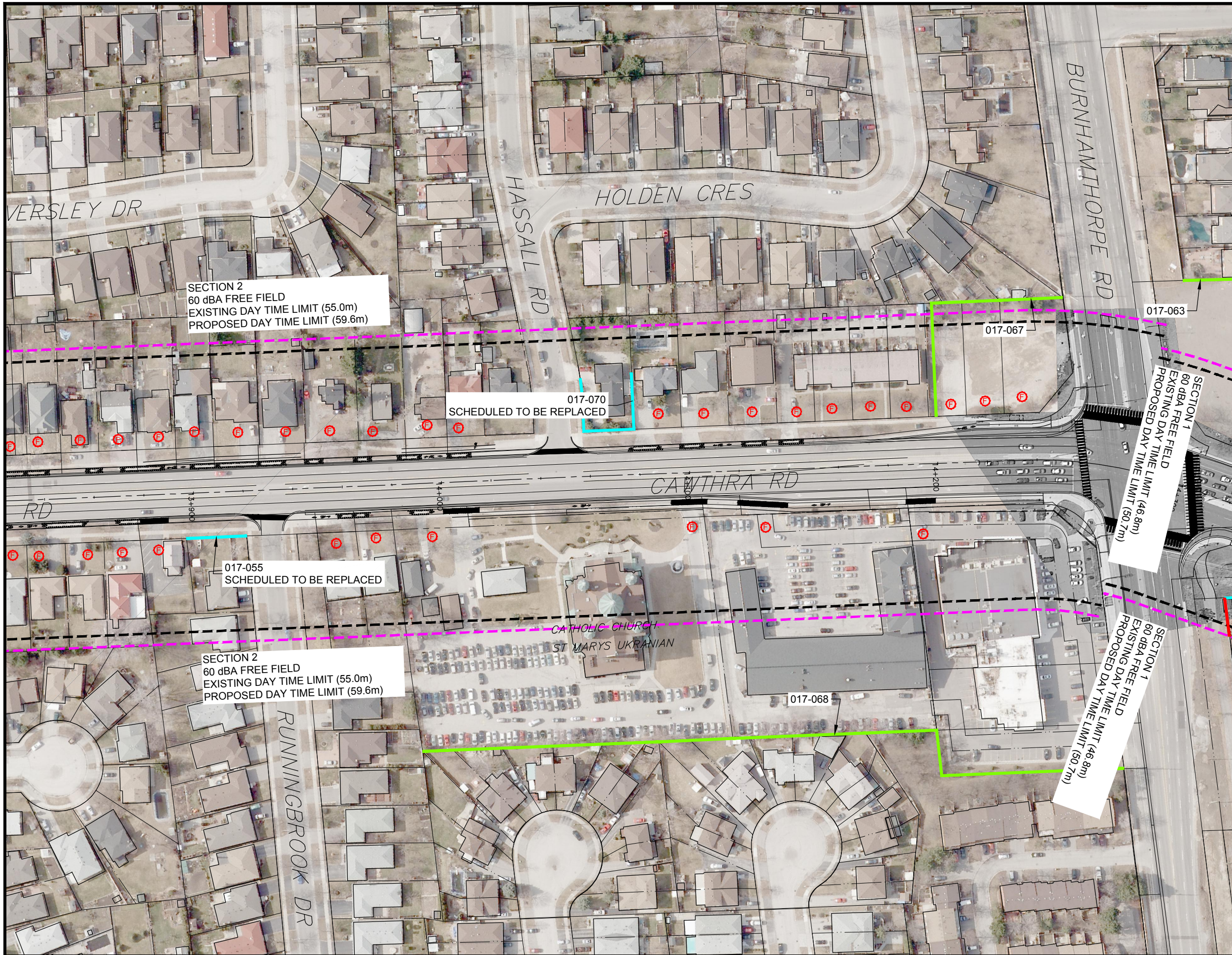
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NOISE INFORMATION PLAN
 ROAD TRAFFIC
 STA 13+340 TO STA 13+820

FIGURE N9



- LEGEND**
- Ⓡ FRONT YARD ABUTTING ROAD
 - EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - PROPERTY LINE
 - PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - ROAD CENTRELINE
 - BUILDING FOOTPRINT
 - EXISTING NOISE WALL
 - PROPOSED NOISE WALL
 - EXISTING PRIVACY FENCE

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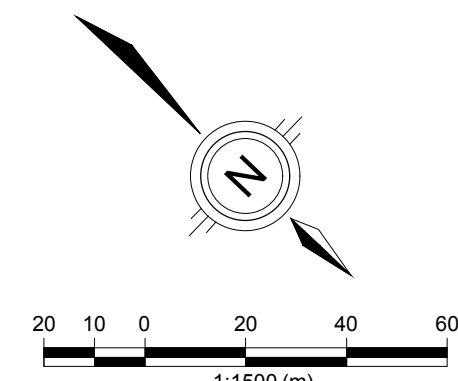
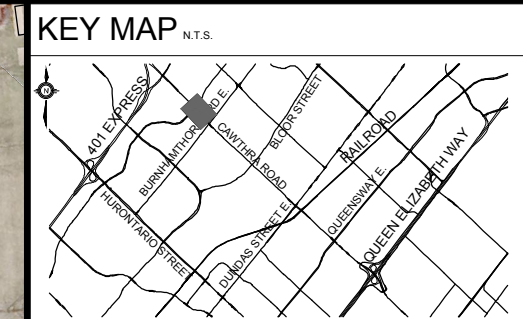
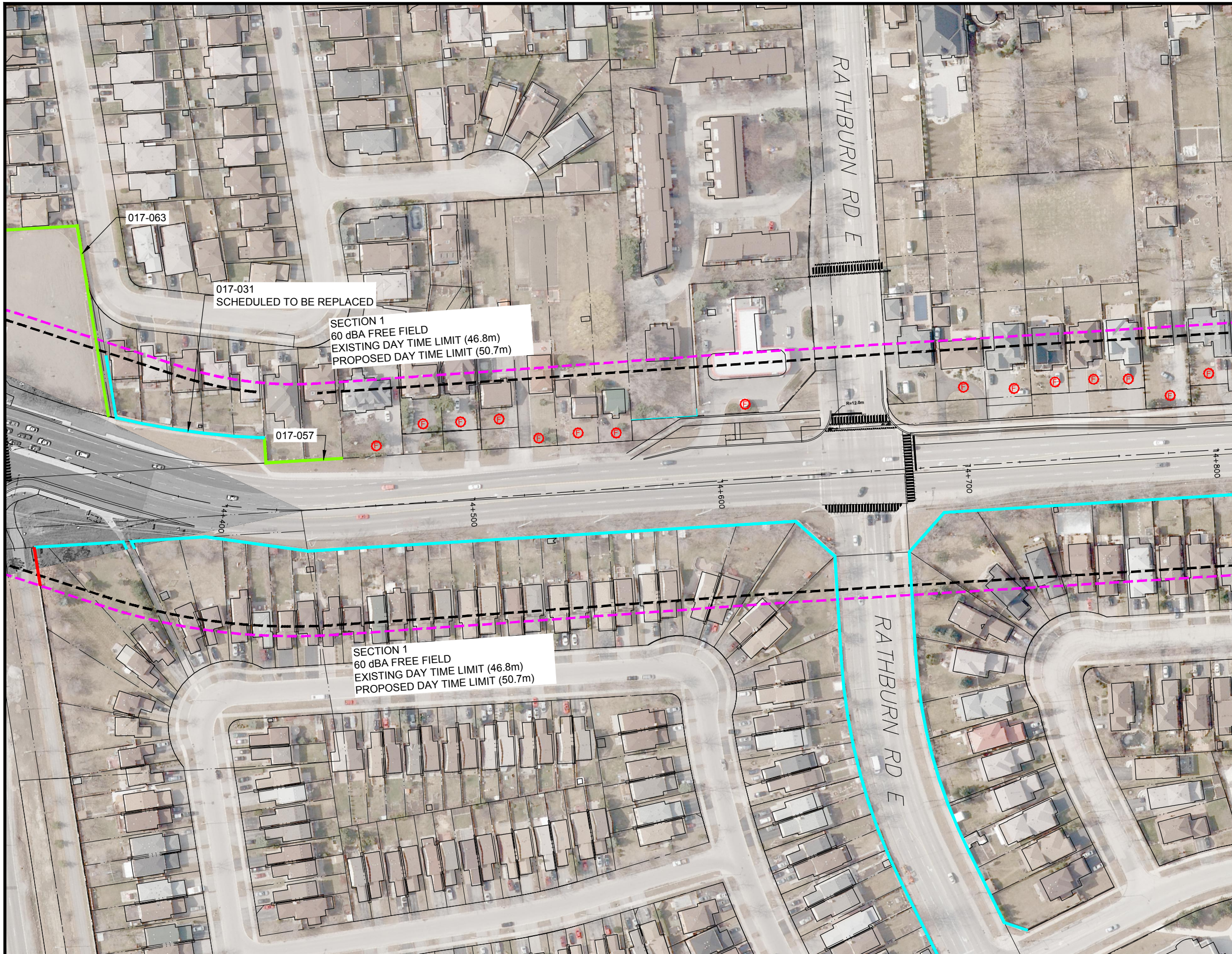
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NOISE INFORMATION PLAN
 ROAD TRAFFIC
 STA 13+820 TO STA 14+320

FIGURE N10



- LEGEND**
- FRONT YARD ABUTTING ROAD
 - EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - PROPERTY LINE
 - PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - ROAD CENTRELINE
 - BUILDING FOOTPRINT
 - EXISTING NOISE WALL
 - PROPOSED NOISE WALL
 - EXISTING PRIVACY FENCE

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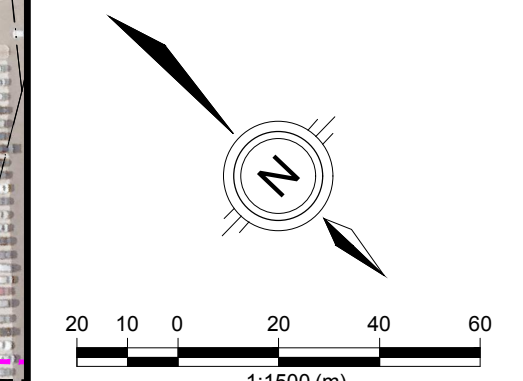
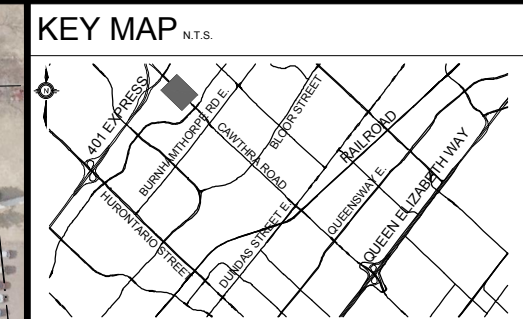
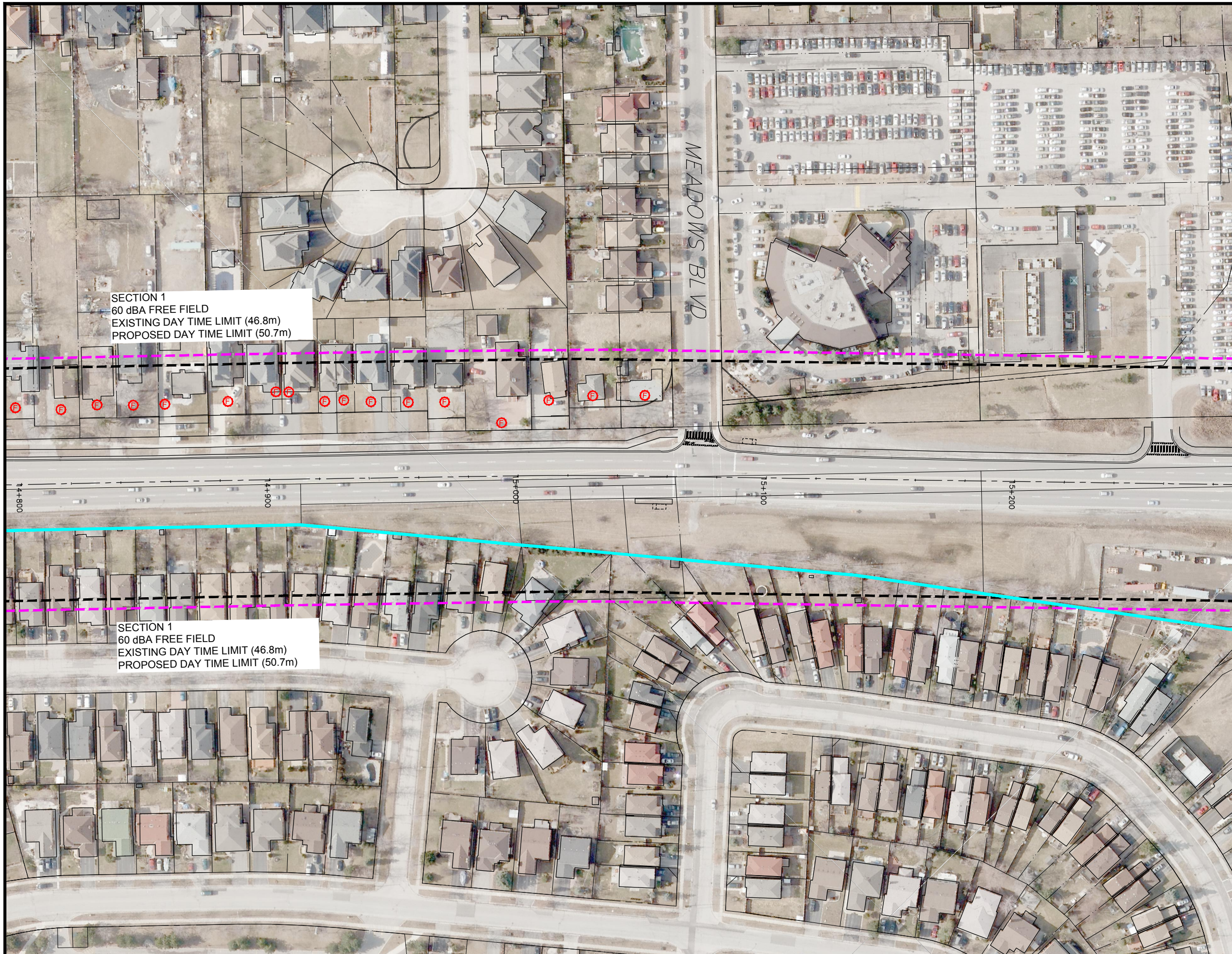
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 STA 14+320 TO STA 14+800

FIGURE N11



- LEGEND**
- Ⓡ FRONT YARD ABUTTING ROAD
 - EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - PROPERTY LINE
 - PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
 - ROAD CENTRELINE
 - ▭ BUILDING FOOTPRINT
 - EXISTING NOISE WALL
 - PROPOSED NOISE WALL
 - EXISTING PRIVACY FENCE

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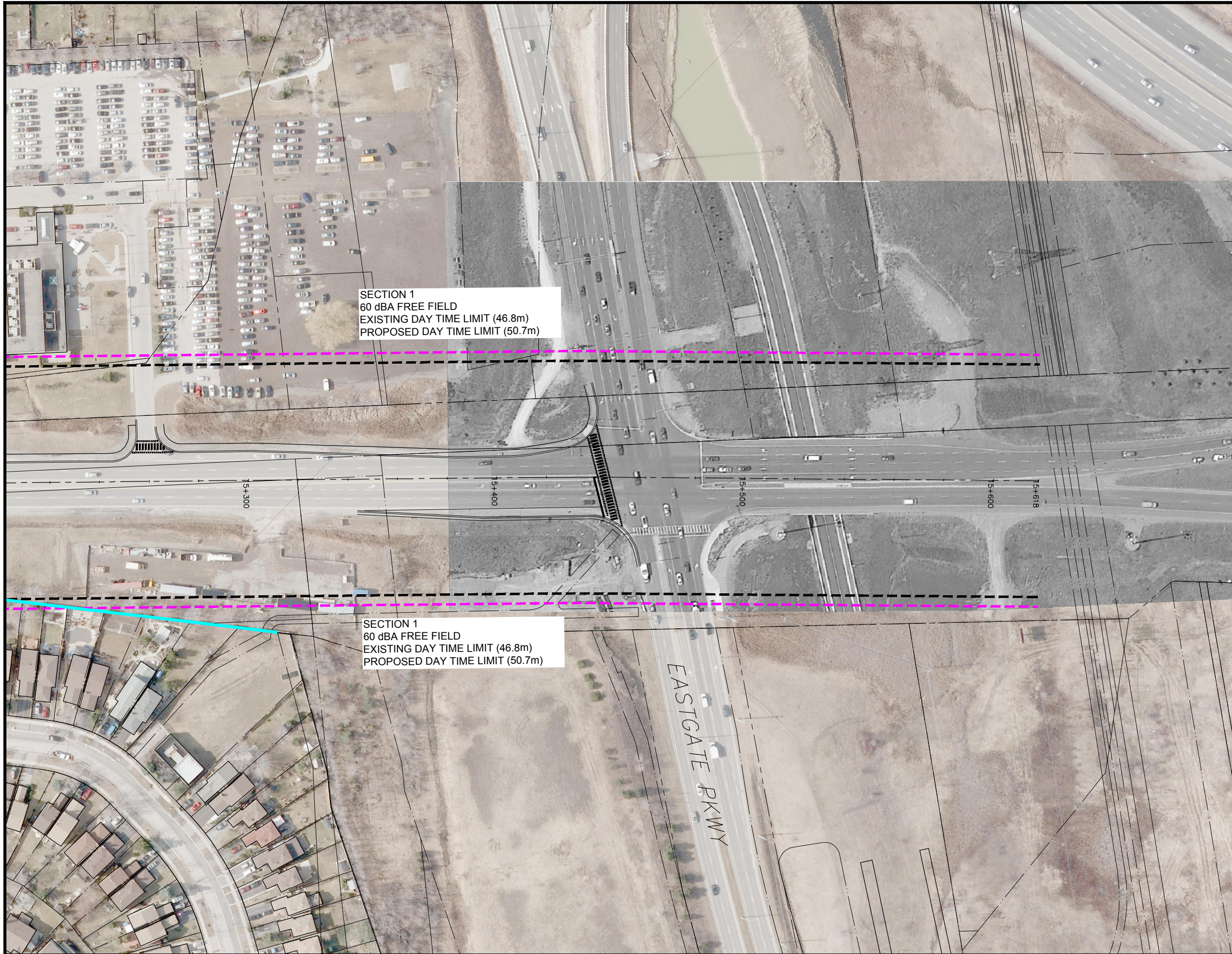
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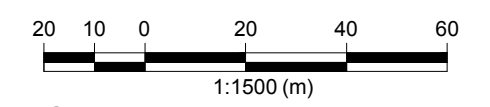
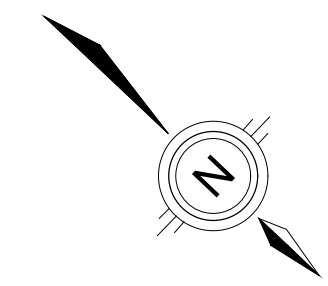
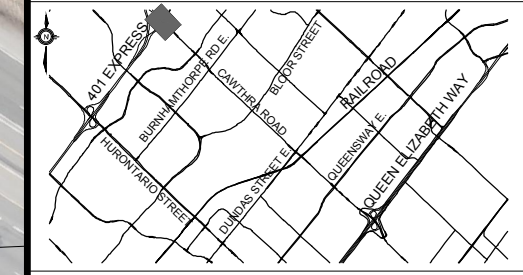
FIGURE N12



SECTION 1
60 dBA FREE FIELD
EXISTING DAY TIME LIMIT (46.8m)
PROPOSED DAY TIME LIMIT (50.7m)

SECTION 1
60 dBA FREE FIELD
EXISTING DAY TIME LIMIT (46.8m)
PROPOSED DAY TIME LIMIT (50.7m)

KEY MAP N.T.S.



LEGEND

- FRONT YARD ABUTTING ROAD
- EXISTING FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
- PROPERTY LINE
- PROPOSED FREE FIELD ANALYSIS LIMITS (ROAD - DAYTIME)
- ROAD CENTRELINE
- BUILDING FOOTPRINT
- EXISTING NOISE WALL
- PROPOSED NOISE WALL
- EXISTING PRIVACY FENCE

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STA 15+280 TO STA 15+600

FIGURE N13