



 **Region of Peel**  
*Working for you*



Phase 2 Final Report

Cawthra Road Pre-Environmental Assessment

Technical Feasibility Study  
Project No. 11-4350



Prepared for Region of Peel  
by IBI Group

September 2014



# Preface

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*The Pre-Environmental Assessment (EA) for Cawthra Road has been completed in two phases.*

*Phase 1 of this study focused on completing a Multi-Modal Transportation Report for the section of Cawthra Road from the Queen Elizabeth Way (QEW) to Highway 403/ Eastgate Parkway. The study was subsequently combined with the work being undertaken by IBI Group, on behalf of Peel Region, to assess opportunities for bike lanes between the QEW and Lakeshore Road.*

*This Phase 2 report combines the findings of the two studies for Cawthra Road, and focuses on the development and assessment of design concepts. Part A of this report presents the analysis north of the QEW (building on the findings of the Multi-Modal Transportation Report), while Part B presents the analysis and options considered south of the QEW. The scope of work for Part B of the study did not include a detailed traffic operations analysis.*



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# Part A - Cawthra Road

(QEW to Hwy 403/Eastgate Parkway)

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# 1 Introduction and Background

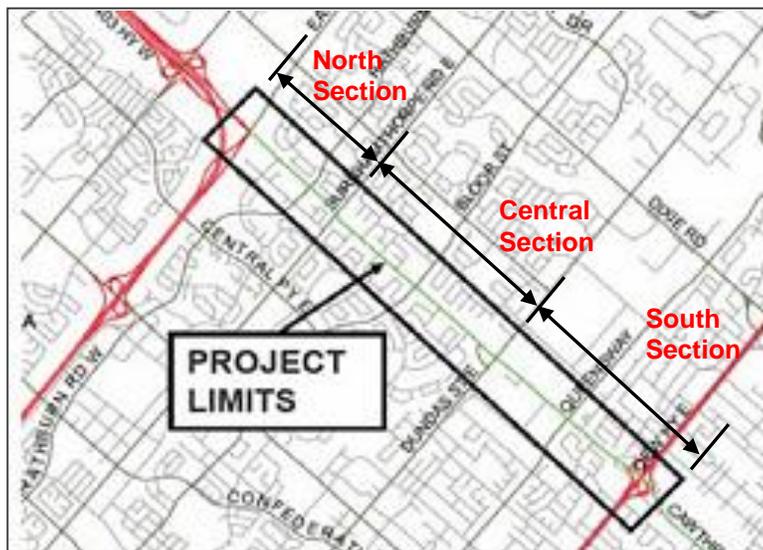
The purpose of the Pre-Environmental Assessment Technical Feasibility Study is to:

- Confirm future capacity and operational needs for all modes of transportation including pedestrians, cyclists, transit users, and motorists;
- Identify long term improvements that address capacity and operational requirements;
- Identify technically feasible transportation improvements that benefit pedestrians, cyclists, transit users, and motorists;
- Compile and summarize existing transportation issues, constraints and opportunities;
- Develop and evaluate realistic design concepts that address the identified issues, constraints and opportunities; and,
- Select a recommended design concept and prepare a study report.

The Multi-Modal Transportation Report completed during Phase 1 of the study responded to the first four objectives. This Technical Feasibility Study Report builds on the findings of the multi-modal transportation analysis and focuses on the development and assessment of design concepts. It represents the second of two primary deliverables for the overall study.

Part 'A' of the study focuses on Cawthra Road between the QEW and Highway 403/ Eastgate Parkway (approx. 6km), as illustrated in **Exhibit 1**.

**Exhibit 1: Project Limits**



**North Section -**  
 Eastgate Parkway to  
 Burnhamthorpe Road

**Central Section -**  
 Burnhamthorpe Road to  
 Dundas Street

**South Section -**  
 Dundas Street to the QEW

## 1.1 Study Findings / Needs Assessment (Phase 1)

The following summarizes the analysis undertaken during Phase 1 of the study, as outlined in the *Multi-Modal Transportation Report*.

### a) Study Area Profile

- Cawthra Road is surrounded by fairly stable land use with many mature neighbourhoods. There are no significant major developments planned along the corridor which would contribute to a major increase in local traffic. As such, much of the growth in traffic along the corridor is expected to be through traffic originating outside of the immediate study area.
- The designated right-of way along Cawthra Road is as follows:
  - North Section (Eastgate Parkway to Burnhamthorpe Road ) – 45 m
  - Central Section (Burnhamthorpe Road to Dundas Street) – 36 m
  - South Section (Dundas Street to QEW) – 45 m (versus 36m existing)
- Transit is limited on Cawthra Road with only one local bus route which does not serve the entire corridor. The addition of the MiWay BRT at Eastgate Parkway and the Dundas BRT would provide new interchange opportunities and may result in more transit on Cawthra Road, however the extent of this benefit is not quantified in the current regional modelling framework.
- Goods movement is not a high priority for Cawthra Road however the lands south of Cawthra Road are general light industrial and the design alternatives should be mindful of this activity especially how it relates to safe interrelation with active transportation facilities.

### b) Active Transportation Facilities

- Cawthra Road is part of the cycling master plans for both Peel Region and the City of Mississauga.
- Based on the characteristics of Cawthra Road (i.e. traffic volumes, traffic speeds, road classification, etc) a physical separation of motor vehicle and bicycle facility is desirable. Appropriate treatments include (but are not limited to) providing 1.5 m on-road bike lanes with a 0.5m buffer; providing 1.8 to 2.0 m cycle track; or providing a 3.0 to 3.5m multi-use trail in the boulevard.
- Given the numerous driveways and unsignalized intersections along Cawthra Road, bike lanes may be more appropriate than a multi-use trail since motorists are more likely to be aware of cyclists on the roadway rather than adjacent to the road. If located on-street, bike lanes have priority over traffic entering from driveways.

### c) Traffic Safety

- Traffic speeds recorded on Cawthra Road are high; the 85<sup>th</sup> percentile speed is approximately 20 km/h above the posted speed limit. Where possible, opportunities to incorporate appropriate speed reduction measures (i.e. reduced lane/ pavement widths, etc) should be considered.
- Most of the collisions occurred at intersections with the highest proportion being rear-end collisions (45%), followed by turning movement collisions (33%).
- Sight and visibility should be enhanced where possible, including measures to improve safety of left turning vehicles such as fully protected left turns.

**d) Existing Traffic Volumes**

- Existing traffic volumes along Cawthra Road range from 900 to 1500 vehicles/hr/direction during peak hour conditions. Although generally balanced, volumes tend to be slightly higher in the southbound direction of travel. These volumes also tend to be heaviest during the PM peak period.
- Traffic volumes on Cawthra Road were fairly steady from 1998 to 2008 with a significant reduction in traffic (25 to 30 percent) recorded in the 5 years since the onset of the global recession in 2008.
- Turning movements count volumes collected during 2012 and 2013 are generally consistent with the recorded Automatic Traffic Recorder (ATR) data. Pedestrian volumes at intersections are generally below 50 persons per hour per crosswalk. Bicycle volumes are low with fewer than 5 observations on any particular movement during the peak hours.
- Cawthra Road is identified as a connector truck route from Eastgate Parkway to Dundas Street and as a primary truck route from Dundas Street to the QEW. Trucks generally make up is 4.5 - 6.5% of demands. Truck restrictions are in place between 7PM to 7AM within the Central Section.
- Cawthra Road is often used as a connector between the 400 series highways to the north (403, 401, 407 and 410) and the Queen Elizabeth Way. Based on a select link analysis along Cawthra Road between Burnhamthorpe Road and Dundas Street, the average trip duration is estimated to be 35 minutes (approximately 16% of trips are expected to be under 15 minutes and 65% of trips are expected to be over 30 minutes in duration).

**e) Traffic Growth Projections**

- Growth rates were determined for the following potential improvement scenarios.
  - **Four Lanes:** reflects two through lanes northbound and southbound throughout the entire corridor except for between the Queensway and the QEW which is currently three lanes southbound;
  - **Base Case:** reflects six lanes from Eastgate Parkway Burnhamthorpe Road (North Section) and from Dundas Street to the QEW (South Section), in keeping with the needs identified as part of the LRTP Update (2012).
  - **Six Lane:** reflects widening of Cawthra Road to three through lanes per direction throughout the corridor from Eastgate Parkway to the QEW.
- Background traffic volumes along Cawthra Road are expected to increase between 0.1% and 1.1% per year over the next 20 years. Based on a comparison with adjacent corridors, modest growth (0.7% to 0.9% per year) is expected. As a result, a compounded growth rate of 0.8% per year was used to forecast future demand.
- Maintaining the Central Section of Cawthra Road as four lanes somewhat constrains demands within the corridor. If Cawthra Road is widened to six lanes throughout the corridor, future through traffic demands are expected to increase by 200-500 veh/hr, largely due to a shift from adjacent corridors (rather than new growth).

**f) Traffic Operations Analysis**

- The existing intersection analysis reveals a number of congested intersections and movements along the corridor, primarily due to conflicting heavy left turn and opposing through traffic demands.

- The heavy southbound right turn at Cawthra Road and Eastgate Parkway during the PM peak is likely due to drivers attempting to short cut congestion on the Highway 403.
- Unsignalized intersections generally operate with high delays but well below capacity; the centre two-way left turn lane along Cawthra Road provides reasonable turning opportunities for side streets and driveways along the corridor.
- The 2031 link and intersection analysis indicates that maintaining the current four lanes with a centre turn lane and localized improvements (herein referred to as Four Lane option) represents the best overall solution for Cawthra Road, and operates superior to six laning; even though many intersections will continue to operate at or near capacity.
- Widening Cawthra Road to six lanes does not provide a significant benefit from a traffic operations perspective (compared to maintaining the existing Four Lane option), primarily due to the additional induced demands associated with widening. The additional traffic worsens operations within the Central Section (which cannot be widened) and increases delays entering / exiting from the numerous unsignalized side roads and driveways along the corridor.
- Since six laning offers little/no advantage from a traffic operations perspective, is more restrictive from an active transportation standpoint, and is more difficult to fit within the existing right-of-way, it is less desirable from an overall transportation perspective.

**g) Cross-section**

- A four lane cross-section with centre turn lane and either on-road bike lanes or multi-use trail can reasonably be accommodated within a 36m right-of-way.
- Although it is possible to construct six lanes with a centre turn lane and a multi-use trail within a 36m right-of-way, it will be significantly constrained. Additional right-of-way and/or easements will be required beyond the 36m to allow for hydro clearances/guying, grading, noise walls, bus stops/bays, turn lanes, etc. These elements can otherwise generally be accommodated within a 45m, where available.
- It will not be feasible to construct six lanes with a centre turn lane and on-road bike lanes within a 36m right-of-way (requiring a minimum of 39.5m, plus for additional right-of-way or easements for hydro clearances/guying, grading, noise walls, bus stops/bays, turn lanes, etc.).
- Although widening to six lanes can be accommodated within the North Section (north of Burnhamthorpe Road) with limited property impacts, within the South Section (south of Dundas Street) will be much more difficult, given the limited right-of-way and number properties potentially affected. Six laning within the Central Section is not feasible within the existing right-of-way.
- Both the Dundas Street and the Lakeshore West rail underpass structures span 33.5m (face of barrier to face of barrier) and represent a significant constraint to widening to six lanes in conjunction with either a multi-use trail or bike lanes.

## 1.2 Recommendations of the Multi-Modal Transportation Report (Phase 1)

The following potential improvements, intended to accommodate demands along the corridor within a 20 year horizon, were carried forward to Phase 2 for further consideration:

### a) Potential Corridor Improvements (including Active Transportation)

#### North Section - Eastgate Parkway to Burnhamthorpe Road:

- Maintain four lanes with intersection improvements and a centre turn lane.
- Maintain the multi-use trail recently reconstructed along the west side of Cawthra Road.

#### Central Section - Burnhamthorpe Road to Dundas Street

- Given the constraints of adjacent residential development and numerous residential properties directly fronting onto Cawthra Road, four lanes with centre turn lane should be maintained within this section.
- Provide either on-road bike lanes or a multi-use trail along Cawthra Road (bike lanes may be more preferable given the significant number of driveways within the corridor).

#### South Section - Dundas Street to the QEW

- The Dundas Street and the Lakeshore West rail underpass structures represent significant constraints to widening within the corridor in conjunction with bike lanes. Based on a review of geometric constraints, additional right-of-way requirements, and traffic operations, it is desirable to maintain Cawthra Road as a four lane section with centre left turn at intersections/ entrances and localized intersection improvements.
- Widening within this section is constrained by adjacent residential development, and it is recommended to maintain three lanes southbound and two northbound lanes.
- Provide a multi-use trail or bike lanes along Cawthra Road. Both options are to be investigated in detail during Phase 2 considering boulevard width, utility impacts, driveway frequency, etc.

### b) Potential Intersection Improvements

- At **Eastgate Parkway**, adding a dual left turn lane should be considered on the southbound approach (along with fully protected left turn advance phasing), as well as an exclusive northbound right turn lane.
- At **Rathburn Road**, the signal should be modified to include left turn advance phasing (protected-permissive) for the southbound left turn movement. Adding a northbound right turn lane should also be considered to reduce the occurrence of rear-end collisions.
- At **Burnhamthorpe Road**, consider adding a fully protected dual northbound left turn lane at the intersection.
- At **Bloor Street**, adjustment signal timings to provide more east-west green time, extend advance phases, and consider adding an exclusive northbound right turn lane.
- Minor signal timing adjustments should be considered at **Silver Creek Boulevard** to provide more eastbound green time. It is desirable to extend the northbound left turn lane to avoid queue spillback into the through lane.

- At the **Dundas Street Ramp**, the eastbound right turn channel should be modified to include a clear yield point to improve safety on the merge.
- At the **Queensway**, undertake adjustments to signal timings to improve overall operations.
- Given the proximity of **Melton Drive** to the Queensway intersection, potentially restrict Melton Drive to right-in/right-out at Cawthra Road.
- At the **North Service Road**, add a dual westbound left turn and an exclusive eastbound right turn lane to accommodate heavy demands.

## 2 Active Transportation

Walking and cycling are both important modes of transportation along Cawthra Road. Multiple policy documents support the need to accommodate active transportation along the corridor. Among these include: the Peel Active Transportation Master Plan (ATMP 2012), the Mississauga Cycling Master Plan (2010), and the Peel Road Characterization Study (2013). The Multi-Modal Transportation Report for this study (dated June 2014) provides more background information about the policy context and the development of design criteria.

This section focuses on the evaluation of feasible strategies to accommodate walking and cycling along Cawthra Road between the Eastgate Parkway and the QEW.

### 2.1 Existing Conditions

For pedestrians, there are sidewalks on both sides of Cawthra Road from Burnhamthorpe Road to the QEW. However, north of Burnhamthorpe Road to Eastgate Parkway, there is no sidewalk on the east side of Cawthra Road (only a splash pad exists adjacent to the curb). The sidewalk on the west side was recently replaced with a multi-use trail, and a new 3.5m multi-use trail was constructed on the west side of Cawthra Road, north of Meadows Blvd.

For cyclists, there are no cycling facilities along Cawthra Road except for the multi-use trail noted above. Bikeways intersect Cawthra Road at the following locations:

- Multi-use trail on the north side of Rathburn Road (east approach);
- Multi-use trail on the north side of Burnhamthorpe Road;
- Multi-use trail on the south side of the Queensway; and,
- Signed route on Silver Creek Boulevard (west approach).

The transportation master plans for the Region of Peel and the City of Mississauga both include plans for bicycle facilities on Cawthra Road. **Exhibit 2** is a summary of the existing conditions on Cawthra Road from Eastgate Parkway to the QEW. The following lists several key project-specific constraints:

- Operating speed = 70 km/h
- Mature residential neighbourhoods with many mature trees.
- Hydro poles on the east side north of Burnhamthorpe and on the west side south of Bloor Street.
- Numerous residential and commercial driveways.
- Right-of-Way is constrained at several locations (particularly on the west side of Cawthra Road south of the Queensway, at the Mount Peace cemetery, and just north of the Bloor Street intersection; and, on the east side of Cawthra Road north of Burnhamthorpe Road).
- QEW Overpass (bridge structure).
- Possible reintroduction of bus routes between Bloor Street and Eastgate Parkway.
- High volume/capacity ratios (particularly for left-turning movements) limit the opportunities for bike boxes or exclusive bike signal phases at intersections.

**Exhibit 2: Existing Conditions related to Active Transportation**

EXISTING CONDITIONS SUMMARY		
<b>Planning Characteristics</b>		
Major Road Network <sup>1</sup>	Yes	
Region Road Character <sup>2</sup>	Suburban Connector (Eastgate Parkway to Dundas Street) Industrial Connector (Dundas Street to the QEW)	
City Functional Road Class <sup>3</sup>	Regional Arterial	
Regional Cycling Network <sup>4</sup>	Proposed multi-use trail on one side throughout Segregated bike lanes are also to be considered from Burnhamthorpe Road to Dundas Street Interchange Improvement proposed across the QEW	
City Cycling Network <sup>5</sup>	Proposed Primary Boulevard Route (north of Dundas) Proposed Primary On-Road Route (south of Dundas)	
<b>Physical Characteristics</b>		
Right-of-Way width <sup>6</sup>	45m 36m 45m 40m 36m	Eastgate Parkway to Burnhamthorpe Road Burnhamthorpe Road to Dundas Street full-on ramp intersection Dundas Street to the QEW as per Region of Peel OP Dundas Street to the Queensway as per City of Mississauga OP Queensway to the QEW as per City of Mississauga OP
Midblock pavement width <sup>7</sup>	17.5 m to 19.0 m where 4 to 5 lanes, 24.5 m where 6 lanes 20.0m through the Dundas underpass	
Number of lanes	4 lanes with raised median (Eastgate Parkway to Meadows Blvd and through Dundas Street underpass) 5 lanes: 4 general purpose and 1 median lane (Meadows Blvd to the Queensway) 6 lanes: 5 general purpose and 1 median lane (Queensway to the QEW)	
<b>Operating Conditions</b>		
Posted Speed	50 km/h throughout	
Operating Speed (85 <sup>th</sup> percentile)	1km N. of Burnhamthorpe 200m N. of Bloor 500m N. of Silvercreek 200m N. of the Queensway 100m N. of Tedwyn	70 km/h, SB operates at higher speed up to 72 km/h 68 km/h 64 km/h 65 km/h, NB operates at higher speed up to 67km/h 67 km/h, SB operates at higher speeds up to 70km/h
Existing Annual Average Daily Traffic <sup>8</sup>	1km N. of Burnhamthorpe 200m N. of Bloor 500m N. of Silvercreek 200m N. of the Queensway 100m N. of Tedwyn	27,600 vpd 29,500 vpd 32,400 vpd 30,300 vpd 32,500 vpd
Forecasted Annual Average Daily Traffic <sup>8</sup>	Estimated to be between 32,100 vpd and 37,700 vpd depending on future condition	
Goods Movement Strategy	Connector Truck Route (Eastgate Parkway to Dundas Street) Primary Truck Network (Dundas Street to the QEW)	
Truck Restrictions	No trucks from 7pm to 7am	
Percent Trucks	4% to 6.5% generally more trucks closer to the QEW	

References:

1. Schedule E: Major Road network, Region of Peel Official Plan (2012)
2. Figure 5.0 Road Character Map, Region of Peel Road Characterization Study (2013)
3. Schedule 5: Long-term Road Network, City of Mississauga Official Plan (2010)
4. Map 10c: Proposed Long-Term Regional Cycling Network, Region of Peel Active Transportation Study (2011)
5. Map5-4 Proposed Mississauga Cycling Route Network (2010)
6. Schedule F: Regional Road Mid-Block Right of Way Requirements, Region of Peel Official Plan (2012)  
Schedule 8: Designated Right-of-Way Width, City of Mississauga Official Plan (2010)
7. Measured from basemap data

8. Existing volume based on automatic traffic recorder volumes in 2012, forecast assumes 0.8% growth per year

## 2.2 Approach and Methodology

For pedestrians, the basic provision of a safe place to walk (along a corridor) is often a decision between providing sidewalks or a multi-use trail that simultaneously accommodates cyclists. Additional treatments can be considered to enhance the pedestrian experience. For example, the Peel Active Transportation Master Plan proposed pedestrian amenities between Dundas Street and the Queensway; and, Ontario Traffic Manual (OTM) Book 15 provides guidance on pedestrian crossing devices. However, the feasible strategy for (continuing to accommodate) pedestrians along the corridor is largely influenced by the feasibly bikeways options.

For cyclists, there is a wider range of bike facilities to consider and evaluate. OTM Book 18 recommends a three step selection process to guide the evaluation of various bike facilities:

- **Step 1: Pre-select a desirable facility type.** This step involves identifying a desirable type of bike facility based on traffic speed and volumes.
- **Step 2: A more detailed look.** This step involves a more detailed look at the context. It includes both an inventory of site-specific conditions and a review of the key design considerations and applications. This step includes evaluating the site characteristic against thirteen (13) criteria with application heuristics.
- **Step 3: Develop your rationale.** This step involves documentation to justify the rationale and define a final decision or recommendation.

The 3-step process recommended in OTM Book 18 was applied to this section of Cawthra Road to help identify an appropriate bike facility.

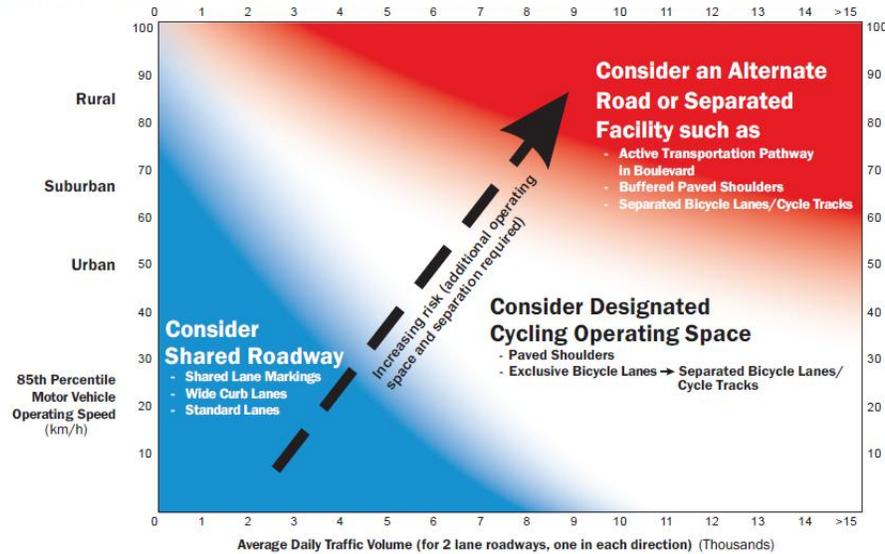
## 2.3 Pre-Select a Desirable Facility Type (Step 1)

For Step 1, the type of bike facility is pre-selected based on volume and operating speed. The existing volume ranges from 27,600 to over 32,000 vehicle per day (vpd) and forecasted volume is anticipated to grow on average by 0.8% per year (see **Exhibit 3**). These volumes translate to an estimate of over 15,000 vpd in the curb lanes. Operating speeds start at 64 km/h or higher.

**Exhibit 3: Desirable Bicycle Facility Pre-selection Nomograph**

**STEP 1 of 3**

**Desirable Cycling Facility Pre-selection Nomograph**



Based on these conditions, the pre-selected desirable bike facility is a separated bike facility such as a multi-use path in the boulevard OR separated bike lanes/cycle tracks. Note that an alternate corridor is also identified as a desirable facility according to the OTM Book 18 nomograph. This option is considered undesirable given that Cawthra Road is identified as a proposed bike route in multiple plans.

**What are Separated Bike Lanes?**

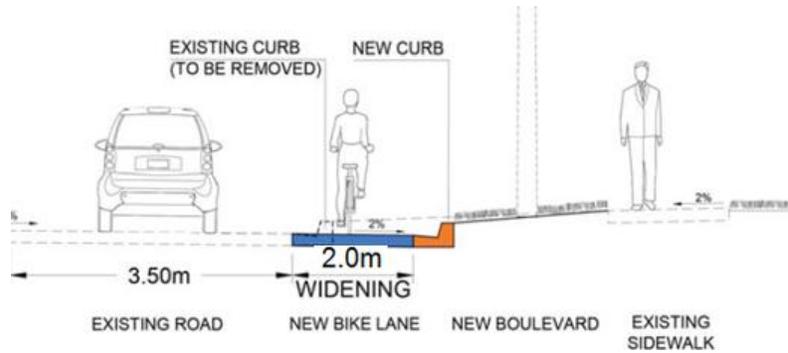
Cycle tracks or separated bike lanes are bikeways that have the following characteristics:

- The space is intended to be used, generally, by cyclists only;
- The space is separated from motor vehicle lanes, parking lanes and sidewalks by pavement markings, pavement colouring, bollards, curbs, raised medians, or a combination of these elements; and
- They generally operate in one direction and are provided on both sides of the street, but can also operate two-way or contra-flow on just one side of the street.

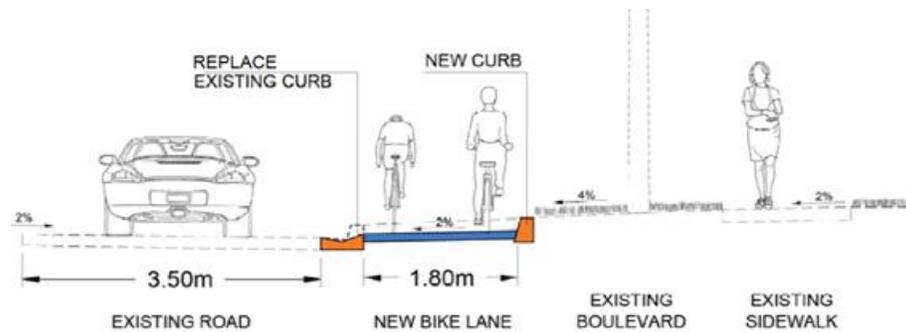
A variety of bike lane treatments were considered to make this an attractive, comfortable and safer corridor for cyclists to ride along. Alternatives included:

- **Option 1** - Widening the road to provide bike lanes painted on the road. Although the existing travel lanes could be narrowed somewhat, the extra width is not enough to provide bike lanes on both sides of the road;
- **Option 2**- Creating segregated bike lanes or cycle tracks that are separated and raised slightly from the travel lanes by a mountable/ bevelled curb; and
- **Option 3** - Constructing a Multi-Use Trail (MUT), replacing the existing sidewalk in the boulevard area (one-side).

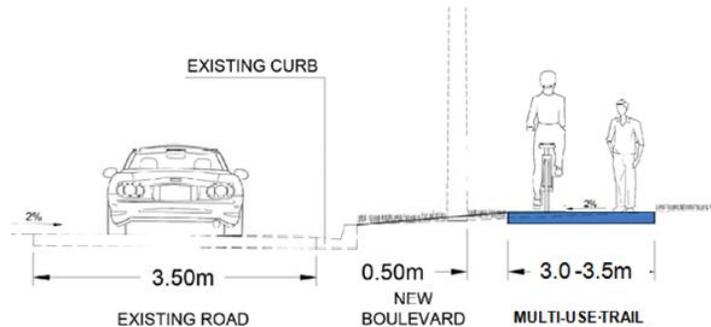
**Option 1** - Conventional 1.5m bike lane created by widening the road, separated from the travel lane by a 0.5m painted buffer



**Option 2** - Segregated 1.8m bike lane (cycle track), separated from the travel lane by a mountable/beveled curb



**Option 3** - 3.0 to 3.5m Multi-Use Trail (replace sidewalk, one-side)



## 2.4 A Detailed Look (Step 2)

For Step 2, the corridor is reviewed based on other site specific characteristics to determine the appropriateness of the pre-selected bike facility. The summary of existing conditions (**Exhibit 2**) provides a basis for this step. The site-specific characteristics were evaluated over 5 sections:

- North Section, Eastgate Parkway to Burnhamthorpe Road
- Central Section, Burnhamthorpe Road to Dundas Street
- Dundas Underpass, Dundas Street ramp intersection to Needham Lane
- South Section, Needham Lane to the North Service Road
- QEW Overpass, North Service Road to the South Service Road

The 13 criteria listed in **Exhibit 4** were evaluated based the application heuristics in OTM Book 18.

### Exhibit 4: Detailed Bike Facility Selection Criteria

OTM BOOK 18 APPLICATION HEURISTICS	
Primary determining criteria, not in any specific order	Secondary criteria
85 <sup>th</sup> percentile motor vehicle operating speeds	Costs
Motor vehicle volumes	Anticipated users in terms of skill and trip purpose
Function of street, road or highway	Level of bicycle use
Vehicle mix	Function of route within bicycle facility network
Collision history	Type of roadway improvement project
Available space	On-street parking
	Frequency of intersection

The full evaluation of each criterion is documented in **Exhibits 5 to 7**. Note that rows highlighted in blue in **Exhibit 6** (i.e. operating speed, volumes, vehicle mix, costs, type of roadway improvement, frequency of intersections) represent the criteria with a more significant influence on the outcome of the detailed assessment.

Based on this criteria, the appropriate bike facility type is an on-road bike lane with additional separation from motor vehicles that is preferably physically separated (e.g. buffered bike lanes, segregated bike lane or raised bike lanes). However, available space, type of roadway improvement and associate cost greatly impact the feasibility of these options.

The following is a summary of the key criteria that most influence the outcome of the selection process and present a recommendation.

#### a) Traffic Operation and Vehicle Mix

Both the traffic operation and vehicle mix affect the safety and comfort within the corridor for motorist and cyclists alike. The risk of a collision with a cyclist grows with increasing motor vehicle volumes and speeds. Heavy truck and bus traffic further expose cyclists to uncomfortable riding conditions, and a higher potential for more severe collisions.

Operating speeds for motor vehicles in this corridor are moderate to high, ranging between 64 km/h and 72 km/h. In contrast, a typical design speed for cyclists is 30 km/h. Physical separation is most appropriate where speed differential is in excess of 40km/h. At minimum, exclusive operating space for cyclists away from motor vehicles is recommended.

Motor vehicle volumes are very high throughout the corridor. The estimated equivalent volume for a two-lane road ranges from 13,000 vpd to over 15,000 vpd. In one direction, curb lane

volume is estimated to reach 750 to over 1,000 vehicles in the peak hour. At minimum, a formal bicycle facility with designated operating space for exclusive use by cyclists is recommended. However, physical separation between motor vehicle bicycle traffic is most appropriate for these volumes.

As a Connector and Primary Truck Route, between 70 and 100 trucks per hour have been observed in one direction, or an estimated 30 to 40 trucks in a one-way curb lane. Bus stops for Route 8 and several school express routes are also located on the corridor from Bloor Street to the QEW. Separated bike facilities are preferred with additional buffer width to separate cyclists from heavy vehicles in the curb lane. At bus stops, facilities should be designed to minimize and clearly mark conflict areas between cyclists with buses and pedestrians.

Overall, design considerations based on traffic operation and vehicle mix align with the pre-selected desirable facility for a separated facility.

### **b) Available Space, Type of Roadway Improvement, and Costs**

The available space, type of roadway improvement, and costs are intrinsically related to the feasibility of the desirable bike facility. On a heavily congested corridor, there is often competition for space by motorists and other users. Cost can become a more important factor when more than one type of bike facility appears appropriate. Road improvement projects often provide a cost-savings opportunity to coordinate the implementation of a bike facility together with a road extension, widening or resurfacing.

The Multi-Modal Transportation Report concluded that the existing 4 lane plus centre turn lane configuration is to be maintained. In this condition, it is possible to replace the sidewalk on one or both sides with a multi-use trail. To add bike lanes, a minimum of 21.5 m of curb-to-curb width is required (the existing width is 17.5m to 19.0m). Therefore, road widening would be required to add an on-road facility. Where this is not feasible, OTM Book 18 proposes to consider wide curb lanes or an alternate route. As discussed above, shared use facilities (i.e. wide curb lanes) is not considered appropriate for the traffic conditions and vehicle mix. As the bike route is identified in multiple plans, an alternate route is considered inappropriate.

The cost criteria recommend a benefit cost analysis during functional or preliminary design when more than one type of bike facility appears appropriate. In this case, a separated facility is appropriate based on the traffic operation and vehicle mix. At this point, either a multi-use trail or on-road separated facility (i.e. road bike lanes with a buffer, segregated bike lanes) remain appropriate options. Greater details about the potential impacts to cost may be evaluated in a functional or preliminary design (e.g. sidewalk or curb removal and disposal, movement of utility poles, curb and gutter, additional excavation, etc.)

Road improvement projects help offset the costs to implement bike facilities by coordinating planning and design, and other work included with new, widened or resurfaced roads. Since the pavement quality does yet warrant resurfacing or reconstruction in the near future, these cost savings may only be realized as part of a road widening project. As outlined in Section 1.1, the analysis of future traffic operations concludes that road widening would not provide significant improvement over the current operation due to induced traffic. Therefore, a standalone project would be required either to widen the road to accommodate bike lanes, or to replace the sidewalk on one or both sides to provide a multi-use trail. Note that since a multi-use trail has been recently constructed in the North Section on the west side; it is unlikely for further road improvement projects to occur along in this section.

Maintaining the existing conditions (i.e. no road widening) impacts the feasibility of a separated bike facility. To accommodate on-road bike facilities, road widening will be required. To accommodate a multi-use trail in the boulevard, the existing sidewalks on one or both sides will need to be removed. A standalone road improvement project will be required to implement a separated facility.

### c) Function of the Route within the Bike Network

In the City of Mississauga Cycling Master Plan, Cawthra Road is identified as a Primary Bike Route throughout the corridor. Its inclusion within the Regional Cycling Network reinforces the role of Cawthra Road as a primary cycling route. The corridor also connects to employment areas, across the QEW and between two planned Regional trails that are currently under development: the Highway 403 Utility Trail, and the Hydro One Lakeshore – Royal Windsor Trail. Therefore, the function of the route within the bike network plays an important role in this selection process.

As a new route, bicycle lanes and separated facilities should be considered to encourage cycling for all users. However, as there is an existing multi-use trail north of Burnhamthorpe Road, OTM Book 18 recommends that a bike facility should provide continuity with adjacent bicycle facilities to the extent possible. The rationale for route continuity is to provide a connection between adjacent existing facilities. In this regard, a multi-use trail is slightly preferred to provide continuity of the bike route. This criterion is important. Unlike other key criteria discussed above, it provides a preference for a multi-use trail over on-road facilities as the desirable separated facility. However, the opportunity exists to provide a new continuous bike facility in this corridor together with Part B (south of the QEW) segregated bike lanes.

### d) Frequency of Driveways and Side Streets

Intersections and driveways present conflict points between motorists, cyclists and pedestrians. Therefore, careful consideration is needed when selecting a bike facility in a corridor with frequent conflict areas. A cyclist riding an on-road bikeway is entitled to the same rights and responsibilities of other motorists on the road (i.e. right of way over traffic from driveways and stop-controlled side streets). However, on-road facilities may provide less separation from motor vehicle traffic along the corridor. Some cyclists may be more comfortable riding further away from motor vehicles in the boulevard. However, motorists tend to be less aware of cyclists in off-road facilities. Conflict areas can be exacerbated by high volume driveways, residential driveways where motorists back out to the street or through crosswalks where cyclists tend not to dismount.

Frequent driveways are observed throughout the corridor (except through the grade-separated areas) with spacing between 10m and 100m apart. There are frequent residential driveways: on the west side in the North Section, on both sides in the Central Section and on the east side of the South Section (south of the Queensway). There are frequent commercial driveways on both sides of the South Section (north of the Queensway).

Based on the intersection frequency, bike lanes are more appropriate than separated facilities since motorists are more likely to be aware of cyclists on the roadway rather than adjacent to the road. Note that the presence of mature trees and hydro utilities poles throughout the corridor can also impact the motorist awareness of cyclists in the boulevard. For example :

- North Section: hydro corridor, trees and sound barrier wall on east side
- Central Section: hydro corridor on west side south of Bloor, trees on both sides
- South Section: hydro corridor on west side,

This criterion presents a trade-off between cyclist safety and continuity of the bike facility.

**Exhibit 5: EVALUATION OF ALTERNATIVES (Step 2a - Inventory Site Specific Conditions)**

SITE CHARACTERISTIC	SECTIONS				
	NORTH SECTION Eastgate Parkway to Burnhamthorpe	CENTRAL SECTION Burnhamthorpe to Dundas	Dundas Underpass	SOUTH SECTION Dundas to QEW	QEW Overpass (North Service Rd to South Service Rd)
Existing cross-section	5-lane road (4 travel lanes + centre turn lane + multi-use trail on west side north of Meadows Blvd + sidewalk on west side south of Meadows Blvd) Raised median north of Meadowland Blvd	5-lane road (4 travel lanes + centre turn lane + sidewalks on both sides)	4-lane divided road (4 travel lanes + raised median + raised asphalt surface, raised sidewalks on both sides)	4-lane road north of the Queensway (4 travel lanes + wide flush median + sidewalks on both sides) 5-lane south of the Queensway (5 travel lanes + wide flush median + sidewalks on both sides)	6-lanes (on bridge deck) + raised median + sidewalks on both sides
Land uses	Low-density residential (both sides) medium residential at SW corner of Rathburn, limited commercial areas	Low-density residential with medium density and mixed use at Burnhamthorpe, Bloor and Dundas	N/A	Light industrial / commercial lands, north of the Queensway (Dixie Employment Lands), low density residential to the QEW	N/A
Features	Hydro corridor, trees and noise barrier on east side Front-lotted homes and sidewalks on west side. Multi-use trail recently constructed west side.	No hydro corridor north of Bloor St (on west side south of Bloor St). Wide boulevard with trees on west side, curbface sidewalk or narrow boulevard on east. Front-lotted homes generally on both sides, backlotted home on east side near Bloor. RTL islands at Bloor and Dundas	Full on-ramp signalized intersection Dundas St, north of Dundas street underpass	Hydro on west side. Curbface sidewalk on both sides (or narrow boulevard present) commercial/industrial driveways RTL islands at Dundas and the Queensway	Diverging 6 <sup>th</sup> lane for on-ramps from bridge deck, 5 lanes + auxiliary turn lanes at North Service Rd and South Service Rd
Future Condition	Maintain 4 lanes with intersection improvements and centre turn lane Multi-use trail on west side (sidewalk south of Meadows Blvd to be replaced by multi-use trail by 2016)	4 travel lanes + centre turn lane AT facilities proposed as part of this evaluation	4 travel lanes + raised median AT facilities proposed as part of this evaluation	4 travel lanes + centre turn lane AT facilities proposed as part of this evaluation	Maintain existing 5 to 6 travel lanes configuration, add AT facilities as proposed as part of this evaluation in consultation with MTO
Signalized intersections	Four signalized intersections (Eastgate Parkway; Meadows Blvd; Rathburn Rd; Burnhamthorpe Road)	Three signalized intersections (Burnhamthorpe Road; Bloor Street; Silver Creek Boulevard)	Two signalized intersections (Silver Creek Boulevard; and Dundas Street ramp)	Three signalized intersections (Queensway; Tedwyn Drive; and QEW North Service Road)	QEW North Service Road QEW Ramps E-N/S QEW South Service Road
Unsignalized intersections	None	Seven unsignalized intersections (Santee Gate; Schomberg Ave; Hyacinthe Blvd; Breckenridge Rd; Hassall Rd; and Runningbrook Drive)	One unsignalized intersection ( Needham Lane )	Three unsignalized intersections (Needham Lane; Orwell Street; and Melton Drive)	QEW Ramp S-W QEW Ramp N-E
Driveways	Numerous residential driveways on the west side of Cawthra Road.	A few commercial driveways near Burnhamthorpe intersection. Limited number of institutional driveways. Numerous residential driveways on both sides of the road.	A few driveways just north of the Dundas grade separation.	North of Queensway: Significant number of commercial driveways on both sides of Cawthra. South of Queensway: Residential driveways on east side of Cawthra Road.	None

**Exhibit 6: EVALUATION OF ALTERNATIVES (Step 2b - Review Key Design Considerations and Application)**

SITE CHARACTERISTIC	SECTIONS (DESIGN CONSIDERATION AND APPLICATION OF HEURISTICS)				
	NORTH SECTION Eastgate Parkway to Burnhamthorpe	CENTRAL SECTION Burnhamthorpe to Dundas	Dundas Underpass	SOUTH SECTION Dundas to QEW	QEW Overpass (North Service Rd to South Service Rd)
<b>85TH PERCENTILE MOTOR VEHICLE OPERATING SPEED</b>					
Moderate (50 to 69 km/h) to High (70 to 89km)		66 to 69 km/h at 200m north of Bloor 63 to 65 km/h 500m north of Silver Creek	No data (anticipated to be lower through underpass, estimated to be between 65 and 66 km/h based on data from adjacent locations)	61 to 67 km/h at 200m north of the Queensway 61 to 70 km/h at 100m north of Tedwyn	No data (anticipated to be higher through overpass, estimated to be between 68 and 70 km/h based on data from adjacent locations)
Exclusive operating space for bicycles and motor vehicles in the form of bicycle lanes or separated facilities is recommended.					
<b>MOTOR VEHICLE VOLUMES</b>					
High Volume where two-way daily average volume is greater than 10,000 vpd on a two-lane road		Between 29,000 and 33,000 vpd for 4-lane road (15,000 vpd estimated in curb lanes). Future volumes forecasted to grow to between 34,300 and 37,700 vpd (18,000 vpd) based on 0.8% annual growth rate	No data	30,000 to 33,000 vpd for 4-lane road (16,000 vpd estimated in curb lanes). Future volumes forecasted to grow to between 35,000 and 38,000 vpd for 4-lane road (18,000 vpd) based on 0.8% annual growth rate	No data
Physical separation of motor vehicle and bicycle traffic may be most appropriate.					
Hourly one-way volume in the curb exceeds 250 vph		Up to 2,100 vph one-way (based through volumes in TMC data) (1,000 vph estimated for curb lane).	Up to 1,600 vpd one-way (based on through volume at Dundas St ramp) (800 vph estimated for curb lane)	Up to 1,500 vph one-way (based through volumes in TMC data) (750 vph estimated for curb lane).	Up to 2,300 vph one-way (based through volumes in TMC data) (750 vph estimated for curb lane).
Some level of formal bicycle facility such as bike lane is recommended					
<b>FUNCTION OF THE STREET OR ROAD</b>					
Mobility road such as arterial and major collector		<b>Major Road</b> as per Region of Peel Official Plan (2012) Schedule E: Major Road Network <b>Regional Arterial</b> as per City of Mississauga Functional Road Class (2010)			
		<b>Suburban Connector</b> as per Region of Peel Road Characterization Study (2013); cyclists to be accommodated within a multi-use trail or bicycle lane.	<b>Industrial Connector</b> north of the Queensway; Suburban Connector south of the Queensway. Professional judgment is recommended to determine appropriate bike facilities in areas with high truck volume and/or where accesses / intersections are less than 300m apart.		<b>Suburban Connector</b> (Road Character Study); cyclists to be accommodated within a multi-use trail or bicycle lane.
		<b>Connector Truck Route</b> (Goods Movement Strategic Plan)	<b>Primary Truck Route</b> as per Region of Peel Good Movement Strategic Plan (2013): Strategic Goods Movement Network		
Some level of formal bicycle facility such as bicycle lanes or separated facility is appropriate					
Motor vehicle commuter route		Yes - as described above	Yes - as described above	Yes - as described above	Yes - as described above
Separated bicycle facility should be considered to minimize conflicts with aggressive drivers					
<b>VEHICLE MIX</b>					
More than 30 trucks or buses per hour are present in a single curb lane.		Up to 70 trucks in one direction during AM peak hour (from TMC data) 40 trucks per hour estimated for one-way curb lane	Up to 60 trucks in one direction during midday peak hour (from TMC data) 30 trucks per hour estimated for one-way curb lane	Up to 70 trucks in one direction per hour during PM peak hour (from TMC data) 40 trucks estimated for one-way curb lane Industrial / commercial driveways to accommodate truck turning volumes	Up to 100 trucks in one direction during AM peak hour (from TMC data) 40 trucks estimated in the curb for one-way curb lane
		Identified as a Connector Truck Route	Identified as a Primary Truck Route (Peel Region Goods Movement Strategic Plan, 2013)		
Separated bicycle facilities may be preferred by many cyclists. If wide curb lanes or bicycle lanes are considered, additional width should be provided as a buffer.					
Bus stops are located along the route		Two (2) stops each on east and west side. Bus bay at Silver Creek (west side), for Route 8 and school express routes turn on Bloor St	No bus stops along underpass	Six (6) stops on east side; four (4) stops on west side, for Route 8 and school express routes. Bus bay at Tedwyn (east).	No bus stops along over pass
		Facilities should be designed to minimize and clearly mark conflict areas with buses or pedestrians at stop locations	N/A	Facilities should be designed to minimize and clearly mark conflict areas with buses or pedestrians at stop locations	N/A

SITE CHARACTERISTIC	NORTH SECTION Eastgate Parkway to Burnhamthorpe	CENTRAL SECTION Burnhamthorpe to Dundas	Dundas Underpass	SOUTH SECTION Dundas to QEW	QEW Overpass (North Service Rd to South Service Rd)
<b>COLLISION HISTORY</b>					
Conflict areas exist between bicyclist and motor vehicles or pedestrians	No bicycle collision data. Potential conflicts identified through other collision data.				
		High frequency of collision turning left into plaza on east side and at Bloor St intersection. 85th percentile speeds frequently reach over 20km/h above the posted speed limit. Potential conflict to cyclists through higher risk of collision (through exposure) and severity of injury	History of rear-end collision of southbound vehicles merging from the right-turn channel of the Dundas St ramp: potential conflict area for cyclists.	High number of left-turn collisions into commercial driveway on west side. Potential conflict with off-road facility on west side. High frequency and rate of collisions at the Queensway, with potential sight line issues related to asymmetry of the left-turn lanes.	Both the North and South Service Roads were identified to have a high incidence of collisions related to drivers misjudging the sharpness of the eastbound and westbound approach curves. Potential conflicts where intersection may serve as transition area between different bikeway facilities.
	Facilities and crossings should be designed to minimize conflict between different types of users and the conflict area should be clearly marked at: plaza on east side 100m south of Burnhamthorpe, at Bloor St, at the Queensway, North Service Rd and South Service Rd				
<b>AVAILABLE SPACE</b>					
Curb-to-curb width not adequate to provide sufficient operating space for both motorists and cyclists		17.5m curb-to-curb is not sufficient to maintain 4 travel lanes with a centre turn lanes and add bike lanes (minimum 21.5m) to accommodate between 29,500 and 32,400 vpd	Road is divided through the underpass with a 5.0m raised median and raised sidewalks 7.0m curb-to-curb for each direction is not sufficient to maintain 2 travel lanes in one direction and add bike lane (minimum 9.0m)	19.0m curb-to-curb is not sufficient to maintain 4 travel lanes (5 south of the Queensway) with a centre turn lane and add bike lanes (minimum 22m) to accommodate 29,500 to 32,400 vpd	24.5m curb-to-curb is not sufficient to maintain 6 travel lanes including turn lanes and add bike lanes (minimum 26m)
	Provide separated facilities adjacent to the roadway or within independent right-of-way, or widen roadway platform to accommodate bicycle lanes.				
		<u>Utility impacts</u> • Light standards typically sufficiently set back so as not to interfere with bike lanes. • Hydro poles south of Bloor on west side of Cawthra. However, the poles are typically sufficiently set back to avoid relocation. • Several large hydro boxes on both sides of the Cawthra Road would require relocation. • Limited other utility impacts (e.g., fire hydrants).	<u>Utility impacts</u> Construction of an MUT relocation of approx. 2 light standards may be required.	<u>Utility impacts</u> • There are large hydro poles on the west side of Cawthra Road. • North of Queensway: Relocation of some poles may be required. • South of Queensway: Poles would be difficult to relocate due to ROW constraints.	<u>Utility impacts</u> None
		<u>Tree impacts</u> Mature trees on both sides of the road. Tree impacts likely to be more significant on the east side of Cawthra Road.	<u>Tree impacts</u> No tree impacts.	<u>Tree impacts</u> • North of Queensway: No impacts • South of Queensway: Mature trees on both sides of the road.	<u>Tree impacts</u> None
		<u>ROW constraints</u> • Just north of Bloor Street – ROW constraints on west side would require taking additional property or realigning the Cawthra Road easterly for a bike facility on the west side of Cawthra if a substandard bike facility is not acceptable at this location. • At the Mount Peace cemetery – Road realignment (easterly) would be required for any bike facility on the west side of Cawthra.	<u>ROW constraints</u> There are no ROW constraints in this road segment. However, a potential SB roadway widening at the north approach of the Dundas ramp intersection could create property impacts on the west side of Cawthra Road.	<u>ROW constraints</u> South of Queensway: Large hydro poles on the west side of Cawthra Road and an existing noise wall create significant obstacles to any road widening. Removal of at least one residence would be required for any easterly road widening.	<u>ROW constraints</u> The pavement width at the bridge (incl. raised median) is 24m-25m.

SITE CHARACTERISTIC	NORTH SECTION Eastgate Parkway to Burnhamthorpe	CENTRAL SECTION Burnhamthorpe to Dundas	Dundas Underpass	SOUTH SECTION Dundas to QEW	QEW Overpass (North Service Rd to South Service Rd)
<b>ANTICIPATED USERS IN TERMS OF SKILL AND TRIP PURPOSE</b>					
Experienced cyclists (commuter or other utilitarian)		Existing cyclists riding on-street Cawthra Rd, a major road connecting Eastgate Parkway/Highway 403 through a QEW interchange, are likely experienced cyclists who prefer direct, continuous facilities with minimal delay. Cawthra Rd is the most direct route, for adjacent residents, to access south of the QEW and to connect to the Dixie employment area, to the Dundas transit and intensification corridor, and to Mississauga Bus Rapid Transit way. At northeast corner of Eastgate Pkwy, the BRT station is under construction and multi-use trail is proposed to connect from Cawthra Rd east to the station entrance. <u>Prefer on-street bike lanes, or separated facilities where warranted</u>			
Novice cyclists (recreational / beginners)		Existing cyclists may be beginner or recreational cyclists travelling off-street on Cawthra Rd to connect to the Burnhamthorpe Trail. Potential novice cyclists are anticipated when bikeways is developed, bikeway to connect to this trail as well as the other proposed trails along the Highway 403 utility corridor and the Hydro One-Royal Windsor corridor at North Service Rd. It is anticipated to encourage cycling to transit and short trips to employment lands. <u>Bike lanes (with or without buffer) or separated facilities should be considered.</u>			
<b>COSTS</b>					
More than one type of bicycle facility appears appropriate		Based on the characteristics of Cawthra Road physical separation of motor vehicle and bicycle facility is desirable. Appropriate treatments include (but are not limited to) providing on-road bike lanes with a buffer, segregated bike lanes and/or a multi-use trail in the boulevard. Given the numerous driveways and unsignalized intersections along Cawthra Road, an on-road bikeway may be more appropriate than an off-road facility since motorists are more likely to be aware of cyclists on the roadway, and on-road cyclists maintain the right-of-way across driveways and minor intersections. In the event that Cawthra Road remains four lanes, there is an opportunity to consider multi-use trails on both sides of the roadway or a multi-use trail in combination with bike lanes, at select locations, if/where appropriate. If Cawthra Road is widened to six lanes, these options will generally be limited to either a multi-use trail on one side of the roadway or bike lanes without a multi-use trail. <u>Benefit / cost analysis of alternatives is recommended during functional or preliminary design</u>			
<b>LEVEL OF BICYCLE USE</b>					
Low bicycle volumes (< 10 cyclists per hour)		Between 10 to 30 cyclists observed during 8h TMCs	20 cyclists observed during 8h TMCs	Between 5 to 20 cyclists observed during 8h TMCs	Between 5 to 20 cyclists observed during 8h TMCs
Significant bicycle traffic generators nearby		Low cyclists demand is attributed in part to inadequate cycling facilities. Cycling volumes are anticipated to increase with improvements to cycling infrastructure. <u>Wide curb lanes maybe adequate in some cases (however this type of facility is inadequate based on the high volume and speed)</u> The existing trail on Burnhamthorpe Road is a notable bicycle traffic generator, bicycle volumes increase near Burnhamthorpe (as per the TMC data). Other proposed trail (the Highway 403 Utility Trail and the Hydro One Lakeshore - Royal Winsor Trail) are both potential bicycle traffic generators, especially if connected to formal bicycle facilities on Cawthra Rd with designated operating space. Cawthra Rd serves as a connector route to the Dixie commercial and employment area, as well as the Mississauga BRT station under construction at Eastgate Parkway. Adjacent residential area and properties fronting Cawthra, comprised of mostly low-density established neighbourhoods, serve as origin points for latent bicycle demand to these nearby destinations. Few sites in the Mississauga Valley neighbourhood remain to be developed. <u>Bicycle lanes or separated facilities should be considered to accommodate the anticipated volume of cyclists</u>			
<b>FUNCTION OF THE ROUTE WITHIN BIKE NETWORK</b>					
New route provides access to a neighbourhood, suburb or other locality		Multi-use trail on one-side to replace existing sidewalk or segregated bike lanes (Active Transportation Study)	Transition area	Multi-use trail on one-side and Pedestrian Amenities proposed in Active Transportation Study.	Interchange Improvements (Active Transportation Study)
		Primary Boulevard Route as per the City of Mississauga Cycling Master Plan (2010)		Primary On-road Route (Cycling Master Plan).	
		<u>Bicycle lanes or separated facilities should be considered to encourage cycling for all users</u>			
New route provides access a connection between adjacent existing facilities		Existing multi-use trail on north side of Burnhamthorpe Rd	N/A	Existing multi-use trail on south side of the Queensway	N/A
		Existing signed route on Silver Creek Blvd			
		Primary Cycling Routes (as per the City of Mississauga Cycling Master Plan) are intended to serve as the backbone of the cycling network, providing direct and safety access to key city destination and connecting to existing and secondary routes <u>Facility selection should provide continuity with adjacent bicycle facilities (existing multi-use trail north of Burnhamthorpe) to the extent possible</u>			

SITE CHARACTERISTIC	NORTH SECTION Eastgate Parkway to Burnhamthorpe	CENTRAL SECTION Burnhamthorpe to Dundas	Dundas Underpass	SOUTH SECTION Dundas to QEW	QEW Overpass (North Service Rd to South Service Rd)
<b>TYPE OF ROADWAY IMPROVEMENT</b>					
Reconstruction	Reconstruction is planned; opportunity to accommodate on-road bicycle facilities and motor vehicle volumes.				
	Designated and existing right-of-way is 36m, with a few pinch points at 25m	Existing structure is 33.5m from abutment to abutment (of raised sidewalks). Abutment-to-raised median width is 14.3m.	Designated right-of-way is 40m north of the Queensway, 36m south of the Queensway (City of Mississauga).	Bridge span is 31m. Curb-to-curb width is 24.5m with a 2m raised median	
	Reconstruction provides opportunity to widen roadway to provide on-road bike facilities such as bike lanes; or to increase the boulevard width for a multi-use trail.				
<b>ON-STREET PARKING</b>					
Parallel on-street parking is not permitted	Stopping is prohibited on both sides south of Needham Lane to Eastgate Parkway as per Regional By-Law 15-2013			Parking is prohibited on both sides south of Needham Lane to the Queensway as per Regional By-Law 15-2013. No prohibitions are noted between the Queensway and the North Service Road, however there appears to be little or no demand for on-street parking and sufficient off-street parking is available.	Stopping is prohibited upon any bridge as per Regional By-Law 15-2013.
	Opportunities to provide bicycle lanes if on-street parking is not permitted				
<b>FREQUENCY OF INTERSECTIONS</b>					
Numerous low volume driveways or unsignalized intersections are encountered		Frequent residential driveways on both sides (every 10-30m).  <u>Bicycle lanes may be more appropriate than off-road separated facilities since motorists are more likely to be aware of cyclists on the roadway rather than adjacent to the road.</u>	N/A	Frequent residential driveways on east side (every 10-30m) south of the Queensway <u>Bicycle lanes may be more appropriate than separated facilities since motorists are more likely to be aware of cyclists on the roadway rather than adjacent to the road.</u>	N/A
Numerous high volume driveways or unsignalized intersections are present along the route		N/A	N/A	Frequent commercial driveways on both sides (every 30-100m) north of the Queensway. <u>Separated facilities are not generally preferred in this situation; bicycle lanes may be more appropriate. Crossings should be design to minimize conflict; additional positive guidance should be considered to warn cyclists and motorists of conflicts.</u>	N/A
Major intersection with high speed and traffic volumes encountered Note: Special treatments may be required at the intersection of South Service Road to transition the proposed bikeway north the QEW with the proposed bikeway south of South Service Road (e.g. cross-rides or curb cuts to on-road bikeways from a multi-use trail and vice versa)	5,000 vehicles entering Burnhamthorpe Rd during the peak hour		Dundas is an arterial road and major intersection, grade-separated with full move on-ramps. Vehicles entering intersection with the on-ramp is <5,000 during the peak hour (4,800 vph)	5,100 vehicles entering the Queensways intersection during the peak hour	5,600 vehicles entering the South Service Rd intersection during the peak hour
	<u>Consider provision of bicycle lanes, bike boxes, intersection and conflict zone markings as well as special bicycle signal phases at major intersections. Consider indirect left-turn treatments if there is significant bicycle left turn demand conflicting with through motor vehicle traffic. If a separated facility is being considered, crossings should have bicycle traffic signals with exclusive phases, and conflicts should be clearly marked.</u>		N/A	<u>Consider provision of bicycle lanes, bike boxes, intersection and conflict zone markings as well as special bicycle signal phases at major intersections. Consider indirect left-turn treatments if there is significant bicycle left turn demand conflicting with through motor vehicle traffic. If a separated facility is being considered, crossings should have bicycle traffic signals with exclusive phases, and conflicts should be clearly marked.</u>	

**Exhibit 7 - EVALUATION OF ALTERNATIVES (Step 2c - Select Appropriate and Feasible Bicycle Facility Type)**

ALTERNATIVE	NORTH SECTION Eastgate Parkway to Burnhamthorpe	CENTRAL SECTION Burnhamthorpe to Dundas	Dundas Underpass	SOUTH SECTION Dundas to QEW	QEW Overpass (North Service Rd to South Service Rd)
Multi-use trail on west side	RECENTLY CONSTRUCTED - in conjunction with Mississauga City Centre Watermain Construction..	NO - frequent residential driveways (10-30m) and mature trees that obstruct sight lines. South of Bloor St, hydro utility poles obstruct sight lines	NO - History of collision for southbound merging vehicles at Dundas St off-ramp. Appropriate transition treatments required to highlight potential conflict area. No safe crossing (i.e. signalized intersection) available to transition to on-road facility south of the underpass.	NO (north of the Queensway) frequent commercial / industrial driveways (30-100m) and history of collision for left-turning vehicles into commercial driveway on west side MAYBE (south of the Queensway) - backlotted residential, existing curbside sidewalk will require movement of hydro utility poles or road centreline. Connection to existing multi-use trail on south side	MAYBE - curbside sidewalk (2m) across bridge deck. Treatments required to highlight potential vehicles to westbound on-ramp. Curbside sidewalk adjacent to high-speed traffic in diverging lane, physical separation preferred. Will require consultation with MTO
Multi-use trail on east side		NO - frequent residential driveways (10-30m) and mature trees that obstruct sight lines.	NO - No safe crossing (i.e. signalized intersection) available to transition to on-road facility south of the underpass.	NO (north of the Queensway) frequent commercial / industrial driveways (30-100m). South of the Queensway, residential driveways (10 to 150) for 12 fronted-lotted homes, and several mature trees	MAYBE - curbside sidewalk (2m) across bridge deck. Treatments required to highlight potential vehicles to westbound on-ramp. Curbside sidewalk adjacent to high-speed traffic in diverging lane, physical separation preferred. Will require consultation with MTO
Bike lane		NO - not appropriate for speed and volume conditions. May be considered at intersections to provide continuity.	NO - not appropriate for speed and volume conditions. May be considered at intersections to provide continuity.	NO - not appropriate for speed and volume conditions. May be considered at intersections to provide continuity.	NO - cost prohibitive to widen bridge structure, insufficient width for min 1.8m conventional bike lane splitting two travel lanes through high-speed diverging ramp (interim treatment: permit use of sidewalk through the overpass). Will require consultation with MTO
Buffered bike lanes		MAYBE - physical separation is most appropriate for speed and volume conditions, will require road widening.	MAYBE - the constrained environment and high volume through the underpass creates an uncomfortable environment for motorist and cyclists. Physical separation is preferred, will require road widening (sufficient width through underpass to accommodate)	MAYBE - physical separation is most appropriate for speed and volume conditions, will require road widening.	
Segregated bike lanes		MAYBE- physical separation from adjacent traffic is most appropriate for high speed and volumes, function of the street and bicycle route, vehicle mix and available ROW. Frequent openings in separators will be required to accommodate residential driveways on both sides. Will require road widening.	YES - physical separation from adjacent traffic is most appropriate for high speed and volumes, function of the street and bicycle route. Frequent openings in separators will be required to accommodate residential driveways on west side,	MAYBE- physical separation from adjacent traffic is most appropriate for high speed and volumes, function of the street and bicycle route, vehicle mix and available ROW. Frequent openings in separators will be required to accommodate residential driveways on both sides. Will require road widening.	
RECOMMENDED FACILITY TYPE	Sidewalk on west side recently reconstructed to a multi-use trail. Construct transition treatments from multi-use trail to segregated bikeway south of Burnhamthorpe Road	Reconstruct roadway to provide 4 lanes with a centre turn lane and segregated bike lanes*	Reconstruct underpass to provide 4 lanes with raised median and segregated bike lanes*	Reconstruct roadway to provide 4 lanes (5 lanes south of the Queensway) with a centre turn lane and segregated bike lanes*	Reconstruct sidewalk on east side to a multi-use trail and install transition treatments at North Service Rd (e.g. cross-rides, left-turn queue boxes,

\*Note: Segregated bike lanes are bike lanes with a painted buffer and separators used to prohibit motorist from driving in the lane; such as raised bike lanes with a bevelled curb.

## 2.5 Rationale Development (Step 3)

Step 3, the rationale for the final recommendation is documented below.

### 2.5.1 Recommendations

To accommodate active transportation along Cawthra Road from Eastgate Parkway to the South Service Road, the following are recommended:

- North of Burnhamthorpe Road: maintain the recently constructed multi-use trail on the west side of Cawthra Road.
- From Burnhamthorpe Road to the North Service Road: maintain the existing sidewalks and implement raised bike lanes by widening the road platform.
- From the North Service Road to the South Service Road: transition the raised bike lanes to accommodate cyclists to off-road on both sides across the QEW Overpass.
- From Dundas to the Queensway, implement pedestrian amenities such as shading, landscaping, garbage bins, benches and other bus stop improvements to improve the pedestrian experience.
- Improve crossing conditions for pedestrians at all signalized intersections. OTM Book 15 provides additional guidance for pedestrian crossing facilities.
- Improve crossing conditions for cyclists where Cawthra Road intersects with existing or proposed bike routes: Eastgate Parkway (future Highway 403 Utility Trail and Cawthra BRT station), Rathburn, Burnhamthorpe Trail, Bloor Street, the Queensway, and the North Service Road (Hydro One Lakeshore – Royal Windsor Trail). OTM Book 18 Bicycle Facilities provides additional guidance for conflict zones and other crossing treatments.

### 2.5.2 Rationale

**North of Burnhamthorpe**, further development of active transportation facilities is likely to provide marginal benefits. The construction of a multi-use trail on the east side of Cawthra Road is constrained by hydro utilities poles and trees within the boulevard. An on-street bike facility would require road widening where trips served by this type of facility can also be accommodated by the recently constructed multi-use trail. It aligns with the pre-selected desirable facility of a separated bike facility. It is also directly connects to properties fronting Cawthra Road. Other pedestrians and cyclists entering this section of the corridor are likely to enter via the signalized intersections of Burnhamthorpe Road, Rathburn Road or Eastgate Parkway (from the future BRT station and Highway 403 Utility trail). Intersection treatments such as crossrides and signal timing adjustments may help improve crossing conditions for pedestrians and cyclists coming from these areas.

**From Burnhamthorpe to the North Service Road**, raised bike lanes align with the pre-selected desirable facility of a separated bike facility. It provides exclusive operating space and physical separation from motor traffic that is preferred in high volume and speed conditions. An on-road facility may be less preferred from a continuity perspective (given the existing multi-use trail); however, special transitions at the intersection of Burnhamthorpe Road can be designed to mitigate impacts to route continuity. Example treatments include: crossrides, coloured pavement, and in-curb bike boxes. Raised bike lanes can present a greater awareness of cyclist in the corridor as it is located adjacent to general travel lanes for motorists, while providing the right-of-way across driveways and side streets. The most significant drawback of this option is cost associated with widening the road and moving the curb and gutter. While an off-road facility may provide cost advantages, safety issues remain from the frequent driveways and cross-streets and limited visibility from hydro utility poles and trees. In the past, the provision

of a multi-use trail has coincided with other opportunities (i.e. the Hanlan Watermain construction). Given that there will be no road widening for motor vehicle capacity, a standalone project will be required for any new active transportation facility. Cost impacts may be mitigated by postponing construction to align with future road resurfacing or reconstruction.

**Across the QEW**, this section has the highest traffic volumes (including high truck volumes) and higher speeds as motorists approach the QEW. Separation from pedestrians and cyclists from motorists is preferred. The ramp entry and exit points present significant conflicts given the higher traffic volumes. It is recommended to transition the raised bike lanes to allow cyclists to move off-road. For example, an ‘exit ramp’ can be used to provide an option to exit the road and use the sidewalk. Other treatments may include pavement markings or conflict zones, jug handles and other crossing treatments for high-speed ramps. Replacement of the lower guard rail with a higher railing can help improve cyclist comfort. Since the sidewalk on the bridge deck appears to be less than 3 m wide, cyclists are expected to dismount or yield to pedestrians.

## 2.6 Key Impacts of Design Alternative

The following is a summary of issues and key impacts associated with implementing bike facilities within the project limits. A more detailed review is provided in **Appendix A1**.

### 2.6.1 North Section – Highway 403 / Eastgate Parkway to Burnhamthorpe Road

A multi-use trail (MUT) was recently constructed between Eastgate Parkway and Burnhamthorpe Road on the west side of Cawthra Road. At the northern terminus, a crossover is provided to connect to the Cawthra Road BRT Station.

### 2.6.2 Central Section – Burnhamthorpe Road to Dundas Street

The central section is characterised by mature residential developments, which mainly consist of single-family homes with direct driveway access to Cawthra Road. Some commercial development is also present at major intersections (e.g., south of Burnhamthorpe Road), as well as several churches and two cemeteries. The intersections within this segment are unsignalized with the exception of the Bloor Street intersection. South of Bloor Street, hydro poles are situated on the west side of Cawthra Road.

The main impacts of providing bike facilities along Cawthra Road include:

- Removal of mature trees
- Relocation of light standards
- Utility relocations (typically limited to several fire hydrants, large hydro boxes, and several hydro poles)
- Sidewalk relocation in the vicinity of intersections
- Constrained ROW at several locations may require either property acquisition or road realignment.



#### Removal of Mature Trees

Provision of a bike facility will result in the removal of mature trees and/or raising of the tree canopy located within the boulevard of Cawthra Road.

### Light Standards and Utility Relocations

Generally, light standards are sufficiently set back from the roadway so that provision of bike lanes will not require their relocation. However, relocation of a limited number of light standards will be required.

Utility relocations will potentially involve several fire hydrants and hydro boxes. South of Bloor Street, hydro poles are located on the west side of Cawthra Road, but most of these are sufficiently offset from the roadway and are not expected to interfere with the implementation of bike lanes.

### Sidewalk Relocations or Removal

Between intersections, sidewalks are set back from the curb and therefore will not have to be relocated to accommodate segregated bike lanes or cycle tracks. However, at intersection locations sidewalks are typically adjacent to the curb and therefore will require relocation.

### Right-of-Way Constraints

There are several locations where the introduction of bike lanes is hampered by right-of-way constraints (i.e. at the Ukrainian Church just south of Burnhamthorpe, just north of Bloor Street and at the Mount Peace cemetery).

- South of Burnhamthorpe: Additional property on the east side of Cawthra Road may be required just south of the Burnhamthorpe intersection (at the Ukrainian Church and the strip mall immediately to the north of the church) for a northbound segregated bike lane.
- Bloor Street: North of Bloor Street the right-of-way is constrained on the west side of Cawthra Road. At this location, additional property or an easterly shift of the roadway will likely be required to accommodate segregated bike lanes.
- Mount Peace Cemetery: At the Mount Peace cemetery implementation of segregated bike lanes on the west side of Cawthra Road will require realigning the roadway easterly.



### 2.6.3 South Section – Dundas Street to the QEW Interchange

#### Dundas Street Interchange

At the Dundas Street interchange implementation of segregated bike lanes will be straightforward due to the presence of a 4.6m wide boulevard on both sides of the roadway. Minor curb adjustment or removal of a bus shelter would be required for the implementation of a raised cycle track.



#### Needham Lane to the Queensway

Between Needham Lane and the Queensway, Cawthra Road is industrial/commercial in nature with a significant number of driveways. Segregated bike lanes or cycle tracks could be implemented with limited utility impacts or sidewalk relocations.



#### The Queensway to the QEW Interchange

Between the Queensway and the QEW interchange the ROW is very constrained due to the road widening to accommodate a third lane southbound and the presence of hydro poles on the west side. Providing a segregated bike lane on the west side of Cawthra Road will require shifting the roadway to the east.



Between Melton Drive and the Queensway road widening is not feasible unless at least one residential building is removed. However, the median south of the Queensway is very wide and could be narrowed to construct bike facilities. This would involve realigning traffic lanes toward the median and (potentially) converting the intersection of Melton Drive and Cawthra Road to a right-in/right-out configuration.



## 3 Local Road Improvements

### 3.1 Corridor and Intersection Improvements

Based on the traffic analysis completed as part of Phase 1 of this study, it was determined that:

- 1) Cawthra Road is to remain two through lanes northbound and southbound throughout the entire corridor except between the Queensway and the QEW where three southbound lanes are available; and,
- 2) To address operational and safety concerns at individual intersections, isolated improvements are to be further considered.

The opportunity for potential intersection improvements are discussed below.

#### 3.1.1 Signalized Intersections

The **Eastgate Parkway** intersection is expected to operate at LOS F during the 2031 AM and PM peak hours. The EBT, NBT, and SBL would operate beyond capacity during AM peak hour. As a result longer delays are expected for these movements. During the PM peak hour, the EBL, WBT, NBL, and SBT will operate overcapacity.

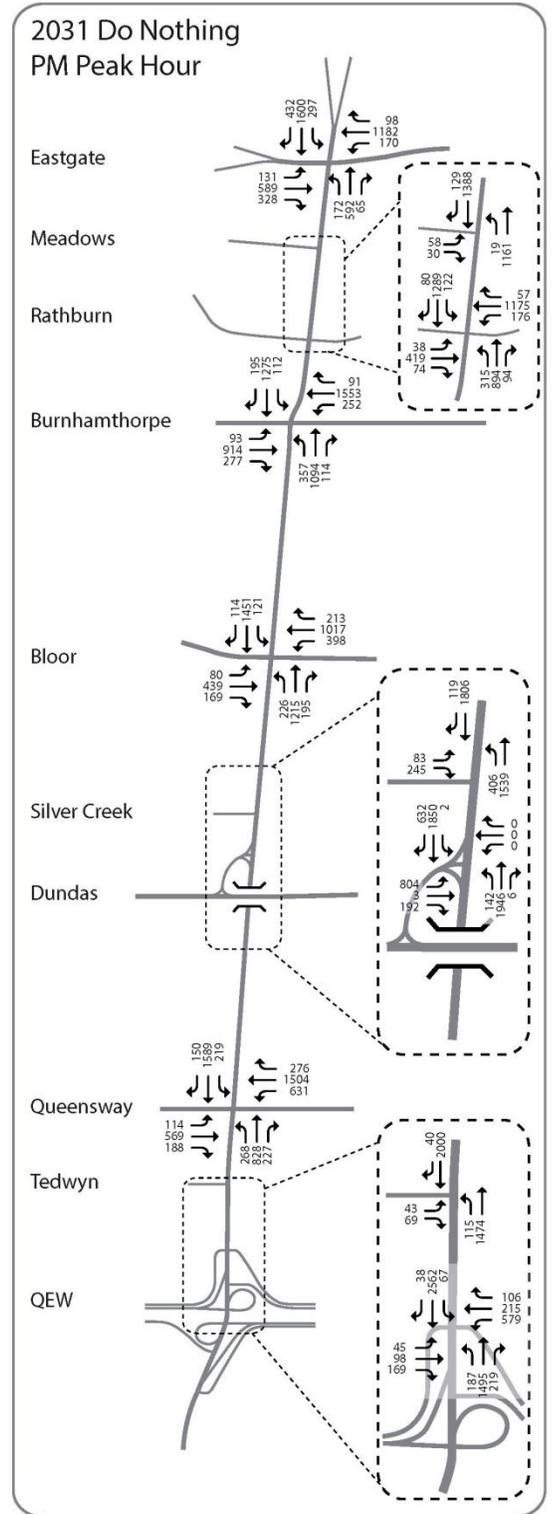
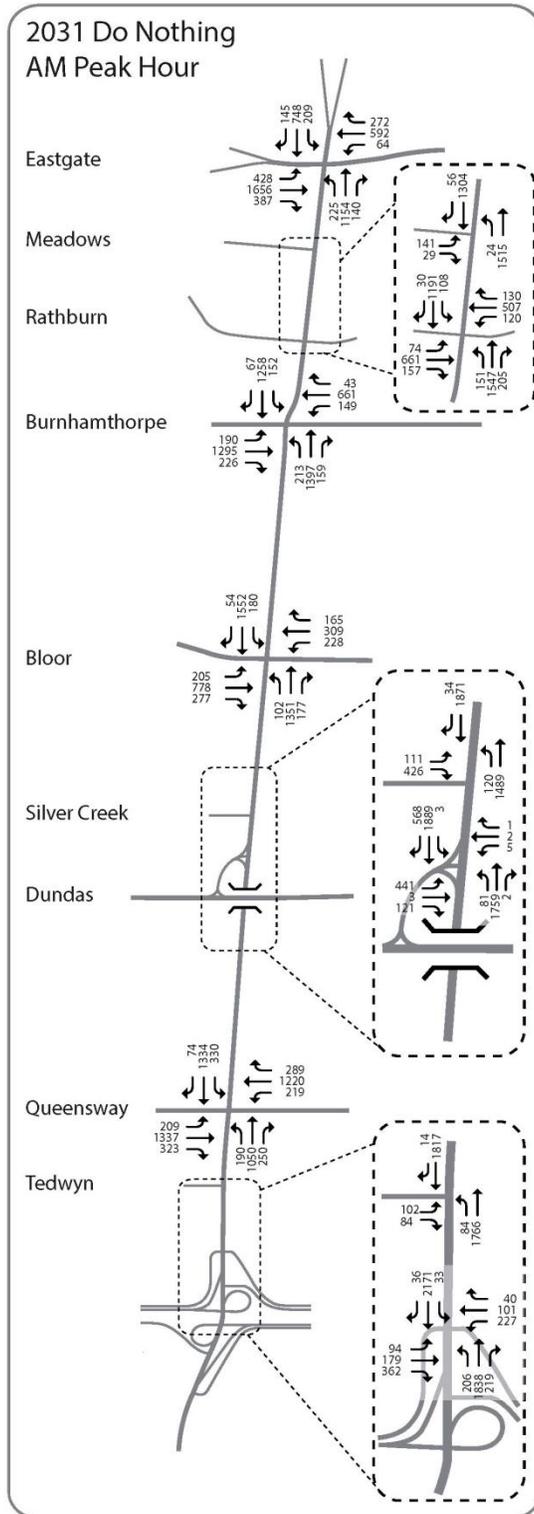
Potential improvements were considered, including provision an exclusive northbound right turn lane and dual southbound left turn lanes.

- An exclusive northbound right turn lane would help improve northbound traffic operations. It can be implemented within the existing right-of-way with minimal impacts and therefore is recommended.
- A fully protected dual southbound turn lane was considered to accommodate future demands (particularly during the PM peak when the southbound left turn demand equals approximately 300 veh/hr). However, since this will only marginally improve operations and requires substantial road widening, it is not recommended.

The **Rathburn Road** intersection is expected to operate at LOS E during the 2031AM peak hour and LOS F during the PM peak hour. The higher delays and overcapacity issues are related to the WBL & NBT movements during the AM peak hour, and the WBTR, NBL & SBTR movements during the PM peak hour. Among these movements, the NBL will operate the worst given the high turning volume.

Potential improvements, including a southbound left turn with permitted-protected phasing and an exclusive northbound right turn lane, will improve traffic operations and may help reduce the occurrence of rear-end collisions. The southbound left phasing can be implemented at minimal cost and therefore recommended. The northbound right turn can be implemented within the existing right-of-way (although possibility requiring relocation of several existing hydro poles and overhead hydro easement) and therefore is recommended.

**Exhibit 7: 2031 Four Lanes – Traffic Projections**



The **Burnhamthorpe Road** intersection is expected to operate at LOS F during both the 2031 AM and PM peak hours. During the AM peak hour the EBT, WBL, NBL, NBT, and SBL movements will operate over capacity. During the PM peak hour the WBL, WBT, NBL, and SBT will operate overcapacity. The northbound left turn demands exceed 350 veh/hr during the PM peak but remain critical during both the AM and PM peak periods.

Potential improvements, including provision a dual northbound left turn lane, were considered to improve traffic safety and provide better intersection performance. However, although beneficial from a traffic operations perspective, implementation of a dual northbound left turn would require road widening through the intersection to avoid opposing overlapping lefts or require split phasing. Providing a dual northbound left turn it is not recommended from a geometric and property impact perspective.

The **Bloor Street** intersection is expected to operate at LOS E during the 2031 AM and PM peak hours. Under existing conditions the dominant collision type is rear-end collisions.

Potential improvements, including signal phasing and an exclusive northbound right turn lane, would improve traffic operations and potentially reduce the occurrence of rear-end collisions.

- Adjustments to the signal timings to provide more east-west time and extend advance phases can be implemented with minimal impacts and therefore is recommended based on traffic demands.
- The addition of a northbound right turn lane will improve traffic operations and potentially reduce the number of rear-end collisions at the intersection. Although expected to require additional right-of-way (if implemented in conjunction with segregated bike lanes along the corridor) it is recommended.

The **Silver Creek** and **Dundas Ramp** intersections are expected to operate at LOS C during the 2031 AM peak hour and LOS D & E during the PM peak hour respectively. The safety analysis indicates that the predominant type of collision at Silver Creek Boulevard is southbound rear-end collisions. For the Dundas Street Ramp, the safety analysis indicates that a high proportion of collisions on the eastbound to southbound merge. The northbound left turn at Silver Creek Boulevard also exceeds 400 veh/hr during the PM peak hour.

Potential improvements, including minor signal timing adjustments (to provide more eastbound green time) and repainting to extend the existing turn lane at Silver Creek Boulevard, can be implemented at minimal cost and therefore are recommended. Modifying the eastbound right turn channelization at Dundas Street to provide clearer yield point should be undertaken.

**The Queensway** intersection is expected to operate at LOS F during both the 2031 AM and PM peak hours. With the right turn channelization on each approach there is space for two vehicles to queue at the stop bar before obstructing right turning motorists. The lane drop approximately 100 metres downstream in EB/WB and NB directions likely results in a lower utilization of the curb lane.

Potential improvements, apart from minor adjustments, were considered including providing a dual northbound left turn to improve traffic safety and provide better intersection performance. However, although beneficial from a traffic operations perspective, implementation would require road widening beyond that of the existing shadow lane to avoid opposing overlapping lefts or require split phasing and therefore is not recommended from a geometric and property impact perspective.

Observations also indicate that the existing northbound channelized right turn at the Queensway is a conflict point and should be removed. The outer (third) northbound lane is currently not used correctly and unless intended as a future queue jump lane, should be removed leaving only an exclusive northbound right turn lane.

The **North Service Road** intersection is one of the poorest performing intersections along the corridor. The intersection is expected to operate at LOS E during the 2031 AM peak hour and LOS F during the PM peak hour. Westbound left turn demands are expected to exceed 500 veh/hr during the PM peak hour.

Potential improvements, including adding an exclusive eastbound right turn lane and fully protected dual westbound left (to accommodate heavy demands) can improve intersection operations. However, since the volumes along the North Service Road may be significantly reduced as a result of the proposed improvements along the QEW and the interchange at Dixie Road, it is recommended that these improvements be deferred and intersection operations monitored following implementation of improvements to the QEW (scheduled for 2018).

### 3.1.2 Unsignalized Intersections

The **Hyacinthe Boulevard** and **Running Brook Drive** intersections will operate the poorest of the unsignalized intersections. The eastbound left turn onto Cawthra Road at both intersections is expected to operate at LOS F during 2031 AM peak hour conditions. The eastbound left turn movement at **Breckenridge Road** is also expected to operate at LOS F during 2031 PM peak hour. However, in all three cases, the left turn movement will remain well below capacity and therefore no improvements are recommended at this time.

At the three remaining unsignalized intersections within the project limits (i.e. **Needham Lane** and **Orwell Avenue** during both the AM and PM peak hour, and at **Melton Drive** during the AM peak hour), the left turn onto Cawthra Road operates overcapacity and drivers experience long delays (LOS F). The Orwell Avenue and Needham Lane intersections do not currently meet the warrants for traffic signals; however operations should continue to be monitored and traffic signals implemented upon satisfaction of the warrants. At **Melton Drive**, intersection operations are to be monitored and, if necessary, left turns restricted at the intersection.

## 4 Summary and Conclusions

### 4.1 Active Transportation

Existing conditions are discussed in detail in the Multi-Modal Transportation Report. The analysis of feasible strategies to accommodate walking and cycling along Cawthra Road between Eastgate Parkway and the QEW reveals the following:

- Key constraints relevant to active transportation are: high volumes (>30,000 vph) and high operating speed (70 km/h), the presence of mature trees and hydro poles in the boulevard (east side north of Burnhamthorpe Road, west side south of Bloor Street), frequent driveways on both sides, right-of-way pinch points at several locations including the QEW overpass and near capacity operation at multiple intersections.
- For pedestrians, sidewalks exist on both sides throughout the corridor south of Burnhamthorpe Road. North of Burnhamthorpe Road, the sidewalk on the west side was recently replaced with a multi-use trail. North of Meadows Blvd, a new 3.5m multi-use trail was constructed on the west side of Cawthra Road. There is no sidewalk on the east side of Cawthra Road between Burnhamthorpe Road and Eastgate Parkway (only a splash pad exists, adjacent to the curb).
- For cyclists, there are no cycling facilities along Cawthra Road except for the multi-use trail noted above. Bikeways intersect Cawthra Road at the following intersections: Rathburn Road, Burnhamthorpe Road, the Queensway, and Silver Creek Boulevard.

The proposed alternatives were evaluated using the three-step process outlined in OTM Book 18. Step 1 identified a pre-selected desirable facility of separated facilities throughout the corridor. As part of Step 2, thirteen criteria were evaluated based on the site conditions and specific design heuristics. The most influential criteria included: the traffic operations and vehicle mix, the available space, type of roadway improvement, cost, function of the route in the bike network and frequency of driveways and side streets.

Based on the evaluation of alternatives, it is recommended to construct raised bike lanes along Cawthra Road from Burnhamthorpe Road to the North Service Road (raised bike lanes are proposed by widening the road platform, and maintaining existing sidewalk). The rationale was as follows:

- The raised (segregated) bike lanes would provide additional separation from motor vehicle traffic thus increasing comfort of cyclists riding in heavy traffic;
- The raised bike lane can be transitioned to a conventional painted bike lane at intersections so that cyclists can move in and out of the lane for easy access; and,
- Maintains the bikeway adjacent the travel lanes where cyclists are more visible to motorists particularly when turning across the bikeway at signalized intersections and commercial driveways.

North of Burnhamthorpe Road, the recently constructed multi-use trail on the west side of Cawthra will accommodate pedestrian and cyclist needs. The inclusion of resilient, low maintenance trees planted at regular intervals, benches, waste receptacles, community information boards, water fountains and bicycling parking are to be considered.

Similarly, pedestrian amenities are also recommended from Dundas Street to the Queensway to improve the pedestrian experience. Example amenities are shading, landscaping, garbage bins, benches and other bus stop improvements. Crossing improvements for pedestrians are recommended at all signalized intersections (i.e. increasing pavement treatments and markings for pedestrians, audible pedestrian crossing signals, etc). Crossing treatments for cyclists are recommended at Eastgate Parkway, Rathburn, Burnhamthorpe Trail, Bloor, the Queensway and North Service Road. OTM Book 18 Bicycle Facilities provides additional guidance to conflict zones and other crossing treatments.

From the North Service Road to the South Service Road, a transition is recommended from the raised bike lanes to allow cyclist to off-road on both sides across the QEW.

## 4.2 Summary of Recommended Improvements

The following is a summary of recommended improvements within the project limits. Key issues are identified on plans provided in **Appendix A2**.

### a) Eastgate Parkway to Burnhamthorpe Road

Improvements within this section involve providing a northbound right turn lanes at Eastgate Parkway and Rathburn Road (potentially requiring relocation of several hydro poles along Cawthra Road at Rathburn Road). Active transportation needs within this section will be adequately served with completion of the planned MUT on the west side of Cawthra Road.

### b) Burnhamthorpe Road to Bloor Street

For the most part, improvements within this section involve maintaining the existing centreline and 17.5m pavement width (4 lanes at 3.5 plus 3.5m flush median) and widen both sides to accommodate raised bike lanes or cycle tracks (1.8m). It is expected that these improvements can be implemented with minor utility and mature tree removals. Where possible, bus bays should be eliminated.

Given the limited space available north of Bloor Street, additional right-of-way and relocation of the noise barrier is potentially required to accommodate bike lanes adjacent to the southbound right turn lane.

### c) Bloor Street to Dundas Street

For the most part, improvements within this section will involve maintaining the existing centreline and 17.5m pavement width (4 lanes at 3.5 plus 3.5m flush median) and widen both sides to accommodate raised bike lanes or cycle tracks (1.8m). It is expected that improvements can be implemented with minor utility impacts. Mature tree removals will be required on both east and west sides of the roadway.

Given the limited space available adjacent to the Mount Peace Cemetery, it is recommended to hold the existing curb line along west side of the road, and a 3.0m flush median in conjunction with an alignment shift to the east.

Additional right-of-way will potentially be required to accommodate a northbound right turn lane at Bloor Street (in conjunction with bike lanes).

### d) Dundas Street to the Queensway

Improvements within this section involve maintaining the existing barrier curb between Dundas Street to Needham Lane and providing a cycle track within the existing paved boulevard. South of Needham Lane, maintain the existing centreline, provide a 18.0m

pavement width (4 lanes at 3.5 plus 4.0m flush median); and widen both sides to accommodate raised bike lanes or cycle tracks (1.8m). This will involve reducing the 5.0m flush median to 4.0m (except at intersections).

It is expected that improvements can be implemented with moderate utility impacts; however given the limited boulevard width immediately north of the Queensway, additional right-of-way will likely be required to accommodate relocation of sidewalk to behind hydro poles adjacent to outside (third) southbound lane.

**e) The Queensway to the North Service Road**

Improvements will involve providing a 21.5m pavement width (5 lanes at 3.5 plus 4.0m flush median), and widening to accommodate raised bike lanes or cycle tracks (1.8m). Immediately north and south of Tedwyn Drive, this involves holding the west curb line and widening to the east. It also involves reducing the 5m flush median to 4m (except at Tedwyn intersection). It is expected that these improvements can be implemented with minor utility impacts (avoiding hydro poles on west side), however will require significant tree removal within the existing ROW (east side).

Given the limited space available at Melton Drive, it is recommended to remove the median island at Melton Drive (reducing the median width from 7m to 4m flush), and maintain the existing east and west side curb along Cawthra Road. Alternatively, reduce the raised median to 2m and restrict Melton Drive to right-in/ right-out.

**f) North Service Road to the South Service Road**

Based on information available, it is estimated that the existing roadway width across the QEW Overpass is approximately 24.5 to 25m. The sidewalks are estimated to be approximately 1.8 to 2.0m wide. Although bike lanes cannot be accommodated across the bridge, it is estimated that a 0.75 to 1.0m shoulder will be available. North and south of the bridge a raised bike lane or a cycle track can be added without major impacts.

Implementation of the above improvements is considered a 'Schedule B' undertaking under the Municipal Class EA process.

It is expected that costs to implement the proposed improvements will be in the order of \$7.4M, including allowances for engineering, property, utility relocations, and 20% overall contingency (totalling \$2.7M). Of the \$4.7M construction cost, it is estimated that approximately \$1.6M is related to intersection improvements and pavement resurfacing, while the remaining \$3.1M is associated with the implementation of bike lanes.





# Appendix A

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# Appendix A1: Feasibility of Implementing Bike Lanes/ Cycle Tracks (Segment Review)

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## Appendix A1 - Feasibility of Implementing Bike Lane/ Cycle Tracks (Segment Review)

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
<p>QEW South Service Road</p>	<p>QEW North Service Road</p>	<p>Same discussion as for northbound bike lane or cycle track.</p>	   	<p>A bike lane can be added south of the QEW Overpass.</p> <p>Relocation of the sidewalk at the intersection with South Service Road. Traffic signal poles require relocation.</p> <p><u>QEW Overpass:</u></p> <p>The roadway width is approximately 25m (e/p to e/p), consisting of 6 lanes at 3.5m [21m lanes] + 2m [1.5m raised median plus offset] + 0.75 to 1.0m shoulders each side = approx. 24.5 to 25m (TBC)</p> <p>The sidewalks are approx. 1.8 to 2m wide.</p> <p>1.5m bike lanes cannot be accommodated across the bridge (however approx. 0.75 to 1.0m shoulder currently available).</p> <p>North of the bridge a bike lane or a raised cycle track can be added without major impacts.</p>	   

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
QEW North Service Road	Tedwyn Drive	<p>Typical 19m pavement width (edge of pavement to edge of pavement)</p> <p>Existing 5m flush median</p> <p>Approx. 5m offset to right-of-way (0.5m curb, 2m sidewalk, 3m offset to ROW including noise wall)</p> <p>Area behind sidewalk currently accommodates hydro poles, guying, utilities, and street trees.</p> <p><u>Provision of cycle track or bike lane will require 1.5m easterly shift of roadway.</u></p> <p><u>Hold existing curb line along east side</u></p> <p><u>Reduce 5m flush median to 4m, in conjunction with easterly shift of roadway.</u></p> <p>Alternative to fully pave boulevard to noise wall, eliminate street trees, and add hazard protection signing to hydro poles, is less desirable and not recommended.</p>	   	<p>Cycle track or bike lane can be accommodated; however will require relocation of several light standards, and removal of numerous trees within existing ROW.</p> <p>Will require relocation of bus shelter toward the ROW limit</p> <p><u>Provision of cycle track or bike lane will require 2m widening east side (including 1.5m easterly shift of roadway for southbound bike lane, minus 1m median width reduction, plus 1.5m northbound bike lane/cycle track)</u></p> <p><u>Overall, 2m widening east side [3m adjacent to left turn lane at Tedwyn Drive intersection].</u></p> <p>Widening for bike lanes extends up to existing light standards.</p> <p>Remove trees with ROW (east side) and where necessary shift sidewalk behind existing light standards and traffic signal poles.</p>	   

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Tedwyn Drive	Melton Drive	<p>Typical 19m pavement width (edge of pavement to edge of pavement)</p> <p>Typical 5m flush median at north of Tedwyn and widening to 7m median with raised island at Melton Drive</p> <p>Approx. 5m offset to ROW (0.5m curb, 2m sidewalk, 3m offset to ROW including noise wall)</p> <p>Area behind sidewalk currently accommodates hydro poles, guying, utilities, and street trees.</p> <p>Due to the constrained ROW easterly alignment shift and median width reduction required to accommodate bike lane or cycle track.</p> <p><u>Provision of cycle track or bike lane will require 1.5m easterly shift of roadway.</u></p> <p><u>Reduce 5m flush median to 4m, in conjunction with easterly shift of roadway.</u></p>	   	<p>Typical 19m pavement width (edge of pavement to edge of pavement)</p> <p>Typical 5m flush median at north of Tedwyn and widening to 7m median with raised island at Melton Drive</p> <p><u>Provision of cycle track or bike lane will require 2m widening east side (including 1.5m easterly shift of roadway for southbound bike lane, minus 1m median width reduction, plus 1.5m northbound bike lane/cycle track)</u></p> <p>Sidewalk relocation and tree removal will be required in conjunction with 2m road widening to the east.</p> <p>Although trees are often set back toward the noise wall, the majority of trees are required to be removed.</p> <p><u>Existing 5m flush median to be narrowed to 4m, in conjunction with easterly shift of roadway, except at Tedwyn Drive intersection</u></p>	   

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Melton Drive	Queensway	<p>Existing 3m bus bay and 2m sidewalk located on west side of Cawthra Road opposite Melton Drive.</p> <p>Due to the constrained ROW, it is not feasible to provide a southbound bike lane or a cycle track, without a westerly alignment shift (1.5m) and median width reduction.</p> <p><u>Maintain west side curb</u></p> <p><u>Remove median island at Melton Drive (reduce median width from 7m to 4m flush).</u></p> <p>Enbridge Station in southwest quadrant of intersection will be affected with any widening to the west.</p> <p>At that location additional property would need to be taken to accommodate a bike lane or cycle path</p>	   	<p>North of Melton Drive any road widening will require removal of house in north/west quadrant of the intersection.</p> <p>Median narrowing is the only option to accommodate bike lane or cycle track without significant property impacts.</p> <p><u>Maintain west side curb</u></p> <p><u>Remove median island at Melton Drive (reduce median width from 7m to 4m flush).</u></p> <p><u>Alternatively, carry 2m raised island through Melton Drive intersection and restrict to right-in/right-out, including potential U-turn at Tedwyn Drive.</u></p> <p><i>Left turn demands at Melton Drive potentially affected:</i></p> <p><i>2031 WB Left = 31 veh/ hr AM peak; 19 veh/hr PM peak.</i></p> <p><i>2031 SB Left = 33 veh/hr AM peak; 78 veh/hr PM peak.</i></p>	   

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Queensway	Orwell Street	<p>Typical 19m pavement width (edge of pavement to edge of pavement)</p> <p>Existing 7m median width north of Queensway tapers to 5m flush median south of Orwell Street (with 2 m raised island at intersection)</p> <p>Right-of-Way is constrained where Cawthra Road has been widened to accommodate a third lane southbound, approaching and through the Queensway intersection.</p> <p><u>Additional ROW will be required for a bike lane or cycle path on the west side of Cawthra Road, adjacent to the third lane southbound.</u></p> <p><u>Reduce median width by 1m and shift southbound lanes approximately to the east. Relocate sidewalk to behind hydro poles.</u></p>	   	<p>Typical 19m pavement width (edge of pavement to edge of pavement)</p> <p>Reduce /eliminate the northbound speed-change lane (for the westbound right turn movement) north of the Queensway intersection in conjunction with a northbound bike lane/ cycle track.</p> <p>The TWLT lane is 5m wide. <u>Reduce flush median to 4m between intersections.</u></p> <p>Several hydro poles on east side will require relocation.</p> <p><u>Provision of bike lanes/ cycle tracks will require relocation of sidewalk to behind light standards.</u></p> <p>Requires relocation or removal of bus shelter.</p>	   

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Orwell Street	Needham Lane	<p>Typical 19m pavement width (edge of pavement to edge of pavement)</p> <p>Existing 5m flush median between Orwell Street and Needham Lane (with 2 m raised island at intersection)</p> <p>Generally, the existing boulevard width is sufficient to <u>accommodate a southbound bike lane or cycle path with minimal impacts.</u></p> <p>Hydro poles appear sufficiently set back from the roadway to accommodate bike lane or cycle path.</p> <p>The bus shelter north of Orwell intersection will require relocation (i.e. set back further from curb).</p>	   	<p>Typical 19m pavement width (edge of pavement to edge of pavement)</p> <p>Existing 5m flush median between Orwell Street and Needham Lane (with 2 m raised island at intersection)</p> <p><u>A bike lane or cycle track can be accommodated with minor impacts.</u></p> <p>Some narrowing of the median maybe possible (up to 1m), if required.</p>	  

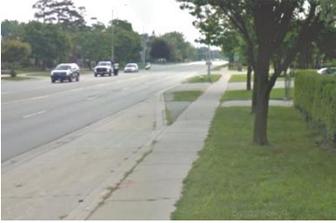
From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Needham Lane	Dundas Street ramp terminal	<p>Existing paved boulevard is approximately 4.6m wide.</p> <p>Existing 5m raised median between Needham Lane and Dundas Ramp.</p> <p>There are no driveways within this section.</p> <p><u>Maintain the existing barrier curb. Provide cycle track within paved boulevard.</u></p> <p>A few light standards are located in the boulevard, but they are 2.6m offset from back of curb and can be provided width hazard signing.</p>	   	<p>Existing paved boulevard is approximately 4.6m wide.</p> <p>Maintain existing 5m raised median between Needham Lane and Dundas Ramp.</p> <p>There are no driveways within this section.</p> <p><u>Maintain the existing barrier curb. Provide cycle track within paved boulevard.</u></p> <p>A few light standards are located in the boulevard, but they are 2.6m offset from back of curb and can be provided width hazard signing.</p> <p>South of the Dundas Ramp intersection there is a bus shelter on the east side that will need to be removed/relocated toward the retaining wall.</p> <p>The existing road widening at the intersection can be shifted further north to better accommodate the cycle track.</p>	   

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Dundas Street ramp terminal	Silver Creek Boulevard	<p>Typical 19m pavement width (edge of pavement to edge of pavement)</p> <p>Typical 5m flush median between Dundas Street and Silver Creek Boulevard (including 2m raised islands at intersections)</p> <p><u>Bike lanes or cycle tracks can be accommodated with minimal impacts.</u></p>		<p><u>Bike lanes or cycle tracks can be accommodated, with minor utility and tree impacts.</u></p> <p>Access to Dixie Presbyterian Church (registered heritage site) at signalized intersection opposite Dundas Ramp. No property impacts.</p>	

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Silver Creek Boulevard	Santee Gate	<p>Typical 17.5m pavement width (edge of pavement to edge of pavement)</p> <p>Typical 3.5m flush median at north of Silver Creek Boulevard narrowing to 3m adjacent to Mount Peace Cemetery (within 28.3m right-of-way width)</p> <p>Just north of the intersection with Silver Creek Blvd there is a bus shelter that would need to be removed to accommodate a bike facility</p> <p><u>To accommodate bike lane/ cycle tracks adjacent to the Mount Peace Cemetery, a 1.5m easterly alignment shift of the road is required.</u></p> <p><u>Hold existing curb line along west side</u></p> <p><u>Maintain 3m flush median in conjunction with easterly shift of roadway.</u></p> <p>Shift avoids impacts to Mount Peace Cemetery (registered heritage site).</p>	   	<p>Typical 17.5m pavement width (edge of pavement to edge of pavement).</p> <p>Existing sidewalk sufficiently set back from curb.</p> <p>Generally, a bike lane or cycle track can be accommodated; however there will be significant impacts to mature trees, located between existing curb and sidewalk.</p> <p><u>Provision of cycle track or bike lane will require 3m widening opposite Mount Peace Cemetery (including 1.5m easterly shift of roadway for southbound bike lane, plus 1.5m northbound bike lane/ cycle track)</u></p> <p><u>Overall, 1.5 to 3m widening along east side of Cawthra Road.</u></p> <p><u>Will require removal of mature trees within boulevard.</u></p> <p>Isolated utility pole impacts, requiring relocation.</p>	   

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Santee Gate	Bloor Street	<p>Typical 17.5m pavement width (edge of pavement to edge of pavement)</p> <p>Maintain 4 lanes at 3.5m, plus 3.5m flush median within residential area from Santee Gate to Bloor Street.</p> <p><u>Bike lanes or cycle tracks can be accommodated; however will require significant tree removals.</u></p> <p><i>Confirm 25.3m existing right of way width at residential property located 150m south of Bloor Street (plans potentially incorrect, as sidewalk is shown on private property). [See Photo]</i></p>	   	<p><u>Bike lanes or cycle tracks can be accommodated, with minor utility and tree impacts.</u></p> <p>Maintain 4 lanes at 3.5m, plus 3.5m flush median</p> <p>Avoids impacts to residential property # 3245 (cultural heritage landscape site).</p> <p>Avoids impacts to residential property # 3281 (cultural heritage landscape site). [See photo right side]</p> <p>Avoids impacts to residential property # 3317 (cultural heritage landscape site). [See photo]</p> <p><u>Additional ROW will be required if Cawthra Road is widened to accommodate northbound right turn lane.</u></p> <p><i>Northbound right turn demands at Bloor Street: 2031 NB Right = 177 veh/ hr AM peak; 195 veh/hr PM peak.</i></p>	   

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Bloor Street	Schomberg Avenue	<p>Limited space available to accommodate a bike facility immediately north of Bloor Street.</p> <p>Adding bike lanes or cycle tracks will impact hydro box adjacent to southbound right turn lane at Bloor Street.</p> <p><u>Additional 1m right-of-way and relocation of noise barrier or alignment shift potentially required adjacent to southbound right turn lane.</u></p> <p><i>2031 SB Right = 54 veh/ hr AM peak; 114 veh/hr PM peak</i></p>	 	<p><u>Bike lanes or cycle tracks can be accommodated; however will include minor utility and mature tree removals.</u></p>	 
Schomberg Avenue	Hyacinthe Boulevard	<p><u>Bike lanes or cycle tracks can be accommodated with minimal impacts.</u></p> <p>Impacts to some mature trees.</p>	 	<p><u>Bike lanes or cycle tracks can be accommodated; however will include minor utility and mature tree removals.</u></p> <p>Avoids impacts to residential property #3447 (cultural heritage landscape site).</p> <p>Remove unused bus bay south of Schomberg Ave.</p>	 

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Hyacinthe Boulevard	Breckenridge Road	<p><u>Bike lanes or cycle tracks can be accommodated with minimal impacts.</u></p> <p>Impacts to some mature trees.</p> <p>Remove unused bus bay south of Breckenridge Road.</p>		<p><u>Bike lanes or cycle tracks can be accommodated; however will include minor utility and mature tree removals.</u></p>	
Breckenridge Road	Runningbrook Drive	<p><u>Bike lanes or cycle tracks can be accommodated with minimal impacts.</u></p>		<p>Relocation of the fire hydrant at the Breckenridge intersection would be required.</p> <p>Avoids impacts to residential property # 3569 (cultural heritage landscape site).</p> <p>Remove unused bus bay north of Breckenridge Road</p>	
Runningbrook Drive	Hassall Road	<p>Relocate sidewalk or bus bay to avoid removal of hydro box just south of Hassall Road.</p> <p>Remove unused bus bay south of Hassall Road.</p>		<p><u>Bike lanes or cycle tracks can be accommodated; however will include minor utility and mature tree removals.</u></p> <p>Remove unused bus bay north of Runningbrook Drive.</p>	

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Hassall Road	Burnhamthorpe Road	<p><u>Bike lanes or cycle tracks can be accommodated; however will include minor utility and mature tree removals.</u></p> <p>Remove or shorten taper south of Burnhamthorpe Road (associated with previous channelized right turn) to avoid removal of hydro box.</p>		<p><u>Bike lanes or cycle tracks can be accommodated; however will include utility impacts and mature tree removals.</u></p> <p>At St. Mary's Ukrainian Catholic Church reduced ROW available, however no additional property required.</p> <p>Potentially reduce northbound right turn length to avoid relocation of large hydro boxes north of church.</p>	
Burnhamthorpe Road	Rathburn Road	<p>A Multi-Use Trail (MUT) will be constructed from Burnhamthorpe Road to Meadows Boulevard on the west side of Cawthra Road, which will connect to the MUT north of Meadows Boulevard</p>		<p>Just north of the Burnhamthorpe intersection, currently no sidewalk.</p> <p>No significant road widening could be accommodated given hydro poles and embankment beyond splash pad.</p> <p>Removal of mature trees would be required.</p> <p>Desirable to add northbound right turn at Rathburn Road</p> <p><i>Northbound right turn demands at Rathburn Road: 2031 NB Right = 205 veh/ hr AM peak; 94 veh/hr PM peak</i></p>	

From	To	Southbound cycle track and/or bike lane (west side)	Reference Photos	Northbound cycle track and/or bike lane (east side)	Reference Photos
Rathburn Road	Meadows Boulevard	A MUT will shortly be constructed on the west side of Cawthra, directly adjacent to the roadway.		Currently no sidewalk No significant road widening could be accommodated given hydro poles and embankment beyond splash pad. Removal of mature trees would be required.	
Meadows Boulevard	Eastgate Parkway	A MUT was recently constructed on the west side of Cawthra, directly adjacent to the roadway.		At present the road has a rural cross-section (partially paved shoulder) on the east side. A bike facility could take the form of a fully paved shoulder or construction of a curb (bike lane or cycle track). Add northbound right turn at Eastgate Parkway <i>Northbound right turn demands at Eastgate Parkway: 2031 NB Right = 140 veh/ hr AM peak; 65 veh/hr PM peak</i>	

Notes:

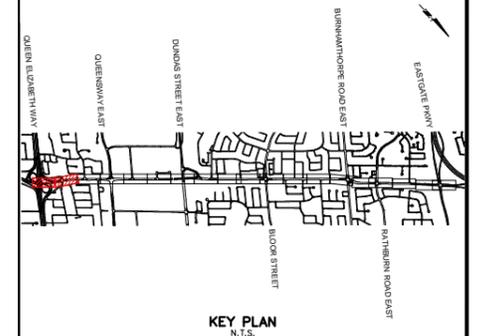
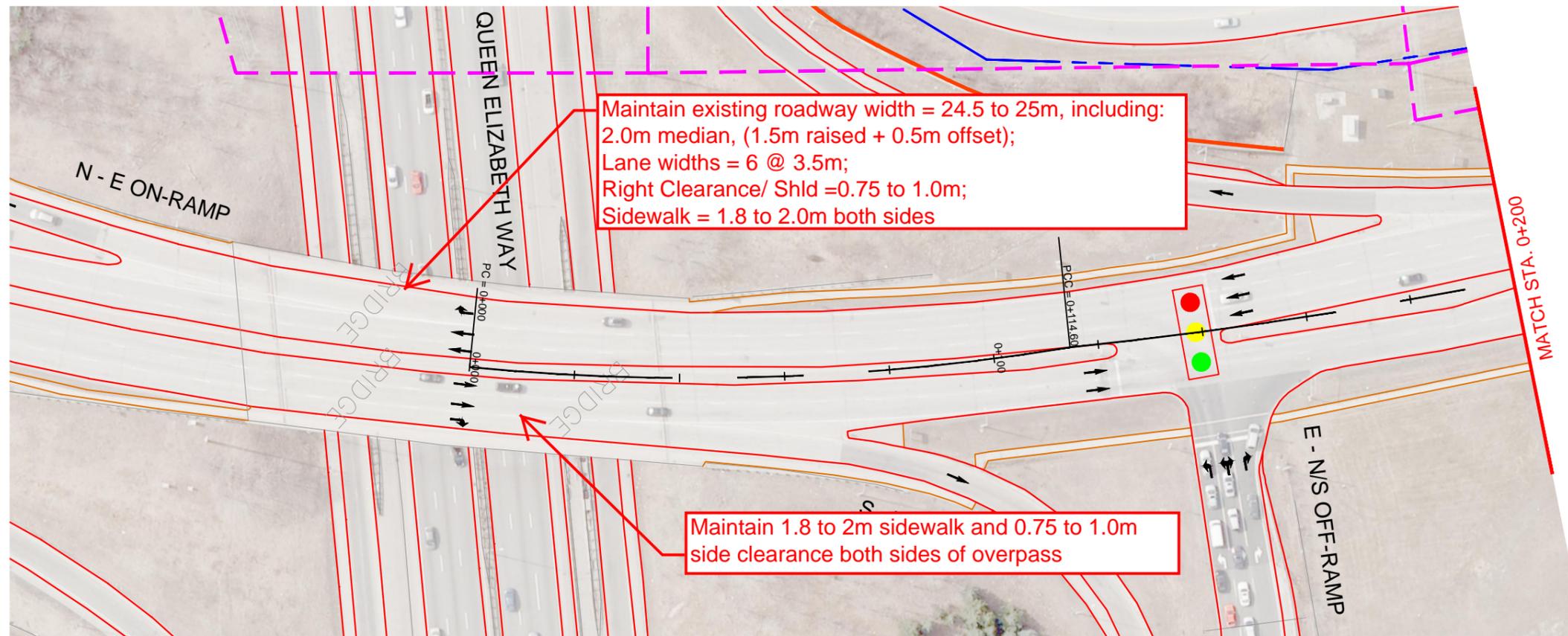
f/c = face of curb; e/p = edge of pavement; b/c = back of curb  
 LS = light standard; HP = hydro pole; TP = traffic signal pole  
 MUT = multi-use trail

# Appendix A2: Study Area Plans (QEW to Highway 403/Eastgate Parkway)

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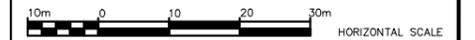
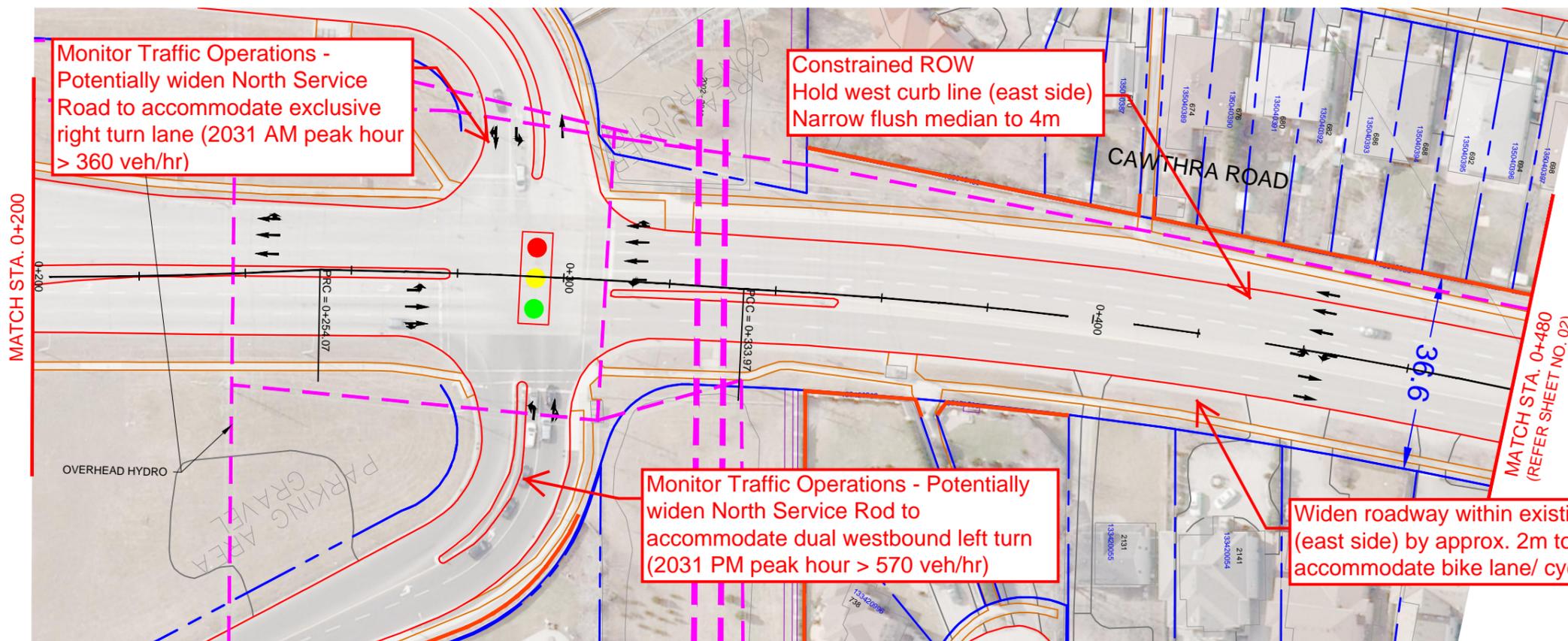


# APPENDIX A2



- LEGEND: (Existing Conditions)**
- EXISTING PROPERTY LIMIT
  - NOISE WALL
  - RETAINING WALL
  - OVERHEAD HYDRO
  - SIGNALIZED INTERSECTION
  - STOP CONTROL INTERSECTION

**NOTE:**  
THE SCHEMATICS OF EXISTING FEATURES SUCH AS NOISE WALL, RETAINING WALL & HYDRO LINES ARE FOR ILLUSTRATION PURPOSE ONLY AND DO NOT REFLECT THE PRECISE LOCATION / OFFSET FROM THE EXISTING ROADWAY.



**IBI Group**  
30 International Boulevard  
Toronto ON M9W 5P3 Canada

Designed by: Chkd. Approved by:

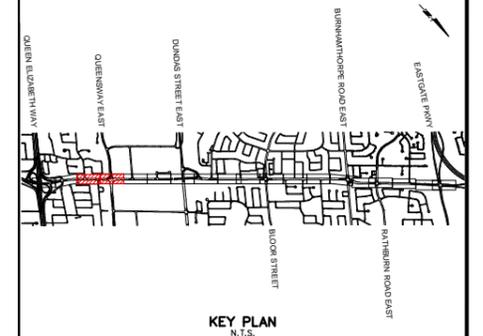
**Region of Peel**  
Working for you

**CAWTHRA ROAD**  
(FROM QUEEN ELIZABETH WAY TO EASTGATE PARKWAY)

STA. 0+000 TO STA. 0+480

CAD Area	Area	Project No.	04-4060
Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of
		Plan No.	<b>01</b>

# APPENDIX A2



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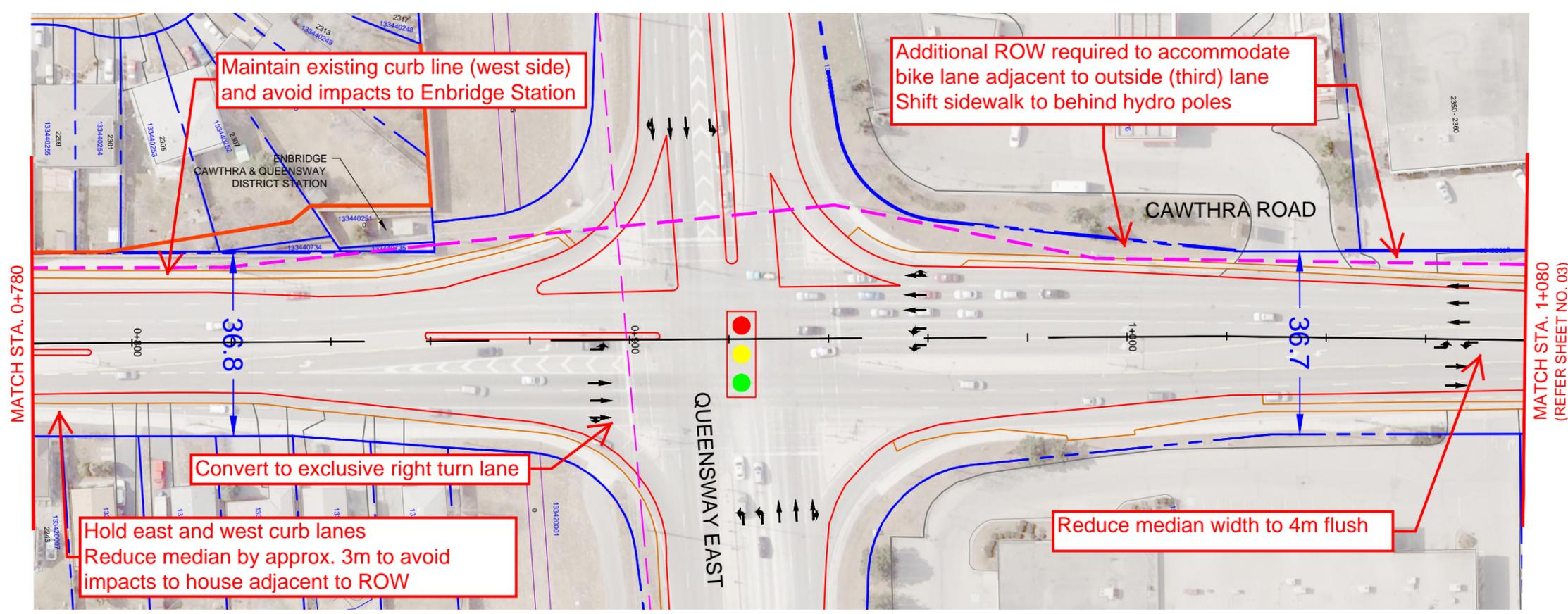
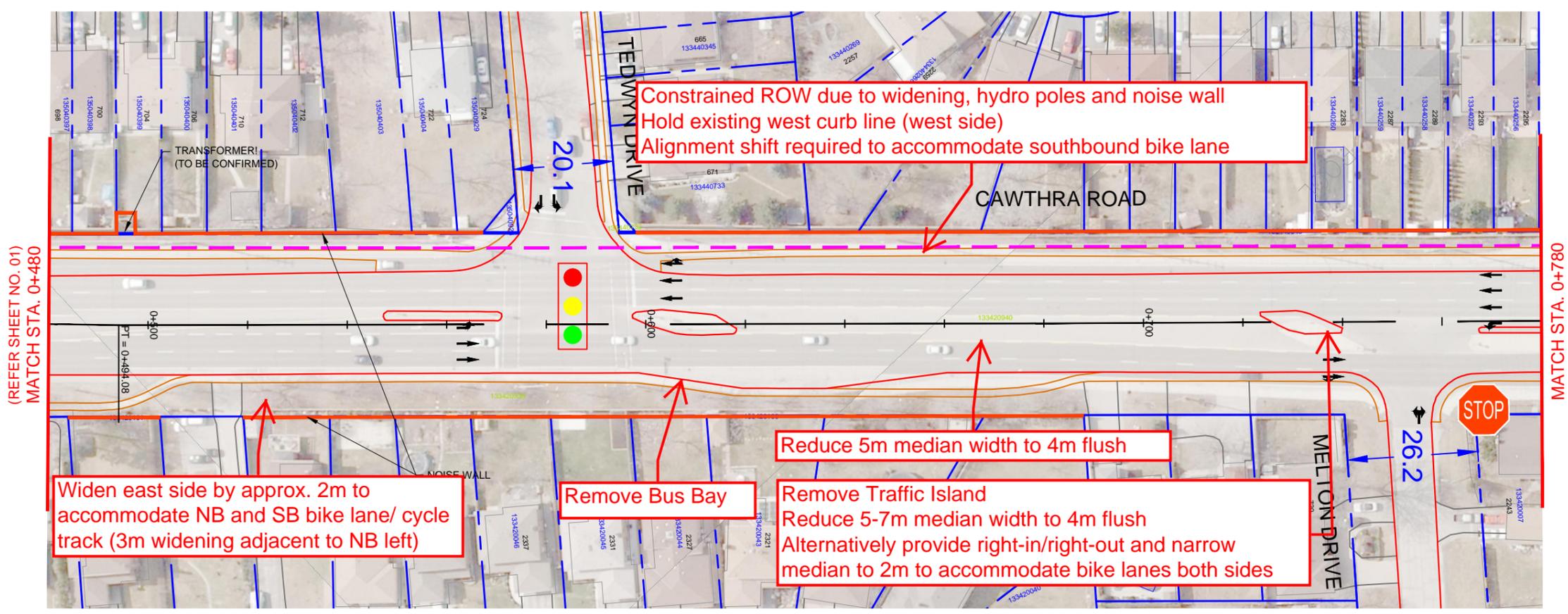
Designed by: Chkd. Approved by:



## CAWTHRA ROAD (FROM QUEEN ELIZABETH WAY TO EASTGATE PARKWAY)

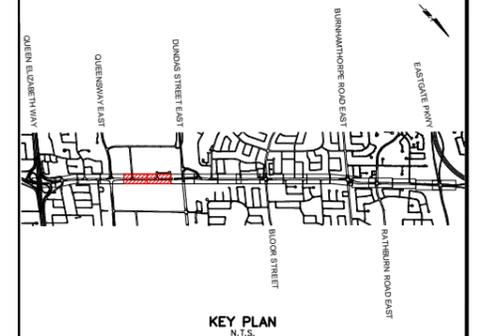
STA. 0+480 TO STA. 1+080

CAD Area	Area	Project No.	04-4060
Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of
		Plan No.	<b>02</b>



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Wednesday, May 21, 2014

# APPENDIX A2



- LEGEND: (Existing Conditions)**
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  - NOISE WALL
  - RETAINING WALL
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**IBI Group**  
30 International Boulevard  
Toronto ON M9W 5P3 Canada

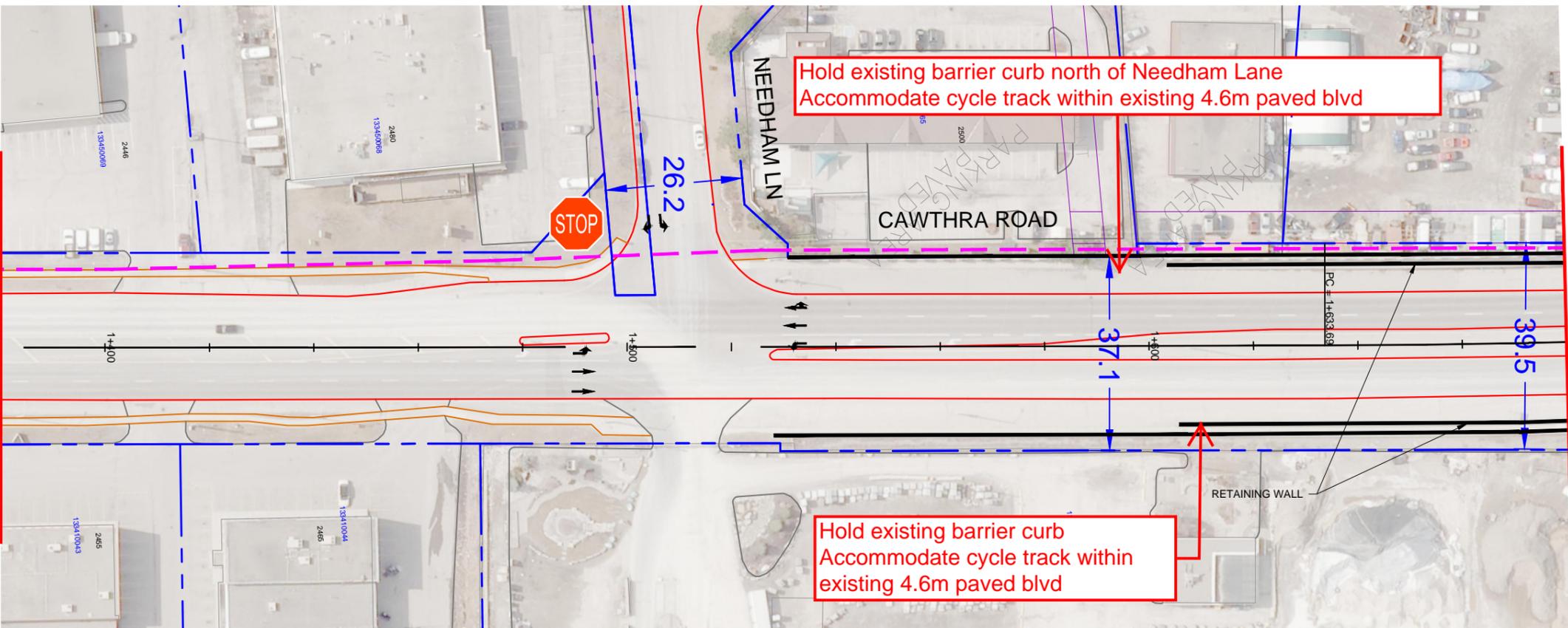
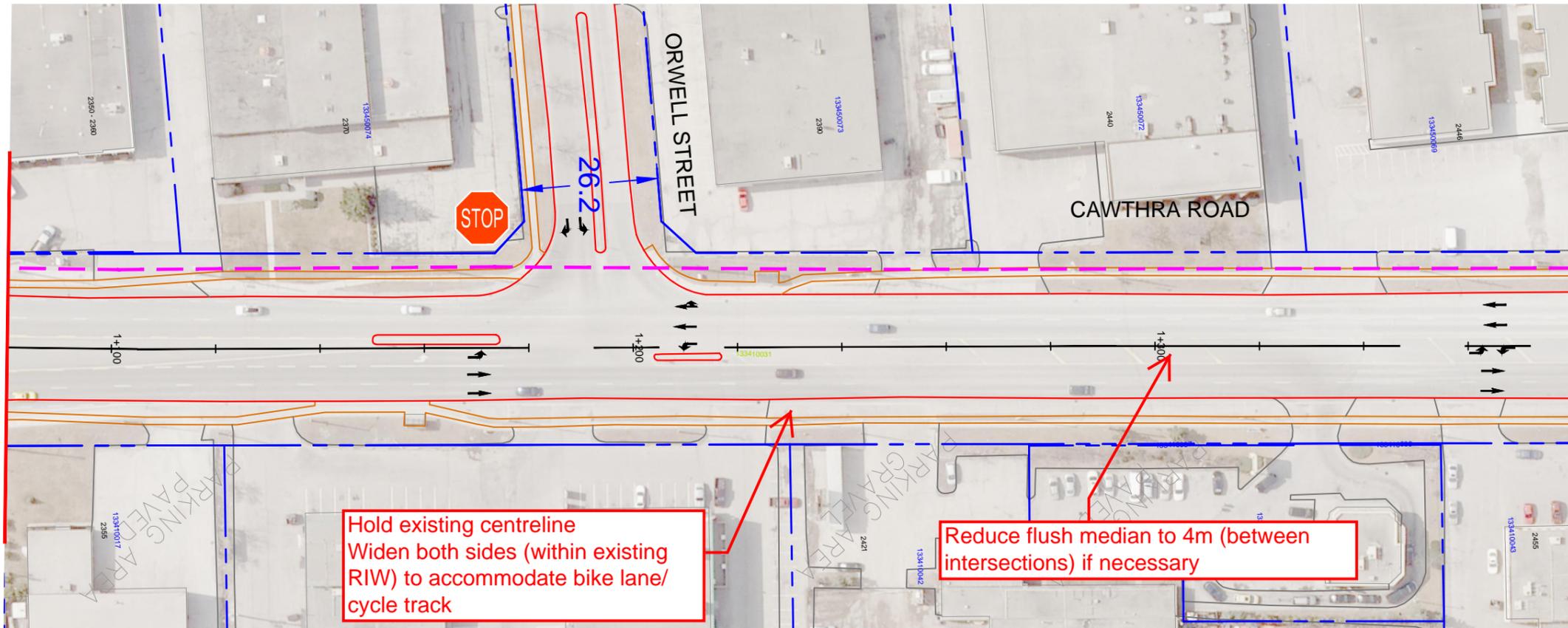
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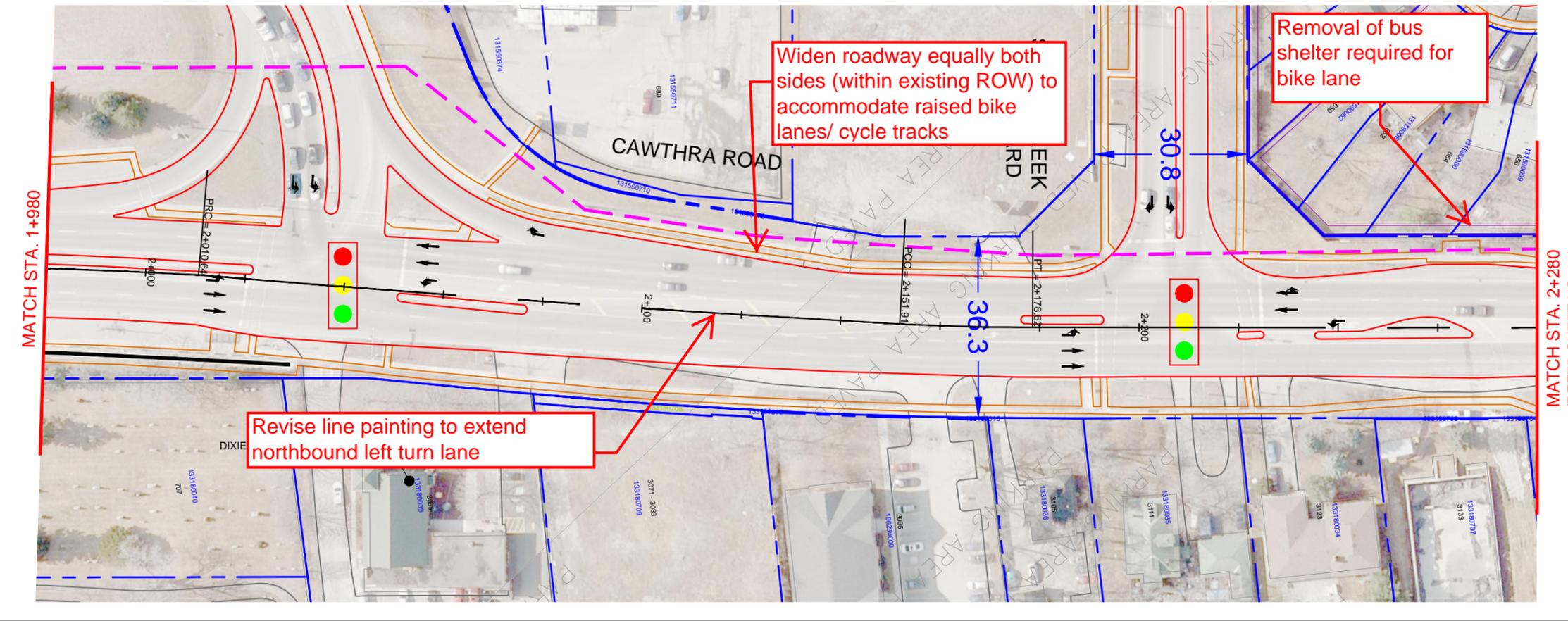
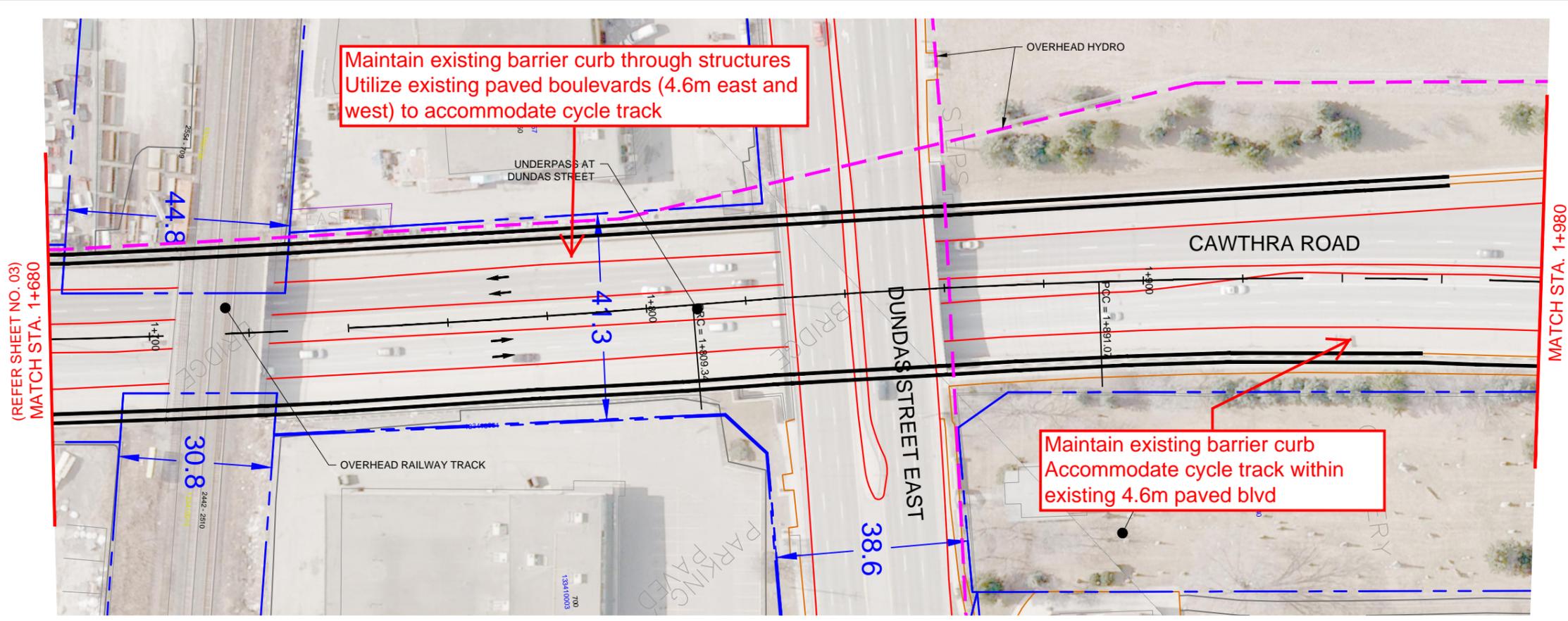
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STA. 1+080 TO STA. 1+680

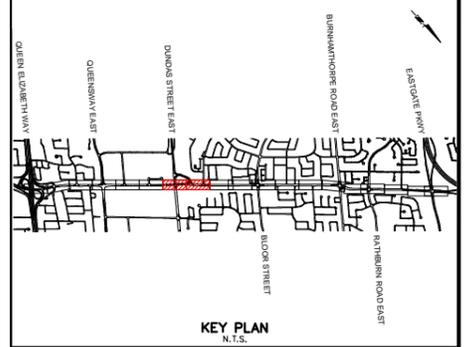
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Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of
		Plan No.	<b>03</b>



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Wednesday, May 21, 2014



# APPENDIX A2



- LEGEND: (Existing Conditions)**
- EXISTING PROPERTY LIMIT
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30 International Boulevard  
Toronto ON M9W 5P3 Canada

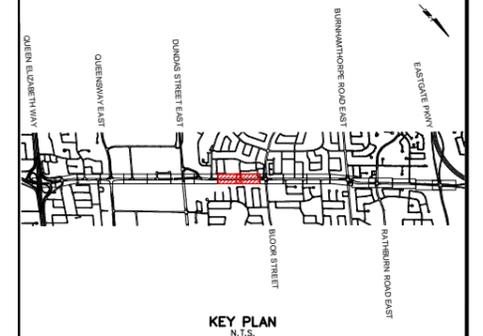
Designed by: Chkd. Approved by:



## CAWTHRA ROAD (FROM QUEEN ELIZABETH WAY TO EASTGATE PARKWAY)

STA. 1+680		TO STA. 2+280	
CAD Area	Area	Project No.	04-4060
Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of
		Plan No.	<b>04</b>

# APPENDIX A2



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**IBI Group**  
30 International Boulevard  
Toronto ON M9W 5P3 Canada

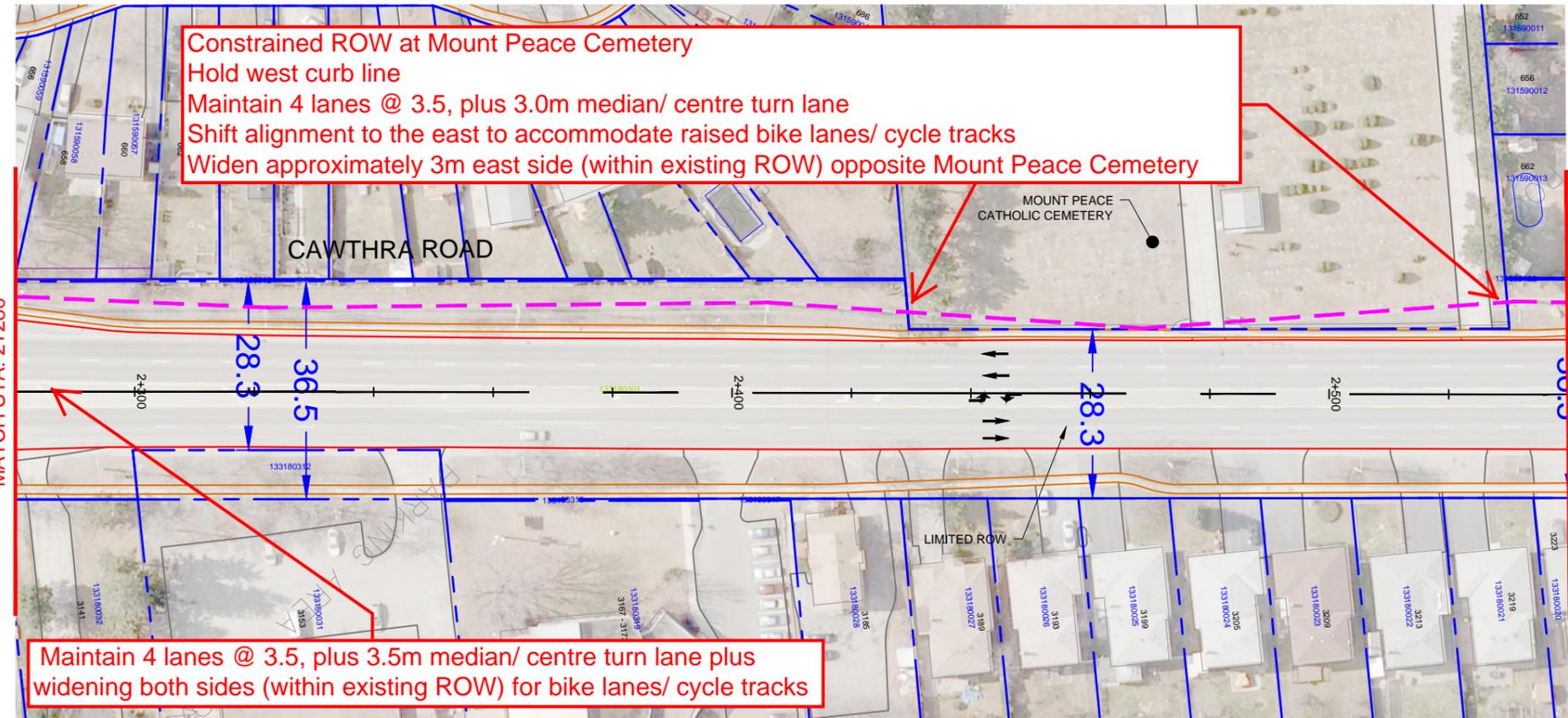
Designed by: Chkd. Approved by:



## CAWTHRA ROAD (FROM QUEEN ELIZABETH WAY TO EASTGATE PARKWAY)

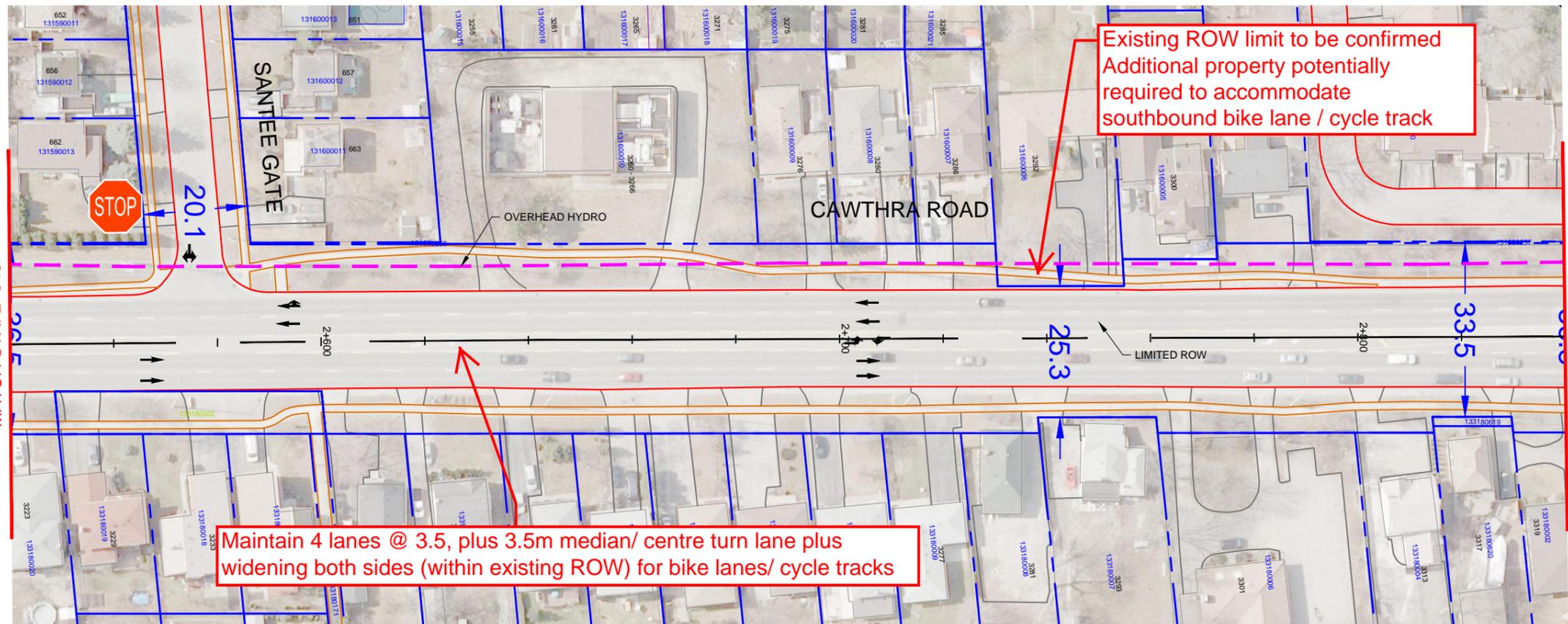
STA. 2+280 TO STA. 2+840

CAD Area	Area	Project No.	04-4060
Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of
		Plan No.	<b>05</b>



REFER SHEET NO. 04)  
MATCH STA. 2+280

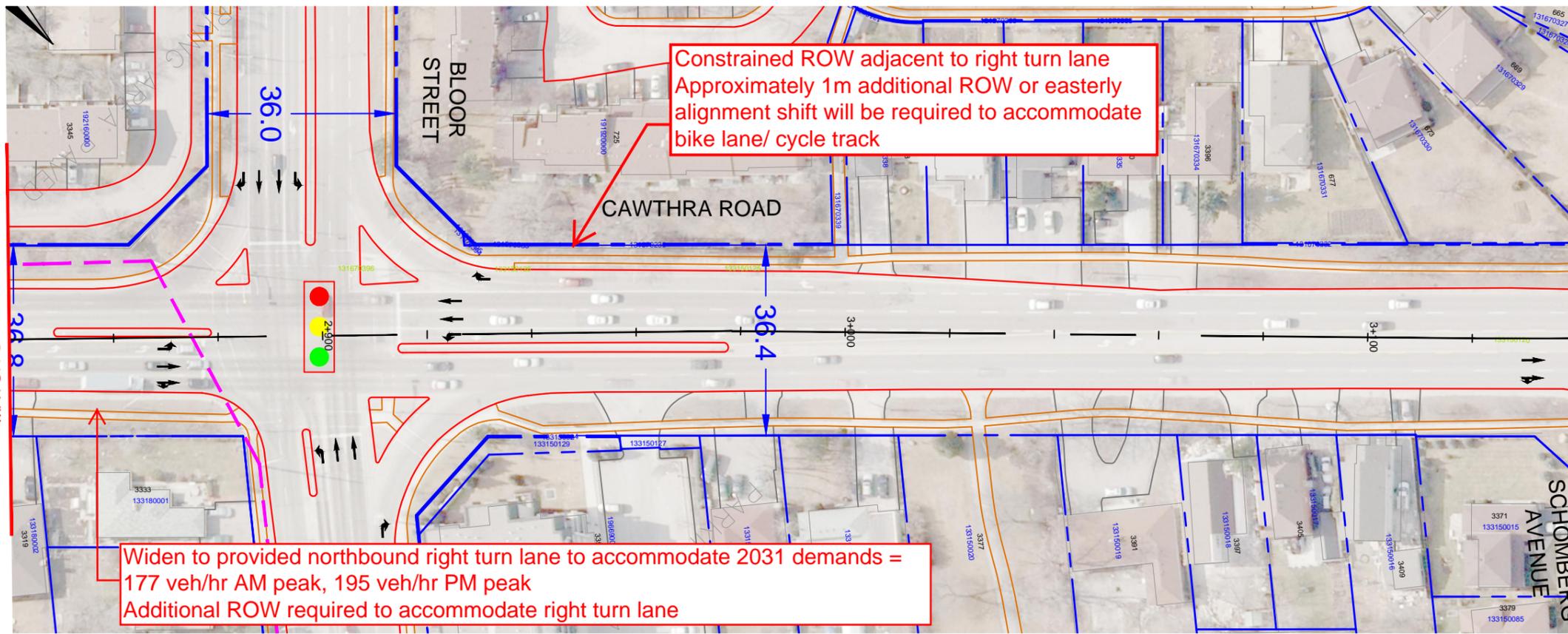
MATCH STA. 2+540



MATCH STA. 2+540

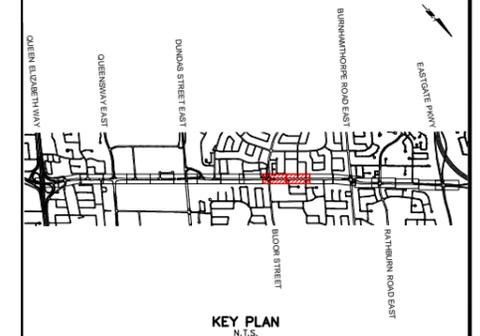
MATCH STA. 2+840  
(REFER SHEET NO. 06)

(REFER SHEET NO. 05)  
 MATCH STA. 2+840



MATCH STA. 3+140

# APPENDIX A2



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**IBI Group**  
 30 International Boulevard  
 Toronto ON M9W 5P3 Canada

Designed by: Chkd.  
 Approved by:

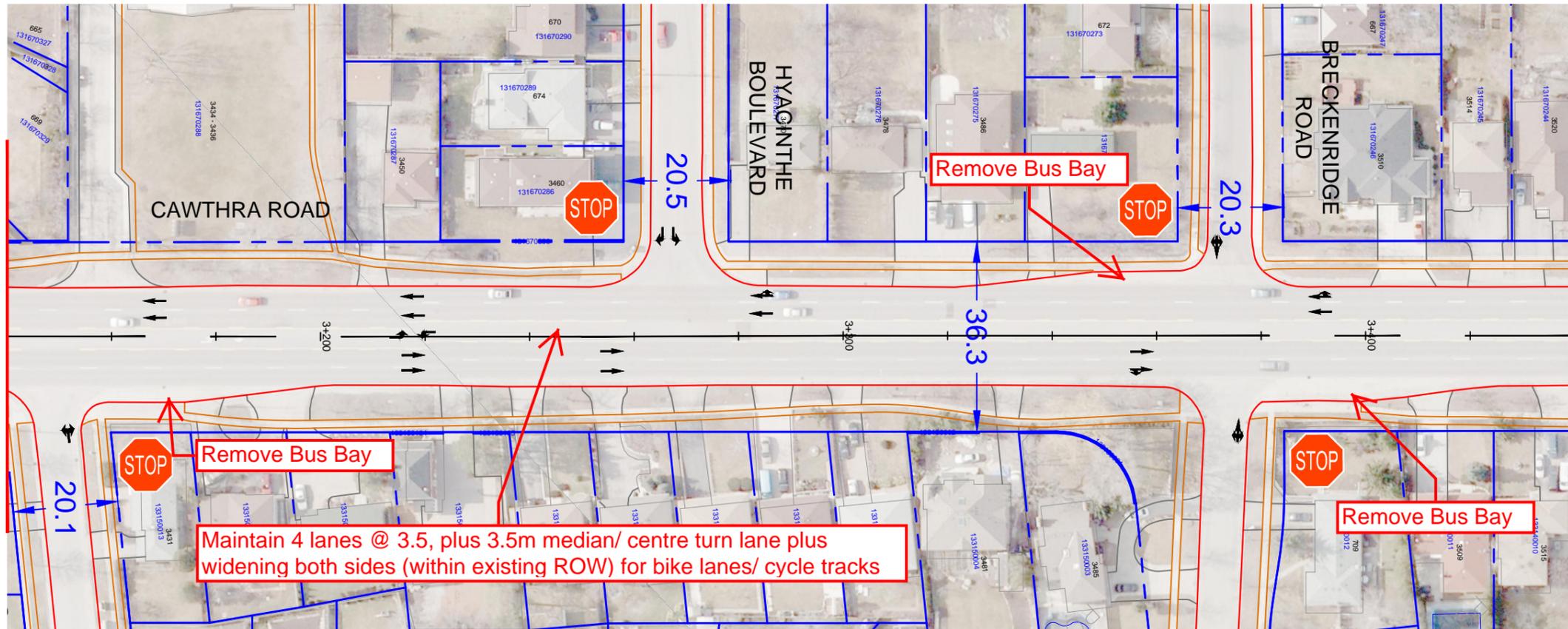
**Region of Peel**  
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**CAWTHRA ROAD**  
 (FROM QUEEN ELIZABETH WAY  
 TO EASTGATE PARKWAY)

STA. 2+840 TO STA. 3+440

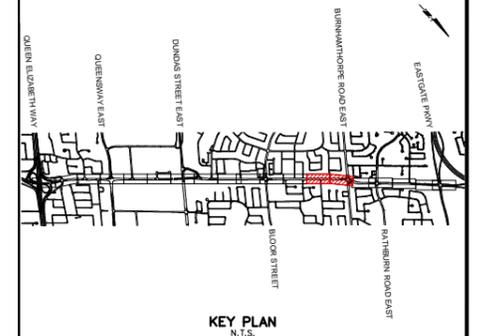
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Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of
		Plan No.	<b>06</b>

MATCH STA. 3+140



MATCH STA. 3+440  
 (REFER SHEET NO. 07)

# APPENDIX A2



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Toronto ON M9W 5P3 Canada

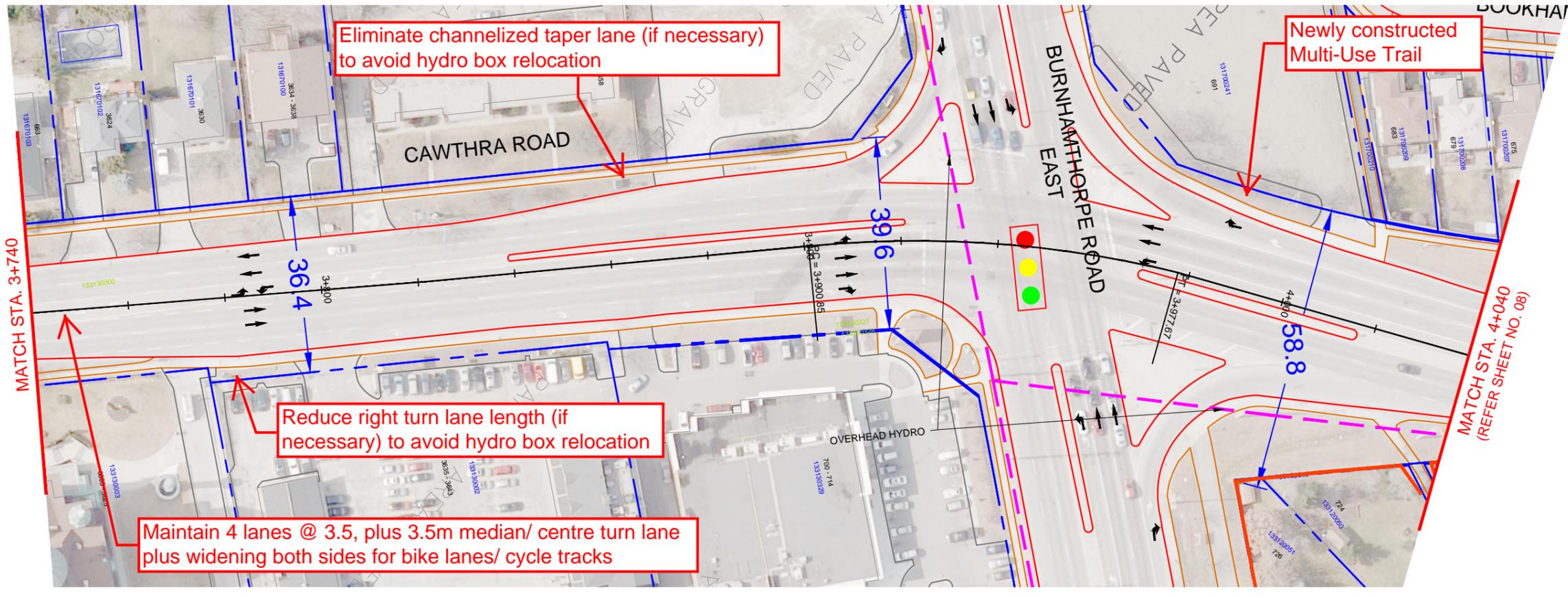
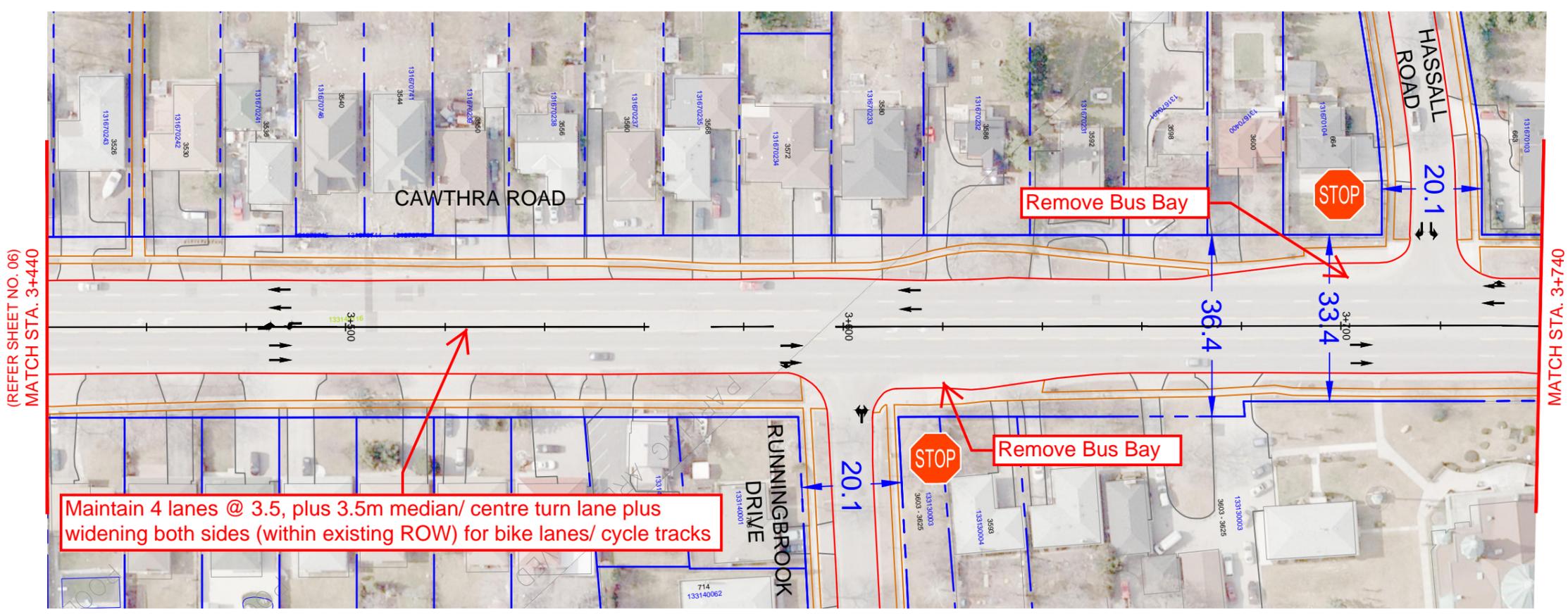
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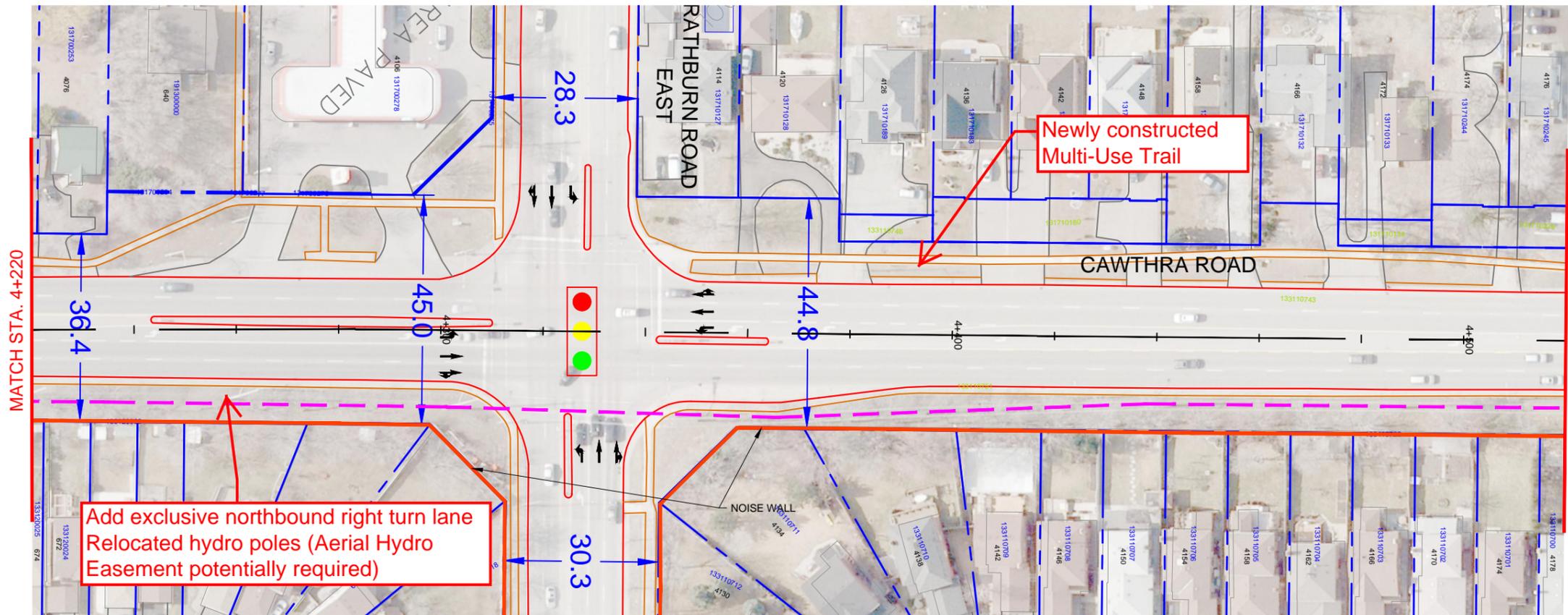
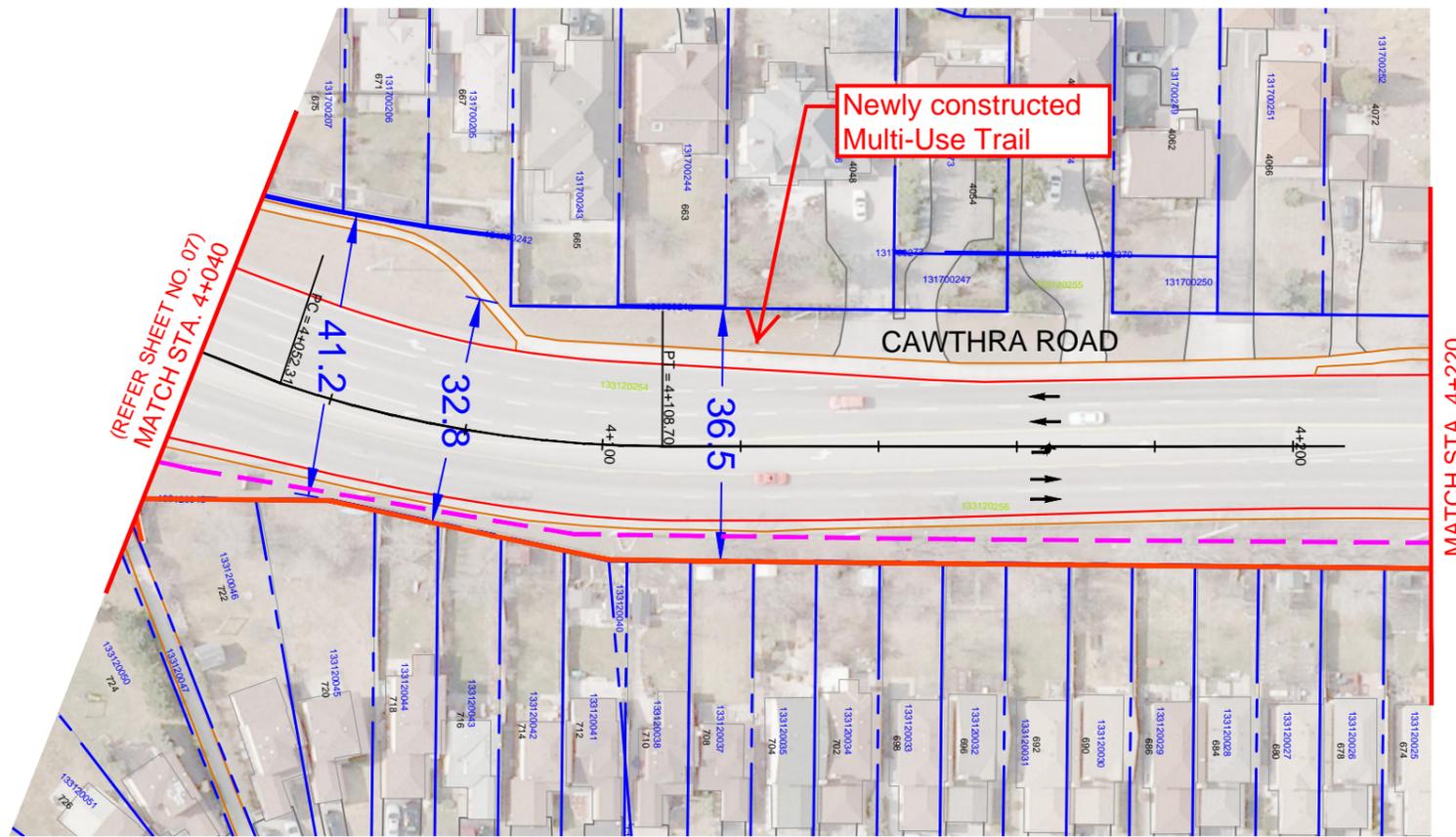
**Region of Peel**  
Working for you

**CAWTHRA ROAD**  
(FROM QUEEN ELIZABETH WAY  
TO EASTGATE PARKWAY)

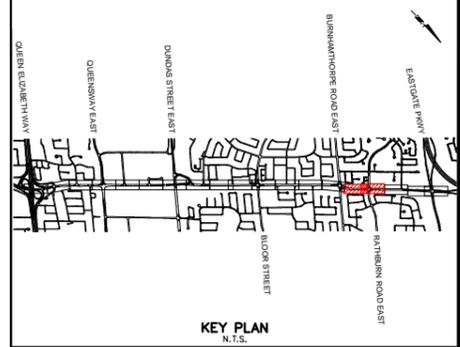
STA. 3+440 TO STA. 4+040

CAD Area	Area	Project No.	04-4060
Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of
		Plan No.	<b>07</b>





# APPENDIX A2



- LEGEND: (Existing Conditions)**
- EXISTING PROPERTY LIMIT
  - NOISE WALL
  - RETAINING WALL
  - OVERHEAD HYDRO
  - SIGNALIZED INTERSECTION
  - STOP CONTROL INTERSECTION

**NOTE:**  
 THE SCHEMATICS OF EXISTING FEATURES SUCH AS NOISE WALL, RETAINING WALL, & HYDRO LINES ARE FOR ILLUSTRATION PURPOSE ONLY AND DO NOT REFLECT THE PRECISE LOCATION / OFFSET FROM THE EXISTING ROADWAY.



**IBI GROUP**  
 IBI Group  
 30 International Boulevard  
 Toronto ON M9W 5P3 Canada

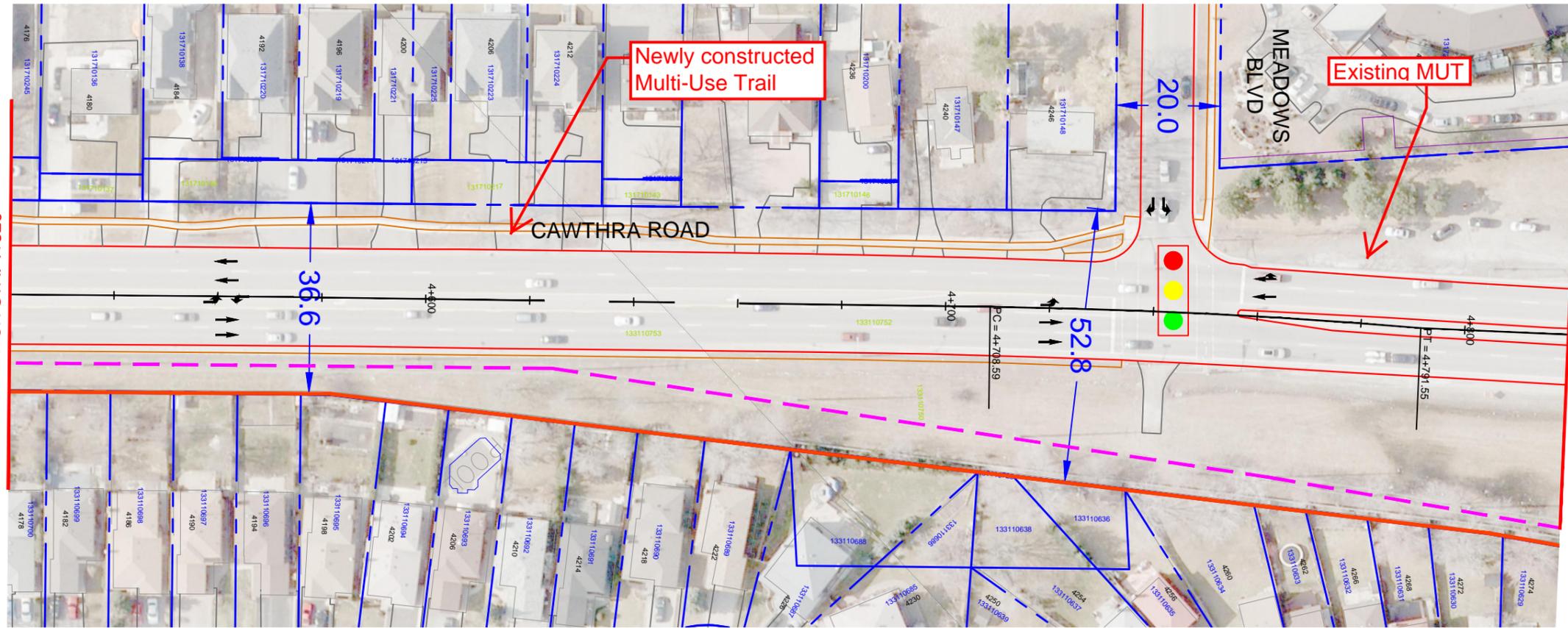
Designed by: Chkd. \_\_\_\_\_  
 Approved by: \_\_\_\_\_

**Region of Peel**  
 Working for you

**CAWTHRA ROAD**  
 (FROM QUEEN ELIZABETH WAY  
 TO EASTGATE PARKWAY)

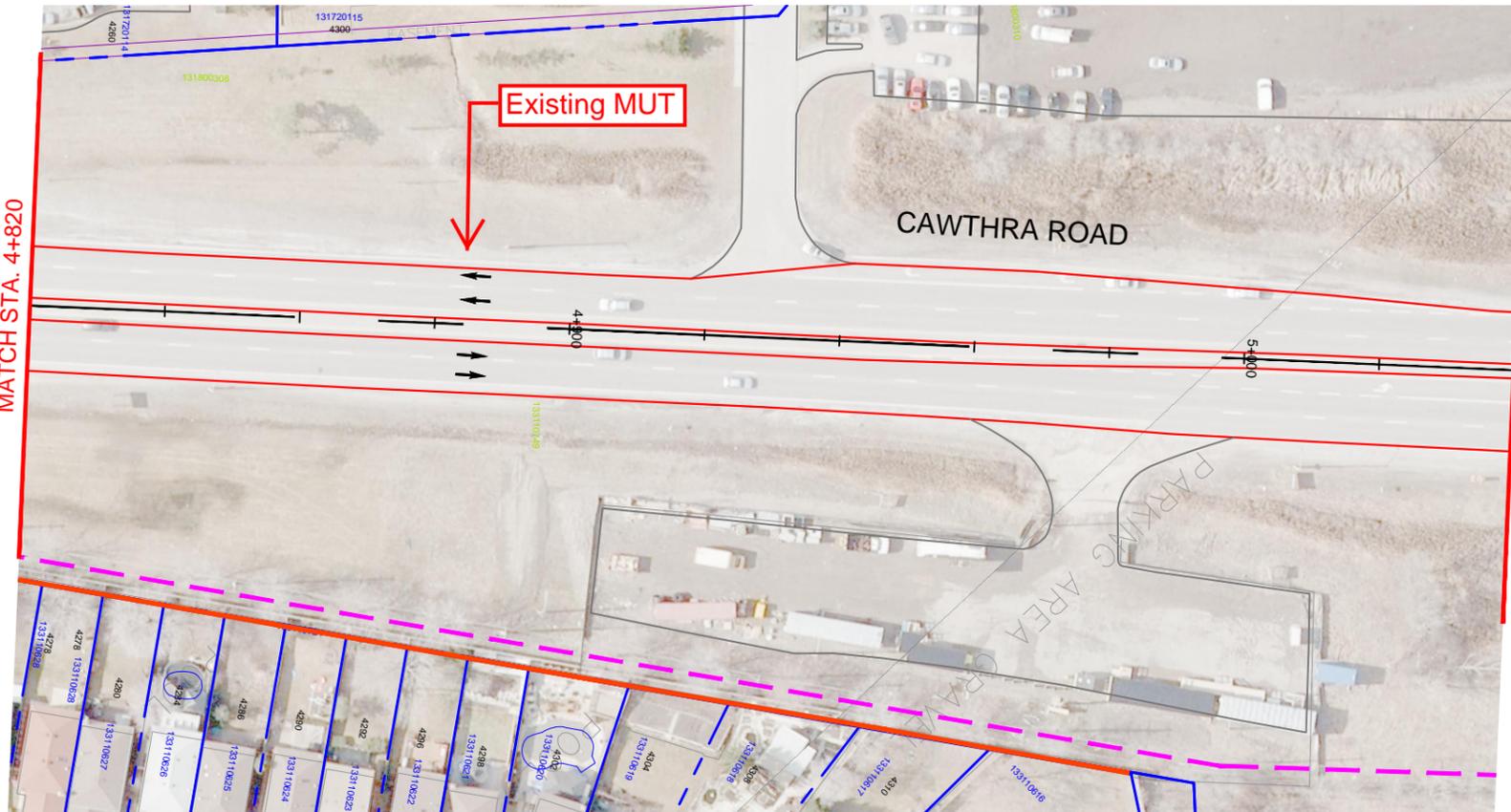
STA. 4+040		TO STA. 4+520	
CAD Area	Area	Project No.	04-4060
Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of
		Plan No.	<b>08</b>

(REFER SHEET NO. 08)  
 MATCH STA. 4+520



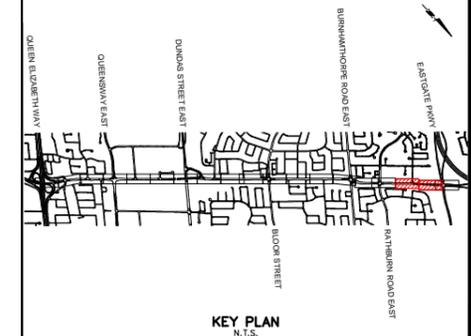
MATCH STA. 4+820  
 (REFER SHEET NO. 00)

(REFER SHEET NO. 00)  
 MATCH STA. 4+820



MATCH STA. 5+040  
 (REFER SHEET NO. 10)

# APPENDIX A2



- LEGEND: (Existing Conditions)**
- EXISTING PROPERTY LIMIT
  - NOISE WALL
  - RETAINING WALL
  - OVERHEAD HYDRO
  - SIGNALIZED INTERSECTION
  - STOP CONTROL INTERSECTION

**NOTE:**  
 THE SCHEMATICS OF EXISTING FEATURES SUCH AS NOISE WALL, RETAINING WALL, & HYDRO LINES ARE FOR ILLUSTRATION PURPOSE ONLY AND DO NOT REFLECT THE PRECISE LOCATION / OFFSET FROM THE EXISTING ROADWAY.



**IBI GROUP**  
 IBI Group  
 30 International Boulevard  
 Toronto ON M9W 5P3 Canada

Designed by: Chkd. Approved by:

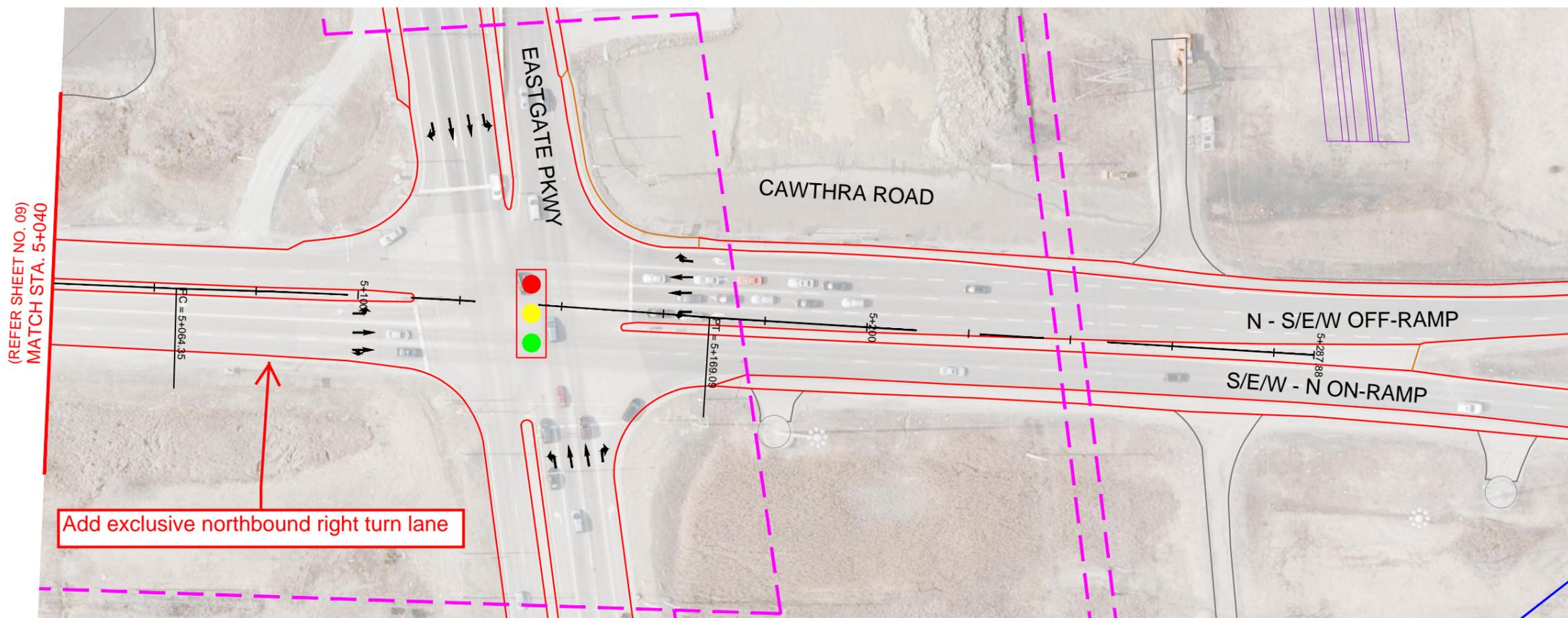
**Region of Peel**  
 Working for you

**CAWTHRA ROAD**  
 (FROM QUEEN ELIZABETH WAY  
 TO EASTGATE PARKWAY)

STA. 4+520 TO STA. 5+040

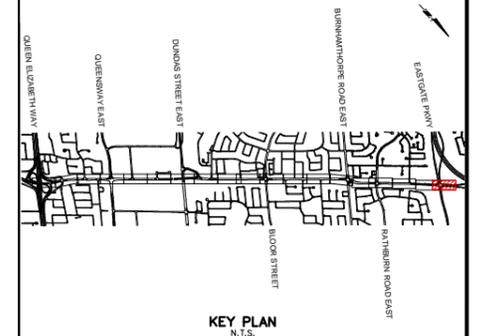
CAD Area	Area	Project No.	04-4060
Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of
		Plan No.	<b>09</b>

# APPENDIX A2



(REFER SHEET NO. 09)  
MATCH STA. 5+040

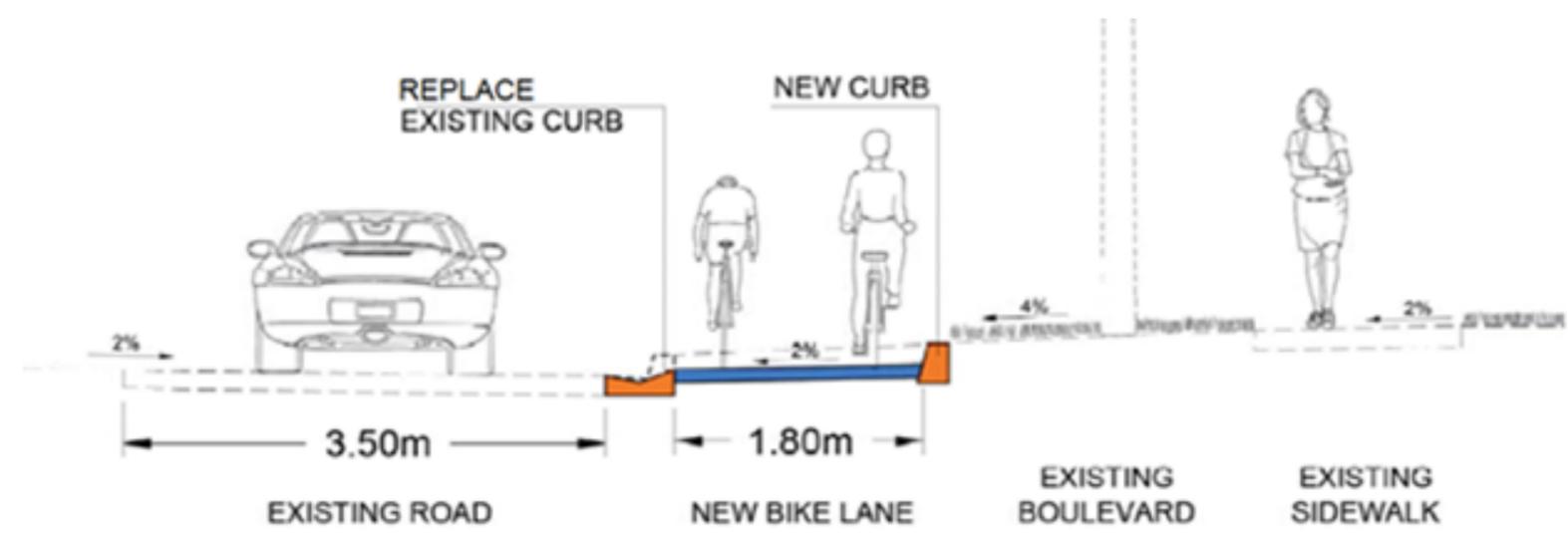
Add exclusive northbound right turn lane



- LEGEND: (Existing Conditions)**
- EXISTING PROPERTY LIMIT
  - NOISE WALL
  - RETAINING WALL
  - OVERHEAD HYDRO
  - SIGNALIZED INTERSECTION
  - STOP CONTROL INTERSECTION

**NOTE:**  
THE SCHEMATICS OF EXISTING FEATURES SUCH AS NOISE WALL, RETAINING WALL, & HYDRO LINES ARE FOR ILLUSTRATION PURPOSE ONLY AND DO NOT REFLECT THE PRECISE LOCATION / OFFSET FROM THE EXISTING ROADWAY.

## TYPICAL RAISED BIKE LANE/ CYCLE PATH TREATMENT



**IBI Group**  
30 International Boulevard  
Toronto ON M9W 5P3 Canada

Designed by \_\_\_\_\_  
Chkd. \_\_\_\_\_  
Approved by \_\_\_\_\_



**CAWTHRA ROAD**  
(FROM QUEEN ELIZABETH WAY  
TO EASTGATE PARKWAY)

STA. 5+040 TO STA. 5+287.88

CAD Area	Area	Project No.	04-4060
Checked by	A.O.	Drawn by	T.Y.
Date	MAY 20, 2014	Sheet	of _____
		Plan No.	<b>10</b>



## Part B - Cawthra Road (QEW to Lakeshore Road)

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## 5 Introduction and Background

### 5.1 Dixie Road and Cawthra Road Bikeway Feasibility Studies

In October 2013, IBI Group was retained to study feasible bikeway options for Cawthra Road and Dixie Road from the QEW to Lakeshore Road. On Cawthra Road, the extent of the study is from the South Service Road to Lakeshore Road. The scope of work consisted of the following items:

1. Review the site-specific conditions in the corridor and annotate site characteristics on a base plan;
2. Determine the various strategies that could be implemented in order to implement the bike lanes or other proposed active transportation facilities; and
3. Recommend a preferred strategy (or strategies) for implementation and confirm the associated schedule under the Municipal Class Environmental Assessment for road projects.

The Cawthra Road portion of the feasibility study was combined with the Cawthra Road Pre-EA Technical Feasibility Study and the findings of the study documented herein (i.e. Part B of this report).

Note that due to limited scope of work, this study does *not* include the following:

- Detailed functional plan drawings showing the proposed active transportation facilities (provided are: a base map of existing conditions with annotations of site-specific conditions; a conceptual plan and typical cross-section of the proposed facilities)
- Detailed travel demand forecasts (background growth of 1% was assumed based on guidance from Regional staff)
- Traffic operations analysis in Synchro

### 5.2 Study Consultation

Two project team meetings were held to report on-going findings and to solicit feedback from the project team.

The first meeting was held on December 13, 2013. The purpose of the first meeting was to introduce the study, review existing conditions, and discuss design criteria and preliminary options. Participants represented several departments from both the Region and the City of Mississauga:

- Sustainable Transportation, Peel Transportation Division
- Traffic Operation, Peel Transportation Division
- Cycling Office, City of Mississauga
- Transportation and Works, City of Mississauga
- Infrastructure Planning and Design, Peel Transportation Division

More details about the discussion and outcomes of the first project team meeting is provided in Technical Memorandum dated March 27, 2014 (see **Appendix B1**)

The second meeting was held on July 23, 2014 in conjunction with the second project meeting for the Technical Feasibility Study (i.e. Part A – Eastgate Parkway to the QEW). The purpose of the second meeting was to explain the rationale for merging both studies, to present the recommended active transportation facilities, and to solicit feedback from the project team. Feedback from the second project team meeting was used to guide the development of this report.

## 6 Relevant Plans and Existing Conditions

### 6.1 Relevant Plans and Other Studies

Below is a summary of other projects, studies and plans that are relevant to bikeway options on Cawthra Road.

#### 6.1.1 Cawthra Road Pre-Environmental Assessment Study

As discussed in Part A of this report, this purpose of this study is to identify technically feasible alternatives to address the operational capacity and needs for all users for the section from the QEW to the Eastgate Parkway. The study is intended to provide guidance with respect to the need and range of improvements to be considered along Cawthra Road as part future Environmental Assessment (EA) studies.

#### 6.1.2 Hanlan Feedermain Project

In 2011, Peel Region started construction of its largest and most extensive watermain project. The project also involves the construction of a multi-use trail on the west side of Cawthra Road north of Burnhamthorpe Road. Recommendations in Part A of this study incorporate the plans for this multi-use trail.

#### 6.1.3 QEW Improvements from Evans Avenue to Cawthra Road

In 2012, MTO initiated a preliminary design and Class EA for this section of the expressway. Project completion is anticipated for late summer 2015, followed by a detail design assignment and anticipated construction in 2018. To date, the project has proposed a reconfiguration of the interchange at Dixie Road. No changes are proposed for Cawthra Road. However, the proposed improvements to the QEW may have indirect impacts to future traffic operations for Cawthra Road at North Service Road and at the South Service Road.

#### 6.1.4 Inspiration Lakeview

In 2010, the City of Mississauga initiated Inspiration Lakeview, an initiative between the City, the Province and Ontario Power Generation to develop a shared vision for Lakeview Waterfront. The lands are located south of Lakeshore Road, between Cawthra Road, Dixie Road and the waterfront. By proposing feasible bikeway options on Cawthra Road to Lakeshore Road, this study supports 3 of the 8 core principles of the plan: 1) to connect the City and the water; 2) provide multiple ways to get around and 3) create a green, sustainable innovative model community.

#### 6.1.5 Lakeview Local Area Plan

The City of Mississauga is currently updating the Lakeview Local Area Plan (LAP) included in its Official Plan. The Lakeview Area is generally bound by Cawthra Road, Lakeshore Road, the Queensway, and the Etobicoke Creek. The draft plan was completed in January 2014. It proposes that the City to undertake a Transportation Master Plan (TMP) to examine

transportation issues specific to Lakeview Area. It will also include a proposed long-term cycling network. The proposed bikeway on Cawthra Road is anticipated to be consistent with the proposed cycling network.

### **6.1.6 Lakeshore Road Transportation Review Study**

In 2010, the City of Mississauga completed a comprehensive and technical transportation review to identify how Lakeshore Road can accommodate alternative modes of transportation. The study recommends bike lanes on Lakeshore Road over the long-term. Near Cawthra Road (from Broadview Ave to Greaves Ave), a wide curb lane with sharrow is proposed over the short-term given the narrow right-of-way.

### **6.1.7 The Big Move**

In 2008, Metrolinx released its Regional Transportation Plan for the Greater Toronto and Hamilton Area. Among its key strategies and priority actions are to build communities that are pedestrian, cycling and transit supportive. Near the study area, rapid transit is proposed on a route near the waterfront from Port Credit to Union Station. It is anticipated that Lakeshore Road will serve as this higher-order transit corridor from Hurontario Street to the east boundary of the City.

### **6.1.8 Strategic Goods Movement Network Study**

In 2013, Peel Region completed its Strategic Goods Movement Network Study. The objective of the study was to develop a systematic hierarchical truck route network throughout Peel Region. The study recognizes that the efficient flow of goods on Regional Roads is important to the economies of both the Region and the Province. Cawthra Road north of the QEW is identified as a truck route; the section south of the QEW is not identified as part of the truck route network.

## **6.2 Existing Conditions**

From the South Service Road to Lakeshore Road, Cawthra Road is a 5-lane road (i.e. 4 lanes plus centre turn lane) situated on the boundary between the Lakeview Community (to the east) and the Mineola Community (to the west). Existing land uses consist of established residential neighbourhoods with a hub of activity (i.e. a high school, community centre, senior's centre and park) on the east side, north of Atwater Avenue. Intensification is planned south of Atwater Avenue as the adjacent lands are planned for higher density residential development with the southerly lands fronting Lakeshore Road are planned for commercial uses.

For pedestrians, there are sidewalks on both sides of Cawthra Road from the South Service Road to Lakeshore Road. At the intersections of South Service Road, Atwater Road and Lakeshore Road, the 8 hr pedestrian volumes were: 100, 450, and 390 people, respectively. These numbers suggest a moderate level of pedestrian activity along the corridor.

For cyclists, there are no currently cycling facilities. The existing volume for cyclists was observed to be low (less than 20 people in an 8 hr period). However, it is anticipated that this condition is influenced by the lack of designated bicycle facilities. Site visits yielded observations of sidewalk riding on the east side of Cawthra Rd, north of Atwater Ave. The transportation master plans for the Region of Peel and the City of Mississauga both include plans for bicycle facilities on Cawthra Road.

**Exhibit 2** is a summary of the existing conditions on Cawthra Road from the South Service Road to Lakeshore Road.

**Exhibit 8: Existing Conditions related to Active Transportation**

EXISTING CONDITIONS SUMMARY	
<b>Planning Characteristics</b>	
Major Road Network <sup>1</sup>	Yes
Region Road Character <sup>2</sup>	Suburban Connector
City Functional Road Class <sup>3</sup>	Regional Arterial
Regional Cycling Network <sup>4</sup>	Proposed Bike Lanes (Implementation Strategy: retrofit bike lanes i.e. potential restriping)
City Cycling Network <sup>5</sup>	Proposed Primary On-Road Route (Proposed Secondary Route on South Service Rd, Arbor Rd, Atwater Ave)
<b>Physical Characteristics</b>	
Right-of-Way width <sup>6</sup>	36m
Midblock pavement width <sup>7</sup>	18.3m to 18.5m 20.9m at the CN underpass (including the median)
Number of lanes	5 lanes (4 general purpose lanes, 1 median lane)
<b>Operating Conditions</b>	
Posted Speed	50 km/h throughout
Operating Speed (85 <sup>th</sup> percentile)	67 km/h
Existing Annual Average Daily Traffic <sup>8</sup>	22,500 vpd (TMC data indicate significant reduction in volume from South Service Rd, to south of Atwater Rd, and to Lakeshore Rd: from an estimated 33,400 vpd to 18,600 vpd and to 8,200 vpd)
Forecasted Annual Average Daily Traffic <sup>8</sup>	27,200 vpd (if volume characteristics remain the same, lower volume are forecasted south of Atwater Rd and Lakeshore Rd)
Goods Movement Strategy	Not identified in Truck Network
Truck Restrictions	No trucks from 7pm to 7am
Percent Trucks	4%

References:

1. Schedule E: Major Road network, Region of Peel Official Plan (2012)
2. Figure 5.0 Road Character Map, Region of Peel Road Characterization Study (2013)
3. Schedule 5: Long-term Road Network, City of Mississauga Official Plan (2010)
4. Map 10c: Proposed Long-Term Regional Cycling Network, Region of Peel Active Transportation Study (2011)
5. Map5-4 Proposed Mississauga Cycling Route Network (2010)
6. Schedule F: Regional Road Mid-Block Right of Way Requirements, Region of Peel Official Plan (2012)  
Schedule 8: Designated Right-of-Way Width, City of Mississauga Official Plan (2010)
7. Measured from basemap data
8. Existing volume based on automatic traffic recorder volumes in 2012, forecast assumes 0.8% growth per year

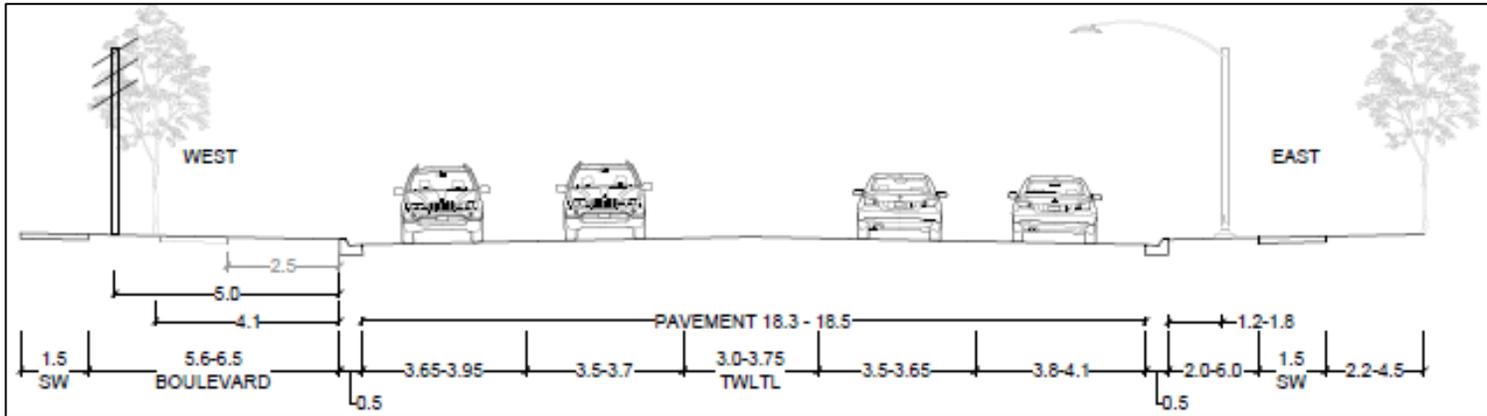
The study team visited the site on November 20, 2013 to survey the corridor and observe current operations.

**Exhibit 9** shows a typical cross-section of the corridor from the South Service Road to Lakeshore Road (see **Appendix B2** for an annotated based map of existing conditions). The mid-block road width remains consistent between 18.3 to 18.5m with slight variations in the boulevard features. However, two constraint areas exist at the intersection of Atwater Avenue and the CN Underpass.

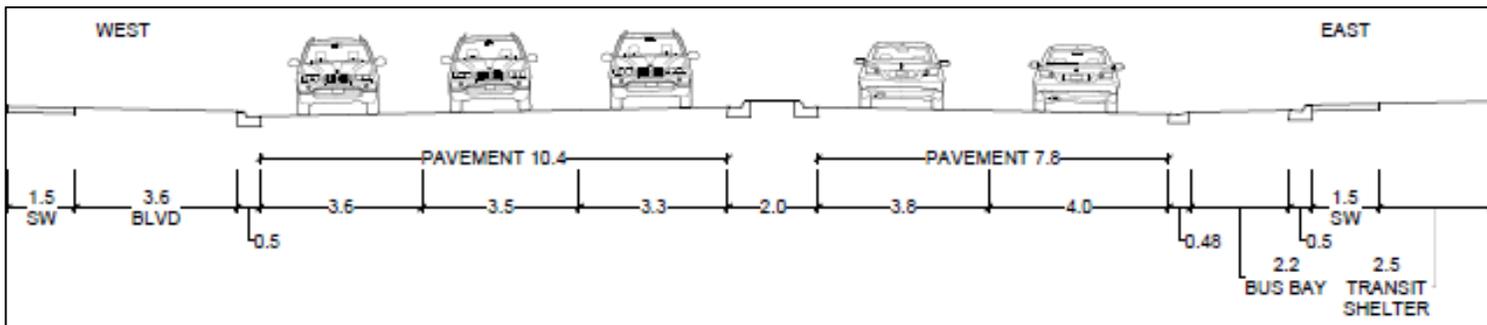
At Atwater Avenue, there is an additional left-turn lane as well as bus bay and bus shelter on the east side (see **Exhibit 10**). The intersection experiences significant pedestrian and transit activity during the mid-afternoon when students depart the nearby high school.

At the CN Underpass, the roadway widens to accommodate a raised median and a bridge support footing. Sidewalks are raised behind the bridge abutment (see **Exhibit 11**).

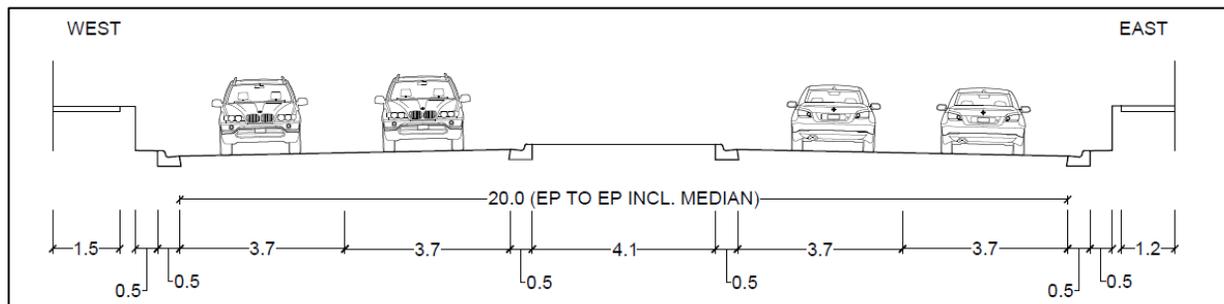
**Exhibit 9: Existing Cross-Section of Cawthra Road from South Service Road to Lakeshore Road (excluding CN Underpass)**



**Exhibit 10: Existing Cross-Section Intersection of Cawthra Road at Atwater Avenue (north leg)**



**Exhibit 11: Existing Cross-Section of Cawthra Road at CN Underpass**



Despite a consistent midblock cross-section, other site characteristics vary throughout the corridor. These include traffic operations, adjacent land uses, transit service, frequency of driveways, location of sidewalks, hydro poles, mature trees or other elements within the boulevard. The corridor was divided into three distinct sections described in the following sections.

- South Service Road to Atwater Avenue
- Atwater Avenue to CN Underpass
- CN Underpass to Lakeshore Road

From South Service Road to Atwater Avenue, there is a wide boulevard (5m to 6m) on the west side with mature trees, hydro poles and frequent residential driveways. On the east side, there is parkland, a community centre, seniors centre and high school. The boulevard is slightly narrower (3m to 5m) and there are limited driveways to service the institutional uses, include the intersection of Arbor Road. Left-turning vehicles are required to use the median lane. Route 8 operates every 20 min during peak periods and every 30min off-peak; school special route operation in addition during the mid-afternoon.

South of Atwater Avenue, traffic volumes reduce significantly (estimated to be around 60% of the volumes observed at South Service Road based on turning movement count data). The data suggest that most traffic turning from Atwater Avenue is directed north towards the QEW. Frequent driveways remain in the boulevard on the west side, however hydro poles are located behind the sidewalk and there are no trees in the boulevard (approximately 2.5m width). There is a painted median to shadow the northbound left-turn lane serving a townhouse complex just north of the CN Underpass on the west side. However, southbound motorists were observed to queue in the median to make left-turn into Village Green Lane.

Further south of the CN Underpass, count data at Lakeshore Road indicate further reductions in the volumes (estimated to be around 40% of the volumes observed at Atwater Avenue). There are frequent residential driveways on both sides. However, the boulevard on the west side is wider (5 to 6m compared to 1.5 to 2m the east side) and it contains hydro poles (approximately 4m behind the curbface). The flush median lane shadows auxiliary left-turn lanes for 3<sup>rd</sup> Street, Gardner Ave and Ebony Avenue and is often used for queuing left-turning vehicles into residential driveways. At Lakeshore Road, the centre median transitions to a dual left-turn lane however, roadway width remains consistent.

## 7 Alternative Strategies

To help develop these bikeways strategies, design criteria were first prepared to determine the feasibility of the various options. Alternative strategies were developed in the context of these three distinct sections in the corridor. Site specific strategies are also discussed for Atwater Avenue, the CN Underpass and Lakeshore Road.

### 7.1 Design Criteria

Several references were considered during the development of the design criteria. These references included: the existing condition; the design guidelines listed below; and, research of best practices throughout North America.

- Peel Road Characterisation Study (2012)
- Region of Peel Active Transportation Study: Chapter 8 Active Transportation Facilities Reference Guide

- Ontario Traffic Manual (OTM) Book 18: Bicycle Facilities (2013)
- Transportation Association of Canada (TAC) Geometric Design Guidelines for Canadian Roads (1999): Chapter 3.4 Bikeways
- American Association for State Highway and Transportation Officials (AASHTO) Guide

Design criteria are proposed to address the context-specific road characteristics of Cawthra Road including the potential implementation strategies (i.e. restriping, road widening, or retrofitting active transportation facilities within the boulevard). **Exhibit 12** is the proposed design criteria for Cawthra Road.

**Exhibit 12: Proposed Design Criteria**

DESIGN CRITERIA FOR BIKEWAY ALTERNATIVES			
CAWTHRA ROAD Characteristics			
Function	Minor Arterial, Bus Route (north of Atwater), Trucks restricted after 7pm to 7am		
Posted Speed	50 km/h		
Existing Volumes	20,000 to 25,000 vpd (less than 20,000 vpd estimated south of Atwater)		
Forecasted Volumes	25,000 to 30,000 vpd (less than 25,000 vpd estimated south of Atwater)		
% Trucks	4%		
Road Element	Existing Width	Desirable With	Minimum Width
General purpose lane	3.45 – 3.6 m (excluding gutter)	3.5 m (excluding gutter)	3.3 m (inside lane) 3.35 m (curb lane excluding gutter)
Two-way left-turn lane	3.0 – 3.65 m	3.5 m	3.5 m
Auxiliary turn lane	-	3.25 m (divided) 3.3 (undivided) 3.5 m (dual left)	3.0 m
Bike lanes	-	1.8 m	1.5 m
Buffered bike lanes	-	1.5 bike lanes + 1.0 painted buffer	1.5m bike lanes + 0.5 m painted buffer
Segregated bike lanes (incl. raised bike lanes or separated by other delineators)	-	1.5m 0.5 m (buffer if level with roadway)	1.8 – 2.0 m 1.2m (buffer if level with the roadway)
Multi-use trail	-	3.5 – 5.0 m	3.0 m
Sidewalk	-	1.5m	1.5 m 1.8 m (curbface)

**7.2 Proposed Alternative Strategies**

Below are several outcomes of the design criteria for feasible alternative strategies based on the existing conditions and typical cross-sections:

- Where the existing 5-lane configuration is maintained, road widening is required to accommodate an on-road bikeway. The existing roadway is between 18.3m and 18.5m. The minimum width required to accommodate 5-lanes and bike lanes is 19.8m. Therefore road widening is required to accommodate bike lanes, buffered bike lanes or segregated bike lanes.
- Where the road reconfiguration is feasible (i.e. removal of one or two lanes), bike lanes, buffered bike lanes or segregated bike lanes can be accommodated within the existing roadway. For example, a four-lane road with no median would require 14.0m to meet the desirable width dimensions. This design would provide more than 2.0m for an on-road bikeway (which is sufficient for segregated bike lanes). The removal of a centre turn lane may result in adverse safety impacts. For these

bikeway options, it is recommended to consider a 3-lane configuration or to conduct a detailed safety analysis based on past collision history to assess the safety impacts.

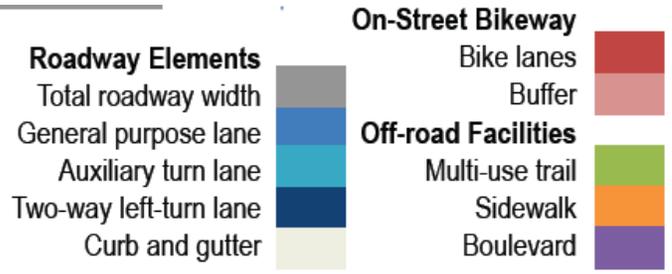
- Where multi-use trails are proposed in the boulevard, implementation will generally require removal of the existing sidewalk. The width of the boulevard adjacent between the sidewalk and the road, the sidewalk and a hydro pole, or the sidewalk and the right-of-way, ranges from 2.0m to 6.0m. While sufficient in some sections, the width required to provide a continuous facility through the distinct sections conflicts with the existing sidewalk. The relocation of light standards and the removal or trees may also be required.

**Exhibit 13** is a summary of proposed alternative strategies for each section. **Exhibit 15** to **Exhibit 17** (inclusive) shows the corresponding cross-section diagrams (**Exhibit 14** is the legend).

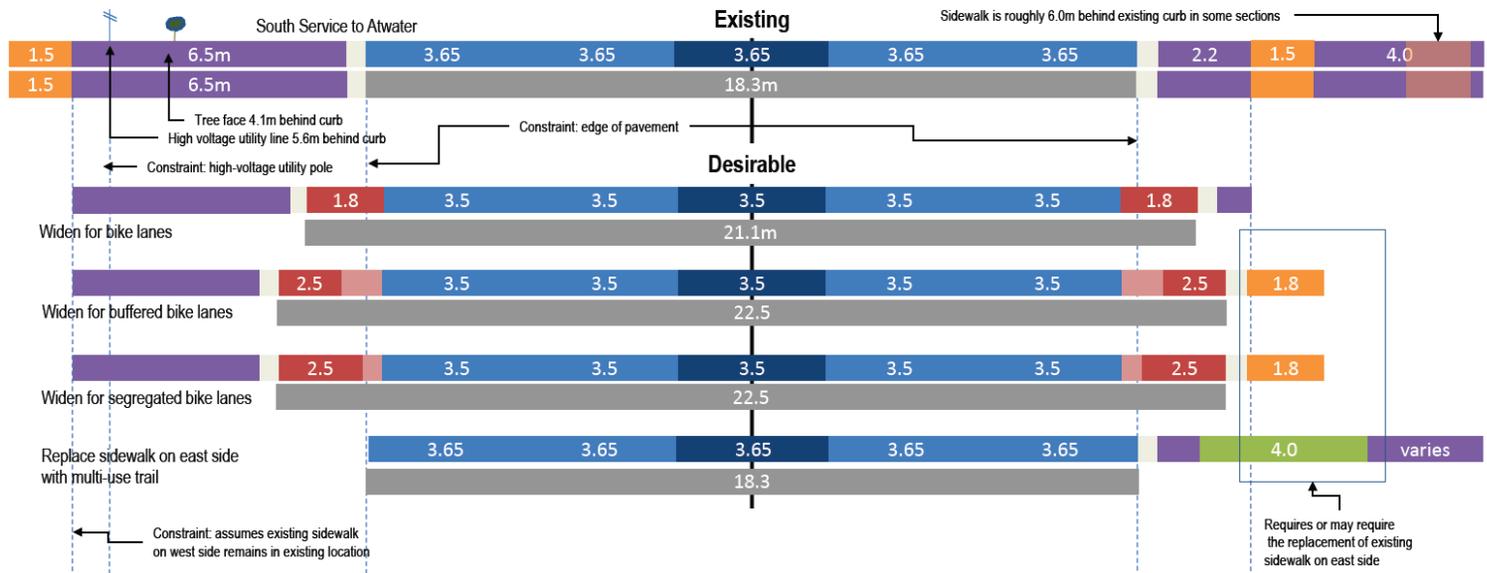
**Exhibit 13: Proposed Alternative Strategies**

ALTERNATIVE STRATEGIES	
<b>Mid-block Sections</b>	
<b>C1.</b> South Service Road to Atwater Avenue	<ul style="list-style-type: none"> <li>• Widen for bike lanes, buffered bike lanes or segregated bike lanes</li> <li>• Replace sidewalk on east side with multi-use trail (feasibility of this option will depend on the transition from off-road to on-road facilities at Atwater Avenue)<sup>1</sup></li> </ul>
<b>C2.</b> Atwater Avenue to CN Underpass	<ul style="list-style-type: none"> <li>• Widen for bike lanes, buffered bike lanes or segregated bike lanes</li> <li>• Reconfigure (5 lanes to 4 or 3 lanes) to accommodate bike lanes, buffered bike lanes or segregated bike lanes<sup>2</sup></li> </ul>
<b>C3.</b> CN Underpass to Lakeshore Road	<ul style="list-style-type: none"> <li>• Widen for bike lanes, buffered bike lanes or segregated bike lanes</li> <li>• Reconfigure (5 lanes to 4 or 3 lanes) to accommodate bike lanes, buffered bike lanes or segregated bike lanes*</li> </ul>
<b>Site Specific Conditions</b>	
<b>C4.</b> CN Underpass	<ul style="list-style-type: none"> <li>• Reconfigure (4 or 2 lanes) to accommodate bike lanes, buffered bike lanes or segregated bike lanes<sup>2</sup></li> <li>• Provide off-ramp or other transition for cyclists (in each direction one-way) to use sidewalk</li> <li>• Investigate the feasibility of narrowing the raised median to accommodate bike lanes</li> </ul>
<b>C5</b> Atwater Avenue -bus shelter constraints -bus bay	<ul style="list-style-type: none"> <li>• Transition multi-use trail behind the existing bus shelter to avoid conflicts with pedestrians and transit users</li> <li>• Provide a crossrides across all legs of the intersection to permit southbound cyclists in the multi-use trail to make a two-stage crossing into the southbound bike lanes on the west side</li> <li>• Pilot a shamble crossing (pedestrian cross in all directions while all motorist stop) that permits cyclists to cross</li> <li>• Consider removing bus bay and/or relocation bus stop further downstream to allow more space for northbound motorist in right lane to merge left</li> </ul>
<b>C6.</b> Lakeshore Road	<ul style="list-style-type: none"> <li>• Reconfigure dual left-turn lane to single left-turn lane pocket lanes for turning cyclists (right and left turns)</li> <li>• Use pavement markings and signage to indicate shared use as motorists and cyclists approach the intersection</li> </ul>
Notes:	
<ol style="list-style-type: none"> <li>1. A transition from off-road facilities north of Atwater Avenue to on-road facilities will be required for this option. No off-road facilities are proposed south of Atwater Avenue due to insufficient opportunities for safe crossing. See below alternative</li> <li>2. Available count data indicate that 4 lanes are not required to accommodate existing travel demand. Future travel demand (based on background growth of 1%) is not anticipated to cause significant operational issues. Further detailed assessment of the travel forecast and future operation is recommended for the intersections of Atwater Avenue and at Lakeshore Road</li> </ol>	

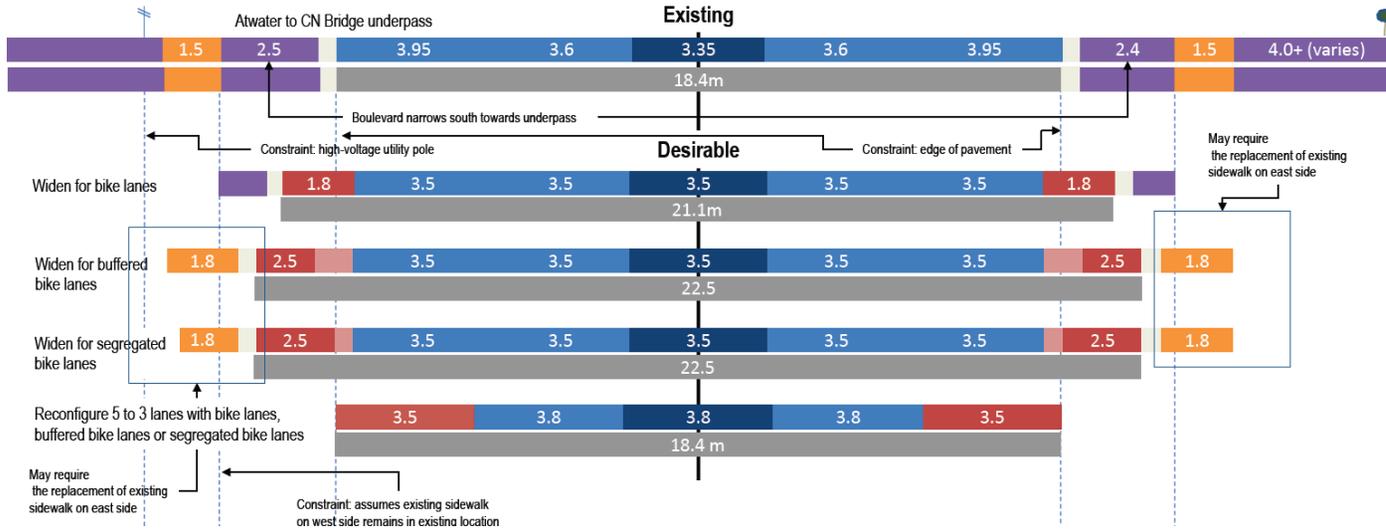
**Exhibit 14: Legend of Proposed Alternative Strategies**



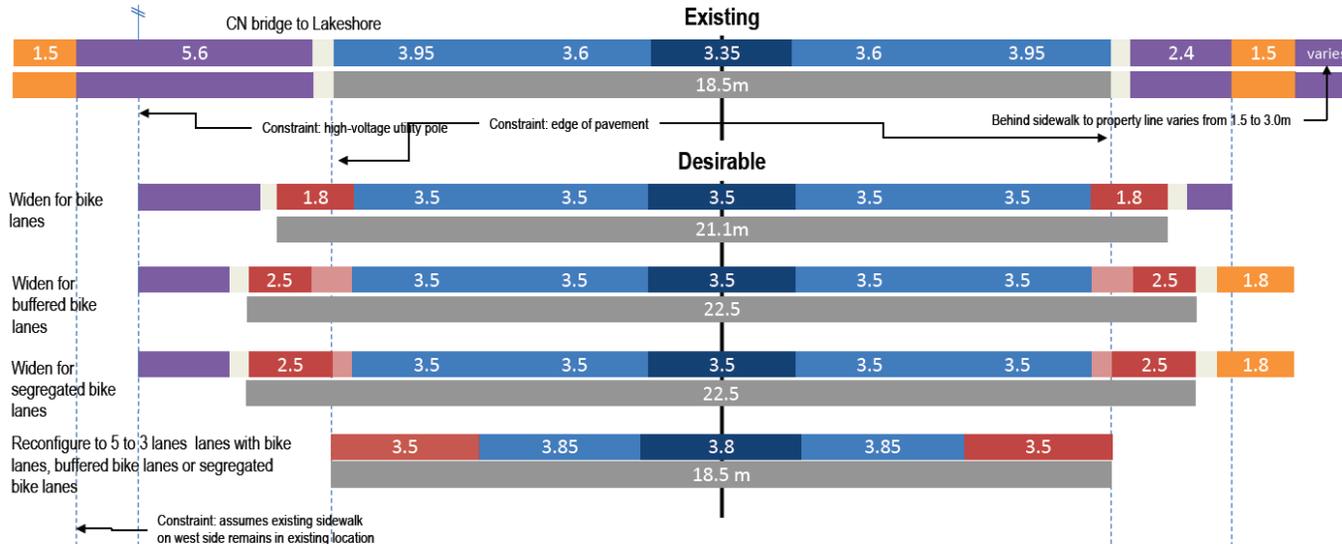
**Exhibit 15: Proposed Alternative Strategies for South Service Road to Atwater Avenue**



**Exhibit 16: Proposed Alternative Strategies for Atwater Avenue to CN Underpass**



**Exhibit 17: Proposed Alternative Strategies for CN Underpass to Lakeshore Road – NTS**



## 8 Evaluation of the Preferred Strategy

### 8.1 Approach and Methodology

As in Part A, the evaluation of the preferred bikeway strategy is guided by the Ontario Traffic Manual: Book 18 Cycling Facilities. OTM Book 18 recommends a three-step selection process to guide the evaluation of various bike facilities:

- **Step 1: Pre-select a desirable facility type.** This step involves identifying a desirable type of bike facility based on traffic speed and volumes.
- **Step 2: A more detailed look.** This step involves a more detailed look at the context. It includes both an inventory of site-specific conditions and a review of the key design considerations and applications. This step includes evaluating the site characteristic against thirteen (13) criteria with application heuristics.
- **Step 3: Develop your rationale.** This step involves documentation to justify the rationale and define a final decision or recommendation.

The 3-step process recommended in OTM Book 18 was applied to this section of Cawthra Road to help identify an appropriate bike facility.

### 8.2 Pre-Select a Desirable Facility Type (Step 1)

For Step 1, the type of bike facility is pre-selected based on volume and operating speed. The existing volume measured near Arbor Road is approximately 22,500 vpd and is forecasted to grow to approximately 27,200 vpd based on an assumed background growth rate of 1% per year. South of Atwater, Turning Movement Count (TMC) data suggest that traffic volumes drop to roughly 60% of volume at the South Service Road. Less than 10,000 vpd per day is estimated at Lakeshore Road.

These volumes translate to an estimate of 13,600 vpd in the curb lanes. Operating speeds are approximately 67 km/h. Based on these conditions, the pre-selected desirable bike facility sits along the borderline between designated operating space (such as bike lanes) and a separated bike facility (such as a multi-use path in the boulevard OR separated bike lanes/cycle tracks). South of Atwater Avenue and near Lakeshore Road, the desirable facility remains within the realm of a designated operating space despite lower volumes due to the high speeds observed in the corridor.

### 8.3 A Detailed Look (Step 2)

For Step 2, the corridor is reviewed based on other site specific characteristics to determine the appropriateness of the pre-selected bike facility. The summary of existing conditions (**Exhibit 8**) provides a basis for this step. The site-specific characteristics were evaluated over the 4 sections including the CN Underpass:

- South Service Rd to Atwater Ave
- Atwater Ave to CN Bridge
- CN Underpass (roughly 100m south of Village Gate Blvd to 3rd Street)
- CN Bridge to Lakeshore Rd

Each of the 13 criteria listed in **Exhibit 18** were evaluated based the application heuristics in OTM Book 18.

**Exhibit 18: Detailed Bike Facility Selection Criteria**

OTM BOOK 18 APPLICATION HEURISTICS	
Primary determining criteria, not in any specific order	Secondary criteria
85 <sup>th</sup> percentile motor vehicle operating speeds	Costs
Motor vehicle volumes	Anticipated users in terms of skill and trip purpose
Function of street, road or highway	Level of bicycle use
Vehicle mix	Function of route within bicycle facility network
Collision history	Type of roadway improvement project
Available space	On-street parking
	Frequency of intersection

The full evaluation of each criterion is documented in **Exhibit 19** to

**Exhibit 21.**

Based on this criteria, the appropriate bike facility type throughout the corridor is on-road bike lanes with additional separation from motor vehicles that is preferably physically separated (e.g. buffered bike lanes, segregated bike lane or raised bike lanes).

The following is a summary of the key criteria that most influence the outcome of the selection process and present a recommendation.

**a) Traffic Operation and Vehicle Mix**

These criteria were most applicable to the section north of Atwater Avenue where the traffic volumes are higher and where bus routes operation:

- Operating speed for motor vehicles in this section is moderate at 67 km/h. At minimum, exclusive operating space for cyclists away from motor vehicles is recommended.
- Motor vehicle volumes are relatively high throughout the corridor. The estimated equivalent volume for a two-lane road ranges from 13,000 vpd to over 15,000 vpd. In one direction, curb lane volume is estimated to reach 750 to over 1,000 vehicles in the peak hour. At minimum, a formal bicycle facility with designated operating space for exclusive use by cyclists is recommended. However, physical separation between motor vehicle bicycle traffic is most appropriate for these volumes.
- Bus stops for Route 8 and several school express routes are also located on the corridor from Atwater Avenue to the QEW. Separated bike facilities are preferred with additional buffer width to separate cyclists from heavy vehicles in the curb lane. At bus stops, facilities should be designed to minimize and clearly mark conflict areas between cyclists with buses and pedestrians.

Overall, design considerations based on traffic operation and vehicle mix align with both the pre-selected desirable facilities of designated space and a separated facility.

**b) Frequency of Driveways and Side Streets**

Intersections and driveways present conflict points between motorists, cyclists and pedestrians. The risks associated with frequent driveways and sidewalks are previous discussed the corresponding Part A: Section 2.4e:

- North of the CN Underpass, there are frequent residential driveways on the west side

- South of the CN Underpass, there are frequent residential driveways on both sides.
- Note that the presence of mature trees and hydro utilities poles on the west side throughout the corridor can affect visibility and augment the risk associated with motorist awareness of cyclists in the boulevard.

Based on the intersection frequency, multi-use trails are considered infeasible throughout the west side of the corridor, and on the east side south of the CN Underpass. Bike lanes are more appropriate than separated facilities since motorists are more likely to be aware of cyclists on the roadway rather than adjacent to the road.

### **c) Available Space, Type of Roadway Improvement and Costs**

The available space, type of roadway improvement and costs are intrinsically related to the feasibility of the desirable bike facility:

- North of Atwater Avenue, the existing 5-lane configuration is needed to accommodate the existing and forecasted travel demand. Road widening will be required to accommodate on-road bike ways based on minimum widths in the design criteria. A multi-use trail on the east side may be a lower cost options, however the removal of the existing sidewalk can bear cost similar to the movement of curb and gutter.
- South of Atwater Avenue, there may be opportunities to reallocate road space for bikeway and reduce cost by deferring the need to widen the road. Lower traffic volumes indicate an opportunity to removal a lane to accommodate on-road bikeways. A multi-use trail is suitable on the east side north of the CN Underpass, however the existing sidewalk (1.2m) is inappropriate to accommodate cycling in two directions. Without a safe crossing location (i.e. a signalized intersection) north of the underpass, a multi-use trail is not feasible north of the CN Underpass. Road reconfiguration presents a lower cost option for providing on-road bikeways.
- If road reconfiguration is not feasible south of Atwater Avenue (for other reasons), then road widening will be required to accommodate on-road bike lanes. Cost criteria in OTM Book 18 recommend the undertaking of a benefit cost analysis during functional or preliminary design when more than one type of bike facility appears appropriate. In this case, the benefits of maintained existing motor vehicle capacity must be assessed against the cost of road widening, and the benefits of providing a multi-modal corridor must be assessed against the cost of road reconfiguration.
- At this point, either a multi-use trail or on-road separated facilities (i.e. road bike lanes with a buffer, segregated bike lanes) remain appropriate options. Greater details about the potential impacts to cost may be evaluated in a functional or preliminary design (e.g. sidewalk or curb removal and disposal, movement of utility poles, curb and gutter, additional excavation, etc.)

Part A: Section 2.4b discussed the opportunity for cost savings and challenges associated with coordinating road projects for the entire Cawthra Road corridor. Maintaining the existing conditions (i.e. no road widening) impacts the feasibility of on-road bike facility. To accommodate on-road bike facilities, road widening will be required. To accommodate a multi-use trail on the east side boulevard north of Atwater Avenue, the existing sidewalks will need to be removed. A standalone road improvement project will be required to implement a separated facility.

#### **d) Function of the Route within the Bike Network**

Cawthra Road plays an important road in the bike network both for Peel Region and for the City of Mississauga. Part 2.4c discussed the various plans supporting the need for a dedicated bikeway on Cawthra Road.

As a new route, bicycle lanes and separated facilities should be considered to encourage cycling for all users. The need for continuity is also identified in OTM Book 18 as an influencing factor to facility type selection. In Part A of the corridor, segregated bike facilities are recommended. In this regard, a segregated bike facility is preferred to provide continuous route throughout the corridor.

**Exhibit 19: EVALUATION OF ALTERNATIVES (Step 2a - Inventory Site Specific Conditions)**

SITE CHARACTERISTIC	SECTIONS			
	South Service Rd to Atwater Ave	Atwater Ave to CN Bridge	CN Underpass	CN Bridge to Lakeshore Rd
Existing cross-section	5-lane road (4 travel lanes + median TWLTL) turns lanes See drawing C1	4-lane road (4 travel lanes + flush median)  See drawing C2	4-lane road (4 travel lanes + raised median + raised sidewalks) See drawing C3	4-lane road (4 travel lanes + flush median)  See drawing C2
Land uses	Low-density residential on west side. Parkland, community centre, seniors centre and high school on east side.	Medium density residential on west side and high density residential on east side.	N/A	Medium-density residential (both sides), commercial uses near Lakeshore Rd
Features	Wide boulevard with hydro corridor, trees and sidewalk on west side, front-lotted homes.	Hydro corridor in boulevard on the west side.	Structural support within raised median	Hydro corridor in boulevard on the west side.
Future Condition	4 travel lanes + centre turn lane AT facilities proposed as part of this evaluation	4 travel lanes + raised median AT facilities proposed as part of this evaluation	4 travel lanes + centre turn lane AT facilities proposed as part of this evaluation	Maintain existing 5 to 6 travel lanes configuration, add AT facilities as proposed as part of this evaluation in consultation with MTO
Signalized intersections	Three signalized intersections (South Service Rd, Arbor Rd, Atwater Ave)	One signalized intersection (Atwater Ave)	One signalized intersection (3 <sup>rd</sup> St)	Two signalized intersections (3 <sup>rd</sup> St, Lakeshore Rd)
Unsignalized intersections	Two unsignalized intersections (Dexter Crescent; north and south leg)	One unsignalized intersection (Village Green Blvd)	N/A	Two unsignalized intersections (Gardner Ave; Ebony Ave)
Driveways	Limited number of institutional driveways on east side. Numerous residential driveways on the west side.	Number residential driveways on the west side, including one higher volume driveway to a townhome complex.	N/A	Number residential driveways on both sides.

**Exhibit 20: EVALUATION OF ALTERNATIVES (Step 2b - Review Key Design Considerations and Application)**

SITE CHARACTERISTIC	SECTIONS (DESIGN CONSIDERATION AND APPLICATION OF HEURISTICS)			
	South Service Rd to Atwater Ave	Atwater Ave to CN Bridge	CN Underpass	CN Bridge to Lakeshore Rd
<b>85TH PERCENTILE MOTOR VEHICLE OPERATING SPEED</b>				
Moderate (50 to 69 km/h)	66 to 67 km/h, measured at 100m north of Arbor St <u>Exclusive operating space for bicycles and motor vehicles in the form of bicycle lanes or separated facilities is recommended</u>			
<b>MOTOR VEHICLE VOLUMES</b>				
High Volume where two-way daily average volume is greater than 10,000 vpd on a two-lane road	22,500 vpd for 4-lane road (11,000 vpd estimated in curb lanes). Future volumes forecasted to grow to 37,500 vpd (14,000 vpd) based on 1% annual growth rate. TMC data indicate lower volumes, south of Atwater Ave and approaching Lakeshore Rd (approx. <20,000 vpd and <10,000 vpd, respectively) <u>Some level of formal bicycle facility is recommended such as bike lanes.</u>			
Hourly one-way volume in the curb exceeds 250 vph	Up to 2,000 vph one-way at South Service Rd (based on volumes in TMC data) (1,000 vph estimated for curb lane).	Up to 1,600 vpd one-way (based on through volume at Dundas St ramp) (800 vph estimated for curb lane)	Up to 1,500 vph one-way (based through volumes in TMC data) (750 vph estimated for curb lane).	Up to 2,300 vph one-way (based through volumes in TMC data) (750 vph estimated for curb lane).
	<u>Some level of formal bicycle facility such as bike lane is recommended</u>			
<b>FUNCTION OF THE STREET OR ROAD</b>				
Mobility road such as arterial and major collector	<b>Major Road</b> as per Region of Peel Official Plan (2012) Schedule E: Major Road Network <b>Suburban Connector</b> as per Region of Peel Road Characterization Study (2013) <b>Regional Arterial</b> as per City of Mississauga Functional Road Class (2010) <u>Some level of formal bicycle facility such as bicycle lanes or separated facility is appropriate</u>			
Motor vehicle commuter route	Yes - as described above <u>Separated bicycle facility should be considered to minimize conflicts with aggressive drivers</u>			
<b>VEHICLE MIX</b>				
More than 30 trucks or buses per hour are present in a single curb lane	Up to 60 trucks in one direction during AM peak hour (from TMC data) 30 trucks per hour estimated for one-way curb lane	Up to 50 trucks in one direction during midday peak hour (from TMC data) 25 trucks per hour estimated for one-way curb lane	No data 20-25 per hour estimated for one-way curb lane	Up to 20 trucks in one direction during AM peak hour (from TMC data) 10 trucks estimated in the curb for one-way curb lane
	<u>Separated bicycle facilities may be preferred by many cyclists. If wide curb lanes or bicycle lanes are considered, additional width should be provided as a buffer.</u>			
Bus stops are located along the route	Three (3) stops on east side and six (6) stops on west side. Potential conflict with on-road bicycle facilities), Route 8 and school express routes turn from Atwater Ave	Bus bay on northeast of intersection with Atwater Ave (high pedestrian activity): potential conflict area.	N/A	N/A
	<u>Facilities should be designed to minimize and clearly mark conflict areas with buses or pedestrians at stop locations</u>			
<b>COLLISION HISTORY</b>				
Conflict areas exist between bicyclist and motor vehicles or pedestrians	No bicycle collision data. Potential conflicts areas at driveways on east side near community centre and high school, and at intersection of Atwater Ave: observed sidewalk riding on east side, north of Atwater Ave; high pedestrian activity at intersection of Atwater Ave <u>Facilities and crossings should be designed to minimize conflict between different types of users and the conflict area should be clearly marked at: plaza on east side 100m south of Burnhamthorpe, at Bloor St, at the Queensway, North Service Rd and South Service Rd</u>			
<b>AVAILABLE SPACE</b>				
Sufficient curb-to-curb width exist to adequately accommodate motorist and cyclists	N/A (see below)	<b>18.4m</b> curb-to-curb is sufficient for 3-4 travel lanes + bike lanes (with or without buffer) to accommodate estimated 18,600 vpd or less south of Atwater Ave (22,500 vpd or less forecasted based on 1% per year growth)	<b>7.4m</b> each direction + 5.1m raised median (potential to narrow raised median to provide more pavement space depending on structure footing)	<b>18.5m</b> curb-to-curb is sufficient for 3-4 + biker lanes (with or without buffer) to accommodate estimated 8,200 or less near Lakeshore Rd (9,900 or less forecasted based on 1% per year growth)

SITE CHARACTERISTIC	SECTIONS (DESIGN CONSIDERATION AND APPLICATION OF HEURISTICS)			
	South Service Rd to Atwater Ave	Atwater Ave to CN Bridge	CN Underpass	CN Bridge to Lakeshore Rd
	Redistribute roadway space to accommodate bicycle lanes by narrowing travel lanes, or eliminating unnecessary travel or turn lanes			
Curb-to-curb width not adequate to provide sufficient operating space for both motorists and cyclists	18.3m curb-to-curb is not sufficient for 5 lanes (including median TWLTL) + bike lanes (20.5m minimum) to accommodate 22,500 vpd (ATR data). Up to 33,000 vpd estimated (from TMC data) at South Service Rd <u>Provide separated facilities adjacent to the roadway or within independent right-of-way, or widen roadway platform to accommodate bicycle lanes.</u>	N/A	N/A	N/A
<b>ANTICIPATED USERS IN TERMS OF SKILL AND TRIP PURPOSE</b>				
Experienced cyclists (commuter or other utilitarian)	Existing cyclists riding on-street Cawthra Rd, a major road connecting through a QEW interchange, are likely experienced cyclists who prefer direct, continuous facilities with minimal delay. Cawthra Rd is the most direct route, for adjacent residents, to access north of the QEW, which connects to the Dixie employment area and to the Dundas transit corridor. It also connects south to the Lakeview employment area and Lakeview Community Node. <u>Prefer on-street bike lanes, or separated facilities where warranted</u>			
Novice cyclists (recreational / beginners)	Existing cyclists observed riding on the sidewalk on the east side (where community destinations are located), indicating a preference by novice cyclists to ride away from high volume and high speed traffic. Anticipated cyclists may be beginner or recreational cyclists travelling off-street on Cawthra Rd to connect to the Burnhamthorpe Trail. Potential novice cyclists are anticipated when bikeways is developed, bikeway to connect to this trail as well as the other proposed trails along the Highway 403 utility corridor and the Hydro One-Royal Windsor corridor at North Service Rd. It is anticipated to encourage cycling to transit and short trips to employment lands. <u>Bike lanes (with or without buffer) or separated facilities should be considered.</u>			
<b>COSTS</b>				
More than one type of bicycle facility appears appropriate	Physical separation of motor vehicle and bicycle facility is desirable. Based on the site characteristics and operation, the existing 5-lanes are required to maintain corridor a high level of service. Physical separation can be provided by widening the road and adding on-road bike lanes with a buffer, segregated bike lanes and/or a multi-use trail in the boulevard on the east side (west side inappropriate for multi-use trail given the numerous driveways and unsignalized intersections)	Physical separation of motor vehicle and bicycle facility is desirable. Based on the site characteristics and operation, it may be possible to redistribute the roadway space to accommodate on-road bike lanes (with or without a buffer) or segregated bike lanes by narrowing travel lanes, eliminating unnecessary travel or turn lanes or widening the road. A multi-use trail on the east side is inappropriate given the limited width on the east side raised sidewalk through the CN underpass (1.2m). This width is sufficient for 2-way pedestrian and cycling traffic. A multi-use trail on the west side is inappropriate for multi-use trail given the numerous driveways and unsignalized intersections		
<u>Benefit / cost analysis of alternatives is recommended during functional or preliminary design</u>				
<b>LEVEL OF BICYCLE USE</b>				
Low bicycle volumes (< 10 cyclists per hour)	Between 4 to 8 cyclists observed during 8h TMC at South Service Rd, Atwater Ave and Lakeshore Rd  Low cyclists demand is attributed in part to inadequate cycling facilities. Cycling volumes are anticipated to increase with improvements to cycling infrastructure. <u>Wide curb lanes maybe adequate in some cases (however this type of facility is inadequate based on the high volume and speed)</u>			
Significant bicycle traffic generators nearby	The community centre and high school are considered potential bicycle traffic generators in conjunction of formal bicycle facilities with designated operating space. Cawthra Rd serves as a connector route to the Dixie and Lakeview commercial and employment areas. <u>Bicycle lanes or separated facilities should be considered to accommodate the anticipated volume of cyclists</u>			
<b>FUNCTION OF THE ROUTE WITHIN BIKE NETWORK</b>				
New route provides access to a neighbourhood, suburb or other locality	Bicycle lanes are proposed (via road retrofit) as per the Region of Peel Active Transportation Study (2011). The route is classified as a Primary On-road Route as per the City of Mississauga Cycling Master Plan (2010). <u>Bicycle lanes or separated facilities should be considered to encourage cycling for all users</u>			

SITE CHARACTERISTIC	SECTIONS (DESIGN CONSIDERATION AND APPLICATION OF HEURISTICS)			
	South Service Rd to Atwater Ave	Atwater Ave to CN Bridge	CN Underpass	CN Bridge to Lakeshore Rd
New route provides access a connection between adjacent existing facilities	Bicycle lanes are proposed (via road retrofit) as per the Region of Peel Active Transportation Study (2011). The route is classified as a Primary On-road Route as per the City of Mississauga Cycling Master Plan (2010). <u>Bicycle lanes or separated facilities should be considered to encourage cycling for all users</u>			
<b>TYPE OF ROADWAY IMPROVEMENT</b>				
Reconstruction	Reconstruction required to accommodate on-road bicycle facilities and existing motor vehicle volumes	Restriping is adequate to redistribute road space to accommodate on-road bicycle facilities and existing motor vehicle volumes (in 3 lanes or 2 lanes at CN underpass). If reconfiguration is not feasible, reconstruction required to accommodate on-road bicycle facilities and existing motor vehicle volumes		
<u>Reconstruction provides opportunity to widen roadway to provide on-road bike facilities such as bike lanes; or to increase the boulevard width for a multi-use trail.</u>				
<b>ON-STREET PARKING</b>				
Parallel on-street parking is not permitted	Parking on-street not permitted on east side from Lakeshore Road to CN Railway Overpass and both sides near the CN Railway Overpass. On-street parking is prohibited from 2am to 6am and limited to 3h maximum unless otherwise posted. Regional By-Law 15-2013 does not restrict parking or stopping except where noted above. There are no signs that prohibit parking or stopping north of the CN Railway Overpass, however there appears to be no demand or little demand for on-street parking and sufficient off-street parking available. <u>Opportunities to provide bicycle lanes if on-street parking is not permitted</u>			
<b>FREQUENCY OF INTERSECTIONS</b>				
Numerous low volume driveways or unsignalized intersections are encountered	Frequent residential driveways on west side (every 10-30m). No driveway on east side.  <u>On the west side, bicycle lanes may be more appropriate than separated facilities since motorists are more likely to be aware of cyclists on the roadway rather than adjacent to the road.</u>	Frequent residential driveways on west side (every 10-30m). Unsignalized intersection on east side less than 300m  <u>On the west side, bicycle lanes may be more appropriate than separated facilities since motorists are more likely to be aware of cyclists on the roadway rather than adjacent to the road.</u>	No driveways on both sides	Frequent residential driveways on both sides (every 10-30m)  <u>Bicycle lanes may be more appropriate than separated facilities since motorists are more likely to be aware of cyclists on the roadway rather than adjacent to the road.</u>
Major intersection with high speed and traffic volumes encountered Note: Special treatments may be required at the intersection of South Service Road to transition the proposed bikeway north the QEW with the proposed bikeway south of South Service Road (e.g. cross-rides or curb cuts to on-road bikeways from a multi-use trail and vice versa)	Over 5,500 vehicles entering the South Service Rd intersection during the peak hour  <u>Consider provision of bicycle lanes, bike boxes, intersection and conflict zone markings as well as special bicycle signal phases at major intersections. Consider indirect left-turn treatments as there is significant bicycle left turn demand conflicting with through motor vehicle traffic. If a separated facility is being considered, crossings should have bicycle traffic signals with exclusive phases, and conflicts should be clearly marked.</u>	N/A	N/A	N/A

**Exhibit 21 EVALUATION OF ALTERNATIVES (Step 2c - Select Appropriate and Feasible Bicycle Facility Type)**

ALTERNATIVE	South Service Rd to Atwater Ave	Atwater Ave to CN Bridge	CN Underpass	CN Bridge to Lakeshore Rd
Widen for bike lanes	MAYBE - More separation between motorists and cyclists may be more appropriate given high volume and speeds of motor vehicles	MAYBE - cost prohibitive to widen bridge structure; transition through underpass required	MAYBE - cost prohibitive to widen bridge structure (interim treatment: permit use of sidewalk through the underpass)	MAYBE - cost prohibitive to widen bridge structure; transition through underpass required
Widen for buffered bike lanes	YES - provides separation for cyclists from motor vehicles, avoid conflicts between driveway or west side and an off-road facility; provides space in intersections for left-turn queue boxes	MAYBE - cost prohibitive to widen bridge structure; transition through underpass required	MAYBE - cost prohibitive to widen bridge structure (interim treatment: permit use of sidewalk through the underpass)	MAYBE - cost prohibitive to widen bridge structure; transition through underpass required
Widen for segregated bike lanes	MAYBE - frequent openings in separators will be required to accommodate residential driveways on west side, provide continuity with proposed bikeway north of the QEW	MAYBE - frequent openings in separators will be required to accommodate residential driveways on west side; transition through underpass required	MAYBE (special treatment required) - cost prohibitive to widen bridge structure (interim treatment: permit use of sidewalk through the underpass and investigate opportunity to narrow raised median to accommodate bikeway in long-term)	MAYBE - frequent openings in separators will be required to accommodate residential driveways on west side; transition through underpass required
Replace sidewalk on east side with multi-use trail	MAYBE - does not provide direct, continuous route for cyclists travelling through corridor	NO - no safe crossing (i.e. signalized intersection) available transition to on-road facilities at CN bridge	NO - insufficient space on east sidewalk (1.2m) to accommodate multi-use trail (min 3m). (Interim treatment not appropriate to accommodate cyclists and pedestrians in both directions)	NO - frequent residential driveways (10-30 m)
Reconfigure 5 lanes to 3 lanes plus on-street bike facilities within existing curb-to-curb width	NO - existing motor vehicle volumes cannot be accommodated in reduced 3 travel lanes	MAYBE - forecast motor vehicle volumes may not be accommodated in 3 travel lanes**	MAYBE - forecasted motor vehicle volumes be accommodated in 2 travel lanes**	YES - existing and forecasted motor vehicle volume can be accommodated in 3 travel lanes.
<b>RECOMMENDED FACILITY TYPE</b>	Reconstruct roadway to provide 4 lanes with a centre turn lane and segregated bike lanes*	Reconstruct roadway to provide 4 lanes with a centre turn lane and segregated bike lanes*	Reconstruct roadway to provide 4 lanes with a centre turn lane and segregated bike lanes*	Reconstruct roadway to provide 4 lanes with a centre turn lane and segregated bike lanes*

\* Note: buffered bike lanes are recommended to have some separators to prohibit motorist from driving in the lane; such as a bevelled curb, flexible delineators, precast concrete curbs, cycle lane (a modular rubber separator by Traffic Logix) or planters in some locations

\*\*Note: detailed traffic analysis is required during functional or preliminary design to warrant 5-to-4 lane or 5-to-3 lane reconfiguration for forecast motor traffic volumes. Ongoing monitoring is recommended to assess



## 8.4 Rationale Development (Step 3)

Step 3, the rationale for the final recommendation is documented below.

### 8.4.1 Recommendations

To accommodate active transportation along Cawthra Road from South Service Road to Lakeshore Road, the following are recommended:

- Widen the road to accommodate segregated bike lanes (i.e. raised bike lanes) throughout the corridor.
- At the CN Underpass, transition segregated bikeway to allow cyclists (in one direction) onto sidewalk through underpass. Investigate future opportunities to narrow raised median to accommodate on-road bike facilities through the underpass.
- North of South Service Road: transition the raised bike lanes to allow cyclist to off-road on both sides across the QEW.
- Improve crossing conditions for pedestrians at signalized intersections. Special attention is required at Atwater Avenue where existing conflicts between pedestrians, transit users and cyclists riding on the sidewalk have been observed. OTM Book 15 provides additional guidance for pedestrian crossing facilities.
- Improve crossing conditions for cyclists where Cawthra Road intersects with existing or proposed bike routes: South Service Road, Arbor Road and Atwater Avenue (secondary cycling routes), as well as Lakeshore Road (proposed multi-modal corridor). OTM Book 18 Bicycle Facilities provides additional guidance to conflict zones and other crossing treatments.

### 8.4.2 Rationale

Raised bike lanes align with the pre-selected desirable facility of a separated bike facility. It provides exclusive operating space and physical separation from motor traffic that is preferred in high volume and speed conditions.

While physical separation may not be required south of Atwater Avenue, raised bike lanes throughout the corridor maintain continuity of a high-quality bike facility into the planned higher density areas to the south, the future Lakeview Waterfront and multi-modal corridor on Lakeshore Road. A partial multi-use trail on one-side is feasible, however special treatments at the intersection Atwater Avenue would be required to accommodate transitions between on- and off-road facilities. Road widening will be required to provide any on-road bike facility, whether bike lanes or segregated facilities, and to maintain the existing motor vehicle capacity. Another advantage of a continuous bikeway is that the special crossing treatments can be applied throughout the corridor with minimal confusion over exceptional operating conditions. Example treatments include crossrides, coloured pavement, and in-curb bike boxes.

The restricted space at the CN Underpass has a significant impact on the feasible strategies. While the conditions between Atwater Avenue and the CN Underpass are conducive to a multi-use trail on the east side, there are no safe crossing areas (i.e. signalized intersection) to transition on-road north of the underpass. The narrow sidewalk (1.2m) disqualifies as a safe off-street cycling option. A minimum of 3.0m is required for two-way cycling; while allowing cyclists (whom are uncomfortable riding through the underpass) to exit in one direction onto the sidewalk is considered a reasonable compromise solution. In the long-term, it is recommended that the Region investigate the opportunity to narrow the raised median to accommodate bike lanes.

The most significant drawback of this option is cost associated with widening the road and moving the curb and gutter. Part A: Section 4.4 discusses the benefits and consideration associated cost and program management.

## 9 Summary and Conclusion

In summary:

- In October 2013, the Dixie Road and Cawthra Road Bikeway Feasibility Studies was initiated to evaluate feasibility bikeway options on the two corridors. In June 2013, the Cawthra portion of this study was combined with the Cawthra Pre-EA Study.
- Two meetings were held with the project team to report findings and solicit feedback in the development bikeway strategies. The first meeting was held in December 2013. The second meeting was held jointly with the Cawthra Pre-EA Study project team in July 2014.
- The development of a designated bikeway on Cawthra Road is supported in numerous plans including, but not limited to: the Peel Region Active Transportation Plan, the City of Mississauga Cycling Plan, Inspiration Lakeview, Lakeview Local Area Plan, and The Big Move. Other relevant projects, studies and plans were reviewed as part of this study.
- Cawthra Road is a 5-lane arterial road (4 lanes plus centre turn lane) with approximately 22,500 vph and 85<sup>th</sup> percentile operating speed of 67 km/h. Turning movement count data indicate that volume decrease significantly south of Atwater Avenue and it is estimated less than 10,000 vpd approach the north leg intersection with Lakeshore Road. Frequent residential driveways exist throughout the corridor, except for the east side north of the CN Underpass. North of Atwater Avenue, the adjacent land use consists of parkland, a community centre, a senior's centre, and a high school that contribute to significant pedestrian activity at the nearby bus stop.
- For pedestrians, sidewalks exist on both sides throughout the corridor. At the intersections of South Service Rd, Atwater Rd and Lakeshore Rd, the 8 hr pedestrian volumes were: 100, 450, and 390 people, respectively. These numbers suggest a moderate level of pedestrian activity along the corridor.
- For cyclists, there are no currently cycling facilities. Existing volumes for cyclists was observed to be low (less than 20 people in an 8 hr period). However, it is anticipated that this condition is influenced by the lack of designated bicycle facilities. Site visits yielded observations of sidewalk riding on the east side of Cawthra Rd, north of Atwater Ave. The transportation master plans for the Region of Peel and the City of Mississauga both include plans for bicycle facilities on Cawthra Road.
- Design criteria were prepared identify the proposed alternative strategies. The design criteria are context-specific and are based on guidance in the Peel Road Characterisation Study, OTM Book 18, and other national design guides.
- The proposed alternative strategies considered a range of bikeway options including: multi-use trails, bike lanes, buffered bike lanes, and segregated bike lanes. Shared use facilities were considered inappropriate given the existing operating conditions of the corridor.

- The proposed alternatives were evaluated using the three-step process outlined in OTM Book 18. Step 1 identified a pre-selected desirable facility of separated facilities north of Atwater Avenue. South of Atwater Avenue, a designated operation space is desirable (i.e. bike lanes).
- As part of Step 2, thirteen criteria were evaluated based on the site conditions and specific design heuristics. The most influential criteria included: the traffic operations and vehicle mix (for the section north of Atwater Avenue), frequency of driveways and side streets, the available space, type of roadway improvement, cost and function of the route in the bike network.
- The recommended bikeway is raised bike lanes throughout the corridor with special treatments at Atwater Avenue, the CN Underpass and Lakeshore Road. Raised bike lanes provide a high quality, continuous bikeway that aligns with the desirable facility based current and forecasted operation. Special treatment will be required at the CN Underpass to transition cyclists comfortably through the structure.





# Appendix B

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# Appendix B1: Memorandum

## (Interim Summary - March 2014)

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# Memorandum

<b>To/Attention</b>	Margie Chung, Peel Region	<b>Date</b>	March 27, 2014
<b>From</b>	Marian Saavedra, IBI Group	<b>Project No</b>	35303
<b>cc</b>	Norma Moores, IBI Group Brian Hollingworth, IBI Group	<b>Steno</b>	ms
<b>Subject</b>	Dixie Road and Cawthra Road Bikeway Feasibility Studies: Background and Alternatives		

## Introduction

The purpose of this memo is to document findings to date of the Dixie Road and Cawthra Road Bikeway Feasibility Studies.

The Region of Peel's *Active Transportation Study*, recommends providing bicycle lanes on: Dixie Road, from Rometown Drive to Lakeshore Road, and Cawthra Road, from South Service Road to Lakeshore Road. IBI Group was retained to undertake the bikeway feasibility study for both these streets. The study is intended to build on the recommendations of the *Active Transportation Study* with additional site-specific conditions to determine the feasibility of implementation at a more detailed level not possible within a master plan. To date, the following tasks have been completed:

1. Review of site-specific conditions: site visit to verify conditions along the corridors; preparation of an annotated base map with site constraints; development of typical cross-sections to represent existing conditions.
2. Identification of bikeway implementation strategies: development of design criteria for road elements and cycling facilities based on relevant design guidelines and best practices associated with various implementation strategies; development of typical cross-sections for various strategies to accommodate cyclists; review of background information about the proposed QEW ramp at Dixie Road.

This memo documents the following items:

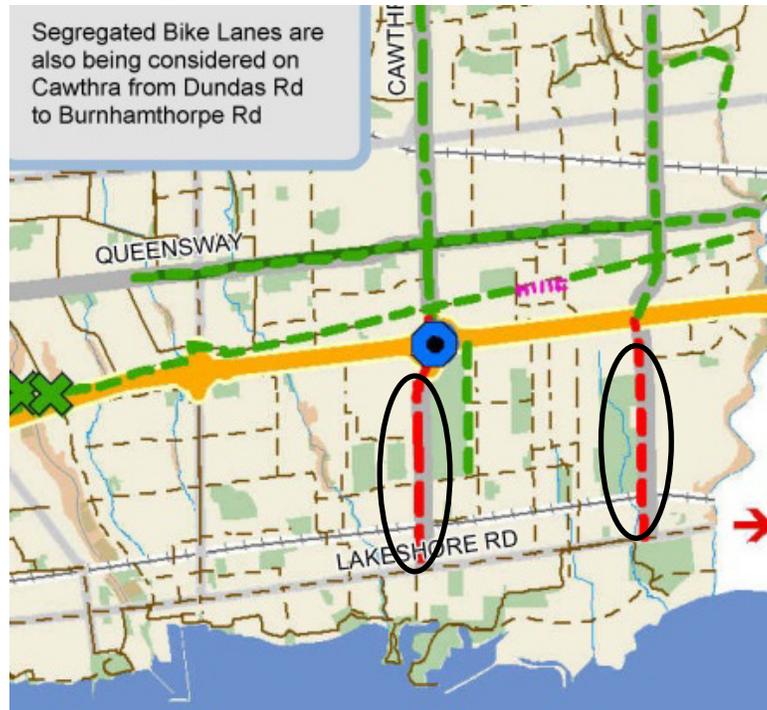
- Existing Conditions and Background Information (page 2)
- Proposed Design Criteria (page 10)
- Project Team Meeting No. 1 (page 12)
- Alternative Implementation Strategies (page 13)
- Remaining Tasks and Next Steps (page 14)

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## Existing conditions and Background Information

**Exhibit 1** shows the proposed bike lanes on Dixie Road and Cawthra Road Proposed Long-term Regional Cycling Network in Mississauga as per the Region's *Active Transportation Study*.

**Exhibit 1: Study Area**



(Bike lanes are indicated by the dashed red lines. Solid lines indicate existing facilities. Green lines represent multi-use trails and brown lines represent the cycling network proposed by the City of Mississauga's Cycling Master Plan.)

**Attachment A** is an annotated basemap of both corridors. It shows aerial imagery, delineation of the right-of-way and edge of pavement, and highlights some of the corridor constraints.

**Attachment B** shows the typical cross-sections for both corridors. However, each corridor is described in the following sections.

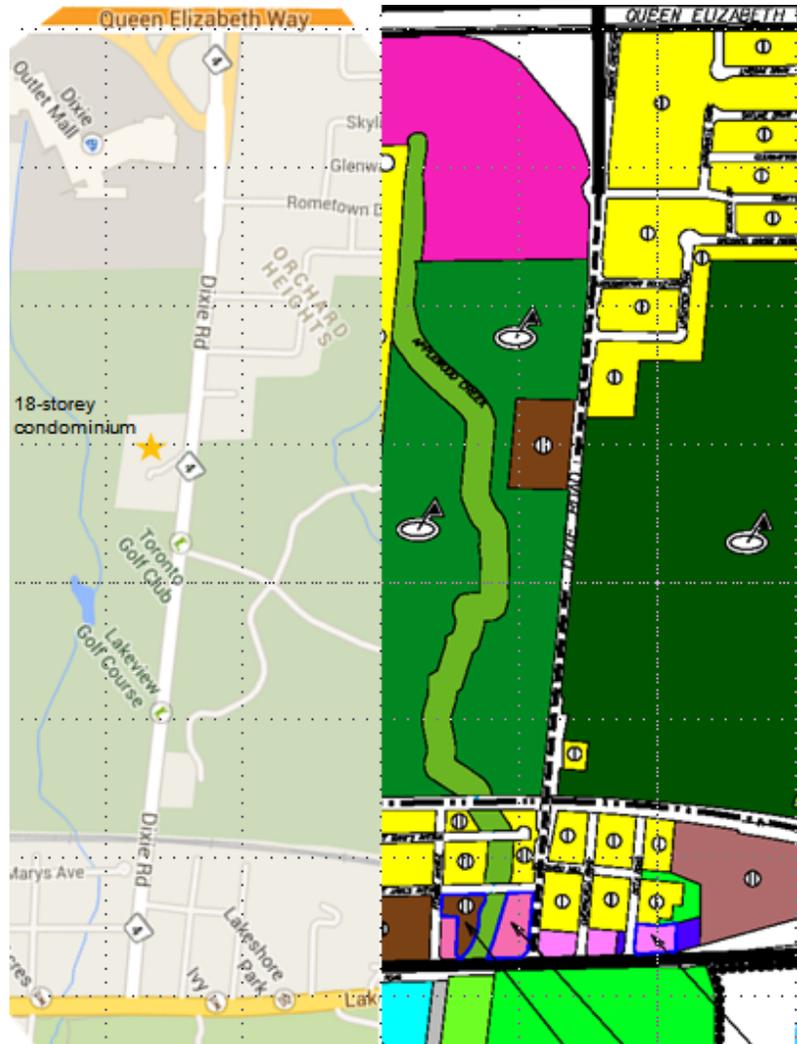
### **Dixie Road**

Dixie Road is a 4-lane within the Lakeview Community. Fronting the street are: a plaza mall; residential areas and two (2) golf courses. **Exhibit 2** shows the designated land use in the Lakeview Area Secondary Plan.

On the north end, the main driveway to the Dixie Outlet mall is situated on the west side opposite Rometown Road. On the east side, an established residential neighbourhood is comprised of roughly four (4) blocks. On the west side, an 18-storey condominium is located 150m south. Sidewalks are located on both sides from Rometown Drive to the condominium, then, the sidewalk continues only on the east side. Approximately 100m north of the CN bridge, the sidewalk recommences on the west side. On the south end past the CN bridge, residential properties front both sides of the street.

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### Exhibit 2: Dixie Road from Rometown Drive to Lakeshore Road



(Land use map: Yellow indicates low density residential. Brown indicated higher density residential. Green indicates open space and parkland. Pink indicates commercial uses.)

**Exhibit 3** is a summary of the existing conditions throughout the corridor. The corridor can generally be divided into three general areas with typical cross-sections (see Attachment B):

- Existing D.1. Rometown Dr to Larchview Trail, South of the CN underpass to Lakeshore Rd: this section is 4 lanes (pavement is 13.3m-13.5m wide) with standard sidewalks on both sides (curbface on the west) and a hydro corridor on the west side
- Existing D.2. Larchview Trail to CN underpass: this section is 4 lanes (pavement is 13.3m-13.4m wide) with narrow sidewalks on east side only, a hydro corridor and an asphalt strip on the west side
- Existing D.3. at CN underpass: this section is 4 lanes with (pavement is 13.4m wide) with a wider boulevard and railing to separate elevated sidewalks

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**Exhibit 3: Existing Conditions on Dixie Road**

Existing Conditions Summary	
<b>Planning Characteristics</b>	
Major Road Network <sup>1</sup>	No
Region Road Character <sup>2</sup>	Suburban Connector
City Functional Road Class <sup>3</sup>	Regional Major Collector (Scenic Route)
Regional Cycling Network <sup>4</sup>	Proposed Bike Lanes (Implementation Strategy: new construction (e.g. road widening))
City Cycling Network <sup>5</sup>	Proposed Primary On-Road Route (Proposed Secondary Route on Rometown Dr)
<b>Physical Characteristics</b>	
Right-of-Way width <sup>6</sup>	20m
Midblock pavement width <sup>7</sup>	13.3m to 13.5m 15.0m at the CN underpass
Number of Lanes	4 lanes
<b>Operating Conditions</b>	
Posted Speed	60 km/h from Rometown Dr to CN bridge 50 km/h from CN bridge to Lakeshore Rd
Operating Speed (85h percentile)	70 km/h (slightly higher speed SB than NB, 72 km/h vs. 68 km/h)
Existing Annual Average Daily Traffic <sup>8</sup>	12,500 vpd (ATR indicate higher volumes NB than SB, 6,900vpd vpd 5,600)
Forecasted Annual Average Daily Traffic <sup>8</sup>	15,100 vpd** (if volume characteristics remain the same, higher volumes are forecasted for NB than SB, 8,300 vph 6,800 vph)
Good Movement Strategy	Not identified in Truck Network (Primary Truck Network north of the QEW)
Truck Restrictions	No restrictions
Percent Trucks	5% (TMC data indicate slight higher percent of trucks traveling SB than NB, 7% vs. 3%)

## References:

- Schedule E: Major Road Network, Region of Peel Official Plan (2012)
- Figure 5.0 Road Character Map, Region of Peel Road Characterization Study (2013)
- Schedule 5: Long Term Road Network, City of Mississauga Official Plan (2010)
- Map 10c Proposed Long-Term Regional Cycling Network, Region of Peel Active Transportation Study (2011)
- Map 5-4 Proposed Mississauga Cycling Route Network (2010)
- Schedule F: Regional Road Mid-Block Right-of-Way Requirements, Region of Peel Official Plan (2012)  
Schedule 8 Designated Right-of-Way Widths, City of Mississauga Official Plan (2010)
- Measured on site
- Existing volume based on automatic traffic recorder volumes in 2012, forecast assumes 1% growth per year\*\* **growth rate assumptions to be confirmed by Peel Region**

Key constraints on the Dixie Road corridor (as identified in the annotated basemap) are:

- Residential driveways on the west side from Rometown Dr to Larchview, and both side south of the CN underpass
- Hydro corridor on the west side throughout
- Scenic character by the presence of many trees within the right-of-way
- CN bridge underpass
- Need to accommodate a high volume of left-turns from Dixie Rd to Lakeshore Rd

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### Cawthra Road

Cawthra Road is a 5-lane road situated on the boundary between the Lakeview Community and the Mineola Community. Fronting the street are: multiple residential properties, a provincially significant wetland and multiple community destinations. **Exhibit 2** shows the designated land use in the Lakeview Area Secondary Plan.

On the north end, multiple residential driveways are located on the west side opposite Cawthra Park with a heritage building located on the grounds. From Arbor Rd to Atwater Ave, there is a community centre, a senior’s centre and a high school. South of the CN underpass, residential properties front both sides of the street. Sidewalks are located on both sides throughout the corridor with varying widths in the boulevard with trees and a hydro trail on the west side.

**Exhibit 4: Dixie Road from Rometown Drive to Lakeshore Road**



(Land use map: Yellow indicates low-density residential. Orange indicates medium density. Brown indicated high density residential. Green indicates open space and parkland. Pink indicates commercial uses. Red indicates a mixed use area.)

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**Exhibit 5** is a summary of the existing conditions throughout the corridor.

### Exhibit 5: Existing Conditions on Dixie Road

Existing Conditions Summary	
<b>Planning Characteristics</b>	
Major Road Network <sup>1</sup>	Yes
Region Road Character <sup>2</sup>	Suburban Connector
City Functional Road Class <sup>3</sup>	Regional Arterial
Regional Cycling Network <sup>4</sup>	Proposed Bike Lanes (Implementation Strategy: retrofit bike lanes (e.g. potential restriping))
City Cycling Network <sup>5</sup>	Proposed Primary On-Road Route (Proposed Secondary Route on South Service Rd, Arbor Rd, Atwater Ave and Existing multi-use trail on west side north of CN underpass)
<b>Physical Characteristics</b>	
Right-of-Way width <sup>6</sup>	36m
Midblock pavement width <sup>7</sup>	18.3m to 18.5m 20.9m at the CN underpass (including median)
Number of Lanes	5 lanes (4 general purpose lanes, 1 median lane)
<b>Operating Conditions</b>	
Posted Speed	50 km/h throughout
Operating Speed (85h percentile)	67 km/h
Existing Annual Average Daily Traffic <sup>8</sup>	22,500 vpd (TMC data indicate significant reduction in volumes from South Service Rd, to south of Atwater Rd and to Lakeshore Rd: 33,400 vph to 18,600 vpd and 8,200 vpd)
Forecasted Annual Average Daily Traffic <sup>8</sup>	27,200 vpd (if volume characteristics remain the same, lower volumes are forecasted south of Atwater Rd and at Lakeshore Rd: 22,500 vpd and 9,900)
Good Movement Strategy	Not identified in Truck Network (Primary Truck Network north of the QEW)
Truck Restrictions	No trucks from 7pm to 7am
Percent Trucks	4%

References:

- Schedule E: Major Road Network, Region of Peel Official Plan (2012)
- Figure 5.0 Road Character Map, Region of Peel Road Characterization Study (2013)
- Schedule 5: Long Term Road Network, City of Mississauga Official Plan (2010)
- Map 10c Proposed Long-Term Regional Cycling Network, Region of Peel Active Transportation Study (2011)
- Map 5-4 Proposed Mississauga Cycling Route Network (2010)
- Schedule F: Regional Road Mid-Block Right-of-Way Requirements, Region of Peel Official Plan (2012)
- Schedule 8 Designated Right-of-Way Widths, City of Mississauga Official Plan (2010)
- Measured on site
- Existing volume based on automatic traffic recorder volumes in 2012, forecast assumes 1% growth per year

The corridor can generally be divided into three general areas with typical cross-sections (see Attachment B):

Existing C.1. South Service Rd to CN underpass, South of the CN underpass to Lakeshore Rd: this section is 4 lanes plus a median TWLTL (pavement is 18.3m-18.5m wide) with standard sidewalks on both sides, varying boulevard widths and a hydro corridor on the west side

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Existing C.2. at Atwater Ave: this section is 4 through lanes with a divided left-turn lane and a bus bay with rolled curb and standard sidewalks on both sides

Existing C.3. at CN underpass: this section is 4 lanes (pavement is 7.4m wide on each side) with a raised median (5.1m including curb and gutter) to provide space of structural support of the bridge, and a wider boulevard and railing to separate elevated sidewalks

Key constraints on the Cawthra Road corridor (as identified in the annotated basemap) are:

- Provincially significant wetland on the west side, from South Service Rd to Arbor St
- Residential driveways on the west side from South Service Rd to the CN underpass, and both sides south of the CN underpass
- Hydro corridor on the west side throughout
- Community centre, seniors' centre and high school located on north west block of Cawthra Rd and Atwater Ave (with a high volume of pedestrians and transit users)
- Observed sidewalk cycling on east sidewalk from South Service Rd to Atwater Ave
- Heavy volume of traffic north of Atwater Ave restricts opportunity to remove a travel lane
- Need to accommodate connectivity to proposed cycling facility north of the QEW as per Cawthra Road Pre-EA study
- Need to accommodate a high volume of left-turns from Cawthra Rd to Lakeshore Rd

### Relevant plans and other studies

Below is a summary of other projects, studies and plans that are relevant to this study:

1. Cawthra Road Pre-EA study<sup>1</sup>: Peel Region is currently undergoing a study to assess the operational capacity and needs, on Cawthra Road from the QEW to Highway 403, for all modes of transportations. The purpose of the study is to identify technical feasible alternatives prior to an Environmental Assessment process, to improve the corridor under existing conditions and in the long-term for pedestrians, cyclists, transit users and motorists. Existing active transportation facilities have been identified as part of the study, including planned facilities as part of the Hanlan Feedermain Project. **Immediately north of the QEW, there are currently no existing cycling facilities. Preliminary recommendations include widening to six (6) lanes and a multi-use trail on the west side. As part of the bikeway feasibility studies, IBI Group will recommend a preferred strategy and Municipal Class EA Schedule. This strategy may consider a combined EA for Cawthra Road from Eastgate Pkwy to Lakeshore Rd.**
2. Hanlan Feedermain Project<sup>2</sup>: In 2011, Peel Region started construction of its largest and most extensive watermain project that connects from Lakeview Water Treatment Plant on Lake Ontario to the Hanlan Reservoir and Pumping Station on Tomken Rd and Britannia Rd. It is comprised of the installation of the Hanlan Feedermain along Dixie Rd (Eastgate Pkwy to Lakeshore Rd) and the Mississauga City Centre Subtransmission Watermain along Cawthra Road (Eastgate Pkwy to Burnhamthorpe Rd). Construction will be completed in

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<sup>1</sup> Draft Multi-Modal Transportation Report for the Cawthra Road Pre-EA (QEW to Hwy 403 / Eastgate Parkway) prepared by IBI Group for the Region of Peel, dated January 20, 2014

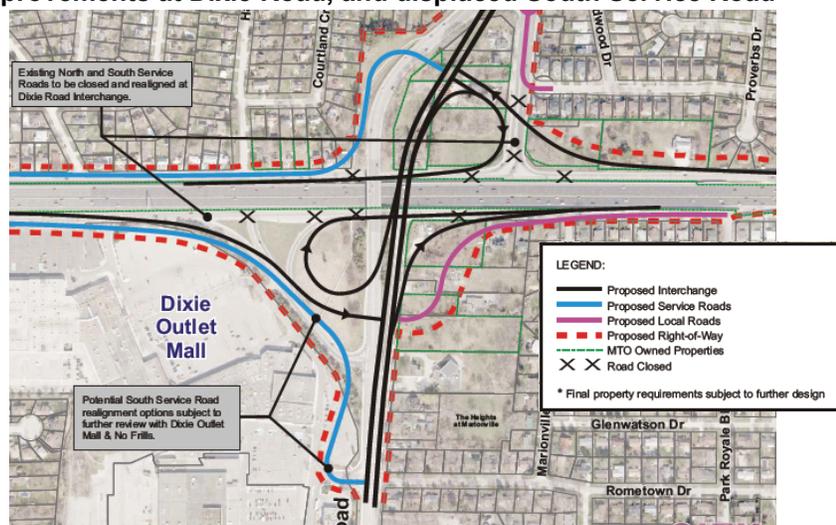
<sup>2</sup> Hanlan Water Project website at <<http://www.peelregion.ca/pw/water/hanlan-water/>> Accessed on March 24, 2014.

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2016. **As part of the project, multi-use trails will be built on the east side of Cawthra Rd, north of Burnhamthorpe Rd. On Dixie Rd, a multi-use trail will be built in the west side from Hickory Dr to Kendall Rd (or approximately one (1) block south of Eastgate Pkwy to four (4) blocks north of the QEW.)**

3. QEW Improvements from Evans Avenue to Cawthra Road<sup>3</sup>: In early 2012, MTO initiated a preliminary design and Class EA for this section of the expressway. Project completion is anticipated for the fall of this year. To date, the project has proposed a reconfiguration of the interchange at Dixie Road including relocation of both South Service Road and North Service Road. The technically preferred alternative (shown on **Exhibit 6**) is a Parclo A4 configuration south of the QEW and a Parclo A2 to the north. The existing South Service Road is proposed to be realigned to intersect with the south ramp terminal. **As per the study timeline, the study team is undergoing preliminary design with a schedule deadline in Spring 2014. As part of the bikeway feasibility studies, IBI Group will review the connectivity of the QEW ramp at Dixie Road and provide input to the MTO study.**

**Exhibit 6: Technically Preferred Alternative for QEW Interchange Improvements at Dixie Road, and displaced South Service Road**



4. Inspiration Lakeview<sup>4</sup>: In October 2010, the City of Mississauga initiated Inspiration Lakeview, an initiative between the City, the Province and Ontario Power Generation to develop a shared vision for Lakeview Waterfront. The lands are located south of Lakeshore Rd, between Cawthra Rd, Dixie Rd and the waterfront. In March 2014, the study team hosted a community workshop to help develop a framework for a Master Plan. Completion of the plan is anticipated for the end of June 2014. To date, the Vision for the plan is based on (8) core principles. **Among the principles of the plan are accessible public space, a**

<sup>3</sup> Display panels for Public Information Centre #2 for the QEW Improvements from Evans Avenue to Cawthra Road, Preliminary Design and Class Environmental Assessment Study, on October 24, 2013 Available at: <<http://qewdixieea.ca/wp-content/uploads/2013/10/3211155-PIC-2-Text-Displays-Oct-25.pdf>>. Accessed on March 24, 2014.

<sup>4</sup> Inspiration Lakeview Community Update on November 27, 2013. Available at: <<http://www5.mississauga.ca/marketing/websites/lakeview/downloads/2013-11-27-slides.pdf>>. Accessed on March 24, 2014

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**sustainable community, and well-connected including options to walk, bike, take transit and drive.**

5. Lakeview Local Area Plan<sup>5</sup>: The City of Mississauga is currently updating the Lakeview Local Area Plan (LAP) included in its Official Plan. The Draft LAP is anticipated to be completed in early 2014. **To date, the draft LAP proposes a Transportation Master Plan (TMP) for Lakeshore Rd throughout the City. The proposed TMP may also involve improvement to the road network and higher-order transit needs in the Lakeview Area, which is generally contained within Lakeshore Rd and the Queensway, from Cawthra Rd to the east boundary of the city.**
6. Lakeshore Road Transportation Review Study<sup>6</sup>: In 2010, the City of Mississauga completed this review study to provide a comprehensive and technical transportation review to identify how the Lakeshore Road can accommodate alternative modes of transportation. The review served as input for the development of the local area plans for Lakeview and Port Credit. **The review ultimately proposed bike lanes on Lakeshore Road throughout the City over the long-term that will impact on-street parking. Near Cawthra Road (from Broadview Ave to Greaves Ave), a wide curb lane with sharrow is proposed over the short-term given the narrow right-of-way. Near Dixie Rd, the proposed bike lane requires widening on both sides of the road.**
7. The Big Move: In 2008, Metrolinx released its Regional Transportation Plan for the Greater Toronto and Hamilton Area. In the Big Move, ten (10) strategies and nine (9) priority actions, also known as the “Big Moves”. Among these recommendations are: build a comprehensive rapid transit network, build communities that are pedestrian, cycling and transit supportive; complete walking and cycling network with bike sharing programs. **Near the study area, rapid transit is proposed on a route titled “Waterfront West (27)”, which connects Port Credit to Union Station. It is anticipated that Lakeshore Road will serve as this higher-order transit corridor from Hurontario St to the east boundary of the City.**
8. Strategic Goods Movement Network Study<sup>7</sup>: In 2013, Peel Region completed its Strategic Goods Movement Network Study. The objective of the study was to develop a systematic hierarchical truck route network throughout Peel. **The study recognizes that the efficient flow of goods on Regional Roads is important to the economies of both the Region and the Province. However both Cawthra Rd and Dixie Rd, south of the QEW are not identified as part of the truck route network.**

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<sup>5</sup> Reported by the Transportation and Work Department at the City of Mississauga, December 17, 2013

<sup>6</sup> Executive Summary of the Lakeshore Road Transportation Review Study (background report to the Draft Port Credit Local Area Plan), completed December 2010. Available at <http://www6.mississauga.ca/onlinemaps/planbldg/LakeviewPortCredit/DraftPCRLocalAreaPlanAppendix2LakeshoreRoadTransportationReview.pdf>. Accessed on March 24, 2014

<sup>7</sup> Final Technical Report for the Strategic Goods Movement Network Study, dated April 25, 2013. Available at <http://www.peelregion.ca/pw/transportation/goodsmovement/pdf/peel-final-technical-report.pdf>. Accessed on March 24, 2014

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## **Proposed Design Criteria**

Several references were considered during the development of the design criteria. These references included the existing conditions, the design guidelines listed below, and research of best practices throughout North America.

- Peel Road Characterisation Study (2012)
- Region of Peel Active Transportation Study: Chapter 8 Active Transportation Facilities Reference Guide
- Ontario Traffic Manual (OTM) Book 18: Bicycle Facilities (2013)
- Transportation Association of Canada (TAC) Geometric Design Guidelines for Canadian Roads (1999): Chapter 3.4 Bikeways
- American Association for State Highway and Transportation Officials (AASHTO) Guide

Separate design criteria are proposed for Dixie Road and Cawthra Road. The separation is required to address different road characteristics and the potential for different implementation strategies. **Exhibit 7** is the proposed design criteria for Dixie Road. **Exhibit 8** is the proposed design criteria for Cawthra Road.

### **Exhibit 7: Design Criteria for Dixie Road**

<b>DIXIE Road Characteristics</b>			
Function	Minor Arterial, Scenic Route, Trucks permitted all-day		
Posted Speed	50 km/h south of the CN bridge 60 km/h north of the CN bridge		
Existing Volumes	8,000 to 12,500 vehicles per day		
Forecasted Volumes	10,000 to 15,000 vehicles per day		
% Trucks	3 to 8%		
<b>Road Element</b>	<b>Existing Width</b>	<b>Minimum Width</b>	<b>Desirable Width</b>
General purpose lane	3.1-3.7 m (excluding gutter)	3.35 m (excluding gutter)	3.5 m (excluding gutter)
Two-way left-turn lane	-	3.5m	3.5m
Auxiliary turn lane	3.0 m	3.0 m	3.25 m (divided) 3.3 m (undivided)
Bike lanes	-	1.5 m	1.8 m
Buffered bike lanes	-	1.5 m bike lane + 0.5 m painted buffer	1.5m bike lane + 1.0 m painted buffer

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**Exhibit 8: Design Criteria for Cawthra Road**

<b>CAWTHRA Road Characteristics</b>			
Function	Minor Arterial, Bus Route (north of Atwater), Trucks restricted after 7pm to 7am		
Posted Speed	50 km/h		
Existing Volumes	18,500 to 33,500 vehicles per day north of Atwater 10,500 to 15,500 vehicles per day south of Atwater		
Forecasted Volumes	22,500 to 40,500 vehicles per day north of Atwater 12,500 to 18,500 vehicles per day south of Atwater		
% Trucks	3 to 5%		
<b>Road Element</b>	<b>Existing Width</b>	<b>Minimum Width</b>	<b>Desirable Width</b>
General purpose lane	3.45 - 3.6 m (excluding gutter)	3.3 m (inside lane) 3.35m (curb lane excluding gutter)	3.5 m (excluding gutter)
Two-way left-turn lane	3.0 - 3.65 m	3.5m	3.5m
Auxiliary turn lane	3.0 - 3.65 m	3.0 m	3.25 m (divided) 3.3 m (undivided) 3.5 m (dual left)
Bike lanes	-	1.5 m	1.8 m
Buffered bike lanes	-	1.5 m bike lane + 0.5 m painted buffer	1.5m bike lane + 1.0 m painted buffer
Segregated bike lanes	-	1.5 m bike lane + 0.5 m separator	2.0 m bike lane + 0.5 m separator
Multi-use trail	-	3.0 m	3.5 - 5.0 m
Sidewalk	-	1.5m 1.8m (curbface)	1.8m

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## **Project Team Meeting No. 1**

The first project team meeting was held on December 13, 2013. The purpose of the meeting was to introduce the study, review existing conditions and discuss design criteria and preliminary options. Participants represented several departments from both the Region and the City of Mississauga:

- Sustainable Transportation, Peel Transportation Division
- Traffic Operation, Peel Transportation Division
- Cycling Office, City of Mississauga
- Transportation and Works, City of Mississauga
- Infrastructure Planning and Design, Peel Transportation Division
- Pre-EA Study on Cawthra Road, Burnhamthorpe Road to North Service Road

The project team was presented with background information as discussed in the *Existing Conditions* and *Proposed Design Criteria* Sections. Based on this information, preliminary options were also discussed with the project team; however, the alternative strategies are presented in more details in the following section.

For Dixie Road, preliminary options include the reconfiguration of the road from 4 lanes to 3 lanes with bike lanes or buffered bike lanes. Representatives from the City expressed the need to recognize the heritage and scenic character of the corridor. Traffic Operations proposed the consideration of a roundabout design to accommodate.

For Cawthra Road, preliminary options include widening of the road to add bike lanes, buffered bike lanes or segregated bike lanes (i.e. cycle tracks). North of Atwater Road, another preliminary option was the replacement of the sidewalk on the east side with a multi-use trail, provided that a safe crossing treatment can be provided to transition cyclists to on-road facilities south of Atwater Road. Participants expressed a need to integrate the bikeway implementation strategies with cycling facilities proposed north of the QEW as per the Cawthra Road Pre-EA study.

For both corridors, participants discussed anticipated growth and development in south Mississauga, and its impact to the travel forecast assumptions. Staff from Infrastructure Planning and Design shared finding from a preliminary analysis of trip pattern in south Mississauga. Participants also raised the issue of snow storage, goods movement, minimum widths in the design criteria, and requirements as per the Municipal Class Environmental Assessment (EA) process.

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## **Alternative Implementation Strategies**

Attachment C provides cross-sections for the alternative implementation strategies listed below. Three types of cross-section are shown:

- Existing: shows existing widths measured on site
- Desirable: shows ideal widths based on proposed design criteria
- Recommended: shows recommended widths based on site context

### **Dixie Road**

The recommended implementation strategy is to reconfigure the road from 4 lanes to 3 lanes, when the road is resurfaced, to accommodate bike lanes. Four (4) cross-sections are provided in Attachment C.

- D.1. Midblock: bike lanes on both sides with two general purpose lanes and median travel lane
- D.2. at CN underpass: buffered bike lanes on both sides with two general purpose lanes and a painted median
- D.3. at Rometown Dr: narrow bike lanes if on-street facilities existing north of Rometown Rd OR bike lanes dropped as approaching intersection if no on-street facility exists north of Rometown Rd
- D.4. at Lakeshore Rd: bike lanes with two general purpose lanes and auxiliary left-turn lanes for southbound traffic

### **Cawthra Road**

No recommendations are provided yet for Cawthra Rd. Several site-specific constraints will impact the feasibility and advantages of the alternative strategies. Discussion with the project team is critical to assessing the constraints and alternatives. Six (6) cross-sections are provided in Attachment C.

- C.1. Midblock (South Serve Rd to Atwater Ave): alternative strategies include widening for bike lanes, buffered bike lanes or segregated bike lanes; or replacing sidewalk on east side with multi-use trail

Site specific constraint: feasibility of the multi-use trail option will depend on a transition from off-road to on-road facilities at Atwater Ave

- C.2. Midblock (Atwater Ave to CN underpass): alternative strategies include widening or reconfiguring from 5 to 4 lanes to accommodate bike lanes, buffered bike lanes or segregated bike lanes
- C.3. Midblock (CN underpass to Lakeshore Rd): alternative strategies include widening or reconfiguring from 5 to 4 lanes to accommodate bike lanes, buffered bike lanes or segregated bike lanes
- C.4. at CN underpass: alternative strategies include allowing cycling on the sidewalk or reconfiguring from 4 to 2 lanes to accommodate bike lanes, buffered bike lanes or segregated bike lanes

Site-specific constraint: bridge support structure located on 5.1m wide raised median; it is assumed that feasible strategies do not impact existing median

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- C.5. at Atwater Ave: alternative strategies include widening for bike lanes, buffered bike lanes or segregated bike lanes; or replacing sidewalk on east side with multi-use trail
- Site-specific constraint: bus bay and transit shelter on east side must be appropriate relocated
- C.6. at Lakeshore Rd: alternative strategies include widening or reconfiguring from 5 to 4 lanes (including an auxiliary left-turn lane) to accommodate bike lanes, buffered bike lanes or segregated bike lanes

### **Remaining Tasks and Next Steps**

1. Confirm traffic growth assumptions for Dixie Road
2. Meet with the project team to solicit feedback and discuss advantages and impacts of each strategy (in a second project team meeting)
3. Confirm the recommended implementation strategy for both corridors
4. Confirm proposed design of the QEW ramp at Dixie Road and provide input to MTO regarding connectivity to the proposed cycling facilities across the Dixie Rd interchange
5. Confirm the municipal Class EA Schedule for the recommended strategy
6. If additional scope of work is approved, review the traffic operations analysis for Dixie Rd at Rometown Rd and Lakeshore Rd for the existing, future and road reconfiguration conditions
7. Recommend outstanding issues to be considered in subsequent studies or design assignments

### **Attachments**

Attachment A: Annotated basemap of existing conditions

Attachment B: Typical cross-section of existing conditions

Attachment C: Alternative Implementation Strategies

# Appendix B2: Study Area Plans (QEW to Lakeshore Road)

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# Cawthra Road (QEW to Lakeshore Road)









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