



City of  
**Peterborough**

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**To:** **Members of the Committee of the Whole**

**From:** **W.H. Jackson, Director of Utility Services**

**Meeting Date:** **May 29, 2017**

**Subject:** **Report USTR17-012  
Pedestrian Signal on Parkhill Road West at the Rotary  
Greenway Trail Link / Benson Avenue Crossing**

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## **Purpose**

A report to recommend the implementation of a Pedestrian Signal on Parkhill Road at the Rotary Greenway Trail Link / Benson Avenue Crossing.

## **Recommendation**

That Council approve the recommendation outlined in Report USTR17-012 dated May 29, 2017, of the Director of Utility Services, as follows:

That a Pedestrian Signal be implemented on Parkhill Road West at the Rotary Greenway Trail Link / Benson Avenue.

## **Budget and Financial Implications**

The implementation of a Pedestrian Signal on Parkhill Road West at the Rotary Greenway Trail Link / Benson Avenue Crossing will cost approximately \$250,000, funds for which are available in the uncommitted balance in the 2017 Capital Budget for Various New Multi-Use Trails (Project Reference 5-5.01).

## **Background**

In response to resident and trail user concerns, staff undertook a review of the Rotary Greenway Trail Link crossing of Parkhill Road at Benson Avenue with respect to the need for a protected pedestrian crossing on Parkhill Road.

### **Site Details**

Parkhill Road is a medium capacity arterial road extending from the intersection of Monaghan Road to the east city limit. West of Monaghan Road, Parkhill Road is a high capacity arterial road. Parkhill Road serves both local and commuter traffic providing an east-west link to the downtown core via George and Water Streets. The Rotary Greenway Trail Link ("the Trail") crosses Parkhill Road at Benson Avenue approximately 100 m west of George Street.

On Parkhill Road, west of the Trail, there is a steep hill (approximately 12%). To the east of the Trail is the intersection of Parkhill Road and George Street. The speed limit on Parkhill Road is 50km/h and the two-way traffic volume is approximately 18,000 vehicles per day. There is a concrete sidewalk on both sides of Parkhill Road from George Street to Benson Avenue and on the south side from Benson Avenue to Aylmer Street.

The Trail connects the Rotary Greenway Trail at Hilliard Street to Bethune Street in the downtown core. Approximately 223 pedestrians and 179 cyclists use this section of Trail during a 12-hour period between 7 am and 7 pm. The Trail crossing of Parkhill Road is uncontrolled. Bicycle crossing ahead signs (Wc-7) are located on Parkhill Road, east and west of the Trail crossing.

Benson Avenue is a local residential street linking Parkhill Road West to Wolsely Street. The two-way traffic volume on Benson Avenue is approximately 1,200 vehicles per day and there is a concrete sidewalk on both sides of the street. The intersection of Benson Avenue and Parkhill Road West is a 'T' intersection with stop sign control on Benson Avenue. The speed limit on Benson Avenue is 50 km/h.

A sketch of the subject area is shown in Appendix A

### **Trail Crossing Review**

The Trail crossing review included data collection and analysis with respect to the need for a protected trail crossing and selection of the most appropriate type of pedestrian crossing treatment.

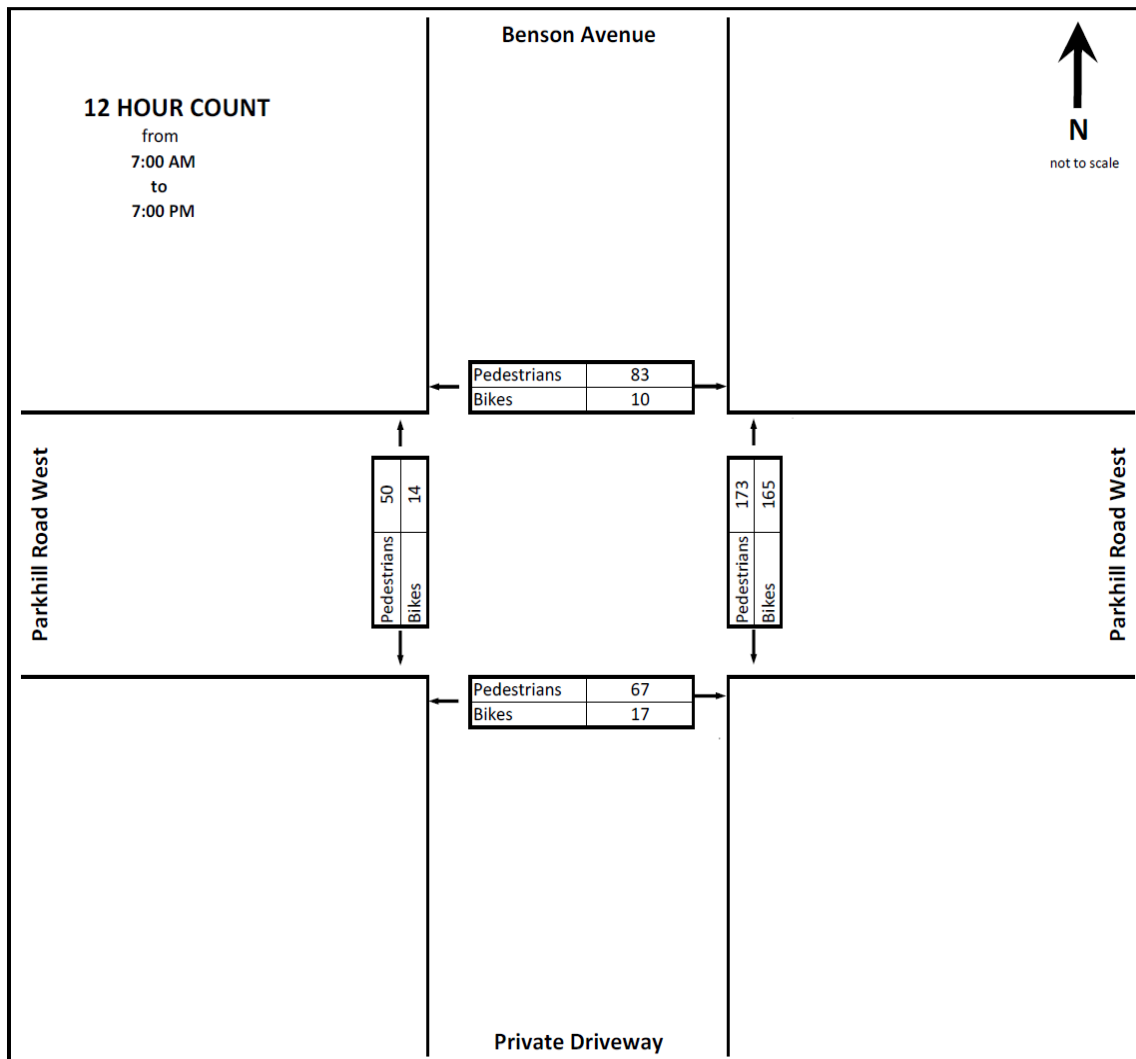
## Data Collection

- Pedestrian / Cyclist count,
- Sight distance,
- Vehicle speed,
- Collision history and;
- Site observations.

## Pedestrian / Cyclist Count

A pedestrian / cyclist count was conducted at the Trail crossing over a 12-hour period and the results are shown in Figure 1 below:

Figure 1 – 12 Hour Pedestrian/Cyclist Count



## **Sight Distance**

Before undertaking an assessment to implement a pedestrian crossing treatment it must be confirmed that drivers can see pedestrians waiting to cross the road and that pedestrians are able to see oncoming traffic in both directions.

The stopping sight distance is the minimum distance that a driver requires to identify a conflict and apply the brakes and come to a stop for a given speed and roadway grade. Based on Transportation Association of Canada (TAC) standards, the minimum stopping sight distance for a vehicle traveling westbound at a grade of 3.7% at the posted speed limit of 50 km/h is 67 metres. This compares to the existing stopping sight distance of 195 metres.

The minimum stopping sight distance for a vehicle traveling eastbound at a grade of 12.3% at the posted speed limit of 50 km/h is 80 metres. This compares to the existing stopping sight distance of 223 metres.

Accordingly, the stopping sight distances for vehicles traveling on Parkhill Road at the posted speed limit exceed the minimum requirements set out by the TAC design guidelines.

The sight distances for pedestrians looking to the east and west were measured at 195 metres and 198 metres respectively. These distances provide a good opportunity for a pedestrian to decide if it is safe to cross Parkhill Road.

## **Vehicle Speed Study**

The speed limit on Parkhill Road is 50km/h. Recorded vehicle speeds revealed that 85% of the drivers on Parkhill Road travelling eastbound are traveling at or below 57km/h with the average speed being 49 km/h and 85% of drivers travelling westbound are travelling at or below 51 km/h, with the average speed recorded at 45km/h. These results are lower than expected for an arterial road within the City and are likely influenced by the close proximity of the traffic signals at George Street.

## **Collision History**

There has been on average one reported collision a year over a twelve year period at the intersection of Parkhill Road and Benson Avenue / the Trail. Of the twelve collisions, eight were vehicle-pedestrian/cyclist collisions, of which, six involved pedestrian/cyclists crossing at the Trail and all of these collisions resulted in personal injury.

## **Site Observations**

The intersection is a conventional 'T' intersection with good sight lines and there is a low volume residential driveway on the south side of the intersection. Vehicle traffic on Parkhill Road is heavy and congested during peak times. Eastbound vehicles frequently queue from the George Street traffic signals west past Benson Avenue and up the hill to Aylmer Street. This congestion slowed vehicle speeds and blocked traffic turning left from Benson Avenue onto Parkhill Road. The difficulty of turning left onto Parkhill Road deters drivers from using Benson Avenue as a short-cut from Wolsely Street to George Street.

The Trail intersects the Benson Avenue / Parkhill Road intersection on the northeast and southwest corners of the intersection. If the pedestrian / cyclist takes the crossing in a straight line they cross the intersection diagonally, which results in a longer crossing distance. Numerous pedestrians and cyclists cross diagonally which is unexpected by drivers who are used to seeing pedestrians crossing perpendicular to the road. Pedestrians and cyclists were also observed crossing eastbound vehicles stopped in the queue extending from George Street, which makes them hard to see for westbound vehicles approaching the crossing from the east.

## **Alternative Pedestrian Crossing Treatments:**

The Trail is important to the connectivity of the trail network is utilized by a large number of pedestrians and cyclists on a daily basis. To support and accommodate the pedestrian and cyclist crossing at Parkhill Road, the following types of pedestrian crossing treatments were examined:

- Traffic Signal Control at Parkhill Road and Benson Avenue,
- Intersection Pedestrian Signal / Mid-block Pedestrian Signal,
- Two-Stage Pedestrian Refuge Island and;
- Pedestrian Crossover

## **Traffic Signal Control**

The traffic signal installation warrant considers major street volume, minor street volume, total intersection volume as well as traffic and pedestrians volumes crossing the major street. The warrant evaluates the existing delay to side road traffic or delay to crossing traffic compared to the likely increase in overall delay to through traffic that would occur with a traffic signal.

To warrant the installation of traffic signals, either Justification #1 or Justification #2 must be satisfied 100%. Each justification is a two-part test that considers traffic on the major road and traffic / crossing volumes on the minor road. For a justification to be satisfied both of the criteria a) and b) must be satisfied to 100%.

**Table 1 - Minimum Traffic Signal Requirements:**

<b>Justification 1</b>	<b>Requirement</b>	<b>% Satisfied</b>	<b>Criteria Met?</b>
1a) Total vehicular volume entering the intersection in an average hour	Volume exceeds 720 vehicles per hour	100%	NO
1b) Total minor street volume entering the intersection in an average hour	Volume exceeds 170 vehicles per hour	16%	
<b>Justification 2</b>	<b>Requirement</b>	<b>% Satisfied</b>	<b>Criteria Met?</b>
2a) total major road volume entering the intersection in an average hour	Volume exceeds 720 vehicles per hour	100%	NO
2b) Total vehicles / pedestrians crossing major road in an average hour	Volume exceeds 75 vehicles per hour	68%	

Based on the results summarized in Table 1, the minimum warrant for traffic signal control at the Parkhill Road and Benson Avenue intersection is not satisfied.

### **Intersection Pedestrian Signal / Mid-block Pedestrian Signal**

Intersection Pedestrian Signals (IPS) and Mid-block Pedestrian Signals (MPS) are pedestrian activated traffic signals designed to provide a gap in traffic to assist pedestrians in safely crossing a major roadway. The City currently has a total of eleven IPS/MPS.

The City of Peterborough Intersection Pedestrian Signal Warrant (Appendix B) examines the number of pedestrians during the peak pedestrian hour (converted to Equivalent Adult Units or EAU's) compared to the number of safe crossing opportunities (gaps in traffic) during the same period of time.

A gap study records the number of safe gaps that exist in the traffic flow that would allow the average pedestrian to safely cross the road. The average pedestrian crossing time on Parkhill Road is 13 seconds, based on an average walking speed of 1.07 m/sec plus a 4 second reaction time.

The total number of gaps in traffic during peak crossing times large enough to cross Parkhill Road safely was recorded as follows:

A.M. Peak – 5 gaps  
P.M. Peak – 6 gaps

### Pedestrian Counts:

Data was collected during the peak pedestrian times, 8:00 A.M. – 9:00 A.M. (A.M. Peak) and 2:45 P.M. – 3:45 P.M. (P.M. Peak). Pedestrian counts were converted to Equivalent Adult Units (EAU) which accounts for slower walking speeds and reaction times for vulnerable pedestrians as shown below:

#### A.M. Peak

Adults	50	x	1	=	50.0
Children	2	x	2	=	4.0
Disabled	0	x	2	=	0.0
Senior	1	x	1.5	=	1.5

<b>Total EAU's</b>	<b>55.5</b>
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#### P.M. Peak

Adults	45	x	1	=	45.0
Children	1	x	2	=	2.0
Disabled	0	X	2	=	0.0
Senior	1	x	1.5	=	1.5

<b>Total EAU's</b>	<b>48.5</b>
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During the A.M. and P.M. Peak periods the pedestrian crossing demand exceeds the number of safe crossing opportunities. Based on this result, the warrant for a pedestrian signal at the Parkhill Road and Benson Avenue intersection is satisfied.

### **Raised Pedestrian Refuge Island**

Raised pedestrian refuge islands are raised medians placed in the centre of the roadway at a mid-block or unsignalized intersection. These islands are intended to assist pedestrians in crossing a wide street by providing a safe “refuge” in the centre of the road, allowing pedestrians to cross one direction of traffic at a time. Under this type of crossing, pedestrians are required to wait for a gap in traffic before crossing and traffic flow is not interrupted on the main street. The City currently operates four Raised Pedestrian Refuge Islands.

The estimated cost to construct the raised refuge island including utility relocation and road widening is approximately \$750,000. The installation of the raised refuge island would eliminate the east and westbound left-turn movements from Parkhill Road to Benson Avenue and the private driveway. As well, the northbound and southbound straight and left-turn movements from Benson Avenue and from the south driveway would be eliminated. This would impact

approximately 500 (42%) of the daily traffic on Benson Avenue. Staff are of the opinion this is not a viable alternative given the cost and adverse impacts.

### **Pedestrian Crossover**

On June 2, 2015, Bill 31, the Transportation Statute Law Amendment Act (Making Ontario's Roads Safer) passed final reading in the Ontario Legislature and took effect on January 1, 2016.

Based on Ontario guidelines, the suitability for a Pedestrian Crossover on Parkhill Road at Benson Avenue was evaluated as summarized in Table 2.

**Table 2 – Pedestrian Crossover Assessment Results for Parkhill Road**

<b>Pedestrian Crossover Assessment</b>			
<b>Factor</b>	<b>Criteria</b>	<b>Parkhill Road at Benson Avenue</b>	<b>Criteria Satisfied</b>
Traffic Signal	Traffic Signal, IPS, MPS Not Warranted	IPS / MPS Warranted	No
Pedestrian Volume	8 Hour Pedestrian volume greater than 100 pedestrians	225 Pedestrians	Yes
Vehicle Volume	8 Hour vehicle volume on main street greater than 750 vehicles	8,246 vehicles	Yes
Location	Is the location greater than 200 m from another traffic control device?	105 m	No
Connectivity	Is the location on pedestrian desire lines?	Multi-Use Trail Crossing	Yes
<b>Overall Results</b>	<b>All Criteria Satisfied</b>		<b>No</b>

As summarized in Table 2, all of the Pedestrian Crossover Assessment criterion were not satisfied meaning that this site is not a suitable candidate for a pedestrian crossover. The site review already noted the frequent occurrence of traffic queues from the George Street intersection backing up through the pedestrian crossing. If a pedestrian approached the crossing during the peak periods it is very likely that queued vehicles would already be blocking the crossing and pedestrians would have to navigate between queued vehicles to cross the roadway, as they do today. The Pedestrian Crossover treatment is best suited to locations where there is good visibility of pedestrians trying to cross the road, so drivers can react accordingly and stop in time to



yield the right of way. The result of the Pedestrian Crossover Assessment supports the need for a higher level of control based on the complexity of the roadway and the existing environmental conditions.

## Discussion

The need for a controlled pedestrian crossing treatment on Parkhill Road at the Trail has been clearly identified. The collision history, pedestrian / cyclist volumes and the lack of adequate gaps in traffic on Parkhill Road support the need for a controlled pedestrian crossing with a higher level crossing treatment such as a traffic signal, IPS or MPS.

Traffic signal control at the intersection of Parkhill Road and Benson Avenue is not warranted due to insufficient vehicle volume entering Parkhill Road from Benson Avenue. Also, a full traffic signal at this location would likely increase cut-through traffic using Benson Avenue to travel between Parkhill Road and Wolsely Street and this traffic would likely migrate into the mainly residential neighbourhood over time.

Staff believe the most appropriate crossing treatment for the pedestrian crossing on Parkhill Road at the Trail is the Mid-block Pedestrian Signal. This traffic control device will ensure a safe crossing opportunity at Parkhill Road and improve safety for pedestrians and cyclists using the Trail. The implementation of a Mid-block Pedestrian Signal will impact traffic flow on Parkhill Road, however, coordinating the Mid-block Pedestrian Signal timing with the traffic signals at the Parkhill Road and George Street intersection will maintain east-west through traffic flow on Parkhill Road through the study area.

The proposed design of the pedestrian crossing on Parkhill Road at the Trail includes:

- The realignment of the existing trail connection to discourage pedestrians from crossing diagonally through the Benson Avenue intersection;
- Accessible pedestrian pushbuttons and tactile walking surface indicators in accordance with AODA standards;
- Additional street lighting at the Trail crossing;
- Combined crossride pavement markings with cyclists crossing on either side of the pedestrian ladder crosswalk markings;
- A new “Prepare to Stop When Flashing” warning sign and beacon on Parkhill Road at Aylmer Street for eastbound traffic on the downhill approach to the crossing; and

- Traffic signal interconnect cable and ducts to permit coordinated signal timing with the existing traffic signal at the intersection of Parkhill Road and George Street.

A sketch of the Proposed Parkhill Road West / the Trail Mid-block Pedestrian Signal is shown as Appendix C

## **Timelines**

If the recommendations are approved, it is anticipated that construction of the mid-block pedestrian signal could be completed before the end of 2017.

## **SUMMARY**

The Parkhill Road and the Rotary Greenway Trail Link crossing review supports the need for a mid-block pedestrian signal on Parkhill Road at the Rotary Greenway Trail Link. Increasing pedestrian and cyclist volume combined with increasing vehicle volume on Parkhill Road results in few safe crossing opportunities and a number of vehicle / pedestrian / cyclist collisions have occurred at the trail crossing. The implementation of a mid-block pedestrian signal at this crossing will improve connectivity within the trail network, improve safety, and enhance trail user's experience.

Submitted by,

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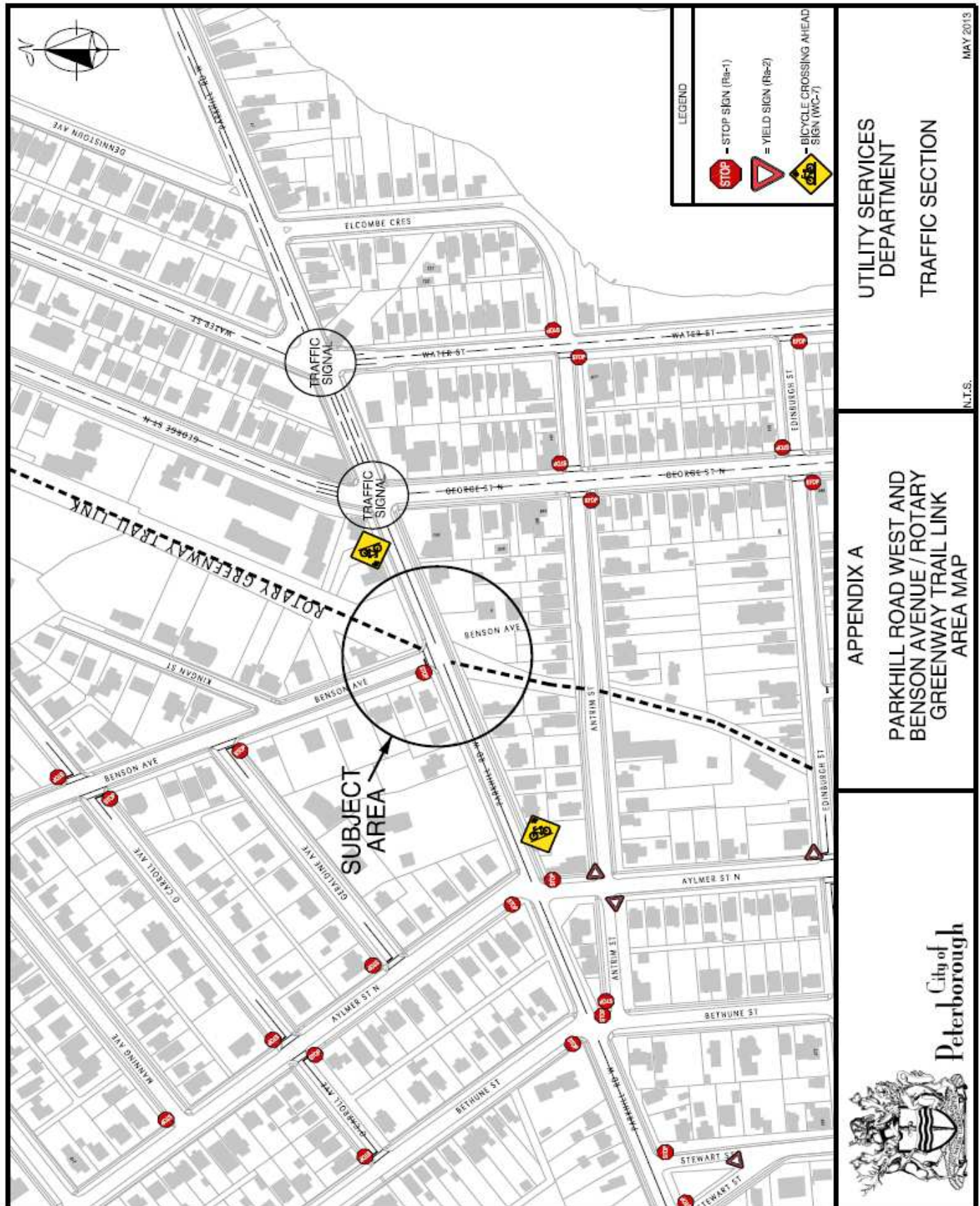
### **Attachments:**

Appendix A: Parkhill Road West / Rotary Greenway Trail Link / Benson Avenue Area  
Diagram

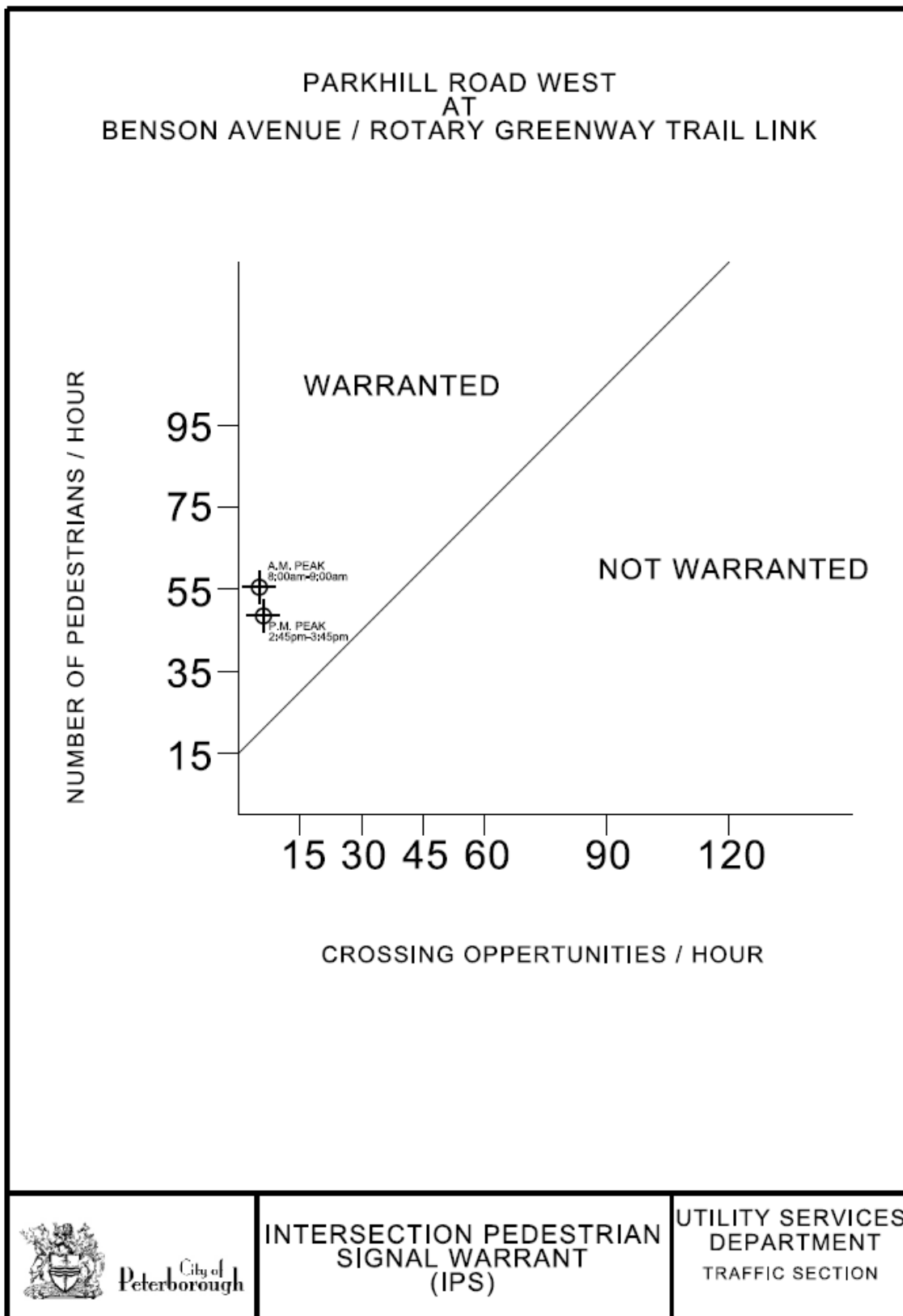
Appendix B: City of Peterborough Intersection Pedestrian Signal Warrant

Appendix C: Proposed Parkhill Road West / Rotary Greenway Trail Link Mid-block  
Pedestrian Signal

Appendix A: Parkhill Road West / Rotary Greenway Trail Link / Benson Avenue Area  
Diagram



Appendix B: City of Peterborough Intersection Pedestrian Signal Warrant





Appendix C: Proposed Parkhill Road West / Rotary Greenway Trail Link Mid-block  
Pedestrian Signal

