



City of
Peterborough

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

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

Meeting Date: **October 17, 2016**

Subject: **Report USTR16-012**
Mark Street / Robinson Street Traffic Operational Review

Purpose

A report to present the findings of the Mark Street / Robinson Street Traffic Operational Review.

Recommendations

That Council approve the recommendations outlined in Report USTR16-012 dated October 17, 2016, of the Director of Utility Services, as follows:

- a) That a Pedestrian Crossover Type B – Intersection crossing complete with rectangular rapid flashing beacons be implemented on Mark Street at Robinson Street;
- b) That a 40km/h speed limit be implemented on Mark Street between Hunter Street and Sophia Street;
- c) That the existing “No Stopping” parking restriction on the west side of Mark Street, south of Robinson Street, be extended 23 m further south; and
- d) That intersection warning signs be implemented on Mark Street in advance of the Mark Street / Robinson Street intersection.

Budget and Financial Implications

The implementation of a Pedestrian Crossover, speed limit, parking and intersection warning signs on Mark Street will cost approximately \$40,000, funds for which are available in the 2016 Capital Budget for Traffic Improvements (Project Reference 5-13.04).

Background

In March 2016, City staff initiated an operations review of the Mark Street / Robinson Street area in response to residents concerns about the speed of vehicles on Mark Street and the poor sightlines at the intersection at Mark Street and Robinson Street where school children cross the road on their way to and from school.

Site Details

Mark Street, between Hunter Street and Maria Street, is a local road with a 50km/h speed limit. This street serves a mainly residential neighbourhood and Immaculate Conception Catholic Elementary School is located on the northwest corner of the Mark Street and Robinson Street intersection. There is an uncontrolled painted pedestrian crossing on Mark Street at the top of the hill on the north side of Robinson Street. Mark Street has sidewalks on both sides of the street except for one section on the west side of Mark Street between Sophia Street and Robinson Street. The sidewalk in this section was most likely not constructed due to a steep embankment at the edge of the road.

School Area warning signs (Wc-1) are posted on all roads approaching the school and there is an amber flashing beacon located on Mark Street approximately 75 metres south of Robinson Street for northbound traffic. During the spring and early fall the flashing beacon can be partially obscured by vegetation from adjacent street trees. A sketch of the subject area is shown as Appendix A Mark Street / Robinson Street Area Diagram.

Traffic Operational Review

The traffic operational review included data collection and analysis with respect to the need and conditions required for the implementation of additional traffic control devices. The data collected included:

- Vehicle volume,
- Vehicle speed,
- Collision history,
- Sight line measurements,
- Pedestrian volume and vehicle gaps and;
- Site observations.

Vehicle Volume

Total two-way traffic volume on Mark Street varies between 2,300 and 2,400 vehicles per day during the week (Monday to Friday) and between 1,600 and 2,000 vehicles per day during the weekend (Saturday to Sunday). The Transportation Association of Canada (TAC) guidelines suggest that 1,000 – 3,000 vehicles per day is typical for the average daily volume on an urban local road. While the City does not undertake annual traffic counts on every local road, there have been a number of counts done as part of other studies that suggest many other local roads in Peterborough have traffic volumes within this range. A few examples include Bellevue Street (2,800 / day), Douro Street (2,150 / day), Driscoll Terrace (2,300 / day), McKellar Street (1,500 / day), Neptune Street (3,400 / day), Hopkins Avenue (900 / day), Simons Avenue (1,100 / day) and Hewitt Drive (980 / day). The average daily volume on Mark Street is within the TAC guidelines for an urban local road, and is typical of other local roads in the City.

Vehicle Speed Study

The speed limit on Mark Street is 50km/h. Analysis of the vehicle speed study determined that 85% of the drivers on Mark Street are travelling at or below 56 km/h, with the average speed recorded as 47 km/h. The results of the vehicle speed study are also typical for an urban local road within the City of Peterborough.

Collision History

There have been three right-angle collisions reported within the past five years at the intersection of Mark Street and Robinson Street.

Sight line Review

Stopping sight distances were measured for vehicles traveling on Mark Street and sight line distances was measured for vehicles turning from Robinson Street onto Mark Street.

The stopping sight distance is the minimum distance required for a driver to perceive the need to stop plus the reaction and deceleration time to bring the vehicle to a complete stop for the prevailing operating speed. The measured stopping sight distance for vehicles traveling on Mark Street is 360 metres northbound and 104 metres southbound, which exceeds the 56 km/h minimum requirements set out by the Transportation Association of Canada (TAC) design guidelines.

The review of sight lines for vehicles turning onto Mark Street from Robinson Street revealed that the sight line to the south for eastbound vehicles is obstructed by an existing grass/treed embankment on the west side of Mark Street. The measured sight line distance from the stop bar on the west leg of Robinson Street is approximately 40 metres, which is insufficient for left turning vehicles to exit Robinson Street and accelerate to the operating speed on Mark Street. In addition, on-street calendar

parking is permitted on the west side of Mark Street (last half of the month), beginning about 15.0 m south of the Robinson Street intersection.

Site observations confirmed that most drivers would stop at the stop sign and then creep forward, through the painted crosswalk, until they were able to see northbound traffic on Mark Street. This driver behaviour is typical for this condition but it was noted that vehicle speed, pedestrian activity and congestion at school admittance and dismissal times made it difficult for drivers to negotiate the intersection. The reduced visibility to the south can draw the drivers attention away from the pedestrians crossing Mark Street, on the north side of the intersection.

All-way Stop Analysis

The key elements for the implementation of all-way stop control includes: collision experience, minimum vehicle volume and traffic flow. The technical justification for the installation of an all-way stop requires a minimum of 350 vehicles entering the intersection in the peak hour and/or an average of 4 or more collisions per year over a three year period susceptible to correction by all-way stop control. The warrants for the installation of all-way stop control were not met because of insufficient vehicle volume and an average of less than one collision per year was reported.

Intersection Pedestrian Signal

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

The key elements for a City of Peterborough Intersection Pedestrian Signal Warrant include:

- Pedestrian Crossing Volume converted to Equivalent Adult Units (EAU's)
- Total Safe Gaps (Crossing Opportunities)

Data was collected during the peak pedestrian times, 7:30 A.M. – 8:30 A.M. (A.M. Peak), 11:25 A.M. – 12:25 P.M. (Noon 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. The adjusted pedestrian crossing demand is shown below:

A.M. Peak

Adults	23	x	1	=	23.0
Children	20	x	2	=	40.0
Disabled	0	x	2	=	4.0
Senior	0	x	1.5	=	0.0
Total EAU's					63.0

Noon Peak

Adults	2	x	1	=	2.0
Children	0	x	2	=	0.0
Disabled	0	x	2	=	0.0
Senior	0	x	1.5	=	0.0
Total EAU's					2.0

P.M. Peak

Adults	18	x	1	=	18.0
Children	12	x	2	=	24.0
Disabled	0	x	2	=	0.0
Senior	0	x	1.5	=	0.0
Total EAU's					42.0

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 Mark Street is 13.0 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 Mark Street safely was recorded as follows:

A.M. Peak – 81 gaps

Noon Peak – 65 gaps

P.M. Peak – 76 gaps

The data collected was analyzed in concert with the City of Peterborough Intersection Pedestrian Signal Warrant (Appendix B). This warrant 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 during the same period of time. Analysis concluded that the minimum technical criterion for the installation of an Intersection Pedestrian Signal was not met.

Adult Crossing Guard

The key elements for the installation of an Adult Crossing Guard include: number of children crossing the road on a regular basis, number of safe crossing opportunities or safe gaps in traffic, the proximity of other controlled crossings and pedestrian sight lines / visibility. Based on the data collected, the warrants for the installation of an adult crossing guard were not met because there were a sufficient number of safe gaps in traffic during the peak pedestrian hour and pedestrian visibility was clear and unobstructed.

Pedestrian Crossover Type B

The existing pedestrian crossing on Mark Street is a painted crosswalk with no pedestrian crossing signs at the crossing. There are school area warning signs on all approaches to the intersection and an amber flashing beacon just south of the crossing. This type of crossing is defined as an uncontrolled pedestrian crossing and under the Highway Traffic Act (HTA) does not give pedestrians the right-of-way. The closest controlled pedestrian crossing on Mark Street is located at the intersection of Hunter Street and Mark Street.

On June 2, 2015, Bill 31, the Transportation Statute Law Amendment Act (Making Ontario's Roads Safer) passed final reading in the Ontario Legislature. In response to requests from municipalities, Bill 31 includes amendment to the HTA to allow for new pedestrian crossing devices for low-speed and low-volume roads. Bill 31 took effect on January 1, 2016.

The amendments recently approved to the Highway Traffic Act through Bill 31 provide the legal authority for a series of three new variations of the Pedestrian Crossovers (PXOs) that were implemented in the 2015 update to the Ontario Traffic Manual (OTM) Book 15. This type of crossing treatment will provide the right-of-way to pedestrians to cross the road and the legislation requires drivers to stop until all pedestrians have cleared the crosswalk. Fines for violating the new rules are \$150 - \$500, plus 3 demerit points.

The new PXOs are limited to roads with a posted speed limit of 60 km/h or less and must be implemented in conjunction with a defined set of roadside signs and road pavement markings which form a new passive treatment to provide pedestrians the right-of-way when crossing the roadway. There are four different variations of the PXO treatment defined in the OTM Book 15 standards for different roads with different levels of traffic. The basic installation features signs and enhanced pavement markings, while busier roadways require enhanced crossing treatments with overhead signing, flashing beacons and enhanced markings.

Based on guidelines set out in the Ontario Traffic Manual Book 15 – Pedestrian Crossing Treatments, the data collected on Mark Street was applied to the PXO assessment guidelines to determine the suitability for a PXO on Mark Street at

Robinson Street. The results of the assessment are summarized in Table 1.

Table 1 – Pedestrian Crossover Assessment Results for Mark Street

Pedestrian Crossover Assessment			
Factor	Criteria	Mark Street	Criteria Satisfied
Traffic Signal	Traffic Signal Not Warranted	Not Warranted	Yes
Pedestrian Volume	8 Hour Pedestrian volume greater than 100 pedestrians	158 Pedestrians	Yes
Vehicle Volume	8 Hour vehicle volume on main street greater than 750 vehicles	910 vehicles	Yes
Location	Is the location greater than 200 m from another traffic control device?	205 m	Yes
Connectivity	Is the location on pedestrian desire lines?	School located at intersection	Yes
Overall Results	All Criteria Satisfied		Yes

As summarized in Table 1, all of the Pedestrian Crossover Assessment criterion were satisfied which means that this site is a suitable candidate for a pedestrian crossover.

The implementation of the Type B PXO on Mark Street at Robinson Street is recommended and this new device would include flashing amber lights on the pedestrian crossing sign, an overhead pedestrian crossing sign and enhanced crosswalk markings as illustrated in Appendix C. This treatment would improve pedestrian safety by providing pedestrians the legal right-of-way, requiring traffic on Mark Street to stop.

Other Recommendations

The traffic operational review identified sight line deficiencies for eastbound vehicles on Robinson Street entering the Mark Street intersection and an uncontrolled pedestrian crosswalk used primarily by parents and school children. During the field reviews undertaken by staff during this study, confusion among drivers and pedestrians was evident during school admission and dismissal times. Parents were observed parking on Mark Street waiting to picking up their children, further reducing existing sight lines in both directions and creating added congestion during the peak vehicle and pedestrian hour. The primary sight line obstruction is an earth embankment on the west side of

Mark Street south of Robinson Street. This embankment is a permanent topographic feature that is not practical to remove without significant cost and impacts to adjacent properties.

Sight line distances are calculated based on driver perception, decision and reaction time factored by the speed of the approaching vehicle. Reducing the speed of the approaching vehicles through a legal speed limit reduction will provide the drivers exiting Robinson Street additional time to identify the approaching vehicle and make a decision when to safely enter the intersection. A reduction of the speed limit on Mark Street in the vicinity of this intersection to 40km/h, combined with the implementation of a new PXO treatment would provide area residents and school children a protected crossing opportunity and make it easier for drivers to negotiate the unique and complex conditions that exist at the intersection today.

In addition to these improvements, staff also recommends moving the “No Stopping” prohibition, on the west side of Mark Street, approximately 23.0m further south to ensure vehicles cannot park within the area of restricted sight lines; the removal of the existing amber flashing beacon (due to the new amber flashers that will be on the PXO signs); and the implementation of intersection warning signs on Mark Street to make drivers aware of vehicles entering Mark Street from Robinson Street.

SUMMARY

The Mark Street / Robinson Street Traffic Operational Review has shown that the installation of all-way stop control, intersection pedestrian signal and adult crossing guard at the intersection of Mark Street / Robinson Street are not warranted. Vehicle speed, collision history and vehicle volumes are well within expected levels. The review also identified restricted sight lines for east vehicles entering the Mark Street / Robinson Street intersection and an uncontrolled pedestrian crossing used primarily by parents and school children. These conditions create a complex condition for both drivers and pedestrians that would be improved by the implementation of a Pedestrian Crossover Type B –intersection crossing, a 40km/h speed limit and intersection warning signs on Mark Street.

Submitted by,

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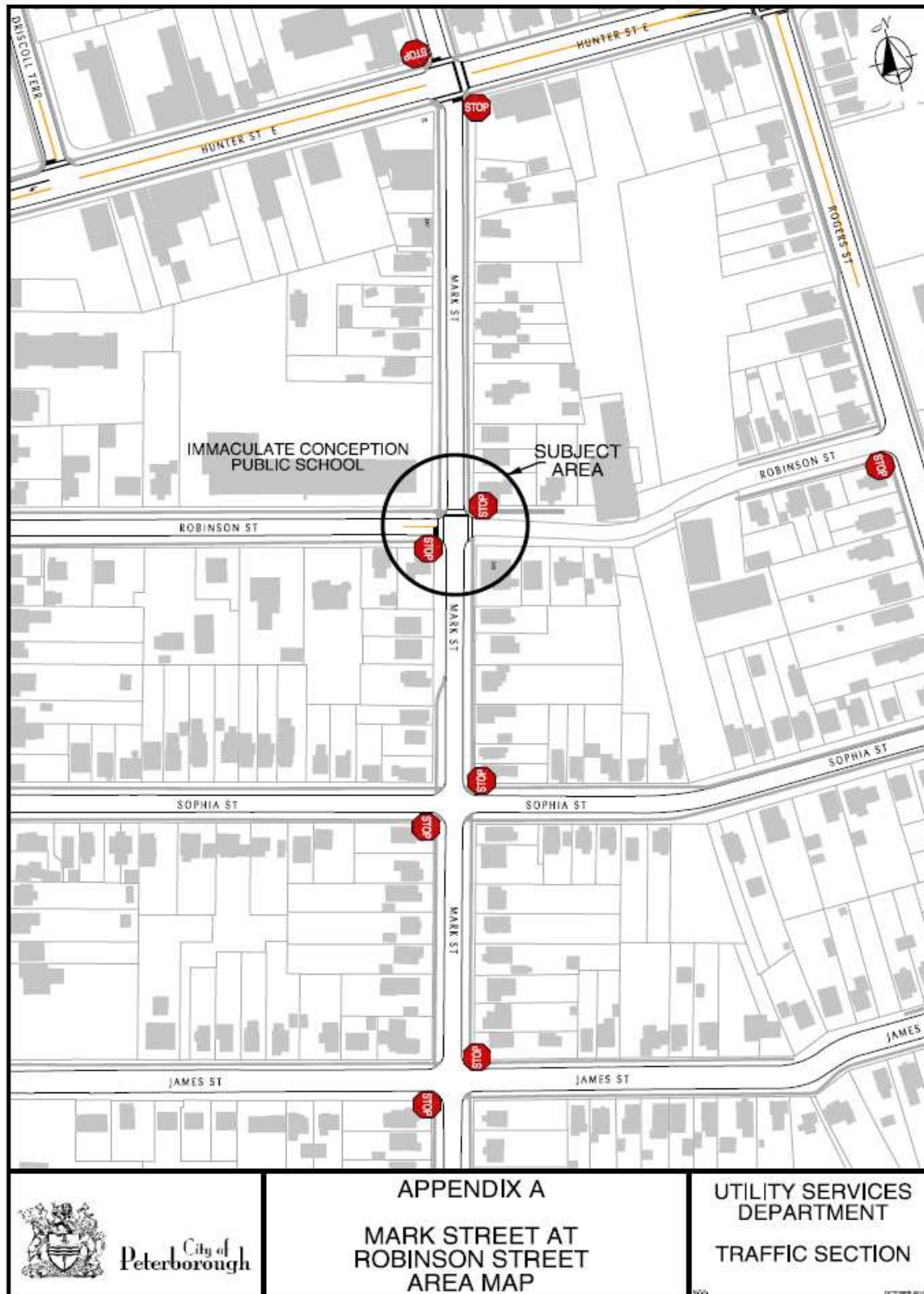
Attachments:

Appendix A: Mark Street / Robinson Street Area Diagram

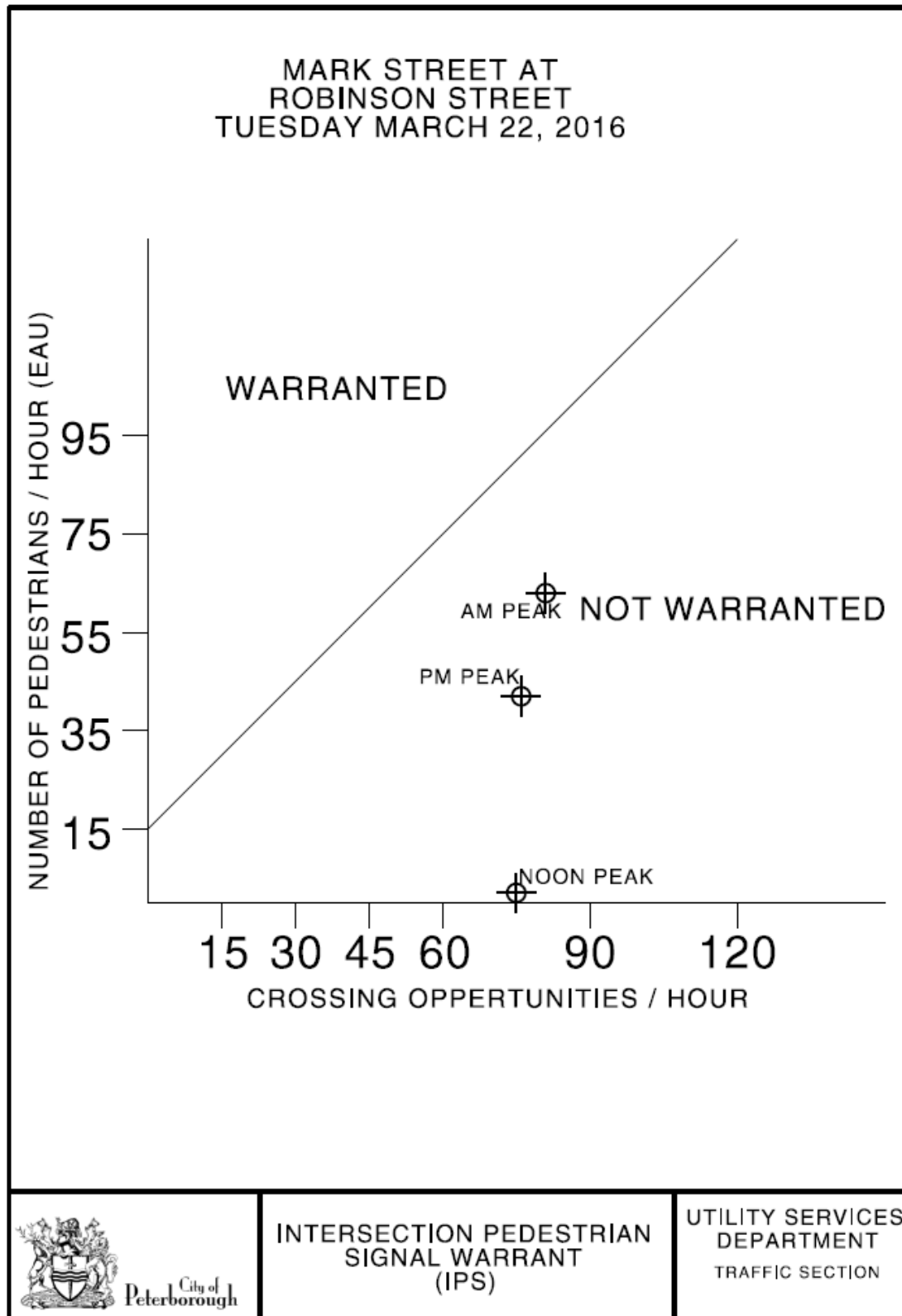
Appendix B: Intersection Pedestrian Signal Warrant

Appendix C: PXO Type B – Intersection Crossing

Appendix A: Mark Street / Robinson Street Area Diagram



Appendix B – Intersection Pedestrian Signal Warrant



Appendix C – PXO Type B – Intersection Crossing

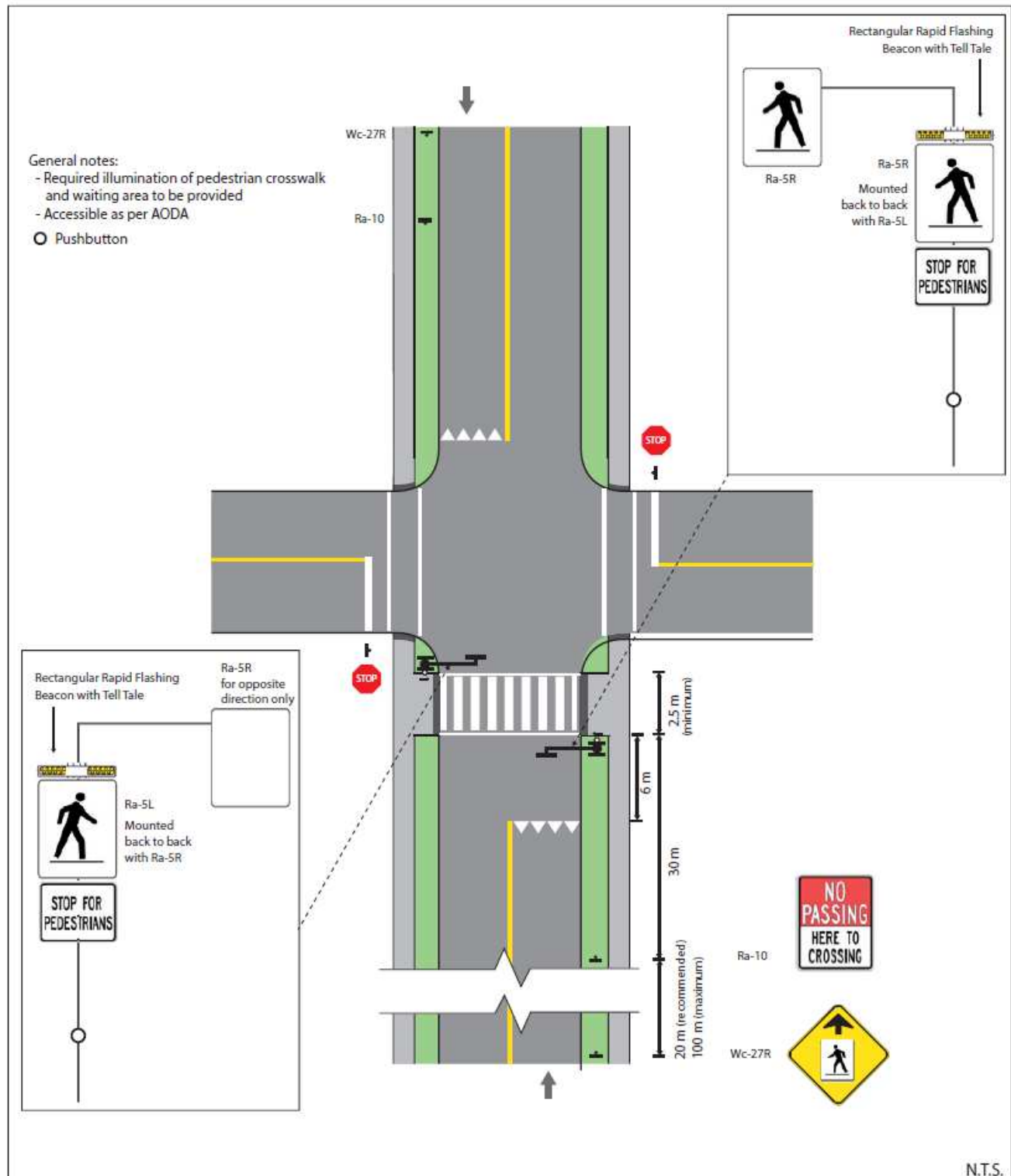


Figure 27: Pedestrian Crossover Level 2 Type B – Intersection (2-way)