



**PUBLIC AGENDA  
STANDING POLICY COMMITTEE  
ON TRANSPORTATION**

**Tuesday, December 6, 2016, 9:00 a.m.**

**Council Chamber, City Hall**

**Committee Members:**

**Councillor R. Donauer, Chair, Councillor M. Loewen, Vice-Chair, Councillor C. Block, Councillor T. Davies, Councillor D. Hill, His Worship Mayor C. Clark (Ex-Officio)**

**Pages**

**1. CALL TO ORDER**

**2. CONFIRMATION OF AGENDA**

**Recommendation**

That the agenda be confirmed as presented.

**3. DECLARATION OF CONFLICT OF INTEREST**

**4. ADOPTION OF MINUTES**

**Recommendation**

That the minutes of regular meeting of the Standing Policy Committee on Transportation held on November 14, 2016 be adopted.

**5. UNFINISHED BUSINESS**

**6. COMMUNICATIONS (requiring the direction of the Committee)**

**6.1 Delegated Authority Matters**

**6.2 Matters Requiring Direction**

**6.2.1 Pedestrian Crosswalks on 22nd Street West [File No. CK 6150-1]**

**6 - 7**

Attached is a letter from Blair Wooff dated November 16, 2016.

**Recommendation**

That the letter be referred to the Administration and to the Traffic Safety Committee for information.

## 6.3 Requests to Speak (new matters)

### 6.3.1 Crosswalk Issue at Aden Bowman Collegiate [File No. CK 6150-1]

8 - 8

Attached is a letter from the Aden Bowman Collegiate School Community Council dated November 23, 2016.

#### **Recommendation**

1. That the Aden Bowman Collegiate School Community Council be heard; and
2. That the matter be referred to the Administration for a report.

## 7. REPORTS FROM ADMINISTRATION

### 7.1 Delegated Authority Matters

### 7.2 Matters Requiring Direction

#### 7.2.1 Riversdale Limited Residential Parking Permit Expansion [Files CK 6120-4-2 and PL 6120-1]

9 - 22

#### **Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:

1. That the Riversdale Limited Residential Parking Permit Program be expanded to include the 300 block of Avenue E South and the 400 block (south side) of 18th Street West; and
2. That the City Solicitor be requested to prepare the amendments to Residential Parking Program Bylaw, 1999, No. 7862.

- 7.2.2 Highway 16 West Operational Jurisdiction Amendment [Files CK 4060-1 and TS 0290-5]** 23 - 25

**Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:

1. That the agreement with the Ministry of Highways and Infrastructure be amended to include the entire portion of Highway 16 from the current city limits to 500 metres after the centre of the intersection with 71st Street; and
2. That the City Solicitor be requested to prepare the appropriate agreement and that His Worship the Mayor and the City Clerk be authorized to execute the agreement under the Corporate Seal.

- 7.2.3 Overhead Guide Sign Structures – Award of Contract [Files CK 6280-1 and TS 1000-13]** 26 - 29

**Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:

1. That the City of Saskatoon enter into agreement with Graham Design Builders LP for the repair/replacement of seven overhead guide sign structures at a total cost of \$976,580 (including GST and PST); and
2. That the City Solicitor be requested to prepare the appropriate agreement and that His Worship the Mayor and the City Clerk be authorized to execute the agreement under the Corporate Seal.

- 7.2.4 Inquiry – Councillor R. Donauer (August 18, 2016) Sidewalk or Multi-Use Pathway – 51st Street between Warman Road and Millar Avenue [Files CK6220-1 and TS 6320-1]** 30 - 31

**Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:

That the Administration be directed to bring forward a prioritized list of 2017 sidewalk retrofit locations for Committee and City Council's consideration.

- 7.2.5 **Inquiry – Councillor R. Donauer (August 18, 2016) Sidewalk or Multi-Use Pathway – North Side of Lenore Drive – Joining Sidewalk at Russell Road and Lenore Drive [Files CK 6220-1 and TS 6320-1]** 32 - 33

**Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:

That the Administration be directed to bring forward a prioritized list of 2017 sidewalk retrofit locations for Committee and City Council's consideration.

- 7.2.6 **Inquiry – Councillor Z. Jeffries (January 25, 2016) Lime as Asphalt Anti-Stripping Agent [File No. CK 6150-3]** 34 - 37

**Recommendation**

That the report of the General Manager, Transportation & Utilities Department dated December 6, 2016, be forwarded to City Council for information.

- 7.2.7 **Inquiry – Councillor Z. Jeffries (January 25, 2016) Alternative Surfacing Techniques [Files CK 6315-1 and TS 1702-01]** 38 - 42

**Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:

That the Administration continue to investigate alternative road treatments and include updates in the annual reports to Committee and City Council on Roadway Asset Management.

- 7.2.8 **Inquiry – Councillor Z. Jeffries (September 19, 2016) – Snow and Ice Levels of Service [Files CK 6290-1 and PW 6290-1]** 43 - 46

**Recommendation**

That the report of the General Manager, Transportation & Utilities Department dated December 6, 2016, be forwarded to City Council for information.

**7.2.9 Inquiry – Councillor Z. Jeffries (August 18, 2016) Use of RRFB's (Rapid Rectangular Flashing Beacons) as Pedestrian Crossing Device [Files CK 6000-1 and TS 1702-01]**

47 - 84

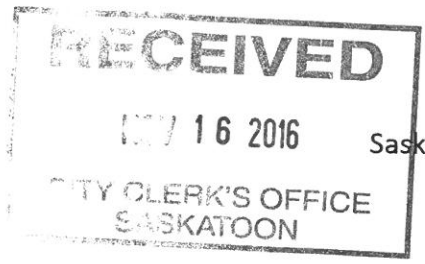
**Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:

That the Administration be directed to bring forward a report by April 2017 outlining funding options for implementation of a pilot project for Rapid Rectangular Flashing Beacons.

- 8. URGENT BUSINESS**
- 9. MOTIONS (Notice Previously Given)**
- 10. GIVING NOTICE**
- 11. IN CAMERA AGENDA ITEMS**
- 12. ADJOURNMENT**

6150-1



2016-11-16

Saskatoon, SK

To The Mayor and Council,

**Summary:**

22<sup>nd</sup> Street West is a major traffic corridor but has limited infrastructure for pedestrian crossing. In 2011 safety signage at several legal crossings was removed while two crossings were upgraded to include button activated lights. Jaywalking is common yet understandable; pedestrians wait in vain for traffic to stop even at legal crossings. This will continue until drivers and pedestrians realize where pedestrians can and should cross. An affordable part of the solution is to paint high visibility crosswalks at many of the lettered avenue crossings. The city administration has refused this approach until now, claiming that it would only desensitize drivers to the meaning of these safety elements. The city should reconsider this issue.

**Background:**

Every lettered avenue crossing of 22<sup>nd</sup> Street West is a legal pedestrian crossing. Traffic must by law stop and yield to pedestrians. This has been confirmed by both SGI and the city police. In 2011 the city removed many pedestrian safety signs that were along 22<sup>nd</sup> Street west. These signs were the yellow diamond warning sign indicating "pedestrian crosswalk or corridor ahead" as found in section 4.9 of the SGI drivers handbook. In other words these were legal and appropriate signs and the city spent money to remove them. The reason given at the time of the removal was that the signs were "confusing to motorists" and gave pedestrians "a false sense of security". Although I agree that any sense of security a pedestrian might feel on 22<sup>nd</sup> W is false, I fail to understand how removal of safety signage makes the situation less confusing.

At the same time two crossings (Ave. R and Ave. M) were upgraded with button activated traffic lights and signs were installed indicating this area was a high pedestrian collision location. The city's approach seems to be to persuade pedestrians to use a few crossings that have some safety measure installed and dissuade them from using the crossings at other avenues. But each crossing is a valid place for a pedestrian by law. A pedestrian has the legal right to be in that space and use it to cross the street. Beyond this *de jure* argument there is the *de facto* reality that a pedestrian walking up Ave. X to the grocery store in Westgate Plaza is not going to walk two blocks out of her way to cross at Ave. W. She neither has to by law nor will she in practice. The median itself points out the absurd lack of safety and recognition for pedestrians: at each lettered crossing a curb cut invites a pedestrian to cross.

I must note another development from 2011. At the same time that the city spent scarce money to remove safety signage on 22<sup>nd</sup> W, it also spent some to install a first-class crossing nearby. This crossing is on Ave W just south of 11<sup>th</sup> street. It has expanded sidewalks with curb-cuts, a hi-vis painted crosswalk, galvanized posts with button activated flashing lights, and white pedestrian crossing signs. This crossing was installed *in the middle of a block* only 50 yards from an existing pedestrian crossing at a 4-way stop. Our shopper going for groceries is expected to detour blocks out of her way to cross but industrial elites couldn't use the crossing on the corner. There is no way to see the removal of signs on

22<sup>nd</sup> and the simultaneous installation of this crossing as anything other than a result of two tiered service where the needs of some citizens matter more than others.

Why do people jaywalk across 22<sup>nd</sup>? It is because there is little alternative. A pedestrian can wait at a crossing but cars will not stop. The best strategy for a person trying to cross is to pick a time wherever you might be and run. I don't blame jaywalkers. I have seen city vehicles and police cars not yield. I have yielded only to create a dangerous situation where two other lanes of traffic continue and the pedestrian walks into this. I have seen parents with strollers and elderly people stand in the rain and snow while everyone ignores their right to cross. This happens everyday. Much of this is because drivers don't realize that the pedestrians have a place there. There are no indicators of their place. Drivers along 22<sup>nd</sup> are in the habit of ignoring pedestrians. What are needed are indicators that pedestrians belong in the legal spaces for them.

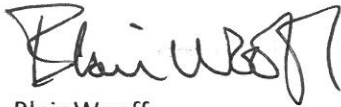
In 2011 and 2012 I tried to convince the city to simply paint some high visibility crosswalks. I was told that this would only desensitize the traffic to the meaning of these safety elements. But this isn't the case along other corridors where they are used. 33<sup>rd</sup> St W, 19<sup>th</sup> St W, and 11<sup>th</sup> St W all use high-vis crosswalks this way. I understand that to paint a crosswalk at every crossing might be prohibitive, but at certain crossings safety would improve.

**My Request:**

I request that the city Standing Policy Committee on Transportation as well as the Traffic Safety Committee consider the situation along 22<sup>nd</sup> St West as it pertains to safe and legal pedestrian crossings. I request a reconsideration of the use of high visibility painted crosswalks at certain crossings to give both drivers and pedestrians an indication of where crossing is legal and to improve safety. Of special concern are the crossings at Avenues K, N, O, R, S, T, X and Y.

Thank you for your consideration of this matter.

Sincerely,



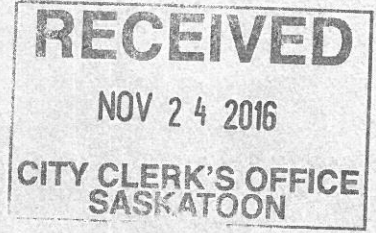
Blair Wooff  
212 25<sup>th</sup> Street West  
Saskatoon, SK  
(306)845-7252

6150-1

To: The Standing Policy Committee on Transportation (Mayor Charlie Clark, Councillor C. Block, Councillor M. Loewen, Councillor R. Donauer, Councillor T. Davies, and Councillor D. Hill)

cc. Paul Humbert - Principal - Aden Bowman Collegiate  
Lisa Gurski-Risling - Vice Principal - Aden Bowman Collegiate

From: Aden Bowman Collegiate School Community Council (SCC)  
Subject: Crosswalk issue at Aden Bowman Collegiate  
Date: November 23, 2016



Dear Committee Members;

We have had numerous discussions over the years regarding a solution to the issue of students jaywalking across Clarence Ave from the front of Aden Bowman to the Mac's store/mall. This is foremost a safety issue for the students. The school administration has repeatedly tried to modify student behavior to address this issue but the fact is the students are still kids and continue to take the easiest path by jaywalking to the mall. The only permanent solution would be to renovate the school and close the Clarence Ave entrances and relocate the main entrance to Taylor street. However this would be very costly and not practical given the funding cutbacks to education.

Our collective responsibility is to come up with a safe, low cost and practical solution to this important issue. We appreciate the open dialogue we have had with Jay Magus from the City Of Saskatoon and the opportunity to express our points of view. That being said, we are not in agreement with his current proposal. There is already a turning access across Clarence Ave into the mall when heading south on Clarence Ave. As a result, cars are already accustomed to slowing and/or stopping for this purpose. Therefore the SCC believes that adding a crosswalk further south after the turn access would not present any additional traffic flow issue since it would still be in the school zone. A crosswalk on Clarence Ave in front of the main school doors would further reinforce the school zone and drivers to be alert for students. Therefore, we request you to consider implementing a crosswalk with painted lines and signage in this location. It is our opinion that this would be a simple, safe, and cost effective approach. The fact is that the area in question has been informally functioning as a crosswalk for years whether we chose to acknowledge it or not. We need to do the right thing and formalize it and provide the additional safety for the students.

We do appreciate the other solutions proposed by the City (ex - a barrier fence down the middle of Clarence Ave and /or planter boxes down the curb of Clarence Ave). Both these options would still challenge kids to climb or jump them, continuing to present a safety issue. Additionally, snow removal would be a bigger issue for traffic given Clarence Ave is a narrow street. Furthermore, the cost to implement these other options would be significantly increased. An added option might be to consider a trial period for the crosswalk. We would like to join your meeting on December 6<sup>th</sup> to further discuss this important issue.

On behalf of the entire Aden Bowman School Community Council

*Lisa Gurski-Risling*  
*Paul Humbert*  
*[Signature]*

*Pankaj Kumar Bharamit*  
*[Signature]*

*Chris Wlesek*  
*Catherine Wlesek*  
*[Signature]*  
*[Signature]*



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## Riversdale Limited Residential Parking Permit Expansion

### Recommendation

That the Standing Policy Committee on Transportation recommend to City Council:

1. That the Riversdale Limited Residential Parking Permit Program be expanded to include the 300 block of Avenue E South and the 400 block (south side) of 18<sup>th</sup> Street West; and
2. That the City Solicitor be requested to prepare the amendments to Residential Parking Program Bylaw, 1999, No. 7862.

### Topic and Purpose

The purpose of this report is to obtain approval for expansion to the Riversdale Limited Residential Parking Permit Program.

### Report Highlights

1. Petitions have been received to expand the Riversdale Limited Residential Parking Permit (LRPP) Program.

### Strategic Goals

This report supports the City of Saskatoon's (City) Strategic Goals of Quality of Life and Moving Around as it ensures efficient and effective vehicle movement in a way that aligns with the lifestyle of residential property owners.

### Background

In 2013, City Council approved an amendment to Residential Parking Permit (RPP) Program Policy No. C07-014 (Policy) to allow the provision that residential areas within 150 metres of the Central Business District and River Landing boundary can be considered for the RPP Program. Attachment 1 outlines the current RPP policy.

### Report

Residents on the 300 block of Avenue E South and on the 400 block of 18<sup>th</sup> Street West have submitted petitions requesting to be included in the Riversdale LRPP Program as a result of the increasing influx of transient parking in front of their residences due to their proximity to the Central Business District. An LRPP would provide residents who live in the zone the ability to purchase an annual permit for \$15 to allow the zone residents' vehicles to be parked on the street for a period longer than the two-hour posted parking restriction.

As per the Policy, application of the LRPP requires no less than 50% support from area residents. The results of the petition are shown in the table below.

## Riversdale Limited Residential Parking Permit Expansion

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Riversdale	Resident Addresses	Number of Signatures	Percentage of Support
300 Avenue E South	21	15	71%
400 18 <sup>th</sup> Street West	9	9	100%

The Administration has confirmed that these locations meet the requirements as set out in Section 3.3 (a - e) of the Policy and is recommending that the Riversdale LRPP zone be expanded to include the 300 block of Avenue E South and the 400 block (south side) of 18<sup>th</sup> Street West from 9 a.m. to 6 p.m., Monday to Friday.

Attachment 2 outlines the current Riversdale LRPP zone. Attachment 3 outlines the areas to be included in the Riversdale LRPP zone as recommended in this report. Enforcement within the zone would occur on a complaint-driven basis as set out by the Policy.

### **Public and/or Stakeholder Involvement**

Residents impacted by the Riversdale LRPP zone were involved in the petition to create the expansion. The petition requirement of the Policy ensures stakeholder engagement and buy-in throughout the process. Additional stakeholder involvement included seeking input from the nearby Riversdale Business Improvement District (RBID).

The RBID is concerned about lack of parking in the business area and, therefore, the impact of localizing nearby residential street parking through an LRPP expansion. The RBID was prepared to support this expansion if it was coordinated with the introduction of parking on 19<sup>th</sup> Street from Avenue A to Avenue C. The current plans on 19<sup>th</sup> Street, as part of the Active Transportation Plan, call for parking to be provided only along the south side of 19<sup>th</sup> Street, in order to facilitate protected bikes lanes on the north side. As a result of the diminished parking inventory, the RBID does not fully support the LRPP expansion at this time.

### **Communication Plan**

Brochures outlining the details of the program, including information on where to purchase permits and the associated costs, will be provided to all places of residence that qualify for parking within the LRPP zones. The City's website will also be updated to reflect the addition of these areas. Additionally, signage will be placed around the perimeter of the newly demarcated parking zone to alert local residents, as well as those that regularly park in the neighbourhood, of the changes.

### **Policy Implications**

The recommendations in this report are consistent with the requirements in the Policy. Approval of the Riversdale LRPP Program expansion will require amendments to Residential Parking Program Bylaw, 1999, No. 7862.

### **Financial Implications**

The cost of the parking permits for the LRPP are \$15, plus GST. Residential Parking Permit programs have traditionally been designed to be revenue neutral, whereby the

annual purchase price of the permit covers the costs to implement, administer, and enforce the program. This premise, however, is due for analysis and review with further financial recommendations to be brought forward.

**Environmental Implications**

The implementation of and expansion to the Riversdale LRPP zone may reduce the frequency of drive-by traffic searching for available parking spaces, which may, in turn, reduce greenhouse gas emissions. Other transportation options may also be considered by parking users in the noted areas.

**Other Considerations/Implications**

There are no options, privacy, or CPTED considerations or implications.

**Due Date for Follow-up and/or Project Completion**

Subject to approval, the Riversdale LRPP Program will be implemented by April 30, 2017. In consideration of the concerns of the RBID, LRPP implementation would only occur after the new parking spaces on the south side of 19<sup>th</sup> Street are in place.

In mid-2017, a comprehensive review of the RPP Program will be brought forward with recommendations for improvement. This will include the previously-mentioned financial analysis and recommendation of possible rate changes. Consideration will also be given in this review to nearby businesses or commercial properties within an RPP zone.

**Public Notice**

Public notice, pursuant to Section 3 of Public Notice Policy No. C01-021, is not required.

**Attachments**

1. Residential Parking Permit Program Policy No. C04-014
2. Current Riversdale LRPP Zone
3. Riversdale LRPP Proposed Expansion Areas

**Report Approval**

Written by: Andrew Hildebrandt, Director of Community Standards  
Approved by: Randy Grauer, General Manager, Community Services Department

S/Reports/2016/CS/TRANS – Riversdale Limited Residential Parking Permit Expansion/lc

## Residential Parking Permit Program Policy No. C07-014

# CITY OF SASKATOON COUNCIL POLICY

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NUMBER  
C07-014

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<b>POLICY TITLE</b> Residential Parking Permit Program	<b>ADOPTED BY:</b> City Council	<b>EFFECTIVE DATE</b> March 10, 2003
		<b>UPDATED TO</b> November 4, 2013
<b>ORIGIN/AUTHORITY</b> Planning and Operations Committee Reports No. 4-2003; 17-2010 and 11-2011; Clause 12, Planning and Operations Committee Report No. 9-2012; Clause E5, Administrative Report 9-2013; Clause 1, Report No. 17-2013 of the Administration and Finance Committee	<b>CITY FILE NO.</b> CK. 6120-4	<b>PAGE NUMBER</b> 1 of 8

## 1. PURPOSE

To provide a cost/revenue neutral Residential Parking Permit Program that allows increased on-street parking opportunities for residents in areas of high on-street parking demand.

## 2. DEFINITIONS

- 2.1 Residential Parking Permit Program – is a program that allows residents to park on a street for a period longer than that allowed by a posted parking restriction.
- 2.2 Residential Parking Permit – is a decal/tag displayed in a vehicle, which indicates that the vehicle is part of a Residential Parking Permit Program.
- 2.3 Resident – a person who occupies a one-unit dwelling, a two-unit dwelling, a semi-detached dwelling, or a multiple-unit dwelling with three or four units within a residential parking permit zone and produces proof of that occupancy.
- 2.4 Residential Parking Permit Zone – is the area in which a Residential Parking Permit Program is implemented.
- 2.5 Single Housing Unit- a separate building designed and occupied exclusively as one dwelling unit.
- 2.6 Multi Housing Unit- a separate building designed and occupied exclusively as two, three or four separate dwelling units.

# CITY OF SASKATOON COUNCIL POLICY

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- 2.7 Apartment Building – a building designed and occupied with five or more separate dwelling units.
- 2.8 Household- the occupants of a single or multi housing unit.
- 2.9 High Parking Generator – are events, businesses, institutions, etc., which generate large amounts of transient on-street parking.
- 2.10 Limited Residential Parking Permit Program – is a program similar to the traditional Residential Parking Permit Program with exceptions to the existing criteria.
- 2.11 Institutional Property – publicly owned hospital (Royal University Hospital, City Hospital and St. Paul’s Hospital), special care home (St. Joseph’s Home, Porteous Lodge, Oliver Lodge, Central Haven, Saskatoon Convalescent Home, Parkridge Centre, Lutheran Sunset Home, Sherbrooke Community Centre, Sunnyside Nursing Home, Stensrud Lodge, St. Ann’s Senior Citizen’s Village and Circle Drive Special Care Home), secondary or post secondary educational facility.

### 3. POLICY

#### 3.1 General

A Residential Parking Permit Program will provide an effective and long-term solution to the problems associated with transient on-street parking occurring in residential neighbourhoods close to high parking generators. A Residential Parking Permit Program is not a guarantee that a resident will be able to park in front of their place of residence.

A Limited Residential Parking Permit Program is a scaled down version of the traditional Residential Parking Permit Program for residential streets within 150 metres of an institutional property.

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Residents are not exempt from the City’s global parking restrictions (36 hour maximum, 10 metres to corner, hydrants, driveways, etc.) and other poster parking restrictions or prohibitions (i.e. bus stops, no parking signs, loading zones, etc.).

A Residential Parking Permit is only valid for parking in the zone indicated on the permit. Permits are only available to those properties within the restricted parking zone.

A Residential Parking Permit Program will not be implemented in an area of the City with parking meters.

### 3.2 Residential Parking Permit Program

The following criteria must be met for a traditional Residential Parking Permit to be warranted:

- a) The area to be specified as a Residential Parking Permit zone must be predominantly used as a single or multi housing unit area as determined by Infrastructure Services.
- b) The area to be specified as a Residential Parking Permit zone must have a shortage of on-street parking as determined by Infrastructure Services.
- c) The Residential Parking Permit zone will be determined by Infrastructure Services and must consist of a minimum of ten city block faces. The boundary of each zone will be evaluated and determined by the Administration on a situation specific basis.
- d) The minimum level of support from residents of single or multi housing units in the Residential Parking Permit zone must be no less than 70 percent on each block. Only one resident per single housing unit and one resident of each unit in a multi housing unit is eligible to sign the petition.

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- e) The minimum level of support of residents of single or multi housing units who would purchase Residential Parking Permits in the Residential Parking Permit zone must be no less than 70 percent of the people who support the program. Only one resident per single housing unit or one resident of each unit in a multi housing unit is eligible to sign the petition.

### 3.3 Limited Residential Parking Permit Program

The following criteria must be met for a Limited Residential Parking Permit to be warranted:

- a) The area to be specified as a Limited Residential Parking Permit zone must be within 150 metres of an institutional property as determined by Infrastructure Services, including the residential areas within 150 metres of the boundary of the Central Business District and River Landing.
- b) The Limited Residential Parking Permit will only be available to residents within the zone.
- c) The area to be specified as a Limited Residential Parking Permit zone must have a shortage of on-street parking as determined by Infrastructure Services.
- d) The minimum level of support from residents of single or multi housing units in the Limited Residential Parking Permit zone must be no less than 50 percent within the area. Only one residential per single housing unit and one resident of each unit in a multi housing unit is eligible to sign the petition.
- e) The minimum level of support of residents of single or multi housing units who would purchase Limited Residential Parking Permits in the Limited Residential Parking Permit zone must be no less than 50 percent of the people who support the program. Only one resident per single housing unit or one resident of each unit in a multi housing unit is eligible to sign the petition.

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- f) The time frame for the Limited Residential Parking Permit Program will be set based on the specific circumstances of the area.
- g) Visitor and Temporary Permits for the Limited Residential Parking Permit Program will not be available. The exception is for managers of an apartment building (5 unit of higher dwelling) for the Limited Residential Parking Permit Program.

### 3.4. Implementation

- a) Upon receipt of a request for a Residential Parking Permit zone, Infrastructure Services will send out to the applicant(s) the criteria for the establishment of a Residential Parking Permit zone and a blank petition. It is up to the applicant(s) to circulate the petition to residents of the proposed Residential Parking Permit zone. One signature will be allowed on the petition from each single housing unit or each dwelling unit in a multi housing unit. The petition will ask residents the following questions:
  - Would your household support the implementation of a Residential Parking Permit Program?
  - If your household supports a Residential Parking Permit Program, would any member of your household purchase a permit at an annual cost of \$25? **OR**
  - If your household supports a Limited Residential Parking Permit Program, would any member of your household purchase a permit at an annual cost of \$15?

Infrastructure Services will verify the results of the petition.

- b) If the criteria and petition requirements are met, Infrastructure Services will conduct a parking study to determine parking accumulation, duration, turnover and the extent of transient parking in the area. The transient parkers in the Residential Parking Permit zone must be 25 percent or greater of the vehicles parked in the area, when measured at two times during the day (typically 10:30 a.m. and 2:30 p.m.). The parking accumulation must be greater than 70% when measured at two times during the day (typically 10:30 a.m. and 2:30 p.m.). The measure of transient parkers and accumulation



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is taken as a percentage of all the vehicles and parking spaces in the entire Residential Parking Permit zone, respectively (not on a block face basis). When 90% of the entire block faces, with the maximum limits of a Residential Parking Permit Zone, are included within the zone, the requirement to identify a shortage of on-street parking will no longer be required, and the Administration may proceed with implementing timed parking restrictions along the remaining block faces within the zone.

- c) If all requirements are met, the Residential Parking Permit zone shall employ the least restrictive parking restriction, which is suitable and is applied consistently over the zone. A resident only parking zone will not be allowed.
- d) A report will be sent to City Council seeking approval of the Residential Parking Permit Program.
- e) Notices will be sent to the area's residents giving a brief description of what the Residential Parking Permit Program entails, the office location and service hours to secure permits, the cost of the permits, the documentation required to purchase a permit and a notice of the impending installation of a parking restriction.

### 3.5 Removal/Expansion

- a) If the level of participation by residents in a Residential Parking Permit Program declines, then Infrastructure Services will review the need for the zone and consider discontinuing the program.

# CITY OF SASKATOON COUNCIL POLICY

<b>NUMBER</b>
<i>C07-014</i>

<b>POLICY TITLE</b> <i>Residential Parking Permit Program</i>	<b>EFFECTIVE DATE</b> <i>March 10, 2003</i>	<b>UPDATED TO</b> <i>November 4, 2013</i>	<b>PAGE NUMBER</b> <i>7 of 8</i>
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- b) Reviews of Residential Parking Permit Zones will coincide with the annual renewal date for the respective programs as follows:

RPP Zone	Annual Renewal Date	Deadline for Expansion Requests
Varsity View	September 1	June 1
City Park	May 1	February 1
Caswell Hill	June 1	March 1

Any requests for expansion received after the deadline will be held until the next renewal period.

- c) The Residential Parking Permit program may be removed entirely or on a block by block basis at the discretion of Infrastructure Services.
- d) If the residents no longer want a Residential Parking Permit Program in their area, it is up to the residents to circulate a petition and obtain 70% (or 50% in the case of a Limited Residential Parking Permit Program) support for the removal of the program. This process can proceed on a block by block basis. Infrastructure Services will verify the results of the petition.

## 4. RESPONSIBILITIES

### 4.1 The Infrastructure Services Department is responsible for:

- a) Administering this policy;
- b) Reporting to City Council, through the Planning and Operations Committee, on requests under the Residential and Limited Residential Parking Permit Programs; and
- c) Proposing amendments to this policy, as required.

# CITY OF SASKATOON COUNCIL POLICY

NUMBER  
C07-014

POLICY TITLE	EFFECTIVE DATE	UPDATED TO	PAGE NUMBER
<i>Residential Parking Permit Program</i>	<i>March 10, 2003</i>	<i>November 4, 2013</i>	<i>8 of 8</i>

4.2 Planning and Operations Committee is responsible for:

- a) Considering and forwarding recommendations to City Council regarding requests under the Residential and Limited Residential Parking Permit Programs; and
- b) Reviewing and forwarding recommendations to City Council regarding proposed policy amendments.

4.3 City Council is responsible for:

- a) Considering and approving requests under the Residential and Limited Residential Parking Permit Programs; and
- b) Reviewing and approving proposed amendments to this policy.



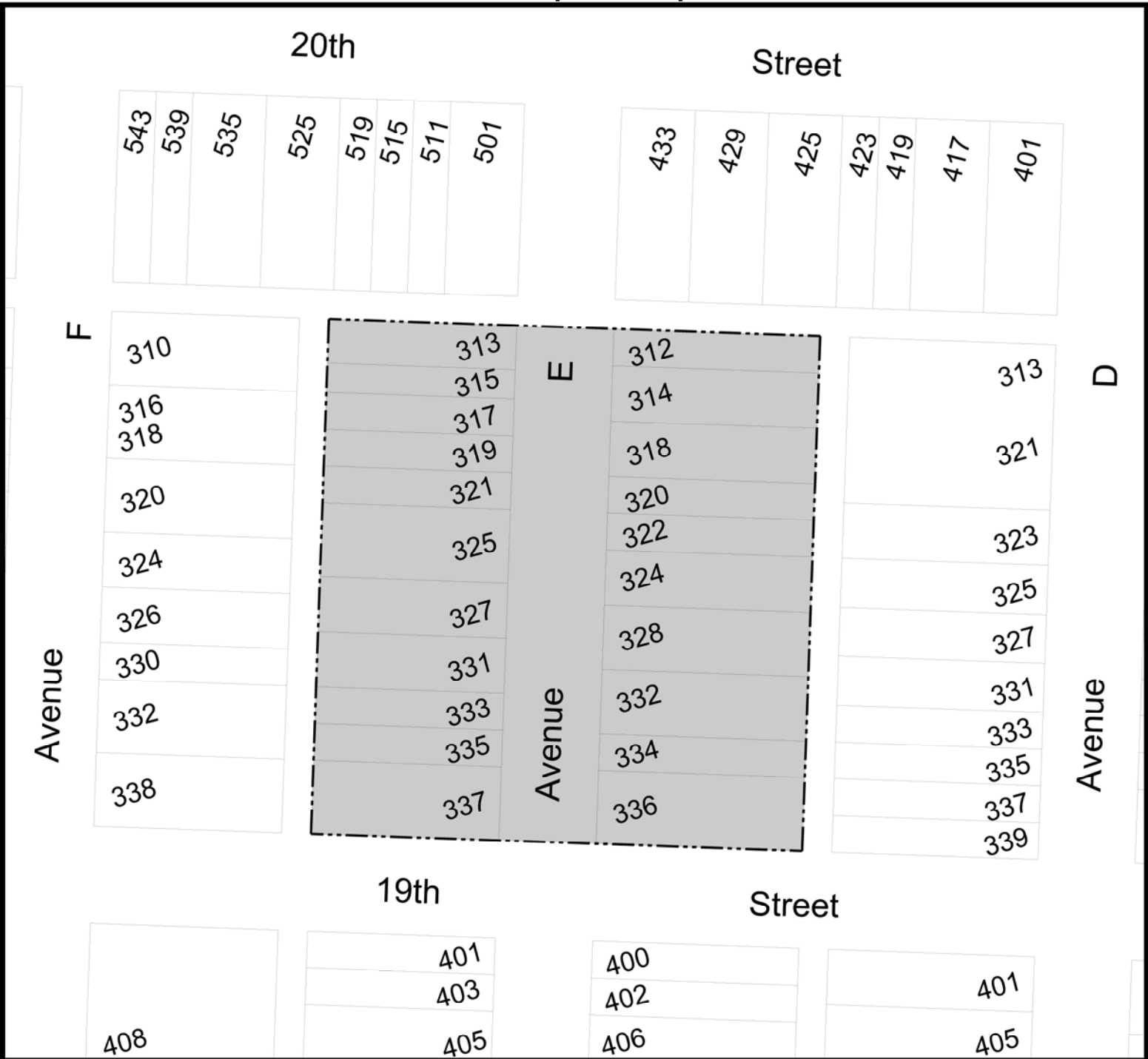
**Riversdale LRPP Zone**  
**Riversdale LRPP Zone**  
 Site Description: Riversdale LRPP Zone

Aerial DSC: B

6  
 Revised: JAN 10

Scaled: B B # 76

- Total Area
- Enclosed Area
- Perimeter



# RIVERSDALE Residential Parking Permit Zone

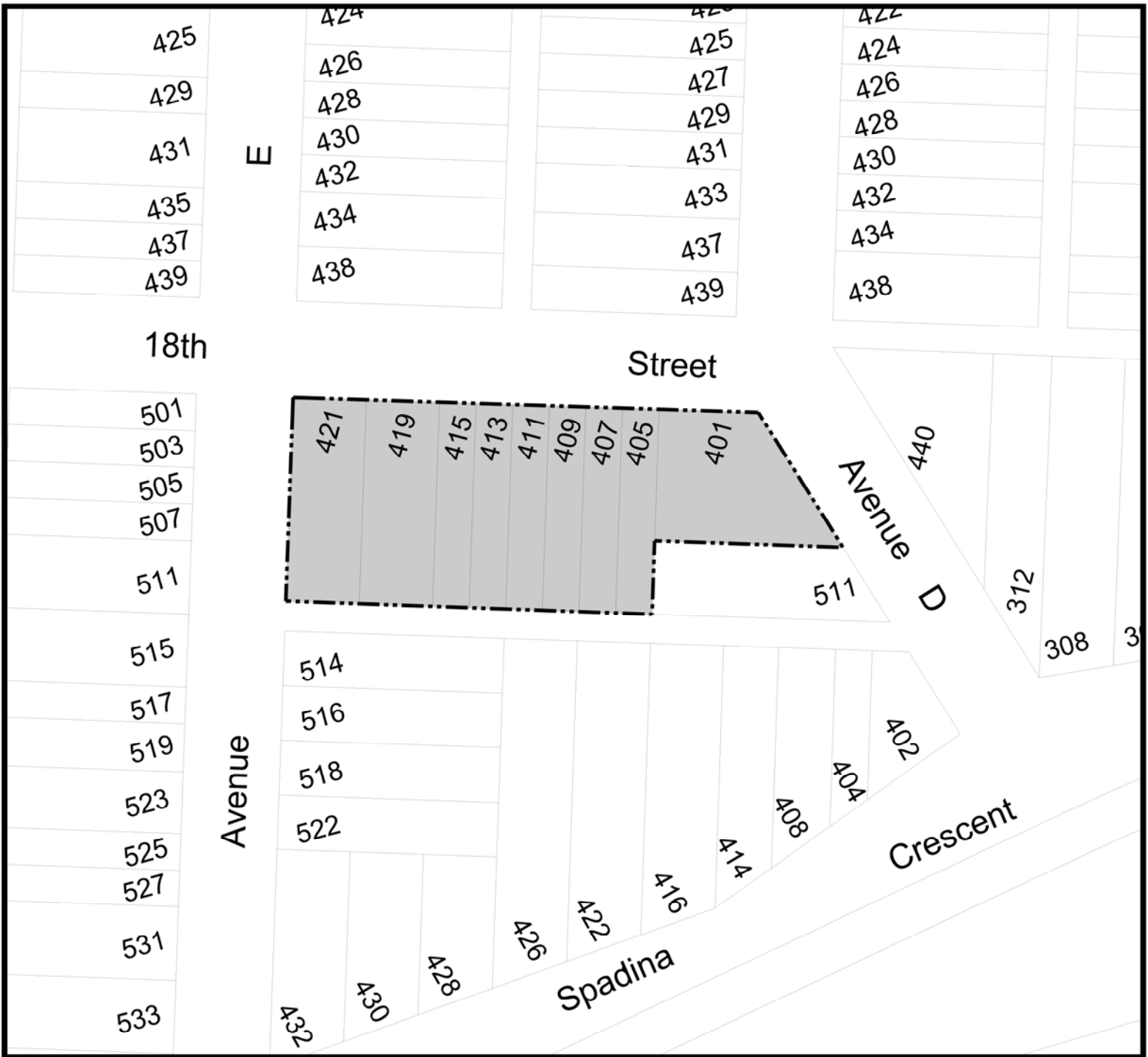


- Two hour time restrictions
- Effective Monday to Friday
- Parking Permits expire May 31 of each year

Streets Designated as the Riversdale Residential Parking Permit Zone

- Avenue E South- 300 Block





# RIVERSDALE

## Residential Parking Permit Zone



Streets Designated as the Riversdale Residential Parking Permit Zone

- 18th Street West - 400 Block

- Two hour time restrictions
- Effective Monday to Friday
- Parking Permits expire May 31 of each year



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## Highway 16 West Operational Jurisdiction Amendment

### Recommendation

That the Standing Policy Committee on Transportation recommend to City Council:

1. That the agreement with the Ministry of Highways and Infrastructure be amended to include the entire portion of Highway 16 from the current city limits to 500 metres after the centre of the intersection with 71<sup>st</sup> Street; and
2. That the City Solicitor be requested to prepare the appropriate agreement and that His Worship the Mayor and the City Clerk be authorized to execute the agreement under the Corporate Seal.

### Topic and Purpose

The purpose of this report is to modify the existing agreement to include the entire portion of Highway 16, including the bridge overpass at Highway 16 West and Idylwyld Drive.

### Report Highlights

The City of Saskatoon (City) will be responsible for the maintenance, management, and control of the entire portion of Highway 16, from the current city limits to 500 metres after the centre of the intersection with 71<sup>st</sup> Street.

### Strategic Goal

This report supports the Strategic Goal of Sustainable Growth. The City of Saskatoon has adopted a comprehensive Growth Plan based on sustainable growth, and bringing highways into the City's area of responsibility will be required as the city grows outward.

### Background

City Council, at its meeting held on September 29, 2014, considered the Boundary Alteration Proposal – Highway 16 and 71<sup>st</sup> Street Intersection Improvements report and resolved, in part;

- “2. That an agreement with the Ministry of Highways and Infrastructure be approved, in principle, to take over operational jurisdiction of Highway 16 from the current city limits up to, and including, the intersection of 71<sup>st</sup> Street as per the terms in the report of the General Manager, Community Services Department dated September 22, 2014.”

The report indicated that under the agreement, the City will be responsible for maintenance, direction, management, and control (including legal liability) of the portion of the highway, excluding the bridge overpass, which was planned for rehabilitation by Ministry of Highways and Infrastructure in 2015.

The agreement was intended to be an interim agreement until the highway was formally annexed. Annexation has not yet occurred and the agreement was previously extended to January 1, 2018, or at the time the City completed the annexation of the land.

**Report**

Ministry of Highways and Infrastructure completed the bridge rehabilitation in 2015 as planned and is now in a position to turn over jurisdiction of the structure to the City.

Attachment 1 shows the revised limits of the operational jurisdiction agreement.

**Financial Implications**

The cost to maintain and operate this portion of Highway 16 right-of-way will be offset by a maintenance grant from the Province under the Urban Highway Connector Program (UHCP). Although maintenance costs are funded by the province, their UHCP is chronically under-funded, and as such, the City typically must bear the cost of future rehabilitation of provincial highways within its corporate limits.

**Other Considerations/Implications**

There are no options, public and/or stakeholder involvement, communications, policy, environmental, privacy, or CPTED implications or considerations.

**Due Date for Follow-up and/or Project Completion**

The agreement to transfer operational jurisdiction to the City will come into effect upon signing of the agreement.

**Public Notice**

Public Notice, pursuant to Section 3 of Public Notice Policy No. C01-021, is not required for consideration of this report.

**Attachment**



1. Proposed Operational Agreement – Highway 16

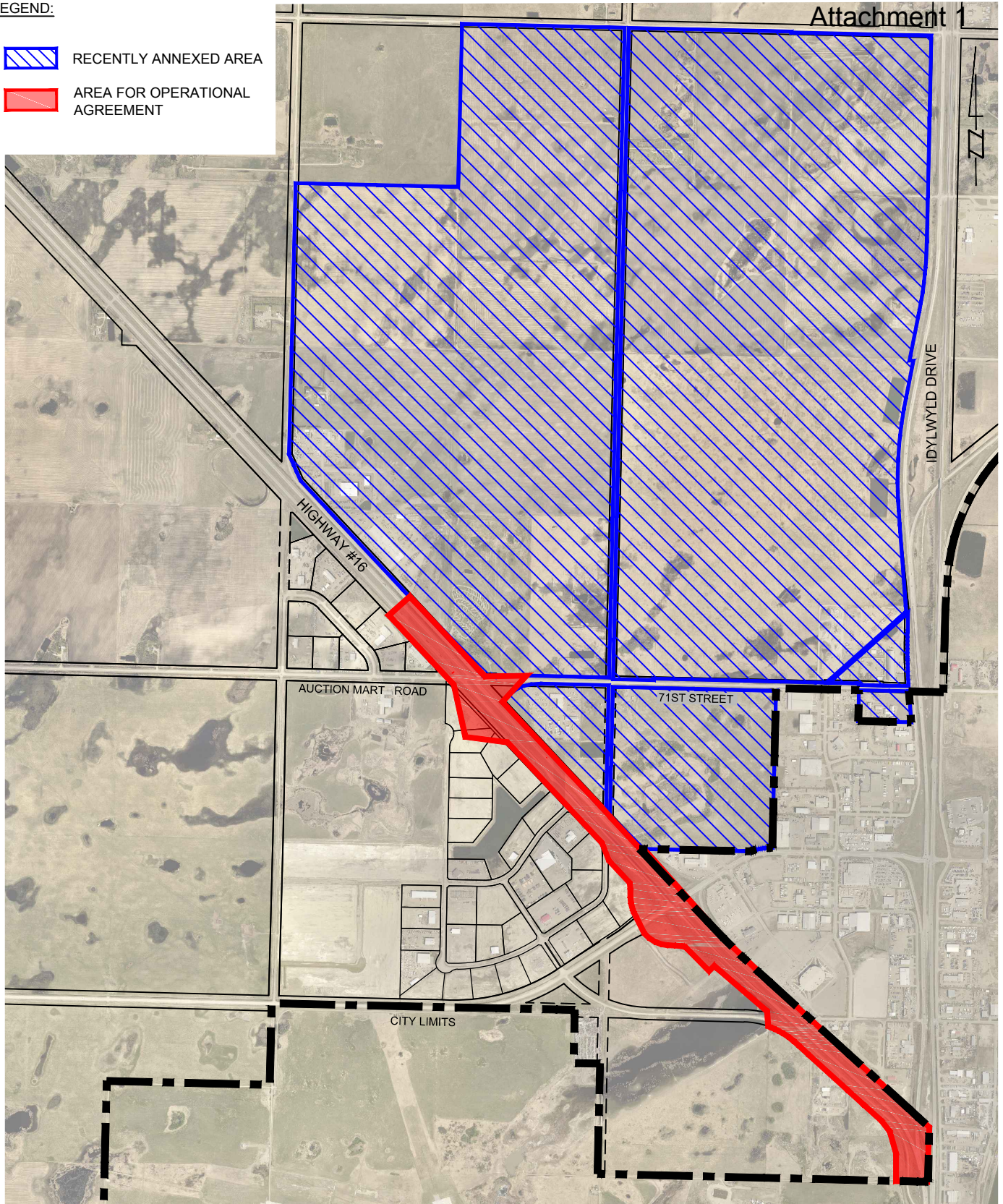
**Report Approval**

Written by: Angela Gardiner, Director of Transportation  
Approved by: Jeff Jorgenson, General Manager, Transportation & Utilities  
Department



LEGEND:

-  RECENTLY ANNEXED AREA
-  AREA FOR OPERATIONAL AGREEMENT



PLAN DESCRIPTION/REVISIONS	
4	
3	
2	
1	
DRAWN BY <u>RBV</u>	
DATE <u>2014-OCT-09</u>	
SCALE: HOR. <u>NTS</u> VERT. _____	



**PROPOSED OPERATIONAL AGREEMENT**  
**HIGHWAY #16**  
**FIGURE 1**  
 25

APPROVED	
ENGINEER	_____
ENGINEER	_____
PROJECT NUMBER:	291-0003-001-r001

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## Overhead Guide Sign Structures – Award of Contract

### Recommendation

That the Standing Policy Committee on Transportation recommend to City Council:

1. That the City of Saskatoon enter into agreement with Graham Design Builders LP for the repair/replacement of seven overhead guide sign structures at a total cost of \$976,580 (including GST and PST); and
2. That the City Solicitor be requested to prepare the appropriate agreement and that His Worship the Mayor and the City Clerk be authorized to execute the agreement under the Corporate Seal.

### Topic and Purpose

The purpose of this report is to gain approval to enter into a contract with Graham Design Builders LP for the replacement of seven of the City's overhead guide sign structures.

### Report Highlights

1. Previous inspection reports identified seven overhead guide sign structures that need repair/replacement.
2. A Request for Proposal (RFP) was issued on August 23, 2016. Of the two submissions received, Graham Design Builders LP was rated the highest.
3. An agreement with Graham Design Builders is recommended at a total cost of \$976,580 (including GST and PST).

### Strategic Goals

This report supports the Strategic Goal of Asset and Financial Sustainability by supporting the long-term strategy of maintaining the City's infrastructure. This report also supports the Strategic Goal of Moving Around by optimizing the flow of people and goods in and around the city.

### Background

The Transportation division requested proposals to fulfill the City's commitment to provide safe movement on all roadways for traffic, cyclists and pedestrians. As the overhead structures age, inspections are completed to locate deficiencies or other problems that may be hazardous to all roadway users. In 2011 and 2012, Stantec Consulting Ltd. completed inspections for deficiencies and recommended the repair/replacement of seven overhead sign structures.

The locations of the seven structures are as follows:

1. Idylwyld Drive near 53<sup>rd</sup> Street
2. Idylwyld Drive northbound at the 42<sup>nd</sup> Street on ramp

3. Idylwyld Drive southbound near 45th Street West
4. Idylwyld Drive southbound at the 42<sup>nd</sup> Street on Ramp
5. Sid Buckwold Bridge southbound northbound at 1<sup>st</sup> Avenue/20<sup>th</sup> Street on Ramps
6. Circle Drive Southbound at the 8<sup>th</sup> Street on Ramp
7. Idylwyld Drive Southbound at the Ruth Street on Ramp

## **Report**

### Structural Inspection

The seven overhead guide sign structures along Idylwyld Drive are comprised of welded aluminum tube trusses with aluminum supports. The reports indicated that these structures have varying degrees of defects susceptible to cracking and fatigue, which includes crumbling concrete foundations, rusting, cracking, deformations, and/or welds breaking.

### RFP Responses

An RFP was released on August 23, 2016, with a submission deadlines of October 7, 2016. Two qualified proposals were received from the following companies:

- Allan Construction, (Saskatoon, SK)
- Graham Design Builders LP, (Saskatoon, SK)

The proposals were evaluated according to the following criteria as outlined in the RFP:

- 10 Points - Clear Understanding of the Project Requirements
- 25 Points - Qualification/Relevant Experience of Proponent
- 10 Points - Project Schedule, Milestones, and Control
- 30 Points - Project Work Plan
- 25 Points - Fee for Service

Using the above criteria, a group of City staff evaluated each proposal. Graham Design Builders LP's proposal consistently received the highest score.

### Contract Terms

A contract with Graham Design Builders LP will allow for the repair/replacement of the guide sign structures during the 2017 construction season. The terms of the contract are as follows:

- Provide the design drawings and analysis for the concrete foundations, guide sign structures, and the brackets for guide sign installation.
- Provide the materials, construction services and labour needed to replace the guide sign structures, along with their respective foundations.
- Provide onsite inspections during construction to ensure industry standard quality assurance and quality control procedures are being followed.
- Provide a project schedule.

Traffic control will be coordinated by the Transportation division.



### Contractor Qualification and Experience

Graham Design Builders LP are a qualified firm that has installed guide sign structures across western Canada, 15 of those being a part of the South Circle Drive Project. Graham Design Builders LP has partnered with ISL Engineering and Land Services as their design/analysis lead and P. Machibroda Engineering Ltd. as their geotechnical lead. Both of these firms have significant experience in their respective fields.

### **Options to the Recommendation**

An option to the recommendation is to not accept the proposal from Graham Design Builders LP. This option is not recommended, as the proposal meets the City's requirements and is a cost effective, long-term solution.

### **Communication Plan**

During construction, traffic will be restricted at the various locations around the guide sign structures. Although all of the structure locations are on expressway portions of Idylwyld Drive, the majority of the work zones will be located on the shoulder of the road where the foundations are located. These work zones will only require single lane closures. Information on traffic restrictions will be delivered to the community using a variety of methods, including Public Service Announcements, the Road Report, service alerts and website updates as required.

### **Financial Implications**

The funds for this project are available in Capital Budget #1506 – TU - Traffic Signing Replacement. There is sufficient funds to cover the costs of this contract.

The cost to the City for the proposal submitted by Graham Design Builders LP is as follows:

Contract Amount	\$887,800.00
PST	44,390.00
GST	<u>44,390.00</u>
Total Cost	\$976,580.00
GST rebate (5%)	<u>(44,390.00)</u>
Net Cost to the City	<u>\$932,190.00</u>

### **Other Considerations/Implications**

There are no public and/or stakeholder involvement, policy, environmental, privacy, or CPTED considerations or implications.

### **Due Date for Follow-up and/or Project Completion**

If approved, the design, analysis, and geotechnical investigation will commence once the contract is finalized. The construction is scheduled to start at the beginning of August 2017 and be completed by the end of 2017.

The schedule for the Sid Buckwold Bridge structure is different, as the replacement will be coordinated with the Sid Buckwold Bridge Rehabilitation Project scheduled for 2018.

**Public Notice**

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

**Report Approval**

Written by: Dylan Ramsay, Operations Engineer, Sign Shop  
Reviewed by: Cory Funk, Traffic Operations and Control Manager  
Angela Gardiner, Director of Transportation  
Approved by: Jeff Jorgenson, General Manager, Transportation & Utilities  
Department

TRANS DR – Overhead Guide Sign Structures – Award of Contract.docx

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## **Inquiry – Councillor R. Donauer (August 18, 2016) Sidewalk or Multi-Use Pathway – 51st Street between Warman Road and Millar Avenue**

### **Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:  
That the Administration be directed to bring forward a prioritized list of 2017 sidewalk retrofit locations for Committee and City Council's consideration.

### **Topic and Purpose**

The purpose of this report is to provide information regarding the addition of a sidewalk or multi-use pathway on 51<sup>st</sup> Street between Warman Road and Millar Avenue.

### **Report Highlights**

The Active Transportation Plan (ATP) identifies a sidewalk on 51<sup>st</sup> Street between Warman Road and Millar Avenue. The Administration will be bringing forward a report in the first quarter of 2017 with a list of proposed construction locations for the 2017 sidewalk/pathway retrofit program.

### **Strategic Goal**

This report supports the Strategic Goal of Moving Around with well-planned neighbourhoods that encourage walking and transit.

### **Background**

The following inquiry was made by Councillor R. Donauer at the meeting of City Council held on August 18, 2016:

“Would the Administration please report back on the addition of a sidewalk or multi-use pathway on 51<sup>st</sup> Street between Warman Road and Millar Avenue to join the residential neighbourhoods of Lawson Heights and Silverwood Heights with the north industrial employment area.”

### **Report**

On June 27, 2016, City Council approved the ATP in principle. The ATP contains an 80-point action plan organized around the following items: Improving Connectivity, Safety and Security, Convenience, Land Use and Growth, Maintenance and Accessibility, and Education and Awareness.

Page 40 of the ATP notes the following regarding the theme of ‘Improving Connectivity’:

“...establishing a complete, connected and convenient network of pedestrian and cycling facilities throughout the city is critical to encouraging more active transportation trips.”

As part of this Connectivity theme, a direction to ‘Expand and Enhance the Sidewalk Network’ is provided. An action item under this direction is to ‘Eliminate gaps in the sidewalk network and major roads’. Further, a key recommendation of the ATP is that all major roads and transit routes should have sidewalks on both sides of the street. Accordingly, identified in the ATP is the addition of sidewalks along Warman Road between Warman Road and Millar Avenue.

The ATP notes that there are 90 kilometres of missing sidewalks on major roads such as arterials, at a total cost estimate of \$31M to construct. The ATP does not provide a prioritization of projects. Total funding included in the proposed 2017 Business Plan and Budget is \$1.3M, which is funded in part from the federal Public Transit Infrastructure Funding. The proposed 2017 program will be presented to Committee and Council in the first quarter of 2017.

The Administration is bringing forth an overall AT Implementation Plan in 2017 that will identify the missing sidewalks on major roads, prioritize them and group into projects, and provide a cost estimate for each project.

#### **Other Considerations/Implications**

There are no options, public and/or stakeholder involvement, communication, policy, financial, environmental, privacy, or CPTED considerations or implications.

#### **Due Date for Follow-up and/or Project Completion**

A report will be provided in the first quarter of 2017 to present the proposed 2017 program, followed by a report on the overall ATP implementation later in 2017.

#### **Public Notice**

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

#### **Report Approval**

Written by: Chris Helt, Special Projects Manager, Transportation  
Jay Magus, Engineering Manager, Transportation  
Reviewed by: Angela Gardiner, Director of Transportation  
Approved by: Jeff Jorgenson, General Manager, Transportation & Utilities  
Department

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## **Inquiry – Councillor R. Donauer (August 18, 2016) Sidewalk or Multi-Use Pathway – North Side of Lenore Drive – Joining Sidewalk at Russell Road and Lenore Drive**

### **Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:  
That the Administration be directed to bring forward a prioritized list of 2017 sidewalk retrofit locations for Committee and City Council's consideration.

### **Topic and Purpose**

The purpose of this report is to provide information regarding the addition of a sidewalk or multi-use pathway on the north side of Lenore Drive between Russell Road and Wanuskewin Road.

### **Report Highlights**

The Active Transportation Plan (ATP) identified the need for a sidewalk on the north side of Lenore Drive between Wanuskewin Road and Russell Road. The Administration will be bringing forward a report in the first quarter of 2017 with a list of proposed construction locations for the 2017 sidewalk/pathway retrofit program.

### **Strategic Goal**

This report supports the Strategic Goal of Moving Around with well-planned neighbourhoods that encourage walking and transit.

### **Background**

The following inquiry was made by Councillor R. Donauer at the meeting of City Council held on August 18, 2016:

“Would the Administration please report back on the addition of a sidewalk or multi-use pathway on the north side of Lenore Drive to join the sidewalk at Russell and Lenore with the pathway on Wanuskewin, especially since there is a bus stop on that span of Lenore with no sidewalk or pathway leading to it. I would prefer the sidewalk/pathway not directly touch the curb, but would recommend a boulevard or grass area between the curb and the sidewalk for safety reasons.”

### **Report**

On June 27, 2016, City Council approved the ATP in principle. The ATP contains an 80-point action plan, organized around the following items: Improving Connectivity, Safety and Security, Convenience, Land Use and Growth, Maintenance and Accessibility, and Education and Awareness.



Page 40 of the ATP notes the following regarding the theme of ‘Improving Connectivity’:  
“...establishing a complete, connected and convenient network of pedestrian and cycling facilities throughout the city is critical to encouraging more active transportation trips.”

As part of this Connectivity theme, a direction to ‘Expand and Enhance the Sidewalk Network’ is provided. An action item under this direction is to ‘Eliminate gaps in the sidewalk network on major roads’. Further, a key recommendation of the ATP is that all major roads and transit routes should have sidewalks on both sides of the street. Accordingly, identified in the ATP is the addition of a sidewalk on the north side of Lenore Drive between Wanuskewin Road and Russell Road.

The ATP notes that there are 90 kilometres of missing sidewalks on major roads such as arterials, at a total cost estimate of \$31M to construct. The ATP does not provide a prioritization of projects. Total funding included in the proposed 2017 Business Plan and Budget is \$1.3M, which is funded in part from the federal Public Transit Infrastructure Funding. The proposed 2017 program will be presented to Committee and City Council in the first quarter of 2017.

The Administration is bringing forth an overall AT Implementation Plan in 2017 that will identify the missing sidewalks on major roads, prioritize them and group into projects, and provide a cost estimate for each project.

### **Other Considerations/Implications**

There are no options, public and/or stakeholder involvement, communication, policy, financial, environmental, privacy, or CPTED considerations or implications.

### **Due Date for Follow-up and/or Project Completion**

A report will be provided in the first quarter of 2017 to present the proposed 2017 program, followed by a report on the overall ATP implementation later in 2017.

### **Public Notice**

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

### **Report Approval**

Written by: Chris Helt, Special Projects Manager, Transportation  
Jay Magus, Engineering Manager, Transportation  
Reviewed by: Angela Gardiner, Director of Transportation  
Approved by: Jeff Jorgenson, General Manager, Transportation & Utilities  
Department

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## **Inquiry – Councillor Z. Jeffries (January 25, 2016) Lime as Asphalt Anti-Stripping Agent**

### **Recommendation**

That the report of the General Manager, Transportation & Utilities Department dated December 6, 2016, be forwarded to City Council for information.

### **Topic and Purpose**

The purpose of this report is to provide additional information on lime as an additive in asphalt mix.

### **Report Highlights**

1. The City of Saskatoon specifies stringent material requirements and performs standard asphalt testing procedures to ensure a high quality asphalt product.
2. Studies show that lime is effective as an anti-stripping agent and can have other added benefits.
3. The City utilizes polymer modified asphalts and asphalt testing requirements that are also considered to provide added benefits to the asphalt surface.
4. City condition data shows that raveling is not a prevailing issue on current specification asphalt surfaces.
5. While lime is an allowable additive to reduce stripping potential, the Administration has no current plan to require a mandatory addition of lime to our existing asphalt mixes.

### **Strategic Goals**

This report supports the Strategic Goal of Moving Around and ensures that roads are continuously improving.

This report also supports the Strategic Goal of Asset and Financial Sustainability. Ensuring good quality products are specified provides longer lifecycles for the City's infrastructure and a more sustainable approach to building and maintaining the infrastructure.

### **Background**

The following inquiry was made by Councillor Z. Jeffries at the meeting of City Council held on January 25, 2016:

“Could Administration please report back on whether lime as an asphalt anti-stripping agent is more effective than other agents and if specifying lime as an anti-stripping agent is a best practice in North America.”

The City of Saskatoon (City) specifies stringent material requirements and performs standard asphalt testing procedures to ensure a high quality asphalt product is produced and received during roadway construction.

### **Report**

Studies show that lime is effective as an anti-stripping agent by reducing the moisture sensitivity similar to other anti-stripping agents. There are additional added benefits that have also been discussed in publications in regards to lime such as:

- Reduce oxidative aging;
- Improve mechanical properties; and
- Improve resistance to fatigue and rutting.

Many of the researched reports were funded by various lime associations.

In Western Canada, and jurisdictions with similar climatic factors, the Saskatchewan Ministry of Highways and Infrastructure is the only organization that has been identified to require lime as a mandatory requirement in the asphalt mix. Through additional product research, it has been found that an estimated 10% of asphalt surfaces currently installed in the United States have lime included as an additive to the mix.

Additional products can also be used to create overall improvements to the asphalt mix. The City specifies a requirement for anti-stripping potential in the City's standard construction specifications. When stripping potential is greater than 5%, an anti-stripping agent is required. Lime would be considered a suitable anti-stripping agent if the required testing is completed to ensure the added proportions meet the specified criteria.

The City incorporates additional specifications to achieve improved rutting and aging characteristics through the requirement of polymers modified asphalts, air voids in mix, asphalt percentage ranges and density requirements. The City also specifies high quality aggregates which improve the overall quality of the asphalt. Rural roadways can sometimes be sourced with local aggregates that can also allow for wider gradation tolerances. The requirements for anti-stripping additives are often greater when local, poorer quality aggregate is sourced adjacent to projects, which causes the pavement to be more prone to raveling.

The Administration met with industry to discuss potential issues of utilizing lime in the asphalt mix. The following potential negative impacts were discussed during that investigation:

- More stringent Occupational Health and Safety requirements need to be implemented when using lime as the use of lime can impose health and safety risks to employees.
- Additional cost setup for each plant would have an immediate impact on unit costs to the City (estimated at \$0.5M per plant to set up for mandatory lime).

- For asphalt plants located in an urban environment, mandatory lime creates additional environmental and safety hazards for citizens adjacent to the plants and thus affects quality of life.
- Standard test procedures to ensure lime percentages are being met have not been fully developed at this time.

The Administration reviewed the condition data of roadways paved in the last 5 years. Raveling was not found to be an issue on these roadways. This data indicates that raveling is not a prevailing issue in our current asphalt specifications or mix designs.

The City is continuously investigating ways to improve construction practices. Our current specifications have many products and variables that provide for a high quality and long lasting asphalt product. The Administration will continue to review alternate products, additives and procedures to improve the overall construction practices of the paved road network. All proposed changes to the City's construction specifications are submitted through the Specification Review Committee made up of staff from various divisions that plan, build and maintain the roadway infrastructure at the City. Updated products and specifications can be submitted through this committee, they are then reviewed and approved or rejected through unanimous vote by committee.

The City currently has specifications in place to improve the stripping potential, mechanical properties and rutting properties of asphalt. While lime is an allowable additive to reduce stripping potential, the Administration has no current plan to require a mandatory addition of lime to our existing asphalt mixes.

### **Options to the Recommendation**

An option to the recommendation would be to perform further studies on lime and how it effects our roadways.

The option to perform additional studies was not chosen as there is a significant amount of research in the area. The Administration will continue to receive product updates through the product review committee and research and review best practices in pavement design. The City will implement products and improvements that are considered a direct and measurable benefit to the infrastructure.

### **Environmental Implications**

Roadway construction inherently utilizes resources that produce greenhouse gases through processing, transport and installation of the required products. The City utilizes treatments that can take advantage of existing structures when possible to limit the required natural resources. This approach reduces the overall negative environmental impacts of the project, by reusing valuable natural resources, minimizing waste and avoiding greenhouse gas emissions.

If lime were selected as a mandatory additive, appropriate OH&S policies and extended protection to the adjacent public would need to be ensured at asphalt plants within City limits.

**Other Considerations/Implications**

There are no public and/or stakeholder involvement, communications, policy, financial, privacy, or CPTED implications or considerations.

**Due Date for Follow-up and/or Project Completion**

No follow up required, suggested changes to the City’s construction specifications are submitted and reviewed through the specification review committee process.

**Public Notice**

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

**Report Approval**

Written by: Rob Frank, Engineering Manager of Asset Preservation  
Reviewed by: Dan Willems, Director of Major Projects  
Approved by: Jeff Jorgensen, General Manager of Transportation and Utilities

TRANS RF – Inq - Z Jeffries (Jan 25-2016) Lime as Asphalt Anti-Stripping Agent

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## **Inquiry – Councillor Z. Jeffries (January 25, 2016) Alternative Surfacing Techniques**

### **Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:  
That the Administration continue to investigate alternative road treatments and include updates in the annual reports to Committee and City Council on Roadway Asset Management.

### **Topic and Purpose**

The purpose of this report is to provide information on the roadway preservation program treatment strategies and potential alternative surfacing treatment use.

### **Report Highlights**

1. The Major Projects division is responsible for strategically selecting roadways for treatments in order to improve the City of Saskatoon's network as a whole.
2. Treatment strategies are categorized as Maintenance, Preservation, Restoration, and Rehabilitation.
3. Slurry seal treatments have been used in the past in Saskatoon but have not been used in recent years, as micro-surfacing was found to have a longer service life.
4. It has been found that micro-surfacing is better suited for similar purposes as the slurry seal, although with additional benefits such as filling dips, ruts, and for various types of depressions to improve the ride.
5. Administration is investigating the use of preservation and rehabilitation treatments, such as Super Ultrathin Overlays (SUTO) and Full-Depth Reclamation (FDR) for the 2017 construction season.
6. Administration will continue to investigate, research new treatments, and work with industry to determine viable options for maintenance, preservation, restoration and rehabilitation of the City of Saskatoon roadways.

### **Strategic Goals**

The recommendation in this report supports the Strategic Goal of Moving Around. It ensures that roads are continuously improving and in a good state of repair; keeping in mind the priority of roadway preservation programs to best suit the city and movement of its citizens.

The recommendation also supports the Strategic Goal of Asset and Financial Sustainability. Various roadway treatments ranging in cost are utilized in order to preserve and improve roads in various condition states. Ongoing investigation and research will result in continuous improvement of the program.

**Background**

The following inquiry was made by Councillor Z. Jeffries at the meeting of City Council held on January 25, 2016:

“Could Administration please report back about the possibility of using other road surfacing techniques beyond micro surfacing, including slurry seals and other treatments. Administration said in 2013 that they would “continue to look into alternative surfacing techniques” and I look forward to hearing about any progress”

The Major Projects division is responsible for strategically selecting roadways for treatments in order to improve the City’s network as a whole. There are a number of factors taken into account when it comes to selection of specific roadways for specific treatments. These factors include but are not limited to: road condition state, road class, traffic volumes and type, type of treatment required, life cycle assessment for treatment selections, costs of the treatment, grouping of projects, coordination with road maintenance work, and water and sewer projects or other divisions within the City.

The City has a rigorous selection method and utilizes a variety of treatments. Our overall strategy is to perform as many light treatments as possible to keep roads in good condition at up to 1/20th of the cost for a heavy treatment. Crack sealing a road is our lightest treatment where as a full depth reconstruction is our heaviest and most expensive treatment.

**Report**

There are many aspects that must be considered in order to strategically plan and execute improvements to the roadway network as a whole, utilizing a variety of treatments.

Treatment strategies are categorized as Maintenance, Preservation, Restoration, and Rehabilitation. Current treatments utilized by the City to address various road conditions are outlined in the following table:

Treatment Strategy	Treatment	Costs	Design Life
Maintenance	Pothole Repair	\$20/m <sup>2</sup>	Variable
	Seam Repair	\$13/m	3-5 years
	Crack Sealing	\$8/m	3-5 years
	Patching	\$55/m <sup>2</sup>	15 years
Preservation	Micro-surfacing	\$10/m <sup>2</sup>	8-12 Years
	Blade Level	\$18/m <sup>2</sup>	12-15 Years
	Asphalt Overlays	\$20/m <sup>2</sup>	15 years
Restoration	Resurfacing	\$35/m <sup>2</sup>	15-20 years
Rehabilitation	Reconstruction	\$85-\$200/m <sup>2</sup>	20 years

A slurry seal, which is not currently used, would be categorized as preservation treatment. It is an emulsification of asphalt, water and fine aggregates and is used to provide a thin 3mm to 5mm coat to seal and act as wearing course to a relatively newer road with minimal to no evidence of surface distress. This treatment would cost the city approximately \$6/m<sup>2</sup> and have a design life of 2 to 8 years depending on the traffic volumes. Although this type of treatment is currently in the City's Construction Specifications, it is not currently used for treating the roadways.

Starting in 1996 and continuing for a period of 3-5 years, the City utilized slurry seals on local roadways, and micro-surfacing on higher volume roadways. Over time, it was proven that the incremental cost of micro-surfacing was a prudent investment due to the longer service life of micro-surfacing. This led to a lower life-cycle cost and less frequent disruptions for citizens.

It has been found that micro-surfacing is better suited for similar purposes as the slurry seal, although with additional benefits. Micro-surfacing has the ability to fill dips, ruts, and various types of depressions to improve the ride and for dual treatment strategies – Maintenance and Preservation. The micro-surfacing treatment utilizes a polymer-modified asphalt emulsion. The result is a more durable and more capable product for a variety of uses in the preparation of the main treatment, resulting in an improved life cycle compared to slurry seal.

For 2017, the Administration is investigating the use of alternative preservation and rehabilitation treatments.

Similar to a micro-surfacing treatment, the Super Ultrathin Overlay (SUTO) is a preservation treatment and is used for sealing a road and providing a wearing course. A SUTO is comprised of hot mix asphalt with a finely graded aggregate and is placed at a thickness of 10mm-12.5mm. The finished surface is very comparable to any hot mix asphalt paved surface, although with less positive impact on road surface depressions. Administration conducted a pilot project utilizing this treatment during the 2016 construction season on Kusch Crescent. Pricing and design life are projected to be similar to that of micro-surfacing, which will be determined through ongoing monitoring.

Full-depth reclamation (FDR) is a rehabilitation treatment strategy. In lieu of doing a conventional full depth reconstruction, where materials are removed and new materials are brought in, the FDR recycles material already in place. There are standardized design processes in place to ensure adequate structural capacity for a specified design life. Generally, an FDR will rotomix the existing structural components of the road which includes the surface material (pavement) and substructure material (base course and subbase course). Additives may be introduced depending on the requirements of the design. The rotomixed material is then shaped and compacted. Extra base course material may be introduced to ensure geometrics and material properties are met, and then the structure is surfaced with a traditional asphalt pavement. Depending on the design, it is estimated that cost of construction could range from \$120 to \$180/m<sup>2</sup>. Not



all roads that require reconstruction would be considered a candidate for FDRs, which are sensitive to the composition of the in-situ materials.

FDRs have been implemented in Saskatoon, dating back approximately 15 years. Those early trials were not successful, and some road segments failed and required reconstruction. Further, the treatment was found to be extremely intrusive to residents due to the time taken for construction. As a result, use of the treatment was abandoned. For the 2017 trial, the Administration will utilize updated design and construction practices.

Administration will continue to investigate and work with industry to determine viable options for maintenance, preservation, restoration and rehabilitation of the City of Saskatoon roadways.

### **Options to the Recommendation**

An option is that the Administration continue to only use current treatment methods and not look into other treatment options that may be more economical and have improved lifecycle. The Administration does not believe this is a reasonable option; therefore, the Administration intends to continue to take a balanced approach to investigating potential new treatments. Research and trials tend to be costly and have associated risk, so before any treatments are adopted on a wide-scale basis, small demonstration projects will be implemented.

### **Environmental Implications**

Roadway construction inherently utilizes resources that produce greenhouse gases through processing, transport and installation of the required products. The City utilizes treatments that can take advantage of existing structures when possible to limit the required natural resources. This approach reduces the overall negative environmental impacts of the project, by reusing valuable natural resources, minimizing waste and avoiding greenhouse gas emissions.

### **Financial Implications**

Each treatment strategy is targeted at roadways in various states of condition. Treatment costs increase from typical maintenance being the cheapest to rehabilitation being the most expensive strategy. Ultimately, the goal is to ensure that value engineering is followed in order to make the most appropriate treatment decision to maximize the lifecycle of City roadways.

### **Other Considerations/Implications**

There are no public and/or stakeholder involvement, communications, policy, privacy, or CPTED implications or considerations.

### **Due Date for Follow-up and/or Project Completion**

No follow up is required.

**Public Notice**

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

**Report Approval**

Written by: Mitchell Parker, Asset Preservation Manager - Roads  
Reviewed by: Dan Willems, Director of Major Projects  
Approved by: Jeff Jorgenson, General Manager of Transportation and Utilities

TRANS MP – Inq – Z Jeffries (Jan 25-16) Alternative Surfacing Techniques

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## **Inquiry – Councillor Z. Jeffries (September 19, 2016) – Snow and Ice Levels of Service**

### **Recommendation**

That the report of the General Manager, Transportation & Utilities Department dated December 6, 2016, be forwarded to City Council for information.

### **Topic and Purpose**

The purpose of this report is to provide information on the feasibility of increasing Snow and Ice Levels of Service related to rut maintenance on residential streets and pavement service standards on priority one and two streets.

### **Report Highlights**

1. The Rut Management Program is weather dependent and variable when determining the rut height trigger point and program initiation.
2. Extending Bare Pavement Level of Service for non-expressways represents a significant change in the scope of work.

### **Strategic Goals**

This report supports the Strategic Goal of Moving Around by ensuring sound engineering principles are considered while setting technical levels of service for rut management and pavement condition service standards. It also supports the Strategic Goal of Asset & Financial Sustainability by efficient and effective management of available funding.

### **Background**

The following inquiry was made by Councillor Z. Jeffries at the meeting of City Council held on September 19, 2016:

“Would the Administration please report on the possibility and feasibility of implementing the following changes to our snow and ice levels of service:

1. Changing the trigger point for residential street grading from 15cm of snow pack to 10cm of snow pack; and
2. Changing the plowing and sanding frequency details on priority one and two streets to state that those streets shall be kept to a bare pavement service standard, as has already been implemented for our freeway network.”

### **Report**

#### **The Rut Management Program Variables**

The current Rut Management Program is weather dependent and considers the below criteria in managing ruts efficiently and economically throughout each winter.

- A well maintained snowpack results in minimal rutting until temperatures are high enough to significantly soften the snowpack.
- Mobility becomes significantly impacted when rut depths begin to exceed 150 mm, as most vehicles have clearances around 150 mm.
- Priority streets are graded after every snow event and all streets receive snow maintenance throughout the winter to minimize rut formation.
- Equipment has the highest productivity rate during moderate temperatures, as the snow pack softens and readily delaminates from the asphalt surface. Rut removal in low temperatures can result in damage to equipment.
- Rut removal is planned in conjunction with the snow melt as the majority of rutting occurs on residential streets where Administration does not want to seriously impact on-street parking with windrow storage. Removing ruts earlier in the season will result in parking issues or significant cost increases for snow removal.
- Localized flooding issues are managed in conjunction with the Rut Management Program.
- Rut Management will be suspended at any time by other emerging priorities, like excessive meltwater causing flooding, or a new weather event resulting in higher priority roads requiring treatment.

Municipalities with warmer winter climates and multiple snow melts per season such as Calgary can achieve rut removal at a much lower cost due to local conditions. An effective Rut Management Program will limit vehicle mobility issues when the residential road snow pack is well in excess of 150mm. Once the road's snow pack exceeds 150 mm and melting causes ruts to form, a Rut Blitz may be required.

A Rut Blitz is grading the driving lanes on streets at risk for severe rutting, as defined in the criteria above. Grading typically occurs by neighbourhood and does not include parking enforcement, with graders moving around parked vehicles. Initiating a Rut Blitz with a snow pack less than 150 mm has a diminishing return on investment as the entire snow pack will be removed.

Administration requested funding in the 2017 budget to investigate a comprehensive rut mitigation strategy that considers prevention as well as treatment.

#### Extending the Grading Level of Service to Bare Pavement

Administration follows a bare pavement service standard for the expressway network, based on roadway geometrics, and traffic speeds. Anti-icing methods for the expressway network may not apply to lower speed, urban cross-section roadways. The investigation of a bare pavement standard on non-expressways includes consideration of snow storage capacity and weather monitoring activities.

Snow grading alone to achieve bare pavement on roads with an urban cross-section requires snow storage and removal that is not currently available without significant service disruptions. Other agencies that pursue bare pavement on non-expressways do so through a combination of anti-icing and snow removal techniques.

Anti-icing activities require accurate weather forecasting, pavement temperature measurements and current wind speed readings. Anti-icing efforts without this crucial data can result in inappropriate applications and risks of compounded ice buildup. Administration requested funding in the 2017 budget for a Roadway Weather Information Systems (RWIS) that is expected to increase the reliability of forecast data and permit safe use of a variety of anti-icing techniques.

Administration is seeking to increase our capacity for providing higher Levels of Service in the future on all roads. To pursue bare pavement on non-expressways, a detailed cost analysis and study would be required.

### **Options to the Recommendation**

City Council could direct the Administration to begin preparations for a reduced rut trigger point and implement bare pavement standards on Priority 1 and 2 streets. This option would require additional funding, the level of which would need to be determined through a more comprehensive study.

### **Communication Plan**

Salting and sanding is one of the winter road maintenance topics included in the social media, advertising and media relations plan for the Better Winter Roads campaign. Citizens will be informed of a neighbourhood rut blitz through Public Service Announcements, social media channels, and updates provided to local media. Additional advertising may be considered, depending on the severity of the road conditions and weather. When weather conditions are warmer, messages to the public include reminders to avoid driving in existing ruts when the snow pack softens as it can make them deeper.

### **Financial Implications**

The recommendation does not have any financial implications for the Snow & Ice operating budgets. Should City Council pursue any option to the recommendation, changing snow & ice operations would significantly increase pressures on these budgets.

### **Environmental Implications**

The recommendation does not change the current environmental impact of snow and ice operations. Changing to more aggressive stances on ruts and anti-icing operations would increase the greenhouse gas emissions from snow operations, in particular CO<sub>2</sub> and chlorides from anti-icing operations.

### **Other Considerations/Implications**

There are no policy, privacy, or CPTED implications or considerations.

### **Due Date for Follow-up and/or Project Completion**

Administration will continue to provide updates regarding winter road maintenance levels of service.

**Public Notice**

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

**Report Approval**

Written by: Barrett Froc, Operations Engineer, Logistics & Procurement  
Eric Quail, Roadways Manager, Roadways & Operations  
Reviewed by: Brandon Harris, Director of Roadways & Operations  
Approved by: Jeff Jorgenson, General Manager, Transportation & Utilities  
Department

TRANS BF – Inq – C Jeffries (Sept 19-16) – Snow and Ice Levels of Service

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## **Inquiry – Councillor Z. Jeffries (August 18, 2016) Use of RRFB’s (Rapid Rectangular Flashing Beacons) as Pedestrian Crossing Device**

### **Recommendation**

That the Standing Policy Committee on Transportation recommend to City Council:  
That the Administration be directed to bring forward a report by April 2017 outlining funding options for implementation of a pilot project for Rapid Rectangular Flashing Beacons.

### **Topic and Purpose**

This purpose of this report is to provide information on the possibility of using Rapid Rectangular Flashing Beacons (RRFB’s) as a pedestrian crossing device in Saskatoon.

### **Report Highlights**

1. Transportation Association of Canada (TAC) recently completed a research project on RRFB’s and is developing criteria for the consistent use of RRFB’s in Canada.
2. The Administration is recommending that RRFB’s be installed at five locations as a pilot project pending funding.

### **Strategic Goals**

This report supports the Strategic Goal of Moving Around by improving safety of all road users (pedestrians, cyclists, and drivers), and supports the Strategic Goal of Quality of Life by providing a great place to live, work, and raise a family.

### **Background**

The following inquiry was made by Councillor Z. Jeffries at the meeting of City Council held on August 18, 2016:

“Would administration please report on the possibility of using RRFB’s (Rapid Rectangular Flashing Beacons) as a pedestrian crossing device, even on a pilot basis in Saskatoon?”

### **Report**

#### Previous Work by TAC

TAC is a national association with a mission to promote the provision of safe, secure, efficient, effective, and environmentally and financially sustainable transportation services in support of Canada’s social and economic goals.

The City of Saskatoon (City) is a corporate member of TAC with several staff active within the association. TAC publishes numerous planning and engineering documents that provide transportation engineering practitioners across Canada with consistent guidance. The resultant benefit is a consistent approach to road design throughout the

country, including pedestrian crossing devices, which ultimately increases the level of road safety.

TAC initiated a project to evaluate the use of RRFB's as an enhancement to pedestrian crossing devices to improve pedestrian safety. In 2015, TAC published the results from their RRFB research project, the key excerpts from the report are as follows:

- “Despite a number of palpable efforts by TAC to improve pedestrian safety at crosswalks through the implementation of traffic control devices, there still exists a significant gap between a marked crosswalk and a special crosswalk, in terms of structure and cost. Rectangular Rapid Flashing Beacons (RRFB's) have recently been used in many US and Canadian cities to reinforce signs and markings at pedestrian crossings; and could provide a cost effective method to improve pedestrian safety at crosswalks. The lack of Canadian Standards and implementation guidelines is restricting the uniform application of these systems.
- Rectangular Rapid Flashing Beacons (RRFB's) are high intensity flashing beacons that flash in a rapidly alternating “wig-wag” flashing sequence to warn drivers of the presence of a pedestrian in the crosswalk. RRFB's consist of two rectangular-shaped amber indications, each with an LED-array based light source. Each RRFB indication is minimum 125mm wide and 50mm high placed 175mm apart...
- RRFB's may be used to supplement warning signs at unsignalized intersections and can be activated by pedestrians manually by a push button or passively by a pedestrian detection system. RRFB's can enhance safety by reducing crashes between vehicles and pedestrians at unsignalized intersections and mid-block pedestrian crossings by increasing driver awareness of potential pedestrian conflicts.
- In terms of hierarchy, addition of RRFB's to signed and marked crosswalks would likely fall between a “pedestrian crosswalk” and a “special crosswalk”. This however, needs to be investigated in greater details as part of the warrant analysis which is not included in the scope of this project.”

Phase 2 of the RRFB project is now underway to develop a standard warrant, or criteria, for the use of RRFB's. The scope of Phase 2 is as follows and is expected to be completed by the end of 2017.

- Confirm the use of RRFB's as a standard traffic control device within Canada;
- Review the technical and physical requirements of the device;
- Develop a warrant, or criteria, to guide the use of RRFB's; and
- Update the Manual of Uniform Traffic Control Devices.

The above report key points are included as Attachment 1; and a typical RRFB installation is illustrated in Attachment 2.



### RRFB Pilot Project

In the absence of formal guidance from TAC, the Administration is recommending that an RRFB pilot project be considered. The scope of the pilot project is as follows:

- Install RRFB's at the following five locations, which were identified by cross-referencing the information provided in the TAC research study with known locations of concern:
  - Clarence Avenue and Glasgow Street (south);
  - Clarence Avenue and 14<sup>th</sup> Street;
  - Taylor Street and Weyakwin Drive;
  - Lowe Street south of Atton Crescent; and
  - Spadina and 33<sup>rd</sup> Street (located at the multi-use path on south side).
- The RRFB's are left in place for a period of two years;
- Before and after studies completed to assess yield compliance; and
- A report back to City Council after two years.

Further expansion of the use of RRFB's would be dependent on the outcome of the pilot project and the completion of Phase 2 of TAC's RRFB project.

### **Communication Plan**

A driver awareness plan would be developed and provided to the public through the City website, a newspaper advertisement, and public announcements.

### **Financial Implications**

The TAC research document indicates that the RRFB's cost approximately \$15,000 each. This would be highly dependent on volume, contract scope, and local contracting climate. At this time, the Administration estimates the cost of the 5-site pilot would be approximately \$100,000 and will include construction costs and detailed site monitoring to evaluate the effectiveness of the pilot. The Administration will report back at the conclusion of the 2-year period.

The 2017 Budget Plan did not include this potential project for City Council's consideration. A budget adjustment report will be presented in the first half of 2017 with recommendations to fund additional projects from the Traffic Safety Reserve using Automated Speed Enforcement revenues from 2016. If Committee supports the recommendation of this report, the Administration will include the proposed pilot project in the upcoming Traffic Safety Reserve funding report.

### **Other Considerations/Implications**

There are no options, public and/or stakeholder involvement, policy, environmental, privacy, or CPTED considerations or implications.

### **Due Date for Follow up and/or Completion**

A further report will be provided to City Council by mid-2017 for budget adjustment.

**Inquiry – Councillor Z. Jeffries (August 18, 2016) Use of RRFB's (Rapid Rectangular Flashing Beacons) as Pedestrian Crossing Device**

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**Public Notice**

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

**Attachments**

1. Transportation Association of Canada – Final Report – Project No. 327 - Rectangular Rapid Flashing Beacons - September 2014,
2. Typical RRFB installation

**Report Approval**

Written by: Jay Magus, Engineering Manager, Transportation  
Reviewed by: Angela Gardiner, Director of Transportation  
Approved by: Jeff Jorgenson, General Manager, Transportation & Utilities Department

TRANS JM – Inq C Jeffries (Aug 18-16) Use of RRFBs as Pedestrian Crossing Device



# Final Report

## Project No. 327

## Rectangular Rapid Flashing Beacons

### Submitted to:

*Traffic Operations and Management  
Standing Committee (TOMSC)*

### Submitted by the Project Steering Committee:

Gord Elenko, City of Calgary (Chair)  
Mike Skene, Boulevard Transportation Group  
Heide Schlegl, Town of Milton  
Stephen Chapman, City of Winnipeg  
Rod Sanderson, City of Chilliwack  
Fred Wollin, City of Kelowna  
Hart Solomon, CIMA+  
Richard Chow,  
Alberta Transportation  
Rob Hird, Nova Scotia Department of Transportation  
Shannon Noonan, City of Cambridge  
Steven Kodama  
City of Calgary, City of Toronto

**September 2014**

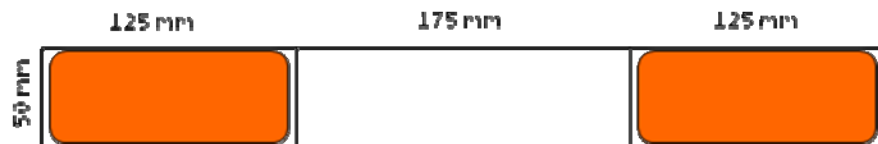
## 1. Introduction

Pedestrians are one of the most vulnerable road users in a transportation system. The accommodation of pedestrians at crosswalks in a safe and interactive manner with other users of transportation system has always been a great challenge to transportation professionals. The Transportation Association of Canada (TAC) has published a number of guidelines, manuals and standards together with a long list of traffic control devices to facilitate the safe crossing at the crosswalks.

Despite a number of palpable efforts by TAC to improve pedestrian safety at crosswalks through the implementation of traffic control devices, there still exists a significant gap between a marked and signed crosswalk and a special crosswalk, in terms of structure and cost. Rectangular Rapid Flashing Beacons (RRFBs) have recently been used in many US and Canadian Cities to reinforce signs and markings at pedestrian crossings; and could provide a cost effective method to improve pedestrian safety at crosswalks. The lack of Canadian Standards and implementation guidelines is restricting the uniform application of these systems.

Traffic Operations and Management Standing Committee (TOMSC); at its April 13, 2013 meeting, unanimously approved a motion to initiate a project to develop a guide for the use of Rectangular Rapid Flashing Beacons in Canada.

Rectangular Rapid Flashing Beacons (RRFB) are high intensity flashing beacons that flash in a rapidly alternating "wig-wag" flashing sequence to warn drivers of the presence of a pedestrian in the crosswalk. RRFBs consist of two rectangular-shaped amber indications, each with an LED-array based light source. Each RRFB indication is minimum 125 mm wide and 50mm high placed 175mm apart (see Appendix A for detailed specifications).



*Figure 1: Sketch of a pair of RRFBs*

RRFBs may be used to supplement warning signs at unsignalized intersections and can be activated by pedestrians manually by a push button or passively by a pedestrian detection system. RRFBs can enhance safety by reducing crashes between vehicles and pedestrians at unsignalized intersections and mid-block pedestrian crossings by increasing driver awareness of potential pedestrian conflicts.



*Figure 2: Typical RRFB Installation <sup>1</sup>*

In terms of hierarchy, addition of RRFBs to signed and marked crosswalks would likely fall between a “pedestrian crosswalk” and a “special crosswalk”. This however, needs to be investigated in greater details as part of the warrant analysis which is not included in the scope of this project. If the RRFB device is adopted as a new traffic control device, changes would be required to the Pedestrian Crossing Control Guide, as well as to the MUTCDC. The scope of this project is to gather supporting information to:

- Consider the use of RRFBs as a traffic control device within Canada
- Review the technical and physical requirements of the device
- Update the MUTCDC

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<sup>1</sup>City of Calgary

## 2. Study findings

A thorough literature review was carried out and various jurisdictions across Canada and the United States were contacted to gather background information as well as the level of usage of the Rectangular Rapid Flashing Beacons across Canada and the United States.

### 2.1 Literature Review:

The *TAC Pedestrian Crossing Control Guide*<sup>2</sup> was published in 2012, and provides guidelines on the use of devices for pedestrian crossing control relating to new installations or where existing installations need to be retrofitted. The Guide is primarily intended to augment the information about pedestrian crossing control devices and their applications contained in the *Manual of Uniform Traffic Control Devices for Canada* (MUTCD). The *Pedestrian Crossing Control Guide* does not mention RRFBs in any context. However, it has referred to a few RRFB related literatures in the knowledge base. The Guide identifies a listing of pedestrian crossing control devices that can be used individually or in combination to enhance the overall quality of the pedestrian crossing. These include:

- Pedestrian crosswalk with side-mounted signs
- Pedestrian crosswalk with overhead-mounted signs
- Special crosswalks
- Crossing guards
- In-street school crosswalk signs
- Half signals (intersection of mid-block)
- Accessible pedestrian signals
- Pedestrian countdown signals
- Raised refuge islands of medians
- Advanced Yield to Pedestrians markings
- Pedestrian grade separations

The City of St. Petersburg, FL conducted experiments with the RRFB at 18 pedestrian crosswalks across uncontrolled approaches on multi-lane roads starting March, 2006 after FHWA granted permission to experiment the use of RRFB device<sup>3</sup>. Results from these experiments were summarized in a final report that was used by FHWA<sup>4</sup> to provide interim approval for the RRFB device. The before-after data collected at

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<sup>2</sup> Montufar, J; Regehr, J; Bahar, G; Patmore, K; Zegeer, C. Pedestrian Crossing Control Guide. Transportation Association of Canada (2012)

<sup>3</sup> [http://www.stpete.org/pdf/ite\\_paper\\_07.pdf](http://www.stpete.org/pdf/ite_paper_07.pdf)

<sup>4</sup> [http://mutcd.fhwa.dot.gov/resources/interim\\_approval/ia11/fhwamemo.htm](http://mutcd.fhwa.dot.gov/resources/interim_approval/ia11/fhwamemo.htm)

intervals for 1 year at all sites and for 2 years at the first 2 implemented sites revealed the following:

- For the first 2 sites, the city collected data for overhead and ground-mounted pedestrian crossing signs supplemented with standard round yellow flashing beacons, for comparison purposes, before the RRFBs were installed. The data show very high rates of motorist "yield to pedestrians" compliance, mostly in the high 80s to close to 100 percent, in comparison to far lower rates (in the 15 to 20 percent range) for standard beacons.
- The very high yielding rates are sustained even after 2 years in operation, and no identifiable negative effects have been found.
- The RRFB's very high compliance rates are previously unheard of for any device other than a full traffic signal and a "HAWK" hybrid signal, both of which stop traffic with steady red signal indications.
- The St. Petersburg data also shows that drivers exhibit yielding behavior much further in advance of the crosswalk with RRFB than with standard round yellow flashing beacons.

These data clearly document very successful and impressive positive experience with the RRFBs at crosswalks in the City of St. Petersburg, Fl. Following the St. Petersburg report, The US *Manual on Uniform Traffic Control Devices* (MUTCD) gave interim approval to RRFBs for optional use in limited circumstances in July 2008. The interim approval allows for usage as a warning beacon to supplement standard pedestrian crossing warning signs and markings at either a pedestrian or school crossing; where the crosswalk approach is not controlled by a yield sign, stop sign, or traffic-control signal; or at a crosswalk at a roundabout.

In the interim approval memo dated July 16, 2008<sup>5</sup>, the MUTCD states that "*An RRFB shall not be used for crosswalks across approaches controlled by YIELD signs, STOP signs, or traffic control signals. This prohibition is not applicable to a crosswalk across the approach to and/or egress from a roundabout*". This allows the use of RRFBs at the roundabout approaches as well despite the fact that there hasn't been much research focused at the installation of RRFBs at roundabouts. One of the locations where RRFBs have been installed at roundabouts is Springfield, Oregon at Martin Luther King Jr. Pkwy in 2011<sup>6</sup>. The yield compliance details at this location were not available.

Following the interim approval of the RRFB device, The Federal Highway Administration (FHWA) published a brief safety bulletin<sup>7</sup> in May, 2009, in which it has highlighted the following potential benefits of RRFBs.

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<sup>5</sup> [http://mutcd.fhwa.dot.gov/resources/interim\\_approval/ia11/fhwamemo.htm](http://mutcd.fhwa.dot.gov/resources/interim_approval/ia11/fhwamemo.htm)

<sup>6</sup> [http://www.oregon.gov/ODOT/TD/TP\\_RES/docs/reports/2012/spr721pedreport.pdf](http://www.oregon.gov/ODOT/TD/TP_RES/docs/reports/2012/spr721pedreport.pdf)

<sup>7</sup> FHWA-SA-09-009, May 2009

- RRFBs are a lower cost alternative (approx. \$10,000 – \$15,000 per set i.e. 2 units – one on either side of road) to traffic signals and hybrid signals that are shown to increase driver yielding behavior at crosswalks significantly when supplementing standard pedestrian crossing warning signs and markings.
- An official FHWA-sponsored experimental implementation and evaluation conducted in St. Petersburg, Florida found that RRFBs at pedestrian crosswalks are dramatically more effective at increasing driver yielding rates to pedestrians than traditional overhead beacons.
- The novelty and unique nature of the stutter flash may elicit a greater response from drivers than traditional methods.
- The addition of RRFB may also increase the safety effectiveness of other treatments, such as the use of advance yield markings with YIELD (or STOP) HERE FOR PEDESTRIANS signs. These signs and markings are used to reduce the incidence of multiple-threat crashes at crosswalks on multi-lane roads (i.e., crashes where a vehicle in one lane stops to allow a pedestrian to cross the street while a vehicle in an adjacent lane, traveling in the same direction, strikes the pedestrian), but alone they only have a small effect on overall driver yielding rates.

The Florida Department of Transportation (FDOT) published a report in 2009<sup>8</sup> evaluating the installation of RRFBs on a busy four-lane, urban street where the Pinellas Trail crosses 22<sup>nd</sup> Avenue. The results of this study showed that trail user delay was reduced substantially and that drivers yielding to trail users increased from about 3% to 80% when the push-button was activated. It was interesting to note that trail users only activated the pushbutton 51% of the time.

A comprehensive study<sup>9</sup> that included sites in St. Petersburg Florida, Washington DC and Mundelein Illinois in 2010, found that yielding behavior increased dramatically when comparing RRFB installations with traditional overhead and side-mounted flashing beacons. Yielding during the baseline period before the introduction of the RRFB ranged between zero and 26 percent. Two years after the introduction of the RRFBs, the yielding ranged between 72 and 96 percent.

The Institute of Transportation Engineers (ITE), Midwest District, Wisconsin Section published Issue Paper 19<sup>10</sup>, regarding the positive operational experiences of RRFBs. The devices are introduced as an alternative to traditional overhead or side-mounted yellow flashing beacons, and in-roadway, “YIELD TO PEDESTRIAN” signs and lights.

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<sup>8</sup> Hunter, WW; Srinivasen, R; & Martell, CA. *Evaluation of the Rectangular Rapid Flashing Beacon at a Pinellas Trail Crossing in St. Petersburg Florida*. University of North Carolina, Highway Research Centre (2009)

<sup>9</sup> Shurbutt, J.; & Van Houten, R. *Effects of Yellow Rectangular Rapid-Flashing Beacons on Yielding at Multilane Uncontrolled Crosswalks*. McLean, VA: Federal Highway Administration (2010)

<sup>10</sup> ITE Midwest District, Wisconsin Section, Referenced on July 29 2013 at [http://www.itewisconsin.org/downloads/committees/Traffic\\_Engineering\\_Council/Issue\\_Papers/te%20Council%202011%20Rapid%20Flashing%20Beacon.pdf](http://www.itewisconsin.org/downloads/committees/Traffic_Engineering_Council/Issue_Papers/te%20Council%202011%20Rapid%20Flashing%20Beacon.pdf)



Five RRFB units were installed in the Town of Cary North Carolina at four crossing locations as part of the Town's "Greenway Mid-Block Pedestrian Crossing" project<sup>11</sup>. They were basing the RRFB installation on the findings of previous studies showing that the devices have been able to improve the rate at which drivers yield to pedestrians in the crosswalk from 10-20% to 70-85%, to support this safety project.

A study conducted by Texas A&M Transportation Institute<sup>12</sup> on driver yielding at 'Rectangular Rapid Flashing Beacons (RRFB)' together with Traffic Control Signals (TCS) and Pedestrian Hybrid Beacons (PHB) revealed that the driver yield compliance rates in all cases were above 85%. The percentages of drivers yielding to pedestrians were collected at 22 RRFB sites, 7 TCS sites and 32 PHB sites.

The study also found that those cities with a greater number of particular devices had higher driver yielding rates as compared to cities where the device was only used at a few crossings indicating that driver's familiarity with the device plays a major role. Comparing the number of days since installation revealed a statistically significant higher driver yielding rates for those devices that had been installed for a longer period of time. Relatively higher compliance rates were observed at sites with shorter crossing distances compared to longer ones, which may indicate that there may be a limitation on number of lanes where an RRFB device could be effectively used to improve driver yield compliance.

Another study conducted by Texas A&M Transportation Institute<sup>13</sup> and sponsored by FHWA to evaluate the effect of yellow rapid flashing beacon characteristics on the ability to detect objects located behind the sign during a closed course driving study concluded that fewer objects were missed when the beacons were located above the sign. Based on the study findings, the authors suggest that having the rectangular beacons located above the sign rather than below the sign should be considered. The study also found that when grouping the beacons by shape (i.e., rectangular versus circular), no significant difference was found.

The City of Calgary<sup>14</sup> did a trial of RRFB devices at eight locations in Calgary in 2012, and found that the devices improved the yielding behaviour in all cases to between 90 and 100%. The majority of locations where the driver yielding behavior to

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<sup>11</sup> Town of Cary NC, Referenced on July 29 2013 at [http://www.townofcary.org/Departments/Engineering/Streets\\_and\\_Sidewalks/Streets\\_Projects/flashing\\_beacon.htm](http://www.townofcary.org/Departments/Engineering/Streets_and_Sidewalks/Streets_Projects/flashing_beacon.htm)

<sup>12</sup> Fitzpatrick et al, Driver Yielding at Traffic Control Signals, Pedestrian Hybrid Beacons and Rectangular Rapid Flashing Beacons in Texas, TRB 2014 Annual meeting (2013)

<sup>13</sup> Fitzpatrick et al, Closed-course Study of Driver Detection of Pedestrians beyond Flashing Beacons within a Sign Assembly, TRB 2014 meeting (2013)

<sup>14</sup> J. Domarad, P.Grisak, J.Bolger. *Improving Crosswalk Safety: Rectangular Rapid-Flashing Beacon (RRFB) Trial in Calgary – Preliminary Technical Report*. Compendium of Papers of the CITE Annual Conference held in Calgary, Alberta (2013)

pedestrians were already high (mid 70 to 90 percent in most cases), experienced a consistent increase to over 90% (up to 100% in some cases).

A follow up yield compliance study conducted in June 2014 to examine the effectiveness of these devices after a year in operation revealed that the RRFBs continue to be highly effective in increased 'yield to pedestrian' compliance levels by motorists. Table 1 summarizes the Yield compliance results before and after RRFB installations as well as similar results from a follow up study.

*Table 1: Yield compliance results before and after RRFB installations in Calgary*

#	Location	Facility Type	Traffic Volume	Lanes	Speed (km/h)	Median	Yielding Percentage Before	Yielding Percentage After	Yielding Percentage After (Follow up)
1	Glenmore Trail/18 Street SE	Freeway Interchange Loop Ramp	10,208	1	50	-	81	100	95
2	Crowchild Trail/Shaganappi Trail NW	Freeway Interchange Channelized Right Turn Ramp	4,776	1	60	-	77	90	85
3	Sun Valley Boulevard/Sun Harbour Road SE	Multi-lane Arterial near a recreation area	8,098	5	60	Concrete	87	98	100
4	18 Street/Riverview Close/Riverwood Circle SE	Multi-lane Arterial	14,565	5	50	Concrete	74	100	95
5	Radcliffe Drive/100 Radcliffe Place SE	Collector within School Zone	7,479	2	30	-	84	99	100
6	Douglasdale Boulevard/Douglas Ridge Close SE	Collector within School Zone	6,051	2	30	Boulevard	94	99	100
7	Harvest Hills Boulevard/harvest Oak Drive NB	Multi-lane Arterial	11,306	2 1-way	50	Grassy	87	98	95
8	Harvest Hills Boulevard/harvest Oak Drive SB	Multi-lane Arterial	8,999	2 1-way	50	Grassy	83	96	93

While RRFBs were found extremely effective in positively affecting driver's yielding behavior, the reliability of solar panels to power the RRFB device has been an ongoing issue. The suppliers have been trying to come up with improved technologies for new installations to increase the reliability of solar power for RRFB operations throughout the year. City of Calgary is also moving forward with testing different alternate power sources (AC Power, Streetlight power and alarm system in case of power failure) to identify the best possible alternate to power the RRFB devices.

The approximate cost to install a traditional pedestrian-activated overhead flasher system (based on City of Calgary estimates) with a continuous power supply is

\$85,000. The average cost to install an RRFB is approximately \$25,000 and the cost to connect the RRFB to continuous power is approximated at \$20,000. The major cost difference between these two systems seems to come from the requirements to provide infrastructure (larger pole, base etc.) to the overhead flashers.



Figure 3: RRFB installed in a School Zone<sup>15</sup>

Although the RRFBs are not meant to replace the traditional overhead flashers, research around various jurisdictions in North America have shown that these side-mounted RRFBs are found to be equally effective compared to the traditional overhead systems in terms of yield compliance. The hierarchy and warrant process of this new pedestrian crossing control device is yet to be determined.

## 2.2 Existing Jurisdictional Experience

Canadian Jurisdictions: In order to get a sense of what the experience has been in Canadian jurisdictions with RRFB installations, a brief email survey was undertaken with the members of the project steering committee. The survey results indicated that a few jurisdictions such as: City of Calgary, Town of Milton, University of Calgary, City of Burnaby, City of Pitt Meadows, City of Maple Ridge, City of Langford, City of Saanich and District of north Vancouver have installed some RRFB devices. A few others have been discussing about installation of such devices but haven't done so because of regulatory issues.

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<sup>15</sup> City of Calgary

The experience has so far been mostly positive from those jurisdictions that have been using the RRFB devices. However, some are hesitant in adopting the device without TAC approval. A few concerns have been raised over the reliability of solar powered RRFB devices. Detailed survey results from Canadian jurisdictions can be found in Appendix B.

US Jurisdictions: A query was sent out on the ITE Community for Traffic Engineering members, to identify any additional experiences from their perspective. A few replies came back with some very detailed discussion:

City of San Jose, CA

- RRFBs were authorized for use in California starting in early 2012. San Jose created a Pedestrian Safety Enhancement Program to install enhancements at uncontrolled crosswalks along major roadways, with almost all treatments including RRFB installations. RRFBs have already been installed at 5 locations, with at least 30 more planned to be completed in 2014.
- RRFBs have been found to be very effective in grabbing drivers' attention. In addition, they have the option to have side indicators, which allow pedestrians to see that the beacons have been activated after pedestrian push buttons have been pushed. This had been a complaint in the past at locations where standard 12" flashing beacons had been installed
- City of San Jose does not have specific warrants for installation of RRFBs, but in general, they are being installed on roadways with high volume, high speeds (posted and actual) and almost all on multi-lane arterials. There are no plans to install any on residential roadways.
- As far as design guidelines, it has been a site-specific type of design, with roadways having existing raised medians or curves or room to place a median all leading to different installations. Since the installations are occurring at wider roadways, City of San Jose is striving to narrow the exposed crossing distances for pedestrians, installing median islands (if not already present) where the device can fit in (minimum 5-foot) or bulbouts/ chokers on the curbsides. Additional pole with beacons has been installed in the median to enhance their visibility to approaching vehicles. All installations have back-to-back beacons, meaning there are RRFBs on the left and right of traffic. This is done to avoid the situation where a tall vehicle in the slow lane yields, blocking the RRFB on the curb side, and an approaching vehicle in the fast lane (or 3rd lane on wider roads) cannot see the RRFB has been activated. This has also been done with old beacon installations, and it has helped a lot.

- City of San Jose strives to use only solar for installations, mainly because it helps to avoid getting a meter through electric utility. But it also means less trenching and easier/cheaper installation. There has been a rare instance where the crosswalk is located near a very large tree, rendering solar as unusable. In that case, RRFB has been installed onto a street light and tied into its AC power. Since they are only on sporadically throughout any day (and are LEDs), the power drain is very low.

#### Florida

- RRFB's are being used heavily in St. Petersburg and other locations throughout Florida.

#### City of Santa Monica, CA

- The City of Santa Monica was granted permission by the California Traffic Control Devices Committee (CTCDC) to experiment with both Rectangular Rapid Flashing Beacon (RRFB) device and Circular Rapid Flashing Beacon (CRFB) in March 2011. The experiment with the CRFB was also approved by the Federal Highway Administration (FHWA) on March 11, 2011.
- Both the Rectangular Rapid Flashing Beacon (RRFB) and Circular Rapid Flashing Beacon (CRFB) devices were installed in November 2011.



Figure 4: RRFB vs CRFB<sup>16</sup>

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<sup>16</sup> City of Santa Monica, CA

- The Santa Monica Boulevard (Principle arterial) & Princeton Street test site consists of a marked crosswalk on Santa Monica Boulevard across the uncontrolled eastern leg of the intersection. Stop controls are provided on Princeton Street, the minor side street approaches to Santa Monica Boulevard. The Santa Monica Boulevard & Stanford Street test site originally consisted of unmarked uncontrolled crosswalks on Santa Monica Boulevard. Stop controls are provided on Stanford Street, the minor side street approaches to Santa Monica Boulevard.
- The evaluation results generally show that both flashing beacon systems increase driver yielding response rates. The RRFB seems to result in a greater increase in driver yielding response than the CRFB, with about a 24% average increase for the RRFB versus an about 20% increase for the CRFB.
- The reports from the data collection team during the January 2012 evaluations indicate that amongst drivers who saw the pedestrian attempting the crossing, the flashing beacons seemed to legitimize the pedestrian crossing, and that drivers seemed to feel more compelled to let the pedestrian cross when the flashing beacons were activated rather when they were not activated. During the May 2012 evaluations, field observations suggest that drivers were generally much more aggressive than in the previous evaluations, and in November 2012 driver behaviour had calmed from May 2012 levels.

### **3. Conclusions and Recommendations:**

#### **Conclusions:**

The following conclusions were made after the thorough investigation of the existing practices on the RRFB installations, available literature review and subsequent discussions with the Project Steering Committee.

1. RRFBs have been widely used in the United States especially after the MUTCD gave interim approval for optional use in July 2008. The interim approval allows for usage as a warning beacon to supplement standard pedestrian crossing warning signs and markings at either a pedestrian or school crossing; where the crosswalk approach is not controlled by a yield sign, stop sign, or traffic-control signal. The prohibition is not applicable to a crosswalk across the approach to and/or egress from a roundabout.
2. A few Canadian jurisdictions have also used the RRFB device. However, as the device is not yet approved by TAC, many jurisdictions still hesitate to use it. There is no common standard for the use of RRFBs in Canada.
3. The benefits of RRFBs have been well documented by means of various case studies. In most cases, the increase in yield compliance by motorists has increased significantly compared to standard marked crosswalks.
4. Various studies have indicated that RRFBs significantly improve motorists' yield compliance levels compared to marked crosswalks; in most cases to the similar level as with the overhead flashers. However, the cost of RRFB installation is significantly lower than traditional overhead flashers. This indicates that RRFB could provide a more cost effective method to improve pedestrian safety at cross walks.
5. The reliability of solar power to operate the RRFBs seems to be one of the major issues that need to be addressed. Although new technologies to address the power issue are emerging, ongoing pilot studies in Calgary have focused on testing alternate means (AC power, Streetlight power and Alarm system in case of power failure) to power the devices.
6. The research conducted on the use of RRFBs up to this point in Canada has focused on the pilot projects that have been conducted around various jurisdictions; mostly in Calgary, performance of the device in terms of functionality, installation and operation/maintenance costs, feasibility of solar powered system vs hard-wire system in different weather conditions. In terms of operational effectiveness, the RRFB seems to be a viable traffic control device because of the greater driver yielding response than other traditional means.



## Recommendations:

1. Based on the research presented in the literature review indicating the benefits of RRFBs in improving pedestrian crossing safety, it is recommended that Rectangular Rapid Flashing Beacons (RRFB) be accepted as a traffic control device and be included in the *Manual of Uniform Traffic Control Devices for Canada*- fifth edition (see Appendix C for proposed changes to MUTCDC).
2. It is recommended that the RRFBs be limited to pedestrian-activated, side-mounted installations at marked and signed pedestrian or school crosswalks and roundabouts (See Figure 5 for typical installation). Since the increased visibility of the RRFBs is targeted at improving pedestrian crossing safety, applying them solely to crosswalks will ensure that the devices are associated by motorists with pedestrian movements only, and not with other warning applications.
3. Implementing Rectangular Rapid Flashing Beacons as component of a pedestrian crossing treatment will also require revisions to the *Pedestrian Crossing Control Guide* that should include details of the operation (brightness, flash frequency), layout (associated signs, configuration for various road geometrics – see Appendix A for RRFB technical specifications).
4. Review of the decision support tool for pedestrian crossing control to include RRFB was beyond the scope of this project. A separate funded project has been recommended to determine how RRFBs would fit into the decision support tool for pedestrian crossing control provided in the *Pedestrian Crossing Control Guide*. Updates to the Guide are pending approval of the RRFB as a traffic control device and development of guidance for the use of RRFB.



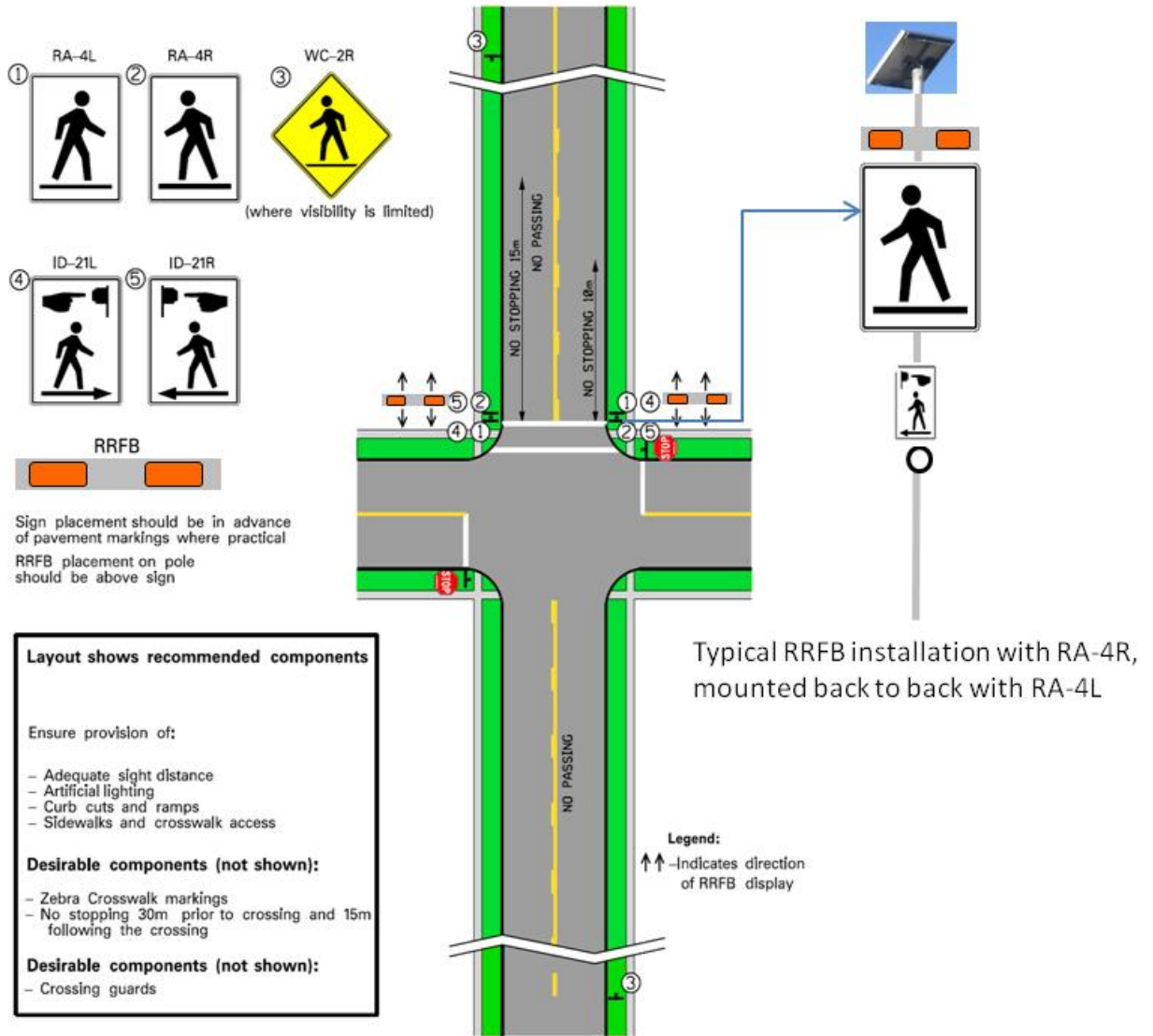


Figure 5: Typical RRFB installation

# Appendix A: RRFB Technical Specifications

## RRFB Technical Specifications:

Rectangular Rapid Flashing Beacons (RRFBs) are pedestrian-activated, high-intensity flashing beacons that warn drivers of the presence of a pedestrian in the crosswalk. RRFBs shall consist of two rapidly and alternately flashed rectangular amber indications having LED-array based pulsing light sources, and shall be designed and placed in accordance with the detailed requirements specified below.

- a. An RRFB shall consist of two rectangular-shaped amber indications, each with an LED-array based light source. Each RRFB indication shall be a minimum of 125 mm wide by 50mm high. The two RRFB indications shall be aligned horizontally, facing both directions of travel, with the longer dimension horizontal and with a minimum space of 175 mm between the two indications, measured from inside edge of one indication to inside edge of the other indication. The outside edges of the RRFB indications, including any housing, shall not project beyond the outside edges of the RA-4 or RA-3 sign.



- b. When activated, the two amber indications in each RRFB shall flash in a rapidly alternating "wig-wag" flashing sequence (left light on, then right light on).
- c. Each of the two amber indications of an RRFB shall have 70 to 80 periods of flashing per minute and shall have alternating but approximately equal periods of rapid pulsing light emissions and dark operation. During each of its 70 to 80 flashing periods per minute, the amber indications on the left side of the RRFB shall emit two slow pulses of light after which the amber indications on the right side of the RRFB shall emit four rapid pulses of light followed by a long pulse.
- d. The flash rate of each individual amber indication, as applied over the full on-off sequence of a flashing period of the indication, shall not be between 5 and 30 flashes per second, to avoid frequencies that might cause seizures.
- e. The light intensity of the amber indications shall meet the minimum specifications of Society of Automotive Engineers (SAE) standard J595

(Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles) dated January 2005.

- f. The RRFB shall be normally dark, shall initiate operation only upon pedestrian actuation, and shall cease operation at a predetermined time, after the pedestrian clears the crosswalk. However, if a pedestrian pushes the button while the flashers are in operation, the beacons should reset and flash for another cycle.
- g. All RRFBs associated with a given crosswalk shall, when activated, simultaneously commence operation of their alternating rapid flashing indications and shall cease operation simultaneously.
- h. Pushbutton should be used to actuate the RRFBs and the Pedestrian Pushbutton Sign (ID-21) should be mounted at each end of the crosswalk, directly above the pushbutton.
- i. RRFBs must flash for a minimum period of time, calculated as follows:
  - o Minimum flashing time = (Crossing distance/walking rate) + 5 seconds
  - o The walking rate should be in the range of 1m/s to 1.25m/s, but a lower rate may be used where local conditions of pedestrian characteristic demand
- j. A small light directed at and visible to pedestrians in the crosswalk should be installed integral to the RRFB or push button to give confirmation that the RRFB is in operation.

*Note: As the RRFBs are still new devices that have been used in a limited number of Jurisdictions, there have been numerous research and subsequent revisions by Federal Highway Administration (FHWA) in a bid to standardize the flash pattern. Acknowledging the fact that there might still be few more revisions based on the research outcomes, the above noted specifications have been proposed for consideration in the Canadian context.*

# Appendix B: Canadian Jurisdictional Experience

## Canadian Jurisdictional Experience

A brief email survey was undertaken with the members of the project steering committee that represent the following Canadian Jurisdictions:

Municipal Jurisdictions	Provincial Jurisdictions	Consulting Firms
City of Calgary	Alberta Transportation	Boulevard Transportation
Town of Milton	Nova Scotia DOT	CIMA+
City of Winnipeg		
City of Chilliwack		
City of Kelowna		
City of Cambridge		
City of Toronto		

The email questionnaire included the following questions:

1. Does your agency utilize any RRFB devices?
2. What type of equipment do you have?
3. What type of installation do you have (side-mounted, overhead-mounted, etc.)?
4. What is the roadway geometry of the installation?
5. What were the pedestrian crossing volumes prior to installation?
6. How was it decided to utilize these RRFBs (trial/pilot, warrant process, pedestrian accident history, and visibility issues)?
7. Did you undertake yielding compliance before/after studies?
8. How long have you used the RRFB devices?
9. Do you have technical specifications of the devices you use?
10. How are your devices powered (solar or hardwired)?
11. Do you use any other solar-powered devices?
12. What is your experience with solar-power reliability/maintenance?
13. Do you have any other feedback?

## Survey Results

### 1. Does your agency utilize any RRFB devices?

City of Calgary	Yes, we have implemented an eight location pilot project
Town of Milton	Yes, we have one at a school crossing as a test site. This device is on a timer and programmed to only work when the crossing guard pushes the ped button
City of Winnipeg	No
City of Chilliwack	No
City of Kelowna	No, pressure from one staff member to do so, however, not accepted do to some limitations and potential BC – MVA Regulations issues. We do use the fast flash round beacons for special crosswalks, some overhead but mainly side mounted
City of Cambridge	
City of Toronto	
Alberta Transportation	Yes! We have 2 sets that were installed by error
Nova Scotia DOT	
Boulevard (ICBC Installations)	Yes - City of Burnaby, City of Pitt Meadows, City of Maple Ridge, City of Langford , City of Saanich, District of North Vancouver
CIMA+ (City of Hamilton)	No
University of Calgary	Yes – 2 installed, more planned
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

### 2. What type of equipment do you have?

City of Calgary	Electromega, Trafco Canada, Fortran Traffic Systems, S&A Supplies
Town of Milton	RTC Manufacturing Inc
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	N/A
City of Cambridge	
City of Toronto	
Alberta Transportation	Carmanah Technologies - R920 with standard pedestrian crosswalk signs (RA-4)
Nova Scotia DOT	
Boulevard (ICBC Installations)	

CIMA+ (City of Hamilton)	
University of Calgary	Carmanah Technologies
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

3. What type of installation do you have? (side-mounted, overhead-mounted, etc.)?

City of Calgary	Side-mounted
Town of Milton	Side-mounted
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	We do use the fast flash round beacons for special crosswalks, some overhead but mainly side mounted. we have 30 locations with the round yellow pedestrian activated flashers
City of Cambridge	
City of Toronto	
Alberta Transportation	Side mounted with median back-to-back mounting
Nova Scotia DOT	
Boulevard (ICBC Installations)	Side-mounted on one or both sides of crosswalk, overhead-mounted on cantilevered structures
CIMA+ (City of Hamilton)	N/A
University of Calgary	Side-mounted, both side of xwalk, both directions
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

4. What is the roadway geometry of the installation?

City of Calgary	2 locations were 1-lane 1-way interchange ramps; 2 locations were 4-lane with a median; 1 location was 2-lane undivided collector; 1 location was 2-lane divided collector; 2 locations were 2 lane 1-way
Town of Milton	Local minor collector road, 1 lane per direction near a school
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	Varies from a two lane roads to 5 lane cross-sections
City of Cambridge	
City of Toronto	



Alberta Transportation	4 -lane divided highway intersection, median, semi-urban
Nova Scotia DOT	
Boulevard (ICBC Installations)	
CIMA+ (City of Hamilton)	N/A
University of Calgary	Single lane approach and 2 lane approach
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

5. What were the pedestrian crossing volumes prior to installation?

City of Calgary	Don't know
Town of Milton	Heavy during school entrance and dismissal times, as a crossing guard was warranted
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	Varied from 20 / hour to over 50 / hour. Getting to the 100 / hour then we look at half (ped activated) signal
City of Cambridge	
City of Toronto	
Alberta Transportation	Don't know
Nova Scotia DOT	
Boulevard (ICBC Installations)	
CIMA+ (City of Hamilton)	N/A
University of Calgary	
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

6. How was it decided to utilize these RRFBs (trial/pilot, warrant process, pedestrian accident history, and visibility issues)?

City of Calgary	Trial/ Pilot project
Town of Milton	Trial and visibility as school crossing is through a curve
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	Have resisted
City of Cambridge	

City of Toronto	
Alberta Transportation	Installed by default...politically driven
Nova Scotia DOT	
Boulevard (ICBC Installations)	
CIMA+ (City of Hamilton)	N/A
University of Calgary	
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

7. Did you undertake yielding compliance before/after studies?

City of Calgary	Yes - see table in report
Town of Milton	No
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	We do observations for motorists yielding to pedestrians in most cases
City of Cambridge	No
City of Toronto	
Alberta Transportation	
Nova Scotia DOT	
Boulevard (ICBC Installations)	
CIMA+ (City of Hamilton)	N/A
University of Calgary	
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

8. How long have you used the RRFB devices?

City of Calgary	Installed in 2012
Town of Milton	Installed Sept 2012
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	n/a
City of Cambridge	
City of Toronto	

Alberta Transportation	Installed Jan 2013
Nova Scotia DOT	
Boulevard (ICBC Installations)	
CIMA+ (City of Hamilton)	N/A
University of Calgary	Installed November 2012
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

9. Do you have technical specifications of the devices you use?

City of Calgary	Supplier specifications - Electromega, Trafco Canada, Fortran Traffic Systems, S&A Supplies
Town of Milton	Supplier specifications - RTC Manufacturing Inc
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	Not for RRFB
City of Cambridge	
City of Toronto	
Alberta Transportation	Carmanah Technologies - R920
Nova Scotia DOT	
Boulevard (ICBC Installations)	
CIMA+ (City of Hamilton)	N/A
University of Calgary	Carmanah Technologies
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

10. How are your devices powered (solar or hardwired)?

City of Calgary	Solar
Town of Milton	Solar
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	
City of Cambridge	
City of Toronto	
Alberta Transportation	Solar

Nova Scotia DOT	
Boulevard (ICBC Installations)	Solar
CIMA+ (City of Hamilton)	N/A
University of Calgary	Solar
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

11. Do you use any other solar-powered devices?

City of Calgary	Yes, portable DMS and iSLOWS
Town of Milton	Yes, School Zone Flashers
City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	Mainly solar powered, however, moving toward hardwiring for locations on arterial roads and where additional street lighting is required. Also due to some maintenance issues of solar panels at heavily used location and winter (less hours of daylight, snow cover & pedestrian usage). Some are dedicated power supply as they were part of a new road projects
City of Cambridge	
City of Toronto	
Alberta Transportation	Solar-powered beacons
Nova Scotia DOT	
Boulevard (ICBC Installations)	
CIMA+ (City of Hamilton)	We did use solar powered stop sign flashers in Hamilton, but they were relatively new, so I was not made aware of any reliability issues associated with their operation
University of Calgary	We are very happy with the devices – brightness and reliability
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

12. What is your experience with solar-power reliability/ maintenance?

City of Calgary	During winter months, each location required servicing over and above normal monthly maintenance (snow clearing (all), water damage (2), battery charging, push buttons (2),
Town of Milton	We have had no issues to date but have only been using solar power devices for about 1 - 1½ years

City of Winnipeg	N/A
City of Chilliwack	N/A
City of Kelowna	
City of Cambridge	
City of Toronto	
Alberta Transportation	Reliability is considered to be good based on comments received from the field
Nova Scotia DOT	
Boulevard (ICBC Installations)	
CIMA+ (City of Hamilton)	N/A
University of Calgary	No problems through one winter so far, no maintenance issues
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

13. Do you have any other feedback?

City of Calgary	RRFBs are effective, but solar power supply needs improvement
Town of Milton	
City of Winnipeg	
City of Chilliwack	
City of Kelowna	Hesitant to move to the RRFB, therefore, keenly waiting for this review and hence our involvement
City of Cambridge	
City of Toronto	
Alberta Transportation	None
Nova Scotia DOT	
Boulevard (ICBC Installations)	
CIMA+ (City of Hamilton)	
University of Calgary	
City of Pitt Meadows	
City of Maple Ridge	
City of Saanich	
District of North Vancouver	

# Appendix C: Recommended Changes to MUTCDC

## Recommended revisions to the MUTCDC

ADD a new section, preferably A6.6, “Rectangular Rapid Flashing Beacons” and subsequently make the following **changes in red**.

### **A6 PEDESTRIAN CROSSING CONTROL**

The description of pedestrian crossing control signs and devices and their application is organized as follows:

Section A6.1 General considerations for pedestrian crossing control

Section A6.2 Crosswalk lighting

Section A6.3 Crosswalk pavement markings

Section A6.4 Pedestrian crosswalks

Section A6.5 School crosswalks

**Section A6.6 Rectangular rapid flashing beacon crosswalks**

Section **A6.7** Special crosswalks (pedestrian crossovers, pedestrian corridors)

Section **A6.8** Traffic control signals at pedestrian crossings

Section **A6.9** School and playground areas

Section **A6.10** Other pedestrian signs

Section **A6.11** Accessible pedestrian signals

### **A6.1 GENERAL CONSIDERATIONS FOR PEDESTRIAN CROSSING CONTROL**

The challenge of providing safe crossing control and protection for pedestrians may be particularly complex, especially for children and senior citizens. Considerable public pressure may be exerted from various organizations, including parent and community groups, for the installation of signs, signals and pavement markings for these purposes.

The Manual does not attempt to deal with regulations. The signs presented can be adapted to various types of prevailing regulations. Normally, in designing for a given situation, a combination of regulatory signs, warning signs, pavement markings and sometimes traffic control signals will be required.

There are four categories of pedestrian crosswalks. Generally, the category should be selected only after an engineering study has considered all aspects, such as: vehicular traffic volumes and speeds; pedestrian volumes, types and delays; collision experience; visibility conditions; proximity of adjacent traffic control devices; road alignment and geometry; and the availability of an adequate adjacent sidewalk or walkway system.

The pedestrian crosswalk categories are as follows:

- (a) Crosswalks which use ground-mounted signs:
  - (i) Pedestrian Crosswalk (A6.4);
  - (ii) School Crosswalk (A6.5); and
  - (iii) **Rectangular Rapid Flashing Beacon Crosswalk;**
- (b) Special Crosswalk (A6.7);
- (c) Pedestrian Signals (A6.8); and
- (d) Full Traffic Control Signals.

Add the following to Section A6 PEDESTRIAN CROSSING CONTROL
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### **A6.6 Rectangular Rapid Flashing Beacon Crosswalks**

A Rectangular Rapid Flashing Beacon Crosswalk is a pedestrian or school crosswalk installed with the following additional features:

- a) Rectangular Rapid Flashing Beacon on both sides of the road
- b) Pedestrian Pushbutton Sign (ID-21) on both sides of the road
- c) RRFB Crosswalk Actuation Indicator on both sides of the road

Typical installation of the crosswalk markings, side mounted signs, advance warning signs where visibility is limited, pedestrian push button with signs and Rectangular Rapid Flashing Beacons are shown in FIGURE A6-1. An RRFB shall not be used for crosswalks across approaches controlled by YIELD signs, STOP signs, or traffic control signals. This prohibition is not applicable to a crosswalk across the approach to and/or egress from a roundabout.

Where there is a limited visibility of the crosswalk area, the Pedestrian Crosswalk Sign (WC-16) should be installed 50m to 100m in advance of the pedestrian crosswalk. The School Crosswalk Ahead Sign (WC-16) should be used in the school area with limited visibility. A no stopping regulation, in effect all times, must be implemented for a minimum of 15m on each approach to the crossing, and 10m following the crossing. In addition, a passing restriction on single lane approaches as well as lane change prohibition on multiple lane approaches using solid white line should be implemented. The recommended length of solid line is dependent on approach speed.



The RRFB Crosswalk should be supplemented with the following signs where applicable:

- a) Pedestrian Crosswalk Sign (RA-4)
- b) Pedestrian Crosswalk Ahead Sign (WC-2)
- c) A6.6.3 School Crosswalk Sign (RA-3)
- d) A6.6.4 School Crosswalk Ahead Sign (WC-16)
- e) A6.6.5 Pedestrian Pushbutton Sign (ID-21)

TYPICAL RECTANGULAR RAPID FLASHING BEACON INSTALLATION

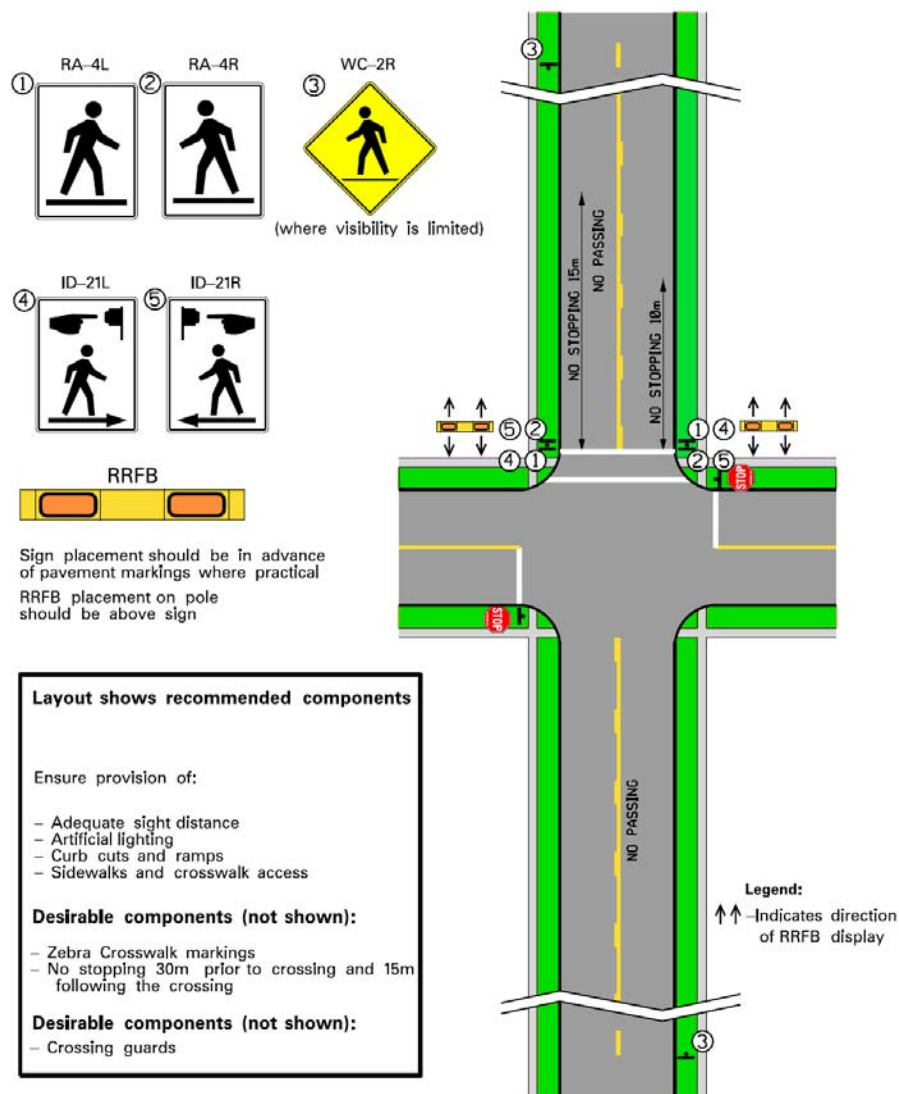


Figure A6-1

Add the following to Section B1.5.4 PEDESTRIAN SIGNAL INDICATIONS

**B1.5.4.6 RRFB Crosswalk Actuation Indicator**

A small light directed at and visible to pedestrians in the crosswalk should be installed integral to the RRFB or push button to give confirmation that the RRFB is in operation. Pedestrians may enter the crosswalk when the lights are visible.

Add the following to Section B3.2 VISIBILITY OF TRAFFIC CONTROL SIGNALS

**B3.2.5 Flash Rate for Rectangular Rapid Flashing Beacons**

When activated, the two amber indications in each RRFB shall flash in a rapidly alternating "wig-wag" flashing sequence (left light on, then right light on). Each of the two amber indications of an RRFB shall have 70 to 80 periods of flashing per minute and shall have alternating but approximately equal periods of rapid pulsing light emissions and dark operation. During each of its 70 to 80 flashing periods per minute, the amber indications on the left side of the RRFB shall emit two slow pulses of light after which the amber indications on the right side of the RRFB shall emit four rapid pulses of light followed by a long pulse.

The flash rate of each individual amber indication, as applied over the full on-off sequence of a flashing period of the indication, shall not be between 5 and 30 flashes per second, to avoid frequencies that might cause seizures. The light intensity of the amber indications shall meet the minimum specifications of Society of Automotive Engineers (SAE) standard J595 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles).

Add the following to FIGURE B3.9

**24. RRFB Indication (125 mm x 50 mm)**



Add the following to Section B3.4 SIZE, COLOUR AND SHAPE OF TRAFFIC CONTROL SIGNAL LENSES

#### **B3.4.2 Rectangular Rapid Flashing Beacon Indications**

An RRFB shall consist of two rectangular-shaped amber indications, each with an LED-array based light source. Each RRFB indication shall be a minimum of 125 mm wide by 50mm high.

The two RRFB indications shall be aligned horizontally, facing both directions of travel, with the longer dimension horizontal and with a minimum space of 175 mm between the two indications, measured from inside edge of one indication to inside edge of the other indication. The outside edges of the RRFB indications, including any housing, shall not project beyond the outside edges of the RA-4 or RA-3 sign. Except as otherwise provided above, all other provisions of the MUTCDC applicable to Warning Beacons shall apply to RRFBs.

Add the following to Section B3.5 POSITION OF TRAFFIC CONTROL SIGNAL INDICATIONS

#### **B3.5.1 Rectangular Rapid Flashing Beacon**

For any approach on which RRFBs are used, two RA-4 (Pedestrian) or two RA-3 (School) crossing signs (each with RRFB and Pushbutton Sign ID-21) shall be installed at the crosswalk, one on the right-hand side of the roadway and one on the left-hand side of the roadway. On a divided road, the left-hand side assembly should be installed on the median, if practical, rather than on the far left side of the roadway.

An RRFB shall not be installed independent of the crossing signs for the approach the RRFB faces. The RRFB shall be installed on the same support as the associated RA-4 (Pedestrian) or RA-3 (School) crossing sign. The RRFB shall be placed above the Pedestrian (or School) crossing sign.

# Typical RRFB Installation

