

2015

## TRANSPORTATION ASSOCIATION OF CANADA

### DECADE OF ACTION ROAD SAFETY AWARDS

This submission nominates the **Road Improvement Program (RIP)**, an initiative of the Insurance Corporation of British Columbia (ICBC), for the TAC Special Road Safety Award, focusing on two pillars of the U.N. Decade of Action for Road Safety:

- **Pillar 1: Road Safety Management**
- **Pillar 2: Safer Roads and Mobility**

This application provides information on:

1. Overview of the Road Improvement Program
2. Program History
3. National and International Context of this Application
4. Road Improvement Program Achievements
5. RIP Contributions to Road Safety:
  - 5.1 Technical and Funding Assistance to Municipalities
  - 5.2 Funding Assistance to the Ministry of Transportation
  - 5.3 Proactive Funding of Road Safety and VRU Initiatives
  - 5.4 Signing and Marking Reviews
  - 5.5 Municipal Road Safety Audit Program
  - 5.6 Research
6. The Future of the Road Improvement Program

#### 1. OVERVIEW OF THE ROAD IMPROVEMENT PROGRAM

*The Road Improvement Program (RIP), part of ICBC's multi-sectoral Road Safety Management initiative, develops and leads a host of safety projects promoting Safer Roads and Mobility. Celebrating 25 years in 2015, the RIP partners with road authorities in BC to provide engineering/technical advice and funding (\$130M since inception) for safer road infrastructure. The RIP coordinates with ICBC's education and enforcement initiatives (currently targeting Impaired Driving, High-Risk Driving, and Driver Distractions) and specialists on Safer Vehicles, VRUs, and Youth.*

The RIP:

- *promotes the safe operation of existing road infrastructure through investment and leveraging, using evidence-based criteria to identify promising sites. RIP investments encourage our partners to undertake and/or expand the scope of road safety initiatives.*

#### RIP GOALS

The goals of the Road Improvement Program are:

- to reduce the frequency and severity of collisions through the introduction of engineering interventions, as part of the annual retrofit programs.
- to reduce the road safety risk for road users by implementing engineering interventions targeted to prevent collisions, as part of the annual proactive program.
- for projects with a quantifiable safety benefit, to achieve a minimum 50 percent internal rate of return for road improvement projects over the expected service life of the measure.

## ROAD IMPROVEMENT PROGRAM: BY THE NUMBERS

**\$8 million:** program's annual budget since 2005 (\$130M since program inception in 1990)

**5.6 to 1:** two-year benefit-cost ratio of RIP improvements as reported in the most recent evaluation

**5** road safety engineers employed full time to work with municipal and provincial partners

### IN 2014:

**80** municipal partners were assisted with RIP cost-share funding

**446** municipal and provincial projects benefitted from RIP cost-sharing

**14** Road Safety Audits for municipal road projects were conducted by RIP engineers

**122** projects aimed specifically at pedestrian safety were co-funded by the RIP program

- *provides leadership in the safety industry:* US and Canadian insurers have modelled similar infrastructure improvement/investment programs on the RIP
- *provides leadership in the community:* working with local safety committees and providing expertise in smaller communities that lack transportation/safety engineering capability
- *is forward-thinking:* being instrumental in introducing roundabouts and Road Safety Audits in BC, and supporting cutting-edge road safety research such as UBC's video-based traffic conflict technique
- *works alongside ICBC's educators, user-behaviour specialists, and enforcement* to achieve the multi-sectoral approach that characterizes the ICBC Road Safety Program.

## 2. PROGRAM HISTORY

The RIP is a constantly-evolving initiative to develop and lead the delivery of road safety at the provincial and municipal levels.

- The RIP started in 1990 with a mandate to make roadways safer for all users, thereby reducing insurance losses.
- Since 2011, it has expanded to include:
  - proactive funding of meritorious safety projects at sites having little or no previous crash history
  - a program of municipal RSAs conducted by RIP traffic safety engineers
  - municipal workshops to improve signs and markings.

## 3. INTERNATIONAL AND NATIONAL CONTEXT OF THIS APPLICATION

In 2010, the United Nations General Assembly proclaimed 2011-2020 to be the Decade of Action for Road Safety. The goal of the initiative is to stabilize and then reduce traffic fatalities through:

- developing and implementing sustainable road safety strategies and programmes
- strengthening management infrastructure and the capacity for technical implementation of road safety activities

- o encouraging increased funding for road safety and better use of existing resources, including through ensuring a road safety component within road infrastructure projects.

As demonstrated below, the Road Improvement Program is an example of the successful application of these strategies. In British Columbia, through a combination of many efforts by many agencies, including the RIP, traffic fatalities have steadily declined year over year from 329 in 2009 to 245 in 2013 (the most recent year for which finalized data is available).

The Road Improvement Program aligns with two approaches supported by the UN Decade of action:

- a “safe systems” approach, which underlies the entire Road Improvement Program, aims at developing a road system that is better able to accommodate human error and vulnerable road users
- the Road Improvement Program is an illustration of the UN’s call for *nongovernmental organizations and the private sector to be included in the development and implementation of activities* that will help meet the Decade’s goals of reduced fatalities.

The Road Improvement Program also aligns with Canada’s *Road Safety Strategy 2015*. The Road Improvement Program, which is embedded within ICBC’s larger Road Safety program that brings educational and enforcement initiatives to address road safety, aligns with the Canadian Road Safety Strategy 2015 in its holistic, coordinated “safer systems” approach that targets road users, vehicles, and infrastructure. This “safer systems concept” recognizes the interdependencies that exists between these elements.

#### 4. ROAD IMPROVEMENT PROGRAM: ACHIEVEMENTS

	Pillar 1 Road Safety Management	Pillar 2 Safer Roads and Mobility
contribution to field of road safety	<p>Since <u>January 2011</u> (the start of the UN Decade of Action):</p> <ul style="list-style-type: none"> <li>• \$30.2M spent on cost-sharing on municipal and provincial projects and studies to improve road safety</li> <li>• 169 BC communities in which the RIP provided funding assistance for road safety improvements</li> <li>• 1,430 projects in which the RIP cost-shared</li> <li>• 54 Road Safety Audits by RIP road safety engineers</li> </ul>	<p>See 5.1 through 5.6 below for examples of Road Improvement Program contributions to safer roads and mobility throughout BC.</p>

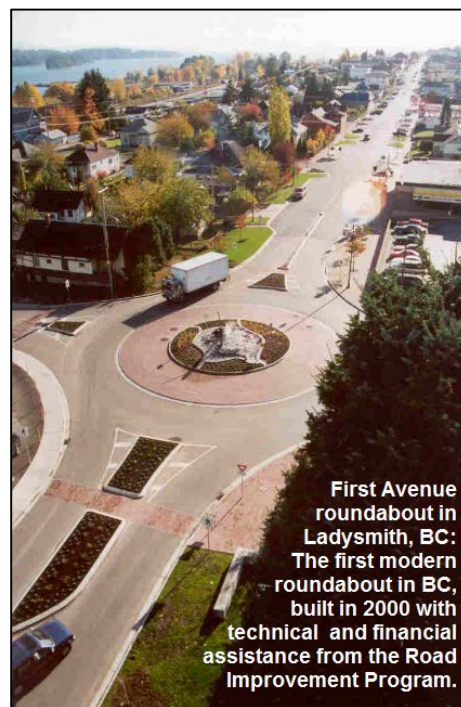
	Pillar 1 Road Safety Management	Pillar 2 Safer Roads and Mobility
innovation	<p>The RIP is itself an innovative partnering between insurance and municipal/provincial road authorities. It has supported, through funding and staff time, road-safety innovations such as those below and at right:</p> <ul style="list-style-type: none"> <li>• introducing RSAs (Road Safety Audits) in Canada</li> <li>• developing and introducing the Traffic Conflict Technique to identify safety issues “on the ground”</li> <li>• partnering in development and dissemination of Crash Prediction Models for BC</li> <li>• High Risk Corridor initiative</li> </ul>	<p>Since its inception, the RIP has supported through cost-sharing in the dissemination of the following innovations:</p> <ul style="list-style-type: none"> <li>• reflective signal backboards,</li> <li>• Diamond Grade sheeting,</li> <li>• UPS (uninterrupted power supply) for signals,</li> <li>• LED signal heads,</li> <li>• speed-activated signals,</li> <li>• tensioned median cable barrier,</li> <li>• profiled pavement markings,</li> <li>• modern roundabouts</li> <li>• modified right turn channelization</li> </ul>
national and/or international dissemination and adoption	<p>The RIP has been emulated by:</p> <ul style="list-style-type: none"> <li>• AAA Michigan’s “Road Improvement Demonstration Program”</li> <li>• State Farm “Dangerous Intersections” program</li> <li>• Saskatchewan Government Insurance cost-sharing program</li> </ul>	
realized road safety benefits	<p>A series of post-implementation time series evaluations have shown that investments in road safety are cost-effectively implemented by the RIP, such that the reduction in claims costs due to the road improvement is much greater than the capital costs associated with the implementation of the improvement. RIP program evaluations conducted in 1997, 1998, 1999, 2001, 2006, and 2009 have shown two-year benefit/cost ratios ranging between 4.4-to-1 and 8-to-1. In many cases, the safety benefits of the road improvement projects extend well beyond a two-year service life, resulting in much higher benefit/cost ratios, and a significant and positive net present value of road safety improvement projects.</p> <p>The most recent (2009) RIP program evaluation used an Empirical Bayes evaluation method, and was conducted in conjunction with UBC Engineering Department. The evaluation incorporated comparisons of the treatment group sides with a comparison group (to correct for confounding factors of history and maturation) and with reference group sites (to generate CPMs and, together with Empirical Bayes refinement procedures, address the regression to the mean). The evaluation results are summarized below.</p>	

	Pillar 1 Road Safety Management	Pillar 2 Safer Roads and Mobility		
<b>Note that the 2014 RIP program evaluation results are not yet finalized, but early draft results from the 2014 evaluation are consistent with the 2009 results summarized below.</b>				
<b>2009 realized road safety benefits</b>	urban intersections	rural highway segments	all sites	
	42 sites	60 sites	102 sites	
<b>collision reductions</b>				
reduction in severe crashes (fatal + injury)	20.1%	19.5%	19.6%	
reduction in PDO crashes (property damage only)	9.1%	16.6%	11.9%	
<b>benefit/cost evaluation results</b>				
B/C over two years	5.6 to 1	5.7 to 1	5.6 to 1	
B/C over five years	12.7 to 1	13.0 to 1	12.8 to 1	

### 5.1 ROAD IMPROVEMENT PROGRAM CONTRIBUTION TO ROAD SAFETY: TECHNICAL AND FUNDING ASSISTANCE TO MUNICIPALITIES

*The Road Improvement Program has built sustained partnerships with over 100 municipalities in BC, ranging in size from large to small, to bring about change for road safety through technical assistance and cost-sharing.*

Road authorities typically have a wide range of objectives and constraints to consider when developing and delivering road projects. As a result, road safety can sometimes be compromised by political, operational, and budgetary considerations. RIP works with its municipal partners to identify road safety as an important objective, elevate the priority of road safety projects, and reduce crashes at high risk locations.



Through the RIP, ICBC has invested significantly in road safety engineering partnerships with municipalities throughout the province to reduce the frequency and/or severity of crashes and reduce claims costs. The RIP meets its objectives by assisting municipalities in a number of ways:

- helps identify high crash locations by providing crash data and tools for analysis
- encourages and assists municipalities to expand proposed road improvements to include safety upgrades

- assists with funding road safety improvements based on a business-case benefit/cost analysis reflecting expected crash reduction and reduced claims costs
- provides “proactive funding” for meritorious safety improvements at low- or no-crash sites that do not meet business-case criteria, independent of any expectation of reduced claims costs (see 5.3 below)
- provides in-service road safety reviews and design-stage Road Safety Audits free of charge to municipalities (see 5.5 below)
- offers programs to improve road safety, including:
  - Signing and Pavement Marking workshops (since 2013) to review these low-cost forms of guidance in smaller communities, identify deficiencies, and formulate a strategy for addressing them with RIP assistance (see 5.4 below)
  - assistance with the purchase of speed reader boards and UPS (uninterruptible power supply) upgrades for signals
  - large-scale STOP sign infill program (resulting in an reduction in neighborhood crashes of about 50 percent)
  - sign upgrade program to upgrade from Engineering Grade sign sheeting on regulatory and warning signs
  - roundabout program to provide technical expertise and funding for construction of modern roundabouts
  - traffic signal upgrade program (in conjunction with BC Power Smart program) to upgrade signals to 300mm LED displays

RIP assistance is particularly valuable to smaller communities where resources and staff expertise related to road safety are limited.

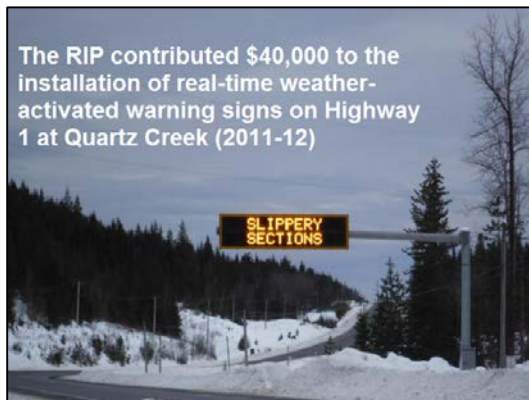
**ATTACHMENT 2** contains feedback on the value that our municipal and provincial partners attach to the Road Improvement Program.



**Bottom Wood Lake Road (Lake Country, BC):** Photos show corridor improvements made in 2014, using a \$53,000 contribution from the Road Improvement Program.

*For additional before/after images of collaboration projects, see ATTACHMENT 1.*

The RIP contributed \$40,000 to the installation of real-time weather-activated warning signs on Highway 1 at Quartz Creek (2011-12)



## A POSITIVE EXAMPLE FOR PROVINCES AND TERRITORIES

“ICBC’s Road Improvement Program is a positive example for the provinces and territories across the country. With ICBC’s contributions, the Ministry was able to advance more road safety projects. These projects improved road safety at many intersections, highway sections, and bridges throughout the province and also helped ICBC manage escalating claims costs. This strong partnership should continue to further the safety mandates of both agencies. Together, and through coordinated efforts in engineering, enforcement, and education, more will be achieved in the future to make our roads safer.”

*Dirk Nyland, P.Eng., Chief Engineer,  
BC Ministry of Transportation and  
Infrastructure*

### 5.2 ROAD IMPROVEMENT PROGRAM CONTRIBUTION TO ROAD SAFETY: FUNDING ASSISTANCE TO PROVINCIAL MINISTRY OF TRANSPORTATION

*The Road Improvement Program has built a sustained partnership with the provincial Ministry of Transportation and Infrastructure to bring about change for road safety through cost-sharing and research partnerships.*

Through the RIP, ICBC has invested significantly in road safety engineering partnerships with municipalities throughout the province to reduce the frequency and/or severity of crashes and reduce claims costs. The RIP meets its objectives by assisting municipalities in a number of ways:

- assists with funding road safety improvements based on a business-case benefit/cost analysis reflecting expected crash reduction and reduced claims costs
- provides “proactive funding” for meritorious safety improvements at low- or no-crash sites that do not meet business-case criteria, independent of any expectation of reduced claims costs
- assists with system-wide countermeasures known to improve safety, including:
  - barrier upgrades,
  - centreline and shoulder rumble strips,
  - signal improvements with UPS (uninterrupted power supply) upgrades
- assists with deployment of innovative measures such as:
  - LED-enhanced signing, including enhanced chevron signs
  - real-time weather-activated warning system (right).

### 5.3 ROAD IMPROVEMENT PROGRAM CONTRIBUTION TO ROAD SAFETY: PROACTIVE FUNDING OF ROAD SAFETY AND VRU INITIATIVES

*Pillar 2 of the UN’s Decade of Action identifies the need to “raise the inherent safety and protective quality of road networks for the benefit of all road users, especially the most vulnerable”. While it is important to reduce the frequency and severity of collisions at known problematic locations, it is also important to work to reduce road safety risks associated with vulnerable road users, as well as at locations having obvious safety issues but with few or no recorded crashes.*

The RIP instituted a Proactive Road Safety program in 2013 in response to the needs municipal and provincial partners. Many of our partners were creating or increasing funding for vulnerable road user (VRU) projects. These projects typically addressed the mobility needs of cyclists and pedestrians in response to sustainable transportation strategies, but did not necessarily address a demonstrated safety problem. To promote the Program's ability to promote safe accommodation of vulnerable modes and fund meritorious projects at low- or no-crash locations, the RIP program allocated 25 percent of its budget to a Proactive Road Safety program that allocates funding independently of any business-case benefit/cost analysis.

In 2014, \$1.85M of the approximately \$8.6M spent on road safety projects was allocated to projects funded under the Proactive Road Safety program, representing 179 projects and collaboration with the Ministry and 49 municipal partners.



**Auchinachie Road at Tansor School (North Cowichan):** The new sidewalk in the photo was installed in 2014 with cost-sharing (\$10,000) from the RIP Proactive funding envelope. Although no collisions were reported in the 5 years prior to installation, construction of the sidewalk was supported to enhance safety for children walking to and from school.

#### 5.4 ROAD IMPROVEMENT PROGRAM CONTRIBUTION TO ROAD SAFETY: ROAD SIGN AND MARKINGS REVIEWS

*Signing and pavement markings that are consistent with provincial and TAC standards help to enhance road safety. However, many smaller communities struggle to keep pace with evolving standards and practices. To address this issue, the RIP initiated a Sign and Markings Review program to provide the means for these communities to upgrade their signs and markings to a consistent standard.*

In 2013, the RIP initiated a Road Sign and Markings Review program for smaller communities. Participating communities receive:

- a workshop for municipal staff involved with sign and marking design, installation, and maintenance, to identify key manuals and procedures, highlight areas requiring local interpretation, discuss best practices, and set direction for policies and procedures
- a practical guide for sign and marking installation based on the workshop, as well as a report detailing a set of recommendations arising out of a field review of the municipality's signs and pavement markings
- funding assistance to implement these recommendations.

Since the introduction of the Road Sign and Markings Review program, 20 municipalities have participated in the program. Upgrades arising out of the Reviews have begun, generating over \$52,000 worth of signing and marking improvements, of which ICBC underwrote over \$33,000.



## 5.5 ROAD IMPROVEMENT PROGRAM CONTRIBUTION TO ROAD SAFETY: MUNICIPAL ROAD SAFETY AUDIT PROGRAM

*Road Safety Audits (RSAs) are a key element of the framework for Pillar 2 of the UN Decade of Action, being explicitly identified in three of the six Pillar 2 Activities that participating countries are encouraged to implement in the UN's "Global Plan for the Decade of Action for Road Safety 2011-2020". That document notes that effective road safety initiatives include "designing safer roads and requiring independent road safety audits for new construction projects".*

A Road Safety Audit (RSA) is a formal, independent safety performance review of a road transportation project by an experienced team of safety specialists, addressing the safety of all road users. Road Safety Audits were introduced in the 1990s in BC under the combined leadership of ICBC and the Ministry of Transportation, and are currently required for provincial projects above a defined threshold.

To promote the widespread use of RSAs at the *municipal* level, the RIP currently provides a Municipal RSA program providing audits at no cost to requesting municipalities. The purpose of the RSA program is to provide municipal engineers with exposure to the RSA process and results, as a way of encouraging the wider adoption of RSAs for municipal projects.

Audits are conducted by the RIP Road Safety Audit Team, formed from the RIP engineers. RIP Road Safety Audit team members include two engineers who provided early leadership in the introduction of RSAs in Canada and the United States, including a principal author of the TAC *Canadian Road Safety Audit Guide*. The RIP provided funding and steering committee input to TAC and CITE for *Canadian Guide to In-Service Road Safety Reviews*.



In 2014, the RIP Road Safety Audit team conducted 14 audits for 13 road authorities in the province, ranging from roundabout designs to Complete Streets conversions.

## 5.6 ROAD IMPROVEMENT PROGRAM CONTRIBUTION TO ROAD SAFETY: RESEARCH

*Pillar 2 (Activities 5 and 6) of the UN's "Global Plan for the Decade of Action for Road Safety 2011-2020" calls for participating countries to "encourage capacity building and knowledge transport in safe infrastructure by creating partnerships with ... education providers and the private sector" and to "encourage research and development in safer roads by ... promoting demonstration projects to evaluate safety improvement innovations..."*

Besides typical road safety projects, the RIP has been a strong partner with the Ministry of Transportation in developing engineering tools and improving the road safety engineering profession and practice. The Ministry's *Crash Prediction Models for BC* and *Collision Modification Factors for BC* document emerging methodologies that approach safety proactively and ensure that road safety is

an explicit priority in transportation planning and design. The RIP was a funding partner on the studies above, and sponsored subsequent workshops for Ministry staff and consultants.

In addition to its work with the Ministry, the RIP has sponsored research on:

- safety benefits of rumble strips
- safety benefits of larger signal heads
- safety benefits of highly reflective signs and pavement markings
- safety benefits of modern roundabouts
- investigation of automated traffic conflict analysis using video sensors (with UBC)
- identification of driver-related accident prone locations.

The RIP has also published safety-related guidance documents for free distribution:

- *Safety Design Guidelines for Parking Facilities* (1998, currently being updated)
- *British Columbia Community Traffic Manual* (1999, updated in 2002).

## 6. THE FUTURE OF THE ROAD IMPROVEMENT PROGRAM

Looking ahead, much will change in British Columbia and Canada when it comes to driving, including:

- population growth and densification of urban areas
- emergence of vehicle technologies (crash avoidance, telematics, safety features)
- increased use of data and analytics to change driver behaviour
- growth of sophisticated policing tools and strategies
- continued evolution of legislative approaches to addressing road risks.

These developments will change how drivers, roads, and vehicles interact with one another, meaning that road safety strategies will need to adapt. The RIP cannot rest on 25 years of success, but must instead find new approaches to evolve our understanding of road technologies and countermeasures. The RIP will look for creative ways to integrate their work with other road safety initiatives, including driver-based awareness and enforcement program and safer vehicle initiatives.

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## **ATTACHMENTS**

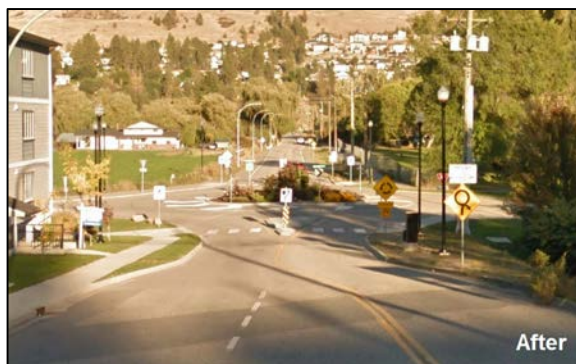
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|--------------|---|
| Attachment 1 | Examples of Municipal Road Improvement Projects co-funded by the Road Improvement Program |
| Attachment 2 | Program Feedback from Municipal and Provincial Partners (2014)                            |

**ATTACHMENT 1**

**EXAMPLES OF MUNICIPAL ROAD IMPROVEMENT PROJECTS  
CO-FUNDED BY ROAD IMPROVEMENT PROGRAM**



**Craigflower Bridge (View Royal, BC):** Photos show corridor improvements (added vehicle and cycling lanes, improved pedestrian facility, improved lighting) made in 2013/14, using a \$250,000 contribution from the Road Improvement Program.



**Intersection of Lodge Road and Bottom Wood Lake Road (Lake Country, BC):** Photos show a modern roundabout constructed in 2012 as part of corridor upgrades, using a \$102,400 contribution from the Road Improvement Program.



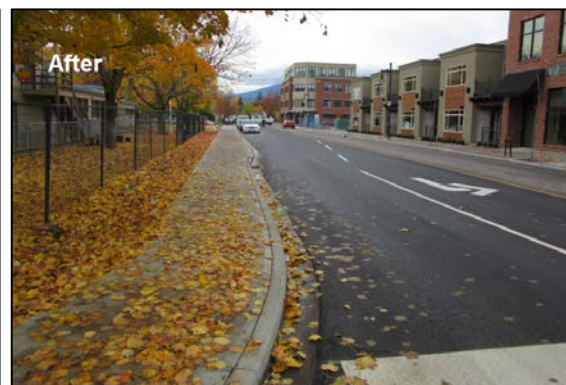
**King George Boulevard, 98B Ave to Fraser Hwy (Surrey, BC):** Photos show corridor improvements (installation of median fence to reduce jaywalking) made in 2014, using a \$25,000 contribution from the Road Improvement Program.



**Intersection of Goldstream Avenue and Peatt Road (Langford, BC):** Photos show signal upgrades (protected left turns and pedestrian countdown heads) made in 2014, using a \$17,000 contribution from the Road Improvement Program.



**Ladner Trunk Road, Hwy 17 to 64 St (Delta, BC):** Photos show corridor improvements (revisions to laning) made in 2013, using a \$41,000 contribution from the Road Improvement Program.



**Raymer Avenue (Kelowna, BC):** Photos show new sidewalk constructed in 2014, using a \$5,000 contribution from the Road Improvement Program's Proactive funding envelope.



**Resthaven Drive at Ardwell Avenue (Sidney, BC):** Photos show pedestrian crossing improvements (median island and side-mount pedestrian flashers) made in 2014, using a \$6,000 contribution from the Road Improvement Program.

## ATTACHMENT 2

### PROGRAM FEEDBACK FROM MUNICIPAL AND PROVINCIAL PARTNERS (2014)

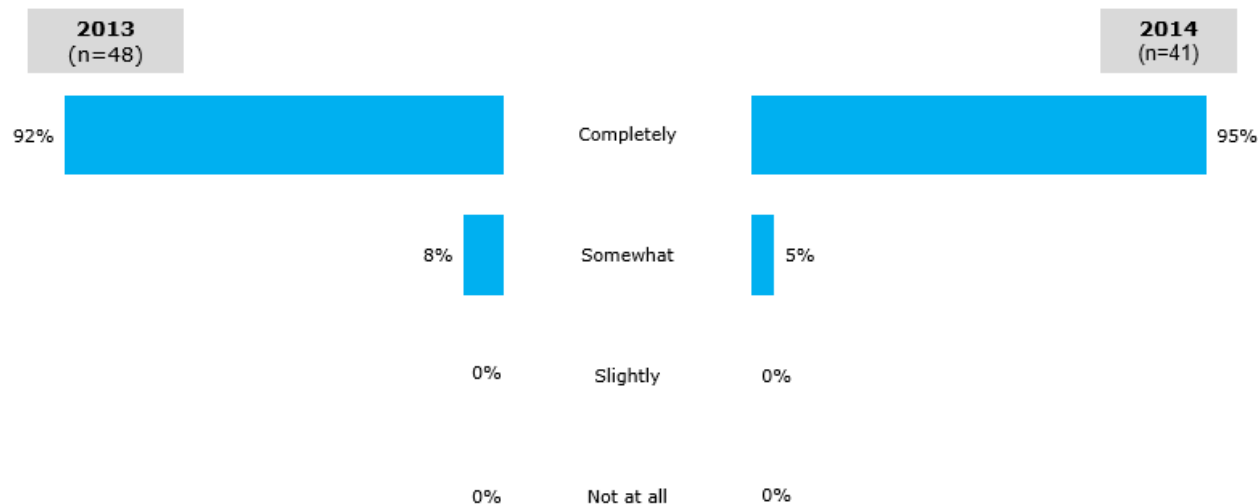
The RIP team evaluates each year’s road safety work to make sure that the program supports and contributes to making roads safer in the community. To gather 2014 feedback, a survey was hosted on ICBC’s *Shifting Gears* panel in December 2014.

In total, 103 road authority partners were invited to take part in the survey. Of these, 41 completed surveys were collected, resulting in a completion rate of 40 percent. A total sample size of 41 completed surveys provides a margin of error of +/-11.9% nineteen times out of twenty.

The results of the survey are presented in the following pages, and represent the views of our municipal and provincial partners regarding the Road Improvement Program.

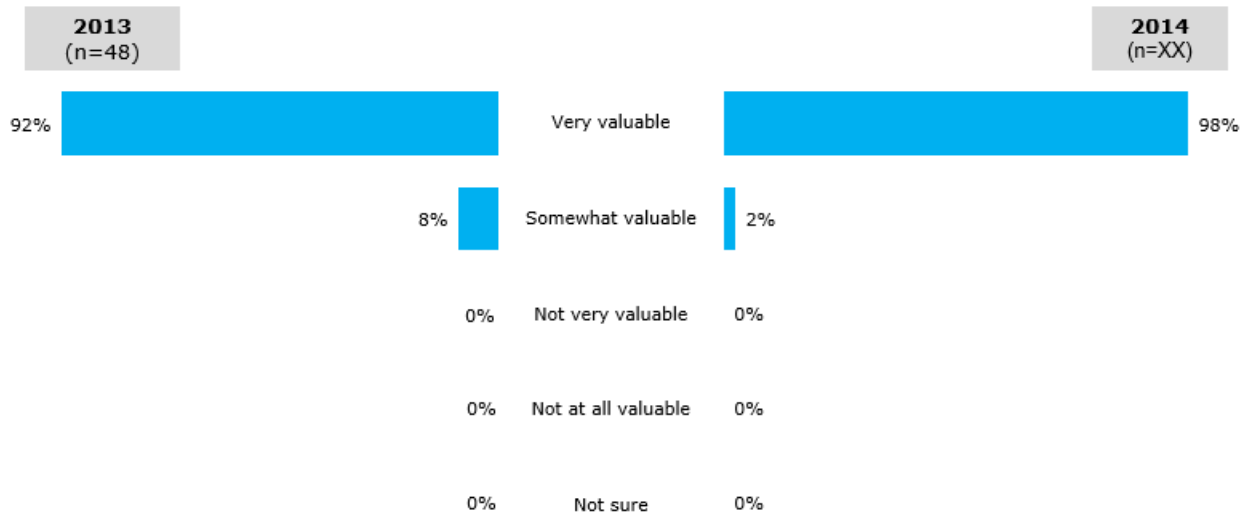
### Received Suitable Support from Road Improvement Program

- Positively, almost all partners continue to feel that their road authority received suitable support from the program.



## Value of Funding of Proactive Road Improvement Projects

- Same as last year, all partners continue to value the program's funding for proactive road improvement projects.



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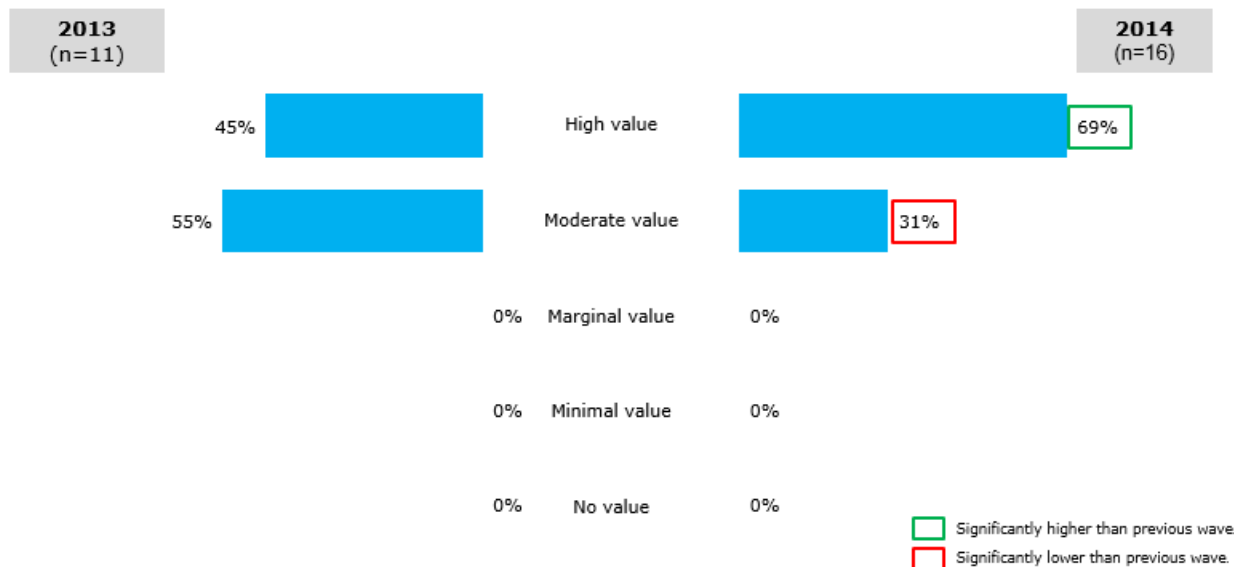
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3. In 2013, the Road Improvement Program started to provide funding for 'Proactive' road improvement projects, such that funding was not linked directly to a history of collisions but rather to the potential to prevent future collisions. The collision prevention program allowed funding to be provided for projects that would not normally receive Road Improvement Program funding. In your opinion, how valuable do you believe this is to the Road Improvement Program? *BASE: All respondents.*



## Value of Road Safety Audit

- Encouragingly, significantly more Road Safety Audit participants rate the overall value of the program as high compared to 2013.



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5. How would you rate the overall value of the Road Safety Audit undertaken by ICBC staff to identify safety issues and to recommend potential solutions for your project? *BASE: All respondents who had Road Safety Audit undertaken by ICBC Road Improvement Program staff.*

## Attitude Toward Road Improvement Program

- There are no significant changes in terms of partners' perceptions of the Road Improvement Program's ability to help make roads and infrastructure safer. A strong majority continue to completely agree the program meets this goal.

**The support provided by the Road Improvement Program helped to make roads and infrastructure safer.**

