

#201, 8506 – 200th Street Langley, BC V2Y 0M1 T: 604.371.0091 F: 604.371.0098



## New Westminster Intersection Safety Review

CARSP Conference, Halifax, NS  
June 8, 2016 (Wednesday)

Borg Chan, M.Sc., P.Eng., PTOE, FITE  
Manager, Traffic Engineering  
and Road Safety  
ISL Engineering and Land Services Ltd.

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 [islengineering.com](http://islengineering.com)

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# Presentation Agenda



- Background and Introduction
- Study Objectives and Methodology
- Study Area and Road Network
- Phase 1 – Preliminary Analysis
- Phase 2 – Safety Strategy Development
- Phase 3 – Updated Road Safety Plan
- Next Steps and Lesson Learned



Holmes Street at Columbia Street (Eastbound)





- The City of New Westminster (the City) approved 2014 MTP, which has a focus on vulnerable road users, sustainable modes and safety
- City continues to work closely with all its partners to exam locations and contribution factors of collisions
- With support from ICBC, City is updating safety review regularly, and acting on recommendations



Red-light Camera at 8<sup>th</sup> Street Westbound





## Clients:

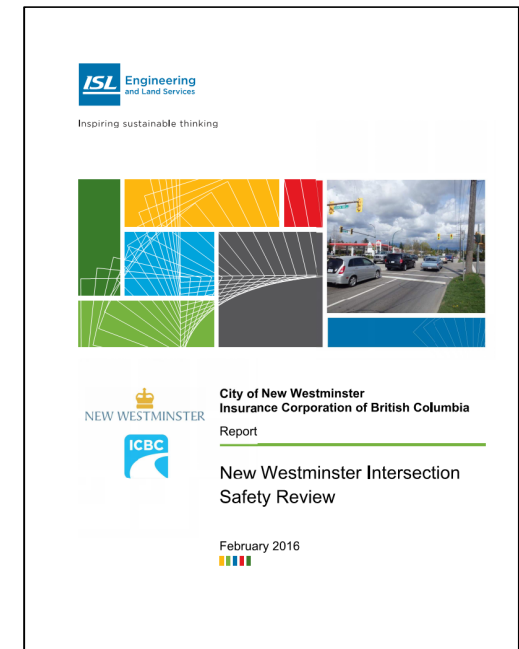
## Consultant:

(Road Safety Engineering)

## Project:



in association with





# Study Objectives



- Undertake road safety improvements for road users within the City's road network
- Ensure the updated road safety plan continues to meet the needs of all road users
- Identify common safety issues/trends
- Develop City-wide and site-specific countermeasures

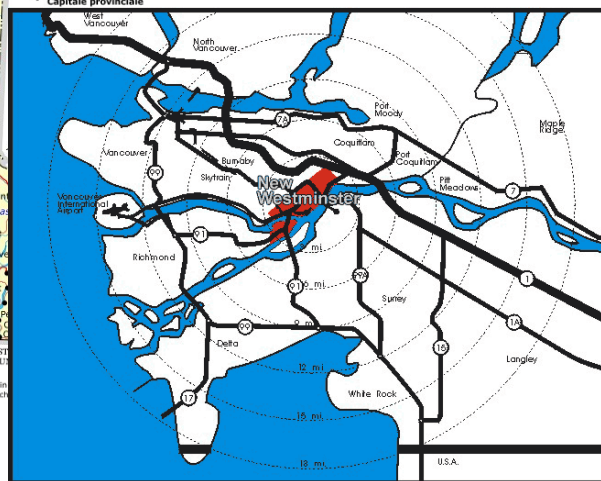


Special Crosswalk at 8<sup>th</sup> Street North Leg





LEGEND / LÉGENDE  
○ Provincial capital / Capitale provinciale

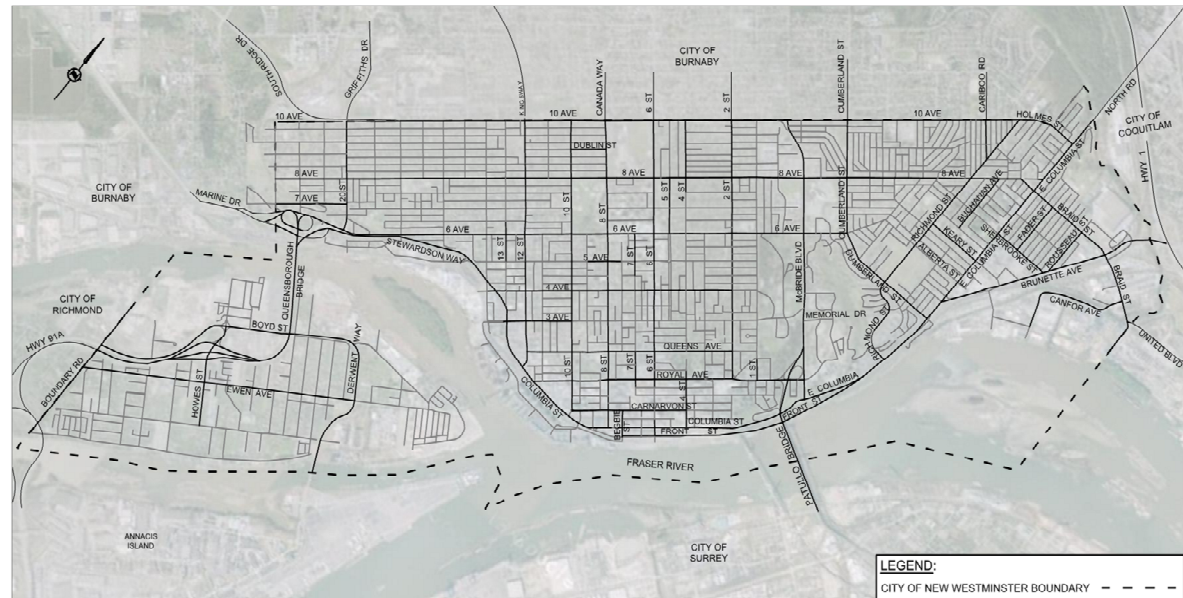


One of oldest cities in Western Canada (1858)  
Capital of BC from 1858 to 1871 (to Victoria)  
Area = 15.63 sq. m  
Population = 66,000 (2011)





- Dense and compact
- Historically small city
- One of major transportation hubs in Metro Vancouver
- A gap in the regional/provincial road network
- Significant hit traffic-wise due to the location in region

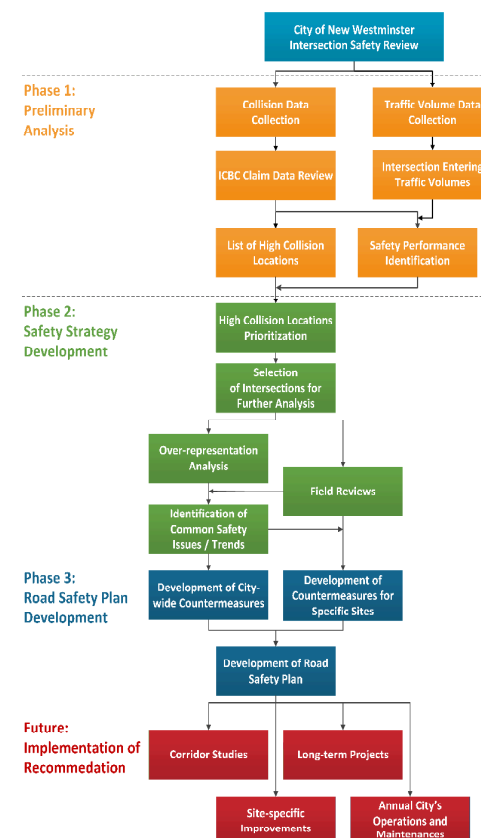


New Westminster Intersection Safety Review Study has three phases:

- Phase 1 – Preliminary Analysis
- Phase 2 – Safety Strategy Development
- Phase 3 – Road Safety Plan Development

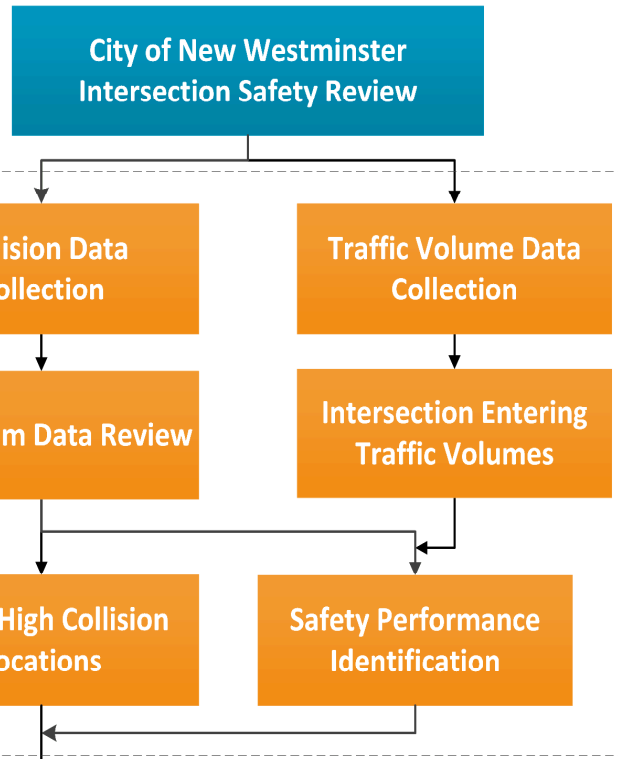
Technical Memorandum/Reports and Review Meeting provided at the end of each phase

Future: Implementation of Recommendation





# Phase 1: Preliminary Analysis



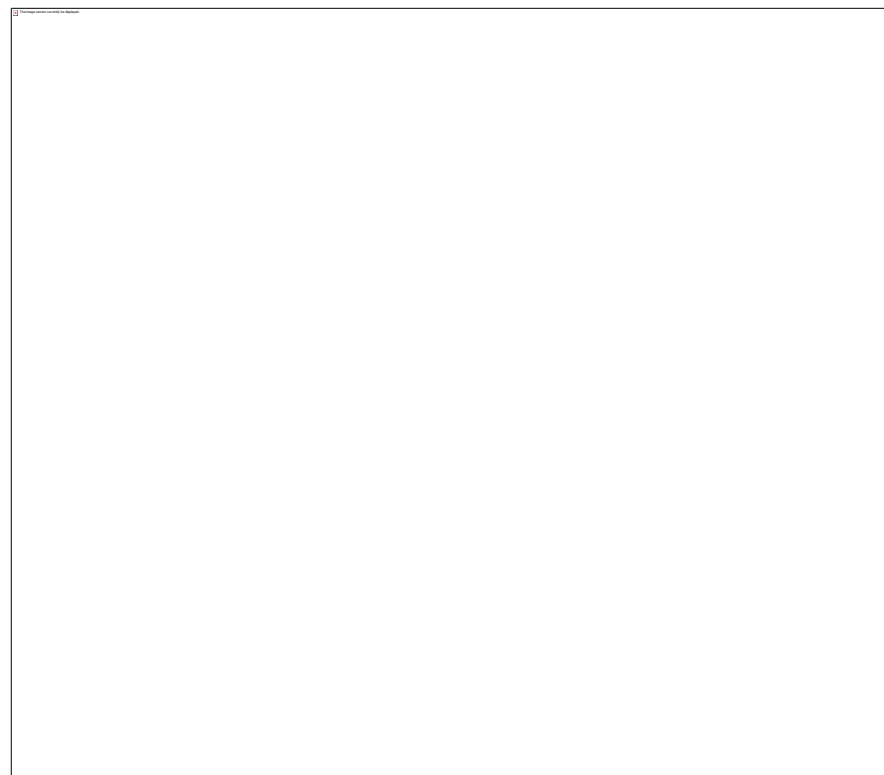
- Collision Data Collection
- Insurance Corporation of British Columbia (ICBC) Claim Data Review
- Traffic Volume Data Collection
- Intersection Entering Traffic Volumes Estimation
- List of High Collision Locations Development
- Safety Performance Identification
- Technical Memorandum 1



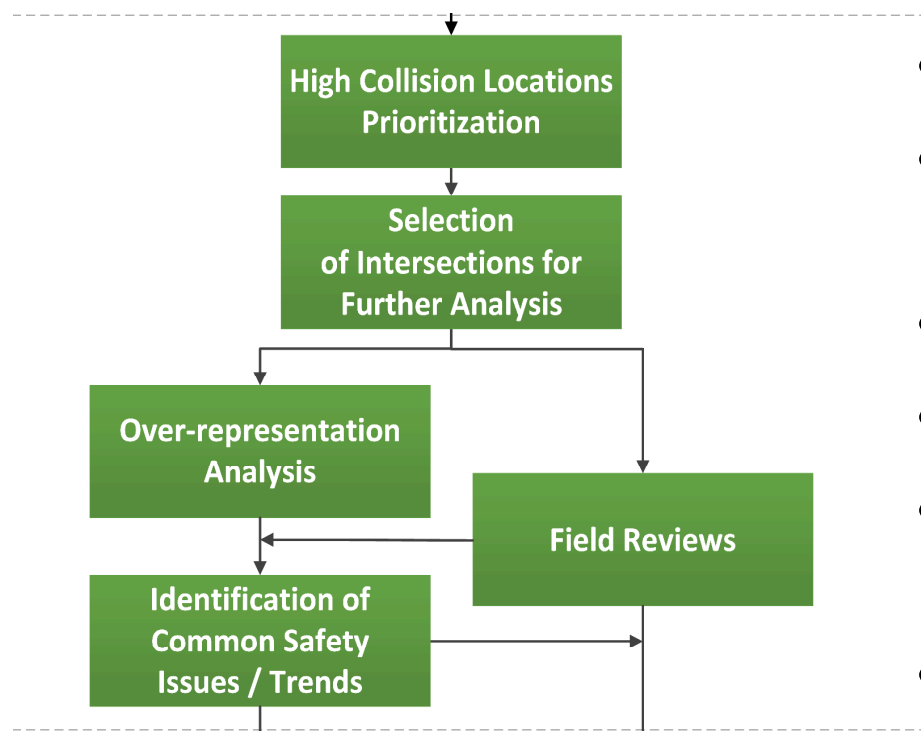


- Collision Frequency – Probability
- Determine ranking of high collision locations:
  - Number of 5-year collisions
  - Annual Average Collision Cost (\$31,000 for casualty and \$2,900 for property damage only)
  - Collision Rate (annual collision/entering volumes)
  - Critical Collision Rate Index:  $\frac{|R - R_c|}{R_c}$

$$R_c = R_a + K \sqrt{\frac{R_a}{AADT \times R_{TV} \times R_{MEV}}} + \frac{1}{2 \times AADT \times R_{TV} \times R_{MEV}}$$



## Phase 2 – Safety Strategy



- High Collision Location Prioritization
- Selection of Intersections for Further Analysis
- Over-representation Analysis
- Field Reviews
- Identification of Common Safety Issues/Trends
- Technical Memorandum 2



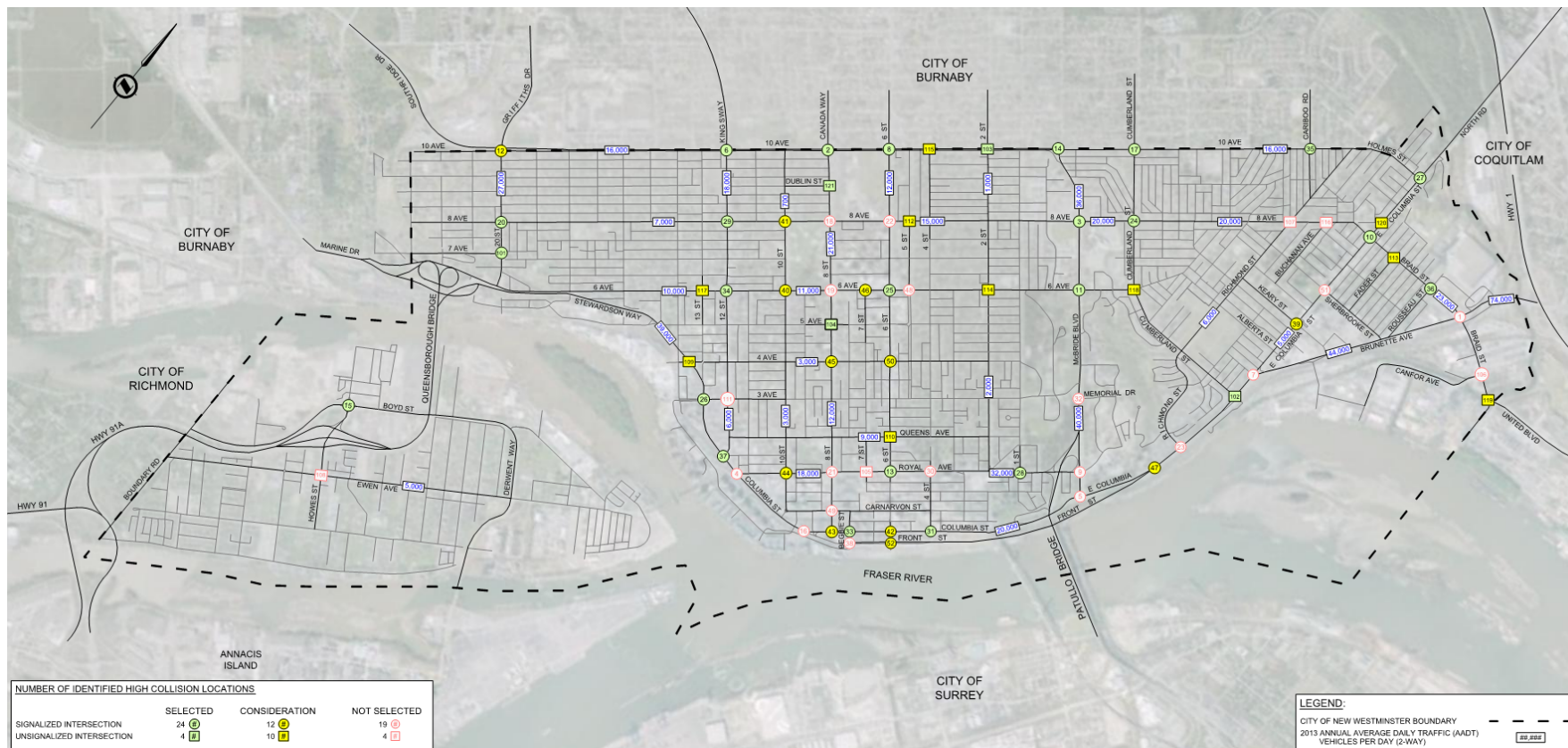


- The 50 high collision intersections were Prioritized and selected using:
  - Critical Collision Rate Index > 1.00
  - High Pedestrian-related Collisions
  - High Cyclist-related Collisions
  - High Annual Average ICBC Cost
  - Resident Comments and Requests
- 28 intersections (24 signals and 4 unsignalized) were selected for further review

Selected Intersection		Ranking			Selected Reason
ID	Name	Collision Frequency (Five-year)	Average Annual ICBC Cost (Five-year)	Critical Collision Rate Index	
2	8 <sup>th</sup> Street and 10 <sup>th</sup> Avenue	2	2	5	Critical Collision Rate Index > 1.00
3	McBride Boulevard and 8 <sup>th</sup> Avenue	3	3	6	Critical Collision Rate Index > 1.00
6	12 <sup>th</sup> Street and 10 <sup>th</sup> Avenue	6	5	8	Critical Collision Rate Index > 1.00
8	6 <sup>th</sup> Street and 10 <sup>th</sup> Avenue	8	6	12	High Pedestrian-related Collisions
10	Columbia Street and Braid Street	10	11	10	Critical Collision Rate Index > 1.00
11	McBride Boulevard and 6 <sup>th</sup> Avenue	11	9	18	High Pedestrian-related Collisions
13	6 <sup>th</sup> Street and Royal Avenue	13	12	21	High Collision Frequency
14	McBride Boulevard and 10 <sup>th</sup> Avenue	14	14	26	High Collision Frequency
15	Howes Street and Boyd Street	15	16	7	Critical Collision Rate Index > 1.00
17	Cumberland Street and 10 <sup>th</sup> Avenue	18	17	19	High Collision Frequency
20	20 <sup>th</sup> Street and 8 <sup>th</sup> Avenue	21	21	14	High Collision Frequency
24	Cumberland Street and 8 <sup>th</sup> Avenue	25	22	36	High Collision Frequency
25	6 <sup>th</sup> Street and 6 <sup>th</sup> Avenue	28	30	28	High Pedestrian-related Collisions
26	Stewardson Way and 3 <sup>rd</sup> Avenue	29	27	54	High Collision Frequency
27	Columbia Street and Holmes Street	31	28	38	High Pedestrian-related Collisions
28	1 <sup>st</sup> Street and Royal Avenue	32	31	50	High Collision Frequency
29	12 <sup>th</sup> Street and 8 <sup>th</sup> Avenue	33	34	49	High Collision Frequency
31	4 <sup>th</sup> Street and Columbia Street	35	37	40	High Collision Frequency
33	Begbie Street and Columbia Street	37	33	29	High Collision Frequency
34	12 <sup>th</sup> Street and 6 <sup>th</sup> Avenue	38	42	59	High Collision Frequency
35	Cariboo Road and 10 <sup>th</sup> Avenue	39	43	39	High Collision Frequency
36	Rousseau Street and Braid Street	40	41	51	High Collision Frequency
37	12 <sup>th</sup> Street and Stewardson Way	41	39	70	High Average Annual ICBC Cost
101	20 <sup>th</sup> Street and 7 <sup>th</sup> Avenue	17	15	11	Critical Collision Rate Index > 1.00
102	Columbia Street and Cumberland Street	27	32	22	High Collision Frequency
103	2 <sup>nd</sup> Street and 10 <sup>th</sup> Avenue	30	24	25	High Collision Frequency
104	8 <sup>th</sup> Street and 5 <sup>th</sup> Avenue	44	35	20	High Average Annual ICBC Cost
121	8 <sup>th</sup> Street and Dublin Street	74	73	72	High Cyclist-related Collisions



# Prioritization and Selection



- Preliminary field review
- Photographs, videos, and site observation notes
- Detailed review
- Using the *TAC Site Visit Sample Observation Report*
- Walk-about for all approaches
- Vehicle drive-through



Limited Visibility of Signal Head



Steep Gradient



Upstream Lane Drop



Missing Object Markers sign

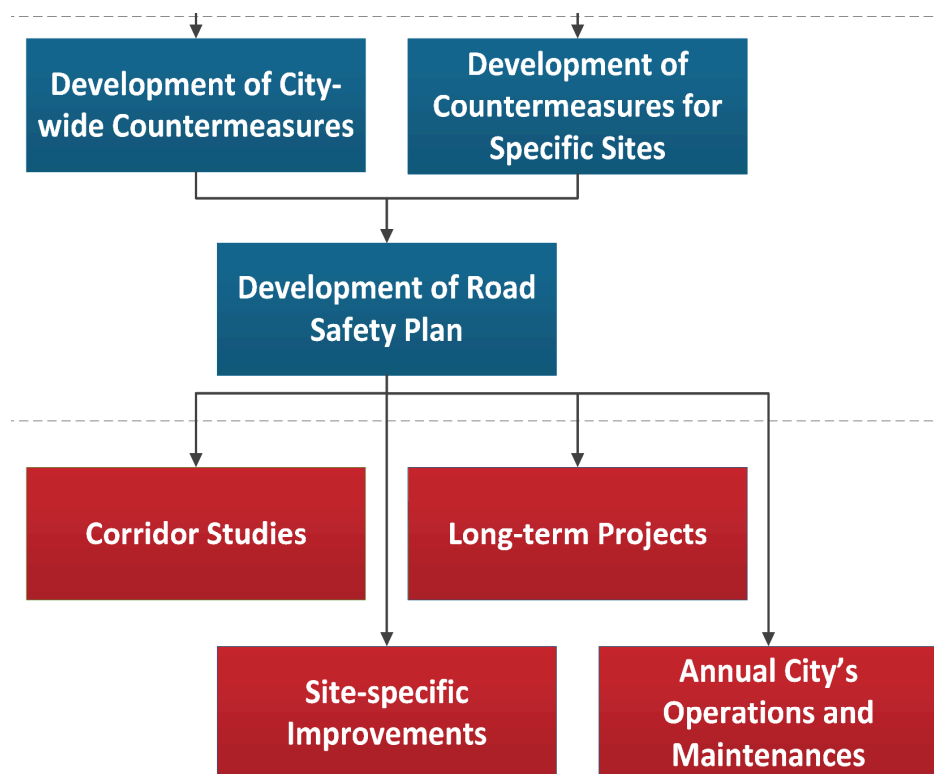


# Common Safety Issues/Trends



Selected Intersection			Identified Safety Issues																																												
			Operational									Geometric									Signal					Vulnerable User					Other				TOTAL												
ID	Name	Type	Vehicle speeding	Vehicular violations (red-light-running, u-turn, etc)	Significant heavy vehicle volume(s)	High through volume(s) and queue(s)	High left-turn volume(s) and queue(s)	Considerable lane changing/weaving	Vehicles turning prohibition(s)	On-street parking close to intersection	Traffic operation conflict(s)	Bus stop(s) close to intersection	SUBTOTAL	Dual left-turn lanes	Lack of left-turn bay(s)/lane(s)	Wide channelized right-turn lane(s)	Designated right-turn bay(s)/lane(s)	Lane drop(s) before/after intersection	Horizontal curve(s) on approach(es)	Steep gradient(s) on approach(es)	Misaligned approaches	Wide lane(s)	Wide curb radius	Access(es) close to intersection	Wide raised/painted median(s)	Inadequate roadside barrier(s)	SUBTOTAL	Inadequate traffic signal head(s)	Left-turn phase(s) without left-turn bay(s)/lane(s)	Presence of split phases	Lack of left-turn phase(s)	Limited traffic signal head(s) visibility	SUBTOTAL	Substantial crossing pedestrian volume(s)		Traffic-pedestrian/cyclist operation conflict(s)	Inadequate pedestrian/cyclist connection(s)	Wide intersection (long pedestrian crossing distance(s))	Narrow pedestrian sidewalk(s)	Short pedestrian clearance interval	Poor sight distance to crossing pedestrians	SUBTOTAL	Faded/Missing pavement marking	Missing road sign(s)	Poor pavement surface	Inadequate street lighting	SUBTOTAL
2	8 <sup>th</sup> Street and 10 <sup>th</sup> Avenue	Signalized		✓	✓	✓	✓	✓					5				✓							✓	✓			4		✓				1	✓		✓							2	16		
3	McBride Boulevard and 8 <sup>th</sup> Avenue	Signalized	✓		✓	✓	✓	✓				✓	4				✓			✓					✓			3					✓	1				✓						0	10		
6	12 <sup>th</sup> Street and 10 <sup>th</sup> Avenue	Signalized	✓		✓	✓	✓	✓				✓	6					✓					✓	✓				4	✓	✓				2	✓										2	16	
103	2 <sup>nd</sup> Street and 10 <sup>th</sup> Avenue	Pedestrian Signal	✓				✓		✓				3		✓												3							0					✓		✓	✓	✓	3	10		
104	8 <sup>th</sup> Street and 5 <sup>th</sup> Avenue	Special Crosswalk											0								✓					1	✓		✓				1	✓						✓	✓	✓	2	5			
121	8 <sup>th</sup> Street and Dublin Street	Pedestrian Signal	✓			✓		✓	✓	✓			5												✓		1						✓	1	✓			✓	✓	✓				3	12		
TOTAL			15	7	16	27	12	15	7	10	2	5	##	2	6	3	8	4	4	17	3	12	2	10	4	2	77	6	3	1	4	19	33	15	4	8	10	5	1	14	57	5	13	1	14	33	316





- Development of City-wide Countermeasures
- Development of Countermeasures for Specific Sites
- Development of Road Safety Plan Update
- New Westminster Intersection Safety Review Report
- Next Steps: Future Considerations



- Immediate  
(less than 1 year)
- Short-term  
(between 1 to 3 years)
- Medium-term  
(between 3 to 5 years)
- Long-term  
(after 5 years)

Identified Issues	Suggested Countermeasures			
	Immediate (<1 year)	Short-term (1-2 years)	Medium-term (3-5 years)	Long-term (>5 years)
High through volume(s) and queue(s)	<ul style="list-style-type: none"> <li>- Optimize signal coordination along commuter routes</li> <li>- Increase police enforcements on turning and truck restrictions</li> <li>- Enlarge secondary signal head and provide yellow back boards</li> </ul>	<ul style="list-style-type: none"> <li>- Enhance enforcement on red-light-running violations</li> <li>- Extend left-turn storage, need to review on case-by-case basis</li> </ul>	<ul style="list-style-type: none"> <li>- Review the need for left-turn lanes at intersections without left-turn lanes</li> </ul>	<ul style="list-style-type: none"> <li>- Implement measures to encourage modal shift</li> <li>- Manage the major/internal road network to reduce high through traffic volume as per the City's 2014 Master Transportation Plan</li> </ul>
Limited traffic signal head(s) visibility	<ul style="list-style-type: none"> <li>- Enlarge signal lenses for secondary and/or tertiary traffic signal heads with yellow back boards</li> <li>- Upgrade signage and pavement markings</li> <li>- Trim foliage near intersections</li> </ul>	<ul style="list-style-type: none"> <li>- Add traffic signal heads to ensure one primary signal head for each through lane</li> <li>- Add nearside tertiary signal heads</li> <li>- Increase the length of signal visors</li> </ul>	<ul style="list-style-type: none"> <li>- Review and reposition traffic signal displays at locations with horizontal curvature</li> </ul>	
Steep gradient(s) on approach(es)	<ul style="list-style-type: none"> <li>- Verify stopping sight distance on approaches</li> </ul>	<ul style="list-style-type: none"> <li>- Review the drainage system if water ponding is an issue</li> <li>- Provide anti-skid pavement treatments</li> </ul>	<ul style="list-style-type: none"> <li>- Consider right-turn-on-red restrictions where sightlines are constrained</li> <li>- Review truck route network</li> </ul>	<ul style="list-style-type: none"> <li>- Modify geometric layout</li> </ul>
Significant heavy vehicle volume(s)	<ul style="list-style-type: none"> <li>- Enhance joint enforcement activities with Commercial Vehicle Safety and Enforcement (Ministry and TransLink – MRN)</li> </ul>	<ul style="list-style-type: none"> <li>- Enhance signal displays</li> <li>- Enhance enforcement of truck route restrictions</li> <li>- Review the signal clearance intervals to accommodate truck deceleration/acceleration on truck routes</li> </ul>	<ul style="list-style-type: none"> <li>- Provide traffic calming along local roads or collector roads on a case-by-case basis</li> <li>- Review adequacy of truck routes</li> <li>- Review truck route network</li> </ul>	<ul style="list-style-type: none"> <li>- Manage good movements to reduce high through truck traffic volume as per the City's 2014 Master Transportation Plan, such as continue to implement changes to the New Westminster truck route network</li> </ul>

# Site-specific Countermeasures



Selected Intersection			Countermeasures																		
			Immediate				Short-term						Medium-term					Long-term			[Total]
ID	Name	Type	Pavement Markings (Repaint/Provide markings)	Road Signs (Mount/Relocate signs)	Urban Forestry (Trim/Remove foliage)	Immediate [Subtotal]	Police Services (Enhance/Install enforcements)	Vulnerable User Amenities (Provide/Relocate amenities)	Traffic/Pedestrian Signals (Enlarge/Increase signals)	Parking Activities (Restrict/Remove parking)	Street Lightings (Improve/Increase lightings)	Short-term [Subtotal]	Roadside Barriers (Add/Review barriers)	Transit Services (Review/Relocate locations)	Pavement Surface (Install/Repave pavement)	Left-turn Bays/Lanes (Provide/Realign bays)	Medium-term [Subtotal]	Geometric Layouts (Widen/Modify roadways)	Nearby Access (Close/Modify access)	Long-term [Subtotal]	
2	8 <sup>th</sup> Street and 10 <sup>th</sup> Avenue	Signalized		1	1	2	1	2			1	4				1	1	1		1	8
3	McBride Boulevard and 8 <sup>th</sup> Avenue	Signalized				0	1		2			3					0			0	3
6	12 <sup>th</sup> Street and 10 <sup>th</sup> Avenue	Signalized	1	1		2	1		1		1	3		1			1	1	1		7
103	2 <sup>nd</sup> Street and 10 <sup>th</sup> Avenue	Pedestrian Signal	2	1		3	1		1		1	3					0			0	6
104	8 <sup>th</sup> Street and 5 <sup>th</sup> Avenue	Special Crosswalk		2		2	1	1	1		1	3					0			0	5
121	8 <sup>th</sup> Street and Dublin Street	Pedestrian Signal	1	1		2	1	2	2			5			1		1			0	8
[Total]			19	32	10	61	22	17	44	4	14	101	2	4	5	7	18	6	6	12	192





- Immediate: Annual Operation Program
- Short- and medium-term countermeasures: 5-year Capital Plan
- Some countermeasures be reviewed with other stakeholders
- Medium- and long-term countermeasures: more detailed analysis
- Benefit-cost analyses be conducted on some short-term and all medium- and long-term countermeasures





## Next Steps

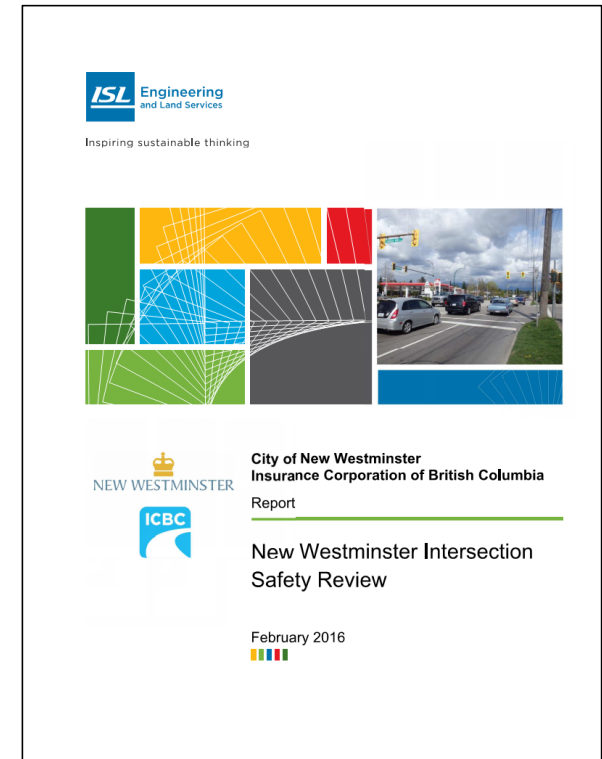


- Conduct a more detailed corridor safety review study for the 10<sup>th</sup> Avenue corridor, between 20<sup>th</sup> Street and McBride Boulevard (shared between the City of Burnaby)
- Undertake traffic operations and safety review study of other high priority locations
- Develop a separate pedestrian and cycling safety study
- Review the annual budget for road safety improvement projects
- Update City-wide Intersection Safety Plan every 5 to 10 years



# Lesson Learned

- Over 21,000 ICBC claim data to review
- Recent and committed improvements
- Needs and safety of all road users
- Focus on selected intersections
- Identify common issues/trends
- City-wide vs site-specific





**Eugene Wat, P.Eng., PTOE**

Manager of Infrastructure Planning, City of New Westminster

**Lisa Leblanc, P.Eng.**

Manager of Transportation, City of New Westminster



**Alison Wong, P.Eng., MBA**

Road Safety Engineer, Insurance Corporation of British Columbia



**Geoffrey Ho, P.Eng., FITE**

President, G. Ho Engineering Consultants Inc.



**Alvin Tse, E.I.T. and Michael Ge, M.Sc., E.I.T.**

Traffic / Road Safety Engineer, ISL Engineering and Land Services





## Need More Information

ISL Engineering and Land Services – [www.islengineering.com](http://www.islengineering.com)  
Borg Chan, M.Sc., P.Eng., PTOE, FITE, [bchan@islengineering.com](mailto:bchan@islengineering.com)  
Manager, Traffic Engineering and Road Safety

City of New Westminster – [www.newwest.ca](http://www.newwest.ca)  
Lisa Leblanc, P.Eng., [lleblanc@newwest.ca](mailto:lleblanc@newwest.ca)  
Manager of Transportation



**THANK YOU!!!**

**ANY QUESTIONS?**

