



To: Public Works and Transportation Committee **Date:** September 6, 2022
From: Lloyd Bie, P.Eng.
Director, Transportation **File:** 10-6460-01/2022-Vol
01
Re: **Removal of Channelized Right-Turn Islands to Improve Road Safety**

Staff Recommendation

That the City request the Ministry of Transportation and Infrastructure and Vancouver Airport Authority review channelized right-turn island locations in Richmond that are within their jurisdictions to improve road safety at these intersections.

Lloyd Bie, P.Eng.
Director, Transportation
(604-276-4131)

Att. 2

REPORT CONCURRENCE		
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER
Intergovernmental Relations RCMP	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	
SENIOR STAFF REPORT REVIEW	INITIALS: 	APPROVED BY CAO

Staff Report

Origin

In 2019, Council endorsed the report titled “Review of Collision Prone Intersections,” which identified and recommended improvements to address the top 20 most collision-prone intersections in the City. The study identified that a high percentage of the right-turn collisions and conflicts at these locations were a result of channelized right-turn lanes that allow motorists to maintain high rates of speed and create both vehicle and pedestrian safety issues during right turn movements. Improvements to mitigate these collisions involving right-turn vehicles and pedestrians were identified and are being implemented at intersections within the City’s jurisdiction as part of the annual Capital Program.

To further improve safety outside of the top 20 locations, all intersections in the City with channelized right-turn islands were identified for analysis to determine which locations can and should be modified to improve intersection safety. As some intersections are within the jurisdiction of the Ministry of Transportation and Infrastructure (the Ministry) or the Vancouver Airport Authority (YVR), this report recommends that the City request the Ministry and YVR to review those intersections to improve road safety.

This report supports Council’s Strategic Plan 2018-2022 Strategy #1 A Safe and Resilient City:

Enhance and protect the safety and well-being of Richmond.

1.2 Future-proof and maintain City infrastructure to keep the community safe.

This report supports Council’s Strategic Plan 2018-2022 Strategy #6 Strategic and Well-Planned Growth:

Leadership in effective and sustainable growth that supports Richmond's physical and social needs.

6.3 Build on transportation and active mobility networks.

Overview

Channelized Right-Turn Islands

A channelized right turn is an intersection configuration that provides a dedicated, separated lane for right turn movements that typically has a gentle, long-radius curve (Figure 1). At the end of the curve, the turn lane either enters its own dedicated free-flow lane, or meets a merge point with the adjacent through lane. This allows motorists to maintain a relatively high speed when making this movement as long as the receiving lane is clear. To accommodate this geometry while still allowing pedestrian crossing, an island is typically placed in between the right turn lane and the crosswalk to provide pedestrian refuge and reinforce the geometry of the lane.

Safety Concerns

The channelized right turn intersection geometry creates a number of safety concerns arising out of the following conflicts:

- High rates of speed – The channelized right-turn does not encourage motorists to slow down to the same degree as a typical 90-degree intersection. This limits the amount of time available to examine whether there is adequate spacing for the motorist to enter the adjacent lane, as well as scan for other conflicts.
- Sightlines at entry angle – The wide angle at which motorists performing a right-turn approach the adjacent lane makes an effective shoulder-check difficult. The motorist must look nearly completely behind themselves, diverting attention from their direction of travel and creating further hazards to themselves and others.
- Pedestrian conflicts – Channelized right-turns create a range of concerns for pedestrians. The crossing point is typically at or near the apex of the curve, where motorists typically still hold a high rate of speed. The focus of motorists is generally on the traffic in the upcoming adjacent lane which holds attention to their left and behind them, away from any pedestrians joining from the shoulder. Right-turn islands are often small and some pedestrians will feel there is not enough refuge area (Figure 1). This creates a hostile environment for pedestrians and a challenge for those with mobility issues. The configuration creates an additional crossing for the pedestrian and therefore an additional potential conflict.
- Cyclist conflicts – Cyclists travelling in on-street bike lanes are also put in additional danger. Motorists must cross these lanes twice, with the same speed and sightline concerns as listed above putting cyclists at risk.



*Figure 1: Existing Channelized Right-Turn Island
– Eastbound Westminster Hwy @ Cooney Rd*

Proposed Mitigation

Removing and replacing channelized right-turns is feasible in most locations. This is particularly desirable in an urban setting with high pedestrian crossing activities and high right-turn volumes. The large footprint typically affords ample room for a “Standard Intersection” as described below, which can be accommodated within the existing road dedication.

Standard Intersection – A standard intersection without a separated right-turn channel (Figure 2) is the preferred intersection geometry and has a number of advantages in urban settings including:

- Reduced vehicle speeds – Drivers must come to a complete stop and are naturally slowed down on approach;
- Increased pedestrian/cyclist safety – Only one crossing point is required and drivers focus remains on the crossing in front of them; and
- Large refuge area – The footprint of the turn is greatly reduced and allows for additional sidewalk, bike facilities and landscaping.



*Figure 2: Southbound Garden City Rd @ Lansdowne Rd
Before: Channelized Right-Turn Island / After: Standard Intersection with Separated Cycling Facilities*

Analysis

Review of City Channelized Right-Turn Inventory

A total of 45 intersections with channelized right-turns within the city were identified through staff review. Locations were reviewed on the following criteria:

- Right-turn vehicle volumes
- Pedestrian and cyclists volumes
- Collision data / observed conflicts
- Size of the channelized island for pedestrian refuge
- Intersection geometry
- Public feedback
- Jurisdictional Authority (City of Richmond, the Ministry, Vancouver Airport Authority)

Locations within City of Richmond Jurisdiction

Of the 45 total locations (Attachment 1), 20 are within the City's jurisdictional authority. These locations were reviewed to determine if they are good candidates for upgrade. The locations fell into the following categories (Attachment 2):

- Upgrade to Standard Intersections- 11 of the 20 locations are good candidates for upgrades. Upgrades have already been completed at three locations, with the remaining eight locations to be improved via capital projects, with future projects to be presented to Council for consideration as part of the annual capital program process.
- Not Warranted for Upgrade (status quo)- Six of the 20 locations have been identified to remain, i.e., no upgrade, due to several factors. These included low pedestrian and cycling traffic, limited collisions per number of traffic movements and a lack of immediate merge points.
- Future Study- Existing channelized islands at three locations are to be further assessed in the future, including the Garden City Road/Granville Avenue intersections and Coppersmith Place and No. 5 Road intersections along Steveston Highway.

Locations within External Jurisdictions

The remaining 25 of the channelized right-turn island locations in the City are either partially or fully inside the jurisdictional authority of another governmental organization (Attachment 3). The majority of these intersections (19) are within the Ministry's jurisdiction, with remaining (6) falling within YVR's.

Staff recognize that these organizations have qualified technical staff who assess road safety, including right-turn channelized islands; notwithstanding, they may benefit from staffs observations from the rest of the City. Accordingly, staff recommend that the City send a letter to the Ministry and YVR requesting their reviews of these right-turn channelized islands to improve road safety as necessary.

Financial Impact

None at this time. Financial impacts will be identified through future capital programs.

The removal of a channelized right-turn island and replacement with a standard intersection typically cost in the range of \$200,000 to \$400,000. The improvement is expected to reduce approximately 47% right-turn and rear-end collisions attributed to channelized islands, and is equivalent to an average annual collision savings of approximately \$110,000 per location. Upgrading to standard intersections will contribute to improving road safety in the City. As the collision savings are largely realized by the insurance company, the City will continue to pursue road safety funding from the insurance company to help offset costs incurred by the City.

Conclusion

The City's review revealed a total of 45 intersections with channelized right-turn island locations in Richmond. Of these locations, 19 fall within the Ministry of Transportation and Infrastructure's jurisdiction, and 6 are in the Vancouver Airport Authority's.

Over the years, the growth and urbanization of the city and the associated increase in traffic, pedestrian and cyclist volumes have lead to public safety concerns at many of these locations. While the City continues to proactively pursue improvements at these locations, 25 of the locations are not within the City's jurisdiction. Therefore, staff recommend that a letter be sent

September 6, 2022

- 6 -

to the Ministry requesting their review of channelized right turn island locations within Richmond that are within its jurisdiction to improve road safety at these cross-jurisdictional locations.



Fred Lin, P. Eng., PTOE
Senior Transportation Engineer
(604-247-4627)



Kevin Whitmarsh
Transportation Project Lead
(604-204-8703)

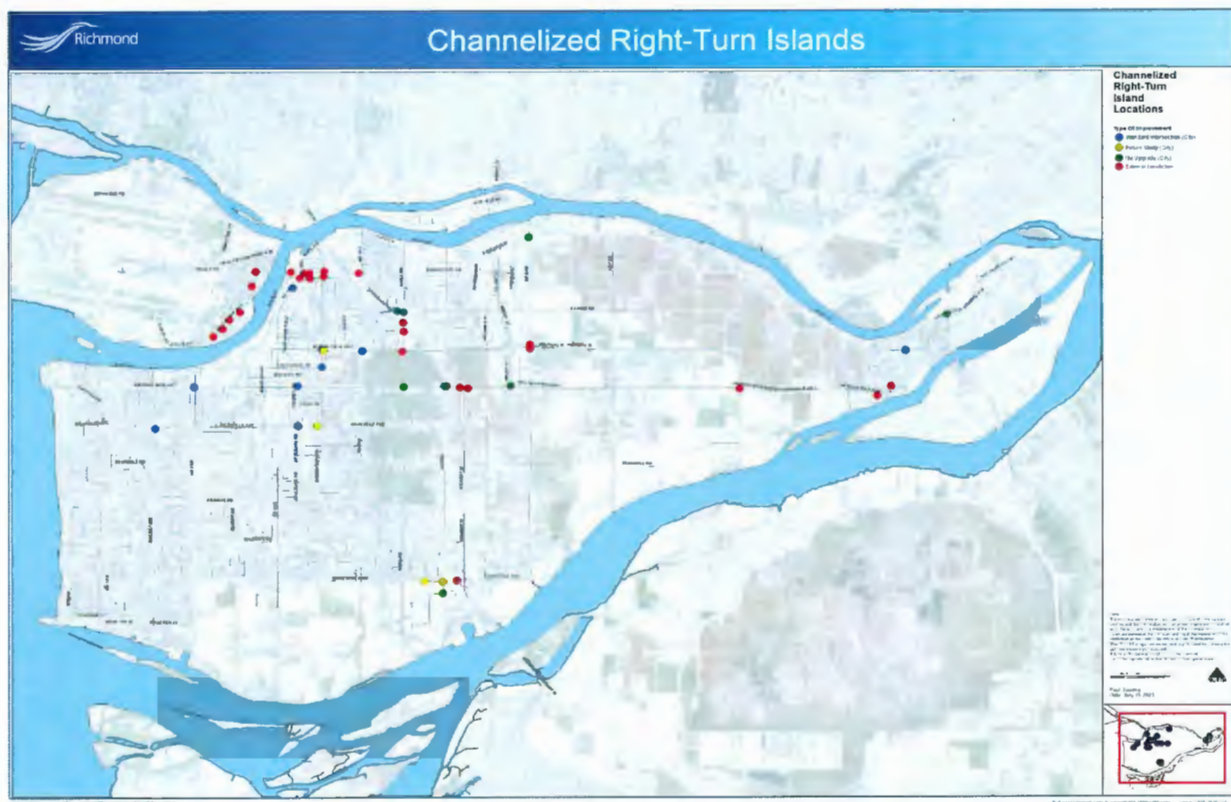
FL:kw

Att. 1: Location of Channelized Right-Turn Islands

Att. 2: Channelized Right-Turn Islands Within City Jurisdiction

Att. 3: Channelized Right-Turn Islands Outside or Partially Outside City Jurisdiction

Location of Channelized Right-Turn Islands



6942248

**Channelized Right-Turn Islands
Within City Jurisdiction**

N-S ROAD	E-W ROAD	Type of Improvement	Status
GARDEN CITY ROAD	LANSDOWNE ROAD	Standard Intersection	Completed
NO 3 ROAD	CAPSTAN WAY	Standard Intersection	Completed
WESTMINSTER HWY	GILLEY ROAD	Standard Intersection	Completed
COONEY ROAD	WESTMINSTER HWY	Standard Intersection	Committed Capital Project
ST ALBANS ROAD/ COONEY ROAD	GRANVILLE AVE	Standard Intersection	Committed Capital Project
NO 4 ROAD	ALDERBRIDGE WAY	Standard Intersection	Committed Capital Project
NO 2 ROAD	WESTMINSTER HWY	Standard Intersection	Committed Capital Project
RAILWAY AVE	GRANVILLE AVE	Standard Intersection	Future Capital Project
ST EDWARDS DRIVE	CAMBIE ROAD	Standard Intersection	Future Capital Project
GARDEN CITY ROAD	ALDERBRIDGE WAY	West side- Standard Intersection East side- TBD	West side- Committed Capital Project East side- TBD
NO 5 ROAD	WESTMINSTER HWY	West side- Standard Intersection East side- Status Quo	West side- committed East side- N/A
KNIGHT STREET	WESTMINSTER HWY	Status Quo	N/A
NO 5 ROAD	HORSESHOE/RIVERSIDE WAY	Status Quo	N/A
NO 6 ROAD	VULCAN WAY	Status Quo	N/A
SHELL ROAD	CAMBIE ROAD	Status Quo	N/A
SHELL ROAD	WESTMINSTER HWY	Status Quo	N/A
BOUNDARY ROAD	WESTMINSTER HWY	Status Quo	N/A
COPPERSMITH PLACE	STEVESTON HWY	Future Study	N/A
NO 5 RD	STEVESTON HWY	Future Study	N/A
GARDEN CITY ROAD	GRANVILLE AVENUE	Future Study	N/A

Channelized Right-Turn Islands Outside or Partially Outside City Jurisdiction

N-S ROAD	E-W ROAD	Jurisdictional Authority
GREAT CANADIAN WAY	BRIDGEPORT ROAD	MoTI
NO 3 ROAD	SEA ISLAND WAY	MoTI
SEXMSITH ROAD	SEA ISLAND WAY	MoTI
SEXSMITH ROAD	BRIDGEPORT ROAD	MoTI
CORVETTE RD	SEA ISLAND WAY	MoTI
NO 3 ROAD	BRIDGEPORT ROAD	MoTI
HWY 99 OFF-RAMP	BRIDGEPORT ROAD	MoTI
SHELL ROAD	HWY 99 ON-RAMP	MoTI
SHELL ROAD	HWY 99 OFF-RAMP	MoTI
HWY 99 OFF-RAMP	WESTMINSTER HWY	MoTI
HWY 99 ON-RAMP	WESTMINSTER HWY	MoTI
HWY 99 (multiple)	STEVESTON HWY	MoTI
HWY 91 OFF-RAMP	NO 6 RD	MoTI
HWY 91 ON-RAMP	NO 6 RD	MoTI
HWY 91 OFF-RAMP	WESTMINSTER HWY (WB)	MoTI
WESTMINSTER HWY (EB)	HWY 91 OFF/ON-RAMPS	MoTI
NELSON ROAD	WESTMINSTER HWY	MoTI
GARDEN CITY ROAD	SEA ISLAND WAY	MoTI
SHELL ROAD	ALDERBRIDGE WAY	MoTI
RUSS BAKER WAY	HUDSON AVE	YVR
RUSS BAKER WAY	MILLER RD	YVR
RUSS BAKER WAY	AIRPORT RD	YVR
RUSS BAKER WAY	GILBERT RD	YVR
RUSS BAKER WAY	INGLES RD	YVR
RUSS BAKER WAY	BCIT EXIT	YVR