

Transportation Design
 SW Marine Drive Rehabilitation Project
 Bikeway Improvements
 Safety Review



Audit Suggestions and CoV Reponse

Issue		Audit Suggestions	CoV Response
1	Bicycle Facility Type and Width	<ul style="list-style-type: none"> Consider restricting right turn vehicle movements from eastbound SW Marine Dr onto southbound SW Marine Dr (Cornish St local street bikeway) utilizing the space of the existing right turn lane and widening the road into the boulevard to provide space for the bicycle lane to continue to the Cornish St intersection. 	<ul style="list-style-type: none"> The project scope objective is to connect the eastbound SW Marine Dr bike lane to Arbutus Greenway for those travelling from the west to head south. However, as a longer term improvement, the City of Vancouver Marpole Community Plan (April 2014) includes policy (9.1.14) to “work with senior levels of government and external agencies to explore options for improving walking and cycling connections to and across the Fraser River, particularly connecting the Arthur Laing Bridge with Hudson Street”. The Plan also identifies this section of SW Marine Dr as a potential new/improved walking/cycling route with connections down Barnard St to W 75th Av. Today, the eastbound SW Marine Dr right turn movement has approximately 450 vehicles per hour during the AM and PM peak hours, and helps to distribute traffic given the limited road network in the area. The City is currently developing and prioritizing short to medium term bike route improvements. If this connection is selected, further detailed assessment/analysis and a public engagement process will be required to understand local access and circulation impacts as well as operational capacity at the intersection of Granville St/W 70th Av based

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			on the limited road network in the area.
		<ul style="list-style-type: none"> Consider reconfiguring the on-street parking and bicycle lane to provide a parking protected bicycle lane. Alternatively, consider restricting parking along this portion of the corridor. 	<ul style="list-style-type: none"> As part of the project, on-street parking was removed for the section between Wiltshire and Cornish St (both sides) to accommodate and extend the bike lane to Arbutus Greenway. On-street parking on the north side (Wiltshire to Angus Dr) is retained as alternate on-street parking for the ones removed. Further monitoring will determine if additional removal of on-street parking is needed to support reconfiguration through this portion.
		<ul style="list-style-type: none"> At locations where the bicycle lane is narrow, the City may consider widening the bicycle lane utilizing the additional space between the edge of the asphalt and the painted white lane. Where there are nearby obstructions such as utility poles, consider installing reflective tape or obstruction signage to ensure these obstructions are visible. Some locations identified where additional tape and signage could be installed include: <ul style="list-style-type: none"> Westbound direction between Angus Dr and W 64th Av where there is no curb separation (in front of 1955 and 1925 SW Marine Dr). Westbound direction between W 57th Av and W 54th Av. 	<ul style="list-style-type: none"> The additional space adjacent to the bike lane that may be narrow will also need to accommodate pedestrian space, utility poles and trees/vegetation. Additional signs have been added on utility poles to increase visibility. Additional obstruction signs (or “object markers” added on utility poles to increase visibility. Locations include westbound direction between Angus Dr and W 64th Av on hydro poles adjacent to 1925 and 1955 SW Marine Dr. Locations also include westbound direction between W 57th Av and W 54th Av at 2215, 2233 and 2237 SW Marine Dr. Note that there are existing “object marker” signs on hydro poles at 2249 SW Marine Dr and on the overhead lamp standard at 2271 SW Marine Dr.
2	Separation	<ul style="list-style-type: none"> The City can continue to work to ensure that the 	<ul style="list-style-type: none"> Ongoing process as part of maintenance and

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		roadway and bicycle lanes are clear of debris including damaged plastic bollards.	street cleaning and sweeping.
		<ul style="list-style-type: none"> Consider installing additional concrete barriers, where feasible at the far side of intersections. Example, westbound direction between Barnard St and east of W 57th Av. <p>When determining placement of additional barriers, the City should review turning movements, volumes, sightlines, and ensuring that there is an adequate turning path space at these locations.</p> <p>Due to potential conflicts with people walking in the bicycle lanes, additional barriers should only be placed at locations where additional space for people walking has been provided.</p>	<ul style="list-style-type: none"> The City will continue to monitor and determine feasibility of implementing concrete barriers at far side intersections based on various factors while meeting design consistency along the corridor. Initial review hasn't shown many opportunities to add barriers.
		<ul style="list-style-type: none"> Consider enhancing the visibility of the concrete barriers along the corridor. Some suggestions to enhance visibility include: <ul style="list-style-type: none"> ➢ Paint the bullnose of the barrier with yellow paint such as the treatment used on the cement diverter at SW Marine Dr and Cornish St ➢ Apply a strip of reflective tape to the bullnose and along the side of the barrier. ➢ Install one or more plastic bollards in advance of the concrete barrier where feasible. Consider installing concrete barriers and/or plastic bollards more consistently along SW Marine Dr to avoid long stretches with no physical separation, particularly in sections of the corridor where there are no vertical or horizontal curves to make the presence of barriers more predictable. 	<ul style="list-style-type: none"> Visibility of concrete barriers is enhanced by painting the bullnose yellow, adding pavement reflective markers alongside the barrier and adding reflective markers on the face side of the concrete barriers. For each curved portion with concrete barrier a delineated painted line is added in advance on the approach and through the concrete barrier length within the bike lane. Installing additional concrete barriers and/or plastic bollards for continuity is constrained by frequent driveway locations and the need to retain access for garbage bin placement/collection.
3	Mixing Zones	<ul style="list-style-type: none"> The City may consider installing a Turning Vehicle 	<ul style="list-style-type: none"> Turning Vehicle Yield to Bicycles Signs are

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		Yield to Bicycles Sign (RB-37) to advise motor vehicle drivers they are crossing and travelling in a designated bicycle lane.	used for protected bicycle facilities in the City. For painted bike lanes, the current practice is to treat the area as a mixing zone where right turning vehicles would typically move closer to the curb space crossing the dashed lines when the bike lane is unoccupied (similar to changing lanes).
		<ul style="list-style-type: none"> Consider adding bollards prior to the dashed line to raise awareness of the presence of the bicycle lane to motor vehicle drivers and make it more clear that they are about to enter a bicycle lane. This treatment will also help to prevent motor vehicles from entering bicycle lane early. 	<ul style="list-style-type: none"> Retain existing design of mixing zone, based on observations/experiences of the mixing zone design for the Smithe St Bikeway in downtown (for example), and general understanding that it would be challenging to achieve the desirable driver behaviour in the mixing zone. The bike stencil is shifted approximately 10m away from the mixing zone to raise an early awareness for drivers and vehicles to be able to enter at the start of the mixing zone. The City will continue to monitor and adjust bike stencil locations as needed.
		<ul style="list-style-type: none"> The City can continue to review the volume of the right turn motor vehicle movements at the intersections along the corridor. At intersections where right turn volumes are low, the City can consider eliminating the shared right turn lane. 	<ul style="list-style-type: none"> The City will continue to monitor and review the right turn traffic volumes at intersections. The City will evaluate mixing zones and at intersections where right turn vehicle volumes are low, while meeting design consistency along the corridor.
		<ul style="list-style-type: none"> Over the long term, as the City monitors intersection turning movements along the corridor, the City can consider opportunities to widen the road into the boulevard to provide a separated right turn lane for motor vehicle drivers and a bicycle lane for people cycling at locations where turning volumes are high. 	<ul style="list-style-type: none"> As part of a longer term plan, the City will consider opportunities to provide right turn bays/lanes.

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4	Perceived Motor Vehicle Lane Widths	<ul style="list-style-type: none"> • The following suggestions have been provided to address vehicles encroaching out of their designated lane between east of W 54th Av and MacDonald St: <ul style="list-style-type: none"> ➢ Consider providing warning signage where the road is winding, particularly between W 54th Av and Marine Cr to encourage motor vehicle drivers to reduce speed through this portion of the corridor due to the curves in the road and the changes in topography. ➢ Alternatively, the City could consider installing speed feedback boards along this section of the corridor. Research suggests that the boards are effective for the short term and comparatively less effective over a long term. 	<ul style="list-style-type: none"> ➢ No further “Road Winding” or “Single Curve” warning signage is needed as there is adequate warning signage in place. ➢ Existing curve warning signage are located adjacent to the following properties: <ul style="list-style-type: none"> ➢ 2237 SW Marine Dr (westbound) ➢ 2410 SW Marine Dr(eastbound) ➢ 2520 SW Marine Dr (westbound + eastbound) ➢ 2628 SW Marine Dr (eastbound) ➢ 6895 Balsam St (westbound) • The City will evaluate the effectiveness of Speed Reader Boards.
5	Walking Facilities	<ul style="list-style-type: none"> • Consider opportunities to provide a continuous concrete or gravel pathway on at least one side of the street consistently throughout the corridor. Based on current conditions, the north side of the street is recommended as there are already walking facilities or space for walking facilities along much of that side of the street. 	<ul style="list-style-type: none"> • Most of the corridor has space for pedestrians on at least one side. • As part of a longer term plan, the City will consider pedestrian facility improvements.
		<ul style="list-style-type: none"> • Consider working with Bylaw Enforcement and homeowners to ensure that where walking space is provided, vegetation including shrubs and hedges is maintained to ensure adequate walking space is provided and sightlines are maintained. 	<ul style="list-style-type: none"> • Currently, as part of maintenance there is an ongoing notification process based on City-wide priorities and complaints received.
		<ul style="list-style-type: none"> • The City can consider reviewing locations along SW Marine Dr where additional crossings may be warranted. 	<ul style="list-style-type: none"> • The City conducted pedestrian studies to determine whether there are locations in the project area that warrant a pedestrian crossing. Only RRFB (flashing beacons) were eligible. However, based on pilot locations and findings in the City, there are currently no immediate plans to implement them on SW

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			Marine Dr.
6	Driveways	<ul style="list-style-type: none"> Consider relocating and pushing back the stop bar at SW Marine Dr and W 57th Av/Yew St in the eastbound direction to avoid vehicles from blocking the driveway. 	<ul style="list-style-type: none"> The stop bar location is to provide right-of-way for vehicles on SW Marine Dr.
7	Signage and Pavement Markings	<ul style="list-style-type: none"> When weather permits, install “sharrow” pavement markings in the right turn lane on SW Marine Dr approaching Cornish St 	<ul style="list-style-type: none"> Green backed sharrow pavement markings have been implemented.
		<ul style="list-style-type: none"> Consider installing reflective tape or obstruction signage on utility poles and other potential obstructions within 0.3m of the centre of the painted line closest to the edge of the roadway at the following locations: <ul style="list-style-type: none"> Westbound direction between Angus Dr and W 64th Av where there is no curb separation (in front of 1955 and 1925 SW Marine Dr). Westbound direction between W 57th Av and W 54th Av. 	<ul style="list-style-type: none"> Object markers added on utility poles to increase visibility. Locations include westbound direction between Angus Dr and W 64th Av on hydro poles adjacent to 1925 and 1955 SW Marine Dr. Locations also include westbound direction between W 57th Av and W 54th Av at 2215, 2233 and 2237 SW Marine Dr. Note that there are existing “object marker” signs on hydro poles at 2249 SW Marine Dr and on the overhead lamp standard at 2271 SW Marine Dr.
8	Lighting	<ul style="list-style-type: none"> Ensure visibility of concrete barriers and bollards based on the recommendations provided to address Issue 2 (separation). 	<ul style="list-style-type: none"> See comment for Issue 2.
		<ul style="list-style-type: none"> Consider installing additional overhead lighting where feasible to ensure the visibility of bollards, concrete barriers and people walking and cycling at the locations noted above, particularly at intersections and where there are horizontal and vertical curves in the road geometry. 	<ul style="list-style-type: none"> New lighting has been added as part of the intersection improvements at W 49th Av/SW Marine Dr intersection. As part of a longer term plan and based on City-wide priorities and needs, the City will consider additional lighting for other locations along the corridor.
9	Maintenance, Drainage and Debris	<ul style="list-style-type: none"> City to continue to coordinate bicycle facility maintenance with other road operations and 	<ul style="list-style-type: none"> The City will continue to monitor and deploy maintenance services as needed.

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		<p>maintenance activities including sweeping, salting and debris removal as well as repairs.</p>	
		<ul style="list-style-type: none"> The City could also consider reminding residents and garbage collectors not to obstruct the bicycle lane with garbage and recycling bins and provide information that outlines where bins should be placed out of the way of the bicycle lane. 	<ul style="list-style-type: none"> The City will continue to monitor and address any issues that may arise with the garbage/recycling bins.
10	Speeding	<ul style="list-style-type: none"> Increased enforcement by VPD particularly at times and locations where speeding has been identified as an issue (overnight on weekends). 	<ul style="list-style-type: none"> VPD regularly review and address safety issues based on City-wide priority needs.
		<ul style="list-style-type: none"> Consider installing speed reader boards to advise motor vehicle drivers of the speed at which they are travelling. See Issue 4 (Motor Vehicle Lane Widths). 	<ul style="list-style-type: none"> The City will review and consider based on City-wide priority needs.