

APPENDIX H

Traffic Safety Audit



PRELIMINARY CONCEPT PLAN ROAD SAFETY AUDIT	17 Street RSA
Date:	November 21, 2012
Our Reference:	2131-00156-0

To:

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1.0 Preliminary Concept Plan Road Safety Audit

A road safety audit is a formal and independent safety performance review of a road transportation project by an experienced team of safety specialists, addressing the safety of all road users.

As outlined in the *Transportation Association of Canada's (TAC) Road Safety Audit Guide*, a preliminary planning audit reviews the early drawings of the concept plans, focusing on the safety performance of design elements such as the horizontal and vertical alignments, cross-section dimensions, intersection layout, traffic operations and efficiency, access, drainage, clear zones and the interaction of road users with the design. At this stage, important design elements can still be changed.

The preliminary concept plans, as attached in **Appendix A**, have been independently reviewed by Cory Wilson, P.Eng and Jason Bell, EIT, who have been completely detached from the design process thus far.

Several general safety benefits of the design were identified, including:

- A significant reduction in the number of access roads, which decrease the number of conflict points and increase motorist expectation as to where turning movements will occur. This reduction in access roads will also decrease braking along the 17 Street corridor, reducing the potential for rear-end collisions;

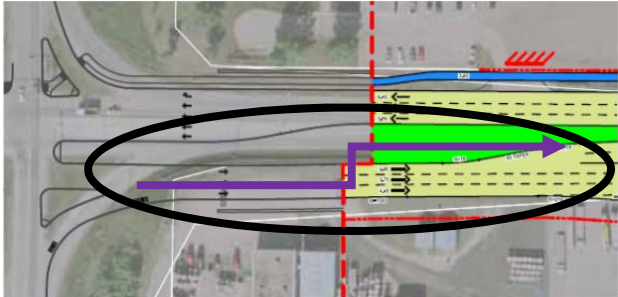
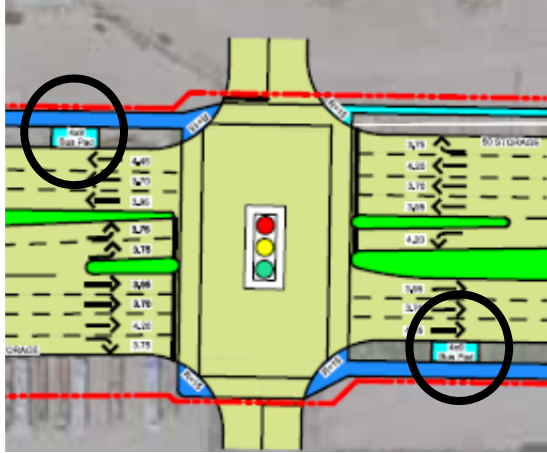
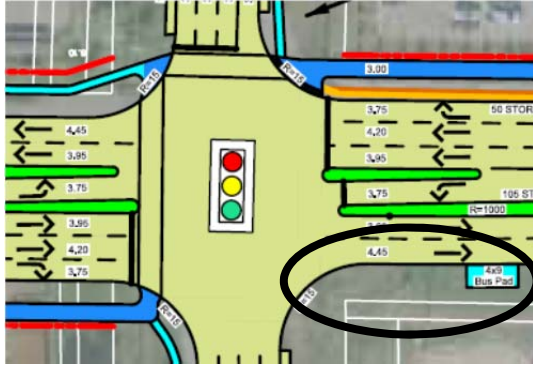


- Although the preferred design would include a multi-use trail on both sides of the street throughout the entire corridor, sidewalks and shared use paths are provided along both sides of the street for most of the corridor. 4m of separation is provided between pedestrian/cyclist facilities and the travel lanes for the majority of sidewalks and paths. Particular safety benefits are realized where separation has been maximized (between Oak Ridge Drive and Maple Ridge Drive on the east side for example);
- “Aussie Style” right turns decrease the likelihood of higher speeds on the approach and also improves sight distances of oncoming vehicles with particular benefit to older drivers;
- Added illumination along the corridor creates greater visibility at night;
- Offset single left turn lanes at 66 Ave, 70 Ave and 76 Ave provide improved sight distances for turning vehicles;
- Consistent intersection treatment layouts at 66 Avenue, 70 Avenue, and 76 Avenue along 17 Street improves driver expectations; and,
- Crossing gates for shared use paths at both railway crossings and lighting/signage at all pedestrian railway crossings.

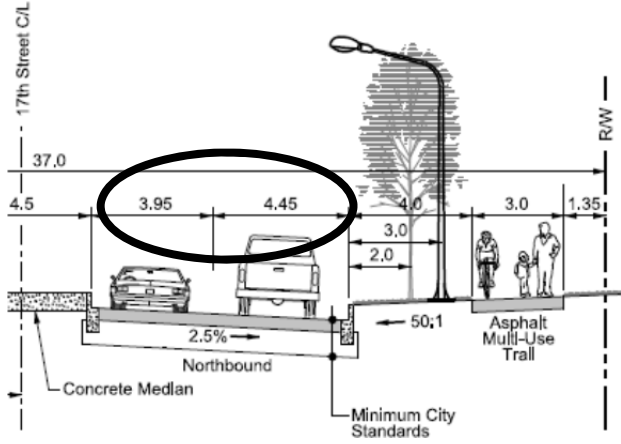
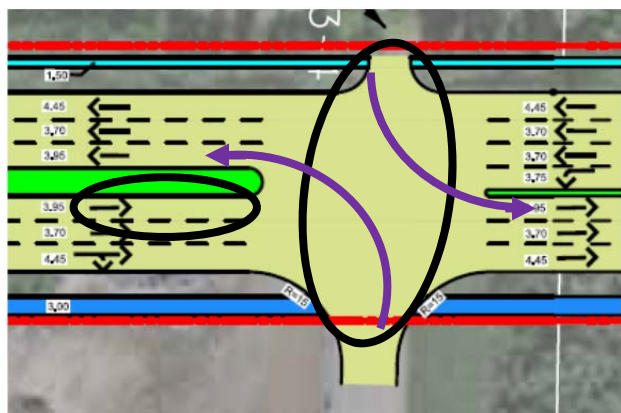
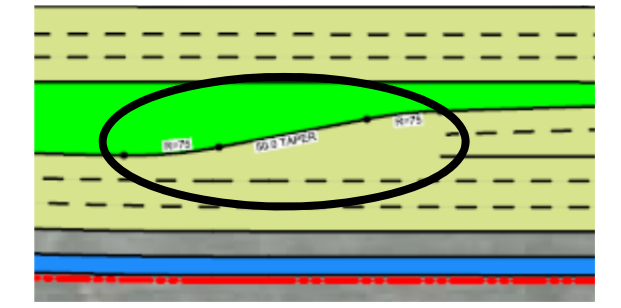
Potential safety issues are identified and discussed in Table 1. Possible improvement suggestions have been identified where possible. However, as with all safety audits, it is ultimately up to the engineers of record to determine what, if any, improvements will be implemented. The engineers of record are encouraged to prepare a response report to this RSA which indicates the rationale behind any changes or lack thereof.



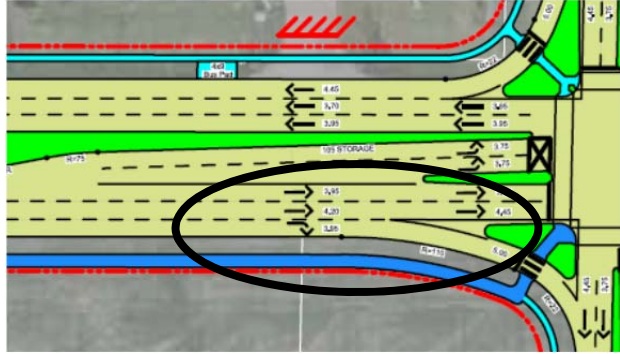
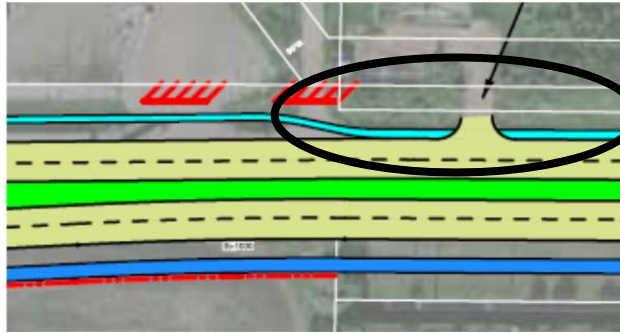
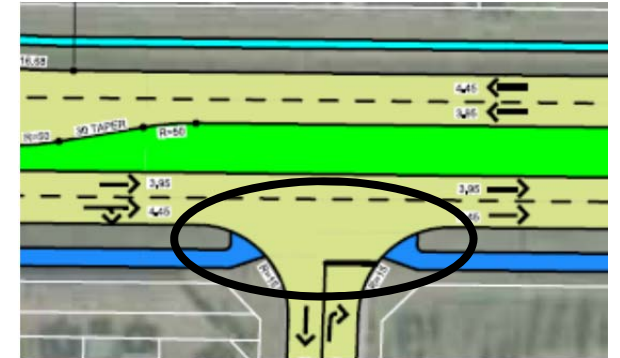
Table 1 – Potential Safety Issues

No.	Potential Safety Issue	Descriptive Reference Photograph
1	<p>Short weaving distance for vehicles exiting WB Whitemud Drive who wish to turn left into the future development access.</p> <p>Short weaving distances increase the risk of side swipe and rear-end collisions.</p>	 <p><i>N. of Whitemud Dr. to future development access</i></p>
2	<p>Several bus stops are located in close proximity to intersections. Motorists may not anticipate traffic stopping in such close proximity to the intersection, which could result in rear-end collisions or queuing into the intersections.</p> <p>Storage for at least 1-2 vehicles should be provided behind bus stops.</p>	 <p><i>Future development access (S. of 51 Avenue)</i></p>
3	<p>No sidewalk connection to the bus stop north of 76 Avenue is proposed. As a result, pedestrians would be required to walk on the street or through the field, both of which pose a hazard to pedestrians.</p> <p>A sidewalk connection should be provided to the bus stop.</p>	 <p><i>17 Street / 76 Avenue Intersection</i></p>

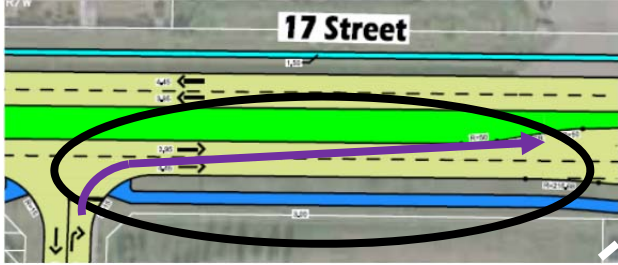
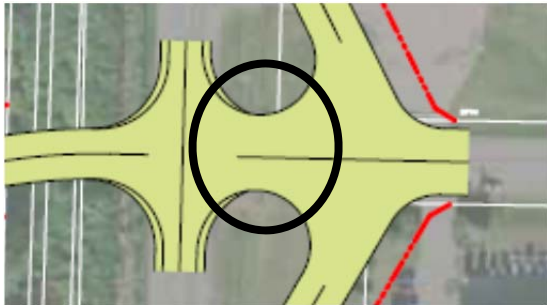
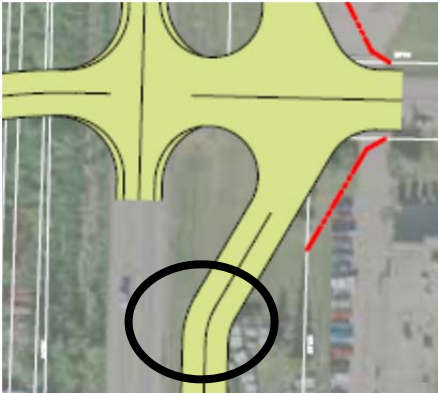


No.	Potential Safety Issue	Descriptive Reference Photograph
4	<p>Wide travel lanes on 17 Street could encourage speeding. Particularly in combination with the predominantly straight and flat alignment of the road. It is assumed that some lanes are intended for shared use with transit and/or bicycles, but even then the width appears excessive.</p> <p>Vehicle lane widths greater than 3.7m and shared lanes wider than 4.2m should be carefully reviewed.</p>	 <p>Typical Cross Sections</p>
5	<p>It is unclear if left turns are permitted from the snow dump access onto 17 Street. Left turn movements would require numerous through lanes to be crossed, resulting in numerous conflict points. Through traffic may not anticipate left-turn traffic at such a large uncontrolled intersection. NB traffic in the left lane may also not anticipate a preceding vehicle to slow or stop to make a left turn.</p> <p>Consideration should be given to right-in/right-out access (for one leg or both), access management or signals.</p>	 <p>17 Street / Snow Dump Access Road Intersection</p>
6	<p>The entrance tapers for the left turn lanes at the intersection of 17 Ave and Roper Road are rather sharp. The sharp change in alignment increases the potential for loss of control, side swipes and challenges for trucks.</p> <p>The possibility of increasing the taper ratio should be explored.</p>	 <p>17 Street / Roper Road Intersection</p>

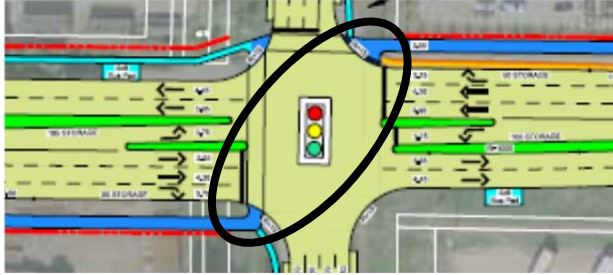
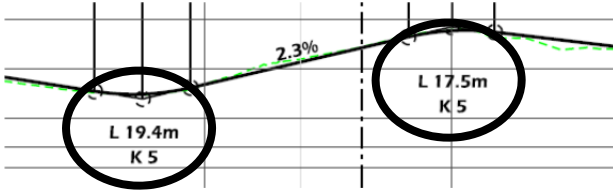
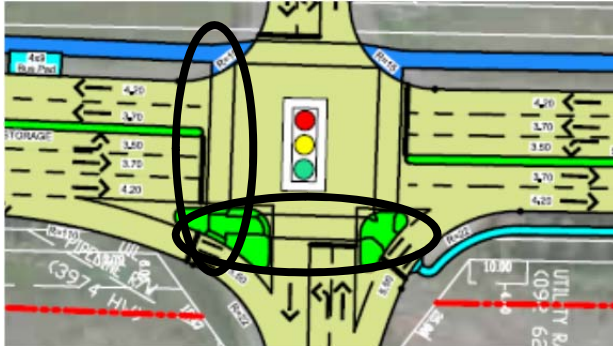


No.	Potential Safety Issue	Descriptive Reference Photograph
7	<p>The right NB through lane ends at Roper Road after being present for an extended length and could potentially catch motorists off-guard (even with signage). Sudden lane changes could result in rear-end and sideswipe collisions.</p> <p>Consideration could be given to ending the lane further south and reintroducing it as an exclusive right turn bay.</p>	 <p>17 Street/Roper Road Intersection</p>
8	<p>Reduced separation is provided between the travel lanes and sidewalk near Maple Ridge Drive due to constraints to the west. The reduced separation will decrease pedestrian comfort and increases the risk of pedestrian collisions.</p> <p>Increasing the separation is desirable. However, if this is not feasible, a monolithic sidewalk is still acceptable for a posted speed limit of 60 km/h.</p>	 <p>17 Street South of Maple Ridge Drive</p>
9	<p>The alignment of the trail ramps at the intersection of 68 Ave directs cyclists and pedestrians into the center of the intersection.</p> <p>A tangent alignment is preferred. However, a straight alignment could discourage cyclists from stopping/slowing to look for conflicting traffic at the intersection. Consideration could be given to using speed reduction gates to encourage cyclists to check for traffic.</p>	 <p>17 Street / 68 Avenue Intersection</p>

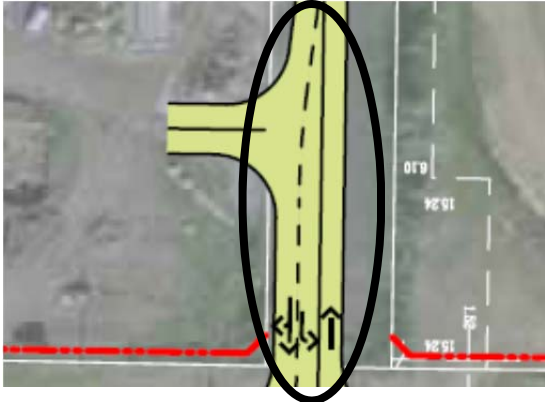
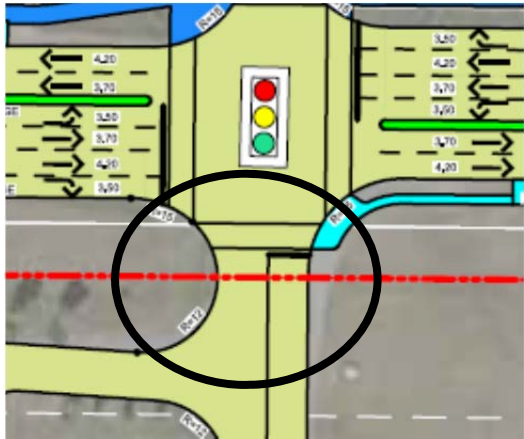
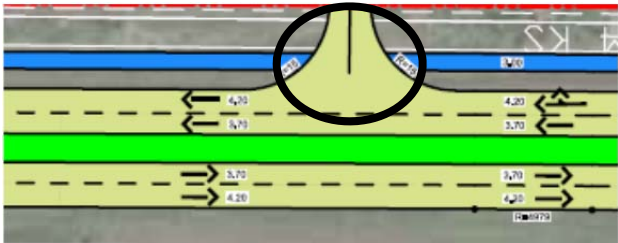


No.	Potential Safety Issue	Descriptive Reference Photograph
10	<p>Short weaving distance for WB right turning vehicles from 68 Avenue who wish to turn left at 70 Avenue. Although this may be a low volume movement, short weaving distances increase the risk of side swipe and rear-end collisions.</p> <p>Consideration could be given to closing the RIRO at 68 Avenue, redirecting traffic to Oak Ridge Dr. Traffic analysis would be required to determine the impact on operations.</p>	 <p>WB 68 Avenue to WB 70 Avenue</p>
11	<p>There is limited separation between 76 Avenue and the intersection to the north on 18 Street. Motorists may not anticipate braking and turning movements in such close proximity to the preceding intersection. There is also the risk that vehicle queues will extend into the preceding intersection. In addition, the skewed intersection results in a large pavement area, which will likely make it difficult for motorists to identify proper turning paths.</p> <p>Alternate access configurations could be considered, but it appears few, if any, alternate options are available.</p>	 <p>18 Street north of 76 Avenue</p>
12	<p>Sharp horizontal curves on the Access Road north of the 76 Avenue increases the risk of run-off-road or head-on collisions.</p> <p>Consideration should be given to increasing the radius of the curves or realigning the proposed access road to a straighter alignment.</p>	 <p>Access Road North of 76 Avenue intersection</p>

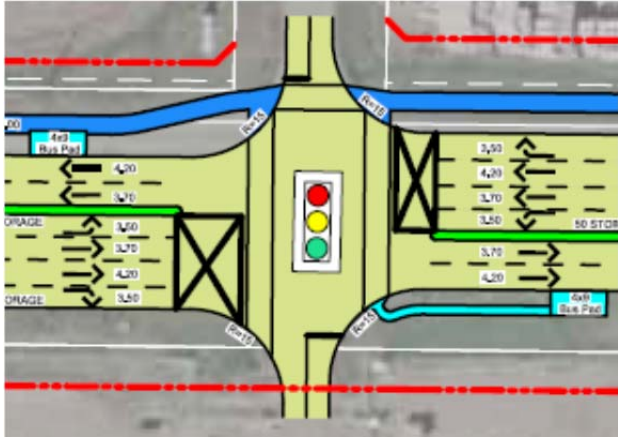
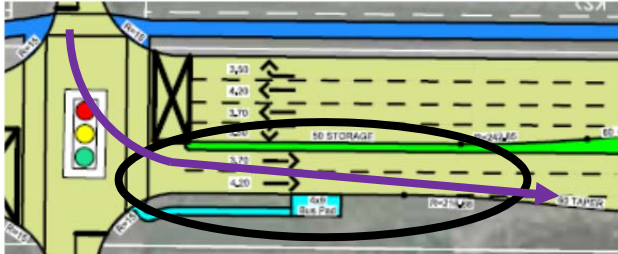
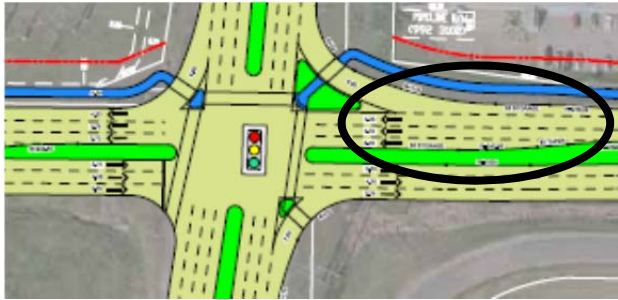


No.	Potential Safety Issue	Descriptive Reference Photograph
13	<p>The shared use path changes from one side of 17 Street to the other at the intersections of 76 Avenue and the Future Development Access north of Whitemud Drive.</p> <p>The disjointed alignment does not help promote active modes and increases the number of crossings required. It may also encourage some cyclists to travel on the sidewalk, which is not wide enough to accommodate them and pedestrians.</p> <p>It is acknowledged that the need to relocate the trail is based on constraints such as the location of trail crossings on bridges outside of this study area and right-of-way constraints in the vicinity of Maple Ridge Dr.</p>	 <p>17 Street / 76 Avenue intersection</p>
14	<p>Vertical curve k values on 17 Street near Baseline Road do not meet minimum standards and may result in substandard sight distances.</p> <p>The vertical profile should be reviewed to confirm there is no feasible way to achieve minimum k values.</p>	 <p>17 Street Profile at Baseline Road</p>
15	<p>Some of the cross walks/ramps provided at the Envirofuels Refinery, Baseline Road, Railway Street, 92 Avenue and 90 Avenue intersections do not connect with pedestrian facilities. It is assumed these facilities may be planned in the future.</p> <p>Crosswalks should not be implemented until there are corresponding facilities on both sides.</p>	 <p>17 Street / 90 Avenue Intersection</p>

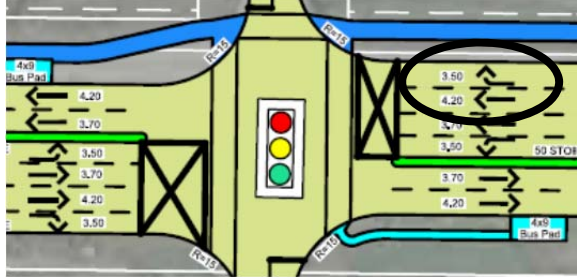
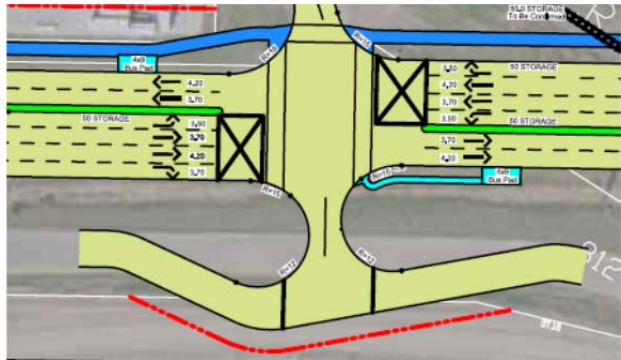


No.	Potential Safety Issue	Descriptive Reference Photograph
16	<p>The intersection west of the 17 Street/92 Avenue intersection is located in the middle of a turning lane. As a result, NB-WB and WB-SB turning movements cross the left turn bay, which could result in conflicts.</p> <p>The problem stems from the fact that intersection spacing on 92 Avenue is very short. Limited separation between intersections could result in unexpected braking/turns and operational issues between intersections.</p> <p>Opportunities to relocate the access further west should be considered.</p>	 <p><i>Access W. of 92 Avenue intersection</i></p>
17	<p>Limited separation between intersections on the Envirofuels Access Road could result in unexpected braking or conflicting turning movements.</p> <p>Understood that space limitations restrict options for increasing intersection separation. Could access road be relocated to east side buildings?</p>	 <p><i>Envirofuels Refinery Access Road</i></p>
18	<p>Large crossing distance for pedestrians and cyclists at uncontrolled access locations increases their exposure to vehicular traffic.</p> <p>Consider splitter islands with pedestrian/cyclist refuge (provided design vehicle turning paths can be accommodated).</p>	 <p><i>Various access locations</i></p>



No.	Potential Safety Issue	Descriptive Reference Photograph
19	<p>Stop boxes running across all lanes of NB and SB 17 Street at Railway Street could cause confusion among motorists. The purpose may not be clear to some motorists, which could result in violations. Furthermore, pavement markings are also likely to fade, reducing the likelihood of vehicles stopping where intended.</p> <p>Consider reducing stop boxes as much as possible to make their purpose more evident and to increase compliance. In order to achieve maximum reductions the stop boxes could be different lengths for each lane. Future signal timing should consider the extra time required to cross the intersection.</p>	 <p>17 Street / Railway Street Intersection</p>
20	<p>Short weaving distance for EB vehicles on Railway Street who wish to access the jug handle. Although the NB through traffic will be separated by the signal phasing, WBR turn traffic could pose a conflict. Short weaving distances increase the risk of side swipe and rear-end collisions.</p>	 <p>17 Street - Railway Street to Jug Handle</p>
21	<p>On SB 17 Street, the added through lane at Baseline Road could be mistaken for a left turn bay, adding confusion to an already atypical intersection (no left-turns permitted) and misleading motorists into thinking they can turn left.</p> <p>Consider eliminating the additional through lane until after the signal.</p>	 <p>Baseline Road</p>



No.	Potential Safety Issue	Descriptive Reference Photograph
22	<p>SB right-hand lane ends unexpectedly at Railway Street. This may lead to sudden lane changes, side swipes and challenges for trucks.</p> <p>Consideration could be given to ending the lane further south and reintroducing it as an exclusive right turn bay.</p>	
23	<p>Sharp curves and winding alignment of access road could be difficult for motorists to navigate (particularly WB-36) and could result in run-off-road or head-on collisions.</p> <p>While the alignment may provide additional storage between intersections, it might be a worthwhile tradeoff to straighten the alignment as adequate storage is likely not provided anyway.</p>	 <p style="text-align: center;"><i>Tank farm access</i></p>

2.0 Conclusion

Features of the preliminary concept drawings have been reviewed from a road safety perspective. Potential safety issues have been identified and design improvements have been recommended, where possible, to further improve the safety of the design.

We trust that this letter report assists your team in the completion of the final concept drawings. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

Cory Wilson, P.Eng
Transportation Project Manager

Jason Bell, EIT
Transportation Engineer