Executive Summary

The following design report compares two sets of guidelines in a single case study. Two intersections and one street corridor in Kingston, Ontario were redesigned using the current Canadian guidelines for bicycle lane and intersection design set out by the Transportation Association of Canada (TAC), as well as those currently used in The Netherlands set out by the Centre for Research and Contract Standardization in Civil and Traffic Engineering. These redesigns were compared using an evaluation framework containing several criteria considered to support high-quality bicycle infrastructure. These criteria were derived from the Dutch manual and supported by other Canadian sources such as the Canadian Institute of Planners' *Community Cycling Manual (2004).*

Evaluation Framework for bicycle lane and intersection design

Coherence - Bicycle lanes should be part of a regional cycling network. A coherent unit is a network of bikeways that link to each other and major destinations. Both bicycle lanes and intersections crossed by bicycle lanes should contain defining features that are recognized as bicycle infrastructure. This will improve awareness and safety for both cyclists and drivers.

Consistency - A bicycle lane should be of consistent quality throughout its length in order for travelling to be more comfortable and enjoyable. Any significant changes of quality should be clear and comprehensible to the road user. The level of quality of cycling facilities should also continue through intersections and crossings.

Directness - Directness is especially important with high bicycle volumes. Cyclists should be given as much priority as possible in order to not be delayed on a road section. Delay should only occur when a bike lane meets an intersection. In order to minimize delay at intersections, cyclists should be given priority without disrupting safety of the intersection.

Visibility - Bicycle lane delineations, turning paths, pavement symbols, signage and road surface should always be clearly visible to both cyclists and drivers. Visibility is especially important at intersections where various modes of transportation interact and cyclists are most likely to get into accidents.

Safety - Conflict between bicycle traffic and other forms of traffic should be kept at a minimum by separating uses, having cyclists travel in the same direction as automobile traffic and providing appropriate bicycle lane widths with sufficient space for encounters, passing and evasive maneuvers.

Comfort - To ensure maximum comfort there should be sufficient space for passing and exiting the bike lane is easy. Pavement surface should be smooth, even and free of sand or gravel, of good quality and well maintained. Furthermore, the number of pavement-transitions should be minimized.

Evaluation of redesigns

After the Queen Street-Bagot Street intersection, Queen Street-Wellington Street intersection and Queen Street corridor were redesigned using both the Canadian and the Dutch guidelines, each was evaluated using the 6 criteria: *Coherence*, *Consistency*, *Directness*, *Visibility*, *Safety*, and *Comfort*. The following tables provide the lane configurations for the existing conditions and the two redesigns, as well as, the criteria evaluation results. Refer to the abbreviations below in order to understand the lane configuration descriptions in each table.

LEGEND:

P – Parking Lane
L – Left-turning Lane
R – Right-turning Lane
P – Parking Lane
B – Bicycle Lane

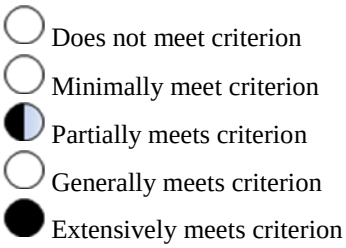

Table A – Evaluation of Queen Street – Bagot Street intersection redesigns

Criteria	Existing Conditions	Redesign with Canadian Guidelines	Redesign with Dutch Guidelines
Bagot Street cross-sectional configuration *Top = North of Queen *Bottom = South of Queen	T-L-T P-T-L-T-P	B-T-L-T-B P-B-T-L-T-B	B-T-B-L-T-B P-B-T-L-B-T-B
	N/A	1 parking lane lost; 2 bicycle lanes gained	1 parking lane lost; 3 bicycle lanes gained
Coherence: defining features recognized as bicycle infrastructure			
Consistency: consistent quality through intersection			
Directness: minimal delay, priority for cyclist			
Visibility: symbols, signage, road surface colouring			
Safety: appropriate bicycle lane widths, separation of cyclists & motorists			
Comfort: smooth, even and free of debris			

Table B – Evaluation of Queen Street – Wellington Street intersection redesigns

Criteria	Existing Conditions	Redesign with Canadian Guidelines	Redesign with Dutch Guidelines
Wellington Street cross-sectional configuration *Top = North of Queen ~Bottom = South of Queen	*P-T-T-P ~P-T-T-P	*B-T-T-B-P ~P-T-T-P	*P-B-T-T-B ~P-T-T-P
	NA	1 parking lane lost; 2 bicycle lanes gained	1 parking lane lossed; 2 bicycle lanes gained
Coherence: defining features recognized as bicycle infrastructure			
Consistency: consistent quality through intersection			
Directness: minimal delay, priority for cyclist			
Visibility: symbols, signage, road surface colouring			
Safety: appropriate bicycle lane widths, separation of cyclists & motorists			
Comfort: smooth, even and free of debris			

Table C – Evaluation of Queen Street corridor redesigns

Criteria	Existing Conditions	Redesign with Canadian Guidelines	Redesign with Dutch Guidelines
Queen Street cross-sectional configuration	T-T-T-P	B-T-T-T-B	B-T-L-B-T-B
	NA	1 parking lane lost; 2 bicycle lanes gained	1 parking lane lost; 1T replaced with 1L; 3 bicycle lanes gained
Coherence: defining features recognized as bicycle infrastructure			
Consistency: consistent quality through corridor			
Directness: minimal delay, priority for cyclist			
Visibility: symbols, signage, road surface colouring			
Safety: appropriate bicycle lane widths, separation of cyclists & motorists			
Comfort: smooth, even and free of debris			

Findings and Recommendations for Kingston

In summary the following findings and recommendations have been derived from the redesigns using Canadian and Dutch guidelines, along with the evaluation tables for Queen Street corridor, Queen Street-Bagot Street intersection and the Queen Street-Wellington Street intersection:

- Bicycle infrastructure as regulated by the Canadian guidelines can be implemented along Queen Street without affecting the corridor's current traffic capacity. However, the existing parking lane would need to be replaced with two bicycle lanes if curb locations were fixed.
- If the City of Kingston was opposed to completely eliminating parking along Queen Street, the corridor could be repurposed as a local street which only requires 3.0 metre wide vehicular lanes under the Canadian guidelines. This would allow for a shared bicycle and parking lane where parking would be permitted only during off-peak hours.
- The section of Bagot Street north of Queen Street could easily accommodate two bicycle lanes by simply reducing the current car lane widths. However, the section south of Queen Street would require the removal of one parking lane, but no car lanes would be affected.
- The City of Kingston should re-examine the *Downtown Action Plan* to ensure revitalization plans along Bagot Street include cyclists, unlike the overly wide pedestrian amenity on Wellington Street that has made the pavement width too narrow to allow for any bike lanes.
- The redesign of Wellington Street should be reviewed as revitalization initiatives continue in the downtown core. The wide pedestrian amenity spaces at Queen Street have impeded the implementation of future bicycle infrastructure.
- The City should ensure that all corridors being redesigned under the *Downtown Action Plan* are done so as complete streets, considering spatial needs of drivers, pedestrians and cyclists.
- Pavement conditions need to be improved along the Queen Street, Bagot Street and Wellington Street corridors before any bicycle infrastructure is implemented.

As the City of Kingston moves forward with the implementation of bicycle lanes at designated utilitarian corridors, efforts should be made to ensure bicycle infrastructure adheres, at a minimum, to current Canadian guidelines. Existing bicycle lanes such as the ones found along Union Street are underutilized as they are not properly marked with signage and pavement markings and are poorly maintained making them dangerous for cyclists to use. Furthermore, vehicles often park in these lanes defeating the purpose of implementing bicycle infrastructure.