

# HALIFAX

REGIONAL MUNICIPALITY

Active Transportation Project  
Streets For Cycling  
Brunswick Street Post Implementation Evaluation



## **Introduction**

The purpose of this visual study is to assess the realignment of the Brunswick Street roadway between Duke and Sackville Streets where cycle lanes were implemented in August of 2000. The realignment provides cyclists with a much higher profile and continues the theme that no one mode of transportation should necessarily dominate our roadways at the expense of another mode.

It is an opportunity to observe the behaviour of automobile traffic sharing the roadway with cyclists after the realignment was implemented. From these observations, it is possible to recommend enhancements or changes to the existing cycling and automobile lane designs to make them safer for both modes.

Photographs identifying potential traffic conflicts as they occurred on the roadway provide a record of the observations contained in this report. In addition, design guidelines are being updated continuously. As a pilot project, Streets for Cycling is expected to provide critical analysis for its designs after implementation. Recommendations for design alterations are based on the latest standards and guidelines for the design of bicycling facilities.

The study is divided into four sections. Each section deals with a particular segment of the Brunswick Street cycle route between Duke and Sackville streets. Section one discusses potential auto/cycle conflicts in southbound traffic at the Rainnie/Duke/Brunswick intersection and the cycle route from this intersection to George Street. Section two discusses options for the George Street intersection. Section three describes the existing conditions for cycling between George and Prince streets and Section four is directed at design alterations along the route between Prince and Sackville streets with particular attention to the Brunswick/Sackville intersection and the right turn merge on to Sackville Street.

Several design options are discussed in each section of the analysis and are directed at providing a safer environment for both commuting cyclists and automobiles.

## **I. Rainnie / Duke/ Brunswick Intersection**

The recommendations included in Phase I of the Streets for Cycling pilot project suggested that a raised concrete refuge area be located immediately after the Rainnie/Brunswick merge. The purpose of creating a raised refuge area was to protect an additional three parking spaces which could be created behind the refuge. The cycle lane in this treatment was to run continuously from the pedestrian island at the Rainnie/Duke/Brunswick intersection to George Street on this segment of the cycle route (see Fig.4: Phase I recommendation below). However, the raised refuge area was not implemented and the additional parking spaces were not created. The post implementation visual study indicates that cars are ignoring the skip lines at Rainnie and Brunswick and driving in the cycle lane after merging with Brunswick Street traffic (see Figs. 1-3). This causes a potentially dangerous automobile/cycle conflict. Two remedial design treatments are recommended for this segment:

**Option I: Create a transition area for southbound traffic between the pedestrian island at the Rainnie/Duke/Brunswick intersection and a new refuge area for parked cars and the cycle lane after the merge at Rainnie/ Brunswick (see Fig. 5 below).**

A raised concrete refuge area should be placed on Brunswick Street after the Rainnie/Brunswick merge to allow for three additional parking spaces. The refuge area should be extended to protect the cycling lane as well from traffic merging at Rainnie Drive. Southbound cycling traffic exiting Rainnie Drive and desiring to make a left hand turn on to George Street would be in the correct lane eliminating a potential lane crossing conflict.

**Option II: Eliminate the dedicated cycle lane between Duke and George Streets and replace with cycle icons on the road surface to indicate shared auto/cycle use (See Fig. 6 below).**

Eliminate the dedicated cycle lane altogether and paint cycle icons on the roadway surface. The focus changes from a shared parking/cycle lane to one wider shared auto/cycle lane. This treatment would moderate potential auto/cycle conflicts discussed in Phase I of the Streets for Cycling report<sup>1</sup>. The argument presented in Phase I is that dedicated lanes should only be used as a last resort in high traffic areas to provide a measure of comfort from large truck and transit buses traveling in the same direction as the cyclist. However, a shared parking/dedicated cycle lane may provide a false sense of security, particularly for less skilled cyclists. These cyclists may not expect automobile traffic to be traveling in the dedicated parking lane as is evident at the Rainnie/Brunswick merge area (see Figs 1-3 below). In addition, the parking lane does not provide enough space to avoid the risk of being 'doored' by auto passengers leaving their cars, if the driver's side doors are opened just before a cyclist passes in the cycling lane. Also, a cyclist wishing to make a left hand turn from the dedicated cycle lane must cross the auto traffic lane, a behaviour which has been identified in the Phase I report as a major source of potential cycle/auto accidents<sup>2</sup>. A cyclist will not feel committed to remain on the right hand side of the roadway, and

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<sup>1</sup> Safety and Bicycle Facilities Design, p.2 Streets For Cycling: Phase I

<sup>2</sup> Streets For Cycling: Phase I, p.5

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automobile drivers are more likely to be aware of the cyclists if both are traveling in the same lane. The bicycle icon painted on the roadway will remind motorists to be vigilant in the shared roadway



*Fig.1 Rainnie Drive/ Brunswick Street: Southbound cars crossing bike lane moving from Rainnie Drive to Brunswick Street. Automobile traffic ignore the skip line at Rainnie and Brunswick.*

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*Fig.2 Rainnie Drive/ Brunswick Street: Cars crossing bike lane after proceeding from Rainnie Drive on to Brunswick Street. The automobile is driving inside the cycle lane and has ignored the skip line.*



*Fig. 3 Rainnie/ Brunswick: Southbound traffic driving in bike lane after turning from Rainnie Drive. The Automobile has ignored the skip line which directs traffic to cross over to the inside lane and is driving in the cycle lane.*

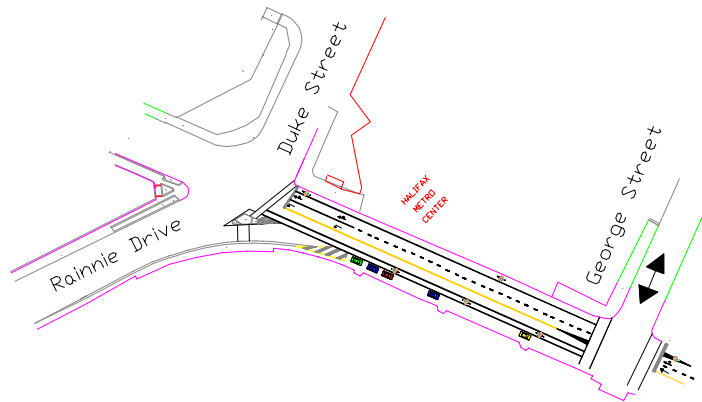


Fig.4 Phase I recommendation: Continuous bike lane from Duke Street to George Street with raised refuge area for additional metered parking. The implemented marking omitted the refuge area but provided skip lines at Rainnie Brunswick.

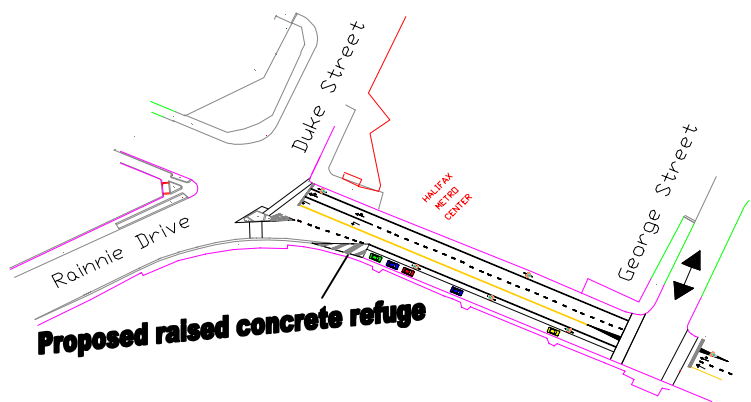
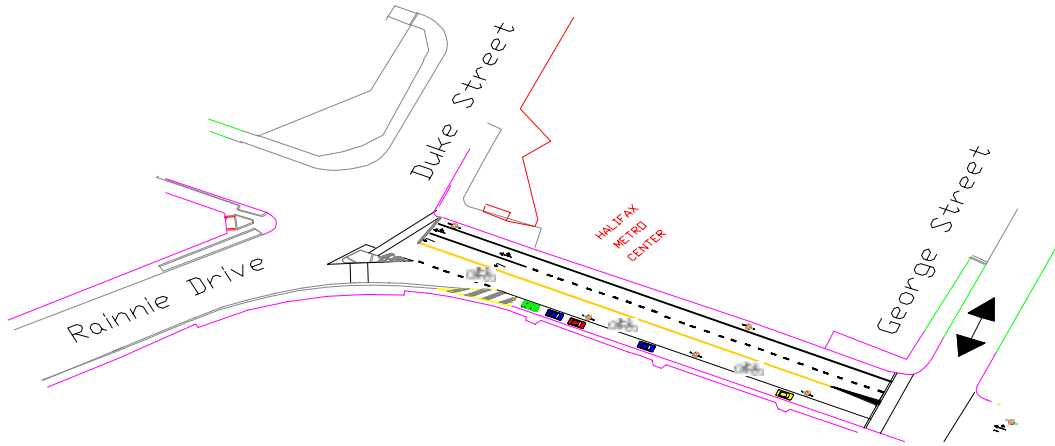


Fig. 5 Create a transition area from the pedestrian island at Rainnie/Duke/ Brunswick to a raised and extended refuge after the merge at Rainnie/Brunswick. The refuge area extends to protect the cycle lane as shown in the concept photo.

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*Fig.6: Existing cycle lane markings are removed changing the focus from a shared parking/cycle lane to a wider shared auto/cycle roadway. This option retains the skip line at Rainnie/Brunswick and recommends that cycle icons be painted on the shared roadway. The refuge area is retained to protect additional parking spaces.*

## II. Crosswalk at George and Brunswick

### **Create a refuge area for southbound cyclists waiting to make a left hand turn from Brunswick on to George Street.**

A painted refuge area at the intersection of Brunswick and George Streets (see fig.7 below) would protect cyclists while stopped and waiting to turn. This is a variation of the recommended design guidelines<sup>3</sup> for left hand turning lanes as it effectively 'widens the throat' for left turning cyclists. However, a turning lane is not necessary at this RA-5 non-signalized intersection.



*Fig. 7: Shown is the cycle lane meeting the crosswalk as recommended by design guidelines.*

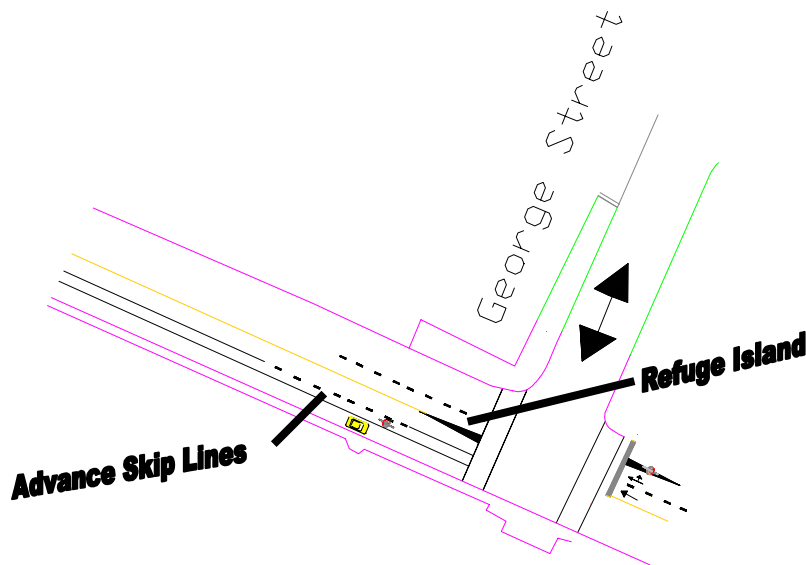
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<sup>3</sup> Guide for the Development of Bicycle Facilities, p.25 and p.30 (fig.12) AASHTO, 1999

**Two options are recommended:**

**Option I:**

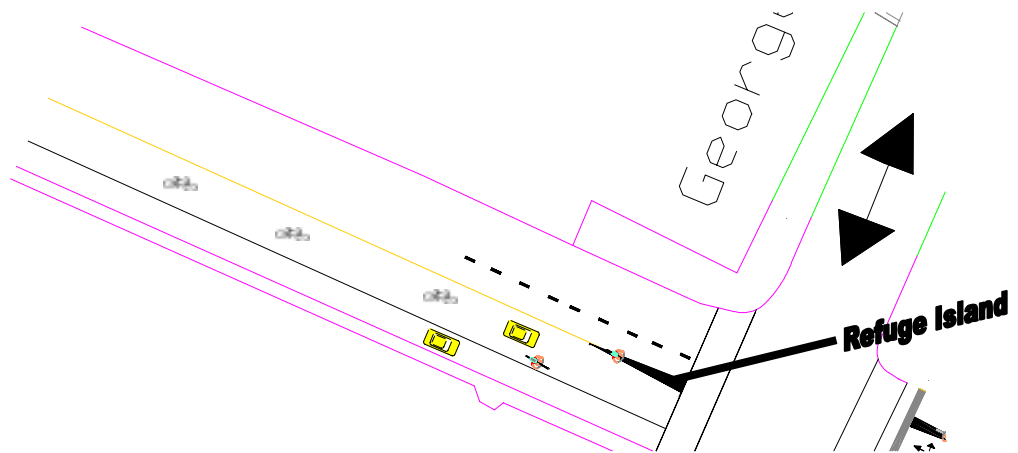
Retain the existing dedicated cycle lane and provide skip lines in advance of a 'refuge area' at the intersection of Brunswick and George Streets. The skip lines will alert both motorists and cyclists of the potential cyclist crossing movement to the refuge area from the cycle lane. (See fig. 8 below).



*Fig.8. Intersection at Brunswick and George Streets indicating placement of cycle lane skip lines in advance of left hand turn and a refuge island instead of a turning lane which effectively 'widens the throat' for left turning cyclists.*

**Option II:**

Eliminate the existing dedicated cycle lane and provide a refuge area for southbound left turning cyclists at the intersection of Brunswick and George Streets effectively 'widening the throat' for left turning cyclists (see Fig.8a)



*Fig. 8a Cycle lane striping is eliminated, replace with pavement icons and a refuge island created for left turn cyclists.*

### III. George to Prince Streets Segment of Cycle Route

In this segment of the existing Duke to Sackville realignment on Brunswick Street, it is recommended that the design be retained. The dedicated cycle lane has been eliminated and replaced with bicycle icons on the roadway. This section conforms to the proposed elimination of the dedicated cycling lanes on the other two segments in this area of the cycle route (see Fig. 9 below).



*Fig. 9: Existing design of cycle route between George and Prince on Brunswick Street. There is no dedicated cycle lane. Bicycle icons replace the dedicated cycle lane existing on other segments of the cycle route.*

#### **IV. Prince to Sackville Segment of Cycle Route**

The southbound roadway on this segment has no on street parking as the parking spaces on the west side of Brunswick Street near the Brunswick/Sackville merge were removed. The dedicated cycle lane runs next to the curb along the length of the segment (see Fig 10 below). Skip lines are provide for right turn traffic at the turn off to Sackville and a solid cycle lane continues after the turn off ends at Sackville Street. The existing skip lines commence at the turn off and require automobiles to make a sharp right turn to cross the cycle lane and access the turn off to Sackville Street (see Fig. 11 below).

Design guidelines recommend striping and signing configurations to encourage lane crossings in advance of intersections. The guides consider these treatments preferable to those that force the crossing in the immediate vicinity of the intersection. Guidelines state, although to a lesser extent, the same is true for left turning cyclists<sup>4</sup>. Two options are recommended:

##### **Option I: Re-stripe the cycle lane to begin the skip lines 30.5 meters from the Sackville turnoff.**

The Streets for Cycling Phase I report recommended that skip lines be provided for the cycle lane starting 30.5 m. in advance of the Sackville Street turn off. This would alert both cyclists and motorists of the turn off well in advance, and also signal that cyclists may cross the roadway to access the left hand turn lane at the Brunswick/Sackville intersection (see Fig. 12 below). The cycle lane of necessity had to be narrowed in advance of the intersection due to road width constraints and is therefore less than minimal width, as is the through cycle lane after the turn off at the intersection.

##### **Option II:** (see Fig. 13 below).

Discontinue the cycle lane 30.5 meters in advance of the Sackville Street turn off and place bicycle icons on the shared roadway. A form of throat widening would be possible at the intersection with the additional roadway width produced by the elimination of the cycle lane in this area. Both right and left turn only lanes and a through lane could be produced at the intersection with the additional width. Appropriate signage warning of possible conflicts could be posted if deemed appropriate. The treatments would accommodate right and left turning cyclists and motorists and cyclists who may prefer to use the crosswalks to negotiate the intersection.

##### **Option IIA:** (see Fig. 14 below).

Eliminate the cycle lane on this segment and provide cycle icons in the widened outside lane to indicate a shared auto/cycling lane. The intersection treatments would remain the same as in Option II.

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<sup>4</sup> Guide for the Development of Bicycle Facilities, AASHTO (1999).

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*Fig. 10: Southbound cycle lane runs next to the curb from Prince to the right turn off at Sackville Street.*

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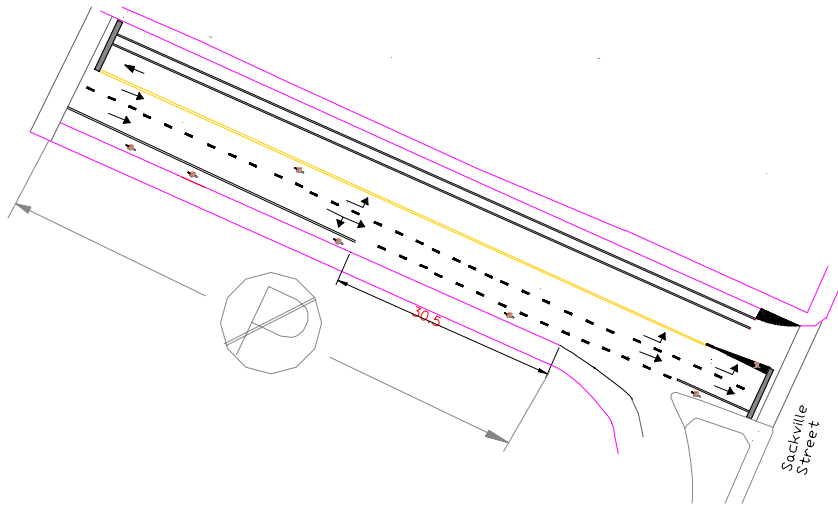
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*Fig.11: Southbound cycle lane on Brunswick Street at the Sackville Street right hand turn off. The skip lines begin at the turn off rather than in advance of it as recommended by design guidelines.*

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*Fig. 12: Streets for Cycling Phase I recommends skip lines commencing 30.5 meters in advance of the turn off to Sackville Street as shown in the drawing and concept photo.*

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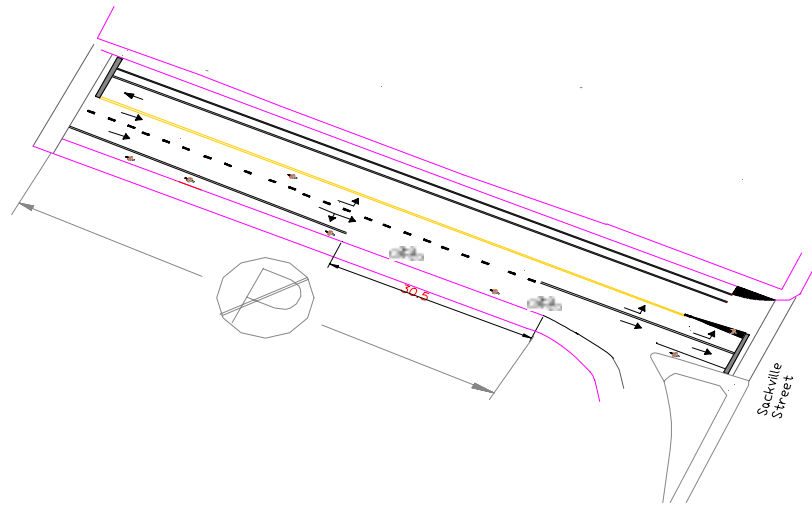


Fig.13: Option II recommends that the cycle lane be eliminated 30.5 meters from the Sackville Street turn off and the additional width re-striped for left turn only and through lane at the intersection and a right only turn lane for Sackville Street, in addition to the through lane at the intersection for cyclists.

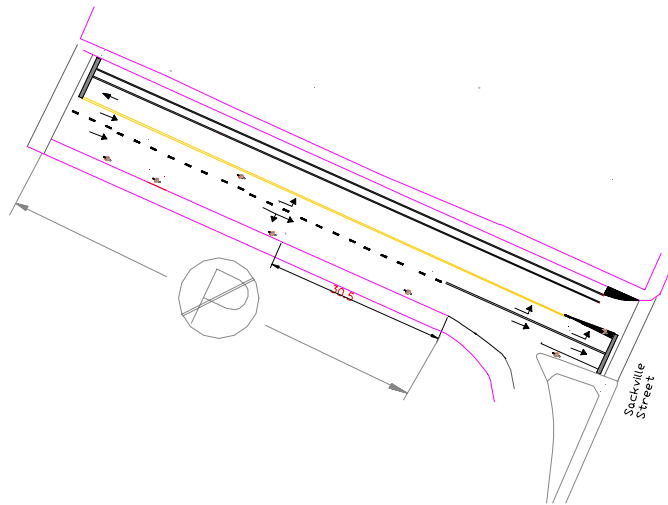


Fig.14 Option IIA eliminates cycle lane striping altogether to produce a wider outside lane marked with cycle icons on the roadway. A right turn lane and through lane are marked. A through lane for cyclists is provided at the intersection.