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HIGHWAY 7 CYCLING FACILITY DESIGN TOWN CENTRE BOULEVARD TO DONCREST ROAD TOWNS OF MARKHAM AND RICHMOND HILL

The Transportation Services Committee recommends:

- 1. Receipt of the deputation by Peter Miasek, Markham Cycling and Pedestrian Advisory Committee, regarding 'Safe and Attractive Cycling on Regional Roads';**
- 2. Receipt of the presentation by Steve Kemp, Director, Traffic Management & ITS; and**
- 3. Adoption of the recommendation contained in the following report dated June 1, 2011 from the Commissioner of Transportation Services.**

1. RECOMMENDATION

It is recommended that this report be received for information.

2. PURPOSE

This report provides information on the proposed cycling facility design for Highway 7 between Town Centre Boulevard and Doncrest Road in the Towns of Markham and Richmond Hill.

3. BACKGROUND

The pedestrian and cycling master plan recommends on-street bicycle lanes on Highway 7

The Pedestrian and Cycling Master Plan adopted by Regional Council in April 2008 identified the need for an on-street cycling facility on Highway 7 between Highway 50 and Donald Cousens Parkway. The York Region Pedestrian and Cycling Master Plan is intended to identify infrastructure needs for commuter cyclists. Facilities for recreational cyclists are generally the responsibility of each local municipality.

Regional Council adopted a recommendation on February 19, 2009 that reconfirmed the pedestrian and cycling master plan recommendation to build on-street bicycle lanes on Highway 7

On February 19th, 2009, Regional Council reconfirmed the Pedestrian and Cycling Master Plan recommendation to implement on-street bicycle lanes on Highway 7. The February 2009 report recommended that the cycling facility be built on-street in order to minimize the number of vehicle-cyclist conflict points at intersection and driveway crossings.

The Highway 7 vivaNext project presented an opportunity to provide facilities for cycling along this important Regional corridor

An important objective of the reconstruction of Highway 7 is to provide opportunities for cycling trips to be made along the corridor. The Environmental Assessment and all cost estimates completed for this project on Highway 7 have always included provisions for cyclists.

The full extent of the proposed Highway 7 transitway extends from the community of Cornell in the east to Highway 50 in the west. Provincial funding for the proposed Highway 7 transitway has been secured for the section between Unionville Station (near Kennedy Road) to Helen Avenue (east of Islington). The first section of the Highway 7 transitway will be constructed within the next three years between Town Centre Boulevard and Yonge Street. The remaining sections of the Highway 7 transitway are scheduled for construction by 2020.

The proposed cycling facility will only be implemented along sections of Highway 7 where the dedicated rapidways will be constructed. In the instance of the first phase of the rapidway, this means that the cycling facility will be in place between Town Centre Boulevard and Doncrest Road (east of Bayview Avenue). *Attachment 1* provides an illustration of the planned rapidway construction and the proposed cycling facility location.

Town of Markham Council has requested that York Region implement the cycling facility within the boulevard of Highway 7

On December 16, 2008, Town of Markham Council adopted a resolution requesting that York Region incorporate segregated bicycle lanes within the Highway 7 right-of-way between the property line and the curb.

In response to this resolution, Regional Council considered a report on February 19, 2009 and reconfirmed their commitment to an on-street cycling facility for Highway 7.

Town of Markham and Town of Richmond Hill Councillors and residents continue to express concerns about the safety of the proposed on-street cycling facility for Highway 7

On several occasions, concerns have been raised regarding the safety of an on-street cycling facility on Highway 7. These concerns focus on the compatibility of an on-street bicycle lane with an environment that includes heavy trucks, high traffic volumes and high travel speeds.

At the Council cycling workshop held on May 27, 2010, Regional staff committed to conduct a review of the cycling facility design being proposed for Highway 7

In response to the concerns being raised regarding the proposed Highway 7 cycling facility design, Regional staff organized a Council cycling workshop held on May 27, 2010 to discuss design alternatives. Two external cycling safety experts were retained to provide Regional Council with an overview of design options and safety issues.

The workshop confirmed that the cycling facility design needs to be context sensitive. This means that different operating environments require different design solutions in order to make cycling both safe and comfortable for users.

At the workshop, Regional staff committed to conduct a review of the current cycling facility design for Highway 7 and report back to Council with the findings. This report presents a summary of that review.

4. ANALYSIS AND OPTIONS

Cycling facilities on Highway 7 are being built for the “Enthusied and Confident” cyclist

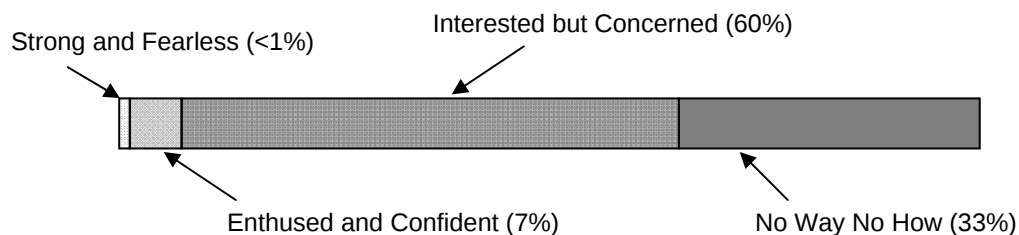
The focus of York Region’s Pedestrian and Cycling Master Plan is to encourage walking and cycling as alternative modes of transportation in order to reduce the need for personal automobile travel. To that end, the infrastructure needs identified in the Regional Plan are targeted towards utilitarian cyclists that will use the bicycle as an automobile alternative in their travel plans.

Recreational cycling is also an important part of an overall cycling plan for any community. Almost all cyclists get their introduction to the bicycle as a form of recreation. People who use a bicycle as a form of recreation are likely to consider its use as a mode of transportation; which is why encouraging recreational cycling is an important component of any long-term plan that attempts to shift trips from the automobile to the bike.

Cycling facilities for recreation are typically located on completely separated bicycle trails or on low volume, low speed roadways. Regional roads by definition are more appropriate for utilitarian cycling trips than they are for recreational purposes.

The City of Portland, often cited as the municipal leader in cycling facility design, completed a survey to gauge the opportunity to shift automobile trips to the bicycle (see Figure 1). Only 7% of respondents were “Enthusied and Confident” enough to consider using the bicycle as their mode of choice in their daily commute. 33% of respondents fell into the “No Way No How” category and 60% were “Interested but Concerned” about their safety.

Figure 1: City of Portland Cyclist Survey



It is important to remember that these results from Portland are from a City that has some of the most extensive cycling infrastructure available of any City in North America. The results of a similar study in York Region would likely produce significantly different results with much fewer respondents expected in the “Enthusied and Confident” category.

The key to promoting cycling as an alternative mode of transportation in any community is to build facilities that will attract the “Interested but Concerned” cyclist. To that end, the local municipalities within York Region have been building local cycling networks that provide comfortable and safe facilities needed for recreational and beginner commuter cyclists. The facility proposed for the Highway 7 corridor is not intended to fulfill the same need. The Highway 7 cycling facility is being designed and constructed to provide a cycling option for the “Enthusied and Confident” commuter cyclist.

Good cycling facility design attempts to match the correct facility type within the environment in which it is being built

At the May 2010 Council Workshop, participants learned cycling facilities need to be designed to “fit in” to the environment in which they are being built. For example, a cycling facility to be built on a low traffic volume, low speed residential street would be quite different from a facility built on a high speed, high volume multi-lane roadway.

Other considerations in design include the presence of transit and pedestrian activity, the frequency of un-signalized access driveways and truck volumes.

Following the Council workshop, Regional staff continued to work with our cycling experts to develop a set of criteria for selecting cycling facility types within environments typically found on the Regional road system. *Attachment 2* provides an illustration of available facility types as well as the criteria used to select a particular design for a given roadway.

Many jurisdictions around the world – including some in Ontario – have recently been designing and building off-street cycling facilities as their preferred design alternative

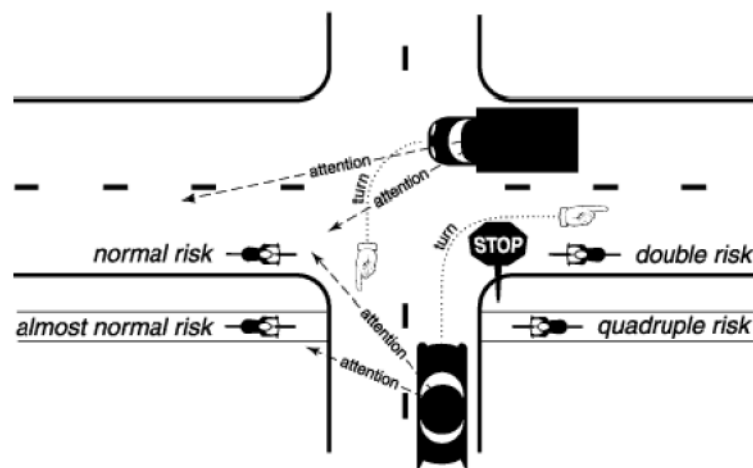
Off-street facilities provide cyclists with a high degree of comfort and separation from other modes of traffic using the roadway. Recreational cyclists and inexperienced cyclists often prefer to use an off-street facility.

Off-street facilities include multi-use (pedestrian and cycling) paths or trails and physically separated cycle-tracks. These off-street facilities are physically separated from other types of traffic within the right-of-way.

One problem with off-street cycling facilities that run parallel to roadways is related to intersection or driveway treatments. Our statistics tell us that almost all cycling collisions occur at intersections. Drivers travelling in vehicles along the main roadway do not expect other vehicles (i.e. bicycles) to be using the boulevard.

Figure 2 illustrates some of the risks associated with cycling/vehicle conflicts at intersections. Due to driver visibility and attention issues, off-street facilities represent a higher risk factor than on-street facilities for cyclists at intersections. It is important to note that risk, safety and comfort are not necessarily considered interchangeable in design. An off-street facility may be more comfortable for many cyclists, however, increased comfort does not equate to decreased risk or increased safety and in fact some evidence suggests that the reverse can be true. Some statistics have shown that operating a bicycle in an environment where you are less comfortable can actually represent less risk and a higher degree of safety.

Figure 2: Cycling Risks at Intersections and Driveways



Another problem with off-street in boulevard cycling facilities is the potential for conflicts with pedestrian traffic in urban areas. Many jurisdictions have had difficulty separating the cyclist zone from the pedestrian zone in a boulevard facility. Even in cases where this separation has been done successfully, safety problems occur at interface points where cyclists and pedestrians most cross each others path. Along Highway 7, the vision for the boulevard space includes a very active pedestrian environment that is not compatible with the needs of commuter cyclists.

The original Highway 7 cycling facility design proposed a 1.5 metre wide bicycle lane separated from three lanes of general purpose traffic by a white pavement marking strip.

The on-street bicycle lane concept included in the original design proposed a typical 1.5 metre bicycle lane separated from three lanes of general purpose traffic by a 0.1 metre wide white pavement marking strip.

This type of cycling facility has been used in many applications across North America and around the world with success. Cyclists tend to prefer riding on roadways designed with bicycle lane facilities as an alternative to sharing space on roadways that do not have this added protection.

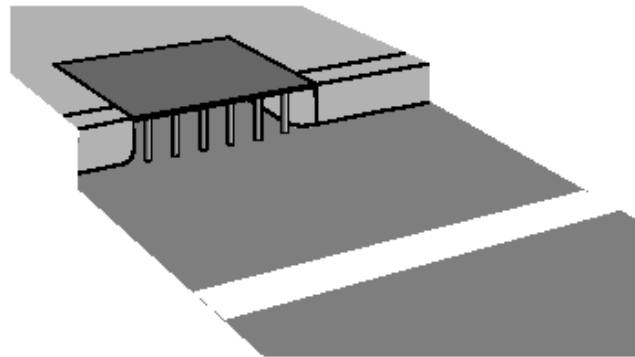
The revised Highway 7 cycling facility design includes a 0.5 metre “buffer” treatment to separate the bicycle lane from general purpose traffic, side inlet catch basins and a lower speed limit

The revised cycling facility design for Highway 7 provides a 1.4 metre bicycle lane separated from three lanes of general purpose traffic by a 0.5 metre buffer. The one-half metre buffer is intended to provide a more comfortable cycling environment by increasing the separation between bicycle traffic and general purpose traffic using the roadway.

An additional 0.5 metres of roadway space was required in each direction for the revised design. In addition to reducing the bicycle lane width by 0.1 metres, the additional width was taken from the right hand most general purpose lane (reduced from 3.50 metres to 3.30) as well as from the gutter (reduced from 0.3 metres to 0.1 metres). By reducing dimensions within the existing roadway cross-section, the revised cycling facility design could be accomplished without relocating proposed curb locations which would have had significant cost and scheduling impacts for the project.

The revised design also includes provisions for side inlet catch basins. As illustrated in Figure 3, side inlet catch basins are considered more cycling friendly, reducing obstructions in the bicycle lane to provide a more comfortable riding environment.

Figure 3: Side Inlet Catch Basin



A speed limit reduction from 70 km/hr to 60 km/hr is also proposed for this section of Highway 7 (*see Attachment 3*). One of the reasons for the proposed reduction is to provide a more comfortable operating environment for users of the new cycling facility.

The provision of a physically separated bicycle lane is problematic for some cyclists

A fully separated bicycle lane along the full length of Highway 7 would create issues for some cyclists. If the bicycle lane is to be fully separated from one end to the other, consideration needs to be made for how cyclists are to exit the bicycle lane to make left turns at intersections. Typically, the “Enthusied and Confident” cyclist for which this facility is being designed will make a left turn by changing lanes out of the bicycle lane, manoeuvre across the general purpose lanes and make their left turn at an intersection from the left turn lane. This manoeuvre would not be possible in the case of a physically separated bicycle lane and left turns would have to be made using pedestrian crosswalks at intersections (a practice that is normally discouraged and also illegal unless you dismount) or two-stage indirect left turns at intersection which results in increased delay and inconvenience for the experienced cyclists. Many of the “Strong and Fearless” or “Enthusied and Confident” cyclists may avoid the separated bicycle lane entirely in order to avoid this increase in delay when turning left at intersections.

The other problem with physically separated bicycle lanes for the experienced cyclists is that there are no passing opportunities to allow them to overtake slower riders using the separated facility. This would be another reason for the “Strong and Fearless” or “Enthusied and Confident” cyclist to avoid a physically separated cycling facility that may be used by less confident riders.

It is important to note that the Highway 7 cycling facility is not being designed for the novice or recreational cyclist. One of the most important considerations in educating new cyclists is the importance for them to choose their route to their destinations wisely just like novice drivers are often taught. For example, Highway 401 may not be the first

roadway that you choose to train a young driver. As a comparative, Highway 7 is not and will not be the place (with or without a physically separated lane) for a novice cyclist.

More comfortable alternatives for novice and recreational cyclists already exist and will continue to be built for anyone that may want to travel to and from destinations within the Highway 7 corridor. As designers, we need to be cognisant of the impacts of our designs which may attract more novice and recreational riders to a facility that is not suitable for them.

Over time, as the nature of Highway 7 changes, it will be possible to have the facility design evolve to attract a wider range of cyclists.

The provision of a physical curb to separate the bicycle lane from general purpose traffic generates issues for transit operations and roadway maintenance

A physical barrier to separate the bicycle lane from general purpose traffic is problematic for transit operations. YRT/Viva will continue to run conventional local transit service in mixed traffic along the curb lane of Highway 7 during and following the implementation of vivaNext. Local transit service stops will continue to be serviced by YRT conventional transit.

If the bicycle lane were to be physically separated from general purpose traffic along the full extent of Highway 7, transit would be loading and alighting passengers from the curb lane. In a scenario where the bicycle lane is physically separate along its full extent, this creates a significant safety issue for transit customers and cyclists whereby we would be asking transit customers to cross the bicycle lane to travel from or to the transit vehicle from the curb. For this reason, it is important that any physical separation of the cycling facility be interrupted to provide local transit service the ability to load and unload passengers at the curb. From a cyclists point of view, this means that transit vehicles will occasionally block their path in the bicycle lane requiring them to either wait for the transit vehicle to load and unload before proceeding, or alternatively pass the transit vehicle using the general purpose lanes. Allowing cyclists to continue operating through the bicycle lane while transit loads and unloads passengers from the general purpose lane is not considered a safe alternative and is not recommended.

The provision of a physically separated bicycle lane also has significant implications for winter maintenance. Clearing a physically separated bicycle lane along Highway 7 is only technically feasible if it is hand-cleaned, which is cost prohibitive. The general purpose lanes of Highway 7 and the centre median transitway will require snow clearing during the winter months. During a snow clearing operation, snow from the transitway and general purpose lanes of Highway 7 will be stored temporarily on the right hand side of the roadway.

In the case of a bicycle lane separated from the general purpose lanes by pavement markings only, the snow will be stored in the boulevard space between the curb and the sidewalk. If the bicycle lane were to be physically separated, the snow from the transitway and the general purpose lanes would temporarily be stored within the bicycle lane, effectively closing the bike lane until a second snow clearing operation could push the snow from the bicycle lane onto the boulevard. This type of operation would result in short-term closures of the bicycle lane during snow removal operations and would at least double the cost of existing snow removal operations along Highway 7.

A physical barrier that separates the bicycle lane would also create maintenance issues outside of the winter months. Roadway cleaning and sweeping operations would have to be done by hand or using specialized equipment making it cost prohibitive. Cyclists are much more susceptible to gravel and other debris in their lane and as such providing a clean and debris free surface is very important. Installing a physical barrier in the buffer space will make it very difficult to ensure that the lane is kept clear of ice, snow and debris.

A cycling facility on the boulevard is not recommended for Highway 7 due to the impacts on cyclists, pedestrians, transit operations and roadway maintenance

A physically separated cycling facility along Highway 7 would be viewed as a more comfortable cycling option for recreational and beginner commuter cyclists. However, there are many negative impacts of a physically separated cycling facility on Highway 7 including:

- Problematic vehicle-cyclist conflicts at intersections and driveways
- Increased vehicle-pedestrian conflicts on the boulevard
- Cyclist-pedestrian conflicts at curb-side transit stops
- Increased costs and lower levels of service for winter and summer maintenance
- Increased delay and problematic left turn operations for commuter cyclists
- Possible false sense of security and comfort for novice cyclists

For these reasons, a physically separated cycling facility along Highway 7 is not recommended.

5. FINANCIAL IMPLICATIONS

The cost to provide the on-street bicycle lane on Highway 7 was included in the initial vivaNext project budgets. Additional costs to undertake the re-design and implementation of the modified cycling facility will be covered within the existing capital contingencies or the Transportation Services capital budget.

Additional operating costs for snow clearing, street sweeping and pavement marking maintenance of the proposed cycling facility have yet to be determined.

6. LOCAL MUNICIPAL IMPACT

The proposed buffered bicycle lane on Highway 7 will provide a safe and comfortable operating environment for commuter cyclists. It is expected that the Highway 7 cycling facility will interconnect to existing and proposed local cycling facilities along the Highway 7 corridor.

7. CONCLUSION

The proposed buffered bicycle lane is the best available solution to provide a safe and comfortable cycling facility on Highway 7. The cycling facility design for future Regional corridors will continue to consider all available facility types including off-road, dedicated bike-ways and cycle tracks as design alternatives.

For more information on this report, please contact Steven Kemp, Director, Traffic Management and Intelligent Transportation Systems at Ext. 5226.

The Senior Management Group has reviewed this report.

(The three attachments referred to in this clause are attached to this report.)

Highway 7 Cycling Facility Design



Presentation to
Transportation Services Committee

Steven Kemp, P. Eng.
June 15, 2011



Outline

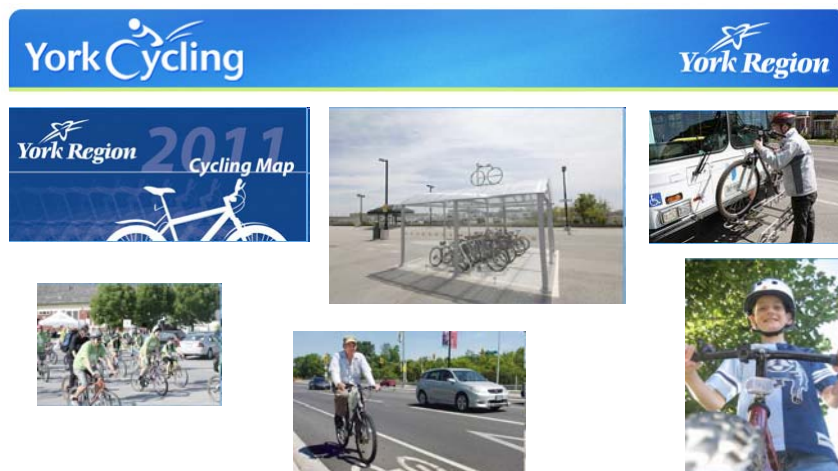
- ❑ Background
- ❑ Cycling in York Region
- ❑ Council Workshop – May 27, 2010
- ❑ Context Sensitive Design
- ❑ A Revised Recommendation



Background

- ❑ Pedestrian and Cycling Master Plans
- ❑ Council Direction – February 2009 to install Highway 7 bicycle lanes on-street
- ❑ Proposed Design Presented for Highway 7 Rapidway Project
- ❑ Town of Markham opposition to on-street facility for Highway 7
- ❑ Council Workshop – May 27, 2010

Cycling in York Region

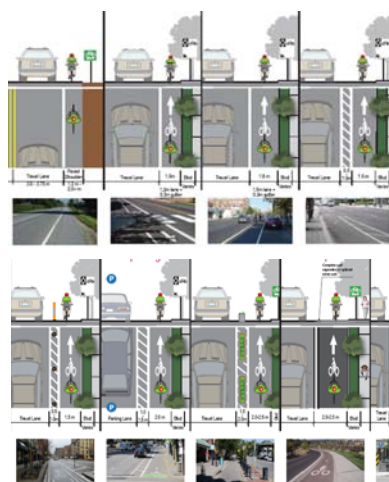


Council Workshop – May 27, 2010

- ❑ One size doesn't fit all
- ❑ Intersections/Driveways combined with off-street bikeways add risk
- ❑ Comfort ≠ Safety

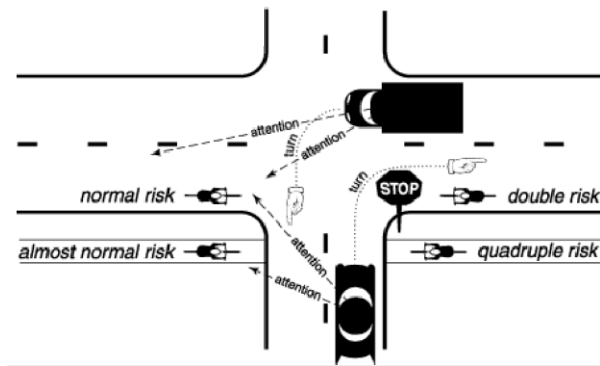


Council Workshop – May 27, 2010



Choosing the appropriate facility type that fits within the context that it is being built is the key

Council Workshop – May 27, 2010



Council Workshop – May 27, 2010

Bicycle Facility Selection Matrix

AADT		>10,000 AADT								Limited Access Roadways
Posted Speed		<40 MPH				>40 MPH				
Vehicular Mix of Heavy Trucks		<10%		>10%		<10%		>10%		
Frequency of Driveways		Low	High	Low	High	Low	High	Low	High	
Functional Class		Arterials								
Facility Type	Cross Section Width*									
Shared Use Path										
Bicycle Lane	>25'									
Paved Shoulder	>25'									
Wide Curb Lane	21'									
Shared Lane	<21'									
Signed Shared Roadway										

- Higher speed roadways with frequent driveways = on-street
- Higher speed roadways with infrequent driveways = off-street

Highway 7 Cycling Facility context sensitive design



Transportation Services Committee June 15, 2011

Context Sensitive Design Cycling on Highway 7 - Today

6 Lane Cross Section plus left turn lanes	
Average Annual Daily Traffic	50,000 – 70,000
Bike Volumes	0
Heavy Trucks	8%
Speed Limit	70 km/hr



Transportation Services Committee June 15, 2011

Slide 10

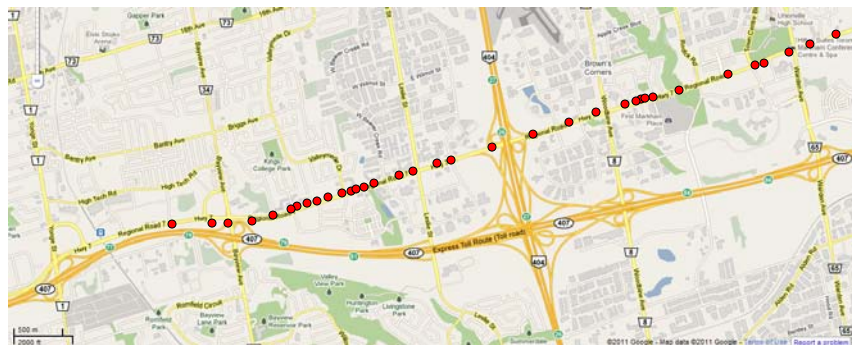
Context Sensitive Design Cycling on Highway 7 – The Future

6 Lane Cross Section with centre median transitway
Average Annual Daily Traffic
Bike Volumes
Heavy Trucks
Speed Limit

?
?
?
60 km/hr

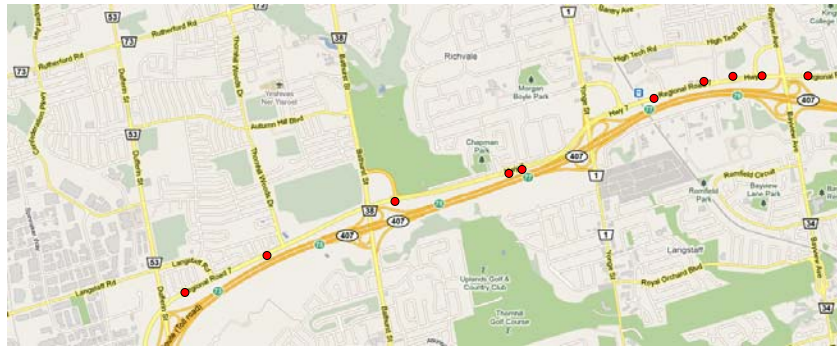


Context Sensitive Design Warden to Bayview



35 Crossing Points – 20 Un-signalized

Context Sensitive Design Bayview to Dufferin



10 Crossing Points – 2 Un-signalized



Transportation Services Committee June 15, 2011

Slide 13

Context Sensitive Design Who are we building for?



Transportation Services Committee June 15, 2011

Slide 14

Context Sensitive Design Who are we building for?



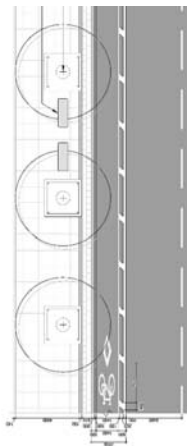
Portland, OR

Highway 7 Cycling Facility a revised recommendation

Highway 7 – Revised Design

- ❑ Town of Markham Council continue to express opposition to an on-street facility
- ❑ All evidence indicates that an on-street facility is the safest choice
- ❑ Right of way re-allocated to provide “buffer” between cycling facility and general purpose lanes
- ❑ Additional physical elements being considered within the proposed buffer

Highway 7 – Revised Design



New York City

Highway 7 – Buffer Treatment Options

- ❑ Pavement Markings
- ❑ Temporary curb
- ❑ Rumble strips
- ❑ Flexi-post vertical barrier



Seattle, Washington



San Francisco, CA

Buffer Treatment Issues

- ❑ Transit Operations
- ❑ Maintenance



Enhanced buffer treatments will not be possible in all areas

Recommendation

It is recommended that:

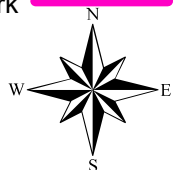
Staff proceed with the on-street
buffered bicycle lane design
consistent with previous
Regional Council direction
provided on February 19th, 2009

Highway 7 Cycling Facility Towns of Richmond Hill and Markham

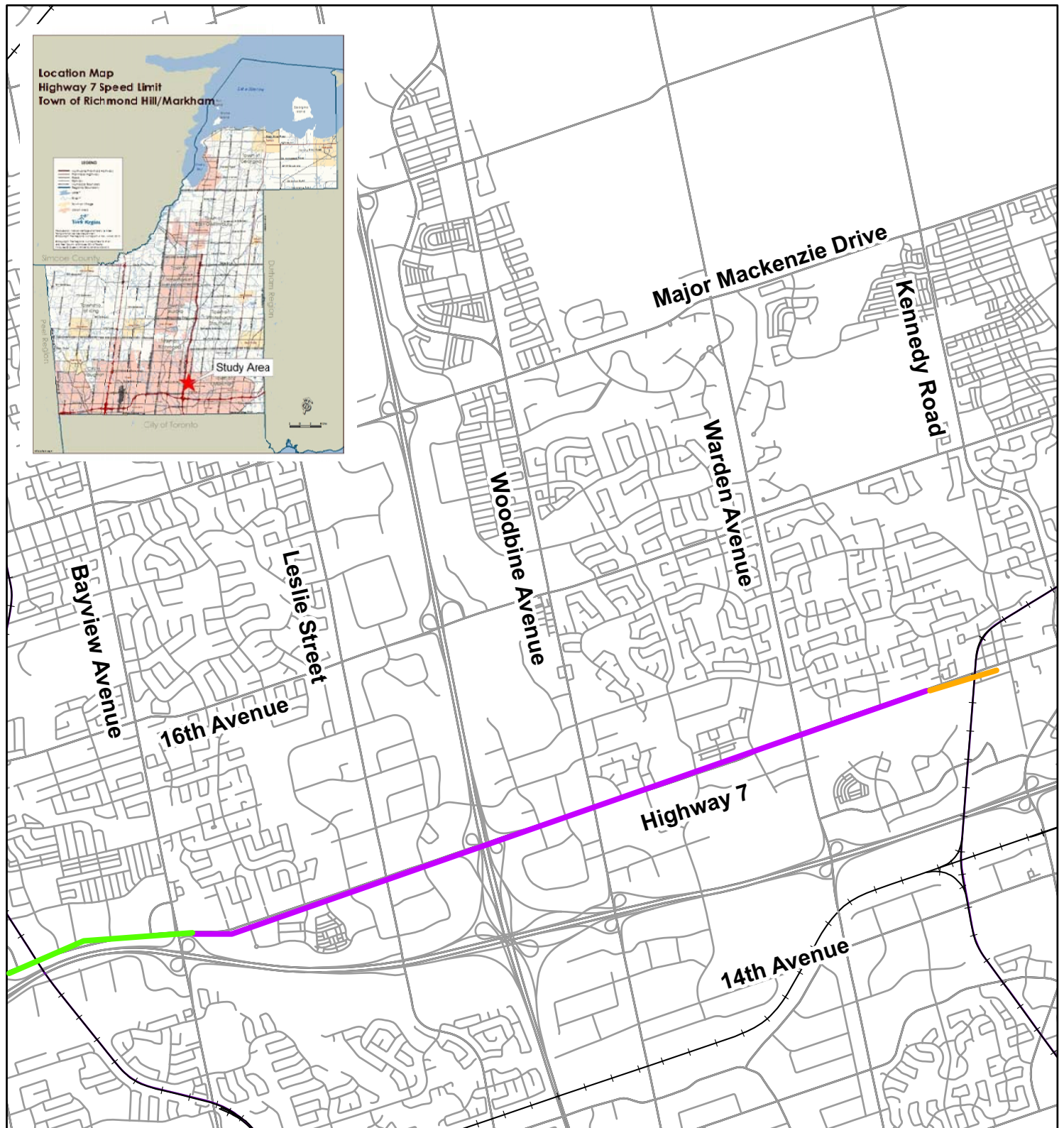
VivaNext

Highway 7 Cycling Facility

Existing Cycling Network



least separation				more separation				most separation											
Shared Bicycle Facility								Segregated Bike Facility				In-Boulevard Bicycle Facility							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
Signed Bike Route	Narrow Travel Lane: SLM	Wide Curb Lane: Signed	Wide Curb Lane: SLM	Paved Shoulder	Conventional Bicycle Lane	Wide Bicycle Lane	Buffered Bicycle Lane	Buffered Bicycle Lane with Flex Bollards	Cycle Track: protected, with parking	Cycle Track: protected with barrier	Cycle Track: raised and curb separated	Two Way Cycle Track	One Way Cycle Track with sidewalk	Two Way Cycle Track with sidewalk	Multi-Use Boulevard Trail	Off-Road Multi-Use Trail			
Minimum Design Specifications																			
Travel lane widths (TAC Standards): o Minor arterial: 3.5 m o Collector (industrial): 3.0 m o Collector (industrial/ commercial): 3.7 m.				Travel lane widths (TAC Standards): Where travel lane less than 4.0 m and the posted speed limit is 50 km/h or less, the streets should be placed in the centre of the travel lane to allow single file bicycle and vehicle operations.				Travel lane widths (York Region Standards): o 4.25 m o greater than 3,000 ADT/lane o less than 60km/h o 6-12% trucks				Markings should be placed 1.0 m from face of curb (or shoulder edge) on streets without on-street parking.				Minimum width: 1.2 m			
Should not be placed on roadways with a speed limit over 50 km/h for single file applications.				Should not be placed on roadways with a speed limit over 60 km/h for side-by-side applications.				The preferred minimum width is 1.5 m wide.				Increase width based on speed and vehicle composition: o 2.0 m for a posted speed > 70 km/h and 5,000 ADT				Recommended width: 1.5 m			
"Shared Use Lane Single File" sign should be used when the travel lane is less than 4.0 m.				"Share The Road" signs should be provided.				Increase width based on speed and vehicle composition: o 2.0 m for a posted speed > 70 km/h and 5,000 ADT				Lanes should not exceed 2.0 m when speeds > 70 km/h. Wider lanes allow > way bicycle travel and encourages vehicle parking in the lane.				Guidelines for buffer width varies: o 80 cm (London and Brussels) o 50-75 cm (CROW Guide) o 183 cm (Portland, OR)			
Travel lane widths (TAC Standards): o Minor arterial: 3.7 m o Collector (industrial): 3.7 m.				Travel lane widths (York Region Standards): o 4.25 m o less than 3,000 ADT/lane o less than 6% trucks				Should not be placed on roadways with a speed limit over 60 km/h for side-by-side applications.				The preferred minimum width is 1.5 m wide.				Increase width based on speed and vehicle composition: o 2.0 m for a posted speed > 70 km/h and 5,000 ADT			
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LOCATION PLAN

Highway 7 Cycling Facility

Existing and Proposed Speed Limits

Towns of Richmond Hill and Markham

Existing 80 km/h —
 Speed Reduction 70 km/h to 60 km/h —
 Existing 50 km/h —

