

TAC Sustainable Urban Transportation Award – Nomination Submission

Organization being nominated: City of Ottawa and Novatech

Initiative undertaken: Churchill Avenue Cycle Tracks

Introduction

Ottawa's first raised cycle tracks were implemented in 2014 on [Churchill Avenue](#) and are worthy of the TAC 2015 *Sustainable Urban Transportation Award* because of the "Complete Street" approach to encourage sustainable and active travel. This \$21.4 million integrated road, sewer and water rehabilitation project also included improved (LED) street lighting, traffic control signals, traffic calming measures, concrete curbs and sidewalks, streetscaping, and utilities relocation for this 1.2 kilometre roadway. The Churchill design incorporates uni-directional cycle tracks, raised cycle cross-rides at side streets, and the "protected intersection" concept at two signalised intersections. Implemented as part of a coordinated roadway reconstruction project, the physically separated raised bike lanes are a design solution new to Ottawa and much of North America.

The City of Ottawa was the proponent and lead for the project with Novatech acting as prime consultant.

Contribution to the Development and Enhancement of Sustainable Urban Transportation

The concept of separating cyclists from motorised vehicles has been applied for decades in a number of European cities. Although the exact design of facilities may vary from country to country, the concept is typically based on the following considerations:

- Cyclists are vulnerable users, very similar to pedestrians, thus they have to be protected from much heavier and faster vehicles, by design. As a result, cyclists are treated at intersections very similarly to pedestrians. This is in contrast to the thinking that groups cyclists in the same category with cars and heavy vehicles and requires cyclists to follow the same movements at intersections as motorists.
- Although the designs of cycle tracks strive to minimise the potential for cyclist-pedestrian conflicts, it is recognised that the consequences of these conflicts are much less than those of cyclists-motorists conflicts. The minimisation of these conflicts is often based on common courtesy and social norms and not exclusively on absolute right of way assignment rules.

The ultimate objective of the cycle track design is to provide a safe and attractive facility to pedestrians, cyclists, and motorists and to increase the cycling modal share. Cities that have achieved cycling modal shares around and above 10% have a network of cycling facilities similar to the Churchill design. The primary objective of cycle tracks is not to facilitate the fastest possible movement of cyclists, however, when roads become congested, cycle tracks provide travel time advantage as well.

The new Churchill Avenue cycle tracks provide a sustainable transportation option for residents in a way that creates a more liveable, healthier and vibrant Ottawa. When residents choose cycling as a form of transportation, there are numerous health, environmental, social and economic benefits at both individual and societal levels.

Social Benefits

In terms of social benefits, cycle tracks enhance transportation options for residents by providing them with a facility that makes cycling safe and accessible to all. When appropriate facilities are provided, cycling can be a preferred form of transport for all demographic groups: men and women; children, adults, and the elderly; long-time residents and new immigrants; and persons at all socio-economic levels. However it is recognised that achieving significant increases in cycling mode share will require cycling facilities that attract a much wider spectrum of the population, including cyclists who do not feel comfortable cycling between or adjacent to motor vehicles. In many cases, such cyclists are currently not provided with cycling facilities that meet their needs. One of the ways to address these concerns is the implementation of cycle tracks, which are attractive and comfortable for a wide variety of cyclists. The Churchill project demonstrates a new type of cycling facility that is accessible and attractive to a broad range of residents, and that facilitates sustainable transportation options. As part of a well-developed City-wide network of cycling facilities, it also provides many residents with an affordable personal mobility option that is low in cost and easily accessible for people aged “8 to 80” (see Appendix Figure 15). For students of Churchill Alternative School in particular – which is located at the north end of the cycle tracks – the project has obvious benefits in terms of the provision of a high-quality cycling facility providing direct access to school for students travelling by bicycle.

Health Benefits

The return on investment for cycling infrastructure is substantial from a health costs perspective. Research shows that for every investment dollar spent, five dollars are saved in health-related impacts.ⁱ As one component of the City’s growing cycling network, the Churchill cycle tracks will contribute to a higher cycling mode share. Ottawa Public Health estimates that the population health impact of a 5% increase in cycling mode share can result in an annual benefit of up to \$16 million. This dollar value represents lives saved due to improved health benefits from increased cycling rates.ⁱⁱ Beyond cost savings to the health system, a healthier population will also enjoy a higher quality of life.

Economic benefits

The positive link between separated cycling facilities and economic benefits is well established, indicating for example that store patrons arriving by bicycle or foot visit the most often and spend the most money per month.ⁱⁱⁱ The Churchill cycle tracks will bring such economic benefits to the surrounding community. The cycle tracks connect residential neighbourhoods of Highland Park and Hampton/Iona with Westboro Village, a “traditional mainstreet” business area featuring retailers offering a wide range of goods and services. A recent survey from the neighbouring Business Improvement Area indicated that 10% of

shoppers currently arrive by bike^{iv}, and with the cycle tracks in place there is the potential to significantly increase the number of cycling shopping trips to Westboro Village.

Environmental benefits

Residents who choose to forgo car ownership altogether, or reduce the 'fleet' of cars at home, will reduce the total household vehicle-kilometres travelled (VKT), and therefore the greenhouse gas (GHG) emissions, by a much higher figure than a simple substitution of bike for vehicle kilometres on a per trip basis. Habits also change, and residents using a bike for utilitarian purposes are more likely to shop and do other chores closer to home or along their commuting routes

Also noteworthy are the various other improvements to the streetscape along Churchill, which now provides vastly improved pedestrian sidewalks that meet accessibility requirements; redesigned bus stops; landscaping enhancements such as street trees, benches and bike racks; and clearly delineated on-street parking. Appendix Figures 1 to 4 show two representative "before and after" perspectives that illustrate the street renewal and show typical views of the new cycle tracks.

Demonstration of Innovation

Process

The Churchill Avenue Rehabilitation project, which included the new cycle tracks, proceeded through the planning and design process as a Schedule 'B' Class Environmental Assessment under the Municipal Class Environmental Assessment (a Provincial process). This ensured a comprehensive consideration of alternative solutions, alternative design concepts, documentation of the decision making process, and comprehensive stakeholder and public notification and consultation. Alternatives were evaluated based on four global criteria (technical, natural environment, economical, and social & cultural).

Technical Characteristics

There are a number of innovative technical characteristics of the project that are necessary to provide the desired cycling facility, and to integrate it with facilities and treatments provided for other roadway users.

The overall design philosophy of the corridor differs from the traditional approach from a number of perspectives. First, instead of having cyclists between parked and moving vehicles, they are placed on the right side of parked vehicles, physically separated from traffic. Second, instead of providing a wider vehicle lane that is generally required when the lane is shared by vehicles and cyclists, the design has a narrower lane (3.5 m) which has a traffic calming effect compared to the conventional 4.3 m shared lane. Finally, the narrower lanes and the separation of the cycling facility provide shorter pedestrian crossings of the vehicle lanes at the intersections. The design philosophy is based on the assumption that the consequences of potential cyclist-pedestrian conflicts are less severe than those of cyclist-motorist conflicts, and they are easier to manage.

The design of the cycle tracks themselves is based on the latest design guidance for a cycling facility which is horizontally and vertically separated from motor vehicle traffic. At a typical mid-block location, the roadway cross-section includes two general purpose lanes and a parking lane between barrier curbs, and then beyond the curb a boulevard space, cycle track, and then pedestrian sidewalk (see Appendix Figure 14). This design enhances safety and comfort for cyclists by separating them from faster, larger, heavier motor vehicle traffic.

The asphalt cycle track was constructed at the same level as the concrete sidewalk. A 10 centimetre wide stamped concrete strip has been inserted between the two facilities to provide guidance to the visually impaired and pavement marking has been implemented along every block indicating the proper usage of the facility. The main advantage of the flush design is expected to be easier winter maintenance. Although the City does not yet have a plan to winter maintain this facility, it is expected that over time as the network of segregated cycling facilities expands, there will be more winter cyclists and maintenance will become a more important factor. Furthermore this design requires the least right-of-way and minimises tripping hazards.

The start and end of the cycle tracks – where cyclists enter and exit the cycle tracks respectively – presented the unique challenge of transitioning from/to a shared road environment. As shown in Appendix Figure 13, bike ramps were provided with appropriate signs and pavement markings to accommodate the transitions.

Intersection Design

The intersection design had more unorthodox elements and was based on the ‘protected intersection’ design concept, perfected by the Dutch and utilised in many European cities with some modifications to address local concerns. The main feature of the concept is that the cycle track is not discontinued at the intersection, thus cyclists continue to be separated from motor vehicles in the curb lane as long as possible. This is a fundamental departure from the conventional North American (NA) practice where cyclists are often mixed with right turning vehicles. The protected intersection concept recognises that most future cyclists who are attracted to cycle tracks would rather avoid sections where bicycles and vehicles have to mix, thus “dropping” the cycle track at the intersection is viewed as introducing a gap into the otherwise low stress midblock section. Second, by focusing on specific design elements and operational rules, the protected intersection is expected to be safer for all users compared to the conventional NA design. The main benefit of the implemented design is the expected positive impact on right turning hook collisions. This is achieved by focusing on three aspects of design: increasing visibility of the potential conflict area, reduction of turning speeds, and helping to establish eye-contact between cyclists and motorists.

At signalised intersections, various treatments are applied to accommodate the cycle track crossing through the intersection:

- Cyclists on the cycle track cross the intersection along a cross-ride marked with: white “elephant’s feet” crossing dashes; high-contrast green colouring; and white bicycle,

diamond (reserved lane) and directional arrow stencils. The stencils are repeated on the cycle track on each side of the crossing to clearly convey the intended purpose to road users.

- “Turning vehicles yield to bikes” signs are posted to direct motorists to yield when turning across the cross-ride.
- Bicycles are provided with their own dedicated traffic signal, which is timed to coincide with the motor vehicle signals.
- Motorists on Churchill are provided with an advanced straight through arrow at the start of the green signal phase in order to mitigate the potential for right turning hook collisions by giving cyclists a few seconds’ “head start” over turning vehicles.

Appendix Figures 5 to 7 show a typical signalised intersection treatment.

At unsignalised intersections, the cycle tracks cross along a raised platform which:

- Provides smooth passage for bicycles rather than ramping sharply down and then up at either end of the crossing;
- Introduces a speed hump for motorists to cue them to drive slowly when driving through the cross-ride and pedestrian crosswalk; and
- Provides a physical reminder to motorists entering from the side street to stop and then yield to crossing cyclists and pedestrians.

The same pavement markings and “turning vehicles yield to bikes” signs are applied as at signalised intersections. Appendix Figures 8 to 10 show typical unsignalised intersection treatments.

Boulevard Treatment

The boulevard space between the curb and cycle track serves several purposes:

- It provides a space for utilities and other street furniture, which visually narrows the roadway to act as a traffic calming feature (creating a “visual friction” for drivers), and also increases the level of comfort for cyclists by inserting a physical barrier between them and motorised vehicles.
- It provides a “buffer” space alongside on-street parking to mitigate the risk of “dooring” to cyclists, where the door of a parked car might otherwise open into the path of a cyclist. Compared to the conventional design where parked vehicles are on the right hand side of cyclists, the selected design has a number of advantages: the chances of having a passenger door opened on the right side of a vehicle is less than having the driver’s door opened on the left side; the buffer helps in moving cyclists out of the “dooring” zone; and even if a cyclists on a cycle track is knocked down by an opening door, he or she will not be hit again by a car as might occur in a traditional “on-road cycling” environment.
- At residential driveways, it allows for a concrete ramp up from the roadway, which cues motorists to drive slowly when entering or exiting.

- At the corridor's four bus stops, it provides some space for public transit users boarding and alighting buses.
- It provides a space for residents along the street to put out their garbage, organic waste and recycling for pick-up.

In addition, each bus stop is treated with pavement markings and signing to indicate pedestrian right-of-way ("bikes yield to pedestrians"), as is the "pick-up and drop-off" zone along the school frontage at the north end of the corridor. Appendix Figures 11 and 12 show the typical cycle track treatment at bus stops.

Also noteworthy are the automated bicycle counters which have been integrated into the design of the cycle tracks to allow for continuous monitoring of bicycle volumes (see "Results to Date" section below).

Financing

The project also demonstrated affordability by integrating the cycle tracks and other street improvements with the planned reconstruction of the street to replace aging water and sewer infrastructure, which minimized capital costs for implementation. The cost to implement the cycle tracks would have been substantially higher if it had proceeded as a retrofit project, and it would not have been seamlessly integrated into the streetscape.

Transferability to Other Canadian Communities and Organizations

Communities across Canada are prioritizing cycling as a mode of transportation, simultaneously recognizing that new design solutions are required to achieve significant shifts in cycling mode share. There is particular interest in urban municipalities in separated cycle tracks, widely being recognized as a missing element in cities' cycling networks.

The project demonstrates one of the primary ways that communities can provide cycling facilities that appeal to a broader spectrum of the population. It demonstrates how cycle tracks can be designed and operated in the North American context, and in particular within Ontario's existing legal framework. Design guidance for cycle tracks was included in the recently released *Ontario Traffic Manual (OTM) Book 18: Cycling Facilities*, however the Churchill cycle tracks are the first substantial implementation of their kind in Ontario. It was therefore necessary as part of the project to address myriad detailed design issues that are not addressed in OTM Book 18 (described previously in "Demonstration of Innovation – Technical Characteristics"), and other communities can now look to the Churchill project for reference on these issues. Furthermore, through its participation in the Ontario Traffic Council (OTC) Active Transportation Committee, the City of Ottawa is sharing its experience on the project with the OTC so that the many "lessons learned" from the design process can be included in a future update to OTM Book 18; this will provide a formal mechanism for knowledge transfer to other communities across Ontario and Canada.

Also, over the coming months and years the project will demonstrate the uptake that can be expected in terms of the number of cycling trips by comparing cycling volumes before

implementation with those after (see “Results to Date” below). This monitoring of cyclist volumes has proven to be very useful in demonstrating the value of infrastructure on other projects such as the Laurier Avenue Segregated Bike Lane.

Results to Date

The Churchill cycle tracks officially opened in November 2014 with substantial completion of the overall road rehabilitation project. The roadway and cycle tracks have operated since that time to a generally positive reception from residents and local media (see <http://kitchissippi.com/cycle-track-churchill/>).

The installation of two automated bicycle counter sites was included as part of construction of the cycle tracks. These counters work by detecting passing bikes with inductive sensor loops embedded in the cycle track pavement connected to a unit which records the data. The City is currently testing and calibrating the counters, and will start collecting data on usage in Spring 2015. Once activated, the counters will track the number of bicycles in each direction at both sites 24 hours per day, 7 days per week. As a result of the opening occurring late in the cycling season combined with early cold and snowy weather conditions in Ottawa, representative results are not yet available but will be collected over the coming months and years.

The City will also conduct turning movement counts (which include motor vehicles, bicycles and pedestrians) at signalised intersections along the corridor as part of its annual traffic counting program.

Added Value

In concert with the opening of the Churchill cycle tracks, the City implemented a public education campaign about cycle tracks focused on the safety of cyclists and other road users. The campaign included:

- A central [website](#)^v with information about cycle tracks and cross-rides.
- An information poster (see Appendix Figure 16) which was:
 - Modified and printed in local community newspapers;
 - Mailed as an information card to approximately 10,000 homes in the areas surrounding the cycle track locations; and
 - Posted on temporary on-street signs along the cycle tracks and rotated through different locations.
- A “Gearing Up for Cycle Tracks” [educational video](#)^{vi} and associated [“infographic”](#)^{vii} (see Appendix Figure 17) to convey the key information about cycle tracks for cyclists, drivers and pedestrians.
- Direct on-street engagement by a City-contracted non-profit organization (the EnviroCentre) that engaged cycle track and sidewalk users face-to-face and handed out bells, reflective bands and Cycle Track information postcards (based on the information poster) to over 400 people on Churchill Avenue.

The public education campaign included messaging for all road users – cyclists, drivers, and pedestrians – with key message tailored to each.

Conclusion

As described above, the Churchill Avenue cycle tracks project supports the key components of TAC's New Vision for Urban Transportation to enhance travel options and to reduce dependence on single occupant vehicles through more choice and opportunities for walking, cycling and public transit. The project enhances the sustainability of urban transportation through social, health, economic, and environmental components, demonstrates innovation, is transferrable to other Canadian communities, and includes added value in the form of public education focused on road safety. For these reasons it is worthy of the TAC 2015 *Sustainable Urban Transportation Award* and if selected would serve as an excellent example to communities across Canada that are looking for solutions to achieve cycling mode share targets and associated broader objectives.

ⁱ Cavill P, Kahlmeier S, Rutter H, Racioppi F, Oja P. Review of transport economic analyses including health effects related to cycling and walking. *Transport Policy*. 2008;15:291-304

ⁱⁱ Ottawa Public Health estimate using the World Health Organization Health economic assessment tool (HEAT) for cycling. 2013. HEAT Model Available from: <http://www.heatwalkingcycling.org/>

ⁱⁱⁱ City of Ottawa. Economic Benefits of Segregated Bicycle Lanes. 2011.

<http://ottawa.ca/cs/groups/content/@webottawa/documents/pdf/mdaw/mdyx/~edisp/con056212.pdf>

^{iv} Wellington West BIA. 2014 Wellington West Modal Survey. 2014.

^v City of Ottawa. "Cross-rides and cycle tracks". 2015. <http://ottawa.ca/en/residents/transportation-and-parking/cycling/cross-rides-and-cycle-tracks>

^{vi} City of Ottawa. "Gearing Up for Cycle Tracks". 2015. <http://ottawa.ca/en/ott-city-online/gearing-cycle-tracks>

^{vii} City of Ottawa. "New Cycle Tracks: Bike Paths at Sidewalk Level". 2015. http://ottawa.ca/sites/default/files/cycle_track_digital_infographic_eng.jpg



Figure 1 - Irene Crescent Intersection (Before)



Figure 2 - Irene Crescent Intersection (After)



Figure 3 - Midblock Avondale Avenue to Clare Street (Before)



Figure 4 - Midblock Avondale Avenue to Clare Street (After)

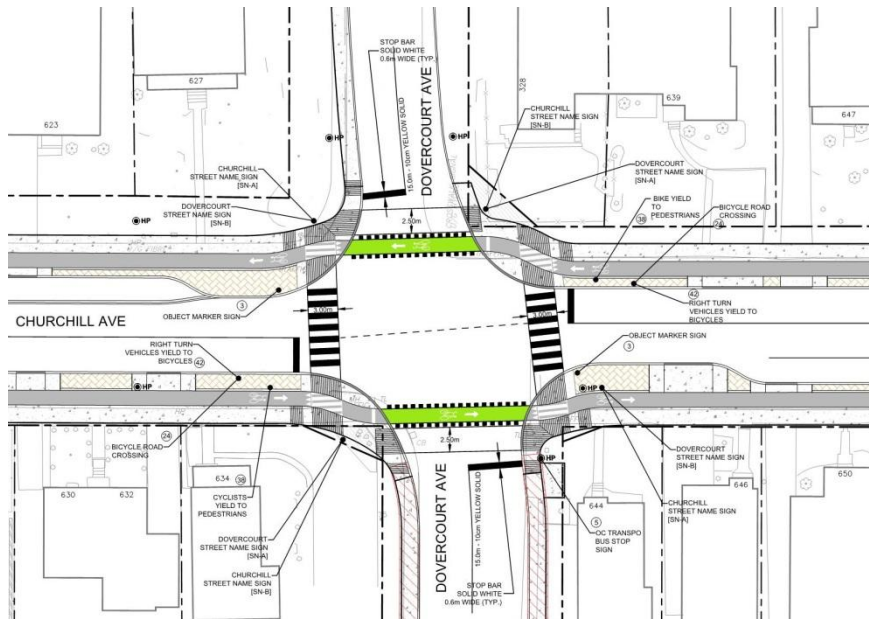




Figure 8 - Tillbury Avenue Unsignalised Intersection

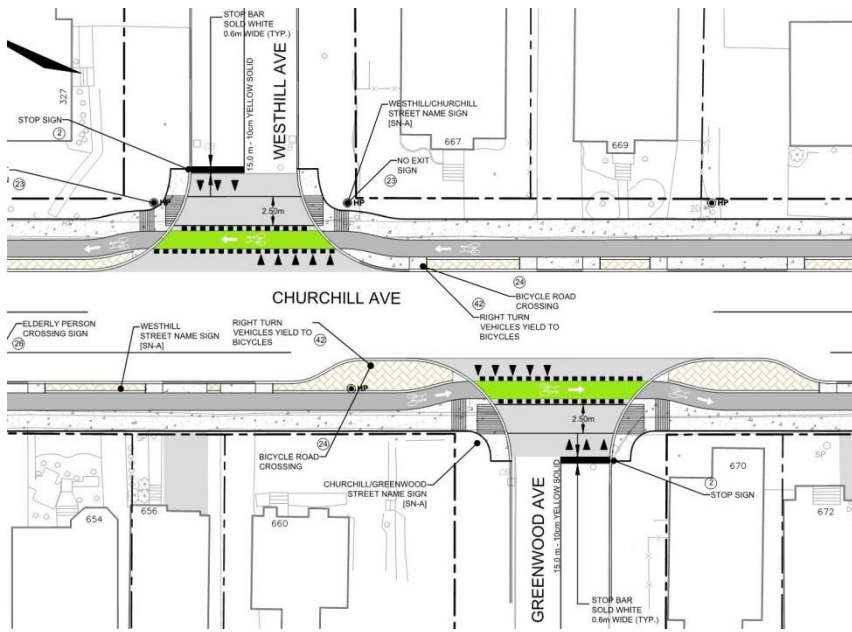


Figure 10 - Westhill & Greenwood Unsignalised Intersections



Figure 9 - Duncairn Avenue Unsignalised Intersection



Figure 11 - Typical Bus Stop Treatment at Avondale Avenue

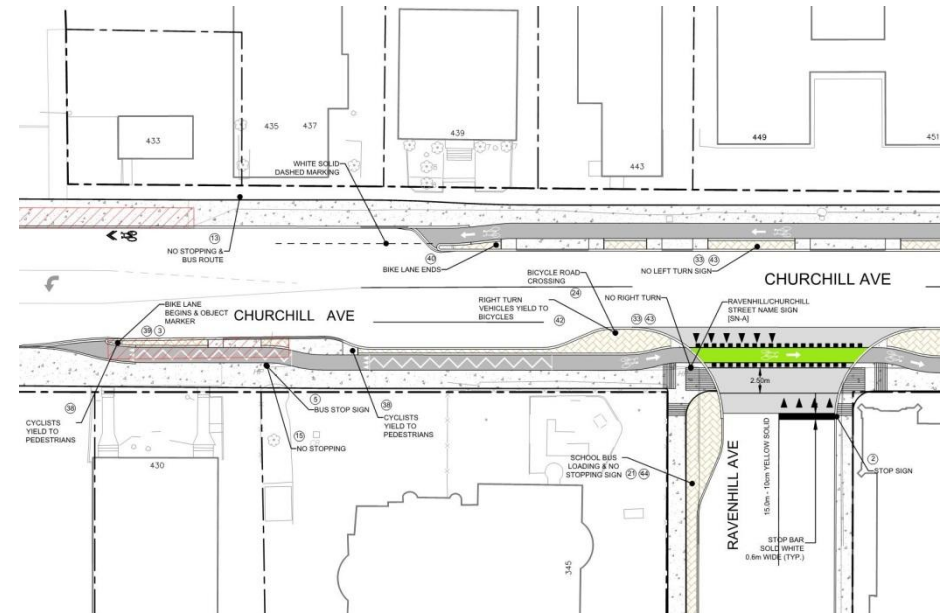


Figure 12 - Bus Stop & School Drop-off / Pick-up Treatment at Ravenhill Avenue



Figure 13 - Transition to Raised Cycle Track at Carling Avenue

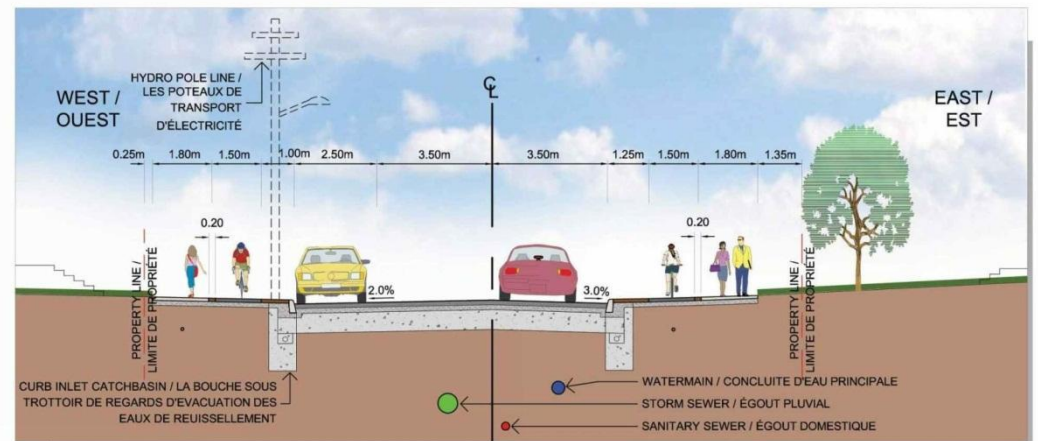


Figure 14 - Typical Cross Section with Raised Cycle Tracks



Figure 15 - Child on Bicycle Crossing a Sidestreet Along Churchill Avenue



Figure 17 - Cycle Track Infographic for All Road Users



Figure 16 - Cycle Track Poster Delivered to Area Homes