

Of particular concern is the unexpected position, direction and speed of the cyclist along these facilities, out of the normal field-of-view of the motorist when crossing at the driveways and side streets. Separate traffic control is usually not provided.

Given that it is illegal for an adult cyclist to ride on a crosswalk in Ontario, typical crosswalk markings that control pedestrian crossings of side streets are not applicable. In contrast, motorists can expect that cyclists on on-road bikeways will be traveling in the same direction and under the same traffic control conditions and HTA Rules of the Road as they are, providing a much higher level of predictability and visibility. The Ganatchio Trail at the far east end of the study area appears to work well as a mixed use side path because there are few intersecting streets or driveways, although some modal conflicts are noted between users of different ages, speeds and experience.

Side paths encourage wrong-way riding that further compounds the sight distance field-of-view issues wherever they cross motor vehicle ways. In addition, the start and ends of the side paths can cause unpredictable cyclist behaviour as they cross roadways, ride the wrong way on the road, or use sidewalks to access them.

In some municipalities, this type of bikeway is retrofitted to existing roadway corridors, with hazardous objects such as utility poles or pedestals located very near or in the side path. Curb cuts at side road crossings may or may not be in place, creating hazards.

A good example of this sidepath treatment is in London, where until recently the City provided asphalt sidepaths along certain arterial roads, such as Wonderland Road in the photo below. Owing to safety issues on these sidepaths, the City's policy is to now provide on-road bike lanes on major roads.

Motorists on the side street entering or crossing the roadway parallel to the side path often will not notice cyclists approaching from the right, or at a higher than pedestrian speed from the left, and often stop blocking the side path. Buildings, walls, property fences and shrubs along the path can impair sight distance. Although cyclists should yield the right-of-way and even stop at the side street crossings, many do not. But if the bikeway were on the roadway, they would have priority at side street and driveway crossings.

The profile of the side path may be undulating through driveways and side streets. Placing the side path further from the roadway to avoid this increases visibility problems for motorists entering or leaving driveways.

In summary, transportation planning industry research shows the following disadvantages of off-road side paths for cycling:¹¹

- Side paths treat cyclists as pedestrians, but bicycles are not as manoeuvrable as pedestrians in quickly moving around obstructions (i.e. pedestrians) and cars in intersections and driveways;
- Motorists are much more likely to block a side path than an on-road bike lane or wide curb lane because in the latter two cases, the cyclists and motorist are moving together in the on-road flow of traffic;
- Where there is a parallel side path with cyclists beside a road, the motorist must scan wider areas than normal to be aware of cyclist locations;
- If a two-way side path is provided on one side of the road, such as the south side in the case of Riverside Drive as suggested by some residents, large bicycle crossing volumes will occur to access the north side parkland;

¹¹ Example: MetroPlan Orlando Bicycle User Guide, Orlando Florida

- Cyclists often find multi-use side paths to be ineffective for commuting and utilitarian purposes due to potential conflicts with other users, resulting slower speed and the ability to move faster on the roadway surface; and
- To safely accommodate head-on approaching cyclists plus pedestrians, a side path must be 3.5 m wide. If a sidepath-type design is used, an additional 1.6m to 3.1m of road right-of-way width is required for boulevard space to separate the side path from the curb and road surface compared to on-road bike lanes. This will impact abutting property more than two 1.5m bike lanes. Exhibit 5.5 compares the road right-of-way width of sidepaths and on-road cycling lanes.

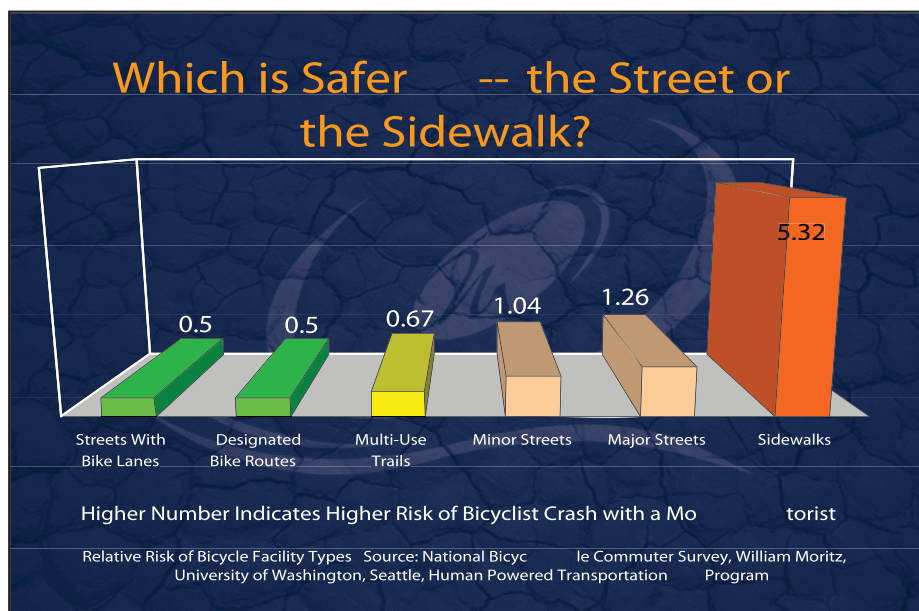
The use of a multi-use side path along either side of Riverside Drive will also result in user conflicts according to a number of professional cycling design sources such as:

“To avoid conflicts and collisions, it is preferable to avoid mixing cyclists and pedestrians on the same facility. Problems between the two user groups are due primarily to the difference in speeds at which each group travels, the unpredictability of pedestrian movement and the multiplicity of users” Canadian Institute of Planners Go For Green: Community Cycling Manual (2004), page 69

“Two-way bicycle lanes on one side of the road are extremely hazardous, confuse motorists and create a liability for municipalities” ibid, page 87

“Cyclists often find busy multi-use trails to be ineffective for commuter and utilitarian purposes due to potential conflicts with other user groups. Pedestrians and other trail users can often feel uncomfortable on multi-use trails amongst high volumes of cyclists and inline skaters.” Windsor BUMP study, page 59

“The use of sidewalks by bicyclists is a contentious issue. On the one hand, researchers have repeatedly found that incident rates are higher on sidewalks. However, on the other hand, the subjective perception of many bicyclists and nonbicyclists is that cycling away from traffic is safer... This decision is despite the fact that in most jurisdictions in Canada, particularly urban areas, it is illegal for adults to bicycle on the





sidewalk.” Transportation Research Record 1636

“Boulevard paths are most suitable for relatively short trips at low speed and should only be used under exceptional circumstances” TAC Geometric Design Guidelines for Canadian Roads (Chapter 3.4.3.4).

“In general, the designated use of sidewalks (as a signed shared facility) for bicycle travel is unsatisfactory” AASHTO Guidelines for the Development of Bicycle Facilities

“The development of extremely wide sidewalks does not necessarily add to the safety of sidewalk bicycle travel...” ibid

“Sidewalk bikeways should only be considered under certain limited circumstances, such as: a)...uninterrupted by driveways and intersections for long distances” ibid

“Providing a bikeway on a sidewalk is generally most unsatisfactory; the use of sidewalks can encourage wrong-way cycling and create hazards to pedestrians” MTO: Ontario Bikeways Planning and Design Guidelines (Section 4.2.5)

Sidewalk-level bike paths are not advised on streets with many driveway entrances because they then necessarily have an undulating profile. Position the bike path away from the sidewalk to eliminate the undulating profile only increases visibility problems for motorists entering or leaving driveways.” Velo Quebec, Technical Handbook of Bikeway Design (page 47)

Based on these and other planning and engineering sources, this EA has concluded that including a multi-use, two-way side path on either side of Riverside Drive **cannot be recommended** for further evaluation because it would encourage unsafe cyclist behaviour and cyclist/motorist interaction. Only in extraordinary circumstances, where such a facility would connect segments of multi-use trails, with no or a low number of intersecting streets and driveways (i.e. Ganatchio Trail) should a side path be considered.

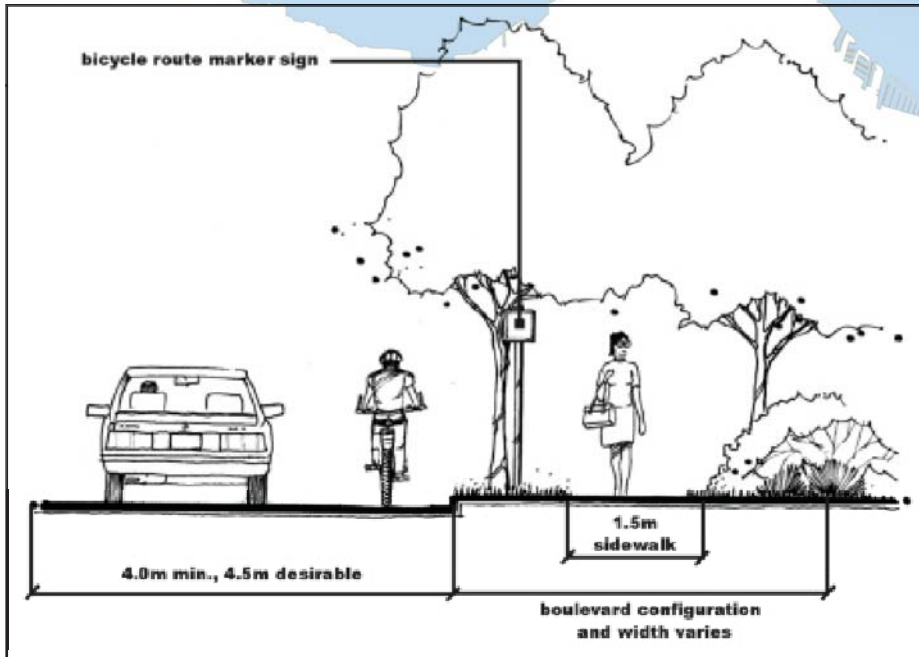
5.8.4 RIVERSIDE DRIVE ON-ROAD WIDE, SHARED LANES

Roadways that are too narrow for dedicated bike lanes can provide wide lanes for motor vehicles and cyclists to share. As with bike lanes, cyclists travel in the same direction as the motor vehicles. Motorists are required to pass with care allowing the cyclist sufficient room on the roadway, which may require them to encroach on the adjacent lane if it is safe to do so.

The Transportation Association of Canada (TAC) has developed a new pavement marking, called *bicycle with chevrons*, for marking the expected position of a cyclist in a wide, shared-use lane. These markings will also serve to make wide, shared use lanes more visible to all road users, such as with the markings for bike lanes, promoting cycling in that particular corridor.

As shown on Exhibit 5.3 from the BUMP study, wide, shared-use lanes should be at least 4.0 m wide but not wider than 4.5 m. The desirable minimum width is 4.2 m. Lane widths greater than 4.5 m should be avoided as this may result in two motor vehicles sharing the lane side-by-side. These width guidelines also apply if the lane is shared between on-street parking and cyclists, with the parking stalls being a minimum of 2.4 m so that the cyclist will not be hit by a car door opening.

EXHIBIT 5.3 – ON-ROAD WIDE SHARED LANES




If the wide, shared-lane narrows to less than 4.0 m over a section of roadway not more than 500 m long, for example over a bridge, and the posted speed is 50 km/h or less, the *bicycle with chevrons* symbol can be used in the middle of the lane to indicate that the cyclist and motorist should operate in single file with the cyclist positioned in the middle of the lane. Passing of the cyclist in the same lane would be prohibited in this narrow section.

5.8.5 RIVERSIDE DRIVE SHARED ROADWAY

Shared roadways consist of travel lanes that cyclists and motorists share, usually requiring the motorist to encroach on adjacent lanes when overtaking the cyclist. Local streets with low operating speeds, traffic volumes and truck/bus traffic can be very comfortable to cycle on, and do not need any special signage or pavement markings to accommodate the cyclist. If not widened, the narrower sections of right-of-way on Riverside Drive may be suited only to shared roadway cycling. However, although Riverside Drive is posted at 50 km/h, the actual speeds are higher, and so the shared roadway approach is generally not suitable for Riverside Drive except in specific short sections. Shared lanes are generally 3.0 to 4.0 m wide.

5.8.6 OFF-ROAD MULTI-USE TRAILS

A multi-use trail is physically separated from the travel portion of a roadway by an open space or a barrier, or is located in an independent right-of-way as in the case of the Ganatchio Trail. Trails can be designed for use by pedestrians, pedestrians with mobility devices, in-line skaters, cyclists, equestrians, etc. Hard surface treatments such as compacted limestone screenings or asphalt are preferred for use by cyclists. Multi-use trails can provide a positive cycling experience for families and for casual cyclists, including a mix of age groups and cycling experience. This positive experience can lead to more cycling in more locations for a variety of purposes.



Multi-use trails must be designed to accommodate the mix, volume and speed of intended users. Engineering guidelines should be applied for the various design elements such as width, horizontal and vertical alignment. In general, multi-use trails shared with cyclists should be a minimum of 3.0 m wide, perhaps 2.5 m wide if use is low or for short sections constrained by the physical environment. A width of 4.0 m or more is preferred. Often, conflicts among users occur, not because of the poor etiquette of the trail users, but because the width, sight distance, grades, etc. are inadequate to allow for appropriate sharing by a moderate to high volume of users with a wide range of skills and travel speeds.

Based on existing land use conditions along Riverside Drive, opportunities for extended multi-use trail development is limited only to the public riverfront parkland, most of which already includes off-road multi-use trails. The downtown pedestrian promenade proposed in the Central Riverfront Implementation Plan offers the only other opportunity of off-road multi-use trail development.

5.8.7 BICYCLE BOULEVARDS

Some municipalities are introducing on-road bikeway boulevards. These consist of local streets that are modified to limit automobile traffic volumes and speeds through the placement of physical measures and traffic controls that favours cycling. The resulting bicycle boulevard is intended to function as a through street for cyclists, while maintaining local access for motorists but inducing slower motorists' speeds and discouraging motorists' through trips.

The traffic control devices and traffic calming features should reduce potential conflicts with and give priority to through bicycle traffic. Traffic signals actuated by cyclists can give access to/from major roadways. Traffic circles or single-lane roundabouts can replace all-way stop control at intersections along the boulevard, reducing the need for cyclists to stop, and inducing slower motorist speeds. Stop signs can be placed to favour the through movement on the boulevard. Other more obstructive devices such as curb extensions, medians, barriers and diverters are used in bicycle boulevards to divert motorist traffic away from the boulevard while using cut-throughs for cyclists only.

The study Technical and Steering Committees considered the application of a bicycle boulevard along sections of Riverside Drive at least from Strabane Avenue to Lauzon Road, and concluded that this type of traffic calming and bikeway design is not suited to Riverside Drive. One of the City's main objectives in improving Riverside Drive is to maintain access along this public roadway for all users, including local residents, visitors and emergency response, while still reducing traffic volume and speed and providing alternatives for through traffic. The Committees believe that these objectives can be met through other traffic calming and bikeway design to provide safe passage for all Riverside Drive users, without barriers to through traffic and those visiting the waterfront parklands.

KEY IMPACT CONSIDERATIONS

Positive Impacts	Negative Impacts
<ul style="list-style-type: none"> • Social impact of enhanced bicycling and pedestrian safety provided by a consistent, appropriately designed bikeway connection; • Social and health impacts of a more active lifestyle for more Windsor residents; • Provide a viable alternative to auto use for short trips and commuting; • Transportation impact of extending a Riverside Drive bikeway to serve existing and latent cycling demands to major destinations along the Windsor riverfront. • No adverse impact on abutting property value, and potential to increase property value based on research conducted, for example, by the City of Vancouver and the Victoria Transport Policy Institute. 	<ul style="list-style-type: none"> • Proximity social impacts on abutting residential property including increased driveway access/ egress constraints from cyclists, and lack of right-of-way encroached space for parking; • Proximity impacts on street trees that may be directly impacted by street widening to provide a bikeway; • Social impact of a change in the appearance and cultural landscape of Riverside Drive by including cyclists; • Economic impacts of incremental capital cost previously estimated to be about 15% in Windsor to add bike lanes to a road such as Riverside Drive.

Conclusion - The type of bikeway that is most appropriate within the Riverside Drive corridor is dependent on a number of environmental factors including the following:

- Volume of motor vehicle traffic;
- Traffic operating speeds;
- Skill level of user, i.e., child, casual or basic adult, and experienced or advanced adult;
- Mix of motor vehicle traffic;
- Number and type of driveways and side streets;
- Traffic control at intersections;
- Potential to reduce collisions;
- Roadside environment including impact on the streetscape and street trees;
- Network continuity;
- Directness and connectivity to destinations;
- Alternative corridors or routes;
- Implementation costs; and
- Opportunity for implementation, i.e., in conjunction with reconstruction projects

Of these factors, the two that most commonly influence the decision on what bikeway type is appropriate are traffic speed and volume. These bikeway type selection criteria presented in Exhibit 5.4 show that **exclusive on-road marked bike lanes are the most appropriate type of bikeway** facility along Riverside Drive, and **is retained for further consideration in this EA**. This is based on an 85th percentile speed on the Drive of 60 km/h and average daily traffic volumes across the Drive greater than 5,000 vpd per lane as reported previously in Section 3.3.1.

EXHIBIT 5.4 - BIKEWAY TYPE SELECTION CRITERIA BASED ON TRAFFIC CHARACTERISTICS (URBAN ROADWAYS)

Average Motor Vehicle Operating Speed (km/h)	Average Annual Daily Traffic (AADT) per lane		
	<3,000 vpd per lane	3,000 to 5,000 vpd per lane	>5,000 vpd per lane
<50 km/h	Shared Lane	Wide, Shared Lane	N/A
50 to 60 km/h	Wide, Shared lane	Wide, Shared Lane or Bike Lane	Wide, Shared Lane or Bike Lane
60 to 70 km/h	Wide, Shared Lane or Bike Lane	Bike Lane	Bike Lane
>70 km/h	N/A	Bike Lane	Bike Lane or Separate Multi-use Trail

Notes: Where Wide, Shared Lane or Bike Lane, select Bike Lane if high volume of trucks (>10%) and/or on-street parking.

These selection criteria are guidelines only. Other factors may influence choice. For example, a bike lane on a low volume roadway with operating speeds of 50 km/h may be reasonable if it is an integral part of a larger bike lane network, or a wide, shared lane may be practical for a lane that has time-of-day on-street parking restrictions.

This table reflects the Design Guidelines For Bikeways used extensively by cities such as Hamilton, and is comparable with conditions and expectations in the City of Windsor. It also considers other bikeway planning documents by MTO, CIP, TAC, AASHTO and FHWA. These other references do not put this information in such a concise format, but they generally set out similar guidance.

5.9 Alternatives for Walking

Rationale – Provision for safe and convenient pedestrian movement along the Riverside Drive corridor is a key objective of this EA, the City’s Scenic Drive and Civic Way policies and overall pedestrian circulation plans along the waterfront.

Description - The streetscape conditions, opportunities and constraints identified for the primary Riverside Drive study area include a number of pedestrian facilities, connection opportunities, new sidewalks and pedestrian nodes. On Riverside Drive West, these alternative improvements may include:

- New sidewalks in the gaps along the north side of Riverside Drive West from Patricia Road to Rankin Avenue, and Josephine Avenue to McEwan Avenue as part of the *Central Riverfront Implementation Plan* (CRIP);

- Wider sidewalks, street trees and other pedestrian improvements as part of the Riverside Drive Pedestrian Promenade planned in the CRIP;
- Other pedestrian circulation improvements (i.e. Riverwalk, Recreationway) along Riverside Drive West as recommended in the CRIP; and
- Pedestrian crossing features at Riverside Drive nodes at selected signalized and unsignalized intersections.

On Riverside Drive East, east of Walker Road where the street character becomes more residential, pedestrian alternatives identified by the Riverside Drive VIP project include:


- Addition of a north side sidewalk along Riverside Drive extending east all the way to the east City border, noting that there may be sections of insufficient public right-of-way width to accommodate sidewalks on both sides using cross-section geometry established for this project. In these cases, this EA will have to evaluate the alternatives of adding a north side sidewalk or widened south multi-use path, compared to retaining only the south side sidewalk and adding cycling lanes, as discussed in Sections 6 and 7 of this report;
- Improvements to pedestrian crosswalks at recommended nodes accessing parkland along Riverside Drive East with pavement markings, vertical deflection features such as raised crosswalks or intersections and/or pedestrian actuated signalized crossings at key mid-block crossing locations

On the section of Riverside Drive East east of Brumpton Park that parallels the Ganatchio Trail, alternative multi use trail improvements can be considered to address a number of pedestrian/cycling/motorist conflicts in this area, including;

- Safety issues at street crossings of the Trail that affect turning vehicles off Riverside Drive;
- High pedestrian crossing concentrations at key locations along the Trail such as at Florence Avenue at Sandpoint Park;
- Impact of existing and additional pedestrian-actuated crossing signals on traffic flow along Riverside Drive, for example at Flora Avenue associated with Marina users; and
- The general issues of pedestrian crossing safety and Riverside Drive traffic flow wherever parking is located on the south side of the street to serve a major attraction such as the waterfront parkland on the north side. This is where the alternatives to pedestrian crossing management, intersection traffic control management and traffic calming will have to be evaluated.

KEY IMPACT CONSIDERATIONS:

Positive Impacts	Negative Impacts
<ul style="list-style-type: none"> • Social impact of enhanced pedestrian crossing safety; 	<ul style="list-style-type: none"> • Traffic operation and level-of-service impacts of additional crossing delays along Riverside Drive.
<ul style="list-style-type: none"> • Social and traffic impacts of traffic diversion from Riverside Drive associated with additional travel delays along Riverside Drive 	<ul style="list-style-type: none"> • Social impact of proximity to residential property and intrusion into private property encroachment into public right-of-way cause by addition of north side sidewalk;
<ul style="list-style-type: none"> • Social enhancement of area pedestrian character; 	<ul style="list-style-type: none"> • Natural impacts of north side sidewalk construction on street trees.



Conclusion – Pedestrian and related alternative solutions for Riverside Drive are being **retained for further consideration** in this EA as part of traffic management, intersection operation and traffic calming alternatives.

5.10 Roadway Geometry Alternative

Rationale – As previously reported in this ESR, Riverside Drive is located within an extremely inconsistent right-of-way width that has evolved over time, and now ranges from less than 12.2 metres to over 30 metres wide. For this reason, it is unreasonable to assume or expect that a consistent right-of-way width can ever be provided along the entire Riverside Drive study area, but attempts can be made, through this Class EA, to identify the more critical deficiencies in the cross-section and how they can be rectified to provide the needed minimum right-of-way width although the road.

Impact Assessment – The existing cross-section geometry along Riverside Drive creates both opportunities and problems for roadway and streetscape improvement, either providing sufficient width for the addition of features, or restricting such features owing to insufficient width and associated need for property acquisition.

The standard minimum travel lane width for arterial and collector roads in Windsor is 3.65 m. On Riverside Drive, the existing travel lane width varies from 3.1 m to 3.75 m based on current lane striping. For the purposes of this Class EA, an alternative lane width of 3.3 m is consistent with Transportation Association of Canada design guidelines and is recommended for Riverside Drive to reflect its role as a Scenic Drive and Civic Way.¹² While still meeting accepted engineering guidelines, the narrower 3.3 m lane width will also increase the side friction along the street created by the closer distance between approaching vehicles, which contributes to reduced vehicle speeds.

Using this lane width, plus an on-road bike lane width, if selected, of 1.5 m on each side of the road as one way of accommodating cyclists within the corridor, curbs, a 1.5 m sidewalk on one side and 1.1 m boulevard space on both sides for utilities (poles and transformers, Bell and cable boxes, fire hydrants, etc.), the minimum right-of-way width of Riverside Drive must be 13.6 m wide as shown on Exhibit 5.5. The existing right-of-way width along the entire Riverside Drive width from Rosedale Avenue to the east City boundary has been reviewed based on available mapping. As shown on Exhibit 5.6, there are only three roadway sections that are less than 12.2 m wide, and therefore currently could not accommodate two travel lanes and two bike lanes plus a sidewalk on one side:

- a 135 m section between Pillette and Buckingham;
- a narrow 20 m section west of Riverdale; and
- a 90 m section between Pierre and Hall west of Strabane.

Exhibit 5.6. also shows there is an additional 695 m of right-of-way west of Strabane and 515 m east of Strabane that is between 12.2 and 13.7 m wide. In summary, only the non-coloured road sections on Exhibit 5.6 would support a minimum 13.7 m road right-of-way. However, almost all of the narrow right-of-way sections are located abutting public parkland that can accommodate the minor (i.e. less than 2 m) right-of-way widenings to provide the minimum width along the entire Riverside Drive study length. These widening requirements will be confirmed in the design concepts provided in Section 7 of this ESR.

Exhibit 5.5 also compares the on-road bike lane cross-section width with that of a north and south sidepath or boulevard bikeway. The result is that a side path bikeway would extend the road right-of-way from 0.9 m to 2.4 m onto abutting property, with direct impacts on property, fences, landscaping and most importantly street trees.

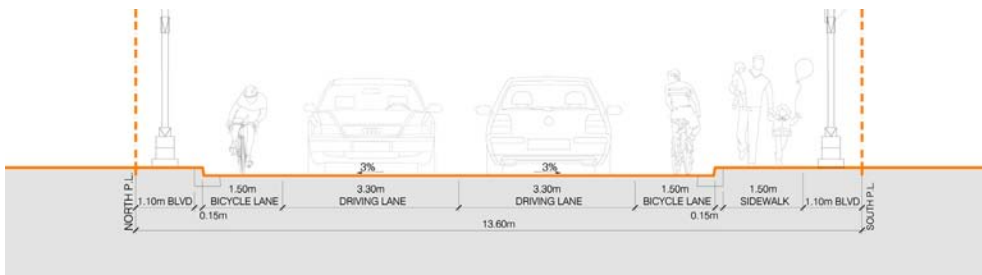
¹² Transportation Association of Canada, 1999 Geometric Design Guide for Canadian Roads

Key Impact considerations:

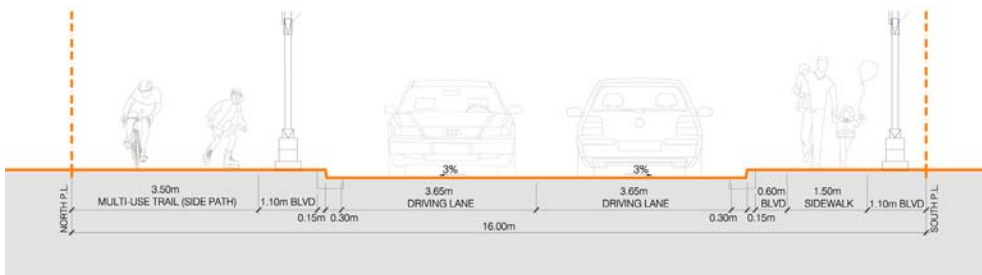
Positive Impacts	Negative Impacts
<ul style="list-style-type: none"> Minimize property acquisition requirement, and associated economic and social impacts; Increase street friction to slow travel speeds; Accommodate cycling and walking within the right-of-way. 	<ul style="list-style-type: none"> Impact on abutting parkland and landscaping features at locations where additional right-of-way width is required to accommodate the final roadway geometry. In some cases where a road widening encroaches into parkland, some modifications to infrastructure (i.e. trails) may be required.

Conclusion – A 13.6 m minimum right-of-way width for Riverside Drive should be used in preparing the design concepts for improvements to Riverside Drive.

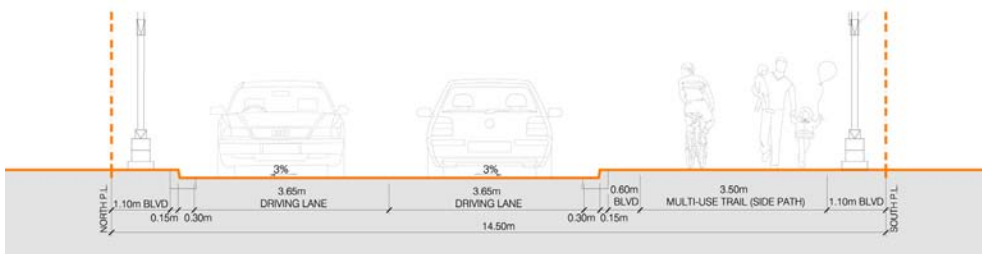
exhibit 5.5 – recommended minimum roadway right-of-way



Recommended minimum Right of way = 13.6m



alternative north side path = 16.0 m



alternative south side path = 14.5 m

EXHIBIT 5.6 – EXISTING RIGHT-OF-WAY CONDITION

