DOCUMENT 2

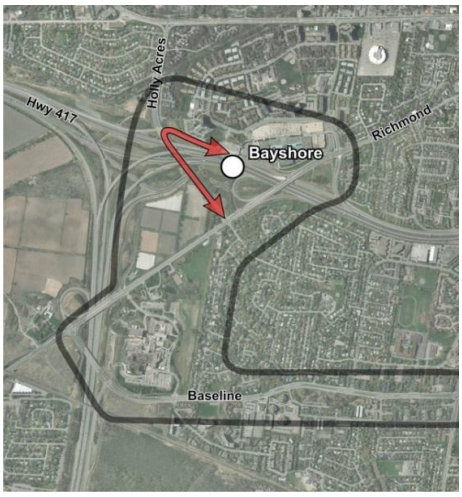
SECTION 1: ALTERNATIVE ALIGNMENTS

1. Bayshore Station Access

Three alternative alignment options were identified to connect Bayshore Station/Shopping Centre. These include:

1.1 Holly Acres Road
1.2 Richmond Road/Bayshore Drive
1.3 Richmond Road/Transitway

1.1 Option 1 - Holly Acres Road

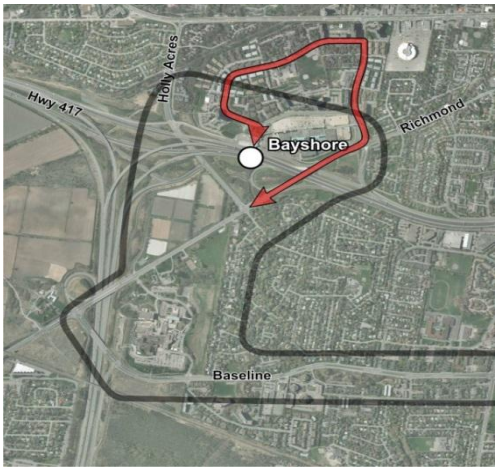


Holly Acres Road is an existing four lane roadway which runs between Richmond Road and Carling Avenue. This option is runs along Holly Acres Road between Richmond Road and the existing West Transitway to access Bayshore Station.

This provides for the inbound and outbound movement of buses. Dedicated transit lanes are provided by the widening of Holly Acres Road or the reallocation of existing lanes from general purpose traffic. This option would tie-in with planned Highway 417 on-ramp changes.

Major issues to consider include some disruptions to Creeks End and traffic access via Holly Acres during construction and operation. Existing sanitary sewer in the corridor will need protection, and some land may be required to widen Holly Acres Road.

1.2 Option 2 - Richmond Road / Bayshore Drive



This alternative uses Richmond Road and Bayshore Drive to access Bayshore Station. Inbound buses to Bayshore Station would travel east along Richmond Road, north on Bayshore Drive and then west along Woodridge Crescent to access Bayshore Station. Outbound buses would exit Bayshore Station and use Woodridge Crescent and Bayshore Drive in the opposite direction to access Richmond Road.

Major issues to consider as part of this alternative include the very limited ability to accommodate dedicated lanes, and it does not improve the ability for local access to Bayshore. Additionally, there would be a reduction in vehicle capacity required to accommodate transit east-bound on

Richmond. Four signalized intersections plus mid-block pedestrian crossings would be impacted and this route passes through a noise sensitive residential neighbourhood which may require noise mitigation.

1.3 Option 3 - Richmond Road / Transitway

This alternative would consist of a one-way loop routing. Buses inbound to Bayshore Station would use Richmond Road east of Holly Acres Drive to cross over Highway 417 on the existing Richmond Road bridge. East of Highway 417, a new bus-only roadway would be constructed to provide access to the West Transitway, which runs along the north side of Highway 417 in this area. Buses would then use the Transitway to access Bayshore Station. Buses outbound from Bayshore Station would need to use either Holly Acres Drive or Bayshore Drive and Richmond Road.

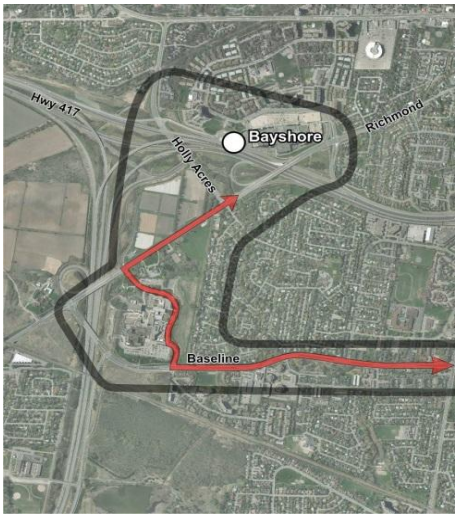
Major issues to consider as part of this alternative are the direct but challenging connectivity with rapid transit facilities and the incompatibility with longer-term conversion to LRT. This option would not provide cycling or pedestrian facilities on the Transitway, and would result in vehicle capacity reductions to accommodate transit east-bound on Richmond.

2. Queensway-Carleton Hospital

Four alternative alignment options were identified in the Queensway-Carleton Hospital area including:

2.1 Ring Road
2.2 East of Hospital
2.3 Baseline Road/Richmond Road
2.4 West of Hospital

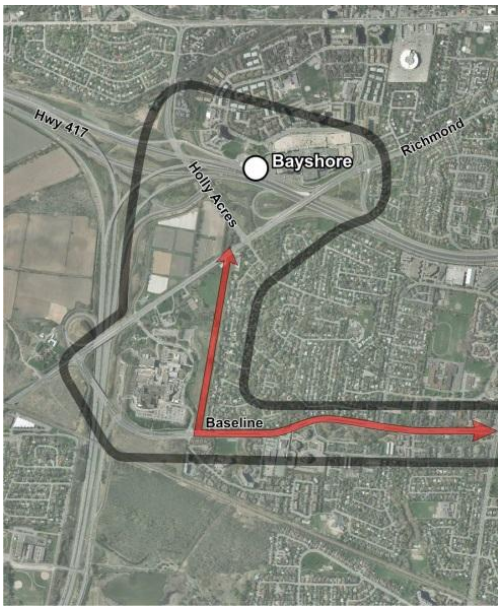
2.1 Option 1 - Ring Road



Option 1 for the Queensway-Carleton Hospital is via the use of the existing hospital ring road (John Sutherland Drive) between Richmond Road and Baseline Road, following the route of existing bus service. In this option, dedicated transit lanes would not be provided, resulting in slower transit trips. However, transit priority may be provided at intersections with Richmond Road and Baseline Road. Major issues with this option include the impact on hospital servicing on the ring road. This option needs to share the road with other traffic, and as bus and general traffic volumes increase, there may be a

negative impact on both transit and road operations. Additionally, this route passes by a noise sensitive hospital with some noise impact on the hospital anticipated. There are no land acquisitions required for this option; however, an operating agreement with the hospital would be required.

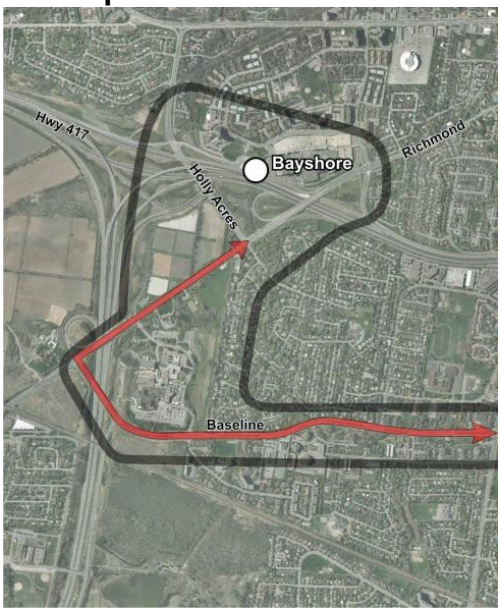
2.2 Option 2 - East of Hospital



The “East of Hospital” option uses an alignment previously identified as part of the former East-West LRT project (2006). This option would see the transit services turn north from Baseline Road approximately 50 m east of the John Sutherland Drive intersection before continuing north through existing parkland (Valleystream Park). It would then turn east at Richmond Road to access Bayshore Station via one of the Bayshore Access alignment alternatives, as described above.

This option provides for faster transit trips but does not serve the hospital effectively. Additionally this option would require NCC land and the loss of existing greenspace adjacent to a residential community. The new corridor would be adjacent to noise sensitive residential receivers and a noise barrier along the rear property line of residences is anticipated. Connections to Baseline Road and Richmond Road would be challenging due to intersection geometry and spacing. This option is within 15 m of Butternut compensation planting beds on the hospital grounds.

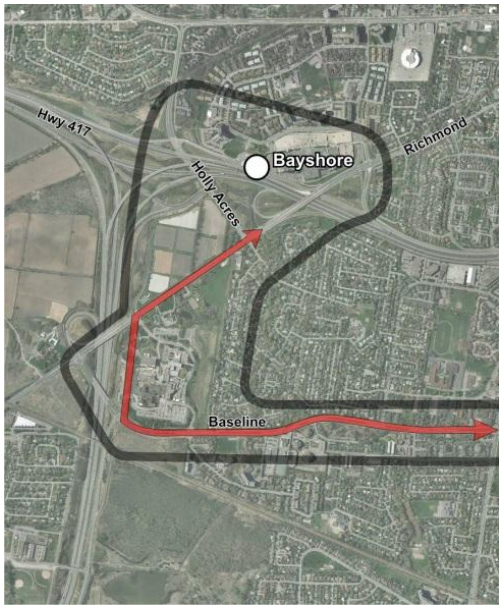
2.3 Option 3 - Baseline Road / Richmond Road



The third option for the Queensway-Carleton Hospital uses on-street transit along Baseline Road and Richmond Road. Dedicated transit lanes would be provided by road widening and reallocation of existing traffic lanes (auxiliary lanes). A positive attribute of this option is that the existing bridges over Highway 416 can accommodate new transit lanes without the need to widen the structures. However, this option does not provide direct rapid transit service to the hospital, although local routes could continue to operate on hospital property.

A major issue associated with this option includes the potential long walk required to access the hospital. Additionally, this is the longest route for this segment of the BRRT which would increase annual operating and maintenance costs.

2.4 Option 4 - West of Hospital



The “West of Hospital” option involves construction of a new transit alignment along the west side of the QCH. This option starts from the intersection of Baseline/Cedarview and ties into the existing hospital ring road just south of the Richmond Road/Sutherland Intersection. Characteristics of this option include the combination of transit-priority and mixed traffic operation through the hospital area. The design of the roadway needs to integrate the existing multi-use pathway and hydro corridor access requirements.

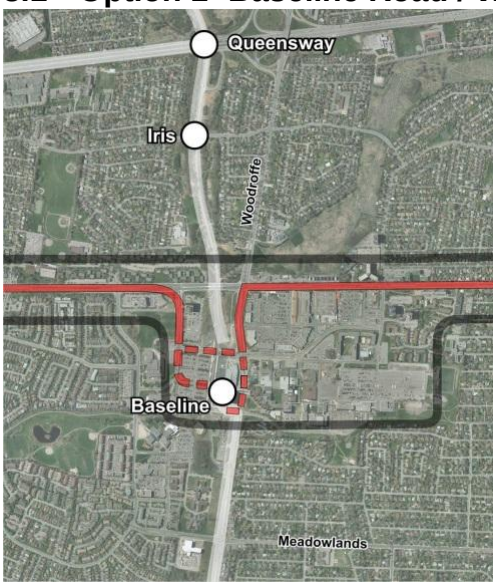
Major issues associated with this alignment include the creation of a new intersection at Cedarview/Baseline and a new mid-block pedestrian crossing which may impact intersection capacity and may require running in mixed traffic along a new ring road. Geometry of the connection to Richmond Road may be a challenge and requires alterations to the existing John Sutherland/Richmond intersection. A land acquisition and operating agreement with the hospital may be required. Butternut tree compensation planting beds are located within 15 m of the alignment on QCH grounds. This option requires NCC lands.

3. Centrepointe Town Centre / Algonquin College

Four alternatives were identified in the Centrepointe Town Centre/Algonquin College area including:

3.1 Baseline Road/Woodroffe Avenue
3.2 Baseline Road/Constellation Crescent
3.3 Navaho Drive
3.4 College Avenue

3.1 Option 1- Baseline Road / Woodroffe Avenue

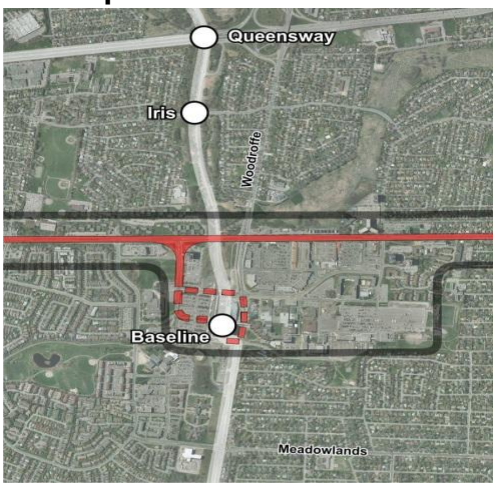


In this option, the proposed rapid transit corridor would use Baseline Road and Woodroffe Avenue to access Baseline Station, and then use Constellation Crescent to return to Baseline Road west of Woodroffe Avenue. Direct service to Algonquin College campus would not be provided by this route, but the supplementary transit corridor would remain on arterial roads. Access to rapid transit would be provided via the overhead walkway providing access to the Algonquin Centre for Construction Excellence.

Major issues associated with this alignment include the challenge of accommodating BRT operation

through the Baseline/Woodroffe intersection. This option impacts the most number of signalized intersections, including Baseline/Woodroffe and will have longer routing with a limited ability for a dedicated facility through Centrepointe Town Centre. This option does not support future college expansion as it is located on the periphery of the node. Major storm and sanitary sewer infrastructure is located under Baseline Road, west of Navaho.

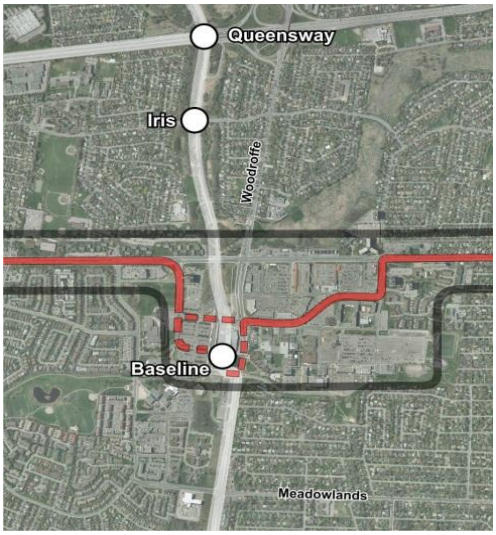
3.2 Option 2- Baseline Road / Constellation Crescent



In this option, the proposed rapid transit corridor would use Baseline Road and Constellation Crescent to access Baseline Station and serve the Centrepointe Town Centre. Direct service to the Algonquin College campus would not be provided and people originating/destined to this location would access rapid transit via Baseline Station. The ability to provide transit priority infrastructure on Constellation Crescent and Centrepointe Town Centre local road network is limited in this option.

Major issues associated with this option include the required operation through Baseline/Woodroffe intersection and along the local road network in Centrepointe Town Centre. Similar to the first option, this alignment does not support future college expansion due to its location on the node periphery. Some lands may be required to widen Baseline Road and the bridge over Pinecrest Creek. Widening of Baseline Road over Pinecrest Creek may impact a major watermain located under Baseline Road, west of Navaho Drive.

3.3 Option 3 - Navaho Drive



In this option, buses would run via Constellation Crescent and Navaho Drive before regaining Baseline Road at Navaho Drive. This option avoids the discontinuous road network within Centrepointe Town Centre, but places the supplementary transit corridor at the north end of the New Baseline Station. Direct service to the Algonquin College would be provided along the campus northern boundary.

This option provides rapid transit service in proximity to both Algonquin College and existing commercial development on the north side of Navaho Drive. Additionally, this option could use either Navaho Drive or College Avenue to access Baseline Station.

Major issues associated with this option include a longer walk which may create some isolation at off-hours. Additionally this route is, somewhat less compatible with existing

and future OC Transpo local routes if buses connect at the north end of Baseline Station.
There is a possible minor impact on small street trees adjacent to the existing parking area west of Baseline Station.

3.4 Option 4 - College Avenue

In this option, the rapid transit corridor would follow the existing route of OC Transpo route 118, which runs south from Baseline Road along Navaho Drive and then through the Algonquin College campus along the college's internal roadway system, accessing Baseline Station via College Avenue at Woodroffe Avenue. The College alternative provides the best access to campus but results in slower transit trips and requires the use of private lands for operation. The possible long-term redevelopment of the Algonquin College campus may be able to accommodate better bus routing in the future.
Major issues associated with the College Avenue option include little to no ability to achieve a dedicated transit facility through the college area or along the Centrepointe Town Centre local road network. This option presents a potential conflict with pedestrian/cycling movement on campus with an increase in speed and number of buses.
This alignment passes in close proximity to a noise sensitive residential receiver on the south side of Algonquin College and a noise barrier may be required. This option requires an operating agreement of acquisition of land through the college and would result in higher operating and maintenance costs than some of the other options.

SECTION 2: EVALUATION OF ALTERNATIVE ALIGNMENTS

Key considerations that guided the development and evaluation of alternative corridors include the following:

- Increase transit ridership, mobility and access.
- Support a sustainable transportation system.
- Compatibility with adjacent communities.
- Connect regional facilities and support lands designated for development.
- Protect, improve and restore the natural environment.
- Protect historical cultural and archaeological resources.
- Provide a wise public investment.

The evaluation results are summarized in Table 2.1.

Table 2.1: Evaluation of Alternative Alignments

Bayshore Station	Queensway-Carleton Hospital	Algonquin College/Baseline Station
Alternative 1		
Richmond – Holly Acres – West Transitway - Bayshore Station	Ring Road (Baseline - John Sutherland - Richmond)	Baseline - Constellation - Woodroffe - Baseline
✓	×	×
Alternative 2		
Richmond - Bayshore Dr. - Woodridge Crescent - Bayshore Station	East of Hospital (new bus only link)	Baseline - Constellation - Baseline
×	×	×
Alternative 3		
Inbound: Richmond – West Transitway (new bus only ramp) - Bayshore Station	Baseline - Richmond	Baseline - Constellation - Woodroffe - Navaho - Baseline
Outbound: Bayshore Station - Holly Acres – Richmond OR Bayshore Station – Woodridge - Bayshore Dr - Richmond		
×	✓	✓
Alternative 4		
-	West of Hospital (new bus only link)	Baseline - Constellation - College - Navaho - Baseline
	×	×

SECTION 3: ALTERNATIVE DESIGNS

The following section provides description of the alternative designs that were considered and evaluated:

Curb-side Bus Lanes

In this design (Figure 3.1) dedicated curb-side transit lanes would be provided by either widening or reallocation of existing traffic lanes where six lanes currently exist. This design option would operate similar to existing bus lanes on Woodroffe Avenue south of Baseline Station. Interaction with right turning vehicles to/from driveways and intersections would reduce transit service efficiency. Future growth in traffic volumes and intensification along Baseline Road will adversely affect transit service reliability along the corridor. Stations would be located along sidewalks.

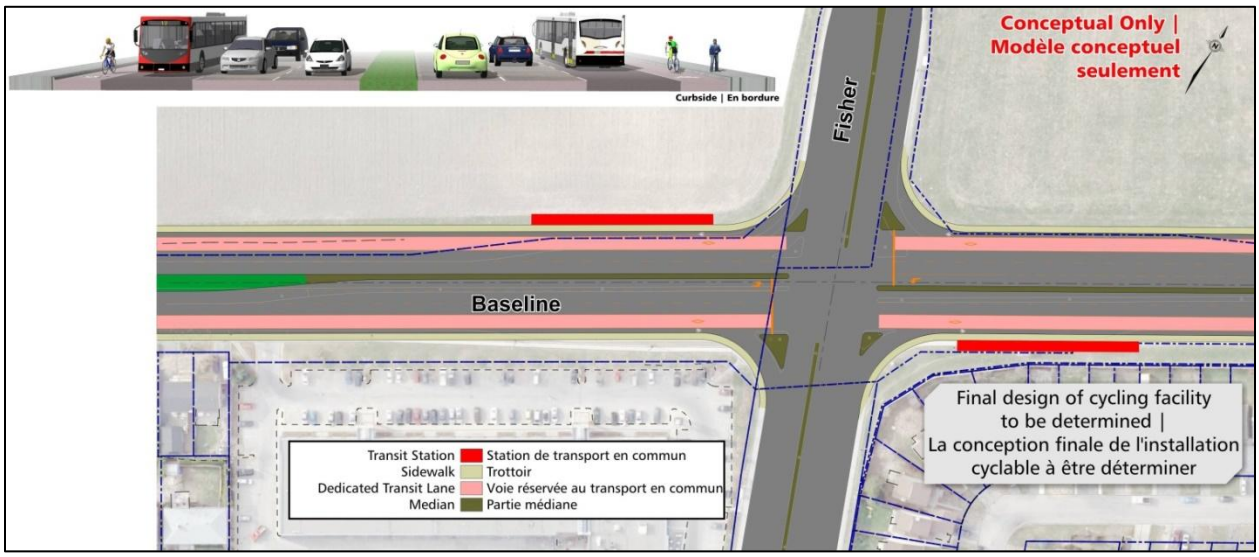


Figure 3.1: Conceptual Schematic of Curbside Bus Lanes

Median Bus Lanes

This design option would locate the future bus operation on the inside (median) lanes of the roadway (Figure 3.2). Dedicated BRT lanes would be accommodated by either widening or reallocation of existing lanes, such as where six lanes currently exist. Stations would be located at intersections at median platforms in the middle of the roadway.

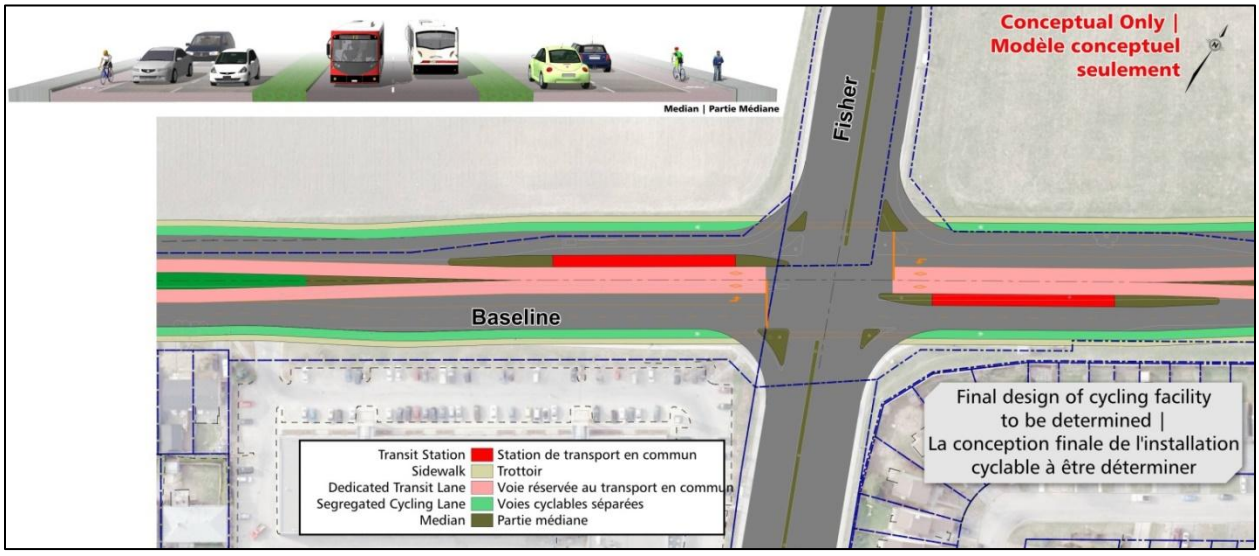


Figure 3.2: Conceptual Schematic of Median Bus Lanes

Following two options for the median design were also investigated:

1) a Double Median where bus lanes are physically separated from traffic on each side; and
2) a Single Median where bus lanes are separated from adjacent traffic by painted lines and/or a rumble strip.

Both design options provide for more segregation between transit and the general traffic, resulting in a higher quality of transit service. These options also require the existing full movement un-signalized intersections or driveways to be either signalized or restricted to right-in/out solution.
Comparing it with curb-side bus lane option, single median design option requires approximately the same widening of the roadway.

<u>One-side Bus Lanes</u>
In this design concept, bus lanes would be located on one side of the roadway (Figure 3.3). Access impacts result in a limited ability to implement this option in much of the corridor. This alternative design is only feasible in areas where there is development only on one side of the road, such as through the Experimental Farm area.

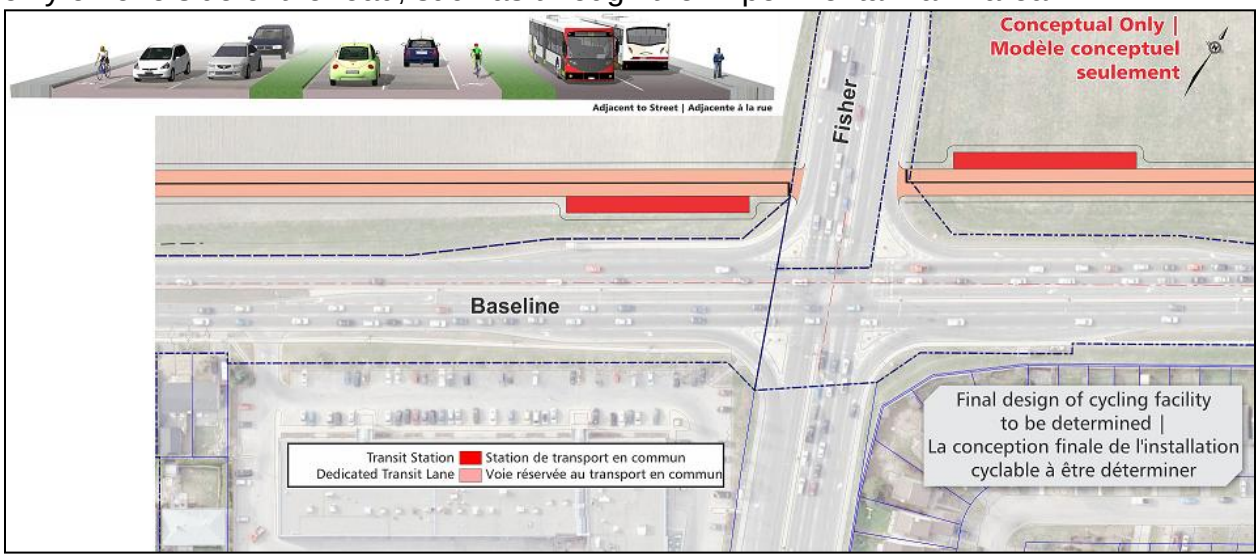


Figure 3.3: Conceptual Schematic of One-side Bus Lanes

Intersection operations would also be an issue with this design, due to additional conflict point creation. Transitions would be required at each intersection to allow buses into and out of the lanes. However, the good physical separation for transit results in a higher quality of transit service.

<u>Other Design Alternatives:</u>
Following are the other design alternatives that were also considered during the course of the study:

<u>Reversible Lanes</u>: This alternative would consist of a single dedicated median transit lane, which would alternate direction in the morning and afternoon peak hours. This would significantly reduce the footprint required, at least in mid-block corridor segments between transit stations.

Buses in non-peak direction would operate in mixed traffic, reducing the overall reliability of service and creating confusion to transit passenger understanding and way finding with respect to where buses will be stopping. Existing and projected transit demand during peak hours, do not support provision of a peak direction-only rapid transit facility.

Lane Reduction: Due to existing right-of-way constraints, primarily in the Navaho Drive – Clyde Avenue segment of the corridor, consideration was given to the feasibility of reducing the number of general purpose traffic lanes from two to one in each direction. This alternative would consist of one dedicated transit lane and one general purpose traffic lane in each direction which would lessen the need for additional property acquisition in constrained segments. However, considering the role and function of Baseline Road as a major east-west travel corridor, truck route and emergency detour route for Highway 417this option was also screened out from further consideration.

Evaluation Results:

Based on the evaluation of design indicators, Median BRT option was selected as the preferred design alternative. Primary factor leading to the preference for Single Median design include reduced property requirement comparing to the Double Median design. The simulation results indicate superior travel time over existing conditions as well as Curb-side Bus Lane option. Further, the Median Bus Lane design has the least propensity to be impacted by future traffic patterns, as the lanes provide superior separation of autos and transit. More visible infrastructure investment as well as the faster travel times may increase the likelihood of corridor investment and more transit-supportive development. Faster travel times will require fewer buses to carry the same number of people, resulting in reduced operating costs for transit and attracting more ridership along the corridor. Table 3.1 shows the evaluation results of median versus curb-side bus lane design options.

SECTION 3

Table 3.1: Evaluation of Design Alternatives (Curb-side Bus Lanes versus Median Bus Lanes)

	Option 1 – Curb Lanes	Option 2 – Single Median
Increase transit ridership, mobility and access	– East of Prince of Wales Drive, curb lanes exist for buses today. Curb lane design could match the existing lane configuration, requiring no transition. – Buses would be required to share the right turn lanes at intersections resulting in conflicts and delay to transit. – Simulation results indicate curb lanes provide very little improvement in transit travel times over existing. As traffic increases, additional delay will occur due to conflicts at intersections and driveways. Reliability of transit travel time does not improve. – Easier for local bus routes to make use of dedicated bus lanes and share bus stops. Transfers to/from intersecting bus routes require the same walking distance. – Slower transit travel times will attract fewer riders. Curb lanes provide greater flexibility to move station/stop locations and provide new station/stops if required to respond to demand. Bicycle parking facilities may be more easily incorporated in this design, although walk distance for connections would be the same for return journeys. – Mobility impaired persons may perceive it easier/safer to access stations/stops located at the curb-side rather than in the middle of the street, although overall walk distance would be the same for return journeys. On one portion of the trip pedestrians must cross the full width of Baseline Road, which can be challenging. – Stations/Stops will be hubs of activity but curb-side locations may be less visible to other corridor users.	– Requires a transition between curb and median lane operations at Prince of Wales, or conversion of existing curb-side transit lanes to median operation at Prince of Wales Drive, or conversion of existing curb-side transit lanes to median operation. Expansion of the study area to convert lanes east of Prince of Wales to median operations will provide a superior service to what currently exists. – More efficient bus movement due to transit signal priority as well as fewer conflicts with other vehicles. Simulation results indicate significant improvement in transit travel times and reliability of transit travel times over existing. Travel times will not be impacted by future traffic growth as median lanes provide superior separation of autos and transit. – Median lanes not likely to be used by local buses which travel on short sections of Baseline Road due to need to transition to/from lanes at intersections. Buses which travel for longer distances along baseline Road can make use of dedicated lanes and share stops. Transfers to/from intersecting bus routes require the same walking distance. – Faster transit times will attract more riders. Median lane facility provides for more visible transit infrastructure and greater separation from other traffic. Can be more difficult to add new station/stops or relocate if needed, however there is also less chance of rapid transit operations becoming degraded due to addition of marginal station/stops. – May require additional footprint to provide bicycle parking facilitates. Bicycle parking is not directly integrated into station/stop but located separately at the curb. Station stop locations in the middle of the street may be perceived as a greater physical barrier, although platforms and infrastructure will be fully accessible. Passengers will need to cross half of the roadway on each leg of the trip and can cross Baseline Road in 2 stages for other local walking trips. – Stations/stops better lit and more visible, providing and enhanced level of safety due to fewer potential hiding locations.
Support a sustainable transportation system	– Model results indicate auto travel time stays generally the same as existing under the curb lane scenario in both AM and PM peak hours. Main impact is conflicts between buses and right-turning vehicles. – Both options impact the same number of existing signalized intersections. The curb lane option does not require signalization of additional intersections.	– Model results indicate median operations results in minor increase in auto travel time in AM peak hour, with a reduction in auto travel time during PM peak hour. Primary impact is due to loss of auxiliary right-turn lanes at intersections due to constrained right-of-way. – This option requires signalization or elimination of several existing un-signalized intersections.
Compatibility with adjacent communities	– Access to the roadway may be easier for individuals through the use of the bus lane (bus every 2-3 minutes) as opposed to a general purpose traffic lane. – New development and associated accesses to Baseline Road will increase conflicts with buses. Curb lane facility is not perceived as rapid transit infrastructure and will not attract as many riders due to slower travel times.	– Ease of access to individual properties remains the same (i.e. pulling into/out of general purpose lanes). Removes the opportunity for new full access to properties (due to median). Several existing properties may have their access modified. – New development will not affect transit operations. Median lane facility perceived as a more substantial infrastructure investment and faster travel times will attract more riders, increasing the likelihood of corridor investment.
Connect regional facilities and support lands designated for development	– Little improvement in transit travel times will result in lower ridership and is less likely to attract transit-supportive development.	– Faster transit travel times, increased service reliability, and more visible rapid transit infrastructure will attract more transit- supportive development.
Protect, improve and restore the natural environment	– Approximately the same footprint is required for both design options. – Not a differentiating factor.	– Approximately the same footprint is required for both design options. – Not a differentiating factor.
Protect historical cultural and archaeological resources	– Approximately the same footprint is required for both design options. – A large bus shelter (50 m long platform and signage) will be placed at the curb directly adjacent to the Central Experimental Farm. Both designs will require property and placement of shelters.	– Approximately the same footprint is required for both design options. – A large bus shelter (50 m long platform and signage) will be placed in the median, in close proximity but not directly adjacent to the Central Experimental Farm. Both designs will require property and placement of shelters.
Provide a wise public investment	– The road will be widening the same amount for each alternative. – Slower transit travel times compared to median operation will require a greater buses to carry the same number of people, resulting in increased operating costs.	– The road will be widening the same amount for each alternative. – Faster transit times require fewer buses to carry the same number of people, resulting in reduced operating costs for transit.
CARRIED FORWARD	**(X)**	**(✓)**