DOCUMENT 6

# Transportation Master Plan
# Infrastructure Requirement Study

# Phasing of TMP Transit Network

November 2008


Ottawa

MRC McCORMICK RANKIN CORPORATION

Delcan
TRANSPORTATION • INFORMATION TECHNOLOGY • WATER

*PREFACE*

*The recommendations and findings presented in this report are one component of a larger study to develop the transit and road infrastructure requirements of the 2008 update to the City of Ottawa's Transportation Master Plan (TMP). This study is being conducted in such a manner as to satisfy Phases 1 and 2 of the Municipal Class Environmental Assessment (October 2000, as amended in 2007) as follows:*

Phase 1 – Problem or Opportunity: *The development of a long-term Transportation Vision and associated planning principles, identifying problems and opportunities;*

Phase 2 – Alternative Solutions: *A review of transit and road networks. This includes a capacity review of the City's downtown rapid transit network; the development of primary and supplementary transit corridors; identifying potential new and widened arterial roads and bridges, and; associated implementation timelines.*

*Further documentation will be prepared which describes all of the work undertaken to fulfill Phases 1 and 2, as well as the public and stakeholder consultation carried out.*

*The Municipal Class Environmental Assessment (EA) recognizes the benefits of long-range infrastructure planning under the Master Planning process and outlines various approaches for Master Plans to fulfill the requirements of the Class EA. The 2008 TMP update is being carried out as part of the City of Ottawa's mandatory 5-year Official Plan Review, and will therefore be planned in accordance with Approach #4 – Integration with the Planning Act.*

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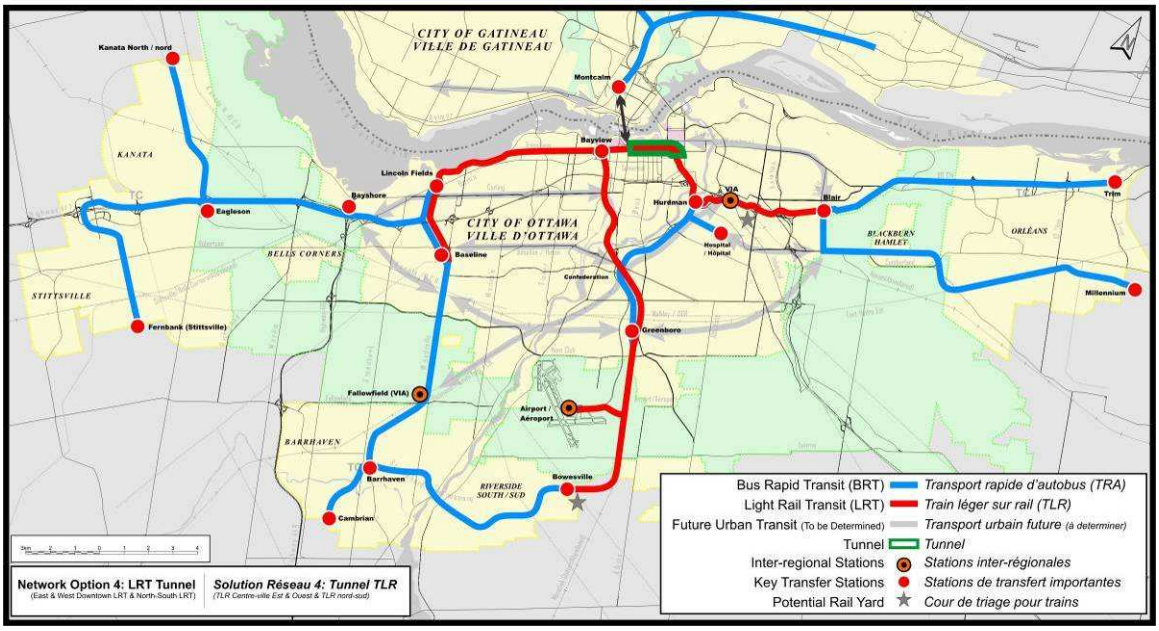
# 1. INTRODUCTION

Ottawa has a bus-based Transitway system that has been implemented over the last 25 years with significant success in terms of building transit ridership. However it has become increasingly evident that the Transitway system has reached its capacity in the downtown core causing delays, unreliable service and environmental concerns as more and more buses have been added over the years.

In response to these issues the Study Team developed a plan, with broad consultation, to implement an electrified Light Rapid Transit (LRT) network that will eventually serve the east, west and south suburban communities directly and will, by 2031, reach as far as Baseline in the west, Bowesville in the south and Blair in the east. The LRT system will be built on the existing Transitway rights of way in the east and west and use the rail corridor currently used by the O-Train in the southeast. Two potential rail yards have been identified as part of the 2031 plan: one at Bowesville in the southeast; and one in the vicinity of St. Laurent Station. Figure 1 presents the base 2031 Rapid Transit Network. This system will accommodate the forecast growth until at least 2031. As the city grows, the LRT can be expanded further across the Greenbelt. Future TMP updates will determine the appropriate time for LRT expansion.

A key element of the future transit network is a tunnel through the downtown core. This will provide the required capacity for the large numbers of commuters traveling by transit to and from central Ottawa in peak periods, improve reliability and reduce travel times. It will also relieve congestion on the streets and improve the environment on Albert and Slater Streets.

**Figure 1: Initial Rapid Transit Network (Option 4)**

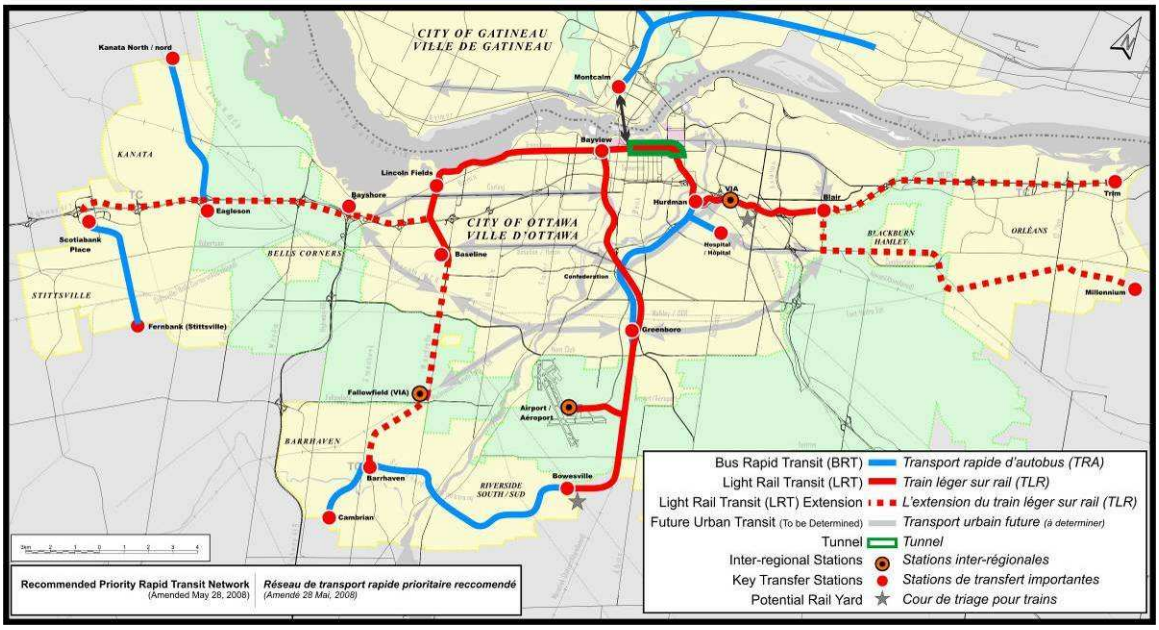



In May 2008 City Council approved the network and directed for the inclusion of LRT extensions across the greenbelt to Trim Road in the east, Fallowfield in the south and Scotiabank Place in the west, as shown in Figure 2, subject to:

- Development of transit corridors inside the Greenbelt first;
- Positive business case supporting the return on investment for the extension in terms of ridership, operating and capital costs;

- Achieving a minimum density target (to be determined in the Official Plan update); and
- Availability of funding.

**Figure 2: Approved Rapid Transit Network (May 2008)**

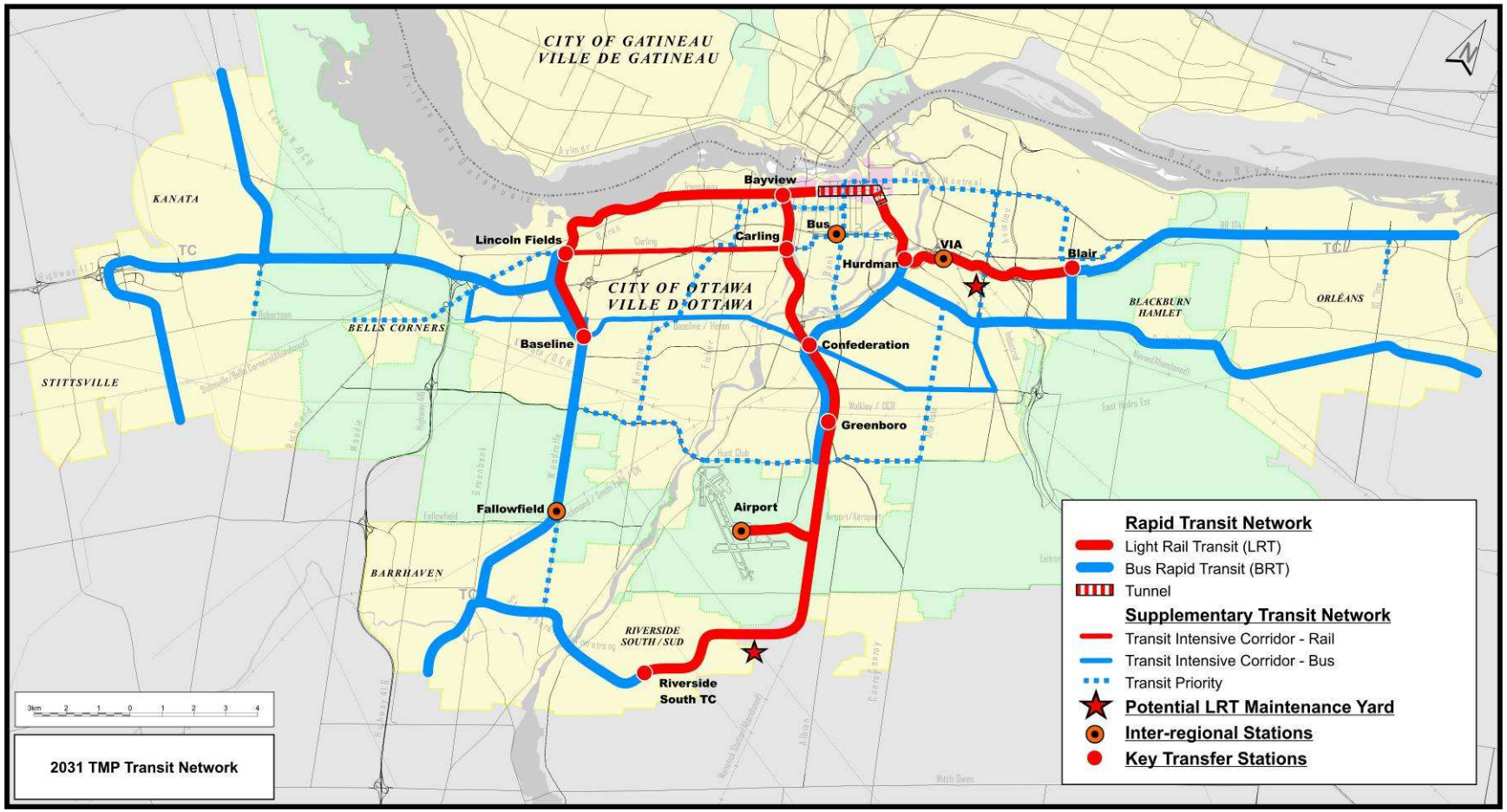



This plan was approved subject to the investigation of alternative LRT termini locations to better serve the Riverside South development community. This analysis is document in the report entitled "Review of Alternative LRT Terminus Locations in Riverside South" dated October 2008. It was determined that the terminus should be located within the Riverside South Town Centre instead of at Bowesville Station. This is reflected in the figure below.

In addition, other supplementary transit corridors have been identified to complete the transit network and encourage transit-supportive development. Details of the supplementary corridors are included in a report entitled "Development of the Supplementary Transit Network". This network is shown in Figure 3 and it should be noted that this will be modified should the conditions listed above for extension of LRT across the Greenbelt be met.

The purpose of this report is to develop a recommended phasing sequence for the implementation of the LRT network, based a number of evaluation criteria covering the benefits to the community, the environment and the economy of the city.

**Figure 3: Recommended 2031 TMP Transit Network**



# 2. KEY CONSIDERATIONS FOR LRT PHASING

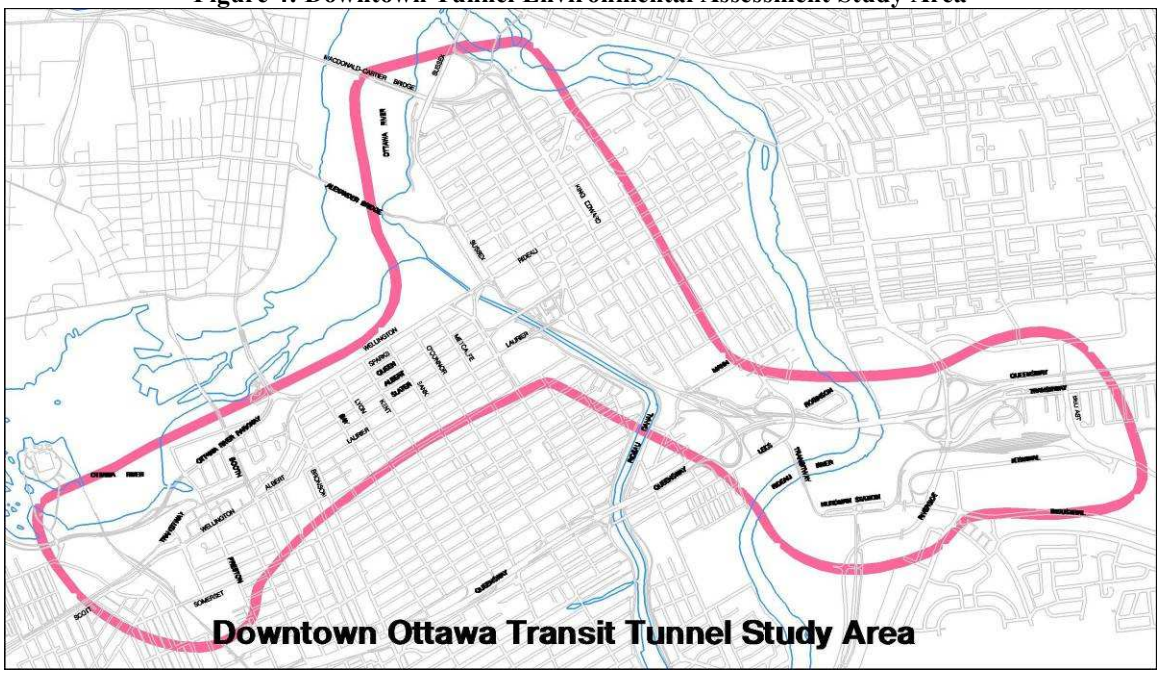
There are a several constraints on the development of a phasing plan that are outlined briefly in this section. Identification of these constraints assists in developing a framework for the development of practical scenarios.

## 1. Downtown Tunnel

A downtown tunnel is included as an element of the first phase of all staging scenarios.

The City of Ottawa has already initiated an Environmental Assessment (EA) for the downtown tunnel. That study's scope includes completing the functional design of the tunnel as well as obtaining all the necessary approvals for further design and construction. The EA and approvals are expected to be complete in early 2010. This will be followed by a two year design phase and another three to four years of construction. The tunnel will therefore not be operational for another seven or eight years. While the tunnel is being constructed, buses will continue to service the downtown area through the use of surface streets. The study area being considered as part of the Tunnel EA is presented below.

**Figure 4: Downtown Tunnel Environmental Assessment Study Area**




## 2. Rail Maintenance Facility

A key criterion in determining what LRT project is to be the first undertaking is whether the corridor has access to a rail maintenance facility. Two sites have been identified as potential rail maintenance facilities: in the south at Bowesville; and another in the east located in the industrial area around St. Laurent Boulevard and Belfast. An EA has already been approved for the site at Bowesville, while significant work would be required to obtain approval for a site in the vicinity of St. Laurent. No suitable space was identified in the west for a rail yard.

It is assumed for this analysis that for those scenarios that assume that if the Bowesville LRT maintenance facility is built first, it will have sufficient expansion capacity for the period under study until 2018 and there will be no requirement for an additional facility in the east.

## 3. Multi-Modal Transfer Stations

As the LRT network is constructed and expanded from the centre of the city, existing commuter buses will terminate at bus/rail transfer stations instead of travelling into the downtown core area. The stations where these transfers will occur need to be large enough to handle the high volume of passengers that will be transferring between bus and rail and also to accommodate bus bays and lay-up spaces for bus routes that terminate there. For the initial LRT network shown in Figure 1, significant transfer stations will be required at Blair, Hurdman, Lincoln Fields and Baseline Transitway stations.

To develop phasing options it is necessary to identify other stations that with minor modifications may be able to accommodate high volume of buses and transit riders as interim transfer facilities. Two examples of this are St. Laurent and Tunney's Pasture stations. It is assumed for this exercise that the city will not construct an entirely new transfer facility if it is only going to serve transfers for an interim phase.

## 4. Basic Infrastructure Requirements to Support Staging

The conversion of the Transitway to LRT must be undertaken in a manner that minimizes disruption to transit customers to retain existing riders and continue to gain new riders during the development period. This is more problematic for the heavily used east Transitway from Blair to the central area than it is in the west, although it will be necessary to approach reconstruction with extreme care in all areas. It is proposed that a new River crossing be in place from Hurdman to Nicholas Street likely in the Alta Vista corridor to provide continuous Transitway service to the downtown during the conversion of the east Transitway downtown approach. In addition, it is proposed that the Hospital Link Corridor as well as the Transitway from Blair Station to Innes be in place to provide a fast reliable alternative to the Transitway between these stations during the conversion of the East Transitway from Hurdman to Blair Stations.

The sequencing of projects was considered for the phase 1 scenarios. These preliminary scenarios assume a procurement process similar to the previous North-South LRT project. The phase 1 schedules for the 4 scenarios are included in Appendix A.

# 3. DEVELOPMENT OF ALTERNATIVE PHASING SCENARIOS

Four scenarios have been developed that would lead to the construction of the LRT and BRT networks shown in Figure 3 by the target year of 2031. Each scenario consists of four phases. All four scenarios include the downtown tunnel as part of the first phase since this is needed to expand the capacity of the downtown core to accommodate growth. Since it is not possible to build the entire LRT network at the same time, the scenarios attempt to balance the transit improvements in communities across the city by, for example, including BRT and O-Train improvements in the west and south with LRT construction in the east.

## Elements Common to all Scenarios

The construction of some Transitway segments is assumed common to all the scenarios since they are currently underway or have been determined as necessary in the near term. These are:

- the construction of the Southwest Transitway from Fallowfield to Strandherd Road;
- the section of Southwest Transitway from Baseline Station to Norice Street; and
- the section of the West Transitway from Bayshore Station to Moodie Drive.

The construction of the Strandherd/Armstrong Bridge, which includes two transit lanes, is also assumed common to all the scenarios with improvements to Strandherd Drive and Woodroffe Ave to give additional priority for transit.

All four scenarios include conversion of the East Transitway to rail in Phase 1 (Scenarios 1, 3 and 4 to Blair and Scenario 2 to St. Laurent). In order to mitigate possible transit operational issues during construction of the LRT, the construction of the Hospital Transitway corridor as well as the Transitway from Blair Station to Innes is therefore included in Phase 1 for all scenarios. This, together with a new Rideau River crossing connecting to Nicholas Street, would allow buses from Orléans to continue to access the downtown through quick and reliable bus service while the existing Transitway is being converted for LRT.

The forth and final phase of each scenario is the same: it sees rapid transit services extended into Kanata, North Orléans, Stittsville and Barrhaven South.

The first three phases of the four scenarios are summarized in the table below and discussed in the four sections that follow.

**Table 1: Summary of Phasing Scenarios**

| Scenario | Phase1 | Phase 2 | Phase 3 |
|---|---|---|---|
| 1. Tunnel and LRT East | LRT<br>• Blair - Tunney's Pasture<br>• St. Laurent Rail Yard<br>Transitway<br>• Hospital link (Lycée Claudel - Innes)<br>• Blair (Blair Station - Innes)<br>• West (Eagleson – Scotiabank Place)<br>O-Train Extension (Greenboro – Leitrim) | LRT<br>• Tunney's Pasture-Baseline<br>Transitway<br>• West (Lincoln Fields – Pinecrest)<br>• Cumberland (Navan - Millennium)<br>• Innes Road/Blackburn to Cumberland Transitway.<br>Supplementary transit<br>• Baseline (Baseline - Confederation) | LRT<br>• North-South link including Airport<br>• Bowesville LRT Yard<br>Transitway<br>• Southwest (Norice - Hunt Club if required)<br>Supplementary transit<br>• Carling LRT<br>• Heron, Walkley, St. Laurent/Russell<br>• Baseline (Bayshore - Baseline) |
| 2. Tunnel and LRT West | LRT<br>• Baseline - St. Laurent<br>• St. Laurent Rail Yard<br>Transitway<br>• West (Pinecrest - Lincoln Fields)<br>• Hospital link (Lycée Claudel - Innes)<br>• Blair (Blair Station - Innes)<br>• Cumberland (Navan - Millennium)<br>• Innes Road/Blackburn to Cumberland Transitway<br>O-Train Extension (Greenboro – Leitrim) | LRT<br>• St. Laurent - Blair<br>Transitway<br>• West (Eagleson - Scotiabank Place)<br>Supplementary transit<br>• Baseline (Baseline - Confederation) | LRT<br>• North-South link including Airport<br>Transitway<br>• Southwest (Norice - Hunt Club if required)<br>Supplementary transit<br>• Carling LRT<br>• Baseline (Baseline - Bayshore)<br>• Heron, Walkley, St. Laurent/Russell |
| 3. Tunnel and LRT East and South | LRT<br>• Blair - Tunney's Pasture<br>• North-South link including Airport<br>• LRT yard at Bowesville<br>Transitway<br>• West (Eagleson - Scotiabank Place)<br>• Cumberland (Navan - Millennium)<br>• Hospital link (Lycée Claudel - Innes)<br>• Blair (Blair Station - Innes)<br>• Innes Road/Blackburn to Cumberland Transitway. | LRT<br>• Tunney's Pasture to Baseline<br>Transitway<br>• West( Lincoln Fields - Pinecrest)<br>Supplementary transit<br>• Baseline (Baseline - Confederation) | Transitway<br>• Southwest (Norice - Hunt Club if required)<br>Supplementary transit<br>• Carling LRT<br>• Heron, Walkley, St. Laurent/Russell<br>• Baseline (Baseline - Bayshore) |
| Scenario 4 Tunnel and LRT East and West | LRT<br>• Blair to Baseline<br>• LRT yard at St. Laurent<br>Transitway<br>• Hospital link (Lycée Claudel - Innes)<br>• Blair (Blair Station - Innes)<br>• West (Pinecrest - Lincoln Fields)<br>O-Train extension (Greenboro – Leitrim) | Transitway<br>• West (Eagleson - Scotiabank Place)<br>• Cumberland (Navan - Millennium)<br>• Innes Road/Blackburn to Cumberland Transitway.<br>Supplementary transit<br>• Baseline (Baseline - Confederation) | LRT<br>• North-South link including Airport<br>• Bowesville LRT yard<br>Transitway<br>• Southwest (Norice - Hunt Club if required)<br>Supplementary transit<br>• Carling LRT<br>• Heron, Walkley, St. Laurent/Russell<br>• Baseline (Baseline - Bayshore) |

Notes: Phase 1 of all scenarios include SW Transitway links from Baseline to Norris and from Fallowfield to Barrhaven Town Centres as well as West Transitway section between Bayshore and Moodie. Phase 4 of each scenario is the same: it sees rapid transit services extended further into Kanata North, Stittsville, Orléans North, and Barrhaven South

## Scenario 1: Tunnel and LRT East

*Phase 1*

It is assumed that the LRT would run from the downtown tunnel to the previously determined eastern terminus at Blair Station. The western terminus is assumed to be Tunney's Pasture, rather than LeBreton or Bayview, for a number of reasons:

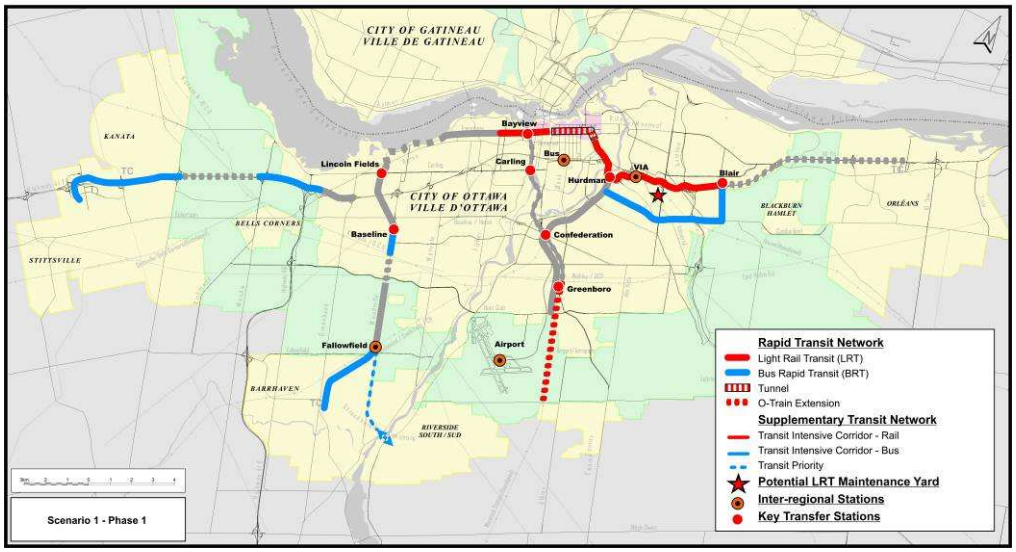
- LeBreton station was not ideal as it does not connect to the existing O-Train Station making it difficult for passengers on the O-Train to access the LRT service;
- Bayview station, while connecting to the existing O-Train, does not have the capacity to accommodate the required transfers between bus, LRT and O-train; and,
- Tunney's Pasture is a major employment centre with 10,000 jobs and providing direct access to this from the LRT service would be a significant advantage. Tunney's Pasture's current multi-level configuration could be modified to accommodate some bus transfers.

Although Tunney's Pasture station could not handle all the transfers to and from the west, some buses could be extended to Bayview and LeBreton LRT stations to reduce the pressure on Tunney's Pasture. However, since in combination these three stations are not large enough to accommodate all of the passenger-transfers from buses from the west, many of these buses would still continue into the downtown on the surface streets.

The LRT maintenance facility would be located in the vicinity of St. Laurent station.

This scenario includes some early transit improvements to the west south-west and south-east in its first phase to acknowledge that those initially benefitting from the LRT service will be from the east. The Transitway from Eagleson to Scotiabank Place will provide an important connection within Kanata and an extension of the existing O-Train is proposed to improve access to the growing south-eastern communities of Leitrim and Riverside South. In addition, in common with all the scenarios, the construction of the Southwest Transitway from Fallowfield to Strandherd Road and from Baseline to Norice, as well as the west Transitway from Bayshore to Moodie Drive and the Strandherd Armstrong Bridge with transit priority measures on Woodroffe and Strandherd are assumed to be in place.

**Figure 5: Scenario 1 – Phase 1: LRT East**

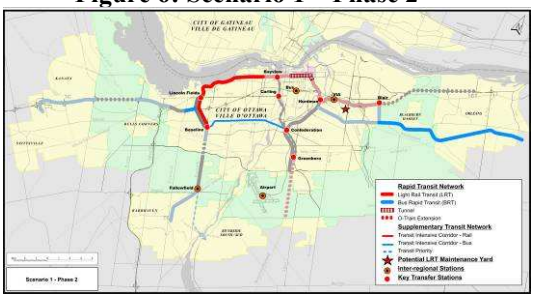


*Phase 2*

The second phase would see the LRT extended west from Baseline to Tunney's Pasture, completing the east-west LRT system. The Transitway between the Southwest Transitway and Pinecrest would also be built, completing the West Transitway to Kanata. In the east, the Cumberland Transitway would be built and connected to Blair Station with bus lanes on the Blackburn-Hamlet Bypass and Innes Road, as well as the Transitway section from Innes to Blair Station.

In addition, east-west transit travel would be further enhanced by the introduction of the Baseline supplementary (BRT) transit corridor from Baseline to Confederation.

**Figure 6: Scenario 1 – Phase 2**

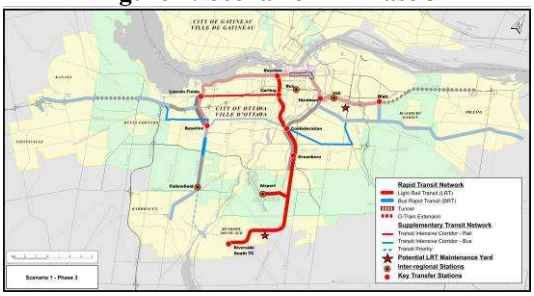


*Phase 3*

This phase would see the completion of the implementation of LRT network with construction of the N-S LRT and the Airport Link. A second LRT maintenance facility would be built at Bowesville.

In addition, it includes the construction of the Carling Supplementary Transit LRT from Lincoln Fields connecting with the North-South LRT at Carling Station. Also included is the Supplementary Transit for Bus on Heron, Walkley and St. Laurent/Russell as well as on Baseline from Baseline to Bayshore Stations.

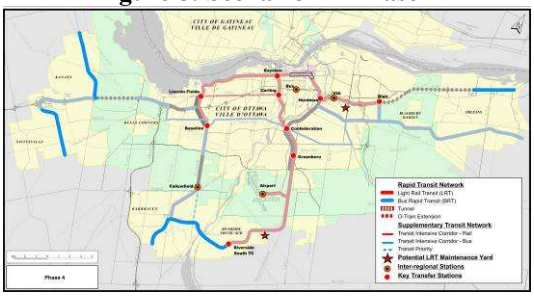
**Figure 7: Scenario 1 – Phase 3**



*Phase 4*

As described above, Phase 4 is common to all scenarios and includes extensions of rapid transit into Kanata, North Orléans, Stittsville and Barrhaven South. A description of this phase is not included in the other scenarios to avoid repetition.

**Figure 8: Scenario 1 – Phase 4**



## Scenario 2: Tunnel and LRT West

*Phase 1*

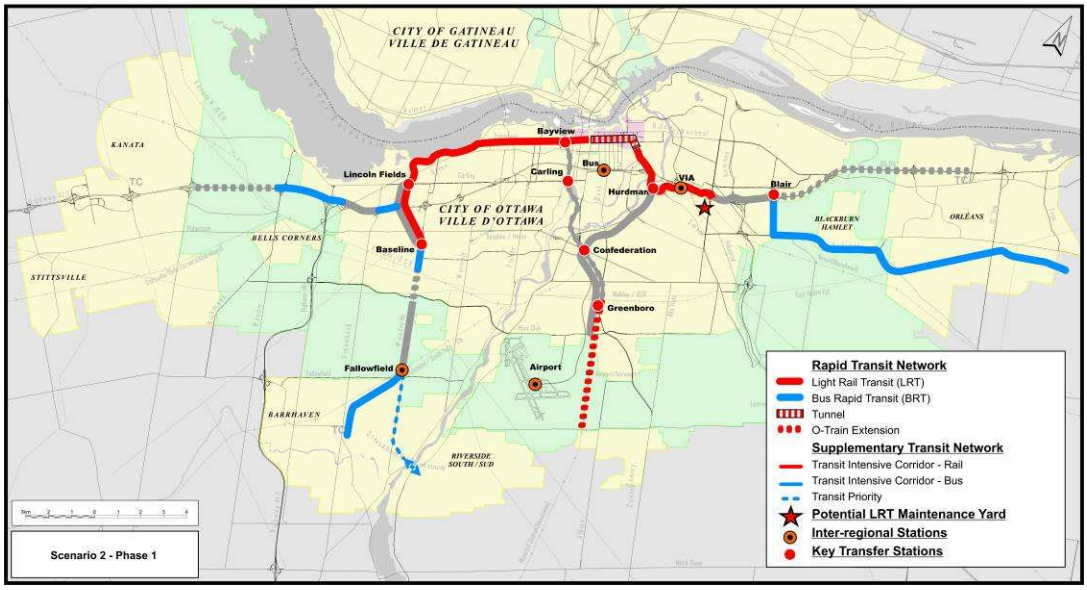
This scenario includes the construction of the LRT to the western terminus at Baseline Station. Although Lincoln Fields was considered as a possible interim terminus, there were strong reasons to prefer Baseline. Lincoln Fields station would not be large enough to accommodate all the transfers from both the West and Southwest Transitways. In addition the connection of the LRT to Algonquin College and the future Centrepoint development at Baseline is highly desirable. Transfers from the Southwest Transitway would occur at the Baseline station while transfers from the West Transitway would be at Lincoln Fields station.

The eastern portal of the LRT downtown tunnel would be in the vicinity of the University of Ottawa. Lees Station is highly constrained and could not support terminal operations and so the first location considered for an interim terminal was Hurdman station. However, the identified rail yard location is in the vicinity of St. Laurent station and it would be necessary to build a connection to this irrespective of where the LRT terminates. Extending the LRT to St. Laurent brings the system close to the potential rail yard, and can also have the significant advantages of serving a major shopping centre, allowing passengers from the local and mainline bus routes to terminate at this station to transfer to the LRT.

St. Laurent Station is not large enough to accommodate all the local buses as well as buses from areas east that would need to transfer to the LRT. Express buses from Orléans are therefore assumed to continue to operate further west, likely to continue downtown, with buses from the Southeast Transitway terminating at Hurdman station.

Transitway improvements include those that are common to all scenarios as well as others that complement the LRT west operations. In order to facilitate the bus access to the Lincoln Fields station for buses from the west Transitway, the portion of Transitway between Pinecrest and the Southwest Transitway is included in the first phase of this scenario. To improve Transitway services for areas in the east, the Cumberland Transitway is also included as well as the Transitway from Blair Station to Innes. An extension of the existing O-train to the Leitrim Park and Ride lot is proposed to improve access to the growing south-eastern communities such as Leitrim and Riverside South is also included in the first phase of this scenario. In addition, in common with all the scenarios, the construction of the Southwest Transitway from Fallowfield to Strandherd Road and from Baseline to Norice, as well as the west Transitway from Bayshore to Moodie Drive and the Strandherd Armstrong Bridge with transit priority measures on Woodroffe and Strandherd are assumed to be in place.

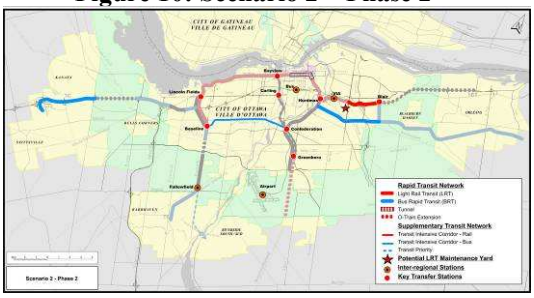
**Figure 9: Scenario 2 – Phase 1: LRT West**




## *Phase 2*

In the west end this phase would see the construction of the Transitway extension from Eagleson to Scotiabank Place. In addition the Baseline Supplementary (bus) Transit Corridor is included from Baseline to Confederation, strengthening cross town transit connections. The hospital link (Lycée Claudel to Innes / Blair) is included as well while the east Transitway gets converted to LRT.

**Figure 10: Scenario 2 – Phase 2**



## *Phase 3*

As in Scenario 1, this phase would see the completion of the implementation of LRT network with construction of the N-S LRT and the Airport Link. A second LRT maintenance facility would be built at Bowesville.

In addition, it includes the construction of the Carling Supplementary Transit LRT from Lincoln Fields connecting with the North-South LRT at Carling Station. Also included is the Supplementary Transit for Bus on Heron, Walkley and St. Laurent/Russell as well as on Baseline from Baseline to Bayshore Stations.

**Figure 11: Scenario 2 – Phase 3**

## Scenario 3: Tunnel and LRT East and South

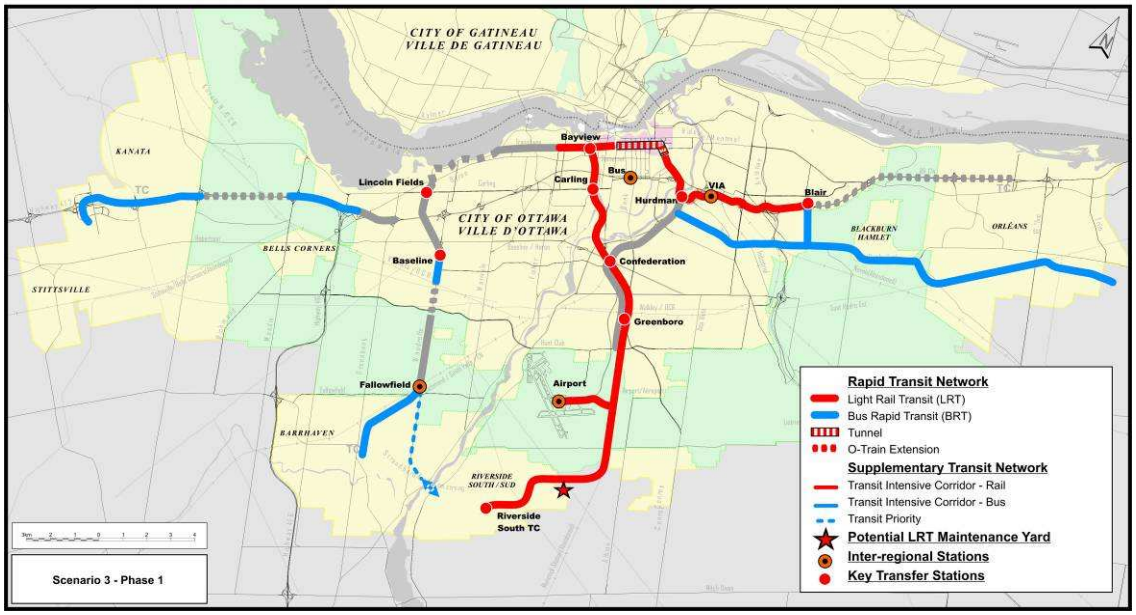
*Phase 1*

This scenario includes in the first phase the construction of LRT between Blair and Tunney's Pasture (as for Scenario 1) and also LRT construction from Bayview Station to Bowesville. The LRT south includes the connection to the airport allowing for an airport to downtown to VIA train station connection.

In the west, the Transitway would be constructed from Eagleson to Scotiabank Place and, in the east the Cumberland Transitway would also be constructed. As described earlier the Hospital Link (Lycée Claudel to Innes / Blair) as well as the Transitway from Blair Station to Innes / Blair are included to facilitate bus operations during conversion of the existing Transitway to LRT. Buses from the west would still continue to operate through the downtown on the surface streets.

Unlike all the other options, there would be no need to construct an interim O-train extension as the south would be directly served by the new electric LRT facility. In common with all the scenarios, the construction of the Southwest Transitway from Fallowfield to Strandherd Road and from Baseline to Norice, as well as the west Transitway from Bayshore to Moodie Drive and the Strandherd Armstrong Bridge with transit priority measures on Woodroffe and Strandherd are assumed to be in place.

**Figure 12: Scenario 3 – Phase 1: LRT East & South**

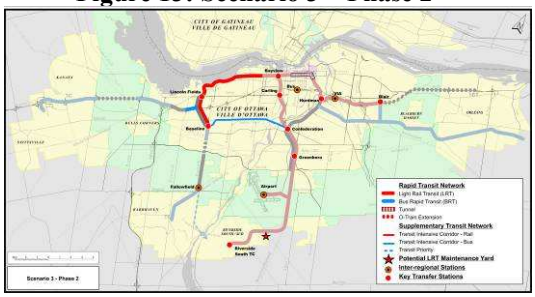



*Phase 2*

This phase would complete the conversion of the E-W Transitway to LRT by extending it from Tunney's Pasture to Baseline, requiring an LRT corridor between Dominion Station and Lincoln Fields.

In addition the Transitway from Lincoln Fields to Pinecrest would be constructed as well the Baseline supplementary bus transit corridor from Baseline to Confederation.

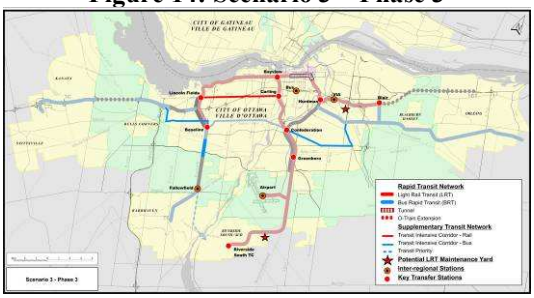
**Figure 13: Scenario 3 – Phase 2**



*Phase 3*

This phase would see the construction of the Carling Supplementary Transit LRT between Lincoln Fields and the North-South LRT, as well as Supplementary Transit for Bus on Heron, Walkley, and St. Laurent/Russell.

**Figure 14: Scenario 3 – Phase 3**



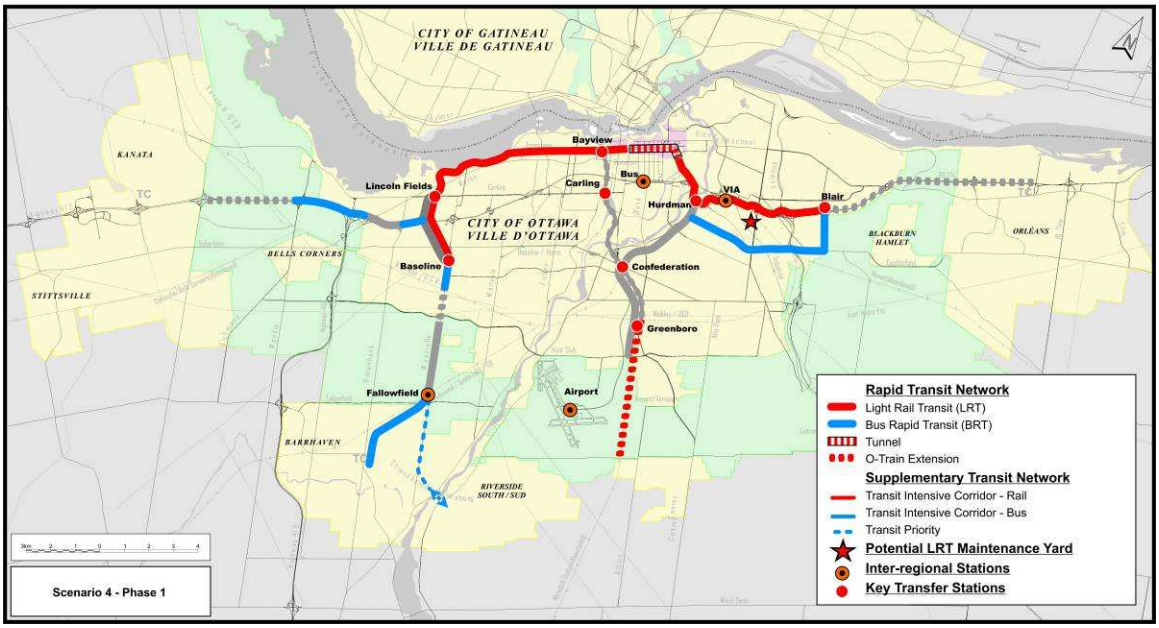
## Scenario 4: Tunnel and LRT East and West

*Phase 1*

The final scenario would see the entire east and west LRT between Baseline and Blair Stations implemented in the first phase, allowing all buses to terminate at transfer facilities without travelling through the downtown. The LRT maintenance facility would need to be located in the vicinity of St. Laurent station. The sections of the Transitway that are included in the first phase are the Transitways from Blair Station to Innes and the Hospital Link (Lycée Claudel to Innes / Blair) to facilitate transit operation during conversion of the exiting East Transitway as well as the section of west Transitway between Pinecrest and Lincoln Fields station. This scenario also includes the extension of the existing O-Train to the Leitrim park and ride lot to improve access to the growing south-eastern communities such as Leitrim and Riverside South.

In common with all the scenarios, the construction of the Southwest Transitway from Fallowfield to Strandherd Road and from Baseline to Norice, as well as the west Transitway from Bayshore to Moodie Drive and the Strandherd Armstrong Bridge with transit priority measures on Woodroffe and Strandherd are assumed to be in place.

**Figure 15: Scenario 4 – Phase 1: LRT East & West**



*Phase 2*

The second phase would include the construction of the Transitway in Kanata from Eagleson to Scotiabank Place. The Baseline supplementary transit (BRT) would be constructed between Baseline and Confederation to enhance east-west transit connections south of the downtown.

In the east, the Cumberland Transitway would be built and connected to Blair Station with bus lanes on the Blackburn-Hamlet Bypass and Innes Road.

*Phase 3*

The third phase of this scenario would see the implementation of the North-South LRT facility from Bayview to Bowesville, as well as the Airport Link. The LRT maintenance facility at Bowesville would be constructed. In addition, the Carling LRT corridor from Lincoln Fields to the North-South corridor would be implemented as would the bus supplementary transit corridors on Heron, Walkley, St. Laurent/Russell and on Baseline from Baseline to Bayshore.

**Figure 16: Scenario 4 – Phase 2**

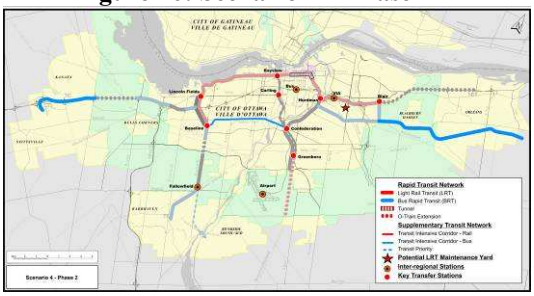
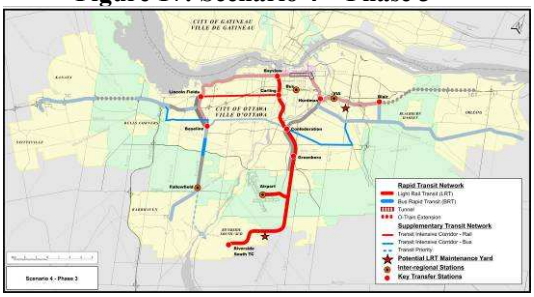


**Figure 17: Scenario 4 – Phase 3**



# 4. EVALUATING THE IMPLEMENTATION SCENARIOS

The four scenarios described in the previous sections would all result in the same transit system by 2031. However, the different phasing for the scenarios means that each scenario provides a different level of benefits, has different costs and different levels of risk associated with it. A detailed summary of the costs, implications, risks and benefits for each phase of each scenario is provided as Appendix A.

The challenge is to evaluate the four scenarios based on criteria that are important for the residents and businesses of Ottawa as well as ease of implementation to determine which scenario should be selected. The approach that has been taken is to base the evaluation of the scenarios on Phase 1 since this should be in place within ten years and sets the general direction.

In this section the evaluation criteria to be used are discussed and a preliminary analysis of the options is presented, based on these criteria. In addition, the feedback received from a Public Open House at which the four scenarios were presented is provided.

## Evaluation Criteria

The criteria used for evaluation of the alternative scenarios can be grouped into eight major categories:

1. Ridership
2. Cost Effectiveness
3. Benefit to Customers
4. Benefit to the Environment
5. Reduction of Downtown Bus Congestion
6. Supports a compact transit city
7. Ease of Implementation
8. Approved Council Directions

Evaluation criteria were developed to evaluate how Phase 1 of each scenario accomplishes the city's objectives. The following table lists the criteria used to evaluate each category. These are described more fully in Appendix B and the details of how the estimates were developed for each of the evaluation criteria are provided in Appendix C. It is important to note that the purpose for which these estimates were developed was to provide a basis for comparison between the four scenarios. Of necessity they are based on broad assumptions and should not be used for more detailed analysis.

**Table 2: Evaluation Criteria**

| Category | Objective | Criteria |
|---|---|---|
| Ridership | To achieve early growth in ridership | • Estimate of total system ridership |
| Cost effectiveness | To maximize the number of passenger-kilometres served for the investments in capital and operating dollars. | • Capital Cost per passenger-km<br>• Operating Cost per passenger-km<br>• Operating Cost Savings |
| Benefit to Customers | To create an efficient, convenient, reliable and comfortable transit system | • Travel Time Savings<br>• Increased Reliability<br>• Quality of Ride<br>• Convenient Access to Rapid Transit |
| Benefit to the Environment | To minimize negative impacts on the environment | • GHG reductions from transit system (CO2)<br>• Emission reductions from transit system (PM) |
| Reduction of Downtown Congestion | To reduce downtown traffic congestion and impact of buses | • Buses removed from Albert & Slater |
| Supports a Compact Transit City | To maximize the potential of transit-supportive developments and intensification. | • Number of mix use centres and key employment / commercial areas served by rapid transit<br>• Number of key sites with potential for development or intensification<br>• Percentage of new Phase 1 Rapid Transit Infrastructure located inside greenbelt |
| Ease of Implementation | To expedite implementation while minimizing disruptions to customers | • Early LRT implementation<br>• Length of BRT network that can be implemented before tunnel<br>• Degree of change to current services during construction<br>• Availability of a Rail Yard |
| Approved Council directions | To fulfill Council's direction regarding rapid transit infrastructure | • Completion of the Transitway by 2015<br>• Construction of the downtown tunnel<br>• Implementation of rapid transit using the Cumberland Transitway alignment<br>• Implementation of the LRT to the South-eastern growth area<br>• Improvement in revenue/cost ratio to achieve 50/50 split |
| | | |

## Detailed Evaluation of Implementation Scenarios

The evaluation of the four scenarios using the evaluation criteria discussed above had the results shown in the table below. To distinguish between the scenarios, the evaluation considers the benefits and impacts should only phase 1 be implemented by 2031. Details of are provided in Appendix C.

**Table 3: Evaluation of Scenarios (Phase 1 in 2031)**

| EVALUATION CRITERIA | SCENARIO | | | |
|---|---|---|---|---|
| | 1 LRT East | 2 LRT West | 3 LRT East & South | 4 LRT East & West |
| **Ridership** | | | | |
| System ridership estimate | 131 M | 137 M | 147 M | 152 M |
| **Cost Effectiveness** | | | | |
| Capital Cost per passenger-km | $0.49 | $0.36 | $0.44 | $0.29 |
| Operating cost per passenger-km | $0.27 | $0.25 | $0.23 | $0.21 |
| Operating cost savings | $ 375 M | $ 430 M | $ 563 M | $ 810 M |
| **Benefit to Customers** | | | | |
| Travel Time Savings (hours) | 13.2 | 11.6 | 14.5 | 14.4 |
| Increased Reliability | 18% | 25% | 23% | 32% |
| Quality of Ride | 11% | 17% | 13% | 25% |
| Convenient Access | 15 | 14 | 29 | 11 |
| **Benefit to the Environment** | | | | |
| GHG reductions from transit system (Tonnes of CO2) | 153,000 | 202,000 | 213,000 | 306,000 |
| Emission reductions from transit system (Tonnes of particulate matter) | 20 | 28 | 29 | 40 |
| **Reduces Downtown Bus Congestion** | | | | |
| Buses removed from Albert / Slater | 40% | 20% | 45% | 90% |
| **Supports a Compact Transit City (Smart Growth)** | | | | |
| Number of mixed-use centres and key employment/ commercial areas served by Rapid Transit infrastructure | 17 | 20 | 26 | 20 |
| Number of key sites with potential for development or intensification | 18 | 13 | 27 | 20 |

| EVALUATION CRITERIA | SCENARIO | | | |
|---|---|---|---|---|
| | 1 LRT East | 2 LRT West | 3 LRT East & South | 4 LRT East & West |
| Percentage of new Phase 1 Rapid Transit infrastructure (length) located inside the Greenbelt | 66% | 55% | 44% | 84% |
| **Ease of Implementation** | | | | |
| Early LRT implementation | O-Train Bayview to Leitrim | O-Train Bayview to Leitrim | LRT Bayview to Riverside TC | O-Train Bayview to Leitrim |
| Length (in km) of BRT network that can be implemented before tunnel implementation | 20.7 | 24.1 | 34.0 | 17.1 |
| Degree of change to current service during construction | bypass of VIA & St. Laurent during conversion | bypass of VIA & St. Laurent during conversion | bypass of VIA, St. Laurent & O-Train Shutdown | bypass of VIA & St Laurent during conversion |
| Availability of rail yard | No approved site | No approved site | Approved at Bowesville | No approved site |
| **Approved Council Direction** | | | | |
| Completion of the Transitway by 2015 (% of remaining Transitway implemented) | 33% | 38% | 54% | 27% |
| Construction of the downtown transit tunnel | ✓ | ✓ | ✓ | ✓ |
| Implementation of Rapid Transit using the Cumberland Transitway alignment | *x* | ✓ | ✓ | *x* |
| Implementation of the LRT to the South-eastern growth area | *x* | *x* | ✓ | *x* |
| Improvement in revenue/cost ratio to achieve 50/50 split | -3% | +3% | +5% | +10% |

## Summary of Evaluation

The evaluation shown in the table above has been further summarized to show for phase 1 of each scenario the extent to which objectives are achieved for each evaluation criterion.

**Table 4: Summary of Evaluation**

| EVALUATION CATEGORY | SCENARIO | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| | LRT East | LRT West | LRT East & South | LRT East & West |
| **Ridership** | ○ | ○ | ◒ | ● |
| **Cost Effectiveness** | ○ | ◒ | ○ | ● |
| **Benefit to Customers** | ○ | ◒ | ◒ | ● |
| **Benefit to the Environment** | ○ | ◒ | ◒ | ● |
| **Reduces Downtown Bus Congestion** | ◒ | ○ | ◒ | ● |
| **Supports a Compact Transit City** | ○ | ○ | ● | ● |
| **Ease of Implementation** | ◒ | ◒ | ● | ○ |
| **Approved Council Direction** | ○ | ◒ | ● | ○ |

○ Achieves Few Objectives ◒ Achieves Some Objectives ● Achieves More Objectives

# 5. Operational Analysis (Conducted by Transit Services)

Subsequent to the Public Open Houses, some additional work was undertaken by OC Transpo to evaluate the operational benefits of the various sections of the rapid transit network. This work is summarized in Table 5.

The operational review was focused on the operating cost savings that could be archived from the various sections of the rapid transit network, the number of passengers who would benefit from the capital investment and also the contribution of individual sections to the expansion of system capacity. In addition the service benefits, in terms of connections and frequencies, improved reliability, reduced travel time for customers, reductions in buses on Albert/Slater and opportunities for redevelopment and integrated development were considered in the evaluation.

**Table 5: Operational Analysis**

| SECTION | CAPITAL COST ($M) | OPERATING SAVINGS ($M) | OPERATION. SAVING / CAPITAL COST (X100) | PERFORMANCE/ INVESTMENT (Passenger KM / Capital Cost) |
|---|---|---|---|---|
| LRT<br>Blair – Tunney's Pasture | 227 | 9.6 | 4.3 | 1.31 |
| LRT<br>Tunney's Pasture – Baseline | 194 | 5 | 2.6 | 0.9 |
| LRT<br>Bayview – Riverside South TC | 423 | 4 | 1.0 | 0.22 |
| LRT<br>Airport Connection | 75 | increase 0.8 | N/A | 0.01 |
| O-Train<br>Greenboro – Leitrim | 45 | increase 0.2 | N/A | 0.11 |
| BRT Southwest Transitway,<br>Fallowfield – Barrhaven TC | 46 | 1.7 | 3.7 | 0.47 |
| BRT Southwest Transitway,<br>Baseline – Norice | 185 | 0.5 | 0.3 | 0.05 |
| BRT Hospital Transitway,<br>Lycée Claudel – Blair/Innes | 88 | 3.7 | 4.3 | 0.47 |
| BRT Cumberland Transitway,<br>Navan – Millennium | 64 | 3.3 | 5.2 | 0.38 |
| Blackburn Bypass Bus Lanes,<br>Blair/Innes - Navan | 20 | 2 | 9.9 | 2.61 |
| BRT West Transitway,<br>Southwest – Pinecrest | 171 | 2.7 | 1.6 | 0.15 |
| BRT West Transitway,<br>Bayshore – Moodie | 18 | 1.9 | 10.7 | 1.65 |
| BRT West Transitway,<br>Eagleson – Scotiabank Pace | 79 | 0.7 | 0.9 | 0.16 |
| Baseline/Heron Bus Lanes,<br>Baseline - Confederation | 90 | 2 | 2.2 | 0.61 |

The Tunnel as well as the section of LRT from Blair to Tunney's Pasture are needed by 2018 to solve future capacity issues. The section of LRT from Tunney's Pasture to Baseline would be required by 2027.

# 6. CONCLUSION

The evaluations of Phase 1 of each of the four scenarios through the public consultation process and the operational review have been summarized in the preceding sections. No weightings have been applied in this analysis to reflect the relative importance of the criteria but the significance attached to the evaluation criteria will have a profound impact on the staging of the rapid transit infrastructure: for example, the need for certain links to be in place for transit-oriented development to occur may provide the justification to implement links that do not have a high operational return on investment earlier than other links that do.

The overall appraisal in Table 4 indicates that Phase 1 of Scenario 4 scores highest for six out of eight of the categories. This group of transit improvements includes:

- LRT from Blair to Tunney's Pasture
- East Rail Yard
- BRT from Innes Road to Blair Station
- BRT on Hospital Link from Lycée Claudel to Innes/Blair
- BRT from Pinecrest to Southwest Transitway
- O-Train extension to Leitrim

Additionally, in common with all other scenarios, Scenario 4 incorporates the implementation of:

- BRT from Fallowfield to Barrhaven Town Centre
- BRT from Baseline to Norice
- BRT from Moodie Drive to Bayshore
- Strandherd/Armstrong Bridge and transit priority lanes on Strandherd and Woodroffe to Fallowfield Station

When these projects are reviewed from the standpoint of the operational evaluation, the following points can be made:

1. LRT from Blair to Tunney's Pasture ranks very high in terms of both a return on investment and passenger benefits. It is also required to be in place by 2018 to avoid restricting the capacity of the transit network (LRT in the west is not required for capacity purposes until 2027).

2. The Hospital Link BRT has some strong advantages in terms of providing an alternative route when the East Transitway is converted to rail, but there are other temporary arrangements that could be implemented for this purpose. Therefore, the timing for this project could be deferred to coincide with the future redevelopment of the former NDMC lands.

3. The BRT from Pinecrest to the Southwest Transitway ranks low in the operational review in terms of both operational cost savings and passenger performance. For this reason it may be preferable to implement this later. The same is true for the O-Train extension from Greenboro to Leitrim.

In addition, feedback from the public consultation process showed the most support for scenario 4 followed by scenario 3.

Although four alternative scenarios were developed to provide a framework for the overall evaluation process, the there is no reason to stick rigidly to the scenarios to develop an implementation plan. There are

other equally valid combinations that could be selected depending on the weighting allocated to the various evaluation factors. In addition, results from the in-depth operational review of each of the transit links became available more recently: these provide more detailed information that should contribute to the implementation plan.

It is therefore appropriate to step back and review the results as a whole to identify priorities that will balance the city's need for an efficient and effective transportation system with strategic city-building objectives keeping in mind the results of the public consultation process and the operational review. To this end, what follows is a proposal for incremental implementation of the rapid transit projects.

**Increment 1**

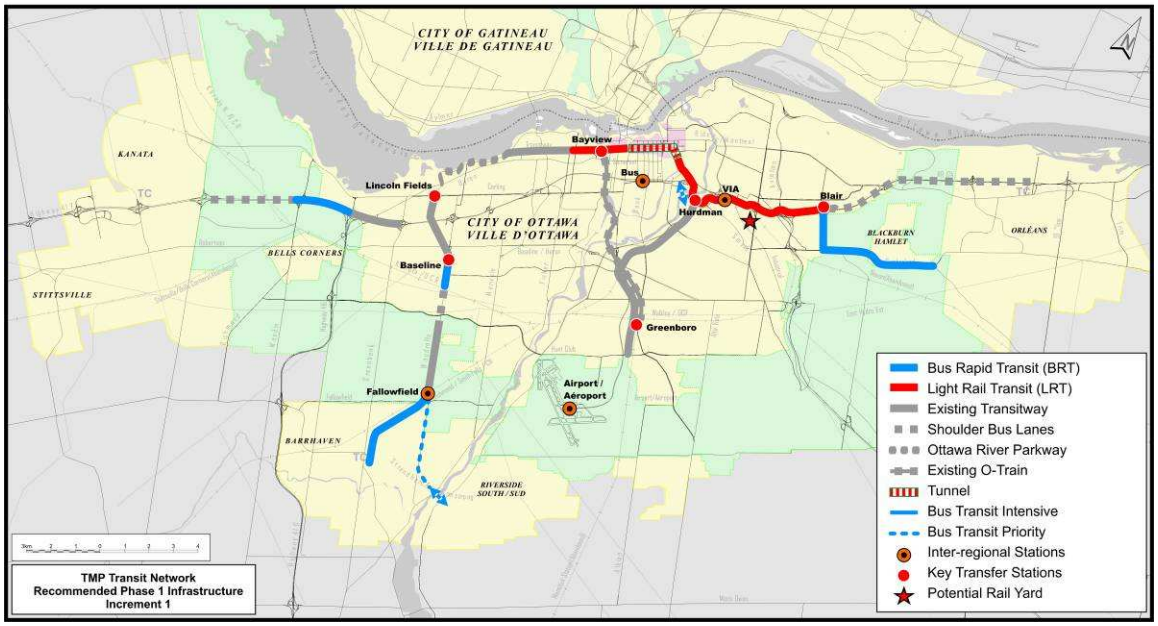
Both the tunnel and the LRT from Blair to Tunney's Pasture are required for system capacity reasons by 2018 and these should, therefore, both be included in the first construction increment. The introduction of LRT will require the construction of a rail maintenance facility and, since the Blair to Tunney's Pasture section will be built first, the East Yard will be required.

The Transitway between Hurdman and downtown is the busiest section of the system. To convert this section to rail while maintaining a good level of transit service, it is proposed to put in place the Nicholas connection from Riverside Drive across the Rideau River to Nicholas Street ahead of the conversion to provide a bypass for transit during construction.

It is assumed that the projects currently being started to address current operational concerns would also be in place as part of the first increment:

- BRT from Fallowfield to Strandherd
- BRT from Baseline to Norice
- BRT from Moodie Drive to Bayshore
- Strandherd/Armstrong Bridge and transit priority lanes on Strandherd and Woodroffe to Fallowfield Station

**Figure 18: Recommended Phase 1 - Increment 1**



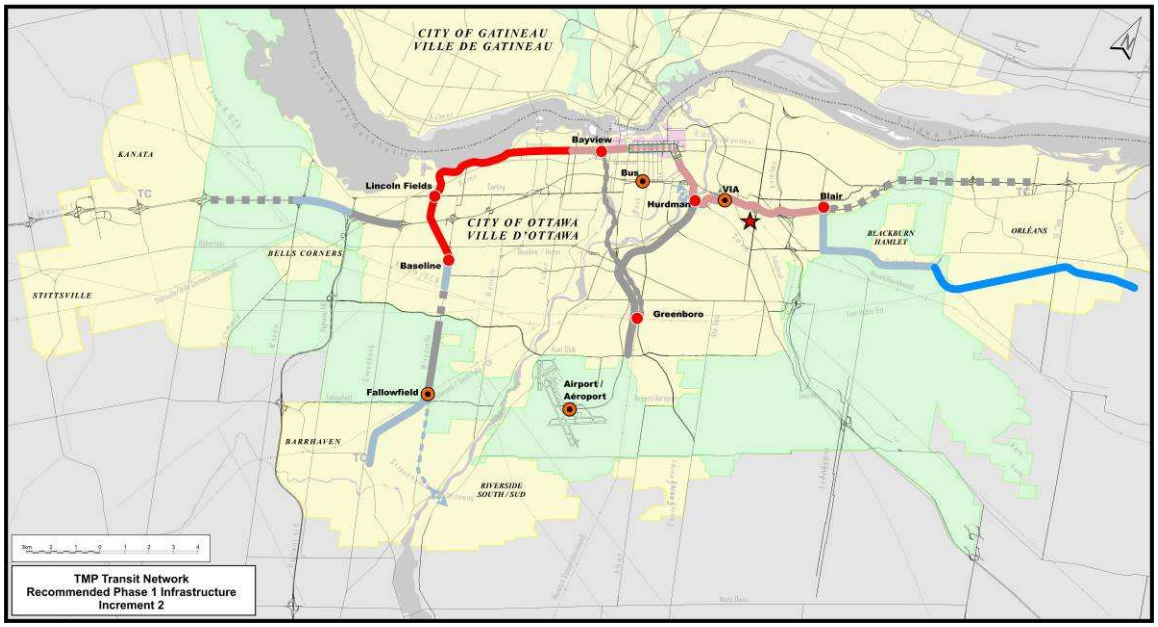
The BRT sections from Fallowfield to Strandherd and from Moodie Drive to Bayshore score high in the operational review, and the development in the area of Baseline Station, which includes Centrepoint Town Centre and the expansion of Algonquin College, is ready to go and, although the BRT section from Baseline to Norice does not score high in the operational review, the construction will be important to facilitate this.

The bus lanes along the Blackburn Hamlet Bypass from Navan to Blair score very high in the operational review and should be included in the first increment as well as the BRT from Innes Road to Blair Station.

**Increment 2**

The LRT from Tunney's Pasture to Baseline Station should be built as the next priority to fully address the downtown constraints. It scored high in the overall evaluation and the operational review. The Cumberland Transitway scores high in the operational review and also should be considered as a part of this increment.

**Figure 19: Recommended Phase 1 - Increment 2**

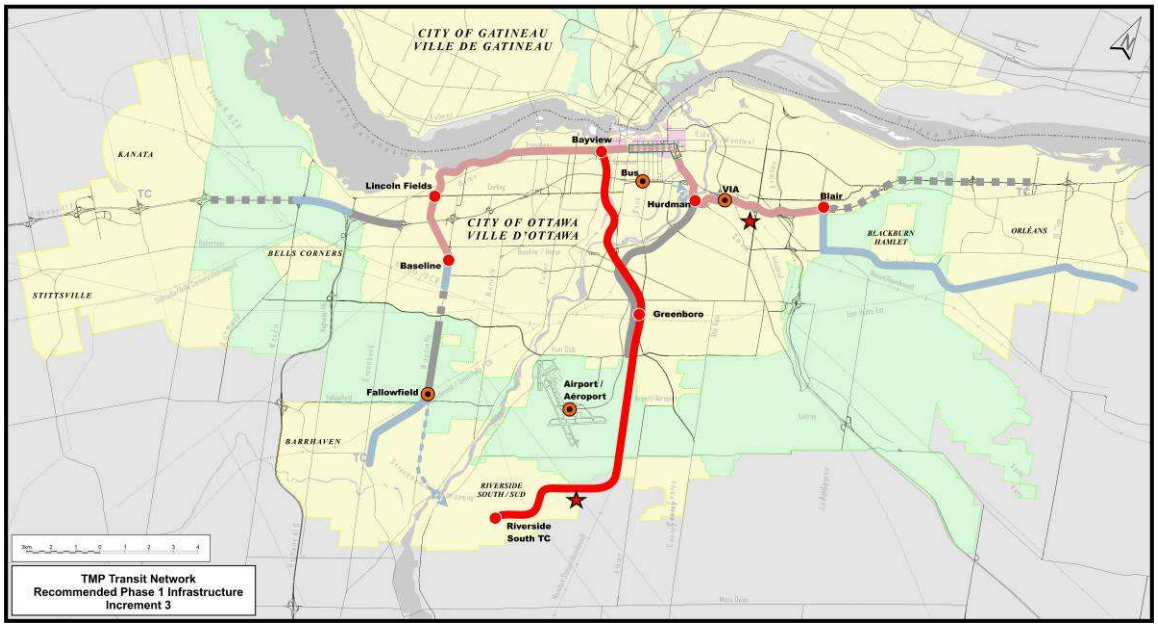



**Increment 3**

Building the LRT to Riverside South at an early stage will allow development in that area to be shaped by an LRT service connecting it to the downtown and broader transit network. In addition, the implementation of this link would provide a catalyst for development opportunities further north on the line that were identified as part of the North-South LRT project. These include development at Carleton University, Walkley Road and Gladstone Avenue. Building the LRT south from Bayview would also allow the development of the area in the vicinity of Bayview Station to move ahead with Bayview in its final configuration.

Although this link did not score well on the operational review, reasons of smart city-building may be sufficient to include it in this increment. This would not, at this stage, include the Airport connection.

**Figure 20: Recommended Phase 1 - Increment 3**




## Phase 2

The remainder of the Rapid Transit Network is to be constructed as part of the Phase 2 implementation.

**Figure 21: Recommended Phase 2**

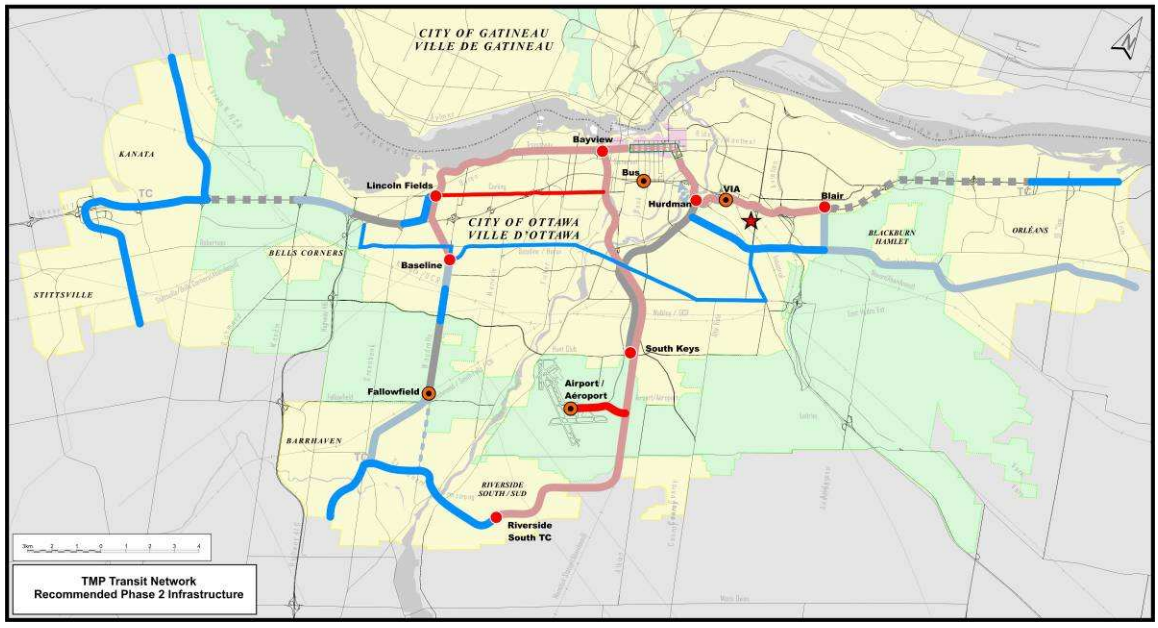


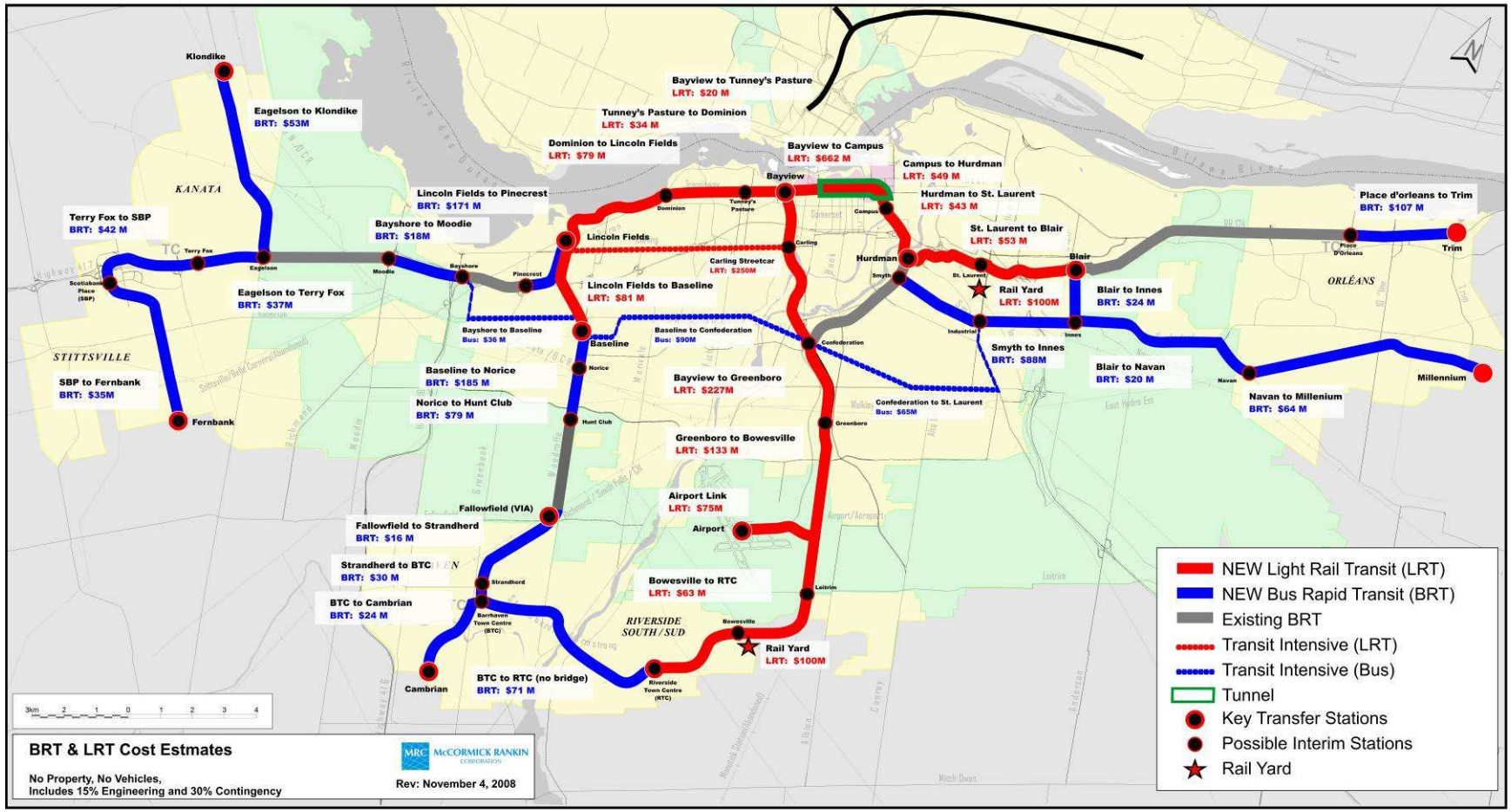
**Table 6: Recommended Phasing**

| PHASE # | INCREMENT # | SECTIONS INCLUDED | COST ($M) |
|---|---|---|---|
| **Phase 1** | Increment 1 | LRT | |
| | | • Blair – Tunney's Pasture (including Tunnel & Rail Yard) | 927 |
| | | • LRT Vehicles | 390 |
| | | BRT | |
| | | • Fallowfield to Strandherd | 46 |
| | | • Baseline – Norice | 185 |
| | | • Bayshore – Moodie | 18 |
| | | • Blair – Innes Road | 24 |
| | | • Innes Road/Blackburn to Cumberland Transitway | 20 |
| | | Supplementary | |
| | | • Strandherd Drive – Rideau River to Woodroffe Park & Ride *(includes bus lanes on Strandherd/Armstrong bridge)* | 28 |
| | | • Woodroffe Avenue – Woodroffe Park & Ride to Fallowfield Park & Ride | 2 |
| | | Other | |
| | | • Nicholas Connection *(bridge over Rideau River and Lees Avenue)* | 40 |
| | | TOTAL | 1,680 |
| | Increment 2 | LRT | |
| | | • Tunney's Pasture – Baseline | 194 |
| | | • LRT Vehicles | 385 |
| | | BRT | |
| | | • Navan - Millennium | 64 |
| | | TOTAL | 643 |
| | Increment 3 | LRT | |
| | | • Bayview – Riverside South Town Centre | 423 |
| | | • LRT Vehicles | 205 |
| | | TOTAL | 628 |
| **TOTAL Phase 1** | | | **2,951** |
| **Phase 2** | | LRT | |
| | | • Airport Connection | 75 |
| | | • 2nd Rail Yard | 100 |
| | | BRT | |
| | | • Lincoln Fields – Pinecrest | 171 |
| | | • Norice to Hunt Club | 79 |
| | | • Eagelson – Klondike | 53 |
| | | • Eagelson – Scotiabank Place | 79 |
| | | • Scotiabank Place - Fernbank | 35 |
| | | • Riverside South TC - Barrhaven TC | 71 |
| | | • Barrhaven TC - Cambrian | 24 |
| | | • Lycée Claudel - Innes/Blair | 88 |
| | | • Place D'Orléans - Trim | 107 |

| | | | |
|---|---|---|---|
| | | Supplementary<br>• Carling LRT<br>• LRT Vehicles<br>• Baseline (Bayshore - Baseline)<br>• Baseline (Baseline - Confederation)<br>• Heron, Walkley, St Laurent/Russell | <br>250<br>75<br>36<br>90<br>65 |
| **TOTAL Phase 2** | | | **1,398** |
| **As Needed** | **Buses Required** | • 2 Bus Maintenance Facilities @ $60M each<br>• Bus Vehicles | 120<br>378 |
| | **Transit Priority** | • See report entitled "Development of the Supplementary Transit Network" October 2008 | 260 |
| **Total** | | | **5,107** |

# APPENDIX A – Detailed Phasing Scenarios

The breakdown of each Corridor's Costs is included as a separate document entitled "TMP Transit Cost Estimates"


Klondike
Eagelson to Klondike
BRT: $53M
Bayview to Tunney's Pasture
LRT: $20 M
Tunney's Pasture to Dominion
LRT: $34 M
Dominion to Lincoln Fields
LRT: $79 M
Bayview to Campus
LRT: $662 M
Campus to Hurdman
LRT: $49 M
Hurdman to St. Laurent
LRT: $43 M
St. Laurent to Blair
LRT: $53 M
Place d'orleans to Trim
BRT: $107 M
Trim
KANATA
Terry Fox to SBP
BRT: $42 M
Lincoln Fields to Pinecrest
BRT: $171 M
Bayshore to Moodie
BRT: $18M
Lincoln Fields
Carling Streetcar
LRT: $250M
Eagelson to Terry Fox
BRT: $37M
Lincoln Fields to Baseline
LRT: $81 M
Rail Yard
LRT: $100M
Blair to Innes
BRT: $24 M
ORLÉANS
STITTSVILLE
Bayshore to Baseline
Bus: $36 M
Baseline to Confederation
Bus: $90M
Smyth to Innes
BRT: $88M
Baseline to Norice
BRT: $185 M
Bayview to Greenboro
LRT: $227M
Blair to Navan
BRT: $20 M
Navan to Millennium
BRT: $64 M
Millennium
SBP to Fernbank
BRT: $35M
Norice to Hunt Club
BRT: $79 M
Confederation to St. Laurent
Bus: $65M
Fernbank
Greenboro to Bowesville
LRT: $133 M
Airport Link
LRT: $75M
Fallowfield (VIA)
Airport
Fallowfield to Strandherd
BRT: $16 M
Strandherd to BTC
BRT: $30 M
Bowesville to RTC
LRT: $63 M
BTC to Cambrian
BRT: $24 M
RIVERSIDE SOUTH / SUD
Rail Yard
LRT: $100M
Cambrian
BTC to RTC (no bridge)
BRT: $71 M
BRT & LRT Cost Estmates
No Property, No Vehicles,
Includes 15% Engineering and 30% Contingency
McCORMICK RANKIN CORPORATION
Rev: November 4, 2008
NEW Light Rail Transit (LRT)
NEW Bus Rapid Transit (BRT)
Existing BRT
Transit Intensive (LRT)
Transit Intensive (Bus)
Tunnel
Key Transfer Stations
Possible Interim Stations
Rail Yard

## Scenario 1 – Downtown Tunnel & LRT East
### *Phase 1 – Implementation by 2018*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| • Blair to Tunney's Pasture (*includes Downtown Tunnel*) | 827 |
| **BRT Corridors:** | |
| • Hospital Link – Lycée Claudel to Innes/Blair | 88 |
| • Blair Road - Innes to Blair Station | 24 |
| • West Transitway – Bayshore to Moodie Drive | 18 |
| • West Transitway – Eagleson to Scotia Bank Place | 79 |
| • Southwest Transitway – Baseline to Norice Street | 185 |
| • Southwest Transitway – Fallowfield to Strandherd Park & Ride | 16 |
| • Southwest Transitway – Strandherd Park & Ride to Barrhaven TC | 30 |
| **Supplementary Corridors:** | |
| • Strandherd Drive – Rideau River to Woodroffe Park & Ride (*includes bus lanes on Strandherd/Armstrong bridge)* | 28 |
| • Woodroffe Avenue – Woodroffe Park & Ride to Fallowfield Park & Ride | 2 |
| **Other:** | |
| • LRT Maintenance and Storage Yard (East) | See below |
| • O-Train Extension – Greenboro to Leitrim Park & Ride | 45 |
| **Infrastructure Sub-Total** | **1,342** |
| LRT Maintenance & Storage Yard | 100 |
| Bus Maintenance & Storage Facility | |
| **Maintenance & Storage Facility Sub-Total** | **100** |
| LRT Vehicles (65) + O-Train Vehicles (2) | 325 + 12 |
| BRT Vehicles (370) | 274 |
| **Vehicle Sub-Total** | **611** |
| **TOTAL** | **2,053** |

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 1 – Downtown Tunnel & LRT East
### *Phase 1 – Implementation by 2018*

### Implications

- New Rideau River crossing from Hurdman to Nicholas St. desired to provide continuous Transitway service to the downtown during conversion of East Transitway Downtown approach, and to facilitate cross-town bus operations until such time as conversion to Baseline Station is complete (crossing is identified in TMP as required future arterial road link (AVTC Phase II))
- Hospital Link Corridor with Transitway from Blair Station to Innes can provide continuous Transitway service to Hurdman Station during conversion of East Transitway – Hurdman to Blair corridor
- Most Transitway buses from west continue to operate on Albert & Slater Streets, and continue to Hurdman Station to 'turn-around'. Afternoon westbound Transitway service will commence at Hurdman Station and cross into the downtown on the new above-noted Rideau River Crossing
- LRT and Transitway bus services will be co-located from Tunney's to the western tunnel portal
- Southwest Transitway – Baseline to Norice required to support Baseline Station re-development in conjunction with Algonquin College expansion project and address current operational concerns
- West Transitway – Bayshore to Moodie & Southwest Transitway Fallowfield to Strandherd required to address current operational constraints
- Riverside South served by: 1) interim extension of existing O-Train to Leitrim Park & Ride and, 2) Bus lanes/priority measures on Woodroffe and Strandherd connecting across the Strandherd/Armstrong Bridge to Riverview Park & Ride

### Benefits/Risks

Benefits:

- Provides relief to downtown congestion – removes 40% of buses from Albert & Slater Streets (2nd lowest of 4 Scenarios)
- Projected City-wide annual ridership of 131M passengers by 2031
- Conversion of East Transitway first benefits more riders than conversion of West Transitway during this time frame
- Provides LRT connections to VIA station and Tunney's Pasture
- Expedites rapid transit services to Ottawa Hospital/Health Sciences campus and facilitates transit-oriented development of former NDMC lands
- Provides rapid transit service to Kanata Town Centre in conjunction with development and serves Scotia Bank Place
- Provides improved transit services to Riverside South quickly and cost-effectively

Risks:

- Requires identification and securing site for East LRT Yard Facility
- Requires resolution of 'Browning Avenue Corridor' concerns
- Requires at least one additional Bombardier 'Talent' train, renewal of Walkley Yard lease, and Transport Canada approval for at-grade crossings of Lester and Leitrim Roads
- Requires construction of Strandherd/Armstrong Bridge

## Scenario 1 – Downtown Tunnel & LRT East
### *Phase 2 – Implementation by 2022*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| • Tunney's Pasture to Baseline | 194 |
| **BRT Corridors:** | |
| • West Transitway – Pinecrest to Southwest Transitway | 171 |
| • Cumberland Transitway – Navan to Millennium | 64 |
| • Innes Road/Blackburn Hamlet Bypass | 20 |
| **Supplementary Corridors:** | |
| • Baseline – Baseline Station to Confederation | 90 |
| **Other:** | |
| • Bus maintenance and Storage Facility (location to be determined) | See below |
| **Infrastructure Sub-Total** | **539** |
| LRT Maintenance & Storage Yard | |
| Bus Maintenance & Storage Facility | 60 |
| **Maintenance & Storage Facility Sub-Total** | **60** |
| LRT Vehicles (65) | 325 |
| BRT Vehicles (0) | |
| **Vehicle Sub-Total** | **325** |
| **TOTAL** | **924** |

**Implications**

- Transitway bus operations unaffected during LRT conversion from Baseline to Dominion Station, as construction operations for new LRT facility occur adjacent to existing bus Transitway facilities.
- Transitway buses can operate on either or both of Scott Street and the Ottawa River Parkway during conversion of West Transitway from Dominion Station to LeBreton
- West Transitway – Pinecrest to Southwest Transitway required to optimize bus connection to LRT transfer station at Lincoln Fields
- Exclusive bus-only lanes to provide connection of Cumberland Transitway to Blair Station. Requires widening of existing Blackburn Hamlet Bypass to 6-lanes (future LRT extension to pass through Blackburn Hamlet community)

**Benefits/Risks**

Benefits:

- Completes conversion of East-West Transitway to LRT – removes all Transitway bus operations from Albert & Slater Streets maximizing benefits of tunnel investment
- Baseline corridor provides needed high-quality cross-town bus link bypassing downtown

Risks:

- Resolving public and NCC concerns regarding LRT implementation in/adjacent to Ottawa River Parkway corridor
- Resolving Roman Avenue neighbourhood concerns related to West Transitway – Pinecrest to Southwest Transitway
- Delays implementation of rapid transit to Riverside South

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 1 – Downtown Tunnel & LRT East
### *Phase 3 – Implementation by 2028*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| • North-South – Bayview to Riverside South (*includes Airport Connection*) | 498 |
| **BRT Corridors:** | |
| • Southwest Transitway – Norice to Hunt Club | 79 |
| **Supplementary Corridors:** | |
| • Carling Ave LRT – Lincoln Fields to North-South Corridor | 250 |
| • Baseline – Bayshore to Baseline Station | 36 |
| • Heron/Walkley – Confederation to St. Laurent/Russell | 48 |
| • St. Laurent/Russell – Innes to Walkley | 17 |
| **Other:** | |
| • Bowesville LRT Maintenance and Storage Yard | See below |
| **Infrastructure Sub-Total** | **928** |
| LRT Maintenance & Storage Yard | 100 |
| Bus Maintenance & Storage Facility | |
| **Maintenance & Storage Facility Sub-Total** | **100** |
| LRT Vehicles (E-W = 53, Carling = 15) | 265 + 75 |
| BRT Vehicles (74) | 55 |
| **Vehicle Sub-Total** | **395** |
| **TOTAL** | **1,423** |

**Implications**

- Physical link required from Carling to North-South corridor to facilitate connection to rail maintenance yard – also provides for service continuity into Downtown

**Benefits/Risks**

Benefits:
- Completes implementation of LRT network, including Carling corridor
- Provides LRT link to Airport – non-stop connection to Downtown destinations
- Completes high-quality cross-town bus link on Baseline/Heron/Walkley corridor
- Bowesville yard location approvals in place

Risks:
- Shuts down existing O-Train service during construction in North-South Corridor
- Should review approved plan for Southwest Transitway extension from Knoxdale to Hunt Club (tunnel under Woodroffe Avenue)

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 1 – Downtown Tunnel & LRT East
### *Phase 4 – Implementation by 2031*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| **BRT Corridors:** | |
| • West Transitway – Scotia Bank Place to Fernbank | 35 |
| • Kanata North Transitway – Eagleson to Klondike | 53 |
| • Southwest Transitway – Barrhaven TC to Cambrian | 24 |
| • South Transitway – Riverside South to Barrhaven Town Centre | 71 |
| • East Transitway – Place d'Orléans to Trim | 107 |
| **Supplementary Corridors:** | |
| **Other:** | |
| • Bus maintenance and Storage Facility (location to be determined) | See below |
| **Infrastructure Sub-Total** | **290** |
| LRT Maintenance & Storage Yard | |
| Bus Maintenance & Storage Facility | 60 |
| **Maintenance & Storage Facility Sub-Total** | **60** |
| LRT Vehicles (13) | 65 |
| BRT Vehicles (55) | 41 |
| **Vehicle Sub-Total** | **106** |
| **TOTAL** | **456** |

**Implications**

- Completes implementation of the TMP transit network

**Benefits/Risks**

Benefits:
- Extends rapid transit services into Kanata North to serve business parks and local development
- Provides rapid transit link between Barrhaven and Riverside South
- Extends rapid transit services into Barrhaven South to support development

Risks:
- Kanata North alignment not defined
- May require second transit-only bridge crossing of the Rideau River adjacent to Strandherd/Armstrong bridge

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 2 – Downtown Tunnel & LRT West
### *Phase 1 – Implementation by 2018*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| • Baseline to St. Laurent (*includes Downtown Tunnel*) | 968 |
| **BRT Corridors:** | |
| • West Transitway – Bayshore to Moodie Drive | 18 |
| • West Transitway – Pinecrest to Southwest Transitway | 171 |
| • Southwest Transitway – Baseline to Norice Street | 185 |
| • Southwest Transitway – Fallowfield to Strandherd Park & Ride | 16 |
| • Southwest Transitway – Strandherd Park & Ride to Barrhaven TC | 30 |
| • Cumberland Transitway – Navan to Millennium | 64 |
| • Blair Road –Innes to Blair Station | 24 |
| • Innes Road/Blackburn Hamlet Bypass | 20 |
| **Supplementary Corridors:** | |
| • Strandherd Drive – Rideau River to Woodroffe Park & Ride (*includes bus lanes on Strandherd/Armstrong bridge)* | 28 |
| • Woodroffe Avenue – Woodroffe Park & Ride to Fallowfield Park & Ride | 2 |
| **Other:** | |
| • LRT Maintenance and Storage Yard (East) | See below |
| • O-Train Extension – Greenboro to Leitrim Park & Ride | 45 |
| **Infrastructure Sub-Total** | **1,571** |
| LRT Maintenance & Storage Yard | 100 |
| Bus Maintenance & Storage Facility | |
| **Maintenance & Storage Facility Sub-Total** | **100** |
| LRT Vehicles (LRT =96, O-train = 2) | 480 + 12 |
| BRT Vehicles (368) | 273 |
| **Vehicle Sub-Total** | **765** |
| **TOTAL** | **2,436** |

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 2 – Downtown Tunnel & LRT West
### *Phase 1 – Implementation by 2018*

### Implications

- LRT tracks must extend at least to St. Laurent to provide for connection to East LRT maintenance and storage yard
- Some Transitway buses from East continue to operate on Albert & Slater Streets, and continue to Tunney's Station.
- New Rideau River crossing from Hurdman to Nicholas St. desired to provide continuous Transitway service to the downtown during conversion of East Transitway Downtown approach, and to service Transitway bus operations from the East until such time as conversion to Blair is complete (crossing is identified in TMP as required future arterial road link (AVTC Phase II))
- Transitway bus operations unaffected during LRT conversion from Baseline to Dominion Station, as construction operations for new LRT facility occur adjacent to existing bus Transitway facilities.
- Transitway buses can operate on either or both of Scott Street and the Ottawa River Parkway during conversion of West Transitway from Dominion Station to LeBreton
- West Transitway – Pinecrest to Southwest Transitway required to optimize bus connection to LRT transfer station at Lincoln Fields
- Exclusive bus-only lanes to provide connection of Cumberland Transitway to Blair Station. Requires widening of existing Blackburn Hamlet Bypass to 6-lanes (future LRT extension to pass through Blackburn Hamlet community)
- Southwest Transitway – Baseline to Norice required to support Baseline Station re-development in conjunction with Algonquin College expansion project and to address current operational concerns
- West Transitway – Bayshore to Moodie & Southwest Transitway Fallowfield to Strandherd required to address current operational constraints
- Riverside South served by interim extension of existing O-Train to Leitrim Park & Ride and Bus lanes/priority measures on Woodroffe and Strandherd connecting across the Strandherd/Armstrong Bridge to Riverview Park & Ride Lot

### Benefits/Risks

Benefits:

- Provides some relief to downtown congestion – removes 20% of buses from Albert & Slater Streets (lowest of 4 Scenarios)
- Projected City-wide annual ridership of 137M passengers by 2031 (second lowest of 4 Scenarios)
- Provides LRT connections to VIA station and Tunney's Pasture
- Provides rapid transit service to South Orleans in conjunction with development along Cumberland Transitway Corridor
- Provides improved transit services to Riverside South quickly and cost-effectively

Risks:

- Requires identification and securing site for East LRT Yard Facility
- Resolving public and NCC concerns regarding LRT implementation in/adjacent to Ottawa River Parkway corridor
- Resolving Roman Avenue neighbourhood concerns related to West Transitway – Pinecrest to Southwest Transitway
- Requires at least one additional Bombardier 'Talent' train, renewal of Walkley Yard lease, and Transport Canada approval for at-grade crossings of Lester and Leitrim Roads
- Does not serve Ottawa Hospital/Health Sciences campus and former NDMC lands in this time frame
- Buses from east of St Laurent would continue into the downtown.
- Requires construction of Strandherd/Armstrong Bridge

## Scenario 2 – Downtown Tunnel & LRT West
***Phase 2 – Implementation by 2022***

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| • St. Laurent to Blair | 53 |
| **BRT Corridors:** | |
| • West Transitway – Eagleson to Scotiabank Place | 79 |
| • Hospital Link – Lycée Claudel to Innes/Blair | 88 |
| **Supplementary Corridors:** | |
| • Baseline – Baseline Station to Confederation | 90 |
| **Other:** | |
| • Bus maintenance and Storage Facility (location to be determined) | See below |
| **Infrastructure Sub-Total** | **310** |
| LRT Maintenance & Storage Yard | |
| Bus Maintenance & Storage Facility | 60 |
| **Maintenance & Storage Facility Sub-Total** | **60** |
| LRT Vehicles (34) | 170 |
| BRT Vehicles | |
| **Vehicle Sub-Total** | **170** |
| **TOTAL** | **540** |

### Implications

- Hospital Link Corridor can provide continuous Transitway service from Blair to Hurdman Station during completion of conversion of East Transitway – Hurdman to Blair corridor

### Benefits/Risks

Benefits:
- Completes conversion of East-West Transitway to LRT – removes all Transitway bus operations from Albert & Slater Streets maximizing benefits of tunnel investment
- Provides rapid transit services to Ottawa Hospital/Health Sciences and facilitates transit-oriented development of former NDMC lands
- Provides rapid transit service to Kanata Town Centre in conjunction with development and serves Scotia Bank Place
- Baseline corridor provides needed high-quality cross-town bus link bypassing downtown

Risks:
- Requires resolution of 'Browning Avenue Corridor' concerns
- Delays implementation of rapid transit to Riverside South

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 2 – Downtown Tunnel & LRT West
### *Phase 3 – Implementation by 2028*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| • North-South – Bayview to Riverside South (*includes Airport Connection*) | 498 |
| **BRT Corridors:** | |
| • Southwest Transitway – Norice to Hunt Club | 79 |
| **Supplementary Corridors:** | |
| • Carling Ave LRT – Lincoln Fields to North-South Corridor | 250 |
| • Baseline – Bayshore to Baseline Station | 36 |
| • Heron/Walkley – Confederation to St. Laurent/Russell | 48 |
| • St. Laurent/Russell – Innes to Walkley | 17 |
| **Other:** | |
| • Bowesville LRT Maintenance and Storage Yard | See below |
| **Infrastructure Sub-Total** | **928** |
| LRT Maintenance & Storage Yard | 100 |
| Bus Maintenance & Storage Facility | |
| **Maintenance & Storage Facility Sub-Total** | **100** |
| LRT Vehicles (LRT = 53, Carling = 15) | 265 + 75 |
| BRT Vehicles (74) | 55 |
| **Vehicle Sub-Total** | **395** |
| **TOTAL** | **1,423** |

**Implications**

- Physical link required from Carling to North-South corridor to facilitate connection to rail maintenance yard – also provides for service continuity into Downtown

**Benefits/Risks**

Benefits:
- Completes implementation of LRT network, including Carling corridor
- Provides LRT link to Airport – non-stop connection to Downtown destinations
- Completes high-quality cross-town bus link on Baseline/Heron/Walkley corridor
- Bowesville yard location approvals in place

Risks:
- Shuts down existing O-Train service during construction in North-South Corridor
- Should review approved plan for Southwest Transitway extension from Knoxdale to Hunt Club (tunnel under Woodroffe Avenue)

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 2 – Downtown Tunnel & LRT West
### *Phase 4 – Implementation by 2031*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| **BRT Corridors:** | |
| • West Transitway – Scotiabank Place to Fernbank | 35 |
| • Kanata North Transitway – Eagleson to Klondike | 53 |
| • Southwest Transitway – Strandherd Park & Ride to Cambrian | 24 |
| • South Transitway – Riverside South TC to Barrhaven TC | 71 |
| • East Transitway – Place d'Orléans to Trim | 107 |
| **Supplementary Corridors:** | |
| **Other:** | |
| • Bus maintenance and Storage Facility (location to be determined) | See below |
| **Infrastructure Sub-Total** | **290** |
| LRT Maintenance & Storage Yard | |
| Bus Maintenance & Storage Facility | 60 |
| **Maintenance & Storage Facility Sub-Total** | **60** |
| LRT Vehicles (13) | 65 |
| BRT Vehicles (55) | 41 |
| **Vehicle Sub-Total** | **106** |
| **TOTAL** | **456** |

**Implications**

- Completes implementation of the TMP transit network

**Benefits/Risks**

Benefits:
- Extends rapid transit services into Kanata North to serve business parks and local development
- Provides rapid transit link between Barrhaven and Riverside South
- Extends rapid transit services into Barrhaven South to support development

Risks:
- Kanata North alignment not defined
- May require second transit-only bridge crossing of the Rideau River adjacent to Strandherd/Armstrong bridge

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 3 – Downtown Tunnel & LRT South
### *Phase 1 – Implementation by 2018*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| • Blair to Tunney's Pasture (*includes Downtown Tunnel)* | 827 |
| • North-South – Bayview to Riverside South (*includes Airport Connection*) | 498 |
| **BRT Corridors:** | |
| • Hospital Link – Lycée Claudel to Innes/Blair | 88 |
| • Blair Road – Innes to Blair Station | 24 |
| • West Transitway – Eagleson to Scotia Bank Place | 79 |
| • West Transitway – Bayshore to Moodie Drive | 18 |
| • Southwest Transitway – Baseline to Norice Street | 185 |
| • Southwest Transitway – Fallowfield to Strandherd Park & Ride | 16 |
| • Southwest Transitway –Strandherd Park & Ride to Barrhaven TC | 30 |
| • Cumberland Transitway – Navan to Millennium | 64 |
| • Innes Road/Blackburn Hamlet Bypass | 20 |
| **Supplementary Corridors:** | |
| • Strandherd Drive – Rideau River to Woodroffe Park & Ride (*includes bus lanes on Strandherd/Armstrong bridge)* | 28 |
| • Woodroffe Avenue – Woodroffe Park & Ride to Fallowfield Park & Ride | 2 |
| **Other:** | |
| • Bowesville LRT Maintenance and Storage Yard | See below |
| **Infrastructure Sub-Total** | **1,879** |
| LRT Maintenance & Storage Yard | 100 |
| Bus Maintenance & Storage Facility | |
| **Maintenance & Storage Facility Sub-Total** | **100** |
| LRT Vehicles (93) | 465 |
| BRT Vehicles (344) | 255 |
| **Vehicle Sub-Total** | **720** |
| **TOTAL** | **2,699** |

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 3 – Downtown Tunnel & LRT South
### *Phase 1 – Implementation by 2018*

### Implications

- New Rideau River crossing from Hurdman to Nicholas St. desired to provide continuous Transitway service to the downtown during conversion of East Transitway Downtown approach, and to facilitate cross-town bus operations until such time as conversions to Baseline and Blair Stations are complete. This crossing is identified as required future arterial road link (AVTC Phase II).
- Hospital Link Corridor can provide continuous Transitway service from Blair to Hurdman Station during conversion of East Transitway – Hurdman to Blair corridor
- Most Transitway buses from west continue to operate on Albert & Slater Streets, and continue to Hurdman Station to 'turn-around'. Afternoon westbound Transitway service will commence at Hurdman Station and cross into the downtown on the new above-noted Rideau River Crossing
- LRT and Transitway bus services will be co-located from Tunney's to LeBreton
- Exclusive bus-only lanes to provide connection of Cumberland Transitway to Blair Station. Requires widening of existing Blackburn Hamlet Bypass to 6-lanes (future LRT extension to pass through Blackburn Hamlet community)
- Southwest Transitway – Baseline to Norice required to support Baseline Station re-development in conjunction with Algonquin College expansion project and to address current operational concerns
- West Transitway – Bayshore to Moodie & Southwest Transitway Fallowfield to Strandherd required to address current operational constraints
- Riverside South also served by Bus lanes/priority measures on Woodroffe and Strandherd connecting across the Strandherd/Armstrong Bridge to Riverview Park & Ride Lot

### Benefits/Risks

Benefits:

- Construction of Bayview to Riverside South (North-South) portion of corridor can proceed in advance of downtown (East-West) tunnel portion – *i.e.* can start earlier than East-West alternatives and may be in operation as early as 2 years before the downtown tunnel portion
- Provides high-quality rapid transit services to Riverside South coincident with development - supporting transit-oriented development of community from Day 1
- Provides LRT link to Airport – non-stop connection to Downtown destinations
- Provides relief to downtown congestion – removes 45% of buses from Albert & Slater Streets (second highest of 4 Scenarios, but substantially lower than Scenario 4)
- Projected City-wide ridership of 147M by 2031 (second highest of 4 Scenarios)
- Conversion of East Transitway first benefits more riders than conversion of West Transitway during this time frame
- Provides LRT connections to VIA station and Tunney's Pasture
- Expedites rapid transit services to Ottawa Hospital/Health Sciences campus and facilitates transit-oriented development of former NDMC lands
- Provides rapid transit service to South Orleans in conjunction with development along the Cumberland Transitway corridor
- Provides rapid transit service to Kanata Town Centre in conjunction with development and serves Scotia Bank Place
- Bowesville yard location approvals in place

Risks:

- Shuts down existing O-Train service during construction in North-South Corridor
- Maintains bus operations on the Ottawa River Parkway
- Requires resolution of 'Browning Avenue Corridor' concerns
- Requires construction of Strandherd/Armstrong Bridge

## Scenario 3 – Downtown Tunnel & LRT South
### *Phase 2 – Implementation by 2022*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:**<br>• Tunney's Pasture to Baseline | 194 |
| **BRT Corridors:**<br>• West Transitway – Pinecrest to Southwest Transitway | 171 |
| **Supplementary Corridors:**<br>• Baseline – Baseline Station to Confederation | 90 |
| **Other:**<br>• Bus maintenance and Storage Facility (location to be determined) | See below |
| **Infrastructure Sub-Total** | **455** |
| LRT Maintenance & Storage Yard | |
| Bus Maintenance & Storage Facility | 60 |
| **Maintenance & Storage Facility Sub-Total** | **60** |
| LRT Vehicles (65) | 325 |
| BRT Vehicles | |
| **Vehicle Sub-Total** | **325** |
| **TOTAL** | **840** |

**Implications**

- Transitway bus operations unaffected during LRT conversion from Baseline to Dominion Station, as construction operations for new LRT facility occur adjacent to existing bus Transitway facilities.
- Transitway buses can operate on either or both of Scott Street and the Ottawa River Parkway during conversion of West Transitway from Dominion Station to LeBreton
- West Transitway – Pinecrest to Southwest Transitway required to optimize bus connection to LRT transfer station at Lincoln Fields

**Benefits/Risks**

Benefits:
- Completes implementation of LRT rapid transit network
- Baseline corridor provides needed high-quality cross-town bus link bypassing downtown

Risks:
- Resolving public and NCC concerns regarding LRT implementation in/adjacent to Ottawa River Parkway corridor
- Resolving Roman Avenue neighbourhood concerns related to West Transitway – Pinecrest to Southwest Transitway

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 3 – Downtown Tunnel & LRT South
### *Phase 3 – Implementation by 2028*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| **BRT Corridors:** | |
| • Southwest Transitway – Norice to Hunt Club | 79 |
| **Supplementary Corridors:** | |
| • Carling Ave LRT – Lincoln Fields to North-South Corridor | 250 |
| • Baseline – Bayshore to Baseline Station | 36 |
| • Heron/Walkley – Confederation to St. Laurent/Russell | 48 |
| • St. Laurent/Russell – Innes to Walkley | 17 |
| **Other:** | |
| • East LRT Maintenance and Storage Yard | See below |
| **Infrastructure Sub-Total** | **430** |
| LRT Maintenance & Storage Yard | 100 |
| Bus Maintenance & Storage Facility | |
| **Maintenance & Storage Facility Sub-Total** | **100** |
| LRT Vehicles (LRT = 25, Carling = 15) | 125 + 75 |
| BRT Vehicles (111) | 82 |
| **Vehicle Sub-Total** | **282** |
| **TOTAL** | **812** |

**Implications**

- Physical link required from Carling to North-South corridor to facilitate connection to rail maintenance yard – also provides for service continuity into Downtown

**Benefits/Risks**

Benefits:
- Completes implementation of LRT network, including Carling corridor
- Completes high-quality cross-town bus link on Baseline/Heron/Walkley corridor

Risks:
- Requires identification and securing site for East LRT Yard Facility
- Should review approved plan for Southwest Transitway extension from Knoxdale to Hunt Club (tunnel under Woodroffe Avenue)

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 3 – Downtown Tunnel & LRT South
### *Phase 4 – Implementation by 2031*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| **BRT Corridors:** | |
| • West Transitway – Scotiabank Place to Fernbank | 35 |
| • Kanata North Transitway – Eagleson to Klondike | 53 |
| • Southwest Transitway – Barrhaven TC to Cambrian | 24 |
| • East Transitway – Place d'Orléans to Trim | 107 |
| • South Transitway – Riverside South TC to Barrhaven TC | 71 |
| **Supplementary Corridors:** | |
| **Other:** | |
| • Bus maintenance and Storage Facility (location to be determined) | See below |
| **Infrastructure Sub-Total** | **290** |
| LRT Maintenance & Storage Yard | |
| Bus Maintenance & Storage Facility | 60 |
| **Maintenance & Storage Facility Sub-Total** | **60** |
| LRT Vehicles (13) | 65 |
| BRT Vehicles (55) | 41 |
| **Vehicle Sub-Total** | **106** |
| **TOTAL** | **456** |

**Implications**

- Completes implementation of the TMP transit network

**Benefits/Risks**

Benefits:
- Extends rapid transit services into Kanata North to serve business parks and local development
- Provides rapid transit link between Barrhaven and Riverside South
- Extends rapid transit services into Barrhaven South to support development

Risks:
- Kanata North alignment not defined
- May require second transit-only bridge crossing of the Rideau River adjacent to Strandherd/Armstrong bridge

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 4 – Downtown Tunnel & LRT East-West
### *Phase 1 – Implementation by 2018*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| • Baseline to Blair (*includes Downtown Tunnel*) | 1021 |
| **BRT Corridors:** | |
| • Hospital Link – Lycée Claudel to Innes/Blair | 88 |
| • Blair Road – Blair Station to Innes / Blair | 24 |
| • West Transitway – Bayshore to Moodie Drive | 18 |
| • West Transitway – Pinecrest to Southwest Transitway | 171 |
| • Southwest Transitway – Baseline to Norice Street | 185 |
| • Southwest Transitway – Fallowfield to Strandherd Park & Ride | 16 |
| • Southwest Transitway –Strandherd Park & Ride to Barrhaven TC | 30 |
| **Supplementary Corridors:** | |
| • Strandherd Drive – Rideau River to Woodroffe Park & Ride (*includes bus lanes on Strandherd/Armstrong bridge)* | 28 |
| • Woodroffe Avenue – Woodroffe Park & Ride to Fallowfield Park & Ride | 2 |
| **Other:** | |
| • East LRT Maintenance and Storage Yard | See below |
| • O-Train Extension – Greenboro to Leitrim Park & Ride | 45 |
| **Infrastructure Sub-Total** | **1,628** |
| LRT Maintenance & Storage Yard | 100 |
| Bus Maintenance & Storage Facility | |
| **Maintenance & Storage Facility Sub-Total** | **100** |
| LRT Vehicles (LRT =119, O-Train = 2) | 595 + 12 |
| BRT Vehicles (232) | 172 |
| **Vehicle Sub-Total** | **779** |
| **TOTAL** | **2,507** |

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 4 – Downtown Tunnel & LRT East-West
### *Phase 1 – Implementation by 2018*

### Implications

- Transitway bus operations unaffected during LRT conversion from Baseline to Dominion Station, as construction operations for new LRT facility occur adjacent to existing bus Transitway facilities.
- Transitway buses can operate on either or both of Scott Street and the Ottawa River Parkway during conversion of West Transitway from Dominion Station to LeBreton
- West Transitway – Pinecrest to Southwest Transitway required to optimize bus connection to LRT transfer station at Lincoln Fields
- New Rideau River crossing from Hurdman to Nicholas St. desired to provide continuous Transitway service to the downtown during conversion of East Transitway Downtown approach (crossing is identified in TMP as required future arterial road link (AVTC Phase II)).
- Hospital Link Corridor can provide continuous Transitway service from Blair to Hurdman Station during completion of conversion of East Transitway – Hurdman to Blair corridor
- Southwest Transitway – Baseline to Norice required to support Baseline Station re-development in conjunction with Algonquin College expansion project and to address current operational concerns
- West Transitway – Bayshore to Moodie & Southwest Transitway Fallowfield to Strandherd required to address current operational constraints
- Riverside South served by interim extension of existing O-Train to Leitrim Park & Ride and Bus lanes/priority measures on Woodroffe and Strandherd connecting across the Strandherd/Armstrong Bridge to Riverview Park & Ride lot

### Benefits/Risks

Benefits:

- Removes 90% Transitway bus operations from Albert & Slater Streets maximizing benefits of tunnel investment - provides initial LRT benefits to the largest number of riders than other scenarios
- Projected City-wide ridership of 152M passengers by 2031 (highest of 4 Scenarios)
- Provides LRT connections to VIA station and Tunney's Pasture
- Expedites rapid transit services to Ottawa Hospital/Health Sciences campus and facilitates transit-oriented development of former NDMC lands
- Provides improved transit services to Riverside South quickly and cost-effectively

Risks:

- Resolving public and NCC concerns regarding LRT implementation in/adjacent to Ottawa River Parkway corridor
- Resolving Roman Avenue neighbourhood concerns related to West Transitway – Pinecrest to Southwest Transitway
- Requires identification and securing site for East LRT Yard Facility
- Requires resolution of 'Browning Avenue Corridor' concerns
- Requires at least one additional Bombardier 'Talent' train, renewal of Walkley Yard lease, and Transport Canada approval for at-grade crossings of Lester and Leitrim Roads
- Requires construction of Strandherd/Armstrong Bridge
- Delays implementation of rapid transit to Riverside South

## Scenario 4 – Downtown Tunnel & LRT East-West
***Phase 2 – Implementation by 2022***

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| **BRT Corridors:** | |
| • West Transitway – Eagleson to Scotiabank Place | 79 |
| • Cumberland Transitway – Navan to Millennium | 64 |
| • Innes Road/Blackburn Hamlet Bypass | 20 |
| **Supplementary Corridors:** | |
| • Baseline – Baseline Station to Confederation | 90 |
| **Other:** | |
| • Bus maintenance and Storage Facility (location to be determined) | See below |
| **Infrastructure Sub-Total** | **253** |
| LRT Maintenance & Storage Yard | |
| Bus Maintenance & Storage Facility | 60 |
| **Maintenance & Storage Facility Sub-Total** | **60** |
| LRT Vehicles (11) | 55 |
| BRT Vehicles (82) | 61 |
| **Vehicle Sub-Total** | **116** |
| **TOTAL** | **429** |

**Implications**

- Exclusive bus-only lanes to provide connection of Cumberland Transitway to Blair Station. Requires widening of existing Blackburn Hamlet Bypass to 6-lanes (future LRT extension to pass through Blackburn Hamlet community)

**Benefits/Risks**

Benefits:
- Provides rapid transit service to Kanata Town Centre in conjunction with development and serves Scotia Bank Place
- Provides rapid transit service to South Orleans in conjunction with development along Cumberland Transitway corridor
- Baseline corridor provides needed high-quality cross-town bus link bypassing downtown

Risks:
- Delays implementation of rapid transit to Riverside South

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 4 – Downtown Tunnel & LRT East-West
### *Phase 3 – Implementation by 2026*

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| • North-South – Bayview to Riverside South (*includes Airport Connection*) | 498 |
| **BRT Corridors:** | |
| • Southwest Transitway – Norice to Hunt Club | 79 |
| **Supplementary Corridors:** | |
| • Carling Ave LRT – Lincoln Fields to North-South Corridor | 250 |
| • Baseline – Bayshore to Baseline Station | 36 |
| • Heron/Walkley – Confederation to St. Laurent/Russell | 48 |
| • St. Laurent/Russell – Innes to Walkley | 17 |
| **Other:** | |
| • Bowesville LRT Maintenance and Storage Yard | See below |
| **Infrastructure Sub-Total** | **928** |
| LRT Maintenance & Storage Yard | 100 |
| Bus Maintenance & Storage Facility | |
| **Maintenance & Storage Facility Sub-Total** | **100** |
| LRT Vehicles (LRT = 53, Carling = 15) | 265 + 75 |
| BRT Vehicles (74) | 55 |
| **Vehicle Sub-Total** | **395** |
| **TOTAL** | **1,423** |

**Implications**

- Physical link required from Carling to North-South corridor to facilitate connection to rail maintenance yard – also provides for service continuity into Downtown

**Benefits/Risks**

Benefits:
- Completes implementation of LRT network, including Carling corridor
- Provides LRT link to Airport – non-stop connection to Downtown destinations
- Completes high-quality cross-town bus link on Baseline/Heron/Walkley corridor
- Bowesville yard location approvals in place

Risks:
- Shuts down existing O-Train service during construction in North-South Corridor
- Should review approved plan for Southwest Transitway extension from Knoxdale to Hunt Club (tunnel under Woodroffe Avenue)

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 4 – Downtown Tunnel & LRT East-West
***Phase 4 – Implementation by 2031***

| Component Projects | Costs ($M) |
|---|---|
| **LRT Corridors:** | |
| **BRT Corridors:** | |
| • West Transitway – Scotiabank Place to Fernbank | 35 |
| • Kanata North Transitway – Eagleson to Klondike | 53 |
| • Southwest Transitway – Barrhaven TC to Cambrian | 24 |
| • East Transitway – Place d'Orléans to Trim | 107 |
| • South Transitway – Riverside South TC to Barrhaven TC | 71 |
| **Supplementary Corridors:** | |
| **Other:** | |
| • Bus maintenance and Storage Facility (location to be determined) | See below |
| **Infrastructure Sub-Total** | **290** |
| LRT Maintenance & Storage Yard | |
| Bus Maintenance & Storage Facility | 60 |
| **Maintenance & Storage Facility Sub-Total** | **60** |
| LRT Vehicles (13) | 65 |
| BRT Vehicles (55) | 41 |
| **Vehicle Sub-Total** | **106** |
| **TOTAL** | **456** |

**Implications**

- Completes implementation of the TMP transit network

**Benefits/Risks**

Benefits:
- Extends rapid transit services into Kanata North to serve business parks and local development
- Provides rapid transit link between Barrhaven and Riverside South
- Extends rapid transit services into Barrhaven South to support development

Risks:
- Kanata North alignment not defined
- May require second transit-only bridge crossing of the Rideau River adjacent to Strandherd/Armstrong bridge

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

**Summary of KM of construction**

| KM | SCENARIO | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Phase 1 | | | | |
| Km of LRT | 13 | 19 | 34 | 22 |
| Km of O-train | 5 | 5 | - | 5 |
| Km of BRT | 22 | 25 | 35 | 19 |
| Km of supplementary | 5 | 5 | 5 | 5 |
| Phase 2 | | | | |
| Km of LRT | 9 | 3 | 9 | - |
| Km of O-train | - | - | - | - |
| Km of BRT | 15 | 12 | 2 | 18 |
| Km of supplementary | 7 | 7 | 7 | 7 |
| Phase 3 | | | | |
| Km of LRT | 21 | 21 | - | 21 |
| Km of Carling LRT | 7 | 7 | 7 | 7 |
| Km of O-train | - | - | - | - |
| Km of BRT | 2 | 2 | 2 | 2 |
| Km of supplementary | 14 | 14 | 14 | 14 |
| Phase 4 | | | | |
| Km of LRT | - | - | - | - |
| Km of O-train | - | - | - | - |
| Km of BRT | 24 | 24 | 24 | 24 |
| Km of supplementary | - | - | - | - |
| **Total** | | | | |
| **Km of LRT** | **43** | **43** | **43** | **43** |
| **Km of Carling LRT** | **7** | **7** | **7** | **7** |
| **Km of O-train** | **5** | **5** | **-** | **5** |
| **Km of BRT** | **63** | **63** | **63** | **63** |
| **Km of supplementary** | **26** | **26** | **26** | **26** |

**Summary of Costs**

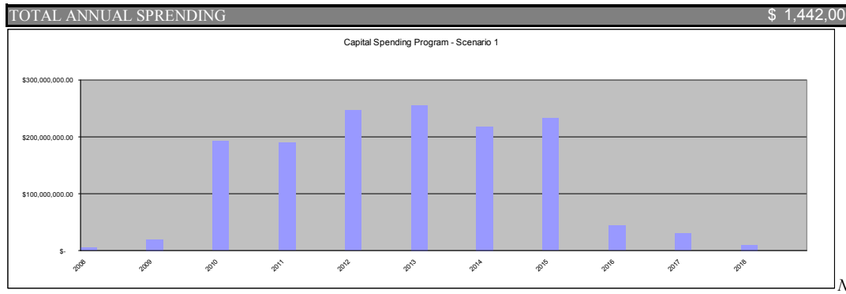
| CAPITAL COST ($M) | SCENARIO | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Phase 1 | | | | |
| infrastructure | 1,342 | 1,571 | 1,879 | 1,628 |
| Maintenance / storage | 100 | 100 | 100 | 100 |
| Vehicles (LRT & BRT) | 611 | 765 | 720 | 779 |
| **Cost** | **2,053** | **2,436** | **2,699** | **2,507** |
| Phase 2 | | | | |
| infrastructure | 539 | 310 | 455 | 253 |
| Maintenance / storage | 60 | 60 | 60 | 60 |
| Vehicles (LRT & BRT) | 325 | 170 | 325 | 116 |
| **Cost** | **924** | **540** | **840** | **429** |
| Phase 3 | | | | |
| infrastructure | 928 | 928 | 430 | 928 |
| Maintenance / storage | 100 | 100 | 100 | 100 |
| Vehicles (LRT & BRT) | 395 | 395 | 282 | 395 |
| **Cost** | **1,423** | **1,423** | **812** | **1,423** |
| Phase 4 | | | | |
| infrastructure | 290 | 290 | 290 | 290 |
| Maintenance / storage | 60 | 60 | 60 | 60 |
| Vehicles (LRT & BRT) | 106 | 106 | 106 | 106 |
| **Cost** | **456** | **456** | **456** | **456** |
| Total | | | | |
| infrastructure | 3,099 | 3,099 | 3,054 | 3,099 |
| Maintenance / storage | 320 | 320 | 320 | 320 |
| Vehicles (LRT & BRT) | 1,437 | 1,436 | 1,433 | 1,396 |
| **TOTAL Cost** | **4,856** | **4,855** | **4,807** | **4,815** |

*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Implementation Schedule and Capital Spending Program for Phase 1 (2008-2018)

### Scenario 1

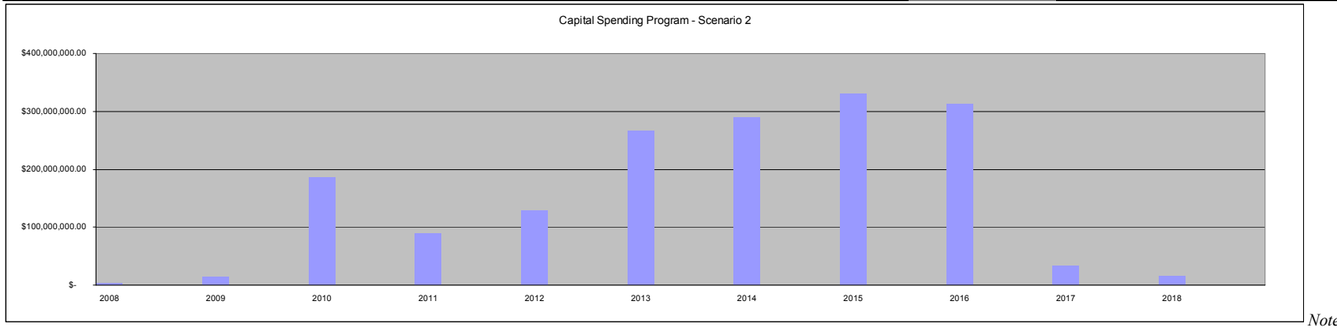
| Project Name | Project Limits | Project Phase | Cost Estimate | Timeframe | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRT Yard | (construction as part of LRT Construction) | | | | | | | | | | | | | | |
| | | EA & Approvals | | 1.5 yrs | | | | | | | | | | | |
| | | Secure Property | | 0.5 yrs | | | | | | | | | | | |
| | | | | **Spending** | | | | | | | | | | | |
| E-W LRT | Tunney's Pasture to Blair including tunnel & rail yard | | $ 927,000,000.00 | | | | | | | | | | | | |
| | | EA & Approvals | $ 9,500,000.00 | 2 yrs | $ 2,375,000.00 | $ 4,750,000.00 | $ 2,375,000.00 | | | | | | | | |
| | | Procurement | $ 10,000,000.00 | 2 yrs | | $ 2,500,000.00 | $ 5,000,000.00 | $ 2,500,000.00 | | | | | | | |
| | | Design, Construction & Commissioning | $ 907,500,000.00 | 4.5 yrs | | | | $ 100,833,333.33 | $ 201,666,666.67 | $ 201,666,666.67 | $ 201,666,666.67 | $ 201,666,666.67 | | | |
| | | | | | $ 2,375,000.00 | $ 7,250,000.00 | $ 7,375,000.00 | $ 103,333,333.33 | $ 201,666,666.67 | $ 201,666,666.67 | $ 201,666,666.67 | $ 201,666,666.67 | | | |
| Hospital link | Hurdman to Blair including Blair BRT | | $ 112,000,000.00 | | | | | | | | | | | | |
| | | EA & Approvals | $ 2,500,000.00 | 1.5 yrs | ### | $ 1,666,666.67 | ### | | | | | | | | |
| | | Design & Tender | $ 14,560,000.00 | 2 yrs | | | $ 5,460,000.00 | $ 7,280,000.00 | ### | | | | | | |
| | | Construction | $ 94,940,000.00 | 2 yrs | | | | | $ 35,602,500.00 | $ 47,470,000.00 | ### | | | | |
| | | | | | $ 416,666.67 | $ 1,666,666.67 | $ 5,876,666.67 | $ 7,280,000.00 | $ 37,422,500.00 | $ 47,470,000.00 | $ 11,867,500.00 | | | | |
| SW Transitway | Baseline to Norice | | $ 185,000,000.00 | | | | | | | | | | | | |
| | | EA Update, Design & Tender | $ 3,700,000.00 | 1 yr | | $ 3,700,000.00 | | | | | | | | | |
| | | Construction | $ 181,300,000.00 | 1.5 yrs | | | $ 120,866,666.67 | ########## | | | | | | | |
| | | | | | | $ 3,700,000.00 | $ 120,866,666.67 | $ 60,433,333.33 | | | | | | | |
| SW Transitway | Fallowfield to Barrhaven TC | | $ 46,000,000.00 | | | | | | | | | | | | |
| | | Design & Tender | $ 3,000,000.00 | underway | ########## | ########## | | | | | | | | | |
| | | Construction | $ 43,000,000.00 | 2.5 yrs | | | | | | | | $ 12,900,000.00 | $ 17,200,000.00 | $ 12,900,000.00 | |
| | | | | | $ 1,500,000.00 | $ 1,500,000.00 | | | | | | $ 12,900,000.00 | $ 17,200,000.00 | $ 12,900,000.00 | |
| West Transitway | Bayshore to Moodie | | $ 18,000,000.00 | | | | | | | | | | | | |
| | | EA Update, Design & Tender | $ 2,700,000.00 | 2.5 yrs | ### | $ 1,080,000.00 | $ 1,080,000.00 | ### | | | | | | | |
| | | Construction | $ 15,300,000.00 | 2.3 yrs | | | | $ 5,100,000.00 | $ 6,800,000.00 | ########## | | | | | |
| | | | | | $ 270,000.00 | $ 1,080,000.00 | $ 1,080,000.00 | $ 5,370,000.00 | $ 6,800,000.00 | $ 3,400,000.00 | | | | | |
| West Transitway | Eagelson to Terry Fox | | $ 37,000,000.00 | | | | | | | | | | | | |
| | | EA Update, Design & Tender | $ 5,550,000.00 | 2 yrs | | | | | | $ 2,081,250.00 | $ 2,775,000.00 | ### | | | |
| | | Construction | $ 31,450,000.00 | 2 yrs | | | | | | | | $ 11,793,750.00 | $ 15,725,000.00 | ### | |
| | | | | | | | | | | $ 2,081,250.00 | $ 2,775,000.00 | $ 12,487,500.00 | $ 15,725,000.00 | $ 3,931,250.00 | |
| West Transitway | Terry Fox to SBP | | $ 42,000,000.00 | | | | | | | | | | | | |
| | | EA & Approvals | $ 1,260,000.00 | 1.5 yrs | | | | | | $ 630,000.00 | $ 630,000.00 | | | | |
| | | Design & Tender | $ 7,500,000.00 | 1.5 yrs | | | | | | | | ### | $ 5,000,000.00 | ### | |
| | | Construction | $ 33,240,000.00 | 2.5 yrs | | | | | | | | | $ 9,972,000.00 | $ 13,296,000.00 | $ 9,972,000.00 |
| | | | | | | | | | | $ 630,000.00 | $ 1,880,000.00 | $ 5,000,000.00 | $ 11,222,000.00 | $ 13,296,000.00 | $ 9,972,000.00 |
| Strandherd / Armstro | Bridge & Strandherd BRT (including Priority on Woodroffe) | | $ 30,000,000.00 | | | | | | | | | | | | |
| | | EA Update, Design & Tender | | underway | $ - | $ - | | | | | | | | | |
| | | Construction | $ 30,000,000.00 | 1.8 yrs | | | $ 17,142,857.14 | $ 12,857,142.86 | | | | | | | |
| | | | | | $ - | $ - | $ 17,142,857.14 | $ 12,857,142.86 | | | | | | | |
| Interim O-Train | Greenboro to Leitrim | | $ 45,000,000.00 | | | | | | | | | | | | |
| | | EA Update, Design & Tender | $ 6,750,000.00 | 1.5 yrs | | $ 4,500,000.00 | ########## | | | | | | | | |
| | | Construction & Commissioning | $ 38,250,000.00 | 0.5 yrs | | | ########## | | | | | | | | |
| | | | | | | $ 4,500,000.00 | $ 40,500,000.00 | $ - | | | | | | | |
| TOTAL ANNUAL SPRENDING | | | $ 1,442,000,000.00 | | $ 4,561,666.67 | $ 19,696,666.67 | $ 192,841,190.48 | $ 189,273,809.52 | $ 245,889,166.67 | $ 255,247,916.67 | $ 218,189,166.67 | $ 232,054,166.67 | $ 44,147,000.00 | $ 30,127,250.00 | $ 9,972,000.00 |




*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 2

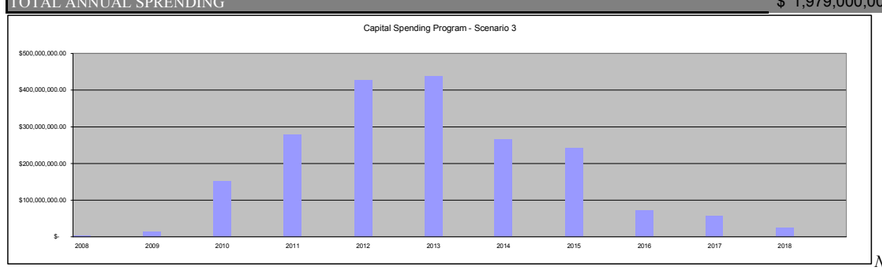
| Project Name | Project Limits | Project Phase | Cost Estimate | Timeframe | 2008 Q1 | 2008 Q2 | 2008 Q3 | 2008 Q4 | 2009 Q1 | 2009 Q2 | 2009 Q3 | 2009 Q4 | 2010 Q1 | 2010 Q2 | 2010 Q3 | 2010 Q4 | 2011 Q1 | 2011 Q2 | 2011 Q3 | 2011 Q4 | 2012 Q1 | 2012 Q2 | 2012 Q3 | 2012 Q4 | 2013 Q1 | 2013 Q2 | 2013 Q3 | 2013 Q4 | 2014 Q1 | 2014 Q2 | 2014 Q3 | 2014 Q4 | 2015 Q1 | 2015 Q2 | 2015 Q3 | 2015 Q4 | 2016 Q1 | 2016 Q2 | 2016 Q3 | 2016 Q4 | 2017 Q1 | 2017 Q2 | 2017 Q3 | 2017 Q4 | 2018 Q1 | 2018 Q2 | 2018 Q3 | 2018 Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRT Yard | (construction as part of LRT Construction) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals | | 1.5 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Secure Property | | 0.5 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | **Spending** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E-W LRT | Baseline to St Laurent including tunnel & rail yard | | $ 1,068,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals | $ 10,580,000.00 | 3 yrs | | | $ 1,763,333.33 | | $ 3,526,666.67 | | | | $ 3,526,666.67 | | | ######## | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Procurement | $ 10,000,000.00 | 2 yrs | | | | | | | | | | | ######## | | $ 5,000,000.00 | | ######## | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design, Construction & Commissioning | $ 1,047,420,000.00 | 4.5 yrs | | | | | | | | | | | | | | | | ######## | $ 232,760,000.00 | | | | $ 232,760,000.00 | | | | $ 232,760,000.00 | | | | $ 232,760,000.00 | | | | $ 232,760,000.00 | | | | | | | | | |
| | | | | | | | $ 1,763,333.33 | | $ 3,526,666.67 | | | | $ 6,026,666.67 | | | | $ 6,763,333.33 | | | | $ 118,880,000.00 | | | | $ 232,760,000.00 | | | | $ 232,760,000.00 | | | | $ 232,760,000.00 | | | | $ 232,760,000.00 | | | | $ - | | | | $ - | | | |
| Cumberland Transitway | Blair to Navan (including Blair bus lanes) | | $ 44,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals | $ 880,000.00 | 1.8 yrs | | | | | | | | | | | | | | | | | | | | | $ 502,857.14 | | | | $ 377,142.86 | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 2,200,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | $ 1,100,000.00 | | | | $ 825,000.00 | | | | | | | | | | |
| | | Construction | $ 40,920,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | $ 20,460,000.00 | | | | $ 15,345,000.00 | | | |
| | | | | | | | $ - | | $ - | | | | $ - | | | | $ - | | | | $ - | | | | $ 502,857.14 | | | | $ 652,142.86 | | | | $ 1,100,000.00 | | | | $ 5,940,000.00 | | | | $ 20,460,000.00 | | | | $ 15,345,000.00 | | | |
| Cumberland Transitway | Navan to Millennium | | $ 64,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 3,200,000.00 | 1.5 yrs | | | | | | | | | | | | | | | | | | | | | | | $ 2,133,333.33 | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 60,800,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | $ 30,400,000.00 | | | | $ 30,400,000.00 | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | $ 533,333.33 | | | | $ 2,133,333.33 | | | | $ 30,933,333.33 | | | | $ 30,400,000.00 | | | | $ - | | | | $ - | | | |
| SW Transitway | Baseline to Norice | | $ 185,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA Update, Design & Tender | $ 3,700,000.00 | 1 yr | | | | | | | $ 3,700,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 181,300,000.00 | 1.5 yrs | | | | | | | | | | | $ 120,866,666.67 | | | ######## | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | $ 3,700,000.00 | | | | $ 120,866,666.67 | | | | $ 60,433,333.33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SW Transitway | Fallowfield to Barrhaven TC | | $ 46,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 3,000,000.00 | underway | | | ######## | | ######## | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 43,000,000.00 | 2.5 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | $ 12,900,000.00 | | | | $ 17,200,000.00 | | | | $ 12,900,000.00 | | | |
| | | | | | | | $ 1,500,000.00 | | $ 1,500,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | $ 12,900,000.00 | | | | $ 17,200,000.00 | | | | $ 12,900,000.00 | | | |
| West Transitway | Pinecrest to SW Transitway | | $ 171,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA Update, "Roman Ave" | $ 500,000.00 | 1.5 yrs | | | | | | | ######## | | $ 333,333.33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 8,525,000.00 | 2.5 yrs | | | | | | | | | | | | | $ 3,410,000.00 | | | | $ 3,410,000.00 | | | | ######## | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 161,975,000.00 | 3 yrs | | | | | | | | | | | | | | | | | | | | | | | ######## | | | | $ 53,991,666.67 | | | | $ 53,991,666.67 | | | | ######## | | | | | | | |
| | | | | | | | $ - | | $ 166,666.67 | | | | $ 333,333.33 | | | | $ 3,410,000.00 | | | | $ 3,410,000.00 | | | | $ 28,700,833.33 | | | | $ 53,991,666.67 | | | | $ 53,991,666.67 | | | | $ 26,995,833.33 | | | | | | | | | |
| West Transitway | Bayshore to Moodie | | $ 18,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA Update, Design & Tender | $ 2,700,000.00 | 2.5 yrs | | | ### | | $ 1,080,000.00 | | | | $ 1,080,000.00 | | | ### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 15,300,000.00 | 2.3 yrs | | | | | | | | | | | | | $ 5,100,000.00 | | | | $ 6,800,000.00 | | | | ######## | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | $ 270,000.00 | | $ 1,080,000.00 | | | | $ 1,080,000.00 | | | | $ 5,370,000.00 | | | | $ 6,800,000.00 | | | | $ 3,400,000.00 | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | | | | | |
| Strandherd / Armstrong | Bridge & Strandherd BRT (including Priority on Woodroffe) | | $ 30,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | | underway | | | $ - | | $ - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 30,000,000.00 | 1.8 yrs | | | | | | | | | $ 17,142,857.14 | | | | $ 12,857,142.86 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | $ - | | $ - | | | | $ 17,142,857.14 | | | | $ 12,857,142.86 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Interim O-Train | Greenboro to Leitrim | | $ 45,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 6,750,000.00 | 1.5 yrs | | | | | | | $ 4,500,000.00 | | ######## | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction & Commissioning | $ 38,250,000.00 | 0.5 yrs | | | | | | | | | | | | ######## | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | $ 4,500,000.00 | | $ 40,500,000.00 | | | | $ - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL ANNUAL SPRENDING | | | $ 1,671,000,000.00 | | $ 3,533,333.33 | | | | $ 14,473,333.33 | | | | $ 185,949,523.81 | | | | $ 88,833,809.52 | | | | $ 129,090,000.00 | | | | $ 265,897,023.81 | | | | $ 289,537,142.86 | | | | $ 331,685,000.00 | | | | $ 313,295,833.33 | | | | $ 33,360,000.00 | | | | $ 15,345,000.00 | | | |




*Notes: Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 3

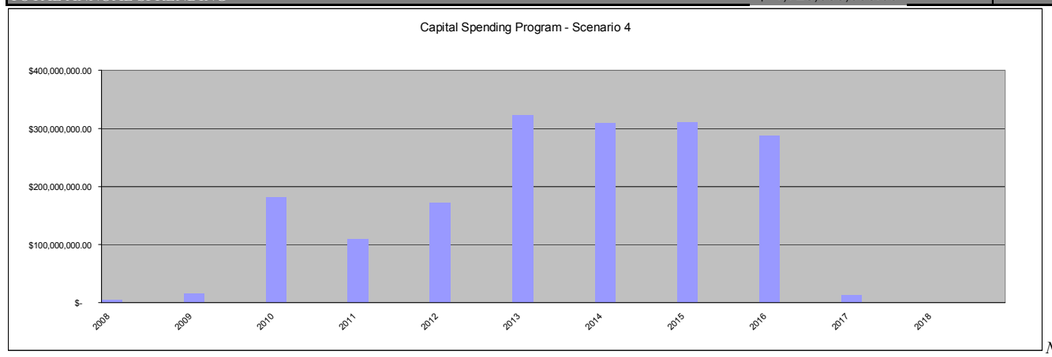
| Project Name | Project Limits | Project Phase | Cost Estimate | Timeframe | 2008 Q1 | 2008 Q2 | 2008 Q3 | 2008 Q4 | 2009 Q1 | 2009 Q2 | 2009 Q3 | 2009 Q4 | 2010 Q1 | 2010 Q2 | 2010 Q3 | 2010 Q4 | 2011 Q1 | 2011 Q2 | 2011 Q3 | 2011 Q4 | 2012 Q1 | 2012 Q2 | 2012 Q3 | 2012 Q4 | 2013 Q1 | 2013 Q2 | 2013 Q3 | 2013 Q4 | 2014 Q1 | 2014 Q2 | 2014 Q3 | 2014 Q4 | 2015 Q1 | 2015 Q2 | 2015 Q3 | 2015 Q4 | 2016 Q1 | 2016 Q2 | 2016 Q3 | 2016 Q4 | 2017 Q1 | 2017 Q2 | 2017 Q3 | 2017 Q4 | 2018 Q1 | 2018 Q2 | 2018 Q3 | 2018 Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRT | Tunneys to Blair & Bayview to Riverside TC & rail yard | | $ 1,425,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals | $ 9,500,000.00 | 2 yrs | | $ 2,375,000.00 | | | $ 4,750,000.00 | | | | $ 2,375,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Procurement | $ 10,000,000.00 | 2 yrs | | | | | | $ 2,500,000.00 | | | $ 5,000,000.00 | | | | $ 2,500,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction & Commissioning(N-S) | $ 498,000,000.00 | 2.8 yrs | | | | | | | | | | | | | $ 90,545,454.55 | $ 181,090,909.09 | $ 181,090,909.09 | ### | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction & Commissioning(E-W) | $ 907,500,000.00 | 4.5 yrs | | | | | | | | | | | | | $ 100,833,333.33 | $ 201,666,666.67 | $ 201,666,666.67 | $ 201,666,666.67 | $ 201,666,666.67 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | $ 2,375,000.00 | | | | $ 7,250,000.00 | | | | $ 7,375,000.00 | | | | $ 193,878,787.88 | $ 382,757,575.76 | | | $ 382,757,575.76 | | | | $ 246,939,393.94 | $ 201,666,666.67 | | | $ - | | | | $ - | | | | $ - | | | | | | | | | | |
| Hospital Link | Hurdman to Blair including Blair BRT | | $ 112,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals | $ 2,500,000.00 | 1.5 yrs | | | ### | | ### | | | | ### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 14,560,000.00 | 2 yrs | | | | | | | | | | ### | | | ### | | | | ### | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 94,940,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | ### | | | ### | | | | ### | | | | | | | | | | | | | | | | | | | |
| | | | | | $ 416,666.67 | | | | $ 1,666,666.67 | | | | $ 5,876,666.67 | | | | $ 7,280,000.00 | | | | $ 37,422,500.00 | | | | $ 47,470,000.00 | | | | $ 11,867,500.00 | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | |
| West Transitway | Eagelson to Terry Fox | | $ 37,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA Update, Design & Tender | $ 5,550,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | | | | $ 2,081,250.00 | | | | $ 2,775,000.00 | | | | ### | | | | | | | | | | | | | | | |
| | | Construction | $ 31,450,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | $ 11,793,750.00 | | | | $ 15,725,000.00 | | | | ### | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | $ 2,081,250.00 | | | | $ 2,775,000.00 | | | | $ 12,487,500.00 | | | | $ 15,725,000.00 | | | | $ 3,931,250.00 | | | | | | | |
| West Transitway | Terry Fox to SBP | | $ 42,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals | $ 1,260,000.00 | 1.5 yrs | | | | | | | | | | | | | | | | | | | | | $ 630,000.00 | | | | $ 630,000.00 | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 7,500,000.00 | 1.5 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ### | | | | $ 5,000,000.00 | | | | ### | | | | | | | |
| | | Construction | $ 33,240,000.00 | 2.5 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | $ 9,972,000.00 | | | | $ 13,296,000.00 | | | | $ 9,972,000.00 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | $ 630,000.00 | | | | $ 1,880,000.00 | | | | $ 5,000,000.00 | | | | $ 11,222,000.00 | | | | $ 13,296,000.00 | | | | $ 9,972,000.00 | | | |
| West Transitway | Bayshore to Moodie | | $ 18,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA Update, Design & Tender | $ 2,700,000.00 | 2.5 yrs | | | ### | | $ 1,080,000.00 | | | | $ 1,080,000.00 | | | | ### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 15,300,000.00 | 2.3 yrs | | | | | | | | | | | | | | $ 5,100,000.00 | | | $ 6,800,000.00 | | | | ######### | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | $ 270,000.00 | | | | $ 1,080,000.00 | | | | $ 1,080,000.00 | | | | $ 5,370,000.00 | | | | $ 6,800,000.00 | | | | $ 3,400,000.00 | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | |
| Cumberland Transitway | Navan to Millennium | | $ 64,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 3,200,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | | | | | | ### | | | | ### | | | | ### | | | | | | | | | | | |
| | | Construction | $ 60,800,000.00 | 3 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ### | | | | ### | | | | ### | | | | ### | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | $ 400,000.00 | | | | $ 1,600,000.00 | | | | $ 6,266,666.67 | | | | $ 20,266,666.67 | | | | $ 20,266,666.67 | | | | $ 15,200,000.00 | | | |
| Cumberland Transitway | Blair to Navan | | $ 20,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals | $ 400,000.00 | 1.8 yrs | | | | | | | | | | | | | | | | | $ 228,571.43 | $ 171,428.57 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 1,000,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | | | | | | ### | | | | $ 500,000.00 | | | | $ 375,000.00 | | | | | | | | | | | |
| | | Construction | $ 18,600,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ### | | | | $ 9,300,000.00 | | | | $ 6,975,000.00 | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | $ 228,571.43 | $ 171,428.57 | | | $ 296,428.57 | | | | $ 500,000.00 | | | | $ 2,700,000.00 | | | | $ 9,300,000.00 | | | | $ 6,975,000.00 | | | | $ - | | | |
| SW Transitway | Baseline to Norice | | $ 185,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 3,700,000.00 | 1 yr | | | | | $ 3,700,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 181,300,000.00 | 1.5 yrs | | | | | | | | | $ 120,866,666.67 | | | | ######### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | $ 3,700,000.00 | | | | $ 120,866,666.67 | | | | $ 60,433,333.33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SW Transitway | Fallowfield to Barrhaven TC | | $ 46,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design | $ 3,000,000.00 | underway | | ######### | | | ######### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 43,000,000.00 | 2.5 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | $ 12,900,000.00 | | | | $ 17,200,000.00 | | | | $ 12,900,000.00 | | | | | | | |
| | | | | | $ 1,500,000.00 | | | | $ 1,500,000.00 | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | | $ 12,900,000.00 | | | | $ 17,200,000.00 | | | | $ 12,900,000.00 | | | | | | | |
| Strandherd / Armstrong | Bridge & Strandherd BRT (including Priority on Woodroffe) | | $ 30,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | | underway | | $ - | | | $ - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 30,000,000.00 | 1.8 yrs | | | | | | | | | $ 17,142,857.14 | | | | $ 12,857,142.86 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | $ - | | | | $ - | | | | $ 17,142,857.14 | | | | $ 12,857,142.86 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL ANNUAL SPRENDING | | | $ 1,979,000,000.00 | | $ 4,561,666.67 | | | | $ 15,196,666.67 | | | | $ 152,341,190.48 | | | | $ 279,819,264.07 | | | | $ 427,208,647.19 | | | | $ 437,035,254.33 | | | | $ 265,561,893.94 | | | | $ 241,020,833.33 | | | | $ 73,713,666.67 | | | | $ 57,368,916.67 | | | | $ 25,172,000.00 | | | |




*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

## Scenario 4

| Project Name | Project Limits | Project Phase | Cost Estimate | Timeframe | 2008 Q1 | 2008 Q2 | 2008 Q3 | 2008 Q4 | 2009 Q1 | 2009 Q2 | 2009 Q3 | 2009 Q4 | 2010 Q1 | 2010 Q2 | 2010 Q3 | 2010 Q4 | 2011 Q1 | 2011 Q2 | 2011 Q3 | 2011 Q4 | 2012 Q1 | 2012 Q2 | 2012 Q3 | 2012 Q4 | 2013 Q1 | 2013 Q2 | 2013 Q3 | 2013 Q4 | 2014 Q1 | 2014 Q2 | 2014 Q3 | 2014 Q4 | 2015 Q1 | 2015 Q2 | 2015 Q3 | 2015 Q4 | 2016 Q1 | 2016 Q2 | 2016 Q3 | 2016 Q4 | 2017 Q1 | 2017 Q2 | 2017 Q3 | 2017 Q4 | 2018 Q1 | 2018 Q2 | 2018 Q3 | 2018 Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRT Yard | (construction as part of LRT Construction) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals | | 1.5 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Secure Property | | 0.5 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | **Spending** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LRT | Baseline to Blair | | $ 1,121,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & ApprovalsTunneys to Blair | $ 9,500,000.00 | 2 yrs | $ 2,375,000.00 | | | | $ 4,750,000.00 | | | | $ 2,375,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals Tunneys to Basel | $ 5,000,000.00 | 2 yrs | | | | | $ 1,250,000.00 | | | | $ 2,500,000.00 | | | | $ 1,250,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Procurement | $ 10,000,000.00 | 2 yrs | | | | | | | | | | | | | $ 5,000,000.00 | | | | ######### | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction & Commissioning | $ 1,096,500,000.00 | 4.5 yrs | | | | | | | | | | | | | | | | | ######### | | | | $ 243,666,666.67 | | | | $ 243,666,666.67 | | | | $ 243,666,666.67 | | | | $ 243,666,666.67 | | | | $ - | | | | $ - | | | |
| | | | | | $ 2,375,000.00 | | | | $ 6,000,000.00 | | | | $ 7,375,000.00 | | | | $ 6,250,000.00 | | | | $ 124,333,333.33 | | | | $ 243,666,666.67 | | | | $ 243,666,666.67 | | | | $ 243,666,666.67 | | | | $ 243,666,666.67 | | | | $ - | | | | $ - | | | |
| Hospital Link | Hurdman to Blair including Blair BRT | | $ 112,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA & Approvals | $ 2,500,000.00 | 1.5 yrs | | ### | | | $ 1,666,666.67 | | | | ### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 14,560,000.00 | 2 yrs | | | | | | | | | | ### | | | ### | | | | ### | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 94,940,000.00 | 2 yrs | | | | | | | | | | | | | | | | | | ### | | | ### | | | | ### | | | | | | | | | | | | | | | | | | |
| | | | | | $ 416,666.67 | | | | $ 1,666,666.67 | | | | $ 5,876,666.67 | | | | $ 7,280,000.00 | | | | $ 37,422,500.00 | | | | $ 47,470,000.00 | | | | $ 11,867,500.00 | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | |
| West Transitway | Pinecrest to SW Transitway | | $ 171,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA Update, "Roman Ave" | $ 500,000.00 | 1.5 yrs | | | | | ######### | | | | $ 333,333.33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 8,525,000.00 | 2.5 yrs | | | | | | | | | | | | | $ 3,410,000.00 | | | | $ 3,410,000.00 | | | | ######### | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 161,975,000.00 | 3 yrs | | | | | | | | | | | | | | | | | | | | | ######### | | | | $ 53,991,666.67 | | | | $ 53,991,666.67 | | | | ######### | | | | | | | | | |
| | | | | | | | | | $ 166,666.67 | | | | $ 333,333.33 | | | | $ 3,410,000.00 | | | | $ 3,410,000.00 | | | | $ 28,700,833.33 | | | | $ 53,991,666.67 | | | | $ 53,991,666.67 | | | | $ 26,995,833.33 | | | | $ - | | | | $ - | | | |
| West Transitway | Bayshore to Moodie | | $ 18,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA Update, Design & Tender | $ 2,700,000.00 | 2.5 yrs | | ### | | | $ 1,080,000.00 | | | | $ 1,080,000.00 | | | | ### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 15,300,000.00 | 2.3 yrs | | | | | | | | | | | | | $ 5,100,000.00 | | | | $ 6,800,000.00 | | | | ######### | | | | | | | | | | | | | | | | | | | | | |
| | | | | | $ 270,000.00 | | | | $ 1,080,000.00 | | | | $ 1,080,000.00 | | | | $ 5,370,000.00 | | | | $ 6,800,000.00 | | | | $ 3,400,000.00 | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | |
| SW Transitway | Baseline to Norice | | $ 185,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design | $ 1,520,000.00 | 1 yr | | | | | $ 1,520,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 183,480,000.00 | 1.5 yrs | | | | | | | | | $ 122,320,000.00 | | | | ######### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | $ 1,520,000.00 | | | | $ 122,320,000.00 | | | | $ 61,160,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SW Transitway | Fallowfield to Barrhaven TC | | $ 46,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design | $ 3,000,000.00 | underway | ######### | | | | ######### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 43,000,000.00 | 2.5 yrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | $ 12,900,000.00 | | | | $ 17,200,000.00 | | | | $ 12,900,000.00 | | | |
| | | | | | $ 1,500,000.00 | | | | $ 1,500,000.00 | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | | $ - | | | | $ 12,900,000.00 | | | | $ 17,200,000.00 | | | | $ 12,900,000.00 | | | |
| Strandherd / Armstrong | Bridge & Strandherd BRT | | $ 30,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | | underway | $ - | | | | $ - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction | $ 30,000,000.00 | 1.8 yrs | | | | | | | | | $ 17,142,857.14 | | | | $ 12,857,142.86 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | $ - | | | | $ - | | | | $ 17,142,857.14 | | | | $ 12,857,142.86 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Interim O-Train | Greenboro to Leitrim | | $ 45,000,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Design & Tender | $ 6,750,000.00 | 1.5 yrs | | | | | $ 4,500,000.00 | | | | ######### | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Construction & Commissioning | $ 38,250,000.00 | 0.8 yrs | | | | | | | | | | | | | ######### | | | | ### | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | $ 4,500,000.00 | | | | $ 27,750,000.00 | | | | $ 12,750,000.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL ANNUAL SPRENDING | | | $ 1,728,000,000.00 | | $ 4,561,666.67 | | | | $ 16,433,333.33 | | | | $ 181,877,857.14 | | | | $ 109,077,142.86 | | | | $ 171,965,833.33 | | | | $ 323,237,500.00 | | | | $ 309,525,833.33 | | | | $ 310,558,333.33 | | | | $ 287,862,500.00 | | | | $ 12,900,000.00 | | | | $ - | | | |




*Notes:* *Cost estimates are based on 2007 Dollars*
*Costs estimates do not include allowance for property requirements*

# APPENDIX B – Description of Evaluation Criteria

| Criteria | Description |
|---|---|
| System ridership estimate | The annual ridership was estimated for 2031 assuming only Phase 1 Transit Infrastructure was in place for each of the four scenarios as well as the planned roadway infrastructure.<br>• The TRANS Model provided an estimate 2031 AM peak hour ridership for the Council Approved Option 4 – without LRT extensions beyond the greenbelt to Orleans/Cumberland, Kanata/Stittsville and Barrhaven. Further analysis of the individual rapid transit lines provided details on the growth in ridership with various investment strategies in rapid transit infrastructure. Previous analysis of Option 4 indicated with full development of the rapid transit system as proposed as well as the supplementary transit network a system wide annual ridership of 170M was achievable.<br>• Phase 1 investment strategies for each of the four options provide different interim solutions in resolving the downtown bus congestion issues and consequently the levels of ridership potential achieved for each of the four scenarios reveal variations in the ability to grow ridership over the planning horizon to 2031 with implementation of the Phase I infrastructure only. The impact and ability to resolve emerging bus congestion issues (short turning buses, higher proportion of articulated buses) are reflected in the overall system ridership estimates for each of the four scenarios. |
| Capital cost per passenger-km | The ratio of capital cost to passenger-km provides a comparative measure of the total capital investment for each of the Phase 1 scenarios against the benefits in terms of passenger-kilometers of travel (system usage) on various elements of the Phase 1 transit infrastructure.<br>• The capital cost of Phase I Transit Infrastructure for each scenario has been calculated and is included in Appendix A.<br>• The passenger-kilometers associated with each of the Phase I Infrastructure investment strategies for the four scenarios were estimated through a detailed analysis of the forecast AM peak hour ridership estimates (2031) on individual rapid transit segments and aggregated to reflect travel across various segments of the Phase I rapid transit infrastructure. This approach in using passenger-kilometers allows for differentiating between high ridership serving longer distance trips versus similar riders over shorter distances.<br>• It should be noted that the estimate of Passenger-km for the AM peak hour is expanded to reflect annual usage as well as to represent the period of operation within the planning horizon (i.e. 2018 to 2031). It is understood that this period (approximately 13 years) underestimates the typical service of the infrastructure and consequently further analysis beyond the planning horizon would reduce the cost to benefit ratio. However, the purpose of the ratio is to provide a relative measure among each of the Phase 1 Scenarios being evaluated at the end of the panning period 2031. |
| Operating cost per passenger-km | The operational cost alone does not provide a fair comparison between scenarios because of the different number of riders being accommodated. Operating cost per passenger-km is used to measure how well spent the operating dollars would be in terms of system usage. For instance, a corridor that has low ridership and is expensive to operate will show a higher cost |

| Criteria | Description |
|---|---|
| | per passenger-km.<br>• The annual operating costs (system wide) were estimated for the 2031 horizon year if only Phase I Transit Infrastructure is constructed.<br>• The average trip length of 12 km was estimated by dividing Ottawa's passenger-km by its city-wide ridership in 2031 for the full LRT/BRT network implementation. This number was verified with OC Transpo's operating statistics in 2007 which shows an average trip length of 11.1km.<br>• The annual system wide passenger-km was determined for each scenario in 2031. This was calculated using the system ridership estimate (criterion #1) multiplied by the average trip length.<br>• Finally, the annual operating cost in 2031 was divided by the annual passenger-km in 2031 to obtain the operating cost per passenger-km in 2031 |
| Operating cost savings | This criterion compares each of the 4 scenarios with the All Bus Scenario (base case). The cost savings calculated include the accumulated cost savings from the opening of the LRT until the 2031 planning horizon.<br>• The operational costs were determined in 2018 (opening) and 2031 (planning horizon) for each scenario<br>• The operational costs were also determined for the all bus scenario (base case)<br>• Compare Savings in operating costs between the All Bus Scenario and each proposed phasing scenario<br>• Sum up savings from when the LRT becomes operational to 2031 |
| Travel time savings (per passenger per year) | The theoretical time savings that have been calculated compare the travel times once phase 1 infrastructure has been constructed with the existing travel times on the rapid transit system.<br>• Assume BRT and LRT average operational speeds are the same therefore conversion of Transitway to LRT does not result in any time savings.<br>• Assumed average operating speed:<br>  ○ Existing roads = 20 KM/hr,<br>  ○ Rapid Transit = 35 Km/Hr,<br>  ○ Downtown = 15 KM/Hr.<br>• The length of each rapid transit segment to be constructed is known. The theoretical travel time per passenger is determined for each link by multiplying the average operational speed by the length of the segment. This is done with both the existing and future operating speeds. The difference is the time saved on that link.<br>• The total passenger time savings per link is calculated by multiplying the time savings determined above by the riders that are on the link in 2031 (passenger min saved per pk hr).<br>• The total passenger time savings due to phase 1 infrastructure is determined by summing the passenger time savings on all the links (total passenger savings per pk hr)<br>• The time savings per peak hour is then converted into annual time savings (Assume pk hr savings x 4 x 200 = annual time savings, i.e. time savings are only during peak periods). This represents the total passenger time savings in a year |

| Criteria | Description |
|---|---|
| | • The annual number of passenger trips on rapid transit has been previously determined.<br>• The time saved per passenger trip is calculated by dividing the total passenger time savings per year by the annual number of passengers on rapid transit.<br>• Assuming a person completes 2 trips per day, and works 225 days a year (250 weekdays - 25 days holiday), then a person completes 450 trips per year.<br>• The travel time savings per passenger per year is then calculated by multiplying the time savings per passenger trip by the 450 trips per year. |
| Increased Reliability | With construction of rapid transit segments, it is assumed that there will be an increase in reliability due to the elimination of general traffic impedances.<br>• Determine passenger-km on phase 1 rapid transit infrastructure using the EMME model assignment results<br>• Determine passenger-km on entire system in Ottawa using the EMME model<br>• Calculate the % of passengers-km on Rapid Transit out of the entire system |
| Quality of ride | It is assumed that LRT is more comfortable and provides an enhanced quality of ride compared to buses. Therefore the more passenger-km that are being accommodated on LRT, the more benefit to customers because of a more comfortable service.<br>• Determine passenger-km on phase 1 LRT infrastructure using the EMME Model<br>• Determine passenger-km on entire system in Ottawa using the EMME Model<br>• Calculate % of passengers km on LRT out of the entire system |
| Convenient access to rapid transit | The more station that are built, the easier it is to access the rapid transit network. This criterion counts the number of new rapid transit stations (BRT or LRT) that will be constructed as part of phase 1.<br>• # of NEW rapid transit stations in phase 1 |
| GHG reductions from transit system<br><br>[CO2] | Based on the calculated annual service vehicle-km for each scenario, this criterion compares each scenario with the All Bus Scenario (Base Case). Since the LRT is electrically powered, the more LRT, the larger the GHG savings.<br>• Determine GHG in 2018 & 2031: Total system vehicle service km's multiplied by CO2 emission factors for each vehicle type (Source: HLB Decision Economics inc.)<br>• Compare with All Bus Scenario (Base Scenario)<br>• sum up savings from 2018 to 2031 |
| Emission reductions from transit system<br><br>[Particulate Matter (PM)] | Based on the calculated annual service vehicle-km for each scenario, this criterion compares each scenario with the All Bus Scenario (Base Case). Since the LRT is electrically powered, the more LRT, the larger the PM savings.<br>• Determine PM in 2018 & 2031: Total system vehicle service km's multiplied by PM emission factors for each vehicle type (Source: HLB Decision Economics inc.)<br>• Compare with All Bus Scenario (Base Scenario)<br>• sum up savings from 2018 to 2031 |
| Buses removed from Albert and Slater Streets | This criterion evaluates the percentage of buses that can be removed from Albert/Slater during peak periods for each scenario (Including deadheading buses)<br>• Experience has proven that 180 buses per hour can be operated in both directions on |

| Criteria | Description |
|---|---|
| | Albert and Slater Streets. This is done by optimizing the signals to allow continuous platoons of 3 of buses to be operated at 55 second cycles. In order to accommodate larger capacities of passengers, larger vehicles would need to be used.<br>• For each scenario, a portion of the buses required to service the demand may not need to travel through the downtown. Instead these buses would take passengers to an LRT transfer station where they can ride the rail into the core area. In some cases, buses would still need to travel through the downtown because of the lack of a suitable transfer station to accommodate the high volumes.<br>• Another element included in determining the reduction of buses on Albert and Slater is the routing of deadhead buses (i.e. buses that have finished their route and are out of service). Many express buses that terminate downtown need to travel back to the garage or to their next route. This can add even more buses in the downtown. |
| Number of mixed-use centres and key employment/ commercial areas served by new Rapid Transit infrastructure | Number of major urban nodes (existing and future) that are adjacent to / connected to Phase 1 Rapid Transit Network<br>• Includes employment areas such as shopping centres, main streets, industrial parks .<br>• Appendix C includes a full listing for each scenario |
| Number of key sites with potential for development or intensification | Number of undeveloped sites and sites with redevelopment potential that are adjacent to / connected to Phase 1 Rapid Transit Network<br>• Includes open spaces, areas with planned redevelopment.<br>• Appendix C includes a full listing for each scenario |
| Percentage of new Phase 1 Rapid Transit infrastructure (length) located inside the Greenbelt | There is a total of 43 Km of LRT and 59 Km of BRT that need to be constructed to complete the 2031 rapid transit network, 42% of which is located inside the greenbelt.<br>• How much of the rapid transit infrastructure constructed in phase 1 is located within the greenbelt? |
| Early LRT implementation | The sooner a portion of the LRT becomes operations, the faster the city can begin to save on emissions and operating costs. In most of the scenarios, the operation of the LRT is dependant on the construction of the downtown tunnel.<br>• Is it possible to operate elements of the LRT before the tunnel begins operation? |
| Degree of change to current service during construction | This criterion attempt to evaluate the degree of disruption to existing transit services<br>• Are there alternate bus routes during conversion of Transitway?<br>• Do existing Transitway stations get bypassed? |
| Availability of rail yard | As described in section 2.2, access to a rail maintenance and storage facility is required. While a number of alternative sites are being considered, the city already has approval for a rail facility in the south end at Bowesville.<br>• Does the scenario have access to an approved rail yard in phase 1? |
| Completion of the Transitway by 2015 | There is a total of 59 km of BRT that need to be constructed by 2031.<br>• What percentage of the 59 km of BRT is constructed in phase 1? |

| Criteria | Description |
|---|---|
| Construction of the downtown transit tunnel | The construction of the downtown tunnel is an important element to allow the city to grow and manage its public transportation. It was previously determined that an at grade transit solution would not be adequate therefore requiring a grade separated alternative. A downtown tunnel was determined to be the appropriate solution.<br>• Does the scenario include a downtown tunnel in phase 1? |
| Implementation of Rapid Transit using the Cumberland Transitway alignment | One of council's priorities was to implement rapid transit using the Cumberland corridor. At the time it was unknown whether it would be BRT or LRT but the approved 2031 plan shows it initially as BRT, with the possibility of conversion to LRT once density targets are reached in Orleans.<br>• Does the scenario include the Construction of rapid transit in the Cumberland corridor in phase 1? |
| Implementation of the LRT to the South-Eastern growth area | One of council's priorities was to implement an LRT service to accommodate the growing community in the southeast. While each scenario does construct a rail service to the southeast growth area, the quality of service provided does differ. Scenarios 1, 2, & 4 include an extension of the current single track diesel O-Train while scenario 3 constructs the twin track electrified LRT facility. |
| Change to revenue/cost ratio | The revenue cost ratio is used to understand how much of the system operations get funded through passenger fares. Currently the city \'s target is to operate at a 50% R/C ratio which means that half is funded through fare payments and half is through government funding. This criterion estimates the future R/C ratio and compares it with the 50% value.<br>• Determine the system ridership for each scenario in 2031<br>• Assume a fare of $1.52 per person<br>• Calculate the revenue by multiplying the system ridership by the assumed fare.<br>• Divide the calculated revenue by the 2031 system operating cost to get the R/C ratio<br>• How does the estimated R/C ratio compare with the existing 50%. |

# APPENDIX C – Evaluation Details

*System ridership estimate*

| | SCENARIO | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| **Ridership on newly constructed Rapid Transit corridors** | | | | |
| 2031 pk hr Ridership on New Rapid Transit Sections | 37,200 | 39,800 | 45,650 | 46,050 |
| 2031 annual Ridership on New Rapid Transit Sections | 78,120,000 | 83,580,000 | 95,865,000 | 96,705,000 |
| **Adjustment for total Rapid Transit system ridership** | | | | |
| Full Rapid Transit Adjustment Factor (Constrained Downtown) | 0.1 | 0.1 | 0.1 | 0.2 |
| Full Rapid Transit Adjustment Factor (Unconstrained Downtown) | 0.2 | 0.2 | 0.2 | 0.2 |
| **Total Rapid Transit System Ridership** | | | | |
| Total Rapid Transit System Ridership in 2031 (Constrained) | 86,800,000 | 92,866,667 | 106,516,667 | 120,881,250 |
| Total Rapid Transit System Ridership in 2031 (Unconstrained) | 97,650,000 | 104,475,000 | 119,831,250 | 120,881,250 |
| **Total Non Rapid Transit Ridership** | | | | |
| 2031 pk hr Ridership on NON Rapid Transit Sections | 17,500 | 17,500 | 17,500 | 17,500 |
| 2031 annual Ridership on NON Rapid Transit Sections | 36,750,000 | 36,750,000 | 36,750,000 | 36,750,000 |
| Adjustment factor (to account for overall reduced volume when not all LRT is built) | 0.9 | 0.9 | 0.9 | 0.9 |
| Adjusted 2031 non rapid transit annual ridership | 33,075,000 | 33,075,000 | 33,075,000 | 33,075,000 |
| **Total System (Rapid & Non Rapid) Transit Ridership** | | | | |
| Total System Annual Ridership in 2031 (Constrained Downtown) | 119,875,000 | 125,941,667 | 139,591,667 | 153,956,250 |
| **Total System Annual Ridership in 2031 (Unconstrained Downtown)** | **130,725,000** | **137,550,000** | **152,906,250** | **153,956,250** |

*Capital cost per passenger-km*

| | SCENARIO | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| Capital Cost (Phase 1 only) | $ 2.05 B | $ 2.44 B | $ 2.70 B | $ 2.51 B |
| Passenger-Km (Rapid Transit) 2018 to 2031 | 4.8 B | 6.7 B | 6.1 B | 8.7 B |
| **Capital Cost per Passenger-Km** | **$ 0.49** | **$ 0.36** | **$ 0.44** | **$ 0.29** |

*Operating cost per passenger-km*

| | SCENARIO | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| Annual System Operating Cost in 2031 | $ 423 M | $ 411 M | $ 409 M | $ 379 M |
| Annual Passenger-Km in 2031 (System Wide) | 1,572 M | 1,632 M | 1,764 M | 1,824 M |
| **Operating Cost per Passenger-Km** | **$ 0.27** | **$ 0.25** | **$ 0.23** | **$ 0.21** |

*Operating cost savings (Compared to All bus Scenario)*

Annual System Operational Costs

| YEAR | ALL BUS | SCENARIO | | | |
|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** |
| 2016 | $ 316 M | $ 294 M | $ 296 M | $ 283 M | $ 265 M |
| 2031 | $ 451 M | $ 423 M | $ 411 M | $ 409 M | $ 379 M |

Scenario 1 saves from $22M to $28M annually over the all bus scenario. With the LRT being operational in 2016 in this scenario, there would be 15 years of savings. (22+28) / 2 x 15 = $375M in savings. Scenario 2 saves from $20M to $40M annually over the all bus scenario and has the LRT in operation by 2017. (20+40) / 2 x 15 - 20 = 430 M. Scenario 3 saves from $33M to $42M over the all bus scenario but has the LRT operational in 2016. This scenario is estimated to save (33+42) / 2 x 15= $563M. Scenario saves the most. It saves from $51M to $72M over the all bus scenario. (51+72) / 2 x 14 - 51 = $810M

| | SCENARIO | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| Savings in 2016 | 22 M | 20 M | 33 M | 51 M |
| Savings in 2031 | 28 M | 40 M | 42 M | 72 M |
| # of Years | 15 years | 14 years | 15 years | 14 years |
| **Operational Cost Savings** | **$ 375 M** | **$ 430 M** | **$ 563 M** | **$ 810 M** |

*Travel Time Savings*

The following represents the number of minutes saved annually compared with today (Base year) for passengers using the rapid transit infrastructure

| | SCENARIO | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| minutes | 130,500,000 | 123,200,000 | 177,000,000 | 176,600,000 |

We have previously estimated the annual number of passenger trips using rapid transit

| | | | | |
|---|---|---|---|---|
| trips | 74,400,000 | 79,600,000 | 91,300,000 | 92,100,000 |

Dividing this out results in the average number of minutes saved per passenger trip using rapid transit

| | | | | |
|---|---|---|---|---|
| minutes | 1.75 | 1.55 | 1.94 | 1.92 |

Assume a person completes 2 trips per day
Assume a person works (250 weekdays - 25 days holiday) 225 days
Therefore a person completes 450 trips per year

Applying this assumption to the time savings calculated above results in the average time savings per person per year on rapid transit compared with today

| **TIME SAVINGS** | SCENARIO | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| minutes | 789 | 696 | 872 | 863 |
| **hours** | **13.2** | **11.6** | **14.5** | **14.4** |

*Increased Reliability*

- Percentage of passenger travel using new system

| | SCENARIO | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| Annual Passenger-Km on Phase 1 Rapid Transit infrastructure in 2031 | 370 M | 514 M | 473 M | 669 M |
| Full system passenger-km in 2031 | 2,092 M | | | |
| **% of passenger-Km using new system** | **18 %** | **25 %** | **23 %** | **32 %** |

*Quality of ride*

- Percentage of passenger travel using LRT Infrastructure

| | SCENARIO | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| Annual Passenger-Km on Phase 1 LRT infrastructure in 2031 | 221 M | 360 M | 280 M | 516 M |
| Full system passenger-km in 2031 | 2,092 M | | | |
| **% of passenger-Km using LRT** | **11 %** | **17 %** | **13 %** | **25 %** |

*Convenient Access to Rapid Transit*

- # of new stations

| SCENARIO | | | | |
|---|---|---|---|---|
| # | 1 | 2 | 3 | 4 |
| 1 | Barr Town Centre | 10th Line | 10th Line | 10th Line |
| 2 | Cyrville | Barr Town Centre | Airport | Barr Town Centre |
| 3 | Didsbury | Frank Kenny | Barr Town Centre | Cyrville |
| 4 | Eagleson | Greenbank | Bowesville | Greenbank |
| 5 | Greenbank | Leitrim | Cyrville | Hospital |
| 6 | Hospital | Lester | Didsbury | Leitrim |
| 7 | Kan Town Centre | Longfields west | Eagleson | Lester |
| 8 | Leitrim | Meadowbrook | Earl Armstrong | Longfields west |
| 9 | Lester | Meadowlands | Frank Kenny | Meadowbrook |
| 10 | Longfields west | Mer Bleue | Greenbank | Meadowlands |
| 11 | Meadowbrook | Moodie | Hospital | Moodie |
| 12 | Meadowlands | Navan Rd | Kan Town Centre | Star Top |
| 13 | Moodie | Portobello | Leitrim | |
| 14 | Scotiabank | Trim | Lester | |
| 15 | Star Top | | Limebank | |
| 16 | | | Longfields west | |
| 17 | | | Meadowbrook | |
| 18 | | | Meadowlands | |
| 19 | | | Mer Bleue | |
| 20 | | | Moodie | |
| 21 | | | Navan Rd | |
| 22 | | | Portobello | |
| 23 | | | Riverside TC | |
| 24 | | | Scotiabank | |
| 25 | | | Spratt | |
| 26 | | | Star Top | |
| 27 | | | Trim | |
| 28 | | | Gladstone | |
| 29 | | | Alert | |
| | **15** | **14** | **29** | **11** |

*GHG reductions from transit system [CO2]*

| | | BUS | | LRT | |
|---|---|---|---|---|---|
| | | Diesel | diesel-hybrid | Diesel* | Electric |
| Emission Rate (g/vkt) | VOC | 1.030 | 0.539 | 0.618 | - |
| | CO | 11.101 | 5.770 | 6.660 | - |
| | NOx | 8.398 | 4.365 | 5.039 | - |
| | SOx | 0.348 | 0.281 | 0.209 | - |
| | PM10 | 0.190 | 0.098 | 0.114 | - |
| | CO2 | 1,318.940 | 751.370 | 791.364 | - |

*Source: HLB Decision Economics inc.*
** O-Train assumed to use 40% less fuel than a transit bus.*
*(http://www.tc.gc.ca/programs/environment/UTSP/otrainlightrailproject.htm)*

| CO2 | SCENARIO | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Kg saved in 2016 | 9,018,200 | 10,764,900 | 11,958,400 | 18,159,500 |
| Kg saved in 2031 | 11,343,100 | 17,666,500 | 16,437,800 | 25,061,100 |
| # of Years | Savings from 2016 to 2031 = 15 years | Savings from 2017 to 2031 = 14 years | Savings from 2016 to 2031 = 15 years | Savings from 2017 to 2031 = 14 years |
| Total Kg saved | 152,709,750 | 202,470,600 | 212,971,500 | 305,995,000 |
| **Tonnes** | **153,000** | **202,000** | **213,000** | **306,000** |

*Emission reductions from transit system [Particulate Matter (PM)]*

| PM10 | SCENARIO | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Kg saved in 2016 | 1,200 | 1,400 | 1,700 | 2,400 |
| Kg saved in 2031 | 1,500 | 2,400 | 2,200 | 3,300 |
| # of Years | Savings from 2016 to 2031 = 15 years | Savings from 2017 to 2031 = 14 years | Savings from 2016 to 2031 = 15 years | Savings from 2017 to 2031 = 14 years |
| Total Kg saved | 20,250 | 27,750 | 29,250 | 40,350 |
| **Tonnes** | **20** | **28** | **29** | **40** |

*Buses removed from Albert and Slater Streets:*

Based on a maximum of 180 buses per hour in the afternoon on both Albert and Slater (this number will remain fixed over future years, though the composition of the numbers between 40-foot and high-capacity buses will change).

For Scenario 2, the LRT West scenario, two options are possible. Council could decide that the routes which approach downtown via the Southeast Transitway end at Hurdman Station, or they could decide not. The routes which approach downtown via the East Transitway would need to operate through into downtown, as for the longer term, the terminal facilities at Hurdman Station would only be sized to accommodate the routes from the Southeast Transitway.

| | SCENARIO | | | | |
|---|---|---|---|---|---|
| | **1** | **2A** | **2B** | **3** | **4** |
| Buses in Service | All 180 of the westbound buses still need to run on Albert, and approximately 40 buses need to run east on Slater to carry customers from the west and on non-Transitway routes. | If the south routes were to end at Hurdman, there would be approximately 120 eastbound buses on Slater, approximately 40 buses need to run west on Albert to carry customers from the east and on non-Transitway routes. | If the south routes were to run through to/from downtown, all 180 of the eastbound buses still need to run on Slater, and approximately 40 buses need to run west on Albert to carry customers from the east and on non-Transitway routes. | The number of westbound buses on Albert would fall to approximately 158, with an estimated one-eighth of the service being replaced by the LRT connection to the south (carrying some customers for Barrhaven and the Carling to Meadowlands area). Approximately 40 buses need to run east on Slater to carry customers from the west and on non-Transitway routes. | Approximately 20 buses will need to run west on Albert and 20 east on Slater on non-Transitway routes. |
| Buses off Service | When they deadhead east for their next trip, the buses for the west will operate via Highway 417 to Hurdman Station and will not run on Slater. | When they deadhead west for their next trip, most of the buses for the east (estimated at 90) will operate via Slater as there is no other feasible route to drive large numbers of buses to Bayview/ LeBreton. | When they deadhead west for their next trip, most of the buses for the east (estimated at 120) will operate via Slater as there is no other feasible route to drive large numbers of buses to Bayview/ LeBreton. | When they deadhead east for their next trip, the buses for the west will operate via Highway 417 to Hurdman Station and will not run on Slater. | The service levels would be balanced and there would be no deadheading buses in the peak hour. |
| Total Bus reduction | The total bus-trips between the two streets would decline from 360 per hour to 220 per hour, which is -39%, say -40%. | The total bus-trips between the two streets would decline from 360 per hour to 250 per hour, which is -31%, say -30%. | The total bus-trips between the two streets would decline from 360 per hour to 320 per hour, which is -11%, say -10%. | The total bus-trips between the two streets would decline from 360 per hour to 178 per hour, which is -45%. | The total bus-trips between the two streets would decline from 360 to 40, which is -90%. |
| **% Bus reduction** | **40%** | **20%** | | **45%** | **90%** |

*Number of mixed-use centres and key employment/ commercial areas served by new Rapid Transit infrastructure*

| MAJOR URBAN NODES | Scenarios | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| **East-West LRT Corridor** | | | | |
| • Centrepointe Town Centre | | ✓ | | ✓ |
| • Algonquin College | | ✓ | | ✓ |
| • College Square Shopping Centre | | ✓ | | ✓ |
| • Lincoln Fields Shopping Centre | | ✓ | | ✓ |
| • Tunney's Pasture | ✓ | ✓ | ✓ | ✓ |
| • LeBreton Flats | ✓ | ✓ | ✓ | ✓ |
| • CBD | ✓ | ✓ | ✓ | ✓ |
| • Rideau/Congress Centre | ✓ | ✓ | ✓ | ✓ |
| • University of Ottawa (main campus) | ✓ | ✓ | ✓ | ✓ |
| • University of Ottawa (Lees campus) | ✓ | ✓ | ✓ | ✓ |
| • Hurdman Station | ✓ | ✓ | ✓ | ✓ |
| • VIA Rail Station | ✓ | ✓ | ✓ | ✓ |
| • St. Laurent Station | ✓ | ✓ | ✓ | ✓ |
| • Cyrville/Transitway node | ✓ | | ✓ | ✓ |
| • Blair Station/Employment Area | ✓ | | ✓ | ✓ |
| **North-South LRT Corridor** | | | | |
| • Carling/Dows Lake Federal Employment Node | | | ✓ | |
| • Carleton University | | | ✓ | |
| • Confederation Heights Federal Employment Node | | | ✓ | |
| • South Keys Shopping Centre | | | ✓ | |
| • Ottawa Macdonald Cartier International Airport | | | ✓ | |
| • Riverside South Town centre | | | ✓ | |
| **West Transitway** | | | | |
| • Scotiabank Place | ✓ | | ✓ | |
| • Kanata Centrum/Town Centre | ✓ | | ✓ | |
| • Bayshore Shopping Centre | ✓ | ✓ | ✓ | ✓ |
| • Pinecrest Shopping Centre | | ✓ | | ✓ |
| **Hospital Link Corridor** | | | | |
| • Ottawa Hospital Campus | ✓ | | ✓ | ✓ |
| **Cumberland Transitway** | | | | |
| • Regional Correctional Facility | | ✓ | ✓ | |
| • Tenth Line Shopping area | | ✓ | ✓ | |
| • Millennium Park | | ✓ | ✓ | |
| **Southwest Transitway** | | | | |
| • Via Rail Station | ✓ | ✓ | ✓ | ✓ |
| • Barrhaven Town Centre | ✓ | ✓ | ✓ | ✓ |
| **Totals** | **17** | **20** | **26** | **20** |

*Number of key sites with potential for development or intensification*

| UNDEVELOPED SITES/SITES WITH RE-DEVELOPMENT & INTENSIFICATION POTENTIAL | Scenarios | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| **East-West LRT Corridor** | | | | |
| • Centrepointe Town Centre | | ✓ | | ✓ |
| • Richmond Road/Westboro | | ✓ | | ✓ |
| • CBC Lanark Site | | ✓ | | ✓ |
| • Tunney's Pasture Intensification | ✓ | ✓ | ✓ | ✓ |
| • Bayview/Somerset Heights Area | ✓ | ✓ | ✓ | ✓ |
| • City Centre Lands | ✓ | ✓ | ✓ | ✓ |
| • LeBreton Flats | ✓ | ✓ | ✓ | ✓ |
| • Nicholas-Main Gateway area | ✓ | ✓ | ✓ | ✓ |
| • Ottawa Train Lands | ✓ | ✓ | ✓ | ✓ |
| • 530 Tremblay Road (Former MTO Yard) | ✓ | ✓ | ✓ | ✓ |
| • Cyrville/Transitway node | ✓ | | ✓ | ✓ |
| • Blair Station Employment | ✓ | | ✓ | ✓ |
| **North-South LRT Corridor** | | | | |
| • Plouffe Park (Federal Warehouse complex) | | | ✓ | |
| • Gladstone/Preston area | | | ✓ | |
| • Carling/Dows Lake Federal Employment district | | | ✓ | |
| • Confederation Heights Federal Employment district | | | ✓ | |
| • Walkley/Bank district | | | ✓ | |
| • Leitrim area | | | ✓ | |
| • Riverside South employment area | | | ✓ | |
| • Riverside South Town Centre | | | ✓ | |
| **West Transitway** | | | | |
| • Kanata West lands (north of Highway 417) | ✓ | | ✓ | |
| • Kanata Town Centre | ✓ | | ✓ | |
| • Pinecrest Shopping Centre/Queensview lands | | ✓ | | ✓ |
| **Hospital Link Corridor** | | | | |
| • Former NDMC Medical Centre Lands | ✓ | | ✓ | ✓ |
| • Ottawa Hospital Campus intensification | ✓ | | ✓ | ✓ |
| • Health Sciences/Bio-Technology Park | ✓ | | ✓ | ✓ |
| • Innes/St. Laurent district lands | ✓ | | ✓ | ✓ |
| • Innes Road Corridor (west of Highway 417) | ✓ | | ✓ | ✓ |
| • Innes Road 'Big Box' area (East of Highway 417) | ✓ | | ✓ | ✓ |
| **Cumberland Transitway** | | | | |
| • South Orleans/Cumberland | | ✓ | ✓ | |
| **Southwest Transitway** | | | | |
| • Barrhaven Town Centre | ✓ | ✓ | ✓ | ✓ |
| **Totals** | **18** | **13** | **27** | **20** |

*Percentage of new Phase 1 Rapid Transit infrastructure (length) located inside the Greenbelt*

| SECTION LIMITS | LENGTH (m) | 2031 | SCENARIO | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| Baseline to Norice | 1200 | in | ✓ | ✓ | ✓ | ✓ |
| Blair to Innes/Blair | 2300 | in | ✓ | ✓ | ✓ | ✓ |
| Bayshore to Moodie | 2600 | out | *x* | *x* | *x* | *x* |
| Fallowfield to Strandherd P&R | 3000 | out | *x* | *x* | *x* | *x* |
| Lycée Claudel to Hospital | 1500 | in | ✓ | | ✓ | ✓ |
| Eagleson to Terry Fox | 2150 | out | *x* | | *x* | |
| Terry Fox to Scotiabank Place | 3100 | out | *x* | | *x* | |
| Hospital to Innes/Blair | 4825 | in | ✓ | | ✓ | ✓ |
| Bayview to Bronson | 1275 | in | ✓ | ✓ | ✓ | ✓ |
| Tunney's Pasture to Bayview | 1300 | in | ✓ | ✓ | ✓ | ✓ |
| Campus to Hurdman | 2000 | in | ✓ | ✓ | ✓ | ✓ |
| Bronson to Campus (tunnel) | 2500 | in | ✓ | ✓ | ✓ | ✓ |
| Hurdman to St Laurent | 2600 | in | ✓ | ✓ | ✓ | ✓ |
| St Laurent to Blair | 2700 | in | ✓ | | ✓ | ✓ |
| Lincoln Fields to Pinecrest | 1700 | in | | ✓ | | ✓ |
| Innes/Blair to Navan | 4500 | out | | *x* | *x* | |
| Navan to Millennium | 8800 | out | | *x* | *x* | |
| Tunney's Pasture to Dominion | 2300 | in | | ✓ | | ✓ |
| Lincoln Fields to Baseline | 3000 | in | | ✓ | | ✓ |
| Dominion to Lincoln Fields | 4000 | in | | ✓ | | ✓ |
| Norice to Hunt Club | 1500 | in | | | | |
| Airport | 2500 | out | | | *x* | |
| Bowesville to Riverside South TC | 3650 | out | | | *x* | |
| Greenboro to Bowesville | 7000 | out | | | *x* | |
| Bayview to Greenboro | 7800 | in | | | ✓ | |
| Strandherd P&R to Barrhaven TC | 800 | out | *x* | *x* | *x* | *x* |
| Kanata West | 5300 | out | | | | |
| Barrhaven to Cambrian | 2500 | out | | | | |
| Place d'Orléans to Trim | 3500 | out | | | | |
| Kanata North | 6000 | out | | | | |
| Riverside South to Barrhaven (no bridge) | 6950 | out | | | | |
| **Total** | **104,850** | **41%** | **66%** | **55%** | **44%** | **84%** |

✓– included in phase & inside greenbelt  *x* – included in phase but outside greenbelt

*Early LRT implementation*

Can elements of the LRT be constructed before tunnel operation?

| SCENARIO | | | |
|---|---|---|---|
| **1** | **2** | **3** | **4** |
| The LRT would not become operational without the tunnel. It would be difficult to transfer all passengers from LRT onto buses at Hurdman if the LRT did not continue into the tunnel | The LRT would not become operational without the tunnel. It would be difficult to transfer all passengers from LRT onto buses at Tunney's Pasture and Bayview if the LRT did not continue into the tunnel | The portion of the NS LRT between Bayview and Riverside South can be operational before the tunnel is complete. Passengers would transfer to Bus to access the downtown as they do today | LRT would not become operational without the tunnel. It would be difficult to transfer all passengers from LRT onto buses at Tunney's Pasture, Bayview and Hurdman if the LRT did not continue into the tunnel |

*Length of BRT that can be implemented before tunnel*

| | SCENARIO | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| Km of phase 1 BRT | 20.7 | 24.1 | 34.0 | 17.1 |

*Availability of rail yard*

(Is there an approved rail facility adjacent the LRT route?)

| SCENARIO | | | |
|---|---|---|---|
| **1** | **2** | **3** | **4** |
| There is no approved rail facility adjacent to the LRT | There is no approved rail facility adjacent to the LRT | There is an approved rail facility at Bowesville Station | There is no approved rail facility adjacent to the LRT |

*Completion of the Transitway by 2015*

Of the 63.5 km of Transitway what percentage is constructed in phase 1

| SCENARIO | | | |
|---|---|---|---|
| **1** | **2** | **3** | **4** |
| 20.7 / 63.5 = 33% | 24.1 / 63.5 = 38% | 34 / 63.5 = 54% | 17.1 / 63.5 = 27% |

*Construction of the downtown transit tunnel*

All Scenarios include the construction of a downtown LRT Tunnel

*Implementation of Rapid Transit using the Cumberland Transitway alignment*

There was previous direction to complete the Cumberland Transitway. If it is being constructed as a phase 1 project, then it will score higher than if it to be constructed later in the plan

Both Scenarios 2 & 3 include the construction of the Cumberland Transitway as part of the first phase while scenarios 1 and 4 construct this segment in phase 3.

*Implementation of the LRT to the South-Eastern growth area*

With rapid growth in the south-eastern growth area, (i.e. south of the greenbelt and east of the Rideau river) council has directed staff to implement LRT to this area.

In the 4 scenarios, transit services are being modified to accommodate these people. In scenarios 1, 2 & 4, the O-train is being extended from its current terminus at Greenboro Station to the future Park and Ride lot to be located at Leitrim Road. Scenario 3 includes the construction of the twin track electric LRT facility into the Riverside South Town Centre.

Scenario 3 is rated better than the rest since it can provide an enhanced service compared to the O-Train extension. It better services the development area with improved reliability and at reduced frequencies.