**Report to/Rapport au :**

**Transit Commission /**
**Commission du transport en commun**

## and Council / et au conseil

**8 June 2011 / le 8 juin 2011**

**Submitted by/Soumis par : Nancy Schepers, Deputy City Manager/**
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| City-wide/ a l'échelle de la ville | Ref N°: ACS2011-ICS-TRA-0013 |

**SUBJECT:** **BUSINESS CASE FOR O-TRAIN SERVICE EXPANSION**

**OBJET :** **ANALYSE DE RENTABILISATION POUR L'ACCROISSEMENT DU SERVICE SUR L'O-TRAIN**

**REPORT RECOMMENDATION**

**That the Transit Commission recommend Council increase the capital authority of OC Transpo's Additional Used Talent Train Capital Account (#905979) to $59 million from $3.63 million with a corresponding increase to debt authority of $55.37 million, in order to increase the current frequency of the O-Train from 15 minutes to 8 minutes.**

**RECOMMANDATION DU RAPPORT**

**Que la Commission du transport en commun recommande au Conseil d'accroître de 3,63 M$ à 59 M$ les dépenses d'immobilisation autorisées du compte d'immobilisation (n$^{o}$ 905979) d'OC Transpo pour le train Talent usagé**

**supplémentaire, avec une augmentation correspondante de 55,37 M$ de la dette autorisée, de façon à faire passer la fréquence du O-Train de 15 minutes actuellement à 8 minutes.**

BACKGROUND

The O-Train has operated successfully since its introduction as a pilot project on October 15, 2001. The Bombardier Talent diesel-powered trains operate seven days a week in an eight-kilometre corridor between the Greenboro and Bayview Transitway stations. Today, the O-Train is one of the City's most important public transit links, especially for customers traveling north and south. Each of the three trains has surpassed one million kilometres of service, and the O-Train's historical passenger count is quickly approaching 10 million. The O-Train pilot project's initial ridership target was 5,100 to 6,400 customer trips per day; actual ridership has now reached more than 12,000 customer trips per day. Growing demands, along with the requirement to enhance non-Transitway service corridors during east-west LRT construction, highlight the need to increase the frequency and capacity of the O-Train service.

In the 2011 OC Transpo Business Plan, approved by the Transit Commission (March 23, 2011) and Council (April 13, 2011) staff committed to providing the Transit Commission with a business case for O-Train service expansion, focusing on three key benefits:

1. Increased O-Train capacity to relieve transit service demands between Hurdman Station and downtown during future construction of the east-west LRT line, and to reduce the corresponding costs of bus acquisitions and operation;
2. Increased O-Train capacity to meet growing demand that is now approaching current limits, partly due to the success of the Carleton University U-Pass program; and,
3. Increased O-Train frequency to reduce wait times and attract new customers, including those who now travel into or through downtown on the Transitway via Hurdman Station.

As one of the busiest transit hubs in the City, the closure of Hurdman Station as part of the light rail transit construction program will have a significant impact, and expanded O-Train service represents a significant opportunity to provide a reliable north-south transportation option to residents during this time.

OC Transpo modeling has confirmed that over 5,000 daily transit riders traveling from the south end through the city's downtown core via Hurdman Station could travel more quickly to their destination if they were routed via the O-Train line through Bayview Station.

In the busiest hour of the morning peak period, over 200 buses run west through Hurdman Station. There are also significant numbers of buses running east through

Hurdman, as well as terminating at Hurdman and returning east or south.

Expanding the O-Train service, as outlined in this report, would reduce bus traffic at Hurdman Station by approximately 6 per cent during the morning peak. This represents a significant reduction in congestion and would be a positive step towards greater service reliability.

Further, over 3,000 additional daily transit riders travelling from the west to Carleton University and points south would benefit from being re-routed to the O-Train line with its increased level of service.

While the planned expansion of Highway 417 will provide new east-west bus-only lanes, it does not fully relieve the mobility challenge presented by the closure of Hurdman Station. Re-routing these passengers to the expanded O-Train service - with increased capacity and eight-minute service frequencies - would provide a valuable alternative.

In the 2011 Business Plan, OC Transpo expressed an option to acquire a fourth Bombardier Talent train on the used market, to provide an additional train and improve the reliability of service. However, collaborative efforts with Bombardier led to the conclusion that a used Talent train was not available for purchase, nor is one likely to become available. In view of this circumstance, and in view of the critical need to preserve transit service reliability and capacity during east-west LRT construction, the City is facing a requirement to provide reserve operational capacity in case of an unscheduled withdrawal of a Talent train from service—in other words, offer replacement bus service for an out-of-service Talent.

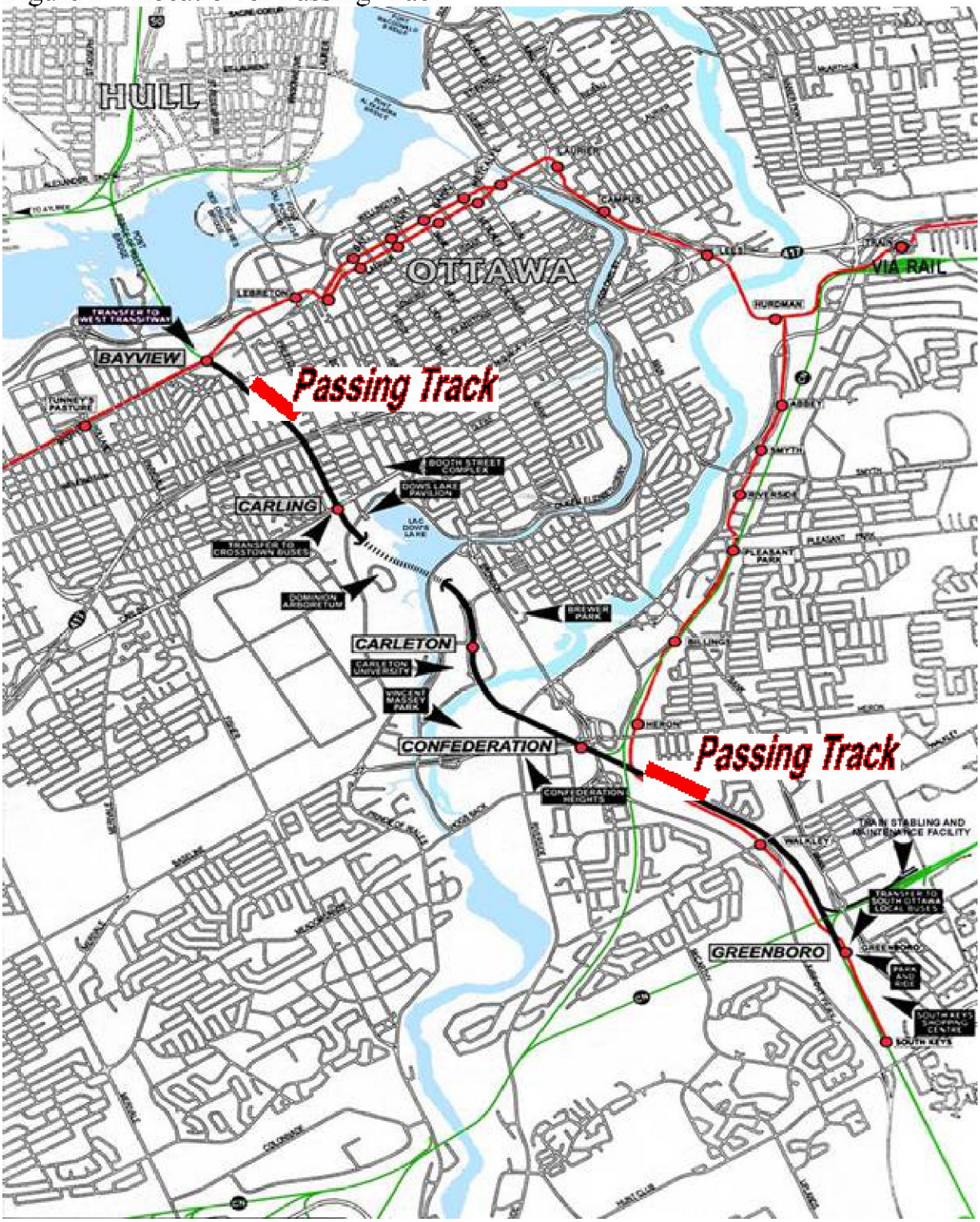
The economic analysis in this report estimates the cost of this capacity (in net present value terms) to be approximately $4.5 million, which exceeds the amount set aside in Budget 2011 to purchase a used Talent train.

Recognizing the parameters above, and the Business Plan commitments, this report recommends an approach to expanding O-Train service that meets short and mid-term needs related to service frequency and capacity, while providing service comparable to the planned electric north-south light rail line (Bayview to South Keys) by 2014, a decade earlier than previously planned. It would also permit the potential extension of high-frequency light rail service south of Greenboro Station without the need for electrification, even though doing so would preclude some benefits of electrification including the potential for better urban integration at stations.

This report discusses the following key elements of the O-Train service expansion proposal:

- Acquisition of six new diesel multiple-unit (DMU) trains to permit concurrent operation of four trains in peak periods, with two spare trains (including one "hot spare" ready to enter service if needed), beginning in 2014;
- Construction of two new passing tracks and signalling infrastructure along the O-Train line at Gladstone Avenue and south of Brookfield pedestrian pathway crossing (see Figure 1);
- An increase in peak service frequency from 15 minutes to approximately 8 minutes (which is lower than the 10-minute frequency estimate in the 2011 Business Plan), yielding an increase in peak capacity of at least 80% (from 1,100 to over 2,000 passengers per hour in each direction—a further increase from 1,800 customers per hour in each direction estimated in the Business Plan);
- Upgraded O-Train station facilities to improve accessibility and customer convenience; and
- Expanded and upgraded maintenance facilities to accommodate the larger DMU fleet.

Figure 1 – Location of Passing Track




The $59-million cost of the recommended O-Train service expansion can be supported by the reallocation of $3.63 million from the existing O-Train train purchase budget. The requested budget increase of $55.37 million will be offset by future cost efficiencies and revenues, including:

- A reduction in the cost of transit service mitigation during east-west LRT construction;
- Revenue from the sale of the current Bombardier trains, and avoidance of major costs to refurbish and overhaul those aging vehicles;
- Reduced requirements for growth of OC Transpo's bus fleet and operations in other corridors; and
- Revenue from increased transit ridership attributable to the improved quality of O-Train service.

The financial analysis reveals that, from 2011 through the first 10 years of operation (i.e. from 2011 through 2024), the capital and operating costs of O-Train expansion would have a neutral net present value (within the project's recommended margin of contingency) compared to the "base scenario" represented by continued operation of the current O-Train service.

Approval of this report's recommendations by the Transit Commission and Council would enable expanded O-Train service to begin by September 2014 – well in advance of the closing of Hurdman Station envisioned for 2015.

DISCUSSION

## Overview

This section of the report contains the following elements:

- A description of the base scenario, involving operation of three existing Talent trains in the north-south corridor from 2011 until planned electrification in 2024-2025;
- A description of the O-Train service expansion scenario, involving replacement of the three Talent trains with six new DMUs in 2014 to provide greater frequency and capacity, and their operation until planned electrification in 2024-2025;
- An economic comparison of the base scenario and O-Train service expansion scenario;
- A summary of key risks and opportunities; and
- A recommended approach to train procurement.

## Base Scenario

This scenario is consistent with the City's Transportation Master Plan, Budget 2011 and OC Transpo's 2011 Business Plan.

*Rolling Stock*
The City would keep its three Talent trains until the planned electrification of the north-south LRT line in 2024-2025, then dispose of them. As noted previously, it is not possible to acquire a fourth used Talent train as proposed in the 2011 Business Plan.

*Operations*
From 2011 to 2023, the O-Train would operate as it does today between Bayview and Greenboro with two active trains and 15-minute headways.

*Maintenance*
In addition to regular running maintenance, the three current Talent trains are scheduled for a major refurbishment and overhaul in 2014-2015, and a subsequent overhaul in 2020. Other track, signal and station maintenance activities would continue.

*Fixed Infrastructure*
Current O-Train stations would receive minor upgrades as per Budget 2011. Rehabilitation of the Rideau River Bridge is scheduled to occur in the summer of 2013.

*Other Impacts on Service*
Because it is not possible to preserve transit service reliability and capacity by acquiring a fourth Talent train, it would be necessary to provide additional bus service parallel to the O-Train corridor whenever a Talent train is unexpectedly withdrawn from service (estimated to be about 15% of the time as the Talents continue to age). In addition, the base scenario includes two periods of transit service mitigation. First, during work on the Rideau River Bridge in the summer of 2013, the O-Train will be shut down for 14 to 16 weeks; replacement bus service will be required during that period. Second, during east-west light rail construction over 2014-2018, the shutdown of the Transitway north of Hurdman Station will require the short-term acquisition of about 118 buses and additional operating costs of about $152 million over five years.

<u>O-Train Service Expansion Scenario</u>

This scenario would improve O-Train frequency and reliability, support the mitigation requirements of east-west LRT construction, increase ridership and reduce long-term operating and capital costs.

*Rolling Stock*
The City would decommission its three Talent trains and replace them with six new trains in 2014, in time to provide service mitigation for the Transitway closure north of Hurdman Station. The estimated cost of new trains is based on a market reference price derived from information provided by proponents in the City's recent call for Expressions of Interest.

*Operations*
Current O-Train operations between Bayview and Greenboro would continue from 2011 until September 2014, when expanded O-Train service begins with four active trains, a 13-minute end-to-end travel time (one minute more than today, due to additional passing requirements), and eight-minute intervals between trains (a reduction from 15 minutes today).

The O-Train's reliability would improve due to the constant availability of one "hot

spare" to enter service if another train has mechanical problems. O-Train capacity would also grow by over 80% from 1,100 to over 2,000 passengers per hour, per direction—which would be enough to carry the ridership growth resulting from the line's increased frequency, the diversion of customers from the Southeast Transitway during east-west LRT construction, and general citywide transit growth through and beyond 2024. New transit riders attracted to OC Transpo because of the more attractive O-Train service (estimated to comprise 20% of the total future growth in O-Train passengers) will also generate additional revenues to offset the costs of expansion.

*Maintenance*
In addition to regular running maintenance of the three Talent trains until 2014, and six new trains after 2014, the new trains would require a lifecycle overhaul by 2020. Track and signal maintenance, and rail traffic control, after 2014 would have to increase from today's levels, due to the additional signalling infrastructure and increased activity of four in-service trains.

*Fixed Infrastructure*
Rehabilitation of the Rideau River Bridge will occur in the summer of 2013. During the required shutdown period of 14 to 16 weeks, work would also be undertaken to install two additional passing tracks with required signals, and to upgrade stations. The expansion and upgrading of the Walkley maintenance facility can start before the line closure and be completed after the O-Train operation resumes.

There is some risk associated with the need for Transport Canada approval of O-Train operation with three passing points (rather than the current single passing point) but a contingency for additional safety measures has been incorporated into the cost estimates presented in the next section. The need for additional noise mitigation measures due to increased levels of O-Train activity will be assessed, but recent advances in vehicle technologies and European regulations mean that the new DMUs will have lower levels of engine noise and emissions than the Talents in service today.

*Other Impacts on Service*
The O-Train service expansion scenario includes two episodes of transit service mitigation. The first, (identical to the base scenario) is during work on the Rideau River Bridge in the summer of 2013, when the O-Train will be shut down for 14 to 16 weeks. The second, is during east-west light rail construction over 2014-2018, when the O-Train's greater frequency and capacity will reduce the operating costs of required transit service mitigation from $152.2 million to $133.7 million. The expanded O-Train service would eliminate the base scenario's requirement for reserve bus capacity to maintain reliability in case a Talent train is unexpectedly withdrawn from service. In addition, the extra capacity of the expanded O-Train line would eliminate growth-related requirements for some of the high-capacity buses which were to have been purchased in

2014, resulting in a capital investment saving of $6.8 million and an annual operational saving of $1.1 million (both in 2011 dollars).

On a daily basis, O-Train expansion would reduce the equivalent demand for 12 articulated buses per hour through Hurdman Station. It would also support a gradual increase of transit modal share in the north-south corridor, in line with the recent service improvements in the Leitrim and River Road areas and the forthcoming completion of the Strandherd-Armstrong Bridge; future origin-destination surveys would provide more information on this particular aspect.

Economic Comparison of Base Scenario and O-Train Service Expansion Scenario

The following table summarizes results of the net present value analysis of the relative benefits and costs of the proposed O-Train service expansion scenario, compared to the base scenario. The analysis uses a 13-year planning horizon from 2011 to 2024, which includes 10 years of expanded operation with the new trains. The analysis reveals an expected net present value cost of $2.9 million for the O-Train expansion, which is within the recommended project contingency of $4.6 million; excluding the contingency, the project would be expected to return a net benefit of $1.7 million.

**Financial Comparison of Base Scenario and O-Train Expansion Scenario:**
**Net Present Value Benefit (cost) of O-Train Expansion Scenario (millions / 2011 dollars)**

| Scenario Element | Base Scenario | Expansion Scenario | Net benefit (cost) of Expansion Scenario | Notes |
|---|---|---|---|---|
| **Rolling Stock** | 0.2 | 6.0 | 5.8 | Residual value of Talent trains (2024 for base; 2014 for expansion) |
| | - | (34.6) | (34.6) | Purchase 6 replacement DMUs (2014; includes parts, quality assurance, etc.) |
| | - | 10.1 | 10.1 | Residual value of replacement DMUs (2024) |
| **Operations** | (17.1) | (29.1) | (12.0) | Annual operation (2014-2023) |
| | - | 6.3 | 6.3 | Revenue change |
| **Maintenance** | (27.1) | (30.9) | (3.8) | Annual maintenance (2014-2023) |
| | (7.6) | (5.6) | 2.0 | Life-cycle overhauls |
| **Fixed Infrastructure** | (1.0) | (12.2) | (11.2) | Station upgrades (both scenarios); O-Train expansion (2013; includes tracks, signals, maintenance facility, noise mitigation) |
| **Other Impacts on Service** | (152.2) | (134.2) | 18.0 | Service mitigation during east-west LRT construction (2014-2018) |
| | - | 16.5 | 16.5 | Reduction in bus fleet and operations |

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|---|---|---|---|---|
| | | | | requirements (2014-2024) |
| | (4.5) | - | 4.5 | Service mitigation during extra maintenance periods for Talent trains (2014-2024) |
| **SUBTOTAL** | **(209.3)** | **(207.6)** | **1.7** | |
| **CONTINGENCY** | **-** | **(4.6)** | **(4.6)** | Environmental assessment, regulatory requirements, currency conversion, project management |
| **TOTAL** | **(209.3)** | **(212.2)** | **(2.9)** | |

Train Procurement

The O-Train service expansion scenario involves the purchase of six new DMU trains to replace the three in-service Bombardier Talent trains that are no longer produced and are unavailable on the used market.

The new trains must operate on the existing line without major station modifications, have compatibility with the existing maintenance facilities and resources, and be delivered on a schedule that supports Ottawa's east-west LRT construction program. Trains must be currently in production and must meet a delivery deadline of January 31, 2014. As well, the trains must meet the specifications set out by Deutsche Bahn (the German national railway company), and must have been in service for at least five years in an operating environment equivalent to that of Deutsche Bahn. The trains must offer the same basic specifications as the Bombardier Talent trains that have been proven in Ottawa over the last 10 years, allowing OC Transpo to offer continued reliability and assure Transport Canada of proven safety standards, while also permitting subsequent service expansion with additional trains or (if needed) a blend of Talents and new European-specification trains.

An Expression of Interest (EOI) for the Potential Expansion of O-Train Service was posted on MERX by Supply Branch on Monday May 16, 2011, with responses requested by Wednesday June 1, 2011. The EOI was designed to be an information-gathering exercise and included relevant background information, operational requirements, and participation instructions. Its purpose was to identify vendors that could supply trains by 2014 that meet the O-Train operational requirements. Four Expressions of Interest were received, indicating that there is competition in the marketplace. As a result, the City will proceed with a detailed Request for Proposal (RFP) for the purchase of six new DMU trains.

Opportunities and Risks

The key opportunities and risks associated with the recommended O-Train service expansion are summarized in the following points:

- Infrastructure work required for O-Train service expansion can be performed during the scheduled O-Train shutdown for the Rideau River Bridge rehabilitation in 2013, and requires no additional service mitigation;
- O-Train service expansion reduces the risks and costs of service mitigation during east-west LRT construction, while maximizing service for transit riders during that period;
- Additional O-Train capacity and frequency will allow operational efficiencies and attract new riders in years prior to scheduled electrification of the north-south light rail corridor;
- The requirement for O-Train maintenance facility expansion within the Walkley yard presents no incremental risk beyond what the City faces today as it negotiates a long-term lease of that property from Canadian Pacific Railway;

- O-Train service expansion does not create barriers to the planned electrification of the north-south LRT line, nor to the extension of light rail service south of Greenboro Station; and
- Other risks relating to environmental assessment requirements, regulatory requirements, Euro currency conversion and project management have been addressed through a general project cost contingency of $4.6 million in the financial analysis.

## ENVIRONMENTAL IMPLICATIONS

Any new train purchased will meet current Canadian regulatory requirements for emissions. Technological advances since the acquisition of the in-service Bombardier Talents have led to rail engines that are both quieter and cleaner, with lower emissions of greenhouse gases (carbon monoxide, hydrocarbons and nitrous oxides) and particulate matters.

## RURAL IMPLICATIONS

N/A

## CONSULTATION

N/A

## COMMENTS BY THE WARD COUNCILLOR

N/A

## LEGAL/RISK MANAGEMENT IMPLICATIONS

In order to proceed with the construction of the sidings at Brookfield and Gladstone, a Schedule "B" Environment Assessment will be required under Ontario's *Environmental Assessment Act*. This can be completed within a few months. A screening report under the *Canadian Environmental Assessment Act* will not be required, provided that the sidings are beyond 30 metres of Sawmill Creek.

Notice will be required to be sent to anyone whose drainage may be affected by the works.

Legal Service will need to conduct a review to ensure that there is no provision in any agreement restricting the level of services or the location where the sidings are to be

constructed. This will be done prior to any contract being entered into by the City.

A review of any labour relations implications for the additional trains in light of current collective agreements will also be conducted by the City Clerk and Solicitor's Department.

## CITY STRATEGIC PLAN

Increasing O-Train capacity directly and indirectly supports the following objectives of the Strategic Plan.

A1. Improve the City's transportation network to afford ease of mobility, keep pace with growth, reduce congestion and work towards modal split targets.

I4. Become a financially sustainable city.

## TECHNICAL IMPLICATIONS

All technical implications are outlined within the report.

## FINANCIAL IMPLICATIONS

The financial analysis, which is summarized within the report, indicates that the recommended expansion of O-Train service would be financially neutral; however, assuming a 10% contingency, the project would be an incremental cost of $2.9M on a 10-year net present value basis.

The initiative does open up further options for the City in the event that future ridership differs from current projections.

Additional debt financing of $55.37 million will be required by the City in regards to the expansion investment, which may be refinanced with gas tax, and/or transit reserve funds at a later date.

## DISPOSITION

With the delegated authority of $59 million, staff will proceed with the purchase of six DMU trains for O-Train service expansion.

At the Transit Commission meeting of May 18, 2011, staff were directed to analyze the feasibility of extending the O-Train corridor south. Pending Commission and Council

approval of this report, staff will proceed with a feasibility study using existing budgets.