



OFFICE OF THE  
**City Auditor**

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# **Edmonton Transit System Bus and Light Rail Transit Review**

February 5, 2016

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The Office of the City Auditor conducted  
this project in accordance with the  
*International Standards for the  
Professional Practice of Internal Auditing*

# Bus and Light Rail Transit Review

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## **Executive Summary**

### **Introduction**

The Administration completed the first phase of a comprehensive review of ETS in 2013. The purpose of the review was to assess the current ETS organization in terms of its fare structure, organizational structure, management of assets, approach to service delivery, and network design. In August 2014, a report outlining the process and outcomes expected from the development of a Transit Strategic Plan was presented to Council's Transportation Committee. The comprehensive strategic plan is intended to provide a framework to guide transit development and sustainable investment for the future. We believe that outcomes described in the report will address most of our observations.

### **Operational Cost and Reliability**

Our analysis shows that from an operational cost perspective, ETS is delivering services at a lower cost than comparable organizations. However, at the same time, the reliability of service has been declining. Decreased reliability may increase the risk of ridership loss. Actions being taken to address reliability issues (i.e., on-time performance and overcrowding) are not improving the overall system performance.

### **Transit Operations Safety and Security**

Incident reports we reviewed show a decrease in collisions and an improvement in transit operations safety. However, our review of security reports indicates an increase in security related incidents over the past four years. ETS management indicated that annual incident counts are above their target level. In November 2015, ETS presented a Safety Update to the Transportation Committee that outlined the progress being made on a number of safety-related initiatives. Initiatives include training Transit Operators and exploring an upgrade to the existing Transit App to allow customers to report incidents from their mobile devices.

### **Bus Fleet and LRT Infrastructure**

While reviewing overcrowding and fleet mix, we noted that the number of passengers carried per service hour by ETS was lower than that of comparable organizations. We also noted that the ETS fleet is primarily made up of standard and community buses. Comparable organizations have more high-capacity buses (i.e., articulated and double-decker) and LRT vehicles that increase capacity without increasing the size of the fleet.

An integrated review of the Bus and LRT networks and fleet mix is required to ensure the City receives maximum benefit from its investment in public transit infrastructure.

## **Funding of Public Transit**

Public transit benefits all citizens. For example, transit users enjoy low cost transportation while all citizens benefit from reductions in the environmental impact, lower infrastructure costs, and less traffic congestion. The benefits enjoyed by transit users are reflected in the fares, while the societal benefits enjoyed by all citizens are reflected in tax levy funding.

In 2014, 45% of transit operations were funded by fare revenues and 55% by the tax levy. City policies and procedures do not specify a target for the portion of operations to be funded by revenues. Effectively, the tax levy is the difference between the operating costs and revenues generated, rather than a reflection of the value of broader societal benefits.

We also observed that fares were not calculated in accordance with the policy and procedures that were in place for the period we reviewed, contributing to a higher portion of operations being funded from the tax levy.

City Council should be engaged in discussion on the societal benefits and establish a target percentage of operating costs that should be funded by revenues (revenue/cost ratio).

We made three recommendations to address our observations.

We thank management and staff in Edmonton Transit Service for their cooperation and openness during this review.

# Bus and Light Rail Transit Review

## 1. Introduction

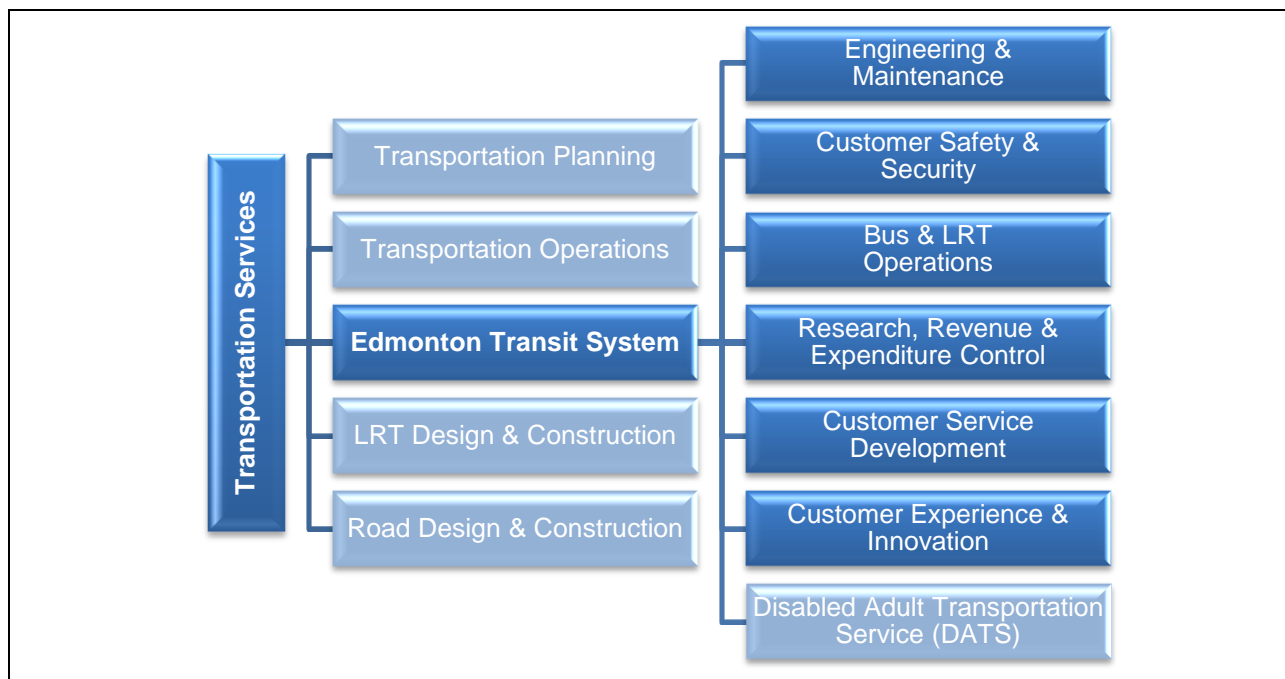
The Office of the City Auditor’s (OCA) approved 2015 work plan included a review of Bus and Light Rail Transit (LRT) operations provided by the Edmonton Transit System (ETS). This review included a service level review, performance measurement review, and a risk identification and assessment exercise.

## 2. Background

### 2.1. ETS Organization, Mission, and Operating Costs

Figure 1 illustrates the organizational structure within ETS. This review included bus and LRT services, which are delivered by six of the functional areas. DATS service was not included in our review.

**Figure 1 – Organizational Structure**



ETS’ mission is “to provide customer-focused, safe, reliable, and affordable public transit services that link people and places.”<sup>1</sup> Management has identified eight goals to support its mission:

1. Offer convenient ways to take transit.
2. Consistent and exceptional customer service.
3. Safe, secure and accessible public transit.
4. Attract, develop and retain exceptional workforce.
5. Reduce impact on the environment.
6. Grow transit ridership.
7. Optimize transit infrastructure & land use.
8. Maintain transit infrastructure.

Table 1 shows how bus and LRT operating expenditures, revenues, and full-time equivalent positions have changed from 2010 through 2015.

**Table 1 – Bus & LRT Operating Expenditures\*** (Millions of Dollars)

	2010 Actual	2011 Actual	2012 Actual	2013 Actual	2014 Budget	2015 Budget
Operating Expenditures	\$230.4	\$256.1	\$269.2	\$285.1	\$296.3	\$307.9
Revenue	<u>102.1</u>	<u>112.1</u>	<u>118.6</u>	<u>134.8</u>	<u>134.2</u>	<u>134.9</u>
Tax Levy	<u>\$128.3</u>	<u>\$144.0</u>	<u>\$150.6</u>	<u>\$150.3</u>	<u>\$162.1</u>	<u>\$173.0</u>
Full Time Equivalents (FTE)	1,925.0	2,002.3	2,057.0	2,099.8	2,123.8	2,176.9

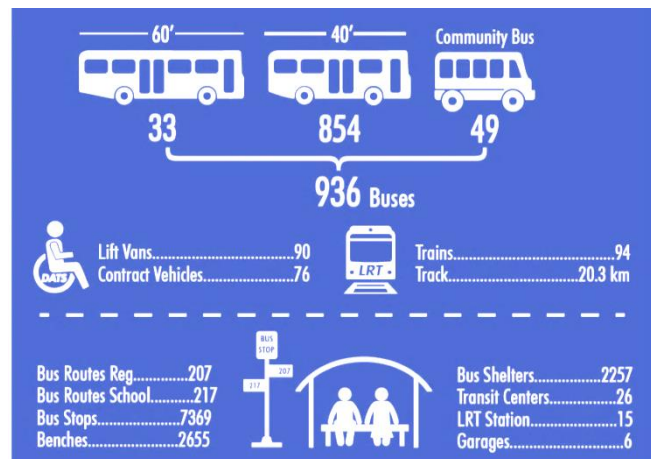
\* Excludes DATS.

Between 2010 and 2015, the operating expenditures increased by 33.6% for an average of 6.7% per year. Over the same five-year period, operating revenue increased by 32.1%, tax levy funding increased by 34.8%, and full-time equivalent (FTE) positions increased by 13.1%.

Figure 2 from the ETS 2016-2018 Business Plan illustrates the size and complexity of the ETS infrastructure.

The City’s entire fleet of buses is maintained by the Fleet Services Branch in the Corporate Services Department. Under the current agreement between ETS and Fleet Services, all maintenance costs for the bus fleet are charged to ETS. ETS personnel maintain the LRT vehicles.

**Figure 2, ETS by the Numbers**



<sup>1</sup> Edmonton Transit System 2011-2013 ETS Business Plan.



The full cost of providing transit service is not reflected in the ETS operating budget. Costs not reflected in the ETS operating expenditures include: shared services (e.g., finance, human resources, information technology), and debt repayment/amortization associated with capital assets (e.g., LRT infrastructure, bus fleet).

## 2.2. Governance

### Service Levels

Bus and LRT operations are an integrated service that includes low-floor and kneeling buses, community buses, and accessible LRT. There are a number of strategic documents that have provided direction for public transit service design. These include: the LRT Network Plan, Transit Oriented Development Guidelines, and business planning documents. However, ETS does not have a comprehensive long-term strategy to guide its investment in integrated bus and LRT infrastructure. Transit service levels are based on guidelines set out in City Policy C539, *Transit Service Standards*. Guidelines cover operating time periods (peak, midday, and evening), walking distance to bus stops, service frequency, and route performance (on-time performance, passenger capacity).

### Fares

Transit fares are established in accordance with City Policy C451G, *ETS Fare Policy*. The current version of the fare policy was approved in March 2015 and states that a “multi-year fare structure shall be included and approved as part of the budget submission as per the City’s Multi-year Budgeting Policy.” The previous version of the policy that was in place for the period we reviewed included a procedure describing fare products (individual tickets, monthly passes, etc.) and the model used for setting fares.

### ETS Comprehensive Review

In 2013, the first phase of a comprehensive review<sup>2</sup> of ETS was completed. The purpose of the review was to “assess the current Edmonton Transit System (ETS) organization in terms of its fare structure, organizational structure, management of assets, approach to service delivery, and the design of its network.” The report identified a number of issues, concluding that:

1. A strategic fare policy needed to be developed as there was a lack of process surrounding the understanding of what fares were intended to do and how the intent should manifest itself in terms of fare structure.
2. A strategic planning document needed to be created to address a gap between ETS operational implementation strategies and the overall transportation master plan strategies.
3. City Council needed to be engaged in establishing principles and direction for the next phase of a strategic transit plan.

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<sup>2</sup> *Edmonton Transit System Comprehensive Review – Phase One Report*, December 5, 2013, Prepared by Stantec Consulting with Jarrett Walker & Associates and JMK Consulting.

4. The current transit structure/governance model was an efficient way to structure the provision of services.

The August 2014 *Transit Strategic Plan, Steps and Costs for Development of a Strategic Plan* report to the Transportation Committee presented the outcomes that the City of Edmonton would achieve through implementing an effective strategy:

- Greater clarity regarding the long-term vision and objectives for transit considering financial implications of future city growth.
- Confirmation of system priorities based on core principles in areas such as customer experience, network, and financial principles.
- Stronger linkages between provision of transit service and urban design and land use planning.
- A better understanding of the acceptable tradeoffs inherent in the transit system, such as the desire to provide a short walking distance to access transit versus providing a higher frequency service.
- Evaluation of alternative network designs, including development of a clearly defined network hierarchy, and assessment of the resulting economic, social, and environmental impacts.
- Enhanced multi-modal integration to leverage capital investments in transit.

In December 2014, Transportation Services had funding approved to develop a longer-term strategy. The public engagement for the Transit Strategy is currently underway and will continue in 2016.

### **3. Objectives, Scope and Risk**

The overall objective for this review was to determine if the City's Bus and LRT program is being delivered in an effective, efficient, and economical manner. This objective was broken into three components.

1. Efficiency and Economy – Are bus and LRT operations being delivered in an efficient and economical manner?
2. Effectiveness – Is ETS effectively meeting its mission of being a customer-focused, safe, and reliable public transit service?
3. Funding of Transit Operations – What impact do fare subsidies and discounts have on transit revenues and the tax levy requirement?

The scope of this review included bus and LRT operations; support services such as planning, scheduling, and safety and security; and overhead functions such as marketing, research, customer service, and revenue and expenditure control. This review did not include Fleet Services bus maintenance, Shared Services, or DATS operations.

We facilitated a risk self-assessment with the Edmonton Transit Management Team. Based on their assessment, the highest-rated risks related to technology (e.g., Smart Bus) not meeting customer expectations, customer perception of safety and security, staffing levels, overcrowding on buses and LRT, and the impact of an economic downturn.

## 4. Observations

### Summary

Our review resulted in the following three conclusions:

1. Efficiency and Economy – ETS services are generally delivered in an efficient and economical manner when compared to other public transit organizations.
2. Effectiveness – Service reliability expressed in terms of on-time performance was lower in 2014 than in prior years.
3. Funding of Transit Operations – A lower percentage of ETS operating expenditures are funded by revenues than for comparable public transit organizations, single ride cash fares are comparable to that of other public transit organizations, and monthly pass prices are below average for comparable organizations.

We believe that our observations align with the 2013 ETS comprehensive review findings and reinforce the need for a comprehensive long-term strategic plan and strategic fare policy.

### 4.1. Efficiency and Economy

Our assessment of efficiency and economy included review of ridership, fleet utilization, staffing levels, and cost of ridership.

Where data was available, we compared ETS performance to that of other Canadian municipalities. For comparative purposes, we utilized statistics published in the Canadian Transit Fact Book.<sup>3</sup>

#### 4.1.1. Ridership

One of the City's goals is to shift the mode of transportation from personal vehicles to public transit and alternate modes of transportation. Public transportation organizations monitor ridership per capita as a means to assess increased use of public transit.

Ridership is a number arrived at by multiplying the number of fare products sold by a multiplier reflecting the estimated number of one-way trips. For example, ETS estimates that customers using monthly adult passes will ride 58 times per month and senior monthly pass holders will

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<sup>3</sup> Canadian Urban Transit Association (CUTA), Canadian Transit Fact Book

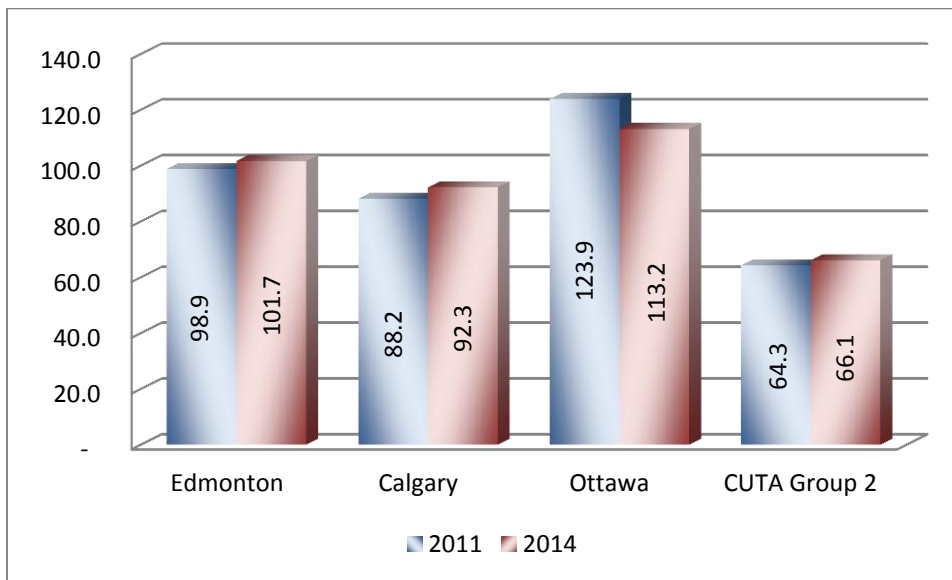
ride 33 times per month. A more accurate picture of ridership will be available through the SmartFare system after its implementation in 2018.

Between 2011 and 2014, ETS ridership increased from 80.3 million to 89.3 million (11.2%). After accounting for population growth, ridership increased from 98.9 rides per capita to 101.7 rides per capita (2.9%). The ETS 2016-2018 business plan shows ridership is targeted to increase to 105 rides per capita by 2018.

We noted two initiatives in *The Way We Move Implementation Plan* with the potential to increase ridership. The first is to encourage integration of all modes of transportation (e.g., taxi and bicycle) with public transit. The second is to provide more fare choices (i.e., SMART Cards). Ridership factors listed later in this section show that service improvements have the greatest potential to increase ridership.

Chart 1 compares ETS' ridership per capita to comparable transit organizations for 2011 and 2014.

**Chart 1, 2011 and 2014 Ridership per Capita**



CUTA Group 2<sup>4</sup> captures data for transit organizations servicing a population of between 400,001 and 2,000,000. There are 13 organizations in Group 2. The organizations most comparable to ETS, in terms of fleet size, are Calgary and Ottawa.

This chart shows that between 2011 and 2014, Edmonton's ridership per capita increased by 2.8% or an average of 0.9% per year. In comparison, Calgary's ridership per capita increased by 4.6% and Ottawa's decreased by 8.6% between 2011 and 2014. The average ridership per capita for CUTA Group 2 increased by 2.8%.

<sup>4</sup> CUTA Group 2 – Brampton ON, Calgary AB, Durham Region ON, Edmonton AB, Hamilton ON, Laval QC, Longueuil QC, Mississauga ON, Ottawa ON, Quebec QC, Waterloo Region ON, Winnipeg MB, York Region ON

## Ridership Analysis

We analyzed the fare product sales for 2011 and 2014 to determine if there has been a shift from casual to regular use of transit.

For the purpose of our analysis, we made the following assumptions:

- The sale of monthly or annual passes indicated the purchaser was a regular transit user. Fare products included in this category include adult, youth, post-secondary, senior and low income senior passes.
- The sale of single-use tickets or cash fare indicated the customer was a casual user.
- U-Pass holders could be either regular or casual users. It is mandatory that students attending participating institutions purchase U-Passes.

Table 2 shows the results of our analysis of ridership and fare product sale information.

**Table 2, Ridership Analysis**

	2011		2014		3 Year Change	
	Ridership (millions)	Percent of Total	Ridership (millions)	Percent of Total	Ridership (millions)	Percent
Regular Riders	43.8	54.6%	47.4	53.0%	3.6	8.2%
U-Pass Holders	21.1	26.3%	26.0	29.1%	4.9	23.2%
Casual Riders	15.4	19.1%	15.9	17.9%	0.5	3.2%
<b>Total Ridership</b>	<b>80.3</b>		<b>89.3</b>		<b>9.0</b>	

This table shows that the estimated ridership for customers riding on a regular and casual basis has increased by 3.6 million (8.2%) and 0.5 million (3.2%) respectively. The largest increase in estimated ridership, 4.9 million (23.2%), is attributed to U-Pass holders. The increase in U-pass sales is primarily due to expansion of the U-Pass program to more institutions.

Current technology does not allow ETS to determine how often U-Passes are used. Therefore, we cannot determine the accuracy of ridership estimates. We noted that, the record of U-Pass sales for 2011 shows that 7% of U of A students, 15% of NAIT students and 13% of Grant MacEwan University students did not pick up their U-Passes. The U-Pass ridership multiplier is lower than the adult monthly pass multiplier to account for varied use.

## Ridership Elasticity

Table 3 shows some of the elasticity factors that influence ridership. These factors are taken from a 2015 report titled *Evaluating Public Transit Benefits and Costs*.<sup>5</sup> The first

<sup>5</sup> *Evaluating Public Transit Benefits and Costs, Best Practices Guidebook*, published by the Victoria Transport Policy Institute, August 24, 2015.

two factors are external. The last three result from service delivery changes implemented by a transit organization.

**Table 3, Examples of Transit Ridership Elasticity**

Factor (a 1% increase in)	Elasticity (influence on ridership)	Description
Regional employment	0.25	A 1% increase in regional employment is likely to increase ridership by 0.25%
Central city population	0.61	A 1% increase in central city population is likely to increase ridership by 0.61%
Fare price	(0.32)	A 1% increase in fares is likely to decrease ridership by 0.32%
Wait time	(0.30)	A 1% increase in time customers wait for a bus is likely to decrease ridership by 0.30%
Travel time*	(0.60)	A 1% increase in travel time is likely to decrease ridership by 0.60%

\* Factors such as discomfort and risk affect Travel Time<sup>6</sup> For example, a minute spent in comfortable and safe conditions imposes less cost to customers than the same minute spent in uncomfortable or unsafe conditions.

This table shows that changes in population and changes in travel time (i.e., quality, reliability, and safety) have more influence on ridership than changes in transit fares.

Discussion with ETS management and statements reported in the *2013 ETS Comprehensive Review Phase 1 Report* indicate that they are aware of the elasticity factors. The awareness of ridership elasticity suggests that all significant factors will be considered in the development of long-term service and fare strategies.

### OCA Observation

Our analysis shows that over half of the 11.2% increase in the estimated ridership between 2011 and 2014 is attributed to the sale of U-Passes. After factoring in population growth, ridership per capita only increased 2.8% over three years.

ETS management will need to ensure that a comprehensive approach is taken in developing a long-term strategy to ensure the greatest opportunity to grow ridership and shift Edmonton's mode of transportation to public transit.

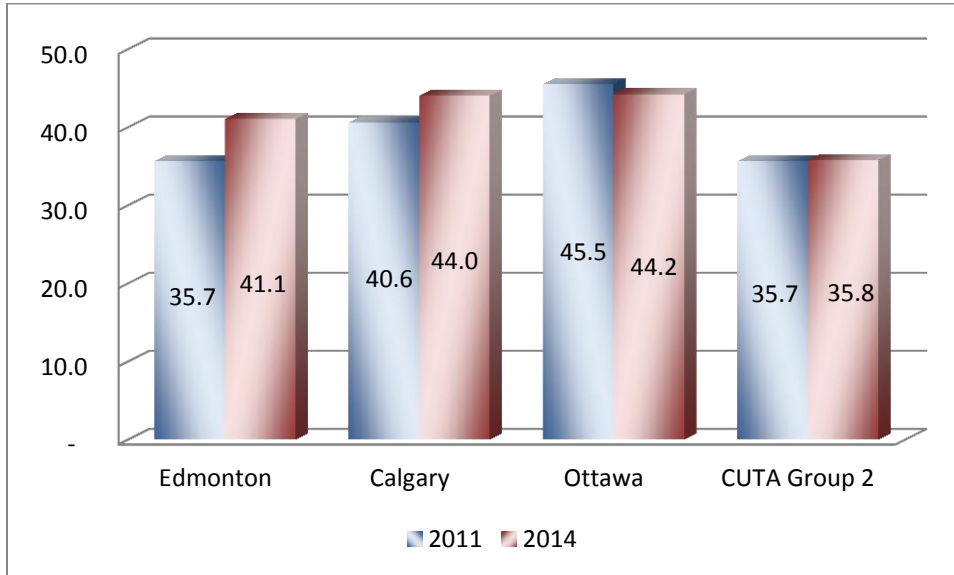
**See Recommendation 1**

<sup>6</sup> *Transportation Elasticities, How Prices and Other Factors Affect Travel Behavior*, Victoria Transport Policy Institute, May 14, 2014

**4.1.2. Transit Fleet Utilization**

In 2011, ETS provided 2.03 million hours of service. The hours of service increased to 2.11 million hours in 2014. One measure of fleet utilization is the number of passengers carried per service hour. Chart 2 compares the number of passengers carried per hour with comparable organizations for 2011 and 2014.

**Chart 2, 2011 and 2014 Passengers Carried per Service Hour**

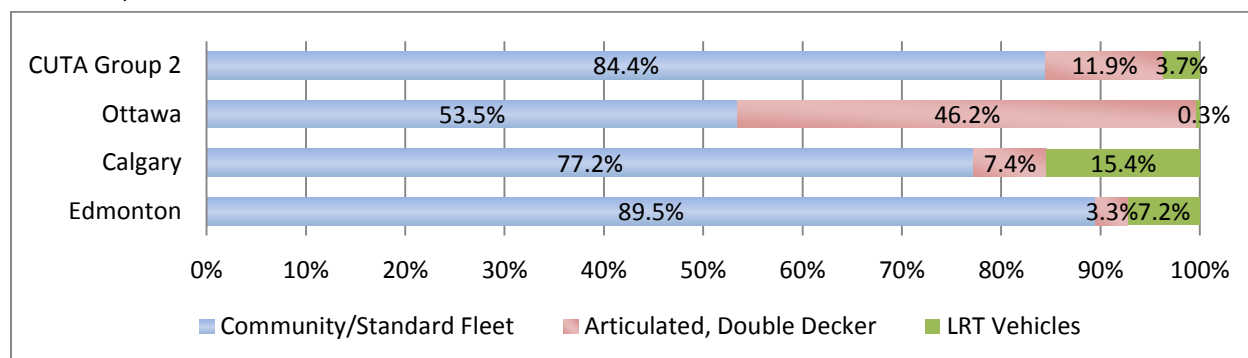


This chart shows that ETS experienced a 15.1% increase in passengers carried per service hour compared to 8.4% in Calgary and a decrease of 2.8% in Ottawa. ETS management advised us that the increase is partly due to the extension of the SLRT to Century Park.

This chart also shows that ETS carries fewer passengers per service hour than Calgary or Ottawa. ETS management suggests that one of the factors contributing to the lower number of passengers carried per service hour is the percent of the fleet made up of standard and community buses. The passenger capacity on an articulated bus is approximately 45% greater than a standard bus.

Chart 3 compares the percentage of the fleet comprised of standard and community buses (lower passenger capacity), articulated buses and double decker buses (higher passenger capacity), and Light Rail Vehicles for 2014.

Chart 3, 2014 Fleet Mix



This chart shows that approximately 90% of the ETS fleet are standard/lower capacity buses compared to 77% in Calgary and 54% in Ottawa.

### OCA Observation

The ridership data we reviewed (Section 4.2.1) suggests that ETS' current fleet mix is meeting the majority of ridership capacity needs. However, 35% of customers rated overcrowding as unsatisfactory (Section 4.2.3). A review of the continued heavy reliance on standard buses should be undertaken.

We recognize that higher capacity buses would require a greater investment. Therefore, we believe that the long-term strategy must include a review of the fleet mix and financial constraints when designing the bus and LRT network.

**See Recommendation 1**

#### 4.1.3. Rapid Transit Infrastructure

The City of Edmonton Transit Strategy Project Scope and Rationale document presented to the Transportation Committee in August 2014 included five sections describing the urgent reasons a long-term strategy is needed for transit in Edmonton:

1. Increasing capital and operating costs
2. Growth in the City
3. Demographic shift
4. Investment in LRT
5. Strong link between transit and land use planning

In 2009, Edmonton City Council adopted a long-term LRT Network Plan that defines the future size, scale, and operation of Edmonton's LRT system. The Project Scope and Rationale document recognizes that the City has invested billions of dollars into LRT and that the integrated bus network must support LRT to achieve an optimized combined system. However, the document does not indicate whether the LRT Network



Plan will be reviewed to determine whether more cost-effective expansion alternatives are available.

We reviewed two recent documents<sup>7</sup> that discuss the investment in transit infrastructure. Table 4, from the Calgary Transit 2013 strategic plan *Route Ahead*, sets out the cost of construction for alternate forms of rapid transit.

**Table 4, BRT and LRT Construction Cost**

INFRASTRUCTURE COSTS For BRT and LRT Construction per Kilometre	
On-street BRT with transit priority	\$0.5 million to \$2.0 million
BRT in high-occupancy rights-of-way or transit-only lanes	\$1.0 million to \$5.0 million
BRT on separate right-of-way	\$10 million to \$20 million
LRT ground level	\$40 million to \$50 million
LRT above ground	\$50 million to \$100 million
LRT underground	\$200 million to \$250 million

The *Route Ahead* also notes that Bus Rapid Transit (BRT) in Calgary is used as a precursor to LRT. The strategy also includes criteria for deciding when changes in service from bus to BRT to LRT should take place.

#### OCA Observation

In our opinion, with the wide range of options and cost of rapid transit infrastructure, the comprehensive long-term strategy needs to encompass an integrated review of all aspects of bus and LRT service to ensure the City is getting maximum benefit from its investment in rapid transit.

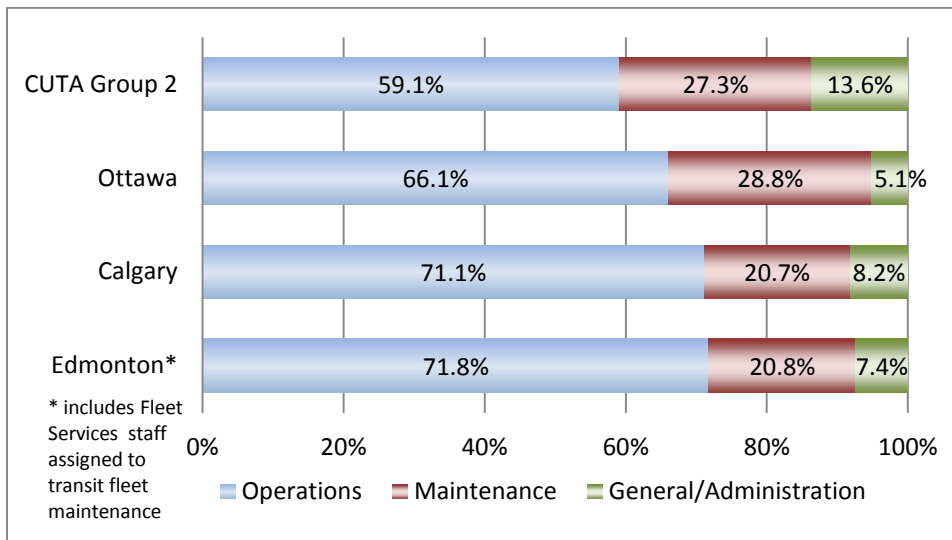
**See Recommendation 1**

#### 4.1.4. Staffing

Staffing costs make up the largest portion of the ETS operating budget. In 2013, the OCA reviewed the supervisory levels in ETS. At that time, we found the levels to be reasonable. To get a different perspective on staff utilization, we looked at how staffing was functionally allocated to operations, maintenance, and general/administration. A comparison of staff allocation to CUTA group 2 organizations for 2014 is shown in Chart 4.

<sup>7</sup> 1) *Fast Cities, A comparison of rapid transit in major Canadian Cities*, Report produced by the Pembina Institute and 2) *Route Ahead*, Calgary Transit 2013 Strategic Plan.

**Chart 4, 2014 Staff Allocation**



This chart shows that nearly 93% of employees associated with transit service are performing direct operations and maintenance service. The chart also shows that the ETS staff mix is reasonable given that it is similar to both Ottawa and Calgary at 95% and 92% respectively.

**OCA Observation**

Based on our review of supervisory levels and staff allocation we believe the ETS staff mix is reasonable.

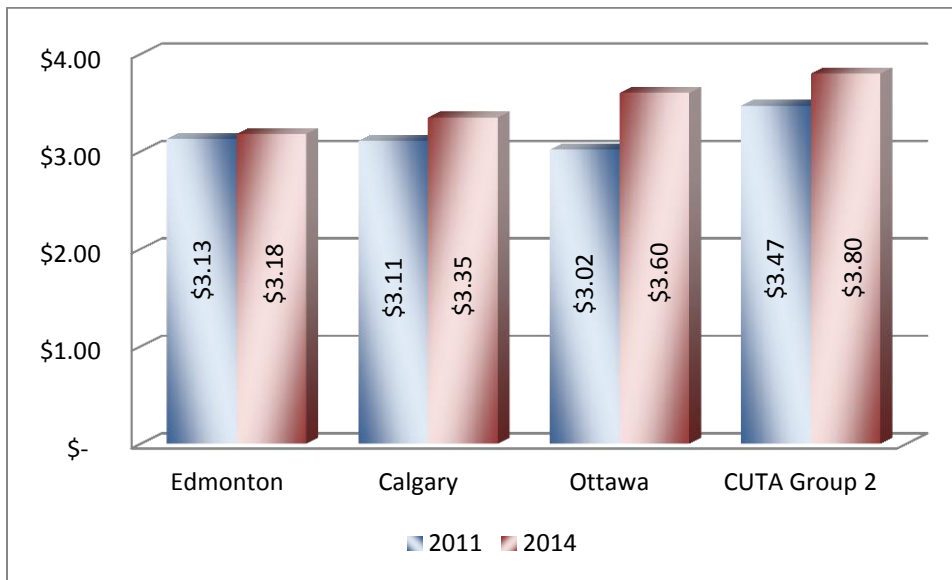
**No Recommendation**

**4.1.5. Overall Economy and Efficiency**

In the background of this report, we noted that the overall operating budget for bus and LRT operations has increased an average of 6.7% per year since 2010. In order to determine the economy and efficiency of the service, the cost needs to be correlated to ridership.

Chart 5 shows the average cost per trip for comparable organizations in 2011 and 2014.

**Chart 5, 2011 and 2014 Average Cost per Passenger Trip**



Our analysis shows that between 2011 and 2014 the average cost per passenger trip in Edmonton increased 1.6% compared to 7.7% in Calgary and 19.2% in Ottawa. The chart shows that for 2014, the average cost per trip in Edmonton was lower than in Calgary or Ottawa.

**OCA Observation**

Our analysis shows that the cost of service is economical. However, a review of the fleet mix, including LRT, and improving the reliability of service may provide opportunities to increase both capacity and ridership. This could lead to a further reduction in the cost per passenger trip.

The Transportation Services Department is currently in the process of gathering input for developing a longer-term strategy. Based on our research, a comprehensive long-term plan needs to include consideration of land use (network connections and alignment, population and job intensities); customer experience (travel time, reliability, capacity, safety); and characteristics such as lifecycle and asset management, overall mobility of the transportation network, and capital costs.

**See Recommendation 1**

**4.2. Effectiveness**

Our assessment of effectiveness included a review of customer satisfaction surveys, on-time performance, ridership and passenger boarding rates, customers being passed by (due to overcrowding), and safety and security trends.

#### 4.2.1. System Performance

Route planning is undertaken within the Customer Service Development section of ETS. In addition to planning new routes, this area is responsible for preparing the bus schedules, monitoring route usage, and implementing service changes.

Input on current conditions is obtained from a variety of sources. These sources include the Bus and LRT Operators, management, Amalgamated Transit Union, focus groups, complaint systems, school boards, land developers, and changes to transit facilities. This input, along with information from the Automatic Passenger Counters (APC), assists planners in adding routes and modifying service to provide more convenient and reliable service using resources available in the approved budget.

APCs have been installed on 250 buses (approximately 27% of the fleet). Buses equipped with the APC system are rotated through all bus routes, typically over a three-month period. This provides planners and schedulers with sample data on bus route performance in terms of system capacity and reliability. LRT planning is based on manual counts that occur over a three-week period in September of each year.

The APC system provides two types of performance information:

- On-Time Performance – GPS based data used by schedulers to monitor adherence to bus schedules.
- Passenger Boarding Counts – Boarding and exiting counts used by route planners to help identify the potential for overcrowding and underutilization situations.

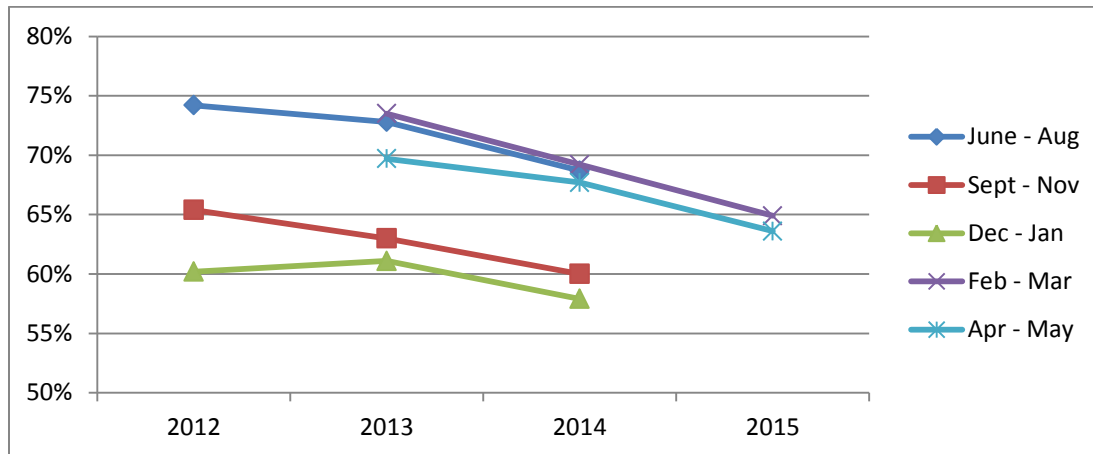
#### On-time Performance

Policy C539 includes the following measure to assess the reliability of service:

- Arrival times at key timing points from 5 minutes early to 1 minute late on 90% of trips.

We were advised that the Customer Service Development section only used current route-specific travel time data in their planning. At our request, data was produced that provided performance data from June 2012 to April 2015 for the entire bus network (all transit centres and all buses). Chart 6 shows system performance for on-time arrival for five time periods that aligned with planned service changes.

Chart 6, Arrival On-Time Performance



This chart shows that:

- Adherence to service schedules has declined from 2012 to 2015.
- The best overall performance period was in the June to August period. In 2012, 74% of service was on-time. In 2014, performance declined to 69%.
- The worst performance was experienced in the December to January period. In 2012, 60% of service was on-time. In 2014, performance declined to 58%.
- The 90% performance target for arrival was not achieved in any time period measured.

We also reviewed the on-time arrival performance at the 26 transit centres spread across the city. Our analysis of performance data for the fall of 2013 and 2014 showed:

- In the fall of 2013 on-time arrival performance averaged 63%. On-time performance at individual transit centres ranged from 31% to 100%. 14 of the 26 transit centres experienced on-time performance of 50% or less for at least one weekday time period (i.e., AM Peak, Midday, PM Peak and Evenings).
- In the fall of 2014 on-time arrival performance averaged 60%. On-time performance at individual transit centres ranged from 18% to 100%. 19 of the 26 transit centres experienced performance of 50% or less for on-time arrival.

ETS management advised us that they believe the decline in performance is a reflection of an increase in the number of persons with mobility devices and strollers, construction activity, and increased traffic congestion on city streets. They also advised us that the 2012 through 2015 operating budgets did not include funding to address schedule adherence and overload issues. Schedule improvements to specific routes were made by reallocating service hours from routes with low ridership. ETS management indicated that the service hours available for reallocation were not sufficient to fully address service issues.

ETS management also identified additional challenges that impact service design and performance, including: rapid population and employment growth, neighbourhood expansion, longer travel distance, and a greater number of travel destinations.

### **Ridership Thresholds**

Policy C539 also sets out low and high ridership thresholds to “flag” individual bus routes that need to be reviewed. The thresholds for regular bus routes are:

#### **Low Ridership Thresholds**

- Peak Periods – 30 boardings per hour
- Offpeak Periods<sup>8</sup> – Average of 15 boardings per hour
- First/last trips carrying 5 passengers or less

#### **High Ridership Thresholds**

##### Peak Periods

- Average boarding per hour more than 60
- Individual trips greater than 55 at the peak point
- More than 50 passengers at the peak point on consecutive trips

##### Offpeak Periods

- Average boardings per hour more than 50
- Individual trips greater than 55 at the peak point
- More than 50 passengers at the peak point on consecutive trips

When the high ridership threshold is exceeded, there is a risk that customers waiting at bus stops will be passed by. When flagged, Transit Planners will review detailed monitoring data on a trip-by-trip basis to determine whether there is available capacity on other buses operating on that route or corridor, and identify remedial actions to address the overload issue if required.

In addition, Bus Operators are requested to record passenger pass-bys when they occur. These records provide Transit Planners with timely additional information related to routes that may be operating over-capacity. ETS management acknowledged that the process for collecting and recording pass-by information is informal as it is based on Bus Operator estimates of passengers by-passed.

We reviewed the 2014 pass-by records to see how many customers are affected by overcrowding on buses. Our review also included assessing explanations provided by Bus Operators to determine if there were any common themes for pass-bys.

In total there were 1,328 pass-by incidents reported in 2014. Bus Operators estimated that more than 21,700 customers were affected. We were able to group the explanation for pass-bys provided by bus operators into four themes:

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<sup>8</sup> Offpeak periods include: Weekday Midday and Early Evening, Saturday Midday and Sunday Midday; and Weekday Late Night, Saturday Morning and Night, Sunday Morning and Night.

- 1) An increase in the number of strollers and mobility devices reducing the overall bus capacity;
- 2) Scheduled buses missing or running late (in a few cases, the reason given for pass-bys indicated that another bus was immediately behind to pick up the remaining customers);
- 3) Insufficient capacity to handle major events (e.g., FIFA, school exams); and
- 4) Repeat overload conditions. Some explanations included a suggestion that an articulated bus be used on the route or frequency of service be increased.

A number of initiatives have been started to improve system performance. This includes: MinBus to optimize scheduling, SmartFare electronic fare system to provide more convenient payment options, and Smart Bus to provide customers with real-time scheduling information.

### **OCA Observation**

Our analysis shows that from 2012 to 2015 on-time performance has declined and ETS has not been able to achieve the performance standards set out in Policy C539.

We believe that ETS needs to monitor and report on service delivery performance relative to approved standards to better communicate service and resource needs.

**See Recommendation 2**

## **4.2.2. Safety and Security**

### **Traffic Safety**

From 2011 to 2014, the total number of collisions investigated by ETS Inspectors decreased from approximately 1,200 per year to 1,100 per year (about 8%). ETS Inspectors review each collision to determine whether the Bus Operator did everything possible to prevent the accident.

In 2011, 424 accidents were classified as preventable and in 2014 Inspectors classified 411 accidents as preventable. After factoring in kilometres driven in a year, there was a 7% improvement in transit operations safety. ETS attributes this to improvement in operator training and a timely feedback process to improve Bus Operator performance.

### **Personal Safety (Security)**

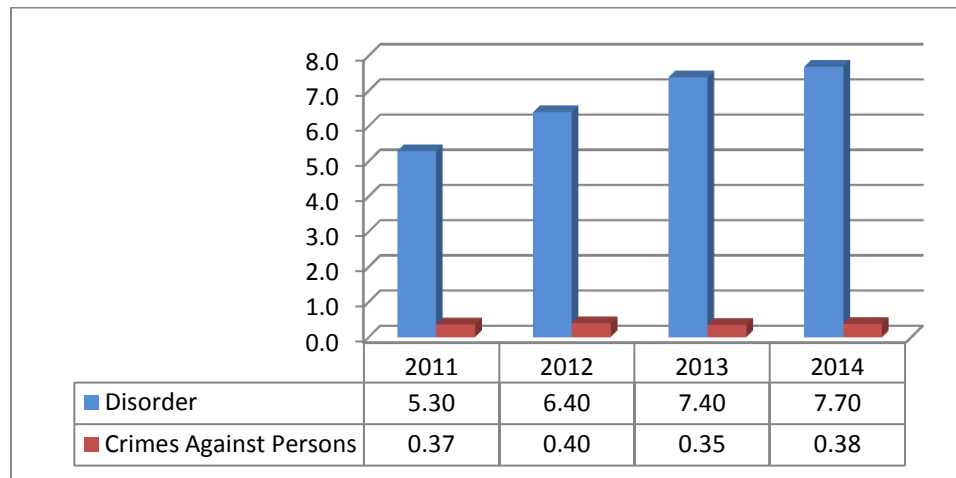
ETS categorizes security incidents that have the greatest impact on customers as either “Disorder” or “Crimes Against Persons.”

- Incidents classified as disorder are loitering, liquor, disturbance, conduct of person, and smoking violations. Transit and Downtown Peace Officers reported 4,264 disorder incidents in 2011 and 6,871 incidents in 2014, or a 61% increase.

- Crimes Against Persons are assaults, uttering threats, robberies, sexual offences, and sexual assaults. There were 297 crimes against persons reported in 2011 and 339 incidents in 2014, a 14% increase.

Chart 7 shows the trend of security incidents for 2011 through 2014 after factoring in the increase in the number of boardings.

**Chart 7, Security Incidents per 100,000 Boardings**



This chart shows that the disorder rate has increased by 45% over the four year period, while the rate of crimes against persons has remained relatively stable. In 2010, ETS Customer Safety and Security section added 10 Peace Officers to enhance security downtown, at ETS facilities, and on buses and LRT vehicles. ETS management believe the increase in Peace Officers contributed to the increase in incidents being recorded.

For performance tracking purposes, ETS set a target of 6.5 disorder incidents per 100,000 boardings. This target was exceeded in both 2013 and 2014. The Proposed 2016-2018 Budget shows the target rate remaining at 6.5 per 100,000 boardings.

In addition to reporting incidents that have the greatest impact on customers, ETS tracks and internally monitors other types of incidents not reflected in Chart 7. For 2014 these included:

- 1,012 Nuisance Incidents, such as trouble with person, disturbing the peace, and juvenile trouble.
- 94 Crimes against property, such as theft and break-and-enter.
- 363 Other Crimes, which included fraud, drugs, weapons and intimidation.
- 95 Assaults to Bus Operators ranging from verbal threats to assaults with a weapon.

In addition to tracking the number of incidents, ETS Security tracks the time of day and location of incidents so staff can be allocated to higher risk areas.



In a recent report to the Transportation Committee, ETS provided an update on initiatives aimed at improving safety, changing perception, and educating employees and citizens. The initiatives included additional training for Transit Operators, exploring an upgrade to the existing Transit App to include an incident reporting tool for customers, safety surveys, and options to alert Edmontonians on safety features of ETS.

### **OCA Observation**

There has been an improvement in transit operations safety.

There has been an increase in the number of personal safety (security) incidents. ETS has a number of initiatives underway to address security concerns.

**No Recommendation**

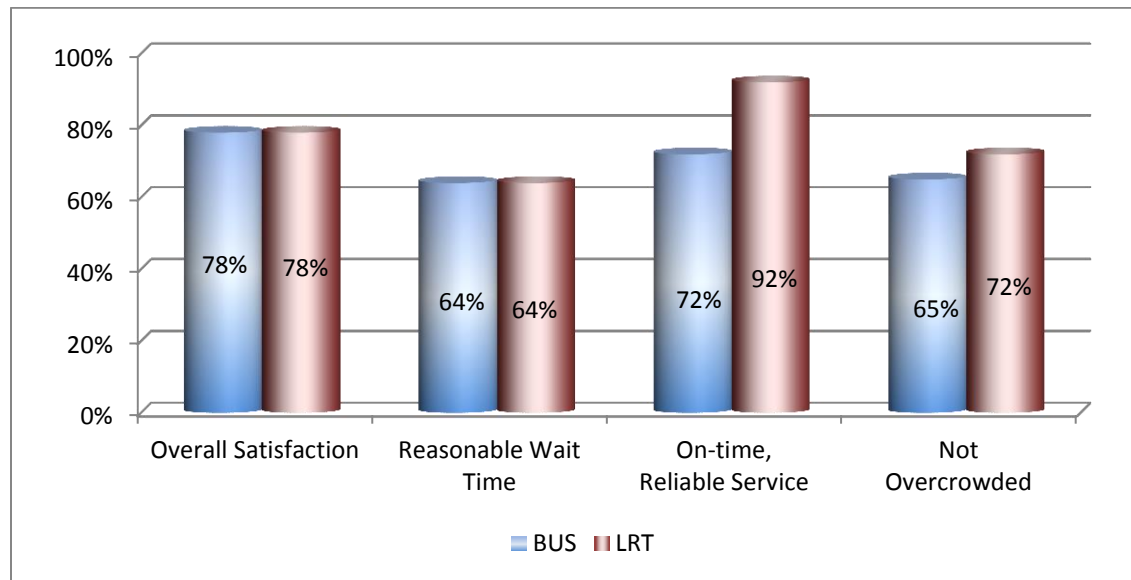
### **4.2.3. Customer Satisfaction**

Prior to 2014, ETS conducted annual in-person surveys of customers to get their perception on transit services. In 2014, ETS changed its survey method to provide its management with better and more frequent customer feedback. Changes included conducting surveys by telephone rather than in-person and reporting bus and LRT customer satisfaction separately. As a result of the change in methodology, 2014 survey results cannot be compared to those of prior years. Our analysis of customer satisfaction shows the trend from 2009 through 2012 separate from 2014 and future year targets. Customer surveys were not conducted in 2013.

### **System Performance**

Between 2009 and 2012, the percentage of customers satisfied with wait times for transfers dropped by 5 percentage points from 74% to 69%. During the same period, satisfaction with on-time arrival dropped by 7 percentage points from 86% to 79%.

Chart 8 shows the results of the customer satisfaction survey for the 4<sup>th</sup> quarter of 2014 using the new survey methodology.

**Chart 8, 2014 Percent of Customers Satisfied with Service**

Overall customer satisfaction for 2014 is 78%. However, as shown in the chart there are aspects of service where customer satisfaction was below the overall satisfaction level. In 2015, ETS reported overall customer satisfaction at 79%. The Proposed 2016-2018 Budget shows the target for the percent of customers satisfied with overall reliability as 70% in 2016, increasing to 75% by 2018.

### Traffic Safety

Customer satisfaction surveys show that the percentage of customers satisfied with Bus Operators obeying traffic rules decreased by 5 percentage points from 98% to 93% between 2009 and 2012.

In 2014, 90% of customers surveyed were satisfied with driver performance. The Proposed 2016-2018 Budget shows a target for customer satisfaction with driving performance of 85% in 2016, increasing to 90% by 2018.

One of the clauses in the Schedule Adherence section of the Bus Operator Instruction manual states that: Bus Operators are NOT to run behind schedule without just cause. At the end of the section Bus Operators are advised, "Do not let the running board dictate your driving practices. Remember – Safety First." ETS management advised us that its primary goal for bus operators is safety. However, they recognize that in reality Bus Operators are under pressure from customers to provide the best possible connections to minimize commute times.

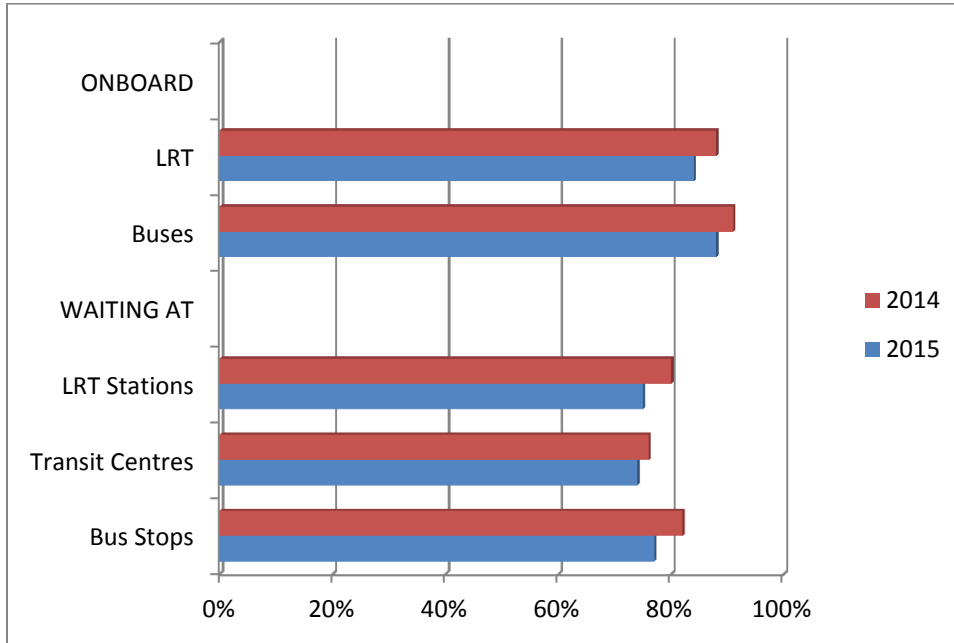
### Personal Safety

Between 2010 and 2012, customers satisfied with personal safety while onboard LRT and Buses increased from 71% to 92%. Between 2010 and 2012 customers satisfied with personal safety while waiting for LRT and Buses increased from 74% to 87%. The

increase is attributed to the addition of 10 Peace Officers to enhance security downtown, at ETS facilities, and onboard buses and LRT vehicles.

In 2014, ETS changed their survey methodology, reporting bus and LRT customer satisfaction separately. Chart 9, shows the results for the 4<sup>th</sup> quarter of 2014 and 3<sup>rd</sup> quarter of 2015.

**Chart 9, 2014 & 2015 Percent of Customers Satisfied with Personal Safety**



This chart shows that customers satisfaction with personal safety decreased slightly from the last quarter of 2014 to the third quarter of 2015. The perception of safety was lowest while waiting at transit centres.

In the Proposed 2016-2018 ETS Budget, a minimum target of 80% has been set for all three years for satisfaction while onboard LRT and buses and waiting at LRT stations, transit centres, and bus stops.

**OCA Observation**

The new survey methodology provides ETS with adequate and timely information to more proactively monitor customer satisfaction levels and manage customer expectations.

**No Recommendation**

**4.3. Funding of Transit Operations**

Our assessment of funding included consideration of the revenue/cost ratio, fares, and fare product sales.

**4.3.1. Revenue/Cost Ratio**

Prior to examining funding and fares it is important to understand how the different elements of transit expenditures, revenues and funding are linked. Figure 3 provides a simplified model that may help to place some context when considering the topic of funding.

**Figure 3, Transit Revenue and Cost Relationship**

<p>The Revenue/Cost (R/C) ratio is the relationship between the elements that influence the Transit Operating budget. (Capital investment and repayment are not included.)</p>	
<p><b>Revenue/Cost = %</b></p>	
<p>Transit <b>revenues</b> are generated from two sources:</p> <p><b>Fare revenue</b> - fares paid by transit customers.</p> <p><b>Other Revenue</b> – includes advertising, contract service, special events, etc.</p>	<p>Key drivers that influence the <b>cost</b> of transit services are:</p> <p><b>Costs of service</b> - labour and materials expenses necessary to provide service.</p> <p><b>Quality of service</b> - investments in customer technology, safety initiatives, reliability projects, security programs, and cleanliness efforts.</p> <p><b>Quantity of service</b> - coverage, capacity, span and frequency of service.</p> <p><b>Type of service</b> - Bus, LRT, and DATS</p>

Investments in public transportation ultimately influence the well-being and quality of life for all citizens. Public transit service not only connects people and places with affordable transportation; it also provides universal societal benefits that include:

- Providing mobility for those unable to transport themselves;
- Allowing most members of society to participate in economic and social activities;
- Reducing the environmental impacts associated with urban travel (land consumption, greenhouse gas emissions, consumption of resources, etc.) by attracting people to use transit rather than private automobiles;
- Reducing the cost of urban travel for individuals (cheaper means of travel);
- Significantly reducing the cost of transportation infrastructure (roads and parking);
- Reducing congestion for other modes of transportation; and
- Supporting a more compact, walkable, and sustainable city.

One way City Council can convey the value the City places on societal benefits is to set a target revenue/cost ratio for ETS to use when developing its budget.

**ETS Revenue/Cost Ratio**

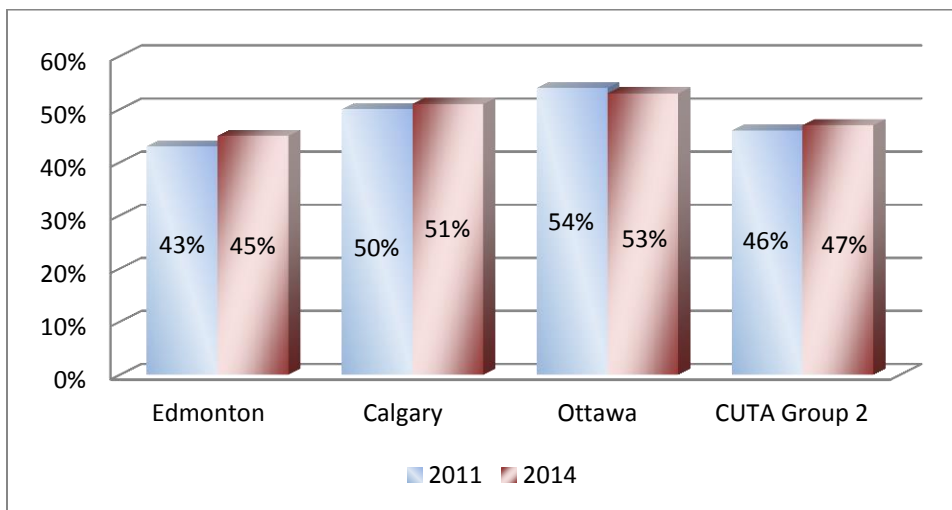
In 1999, ETS’ revenue/cost ratio was 50%. By 2011, the revenue/cost ratio dropped to 43%, increasing the amount of tax-levy subsidy required.

The 2013 ETS Comprehensive Review report states:

Ultimately, fare structure needs to be the outcome of a greater strategic plan encompassing an understanding of why transit matters to a city, how funding strategies will be used to meet transit objectives, and how the structure of fares will be used to encourage ridership onto the system in order to meet specific goals.

In 2014, ETS revenue funded 45% of expenditures. The revenue/cost ratios reported to CUTA by ETS have consistently been lower than the average for comparable cities. Chart 10 shows the revenue/cost ratio or percentage of transit operating expenditures funded by revenues for comparable cities in 2011 and 2014.

**Chart 10, Revenue/Cost Ratio**



This chart shows that the percentage of operating expenditures funded by revenues increased by 2 percentage points between 2011 and 2014 for Edmonton compared to a 1 percentage point increase in Calgary and a 1 percentage point decrease in Ottawa. The chart also shows Edmonton has the lowest revenue/cost ratio of all comparable organizations.

Guiding documents for ETS do not identify a target revenue/cost ratio. We reviewed guiding documents for Calgary, Ottawa, and other CUTA Group 2 organizations and found that the revenue/cost ratio was being used as a target that guides setting fares and serves as a performance measurement indicator.

### OCA Observation

Between 1999 and 2014, the revenue/cost ratio has declined by 5 percentage points resulting in tax payers funding a greater portion of the ETS operations.

The OCA believes that ETS needs to engage City Council in a discussion on the societal benefits of public transit and setting a revenue/cost ratio performance target (i.e., funding strategy).

**See Recommendation 3**

#### 4.3.2. Fares

The analysis presented in this section is based on Policy C451F, *ETS Fare Policy* that was in effect from December 2010 to March 2015. It was approved to:

- Provide an opportunity for City Council to direct Administration in implementing a fare structure within the context of an approved fare model, and
- Provide transparency and consistency to citizens regarding the rationale for the setting of transit fares.

Under Policy C451F, the single cash fare was approved at \$2.85 in 2011, \$3.00 in 2012, and \$3.20 in 2013 and 2014 for an average annual increase of 4.1%.

The procedures set out the structure that was to be used to establish the price of the various fare products. The price of the majority of the fare products was based on the single cash fare discounted by set amounts. For example, the price of an adult monthly pass in 2014 was to be based on the estimated ridership of a pass holder (58 rides) multiplied by the single cash fare (\$3.20) then discounted by 45%. Student monthly passes were to be discounted 50% and the U-Passes by 70%.

Transit fares and changes to the transit fare structure have been presented and approved in the annual operating budget process. We reviewed the information presented to Council in recent budget documents. We found that the documents:

- Lacked context on how fare increases were arrived at;
- Did not state whether the recommended fares were in compliance with policy or not; and
- Did not indicate the potential impact on ridership or on the ability to maintain or improve service performance.

We reviewed all fare products that were based on the single cash fare for 2012 through 2014 to determine whether fares were being set in accordance with Policy C451F. We found that fare product pricing has consistently been set lower than stated in the policy.

Table 6 summarizes the results of our analysis of transit fares approved for 2014.

**Table 6, Potential Impact of Lower Approved Fares on 2014 Revenue**

Fare Category	Council Approved Fares	Fares Per Policy	Difference per Unit	Potential Impact (\$000)
Adult ticket (10)	24.00	25.60	\$(1.60)	\$(1,165)
Day Pass	9.00	9.60	\$(0.60)	(18)
Youth/Senior Ticket (10)	21.00	22.40	\$(1.40)	(134)
Adult Monthly Pass	89.00	102.08	\$(13.08)	(5,064)
Student Monthly Pass	69.00	73.60	\$(4.60)	(1,164)
Post-Secondary Monthly Pass	81.00	92.80	\$(11.80)	(111)
U-Pass	38.75	45.12	\$(6.37)	(3,181)
<b>TOTAL</b>				<b>\$(10,837)</b>

As shown in the table, the approved fare resulted in revenues being lower by \$10.8 million, assuming ridership remained constant. If ridership decreased by the elasticity factor shown in Table 3 the net decrease in revenue would be \$8.0 million.

Our observations are also reflected in the *2013 ETS Comprehensive Review*. That report contains the following statements highlighting deficiencies in the way fares are currently set:

There is no policy in effect that answers questions regarding the intent of the fare categories, the rationale for the discounting of fares, nor the expectations for those discounts in terms of additional ridership or non-monetary gains for the transit system or the City as a whole.

The existing fare structure does not recognize the elements of service that are driving costs upwards, rather it favours the needs of the consumer over the realities of fiscal constraints for the system as a result of the subsidy of fares.

The resulting review has found that there was a lack of process surrounding the understanding of what fares were intended to do and how that intent should manifest itself in terms of fare structure.

In March 2015, City Council replaced Policy C451F with Policy C451G. The revised fare policy, unlike the previous policy, is not supported by a procedure that outlines the fare structure.

Table 7 compares Edmonton's cash fares and major pass prices with those charged by comparable organizations for 2014.

**Table 7, 2014 Fare Comparison**

City/Organization	Adult Fares		Student Fares		Senior Fares	
	Cash Fare	Monthly Pass	Cash Fare	Monthly Pass	Cash Fare	Monthly Pass/ Annual Pass
Edmonton	\$3.20	\$89.00	\$3.20	\$69.00	\$3.20	\$14.00/ \$125.00
Calgary	\$3.00	\$96.00	\$2.00	\$60.00	\$3.00	n/a/ \$95.00*
Ottawa	\$3.45	\$100.75	n/a	\$80.25	n/a	\$40.75/ n/a
Range for CUTA Group 2 Organizations	\$2.55 - \$4.00	\$76.00 - \$133.00	\$2.00 - \$4.00	\$42.00 - \$105.00	\$1.00 - \$4.00	\$14.00 - \$87.00/ \$95.00 - \$205.00
CUTA Group 2 Average	\$3.21	\$97.55	\$3.05	\$73.45	\$2.79	\$53.30/ 141.67
Edmonton Fares as a Percentage of the Group Average	100%	91%	105%	94%	115%	26%/ 88%

\* Calgary sells a low income senior annual pass for \$15.00

This table shows that Edmonton’s adult cash fare is in-line with that of other CUTA Group 2 organizations. Student and senior cash fares are slightly higher than average. Adult monthly passes are among the lowest at 9% below the group average. Student monthly passes are 6% below average. The biggest difference is in senior monthly passes. At \$14.00, Edmonton’s senior monthly pass is the lowest at 74% below the group average. The lower prices for monthly passes contribute to Edmonton having a lower revenue/cost ratio than comparable organizations.

**OCA Observation**

In our opinion, the fare structure and model for establishing fares needs to be reviewed and updated as part of the long-term strategy currently being developed. We also believe that City Council needs to be provided with more detailed information when reviewing and approving fares. This will also help ensure City Council is fully informed on the impact of its decisions.

**See Recommendation 3**

**5. Conclusions and Recommendations**

The overall objective for this review was to determine if the City’s Bus and LRT program is being delivered in an effective, efficient, and economical manner. This objective was broken into three components: efficiency and economy, effectiveness, and funding of transit operations. Looking at these components independently, we found:



1. Efficiency and Economy – Bus and LRT operations are being delivered in an efficient and economical manner when compared to other public transit organizations.
2. Effectiveness – ETS' effectiveness of service measured by on-time performance has declined between 2012 and 2014. While there has been a reduction in traffic incidents, security incidents have increased and are higher than the target set by ETS.
3. Funding of Transit Operations – A funding strategy that reflects the value the City places on the societal benefits of public transit has not been established. Fares have not been established in accordance with approved policy and procedure.

The Administration currently has an initiative underway to develop a long-term service strategy that will address many of our observations. We encourage the Administration to make the strategy as comprehensive as possible to ensure the City gains the greatest benefit from its investment.

We made the following recommendations to address our observations.

#### Recommendation 1 – Transit Strategic Plan

Reference Sections: 4.1.1, 4.1.2, 4.1.3, 4.1.5

The OCA recommends that the General Manager of Transportation Services ensure that the strategic plan being developed is comprehensive and integrates the bus and LRT networks to ensure maximum benefits are achieved.

#### Management Response and Action Plan

##### Accepted

**Action Plan:** Administration has commenced work on the Transit Strategy, which will provide a roadmap for transit planning, expenditures, investment and fare policy for the following 10 years. The project includes extensive stakeholder consultation, and will identify strategic direction for public transit in the future consistent with strategic objectives outlined in “The Ways” documents. Final recommendations related to strategic direction will be presented to City Council by mid-2017.

**Planned Implementation Date:** June 2017

**Responsible Party:** General Manager, Transportation Services Department

**Recommendation 2 – Performance Measures**

Reference Section: 4.2.1

The OCA recommends that the Edmonton Transit Service Branch Manager monitor and report on service delivery performance in relation to approved Policy.

**Management Response and Action Plan****Accepted**

**Action Plan:** ETS will leverage the reporting capabilities from the SmartBus and other technologies to establish and report on system performance indicators related to capacity and on-time performance. Reporting of these measures will align with ETS service standards and be included in public and council facing mediums to support decision-making and funding decisions related to operating and capital budgets.

**Planned Implementation Date:** December 2016

**Responsible Party:** Branch Manager, Edmonton Transit System

**Recommendation 3 – Transit Funding and Fares**

Reference Sections: 4.3.1, 4.3.2

The OCA recommends that Edmonton Transit Service Branch Manager

- a) Engage City Council in a discussion on the societal benefits of public transit;
- b) Establish a revenue/cost ratio target that conveys the value City Council places on societal benefits; and
- c) Establish a fare procedure that sets out the fare structure.

**Management Response and Action Plan****Accepted**

**Action Plan:** Administration agrees that transit has important social, economic, and environmental impacts in the City, and it is important to have conversations about the costs and benefits of providing that system.

As part of the Transit Strategy and budget process, there will be Council and public discussions related to the societal benefits of public transit. Direction from these discussions will be reflected in the financial measures and fare structures submitted as part of the 2018 Operating Budget process.

**Planned Implementation Date:** December 2017

**Responsible Party:** Branch Manager, Edmonton Transit System