

Future Trolley Operations in Edmonton

Recommendation:

1. That Edmonton Transit’s trolley operation be discontinued in 2004.
2. That the “Trolley System Decommissioning Plan” (Attachment 1 of the March 9, 2004, Transportation and Streets Department report 2004TS7791) be approved.
3. That the trolley fleet and supporting infrastructure be declared surplus and disposed of.

B. Biglow; D. Good Striker, Sovereign Blackfoot Nation; D. Cowan; M. Boonstra; R. Clarke; J. Freeman; M. Parsons; S. Cheng; D. Oxenford, Rossdale Community League; J. Guthrie; L. Maisonneuve, Association Canadienne Francaise de l’Alberta; F. Sitek; Z. Schiewe and D. Linder.

Report Summary

The action outlined in the recommendations of this report would result in Edmonton Transit’s trolley operation being discontinued, and the electric trolley buses’ supporting infrastructure being decommissioned and removed by 2013.

Previous Council/Committee Action

- At the June 22, 2004, Transportation and Public Works Committee meeting the March 9, 2004, Transportation and Streets Department report 2004TS7791, and the June 9, 2004, Transportation and Streets Department report 2004TS6537, were postponed to the July 6, 2004, Transportation and Public Works Committee meeting at 9 a.m.
- At the June 22, 2004, Transportation and Public Works Committee meeting the Committee heard from the following delegations:
G. Feltham, Chair, and K. Brown, Edmonton Transit System Advisory Board; T. De Jong; F. Weichman, McKernan Community League; R. Harper; J. Farquhart; A. Lawrie; E. Paschen; M. Marriott; B. Tucker;

Report

- Edmonton Transit’s active fleet includes 802 buses. Of 98 trolleys purchased in 1982, 59 are in service and 39 are in storage. During weekday peak service, 37 trolleys operate on 7 routes in Edmonton. 743 buses fuelled by diesel provide the remaining bus services.
- The present operation is guided by City Council direction in 1993 to make maximum use of the system and continue to evaluate alternate technologies.
- In 2003, Administration identified elimination of the trolley operation as a potential opportunity to reduce the cost of services provided by the City.

Consultant Assessment

- A consultant with substantial experience in evaluating trolley operations in North America, Booz Allen Hamilton, was engaged to complete a comprehensive study of the trolley operation that included financial, environmental, and operational issues. Attachment 2 is the “Summary Observations” from their final report titled “Trolley Operations Review – Strategic Alternatives” dated January 23, 2004.

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- The consultant's report evaluates two alternative strategies. The baseline is the continued and enhanced trolley service to 2010, then replacing the current fleet of trolleys with new state-of-the-art low-floor trolleys. The second strategy is to continue the trolley operation to 2010, at which time the trolleys would be replaced with diesel buses.
- The current Long Range Financial Plan (LRFP) (2004 – 2013) identifies replacement funding will be required for trolleys by 2010. The current trolleys will be 28 years old.

Financial

- The report estimates that from 2004 to 2010, based upon identified capital expenditures, the City could save \$19.83 million if trolley service was eliminated in 2010 and replaced with diesel buses. This estimate includes the cost of dismantling the supporting infrastructure and excludes salvage value realized, which would increase net savings. The majority of these savings accrue when the vehicles are replaced in 2010. It notes that at least \$1.5 million annually for infrastructure maintenance and capital upkeep would be saved after trolley service is discontinued.
- The consultant's report concludes, "The trolley system has been -- and will continue to be -- more expensive to operate and maintain than equivalent diesel service."

Environmental

- The most commonly perceived benefits of trolley operations are that the bus does not produce emissions, and that they produce significantly less noise.

- Emissions of Particulate Matter (PM) and Nitrogen Oxides (NOx) from diesel engines, and Sulphur content in diesel fuel are regulated under the *Canadian Environmental Protection Act, 1999*. Significant reductions in these regulated emissions will come into effect for engines sold in 2007.
- Starting in 2007, the amount of regulated emissions produced by new diesel buses will be less than that produced by Alberta power plants to generate the equivalent electricity necessary to power the trolley buses. Local emissions will continue to favour trolleys, however "...trolleys no longer will offer advantages in area-wide emissions compared to diesel buses."
- Trolleys do not produce emissions from the vehicle. However, 96% of the electricity in Alberta is generated from coal and gas powered plants that produce PM and NOx emissions.
- On a per-kilometre basis, the PM and NOx emissions from the generation of electricity in Alberta used to power new trolleys will be 6 and 3 times higher respectively than from new diesel buses purchased after 2007.
- Information from the study suggests that replacing the trolley operation with diesel buses in 2008 would result in the greatest area wide regulated emission benefit, and the earlier trolley operations were discontinued, the greater the financial savings that could be realized.

Administration Review

- The report was presented to the Edmonton Transit System Advisory Board (ETSAB) and members of the

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Environmental Co-ordinating Advisory Committee on January 26, 2004. Their comments were requested and the ETSAB response dated February 23, 2004 is included as Attachment 3.

- Further to the consultant's scenarios, Administration evaluated additional scenarios of discontinuing trolley operations earlier. As a result of this analysis, Administration is recommending that trolley operation be discontinued in 2004.
- Additional input is being received from stakeholders and will be presented by Administration at the requested non-statutory public hearing.

Budget/Financial Implications

- The following budget and financial implications are based upon discontinuing the trolley operation in 2004 and implementing the recommended decommissioning plan.
- Salvage revenues, and inventory surplus costs have not been included in the analysis. These are expected to be offsetting in magnitude.

Operating Budget

- Discontinuing trolley operations in accordance with the recommended plan would result in a reduction in the Transit operating budget of \$1.9 million in 2005. This comes from reductions in maintenance of the overhead system during decommissioning, reduced Operator training, reduced vehicle maintenance costs, and improved service efficiencies.

Capital Plan - Funded

- \$4 million in additional costs to Roadway capital programs are included in the approved funded Capital Plan (2004 – 2008) to sustain trolley operations. A further \$4.5 million is projected from 2009 to 2013.
- \$2.16 million for trolley overhead refurbishment is included in the funded Capital Plan (2004 – 2008). A further \$2.4 million is projected from 2009 to 2013.
- Decommissioning the trolley overhead is estimated to cost \$13.2 million to 2013 and would be funded from the above projects per the decommissioning plan (Recommendation 2).

Additional Capital Savings

- Rosedale Road realignment costs would be reduced by \$250,000.
- An estimated \$1.5 million in short-term refurbishment of the trolley buses would be eliminated.
- An additional \$0.9 million to refurbish trolley overhead is identified as unfunded shortfall in the Capital Plan in the next 3 years.
- In 2010, replacement diesel buses would be purchased, instead of trolleys. The estimated savings by purchasing diesels is \$26.5 million.
- Beyond 2010, major overhead infrastructure upgrades valued at \$14 million would not be required.
- A total of \$43.2 million of additional capital expenditures will not be required to 2013 by switching to diesel buses.

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Legal Implications

- The City of Edmonton Transportation Electrical Services Agreement (2001 – 2006) with EPCOR requires 120 days written notice on any suspension of work covered by the contract.
- The City must purchase inventory held by EPCOR for exclusive use to maintain the trolley overhead.

Justification of Recommendation

1. Administration's recommendations maximize financial and operational benefits.

Financial

- Financial benefits are maximized by discontinuing trolley operations in 2004. A potential reduction of \$1.9 million in Transit's 2005 operating budget is available. The recommended decommissioning plan for the overhead wire system is financed using funds in roadways projects currently designated for the replacement of trolley infrastructure. Additional capital funding is not required.
- The estimated incremental unfunded capital costs from 2004 to 2013 associated with sustaining trolley operations, and replacing the buses in 2010 is \$43.2 million. The recommended plan will reduce the "infrastructure gap" in the LRFP by this amount.

Environmental

- Small PM and NOx increases are incurred by discontinuing the trolley operation earlier than 2008; however these are minor compared to total overall

reductions that are occurring through the current planned retirement program.

- The impact on emissions by the transit system is small. The consultant estimated NOx and PM emissions to be 1.8% and 1.6% respectively of the total emissions from all transportation sources in the Edmonton region. Because the trolley fleet accounts for only 7% of total fleet kilometres, the impact on emissions is only a few one-hundreds of a percentage point.
- Transit fleet emissions are steadily reducing due to engine and fuel regulations. Trolley operations do not significantly impact this trend.
- To mitigate local emissions, newer low floor diesels will be assigned to the base service on the trolley routes.
- Additional environmental benefits could be realized by reinvesting savings into diesel particulate filters and additional bus service for the existing fleet.

Operations

- Only 1.4% of route stops in Edmonton are served exclusively by trolleys.
 - Edmonton Transit receives ongoing requests from customers for low floor buses on trolley routes. Discontinuing the trolley operation will allow immediate accessible base level services on these routes.
2. The "Trolley Decommissioning Plan" (Attachment 1) identifies operations reductions, and a program to remove the trolley supporting infrastructure from 2004 to 2013, using additional funding currently budgeted in roadway

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reconstruction projects for trolley pole and wire relocations.

3. Revenue from the sales of the trolley fleet and supporting infrastructure will offset costs of obsolete inventory.

Background Information Attached

1. Trolley System Decommissioning Plan.
2. Booz/Allen/Hamilton Report - Trolley Operations Review – Strategic Alternatives – Summary Observations.
3. Edmonton Transit System Advisory Board Letter dated February 23, 2004.

Background Information Available on Request

Booz/Allen/Hamilton – Trolley Operations Review – Strategic Alternatives.

Others Approving this Report

- W. D. Burn, General Manager, Asset Management and Public Works Department
- J. Tustian, General Manager, Corporate Services Department

Trolley System Decommissioning Plan

With the approval of the Administration's recommendation to terminate trolley operations by mid-2004, the following document describes the implementation plan to decommission the trolley system. The decision impacts the scheduling of service on trolley routes with diesel buses, training of operators, size of the fleet, bus maintenance staff and parts requirements, and physical removal of the trolley lines, hardware, poles and substations. The plan to remove the overhead system is financed by the funded portion of the capital budget identified in the Long Range Financial Plan (LRFP). The operational savings related to maintenance of the overhead system, and the operation and maintenance of the trolley fleet will be available to address corporate priorities.

Service Adjustments

The plan calls for stopping trolley service by mid-2004. Service adjustments will be made to go into effect in September 2004. Trolley routes # 3, 5, 7, 9, 120, 133 and 135 are affected by the decision. A total of 37 trolleys are booked out on peak service on weekdays on these routes, 19 on Saturdays and 15 on Sundays. The plan will be to replace these buses with diesel units. The base service of 22 buses during the weekday, 19 on Saturday and 15 on Sunday will utilize low floor diesel buses. Weekday AM and PM peak service totaling 15 runs will use either older GMC or low floor buses depending upon the fleet availability. With the low floor service on the trolley base runs, the issue of not providing accessible service into areas served by the trolleys will be alleviated.

Because routing can be more direct at the beginning and end of the run by using diesel buses instead of trolleys, a saving in the operational time can be achieved. Also, use of the diesel buses will allow extending some routes to other major destination points which will decrease the requirement for transferring. The total estimated saving is \$40,000 in 2004 and \$120,000/year thereafter.

Design of the plan and development of the new signup will be done by Transit Service Development Section for implementation with the September, 2004 service.

Operator Training

With the removal of the trolleys from operation, the operator training plan can be reduced by 3 days per operator. In 2004, some 100 new operators will be trained to replace retirees and other vacancies due to operator attrition. The training requirement for operators is estimated to be the same for the next several years. Retraining costs can also be saved if the trolleys are no longer in service.

The Transit Bus Training Section will be responsible to revamp the operator training program to remove the need to train new operators on the trolley bus. The new training program will be

Trolley System Decommissioning Plan

implemented with the July, 2004 training class. Estimated savings are \$23,000 in 2004 and \$47,000/ year thereafter.

Fleet Adjustments

There are 59 trolleys in the fleet available for active service. These units are operated out of Mitchell and Westwood Garages. In addition, 39 units are in storage. An additional 37 diesels are maintained in an operational state in the two garages to provide for back up service if the trolley service is interrupted for any reason.

MES will move the 59 trolleys out of the two operational garages into a storage compound to free up space in the garages by September 2004.

MES will assess the diesel fleet and ensure that sufficient older GMC diesel buses are refurbished to provide reliable service as trolley replacements. MES will also evaluate the distribution of the low floor fleet to accommodate an additional 22 guaranteed low floor bus runs to cover the former weekday and weekend base trolley runs. This evaluation will be completed before the September 2004 service date.

Thirty five replacement low floor diesel buses will be delivered in the Spring of 2004, and each year in the future, which will be sufficient to accommodate the increased low floor bookout required to serve the former trolley base service runs. It will also ensure a reliable diesel service is provided in place of the trolley bus.

Approval of Administration's report by Council will authorize the disposal of the surplus trolley buses and spare parts.

Trolley Fleet Maintenance & Parts

MES currently employs 4 Electrovehicle Mechanics (EVM) to maintain the trolley fleet. EVM's are paid a premium for their additional knowledge and job requirements. By eliminating the trolley operation, the maintenance work on the diesel buses can be done by diesel mechanics at a lower rate. Savings may also be achieved by the reduction in the number of onroad repairs and responses that are required. No EVM layoffs are anticipated as a result of the decision to terminate trolley operations. The trolley EVM's may be transferred to the LRT system to fill any vacancies and as EVM attrition occurs. Until that point, the EVM's can be employed repairing diesel buses and doing unit repairs. The transfer of any positions will require a new EVM sign-up. Discussion will be required with the Union in July 2004 prior to the new sign-up going into effect.

Trolley System Decommissioning Plan

MES and Materials Management will need to identify all trolley parts that are currently held in stores and segregate them. These parts will be disposed of with the disposal of the surplus trolley buses. This work will be completed by the end of 2004.

Total savings in labour and parts costs in the operating budget is estimated to be \$230,000 in 2004 and \$330,000/year thereafter.

Trolley Overhead System Decommissioning

The trolley overhead system will no longer be required if the decision is made to cease trolley operations. There are 127 km of overhead wire, 81 intersections, 31 feeders and 8 substations to be physically dismantled. The dismantling plan will use funded capital dollars to pay for the removal of the infrastructure over the next ten years.

The overhead system poses two liabilities if it is not removed – an electrical hazard, and tensioned lines and heavy hardware suspended above major public roadways. The electrical hazard will be removed by disconnecting all of the substations from the power grid and isolating the overhead feeders to the trolley lines. The physical hazard will be addressed through the removal of the overhead wire, hardware and feeder wire. Until these hazards are removed, regular maintenance patrols of the line and emergency response to incidents must be maintained. The decommissioning plan concentrates on the removal of these hazards as quickly as possible, given the budget, by first isolating the substations, and then taking down the overhead wire and hardware in stages corresponding to planned roadways work, or other construction in various areas of the City.

The overhead system is currently maintained by EPCOR under contract to Transit. Provision was made in the contract to significantly change the scope of work with the provision of 120 days written notice. With the approval of Administration's recommendation, formal notice will be sent to EPCOR informing them of the change in the contract scope. Negotiation will be required to provide essential line patrols and emergency response for the next 6 years until the overhead elements can be removed. Costs will be negotiated for the staged removal of the system by EPCOR over the next 10 years in accordance with the approved capital program in the LRFP. These changes in scope will be negotiated before September 2004 to ensure the system is safely decommissioned.

Removal of portions of the system will be required to accommodate the relocation of Rossdale Road and the Churchill Square Redevelopment work on 102 and 102A Avenues before August 2004. Planned 2004 trolley capital work will be assessed and cancelled as soon as possible after the decision to suspend trolley operations. Removal of portions of the system related to roadways construction projects will commence in July 2004. Assessment of the trolley projects will be completed by June 2004.

Trolley System Decommissioning Plan

The decommissioning plan includes the removal of the overhead wire and hardware in areas impacted by Roadways, or other known construction, in that year or the subsequent year. The last priorities include the removal of the substation equipment and trolley only poles. Some substation equipment will be assessed for potential use on future LRT extensions. This will be done in early 2005.

Trolley overhead system parts are currently owned by EPCOR and, under the contract, will be purchased from EPCOR by the City. Parts will be assessed to determine which are surplus and a value established for the City to purchase into inventory. Some components may be able to be sold to other transit properties still operating trolleys. This work will be completed in early 2005. Any wire and hardware removed from service will be salvaged and sold.

Six substation sites will require an environmental assessment and remediation at the end of the decommissioning process. This is required due to the use of oil-filled transformers on these sites. Three of these properties may be able to be sold once the process is completed in ten years.

Summary Observations...

- ▶ Edmonton's trolley fleet is old, and the trolley system is underutilized. ETS must decide to either renew or abandon its trolley operations
- ▶ Because of dramatic improvements in diesel engine emissions controls (spurred by the impending 2007 exhaust regulations), trolleys no longer will offer advantages in area-wide emissions compared to diesel buses.
- ▶ Localized emission considerations (at downtown street corners) will continue to favor trolleys,
 - but the perceived difference is likely to be very small, given expected reductions in diesel bus tailpipe emissions, and
 - Trolley service only accounts for about 7% of total fleet kilometers, only 4.2% of total route-stops, and only 1.4% of system route stops are exclusively served by trolleys.
- ▶ The trolley system has been – and will continue to be – more expensive to operate and maintain than equivalent diesel service.

February 23, 2004

Edmonton City Council
 Transportation and Public Works Committee
 #1 Sir Winston Churchill Square
 Edmonton, AB T5J 2R7

Dear Committee Member:

The Edmonton Transit System Advisory Board examined the January 23, 2004 report of the consulting firm Booz Allen Hamilton and concluded that it contains significant flaws and omissions. As such, we do not believe it provides adequate basis for making an objective decision on the future of the trolley system.

According to a Department of Asset Management report presented at the September 16, 2003 Transportation and Public Works Committee meeting, "Input from the Transit System Advisory Board . . . will be solicited for inclusion in the consultant's report." We were surprised to hear at our January 2004 Board meeting that we had been consulted. While the consultants' work was going on, the ETS Advisory Board was, in fact, not formally approached for input. The only contact with our Board consisted of a representative from Mobile Equipment Services sitting in at our September Board Meeting during a presentation made by a community organization. The ETS Advisory Board neither saw nor reviewed a draft of this report prior to its release, nor has it seen the consultants' terms of reference.

The ETS Advisory Board identified a number of serious shortcomings in this report. The following summarize Booz Allen's conclusions and the ETS Advisory Board's comments:

Booz Allen conclude: Edmonton's trolley fleet is old and the system is underutilized.

- The ETS Advisory Board feels the trolley infrastructure is well maintained and represents a significant capital asset. The report does not assess the value of this asset. The Vancouver system--about twice the size of ours--was valued at \$184 million. To consider the trolley's future objectively, we need to know the value of our system.
- If the trolley fleet is "underutilized" (the consultant described it as "not utilized to industry standards") what steps could be implemented to bring utilization to "industry standards"?

Booz Allen conclude: Because of dramatic improvements in diesel engine controls (spurred by impending 2007 exhaust regulations), trolleys no longer will offer advantages in area-wide emissions. Localized emission considerations will continue to favor trolleys . . .

- The issue has never been "area-wide emissions"; it has always been one of curbside emissions. A statement that passengers waiting at bus stops are exposed to up to 40 times the ambient levels of diesel particulate emissions appears buried in the report. Despite devoting many pages to diesel emission standards, Booz Allen miss the fact that Environment Canada states there is no safe level of particulate exposure and recommends exposure be minimized wherever possible. Curbside diesel emissions obviously present greater risk than distant power plant emissions, and this needs to be a key consideration in any comprehensive assessment.
- The report seems unsure about what new technology will be used to meet the 2008+ emission standards. At one point, it alludes to hybrid buses, which are twice the price of current diesels (and would change the capital cost assessment). To our knowledge, emission reduction technologies are still very much in development, with the long-term costs and performance yet unknown. The ETS Advisory Board does not share the consultants' belief that the mere promise of stringent diesel emission standards is sufficient basis to decide the future of zero emission trolleybuses.

- The current fleet renewal timetable will see most of old diesel fleet replaced with existing diesel technology before the new standards come into effect. Thus, the entire diesel fleet will not actually meet the new standards until about 2028. In terms of “area-wide emissions”, the trolleys will still be cleaner than many of the diesel buses in use until that time according to the power and diesel emissions data in the report.

Booz Allen conclude: The trolley system has been and will continue to be more expensive to operate and maintain than an equivalent diesel service.

- The report focuses on costs without considering how ridership and revenue factor into this equation. Trolley routes operate downtown and carry thousands of passengers. The revenue from these passengers should offset the added cost of maintaining trolley infrastructure to some extent. Trolley routes may, in fact, be more financially viable than lightly patronized diesel routes operating in the suburbs. But Booz Allen’s cost per km measure does not permit this analysis; the report’s operating cost assessment is therefore missing a key element. In order to assess the financial viability of the trolley system or establish the cost of the trolley’s benefits, one needs to know the cost per passenger or cost per passenger km. A discounted cash flow (DCF) analysis would provide a better basis for comparison.
- “Life cycle costings”--the cost of each type of vehicle over its lifespan--are customary in fleet maintenance for making equitable comparisons. Such an evaluation is not provided. Instead, the study unfairly compares vehicle maintenance costs of a diesel fleet that is about 50% new with 20+ year old trolleybuses over only the past three years. If one compares old trolleys to old diesels in Booz Allen’s data, the report’s conclusion that trolleys cost more to maintain is, in fact, incorrect. The reported vehicle maintenance costs of 20+ year-old trolleys are significantly lower than diesel buses 10 years of age and older, and the cost of maintaining 12 year old diesels is at least twice that of 21 year old trolleys. When used “maximally” trolleys show up as the least expensive to maintain of all vehicles in the bus fleet 10 years of age and older. The presence of conclusions not supported by the data damages the ETS Advisory Board’s confidence in this study.
- The report states ETS has negotiated a low rate for power on contract with EPCOR, but the consultants cannot predict diesel fuel prices beyond 2007. The ETS Advisory Board is aware that City Council has had to inject funds into the Budget to cover rising diesel costs for the past three years. The report’s conclusion that phasing out trolley operations will bring future cost savings is questionable if diesel fuel price trends cannot be projected for more than three years in advance. The report also does not acknowledge that all Edmontonians are shareholders in EPCOR and benefit from the sale of power and infrastructure maintenance services for the trolley and LRT systems.

The ETS Advisory Board has identified other important issues not considered in the report:

- Diesel bus noise has been a concern in Edmonton neighbourhoods. Trolleybuses are not noise polluters. The report devotes one page to noise emissions, but contains no noise impact assessment that would identify, for instance, the increase in noise peaks per hour >80 db in trolley corridors if all routes were diesel. The City and communities need such an assessment in order to weigh the impacts that any proposed change would have.
- The study does not take into consideration population growth patterns in the city core or evaluate what potential role trolleys might play in the revitalization of downtown Edmonton.
- Most importantly, the study contains no evaluation of ETS customer preferences or the views of residents and business owners in the areas served by trolleys.
- On review of the report, consideration of other capital cost scenarios would reduce the capital cost expenses from 20 Million to 8.75 Million dollars.

The ETS Advisory Board does not see the long-term future of the trolley system as requiring an immediate decision. While Edmontonians can appreciate the need to control expenditures, they have also voiced recent concerns about quality of life issues being lost in an emphasis on economics.

Given the flaws and omissions in this report, the ETS Advisory Board--as a citizens board--recommends deferring any decision until adequate consultation with stakeholders can take place. While a public hearing

has been promised in April and may be beneficial, the Board feels that the effectiveness of such hearings as a measure of public opinion is sometimes limited. Timing can limit the participation of affected citizens, and there is minimal opportunity for discussion. We feel more comprehensive consultation would ensure citizens views are heard and considered. Our Board would like to offer to facilitate such a public consultation process.

Sincerely,

Graeme Feltham
ETS Advisory Board Chair

Cc: Wayne Mandryk, Manager of ETS
Edmonton Environmental Advisory Committee