



# **Arborway Green Line Restoration Project**

## **Independent Review**

**Conducted for**  
**Boston Light Rail Advocacy Group**  
**by**  
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Documents presented for review:

1. MBTA Arborway Green Line Restoration Project, Service Reliability and Neighborhood Impacts – 1/13/05
2. Memorandum January 19, 2005, subject Travel Forecasts for the Arborway Streetcar Restoration Analysis

## **Introduction**

Management Analysis, Incorporated (MAI) was retained by the Boston Light Rail Advocacy Group to review the referenced documents above from an independent perspective to provide recommendations and points relative to the validity of the documents from an auditors view. MAI is a private consulting firm established in 1976 that specializes in the support to government, engineering, cost, and organizational analysis, independent review, and expert witness support. The MAI staff consists of analysts and multi-discipline engineers, including professional engineers. MAI's cost and management independent reviews provide an objective, third-party assessment of government reports and analyses.

MAI's independent review looked at the documents for consistency and completeness in the presentation. We found instances where numbers and factors were presented without a basis for the numbers. Although there are many references cited, some of which are not readily available, MAI found that the reports were inconclusive from an auditor perspective. Although many of the terms presented in the reports are familiar to a Transportation Engineer they may be foreign to the average individual, who may be in the decision process. As such, these terms should be clearly identified in the document.

It is noted that the project was initiated in 2002 for design and environmental elements plus the travel demand analysis. The analysis conducted using various modeling techniques appear to be utilizing "old data" that is generally between 1990 and 1995, combined with a mix of post 2000 data and costs. Although this data may be valid, there is no rationale presented to substantiate use of data that is greater than ten years old. Where old data is used, an explanation should be provided as to why this data is more representative of the Arborway Green Line cost environment than current data. Any assumptions and factors to bring the information to the present or projected date should be presented.

MAI concluded that there are a number of issues and inconsistencies that should be clarified before a final decision on the project is reached. The following should be reviewed and items clarified before reaching a decision as whether to approve or reject the proposed Arborway Streetcar Restoration

## **MAI Document Review of Reference 1: “Service Reliability and Neighborhood Impacts -1/13/05”**

### **Emergency Response**

While the points presented have merit regarding the problems associated with the emergency vehicles transiting the dense corridor, problems for emergency vehicles are not new. These exist as well with the current busses and also large trucks although it is recognized that the longer LRV consists do present some additional problems. To present this as though it were exclusively a problem associated with the Arborway Green Line is misleading.

In a letter from the Deputy Commissioner of Technical Services, the City of Philadelphia Fire Department reported that a review of the past five years found no instances where street cars hindered the Philadelphia Fire Department Operations and that they were able to continue high quality levels of service.

Reference 1 discussed problems for emergency response vehicles during the construction period as an issue. However, it should be anticipated that at some time in the future, major work would have to be accomplished on the streets and create the same problems that would be associated with the Arborway Green Line Restoration. Reference 1 did not address road maintenance and associated access problems in evaluating alternatives to the Arborway Green Line.

### **Service Reliability**

The service reliability issues discussed regarding blocking of traffic are all valid. However, they are also equally valid under a “do nothing” option without the new LRV whether it is snow, accident, double parking or other emergencies along the corridor. Although buses, trucks, and cars can maneuver between lanes during snow situations, the LRV cannot switch lanes. However, it is very feasible to direct snow removal operations to maintain the rail lane open at all times and thereby allow for a constant flow of traffic. Additionally, it is normal for many cities to designate snow emergency routes for which street parking is not allowed during a snow emergency. An area highlighted was the issue of when a fire ladder truck is at a response, the outriggers would be deployed and block a lane. This again would happen despite either scenario and would block bus traffic as well as vehicular traffic. Trucks double parking for off-loading, service of fuel oil, or refuse pickup all will have the same impact and create delays whether with or without the LRV. The only mediation for these delays would be to remove the street parking along the route and will be discussed later. It is also feasible to restrict oil deliveries and garbage pickup to times other than the peak periods. To present the service reliability issue as though it were solely associated with the LRV is misleading.

**Disabled LRV Consist:** The report indicates that there would be 22 disabling of LRVs during each month. This is a very high number. Out-of-service time and can be controlled and minimized with a strong maintenance program for all LRVs and system components. Additionally, the vehicles being put into service would be either new or refurbished and should provide minimal breakdowns requiring recovery. With 25 LRVs in service (number purchased – table 22 of reference 2), the projection is one per month for each

LRV. With proper maintenance, we would expect no more than one to two breakdowns per year per LRV.

**Off-Corridor Turnbacks:** The off-corridor turnbacks account for 37% of all turnbacks contained in the report. It is questionable of whether these should be included or not since they do not have a direct impact on the transportation system in question. It is not reasonable to penalize the new system for problems on another system.

**Summary Review:** A review of the “Summary of Service Reliability Impacts” indicates a variety of inconsistencies as shown in the table below:

Category	Services Table of Trips Turned Back	Percent of Turnbacks from Page 15 Table	Text - Average of number of incidents	Turn backs per incident described in Text	Calculated Trips Turned Back	New Calculation of Percent of Green Line E branch Trips
Vehicular Accidents	39	0.5%	8.5	3	25.5	0.35%
Emergency Calls	314	4.3%	72	3	216	3%
Double Parking						
Oil Deliveries	84		25			
Commercial Deliveries	17		5			
Garbage Pick-up	0*		0			
Parcel Deliveries	5		1.5			
Subtotal Double Parking	105	1.4%	36.5	3	108.5	1.5%
Snowstorms	Not Estimated		Not Estimated		Not Estimated	
Disabled LRV Consists	92	1.3%	22	3	66	0.9%
Off-corridor Turnbacks	329	4.5%			N/A	
<b>Subtotal: Trips turned back or cancelled</b>	<b>879</b>	<b>12%</b>			<b>416</b>	<b>5.6%</b>
<b>Trips Able to meet MBTA's Service Delivery Policy</b>	<b>6,421</b>	<b>88%</b>			<b>6684</b>	<b>94.3%</b>
Total Scheduled Trips	7,300				7,300	

As displayed in the table above, there was an inflation of turnbacks from the report's text to the summary table. Using the text as the basis a recalculation is shown above. Additionally the Off-corridor turnbacks were not included since they are a separate transportation issue that should not impact the LRV for the same reason that the snowstorms are not included. As such, the recalculated turnbacks are 416 versus 879 and result in a Service Delivery recalculation of 94.3% that will be able to meet the MBTA's Service Delivery Policy/ which is very close to the policy desires of 95%. A reevaluation of the disabled LRV consists would result in a new service delivery over 95%.

### **Neighborhood Impacts**

**Loss of On-Street Parking.** This is a very sensitive issue among local residents. However, some of this could be overcome by several concurrent projects of select parking structures along the route at a comparably minimal additional cost to the total project that would actually enhance the total transportation flow. By the construction of several small parking garages at select areas of the route there could be no or reduced on-street parking. This along with select sections of 15 minute parking, would preclude double-parking, improve flow for emergency vehicles, improve traffic visibility, and definitely improve snow emergency actions. In highly congested and highly traveled areas it is best to first remove the on-street parking. Removing the on-street parking would also have an impact of reducing the accident rate along the corridor. This option and respective costs of property and construction should be studied. Also, it has been noted that in other areas where park and ride structures were completed, that they were filled to capacity and later required expansion. This would have the overall effect of reducing automobile traffic, reducing emissions, and increasing the LRV ridership. The Parking Loss Summary Table in the report contains several mathematical errors. The net loss is actually 88 versus 44 spaces and total remaining is 627 versus 671. Since 8 of the spaces are illegal the real net loss is only 80 spaces.

**Bicycle Safety.** There is a lot of discussion about the safety of bicycles along the Arborway corridor and with the rails in the roadway. However, that problem already exists in all but a very small section of approximately 300 feet that has been paved over. Therefore, there is no increased safety hazard. However, new pavement alongside the rails might improve the safety. Additionally, there are two bicycle paths exist that run parallel to the tracks on either side that are approximately ¼ mile away in either direction that bicyclists can use.

**Construction Impacts.** Construction of any transportation system will impact the entire corridor whether it is new construction or just repair of the existing system. These are known facts that are mediated by close coordination with agencies, communication with the community and adequate planning. The control of parking as discussed above before roadway construction would significantly reduce the impacts. It was not discussed in the report but a significant factor is the age of the existing utilities that are currently under the tracks. Repair/replacement of utility infrastructure is a major problem and cost in all cities that will only get worse with time. It should also be noted that the roadwork needed to remove the tracks is approximately \$23 million according to the Boston Transportation Department. This is the same roadwork figure that is used in the study to count against the cost of keeping the tracks and as such should not be counted against the new construction.

**Summary of Neighborhood Impacts.** The report indicates an exaggerated loss of 111 on-street parking. As discussed above, the loss is only 80 parking spaces. The in-street track hazard to bicyclists is no greater a hazard than what exists today with the old tracks within the roadway. The discussion of the sub-terrain ledge and the impact on construction is no greater for the LRV project than reconstruction of the roadbed at a later date. The report continually points out the negative side of the construction rather than addressing the comparison with the improvements and benefits of the new roadway.

**MAI Document Review of Reference 2: “Travel Forecasts for the Arborway Streetcar Restoration Analysis”**

The report is centered on the use of transportation models that are valid and known among transportation professionals. However, many of the factors used and the basis for many of the numbers is not presented or explained.

Although much of the report focuses on data collected subsequent to 2000, there are numerous references to the 1991 Household Travel Survey. There is no reference to sampling to indicate the current validity of that survey or to apply a factor to the survey to update it to the current needs.

The model uses the auto cost as operating cost in dollars at 9.8 cents per mile using 1991 dollars. However, all of the other data is subsequent to year 2000. The 9.8 cents per mile is very low even for 1991. The Federal Travel Regulations, promulgated by the General Services Administration and used nationwide, contain a mileage rate for reimbursement that approximates the operating cost a privately operated vehicle. These are contained in 41CFR301-10 which includes the costs of depreciation, fuel, grease, oil, towage and similar speculative expenses, insurance, state and Federal taxes. The rate established for June 30, 1991 was 25 cents per mile, increased to 30 cents in 1995, and 32.5 cents in January 2000. The current rate as of February 4, 2005 is 40.5 cents per mile. These numbers are also the same ones used by the IRS for tax purposes. As such, the 9.8 cents per mile for automobile cost is much understated and should be increased to more accurately portray the costs associated with auto use in the corridor. The cost of ownership and operation costs as identified by the Federal Highway Administration’s “Our Nations Highways” is shown in the following table for intermediate size vehicles.

<b>Costs in Cents per Mile for Vehicle Ownership &amp; Operation</b>			
<b>Category</b>	<b>1996</b>	<b>1998</b>	<b>2001</b>
Repairs	1.1	0.9	0.9
Depreciation	10.1	13.7	16.4
Fuel Tax	1.2	1.8	1.9
Fuel Cost	4.9	4.0	4.2
Financing	5.1	6.7	7.0
Maintenance	3.5	5.3	2.3
State Fees	1.4	1.3	1.4
Insurance	17.0	10.6	12.7
<b>Total</b>	<b>44.3</b>	<b>44.3</b>	<b>46.8</b>

The report contains a mix of System Wide statistics versus the system that is under study and evaluation. As such, it does not present a clear view of the impacts or benefits of the proposed Arborway study. The System Wide may be used as a baseline but then should be factored to the study under consideration. Since the Corridor under study is relatively small compared with the System Wide it gets lost in the large numbers. However, the benefits to the area impacted may actually be large. This is noted in both the

environmental emissions and costs. Actually, the emissions impact in the congested areas would be greater than those of the System Wide because of the population density in the corridor versus other areas in the System Wide that are more remote or spread out.

The user benefit costs were deflated to 2000 dollars at the rate of \$12 per hour. These benefit costs are used in the ranking of projects. However, the table is not identified with a given year. The costs for Annual Operations & Maintenance and cost avoidance in Tables 23 and 24 use costs escalated to 2005. According to the inflation calculators of the Consumer Price Index by the Bureau of Labor Statistics the benefit of \$12 per hour in 2000 dollars would amount to \$13.16 per hour in 2004 dollars (2005 not out yet). This results in a 10% increase in the applied cost benefits. To bring it to 2005 dollars a factor of 12.5% would be appropriate raising the benefit to \$13.50 per hour.

The use of mixed years in the study along with mixed areas makes the entire study skeptic from an auditing point of view and immediate decisions should not be based upon the figures presented.

### **MAI Independent Review Conclusion**

MAI reviewed the referenced documents from an independent view point to determine if the information presented was complete and adequately documented to make an informed decision regarding public funds.

MAI concludes that the previous studies adequately addressed the concerns of restoring the Green Line with the modern Light Rail Vehicles. The proposed transportation system has the potential to improve the quality of life and environment in the Arborway Green Line corridor. However, the reports understate the risks and costs associated with the status quo or other alternatives to the LRV project execution.

Throughout the reports there are discussions and data introduced with a mix data evaluation years for costs or analysis. Although the data presented may be valid for a given year, there is no rationale presented to substantiate use of old data mixed with recent data or cost factors. To portray complete and accurate representation, all costs should be normalized to a predetermined year for evaluation and an explanation of the normalization for audit purposes. The reports consist of a variety of years from 1991 to 2005. One example is a significantly understated cost of automobile operation. The source of specific data is also not adequately presented to enable a complete audit that would support the decision process for obligation of public funds.

Based upon the identification of inaccurate calculations within the summary of service reliability impacts and the obvious understated cost of automobile ownership and operations, the remainder of the reports and their data presented into the models and analysis become highly skeptical.

MAI concludes that there are a number of issues and inconsistencies, many of which are discussed in this report, that should be clarified before there can be sound conclusions. Only based upon sound conclusions that evaluate all alternatives should a final decision be reached as to whether to approve or reject the proposed Arborway Green Line Streetcar Restoration.