Washington Metropolitan Area Transit Authority

Semi-Annual Status Report on Railcar Programs

Presented to the Board of Directors;

Planning and Development Committee

By

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PDEC

PLANNING • DEVELOPMENT
ENGINEERING • CONSTRUCTION

I. Purpose

To provide the Board of Directors, **Planning and Development Committee** with a semi-annual update on:

- The 5000, 2000/3000, and 6000 Series railcar programs that represent 63% of the WMATA fleet, and

- Other railcar programs such as:
  - Anacostia Street Car Project
  - Precision Stopping
  - 1000 Series Improvements
  - Railcar Capacity

- Look ahead issues:
  - Railcar Rehab Facility
  - 7000 Series
  - Test Track

II. Introduction

Of the ongoing WMATA railcar programs discussed in this presentation, the five principal programs are:

- **5000 Series**, manufactured by CAF; the last railcar of the 192 cars was placed into passenger operations in June 2004.
- **2000/3000 Series** railcars manufactured by Breda in the 1980's, major rehabilitation program underway to extend the useful life of the railcars for another 20 years. Of the 364 cars included in this program, ALSTOM has rehabilitated 158 railcars as of January 31, 2006.
- **6000 Series**, manufactured by ALSTOM; the first pair of the 184 railcar procurement is scheduled for passenger operations in early Spring of 2006 and the last one is scheduled in late 2007. The first two pairs of railcars arrived at WMATA in September and October 2005 for five months of qualification testing and one month of pre-revenue testing.
- **Precision Station Stopping –** Phase I testing has been completed on the Red Line as of December 2005. Phase II, similarly, will be complete for the Orange, Blue, Green and Yellow lines in December 2006. This project supports the introduction of 8-Car trains to the system and is designed to reduce the number of station overruns.
- **Streetcar**, manufactured by INEKON; the procurement of three Streetcars for DDOT for the Anacostia Demo Line.

III. WMATA Railcar Fleet Profile

Railcar Manufacturer	Assigned Cars Nos.	Service Implementation Dates	Fleet Size # of Railcars	% of Total Fleet
Rohr	1000-1299	1974-1978	296	26%
Breda	2000-2075	1983-1984	76	41%
Breda	3000-3291	1984-1988	288	
Breda	4000-4099	1992-1994	100	
CAF	5000-5191	2001-2004	192	17%
Alstom	6000-6183	2005-2007	(184)*	16%
Total			952 (1136)*	100%

*184 railcars are presently in production, successful completion of this order will increase the WMATA fleet size to 1,136 railcars by the end of 2007.

IV. Background

- ALSTOM is presently WMATA's biggest contractor with well over $700 million dollars; ALSTOM is the manufacturer for the new 6000 Series railcars and the contractor responsible for the 2000/3000 Series rehabilitation program. ALSTOM is also the supplier of the Automatic Train Control (ATC) subsystem for the 5000 Series railcars, manufactured by CAF, and the Precision Station Stopping Programs.

- As stated by Mr. Patrick Kron, ALSTOM Chairman and CEO in a January 17, 2006, letter, ***"… let me please stress first that the current projects for WMATA are as key for ALSTOM as they are for WMATA and, as such, are considered as a top priority by ALSTOM Transport top Executives as well as by myself. The commitments expressed by Roelof van Ark* and Philippe Mellier** are fully backed by myself and our Corporate organization."***

- WMATA's current focus is on ensuring that ALSTOM meets its deliverables and devotes the necessary resources to meet the quality and reliability contractual requirements.

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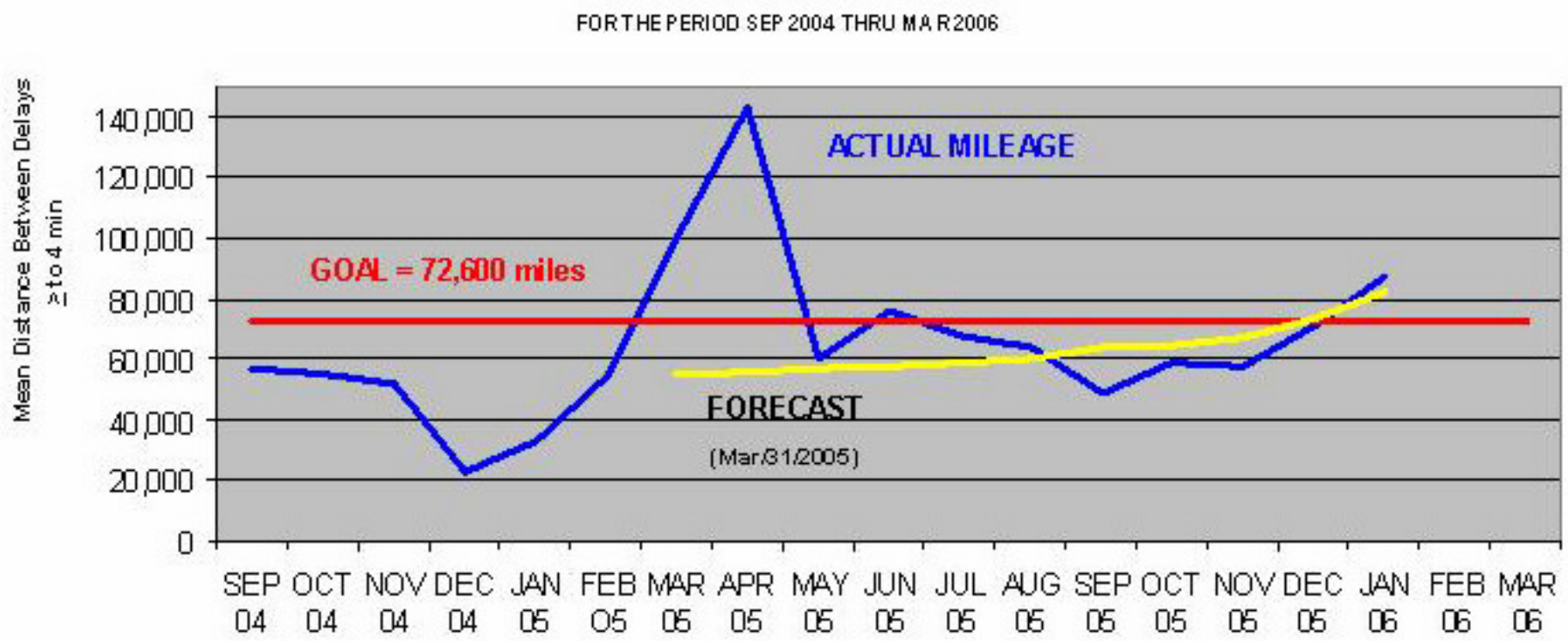
*: ALSTOM Sr. Vice President for North America – responsible for the WMATA Programs
**: ALSTOM President for the Transport Division

V. 5000 Series Railcars

The performance of the 5000 Series railcars continues to improve. The March '05 forecast presented to the Board remains unchanged. At the end of 2005, this fleet met/exceeded the WMATA performance goals. (See next page.)

- **Program Schedule:** 192 cars, manufactured by CAF are all in service; with the last two railcars delivered in June 2004.
- **Budget:** Total program budget is $383M, 94% expended to date. Still withholding $21.5 M for spare parts, reliability, and final completion of engineering modifications and final acceptance.
- **Engineering/Technical:** 172 of 191 modifications have been completed; nine more are currently underway, the modifications of door rollers and limit switches have been completed for more than 1/3 of the fleet.
- **Reliability:** Reliability for this fleet continues to improve. The current testing program covers 12 primary systems. Based on testing to date, 5 of the 12 systems have met reliability goals. For the remaining 7 systems, engineering modifications have been identified and corrective actions are underway. Over 70% of all delays in recent months have been caused by Door System malfunctions. Staff is working with the manufacturer and other suppliers to resolve this outstanding issue.
- **Safety & Quality:** Safety certification is complete.
- **Assessment:** 5000 Series Railcar reliability is steadily improving and MDBD projections are meeting performance goals. Over the last twelve months, there have been significant improvements in the performance. This positive performance trend is expected to continue as a result of the implementation of the engineering modifications throughout the fleet.

V. 5000 Series Railcars



VI. 2000/3000 Series Railcars

This major rehabilitation program, one of the largest in the Country, has experienced delays that are typical for modernization programs of this type. ALSTOM and its suppliers continue to improve on quality. ALSTOM has resolved most of their subsupplier related delays, allowing them to return to full production.

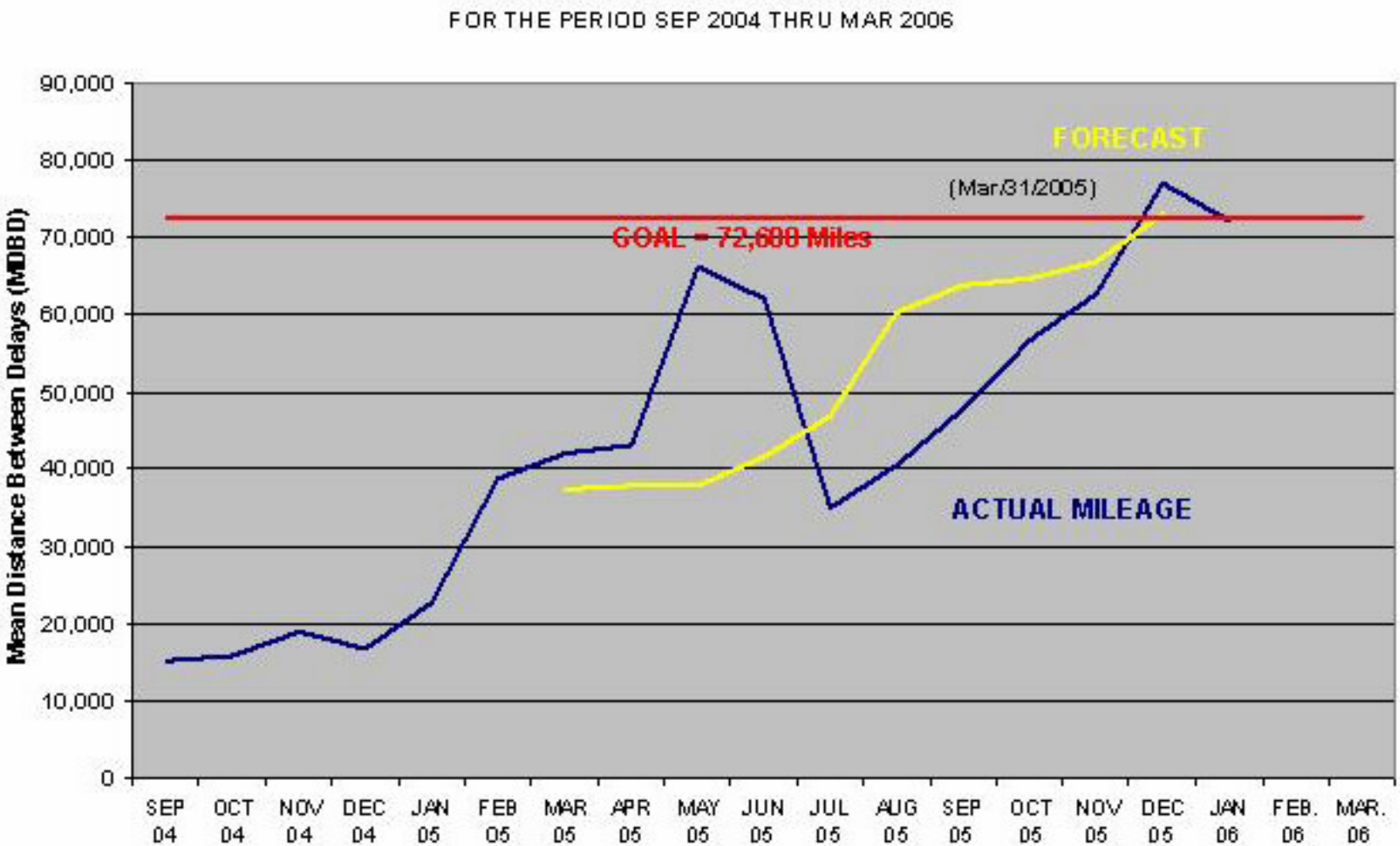
- **Program Schedule:** 364 railcars being rehabilitated by ALSTOM: 166 rebuilt railcars have been received with a 36 railcar float being maintained. (76) **2000 Series Railcars (100% completed)** and (288) **3000 Series Railcars (31% completed)**. ALSTOM's most recent revised Program Schedule shows a completion Fall 2007. This schedule is rather optimistic and is presently under evaluation.

- **Budget:** Total program budget is $382M; 57% has been expended to date; still withholding monies for warranty, reliability, and final completion.

- **Engineering/Technical:** Systems impacting Mean Distance Between Delays (MDBD): Auxiliary Power Supply, Friction Brakes, Door Operators and ATC (station overruns). The implementation of engineering modifications to these systems will improve the performance of this fleet. ALSTOM committed, at a meeting on September 30, 2005, to provide the additional on-site resources for installing engineering modifications at WMATA's Branch Avenue Yard Facility. This effort has been completed and resulted in a positive impact on reliability and availability.

- **Assessment:** ALSTOM has resolved the majority of the open engineering concerns for 2000/3000 Series railcars. ALSTOM completed an aggressive on-site (Branch Avenue Yard) modifications program that resulted in improved railcar reliability. The primary focus has now shifted to consistent production to meet the current delivery schedule.

VI. 2000/3000 Series Railcars



VII. 6000 Series Railcars

ALSTOM delivered the first four pilot railcars of the 184 new 6000 Series railcars on September 8 and October 3, respectively. On-site Qualification Testing has been completed over the past five months. For the first time in WMATA's history, an additional month (at least) has been scheduled for 8-car pre-revenue testing to run off-peak hours throughout the System between revenue trains.

- **Program Schedule:** This program reflects lessons learned from the 5000 Series and includes a more realistic engineering and testing period before acceptance of the cars. Railcar delivery completion is scheduled for late 2007. The base contract of 62 railcars is expected to be in service gradually through the Summer of 2006. ALSTOM has delivered 12 railcars to support a complete 8-car train on-site pre-revenue testing program.
- **Introduction to Service:** Staff will brief the Board, April/May, regarding railcar allocation and service start dates.
- **Budget:** Total program budget is $378M; 25% has been expended to date. ALSTOM has been paid to date $81M.
- **Engineering/Technical:** Over 85 carshells have been produced in Barcelona, Spain to date; 45 have been delivered to Hornell, New York; 18 railcars are presently in final assembly and 12 have been delivered to WMATA.
- **Reliability:** Upgrades developed in the 2000/3000 and 5000 Series railcars programs are being implemented on this fleet.
- **Safety & Quality:** Overall safety certification is over 75% completed with certification for critical systems (i.e. ATC, brakes and propulsion) completed prior to pre-revenue testing.
- **Assessment:** Ongoing testing results reveal that these railcars have been performing well. This program has the full attention of ALSTOM and its subsuppliers.

VII. 6000 Series Railcars

Railcar Programs Assessment

- **Reliability Goals:**
  With each new railcar program the time to meet the reliability goals continues to shorten due to
  incorporating lessons learned from earlier programs.

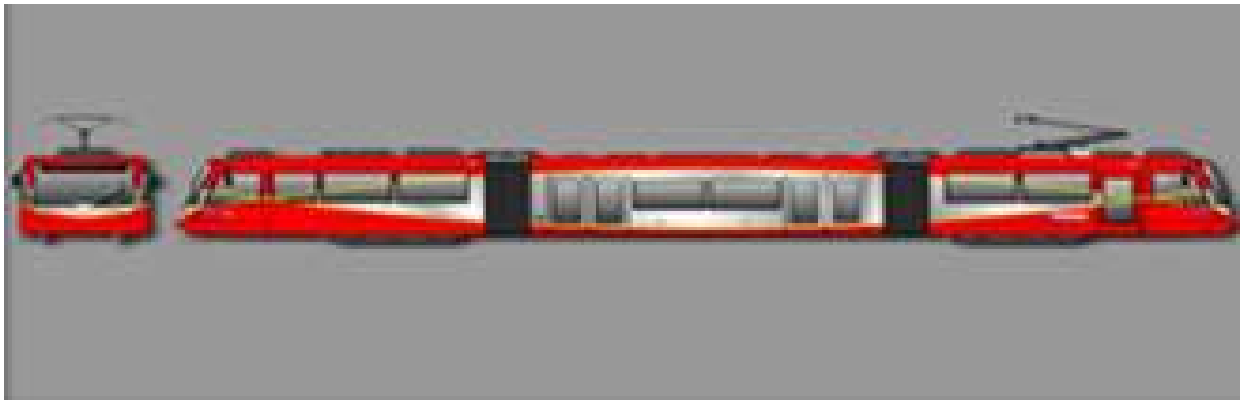
- **Overall:**
  The average fleet wide MDBD has improved from 39,836 in January 2005 to 59,868 MDBD in January, 2006; (see chart below).

FLEET	MDBD Jan 05	MDBD Jan 06		FLEET	MDBD Jan 05	MDBD Jan 06
1000	53,575	42,460		4000	75,499	83,925
2000/3000 AC	22,697	66,607		5000	33,170	87,530
3000	38,674	58,894		**ALL**	**39,836**	**59,868**

VIII. Precision Station Stopping

- **Program Schedule:** The Pilot Program (Phase I) was successfully completed in December 2005 for the Red Line. This project builds a redundant system that if a marker coil is not detected the onboard data base that contains a virtual marker coil will initiate the wayside “handshake” and thus eliminate the station overrun.
- **Budget**: With “Proof of Concept” testing successfully completed; on January 19, 2006 funding ($6M) was approved by the Board for Phase II to complete the program and execute the contract with ALSTOM.
- **Engineering/Technical:** Phase II uses the engineering solutions proven under Phase I, adds lessons learned, includes the upgrade for the 6000 Series railcars, adds the data base for the remaining lines; and also adds three new enhancements: Marker Coil Logging Diagnostics to identify missed wayside marker coils; Cab Signal Logging Function; and Door Inhibit Function to prevent off-platform automatic door opening.
- Fleet installation schedule:
  - 1000 Series – March/April ’06
  - 2000 Series – May/June ’06
  - 3000 Series – July/August ’06
  - 5000 Series – September/October ’06
  - 6000 Series – after design qualification testing is completed and during acceptance of the railcars.
- **Assessment**: Phase I, completed on the Red Line in December 2005, verified and validated the concept to improve the stopping accuracy of the 1000, 5000, and 2000/3000 rehab railcars ±3.5 feet with 99.999% reliability. Phase II will expand and implement the program for the remaining lines by December 2006, as planned.

IX. Anacostia Streetcar



In support of the District of Columbia's program to re-introduce streetcars to the Nation's Capital, WMATA is procuring three streetcar vehicles utilizing a "piggyback" option from Portland, Oregon. WMATA will also design and construct the maintenance facility for the streetcars. DC is responsible for the design and construction of the operating line. The Anacostia Streetcars and maintenance facility are financed through DDOT as a reimbursable project to be built by WMATA.

- **Program Schedule:** The expected delivery date of the railcars will be late 2006 from INEKON, the Czech streetcar builder.
- **Budget:** Streetcar budget is $9.63M, including program management and engineering support.
- **Safety & Quality:** Quality oversight and safety review to be provided by our consulting engineers, BAH/LTK.

X. Other Railcar Programs

- **Rohr Railcar HVAC Program:**
  - This program is to keep in operational condition the 30-year old air conditioning systems on the oldest fleet (1000 Series). To date the contractor (TTA) has not performed to the project schedule. Presently a new recovery plan is being evaluated to expedite this contract and improve performance of the 1000 Series fleet.

- **Rohr Railcar Motor Rewind:**
  - Program on schedule for completion May 2007and within budget.
  - Provides rewound traction motors for 1000 Series railcars.
  - Provides for improved fleet performance during snow events.

- **Railcar Capacity:**
  - April 2005: the Board approved three seating configurations for testing:
    - 6000 Series Railcars
    - Removal of 12 seats, add longitudinal seats
    - Removal of 16 seats, add folding seats and leaning rests
  - May 2006: the reconfigured railcars will be put into passenger service; throughout the survey video data will be collected and archived
  - August - September 2006: a study and analysis of the data will be conducted and results will be compared to Phase I results.
  - September - October 2006: Review study results with key stakeholders (i.e. MTPD, Operators, rail transportation)
  - October - November 2006: Review findings with E&D and RAC Committees, returning to the Board P&D Committee on December 7, 2006 to present recommendations.

XI. Improvement Areas

- **Work Closely with ALSTOM:**
  Continue monthly Partnering Workshops to address key program issues with ALSTOM jointly with its key subsuppliers. WMATA has taken a more aggressive role in helping to manage subsuppliers. Workshops have been held in Spartanburg, South Carolina (Wabco offices), Albany, New York (Merak/Sepsa offices), Hornell, New York (ALSTOM offices), and Washington D.C. (WMATA offices).

- **Expert Reviews:**
  To date, three reviews have been completed for Quality, Engineering and Reliability. The remaining reviews for Safety and Contractual Issues are scheduled for completion in Summer 2006. Reports prepared by the Expert Panel have been used in contractor performance/review sessions.

- **Staffing:**
  The WMATA vehicle engineering and project(s) management unit has filled its key positions. The unit is led by a Chief Engineer (hired September 2005), who is supported by two Sr. Project Managers, one for railcars and the other for buses; two Assistant Chief Engineers one for Engineering and the other for Standards and Configuration. The unit presently employs 47 staff with speciality vehicle engineering positions under recruitment.

- **Contract(s) Administrative Actions:** Starting April 2006 several modifications will be forwarded for Board approval to allow for gradual and systematic contract closeouts of open administrative items.

XII. Look Ahead

- **Railcar Rehabilitation Facility**

- As soon as railcar maintenance completely relocates to the new “New Carrollton Shop” (March 31, 2006) the “Old” Maintenance Shop will be evaluated for conversion to Capital Railcar Rehabilitation and Maintenance Facility to support ongoing major capital upgrades. Currently extended warranty work by railcar builders and their subcontractors is spread over four yards; Alexandria, Branch Avenue, Greenbelt and New Carrollton.

XII. Look Ahead

- **7000 Series Vehicles:**
  - As part of the Dulles Project requirements, an effort is underway to develop a plan for a multi-year railcar program (i.e. 50 railcars per year over 10+ years) to address the upcoming rehabilitation of the 4000 Series railcars (2008-2012), replacement of the 1000 Series railcars (2009-2015), and the expansion needs for the Authority (i.e. Dulles). The plan will be presented to the Board as soon as the Dulles Project and FTA approve funding for the 7000 Series railcars. Contract development is anticipated to begin in the early Summer 2006.
- **Test Track:**
  - A locational analysis for a 10,000-15,000 long single track for railcar testing has been completed for 12 potential sites resulting in two promising sites:
    - New Carrollton – Landover
    - Greenbelt – College Park
  - Feasibility Study with cost-benefit analysis, and a site selection will be complete by May 2006; staff will seek Board authority to proceed with preliminary engineering to determine costs and possible funding sources.

XII. Look Ahead (cont'd)

- Test Track (cont'd)
  - As the railcar fleet grows and non-revenue periods become increasingly difficult to utilize, another method of conducting testing and training is required. A dedicated test track would provide unlimited opportunity to perform testing and training as efficiently as possible.
  - Up to 1989 WMATA used the unopened revenue track between King Street and Van Dorn Stations as a test track. This opportunity ended with the pre-revenue preparations for the opening of the Van Dorn Street Station.
  - New York, Chicago and San Francisco transit properties have test tracks (New York has three).
  - WMATA performs three types of testing of its rail cars:
    - Qualification testing determines whether a new series of cars is acceptable for use in the system.
    - Acceptance testing determines whether new cars can be placed into service.
    - Maintenance testing is performed after major maintenance to determine if the cars can be returned to revenue service.
  - WMATA routinely trains personnel for work in the revenue system:
    - New train operators and refresher training for train operators
    - Track walkers and ATC and power technicians
    - Crane and locomotive operators

XII. Look Ahead (cont'd)

- Testing and training is conducted on revenue track during non-revenue periods. The limited non-revenue windows combined competition for access to non-revenue periods results in a very inefficient testing and training program.

- Criteria for a test track includes:
  - Minimum of 10,000 feet of tangent or near tangent track to allow trains to reach 75 mph and safely brake to a stop….
  - No property acquisition required
  - Space for a mock platform
  - Minimum costs