



Washington Metropolitan Area Transit Authority

Railcar Capacity Analysis



Presented to the Board of Directors:

*Planning & Development Committee
by*

Office of Chief Engineer - Vehicles

November 3, 2005





Purpose

- To brief the P&D Committee on test results of Phase I- Railcar Capacity Analysis, camera installation and data analysis
- To recommend railcar reconfigurations for testing
- To obtain P&D Committee concurrence and forward to the Board for approval the Phase II testing of the three railcar configurations presented
- To obtain P&D Committee concurrence to forward request to Budget Committee for approval to use the remaining balance of the original railcar enhancement program.



Goals

- The APTA Peer Review recommended development and implementation of low-costs improvements to enhance passenger flows that complements the reconfiguration of the railcar interior. The goals of this effort are:
 - **improve passenger flow**
 - **increase the capacity of the railcar**
 - **improve the ridership quality for the standing and sitting passengers**
 - **improve the accessibility of the disabled**



Background

On March 3, 2005 the P&D Committee approved a two-phase project to test the effect of a railcar's configuration on capacity. The Board adopted Resolution 2005-09 on March 17, 2005. Funding in the amount \$260,000 from the \$1 million allocated for the Railcar Enhancement Program, included in the Board approved Capital Improvement Program, was approved for Phase I of Railcar Capacity Concepts Pilot Program.

Phase I – Baseline Testing began August 2005

- Collected and archived video data from 16 railcars from Red, Orange and Green Lines in operation for 3 months
- Analyzed passenger flow and capacity from video data
- Obtained recommendations from Elderly & Disabled Committee
- Formed Customer Task Force to obtain recommendations

Example Video





Phase I

WMATA Recommendations

Results and Recommendations from Staff analysis

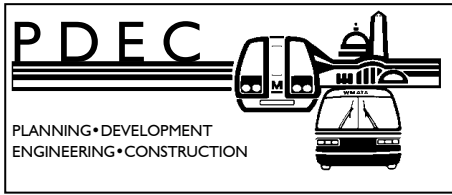
- **Remove obstacles that block passenger movement, i.e., windscreens, floor-to-ceiling hand rails and seats adjacent to doors**
- **Reconfigure seating longitudinally**
- **Increase hand rails utilizing dual overhead hand rails, seatback-to-ceiling hand rails and installing spring-type hand holds**
- **Test 6000 Series railcars in Phase II**



Phase I E&D Recommendations

The Elderly and Disabled (E&D) Committee recommends:

- **Maintain priority seating as it is today**
- **Remove vertical floor-to-ceiling hand rails to allow easier ingress, egress, and movement inside the railcar**
- **Compensate for the pole removal with more hand rails in other locations:**
 - **dual overhead hand rails**
 - **seatback-to-ceiling hand rails**
 - **spring-type hand holds**
 - **6000 Series style wall-mounted handrails**



Phase I Customer Task Force Recommendations

A Customer Task Force reviewed video data, visited a 6000 Series railcar and discussed various configuration schemes. As a result of the task force two interior reconfigurations for testing in Phase II were selected:

- **removal of 8 seats, introduce some longitudinal seating**
- **removal of 16 seats, introduce some longitudinal seating, folding seats, and leaning rests**
- **for both test configurations:**
 - **Maintain priority seating as it is today**
 - **Address risk of increased on-board injuries due to falls with more hand rails:**
 - **dual overhead hand rails**
 - **seatback-to-ceiling**
 - **install spring-type hand holds**
 - **Remove vertical floor-to-ceiling hand rails**



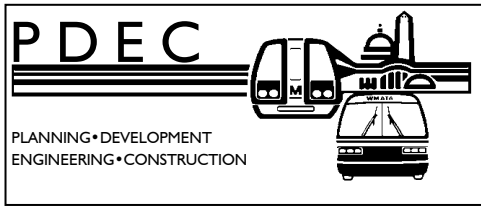
Proposed Phase II Testing Configurations

- **Three configurations that are increasing degrees of change to the interior configuration.**
- **Unique test configurations are used on different ends of the same car, thereby maximizing the data that can be analyzed.**
 - **Test Configuration 1: 6000 Series Railcars**
 - **Test Configuration 2: Removal of 12 seats, introduce longitudinal seats**
 - **Test Configuration 3: Removal of 16 seats, introduce folding seats and leaning rests**
- **Phase II implementation will require minimal services from diverse contractors available through the GSA schedule. This methodology was successful for the Phase I.**

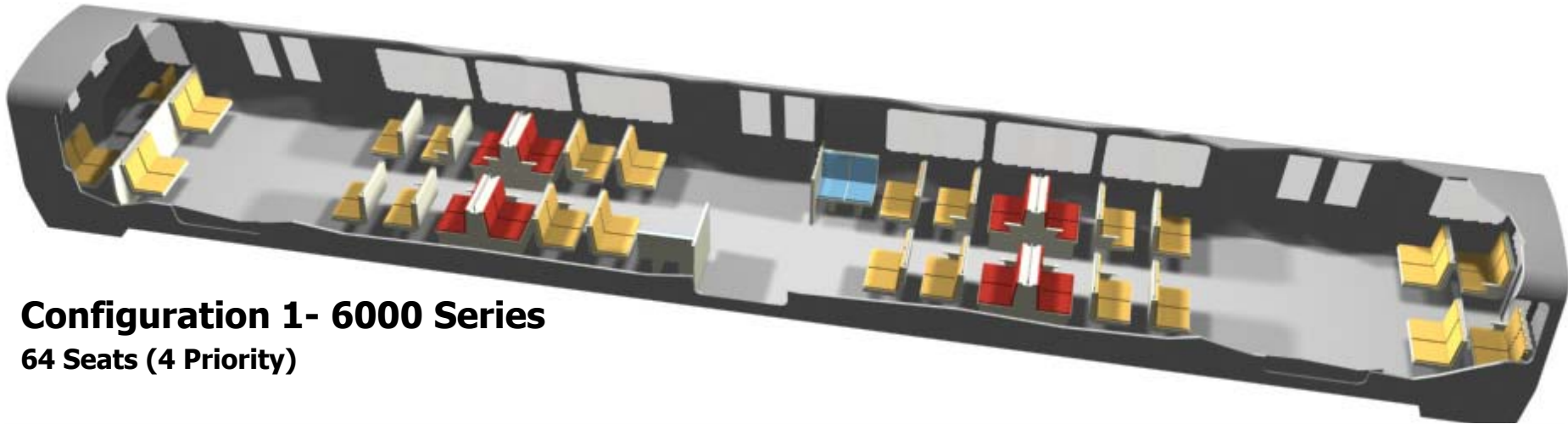
Existing Configuration



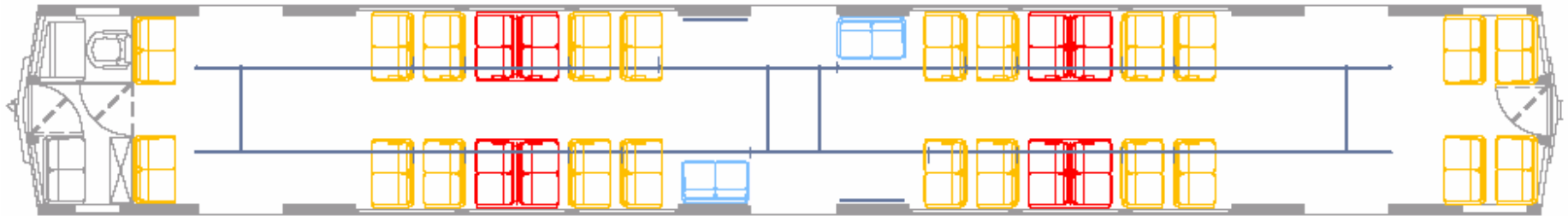
- 64 Seats
- Total Capacity: 182 passengers @ 3.0ft² per passenger
- Windscreens at most doorways
- 34 inch aisle width



Phase II Test Configuration 1



Configuration 1- 6000 Series
64 Seats (4 Priority)



Features:

Removed 4 longitudinal seats at center door

Dual overhead hand rails

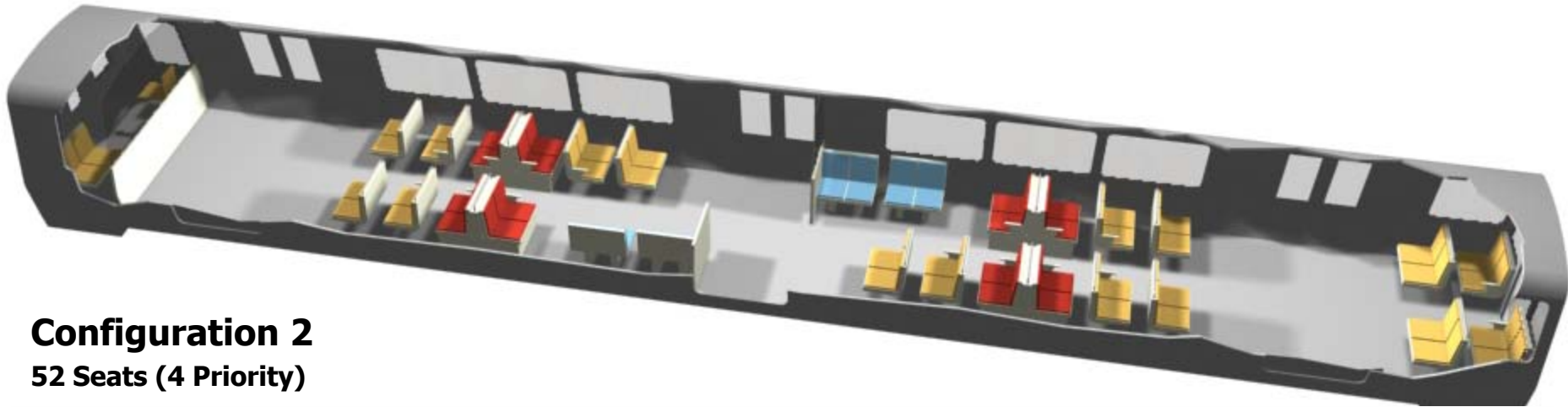
Reduced windscreens

Removed floor-to-ceiling hand rails

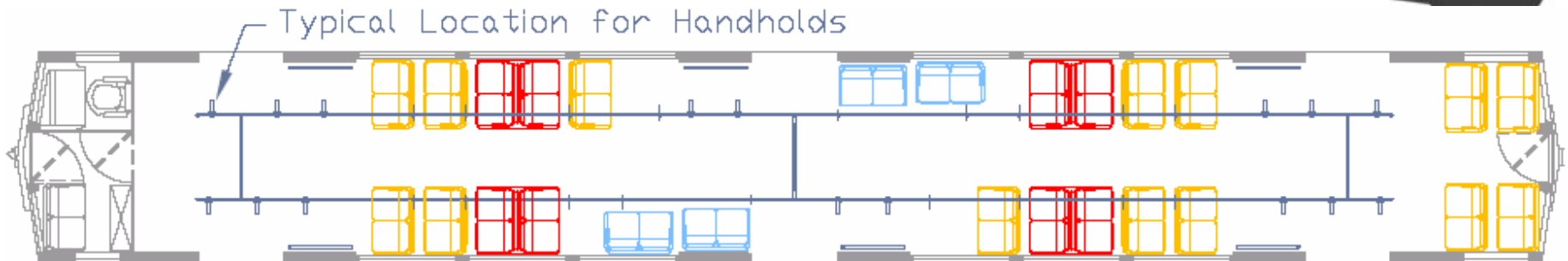
Added seatback-to-ceiling hand rails and wall mounted hand rails

Phase II

Test Configuration 2



Configuration 2
52 Seats (4 Priority)



Features:

Relocated 4 longitudinal seats at center door

Dual overhead hand rails

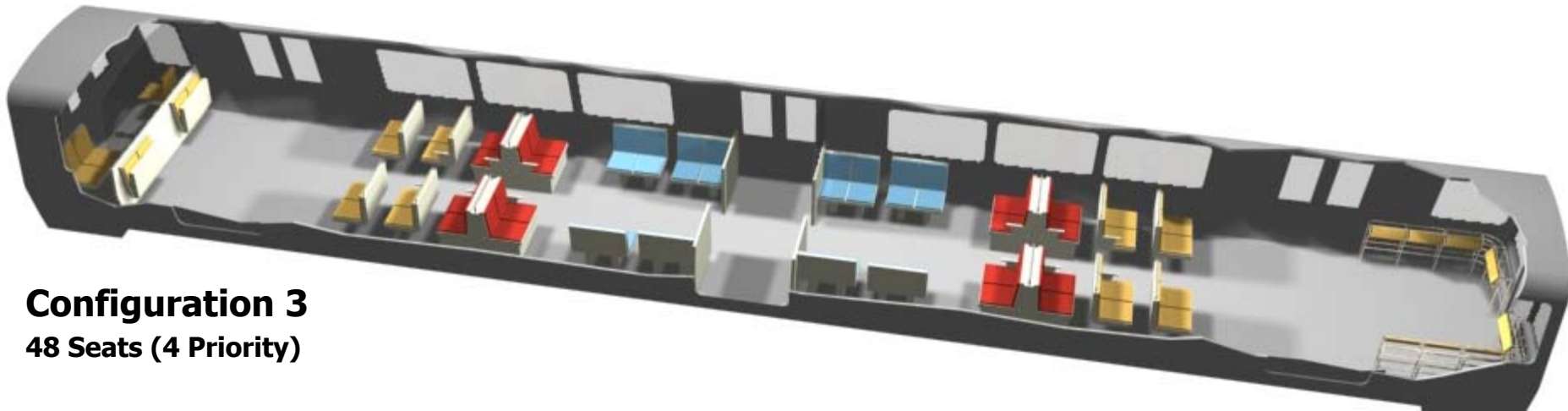
Reduced windscreens

Removed floor-to-ceiling hand rails

Added seatback-to-ceiling hand rails, wall mounted hand rails, and spring-type hand holds

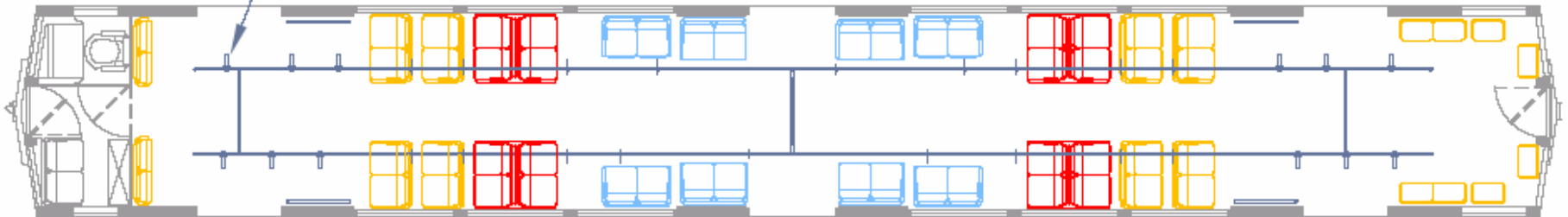
Phase II

Test Configuration 3



Configuration 3
48 Seats (4 Priority)

Typical Location for Handholds



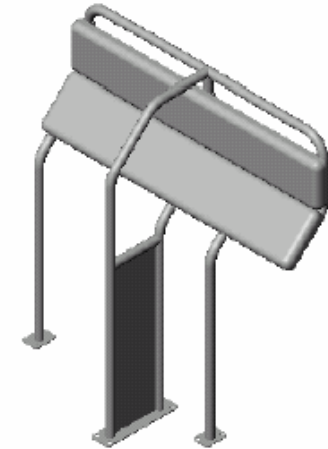
Features:

- Relocated seats longitudinally at center door**
- Dual overhead hand rails, removed floor-to-ceiling hand rails, reduced windscreens**
- Added seatback-to-ceiling hand rails, wall mounted hand rails, and spring-type hand holds**
- Added 4 folding seats at front end of railcar**
- Added lean-rest area at rear end of cars with open area for wheelchairs, luggage, bicycles, etc.**

Phase II Concept Examples



Test Configuration 1 - 6000 Series Interior



Example: Leaning Rests



Example: Spring-type Hand Holds



Example: Folding Seats



Recommendation

P&D Committee and Board approve the Phase II testing of the three railcar configurations presented.

P&D Committee forward to the Budget Committee request for approval to use remaining balance of the original railcar enhancement program.



Next Steps

- Install cameras on 6000 Series railcars
- Reconfigure interiors on the pilot railcars
- Collect and archive video data
- Obtain customer input
- Revisit the Elderly & Disabled Committee
- Report Phase II test results and recommendations for optimum railcar configuration to P&D Committee in Fall/Winter 2006.



Other Passenger Flow Initiatives

- **The APTA Peer Review recommended development and implementation of low-cost improvements to enhance passenger flows and dwell times at stations. Staff is developing a program that complements the reconfiguration of the railcar interior and the 8-car train operation, that includes:**
 - **Passenger flows, on and around escalators**
 - At major transfer locations
 - During escalator rehabilitation projects
 - Stand-to-the-Right program
 - **Passenger flows, on the platform**
 - Utilizing length of platform (8-car trains)
 - Platform signage for flows on and off the trains
- **Staff will present the program at the December P&D Committee.**



(Board Copy)
Washington Metropolitan Area Transit Authority
METRO ELECTRONIC ACTION DOCUMENT

IDENTIFICATION			
MEAD ID:	98938	ACTION:	Initiate
AWARD VALUE:	(Not yet awarded)	CONTRACT: (Proposed)	
FUND SOURCES: (View)	Infrastructure Renewal Program	CONTRACTOR:	
LAST MODIFIED:	10/28/2005		

DESCRIPTION	
SUBJECT:	Approval to proceed with Phase 2 of the Railcar Capacity Study.
PURPOSE:	To obtain the Planning and Development Committee, Budget Committee and Board approval: (1) to proceed with the Phase 2 Study; (2) to proceed with the testing of reconfigured rail car interiors; and (3) to use the remaining balance of the original rail car enhancement program.

ORIGINATION					
INITIATOR			DEPARTMENTAL APPROVAL		
DENNIS LEMKE on 10/14/2005			Not Approved Yet		
PHONE:	202-962-5977	OFFICE:	OENG	DEPT:	Chief Engineer

COORDINATION (ROUTING)		
OFFICE	NAME	ACTION/DATE
(4110)	SALPEAS, PANAGIOTIS	Re-assigned 10/21/2005
IRPG (4710)	COUCH, DAVID	Re-assigned 10/17/2005
(3311)	FEIL, STEVE	Approved 10/19/2005
(4110)	SALPEAS, PANAGIOTIS	Approved 10/26/2005
PRMT (7410)	JACKSON, LUCY	Approved 10/26/2005
(8110)	THOMAS, EDWARD	Approved 10/26/2005
OPAS (3161)	HUGHES, JAMES	Not Reviewed Yet

FINAL APPROVALS	
OFFICE	NAME/ACTION
PLN_DEV_CMTE	PANAGIOTIS SALPEAS (Not Yet Approved)
PLN_DEV_CMTE	Approved for by PANAGIOTIS SALPEAS on 10/26/2005
OPER_CMTE	JAMES HUGHES (Not Yet Approved)
BEMR	Approved w/ Comments for by HAROLD BARTLETT on 10/27/2005
BEMR	HAROLD BARTLETT (Not Yet Approved)
OPER_CMTE	JAMES HUGHES (Not Yet Approved)
GM	GMGR CEO (Not Yet Approved)
BOARD	BOARD WMATA (Not Yet Approved)



Washington Metropolitan Area Transit Authority
METRO ELECTRONIC ACTION DOCUMENT

NARRATIVE

DISCUSSION

In response to a Board request to explore concepts to increase railcar capacity, staff presented concepts to the Board on January 6, 2005.

A pilot program was proposed to determine feasible approaches to increase railcar capacity by removing seats. The analysis revealed that for every two seats removed passenger capacity is increased from two sitting passengers to three standing passengers.

A baseline study, Phase 1, with the current railcar configuration has now been completed. The results are being presented and approval to proceed with a study of alternate car configurations, Phase 2, is being requested.

The baseline study program consisted of sixteen 3000-series cars - two six-car trains plus two pairs as spares. Each train operated on the Red, Orange, Green lines.

A digital video recording (DVR) system was installed on each of the sixteen railcars. Video data of passenger ingress, egress, flow rates, and capacity was collected, archived, and analyzed.

WMATA staff, consultants, and a public task force participated in the baseline data review and in recommending configurations for Phase 2.

This MEAD requests approval to proceed with Phase 2. The 16 railcars will be reconfigured to remove windscreens, relocate and add additional handrails, remove and relocate seating. DVR systems will be installed on 8 6000 Series Railcar. The cars will be operated on the Red, Orange and Green lines. The new video data will be analyzed in comparison to the baseline data collected in Phase 1. Improvements, if any, achieved in railcar capacity, passenger flow, reduced dwell time will be identified. The funding will cover additional DVR systems for 8 6000 Series railcars, the design, material and labor to reconfigure the original 16 3000 Series railcars and to perform the analysis of the Phase II data. Phase II implementation will require minimal services from diverse contractors available through the GSA schedule. This methodology was successful for Phase I.

Staff will report back to the Board in Fall of 2006 with results from the railcar configurations evaluated and with recommendations for changes to the existing rail fleet.

PRIOR APPROVALS

On March 17, 2005, the Board approved implementation of Phase I of the Railcar Capacity Concept Pilot Program for \$260,000. Resolution 2005-09 allocated the funds under the Railcar Enhancement Program contained in the Capital Improvement Program.

IMPACT ON FUNDING

Budget: Infrastructure Renewal
Program FY 2004
Project Title: Railcar Enhancement
Page: N/A

Budget Information: FY 2004
Line Item Budget \$1,000,000.00
This Action \$ 782,844.00
Prior Actions \$ 217,156.00

Subtotal \$1,000,000.00
Remaining Budget \$ 0.00

AFFIRMATIVE ACTION REQUIREMENTS

Contractors will be required to comply with executive order 11246, has amended, Revised Order No. 4 if the contract has 50 or more employees and the contract is \$50,000 or more.

DISADVANTAGED BUSINESS ENTERPRISE

DBE goals are not set for Federally funded contracts less than \$100,000.

RECOMMENDATION

That the Planning and Development Committee, Budget Committee concur with, and WMATA Board of Directors approve: (1) proceeding with the Phase 2 Study; (2) proceeding with the testing of reconfigured rail car interiors; and (3) using the remaining balance of the original rail car enhancement program.