Customer Service and Operations Committee

Board Action Item IV-B

February 10, 2011

Escalator Performance Report
**Washington Metropolitan Area Transit Authority**

**Board Action/Information Summary**

<table>
<thead>
<tr>
<th>Action</th>
<th>Information</th>
<th>MEAD Number:</th>
<th>Resolution:</th>
</tr>
</thead>
</table>

**TITLE:**

Escalator Performance Report

**PURPOSE:**

The purpose of this presentation is to provide the Board of Directors with information about Metro’s escalator maintenance program and how escalator performance is tracked.

**DESCRIPTION:**

This presentation will clarify how the Vital Signs Report Key Performance Indicator (KPI) for escalator availability is calculated and what information that KPI conveys. Also to be covered in this presentation is an overview of the escalator maintenance program including internally tracked performance measures used to assess escalator maintenance; and, an update on actions to improve performance including recommendations from the external escalator review conducted in 2010.

Metro’s strategic goals of Creating a Safer Organization and Delivering Quality Service are both impacted by the viability of the escalator maintenance program.

**FUNDING IMPACT:**

No impact on funding.

**RECOMMENDATION:**

N/A
Escalator Performance Report

Customer Service and Operations Committee

February 10, 2011
Escalator Overview

• Metro has the most escalators (588) and elevators (237 in stations and parking garages) of any transit system in North America
• Installed between 1976 and 2004
• Multiple manufacturers, many no longer in business
• No standardized size/length installed
• Stairs not available adjacent to all escalators
• Elevators and escalators may be out of service --- (safety, repair or scheduled maintenance)
Purpose

- Clarify escalator system availability measure
- Explain escalator maintenance activities that occur when the rail system is open to customers
- Present three maintenance activity performance measures
- Update on actions to improve performance (including VTX assessment recommendations)
Escalator Availability: Snapshot

- Real-time information on wmata.com
- Customer perspective
- To manage, Metro needs a system perspective

<table>
<thead>
<tr>
<th>Station</th>
<th>Problem Description</th>
<th>Code</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archives-Navy Memorial</td>
<td>ESC / Escalator between mezzanine and platform to Glenmont</td>
<td>Modernization</td>
<td>2/17/11</td>
</tr>
<tr>
<td>Penn Quarter</td>
<td>Escalator between mezzanine</td>
<td>Walker</td>
<td>2/17/11</td>
</tr>
<tr>
<td>Metro Center</td>
<td>ESC / Escalator between mezzanine and platform to Glenmont</td>
<td>Preventive Maintenance Repairs</td>
<td>1/13/11</td>
</tr>
<tr>
<td>Metro Center</td>
<td>ESC / Escalator between street and mezzanine</td>
<td>Service Call</td>
<td>1/13/11</td>
</tr>
<tr>
<td>Metro Center</td>
<td>ESC / Escalator between street and mezzanine</td>
<td>Safety Repair</td>
<td>2/14/11</td>
</tr>
<tr>
<td>Metro Center</td>
<td>ESC / Escalator between mezzanine and platform to Shady Grove</td>
<td>Modernization</td>
<td>4/10/11</td>
</tr>
</tbody>
</table>
### Escalator Availability at One Station by Day

**Metro Center**
**December 12-14, 2010**

- **55,091 riders**
- **25 escalators**

<table>
<thead>
<tr>
<th>Date</th>
<th>Escalator Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 12</td>
<td><img src="image" alt="Escalator Status" /></td>
</tr>
<tr>
<td>Dec. 13</td>
<td><img src="image" alt="Escalator Status" /></td>
</tr>
<tr>
<td>Dec. 14</td>
<td><img src="image" alt="Escalator Status" /></td>
</tr>
</tbody>
</table>

- **Visual summary of availability for one station by day**
- **Differentiates scheduled, unscheduled and partial day outages**
- **Interesting daily perspective, but a longer view necessary to evaluate escalator performance**
Escalator Availability at Multiple Stations by Month

- Chart combines number of escalators, ridership (bubble size and color) and availability to help prioritize repair efforts
- Useful information but need system-wide and trend data
Escalator Availability: System-wide

Vital Signs Report – December 2010

Escalator System Availability

- This measure communicates to the Board a strategic view of system-wide performance being at an acceptable level, or not

**Strategic Goal:** Deliver Quality Service

- Not intended to communicate information to individual riders about their travel
- The measure calculates the average of all 588 escalators’ availability while the rail system is open ("revenue hours")
What Maintenance Activity Occurs During Open Hours?

Scheduled maintenance: modernization, corresponding walker units, preventive maintenance and jurisdictional inspections

Unscheduled Maintenance:
- **Service calls**: work to address units turning off unexpectedly, handrails skipping, loose side panels, noises, etc.
- **Safety repair**: work identified during inspections
- **Minor / Major repair**: tasks that are estimated to take less than one day (minor) or more than one day (major)
- **Customer incident**: when unit shut down for inspection after customer incident

*"All Other" includes outages caused by power surges or fire alarms."
Breaking Down System Availability:
Mean Time Between Failure

Measure #1: Mean Time Between Failure

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>Mean Time Between Failure (Revenue Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>153</td>
</tr>
<tr>
<td>2009</td>
<td>172</td>
</tr>
<tr>
<td>2008</td>
<td>178</td>
</tr>
</tbody>
</table>

- Measures how often escalators are breaking down on average

Strategic Goal: Deliver Quality Service

- Influenced by parts availability, preventive maintenance program, staffing levels, equipment reliability and productivity
- Want this number to go up
To better understand reliability, staff is examining factors influencing MTBF. In December 2010:

- Westinghouse 100 and 250 units went the longest before failure. Fuji and APV Baker units had the shortest MTBF.

- Some of Metro’s oldest escalators performed better than newer units, indicating that design and Metro’s modernization program impact reliability.

- Escalators located inside stations operated almost twice as long as outside, uncovered escalators.

<table>
<thead>
<tr>
<th>Model</th>
<th>No. of Units</th>
<th>Average Age (Years)</th>
<th>Dec. MTBF (Revenue Service Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westinghouse 100</td>
<td>430</td>
<td>31</td>
<td>180</td>
</tr>
<tr>
<td>Westinghouse 250</td>
<td>59</td>
<td>20</td>
<td>179</td>
</tr>
<tr>
<td>O&amp;K</td>
<td>8</td>
<td>33</td>
<td>165</td>
</tr>
<tr>
<td>Kone</td>
<td>7</td>
<td>6</td>
<td>165</td>
</tr>
<tr>
<td>Montgomery</td>
<td>20</td>
<td>24</td>
<td>162</td>
</tr>
<tr>
<td>Schindler</td>
<td>9</td>
<td>28</td>
<td>134</td>
</tr>
<tr>
<td>Fuji</td>
<td>49</td>
<td>11</td>
<td>128</td>
</tr>
<tr>
<td>APV Baker</td>
<td>6</td>
<td>30</td>
<td>91</td>
</tr>
<tr>
<td><strong>TOTAL/AVERAGE</strong></td>
<td><strong>588</strong></td>
<td><strong>28</strong></td>
<td><strong>171</strong></td>
</tr>
</tbody>
</table>
How fast are we getting escalators back in service?

**Measure #2: Mean Time to Repair**

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>Mean Time to Repair (Revenue Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>14.00</td>
</tr>
<tr>
<td>2009</td>
<td>13.29</td>
</tr>
<tr>
<td>2008</td>
<td>9.94</td>
</tr>
</tbody>
</table>

- Measures how long (on average) escalator repairs take across all types of unscheduled outages

*Strategic Goal: Deliver Quality Service*

- Influenced by parts availability, preventive maintenance program, staffing levels, equipment reliability and productivity
- Want this number to go down
Preventive Maintenance Compliance

**Measure #3:** Preventive Maintenance Compliance*

- Measures adherence to escalator preventive maintenance schedule

*Additional data verification is underway*

- Inspections proactively identify maintenance issues to reduce units going out of service unexpectedly
- Conducted monthly, quarterly and annually primarily when the rail system is closed to customers
- This measure should be going up
Metro has started implementing the 31 recommendations listed in the VTX assessment. Four recommendations are completed. Safety-related recommendations will be turned into Corrective Action Plans and tracked by the Safety Department.
Actions to Improve Performance

- New General Superintendent of Elevator/Escalator Services
  - Strengthen the ELES organization
  - Elevate visibility of maintenance challenges
  - Incorporate feedback from employee teambuilding efforts

- Analyze Performance Information to Focus Maintenance Work
  - As the system ages, some equipment wears faster than others
  - Turn Maximo data into information
  - Develop equipment performance trends to identify problems
  - Prioritize based on equipment condition (vs. “one size fits all”)

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Actions to Improve Performance

• Improve Preventive Maintenance
  – Realign maintenance staffing to improve efficiency
  – Aggressively reduce vacancy rate
  – Add more resources to the workforce

• Increase Escalator Modernization
  – Modernize additional escalators, targeting low-performing high-usage units. Examples: Foggy Bottom and Dupont Circle.
  – Work with contractors to accelerate scheduling of modernization work.
  – Capital program funding is critical for escalator performance ($63 million for escalator rehabilitation in 6-year CIP).
Actions to Improve Performance

- **Increase Parts Inventory**
  - Identify new part manufacturers for units not yet modernized. In some cases, the original equipment manufacturer is no longer in business.
  - Develop in-house engineering and technical capability to make parts.
  - Standardize parts through the modernization program.

- **Improve Accountability and Transparency**
  - Monthly Vital Signs Report
Next Steps

• Provide a report to the Board in six months on Elevator/Escalator program to include:
  • Escalator maintenance activity performance measure trends
  • Implementation status of:
    • VTX assessment recommendations
    • Actions to improve performance