Capital Program, Planning and Real Estate Committee

Item III - B

October 13, 2016

Capital Project Status Update: Radio and Cellular Infrastructure Replacement
TITLE:
Radio & Cellular Infrastructure Replacement

PRESENTATION SUMMARY:
This presentation updates the Board on the progress of CIP0136 - Radio & Cellular Infrastructure Replacement Project, including the components, work completed, and project schedule.

PURPOSE:
Provide a status update to the Board for the Radio & Cellular Infrastructure Replacement project.

DESCRIPTION:
This project will (1) entirely replace both the Metro Area Radio System and the Public Safety Radio System, and (2) provide the infrastructure for a Cellular Neutral Host System.

Key Highlights:
Metro’s communications infrastructure is being replaced throughout the service area both above and below ground. A new cable system will be installed throughout the tunnel system. A companion cable system will be concurrently installed to support cellular service. In addition, all radios installed on Metrobus, Metrorail, and Metropolitan Police Department vehicles and all handheld radios will be replaced.

Background and History:
In October of 2008, Congress enacted the Rail Safety Improvements Act. Under Section 601(e) (1) of Division B of Public Law 110–432 (112 Stat. 22 4968) of this act, Metro was required to provide cellular coverage to its passengers within 4 years.

Metro initiated a project led by the cellular carriers to build a cellular system. The Authority, cell companies, and their contractors, successfully completed the first phase of the project by providing cellular service in the stations.

In the next phase, the company chosen by the cellular carriers to build the underground system experienced severe financial problems that resulted in bankruptcy. Progress on the project stopped.
When the Middle Class Tax Relief and Job Creation Act was enacted by Congress on February 22, 2012, it required all public agencies to vacate their T-band frequencies (488-500 MHz) within 10 years (by 2/22/22).

The Act did not, however, provide new frequencies for these agencies. After several years of working with the Federal Communications Commission (FCC) new frequencies were assigned to Metro, and the Authority began preparing a new project to replace the existing radio system. Metro recognized that the only way to successfully complete the work was to execute the tunnel installation work with in-house crews. During that time, Metro identified synergies between the radio project and the previous cellular initiative, and the Radio & Cellular Infrastructure Replacement Project (CIP0136) was created.

Discussion:

The project will provide a new state-of-the-art Metro Area Radio System for the Authority, a new Public Safety Radio System in the underground tunnel system as well as access to Metro's entire radio system to our jurisdictional partners, and new cellular infrastructure in the underground tunnel system for wireless providers.

Above Ground

The above ground portion of the 700 MHz radio system requires the leasing and construction of multiple tower locations and in-building enhancements throughout the metro D.C. area. In addition, two new prime sites must be built to handle and route all communication and new dispatch consoles installed at all the Operations Control Centers for the Department of Bus Services (BUS), Department of Rail Services (RAIL), and the Metro Transit Police Department (MTPD).

Below Ground Installation

The below ground portion of the 700 MHz radio system consists of installing a new communication Distributed Antenna System (DAS) in over 100 miles of tunnel, connecting to existing infrastructure in the stations, and installing active components in shafts and stations. Over 400 miles of infrastructure will need to be completed. Metro is also working closely with the carrier consortium to complete the cellular portion of the tunnel DAS installation. Work will be completed in segments. As WMATA finishes a segment, it will be turned over to the carriers to begin installation of their cellular repeaters and subsequently bring the segments on-air. The carriers are committing to complete their portion of the work on each segment within 30 days of turnover.

While the cell system is able to be activated by segments, the WMATA radio portion must be completed in its entirety before being brought on-air. When the radio system is complete, it will also provide new 800 MHz communications for our jurisdictional partners.

Radios

As part of this project, new mobile radios will be installed on all Metro fleet vehicles. New handheld radios will be distributed to workers throughout the Authority.
Construction of the tunnel DAS began in January of 2016. To date, over 30% of the tunnel DAS design is complete. Metro crews have installed 20% of the cable management system and have begun installing cable that will carry the radio and cellular traffic. Metro and the carrier team expect to have the segment from the Potomac Avenue station to the Stadium Armory station operational by the end of 2016. Next will be the segment from the Glenmont station to the Silver Spring station by the spring of 2017. This will be followed by the segment from the Metro Center station to the Potomac Avenue station by September 2017.

**FUNDING IMPACT:**

For information only. Current approved capital budget is $332 Million

<table>
<thead>
<tr>
<th>Project Manager:</th>
<th>Allen Wonder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Department/Office:</td>
<td>ENG/CPDO</td>
</tr>
</tbody>
</table>

**TIMELINE:**

<table>
<thead>
<tr>
<th>Previous Actions</th>
<th>January 2016 – Began construction.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipated actions after presentation</td>
<td>Continue with construction of the tunnel Distributed Antenna System (DAS) and the 700/800 MHz Radio System. The project is scheduled to be completed in 2022.</td>
</tr>
</tbody>
</table>

**RECOMMENDATION:**

N/A
Radio & Cellular Infrastructure Replacement Project Update

Capital Program Planning & Real Estate Committee

October 13, 2016
Purpose

Update Progress of:

Radio & Cellular Infrastructure Replacement Project
Benefits

• Improves access
• Enhances reliability
• Complies with two acts of Congress:

**Act**
Section 601(e)(1) of Division B of Public Law 110–432 (112 Stat. 224968), Rail Safety Improvement Act of 2008. Only agency in U.S. required to provide cellular access.

Middle Class Tax Relief and Job Creation Act of February 22, 2012

**Requirement**
Requires Metro to provide customers with access to wireless services

Requires Metro to vacate its T-band frequencies (488-500 MHz) within ten years (by 2/22/2022)
Project Elements

Radio Only

28 Above Ground Tower Sites

22 Sites collocated on existing towers
6 new tower sites on WMATA property
70+ Metro building supplemental coverage

Radio & Cellular

Metro coverage area

3 Primary Elements

Below Ground Tunnel Installation

100.5 miles of tunnel
400 miles of infrastructure
Stations, comm rooms, various shafts

Radio Only

Install 4000+ Mobile Radios
Issue 6000+ Portable Radios

Radio & Cellular

Bus Revenue & Non-Revenue Vehicles
Rail Revenue & Non-Revenue Vehicles

MTPD
Above Ground Work - Radio

2016 / 2017
Determine Tower Locations

2017 / 2018
Finalize Lease Agreements
Risk Item

2018 / 2019
Site Construction

2017 / 2021
Network On-Air
Install 4000+ Mobile Radios

Provides coverage for entire region

Evaluate WMATA in-building coverage and enhance as needed for 70+ Metro buildings

Consoles for BOCC / ROCC / SOCC
Utilize work trains for install

Deliver carrier equipment. Carriers complete install. Deliver radio equipment

Special high rail for hard-to-reach areas

Radio contractor will complete BDA installations in stations
## Comparable Projects

<table>
<thead>
<tr>
<th>Agency</th>
<th>Project Type</th>
<th>Size of Project (Track Miles)</th>
<th>Duration (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro</td>
<td>Radio &amp; Cellular</td>
<td>100</td>
<td>6.0</td>
</tr>
<tr>
<td>Chicago Transit Authority (CTA)</td>
<td>Cellular</td>
<td>22</td>
<td>0.8</td>
</tr>
<tr>
<td>Massachusetts Bay Transit Authority (MBTA)</td>
<td>Cellular</td>
<td>19.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Port Authority of New York/New Jersey (PATH)</td>
<td>Radio</td>
<td>14</td>
<td>3.0</td>
</tr>
</tbody>
</table>
## Tunnel Installation Schedule

<table>
<thead>
<tr>
<th>Activity</th>
<th>Line</th>
<th>Start Infrastructure Installation</th>
<th>Infrastructure Installation Complete</th>
<th>Cell Phone Availability</th>
<th>Radio Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenmont to Silver Spring</td>
<td>RD</td>
<td>1/2/16</td>
<td>3/31/17</td>
<td>4/28/17</td>
<td>8/21/18</td>
</tr>
<tr>
<td>Potomac Avenue to Stadium Armory</td>
<td>BL/OR/SV</td>
<td>7/15/16</td>
<td>10/31/16</td>
<td>11/30/16</td>
<td>10/30/18</td>
</tr>
<tr>
<td>Metro Center to Potomac Ave</td>
<td>BL/OR/SV</td>
<td>4/1/17</td>
<td>8/8/17</td>
<td>9/8/17</td>
<td>10/30/18</td>
</tr>
<tr>
<td>Benning Road to Largo Town Center</td>
<td>BL/SV</td>
<td>8/9/17</td>
<td>9/18/17</td>
<td>10/20/17</td>
<td>10/31/18</td>
</tr>
<tr>
<td>College Park to Gallery Place</td>
<td>GN/YL</td>
<td>9/19/17</td>
<td>4/17/18</td>
<td>5/31/18</td>
<td>12/31/18</td>
</tr>
<tr>
<td>Union Station to DuPont Circle</td>
<td>RD</td>
<td>4/18/18</td>
<td>7/2/18</td>
<td>8/31/18</td>
<td>4/8/19</td>
</tr>
<tr>
<td>Metro Center to Rosslyn</td>
<td>BL/OR/SV</td>
<td>7/3/18</td>
<td>8/16/18</td>
<td>9/30/18</td>
<td>5/2/19</td>
</tr>
<tr>
<td>Rosslyn to Ballston</td>
<td>OR/SV</td>
<td>8/17/18</td>
<td>11/11/18</td>
<td>12/30/18</td>
<td>7/26/19</td>
</tr>
<tr>
<td>Pentagon to King Street</td>
<td>BL/YL</td>
<td>11/12/18</td>
<td>2/28/19</td>
<td>4/30/19</td>
<td>9/8/19</td>
</tr>
<tr>
<td>Gallery Place to Southern Ave &amp; Suitland to Branch Ave</td>
<td>GR/YL</td>
<td>3/1/19</td>
<td>9/8/19</td>
<td>11/15/19</td>
<td>1/22/20</td>
</tr>
<tr>
<td>DuPont Circle to Medical Center &amp; Grosvenor to White Flint</td>
<td>RD</td>
<td>9/9/19</td>
<td>5/4/20</td>
<td>6/30/20</td>
<td>10/30/20</td>
</tr>
</tbody>
</table>
Tunnel Work – January 2016 to Date

Accomplished:
• 30% of tunnel design work completed
• 20% cable tray installed
• 1.5% of cable installed

First areas to have cellular availability:
• Potomac Avenue to Stadium Armory by end of year
• Glenmont to Silver Springs by spring of 2017
Tunnel Work Interdependencies

- Radio Contractor provides BDAs
- Systems integrator builds MBE
- FACP installs MBE in shaft
- Radio contractor integrates into network

- Cell carriers provide materials
- Cell carriers approve designs
- Cell carriers provide final test for cellular acceptance

- FACP completes cable in tunnel
- FACP / Contractor completes power install
- Cell carriers provide equipment
- FACP delivers in shaft
- Cell carriers complete install

- FACP completes cable in tunnel
- Radio contractor tests for tunnel coverage. Identifies deficiencies
- FACP corrects deficiencies

- Radio Contractor provides BDAs
- Systems integrator builds MBE
- FACP installs MBE in shaft
- Radio contractor integrates into network

Many Interdependencies...
Project Risks

- Project timeframe
- Tower leases
- Cable installation (tunnel access)
- Radio design for the tunnel
- Multiple contracts
- Multiple interfaces between contracts
- Vehicle availability
- Getting frequencies
- Others
Next Steps

Continue to manage project:

• Continue tunnel Distributed Antenna System (DAS) design effort
• Continue tunnel DAS installation
• Award FQ15000 – 700 MHz Radio
• Start working to secure tower leases
• Place orders for vehicle radios
• Continue risk mitigation
• Continue working with jurisdictional partners