State of Good Repair (SGR)

What SGR is...
- For the MBTA, the SGR standard is where all capital assets are functioning at their ideal capacity within their useful life.
- A national leader as FTA continues to develop common standards required under MAP-21.

What SGR is not....
- Completed...it is a work in progress:
  - Since 2012 we have improved the system by adding more assets, improving decay calculations and moving to a web based platform.
  - By June we will have a system that measures the impact of funding scenarios on recorded assets.
- Static...as assets age and investments are made, the backlog will change.
- Unsafe...assets are only no longer within their useful life and replacement and renewal must be planned.
- Our only measure or planning tool...part of broader Asset Management Plan.
# Backlog Estimates

<table>
<thead>
<tr>
<th>Asset Category</th>
<th># of Assets</th>
<th>Replacement Value</th>
<th>SGR Score</th>
<th>SGR Backlog Amount</th>
<th>% of Total Backlog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Vehicles</td>
<td>20,262</td>
<td>$6,807,342,488</td>
<td>2.83</td>
<td>$2,634,418,286</td>
<td>39.4%</td>
</tr>
<tr>
<td>Bridges</td>
<td>1,335</td>
<td>$5,148,275,301</td>
<td>3.39</td>
<td>$799,663,040</td>
<td>11.9%</td>
</tr>
<tr>
<td>Signals</td>
<td>401</td>
<td>$2,900,740,296</td>
<td>2.57</td>
<td>$1,369,027,122</td>
<td>20.5%</td>
</tr>
<tr>
<td>Stations</td>
<td>50,054</td>
<td>$2,699,874,652</td>
<td>3.86</td>
<td>$255,984,809</td>
<td>3.8%</td>
</tr>
<tr>
<td>Facilities</td>
<td>2,855</td>
<td>$1,527,289,845</td>
<td>3.19</td>
<td>$477,930,928</td>
<td>7.1%</td>
</tr>
<tr>
<td>Track/ROW</td>
<td>129</td>
<td>$823,254,368</td>
<td>2.69</td>
<td>$304,603,884</td>
<td>4.6%</td>
</tr>
<tr>
<td>Power</td>
<td>3,047</td>
<td>$793,073,100</td>
<td>2.18</td>
<td>$462,319,775</td>
<td>6.9%</td>
</tr>
<tr>
<td>Parking</td>
<td>47,215</td>
<td>$228,188,855</td>
<td>2.12</td>
<td>$172,050,515</td>
<td>2.6%</td>
</tr>
<tr>
<td>Communications</td>
<td>15,334</td>
<td>$172,916,740</td>
<td>4.25</td>
<td>$3,195,090</td>
<td>0.0%</td>
</tr>
<tr>
<td>Technology</td>
<td>1,092</td>
<td>$138,231,180</td>
<td>1.39</td>
<td>$131,592,980</td>
<td>2.0%</td>
</tr>
<tr>
<td>Tunnels</td>
<td>67</td>
<td>$132,750,000</td>
<td>3.10</td>
<td>$24,000,000</td>
<td>0.4%</td>
</tr>
<tr>
<td>Non-Revenue Vehicles</td>
<td>1,089</td>
<td>$77,414,330</td>
<td>2.70</td>
<td>$33,724,000</td>
<td>0.5%</td>
</tr>
<tr>
<td>Fare Collection</td>
<td>2,982</td>
<td>$64,152,548</td>
<td>3.79</td>
<td>$425,000</td>
<td>0.0%</td>
</tr>
<tr>
<td>Elevators and Escalators</td>
<td>338</td>
<td>$49,370,000</td>
<td>2.94</td>
<td>$22,950,000</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

| Total                       | 146,200     | $21,562,873,703   | 3.05      | $6,691,885,429     | 100%               |

The SGR score is the average rating of all recorded assets within their respective category. A score of less than or equal to 2.5 notes an asset that is not in a state of good repair. The backlog is the current estimated cost to bring all recorded assets into a state of good repair.
Project Selection Process

Overview
• New system implemented used in past two CIP cycles

• Applies to MBTA funded projects

• Departments submit projects which are then scored by subject matter experts according to criteria

• Budget Office then optimizes the scored list to fit within financial constraints

• The final list is published in the draft CIP for review and comment

Criteria and Weights
• Environmental Impact
  • 10% weight

• System Preservation
  • 35% weight

• Financial Considerations
  • 15% weight

• Operations Impact
  • 40% weight
# Construction Project Timeline

<table>
<thead>
<tr>
<th>Concept Planning</th>
<th>Design Procurement</th>
<th>Design</th>
<th>Construction Procurement</th>
<th>Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Variable Timeframe)</td>
<td>(11 - 12 Month Process)</td>
<td>(Variable Timeframe)</td>
<td>(7 - 9 Month Process)</td>
<td>(Variable Timeframe)</td>
</tr>
</tbody>
</table>

- **Planning**
  - Conceptual Estimate and Schedule
  - Preliminary Design & Design Reviews (15% & 30%)
    - Preliminary Estimate
    - Preliminary Schedule
- **Permitting**
- **Real Estate/ROW**
- **Community Involvement**
- **Final Design & Design Reviews (60%, 90%, 100%)**
  - Develop Estimates
  - Develop Construction Time Determination Schedule
  - Constructability Reviews
  - Value Engineering Reviews
  - Risk Analysis
- **Bid Phase**
- **Construction Permitting**
- **Operational impact finalization**
- **Requests for Information**
- **Change Orders**
- **Beneficial Occupancy**
- **Substantial Completion**
- **Final Closeout**
- Payments made against cost and resource loaded construction schedule and documented earned value
Case study: Government Center

City of Boston (BRA) Head house Design Coordination

Light Rail Accessibility Program and Blue Line Modernization ongoing at multiple stations


- LRAP Program established by FTA
- Blue Line Modernization Program begins design of Blue Line Station
- Government Center Identified as a ‘Key Station’
- Contract for design of Green Line Station
- Decision made for station to be closed during construction, saving 2 years

- Green Line and Blue Line projects combined
- New designer hired to combine station designs
- Finalized conceptual design of combined headhouse and BL exit only headhouse
- Planned station closure delayed by 3 months due to competing transportation demands during Callahan Tunnel rehabilitation

- Construction bids received 50% above budget
- 3rd New designer hired to complete final design
- Construction NTP issued July 17, 2013; 36 month duration with 24 month station closure
- Planned station closure delayed by 3 months due to competing transportation demands during Callahan Tunnel rehabilitation
- Decision made to reject bids after an exhaustive analysis
- Construction complete
- Station closed
Case Study: Red and Orange Line Vehicle Procurement:


- 74 Red #1 vehicles due retirement
- 120 Orange Line vehicles due retirement
- Industry review of specification #1
- First specification draft
- Red / Orange RFP issued
- Board approval of builder
- First test vehicle
- Final vehicle
- First production vehicle
Takeaways

• Asset replacement and overhaul schedules are frequently modified due to funding and re-prioritization issues (unfunded mandates)

• State of good repair vs. expansion is not always a direct choice as funds are not all re-allocable

• Project timelines and budgets are often affected by continued, sometimes conflicted, input from internal and external stakeholders

• Procurement laws and processes must be updated
Project Delivery: Factors

- Procurement requirements
- Buses and operators for construction diversions
- DOT priorities
- State Implementation Plan Commitments
- Flagging personnel availability
- Public input
- Late night service limits work time on track and vehicles
- Public Safety Building Code Requirements
- Non-Revenue Hours (1am to 4am) and Weekend only work
- Maintaining daily service around or through project
- Procurement of technical support services
- Abutters
- ADA / MAAB requirements
- Approved Capital Investment Plan
- State Leadership Initiatives

Project Delivery

- Release of available funding
- Late night service limits work time on track and vehicles
- Public Safety Building Code Requirements
- Procurement of technical support services
- State Leadership Initiatives