Overview of Current TRB Research in Transit SGR

prepared for the FTA Transit SGR Workshop
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Adapted from a presentation originally developed by Bill Robert, Spy Pond Partners, LLC and chair of the TRB Subcommittee on SGR

June 3, 2015
Outline

• SGR-related research summary
  – TCRP projects and syntheses
  – Other efforts

• Brief Overview of the TCRP Reports
  – 157, SGR framework
  – 172, Asset management plan guidance
    • Transit Asset Prioritization Tool (TAPT)
TCRP SGR-Related Research
Recent Publications

• Report 157 (2012)
  – SGR Framework,
• Report 172 (2014)
  – TAMP Guidance and Tool
• Synthesis 92 (2011)
  – Transit Asset Condition Reporting
• Synthesis 100 (2012)
  – Elevator and Escalator Maintenance and Safety Practices
• Synthesis 107 (2013)
  – Track Inspection Practices
Specialty Topics

- Training
  - TCRP 170, Establishing a National Transit Industry Rail Vehicle Technician Qualification Program (2014)
- TCRP Web 64: Performance Based Track Geometry, Phase 2 (2014)
- TCRP Web 52: Performance Based Track Geometry, Phase 1 (2012)
TCRP Research Projects Now Underway

- Active synthesis projects
  - None specifically SGR related
- Active research projects (SGR-related)
  - A-41 - Improving the Resiliency of Transit Systems Threatened by Natural Disasters
  - E-10 - Maintenance Technician Staffing Levels for Modern Public Transit Fleets
  - E-11: The Relationship Between Transit Asset Condition and Service Quality (RFP stage)
  - G-08 - A Guidebook for the Evaluation of Project Delivery Methods
- For more information on see the TCRP Annual Report of Progress
Other SGR-Related Efforts

- FTA SGR Pilots and other research
  - Addressed in other conference presentations
- APTA SGR Working Group
  - Completed white papers/guidelines
    - Creating a Transit Asset Management Program
    - Defining a Transit Asset Management Framework to Achieve a State of Good Repair
    - Capital Asset Inventory and Condition Assessment
  - Topics under development
    - Asset Inventory Templates
    - Asset Management Plan Checklist
    - Asset management System Procurement Process
    - Transit Asset Management Software Specifications
Highlights of TCRP Reports 157 and 172

- TCRP Report 157: SGR framework and analysis/prioritization tools
  - Completed in 2012
- TCRP Report 172: Pilots, guidance, revised tools
  - Completed in 2014
TCRP Report 172 Contents

• Introduction
• Steps in Developing an Asset Management Plan
  – Provides step-by-step instructions for developing a MAP-21-compliant TAMP
  – Intended to be tool-agnostic
• Using the Transit Asset Prioritization Tool (TAPT)
• TAPT Tutorials
• Additional Resources
TAPT Functionality

Asset Life Cycle Models
- Predict conditions and costs, including agency, user and external costs
- Three basic asset model types
  - Revenue vehicles
  - Condition-based model
  - Time-based model
- Leverages defaults from TERM

Prioritization
- Life cycle policies detailing increased cost of deferring rehab/replacement developed by asset type
- By default the tool prioritizes with an objective of minimizing life cycle costs
- Priorities can be revised based on non-economic factors

Predicting Conditions and Performance
- Financial measures
  - Needs
  - Backlog
  - Agency costs
  - User costs of delay
  - Emissions costs
- Other measures
  - Mean Distance Between Failure
  - Average TERM condition
  - Hours of delay
  - Tons of CO2
# Recommended TAMP Performance Measures - Core

<table>
<thead>
<tr>
<th>Measure</th>
<th>Use for</th>
<th>How to Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backlog of investment needs</td>
<td>All assets</td>
<td>Sum of costs for unmet needs for achieving SGR</td>
</tr>
<tr>
<td>Average asset age</td>
<td>Guideway, stations, facilities, systems</td>
<td>Year of manufacture for vehicles; year of construction or installation for other assets. Weight by asset value when combining assets.</td>
</tr>
<tr>
<td>Mean distance between failures (MDBF)</td>
<td>Vehicles</td>
<td>Vehicle-miles traveled/number of road calls or failures</td>
</tr>
<tr>
<td>Average accumulated mileage</td>
<td>Vehicles</td>
<td>Total lifetime mileage averaged among all vehicles in the subfleet</td>
</tr>
</tbody>
</table>
### Recommended TAMP Measures - Comprehensive

<table>
<thead>
<tr>
<th>Measure</th>
<th>Use for</th>
<th>How to Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of assets in good/fair/poor condition</td>
<td>Guideway, stations, facilities, systems</td>
<td>TERM condition ratings (good (\geq 4), fair = 3, poor (\leq 2))</td>
</tr>
<tr>
<td>Asset availability</td>
<td>Elevators and escalators</td>
<td>Percentage of total operating time asset is available</td>
</tr>
<tr>
<td>Hours of delay</td>
<td>Vehicles, guideway</td>
<td>Passenger hours of delay caused by mechanical failures of vehicles or fixed assets</td>
</tr>
<tr>
<td>Greenhouse gas (GHG) emissions</td>
<td>Vehicles</td>
<td>Tons of CO(_2) emitted by the vehicle fleet per year</td>
</tr>
</tbody>
</table>
Transit Asset Prioritization Tool (TAPT)

- Spreadsheet tool included with TCRP Report 172
- Incorporates the framework and models described in TCRP Report 157
- Can be used to
  - Prioritize SGR investments
  - Predict future asset conditions given a budget
  - Review the models from the TCRP reports
Conclusions

• TCRP Report 172 may be of particular relevance for agencies developing MAP-21-compliant asset management plans
  – TAMP development guidance
  – Transit Asset Prioritization Tool