Overview of Current TRB Research in Transit SGR

prepared for the
FTA Transit SGR Workshop
Stephen Andrle

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
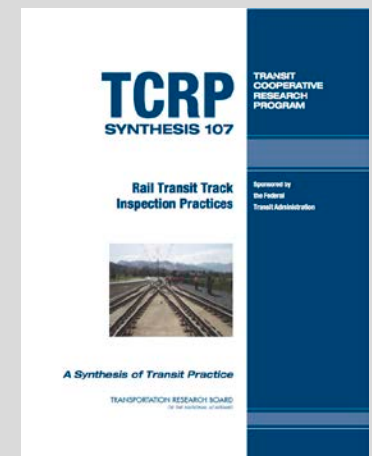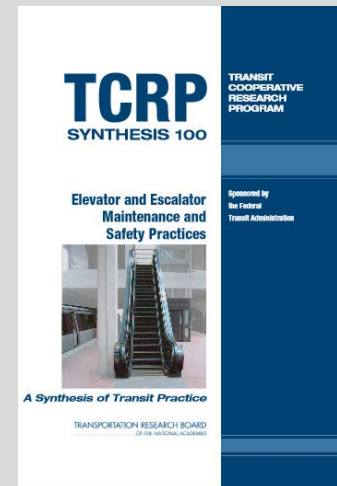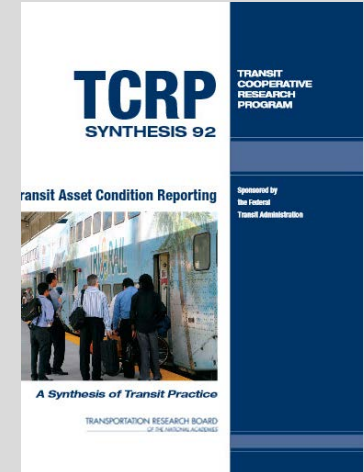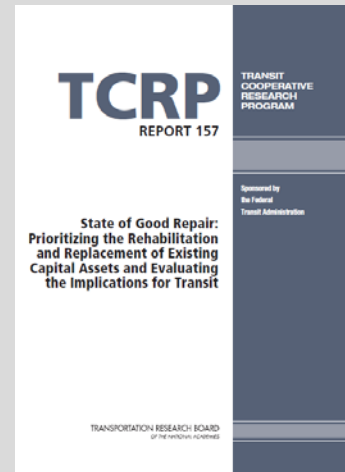
Specialty Topics

- Training
  - TCRP 170, Establishing a National Transit Industry Rail Vehicle Technician Qualification Program (2014)
  - TCRP 178, A National Training and Certification Program for Transit Vehicle Maintenance Instructors (2015)
- TCRP Web 65: Wheel profile Maintenance Guidelines (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
  - http://www.trb.org/SynthesisPrograms/TCRPSynthesisCurrentStudies.aspx
  - 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
  - http://onlinepubs.trb.org/onlinepubs/tcrp/TCRPAnnual2014.pdf
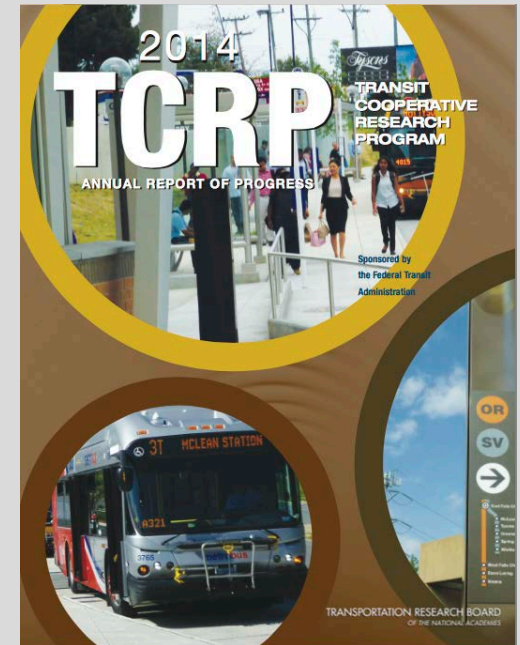
# Other SGR-Related Efforts

- 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
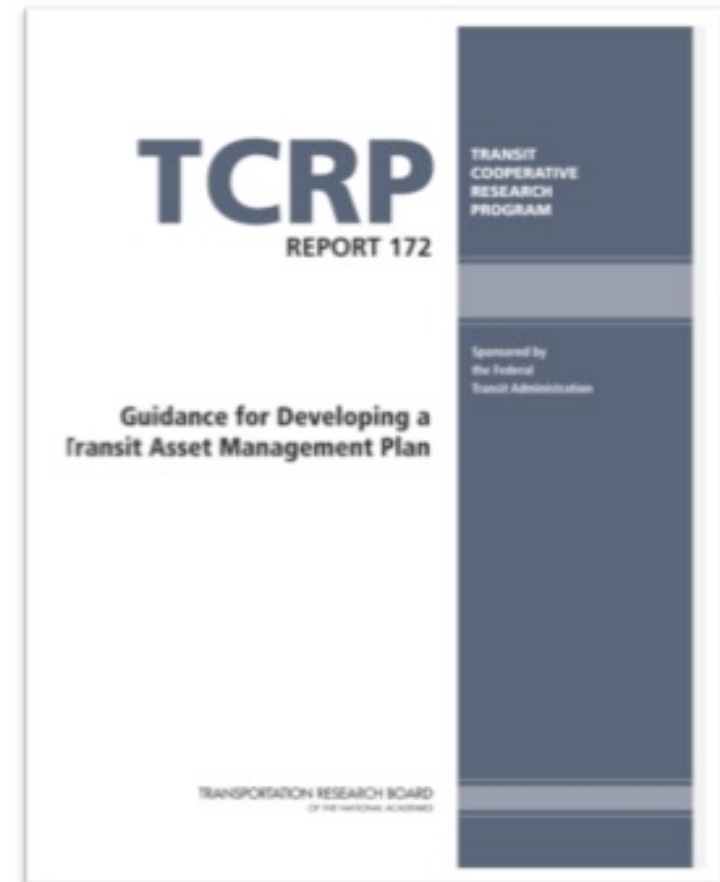
TAPT Functionality

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 CO_2

Recommended TAMP Performance Measures - Core

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

Recommended TAMP Measures - Comprehensive

Measure	Use for	How to Measure
Percent of assets in good/fair/poor condition	Guideway, stations, facilities, systems	TERM condition ratings (good $\geq$ 4, fair = 3, poor $\leq$ 2)
Asset availability	Elevators and escalators	Percentage of total operating time asset is available
Hours of delay	Vehicles, guideway	Passenger hours of delay caused by mechanical failures of vehicles or fixed assets
Greenhouse gas (GHG) emissions	Vehicles	Tons of CO_2 emitted by the vehicle fleet per year

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 condition 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**