

Transit Asset Management Plan “Getting Started”

**Presented by Eric Oparko
Sacramento Regional Transit District**

August 28, 2017

FTA TAM ROUNDTABLE

Cambridge, MA

HISTORY

- The Sacramento Regional Transit District (SacRT) began operations in 1973 with the acquisition of the Sacramento Transit Authority for Bus operations.
- In 1987 SacRT opened an 18.3-mile light rail system, linking the northeastern (Interstate 80) and eastern (Highway 50) corridors with downtown Sacramento.
- SacRT completed its first light rail extension in September 1998.
- Since 1998, SacRT opened multiple extensions totaling about 24.6 miles.

SYSTEM PROFILE

- SacRT operates approximately 69 fixed routes and 42.9 miles of light throughout Sacramento County, including the cities of Citrus Heights, Folsom, Rancho Cordova and Elk Grove.
- Buses and light rail operate 365 days a year using 76 (+21 being refurbished) light rail vehicles and 205 buses powered by compressed natural gas (CNG) and 23 shuttle vans.
- Annual ridership is approximately 25 million. The transit system includes 52 light rail stations, 32 bus and light rail transfer centers, 22 park-and-ride lots and 3,300 bus stops throughout Sacramento County.
- SacRT's entire bus and light rail system is accessible to the disabled community. Additionally, through a contract with Paratransit, Inc., SacRT funds door-to-door transportation service for thousands of elderly and disabled Sacramento area residents who are unable to use conventional public transit services.

REGIONAL INFORMATION



- Sacramento metropolitan area -- which includes seven counties -- has an estimated population of 2.66 million. This is the fourth largest metropolitan area in California after Los Angeles, San Francisco and San Diego, and the 27th largest in the United States.
- The region is forecasted to experience tremendous growth by 2035 with increases in population (34%), employment (39%) and households (35%).

FUNDING CHALLENGES



Currently, SacRT's local funding level is five times lower on average than other transit systems in regions similar to Sacramento. For example, LA Metro receives 1-1/2 cents; BART receives 1 cent, TriMet receives 3/4 cent and San Diego MTS receives 1/2 cent compared to the **1/6 of a penny that SacRT receives.**

STATE OF GOOD REPAIR CHALLENGES

Light Rail Vehicles

- 36 Siemens (30 yrs.), purchased in 1987
- 40 CAF (15 yrs.), purchased in 2003
- 21 UTDC (currently being refurbished to an additional 15 yrs. ULB)

Buses

- 96 Gillig 40' (2-3 yrs.), purchased in 2015
- 97 Orion 40' (10-12 yrs.), purchased 2006-2008
- Approximately 25 miscellaneous buses and vans (10-12 yrs.)

Facilities

- Bus Maintenance 1973 and older
- Rail Maintenance 1985
- Passenger Light Rail Stations 1987
- Fair Vending Machines 2001-2003

CURRENT FOCUS OF TAM PLAN EFFORTS

- 1) **Inventory of Capital Assets - Rolling Stock, Equipment (Non-Revenue Vehicles), Infrastructure (LRT), and Facilities.**
- 2) **Condition Assessment Procedures and Inspections - of the inventoried assets.**
- 3) **Decision Support Tools - a process for prioritizing investments to maintain, enhance or replace the assets. Evaluation phase**
- 4) Investment Prioritization - to maintain a state of good repair.
- 5) TAM and State of Good Repair (SGR) policy.
- 6) Implementation Strategy - of the TAM Plan.
- 7) List of Key Annual Activities - that SacRT intends to engage in over the four-year life of the TAM Plan.
- 8) Identification of Resources – (including personnel) that SacRT needs to carry out the TAM Plan implementation.
- 9) Evaluation Plan - and any related business practices, to ensure “continuous improvement”.

TAM PROGRAM APPROACH

- Develop in-house using local knowledge
- Procedure Development within QA Department
- Decision Making Tool Costs

ASSET INVENTORY IN-PROCESS

- Inventory spreadsheets for **Rolling Stock** assets had been developed by Bus & Light Rail Operations – added to inventory spreadsheets or single database
- Inventory spreadsheets for **Equipment** (non-revenue vehicles) had been developed by Bus Operations – added to inventory spreadsheets or single database
- Inventory spreadsheets for **Infrastructure** (LRT) had been partially developed by Finance and Risk Departments. - Wayside had the remaining data needed and additional assets will be collected during condition assessment inspections – assets to be added to inventory spreadsheets or a single database
- Inventory of individual buildings for **Facilities** had been developed by Finance and Risk but inventory of component items needed to be collected – the remaining data needed and additional assets will be collected during condition assessment inspections

PERFORMANCE TARGETS

Performance measure #/asset category	Asset Type	Sub-Fleet/ Quantity	Other Criteria (Fuel Type, etc.)	Capital Plan ULB	FTA Default ULB	Performance Measure	Current Perf	2018 Target
1. Rolling Stock	Rail	LRV/ 36 Siemens	In Service 1987-91	30	31	Percent Met or Exceeded ULB	27-31	72% Fleet above ULB
1. Rolling Stock	Rail	LRV/ 40 CAF	In Service 2003	30	31	Percent Met or Exceeded ULB	15	0% Fleet above ULB
1. Rolling Stock	Rail	LRV/ 21 UTDC	In Service 1986/2017	30/45*	31/45*	Percent Met or Exceeded ULB	31	0% Fleet above ULB
1. Rolling Stock	Bus	Coach/ 97 Orion	CNG	12	14	Percent Met or Exceeded ULB	10-12	0% Fleet above ULB
1. Rolling Stock	Bus	Coach/ 96 Gillig	CNG	12	14	Percent Met or Exceeded ULB	2-3	0% Fleet above ULB
1. Rolling Stock	CBS Bus	Coach/ 17 El Dorado	CNG	12	14	Percent Met or Exceeded ULB	3-6	0% Fleet above ULB
1. Rolling Stock	CBS Bus	Coach/ 5 Ford	Gasoline	7	7	Percent Met or Exceeded ULB	9-10	100% Fleet above ULB
2. Equipment	Non-rev vehicles	Auto/SUV 52	Gasoline	8	8	Percent Met or Exceeded ULB	4-15	28% Above ULB
2. Equipment	Non-rev vehicles	Auto/ 5	Electric	8	8	Percent Met or Exceeded ULB	3-16	40% Above ULB
2. Equipment	Non-rev vehicles	Truck/87	Diesel, gasoline	8	8	Percent Met or Exceeded ULB	1-15	14% Above ULB

PERFORMANCE TARGETS CONTINUED

Performance measure #/asset category	Asset Type	Sub-Fleet/ Quantity	Other Criteria (Fuel Type, etc.)	Capital Plan ULB	FTA Default ULB	Performance Measure	Current Perf	2018 Target
4. Facilities	Facility	Bus/ BMF1	Maintenance	50	50	3 or above on Term Scale	0.94	10% Below 3
4. Facilities	Facility	Bus/ BMF2	Maintenance	50	50	3 or above on Term Scale	1	65% Below 3
4. Facilities	Facility	Rail/ Metro 1985	Maintenance	50	50	3 or above on Term Scale	0.8	20% Below 3
4. Facilities	Facility	Rail/ MHRF	Maintenance	50	50	3 or above on Term Scale	0.2	0% Below 3
4. Facilities	Stations	Light Rail/ 53	At-grade	50	60	3 or above on Term Scale	0.9	10% Below 3
4. Facilities	Stations	Light Rail/ 111	Fair Collection (FVM)	15	15	3 or above on Term Scale	0.8	10% Below 3
4. Facilities	Stations	N/A	Parking Lot	30	35	3 or above on Term Scale	0.85	10% Below 3
4. Facilities	Facility	Administrative	Administrative	50	50	3 or above on Term Scale	0.9	10% Below 3
4. Facilities	Employee	Parking Lots	Parking Lot	50	50	3 or above on Term Scale	0.8	0% Below 3

CONDITION ASSESSMENTS

- Define Components
- Develop condition assessment procedures and inspection criteria
- Conduct assessments (inspections)
- Calculate overall condition

DEVELOPMENT OF CONDITION ASSESSMENT PROCEDURES

Condition Assessment Procedure Development:

- Bus
- Light Rail Vehicles
- Facilities (FTA Guidebook: Condition Assessment Calculation April 2017)
 - Administration and Maintenance Facilities
 - 10 Primary Levels with multiple secondary levels
 - Passenger and Parking Lots
 - 10 Primary Levels with multiple secondary levels

CONDITION ASSESSMENT MEASURE TRANSIT ECONOMIC REQUIREMENTS MODULE (TERM) SCALE

- 1 - **POOR** – Critically damaged component(s) or in need of immediate repair, well past useful life
- 2 - **MARGINAL** – Defective or deteriorated component(s) in need of replacement, exceeded useful life
- 3 - **ADEQUATE** – Moderately deteriorated or defective component(s); but has not exceeded useful life
- 4 - **GOOD** – Good condition, but no longer new, may have some slightly defective or deteriorated component(s), but is overall functional
- 5 - **EXCELLENT** – No visible defects, new or near new condition, may still be under warranty if applicable

CONDITION ASSESSMENT INSPECTION PROCEDURES

Asset Management
State of Good Repair



Sacramento Regional Transit District

BUS

Inspection Standards

This document contains information for SGR inspectors to rate a bus and its components in a uniform format.

THIS DOCUMENT IS UNCONTROLLED IF IT IS IN PRINTED FORMAT

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Asset Management
State of Good Repair



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LIGHT RAIL VEHICLES (LRV)

Inspection Standards

This document contains information for SGR inspectors to rate a LRV and its components in a uniform format.

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RAIL INFRASTRUCTURE

Inspection Standards

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ADMINISTRATIVE & MAINTENANCE FACILITIES

Inspection Standards

This document contains information for SGR inspectors to rate ADMINISTRATIVE & MAINTENANCE FACILITIES and its components in a uniform format.

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PASSENGER & PARKING FACILITIES

Inspection Standards

This document contains information for SGR inspectors to rate ADMINISTRATIVE & MAINTENANCE FACILITIES and its components in a uniform format.

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Asset Management State of Good Repair



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Transit District**

BUS

Inspection Standards

This document contains information for SGR inspectors to rate a bus and its components in a uniform format.

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<i>Condition Assessment Procedure:</i> Bus Inspection Standards	Section Number: CAP 2.1
<i>Latest Revision by: Eric Oparko</i>	Page 1 of 15

1.0 Purpose

This Condition Assessment Procedure establishes requirements for planning and implementing inspection and testing procedures to verify the state of good repair condition assessments of the subsystems of a Bus.

2.0 Scope

These requirements apply to the physical condition and aesthetic appearance of the subsystems of a complete Bus.

3.0 Requirements

Requirements for inspection and testing procedures, identification of responsibilities, and qualification for inspection and testing personnel will be contained in this document. Qualified personnel, who are independent of those performing the work being inspected or tested, shall perform inspection and testing.

The adequacy and effectiveness of condition assessment processes will be regularly and formally assessed by Quality Assurance and the management of the District.

All inspection and testing activities will be documented on appropriate inspection report and test data forms (electronic?).

4.0 Responsibility

Inspection personnel will be responsible for inspection and testing.

Inspection and testing will be performed in accordance with the procedures outlined below and the condition rating will be documented by the inspector.

5.0 Condition Assessment Measures Rating Scale

This rating is based on how close an asset or component is to replacement or major overhaul. Scores will not have a greater granularity than a half point. An asset is in a State of Good Repair if the score is greater than (2.5). An asset is in Backlog if the score is equal to or less than (2.5). Refer to individual asset Group and Subsystem Inspection Standards for confidence in reliability and specific examples. Asset Management believes that Confidence in Reliability and Remaining Useful Life are interchangeable.



Rating	Condition	Description
5.0	Excellent	New or like new, 95% to 100% confidence in reliability; no visible defects, no damage, cosmetically looks new. *An asset is only new once, after refurbishment some old parts are not new and therefore the highest score after refurbishment is (4.5).
4.5		The inspector is 90% to 95% confident in the reliability of the component / asset.
4.0	Good	The inspector is 80% to 90% confident in the reliability of the component / asset. The asset shows minimal signs of wear, no major defects. Some minor defects with only minimal signs of deterioration. Cosmetic defects/minor wear.
3.5		The inspector is 70% to 80% confident in the reliability of the component / asset.
3.0	Adequate	The inspector is 60% to 70% confident in the reliability of the component / asset. Some moderately defective or deteriorated components; expected maintenance needs. Cosmetically "fair" but all devices are functioning as designed. Small repairs or minor refurbishment.
2.5		The inspector is 50% to 60% confident in the reliability of the component / asset. Asset near overhaul or retirement, but in serviceable condition.
2.0	Marginal	The inspector is 40% to 50% confident in the reliability of the component / asset. Asset has numerous defects or deteriorated component(s). Significant or multiple repairs needed.
1.5		The inspector is 30% to 40% confident in the reliability of the component / asset.
1.0	Poor	The inspector is less than 30% confident in the reliability of the component / asset. Critical defects exist that may affect function or safety. Asset is in need of multiple major repairs or refurbishment; numerous defects.
0		Not safe to use, multiple major repairs or Asset set for disposal/retirement.



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6.0 Procedures

All inspections and tests must be completely documented in clear and concise format and maintained as quality records, per section CAP 2.xx. Documented evidence of detailed inspections performed and the individual responsible for performing inspections is required. Condition assessment inspections shall be performed in the following areas:

- 1) Age Based Score – determines the Useful Life Benchmark (ULB) by age to maintain a State of Good Repair (SGR) which is above 2.5 on the TERM scale.
- 2) Life Mile Based score – compares current mileage reading of vehicle to an expected or projected lifetime mileage.
- 3) Physical Condition Score – score is an average of element condition assessments based on inspection checklist of main bus subsystem elements
- 4) Cost Based score – compares lifetime total maintenance cost per mile of vehicle against an expected or projected useful life maintenance cost per mile.
- 5) Road Call based Score – Similar to the Cost based score, compares lifetime road side breakdowns (for technical reason only) of vehicle against expected lifetime road calls per mile.
- 6) Incident Based Score – Similar to Road call based score, compares lifetime unexpected incident repairs found during preventative maintenance compared against pre-defined expected lifetime incident repairs per mile.

Other potential features for condition assessment:

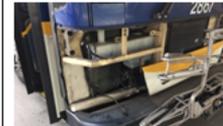
- Bus elements that have already been refurbished

7.0 Asset Group Inspection Standards

8.0 Physical Condition Inspection Standards of Asset Subsystem

Description of Subsystem evaluated [Develop table of all 11 subcomponents and rating sheet](#)

8.2. CHASSIS / BODY

Rating	Example	Inspection Standard
5		Bus is new and all components are new, less than 6 months in service.
4		No signs of rust, body panels in good shape. Under coating adhering tightly, no signs of physical damage. No water entering the body areas.
3		Minor body damage with body panels showing movement between frame and body panel. Signs of minimal rust on small framework of chassis and on undercoating. Surface rust of large frame members is okay but should be minor.
2		Metal fit-up problems in body panels. Multiple areas of minor body damage or one large area having damage. Thicker rust on small frame members. Large members having rust that does not affect the load integrity.
1		Distorted or warped panels, cracks around corners or from stressed welds, smaller frame members failing. Heavy frame members having significant corrosion which can affect load integrity. Accumulation of damage in multiple areas giving bus a poor appearance.

Asset Management State of Good Repair



Sacramento Regional
Transit District

ADMINISTRATIVE & MAINTENANCE FACILITIES

Inspection Standards

This document contains information for SGR inspectors to rate ADMINISTRATIVE &

DEVELOPMENT OF CONDITION ASSESSMENT PROCEDURES

Facility Assessment Rating Levels (from FTA Guidebook) :

- Substructure
- Shell
- Interiors
- Conveyance (Elevators & Escalators)
- Plumbing
- HVAC
- Fire Protection
- Electrical
- Site
- Equipment (for Administrative & Maintenance Facilities)
- Fare Collection (for Passenger and Parking Facilities)

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8.1. SUBSTRUCTURE

8.1.1. Purpose

This Condition Assessment Procedure establishes requirements for physical condition standards and inspection criteria for the Substructure of a facility.

8.1.2. Scope

These requirements apply to the physical service condition and aesthetic appearance of the subcomponents of the substructure of a facility.

8.1.3. Requirements

The items of this subcomponent to be inspected and the respective inspection criteria is identified in the table below. Qualified personnel, who are independent of those performing the work being inspected or tested, shall perform inspection and testing.

Structural inspections must be performed by a licensed Engineer or certified inspectors.

All inspection and testing activities will be documented on appropriate inspection report and test data forms (electronic?).

8.1.4. Responsibility

Inspection personnel will be responsible for inspection and testing.

Inspection and testing will be performed in accordance with the procedures outlined below and the condition rating will be documented by the inspector.

8.1.5. Condition Assessment Measures Rating Scale

This rating is based on how close an asset or component is to replacement or major repair or overhaul. Scores will not have a greater granularity than a half point. An asset is in a State of Good Repair if the score is greater than (2.5).

8.1.6. Procedures

All inspections and tests must be completely documented in clear and concise format and maintained as quality records, per section CAP 2.xx. Documented evidence of detailed inspections performed and the individual responsible for performing inspections is required. Condition assessment inspections shall be performed in the following areas:

- 1.0 Inspect walls for major cracks or other indications of settling and/or movement.
- 2.0 Look for signs of settling floors such as gaps along walls and curbing, or cracks and uneven pavement that pose a tripping hazard.
- 3.0 Check foundations, columns and pillars for concrete deterioration, cracks, spalling, or signs of movement.



Condition Assessment Procedure:
**Administrative & Maintenance Facility
 Inspection Standards**

Section Number: CAP 2.3

Latest Revision by: Eric Oparko

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8.1.7.1. Foundations: Walls, Columns, Pilings

Rating	Example	Inspection Standard
5		New construction, no visible defects.
4		Minimal signs of settling or movement, no major problems, minimal signs of deterioration. Primarily cosmetic defects and minor cracking.
3		Some signs of settling or movement. Minor cracks exist but are under .030" in width. Functioning as designed with no structural cracking.
2		Cracks are structural or critical and/or widespread, repairs are necessary in several areas but in serviceable condition. Cracks need to be repaired or sealed so that reinforcement is not exposed to water and potential corrosion damage. Minor spalling or surfaces have shifted or are not even due to cracking.
1		Critical defects affecting function, health, or safety . Structural cracking, water intrusion is corroding reinforcement. Spalling, shifting, tripping hazards and structural integrity is at risk. Needs, repair, rework or replacement.

8.1.7.2. Basement: Materials, Insulation, Slab

Rating	Example	Inspection Standard
5		New construction, no visible defects.
4		All materials in good condition. Minimal signs of ageing or discoloration, no major problems, minimal signs of deterioration. Primarily cosmetic defects and minor cracking.
3		Some signs of dampness occurrence in walls and slab. Minor cracks exist but are under .030" in width. Functioning as designed with no evidence of water, rodent or structural damage.
2		Damp or wet walls, musty odor or visible mold or mildew, mineral deposits on walls or floors, rust on fuse boxes or appliances, signs of insects or rodents, peeling or bubbling paint, rotted wood, stains or water damage to tile and carpet.
1		Wall issues such as cracks or bowing, large or severe cracks in the slab floor or loose tiles or stains on the carpet, severe rust on electrical outlets and fuse boxes, rotted and deteriorated wood, moldy or damaged and missing insulation

DECISION MAKING TOOLS SOFTWARE

- Assets are identified and Condition Assessment Inspections are Performed
- Where does the data go and how will we use it
- Evaluation of State of Good Repair software
- MPO looking at software on a Regional level

DECISION MAKING TOOLS

- Track Asset Inventories in a single database asset register
- Manage Condition Assessments
 - Age Based
 - Performance Based
 - Physical Condition Inspections
- Lifecycle Management
 - Asset Performance
 - Replacement Policies for individual assets
- Capital Programming
 - Capital Project Priority
- Help create and manage capital plans
- Help Generate NTD Reporting

DECISION MAKING TOOLS

- Inputs
 - Inventory
 - Condition Assessment
 - Asset Replacement Policies
- Outputs
 - Capital Plans
 - NTD Reporting

LESSONS LEARNED

- Partnering with our MPO
 - Possible opportunities in software sharing
- Development of Condition Assessment Inspection Procedures
 - Administration & Maintenance Facilities
 - Passenger and Parking Facilities
- Need for Decision Making Tools (software)
 - Asset and Data Collection
 - Assist Capital Plans
 - NTD Reporting

NEXT STEPS

- Perform Condition Assessment Inspections and collect data
- Input Data into Decision Making Tool
- Develop State of Good Repair Policies
- Analyze Data
- Complete TAM Plan items

