METROLINK

2022 Transit Asset Management Plan

October 2022

Prepared in cooperation with Metrolink Team members
within the Office of the Chief Operating Officer and RailPros, Inc.

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A MESSAGE FROM THE CHIEF EXECUTIVE OFFICER

Darren M. Kettle
CEO, Metrolink

The Southern California Regional Rail Authority (SCRRA) is proud to present the Agency's 2022 Transit Asset Management (TAM) Plan. Since the FTA published its final rulemaking on Transit Asset Management in 2016, SCRRA has made it a priority in identifying opportunities for asset management growth by revisiting our current asset management practices on a recurring basis and executing incremental advances where possible. SCRRA recognizes the development of sound asset management program takes the collective efforts of many to make meaningful change. The information found throughout this plan is based on current asset management best practices, following FTA guidance and policies, reflect a practical and cost-effective asset management program for years to come. Since the previous 2020 SCRRA TAM Plan update, Metrolink has made significant strides towards achieving asset management goals and objectives to maintain assets in a state of good repair as set forth in the 2019 TAM Policy.

The plan highlights several new reports and studies conducted by Metrolink that address ongoing annual state of good repair needs.

The 2022 TAM Plan will refer to the analysis contained in recent plans such as the Metrolink Rehabilitation Plan, Strategic Business Plan, Climate Vulnerability Assessment and Adaptation Plan, and the Rail Fleet Management Plan. In addition, the plan will highlight the significant steps taken over the past couple years to consolidate systems and processes by leveraging the Agency's existing enterprise asset management system. Much effort has been made to assess current business processes, improve quality of asset data, automate workflows, record consistent asset condition ratings, define risk criticality, integrate capital projects and investment prioritization processes, and improve decision-making over the Agency's assets lifecycle.

Metrolink is committed to its foundational value – safety and focused on making ongoing asset management improvements.

Implementation of this plan will align with the Agency's priorities to maintain its infrastructure, equipment, and systems in a safe, reliable, and efficient condition and functioning at their ideal capacity.

EXECUTIVE SUMMARY

The Southern California Regional Rail Authority (SCRRA), otherwise known as Metrolink, has created this Transit Asset Management (TAM) Plan to ensure that the Agency's assets are maintained and operated in a consistent, measurable state of good repair (SGR). The TAM Plan is required by the Federal Transit Administration (FTA) as specified by the Moving Ahead for Progress in the 21st Century Act (MAP-21) legislation. The ruling requires if an Agency receives SGR funding, then a TAM Plan set of performance targets and submission of condition data to the National Transit Database (NTD) must occur on a recurring basis. TAM involves all activities related to maintaining thousands of physical assets, such as rolling stock, equipment, maintenance facilities, and rail infrastructure and to provide of safe and reliable public transit service. MAP-21 also includes requirements for prioritizing reinvestments based on performance, condition, and risk assessment of assets that are within a provider's direct capital responsibility.

Metrolink is responsible for key maintenance and reinvestment tasks. SCRRA also must work within its governance structure – namely, a joint powers authority with five different member agencies and subcontracted services. With the emergence of nationally recognized best practices in asset management and Federal guidance, SCRRA has identified areas of asset management opportunity and growth for itself. These include, among others, TAM strategic planning/business planning; updates to the Metrolink Rehabilitation Plan, monitoring performance against Agency-wide planning documents; TAM leadership and governance; and asset data information/integration.

The FTA published its final rulemaking on Transit Asset Management. This rule, effective October 1, 2016, defines SGR and establishes the minimum Federal requirements for TAM development performance targets and implementation. Pursuant to the rule, SCRRA will also work with freight railroads and other third-party property owners to determine a reasonable method to inventory non-SCRRA-owned assets that are used in the provision of its transit services.

SCRRA is presenting its 2022 TAM Plan Update consistent with federal requirements. The plan is built around a focused approach to asset management best practices that coalesces around both the adopted Strategic Business Plan and the updated Metrolink Rehabilitation Plan (MRP).

ES.1 Acknowledgements

Development of the plan included the participation and input from many key stakeholders that have an important role in asset management, including SCRRA's Executive Team, Asset Managers, Finance, Information Technology, Planning, Contracts & Procurement, Materials Management, Capital Improvement, and Human Resources.

ES.2 TAM Plan Development Summary

The SCRRA Board adopted the initial Transit Asset Management (TAM) Policy back in 2016. However, the TAM policy is considered a living and evolving document that highlights the progress and processes SCRRA implements in maintaining its asset management. Strategic and systematic processes are in place to detail the operation of its assets. Since the development of the previous 2020 TAM Plan, Metrolink has made major strides in fulfilling commitments to maintain assets in a state of good repair and improve asset management across the organization.

ES.3 TAM Summary of Key Improvements

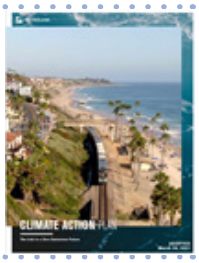
Assessing and prioritizing asset management needs is essential in making investment decisions to achieve a systemwide state of good repair. Numerous data-driven studies have been reported recently that focus on critical improvements and understanding the condition of the Metrolink rail system and its assets. The TAM Plan references key data from the following plans and documents.

Strategic Business Plan – Adopted in January 2021, the SBP serves as a business planning tool that looks ahead as far as 30 years to set a sustainable course for SCRRA, optimizing and improving system performances, and gaining regional consensus on operational and capital needs and priorities.

Metrolink Rehabilitation Plan – Developed since 2017, the MRP provides a comprehensive evaluation of the condition, maintenance, useful life, and required overhauls of the Metrolink rail system assets. The MRP is used to prioritize and guide rehabilitation and improvement projects and inform funding requests to ensure safe and reliable operation over the next 25 years.

Rail Fleet Management Plan (FY2020 – 2040) – Adopted in 2020, the RFMP is a living document that charts a course for future service and investment decisions related to vehicle fleet and facilities through 2040. The RFMP evolves with the life and growth of the fleet.

Climate Action Plan – Adopted in March 2021, the CAP is the first formal environmentally focused plan that spans through 2030 and establishes a framework for reducing greenhouse gas emissions and the effects of climate change.



Climate Vulnerability Assessment and Adaption Plan – Adopted in February 2022, the CVA identifies and prioritizes climate-adaptation strategies to address emergency management and climate resilience.

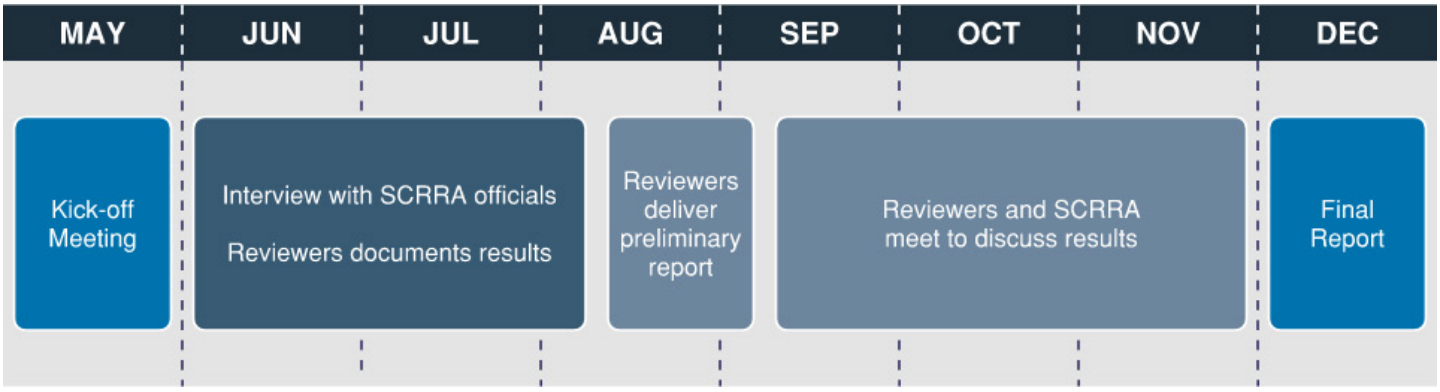
Central Maintenance Facility Action Plan – Updated in January 2022, the CMFAP identifies the major improvements that can modernize the facility operations to enhance the quality-of-life experience of the communities living near the CMF.

ES.4 FTA Certifications and Assurances

FTA provides grant programs for the enhancement of public transportation systems and all applicants are required to submit certifications and assurances. SCRRA must certify that all activities completed under the award are represented in SCRRA's most recent TAM Plan and in compliance with FTA regulations 49 CFR Part 625. SCRRA TAM Plan includes the Agency's capital asset inventory, condition assessment, decision support tools, and investment prioritization.

In addition, FTA aims to promote best practices of asset management and encourages agencies to revisit their maturity level and undertake recurring assessments. In 2023, SCRRA will be participating in FTA's TAM Best Practice Review Pilot Program. SCRRA is one of ten recipients selected to participate in this Pilot Program. Starting in May 2023, a kick-off meeting will be conducted between FTA, consultant reviewers, and SCRRA. In the following two months, the review will consist of request of documentation review. The document review will occur in conjunction with interviews of SCRRA staff that have direct responsibilities in asset management, consisting of Accountable Executives, TAM Manager, Data Owners/Divisions in Operations, Maintenance, Capital Improvement, and other appropriate staff. Following these interviews, the Reviewers will deliver the preliminary report to SCRRA in August 2023. In September 2023, another meeting will be held between the Reviewers and SCRRA to discuss the results of the review. The final report is expected to be released in December 2023.

Figure ES-1. TAM Best Practices Review Pilot Program Timeline (2023)



ES.5 Evaluation of Key Assets

State of Good Repair (SGR) refers to a standard of infrastructure, equipment, and systems that are maintained in a safe, reliable, and efficient condition. Maintaining assets to a state of good repair is essential in ensuring they are operating at their peak performance, while meeting all safety and regulatory requirements. Backlog refers to maintenance and repair work needed to bring an asset to a state of good repair, meeting its safety and performance standards.

According to the upcoming 2023 Metrolink Rehabilitation Plan, the backlog for key asset classes is estimated at approximately $780.43 million. This means $780.43 million is needed in maintenance or repairs throughout the Metrolink system. Through modeling, SCRRA has projected total unconstrained reinvestment needs over a 10-year and 20-year period. The total investment needs, not including cost escalation factors, is $2.12 billion through 2032 and $3.34 billion through 2042.

SCRRA also categorized and prioritized reinvestment needs into three "investment tiers." Each tier represents a different level of reinvestment priority, with Tier 1 representing highest priority needs, and Tier 3 lowest priority needs. Prioritization is conducted based on standard criteria including asset condition, reliability, safety/security and operations & maintenance costs. The results are shown in

Figure ES-2 and point to rolling stock, trackwork, and systems/train control as being the largest and most critical needs. Additional documentation and rationale on prioritization are provided in the body of the report.

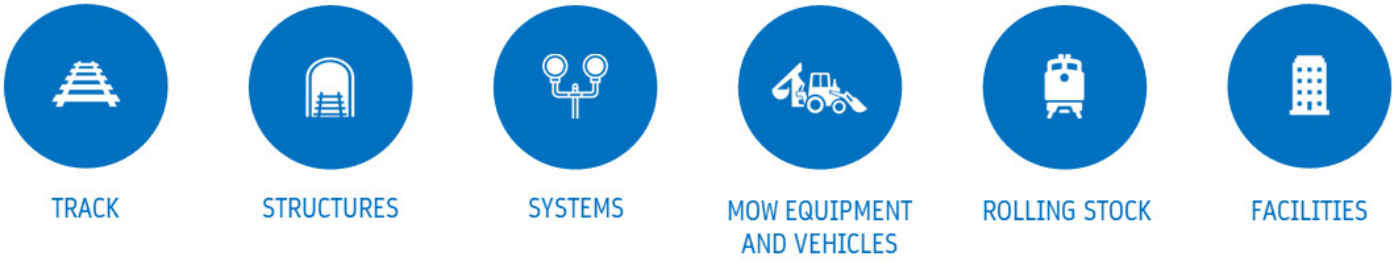
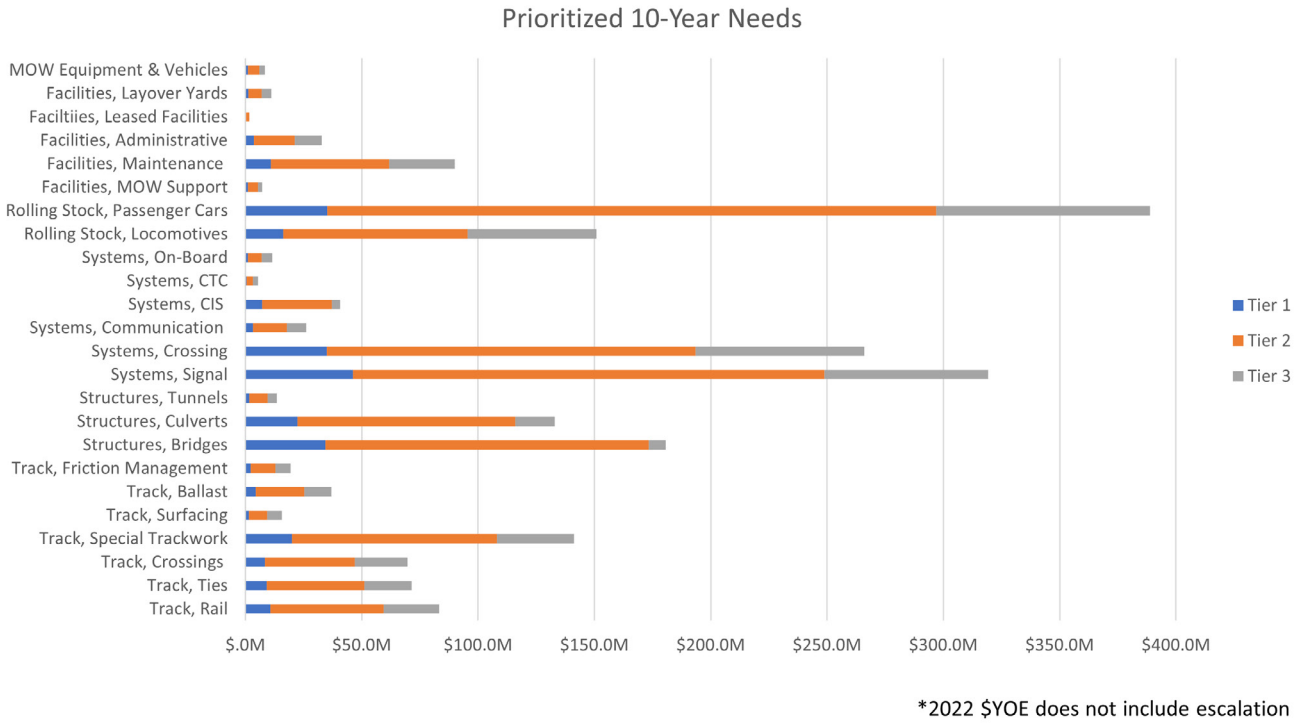


Figure ES-2. SCRRA 10-Year Reinvestment Needs – By Investment Tier



*2022 $YOE does not include escalation

The updated SCRRA Metrolink Rehabilitation Plan evaluates the latest rehabilitation needs, construction costs, condition assessments, and backlog. Accurate backlog and annual state of good repair budgets reflect recent studies, as well as the impacts from the COVID-19 pandemic. A new systemwide backlog for Metrolink has been determined through a thorough review of past funded projects, and rehabilitation budgets.

ES.6 TAM Strategy and Implementation Plan

SCRRA's TAM Plan demonstrates a commitment to continuous process improvement. While previous plans helped to highlight gaps and recommended actions items; SCRRA determined which of these should be prioritized given the level of staff resources and funding available to deliver these activities in a reasonable time period. The Agency's initial focus has been to build a greater awareness of asset management best practices that can be incorporated Agency wide. This was followed by improving data availability and enhancing asset management decision support tools. By incorporating asset management best practices and consolidating asset inventory in a central repository, the Agency has begun to improve its lifecycle management plans and performance modeling for all critical assets.

These key activities have been the focus of the Agency's asset management efforts over the past couple years. Reference Table ES-1 below for most recently updated timeline for key elements that are being delivered.

Table ES-1. TAM Key Elements Timeline

Key Elements	Short Term (0-2 years)	Medium Term (2-4 years)	Long Term (4+ years)
Change Management – Institutionalize Asset Management			
Data Availability – Improve data availability and enhance asset management tools			
Lifecycle Management Plans & Performance Modeling			

SECTION 1 | INTRODUCTION

This Transit Assessment Management Plan (TAM) establishes the SCRRA asset management approach as well as recommendations for maintenance and capital programs necessary to meet service, performance, and achieve a State of Good Repair for SCRRA's portfolio of assets.

Southern California Regional Rail Authority (SCRRA) is a Joint Powers Authority (JPA) that was formed in 1991 and comprises five county agencies that were tasked with reducing highway congestion and improving mobility throughout Southern California:

- Los Angeles County Metropolitan Transportation Authority (Metro)
- Orange County Transportation Authority (OCTA)
- Riverside County Transportation Commission (RCTC)
- San Bernardino Associated Governments (SBCTA)
- Ventura County Transportation Commission (VCTC)

SCRRA began operations in October 1992 to provide commuter rail service between six Southern California counties, with operations over a 546 route-mile network. During the past three decades, SCRRA has expanded from 3 service lines, 11 stations to 7 service lines, 66 stations and an average weekly ridership of 15,453. Revenue train operations are contracted out to Amtrak and TransitAmerica Services, Inc. (TASI).

The Federal Transit Administration (FTA) defines TAM as a strategic and systematic process through which an organization procures, operates, maintains, rehabilitates, and replaces transit assets to manage their performance, risks and costs over their lifecycle to provide safe, cost-effective, reliable service to current and future customers. The term "asset" refers to physical equipment and infrastructure including rolling stock, right-of-way, stations, facilities, systems, tools, etc. that make up SCRRA's commuter rail system.

This TAM Plan is a living document that provides a strategy to coordinate various interdependent business processes, activities, and tools necessary to give SCRRA the ability to manage its assets at optimal efficiency. By examining current TAM practices at SCRRA and through FTA guidance, Metrolink recommends a set of key initiatives and action steps described in the TAM Strategy and Implementation Plan. The initiatives will allow SCRRA to continue improving our TAM maturity and moving towards implementing FTA TAM best practices, while providing safe, reliable and high-quality service today and into the future. The FTA describes the benefits of implementing asset management best practices as listed below in Table 1-1.

Table 1-1. Benefits of Transit Asset Management for SCRRA	
Agency Business Benefits	**Asset Management Approach**
Improved customer service	• Improves on-time performance and service operations; vehicle and facility cleanliness; reduces missed trips, slow orders, and station shutdowns. • Strengthens customer confidence in system safety and reliability. • Avoids or minimizes repair or replacement on failure (only fix when broke) scenarios often resulting in unplanned reactive crisis type repairs and replacements. • Focuses investments around customer-centered goals and metrics.
Improved productivity and reduced costs	• Maintains assets more efficiently, using condition-based approaches and using predictive and preventive maintenance strategies (where these can be employed) to focus and optimize investments with sufficient lead times to avoid costly repairs/replacement on failure or crisis repairs while improving service delivery.
Optimized resource allocation	• Helps implement the SGR commitments in Long Range and Short-Range Transportation Plans. • Better aligns spending with an Agency's goals and objectives to obtain the greatest return from limited funds. • Incorporates life-cycle cost, risk and performance trade-offs into capital programming and operations & maintenance budgeting.
Improved stakeholder communications	• Provides stakeholders with timely, accurate, and transparent SGR assessments and commensurate needs. • Allows SGR to be implemented in an organized, methodical manner. • Provides stakeholders with more accurate and timelier customer-centered performance indicators. • Provides tools to communicate forecasted performance metrics (including level of service) based on different levels of funding.

**Source: USDOT, FTA. Asset Management Guide: Focusing on the Management of our Transit Investments, 2016 and Paterson, L. and Vautin, D. Evaluating User Benefits and Cost-Effectiveness for Public Transit State of Good Repair Investments, Paper submitted to the Transportation Research Board (TRB) 94th Annual Meeting, Washington, D.C. November 14, 2014.*

1.1 Purpose

A primary purpose of a TAM Plan is to elevate the importance of transit asset management throughout an entire organization. The guidance and support from our Executive Leadership Team combined with the collaboration of all divisions will allow SCRRA to continue improving business processes and maintain the Agency's assets in a State of Good Repair. SCRRA will also continue to leverage the resources offered by FTA, collaborate with peer agencies, keep current on asset management industry trend.

The second key purpose is to demonstrate compliance with all the FTA reporting requirements related to MAP-21 rulemaking and the National Transit Database. All FTA Tier 1 TAM Plans are required to include nine FTA elements as listed in Table 1-2 below. Each FTA TAM element is further discussed in the corresponding section noted in the description.

The third key purpose is to discuss the TAM Implementation Plan, which considers lessons learned, prioritizes new initiatives and action steps that reflect the Agency's priorities in the near, medium, and long term.

Finally, the TAM Plan will support an orderly implementation of SGR programs and projects by maintaining and achieving the goals and objectives outlined in SCRRA's Asset Management Policy.

Table 1-2. FTA TAM Plan Requirements		
	Element	**Description**
1	Asset Inventory	List of transit capital assets and their condition *[Section 2, Appendix]*
2	Condition Assessment	Asset condition rating *[Section 2]*
3	Decision Support Tools	Methodology / tools used to create TAM plan *[Section 3]*
4	Investment Prioritization	Prioritized list of SGR projects, using criteria such as safety and cost *[Section 4, Appendix]*
5	TAM and SGR Policy	Policies, strategies, executive directions to support goals for TAMP *[Section 1]*
6	Implementation Plan	Processes to follow to achieve TAMP *[Section 4]*
7	List of Annual Activities	Activities deemed critical to achieving TAM goals for the year *[Section 4]*
8	Financial Resources	Estimate of financial resources necessary to implement TAMP *[Section 4, Appendix]*
9	Evaluation	Continuous TAM improvement plan with milestone and timelines *[Section 4]*
NTD	Performance Measures	Agency and FTA required performance measures / targets

1.2 TAM Plan Development

The TAM Plan development was led by the Business Operations Department reporting to the Chief Operating Officer with support from the Executive Team and the Asset Managers. However, the successful delivery of this TAM Plan would not have been possible without the collaboration and teamwork demonstrated across all divisions over the past year.

The steps in this development process are summarized as follows:

The initial steps in the development of the 2022 TAM Plan included a reevaluation of SCRRA's progress and lessons learned based on the previous Gap Analysis conducted in 2016. SCRRA was able to make significant progress over the recommended timelines. However, agencies are encouraged by FTA to establish a new baseline to understand where the Agency stands in terms of its asset management maturity level. Back in 2016, the initial TAM Plan identified gaps or opportunities for improvement across a series of FTA asset management business processes.

Some of the more notable areas of improvement included the completion of a formal TAM Plan and adoption of the TAM Policy, increased awareness of the TAM best practices and industry standards, improving our approach to collecting and recording condition assessment data in a more consistent manner, integrating the Operating & Maintenance budgeting with the Capital Planning efforts, and consolidating asset management systems to improve asset inventory and reporting capabilities to name a few.

However, there is still further work to be done, and the implementation of TAM best practices should be viewed as a journey where incremental steps will be important and fundamental to SCRRA's success in delivering a sound asset management program. To keep us on track of this goal, SCRRA will continue to identify our level of asset management maturity based on completing a new self-assessment at minimum every 4 years with targeted updates on a biennial basis. The Agency will draw upon lessons learned, ensure compliance with federal requirements, and incorporate industry's best practices as asset management continues to evolve for Tier 1 rail agencies. Reference FTA TAM Review Pilot noted previously in the Executive Summary, ES.4. These action steps will ensure SCRRA achieves its asset management goals and objectives.

1.3 Asset Management Goals and Objectives

SCRRA TAM goals and objectives represent a framework that promotes the Agency's maturity. To ensure there is continuity and success in implementing asset management best practices, SCRRA has established a set of TAM goals and objectives based on the adopted TAM policy and its agreed upon framework and core elements. Table 1-3 lists SCRRA's TAM goals and objective.

Table 1-3. SCRRA TAM Goals and Objectives

TAM Goal	Objectives
Optimize the safety and performance of SCRRA assets to maintain a State of Good Repair for a safe operating environment	• According to FTA TAM Final Rule, as asset is in a state of good repair when: 1. An asset is able to perform its manufactured design function. 2. An asset does not pose an unacceptable identifiable risk. 3. The life-cycle investment needs of the asset are met. • An asset is in a state of good repair when no backlog of rehabilitation needs exists from obsolete assets, including useful life, or when condition assessments indicate rehabilitation is overdue. This can be achieved by: 1. Providing advanced notice of deteriorating asset to avoid or minimize repair on failure and reactive/crisis type repairs and replacements scenarios 2. Measuring and managing TAM-related risks 3. Documenting root cause analysis for asset failures
Build and promote financial sustainability through implementation of asset management best practices	• Strengthen linkages between multi-year SGR needs, annual budget process and Capital Improvement Program • Prioritize SGR investment of existing assets over expansion and addition of new assets • Develop objective method to prioritize capital projects and assess trade-offs between competing investments • Implement minimum life cycle cost policy
Invest in SCRRA assets and SGR	• Provide updates to the TAM Plan and ensure policy is consistent with MAP-21 requirements • Continue to update the capital replacement and rehabilitation plans, and monitor adherence • Utilize a centralized Enterprise Asset Management (EAM) Software to assess the current and future state of systemwide assets
Demonstrate organizational efficiency for asset management processes and outreach to member agencies	• Build understanding and support for asset management at SCRRA executive level • Assess and implement tools to support data driven asset management decisions • Improve and expand communications with member agencies regarding well-documented SGR needs and priorities
Promote asset management culture at SCRRA	• Advance awareness for TAM across all levels at SCRRA • Develop and retain well-trained TAM workforce

1.4 Asset Management Policy

POLICY: SCRRA is committed to maintaining its assets in a State of Good Repair through financial stewardship and reinvestment, transparency, and collaboration with its funding partners, promoting a culture that supports asset management across the organization, and focusing on high quality asset condition and performance information and a risk-based approach as the basis for decision-making. The asset management program shall support and lead to the timely implementation of projects and programs which maintains the Railroad's Infrastructure, Systems, Equipment and Facilities in a State of Good Repair.

PURPOSE: Communicate to the Board of Directors, management, staff, and external stakeholders the ongoing condition of SCRRA's assets and to reinforce SCRRA's commitment to maintain its system in a State of Good Repair; and foster a culture of continuous improvement in asset management planning and performance.

STATE OF GOOD REPAIR: SCRRA is responsible for managing and maintaining public transportation infrastructure, equipment, systems, and facilities in a safe, reliable, and efficient condition. Capital assets are expected to function at their ideal capacity within their design life expectancy and meet all safety and regulatory requirements. Assets are assessed at a component and subcomponent level with policies in place for inspection, maintenance, and rehabilitation practices.

Key performance indicators and metrics for asset categories are detailed in Section 3.

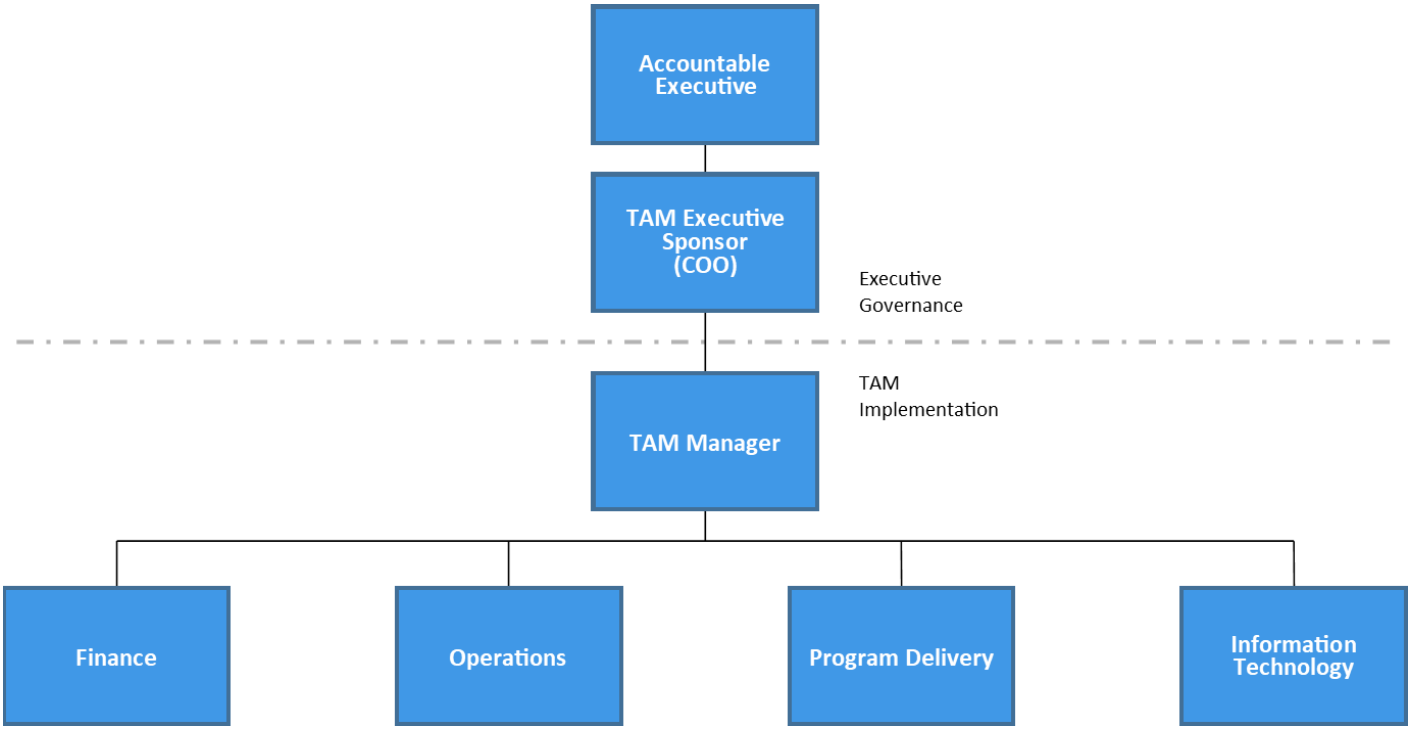
1.5 Roles and Responsibilities

Implementation of the policy is a shared responsibility for all divisions within SCRRA.

OVERALL RESPONSIBILITY: The Chief Executive Officer has overall responsibility for overseeing the development of asset management plans and procedures, in cooperation with the executive leadership team, and reporting to the Board on the status of asset management for the Agency. The CEO is also the "Accountable Executive" with regards to the FTA. Enforcement and policy will be the responsibility of the CEO.

DAY-TO-DAY RESPONSIBILITY: The lead responsibility for the asset management reporting function within SCRRA is within the Office of Chief Operating Officer. Key responsibilities include the development, update, implementation, and monitoring of the TAM Plan required for FTA. As far as budgeting, capital planning, design, procurement, operation, monitoring, rehabilitation, and capital replacements will reside with the respective divisions who oversee the SCRRA's critical assets.

SCRRA TAM LEADERSHIP TEAM:



DIVISION SUPPORT: All SCRRA Divisions will support the TAM policy by participating in technical working group discussions and determine strategies; providing asset management data and assumptions; and implementing TAM initiatives. The following divisions will provide support:

- Operations: Maintenance of Equipment; Facilities & Fleet Maintenance, Track & Structures, Signals & Communication, PTC on-Board, PTC back-Office. (Operations division will support developing and implementing life cycle costs into procurement procedures and other related activities.)
- Finance: (i.e., Finance; Contracts and Procurement, Materials Management) will assist with adding detail to financial accounting data to facilitate linkage with asset management data; establishing a linkage between asset management and the budgeting/financial process.
- Information Technology (IT): will support asset management and information systems necessary to implement the TAM Plan.
- Program Delivery: will support the development of annual capital budget programs, including new capital projects and long-term planning for rehabilitation.

1.6 Asset Management Recent Accomplishments

As mentioned under the "Summary of Key Improvements", SCRRA has developed studies aimed to identify and prioritize the assets that require rehabilitation or replacements to ensure safe and reliable rail services. Recent condition evaluations help SCRRA determine funding requests and forecast rehabilitation needs. The 2023 MRP went through a comprehensive revision process that accurately reflects the current condition of capital assets. Backlog and annual State of Good Repair costs are up to date and assist asset managers with identifying critical rehabilitation needs and future improvements.

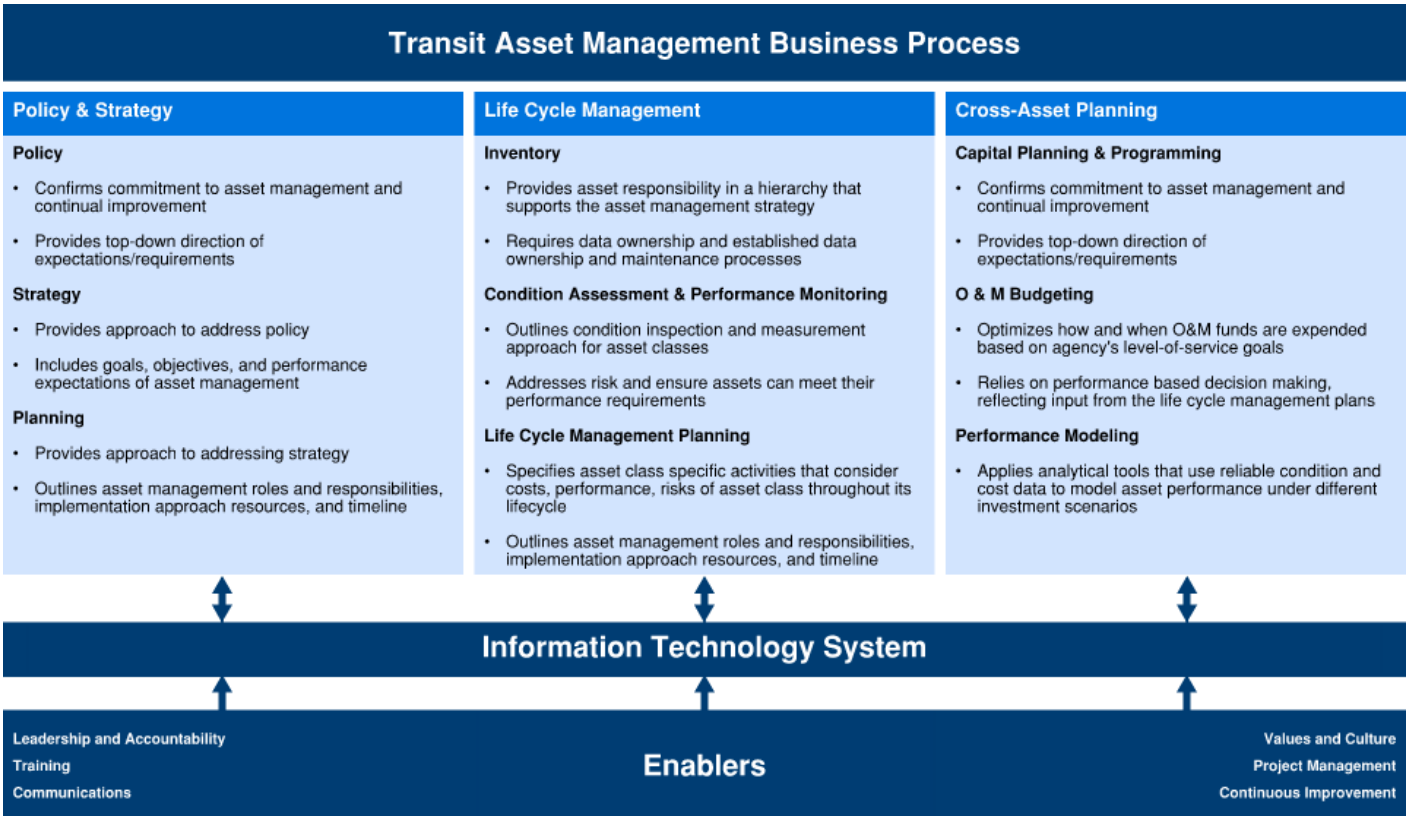
1.7 Drivers for SCRRA TAM Program Implementation

Implementation of SCRRA's TAM program is driven by several drivers and enablers, among which the policy itself (highest level), TAM Plan, and asset management best practices are found in FTA's guidance and other globally recognized organizations such as the Institute of Asset Management (IAM) and International Standard Organization (ISO) 55001:2014.

The FTA *Asset Management Guide: Focusing on the Management of our Transit Investments* (FTA TAM Guide) published in 2012 continues to be the primary source used to organize and describe best practices. The FTA TAM Guide and recently published updates provide the clearest picture of the requirements as well as identifying practices in common use. In addition, the Institute of Asset Management (IAM) has developed a conceptual model of all activities or functions required to implement asset management.

The FTA TAM Guide has five distinct Business Process "areas" which are depicted in Figure 1-1.

Figure 1-1. Transit Asset Management Business Processes Framework



Source: Federal Transit Administration - Asset Management Guide: Focusing on the Management of our Transit Investments, October 2012

SCRRA recognizes and understands the importance of these asset management concepts and principles and makes every effort to incorporate them Agency-wide.

SECTION 2 | TAM BASELINE ASSESSMENT AND CURRENT CAPABILITIES

This section highlights the current TAM baseline and examines our key strengths and where further investments can be made to ensure SCRRA remains on track to deliver asset management best practices. This recent assessment coupled with past TAM efforts demonstrate SCRRA is moving in the right direction with regards to implementing asset management improvements. As noted previously, SCRRA will be participating in an FTA Best Practices Review Pilot scheduled for Summer 2023. The Agency will work closely with FTA and its Reviewers to assess current asset management business practices, identify potential gaps, and prepare a final assessment report sharing findings and recommended action items.

In addition, this section contains a comprehensive description and delineation of SCRRA's asset inventory. Lastly, there is an overview of SCRRA's existing condition assessment methodologies and applications for all critical assets. This section addresses the following FTA TAM Elements: 1 (Inventory of Capital Assets) and 2 (Condition Assessments).

2.1 TAM Maturity & Awareness Self-Assessment

In July 2020, SCRRA completed the TAM Maturity & Awareness Self-Assessment provided by FTA to help determine the current state of its asset management maturity. The assessment centered around the five FTA business process areas or drivers, representing good asset management best practices. Key SCRRA personnel from various business units participated to gain their insight and recommendations on how to further improve the delivery of asset management best practices. Findings were summarized into five distinct maturity levels and corresponding asset management elements. SCRRA delivered an average score near 70 percent across all five maturity levels listed below.

While SCRRA can make further improvements across all five key maturity levels, it is clear staff is committed to working collaboratively to continue making business process improvements. SCRRA continues to perform ongoing self-assessments of its asset management to further improve delivery of asset management best practices. Data driven studies like the recently reported MRP provide reliable resources that help manage critical assets.

2.2 SCRRA's Asset Inventory & Performance Measures

SCRRA's asset inventory is estimated to be $5.01 billion in value, meaning it will take $5.01 billion to replace all SCRRA's assets once they reach the end of their lives. A summary of SCRRA's Capital Assets is presented in Figure 2-1. In addition, the TAM Rule requires that transit agencies establish SGR performance measures and targets for each asset class to convey condition information. Consistent with FTA's requirements, SCRRA presents the performance measures for the Agency's active rolling stock, equipment, facilities, and infrastructure. Currently, SCRRA's rolling stock has 1% of vehicles that have reached their useful life benchmark (ULB). SCRRA has made investments in 40 new Tier 4 F-125 locomotives, which are entirely in revenue service as of 2021. 31 total F59 PH and F40 PH locomotives have been decommissioned as of 2020 due to exceeding their useful life. The Agency has 258 passenger rail cars, which have yet to meet their ULB as of FY 2022. However, in the near term, a large percentage of the Bombardier revenue vehicles will exceed their ULB and SCRRA's has been undertaking a significant overhaul campaign to extend the assets useful life.

The Agency's equipment consists of Maintenance of Way (MOW) and non-revenue vehicles, which include 196 vehicles with nearly half on average exceeding their ULB in FY 2022. Efforts are underway to replace some of the oldest vehicles and reduce on-going maintenance expenses. In addition, SCRRA owns and/or maintains a total of 16 facilities including 2 maintenance facilities, 4 administrative facilities, 6 layover yards, and 4 MOW support facilities. In 2020, the Agency conducted a Facilities Condition Assessment of its properties and provided updated condition assessment based on the FTA 5-Point Scale. Facility performance is assessed by the percentage of facilities scoring below a 3 rating on the scale. Only 3 facilities, or 19 percent of the total recorded, scored less than a rating of 3 based on the scale. Furthermore, FTA requires agencies to report performance restrictions. The Arrow Maintenance Facility (AMF), which serves as the maintenance facility for the DMU's that serve the Arrow line in the City of San Bernardino, was completed in 2022 and owned by SBCTA. Metrolink partnered with SBCTA to provide maintenance of way for the line, as well as maintenance of the CTC and PTC systems. Maintenance costs associated with the AMF are shared with SCRRA.

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Asset Inventory Summary

PERFORMANCE MEASURES

ROLLING STOCK

SCRRA locomotives account for total locomotives stored and in service.
SCRRA passenger railcars account for total railcars stored and in service on SCRRA properties.

Vehicle Type		Total # of Vehicles	Useful Life Benchmark (ULB)	# of Vehicles That Meet or Exceed ULB (FY22)	% of Vehicles That Meet or Exceed ULB (FY22)	% of Vehicles That Meet or Exceed ULB (FY23)
	EMD F125PH	40	30	0	0%	0%
	MPI MP36	15	30	0	0%	0%
	EMD F59 PH-R	5	30	4	80%	100%
	Bombardier Gen 1 Cab	23	30	0	0%	0%
	Bombardier Gen 1 Coach	51	30	0	0%	0%
	Bombardier Gen 1 Coach (O\	14	30	12	86%	100%
	Bombardier Gen 2 Cab	5	30	0	0%	0%
	Bombardier Gen 2 Coach	2	30	0	0%	0%
	Bombardier Gen 3	26	30	0	0%	0%
	Hyundai Rotem Guardian Ca	57	30	0	0%	0%
	Hyundai Rotem Guardian Cc	80	30	0	0%	0%

MOW VEHICLES

Maintenance-of-Way Vehicle performance is measured by the percentage of non-service vehicles (by type) that meet or exceed the ULB.

Vehicle Type		Total # of Vehicles	Useful Life Benchmark (ULB)	# of Vehicles That Meet or Exceed ULB (FY22)	% of Vehicles That Meet or Exceed ULB (FY22)	% of Vehicles That Meet or Exceed ULB (FY23)
	Automobiles	70	7-8	43	61%	61%
	Trucks and other Rubber-Tired Vehicles	100	7-14	25	25%	40%
	Steel-Wheeled Vehicles	26	10-30	22	85%	85%

FACILITIES

Facility performance is measured by the percentage of facilities (by group) that are rated less than '3' on the Transit Economic Requirements Model (TERM) Scale.

Facility Type		Total # of Facilities Assessed	# of Facilities Assessed Below '3' on TERM Scale (FY22)	% of Facilities Assessed Below '3' on TERM Scale (FY22)
	Maintenance Facilities	2†	0	0%
	Administrative Facilities	4	1	25%
	Layover Yards	6	2	33%
	MOW Support Facilities	4	0	0%

SUMMARY OF CAPITAL ASSET INVENTORY

TRACK	**396.42*** Track		**HOST RAILROADS:** SCRRA, BNSF, NCTD, UP
CROSSING	**353** Crossings		**MAINTAINER:** SCRRA
TURNOUTS	**556** Turnouts		**MAINTAINER:** SCRRA
BRIDGES	**251** Each		**MAINTAINER:** SCRRA
CULVERTS	**720** Each		**MAINTAINER:** SCRRA
TUNNELS	**6** Each		**MAINTAINER:** SCRRA
SIGNALS	**1804** Signals		**MAINTAINER:** SCRRA
COMMUNICATIONS	**834** Comms		**MAINTAINER:** SCRRA
MOW EQUIPMENT	**26** Each		**OPERATOR/MAINTAINER:** SCRRA
MOW VEHICLES (Non-Revenue Fleet)	**170** Vehicles		**OPERATOR/MAINTAINER:** SCRRA
LOCOMOTIVES	**60** Vehicles		**MANUFACTURER:** Electro-Motive Diesel (EMD), MotivePower (MPI)
PASSENGER CARS	**258** Cars		**MANUFACTURER:** Bombardier, Hyundai Rotem
FACILITIES	**16**† Facilities		**LOCATIONS:** Los Angeles County, Orange County, San Bernardino County, Riverside County, Ventura County

* SCRRA revenue, non-revenue, and branch line tracks

† SCRRA shared responsibility for ARROW Maintenance Facility

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The valuation of SCRRA's asset inventory is divided by category in Figure 2-1 and Table 2-1. Structures and Track are the two asset types with the highest aggregate value.

Figure 2-1. Asset Inventory Valuation by Category

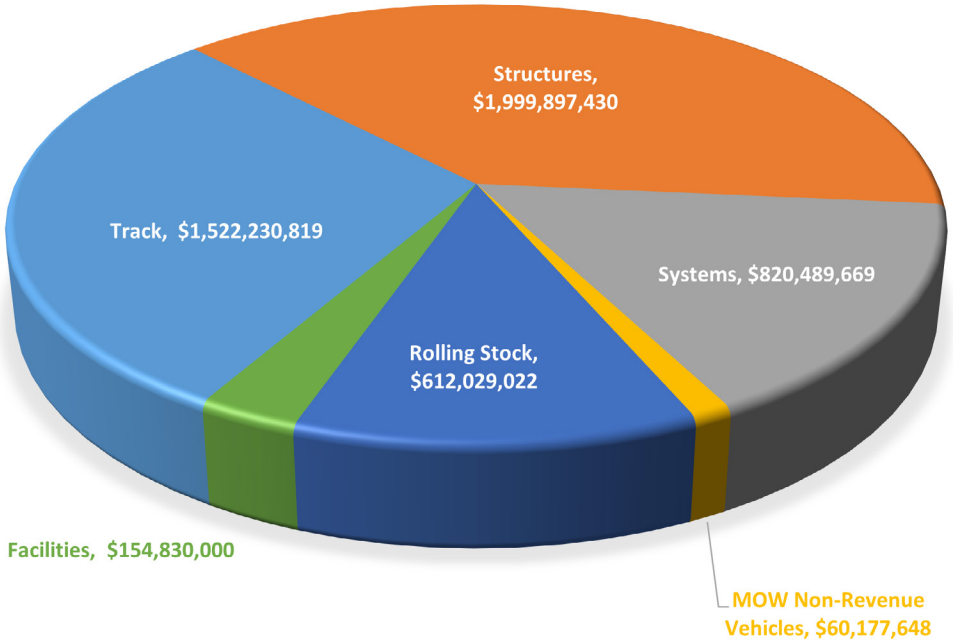


Table 2-1. Asset Inventory Valuation and Percent of Asset Base by Category

Asset Category	Valuation ($)	% of Asset Base
Structures	$1,999,897,430	40%
Track	$1,522,230,819	30%
Systems	$820,489,669	16%
Rolling Stock	$612,029,022	12%
Facilities	$154,830,000	3%
MOW Non-Revenue Vehicles	$60,177,648	1%
TOTAL	**$5,014,824,589**	**100.0%**

Guideway related infrastructure including tunnels and bridges/culverts forms the largest share of SCRRA's asset base at nearly $2.0 billion, which is about 40% of the inventory. Track forms the second largest share with a valuation of $1.52 billion, or about 30% of the asset base.

2.3 Asset Performance Indicators and Metrics

An assets key performance indicator measures the progress towards reaching and maintaining a state of good repair. SCRRA's key asset classes (track, structures, systems, rolling stock, facilities, MOW vehicles, and stations) have various evaluation criteria's that identify the current condition and state of the asset. There is no "one size fits all" approach to assessing an assets condition, but by following established policies and goals, SCRRA is able to determine the best path towards rehabilitation and maintaining a state of good repair and decrease risks. The following performance metrics have been adopted by the Agency to measure how well an asset is meeting its lifecycle requirements:

The normal life-cycle progression of an asset, regardless of its type, goes through five stages:

State 5: Refers to an asset in good condition with only routine maintenance and inspection required.

State 4: An asset still performs well with only minor wear and deterioration, and no increased maintenance or inspection is necessary.

State 3: Indicates that the asset still supports operations, but the rate of deterioration must be monitored, and increased inspections or maintenance may be required to avoid compromising functionality or reliability. Asset's condition is marginal and should be actively monitored and programmed for rehabilitation.

State 2: Represents a backlog state where the asset requires increased inspections, maintenance, and preventative measures to maintain service reliability, resulting in cost increases that often cannot be recouped.

State 1: An asset is in a state of deferral and considered backlog. Condition is now such that even with remedial measures, in-service failures may rise to a level where operations require restrictions to maintain safety.

SCRRA's key assets include:

Asset Class	Asset Elements
Track	• Rail • Ties • Ballast • Crossings • Special Trackwork • Slopes and Embankments • Friction Management
Structures	• Bridges • Culverts • Tunnels
Systems	• Wayside Signals • Crossings • Communications • Communications CIS • Back Office • On-Board
Rolling Stock	• Locomotives • Passenger Cars
Facilities	• Maintenance Facilities • Layover Yards • Administrative Facilities • MOW Support Facilities

Track: Table 2-2. outlines the lifecycle management considerations for the design, preventative maintenance, rehabilitation, and condition monitoring of track assets. Track wear, defects, age, type, and special conditions are factors affecting its useful life.

Table 2-2. Track Performance Metrics

Asset Class	Condition/Structural Assessment Metrics	Performance Metrics
Rail	• Rail wear measurements • Rail surface analysis • Inspection of joint bars • Lateral track strength from Gage Restraint Management Systems (GRMS) • Internal rail flaw detection	• Rail wear rate (vertical and side) • Availability • Rail fatigue defects • Tangent and curve rail wear rate • Percentage of failed and marginal ties in a segment • Mid-life overhauls and lifecycle replacement • Shoulder cleaning cycles • Frequency of maintenance and cleaning
Ties	• Tie Scanning • Satellite imagery • Aurora inspection software	
Ballast	• Ground Penetrating Radar (GPR)	
Crossings	• Field assessments • CDRL 23 Plan • Track geometry measurements	
Special Trackwork	• Metrolink traffic density charts • Metrolink track charts	
Slopes/Embankments	• Test borings • Geotechnical analysis	
Friction Management	• Grinding records • Friction modification programs • Friction management studies	

Structures: Structural deterioration is primarily related to environmental conditions or the structures age. SCRRA's asset management strategies rely on the RAMS Database to store and maintain records and information. Condition rating information, structure load rating data, and site evaluations are primary factors affecting the structures performance metrics.

Table 2-3. Structures Performance Metrics

Asset Class	Condition/Structural Assessment Metrics	Performance Metrics
Bridges Culverts	• RAMS Data Validation • Site characteristics and deterioration • Condition rating information • Load rating data • Maintenance backlog • Structure age • Cell analysis	• Load capacity • Percentage of bridge assets with unacceptable condition ratings • Number of bridges or span distance • Ratio of demand to normal-capacity and demand to maximum-capacity • Overall safety, site, deck, superstructure, and substructure bridge condition ratings • Maintenance backlog by structure condition rating less than 4 • Overall safety, site, cell, and other culvert condition ratings
Tunnels	• Lining, cracking, and ground water intrusion rates • Condition rating information • Maintenance backlog • Site characteristics and deterioration	• Overall safety, site, and structure tunnel condition ratings • Drainage and backfill failures • Maintenance backlog by tunnel condition ratings

Systems: Understanding the life cycles of key components involved in asset management is essential for effective planning. A comprehensive approach to systems rehabilitation planning will ensure that SCRRA maintains a safe, reliable, and efficient operation. Proper equipment testing and condition assessments is a key metric in extending an assets End of Life (EOL) cycle.

Table 2-4. Systems Performance Metrics

Asset Class	Condition/Structural Assessment Metrics	Performance Metrics
Wayside Signals Crossings Communications Communications CIS Back Office On-Board	• Percentage of assets exceeding their EOL cycle • Equipment testing • Condition rating information	• Percentage of asset change out program • Maintenance or replacement backlog by condition rating • Frequency of lifecycle rehabilitation • 10% change-out program for Signals • 20% change-out rate per annum for Communications • 20% change-out rate per annum for Crossings • 20% annual change-out schedule for back-office systems

Rolling Stock: Analysis of locomotives and passenger car fleet mileage, age, and condition data is critical in developing an approach to achieving and maintaining a state of good repair. Target goals for spare ratios helps SCRRA plan and account for corrective maintenance staff, shop space, spare parts, and materials.

Table 2-5. Rolling Stock Performance Metrics

Asset Class	Condition/Structural Assessment Metrics	Performance Metrics
Locomotives Passenger Cars	• Vehicles Age • Scheduled repairs and preventative maintenance rotations • Condition-Based Maintenance Program • Smart Maintenance Program • Overhaul Programs	• Target goal of 15% spare locomotive/cab cars • Target goal of 20% spare trailer cars. • Overall rolling stock availability • Defects (against specific thresholds) • Preventative and corrective maintenance target goals. • Midlife overhauls and 30 years useful life targets • Maintenance cost/vehicle • Scheduled versus unplanned maintenance costs

Facilities: Maintenance and layover facilities emphasize rolling stock maintenance operations, equipment, and structure, while administrative facilities, also known as Dispatch and Operation facilities, emphasize office equipment and computer systems used for telecommunications. SCRRA uses Trapeze EAM to manage its Facilities assets and following the system's Preventative Maintenance (PM) Work Orders Compliance. PM Work Orders Compliance Windows are calculated using a compliant-due-date from PM service type, the date the equipment was put back into service from the last PM work order, and the compliant window. The compliant due date is then compared with the date the equipment is taken out of service in the work order and determined if the work order is out of compliance. On Time Performance (OTP) preventative maintenance or repairs is determined by the work finished date and work-due-date within the work order.

Table 2-6. SCRRA Facilities Asset Hierarchy

Asset Class	Condition/Structural Assessment Metrics	Performance Metrics
Maintenance	• General purpose maintenance facility • Heavy maintenance and overhaul • Service and inspection • Fueling, Testing, and Washing • Other	• Substructure • Shell • Interiors • Conveyance • Plumbing • HVAC • Fire Protection • Electrical • Equipment • Site
Layover	• Wayside power • Water supply • Dump stations • Storage	
Administrative	• Administration office • Dispatch and operations • TMDS, CAD, BOS, and PTC Systems • Data Center • Other	

Table 2-7. Maintenance and Administrative Facilities Performance Metrics		
Asset Class	**Performance Target Reporting Requirement Element Categories**	**Performance Metrics**
Maintenance Layover Administrative	• Substructure • Shell • Interiors • Conveyance • Plumbing • HVAC • Fire Protection • Electrical • Equipment • Site	• PM Work Order Compliance percentage based on compliant-due-date and out of service date. • Work Orders finished OTP. • Maintenance backlog by facility condition rating less than 3

2.4 Enterprise Asset Management System Optimizations

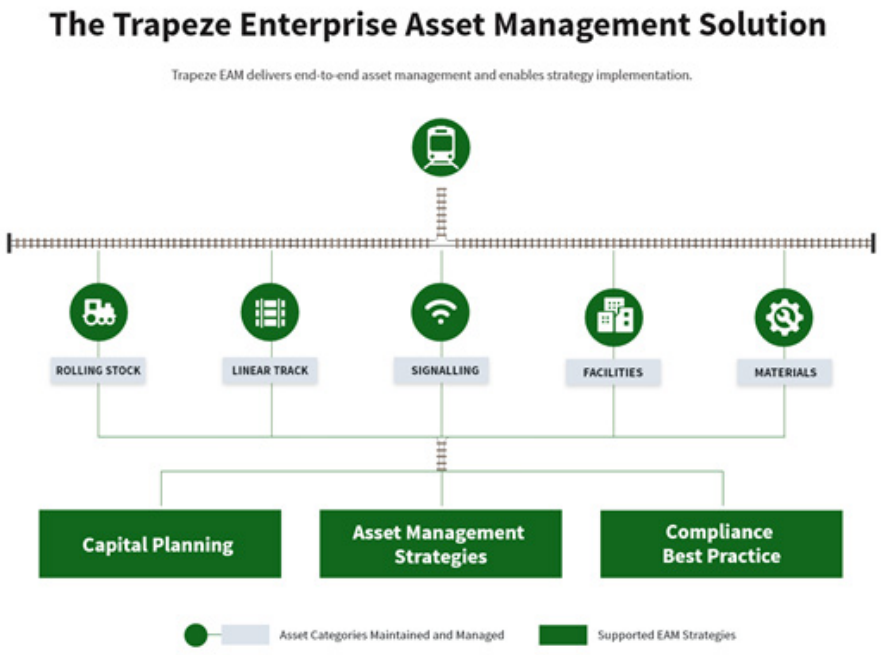
SCRRA is actively in the process of moving towards optimizing and implementing a new Enterprise Asset Management (EAM) system. SCRRA contracted with Trapeze Software Group in November 2020 to engage with Metrolink stakeholders across all asset divisions (facilities, rolling stock, infrastructure, track, wayside) to consolidate existing siloed asset management systems into a central repository and creating a single system of records for the Agency's assets. This decision support tool will allow for improved work order management, automated workflows, standardized condition ratings, risk criticality, development of capital projects, investment prioritization, and improve overall data quality and accessibility.

Where possible and practical, the EAM will interface with other enterprise systems to ensure consistency, accuracy, and accountability of the Agency's asset investment. The EAM will improve operational efficiencies across the Authority's daily rail operations and allow more focus on monitoring, tracking, reporting, developing, forecasting, and prioritizing assets to maintain a state of good repair. SCRRA anticipates this project will span several years with each functional group going through an in-depth current state review, data loading, recommended future state workflows, business process assessment, system configuration, user acceptance testing, training, and Go-Live. The EAM system will be deployed in phases with facilities going live in late 2022, Rolling Stock has begun an iterative Go-Live with the F125 Locomotives, and Maintenance of Way (MOW) expected to Go-Live in early 2024.

While SCRRA is in the early stages of migrating facilities and rolling stock into EAM, there has been a monumental shift and buy-in how the Agency intends to manage its critical assets moving forward. This shift to a more asset-centric organization has been driven based on SCRRA leadership embracing previous TAM assessments and recommendations. In addition, SCRRA is making the necessary investment in EAM resources and change management support to help deliver a project with this level of complexity, which will ensure functional groups will be able to take advantage of the EAM system capabilities now and into the future.

Future EAM phases and investments being considered include:

- Materials Optimization Enterprise Purchasing
- EAM Technical Staff Augmentation
- EAM Application Enhancements
- KPI Management
- Fault/Alert Management
- Change Management Services



2.5 Condition Assessment Methods & Application

The Agency utilizes several condition assessment methods for measuring the performance quality of an asset: (1) Government Accounting Standards Board Statement 34 (GASB 34) Modified Approach, (2) Rail Asset Management System, (3) Federal Transit Administration's (FTA) 5 point scale, (4) Trapeze EAM, and (5) Specialized software for track such as Range Cam and imaging technology. Each assessment method is distinct and varies depending on the asset category and purpose of the analysis. Although there are a variety of assessments being used, SCRRA will continue to work towards implementing a systemwide five-point rating scale across all critical assets as reasonably practical. The following sections provide an overview how these methods are applied across asset types. See Table 2-8 for the FTA Condition Assessment Rating Scale criteria.

2.5.1 Track

SCRRA's track is assessed across five major subcomponents which include: Rail, Ties, Crossing, Special Track, and Ballast. SCRRA adheres to strict Federal Railroad Administration (FRA) regulations and the Agency's Track Maintenance Manual (TMM). The Agency utilizes Range Cam Reporting Software to analyze wear and overall rail condition based on federal standards several times a year. In addition, SCRRA utilizes state-of-the-art imaging technology to reveal the exact condition of every tie and component. Furthermore, the Agency has performed manual condition survey on every crossing using a 5 point rating crossing assessment guideline. The Track and Structures Rehab Department performs regular analysis on the track condition to establish a 5-year plan for rehabilitation projects to supplement regular track maintenance.

Table 2-8. FTA Condition Assessment Rating Scale

Rating	Condition	Description
5	*Excellent*	No visible defects, near new condition, may still be under warranty if applicable
4	*Good*	Good condition, but no longer new, may have some slightly defective or deteriorated component(s), but is overall functional
3	*Fair*	Moderately deteriorated or defective components; but has not exceeded useful life
2	*Marginal*	Defective or deteriorated component(s) in need of replacement; exceeded useful life Note: Condition 2 indicates an asset (or significant portion of an asset) is close to, or in need of, rehab/replacement and should be considered a pending investment need.
1	*Poor*	Critically damaged component(s) or in need of immediate repair; well past useful life

2.5.2 Structures

To determine the needs of Metrolink structure assets, including bridges, culverts, and tunnels, high-level present-day valuations and rehabilitation costs are estimated using industry and available historical project cost data. For each structure, the rehabilitation and replacement costs are then assigned temporarily, informed by the structure's condition, ratings, and age to forecast when the foreseeable investment needs are anticipated. See Table 2-9 for the RAMS Structure Condition Matrix.

Table 2-9. RAMS Structures Condition Matrix

Condition	Rating	Strategy	Work Unit	Cost/Level-of-Effort	Examples
Good	**5**	State of Good Repair	Maintenance	Lowest	Ballast and tie replacement, scour protection, debris removal, and vegetation control
Fair	**4**	Life-cycle Maintenance/ Preservation	Maintenance/Job Order Contract	Low	Crack and spall repairs, bearing adjustments, site restoration
Poor	**3**	Rehabilitate	Job Order Contract (JOC)	High	Bridge and culvert major rehabilitation or replacement
Imminent Failure	**2**	Stabilize	Emergency	Highest	Grade stabilization, erosion, and flood restoration
Failed	**1**	--	--	--	--

2.5.3 Systems

The life cycle of key signals and communications components is essential for effective planning. Equipment must be rehabilitated or replaced according to the following life cycle schedules:

0-10 Years	Back-office equipment and monitors have an average 5-year life cycle
10-20 Years	Positive Train Control (PTC) On-board equipment has an average of 10- to-20-year life cycle, depending on the parts' life cycle. PTC and associated communications equipment have an average 15-year life cycle. Grade Crossing Predictors (GCPs), batteries, and other signal controllers have on an average of 20-year life cycle. Switches and signals have an average 20-year life cycle.
20 Years +	Shelters have an average 30-year life cycle. Undergrounds have an average 30-year to 50-year life cycle, dependent on their installation (with or without conduit).

Regular and thorough inspections and testing are completed for a detailed review of equipment. All systems and subsystems, including Signal, Communications, Back Office, and On-Board systems take a comprehensive approach to rehabilitation planning by undergoing an elevated inspection process. Table 2-10 provides an overview of the System rating system.

Table 2-10. Systems Inspection Rating System Example

Rating	Condition	Description
Excellent	4.8 - 5.0	No visible defects, near new condition
Good	4.0 - 4.7	Some slightly defective or deteriorated components
Fair	3.0 - 3.9	Moderately defective or deteriorated components
Marginal	2.0 - 2.9	Defective or deteriorated components in need of replacement
Poor	1.0 - 1.9	Critically damaged components in need of immediate repair

2.5.4 Rolling Stock

Rolling stock and equipment asset data, specifically for non-revenue service vehicles is collected through on-site assessments for the purpose of facilitating maintenance work orders. This data is stored in the Trapeze EAM system and efforts are underway to expand its use to meet department reporting requirements. Maintenance management has become proactive in assessing the condition of the rolling stock by evaluating SCRRA's fleet daily to ensure availability and determine the asset's condition. As issues are identified, staff coordinates with the maintenance contractor to prioritize daily preventive maintenance activities and address root causes. The rolling stock vehicle maintenance contract award includes the adoption of a condition based/Life Cycle Maintenance (CM/LCM) strategy that is more proactive in identifying, planning, and performing repair or replacement of parts prior to service failure. Mid-life overhauls are also performed due to the age and conditions of portions of the fleet.

See Appendix B for the Rolling Stock systems and components service cycles.

2.5.5 Facilities

Utilizing Trapeze EAM, facility assets are inventoried and organized by adding primary, secondary and compartment identifiers into data sets. Condition ratings based on the FTA's 5-point rating scale are assigned to forecast predictive maintenance and repairs. In 2020, SCRRA conducted a condition assessment in accordance with the FTA's TAM Final Rule (49 CFR 625) and NTD reporting requirements.

Metrolink incorporates all Preventative Maintenance (PM) programs into EAM and eliminates any standalone spreadsheets and manual processes. Asset Managers are able to gather a list of equipment and components that are coming due or overdue for service. They can then stage PM inspection work orders for equipment they expect to service in the future.

See Appendix B for the SCRRA Facilities Condition Assessment reported to the NTD in 2021.

2.5.6 Key Performance Indicators

Table 2-11. Performance Measure for each Asset Class

Asset Class	Performance Measure
Track	SCRRA Track Maintenance Manual (TMM) 5-point rating scale
Structures (Bridges, Culverts, Tunnels)	SCRRA Bridge, Culvert and Tunnel Safety Management Program 5-point rating scale
Communication and Signals	FTA 5-Point condition assessment rating scale
Rolling Stock (Revenue and Non-Revenue)	Percentage of vehicles that meet or exceed their ULB
Facilities	Percentage of facilities below a 3 on the FTA 5-point rating scale

SECTION 3 | CAPITAL REHABILITATION AND REPLACEMENT INVESTMENT PROGRAM

This section provides a description of SCRRA's decision support tools for capital planning, as well as a summary of its capital project prioritization approach. The SGR backlog and a multiyear reinvestment needs forecast is provided. This section addresses FTA TAM Elements: 3 (Decision Support) and 4 (Investment Prioritization).

Through studies such as the MRP, Fleet Management Plan, and Climate Vulnerability Assessment and Adaptation Plan, Metrolink can evaluate and forecast rehabilitation and improvement projects. Metrolink has an annual rehabilitation budget dedicated to replacing or rehabilitating Metrolink's assets. The annual rehabilitation budget is dependent on identification and justification of projects, and funding availability. The annual rehabilitation budget is highly variable, having ranged from $54.3 million dollars in FY2021 to $90.4 million dollars in FY2022, which further complicates the process.

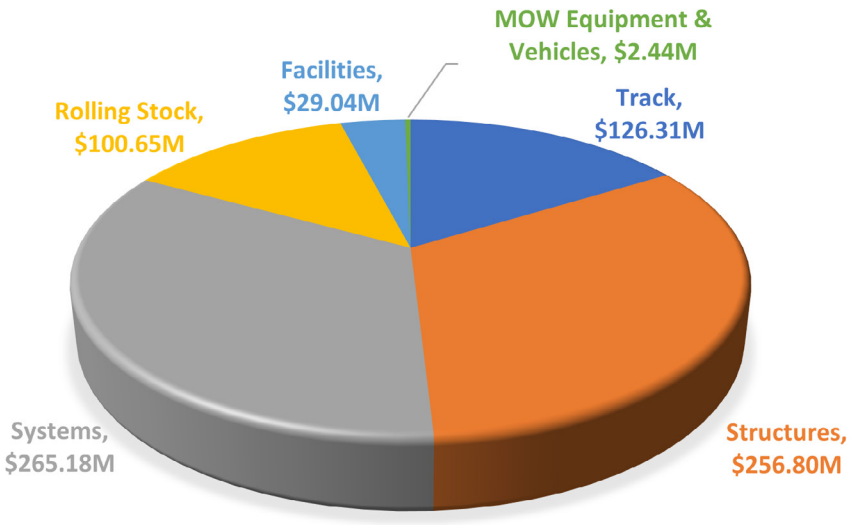
The capital rehabilitation and replacement investments described below illustrate the current size of the Agency's SGR backlog, the tools used to support analysis, and the investments needed to reach a State of Good Repair.

3.1 State of Good Repair (SGR) Backlog

Assets that are in a SGR can operate to their designed purpose, without posing an unacceptable safety risk, and all of their life-cycle reinvestment needs have been met. To quantify the SGR backlog, the Agency utilizes the Metrolink Rehabilitation Plan (MRP) which considers the assets' age, condition, and performance based on the asset inventory described in Section 2 and the relevant life-cycle activities.

As of 2022, Metrolink's current SGR backlog is estimated to be approximately $780.43 million; meaning, it would take SCRRA $780.43 million to perform all the necessary reinvestment actions to address Metrolink's assets that are not in a state of good repair. The composition of Metrolink's backlog is shown in Figure 3-1.

Figure 3-1. MRP Estimated SGR Backlog ($ millions)



Systems is the largest portion of SGR backlog needs, at an immediate need of $265.18 million. Structures such as bridges, culverts, and tunnels are the second largest portion of the backlog, which encompasses $256.80 million of the backlog. The third largest portion of the current identified SGR backlog are the Track subcomponents (rail, ties, crossings, turnouts, and ballast) which estimate an immediate need of $126.31 million. Rolling stock identifies a backlog of $100.65 million from locomotives and passenger cars undergoing rehabilitation. SCRRA Facilities such as maintenance, administrative, and layover facilities are undergoing improvements and make up $29.04 million of the backlog. Non-revenue MOW equipment and vehicles form a negligible share of the backlog needs at a valuation of $2.44 million.

The Metrolink Rehabilitation Plan has been reevaluated with the updated annual state of good repair maintenance and backlog costs. Inflation, materials, and construction costs reflect present day values and provide the Agency with an accurate total of rehabilitation needs.

3.2 Decision Support Tools and Capital Project Prioritization Approach

3.2.1 Use of Asset Management Support Systems

As noted in Section 3, Metrolink utilizes multiple software packages to support asset management processes, most prominently Trapeze EAM. This system provides a baseline for Metrolink's asset inventory and once updated and implemented by the Agency, will provide support for prioritizing asset investment needs and condition rating information.

Alternatively, the Metrolink Rehabilitation Plan (MRP), is the Agency's most comprehensive decision-support tool in use today. The multi-year rehabilitation planning processes was initiated to improve future- year planning, and to cope with the variable nature of Metrolink's rehabilitation budget. It is common for identified rehabilitation projects to be de-scoped or deferred to future years due to funding limitations.

The planning process uses a bottom-up approach that depends on receiving data from several asset management support systems including Trapeze, RAMS, and the MRP data tables.

The increasing rehabilitation needs since the development of the MRP resulted in integrating the method above into the annual capital budgeting process. Metrolink will be implementing a new SGR/capital projects and capital planning module within Trapeze EAM that will include condition ratings, planning and development of capital projects, risk criteria, and proposed reinvestments. By consolidating existing decision support tools into Trapeze EAM in alignment with the MRP, Trapeze will serve as the central repository for the Agency's assets.

3.3 Forecasted Reinvestment Needs

3.3.1 Funding

As a JPA, the majority of SCRRA funding, including FTA formula funds, is allocated through the five member agencies. Meanwhile, there is continued effort to aggressively seek funding opportunities as they become available to help offset revenue constraints. In addition, SCRRA is communicating the capital rehabilitation requirements with the member agencies to address the current State of Good Repair backlog and future reinvestment needs through the updated Metrolink Rehabilitation Plan and Climate Vulnerability Assessment and Adaptation Plan.

3.3.2 Financially Unconstrained Analysis

For SCRRA's reinvestment needs, the MRP financial models were referenced without cost escalation factors. The resulting unconstrained analysis for the next 10 years is shown in Table 3-1 and indicates a total need of $2.12 billion over this time frame. As of 2022, SCRRA is projecting a backlog of $780.43 million and annual investment of $121.97 million to maintain the backlog at its current levels. A 5-year backlog drawdown scenario projects current backlog needs to be addressed in the next 5 years and annual rehabilitation needs thereafter.

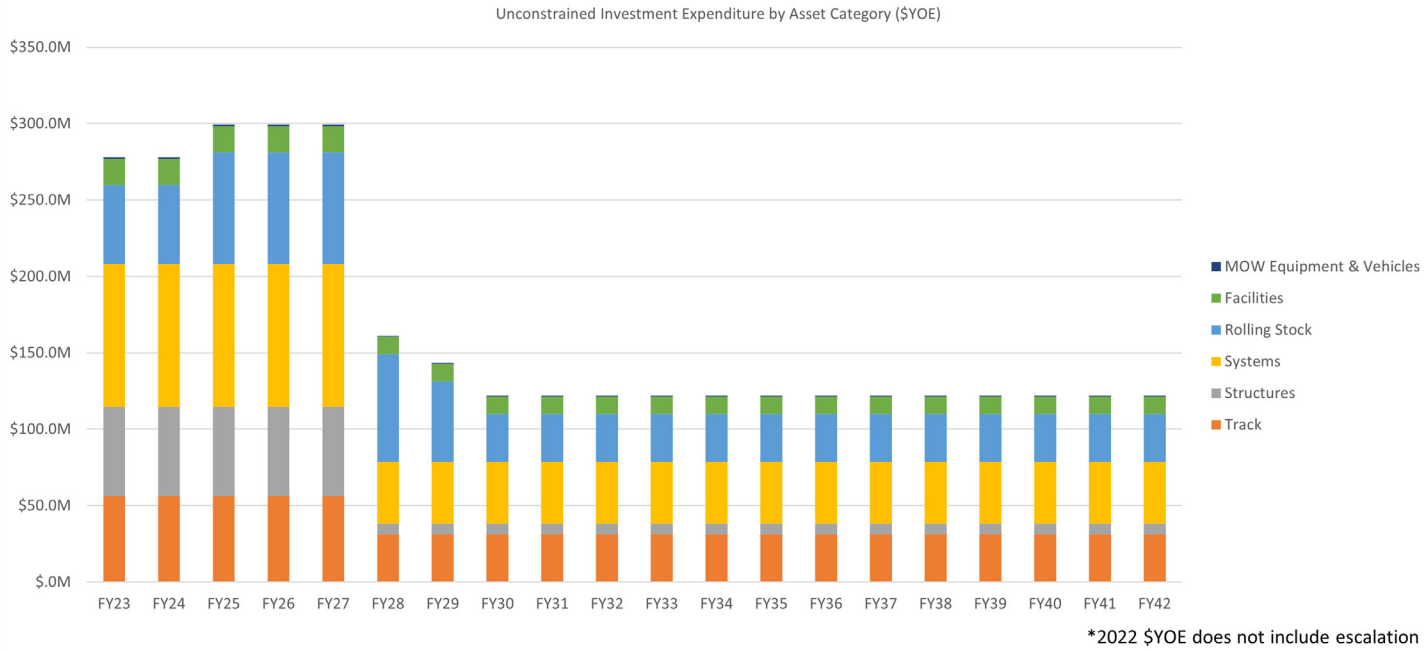
Furthermore, SCRRA is undertaking a special capital project, scheduled to start 2025, for the mid-life overhaul of Hyundai Rotem passenger cars with an estimated cost of $106.96 million.

Table 3-1. Estimated Reinvestment Needs by SCRRA Asset Type in Millions (YOE Dollars)

	Backlog	State of Good Repair												
Asset Category	(One Time Cost)	Annual Cost	Special Projects	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	Total
Rail	$23.90M	$5.94M	$.0M	$10.72M	$10.72M	$10.72M	$10.72M	$10.72M	$5.94M	$5.94M	$5.94M	$5.94M	$5.94M	$83.27M
Ties	$20.63M	$5.08M	$.0M	$9.21M	$9.21M	$9.21M	$9.21M	$9.21M	$5.08M	$5.08M	$5.08M	$5.08M	$5.08M	$71.44M
Crossings	$13.17M	$5.65M	$.0M	$8.28M	$8.28M	$8.28M	$8.28M	$8.28M	$5.65M	$5.65M	$5.65M	$5.65M	$5.65M	$69.67M
Special Trackwork	$58.17M	$8.31M	$.0M	$19.95M	$19.95M	$19.95M	$19.95M	$19.95M	$8.31M	$8.31M	$8.31M	$8.31M	$8.31M	$141.32M
Track Surfacing	$.0M	$1.57M	$.0M	$1.57M	$1.57M	$1.57M	$1.57M	$1.57M	$1.57M	$1.57M	$1.57M	$1.57M	$1.57M	$15.67M
Ballast	$7.58M	$2.95M	$.0M	$4.46M	$4.46M	$4.46M	$4.46M	$4.46M	$2.95M	$2.95M	$2.95M	$2.95M	$2.95M	$37.04M
Slopes and Embankments	$.0M	$.0M	$.0M	$.0M	$.0M	$.0M	$.0M	$.0M	$.0M	$.0M	$.0M	$.0M	$.0M	$.0M
Friction Management	$2.86M	$1.66M	$.0M	$2.24M	$2.24M	$2.24M	$2.24M	$2.24M	$1.66M	$1.66M	$1.66M	$1.66M	$1.66M	$19.51M
Bridges	$162.41M	$1.83M	$.0M	$34.31M	$34.31M	$34.31M	$34.31M	$34.31M	$1.83M	$1.83M	$1.83M	$1.83M	$1.83M	$180.70M
Culverts	$90.89M	$4.20M	$.0M	$22.38M	$22.38M	$22.38M	$22.38M	$22.38M	$4.20M	$4.20M	$4.20M	$4.20M	$4.20M	$132.89M
Tunnels	$3.50M	$1.0M	$.0M	$1.70M	$1.70M	$1.70M	$1.70M	$1.70M	$1.0M	$1.0M	$1.0M	$1.0M	$1.0M	$13.50M
Signal Systems	$143.21M	$17.61M	$.0M	$46.25M	$46.25M	$46.25M	$46.25M	$46.25M	$17.61M	$17.61M	$17.61M	$17.61M	$17.61M	$319.28M
Crossing Systems	$84.49M	$18.15M	$.0M	$35.05M	$35.05M	$35.05M	$35.05M	$35.05M	$18.15M	$18.15M	$18.15M	$18.15M	$18.15M	$265.98M
Communication Systems	$5.47M	$2.06M	$.0M	$3.16M	$3.16M	$3.16M	$3.16M	$3.16M	$2.06M	$2.06M	$2.06M	$2.06M	$2.06M	$26.11M
Communications CIS	$32.01M	$.87M	$.0M	$7.27M	$7.27M	$7.27M	$7.27M	$7.27M	$.87M	$.87M	$.87M	$.87M	$.87M	$40.66M
Centralized Train Control Systems	$.0M	$.55M	$.0M	$.55M	$.55M	$.55M	$.55M	$.55M	$.55M	$.55M	$.55M	$.55M	$.55M	$5.46M
On-Board	$.0M	$1.16M	$.0M	$1.16M	$1.16M	$1.16M	$1.16M	$1.16M	$1.16M	$1.16M	$1.16M	$1.16M	$1.16M	$11.56M
Locomotives	$12.40M	$13.85M	$.0M	$16.33M	$16.33M	$16.33M	$16.33M	$16.33M	$13.85M	$13.85M	$13.85M	$13.85M	$13.85M	$150.90M
Passenger Cars	$88.25M	$17.59M	$106.96M	$35.24M	$35.24M	$56.63M	$56.63M	$56.63M	$56.63M	$38.98M	$17.59M	$17.59M	$17.59M	$388.76M
Maintenance of Way Facilities	$2.89M	$.43M	$.0M	$1.0M	$1.0M	$1.0M	$1.0M	$1.0M	$.43M	$.43M	$.43M	$.43M	$.43M	$7.15M
Maintenance Facilities	$19.64M	$7.03M	$.0M	$10.96M	$10.96M	$10.96M	$10.96M	$10.96M	$7.03M	$7.03M	$7.03M	$7.03M	$7.03M	$89.94M
Dispatch and Operations Facilities	$3.98M	$2.88M	$.0M	$3.68M	$3.68M	$3.68M	$3.68M	$3.68M	$2.88M	$2.88M	$2.88M	$2.88M	$2.88M	$32.78M
Leased Facilities	$1.66M	$.0M	$.0M	$.33M	$.33M	$.33M	$.33M	$.33M	$.0M	$.0M	$.0M	$.0M	$.0M	$1.66M
Layover Yards	$.87M	$1.02M	$.0M	$1.19M	$1.19M	$1.19M	$1.19M	$1.19M	$1.02M	$1.02M	$1.02M	$1.02M	$1.02M	$11.07M
MOW Equipment & Vehicles	$2.44M	$.60M	$.0M	$1.09M	$1.09M	$1.09M	$1.09M	$1.09M	$.60M	$.60M	$.60M	$.60M	$.60M	$8.44M
Total	**$780.43M**	**$121.97M**	**$106.96M**	**$278.06M**	**$278.06M**	**$299.45M**	**$299.45M**	**$299.45M**	**$161.02M**	**$143.37M**	**$121.97M**	**$121.97M**	**$121.97M**	**$2124.78M**

A longer-term analysis, of 20 years, is included here to highlight the needs that SCRRA is facing beyond the 10 years. Over the full 20 years SCRRA's reinvestment needs total $3.34 billion (Figure 3-2).

Figure 3-2. SCRRA 20-Year Unconstrained Needs - By Asset Category.



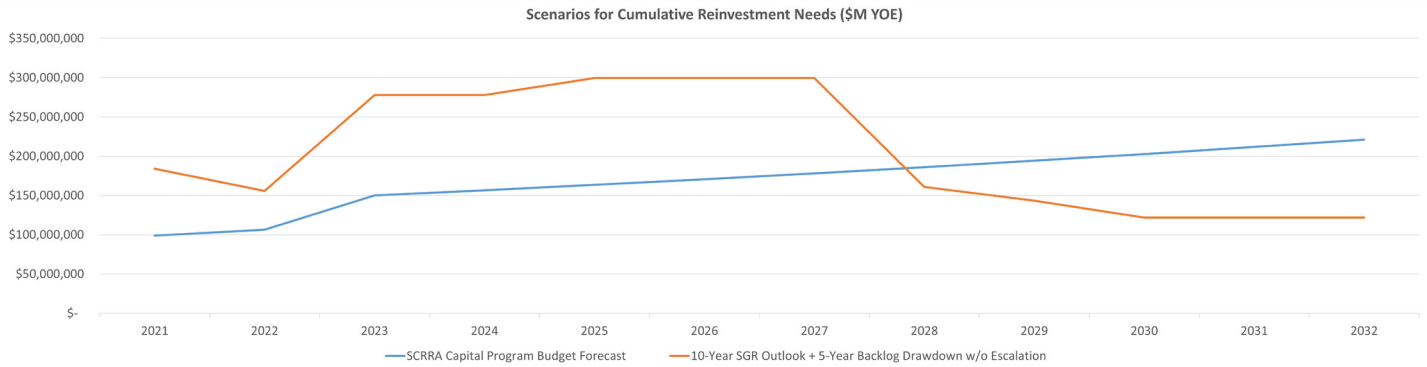
3.3.3 Financially Constrained Analysis

Federal and state grants are the primary funding sources available to SCRRA and they are highly competitive and require thoughtful preparation. Positioning projects for grants requires sufficient time, resources, and support from a widespread coalition of member agencies, county, city governments, and stakeholder. When pursuing grant funding, SCRRA and its member agencies may strategize to prioritize projects based on awarded grants, to reduce local competition and improve success rates in winning grants. Decisions to prioritize and position certain projects for grant funding may be driven by the competitive landscape, annual funding priorities, and SCRRA's ability to secure local matching funds, which most of the identified grants require at varying levels.

Annual budget constraints have led to an increasing size and value of the SGR backlog, the funding constraint decreases the average condition of SCRRA's current assets over time as rehabilitations and replacements are deferred. Figure 3-4 illustrates the resulting funding needs for a 10-year SGR Outlook with a 5-year backlog drawdown.

- To eliminate backlog with a 5-year drawdown by 2028, SCRRA would need an average of approximately $269.25 million annually.

Figure 3-3. Scenarios for Cumulative Reinvestment Needs



3.4 Investment & Project Prioritization

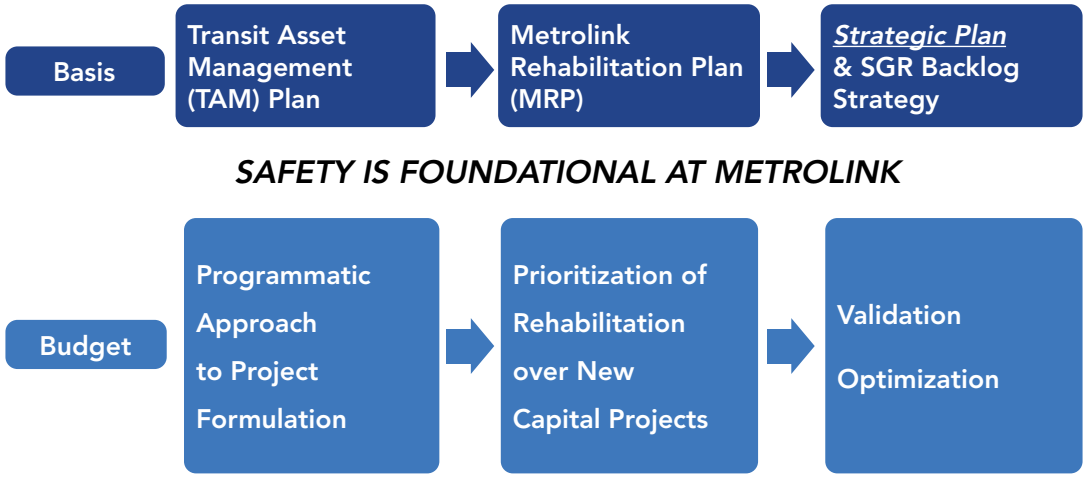
FTA's MAP-21 requirements and best practices both call for the development and implementation of objective methods and processes to identify and prioritize required reinvestment actions. This is to help ensure that limited capital funds are allocated to those investments that best support SCRRA's TAM objectives (including service quality, safety and reliability). SCRRA follows the current practice noted below in Section 3.4.1, however, to complement this Capital Program Budget Approach, the Agency intends to implement a State of Good Repair/Capital Projects module in EAM and leverage asset data such as past performance, condition, criticality, and risk. Combined this information will allow the Agency to develop a risk score and prioritization of capital needs.

3.4.1 Project Prioritization

SCRRA's existing Capital Program Budget attempts to achieve project level prioritization using the approach in Figure 3-4 and provides the following:

- Reflects our Agency's vision and objectives
- Incorporates the Multi-Year Budget Development process

Figure 3-4. SCRRA Capital Program Budget Approach



Programmatic Funding – Funding requests by asset class and subdivision, instead of numerous smaller projects by asset components.

Key Benefits – The MRP recommends funding rehabilitation programs rather than individual projects. The benefits of this recommended approach in budget development include:

- Allows Metrolink to take advantage of economies of scale for procurement purposes and project scope.
- Allows Metrolink to Construction Multiple components of the work under one contract.
- Allows Metrolink to improve project delivery.
- Allows Metrolink to more effectively maximize the capital investments made by Member Agencies.

The benefits of this recommended approach in *project delivery* include:

- Metrolink staff will be better able to make changes to individual projects based on funding constraints.

- During the project delivery phase, staff will be able to adopt to changing field conditions, be more sheltered from price escalation, and be able to provide more efficient and cost-effective delivery.

The benefits of this recommended approach in *fiscal planning* include:

- Metrolink staff will be able to provide projections of future investments needed for the SGR at a macro level.
- Metrolink staff will be able to provide estimated cash flow information at a macro level to assist with multi-year forward planning and fiscal forecast as requested by our Member Agencies.

The method to building the annual capital program includes:

- **Develop Projects.** Develop the specific set of projects that will be evaluated taking care to ensure that they all have been developed using consistent assumptions. To the extent practicable, projects should also be independent i.e., the benefits resulting from a project should be independent of the development of any other project.
- Scope description (goal/purpose statement, objectives, justification, risk discussion, asset condition and system impact).
- Identify and define projects under consideration.
- Explore trade-offs between projects, any categorization of results.
- Optimize to consider factors such as budget scenarios, project timing, dependencies, regional/geographic equity, political constraints, then finalize.

More discussion about the prioritization process follows.

3.4.2 Project Selection and Prioritization Methodology

Optimization considers the "practical realities" associated with developing a list of projects for implementation such as scheduling, interdependencies, project sizing, and equity.

Optimization

After development of an initial projects list, a series of issues are considered prior to selecting a final list of projects for funding. This can be referred to as optimizing a portfolio of projects. Optimization issues often of importance include the following:

- Budget may not be exhausted
- Project dependencies
- Project size
- Equity
- Multi-period scheduling
- Budget sensitivity analysis

A brief discussion of each optimization issue follows.

Budget May Not be Exhausted. Using the project ranking methodology to fund projects until a budget is met may not exhaust all the budget allocated for the program. For example, assume there are five projects being considered with a budget of $10M, and the cost of the projects ranked based on value/cost is as follows $5M, $3M, $3M, $2M, $4M. In this example, project ranks 1 and 2 would be funded with $2M left over: instead, more value could be achieved if the budget was exhausted by funding projects ranked 1, 2, and 4. Thus, when evaluating a ranked list of projects, check projects near the budget cut-off to see if different combinations of projects might provide more value while still remaining at or under the budget constraint.

Project Dependencies. The project ranking methodology assumes that the value derived from each project is independent of whether all other projects on the list are funded. This may not be the case in practice such as when two projects are located close to one another e.g., improvements to an interchange affecting the performance of a nearby passing lane improvement. In such circumstances, projects should be combined to ensure that value resulting from each ranked project is independent of the existence of all other projects.

It may also be that combining two independent projects could result in added value because of synergies such as a combined bridge/pavement project versus conducting the projects separately. Thus, an Agency should evaluate each project ranking list to explore different combinations of projects looking for synergies that can increase the value provided for the dollars spent. Finally, there may be projects that are mutually exclusive i.e., if project A is built, project B cannot be built at the same time or at all. Agencies should examine the list of ranked projects to be sure that all projects are feasible for development during the relevant planning cycle.

Project Size. One common challenge faced in the project ranking process is dealing with projects with vastly different budgets e.g., one project costing $5 million and another costing $500 million. Often it is difficult to create measurement scales for criteria that completely capture the differences between projects of vastly different sizes. At times, the smaller project truly provides more value per dollar spent than the larger project. Other times, however, the larger project may have higher actual value compared to cost, but because of difficulties associated with expressing a measurement scale of sufficient granularity, the smaller project's value/cost is overstated compared to that of the larger project.

Thus, after a project ranking is established, review the ranking and see if the value/cost ranks seem reasonable. If it appears that the ranking does not match staff's intuition either adjust the measurement scales, separate the analysis into tiers or buckets and produce separate rankings for projects of similar sizes, or try the cost / non-cost weighting methodology. If the latter approach is used, then test different types of funding tiers/buckets to identify a funding plan that appears to best meet the Agency's goals.

Equity or Yes/No Considerations. In some evaluations, an Agency may want to achieve equity by geography, income, or other means to ensure that benefits are provided to all state residents in an equitable manner. Equity can be a criterion included as an Other Consideration during the project ranking process, or it can be an adjustment made during optimization. Other criteria with a yes/no measurement scale such as access to regionally important economic centers or intermodal connections can also be addressed during optimization. If one or more criteria are addressed during optimization, an Agency could set minimum funding thresholds for different groupings of projects and optimize value subject to those constraints. That optimization can be done through trial and error, or by using mathematical methods such as integer programming.

Multi-Period Scheduling. Another optimization opportunity exists when scheduling projects over a multi-year time horizon. After developing high-level schedules with dependencies, optimization algorithms can be used to do highest ranked projects first but moving project steps forward and backward in a manner that delivers the most value for a particular time period (e.g., annual or biennial).

Budget Sensitivity Analysis. When evaluating multiple programs with discretionary funding amounts, it is useful to optimize funding levels across programs by testing different funding portfolios. One approach is to combine multiple programs into a single project ranking exercise. Often, however, funding cannot be switched between programs and/or it is difficult to get criteria and measurement scales to align over multiple programs. In those instance, one can compare the value/cost ratios of the last project funded for each program. In theory (assuming the project ranking formula is an exact

representation of value), all programs should be funded at a level where the last projects funded in each program have an equivalent value/cost score. While value/cost scores are just approximations of value, the value/cost scores of the last projects funded will give at least a notional representation of the extent to which funding should be moved from one project to another.

SECTION 4 | TAM IMPLEMENTATION PROGRAM & PROJECT PRIORITIZATION

The SCRRA TAM Plan implementation was initially established from a comprehensive Gap Analysis performed back in 2016, which represented the Agency's foundation for building a sound asset management program. The analysis represented an initial assessment which led to the creation of the first TAM goals, objectives, and policy. To clarify, the gaps which were previously identified in the analysis were not intended to be considered as a pessimistic assessment. Instead, the gaps represented requirements that did not exist prior to the passage of federal legislation and simply recognized as asset management best practices that were emerging over the last several years in the transit industry. SCRRA continues to view the gaps as opportunities to improve our asset management business processes.

4.1 Program Timeframe

The timeframe table below identifies SCRRA's primary activities across key TAM elements with targeted timeframes for implementation (short term, medium, long term).

Table 4-1. TAM Key Elements Timeline

Key Elements	Short Term (0-2 years)	Medium Term (2-4 years)	Long Term (4+ years)
Change Management – Institutionalize Asset Management			
Data Availability – Improve data availability and enhance asset management tools			
Lifecycle Management Plans & Performance Modeling			

4.2 Action Plan

SCRRA's TAM focus has evolved over the past several years as the Agency has matured across several key TAM elements. It is essential to prioritize rehabilitation and replacement projects based on their urgency, potential impacts on operations, and available funding. Metrolink has the following top priorities for each asset class:

Track

- Bring the Aurora system to the property to update the wood tie condition and start a small tie gang to break up clusters noted in the Aurora tie condition reports.
- Get the existing lubricators working as soon as possible, starting with specific subdivision.
- Organize a tie program for several Subdivisions, using a large, high production work team to install wood cross ties.
- Pick turnout locations for renewal and order turnouts to the new standards.
- Start a program of 30 crossing rebuilds.
- Relay old secondhand rails beginning to suffer from fatigue defects.

Structures

- Replace or retrofit backlogged bridges that are considered high priority due to their age, low load rating, and/or poor condition rating.
- Replace or rehabilitate the identified backlog culverts to ensure the continued functionality and safety of the culvert infrastructure.
- Update load ratings assessments for all bridges with outdated information. This action will facilitate informed decision making regarding additional bridge investments.
- Complete a comprehensive condition assessment of the tunnel asset.
- Continue regular maintenance of the bridges that require ongoing attention to preserve their integrity and extend their useful life, delaying the need for costly replacements.
- Maintaining a SGR for culverts less than 75 years old with sufficient capacity.

Systems

- Prioritize the rehabilitation of Communications & Signal (C&S) locations with obsolete equipment, including field equipment and cabling.
- As C&S locations age and become candidates for rehabilitation, add them to a Rehabilitation Priority List to ensure timely and systematic updates.

Rolling Stock

- Capital Improvement Plan: Execute current SGR plans in place following the Metrolink Rail Fleet Management Plan.
- Make continuous updates to the Rail Fleet Management Plan with the latest procurements and lifecycles to plan for the next set of locomotive and coach procurements.
- Increase the amount of consistency of funding for rolling stock rehabilitation, addressing the growing backlog and ensuring a state of good repair.

Facilities

- Prioritize the rehabilitation of Maintenance Facilities (CMF and EMF) with outdated systems, equipment, and infrastructure.
- Address urgent issues over layover yards, such as floodplain risks and limited servicing capabilities, to improve facility resilience and functionality.
- Prioritize upgrades and rehabilitation efforts for dispatch and operation facilities, focusing on essential systems like HVAC, plumbing and electrical systems.
- Address MOW support facilities' issues, including site improvements, equipment upgrades, and facility repairs.
- Complete a detailed risk assessment for select critical facility assets at the CMF and EMF and at facilities critical to systems operations.

While SCRRA will continue to make progress across all activities and action plans noted above as part of the Agency's continuous improvement process, SCRRA has prioritized a series of Agency-wide activities over the next few years. These activities are intended to further advance the Agency's asset management program through improving existing practices and systems, which support the TAM goals and objectives. Each of following activities are organized around three key enablers of asset management: people, processes, and tools.

Along with action items, resources, and associated timeframes that are summarized in Table 4-2 through Table 4-4.

Institutionalize Asset Management

SCRRA will continue to work toward institutionalizing asset management with the Agency to ensure there is a common understanding for how the Agency will manage and track its assets (and the

associated data) and that all asset management activities are coordinated across the Agency. SCRRA has already adopted an asset management policy and staff have a good understanding of asset management principles and benefits.

To further improve the Agency's understanding of asset management, SCRRA will undertake the following action items:

- Develop a formal TAM training and development program: to ensure staff remain informed and engaged. In addition, staff will be encouraged to participate in Agency lead asset management training, attend conferences/webinars, and professional development opportunities to strengthen and develop their knowledge of asset management.
- Improve effectiveness of communication regarding TAM expectations, implementation steps, and progress, and emphasize SGR investment needs to internal and external stakeholders.
- Expand engagement of staff across divisions and functional boundaries to support the change management initiatives for a successful TAM program.
- Ensure TAM best practices and principles are incorporating into procedures and in new staff onboarding.

Table 4-2. Key Activities for TAM Implementation

Key Activities	Action Items	Responsible Individual(s)	Contributors	Timeframe
Change Management – Institutionalize Asset Management				
Establish formal learning and development program	• Identify individuals/divisions that will receive training • Obtain and develop training materials • Administer training	TAM Manager	Asset Managers, Human Resources	2-4 years
Create formal communication and change management approach	• Formalize stakeholder advisory and technical working groups to oversee TAM implementation and define standards and business processes • Develop an overall communication strategy both internally and with the member agencies • Publish recurring TAM Plans and updates to internal and external facing websites	TAM Manager	Asset Managers and support divisions: Finance, Information Technology, Human Resources and Executive Management	1-2 years
Develop TAM succession program to train and groom future leaders	• Develop TAM implementation standard operating procedures • Offer informal shadowing opportunities • Incorporate TAM best practices and principles into procedures and in new staff onboarding	Human Resources/ TAM Manager	Asset Managers, Human Resources	2-4 years

Improve data availability and enhance use of asset management tools

The asset inventory is foundational for asset management since it establishes what the Agency owns (to then understand their condition and the work that needs to be done to maintain desired performance levels). SCRRA asset inventory was previously maintained in several systems. However, the Agency is working on making Trapeze EAM its single source of truth for all rail assets and migrating all data into a single repository.

To maintain and improve its asset management tools, SCRRA will undertake the following action items:

- Create Asset Management/Information Control framework and strategy
- Update business process standard operating procedures (SOPs)

- Consolidate or migrate asset management systems
- Configure modules to increase functionality to meet department requirements
- Further develop dashboards and/or data warehouse for performance modeling
- Provide asset management software training to larger user group

Table 4-3. Key Activities for TAM Implementation

Key Activities	Action Items	Responsible Individual(s)	Contributors	Timeframe
Date Availability – Improve data availability and enhance asset management tools				
Develop Information Control framework and strategy	• Define and document high-level enterprise asset management system requirements • Conduct needs assessment • Conduct fit/gap analysis on system alternatives • Identify and conduct alternative analysis • Work with vendors to demo latest asset management tools • Develop business case to consolidate existing systems or invest in new decision-support tools	TAM Manager	Asset Managers, Operations, Maintenance, Information Technology, Contracts & Procurement, Program Delivery, Finance	1-2 year
Review all business processes and document standard operating procedures for those departments overseeing critical asset types	• Review business processes and document SOP's • Identify gaps and opportunities for improvement • Confirm system/Technical functionality • Determine level of integration	TAM Manager	Asset Managers, Operations, Maintenance, Information Technology	2-4 years
Continue to enhance prominent asset management tools in use today such as Trapeze and migrate others where feasible	• Define scope of work • Coordinate with vendors to define project design • Support software development • Oversee system testing • Coordinate installation and configuration	Information Technology, TAM Manager	Asset Managers, and support divisions	4+ years
Further develop dashboards/data warehouse tools to improve access to asset data	• Assess opportunities to improve use of asset information and performance monitoring • Complete outreach and assessment of key metrics based on department objectives • Develop consensus on what should be monitored • Work with IT to optimize use of Tableau and Business Objects • Coordinate with department to ensure reporting requirements are being met	Information Technology, TAM Manager	Asset Managers, and support divisions	2-4 years

Lifecycle Management Planning & Improve decision making and investment prioritization

SCRRA will strive to develop mature and robust lifecycle management plans for all critical assets containing key content as recommended by FTA. The plans will allow asset managers to make informed decisions for asset investments that consider the benefit and trade-offs associated with capital versus operations and maintenance solutions. The plans will provide clear link to Agency goals and performance expectation.

To develop mature lifecycle management plans SCRRA will undertake the following action items:

- Develop mature and robust lifecycle management plans
- Improve application of asset condition assessment and implement a consistent format
- Develop performance measures reporting to implement predictive maintenance
- Link lifecycles, asset condition and performance data to capital activities

Table 4-4. Key Activities for TAM Implementation

Key Activities	Action Items	Responsible Individual(s)	Contributors	Timeframe
Lifecycle Management Plans & Performance Modeling				
Develop mature and robust lifecycle management plans across all critical asset types to understand the full cost of ownership	• Identify lifecycle activities for each asset class (including their costs and their frequencies). • Incorporate lifecycle activities in a lifecycle management plan for each asset class. • Review and revise as needed to ensure information is current.	Asset Managers	TAM Manager, Operations, Maintenance, Information Technology	2-4 years
Improve application of condition assessment across all critical assets and ensuring use of a consistent format	• Document current condition and reference the asset specific approach to condition assessment. • Develop consistent format such as FTA rating scale. • Document when assets will be inspected and how inspections will be conducted, and condition measured and what actions will be taken based on rating assigned.	Asset Managers	TAM Manager, Operations, Maintenance, Information Technology	2-4 years
Improve performance modeling across all critical assets	• Identify how available data can be used to evaluate how well asset is achieving its level of service. • Track historical data and current data to monitor performance over time and forecast how different funding levels can impact performance in the future.	Asset Managers	TAM Manager, Operations, Maintenance, Information Technology	2-4 years
Link lifecycle management plans, asset condition and performance data to capital planning activities	• Use lifecycle plans to forecast lifecycle costs for planning horizon. • Incorporate condition and performance data. • Prior prioritized list of projects for capital planning.	TAM Manager	TAM Manager, Operations, Maintenance, Information Technology	2-4 years

APPENDIX A

List of FY22, FY23, FY24 Rehabilitation – SGR Projects

FY 2022 Adopted Capital Program - Rehabilitation							
Project #	Type	Subdivision	Condition	Impact	Asset Type	Project Name	Total Requested
2356	Rehab	Valley	Worn	High	Track	VALLEY SUBDIVISION TRACK REHABILITATION	$8,000,000
2357	Rehab	San Gabriel	Worn	High	Track	SAN GABRIEL SUBDIVISION TRACK REHABILITATION	$5,350,000
2358	Rehab	Ventura - LA County	Worn	High	Track	VENTURA (LA) SUBDIVISION TRACK REHABILITATION	$3,000,000
2359	Rehab	Orange	Worn	High	Track	ORANGE SUBDIVISION TRACK REHABILITATION	$6,460,000
2376	Rehab	SB Shortway	Worn	High	Track	SHORT WAY SUBDIVISION TRACK REHABILITATION	$240,000
2377	Rehab	San Jacinto (PVL)	Worn	High	Structures	PERRIS VALLEY SUBDIVISION REHABILITATION - CONSTRUCTION PHASE SERVICES	$1,580,000
2378	Rehab	Ventura - LA/VC	Worn	High	Track	VENTURA (LA/VC) LINE TRACK REHABILITATION	$14,390,000
2380	Rehab	All	Worn	High	Track	SYSTEMWIDE TRACK REHABILITATION	$5,000,000
2381	Rehab	Valley	Worn	High	Structures	VALLEY SUBDIVISION STRUCTURES REHABILITATION	$3,180,000
2382	Rehab	San Gabriel	Worn	High	Structures	SAN GABRIEL SUBDIVISION STRUCTURES REHABILITATION	$2,762,000
2383	Rehab	Ventura - LA/VC	Worn	High	Structures	VENTURA (LA/VC) LINE STRUCTURES REHABILITATION	$6,400,000
2384	Rehab	Orange	Worn	High	Structures	ORANGE SUBDIVISION STRUCTURES REHABILITATION	$2,240,000
2385	Rehab	Ventura - VC County	Worn	High	Structures	VENTURA (VC) SUBDIVISION STRUCTURES REHABILITATION	$4,625,000
2396	Rehab	Valley	Worn	High	Train Control	VALLEY SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$3,250,000
2397	Rehab	San Gabriel	Worn	High	Train Control	SAN GABRIEL SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$4,000,000
2398	Rehab	Ventura - LA County	Worn	High	Train Control	VENTURA (LA) SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$1,390,000
2399	Rehab	Orange	Worn	High	Train Control	ORANGE SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$3,000,000
2400	Rehab	San Jacinto (PVL)	Worn	High	Train Control	PERRIS VALLEY SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$770,000
2401	Rehab	Ventura - VC County	Worn	High	Train Control	VENTURA (VC) SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$1,200,000
2403	Rehab	All	Worn	High	Train Control	SYSTEMWIDE TRAIN CONTROL SYSTEMS REHABILITATION	$5,000,000
2404	Rehab	All	Worn	High	Non-Revenue Fleet	MAINTENANCE-OF-WAY (MOW) VEHICLES & EQUIPMENT - REPLACEMENT & OVERHAUL	$2,650,000
2405	Rehab	All	Worn	High	Facilities	FACILITIES REHABILITATION	$1,000,000
2406	Rehab	All	Worn	High	Rolling Stock	ROLLING STOCK REHABILITATION	$3,000,000
2407	Rehab	Valley	Worn	High	Facilities	LANCASTER CREW BASE REPLACEMENT	$1,946,000
						Total:	**$90,433,000**

FY 2023 Adopted Capital Program - Rehabilitation							
Project #	Type	Subdivision	Condition	Impact	Asset Type	Project Name	Total Requested
2386	Rehab	River Sub - West Bank	Worn	High	Structures	RIVER SUBDIVISION STRUCTURES REHABILITATION - WEST BANK	$6,900,000
2417	Rehab	All	Worn	High	Rolling Stock	BOMBARDIER RAILCAR REBUILD	$30,000,000
2556	Rehab	All	Worn	High	Facilities	FACILITIES REHABILITATION	$5,200,000
2557	Rehab	All	Worn	High	Non-Revenue Fleet	MAINTENANCE-OF-WAY (MOW) VEHICLES & EQUIPMENT - REPLACEMENT & OVERHAUL	$3,510,000
2558	Rehab	All	Worn	High	Train Control	SYSTEMWIDE TRAIN CONTROL SYSTEMS REHABILITATION	$5,000,000
2559	Rehab	All	Worn	High	Track	SYSTEMWIDE TRACK REHABILITATION	$5,000,000
2597	Rehab	All	Worn	High	Rolling Stock	ROLLING STOCK DAMAGE REPAIR	$8,000,000
2598	Rehab	All	Worn	High	Rolling Stock	ROLLING STOCK REHABILITATION	$11,600,000
2617	Rehab	Valley	Worn	High	Track	VALLEY SUBDIVISION TRACK REHABILITATION	$4,000,000
2620	Rehab	Orange	Worn	High	Track	ORANGE SUBDIVISION TRACK REHABILITATION	$6,700,000
2626	Rehab	Orange	Worn	High	Structures	ORANGE SUBDIVISION STRUCTURES REHABILITATION	$2,220,000
2627	Rehab	Valley	Worn	High	Train Control	VALLEY SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$2,500,000
2630	Rehab	Orange	Worn	High	Train Control	ORANGE SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$3,330,000
2631	Rehab	All	Worn	Low	Information Technology	GENERAL INFORMATION TECHNOLOGY EQUIPMENT AND SYSTEM REHABILITATION	$485,000
						Total:	**$94,445,000**

FY 2024 Proposed Capital Program - Rehabilitation							
Project #	Type	Subdivision	Condition	Impact	Asset Type	Project Name	Total Requested
2616	Rehab	All	Worn	High	Non-Revenue Fleet	Electric Vehicles (EV) to replace current vehicles that have reached end of useful life	$250,000
2618	Rehab	San Gabriel	Worn	High	Track	SAN GABRIEL SUBDIVISION TRACK REHABILITATION	$5,700,000
2619	Rehab	Ventura - LA County	Worn	High	Track	VENTURA (LA) SUBDIVISION TRACK REHABILITATION	$3,176,000
2621	Rehab	SB Shortway	Worn	High	Track	SHORT WAY SUBDIVISION TRACK REHABILITATION	$255,000
2622	Rehab	San Jacinto (PVL)	Worn	High	Structures	PERRIS VALLEY SUBDIVISION REHABILITATION - CONSTRUCTION PHASE SERVICES - DEFERRED FROM FY23 BUDGET PROCESS	$5,250,000
2623	Rehab	Valley	Worn	High	Structures	VALLEY SUBDIVISION STRUCTURES REHABILITATION	$3,503,000
2624	Rehab	San Gabriel	Worn	High	Structures	SAN GABRIEL SUBDIVISION STRUCTURES REHABILITATION	$1,296,000
2625	Rehab	Ventura - LA County	Worn	High	Structures	VENTURA (LA) SUBDIVISION STRUCTURES REHABILITATION	$200,000
2628	Rehab	San Gabriel	Worn	High	Train Control	SAN GABRIEL SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$4,275,000
2629	Rehab	Ventura - LA County	Worn	High	Train Control	VENTURA (LA) SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$1,477,000
2656	Rehab	Orange	Worn	High	Track	ORANGE SUBDIVISION TRACK REHABILITATION	$6,301,000
2657	Rehab	Orange	Worn	High	Structures	ORANGE SUBDIVISION STRUCTURES REHABILITATION	$2,114,000
2658	Rehab	Orange	Worn	High	Train Control	ORANGE SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$2,633,000
2659	Rehab	All	Worn	High	Track	SYSTEMWIDE TRACK REHABILITATION	$5,000,000
2660	Rehab	All	Worn	High	Train Control	SYSTEMWIDE TRAIN CONTROL SYSTEMS REHABILITATION	$5,000,000
2661	Rehab	All	Worn	High	Non-Revenue Fleet	VEHICLES AND MAINTENANCE-OF-WAY (MOW) EQUIPMENT - REPLACEMENT & OVERHAUL	$2,820,000
2663	Rehab	All	Worn	High	Rolling Stock	Rotem HVAC Overhaul/Rebuild	$3,650,000
2664	Rehab	All	Worn	High	Rolling Stock	BOMBARDIER RAILCAR REBUILD	$35,000,000
2667	Rehab	Valley	Worn	High	Track	VALLEY SUBDIVISION TRACK REHABILITATION	$8,595,000
2668	Rehab	Ventura - VC County	Worn	High	Track	VENTURA (VC) SUBDIVISION TRACK REHABILITATION	$1,866,000
2669	Rehab	Ventura - VC County	Worn	High	Structures	VENTURA (VC) SUBDIVISION STRUCTURES REHABILITATION	$856,000
2670	Rehab	Ventura - VC County	Worn	High	Train Control	VENTURA (VC) SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$992,000
2671	Rehab	Valley	Worn	High	Train Control	VALLEY SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$4,880,000
2676	Rehab	River	Worn	High	Track	RIVER SUBDIVISION TRACK REHABILITATION	$2,000,000
2677	Rehab	River	Worn	High	Train Control	RIVER SUBDIVISION TRAIN CONTROL SYSTEMS REHABILITATION	$2,100,000
2682	Rehab	All	Worn	High	Facilities	CMF Facility Switch Gear and Fire Alarm panel	$1,300,000
2685	Rehab	All	Worn	High	Facilities	MOC Restroom Renovation	$900,000
2692	Rehab	All	Worn	High	Facilities	LAUS main water line replacement	$250,000

FY 2024 Proposed Capital Program - Rehabilitation							
2693	Rehab	All	Worn	High	Facilities	Storm Water Oil Separator replacement	$1,000,000
2702	Rehab	All	Worn	High	Information Technology	Rehab of Firewalls at 2 Locations	$256,000
2742	Rehab	All	Worn	High	Rolling Stock	F125 Loco "Intermediate" Engine Overhaul	$6,435,000
2743	Rehab	All	Worn	High	Rolling Stock	LDVR & Camera Replacement	$1,700,000
2744	Rehab	All	Worn	High	Rolling Stock	MP36 Loco Overhaul	$3,600,000
2802	Rehab	All	Worn	Low	Right of Way	Metrolink CAM Expenses for Fiscal 2024	$1,675,000
2803	Rehab	Ventura - VC County	Worn	High	Train Control	Spring Road Signal Improvement	$950,000
2804	Rehab	Ventura - VC County	Worn	High	Structures	Arroyo Simi Bridges	$1,000,000
2805	Rehab	Ventura - VC County	Worn	High	Train Control	VCTC Signal Rehab	$1,550,000
						Total:	**$129,805,000**

APPENDIX B

Asset Inventory and Condition Assessment

Table B-1. Rolling Stock Systems and Component Service Cycles

Approximate Service Cycle	Systems & Components		Maintenance Activity
4 Years	HVAC	AC Units	Overhaul
5 Years	Door Systems	Door Guides	Replace
	HVAC	Protective Heaters	Evaluate
	Interior	LLEPM Decals	Replace
6 Years	Cab Equipment	Cab Signal	Replace
	Lighting	Light Shades	Replace
	Truck/Suspension	Brake Disks	Replace
		Wheel Axle Assembly	Overhaul
8 Years	Cab Equipment	Windshield Wiper	Overhaul
		Master Controller	Overhaul
	Electrical	Battery Set	Replace
		LVPS	Overhaul
	HVAC	Contractors	Rebuild
		Regulators	Overhaul
	Toilet	Retention Tank	Inspect
		Hopper	Overhaul/Replace
		Actuator Valve	Overhaul
		Vacuum Breaker	Replace
10 Years	Cab Equipment	Event Recorder	Replace
	Door Systems	CHMM & Battery	Replace
		Door Seals (Sensitive Edge)	Replace
12 Years	Coupler	Coupler	Overhaul
		Draft Gear	Overhaul
		Coupler Carrier	Replace
	Door Systems	Operator	Rebuild
		Limit Switches & Solenoids	Replace
	Electrical	Trainline Jumper Receptacles	Replace
		Decelostat	Overhaul
	Interior	Windows	Replace
	Lighting	Ballast & Sockets	Replace
	Trucks/Suspensions	Anchor Rods & Bushings	Overhaul
		Dampers	Replace
		Air Bags	Replace
		Center Pin	Replace
		Truck Frame	Overhaul
16 Years	Floor	Floor Covering	Replace
	Interior	Passenger Seats	Replace
As Needed	Floor		Replace

Table B-2. Locomotive Fleet Summary

Builder	Model	Built	Engine	Active/ Pending	Contingency	Retired	Road #	HEP Type	HEP (KW)	Disposition	Contract
Active Locomotives											
EMD	+F40	1985	16-cylindar EMD 645			1	800	Direct Drive	800	Retired 2019	Amtrak MOU
EMD	F59PH	1992-93	12-cylindar EMD 710		1	14	853, 854, 857-860, 862-867, 869, 871, 872	Caterpillar 3406	600	Retired 2018-2019 except #866, which remains in contingency fleet	R60-CR-002
EMD	F59PHR	2009	12-cylindar EMD 710 (T2)	5	2		851, 852, 856, 861, 868, 870, 873	Caterpillar C27 Diesel	600	Repowered w/ EPA Tier 2 compliant 710 diesel engines, new electrical cabinets, EM2000 microprocessor control, AESS. Assigned to contingency fleet.	SP247-07
EMD	F59PHI	1995	12-cylindar EMD 710			8	874-881	Caterpillar C27Q	600	Retired 2018-2020	MOU0140
EMD	F59PHI	1998	12-cylindar EMD 710			2	882-883	Caterpillar C27Q or 3406	600	Retired 2019-2020	Phillip-Morris
EMD	F59PHI	2001	12-cylindar EMD 710			4	884-887	Caterpillar 3412	600	Retired 2020	EP 102
MPI	MP36PH-3C	2008	16-cylindar EMD 645 (T2)	15			888-902	Caterpillar C27	600	In service; fitted w/ EPA Tier 2 compliant 16-645 diesel engines, Q-Tron microprocessor control, AESS	EP 161-06
EMD	F59PH	1988	12-cylindar EMD 710		3		18520, 18522, 18533			Leased	LE 114-16
EMD	F125	2015-16	20-cylindar Caterpillar C175 (T4)	40			903-942	Inverter	600	1 unit pending/ due for delivery by Summer 2021	EP 181-13
Total Active / Pending and Contingency Locomotives				**60**	**6**						

*Table established based on data from the Metrolink Fleet Management Plan 2020-2040

Table B-3. SCRRA Railcar Passenger Fleet Summary

Builder	Model	Built	Type	Active	Stored	Road #	Seats	Disposition	Contract
BTNA	Sentinal - Generation 1	1992 - 93	Trailer Car	60	0	101 - 163	149	24 cars re-configured to accommodate bicycles w/ slight reduction in seating; all stored cars need O/H before re-use. Active Car Cars in test trains only. 1 car is out of service - wrecked.	EP R60-CR-001
			Cab Control Car (used as trailers)	22	6	601 - 631	142	Total of 7 still in Metrolink's fleet, Active Cab Cars in test trains only.	
BTNA	Sentinal - Generation 2	1997 - 98	Trailer Car	0	2	166, 168	140		PO150
			Cab Control Car (used as trailers)	3	2	632 - 637	135		
BTNA	Sentinal - Generation 3	2002	Trailer Car	26	0	183 - 210	141	1 car out of service - wrecked.	EP100
Hyundai - Rotem	Guardian	2011 - 12	Trailer Car	80	0	211 - 290	132	All consists run w/ Guardian cab cars and Guardian cab cars or trailers against locomotive; 5 cabs & 3 trailers out of service - wrecked.	EP 142-06
			Cab Control Car	57	0	638 - 695	121		
Total Passenger Railcars by Type			**Trailer Car**	**166**	**2**				
			Cab Control Car (used as trailers)	**25**	**8**				
			Cab Control Car	**57**	**0**				
Total Passenger Railcars Fleet				**248**	**10**				
				258					

*Table established based on data from the Metrolink Fleet Management Plan 2020-2040

Table B-4. SCRRA Facilities Condition Assessment from NTD Report (2021)

Name	Street	City	Zip	Rating	Est. Date of Condition Assessment	Year Built or Reconstructed as New
Central Maintenance Facility	1555 N San Fernando Road	Los Angeles	90065	3	6/30/2020	1992
Eastern Maintenance Facility	1945 Bordwell Ave	Colton	92313	4	6/30/2020	2010
Metrolink Operations Center (MOC)	2558 Supply St.	Pomona	91767	3	6/30/2020	1996
Dispatch Operations Center (DOC)	2704 N Garey Ave.	Pomona	91767	4	6/30/2020	2014
Melbourne	2703 Melbourne Ave.	Pomona	91767	3	6/30/2020	2010
Maintenance of Way (MOW) Santa Fe Depot	2701 N Garey Ave.	Pomona	91767	2	6/30/2020	1992
Bauchet Engineering	413 E Bauchet St.	Los Angeles	90012	3	6/30/2020	1992
Lang Yard	13903 Lang Station Rd.	Canyon Country	91387	3	6/30/2020	2008
Marine Way	6894 Marine Way	Irvine	92618	3	6/30/2020	2014
Lancaster Layover Yard	44812 N. Sierra Hwy	Lancaster	93534	2	6/30/2020	1992
Keller Layover Yard	720 Keller St.	Los Angeles	90012	4	6/30/2020	2011
Moorpark Layover Yard	300 High St.	Moorpark	93201	1	6/30/2020	1992
Ventura Layover Yard	6175 Ventura Blvd.	Ventura	93003	3	6/30/2020	2002
Perris Valley Yard	1304 Case Road	Perris	92570	4	6/30/2020	2016
Riverside Layover Yard	3771 Commerce Street	Riverside	92507	4	6/30/2020	1991
Dayton Yard	533 N. San Fernando Road	Los Angeles	90065	N/A	N/A	1992

Table B-5. Metrolink Structures Asset Inventory by Subdivision

SCRRA Subdivision	Number of Bridges (Active)	Number of Culverts	Number of Tunnels
San Gabriel	54	136	-
Valley	57	219	3
Ventura	44	71	3
River	11	7	-
Orange	51	122	-
Olive	4	14	-
Shortway	9	4	-
Montalvo	1	5	-
Pasadena	9	57	-
Perris Valley	2	57	-
Rialto	1	-	-
Riverside	2	-	-
Redlands	6	28	-
Total	**251**	**720**	**6**

Table B-6. SCRRA Track Miles and Crossing Inventory by Subdivision		
SCRRA Subdivision	Track Miles	# Crossings
San Gabriel	87.55	119
Shortway	1.90	2
River	32.83	3
Valley	98.46	66
Ventura	52.20	37
Montalvo	1.36	6
Olive	6.66	11
Orange	78.11	48
Perris Valley	21.37	19
Pasadena	13.66	31
Rialto	2.34	11
Riverside	2	-
Redlands	6	-
Metrolink Maintained Track	**396.42**	**353**

Table B-7. SCRRA Tie Population		
Tie Type	Tie Population	% of Total
Wood	712,700	59.9%
Concrete	404,000	33.9%
Highway Grade Crossings	30,200	2.5%
Special Trackwork	42,600	3.6%
Bridge Ties	760	0.1%
Total Tie Population	**1,190,260**	**100.0%**

APPENDIX C

Glossary of Terms

Asset Management – A strategic and systematic process through which an organization procures, operates, maintains, rehabilitates, and replaces transit assets over their lifecycle to manage their performance, risks, and costs to provide safe, cost-effective, reliable service to current and future customers.

Capital Asset – Includes equipment, rolling stock, infrastructure, and facilities for use in public transportation, owned or leased by the transit provider. The Federal Transit Administration typically considers five main categories for capital assets: Vehicles, Systems, Guideway Elements, Facilities and Stations.

Capital Asset Inventory – A register of an Agency's assets and information about those assets. The inventory can be at multiple levels of granularity depending on purpose.

Capital Expenditure – The expenses related to the purchase of equipment. Capital expenses do not include operating expenses that are eligible to use capital funds.

Condition Assessment – The process of inspecting the asset to collect data that is used to document and measure condition and performance. Condition assessment can also be carried out through modeling.

Lifecycle Management Planning – Enables agencies to make better investment decisions across the lifecycle using management processes and data specific to each asset as a basis for predicting remaining useful life (including age, condition, historic performance, and level of usage). Transit asset management involves processes for managing and maximizing the performance of an asset while minimizing its costs throughout the course of its lifecycle

ISO 55000 – A set of standards for asset management developed by the International Organization for Standardization (ISO).

Moving Ahead for Progress in the 21st Century Act (MAP-21) – A funding and authorization bill for federal surface transportation. Signed into law in July 2012, Section 20019 requires transit agencies to development of a Transit Asset Management Plan and to implement a Transit Asset Management System.

Operating Expenses – The expenses associated with the operation of the transit Agency

State of Good Repair (SGR) – An objective standard for measuring the condition of capital assets, including equipment, rolling stock, infrastructure, and facilities that are maintained in a safe, reliable, and efficient condition.

Technical Working Group (TWG) – Working level technical body that will include staff with responsibility for managing specific assets or working with TAM related processes.

Transit Asset Management Plan (TAM Plan or TAMP) – A plan developed by an Agency that includes, at a minimum, discussion of current capital asset inventories and condition assessments, decision support project prioritization, and State of Good Repair performance.

Transit Economic Requirements Model – A decision support tool developed by the Federal Transit Administration to estimate future transit Agency needs, backlog impacts and asset conditions.

APPENDIX D

List of Key Abbreviations

CEO	Chief Executive Officer
CFO	Chief Financial Officer
COO	Chief Operating Officer
CTC	Centralized Traffic Control
EAM	Enterprise Asset Management system
ED	Executive Director
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IAM	Institute of Asset Management
JPA	Joint Powers Authority
LCM	Life Cycle Management
MAP-21	Moving Ahead for Progress in the 21st Century Act
METRO	Los Angeles County Metropolitan Transportation Authority
MRP	Metrolink Rehabilitation Plan
NTD	Federal Transit Administration National Transit Database
OCTA	Orange County Transportation Authority
OTP	On Time Performance
PM	Predictive/Preventative Maintenance
PTC	Positive Train Control
RCTC	Riverside County Transportation Commission
ROW	Right of Way
SBCTA	San Bernardino County Transportation Authority
SCRRA	Southern California Regional Rail Authority
SGR	State of Good Repair
TAM Plan	Transit Asset Management Plan
TASI	TransitAmerica Services, Inc.
TERM	Transit Economic Requirements Model
TWG	Technical Working Group
USDOT	United States Department of Transportation
VCTC	Ventura County Transportation Commission
YOE	Year of Expenditure