Transit Asset Management Plan
Chicago Transit Authority
Q3 2021
## Version History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Issue Date</th>
<th>Remarks</th>
<th>Prepared By</th>
</tr>
</thead>
<tbody>
<tr>
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<td>June 22, 2017</td>
<td>Prepared and delivered by WSP under contract C14FI101529369</td>
<td>WSP: S. Cohen, J.P. O’Har, T. Goodyer, C. Roberts</td>
</tr>
<tr>
<td>1.1</td>
<td>October 1, 2018</td>
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<td>CTA: D. Johnson, N. Ayub, A. Makalinao</td>
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<td>CTA: D. Johnson, N. Ayub, A. Makalinao</td>
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<td>CTA: D. Johnson, A. Nimmo</td>
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Overview

Executive Summary

The Transit Asset Management (TAM) Plan provides an organization-wide view of the work necessary for the CTA to deliver transit services across the City of Chicago and 35 suburbs. The TAM plan covers a 5-year period, concurrent with CTA’s 5-year Capital Improvement program.

TAM Plan Purpose

- Provide an overview of CTA’s asset inventory
- Describe CTA’s capital investment prioritization
- Establish CTA’s strategy for TAM
- Comply with Federal TAM requirements
- Document maintenance and replacement approaches

TAM Organization

- The CTA president as Accountable Executive oversees the following:
  - Accountable Executive
  - Core Asset Management Functions
    - Maintenance
    - Specifications & Standards
    - Major Capital Projects
    - EAM Systems
  - Asset Management Policy Functions
    - Resource Allocation & Controls
    - Analysis & Program Support
    - Long-Range Planning
    - Safety & Hazard Management

Capital Investment

CTA deploys several tools to guide its 5-Year Capital Improvement Program:

- $675M
- $675M
- $445M
- $164M
- $847M

The policy specifies that the TAM plan will identify key departmental roles and responsibilities, be made readily available to all CTA employees, and will set employee and management expectations.

The Capital Improvement Program’s 5-year $3.4 billion budget still leaves an unfunded gap of over $1.6 billion in other critical needs.
TAM Implementation Strategy
The goal of the TAM team is to improve the availability and quality of information for asset owners and policy-makers to optimize the allocation of maintenance and capital investment resources. CTA’s current key TAM objectives are as follows:

Transit Asset Management Framework
- Incorporating Comms/IT
- Developing Data Standards
- Improving TAM Comms Channels
- Broadening Asset Condition Rating Process

Enterprise Asset Management Systems
- Completing Infor EAM Migration
- Expanding Deployment of Mobile Device EAM Data Entry
- Populating Key Asset Attributes in Infor
- Developing Tools and Dashboards

Capital Investment Decision Support
- Capital Needs Solicitation Advancements
- Continued Development of Modeling and Analysis Tools

Ongoing TAM Initiatives

Federal Reporting Requirements
The TAM team reports asset data to the National Transit Database annually and dynamically maintains a TAM Plan.

Data quality Improvement and management
We are currently in the process of migrating all asset attributes to Infor to create a centralized data framework for the CTA.

TAM Integration into maintenance activities
We are working closely with other CTA departments to integrate TAM condition ratings and data into daily business practices.
Overview
State of Assets 2021

34% of all CTA assets are overdue for replacement or rehab

Percentage of Assets in Poor Condition
INTRODUCTION

2.1 CTA BACKGROUND

The Chicago Transit Authority (CTA) operates the second largest public transportation system in the United States, covering the City of Chicago and 35 surrounding suburbs. The agency provides 83% of public transit trips in the six-county Chicago region, and its eight rail lines and 130 bus routes carry passengers on over 1.6 million average daily trips.

The CTA is an independent governmental organization created by Illinois legislation in 1945, with four members of the Chicago Transit Board appointed by the Mayor of Chicago and three by the Governor of Illinois. CTA began operations in 1947 after acquiring the assets of the Chicago Rapid Transit Company and the Chicago Surface Lines. In 1952, CTA became the sole operator of Chicago transit when it purchased the Chicago Motor Coach system.

Many of the assets in service today pre-date the founding of the organization, with significant portions of the rail system and several facilities dating to the late-1800s. The age of many assets from these legacy systems requires extra care to maintain a consistent state of good repair.

2.2 BACKGROUND ON TRANSIT ASSET MANAGEMENT (TAM)

2.2.1 WHAT IS TAM?

The Federal Transit Administration (FTA) defines Transit Asset Management (TAM) as a business model that prioritizes resources and investments based on asset conditions to provide safe, reliable, and cost-effective public transportation. TAM has taken on new importance in the U.S. transit industry, with large transit agencies nationwide grappling with limited funding to address an overwhelming backlog of deferred capital investment in an aging asset base.

Prior to its application to transit agencies, Asset Management evolved as set of international practices defined by standards such as PAS 55 and ISO 55000:2014. These standards describe an integrated multi-disciplinary approach for organizations to manage assets across their lifecycle.

2.2.2 THE TRANSIT ASSET MANAGEMENT FINAL RULE

In July 2012, the U.S. Government enacted the Moving Ahead for Progress in the 21st Century (MAP-21) Act, a funding and authorization bill that established specific new asset management requirements on U.S. transit operators. In July 2016, the FTA published the
Transit Asset Management (TAM) Final Rule\(^1\), detailing the exact products, processes, submittals, and associated deadlines to comply with the requirements of MAP-21. These included the development of a Transit Asset Management Plan (TAMP). Section 2.4 lists the requirements of FTA’s TAM Final Rule and indicates the alignment of this document with the requirements.

2.3 DOCUMENT SCOPE AND OBJECTIVES

2.3.1 TAM PLAN OBJECTIVES

The purpose of this plan is to:

- Provide an overview of CTA’s transit asset inventory – including the nature, extent, age, and condition of CTA’s physical assets used to deliver transit service;
- Establish and document CTA’s framework and approach to Transit Asset Management;
- Document the maintenance and replacement approaches used by CTA asset owners;
- Describe CTA’s capital investment prioritization by detailing its decision-support processes and its adopted 5-year Capital Improvement Program (CIP); and
- Comply with Federal TAM Plan Requirements.

2.3.2 PLAN ORGANIZATION

The TAM Plan is organized as a Main Document with several supporting Appendices. The Main Document addresses CTA-wide subject matter, while each Appendix provides greater detail for a particular class of assets. The electronic document contains internal hyperlinks to sections, tables, and figures, as well as footnote references to external sources where applicable.

2.3.3 PLAN HORIZON AND UPDATE CYCLE

The TAM Plan covers a 5-Year period, concurrent with CTA’s 5-Year Capital Improvement Program. CTA’s TAM Plan is a living document that will be updated periodically to reflect major changes in asset conditions, capital investment plans, maintenance programs, and/or improved data accuracy. It is anticipated that the main TAM Plan document will be reviewed and updated on an annual basis, with the Appendices by asset class updated on an as-needed basis.

2.3.4 RELATIONSHIP TO OTHER DOCUMENTS

Portions of the TAM Plan summarize information from a variety of related documents, including:

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The TAM Plan does not supersede these; the latest revisions of the above documents are to be considered the official documents of record for their respective subject matter.
2.4 TAM FINAL RULE CROSSWALK

Under 625 of Title 49 Code of Federal Regulations, the FTA has introduced specific compliance requirements for Transit Asset Management, including a list of required TAM Plan elements. In this document, sections addressing requirements from the Final Rule are prefaced with a callout box with the relevant citation and text from the Final Rule. For example:

625.25 (b) A TAM Plan must include (1) An inventory of the number and type of capital assets.

For reference, all TAM Plan requirements of the TAM Final Rule are summarized in the table below and cross referenced to the complying sections in this TAM Plan.

<table>
<thead>
<tr>
<th>Ref#</th>
<th>49 CFR PART 625</th>
<th>TAM PLAN SECTION</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>625.25 (b) A TAM Plan must include (1) An inventory of the number and type of capital assets.</td>
<td>4.1</td>
</tr>
<tr>
<td>2</td>
<td>(2) A condition assessment of those inventoried assets for which a provider has direct capital responsibility</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>(3) A description of analytical processes or decision-support tools that a provider uses to estimate capital investment needs over time and develop its investment prioritization.</td>
<td>6.2</td>
</tr>
<tr>
<td>4</td>
<td>(4) A provider’s project-based prioritization of investments.</td>
<td>6.3</td>
</tr>
<tr>
<td>5</td>
<td>(5) A provider’s TAM and SGR policy;</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>(6) A provider’s TAM plan implementation strategy;</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>(7) A description of key TAM activities that a provider intends to engage in over the TAM plan horizon period;</td>
<td>6.3, 7.2, and Appendices A-F</td>
</tr>
<tr>
<td>8</td>
<td>(8) A summary or list of the resources, including personnel, that a provider needs to develop and carry out the TAM plan; and</td>
<td>5, 6.3, 7, and Appendices A-F</td>
</tr>
<tr>
<td>9</td>
<td>(9) An outline of how a provider will monitor, update, and evaluate, as needed, its TAM plan and related business practices, to ensure the continuous improvement of its TAM practices.</td>
<td>7</td>
</tr>
</tbody>
</table>
ASSET MANAGEMENT POLICY

625.25 (b) A TAM Plan must include (5) A provider’s TAM and SGR policy;

CTA’s TAM and SGR Policy was issued via Executive Order effective October 1, 2018.

Purpose
The purpose of this Executive Order is to reaffirm the Chicago Transit Authority’s (CTA) commitment to maintain its system in a State of Good Repair (SGR) and to comply with federal laws and regulations. The guiding principles and objectives stated in this policy will inform specific plans, strategies, and projects to advance Transit Asset Management (TAM).

Asset Management Program
CTA will develop and maintain a Transit Asset Management Plan (TAMP) that will identify key departmental roles, responsibilities, and activities in support of the overall Asset Management Program. The TAMP will describe the current inventory and condition of CTA’s assets, and identify strategies and plans to maintain and/or improve the State of Good Repair. The TAMP and associated materials will be made readily available to all CTA employees, and will be reviewed and updated periodically to ensure relevance and continuous improvement.

Asset Information & Control
Accurate information and auditable processes are essential to ensure accountability and support management decision-making. To enhance asset information and control, CTA commits to maintain its inventory of assets and document work performed on those assets in its Enterprise Asset Management (EAM) systems. Additionally, all CTA employees will adhere to existing Administrative Procedures for Property Accounting concerning the tagging, tracking, and transfer of property and supplies.

Asset Lifecycle Management
CTA aims for its assets to deliver maximum in-service reliability at the lowest possible long-term costs. CTA will document its maintenance strategies for revenue vehicles, infrastructure, and facilities in appropriate Maintenance Plans, which will describe methods used to proactively manage asset conditions through periodic inspections or assessments, preventive maintenance, predictive maintenance, or similar (as applicable). CTA will apply maintenance practices consistent with industry standards and CTA experience. Lifecycle cost and maintainability will be considered in the design of all major projects.

Asset Investment Prioritization
CTA will maintain an ongoing system-wide listing of known capital investment needs, including projects needed to achieve or maintain a state of good repair, as well as those to deliver important system enhancements. CTA will prioritize the inclusion of these capital investment needs in its 5-Year Capital Improvement Plan (CIP) on the basis of projected impacts to the following:

- Primary Factors: Safety & Security, Customer Service & Accessibility, and Operations & Maintenance
- Other Key Considerations: Risk avoidance, regulatory compliance, constructability & staging, opportunities for innovation, and community impacts

What is Asset Management?
Transit Asset Management is a business model that prioritizes resources based on asset conditions to provide safe, reliable, and cost-effective public transportation.

What is considered an “asset”?
Assets covered by this policy include rolling stock, facilities, equipment worth >$50,000, and infrastructure. Note that the definition of ‘asset’ for Property Accounting and tagging purposes (APs 1522 & 1523) is more expansive than this and includes items worth >$5,000.

How will this document be used?
This Policy Statement outlines guiding principles and objectives, and provides sponsorship to specific plans, strategies, and projects to achieve them.

Who is responsible for adhering to this Policy?
It is the responsibility of all CTA employees involved in the maintenance, operation, and replacement of CTA assets—from upper management to front-line employees—to support the commitments and goals established by this Policy.
A summary of CTA’s asset portfolio is provided in Table 1 below. Greater detail on the inventory by asset class is provided in the corresponding Appendices. The inventory data summarized here are updated to roughly January 2021, based on data pulls from CTA’s Asset Management Systems, Capital Asset Inventory/Backlog database, with input and validation from CTA subject matter experts.

### Table 1: CTA Current Asset Portfolio

<table>
<thead>
<tr>
<th>ASSET CLASS</th>
<th>INVENTORY OF ASSET TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buses</strong></td>
<td>2010 Buses (including 154 in long-term hold)</td>
</tr>
<tr>
<td></td>
<td>6 Series 600, Proterra, 40’ Electric</td>
</tr>
<tr>
<td></td>
<td>2 Series 700, New Flyer, 40’ Electric</td>
</tr>
<tr>
<td></td>
<td>1030 Series 1000, New Flyer, 40’ Diesel (200 leased)</td>
</tr>
<tr>
<td></td>
<td>208 Series 4000, New Flyer, 60’ Hybrid (all leased)</td>
</tr>
<tr>
<td></td>
<td>100 Series 4300, New Flyer, 60’ Hybrid/Diesel Mix</td>
</tr>
<tr>
<td></td>
<td>214 Series 6400, Nova, 40’ Diesel</td>
</tr>
<tr>
<td></td>
<td>450 Series 7900, Nova, 40’ Diesel</td>
</tr>
<tr>
<td><strong>Rail Cars</strong></td>
<td>1483 Rail Cars (including 31 in long-term hold)</td>
</tr>
<tr>
<td></td>
<td>502 Series 2600, Budd</td>
</tr>
<tr>
<td></td>
<td>257 Series 3200, Morrison-Knudsen</td>
</tr>
<tr>
<td></td>
<td>714 Series 5000, Bombardier</td>
</tr>
<tr>
<td></td>
<td>10 Series 7000, CRRC</td>
</tr>
<tr>
<td><strong>Non-revenue vehicles and Equipment</strong></td>
<td>802 Rubber Tire Vehicles</td>
</tr>
<tr>
<td></td>
<td>635 Heavy Trucks</td>
</tr>
<tr>
<td></td>
<td>66 Automobiles</td>
</tr>
<tr>
<td></td>
<td>101 Trailers</td>
</tr>
<tr>
<td></td>
<td>104 Pieces of Steel-Wheel Work Equipment</td>
</tr>
<tr>
<td></td>
<td>18 Flat Cars</td>
</tr>
<tr>
<td></td>
<td>9 Ballast Regulators</td>
</tr>
<tr>
<td></td>
<td>8 Tie Cranes</td>
</tr>
<tr>
<td></td>
<td>4 Ballast Cars</td>
</tr>
<tr>
<td></td>
<td>5 Motor Cars</td>
</tr>
<tr>
<td></td>
<td>4 Trackmobile Shuttle-Wagons</td>
</tr>
<tr>
<td></td>
<td>24 Work Motor Cars (retired 2400 series rail cars)</td>
</tr>
<tr>
<td></td>
<td>32 Miscellaneous Vehicles/Equipment</td>
</tr>
<tr>
<td><strong>Administrative and Maintenance Facilities</strong></td>
<td>6 Bus Garages</td>
</tr>
<tr>
<td></td>
<td>1 Heavy Maintenance Bus Shop</td>
</tr>
<tr>
<td></td>
<td>10 Rail Car Maintenance Terminal Shops</td>
</tr>
<tr>
<td></td>
<td>1 Heavy Maintenance Rail Shop</td>
</tr>
<tr>
<td></td>
<td>107 Bus Turnarounds</td>
</tr>
<tr>
<td></td>
<td>2 Warehouses</td>
</tr>
<tr>
<td></td>
<td>Central Administration Building (headquarters)</td>
</tr>
<tr>
<td></td>
<td>Control Center</td>
</tr>
<tr>
<td></td>
<td>West Shop</td>
</tr>
<tr>
<td></td>
<td>Beverly Garage</td>
</tr>
<tr>
<td></td>
<td>69 ancillary facilities, inc. power substations</td>
</tr>
</tbody>
</table>
### Asset Class: Inventory of Asset Types

| **Passenger Stations + Parking** | 145 Stations:  
| | 10 At-Grade Stations  
| | 25 At-Grade Median Stations  
| | 21 Subway Stations  
| | 89 Elevated Stations  
| | 16 Parking Facilities  
| **Signals** | 105 Miles of Wayside Signals  
| | 108 Interlockings  
| | 33 Grade Crossings  
| **Guideway Structures** | 106 miles of guideway and structures  
| | 11% Underground Structure  
| | 3% Retained Cut Structure  
| | 30% miles At Grade Exclusive Structure  
| | 41% miles Elevated Structure  
| | 15% miles Elevated Fill Structure  
| | 115 bridges and viaducts  
| **Track** | 225 miles of Revenue Track  
| | 35% ballasted tangent  
| | 17% ballasted curve  
| | 6% direct fixation tangent  
| | 2% direct fixation curve  
| | 30% open deck tangent  
| | 5% miles of open deck curve  
| | 5% special track  
| | 12 rail yards (accounting for 32 miles of track)  
| **Traction Power + Subway Life Safety** | 69 Substations  
| | 5 Substation Tie houses  
| | 225 miles of Revenue Third Rail  
| | 294 miles of Power Cable  
| | 42 Subway Electrical Service Rooms  
| | 42 Sump Pumps  
| | 61 Subway Ventilation Fans  
| | 60,984 linear feet of subway lighting  
| | 21 Emergency Exits  
| **Communications + IT** | ~245-250 workstations/kiosks on shop floors  
| | Cable Fiber Network  
| | Network backbone infrastructure  
| | Servers  
| | Enterprise Systems  
| | 4500 cameras  
| | 7500 telephones  
| | 312 SCADA Remote Terminal Units  
| | 4500 handheld radios  
| | Radio system with 2 main transmitter sites and ~15 receiver sites  
| | Public Address (PA) systems  
| | Communications rooms  
| | Uninterruptible Power Supplies (UPS)  
| | Dynamic Message/Bus tracker signs  

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2 Incorporation of Communications and Information Technology Assets into CTA’s Asset Management Framework for lifecycle management purposes is ongoing as of October 2018; see also Section 7.3.
4.2 ASSET CONDITIONS

625.25 (b) A TAM Plan must include: (2) A condition assessment of those inventoried assets for which a provider has direct capital responsibility. A condition assessment must generate information in a level of detail sufficient to monitor and predict the performance of the assets and to inform the investment prioritization;

Knowing the condition of CTA’s assets is essential both to ensure safe and reliable service on a daily basis and to optimally prioritize future capital investments. This section describes the methods CTA used to assess conditions for the purposes of long-range investment planning and provides summary data of current conditions by asset class. Further detail on asset conditions can be found in the corresponding Appendices A-F, including disaggregated asset condition ratings and descriptions of the cyclical inspection processes applied to ensure that key assets are kept in safe and reliable operating condition.

4.2.1 CONDITION RATING METHODOLOGY

USEFUL LIFE BENCHMARK

An asset’s Useful Life Benchmark (ULB) represents the expected length of time that an asset, when new, will cost-effectively remain in service before the cost of maintenance and risk of service disruption outweigh the cost of replacement. ULBs are a crucial capital planning tool, because they facilitate the estimation of an asset’s remaining service life and expected degradation in condition and performance. CTA has established typical ULBs for various asset classes over time, based on experience and input from subject matter experts. These ULBs may evolve over time for accuracy. It is important to note that the ULBs used for TAM may extend beyond the financial useful life parameters used to calculate asset depreciation for accounting purposes.

RATING SCALE

CTA has adopted a 1-5 asset condition rating scale in line with the FTA’s Transit Economic Requirements Model (TERM), with 1 indicating poor condition and 5 indicating like-new.

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3 The TERM scale uses a score of 2.5 as the cutoff threshold for whether an asset is in a state of good repair or beyond its ULB. Condition scores may be in whole numbers or to multiple decimal places, as appropriate.

4 A TAM condition rating of 1-2 (Poor to Marginal) does not necessarily mean that an asset is unsafe, but rather that the asset is deemed more likely to develop defects that may disrupt service. Any asset that develops a condition presenting an immediate identifiable safety hazard to riders, employees, or the public is immediately removed from service until repairs can be made to restore a safe operating condition, even if at reduced performance.
Table 2: Asset Condition Rating Scale

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>No visible defects, in like new condition. May still be under warranty</td>
</tr>
<tr>
<td>4</td>
<td>No longer new, but still well within its expected useful life. Minimal or minor defects, limited need for repair</td>
</tr>
<tr>
<td>3</td>
<td>Nearing, but not exceeded, expected useful life; still performing its intended function. Periodic defects and/or moderate deterioration</td>
</tr>
<tr>
<td>2</td>
<td>Exceeded expected useful life; still performing its intended function. Periodic defects and/or moderate deterioration</td>
</tr>
<tr>
<td>1</td>
<td>Substantially beyond useful life and requires complete replacement as soon as funding is available</td>
</tr>
</tbody>
</table>

This rating system has several benefits, including:

- Facilitating comparisons within asset classes (e.g., comparing one facility to another) as well as comparisons across different asset classes.
- Supporting consistency, with multiple individuals likely to arrive at the same or similar scores.
- Flexible precision, with the ability to use whole integers or decimal places as applicable.

Importantly, this scale has the ability to accommodate varying levels of data availability between different asset classes in informing an appropriate condition rating. Ratings may be based on comparing an asset to its ULB, by visually inspecting an asset, by inferring condition from defect and performance history, or a combination of the above.

CONDITION RATING DEVELOPMENT: FACILITIES AND STATIONS

The condition ratings for maintenance and station facilities included here are based on iterative tabletop audits conducted in 2016, 2017, 2018, and 2021 by CTA subject matter experts. The ratings for maintenance facilities are informed by comprehensive component-
level engineering condition assessments that were performed at these locations in 2012 and 2021.

In response to the TAM Final Rule and the FTA’s issuance of a Facilities Condition Assessment Calculation Guidebook, CTA has developed a compliant hierarchical component framework for stations and maintenance facilities. Ratings on all stations and maintenance facilities are underway as of September 2021 in anticipation of pending reporting requirements. As these new ratings are completed, the station and facility condition scores used here may change significantly. For further detail on CTA’s new facility condition rating approach, see Appendix C.

**CONDITION RATING DEVELOPMENT: ALL OTHER ASSETS**

For this report, condition has generally been estimated based on asset age using the FTA’s TERM Lite model, which applies standard decay-curves to assets based on an expected useful life. These decay-curves were developed based on asset deterioration from a sampling of assets across the country.

For assets with long useful lives (especially those greater than 25 years) and complex systems of assets, estimating asset condition based solely on age from the time of original construction is only accurate and useful at an aggregate level, and is less accurate for individual assets. To account for this, the effective age of various assets was adjusted to reflect for lifecycle extensions of old assets.

As further described in Section 7, CTA will continue refining and improving its processes for asset condition rating for long-life assets and systems of assets, incorporating component-level ratings and/or utilizing defect data from enterprise asset management systems, as applicable.
4.2.2 CURRENT ASSET CONDITION

Table 3 summarizes aggregate condition measures by asset class. When taken together, the three condition measures highlight the distribution of assets in different conditions within a particular asset class. Evaluating the share of assets beyond their ULB and the share of assets rated below a “3” aligns this reporting with FTA’s TAM Performance Measures (see Section 4.3).

More detail on condition and useful life assumptions can be found in Appendices A through F.

Table 3: Summary Condition and Useful Life Information

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Asset Type</th>
<th>Total Count</th>
<th>Useful Life Benchmark (Years)</th>
<th>Average Condition</th>
<th>% w/ Condition Below 3</th>
<th>% Beyond Useful Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buses</td>
<td>Buses</td>
<td>2010</td>
<td>12-15</td>
<td>3.1</td>
<td>70%</td>
<td>4%</td>
</tr>
<tr>
<td>Rail Cars</td>
<td>Rail Cars</td>
<td>1483</td>
<td>34</td>
<td>3.4</td>
<td>52%</td>
<td>33%</td>
</tr>
<tr>
<td>Rail Stations</td>
<td></td>
<td>145</td>
<td>60</td>
<td>3.1</td>
<td>30%</td>
<td>n/a</td>
</tr>
<tr>
<td>Rail Terminal + Heavy Mtce. Shops</td>
<td></td>
<td>33</td>
<td>60</td>
<td>3.0</td>
<td>24%</td>
<td>n/a</td>
</tr>
<tr>
<td>Bus Garages + Heavy Mtce. Shop</td>
<td></td>
<td>35</td>
<td>60</td>
<td>2.7</td>
<td>46%</td>
<td>n/a</td>
</tr>
<tr>
<td>Other Maj. Admin &amp; Mtce. Facilities</td>
<td></td>
<td>11</td>
<td>60</td>
<td>2.7</td>
<td>37%</td>
<td>n/a</td>
</tr>
<tr>
<td>Facilities</td>
<td>Signals – Interlockings</td>
<td>108</td>
<td>25</td>
<td>2.8</td>
<td>55%</td>
<td>43%</td>
</tr>
<tr>
<td></td>
<td>Signals - Wayside Signals</td>
<td>105 mi</td>
<td>25</td>
<td>2.7</td>
<td>58%</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>Signals - Grade Crossings</td>
<td>33</td>
<td>25</td>
<td>2.9</td>
<td>42%</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td>Structure</td>
<td>106 mi</td>
<td>80</td>
<td>3.3</td>
<td>37%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Subway – Fans</td>
<td>61</td>
<td>25</td>
<td>2.3</td>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>Subway – Illumination</td>
<td>60,984 If</td>
<td>20</td>
<td>3.9</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Subway – Pumps</td>
<td>42</td>
<td>30</td>
<td>3.1</td>
<td>12%</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>Track – Revenue Trackwork</td>
<td>225 mi</td>
<td>25-60</td>
<td>3.3</td>
<td>40%</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Track – Yards</td>
<td>12</td>
<td>50</td>
<td>2.7</td>
<td>58%</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>Traction Power – Substations</td>
<td>69</td>
<td>24-30</td>
<td>2.6</td>
<td>77%</td>
<td>54%</td>
</tr>
<tr>
<td></td>
<td>Traction Power – Power Cable</td>
<td>294.4 mi</td>
<td>30</td>
<td>2.9</td>
<td>64%</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td>Traction Power – Third Rail</td>
<td>224 mi</td>
<td>25</td>
<td>2.5</td>
<td>76%</td>
<td>47%</td>
</tr>
<tr>
<td>Non-Revenue Vehicles and Equipment</td>
<td></td>
<td>802</td>
<td>6-20</td>
<td>3.1</td>
<td>58%</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>Steel-wheel vehicles</td>
<td>104</td>
<td>10-20</td>
<td>-</td>
<td>52%</td>
<td>77%</td>
</tr>
</tbody>
</table>

5 For Facilities, the average condition, Percentage under ULB, and Percentage Condition under 3 were aggregated through a weighted score based on total replacement cost. These figures may change significantly in the coming years as CTA rolls out a standardized hierarchical component rating methodology for Stations and Facilities.

6 Comparison to ULB is of limited value for CTA stations and facilities due to many having received various partial rehabilitations and renewals that have incrementally extended their effective useful life.

7 For Rail Right of Way Infrastructure linear assets, average condition, Percentage under ULB, and Percentage Condition under 3 were aggregated through a weighted score based on total linear length.
4.3 PERFORMANCE MEASURES AND TARGETS

625.45 Setting performance targets for capital assets. (a) General. (1) A provider must set one or more performance targets for each applicable performance measure. (2) A provider must set a performance target based on realistic expectations, and both the most recent data available and the financial resources from all sources that the provider reasonably expects will be available during the TAM plan horizon period.

In accordance with the TAM Final Rule, CTA is currently in the process of preparing its 2021 targets as of January 2021. The Fiscal Year 2021 Performance Targets by asset class are as follows:

Table 4: Performance Targets - Rolling Stock

<table>
<thead>
<tr>
<th>ASSET CLASS</th>
<th>USEFUL LIFE BENCHMARK (ULB)</th>
<th>TOTAL VEHICLES</th>
<th>% MET OR EXCEEDED ULB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>12-15 years</td>
<td>1,856</td>
<td>33%</td>
</tr>
<tr>
<td>Heavy Rail Car</td>
<td>34 years</td>
<td>1,492</td>
<td>33%</td>
</tr>
</tbody>
</table>

Table 5: Performance Targets - Infrastructure

<table>
<thead>
<tr>
<th>ASSET CLASS</th>
<th>TOTAL TRACK LINEAR FEET</th>
<th>% TRACK LINEAR FEET WITH SLOW ZONES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Rail</td>
<td>1,176,439</td>
<td>11.0%</td>
</tr>
</tbody>
</table>

Table 6: Performance Targets - Facilities

<table>
<thead>
<tr>
<th>ASSET CLASS</th>
<th>TOTAL FACILITIES / BUILDINGS</th>
<th>% WITH CONDITION BELOW 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger / Parking</td>
<td>161 Facilities</td>
<td>18%</td>
</tr>
<tr>
<td>Administrative / Maintenance</td>
<td>79 Buildings</td>
<td>37%</td>
</tr>
</tbody>
</table>

Table 7: Performance Targets - Equipment

<table>
<thead>
<tr>
<th>ASSET CLASS</th>
<th>USEFUL LIFE BENCHMARK (ULB)</th>
<th>TOTAL VEHICLES</th>
<th>% MET OR EXCEEDED ULB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automobiles (Sedans, SUVs)</td>
<td>Varies (6-12 Years)</td>
<td>66</td>
<td>21%</td>
</tr>
<tr>
<td>Other Rubber Tire (Trucks, Vans)</td>
<td>Varies (12-20 Years)</td>
<td>635</td>
<td>50%</td>
</tr>
<tr>
<td>Steel-Wheel</td>
<td>Varies (10-20 Years)</td>
<td>104</td>
<td>76%</td>
</tr>
</tbody>
</table>

Additional data describing the condition and performance of CTA assets are provided in the Appendices attached to this TAM Plan.

8 These numbers may differ from the quantity of assets listed in prior sections because of 1) differences in the way that long-term holds and seasonal vehicles were counted, and 2) differing counts as of the date of Plan publication and Target-setting.

9 Subsequent to adopting FY18 TAM targets, CTA refined its ULB assumptions for the bus fleet to reflect slightly different ULBs specific to each sub-fleet.

10 The condition ratings of facilities may change substantially over the coming years as CTA progressively rolls out a hierarchical condition rating process.
5 ASSET MANAGEMENT ORGANIZATION

5.1 OVERVIEW

625.25 (a)(3) A provider’s Accountable Executive is ultimately responsible for ensuring a TAM Plan is developed and carried out in accordance with this part.

This section documents the roles, responsibilities, and relationships of CTA’s asset management framework. The CTA President is the Accountable Executive, with specific asset management activities and roles decentralized across many departments based on their ownership of specific assets or business processes.

The abridged organizational chart below illustrates the basic reporting relationships of major asset management functions.

**Figure 3: Abridged Organization Chart**

Asset management activities and functions are broadly organized into the following groups:

<table>
<thead>
<tr>
<th>CORE FUNCTIONS</th>
<th>POLICY FUNCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential asset lifecycle management</td>
<td>Establishing the overall parameters and priorities of asset management activities</td>
</tr>
<tr>
<td>• Maintenance</td>
<td>• Resource Allocation &amp; Controls</td>
</tr>
<tr>
<td>• Specifications &amp; Standards</td>
<td>• Analysis &amp; Program Support</td>
</tr>
<tr>
<td>• Major Capital Projects</td>
<td>• Long-range Planning</td>
</tr>
<tr>
<td>• EAM System Functionality</td>
<td>• Safety &amp; Hazard Management</td>
</tr>
</tbody>
</table>

Subsequent sections further describe these functions and contain responsibility matrices identifying the corresponding accountable CTA departments. Additional organizational detail for primary maintenance departments is provided where applicable in the corresponding Appendices.
5.2 CORE ASSET MANAGEMENT FUNCTIONS

Core functions are handled by the associated groups exerting day-to-day control over assets. The following table identifies the CTA departments responsible for these functions for each major category of transit asset.

Table 8: Core Asset Management Functions Responsibility Matrix

<table>
<thead>
<tr>
<th>ASSET CATEGORY</th>
<th>MAINTENANCE</th>
<th>SPECIFICATIONS &amp; STANDARDS</th>
<th>MAJOR CAPITAL PROJECTS</th>
<th>EAM SYSTEM FUNCTIONALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buses</td>
<td>Bus Maintenance</td>
<td>Bus Engineering &amp; Technical Services</td>
<td>Bus Engineering &amp; Technical Services</td>
<td>Bus Engineering &amp; Technical Services</td>
</tr>
<tr>
<td>Railcars</td>
<td>Rail Maintenance</td>
<td>Rail Engineering &amp; Technical Services</td>
<td>Rail Engineering &amp; Technical Services</td>
<td>Rail Engineering &amp; Technical Services</td>
</tr>
<tr>
<td>Non-Revenue Vehicles</td>
<td>Non-Revenue Fleet Maintenance (w/ Using Groups)</td>
<td>Non-Revenue Fleet Maintenance</td>
<td>Non-Revenue Fleet Maintenance</td>
<td>n/a (Contracted Service)</td>
</tr>
<tr>
<td>Railborne Work Equipment</td>
<td>Rail Maintenance</td>
<td>Rail Engineering &amp; Technical Services (w/ Using Groups)</td>
<td>Rail Engineering &amp; Technical Services (w/ Using Groups)</td>
<td>Rail Engineering &amp; Technical Services</td>
</tr>
<tr>
<td>Communications &amp; IT Systems</td>
<td>Communication Systems Maintenance</td>
<td>Technology Engineering</td>
<td>Technology Engineering</td>
<td>Technology Engineering</td>
</tr>
</tbody>
</table>

MAINTENANCE

Groups responsible for Maintenance are the primary asset owners. Maintenance activities include periodic inspections, scheduled or other preventive maintenance, corrective maintenance, and major/heavy repairs (including e.g. fabrication and shop rebuilds). The Maintenance group is also responsible for ensuring that its workforce has been trained in the requisite technical skills to perform the work, though it may coordinate with the CTA Training.

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11 Due to its scope, management of all aspects of the Red-Purple Modernization (“RPM”) project is being executed by an independent group reporting directly to the CTA President.  
12 Maintenance of three CTA facilities (567 W. Lake, 120 N. Racine, 901 W. Division) is outsourced and managed by CTA’s Real Estate department.
department and/or outside organizations for training curriculum development and training delivery.

**DESIGN, SPECIFICATION, STANDARDS, & PROCEDURES**

Engineering and Technical Services groups develop and maintain a variety of requirements that define the asset lifecycle. These include designs and specifications for new assets (including the design of new solutions to complex maintenance problems) and for replacement parts/material, the parameters of scheduled inspection and maintenance programs, and the procedures and manuals to be followed by Maintenance groups in the execution of their responsibilities. Such work products may be developed in-house or by outside contractors managed by CTA. The groups performing these activities are also responsible for ensuring that all of the above technical documents are appropriately controlled for revisions and authorship, and that the most recent versions are made readily available to those performing work on assets.

**MAJOR CAPITAL PROJECTS**

Executing major capital projects entails project management responsibility for managing the contracting lifecycle (procurement through close-out), construction management and quality assurance (as applicable), and handover of delivered assets to Maintenance groups in accordance with CTA specifications and designs. For rolling stock, this role generally refers to management of the new bus/car build and delivery process, while for fixed assets this generally refers to construction projects. This function also entails financial management activities such as budgeting and cost accounting.

**EAM SYSTEM FUNCTIONALITY**

Accurately capturing the inventory, performance, and work performed on assets is essential to provide all levels of management the information needed to best allocate resources and maintain appropriate control and accountability. This information is captured by CTA’s Enterprise Asset Management (EAM) software systems, as shown in the table below:

**Table 9: List of EAM Systems Used by Asset Category**

<table>
<thead>
<tr>
<th>Asset Category</th>
<th>EAM System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buses</td>
<td>Maintenance Management Information System (MMIS)</td>
</tr>
<tr>
<td>Railcars</td>
<td>Trapeze</td>
</tr>
<tr>
<td>Railborne Work Equipment</td>
<td>Infor EAM</td>
</tr>
<tr>
<td>Trailers</td>
<td>SolarWinds</td>
</tr>
<tr>
<td>Facilities</td>
<td>Assetworks M5</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>System maintained by City of Chicago Fleet Management</td>
</tr>
<tr>
<td>Communications &amp; Technology</td>
<td>System maintained by City of Chicago Fleet Management</td>
</tr>
</tbody>
</table>

---

13 CTA’s asset inventory for financial accounting purposes is maintained in the Oracle ERP system.
Each asset category has one or more individuals who ensure that Enterprise Asset Management systems are configured and deployed to accurately capture:

- The inventory of assets being managed, including hierarchical structures (e.g. parent-child, system-position, etc.) to facilitate the roll-up of cost and performance data;
- Maintenance business processes and workflows, including the scheduling of preventive maintenance, creation and assignment of work, and supervisory/review close-out;
- Sufficient information to support root-cause and reliability analysis; and
- System interface and usability requirements, to facilitate ease of use and accurate data input by front-line personnel.

This entails ongoing coordination between maintenance managers, front line workers, CTA Information Technology system administrators, and software vendors to modify data, forms, reports, and system functionality.

An additional key responsibility is to provide templates and instructions to Major Capital Project managers to ensure that newly delivered operational assets are accurately and promptly inducted into EAM systems for lifecycle management.

5.3 ASSET MANAGEMENT POLICY FUNCTIONS

The following matrix lists the department(s) responsible for asset management policy functions:

<table>
<thead>
<tr>
<th>RESOURCE ALLOCATION &amp; CONTROL</th>
<th>ANALYSIS &amp; PROGRAM SUPPORT</th>
<th>LONG RANGE PLANNING</th>
<th>SAFETY &amp; HAZARD MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance (Budget &amp; Capital Finance, Accounting)</td>
<td>Performance Management</td>
<td>Planning</td>
<td>Safety &amp; Security Management System</td>
</tr>
</tbody>
</table>

**RESOURCE ALLOCATION & CONTROL**

The Finance department is responsible for preparing and managing CTA’s Operating Budget and 5-Year Capital Improvement Program. This entails ongoing dialogue with asset owners regarding available resources for ongoing maintenance activities, current capital projects, and requirements for major new projects. The Budget & Capital Finance group in Finance ultimately prepares the budgetary constraints under which asset management activities occur. See also Section 6.2.1.

The Accounting department ensures accurate control and accounting of CTA’s assets via property tagging, periodic inventories, and its development of CTA financial statements.

**ANALYSIS & PROGRAM SUPPORT**

The CTA Performance Management department produces independent reports and analysis to support short-, medium-, and long-term management decision-making. CTA’s dedicated TAM team reports through the Performance Management department, providing
inter-departmental coordination and identification and oversight of strategic priorities. See Section 7 for further detail on TAM implementation.

**LONG-RANGE PLANNING**

The CTA Planning department leads studies of potential system expansions, vision plans for major transit corridor rehabilitation, and projection of future ridership and service levels. Each of the above are likely to have significant implications for the future needs of CTA’s asset base, and in turn inform the nature and timing of major capital investments. Additionally, the Planning department coordinates regional planning policy matters with other agencies. See also Section 6.2.3.

**SAFETY & HAZARD MANAGEMENT**

CTA maintains Hazard Logs, which are master listings of potential safety hazards faced by CTA (and their mitigation measures or disposition). Safety and the user departments monitor the hazards in the Log and alert senior management if any of the hazards become severe risks and/or determine if eliminating the hazard requires extensive work beyond routine maintenance.

Additionally, CTA is developing a Safety Management System (SMS), which will be aligned with the FTA’s SMS Framework. The envisioned integration between TAM and the SMS entails ensuring awareness of assets rated in poor condition to be flagged for safety criticality analysis and, if warranted, higher prioritization in capital programming.
CAPITAL INVESTMENT

OVERVIEW

This section describes the processes by which CTA allocates capital investment funds to maintain, improve, or expand CTA’s asset base, and summarizes CTA’s currently-adopted 5-year investment plan.

CTA maintains a rolling 5-Year Capital Improvement Program (CIP), which represents the CTA’s investment priorities for the next five years based on anticipated available funding. CTA deploys several processes and tools to ensure that the Accountable Executive and other key decision-makers have meaningful information to guide when and where to invest scarce capital funding. These information and process flows are illustrated in the following figure:

Figure 4: Capital Investment Decision Process Overview

CTA 5-year Capital Improvement Plan
Reflects CTA’s funded investment priorities, by year, based on expected capital funds availability.
6.2 DECISION SUPPORT

625.25 (b) A TAM Plan must include: (3) A description of analytical processes or decision-support tools that a provider uses to estimate capital investment needs over time and develop its investment prioritization;

The CIP allocates funds to specific major discrete projects and to programs that support capital renewal at the asset class level. Programmatic funding is an essential tool in capital allocation since CTA’s capital investment needs far exceed available funding; programmatic funding ensures that resources will be available for asset owners to target the most critical assets for renewal to maintain safety and reliability.

However, several strategic decision support processes are used to determine high-level investment needs over time and across all asset classes, so as to inform the overall allocation of funds in the CIP:

6.2.1 CIP SOLICITATION / CALL FOR PROJECTS

CTA’s Capital Finance department conducts an annual solicitation process to request new and revised capital project proposals from CTA departments. The solicitation is conducted and compiled using a database and standard forms, which facilitate consistent analysis and evaluation of funding requests across projects and departments. Capital requests are submitted using a standardized Request Form, and requestors are also to provide information in an evaluation rubric and a State of Good Repair questionnaire.

**Figure 5: CIP Solicitation Form Examples**

The Request Form collects high-level information about the capital need (e.g. asset category, location, estimated costs, departmental sponsorship) as well as descriptions of project objectives and other means of project justification. Requestors also have the option to attach supporting reference documentation, if desired.

The evaluation rubric reflects the factors identified in CTA’s TAM Policy Statement for reference by project requestors. For projects that involve replacing or renewing existing assets, the SOGR questionnaire is used to collect TAM-specific information, such as an
evaluation of age/condition against useful life benchmark, and whether the proposed project impacts accessibility or identifiable safety risks.

As shown in Figure 6, CTA has currently identified 202 discrete capital project needs through this process, totaling nearly $16 billion in cost:

Figure 6: Overview of Capital Project Solicitation Submittals - 2021
6.2.2 ANALYSIS & MODELING

TERM LITE

From 2010 through 2016, CTA collaborated with the Regional Transportation Authority (RTA) and the other two Chicagoland transit operators (Metra and Pace, the “Service Boards”) to develop estimates of the region’s backlog of capital investment and estimate long-term capital investment needs. This effort entailed developing a regional model based on TERM Lite, a decision support tool offered by the FTA designed specifically to support State of Good Repair analysis.

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14 “Backlog” refers to the replacement value of assets that are already beyond their expected useful life.

15 See https://www.transit.dot.gov/TAM/TERMLite
As shown in Figure 8, this analysis calculated that CTA’s asset base requires roughly $10.6 billion in normal reinvestment needs over a 10-year period, equating to an average need of $1.06 billion per year. This is in addition to investments required to eliminate the backlog of over-age assets.

The TERM Lite model is constructed based off an inventory (types and quantities) of capital assets, and utilizes assumptions regarding age, useful life benchmarks, and approximate replacement costs to estimate the current backlog of investment needs as well as project out which assets will likely need replacement in a 10-, 20-, or 30-year time horizon. Current and future asset conditions are expressed in a 1-5 rating scale (see Section 4.2.1), and are either...
input manually based on actual measured condition or estimated using decay curves applied to the age of the asset.\footnote{A “decay curve” is a model of how an asset condition deteriorates as time goes on, based on when it entered service and its expected lifespan. The TERM Lite model includes standard decay curves for various types of assets, developed through Federal research programs.}

Much of the inventory and condition data reflected in the TAM Plan and Appendices are based on TERM Lite outputs. CTA has continued the development and refinement of its capital asset inventory and capital program assumptions in TERM Lite, and intends to continue its use for various TAM and Capital Planning purposes.

Additionally, the TERM Lite model can apply prioritization criteria to different assets (based on impact to Safety, Operations, etc.), as well as financial constraints limiting how many assets may be replaced in any given future year in the mode. This functionality permits scenario modeling to evaluate e.g. how future asset conditions will trend based on different levels of funding, or to identify highest-priority capital investments under various assumed priority criteria. See also Section 6.4 for how model outputs can be used for benchmark comparison against adopted CIP allocations.

**FLEET MANAGEMENT PLANS**

In accordance with FTA guidelines and requirements, CTA’s Planning and Vehicle Engineering and Technical Services departments have jointly developed a Bus Fleet Management Plan and Rail Fleet Management Plan, which are updated from time to time to reflect major changes in the fleet outlook.

The Fleet Management Plans are essential inputs to the capital planning process because they:

(a) estimate the required size of the vehicle fleets over the next 10 years, based on expected ridership, service levels, and maintenance programs;
(b) specify the target timeline and sizing of future vehicle procurements (including vehicle length, for buses); and
(c) identify any major constraints or deficiencies in maintenance facilities impacting vehicle maintenance.

**Figure 9: Fleet Requirement Calculation**

CTA’s Fleet Management Plans were last updated in 2016. The total size of the bus fleet is projected to remain roughly constant at 1,850-2,010 buses, while the rail fleet is expected to grow from roughly 1,480 cars to 1,600 cars over the next 5 years, accommodating increased
peak demand. Major capital projects identified in the Fleet Management Plans during the 5-year period of CTA’s current CIP are as follows:

Table 11: Summary of Major Fleet Capital Needs FY2021-2025

<table>
<thead>
<tr>
<th>CAPITAL NEED</th>
<th>BUS FLEET</th>
<th>RAIL FLEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacements</td>
<td>• Retire 74 remaining 6400-Series</td>
<td>• Retire 354 2600-Series, with the rest to be</td>
</tr>
<tr>
<td></td>
<td>• Retire 208 4000-Series</td>
<td>retired by roughly 2025</td>
</tr>
<tr>
<td></td>
<td>• Begin retirement of 400 1000-Series</td>
<td>• Acquire 400 new 7000-Series</td>
</tr>
<tr>
<td></td>
<td>• Acquire 600 new 40’ Buses</td>
<td></td>
</tr>
<tr>
<td>Overhauls</td>
<td>• Life Extension Overhaul on 629 1000-Series</td>
<td>• Quarter-Life “C” Overhaul on 714 5000-</td>
</tr>
<tr>
<td></td>
<td>• Mid-life Overhaul on 4300-Series</td>
<td>Series Cars</td>
</tr>
<tr>
<td></td>
<td>• Mid-Life Overhaul on 7900-Series</td>
<td>• Mini-Overhaul of 90 2600-Series</td>
</tr>
</tbody>
</table>

6.2.3 STRATEGIC CONSIDERATIONS

Major capital investment decisions are informed not only by the goal of maintaining the existing asset base in a State of Good Repair, but also long-term strategic analyses. In addition to the projection of future fleet size requirements, the Planning department leads a variety of strategic technical analyses and policy interfaces that result in critical imports to the CIP development process.

STRATEGIC PROJECT AND PROGRAM DEVELOPMENT

CTA is a mature, legacy system, and as such many aspects of current system design present limitations or other deficiencies that should be addressed comprehensively and strategically through major programs, rather than by tactical “like-for-like” replacements. Such deficiencies may lead to limited customer accessibility, constrained operational capacity, or systemically deficient infrastructure and facilities. Major studies addressing these issues, and whose recommendations are reflected in CTA’s CIP, are briefly summarized below:

ALL STATIONS ACCESSIBILITY

CTA has made substantial progress in increasing system accessibility since the passage of the Americans with Disabilities Act in 1990: at the time of passage, only 10 (6%) of CTA rail stations were accessible, and similarly small proportions of the bus and rail fleets were fully accessible. As of 2018, the entire vehicle fleet is accessible, and 102 (>70%) of 146 rail stations have been reconstructed or rehabilitated to provide step-free access.

In July 2018, CTA published its All Stations Accessibility Plan (ASAP)\textsuperscript{17}, laying out a multi-phase blueprint to achieve 100% accessibility within the next two decades, pending funding availability.

\textsuperscript{17} Plan document and other material available at: \url{https://www.transitchicago.com/accessibility/asap/}
RAIL SYSTEM CAPACITY STUDY

CTA’s legacy infrastructure has several existing bottlenecks that prevent CTA from increasing service levels to meet demand. In the near-term, these often result in very high crowding and reduced service reliability during peak periods, and over the long-run, they risk limiting potential growth in ridership and revenue.

In 2017, CTA completed a System-wide Rail Capacity Study, which comprehensively considered peak passenger demand and the existing or potential capacity limitations due to infrastructure design, asset conditions, and station/facility operations. The study identified primary capacity constraints including traction power capacity on the O’Hare branch of the Blue Line, throughput through Clark Junction (the busy junction north of Belmont station, where northbound Brown Line trains currently cross Red Line and Purple Line trains), and short platforms on the Evanston branch that limit Purple Line trains to six cars.

RED AHEAD – RED/PURPLE MODERNIZATION AND RED LINE EXTENSION

The Red Ahead program is a comprehensive initiative for maintaining, modernizing, and expanding Chicago’s most-traveled rail line. Several major projects have already been completed, including the reconstruction of infrastructure on the southern Dan Ryan branch, the full reconstruction of Wilson station and adjacent infrastructure, the renovation of Clark/Division station, interim improvements to stations on the North Mainline branch. Additionally, the complete reconstruction of the 95th Street Intermodal Terminal.

The remaining key elements are the Red-Purple Modernization (RPM)\textsuperscript{18} and the Red Line Extension (RLE)\textsuperscript{19}. RPM is the largest capital project in CTA history and over multiple phases will completely rebuild roughly 10 miles of rail system infrastructure and intermediary stations, most dating to the early part of the 20\textsuperscript{th} century. CTA has obtained full funding for Phase 1 of RPM, which entails the Red-Purple Bypass and the reconstruction of all infrastructure and stations from Lawrence to Bryn Mawr. These work elements will address both

\textsuperscript{18} See https://www.transitchicago.com/rpm/ for more information.

\textsuperscript{19} See https://www.transitchicago.com/redext/ for more information.
existing capacity constraints and state of good repair needs.

The proposed Red Line Extension would add four new stations over 5.3 miles running south from the existing 95th Street Terminal. CTA has issued its Draft Environmental Impact Statement (DEIS) and Preferred Alignment for the route, and will advance to Preliminary Engineering in the coming years.

**BLUE LINE FOREST PARK BRANCH FEASIBILITY & VISION STUDY**

The Blue Line Forest Park Branch was constructed in the late 1950s, replacing a former elevated branch that was displaced by construction of what is now the Eisenhower Expressway (I-290). Both the transit line and the expressway have reached the end of their useful life and have systemic asset condition issues that warrant full reconstruction. The Illinois Department of Transportation (IDOT) is producing an Environmental Impact Statement for the reconstruction and modernization of the expressway, while CTA has coordinated a concurrent vision study for the Blue Line, which predominantly runs either in the expressway median or immediately adjacent to the expressway. The need for reconstruction affords the opportunity to comprehensively study station locations, access, and infrastructure needs.

**Figure 12: Forest Park Branch Vision Study Area**

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**REGIONAL POLICY COORDINATION**

CTA’s strategic considerations exist within a regional and national context, and thus CTA’s long term goals and major investment decisions are made in coordination with regional bodies. Such regional coordination is all the more vital in the process of prioritization of major “megaprojects” such as the capacity expansions and extensions described above.

CTA recently coordinated with the Regional Transportation Authority in the development of its 2018-2023 Regional Transit Strategic Plan, which both establishes broad policy goals for regional transit operations and identifies regional investment priorities.

CTA also collaborates with the Chicago region’s Metropolitan Planning Organization (MPO): the Chicago Metropolitan Agency for Planning (CMAP). This includes aligning investments with the regional priorities of the pending new 30-year comprehensive plan (ON TO 2050), and participating in the management of the region’s Transportation Improvement Program (TIP) and administration of the federally-funded Congestion Mitigation and Air Quality.

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22 See [http://www.cmap.illinois.gov/onto2050](http://www.cmap.illinois.gov/onto2050) for more information.
6.2.4 TACTICAL DECISION SUPPORT

CTA’s Capital Investment strategy includes the use of programmatic funding allocated for as-needed capital maintenance and rehabilitation of specific asset classes. These funds are used to perform capital work such as vehicle component campaigns, localized infrastructure renewals, and targeted station enhancements. The identification, scoping, and execution of this work happens on a shorter time frame than major capital projects such as the strategic investments identified through the processes described in the previous section, and is needed to best maintain safety and reliability on an aging asset base based on emerging conditions.

PERFORMANCE MANAGEMENT

CTA’s Performance Management department produces a CTA-wide scorecard detailing a wide variety of operational performance metrics for the prior day called the “Daily Flash”. This is distributed to senior staff and discussed in a daily meeting between the President’s Office and executive management. In-depth scorecards are created for CTA’s maintenance departments on a regular basis, typically monthly or quarterly. Additionally, CTA publishes public scorecard data. All of the above reports are based on data pulls from CTA’s enterprise systems.

These processes ensure that assets with recurring issues disrupting service are quickly and transparently identified so that corrective actions can be taken. While sometimes these may be relatively minor maintenance issues, such persistent defects can also warrant larger capital work, such as substantial component replacements or rehabilitation of fixed assets or fleet-wide re-engineering or change-out campaigns on sub-fleets of vehicles.

Figure 13: Examples of Performance Management Reporting

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23 See [http://www.cmap.illinois.gov/programs](http://www.cmap.illinois.gov/programs) for more information.
INSPECTION & MAINTENANCE

Core maintenance functions result in regular “eyes and ears” on operating assets, which means subject matter experts are regularly positioned to identify new or recurring issues resulting from asset conditions. All operational assets are subject to a scheduled maintenance program; depending on the type of assets, such scheduled maintenance may entail inspection, testing, adjustments, or combinations of the above. Further detail regarding the inspection and maintenance regimes applied to each asset class are found in the corresponding Appendices and Maintenance Plans.

Regular inspections, by their nature, are intended to identify and prioritize any new defects on assets. Such defects typically result in smaller maintenance fixes, but depending on the type of asset and scope of the issue, inspection findings may propagate into capital work. For example, the identification of a structural defect may require the fabrication of new steel and significant coordination for installation, or a flaw discovered during inspection or troubleshooting of one vehicle may point to a looming issue with all vehicles of the same sub-fleet.

EAM Systems (see Section 5.2) are also a critical source of information for managers and coordinators planning capital work. By capturing a variety of asset, failure, and workforce measures, roll-up reporting and analyses enable easier identification of trends and facilitate more efficient planning of work.

For example, reports from EAM can help Rail Maintenance determine whether a change-out of a full sub-system with a new or rebuilt capital item is warranted rather than a simple replacement or adjustment of a single failed component. Such reporting capability are especially important for Infrastructure (Power & Way), as it helps managers efficiently coordinate targeted capital replacement work across multiple functions during limited work windows.

6.3 PRIORITIZED CAPITAL INVESTMENT PLAN

625.25 (b) A TAM Plan must include: (3) A description of analytical processes or decision-support tools that a provider uses to estimate capital investment needs over time and develop its investment prioritization; (4) A provider’s project-based prioritization of investments;

CTA investment priorities are represented by its rolling 5-Year Capital Improvement Program, whose time horizon advances one year (e.g. from FY2018-22 to FY2019-23) concurrent with the annual budget process. The CTA President and Chief Financial Officer present incremental CIP revisions for consideration and approval by the Chicago Transit Board, based on information provided through CTA’s decision support processes, changes in expecting funding, and/or revised project needs and schedules.

CTA’s financial plan, including its operating budget, CIP, and long-range projections, are developed in coordination with the Regional Transportation Authority (RTA) and are subject to annual approval by the RTA board. Additionally, the federally-funded portions of CTA’s capital program are coordinated with the Chicago Metropolitan Agency for Planning (CMAP), the region’s Metropolitan Planning Organization (MPO) responsible for maintaining the region’s Transportation Improvement Program (TIP).
Table 12 reflects CTA’s CIP for FY2021-2025. More detail on individual projects in the CIP can be found in corresponding Appendices and in CTA’s annual budget book.

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Project Description</th>
<th>Prior Funding</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>Year Total</th>
<th>Outyear</th>
<th>Total Project</th>
</tr>
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<tbody>
<tr>
<td><strong>Buses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Bus Maintenance</td>
<td>36,000</td>
<td>36,000</td>
<td>36,000</td>
<td>36,000</td>
<td>36,000</td>
<td>0</td>
<td>144,000</td>
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<tr>
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<td>Perform Bus Overhaul</td>
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<td>29,087</td>
<td>17,709</td>
<td>16,098</td>
<td>666</td>
<td>0</td>
<td>63,559</td>
<td>84,442</td>
<td>167,109</td>
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<td>Replace Buses</td>
<td>164,992</td>
<td>36,063</td>
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<td>105,522</td>
<td>43,056</td>
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<td>214,015</td>
<td>347,087</td>
<td>726,094</td>
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<td></td>
<td><strong>Subtotal</strong></td>
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<td><strong>101,150</strong></td>
<td><strong>83,083</strong></td>
<td><strong>157,620</strong></td>
<td><strong>79,722</strong></td>
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<td><strong>421,575</strong></td>
<td><strong>431,528</strong></td>
<td><strong>1,073,203</strong></td>
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<td><strong>Rail Cars</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Perform Rail Car Overhaul</td>
<td>328,000</td>
<td>14,219</td>
<td>10,000</td>
<td>27,897</td>
<td>10,766</td>
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<td>62,882</td>
<td>24,281</td>
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<td>Rail Car Maintenance</td>
<td>35,269</td>
<td>30,000</td>
<td>18,106</td>
<td>24,147</td>
<td>26,435</td>
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<td>98,689</td>
<td>13,750</td>
<td>147,708</td>
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<td>Purchase Rail Cars</td>
<td>491,802</td>
<td>357,308</td>
<td>72,124</td>
<td>82,715</td>
<td>0</td>
<td>512,146</td>
<td>575,130</td>
<td>1,579,079</td>
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<td><strong>Sub-Total</strong></td>
<td><strong>855,071</strong></td>
<td><strong>401,527</strong></td>
<td><strong>100,230</strong></td>
<td><strong>52,044</strong></td>
<td><strong>119,916</strong></td>
<td><strong>0</strong></td>
<td><strong>673,717</strong></td>
<td><strong>613,162</strong></td>
<td><strong>2,141,950</strong></td>
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<td><strong>Facilities and Infrastructure</strong></td>
<td>Rehabilite Blue Line - O'Hare Branch</td>
<td>478,661</td>
<td>119,041</td>
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<td>0</td>
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<td>0</td>
<td>119,041</td>
<td>0</td>
<td>597,701</td>
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<td>Red Line Extension – Project Design</td>
<td>66,579</td>
<td>95,271</td>
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<td>77,500</td>
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<td>77,500</td>
<td>327,771</td>
<td>0</td>
<td>394,350</td>
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<td>North Main Line – RPM</td>
<td>1,686,463</td>
<td>179,372</td>
<td>100,000</td>
<td>100,000</td>
<td>65,476</td>
<td>0</td>
<td>444,848</td>
<td>2,131,311</td>
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<td></td>
<td>Forest Park Branch – Phase 1</td>
<td>178,347</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>139,300</td>
<td>317,647</td>
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<tr>
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<td>Green Line Improvements</td>
<td>69,885</td>
<td>1,448</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1,448</td>
<td>300,500</td>
<td>371,833</td>
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<td>Replace/Upgrade Power Distribution and Signals</td>
<td>32,241</td>
<td>23,004</td>
<td>3,695</td>
<td>2,126</td>
<td>0</td>
<td>0</td>
<td>28,825</td>
<td>0</td>
<td>61,065</td>
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<td>Infrastructure Safety &amp; Renewal Program</td>
<td>127,685</td>
<td>84,038</td>
<td>38,000</td>
<td>38,000</td>
<td>38,000</td>
<td>0</td>
<td>198,038</td>
<td>0</td>
<td>325,723</td>
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<tr>
<td></td>
<td>Rehabilitate Rail Stations</td>
<td>167,236</td>
<td>11,855</td>
<td>16,895</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>29,750</td>
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<td>195,986</td>
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<td>Improve Facilities - Systemwide</td>
<td>230,608</td>
<td>38,940</td>
<td>30,136</td>
<td>30,139</td>
<td>24,187</td>
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<td>123,402</td>
<td>116,349</td>
<td>470,359</td>
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<td><strong>Subtotal</strong></td>
<td><strong>3,037,705</strong></td>
<td><strong>552,969</strong></td>
<td><strong>266,226</strong></td>
<td><strong>247,765</strong></td>
<td><strong>127,663</strong></td>
<td><strong>77,500</strong></td>
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<td><strong>556,149</strong></td>
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<td><strong>Comms and IT</strong></td>
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<td>1,700</td>
<td>0</td>
<td>0</td>
<td>5,100</td>
<td>51,305</td>
<td>60,433</td>
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<td>Implement Security &amp; Communication Projects</td>
<td>10,495</td>
<td>15,405</td>
<td>10,661</td>
<td>5,931</td>
<td>5,940</td>
<td>5,917</td>
<td>43,854</td>
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<td><strong>Subtotal</strong></td>
<td><strong>14,523</strong></td>
<td><strong>17,105</strong></td>
<td><strong>12,361</strong></td>
<td><strong>7,631</strong></td>
<td><strong>5,940</strong></td>
<td><strong>5,917</strong></td>
<td><strong>48,954</strong></td>
<td><strong>51,305</strong></td>
<td><strong>114,782</strong></td>
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<td><strong>Non-Revenue Vehicles</strong></td>
<td>Equipment and Non-Revenue Vehicles Replacement</td>
<td>116,843</td>
<td>22,333</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>0</td>
<td>67,333</td>
<td>0</td>
<td>184,176</td>
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<td><strong>Misc.</strong></td>
<td>Program Management</td>
<td>13,069</td>
<td>13,316</td>
<td>11,833</td>
<td>11,475</td>
<td>10,571</td>
<td>608</td>
<td>47,802</td>
<td>31,836</td>
<td>92,707</td>
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<td>Bond Repayment, Interest Cost, &amp; Finance Cost</td>
<td>1,485,929</td>
<td>276,306</td>
<td>186,952</td>
<td>191,011</td>
<td>193,035</td>
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<td>847,304</td>
<td>0</td>
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<td>Unanticipated Capital</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
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<td>Core Capacity Planning Studies</td>
<td>2,232</td>
<td>275</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>275</td>
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<td>2,507</td>
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<tr>
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<td>Signal Priority (Ashland Av)</td>
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<td>0</td>
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<td>8,891</td>
</tr>
<tr>
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<td>Bus Slow Zone Elimination Program</td>
<td>0</td>
<td>1,652</td>
<td>0</td>
<td>15,025</td>
<td>0</td>
<td>0</td>
<td>16,677</td>
<td>0</td>
<td>16,677</td>
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<tr>
<td></td>
<td><strong>Subtotal</strong></td>
<td><strong>1,510,121</strong></td>
<td><strong>291,549</strong></td>
<td><strong>198,785</strong></td>
<td><strong>217,511</strong></td>
<td><strong>203,606</strong></td>
<td><strong>608</strong></td>
<td><strong>912,058</strong></td>
<td><strong>31,836</strong></td>
<td><strong>2,454,015</strong></td>
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<td><strong>Total</strong></td>
<td><strong>5,754,363</strong></td>
<td><strong>1,386,633</strong></td>
<td><strong>675,685</strong></td>
<td><strong>697,571</strong></td>
<td><strong>551,847</strong></td>
<td><strong>84,025</strong></td>
<td><strong>3,395,760</strong></td>
<td><strong>1,683,980</strong></td>
<td><strong>10,834,101</strong></td>
</tr>
</tbody>
</table>

Transit Asset Management Plan
Chicago Transit Authority
September 2021
625.33 (e) When developing an investment prioritization, a provider must take into consideration its estimation of funding levels from all available sources that it reasonably expects will be available in each fiscal year during the TAM plan horizon period.

In order to pay for its capital investments over the next five years, CTA will rely on funding from the sources as summarized in Figure 15 and Table 13.

**Figure 15: FY2021-25 Capital Funding Sources**
Table 13: Capital Improvement Program Expected Funds ($000s), 2021-2025

<table>
<thead>
<tr>
<th>SOURCES OF FUNDS</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5307 Urbanized Formula</td>
<td>131,524</td>
<td>134,219</td>
<td>136,232</td>
<td>138,276</td>
<td>-</td>
<td>540,252</td>
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<tr>
<td>5337 State of Good Repair</td>
<td>160,742</td>
<td>179,243</td>
<td>181,932</td>
<td>184,661</td>
<td>-</td>
<td>706,578</td>
</tr>
<tr>
<td>5339 Bus and Bus Facilities Formula</td>
<td>13,195</td>
<td>14,599</td>
<td>14,812</td>
<td>15,035</td>
<td>-</td>
<td>57,635</td>
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<td>Subtotal FTA</td>
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<td>328,056</td>
<td>332,976</td>
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<td>1,304,465</td>
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<td>5309 Core FTA</td>
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<td>100,000</td>
<td>100,000</td>
<td>65,476</td>
<td>-</td>
<td>365,476</td>
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<tr>
<td>CMAQ RPM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CMAQ - TSP, E-Buses &amp; Bus Slow Zones</td>
<td>17,270</td>
<td>38,694</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>55,964</td>
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<td>Sec. 5303 UWP Planning</td>
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<td>420</td>
<td>420</td>
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<td>420</td>
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<tr>
<td>STP-Share</td>
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<td>13,930</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>13,930</td>
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<td>Transit Security Grant Program (DHS)</td>
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<td>6,000</td>
<td>6,000</td>
<td>6,000</td>
<td>6,000</td>
<td>30,000</td>
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<td>Illinois Long Range Transportation Plan</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>220</td>
</tr>
<tr>
<td>Subtotal Other Federal</td>
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<td>6,420</td>
<td>467,690</td>
</tr>
<tr>
<td>Total Federal</td>
<td>429,372</td>
<td>448,406</td>
<td>478,090</td>
<td>409,867</td>
<td>6,420</td>
<td>1,772,155</td>
</tr>
<tr>
<td>CTA Bond</td>
<td>215,090</td>
<td>77,500</td>
<td>77,500</td>
<td>-</td>
<td>77,500</td>
<td>447,590</td>
</tr>
<tr>
<td>CTA Bond – Ground Transportation Tax</td>
<td>171,200</td>
<td>7,800</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>179,000</td>
</tr>
<tr>
<td>Transit Motor Fuel (PAYGO)</td>
<td>141,875</td>
<td>141,875</td>
<td>141,875</td>
<td>141,875</td>
<td>-</td>
<td>567,500</td>
</tr>
<tr>
<td>State Bonds</td>
<td>413,472</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>413,472</td>
</tr>
<tr>
<td>Total State/Local</td>
<td>941,636</td>
<td>227,175</td>
<td>219,375</td>
<td>141,875</td>
<td>77,500</td>
<td>1,607,561</td>
</tr>
<tr>
<td>CTA Share for Competitive Grants</td>
<td>160</td>
<td>105</td>
<td>105</td>
<td>105</td>
<td>105</td>
<td>580</td>
</tr>
<tr>
<td>Reprogrammed Funds</td>
<td>15,463</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>15,463</td>
</tr>
<tr>
<td>Total Funds</td>
<td>1,386,631</td>
<td>675,686</td>
<td>697,570</td>
<td>551,847</td>
<td>84,025</td>
<td>3,395,760</td>
</tr>
</tbody>
</table>

Projects funded by these sources are supplemented with funds made available in prior years totaling just under $4 billion.

CTA capital investment funds have historically come from a variety of sources, including federal formula funds, federal grants programs, State bonds from State capital programs, bonds issued by the CTA or RTA, and other locally-derived sources such transit value capture/tax increment financing and the Ground Transportation Tax.

The table indicates average new funding of roughly $1 billion per year over the current 5-year plan. From 2004-2017, on average $707.9 million in new funds were available annually.

6.4 CIP EVALUATION

IMPACT RATING (PRIORITY RANKING)

Because CTA’s capital investment needs exceed available capital funds, all projects that are included in the CIP are considered high priority. As part of the CIP solicitation process and in accordance with the TAM Policy, capital projects are assessed on the basis of the projected impact on three primary factors and several other key considerations:

- **Primary Factors:** Safety & Security, Customer Service & Accessibility, Operations & Maintenance
Other Key Considerations: Risk avoidance, regulatory compliance, constructability & staging (inc. capital program continuity), opportunities for innovation, and community impacts

Non-expansion capital projects are evaluated into priority tiers, with “P1” meaning “Priority 1”, or highest priority. Expansion projects are evaluated through the regional planning process (see Section 6.2.3).

Table 14: FY2021-2025 CIP Project Impact Evaluation Rankings Summary

<table>
<thead>
<tr>
<th>CAPITAL PROJECT</th>
<th>SAFETY &amp; SECURITY</th>
<th>CUST. SERVICE</th>
<th>OPS &amp; MNTCE</th>
<th>OTHER KEY CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform Bus Maintenance Activities</td>
<td>P2</td>
<td>P1</td>
<td>P2</td>
<td>Capital Program Continuity</td>
</tr>
<tr>
<td>Perform Mid-Life Bus Overhaul</td>
<td>P2</td>
<td>P1</td>
<td>P1</td>
<td>Capital Program Continuity, Accessibility, Technology/Innovation</td>
</tr>
<tr>
<td>Replace Buses</td>
<td>P2</td>
<td>P1</td>
<td>P1</td>
<td>Capital Program Continuity, Accessibility, Technology/Innovation</td>
</tr>
<tr>
<td>Perform Rail Car Overhaul</td>
<td>P2</td>
<td>P1</td>
<td>P1</td>
<td>Capital Program Continuity</td>
</tr>
<tr>
<td>Perform Rail Car Maintenance Activities</td>
<td>P2</td>
<td>P1</td>
<td>P1</td>
<td>Capital Program Continuity</td>
</tr>
<tr>
<td>Purchase Rail Cars</td>
<td>P2</td>
<td>P1</td>
<td>P1</td>
<td>Capital Program Continuity, Accessibility, Technology/Innovation</td>
</tr>
<tr>
<td>Rehabilitate Blue Line - O'Hare Branch</td>
<td>P1</td>
<td>P1</td>
<td>P1</td>
<td>Accessibility, Community Impacts</td>
</tr>
<tr>
<td>North Main Line - RPM</td>
<td>P1</td>
<td>P1</td>
<td>P1</td>
<td>Capital Program Continuity, Accessibility, Community Impacts</td>
</tr>
<tr>
<td>Forest Park Branch – Phase I</td>
<td>P1</td>
<td>P1</td>
<td>P1</td>
<td>Capital Program Continuity, Accessibility, Community Impacts</td>
</tr>
<tr>
<td>Green Line Improvements</td>
<td>P2</td>
<td>P1</td>
<td>P1</td>
<td></td>
</tr>
<tr>
<td>Replace/Upgrade Power Distribution and Signals</td>
<td>P1</td>
<td>P1</td>
<td>P1</td>
<td></td>
</tr>
<tr>
<td>Infrastructure Safety &amp; Renewal Program</td>
<td>P1</td>
<td>P1</td>
<td>P1</td>
<td></td>
</tr>
<tr>
<td>Rehabilitate Rail Stations</td>
<td>P2</td>
<td>P2</td>
<td>P2</td>
<td>Accessibility, Community Impacts</td>
</tr>
<tr>
<td>Improve Facilities - Systemwide</td>
<td>P2</td>
<td>P2</td>
<td>P2</td>
<td></td>
</tr>
<tr>
<td>Information Technology</td>
<td>P2</td>
<td></td>
<td></td>
<td>Technology/Innovation</td>
</tr>
<tr>
<td>Implement Security &amp; Communication Projects</td>
<td>P1</td>
<td></td>
<td></td>
<td>Technology/Innovation</td>
</tr>
<tr>
<td>Equipment and Non-Revenue Vehicles Replacement</td>
<td>P2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signal Priority &amp; Modernization (Ashland Ave.)</td>
<td>P2</td>
<td></td>
<td></td>
<td>Technology/Innovation</td>
</tr>
</tbody>
</table>

BENCHMARK / MODEL COMPARISON

The TERM Lite model (see Section 6.2.2) produces hypothetical investment scenarios based on asset conditions, replacement costs, financial constraints, and assumptions regarding the relative priority criteria weightings of different types of assets (i.e. their impact on Safety, number of riders impacted, and so on). This functionality provides a helpful cross-check for overall programmatic allocations amongst asset categories in the CTA CIP as shown in Figure 16.
Figure 17: Comparison of TERM Lite Model Estimation and FY2020-24 CIP Funds

CIP 2020-2024
- Infrastructure: 53%
- Railcar: 24%
- Bus: 13%
- Comms/IT: 2%

TERM Lite 2020-2024
- Infrastructure: 57%
- Railcar: 22%
- Bus: 9%
- Comms/IT: 11%

Transit Asset Management Plan
Chicago Transit Authority
September 2021
TAM IMPLEMENTATION STRATEGY

625.25 (b) A TAM Plan must include: (6) A provider’s TAM plan implementation strategy

625.25 (b) A TAM Plan must include (8) A summary or list of the resources, including personnel, that a provider needs to develop and carry out the TAM plan;

625.25 (b) A TAM Plan must include (9) An outline of how a provider will monitor, update, and evaluate, as needed, its TAM Plan and related business practices, to ensure the continuous improvement of its TAM practices

7.1 BRIEF HISTORY OF CTA TAM ACTIVITIES

As a legacy system – with some assets dating to the late 1800s still in service, and numerous replacement cycles completed for other assets – CTA has incrementally developed many fundamental asset management practices as a matter of necessity over the course of decades. The following timeline of key modern-era activities provides context for the present Transit Asset Management framework at CTA:

- **1992-1994**: CTA conducted a comprehensive engineering review, producing an asset inventory and capital needs assessment to guide maintenance and capital renewal activities.
- **2001-2008**: CTA and its Capital Program Management consultant developed and maintained a rolling 20-year capital needs assessment for Infrastructure and Facilities.
- **2007-2008**: CTA completed initial deployment of the new Maintenance Management Information System (MMIS), the enterprise asset management system for managing the vehicle fleet.
- **2009-2016**: CTA, Metra, and Pace coordinated with the Regional Transportation Authority in the development of a regional capital needs analysis and “Capital Optimization Support Tool” based on the Transit Economic Requirements Model (TERM).
- **2009-Present**: CTA began regular and active participation in the State-of-Good-Repair roundtable meetings hosted by the Federal Transit Administration.
- **2012-2013**: CTA’s Capital Program Manager conducted comprehensive Facilities Condition Assessments at CTA maintenance facilities and substations.
- **2012-Present**: CTA began a multi-year effort to re-implement the Infor-based work order system, with a key goal of migrating various maintenance management systems in use by different departments in Power & Way and Facilities Maintenance into a single enterprise asset management system.
- **2016-2017**: CTA retained WSP USA, Inc. to perform a gap assessment of CTA’s asset management practices compared to best practices, provide a recommended program of asset management improvement initiatives, and develop CTA’s first TAM Plan in anticipation of the TAM Final Rule.
- **2018**: A dedicated Transit Asset Management team is formally established and staffed within CTA’s Performance Management department; first FTA-compliant TAM Plan issued.
7.2 **CTA’S TAM STRATEGY**

CTA’s organizational approach to TAM can be summarized as a decentralization of core asset management functions to asset owners, with program monitoring, coordination, and support provided by a small, independent team dedicated to TAM (see also Section 5)\(^{24}\). This decentralized approach is justified based on the large scope and scale of CTA’s asset base.

The dedicated TAM team is staffed within the Performance Management department, which performs a variety of operational and data analysis and custom reporting to support all levels of CTA management. Having the TAM program coordinated from this department reflects the overarching strategy of CTA’s TAM program: **Improving the availability and quality of information for asset owners and policy-makers to optimize the allocation of maintenance and capital investment resources.**

7.3 **TAM FOCUS AREAS**

In support of this strategy, CTA is pursuing a variety of actions within three tactical focus areas, as informed by the best practices gap assessment and recommended improvement actions.

7.3.1 **ONGOING OF CTA’S TAM FRAMEWORK**

Completion and adoption of this Transit Asset Management Plan and accompanying Transit Asset Management Policy provide the foundation for CTA’s asset management framework. The Plan and Policy establish TAM as a key management framework to achieve and maintain a state of good repair, and lays out key activities and departmental ownership. The expectations and goals defined in the Policy and the practices described in the Plan also provide a template against which CTA’s management practices can be compared on an ongoing basis to identify gaps.

**PLANNED & ONGOING ACTIVITY: STANDARDS DEVELOPMENT**

A lack of standards can result in various asset management challenges, such as confusion over the use of certain terminology, a lack of data compatibility between uses and systems, and so on. In order to improve the long run integrity and usability of asset-related data, CTA will prepare documentation of key asset data standards, in order to codify and standardize CTA’s practices with respect to:

- Asset hierarchy, identification and classification rules
- Minimally required attributes by asset type, and how they’re stored
- Condition rating calculations

**PLANNED & ONGOING ACTIVITY: IMPROVED TAM COMMUNICATION CHANNELS**

In accordance with the TAM policy, important TAM documentation, analysis, reports, links, and other information will be made available to all CTA employees via an internal SharePoint site.

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\(^{24}\) As of October 2018, the TAM team is staffed with one Senior Manager, two analysts, and one vacancy.
Improvements in TAM communication also include the use of visualization tools to represent complex, multi-variable information and making these available to a broader audience.

**PLANNED & ONGOING ACTIVITY: CONDITION RATING PROCESSES**

As described in Section 4.2.1 and Appendix C, CTA has developed a station and facility component hierarchy for TAM Condition Rating purposes. This will establish a consistent methodology for determining overall facility conditions and deficiencies in a manner that complies with guidelines issued by the FTA. Ratings are being performed by CTA subject matter experts in the Facilities trades, structural inspections, and other groups. A minimum of 25% of facilities will be rated according to the new methodology by Dec 31, 2018, with all facilities fully rated no later than Dec 31, 2021. Thereafter, all facility condition rating scores will be reviewed and updated as appropriate at least every four years.

**EAM SYSTEM ENHANCEMENT**

Further development and input are required to ensure CTA is obtaining the maximum possible benefit from its investments in Enterprise Asset Management (EAM) systems.

**ONGOING ACTIVITY: COMPLETE THE MIGRATION OF FIXED ASSETS INTO INFOR EAM**

CTA is nearing completion of a multi-year effort to migrate the management of its major fixed assets (Power & Way, Facilities) into the Infor EAM system. This includes the creation of hierarchically-structured asset records, and the configuration of scheduled maintenance to automatically generate inspection and preventive maintenance work orders according to planned intervals.

As of early 2020, the key remaining assets whose migration into Infor is ongoing are:
• Signals
• Subway Life Safety and ROW Traction Power
• Facilities (Facilities Maintenance assets are fully created; configuration of preventive maintenance is ongoing)

PLANNED ACTIVITY: POPULATE KEY ATTRIBUTES IN INFOR EAM

While hierarchical asset systems are largely built out and assets are identified in a consistent fashion, there remain significant unutilized capabilities within Infor EAM to store essential asset attributes that facilitate improved asset management analyses. Accurately and consistently populating attributes across tens of thousands of assets will be an extended task, albeit with significant long term benefits. Such work will include building out linear references for right-of-way assets, including asset age/installation dates, storing key measurements and other technical parameters, etc.

PLANNED AND ONGOING ACTIVITY: DEVELOP ADDITIONAL TOOLS FOR MAINTENANCE AND DEFECT ANALYSIS

Data visualizations and dashboards are crucial tools to convey a large quantity of dense information to CTA asset managers. Such interactive tools may take the form of “canned” or built-in reports from EAM systems, or may stand alone and draw on the underlying data from EAMs. The levels of development of such tools vary considerably within CTA by function and system.

The CTA Performance Management department, of which the TAM team is a part, is in progress developing interactive dashboards and maintenance analysis tools for Bus and Rail Vehicle Maintenance based on data from MMS and operations management systems. Going forward, similar capabilities will be developed for Facilities Maintenance and Power & Way.

Infrastructure assets present unique challenges and opportunities for data analysis and visualization. These assets typically function as elements in larger systems of assets that extend over a broad geographic area. It is therefore preferable to perform analysis and reporting of these assets visually, rather than through large tables of numbers. CTA is advancing development of the following methods of visual asset representation:

• Integration between Infor EAM and its Geographic Information System (GIS), so that asset attributes, defects, and other factors can be visualized and analyzed geospatially;
• Linear representation, which allows for the display of multiple assets and their attributes aligned to a linear reference system.

Figure 19: Example GIS Visualization of Asset Condition Attributes
7.3.3 CAPITAL INVESTMENT DECISION SUPPORT

ONGOING ACTIVITY: CAPITAL NEEDS SOLICITATION ADVANCEMENTS

CTA’s annual CIP Solicitation process has historically requested capital project requests in the same format, irrespective of whether the request entailed a state-of-good-repair asset replacement need, a major expansion project, or other forms of capital expense. Over time, CTA will align its CIP solicitation with its TAM capital asset inventory for more integrated state-of-good-repair capital investment analysis.

In practice, this means related capital project requests directly to one or more capital assets, with their deficiency reflected in an outstanding investment need and in a commensurate condition rating. Additionally, CTA is developing tools and dashboards to aid in the communication of CTA’s capital needs and programming (see e.g. Sections 6.2.1 and 6.3).

ONGOING ACTIVITY: FURTHER DEVELOPMENT OF MODELING TOOLS (TERM LITE)

As a result of CTA’s multi-year collaboration with the Regional Transportation Authority (RTA), Metra, and Pace, CTA maintains a capital asset inventory in a modified instance of TERM Lite, the capital decision support tool provided by the FTA. This inventory and tool have provided various outputs and benefits to date, including informing the regional conversation on transit capital funding needs and benchmarking for CTA’s CIP development process (see Section 6.2.2).

CTA will continually review and update of the inventory, ULB assumptions, and replacement cost assumptions used in the model. There are nonetheless gaps, assumptions, and other issues in the current capital asset inventory data that limit the applicability of outputs from the TERM Lite model outside of very high-level programmatic analysis. Additionally, for many asset classes, the TERM Lite inventory does not align with the asset hierarchies of CTA’s EAM systems. These discrepancies introduce long-term risks to accuracy and integrity, and make periodic data updates very labor-intensive. The following activities will address these issues:

- Aligning asset types, asset delineation, and asset identification to prepare for future data updates by data exports from Infor EAM and MMIS.
- Adding improved component level detail for Track (e.g., running rail, crossties), Structures (Sub- vs. Super-structure), and Facilities (Elevators/Escalators, MEP, Building Envelope, etc.).
- Continuing the build-out Communications and IT Systems as capital assets with lifecycle investment needs.
- Programming expansion assets to model proposed and planned expansion projects.