



Connecticut Department of Transportation

2022-2025

CT transit

CT rail

CT fastrak

CT ferry

Public Transportation Transit Asset Management Plan

Tier I Plan in accordance with 49 CFR §625.5



September 2022

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**STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546**



**Office of the
Commissioner**

September 30, 2022

Mr. Peter Butler, Acting Regional Administrator
U. S. Department of Transportation
Federal Transit Administration
Kendall Square
55 Broadway, Suite 920
Cambridge, MA 02142-1093

Dear Mr. Butler:

Subject: Notification of Compliance with 49 CFR 625
Transit Asset Management Rule
2022 Public Transportation Transit Asset Management Plan (Tier 1 Providers)
2022 Transit Asset Management Group Plan (Tier 2 Providers)

The Connecticut Department of Transportation (Department) has completed update of the Transit Asset Management Plans (TAMPs) for Tier 1 and Tier 2 Providers to comply with the Federal Transit Administration’s (FTA’s) deadline of September 30, 2022.

Both TAMPs include updates for State of Good Repair (SGR) performance goals that pertain to FTA’s SGR measures for revenue vehicles, service vehicles, rail guideway and facility asset classes, as well as progress on key TAM implementation activities since 2018.

TAMPs will be shared with Connecticut’s eight Metropolitan Planning Organizations for inclusion into their amended Metropolitan Transportation Plans.

Should you have any questions, please contact Ms. Sharon Okoye, Public Transportation Asset Management Lead, at Sharon.Okoye@ct.gov.

Sincerely,

Digitally signed by Joseph J. Giulietti
DN: cn=Joseph J. Giulietti, o=DOT, ou=Commissioner's Office,
c=US

Joseph J. Giulietti
Commissioner

cc: Mr. Matthew Keamy, FTA Program Management Office
Transit Districts
Town of Mansfield, Mashantucket Pequot Nation

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Message from the Commissioner

As Commissioner of the Connecticut Department of Transportation, I am pleased to present the 2022 Public Transportation Transit Asset Management Plan. This plan demonstrates a continued strong commitment toward achieving a State of Good Repair for all aspects of our transportation system.

Connecticut's multimodal transportation system supports state, local and regional economies by enabling the efficient movement of people, goods, and services. Connecticut's transportation system provides an important link between northern New England and New York, New Jersey and the Mid-Atlantic states. The transportation system also links our communities by connecting our neighborhoods, towns, and cities. In order for Connecticut's economy to function properly and continue to grow, the transportation system needs continued and consistent investment. The Connecticut Department of Transportation remains committed to keeping the state moving. Despite the many challenges posed by the COVID-19 pandemic in recent years, construction was never shut down, State of Good Repair projects continued to move forward, and technology allowed the workforce to adapt and innovate.

This Public Transportation Transit Asset Management Plan has been created and is consistently updated in partnership with the Departments' statewide public transportation service providers, to achieve a systematic and comprehensive asset management system for the State's public transportation assets to provide safe and reliable service for the citizens of Connecticut.

The Department continues to make significant progress in advancing the condition of our transportation system, especially with the increase in funding provided by the Bipartisan Infrastructure Law. Implementation of this plan aligns well with the Department's priority to maintain and preserve the transportation system.

A handwritten signature in black ink, reading "Joseph J. Giulietti".

Joseph J. Giulietti

Commissioner

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Disclaimer

The Connecticut Department of Transportation (CTDOT) has prepared this Transit Asset Management Plan (TAMP) in accordance with 49 CFR 625.5 and pursuant to the further guidance and direction of the Federal Transit Administration. The TAMP presented here is our plan to ultimately achieve a systematic and comprehensive asset management system for Connecticut's public transportation assets.

In some cases asset condition reported herein are based on professional judgement in the absence of technical data.

CTDOT will continue to perform inspections of its public transportation assets and will further update the TAMP periodically. Future TAMP updates will revise investment recommendations as the asset condition data requires.

For further information or questions about this document, please contact Sharon Okoye at 860-594-2367 or Sharon.Okoye@ct.gov.

Connecticut Department of Transportation

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Connecticut Department of Transportation Public Transportation Transit Asset Management Plan

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DISCLAIMER: The data presented here is for informational purposes only. It is not to be used in any legal manner or proceedings. CTDOT makes every effort to ensure the data is as accurate and current as possible.

Neither the State of Connecticut, nor the Connecticut Department of Transportation, nor any of its employees, shall be held liable or responsible for any errors or omissions in data.

The U.S. Government and the Connecticut Department of Transportation do not endorse products or manufacturers.

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List of Acronyms

AIM	Asset Inventory Module
ARAN	Automatic Road Analyzer
ARSA	Amended and Restated Service Agreement
BIL	Bipartisan Infrastructure Law
BMS	Bridge Management System
CPI	Consumer Price Index
CSS	Context-Sensitive Solutions
CTC	Centralized Traffic Control
CTDOT	Connecticut Department of Transportation
EMU	Electric Multiple Units
FAST	Fixing America's Surface Transportation
FHWA	Federal Highway Administration
FMS	Facilities Management Solution
FTA	Federal Transit Administration
Group-TAMP	Transit Asset Management Group Plan
HL	Hartford Line
IIJA	Infrastructure Investment & Jobs Act
IRI	International Roughness Index
ITS	Intelligent Transportation Systems
LRTP	Long Range Transportation Plan
LCP	Life Cycle Planning
MAP-21	Moving Ahead for Progress in the 21st Century
MCI	Motor Coach Industries
MDBF	Mean Distance Between Failures
MNR	Metro North Railroad
MOW	Maintenance of Way

MPO	Metropolitan Planning Organization
MTA	Metropolitan Transit Authority
NBI	National Bridge Inventory
NBT	New Britain Transportation Company
NEC	Northeast Corridor
NHL	New Haven Line
NTD	National Transit Database
PT-TAMP	Public Transportation Transit Asset Management Plan
OCS	Overhead Contact System
PCI	Pavement Condition Index
PI	Prioritization Index
PTC	Positive Train Control
RBIM	Railroad Bridge Inspection Manual
RBMP	Railroad Bridge Management Program
ROW	Right-of-Way
SLE	Shore Line East
SGR	State of Good Repair
SQL	Structured Query Language
STIP	Statewide Transportation Improvement Program
TAM	Transit Asset Management
TAPT	Transit Asset Prioritization Tool
TCRP	Transit Cooperative Research Program
TERM	Transit Economic Requirements Model
TYNA	Twenty Year Needs Assessment
ULB	Useful Life Benchmark

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Chapter 1

Introduction

The Connecticut Department of Transportation has created this Transit Asset Management Plan to document the agency's asset management processes and policies, summarize the inventory and condition of transit assets, prioritize State of Good Repair investments, and construct a blueprint for transportation asset management improvements moving forward. This document is also designed to meet Federal Transit Administration's transit asset management requirements. This document builds on past practices and accomplishments in maintaining Connecticut's transportation infrastructure while also emphasizing the importance of implementing a plan to maintain our infrastructure today and in the future.



Welcome

Transit asset management (TAM) is a strategic and systematic process of taking care of assets, with a focus on both engineering and economics and is based upon collection of quality data. The TAM process identifies a structured sequence of work to better maintain transit capital assets in a State of Good Repair (SGR) over their lifecycle at a minimum cost.

In Connecticut, the practices of asset management are needed to address the condition of our infrastructure as many of our assets have aged beyond their intended life expectancy. This aging infrastructure combined with increased demands on the transportation network and limited funding strongly substantiates the need to implement asset management practices.

The Connecticut Department of Transportation (CTDOT) has created this Public Transportation Transit Asset Management Plan (PT-TAMP) to summarize CTDOT's transit assets, lay out the agency's asset management processes, and identify priority SGR investments. The PT-TAMP enhances CTDOT's ability to communicate with the Metropolitan Planning Organizations (MPOs) and State Legislators regarding the performance of the existing transit system and benefits of strategic investments to achieve and maintain the system in SGR. CTDOT is also the sponsor of a group plan for Tier II transit service providers in Connecticut.

A separate document has been developed to address the highway assets maintained by CTDOT as mandated by the Federal Highway Administration. Eventually, CTDOT intends to merge the documents into a comprehensive asset management plan for the entire department.

Federal Legislative Context

Federal authorization (initially Moving Ahead for Progress in the 21st Century or MAP-21 and more recently Fixing

America's Surface Transportation or FAST Act) requires that recipients and subrecipients of federal financial assistance develop TAM plans.

Transit providers may be required to either develop their own TAM plan or participate in a Group TAM plan depending on whether they are Tier I or Tier II. In 49 CFR 625.5, the Federal Transit Administration (FTA) defines Tier I and Tier II providers:

- *Tier I provider* means a recipient that owns, operates, or manages either (1) one hundred and one (101) or more vehicles in revenue service during peak regular service across all fixed route modes or in any one non-fixed route mode, or (2) rail transit.
- Tier II provider means a recipient that owns, operates, or manages (1) one hundred (100) or fewer vehicles in revenue service during peak regular service across all non-rail fixed route modes or in any one non-fixed route mode, (2) a subrecipient under the 5311 Rural Area Formula Program, (3) or any American Indian tribe.

Each provider, Tier I or Tier II, must designate an accountable executive who is responsible for accepting and approving the TAM plan and SGR targets.

A Group TAM plan must include a list of participants in the plan. The sponsor must coordinate development of a Group TAM plan with each participant's accountable executive and must make the completed plan available to all participants.

A TAM plan must cover a period of four years. The initial TAM plan was required to be completed by October 1, 2018, and the plan must be updated every four years.

Tier I and Group Plan Requirements

A sponsor must develop a Group TAM plan for Tier II transit providers, while Tier I providers must develop their own TAM plans. Tier II providers may also choose to forgo the Group TAM plan and develop individual plans. A Tier I TAM plan must include the following nine elements, while a Group plan must include only elements 1 thru 4:

1. Capital asset inventory
2. Condition assessment
3. Description of analytical processes or decision support tools
4. Investment prioritization
5. TAM and SGR policy
6. TAM plan implementation strategy
7. Key TAM activities
8. List of resources to implement the plan
9. Outline of how a provider will monitor, update, and evaluate the plan

Agency Overview

CTDOT owns, operates and maintains a multi-modal transportation network composed of highway assets and transit assets. CTDOT owns or subsidizes nearly all of Connecticut’s public transportation services, including commuter rail, bus, bus rapid transit, paratransit, and ferry services. CTDOT is a Tier I agency and provides 39 million annual passenger trips on bus and ADA service and more than 42 million annual passenger trips on rail service. The ferry service moves over 90,000 passengers annually.

CTDOT is unusual compared to other DOT’s in that CTDOT is a transit service provider within the State of Connecticut. As part of its service delivery model, CTDOT brands its own transit services throughout the state for bus, ferry, and rail operations.

CTDOT has direct capital responsibility for billions of dollars of transit assets in Connecticut, but contracts out the operation of transit service to private companies. To meet the requirements for developing a TAM plan, established in the final rule on TAM by FTA, CTDOT is obligated to collect data, manage, and report on transit assets throughout the state.

The following sections summarize CTDOT transit services.

Bus Network



CTDOT owns the local bus systems in Hartford, New Haven, Stamford, Waterbury, New Britain, Bristol, Meriden and Wallingford, and operates them under the CT*transit* brand name. CTDOT has a contract with First Transit to operate the services in Stamford, New Haven and Hartford and with other private providers for services in New Britain, Bristol, Waterbury, Meriden and Wallingford. In all eight of these service areas the state is fully responsible for all operating deficits and capital costs. Additionally, CTDOT contracts with First Transit and four private companies for the operation of express bus services to Hartford.

CTDOT Transit Services

Bus Network



Ferry



Rail



CTtransit Hartford Division operates 48 local, 16 express bus routes, and 4 connector shuttles. Local routes operate 7 days a week, serving 26 towns in the Capital Region. CTtransit's Hartford Division makes connections with Middletown Area Transit, and the CTtransit New Britain division.

CTtransit New Haven Division operates 26 local routes, connecting with other state-owned or subsidized bus services in Meriden, Wallingford, Milford, and the lower Naugatuck Valley areas, as well as with the New Haven Line and Shore Line East rail services. Service is available in the New Haven Division 7 days a week.

CTtransit Stamford Division operates 19 local bus routes. CTtransit Stamford buses connect with other state-subsidized services in Norwalk, with the New Haven Line in several locations, the Harlem Line on Metro-North Railroad, and with Bee-Line buses in Westchester County New York. The Stamford Division also operates the I-BUS, an express service between downtown Stamford and White Plains, New York. Service is available in the Stamford Division 7 days a week.

CTtransit Waterbury Division operates fixed route and ADA paratransit services in the Waterbury area through a contract with the North-East Transportation Company Incorporated, LLC. Fixed route and paratransit bus service is provided to Waterbury, Watertown, Middlebury, Wolcott, Prospect and Naugatuck Monday through Saturday.

CTtransit New Britain Division and Bristol Division are serviced through contract with New Britain Transportation Company (NBT) which operates 10 bus routes in Berlin, New Britain, Cromwell, Newington, Plainville, Bristol and Meriden. Fixed route bus service operates Monday through Saturday. Also, DATTCO operates fixed route service in New Britain on the East Street and South Street routes through contracted services. Complementary Americans with Disabilities Act (ADA) service is operated by First Transit and administered by the Greater Hartford Transit District.

CTtransit Meriden Division and Wallingford Division operates fixed route services in their respective areas

through a contract with North-East Transportation Company Inc. LLC, with 4 local routes. Complementary ADA services are also operated by North-East Transportation Company Inc. LLC.

CTfastrak

CTfastrak, one of Connecticut's primary transit system assets is a dedicated bus rapid transit line along a 9.4-mile corridor between downtown New Britain and downtown Hartford. The system was launched in March 2015 and operates 7 days a week under CT*transit* Hartford. CTfastrak permits bus access at intermediate points, so that circulator buses that provide service on routes in surrounding neighborhoods can then use the busway corridor, thus providing a one-seat ride. In addition, CTfastrak includes express, shuttle, circulator, and connecting feeder bus service to surrounding Towns.

Ferry

CTferry

CTDOT owns and operates two historic Connecticut River ferries; one that connects Rocky Hill to Glastonbury (CT Route 160) and another that connects Chester to Hadlyme (CT Route 148). The Rocky Hill-Glastonbury Ferry is a tug (Cumberland) and barge (Hollister III) operation that can carry 3-4 cars at a time. The nation's oldest continuously operating ferry service crosses the Connecticut River between Rocky Hill and Glastonbury.

The Rocky Hill - Glastonbury Ferry is a unique element in the Region's transportation services. The ferry plays a special role in serving local vehicular traffic between Rocky Hill and Glastonbury, and it plays an important role for bicyclists. The ferry operates seasonally from April 1st to Nov 30th, 7 days a week.

The Chester - Hadlyme Ferry (Selden III) is a typical double ended ferry boat that can carry 9 cars and 49 passengers between Chester and Hadlyme. The Selden III, was built in 1949. It is an open, self-propelled craft, 65 feet long and 30

feet wide. The ferry operates seasonally from April 1st to Nov 30th, 7 days a week.

Rail Network



The rail network in Connecticut consists of 628.5 miles of guideway, divided into two main classifications: Passenger Rail and Freight Rail. CTDOT has varying levels of responsibility to oversee the safe and efficient movement of trains across all rail lines throughout the State that carries people, goods, and services on a daily basis.

CTDOT provides three main passenger rail services across Connecticut that serve numerous towns across most regions. These services are the New Haven Line, Shore Line East (SLE), and the Hartford Line (HL), and are all governed by unique contract agreements. These services collectively within the State of Connecticut are referred to as CT-rail.

The New Haven Line is a commuter rail service that has been in existence since 1983, operated under an agreement called the Amended and Restated Service Agreement (ARSA). CTDOT is part of this joint operating agreement with the Metropolitan Transportation Authority (MTA), which established Metro North Railroad (MNR) in part to operate service along the New Haven Line and maintain infrastructure along the 72-mile segment between New Haven and Grand Central in New York, along with three additional Branch Line Services (New Canaan, Danbury, and Waterbury). As part of the agreement, each agency owns fixed infrastructure along the route within their respective States, and splits ownership of the rolling stock that operates along these routes. MNR additionally operates service and maintains infrastructure along the Harlem Line and Hudson Line in New York State for the MTA. CTDOT and MNR are subject to FTA's TAM requirements for infrastructure they hold capital responsibility to regarding these services.

SLE is a commuter rail service that originated in 1990, providing service along a portion of the Northeast Corridor

(NEC) from New Haven to New London. The service is fully subsidized by CTDOT, with Amtrak under contract to operate the service as well as perform maintenance throughout the system. Amtrak owns all fixed infrastructure along this route, while CTDOT owns the rolling stock and is the lessee to five of the seven SLE stations that are owned by Amtrak. While Amtrak is not subject to FTA regulations for the TAM program, CTDOT is still obligated to report on its owned rolling stock and stations that are leased to them.

The Hartford Line is a high-speed intercity passenger rail system that opened in June of 2018, providing expanded service between New Haven, Hartford, and Springfield, MA. The new line provides up to 17 round trips per day along the 62 mile route and includes recent major infrastructure investment to upgrade the line to support frequent service. While Amtrak owns all fixed infrastructure along this route, CTDOT has supplemented significant investment into this corridor, and has a need to track infrastructure spending and asset condition to sustain levels of service. Because this line is defined by FTA as intercity, it is not subject to FTA TAM regulations.

CTDOT also owns five additional freight rail routes within Connecticut, and supports in total 10 different freight operators that run on a combination of state-owned and privately owned freight routes. Although CTDOT has a financial interest and some capital responsibility for freight rail networks, these assets are also exempt from FTA TAM requirements and are also not reflected within this initial plan. For more information on Asset Management for these assets, please refer to CTDOT's State Rail Plan and Freight Plan.

Agency Structure Regarding TAM

Organizational alignment and support for TAM is a key element for program success. The PT-TAMP-building and updating process itself brings together the agency's stakeholders, disciplines, and business processes to work towards a common understanding of the transportation asset management mission and objectives, explained in detail in Chapter 2.

CTDOT is organized into five bureaus: Engineering & Construction; Finance & Administration; Highway Operations; Policy & Planning; and Public Transportation. The Bureau of Engineering & Construction leadership initiated an effort in 2013 to implement TAM and develop a TAMP to improve decision-making processes throughout the agency.

As part of this effort, CTDOT designated key TAM roles, formed a TAM Steering Committee, and staffed a Transportation Asset Management Group. The current agency structure for TAM is presented in Figure 1-1. The Agency Sponsor for TAM is the Deputy Commissioner of Transportation and Chief Operating Officer. The Agency Chairperson for TAM is the Assistant Chief Engineer. The TAM Steering Committee includes representatives from the Commissioner's Office and all five bureaus. The role of each member of this committee is to support and recognize the value of TAM for CTDOT and the State of Connecticut. The Committee acts as a liaison to bureaus and divisions to ensure that each area's interests are properly represented and to ensure each area is supporting the TAM initiatives.

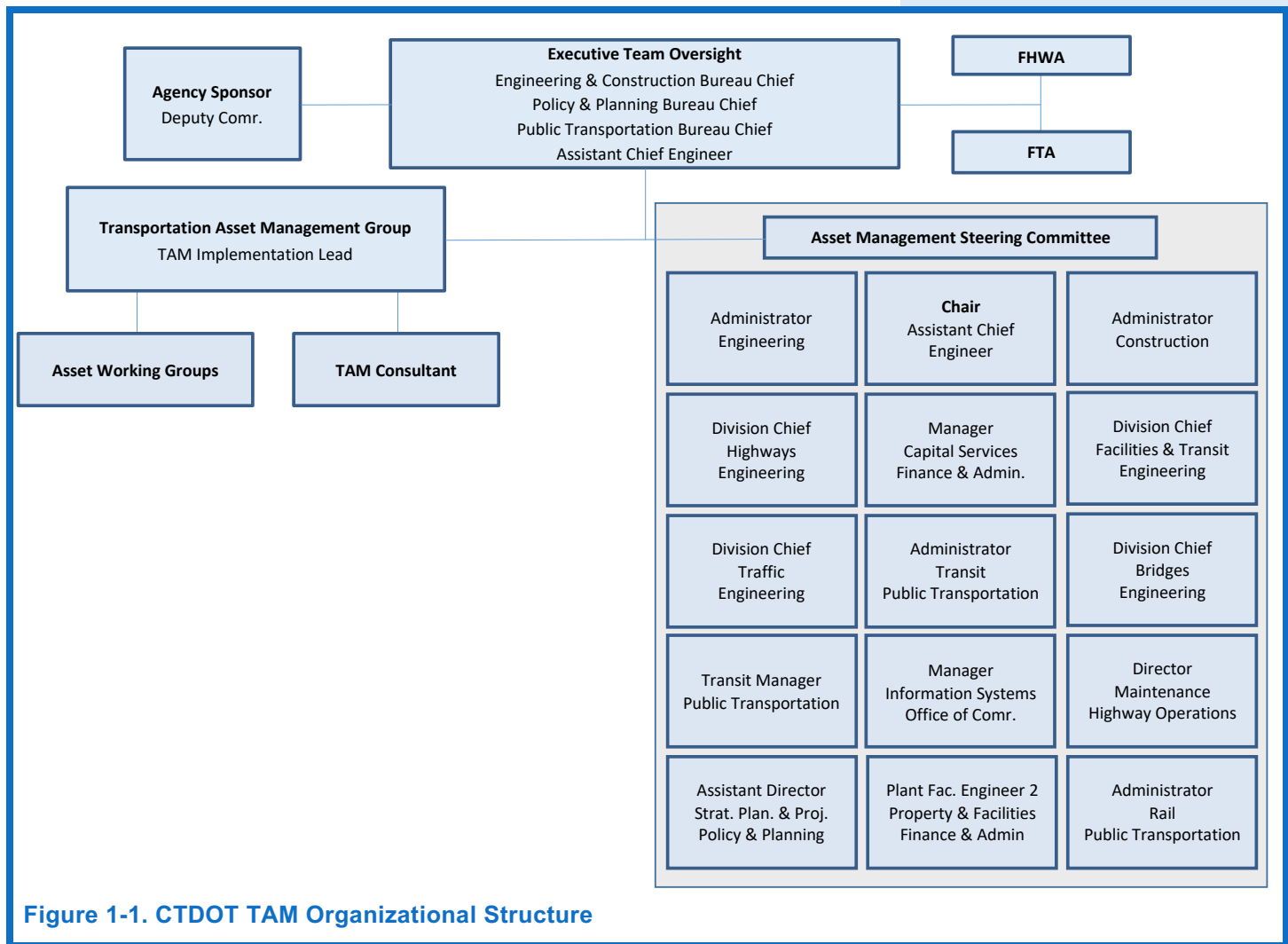


Figure 1-1. CTDOT TAM Organizational Structure

The Transportation Asset Management Group operates under the Assistant Chief Engineer position in the Bureau of Engineering and Construction and under the new Project Administration Unit established in 2019. The Transportation Asset Management Group was created as a result of the CTDOT’s commitment toward implementing asset management. The TAM Group includes a Transit Asset Management lead responsible for leading the preparation of the Tier I and Tier II TAM Plans, collaborating with contracted transit providers for National Transit Database (NTD) reporting requirements for PT-TAMP, and coordinating with the agency lead for future development of CTDOT’s multimodal TAM plan.

PT-TAMP

Purpose of the PT-TAMP

The PT-TAMP is a federally-required document intended to document TAM practices and processes at CTDOT. The plan will help CTDOT manage transit assets to enhance safety, reduce maintenance costs, increase reliability, and improve performance. TAM will help CTDOT maintain the transportation system in SGR with efficient use of financial resources. A summary of transit assets in this plan is shown in Figure 1-2.

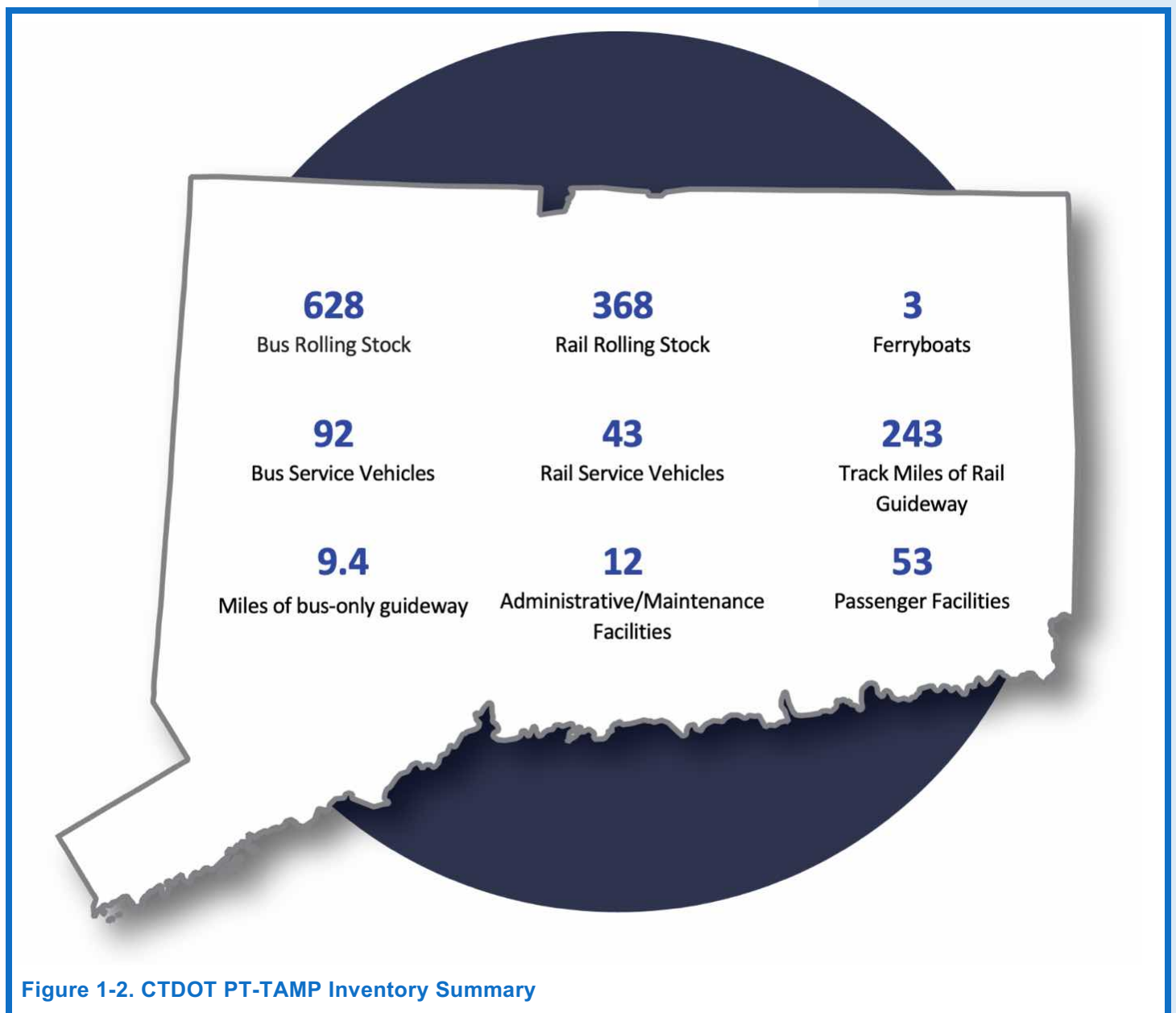


Figure 1-2. CTDOT PT-TAMP Inventory Summary

Scope of the PT-TAMP

CTDOT is a Tier I transit provider offering service across multiple modes, including bus, bus rapid transit, rail, and ferry. This PT-TAMP covers assets across the four categories defined by FTA: rolling stock, equipment, infrastructure, and facilities.

CTDOT, a multi-modal agency, has also completed its initial Highways Transportation Asset Management Plan in accordance with Federal Highway Administration (FHWA) requirements.

Awareness of other CTDOT plans, such as those listed at right, is important for context and alignment with the PT-TAMP.

PT-TAMP Update Process

The PT-TAMP update process began in 2021. A wide range of CTDOT organizational units and representatives from the contracted CTDOT transit service providers in addition to FTA were involved in the development of this PT-TAMP.

Inventory and condition information were updated with the latest available data, while predictions of future needs and conditions were developed using the most recent capital plan.

Asset fact sheets were also developed as part of the PT-TAMP building process to provide quick reference summaries for each asset highlighting the asset's inventory and condition, targets, and needs. Fact sheets for rolling stock, rail infrastructure, facilities, and equipment are in Appendix A.

This PT-TAMP is a living document that will be reviewed and updated every four years.

List of CTDOT Plans

- [Transportation Infrastructure Capital Plan Report, 2022-2026](#)
- [Statewide Transportation Improvement Program](#)
- [Statewide Long-Range Transportation Plan](#)
- [Strategic Highway Safety Plan](#)
- [State Freight Plan](#)
- [State Rail Plan](#)
- [Connecticut Active Transportation Plan](#)
- [CTDOT Highway TAMP](#)
- [CTDOT Americans with Disabilities Act \(ADA\) Transition Plan](#)
- [State Plan of Conservation and Development](#)

Chapter 2

Goals and Objectives

Identifying goals and objectives is an important step in developing transit asset management practices and processes at an agency. CTDOT has established agency-wide goals and objectives that apply across CTDOT divisions, districts, and modes of travel. These goals and objectives help focus agency operations, drive improved performance, and influence investments in transit assets. CTDOT's TAM goals and objectives constitute a commitment to maintaining assets in a state of good repair. This commitment will yield benefits for riders by improving transit service and for the agency by reducing costs.



Overview

CTDOT’s mission and vision are guiding principles that shape TAM policy and transit goals and objectives. Goals and objectives help define and guide the TAM program at CTDOT and are an integral part of the PT-TAMP. Goals are broad statements of ideas to reach a desired outcome or ideal state of the transit system in Connecticut. Objectives should be SMART: specific, measurable, achievable, realistic, and timely steps that will help make progress towards attaining those goals.

This chapter presents CTDOT’s mission, vision, and goals and objectives. The chapter also defines SGR and identifies existing state performance measures and TAM objectives that will be used to develop TAM policies.

Federal Requirements

FTA requires Tier I providers to include a TAM and SGR policy in their TAM Plan. FTA defines TAM policy as “a transit provider’s documented commitment to achieving and maintaining SGR for all of its capital assets. The TAM policy defines the transit provider’s TAM objectives and defines and assigns roles and responsibilities for meeting those objectives.”

SGR is defined by FTA as “the condition in which a capital asset is able to operate at a full level of performance.” The FTA final rule on transit asset management further defines SGR in §625.41:

“A capital asset is in a state of good repair if it meets the following objective standards:

- The capital asset is able to perform its designed function
- The use of the asset in its current condition does not pose an identified unacceptable safety risk
- The life-cycle investment needs of the asset have been met or recovered, including all scheduled maintenance, rehabilitation, and replacements.”



State of Good Repair

The condition in which a capital asset is able to operate at a full level of performance.

Goals and Objectives

The highest-level guiding principles at CTDOT are the vision and mission. These principles influence transportation goals and objectives across the agency.

Vision and Mission

Connecticut strives to achieve a nationally competitive transportation system that is multi-modal, resilient, and long-lasting; addresses capacity issues; and helps the economy.

CTDOT Vision & Mission

CTDOT's vision is to lead, inspire, and motivate a progressive, responsive team, striving to exceed customer expectations.

CTDOT's mission is to provide a safe and efficient intermodal transportation network that improves the quality of life and promotes economic vitality for the State and the region.

CTDOT's Bureau of Public Transportation has its own mission which closely aligns with the overall CTDOT mission.

Bureau of Public Transportation Mission

The **mission** of the **Bureau of Public Transportation** is for the development, maintenance, and operation of a safe and efficient system of motor carrier, rail facilities and maritime assets for the movement of people and goods, such as Bus Transit, Rail Operations, Ferries, State Pier Facilities and Ridesharing programs.

CTDOT Values

- Measurable results
- Customer service
- Quality of life
- Accountability & integrity
- Excellence

CTDOT's vision and mission are further detailed in the 2018 Long-Range Transportation Plan (LRTP) vision.

Long-Range Transportation Plan Vision

- The economy is strong because improved and sustained multimodal and intermodal transportation contribute to an environment in which businesses and people thrive.
- Travel is safe and high safety standards are sustained on all modes of transport.
- Transportation infrastructure is in a state of good repair.
- Transportation services provide efficient mobility for people and goods, both within and beyond state borders.
- Congestion is managed.
- The natural environment is protected, air quality is good, and energy is conserved.
- Urban, suburban, and rural centers are transformed into livable communities that provide opportunities for walking and bicycling and are enhanced by accessible transportation systems.

CTDOT views maintaining condition of its transportation infrastructure as critical to its mission. One of the key goals in the LRTP is:

- Infrastructure in a state of good repair to improve reliability and reduce costs to users.

Maintaining asset condition also supports other goals mentioned in the LRTP, including:

- Economic growth with efficient and effective transportation for people and goods
- Safe and secure travel for people and goods for all modes
- Resilient transportation systems

Maintaining transit assets in a SGR helps support CTDOT goals and TAM objectives. In addition to CTDOT's vision, mission, and LRTP goals, the agency has devoted particular attention to pursuing TAM policy and practices.

Long-Range Transportation Plan

CTDOT's federally required LRTP covers years 2018-2050 and serves as a framework for near- and long-term transportation decision making. The plan encourages performance-based planning and programming and supports the implementation of TAM at CTDOT.

Summary of TAM Objectives

CTDOT has adopted a set of TAM objectives that are aligned with the vision and mission of the agency. These objectives are helping to steer CTDOT as it develops, refines, and implements TAM policies, processes, and practices. CTDOT has also incorporated transit providers TAM objectives to ensure consistency and garner their further support of the states TAM program.

TAM Objectives

- Attain the best asset conditions achievable, given available resources
- Deliver an efficient and effective asset management program that preserves, expands, and modernizes the state's transportation infrastructure
- Enhance communications and ensure transparency about capital programming prioritization and investment decisions
- Achieve and maintain compliance with federal asset management rules
- Maintain federal and state funded assets in SGR
- Ensure safety of customers through asset management
- Pursue other funding sources to sustain CTDOT's TAM program

Performance measures, targets, and SGR modeling capabilities are being developed to help achieve CTDOT TAM objectives. These tools, systems, and practices are being linked so that CTDOT can operate more effectively and make progress towards federal requirements and state goals.

CTDOT currently has a performance measures initiative called "Inside CTDOT Data, Numbers, and Visualization", that provides a series of performance measure reports that focus on results and accountability. The measures link to CTDOT's core mission and are reviewed by CTDOT's Performance Measures Standing Committee to determine their usefulness in helping CTDOT make strategic decisions for managing its assets. The measures are communicated

to CTDOT through an online performance dashboard. In addition to monitoring existing Performance Measures related to asset management, CTDOT includes the TAM performance measures required by NTD in the Dashboard. The Dashboard has existing state and federal performance measures tied to Public Transit Assets, and can be found at: [Performance Measures \(ct.gov\)](#).

Applied to transit assets, the above goals and objectives translate into a commitment to make investments, where possible, to achieve and maintain an SGR for transit assets. These assets include revenue vehicles, equipment, infrastructure, and facilities. Asset inventory and condition are described in Chapter 3 Inventory and Condition.

CTDOT Bureau of Public Transportation plays a major role for supporting these objectives for transit assets. Further details on roles and responsibilities are included in Chapter 7 Implementation and Monitoring.

Chapter 3

Inventory and Condition

Inventory and condition data are the building block upon which investment decisions are made. Inventory and condition data are also valuable for communicating the extent of CTDOT's assets and the state of those assets. Accurate inventory and condition data support asset management practices such as predicting asset conditions, projecting funding needs, and prioritizing investments.



Overview

This chapter presents a summary of CTDOT's transit asset inventory and its condition. CTDOT's PT-TAMP addresses rail, bus, and ferryboat revenue vehicles, equipment, infrastructure, and rail and bus facilities.

Federal Requirements

FTA requires that a Tier I provider's TAMP include an inventory and condition assessment of all capital assets for which the provider has direct capital responsibility. The inventory and condition assessment must be at a level of detail sufficient to model asset condition and support investment prioritization.

As part of the TAM plan rule, transit providers are also required to set performance targets for performance measures defined by FTA in 49 CFR §625.43. These are listed below.

FTA SGR Performance Measures for Capital Assets

- **Rolling Stock:** The performance measure for rolling stock is the percentage of revenue vehicles within a particular asset class that have either met or exceeded their useful life benchmark (ULB). ULB is maximum age of an asset based on operational characteristics (age, mileage, environment) before it is replaced or enters into SGR backlog.
- **Equipment:** The performance measure for non-revenue, support-service and maintenance vehicles equipment is the percentage of those vehicles that have either met or exceeded their ULB.
- **Infrastructure:** The performance measure for rail fixed guideway is the percentage of track segments with speed restrictions.

Useful Life Benchmark

ULB is the maximum age of an asset based on operational characteristics (age, mileage, environment) before it is replaced or enters into SGR backlog.

- Facilities: The performance measure for facilities is the percentage of facilities within an asset class, rated below condition 3 on the FTA Transit Economic Requirements Model (TERM) scale.

Each year, a transit provider must set targets with a one-year horizon based on the most recent data and expected funding. These targets are reported annually to the NTD, as defined by 49 CFR Section 630. A provider must also coordinate with states and Metropolitan Planning Organizations (MPOs) in the setting of performance targets.

Connecticut PT-TAMP Assets

Connecticut’s multi-modal transportation system consists of a wide variety of physical assets, as depicted in Figure 3-1.

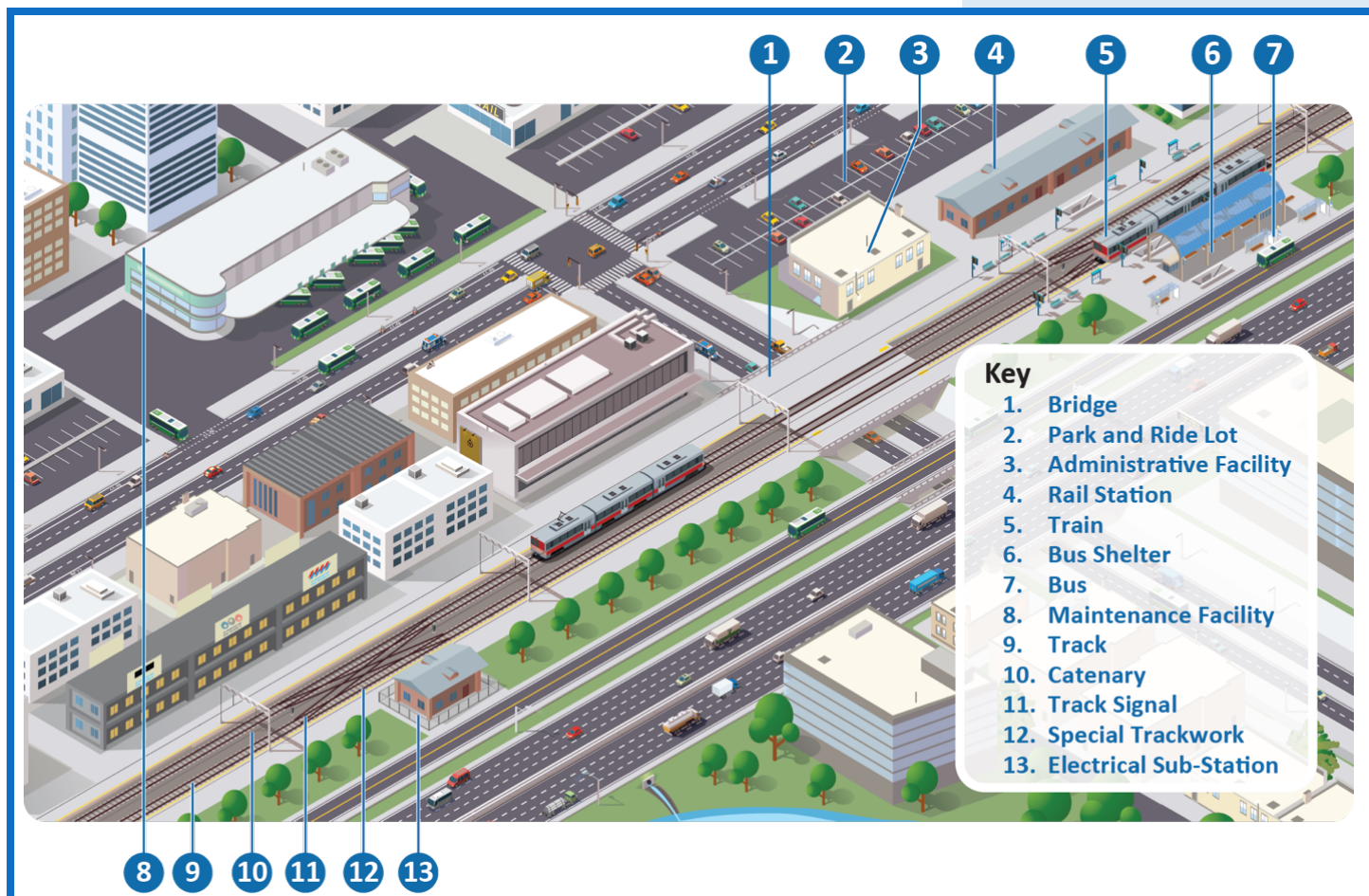


Figure 3-1. Transportation Assets in Connecticut

This plan focuses on four transit asset categories: rolling stock, equipment, infrastructure, facilities. These are the four asset categories defined by FTA and required for inclusion in the PT-TAMP. CTDOT has broken down the four asset categories into asset classes. CTDOT owns or operates rail, bus, and ferry passenger service; equipment; rail and bus rapid transit infrastructure; and passenger and maintenance facilities. The PT-TAMP asset hierarchy is presented in Figure 3-2.

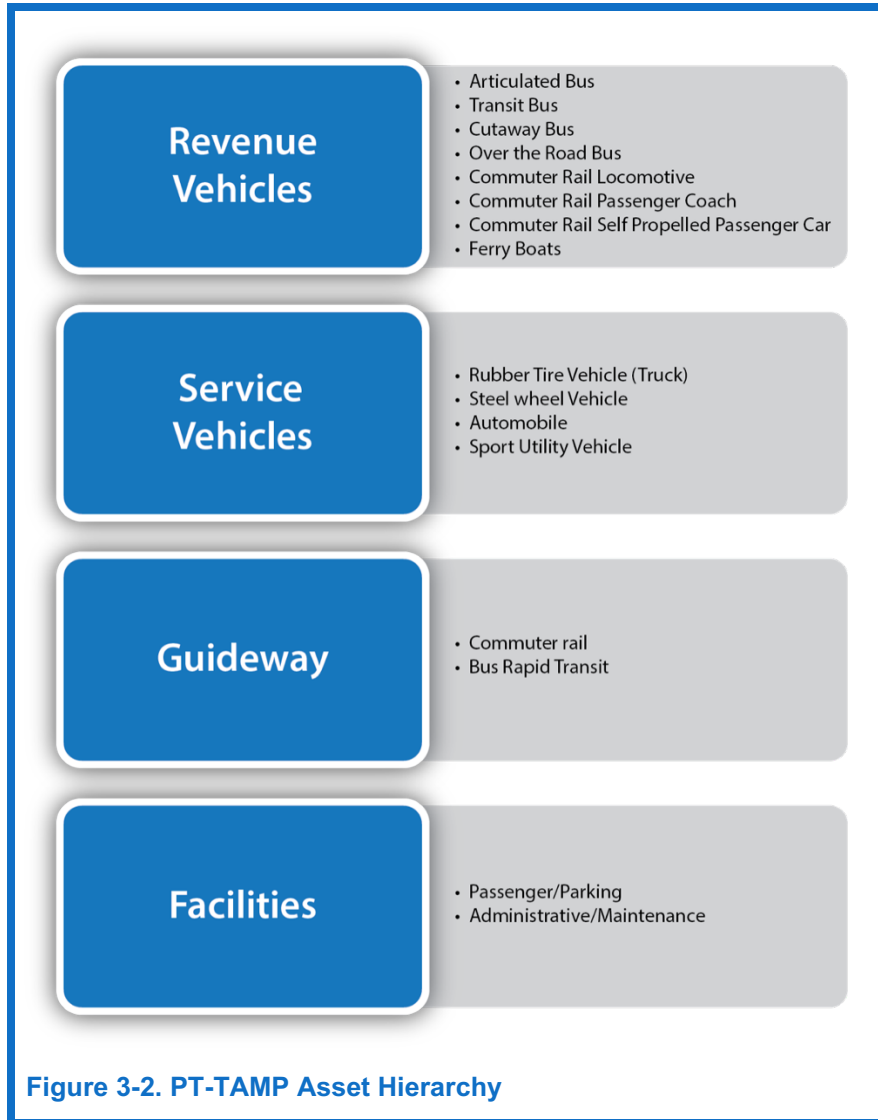


Figure 3-2. PT-TAMP Asset Hierarchy

CTDOT Transit System Summary

Assets included in this plan are as follows (as of 6/30/22):

- 628 buses
- 368 rail vehicles
- 3 ferryboats
- 135 service vehicles
- 243 track miles of rail guideway
- 9.4 miles of bus-only guideway
- 12 administrative / maintenance facilities
- 53 passenger facilities

Bus

Tier I and Tier II bus service in Connecticut is shown in Figure 3-3.

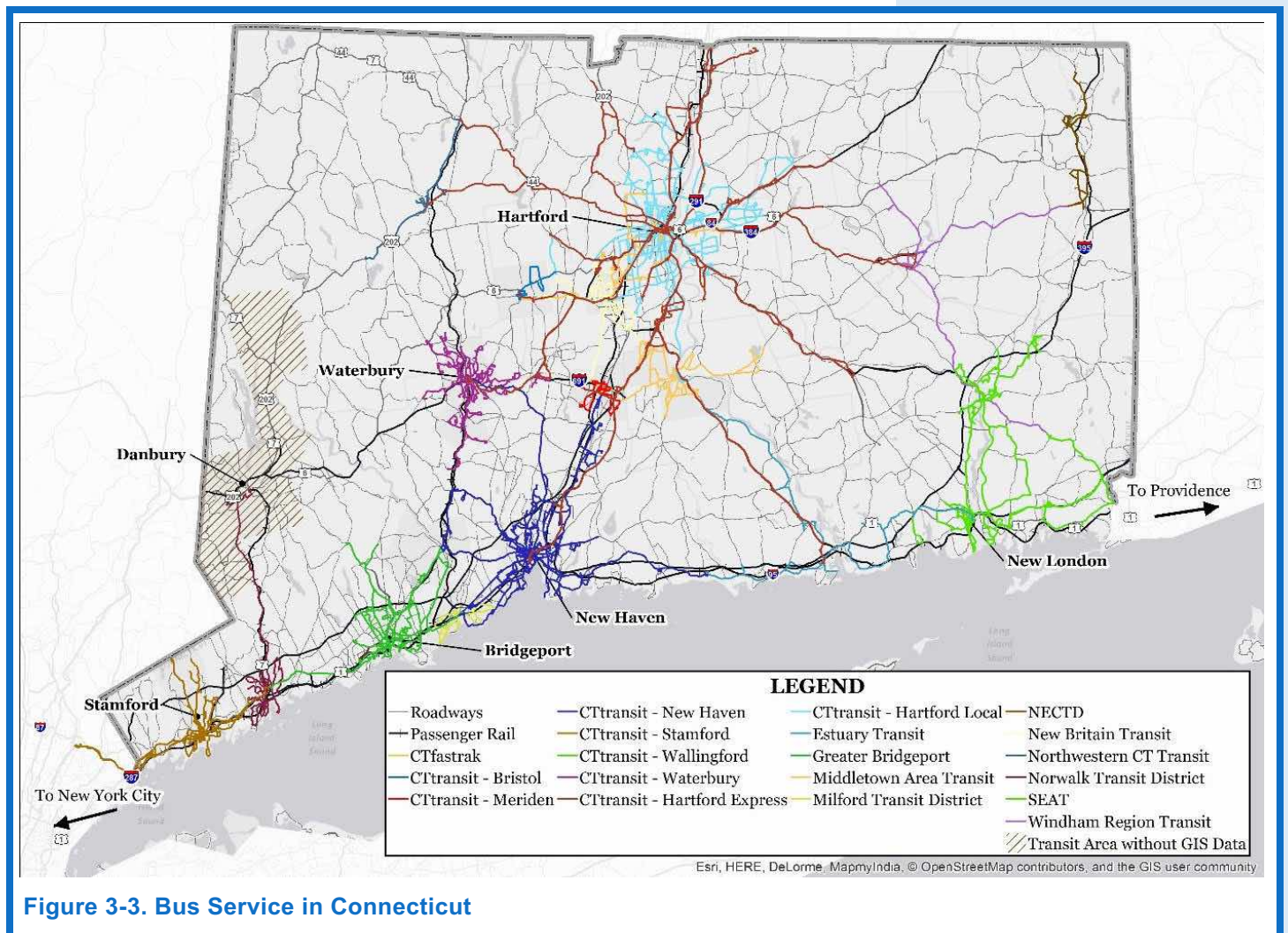


Figure 3-3. Bus Service in Connecticut

As described in Chapter 1, CTDOT owns and provides bus service, branded *CTtransit*, throughout Connecticut, but contracts out operation to private companies.

CTDOT also owns the bus rapid transit system *CTfastrak*, which operates on fixed guideway between Hartford and New Britain under *CTtransit* Hartford. According to FTA, bus rapid transit differs from bus transit in that the majority of each line operates in a separated right-of-way (ROW) dedicated for public transportation use during peak periods. Bus rapid transit also can include defined stations; traffic signal priority for transit vehicles; short headway bidirectional services; and pre-board ticketing, platform level boarding, and separate branding.

The *CTfastrak* system between New Britain and Hartford opened in March 2015 and has carried more than 21 million customers since opening day and routinely transporting more than 17,000 customers daily.

The primary assets of the bus service system in Connecticut are rolling stock, equipment and facilities. The majority of the primary bus assets in Connecticut are owned and supported with State and Federal funds. Connecticut owns all the rolling stock and equipment of CT Transit and maintenance facilities of six of the divisions of CT Transit in Hartford, New Haven, Stamford, Waterbury, Meriden and Wallingford.

Passenger Rail

Passenger rail service is shown below in Figure 3-4 below.

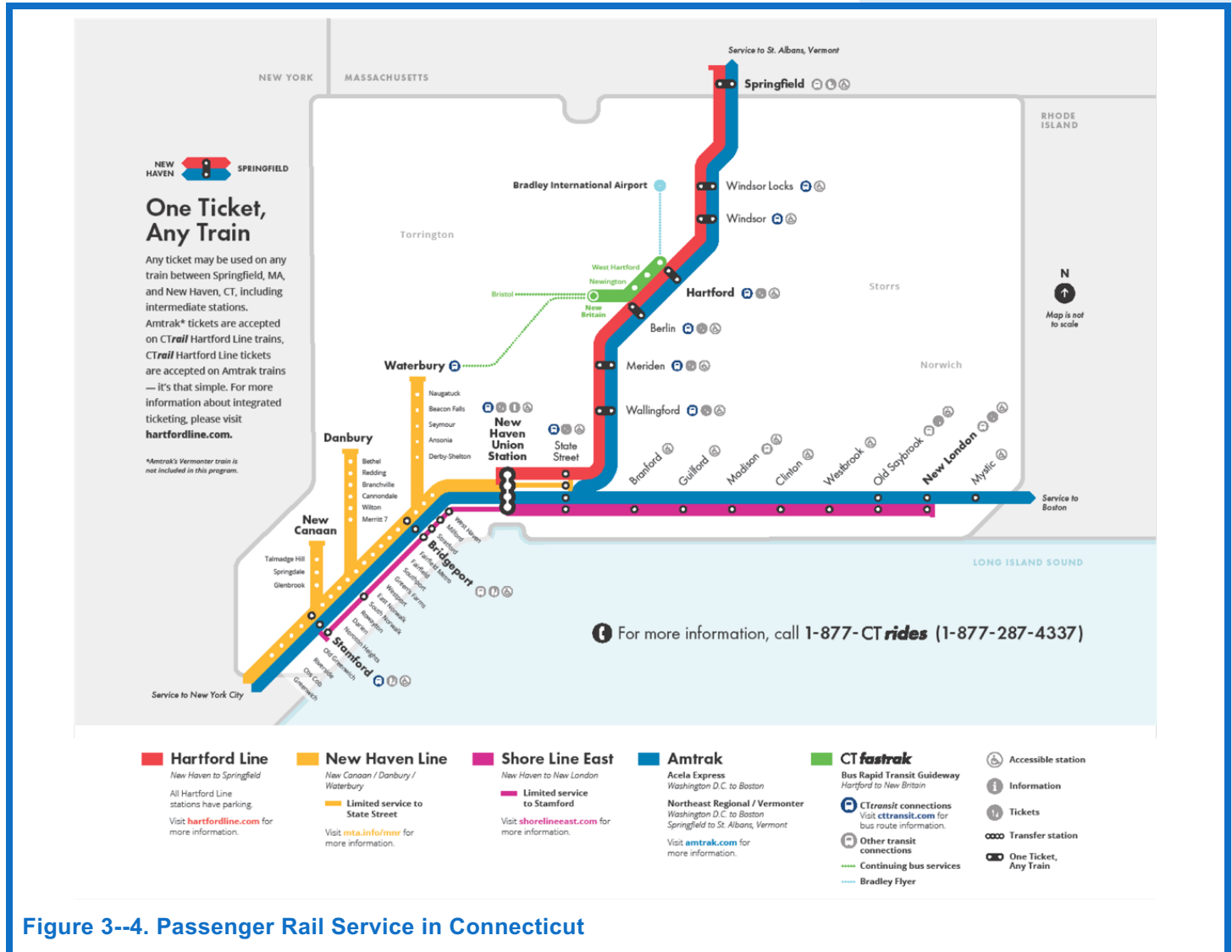


Figure 3--4. Passenger Rail Service in Connecticut

The CT-Rail network is mostly composed of the Northeast Corridor (NEC), a larger regional network of rail that connects Boston to Washington D.C. through Amtrak and other Commuter Rail services. The passenger rail network in Connecticut over which CTDOT services operate or has capital responsibility comprises the New Haven Line and branch lines, Shore Line East, and the Hartford Line.

The New Haven Line and Branch Lines represents the 48 mile segment of the NEC from the CT-NY State Line to New Haven, and the three separate branch lines supplementing the main New Haven Line service that terminates at Grand Central Terminal. The Main Line is generally a four track

corridor electrified through an overhead contact system (OCS) to support a fleet that is mostly comprised of Electric Multiple Units (EMU). The branch lines are three additional single track routes considered as supplemental services that connect to the main line with less frequent service. The branch line services provided are the New Canaan, Danbury, and Waterbury, with segment mileages of 8, 24, and 27 miles respectively. The New Canaan branch is also electrified with overhead contact power that supports EMU Fleet while Danbury and Waterbury operate diesel only rolling stock. All lines except Waterbury use Centralized Traffic Control (CTC) signal systems, which uses manual block to date. The system also comprises 38 passenger stations and 5 administrative/maintenance facilities (four rail yards and one standalone facility).

As stated in the ARSA mentioned in chapter one, CTDOT holds 100% capital responsibility for all fixed infrastructure along these routes. The New Haven Line continues west into New York State for about another 14 miles; however, this portion of the line is owned by MTA/MNR meaning CTDOT has no capital responsibility for this segment. CTDOT holds at least partial capital responsibility for all passenger facilities and 100% capital responsibility for the administrative/maintenance facilities on the Connecticut side of the New Haven Line. Rolling stock used along the line has a split ownership between CTDOT and MTA/MNR, and is denoted by vehicle number in each agency's inventory.

Shore Line East operates along the segment of the NEC from New Haven to New London, which is owned and maintained by Amtrak. This corridor spans approximately 50 miles, and is generally two tracks with passing sidings installed in various locations with OCS and CTC. Although the line is electrified through OCS, Shore Line East service currently uses diesel rolling stock which is owned by CTDOT. The service has 7 total passenger stations (not including New Haven Stations which are part of New Haven Line) and no SLE exclusive administrative/ maintenance facilities (New Haven Rail Yard is part of New Haven Line). Since Amtrak owns this portion of the Northeast Corridor,

CTDOT only has capital responsibility for 5 of the 7 stations and diesel rolling stock but may help fund rail infrastructure projects along this route to provide financial assistance for Amtrak. The NEC within Connecticut continues past New London to the CT-RI state line, but only serves regional intercity Amtrak trains.

The Hartford Line represents a spur of the NEC, but is also the supporting rail network for the new Hartford Line intercity rail service that is provided through CTDOT. This line spans 62 miles from New Haven to Springfield, and is generally two tracks with no OCS and new Positive Train Control (PTC) installed, with a few segments that are single track north of Hartford. The service is operating existing Amtrak diesel locomotives and push-pull coaches, as well as recently leased diesel locomotives and push-pulls coaches operated by Trans America Services and Alternate Concepts Incorporated (TASCI). Occasionally, the Hartford Line will utilize Shore Line East diesel locomotive and passenger coaches. The service currently has 7 stations (includes Springfield, MA; but excludes the two New Haven stations) and no exclusive administrative / maintenance facilities (uses New Haven Rail Yard which is part of New Haven Line) along the route. Similar to SLE, Amtrak owns this corridor meaning CTDOT holds no capital responsibility even though the majority of the recent upgrades to the line used Connecticut state funds. Although CTDOT has leased a portion of the rolling stock used for this new service, any assets used in the operation of the Hartford line are exempt from FTA TAM requirements as mentioned in chapter one and therefore are not reflected in the current inventory.

Communication

The PT-TAMP is a valuable tool to communicate needs and to advocate for resources.

Asset Data Collection and Management

Monitoring and measuring transit asset conditions enables CTDOT to assess the performance of the transit system, analyze deficiencies and predict future needs, allocate funding, and prioritize investments to maintain SGR. Asset condition is also an important public-facing measure. Users of the transit network notice and experience asset condition every day and recognize changes in asset condition.

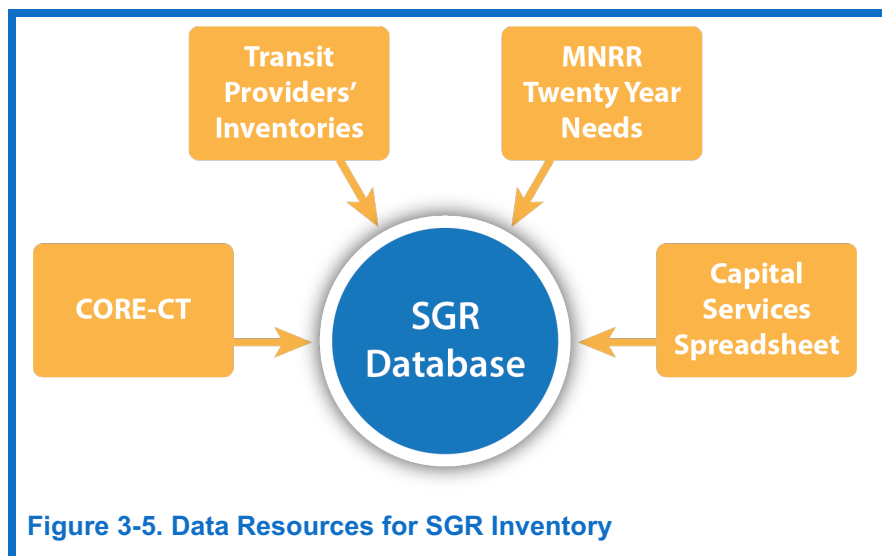
Further, public trust and confidence is bolstered when objective measurable results can be demonstrated from increased public investment. For depicting asset conditions, this PT-TAMP uses definitions of asset condition and SGR developed by CTDOT and consistent with FTA's mandated performance measures.

Since the development of the 2018 PT-TAMP, CTDOT has been implementing and improving its transit asset inventory, the Transit Asset Management Database, which is described in greater detail in Chapter 4.

The first task was to establish the definition of a capital asset and to define an asset hierarchy. Inventory data on transit assets in Connecticut historically has been maintained at a unit level as opposed to an enterprise level, which provided varying definitions of assets and their conditions. While FTA set the four major asset categories required for the PT-TAMP, the PT TAM Unit had to coordinate with providers and staff to determine what should be considered a capital asset, what information should be collected, and where it should be stored.

Inventory data is collected from the transit service providers and CTDOT Capital Services unit. Transit asset inventory and condition data is collected from the individual transit service providers and authenticated by the PT TAM Unit. Data was added into the Transit Asset Management Database after final validation of the transit asset inventory by the PT TAM Unit. The data resources contributing to the Transit Asset Management Database are depicted in Figure

3-5. The database is described in greater detailed in Chapter 4.



Rolling Stock and Equipment

Bus

Transit asset inventory was collected from the individual transit service providers and authenticated against CTDOT Capital Services database and the CORE-CT financial register. This step was integral in the process as many of Connecticut transit assets are owned, maintained and operated by the transit service providers thus do not register in the CORE-CT financial record but are subsidized 100% by CTDOT with state and federal funds. Verified bus data was imported into the Transit Asset Management Database.

Rail

Inventory data including model year (used to determine age) are stored by vehicle in the Office of Rail’s Rolling Stock Inventory Database. For the purpose of developing its PT-TAMP, CTDOT extracted revenue vehicle data from this database, aggregated it by fleet, and imported the data into the Transit Asset Management Database.

Infrastructure

Bus Rapid Transit

CTfastrak guideway pavement inventory and condition data is managed by CTDOT's Pavement Management Group.

Bridges on the CTfastrak system are inspected and managed with CTDOT's other highway bridges. Bridge inspections and condition data are stored in InspectTech.

Rail Guideway

The system of record for data on the rail guideway inventory is the set of track charts maintained for the NEC and branch lines. The charts show locations of major assets, and detail when assets were most recently rehabilitated.

As a supplement to the track charts, MNR maintains a less detailed, summary inventory of rail guideway assets for use in preparation of the MTA Twenty Year Needs Assessment (TYNA). The MNR data were imported into the Transit Asset Management Database and used to populate data on Track and Power in the CTDOT PT-TAMP.

CTDOT's existing structures data were used to populate the data for the structure asset class. Inventory and condition data for bridges are gathered through the bridge inspection process. The data are stored in CTDOT's Bridge Management System (BMS) using customized InspectTech software and updated based on inspections, which happen most commonly on an annual basis per FRA regulations. Existing structures data were imported into the Transit Asset Management Database.

Facilities

Administrative/Maintenance

Inventory data on Connecticut facilities are stored in CTDOT's Financial Management System (CORE-CT) and the transit providers' asset registries, but the level of detail stored on each facility varies. Thus, for the purpose of developing its PT-TAMP, CTDOT extracted data on administrative/maintenance facilities from CORE-CT and

imported the data to the Transit Asset Management Database.

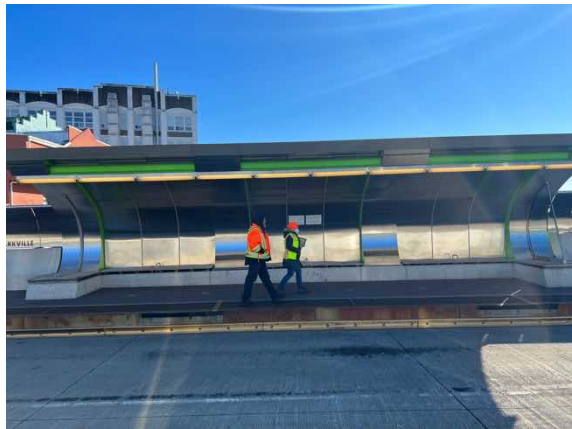
Since the last TAMP, CTDOT began a series of facility inspections which include component-level condition data. These detailed inspections have been completed for all CT*transit* admin/maintenance facilities, as well as for the New Haven rail yard.

For facilities for which component-level condition data are not available, the overall condition of CTDOT-owned facilities has been previously established through engineering judgements when data was unavailable. Thus, component-level conditions were manually determined for each facility using overall facility condition and facility age.

Passenger

Since the last TAMP, CTDOT began a series of facility inspections which include component-level condition data. These detailed inspections have been completed for all CTfastrak facilities.

Facility Assessment Program



Starting in 2019, CTDOT began funding a series of facility inspections in order to collect component-level condition data in a standardized format. The inspections, which are performed by consultants hired by CTDOT, are scheduled to inspect all transit facilities on a rolling four year basis. 25% of the facilities are inspected each year and the detailed data is used to establish condition ratings for the facilities.

For rail stations, the Design Unit of the Office of Rail conducted an evaluation, visual inspection and limited physical testing of the platforms/canopies, station buildings, and pedestrian bridges (cross-track bridges and the bridges connecting the platforms to adjacent parking structures) at 43 of Connecticut's commuter rail stations in early 2017. Reassessments for all passenger stations, Shore Line East (CTDOT-owned), New Haven Line and

Hartford Line (CTDOT-owned) were performed in 2021-2022. Some facility condition assessment data was collected after June 2022, which is beyond the baseline date for TAM Plan data. Although information is not part of the Plan, assessments will be part of the 2023 NTD reporting.

Rolling Stock

In 49 CFR §625.5, FTA defines rolling stock as a revenue vehicle used in providing public transportation, including vehicles used for carrying passengers on fare-free services. CTDOT's PT-TAMP includes rolling stock operating in three modes of travel: bus, commuter rail, and ferry.

Bus Rolling Stock

Bus transit is an integral piece of Connecticut's public transportation system. Buses provide affordable, equitable, and reliable mobility to Connecticut travelers. FTA defines the bus transit mode as comprised of rubber-tired passenger vehicles operating on fixed routes and schedules over roadways. Vehicles can be powered by diesel, gasoline, battery, or alternative fuel engines contained within the vehicle.

As stated in Chapter 1, CTDOT owns the local bus systems in Hartford, New Haven, Stamford, Waterbury, New Britain, Bristol, Meriden, and Wallingford, and operates them under the CT transit brand name. CTDOT owns all the rolling stock that provides CT*transit* services. CT*transit* services carry roughly 80% of annual bus ridership in Connecticut.

CT*transit* Hartford, the largest of the eight divisions operates CTfastrak and provides service using a fleet of rolling stock which includes articulated buses, transit buses and over the road Motor Coach Industries (MCI's). CT*transit* New Haven operates a fleet which includes both articulated and transit buses. CT*transit* Stamford, the smallest of the Hartford, New Haven, Stamford (HNS) operations include articulated buses, transit buses and over the road Motor Coach Industries (MCI) in their fleet.

CT*transit* divisions of Waterbury, Meriden and Wallingford provide service through North-East Transportation Company Inc. The fleet includes transit buses and cutaways for both fixed route and paratransit service.

New Britain and Bristol divisions of CT*transit* are provided through the private companies of New Britain

Rolling Stock

Revenue vehicle used in providing public transportation

CT*transit*

CT*transit* is the brand name for CTDOT-owned bus service across Connecticut. Several companies, including Datto, North-East Transportation Company Inc., New Britain Transportation Co, and Nason/Kelley are under contract to CTDOT to operate the bus service.

Transportation and Dattco whose fleets include both transit buses and over the road MCIs.

Nason/Kelley, a private operator contracted with CTDOT provides express bus service utilizing a fleet which includes over the road MCIs.

CTDOT's rolling stock inventory is used to provide both fixed route and demand response service, and includes a number of asset types. FTA defines these vehicle types in the 2017 NTD Glossary¹.

Bus Types



Transit Bus: A transit mode comprised of rubber-tired passenger vehicles operating on fixed routes and schedules over roadways. Vehicles are powered by:

- Diesel
- Gasoline
- Battery
- Alternative fuel engines contained within the vehicle.



Articulated Bus: Extra-long (54 ft. to 60 ft.) bus with two connected passenger compartments. The rear body section is connected to the main body by a joint mechanism that allows the vehicles to bend when in operation for sharp turns and curves and yet have a continuous interior.



Over-the-road Bus: A bus characterized by an elevated passenger deck located over a baggage compartment.



Cutaway: A vehicle that consists of a bus body that is mounted on the chassis of a van or light-duty truck. The original van or light-duty truck chassis may be reinforced or extended. Cutaways typically seat 15 or more passengers and may accommodate some standing passengers.

¹ FTA. *National Transit Database Glossary*. FTA, 2017.

Bus Condition Assessment and Performance Measures

The purpose of the rolling stock condition assessment is to provide an overall snapshot of the current state of repair of a fleet to aid in decisions concerning when it is most cost effective to replace it.

FTA's mandated performance measure for rolling stock is the percentage of assets within a class that have met or exceed their ULB. An asset is deemed to be in SGR if its age is less than the ULB specified for the corresponding asset type. Likewise, an asset is deemed to no longer be in SGR if its age equals or exceeds the corresponding ULB. The ULB value may be specified in terms of asset age, mileage and/or other factors. FTA provides a set of default ULB values by asset type, all of which are specified in terms of asset age. An agency can use these or set its own values.

CTDOT has worked with transit service providers in Connecticut to define custom ULB values. The custom ULBs align more with the Connecticut operating environment. The miles incurred by our vehicles annually can far exceed the useful life of that vehicle class, particularly for cutaway bus, vans and mini vans utilized for paratransit service.

The climate of New England further adds to the deterioration of vehicles caused by salt and chemical treatments of the roads in Connecticut.

Connecticut's custom ULB values for bus rolling stock are listed in Table 3-1.





Table 3-1. ULB Values for Bus Rolling Stock

Asset Type	FTA Default ULB (years)	Connecticut ULB (years)
Transit Bus	14	12
Articulated Bus	14	12
Over-the-road Bus	14	12
Cutaway	10	5

Bus Inventory and Conditions

CTDOT owns 628 revenue vehicles, the majority of which are transit buses. Table 3-2 summarizes CTDOT’s bus inventory and condition.

Table 3-2. CTDOT Bus Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Transit Bus	476 vehicles	78%	22%	
Articulated Bus	51 vehicles	51%	49%	
Over-the-Road Bus	59 vehicles	51%	49%	
Cutaway Bus	42 vehicles	0%	100%	

Rail Rolling Stock

CTDOT’s rail rolling stock consists of three vehicle types, as defined in the NTD Glossary.

Rail Vehicle Types



Commuter Rail Locomotive: Commuter rail vehicles used to pull or push passenger coaches. Locomotives do not carry passengers themselves.



Commuter Rail Passenger Coach: Commuter rail passenger vehicles not independently propelled and requiring one or more locomotives for propulsion.



Commuter Rail Self-Propelled Passenger Car: Commuter rail passenger vehicles not requiring a separate locomotive for propulsion.

Rail Rolling Stock Condition Assessment and Performance Measures

The condition assessment approach and performance measures are the same for rail rolling stock as for bus rolling stock.

Connecticut's ULB values for rail rolling stock are listed in Table 3-3. Locomotives and passenger coaches have different custom ULBs depending on the rail service due to differing use patterns and maintenance schedules.

Table 3-3. ULB Values for Rail Rolling Stock

Asset Type	FTA Default ULB (years)	Connecticut ULB (years)
Commuter Rail Locomotive (MNR)	39	35
Commuter Rail Locomotive (SLE/HL)	39	25
Commuter Rail Passenger Coach (MNR)	39	35
Commuter Rail Passenger Coach (SLE/HL)	39	25
Commuter Rail Self-Propelled Passenger Car	39	35

Rail Rolling Stock Inventory and Condition

CTDOT owns 368 rail vehicles, the majority of which are EMUs. All of the EMUs are 270 Kawasaki M8s. CTDOT’s rail inventory also includes 22 locomotives and 76 passenger coaches. Of the 76 passenger coaches, 50 are Bombardiers used primarily on the Danbury and Waterbury Branch Lines while 26 are Mafersas used for SLE and HL. Table 3-4 summarizes CTDOT’s rail rolling stock inventory and condition.

Table 3-4. CTDOT Rail Rolling Stock Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Commuter Rail Locomotive (MNR)	16 vehicles	63%	37%	
Commuter Rail Locomotive (SLE/HL)	6 vehicles	0%	100%	
Commuter Rail passenger coach (MNR)	50 vehicles	62%	38%	
Commuter Rail passenger coach (SLE/HL)	26 vehicles	0%	100%	
Commuter Rail Self-Propelled Passenger Car	270 vehicles	100%	0%	

Ferryboat

CTDOT owns and operates two historic Connecticut River ferries as referenced in chapter one – one that connects Rocky Hill to Glastonbury, and another that connects Chester to Hadlyme. FTA defines ferryboat in the 2017 NTD Glossary as a transit mode comprised of vessels that carry passengers and/or vehicles over a body of water and are generally steam or diesel powered.

Ferry Vehicle Types



Ferryboat: Vessels for carrying passengers and / or vehicles over a body of water. The vessels are generally steam or diesel powered conventional ferry vessels. They may also be hovercraft, hydrofoil and other high-speed vessels.

Ferryboat Rolling Stock Condition Assessment and Performance Measures

The condition assessment approach and performance measures are the same for ferryboats as for all other rolling stock. Connecticut’s ULB values for ferryboat rolling stock are listed in Table 3-5.

Table 3-5. ULB Values for Ferryboat Rolling Stock

Asset Type	FTA Default ULB (years)	Connecticut ULB (years)
Ferryboat	42	42

Ferryboat Rolling Stock Inventory and Condition

CTDOT owns 3 ferryboats: a double-ended, self-propelled ferry; a barge; and a towboat. Table 3-6 summarizes CTDOT’s ferryboat inventory and condition.

Table 3-6. CTDOT Rail Rolling Stock Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB
Ferryboat	3 vehicles	0%	100%

Inventory data including model year (used to determine age) are stored by vehicle in the Transit Asset Management Database.

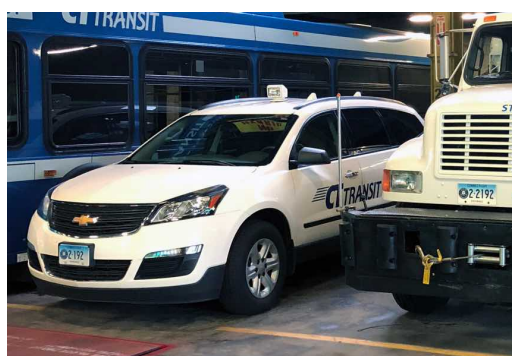
Equipment

In 49 CFR §625.5, FTA defines equipment as an article of nonexpendable, tangible property having a useful life of at least one year. In Connecticut’s case, most equipment assets are service vehicles, defined by FTA as equipment used primarily to support maintenance and repair work for public transportation. Examples of service vehicles provided in the 2017 NTD Glossary include tow trucks, supervisor vans, transit, staff cars, and maintenance vehicles for maintaining passenger facilities and (ROW). CTDOT’s PT-TAMP includes service vehicles supporting two modes of travel: bus and commuter rail.

Note that CTDOT’s inventory includes a small number of additional pieces of equipment valued at \$50,000 or more, but these are not detailed here.

CTDOT’s service vehicles are organized into five types. Trucks, automobiles, sport utility vehicles, and vans can be used as staff vehicles. Steel wheel vehicles are used for inspection and maintenance of facilities and (ROW). The definitions for these vehicles are shown on the next page.

Service Vehicle Types



Automobiles: Passenger cars, up to and including station wagons in size. Excludes minivans and anything larger.

Service Vehicle Types



Rubber Tire Vehicles (Truck): Any motor vehicle designed to transport Cargo



Sport Utility Vehicle: A high-performance four-wheel drive car built on a truck chassis. It is a passenger vehicle which combines the towing capacity of a pickup truck with the passenger-carrying space of a minivan or station wagon.



Van: An enclosed vehicle having a typical seating capacity of 8 to 18 passengers and a driver. A van is typically taller and with a higher floor than a passenger car, such as a hatchback or station wagon.



Steel Wheel Vehicle: Any support vehicle that is solely used on a running rail.

Equipment Condition Assessment and Performance Measures

CTDOT uses the same basic approach for assessing condition of equipment as it does for rolling stock. Specifically, a custom ULB value is established for

equipment type. A piece of equipment is assessed as being in SGR if its age is less than the corresponding ULB, and not in SGR if it meets or exceeds the ULB. This approach supports reporting of FTA’s mandated SGR performance measure for equipment: the percentage of service vehicles that have met or exceed their ULB. Connecticut’s custom ULBs for equipment are listed in Table 3-7.

Table 3-7. ULB Custom Values for Equipment

Asset Type	FTA Default ULB (years)	Connecticut ULB (years)
Rubber Tire Vehicle (Truck)	14	14
Automobile	8	5
Sport Utility Vehicle	8	5
Van	8	5
Steel Wheel Vehicle	25	25

Equipment Inventory and Condition

CTDOT owns 135 service vehicles, 92 for bus and 43 for rail. Table 3-8 summarizes CTDOT’s equipment inventory and its condition.

Table 3-8. CTDOT Equipment Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Rubber Tire Vehicle (Truck)	32 vehicles	63%	37%	
Automobile	13 vehicles	0%	100%	
Sport Utility Vehicle	36 vehicles	28%	72%	
Van	5 vehicles	0%	100%	
Steel Wheel Vehicle	43 vehicles	0%	100%	

Inventory data including model year (used to determine age) are stored by vehicle in the Transit Asset Management Database.

Infrastructure

In 49 CFR §625.5, FTA defines infrastructure as the underlying framework or structures that support a public transportation system. For the purposes of the TAMP, this refers to track, power, signals/communications, and structures. CTDOT owns both rail (New Haven Line and three branch lines) and bus (CTfastrak) fixed guideway, along with any fixed infrastructure located along these lines.

Rail Infrastructure

As noted earlier, the only rail segment that CTDOT owns is the NEC between New Haven and the New York/Connecticut border, as well the New Canaan, Danbury and Waterbury Branch Lines. Therefore the values below only include these segments, and exclude infrastructure along Shore Line East and the Hartford Line.

Rail Infrastructure is not just the track, but the various infrastructure along the ROW that supports the movement of trains along the track. The infrastructure can span from simple assemblies like Rail and Ties, to intricately systems such as substations, grade crossings, and catenary, to multi-million structures such as moveable bridges. MNR and CTDOT both have a Maintenance-of-Way (MOW) unit, which refers to personnel in charge of maintaining fixed railroad property. The assets are summarized into four main types below based on how MNR has structured divisions within its MOW unit:

Rail Infrastructure Types



Track Elements: Track-related infrastructure; includes running rail, ties, turnouts, and ballast.



Power: Infrastructure related to the transmission of power for signals and traction via the overhead contact system. Includes AC substations, catenary plant, catenary portals, and transmission equipment.



Communication and Signals: Systems related to the monitoring and safety of train movements. Includes switches and signals, grade crossings, vehicle detection equipment, Intelligent Transportation System technology, and Positive Train Control equipment.



Structures: Major Infrastructure to supplement safe movement of trains above or below grade. Includes Moveable Bridges, Fixed Bridges, Culverts, Station Pedestrian Bridges/Tunnels, and Retaining Walls.

Rail Infrastructure Condition Assessment and Performance Measures

For all rail guideway assets other than bridges and culverts, CTDOT assesses condition based on asset age, using an approach patterned on current MNR practices. For each

asset type a ULB value is specified in years. Asset condition is then approximated by comparing the age of the asset (years since it was either constructed or last rehabilitated) to the ULB. A condition rating is assigned on the five-point TERM scale based on Table 3-9.

Table 3-9. Conversion Scale: Rail Infrastructure Asset Age to FTA TERM Condition Rating

Asset Age as % of ULB	TERM Rating	Condition
New	5	Excellent
< 50%	4	Good
>50% and <100%	3	Adequate
>100% and <125%	2	Marginal
>125%	1	Poor

Note the ULB values used here for rail infrastructure are generally consistent with those for MNR described in the MTA Twenty Year Needs Assessment (TYNA).

Connecticut’s ULBs for track elements are listed in Table 3-10.

Table 3-10. ULB Values for Track elements

Asset Class	Asset Type	ULB (years)
Rail	Tangent	40
	Curves <2 degrees	30
	Curves 2-4 degrees	20
	Curves >4 degrees	10
Ties	Concrete	40
	Wood	30
Turnouts	High Speed	25
	Mainline	20
	Yard	30
	Siding	30

Connecticut’s ULBs for power are listed in Table 3-11.

Table 3-11. ULB Values for Power

Asset Class	Asset Type	ULB (years)
Overhead Catenary	Overhead Catenary	50
Power Cable	AC Feeder Cable	40
	Signal Power 12kV	50
Catenary Poles	Catenary Poles	100
	Substation Wayside Switchyard	30
	Anchor Bridge Substation	30
Substations / Power Distribution	Snow Melter Transformers/Unit Substation	30
	Supply Stations	40
	Substations	20
	Yard Power Distribution System	30

For structures, a detailed assessment approach has already been defined and implemented. The FRA established Railroad Bridge Safety Standards, 49 CFR Parts 213 and 237 that require track owners to adopt and implement a Railroad Bridge Management Program (RBMP). CTDOT is the railroad track owner as defined in §237.5 for the commuter operations and freight on the NHL and numerous lines or segments of lines supporting freight and tourist operations throughout the state. The Federal Regulations stipulate that each railroad track owner perform inspections, prepare reports, and determine the safe load capacity for railroad bridges in accordance with their adopted RBMP. This RBMP is intended to be specific to structures supporting railroad track and is complemented by the CTDOT Railroad Bridge Inspection Manual (RBIM). The purpose of this Manual is to define the procedures and practices of the CTDOT Office of Rail for determining the physical condition, load capacity and maintenance needs of railroad bridges in the State of Connecticut.

CTDOT performs visual inspections of structures in the subcategories Fixed, Moveable, Culvert, and Pedestrian. These are patterned on the approach used for highway bridges. Through the inspection CTDOT assesses condition




of the bridge deck, superstructure and substructure condition using the 10-point National Bridge Inventory (NBI) condition scale (with values ranging from 0 to 9) rather than the 5-point TERM scale described here. For culverts a single overall culvert rating is specified. A bridge is deemed to be in SGR if all of its ratings are 5 or greater and not in SGR if any rating is 4 or less.

Rail Infrastructure Inventory and Condition

CTDOT owns 243 track miles of passenger rail infrastructure. Since the 2018 TAMP, infrastructure conditions have declined slightly. However, CTDOT has made major capital investments in key power assets, signals, and structures, including work that is still ongoing. One major project was the installation of signals, positive train control, and passing sidings along the Waterbury Branch of the New Haven Line, which previously lacked a signal system. CTDOT has also updated six substations, bringing them back into SGR. The Walk bridge program, described in greater detail in Chapter 6, is another major capital program for CTDOT. Since 2018, CTDOT has made significant progress on the Walk bridge, including replacing the superstructure of the Ann Street Railroad bridge and completing construction of tracks 1,3 and 4 in East Norwalk as part of the CP243 Interlocking project. As a result of these investments, the overall performance of CTDOT’s rail infrastructure, as defined by FTA’s performance measure, has improved since 2018, as shown in Table 3-28.

Tables 3-12 through 3-15 summarize CTDOT’s track, power, structures, and signals inventory and condition.

Table 3-12. CTDOT Track Inventory and Condition

Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Rail	243 track miles	50%	50%	
Tie	243 track miles	69%	31%	
Turnout	375 assets	72%	28%	

Note that the asset class Power Cable includes asset types AC Feeder Cable and Signal Power 12kV cable. The asset class Substations / Power Distribution includes six asset types. The condition data shown in Table 3-13 is an average of the asset types within each asset class, weighted by unit cost.

Table 3-13. CTDOT Power Inventory and Condition





Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Overhead Catenary	268 miles	43%	57%	
Power Cable	171 miles	0%	100%	
Catenary Poles	850 assets	0%	100%	
Substations / Power Distribution	49 assets	12%	88%	

Table 3-14. CTDOT Structures Inventory and Condition

Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Fixed	149 assets	61%	39%	
Moveable	5 assets	40%	60%	
Culvert	35 assets	88%	11%	
Pedestrian	17 assets	94%	9%	

For the asset category Signals, work remains to be performed to develop a full inventory. Thus, for this category the CTDOT inventory has entries for the New Haven Main Line, New Canaan Branch, Danbury Branch, and Waterbury Branch.

Table 3-15. CTDOT Signals Inventory and Condition

Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Main Line	184 miles	50%	50%	
New Canaan	8 miles	0%	100%	
Danbury	24 miles	100%	0%	
Waterbury	27 miles	100%	0%	

Bus Infrastructure

CTDOT owns the CTfastrak bus fixed guideway between New Britain and Hartford. The guideway consists of 9.4 miles of pavement and multiple structures.

Bus Infrastructure Condition Assessment and Performance Measures

CTDOT’s approach for inventorying and assessing condition of bus fixed guideway assets is the same approach as is used for highway assets, for which existing systems and approaches are well defined. CTDOT has adopted FHWA’s pavement performance measures, which are calculated based on different metrics depending on the type of pavement. For asphalt pavements, the following metrics are used to calculate the pavement condition performance measures.

- International Roughness Index (IRI) is an indicator of pavement roughness experienced by road users traveling over the pavements, and is computed from the average of two wheelpath single longitudinal profiles.
- Rutting is quantified for asphalt pavements by measuring the depth of ruts along the wheelpaths. Rutting is commonly caused by a combination of high traffic volumes, heavy vehicles and the instability of the pavement mix.
- Cracking is measured in terms of the percentage of cracking in the wheelpaths within a pavement section.

Cracks can be caused or accelerated by aging, loading, poor drainage, frost heaves or temperature changes, or construction flaws.

For concrete pavements, IRI, faulting and cracking are used to calculate the pavement condition performance measures.

- Faulting is computed as the average vertical misalignment of adjacent slabs.
- Cracking in concrete pavements is measured as the percentage of slabs in the section that are cracked according to the HPMS Field Manual.

For each of the above metrics, FHWA has established thresholds for good, fair and poor condition. These thresholds are summarized in Table 3-16. The pavement condition metrics are used to calculate the FHWA performance measures for pavement condition. Conditions are assessed using these criteria for 0.1-mile-long pavement sections, although shorter sections are permitted at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable, as described in the December 2016 HPMS Field Manual. An individual section is rated as being in good overall condition if all of the metrics are rated as good, and poor when two or more are rated as poor. All other combinations are rated as fair. The lane miles in good, fair, and poor condition are tabulated for all sections to determine the overall percentage of pavement in good, fair, and poor condition.

Table 3-16. Pavement Condition Index Metrics





Metric	Good	Fair	Poor
IRI (inches/mile)	<95	95-170	>170
Rutting (inches)	<0.20	0.20-0.40	>0.40
Cracking (%)			
- Asphalt	<5	5-20	>20
- Jointed Concrete	<5	5-15	>15
- Continuously Reinforced Concrete	<5	5-10	>10
Faulting (inches)	<0.10	0.10-0.15	>0.15

For structures, CTDOT uses a similar approach for rail and highway bridges. As described previously, bridges are inspected visually. Conditions of bridge decks, superstructures and substructures are assessed using the 10-point NBI scale.

Bus Infrastructure Inventory and Condition

CTDOT owns 9.4 centerline miles of bus fixed guideway and 18 bridges. The majority of the CTfastrak pavement is asphalt, with a small portion of concrete pavement located near the stations. The CTfastrak pavement is inspected and managed along with CTDOT’s other pavements. CTDOT has already inventoried and inspected the bridges on the CTfastrak guideway and is managing these together with other highway bridges. Table 3-17 summarizes CTDOT’s bus guideway inventory and condition.

Table 3-17. CTDOT Bus Guideway Inventory and Condition

Asset Type	Inventory	Rated 3 or above on TERM scale		Rated below 3 on TERM scale	
Structure	18 bridges	100%		0%	
Asset Type	Inventory	Good (FHWA Measure)	Fair (FHWA Measure)	Poor (FHWA Measure)	
Pavement	9.4 Centerline miles	12%	88%	0%	
Asphalt Pavement		14%	86%	0%	
Concrete Pavement		0%	100%	0%	

Facilities

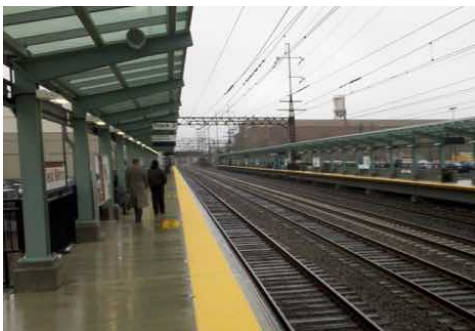
CTDOT categorized transit facilities into FTA’s two main classes: administrative/ maintenance facilities, and passenger facilities. CTDOT owns a majority of these facilities and has capital responsibility for these properties that are operated and maintained by transit providers and other property managers. The condition assessment approach is similar for both facility types, and relies on visual inspection of primary facility components. However, the specific facility components and available data differ between the two types of facilities.

Facilities in this TAM plan are categorized by a Parent/Child Relationship of Site and Building. There are numerous occurrences where a facility may be a single site but have multiple buildings/structures, or have a site but no enclosed structure, particularly for passenger rail stations. Therefore for consistency, inventory counts for facilities are by site, but any condition assessment should be done separately for each building/structure.

Facilities Types



Administrative/Maintenance: Administrative facilities are typically offices that house management and supporting activities for overall transit operations such as accounting, finance, engineering, legal, safety, security, customer services, scheduling, and planning. They also include facilities for customer information or ticket sales, but that are not part of any passenger station. Maintenance facilities are those where routine maintenance and repairs or heavy maintenance or unit rebuilds are conducted.



Passenger/Parking: Passenger facilities are significant structures on a separate ROW. For rail modes, passenger facilities typically mean a platform area and any associated access structures or accessory spaces accessible to passengers or by staff who are in support of passenger service.

Administrative / Maintenance Facilities

CTDOT owns 12 administrative/maintenance facilities for rail, bus, and ferry services. These include *CTtransit* facilities in Hartford, Stamford, New Haven, and Waterbury; *CTferry* facilities in Rocky Hill and Chester/Hadlyme, and rail facilities in Bridgeport, Danbury, New Haven, Stamford, and Springdale.

Administrative/Maintenance Facility Condition Assessment and Performance Measures

CTDOT inspects facilities using an approach based on FTA’s guidance detailed in *TAM Facility Performance Measure Reporting Guidebook: Condition Assessment Calculation*. FTA’s guidance is intended to support calculation of FTA’s mandated SGR performance measure for facilities, which is the percentage of facilities within an asset class rated less than 3 on the five-point scale used in TERM. However, a facility with an overall condition rating of 3 or greater may still have outstanding SGR needs for certain components. CTDOT’s approach is detailed in a Condition Assessment Guidance document, included in Appendix B.

Major facility components are inspected and rated on a 1 to 5 condition scale. The condition rating values and their descriptions are listed in Table 3-18. The components are listed in Table 3-19.

Table 3-18. FTA TERM Condition Assessment Scale

Rating	Condition	Description
5	Excellent	No visible defects, new or near new condition, may still be under warranty if applicable
4	Good	Good condition, but no longer new, may be slightly defective or deteriorated, but is overall functional
3	Adequate	Moderately deteriorated or defective; but has not exceeded useful life
2	Marginal	Defective or deteriorated in need of replacement; exceeded useful life
1	Poor	Critically damaged or in need of immediate repair; well past useful life

The specific components of administrative/maintenance facilities are listed below. Note that the first nine components listed in the table are assessed for each building in the facility, and the final component, Site, is assessed for the site as a whole.

Table 3-19. Administrative/Maintenance Facility Components

Inventory Unit	Component	Notes	Typical Useful Life* (years)	Component Condition Weight**
Building	Substructure		30	1.0
Building	Shell		30	1.0
Building	Interior		30	1.0
Building	Plumbing	May need to assess based on age	20	1.0
Building	HVAC	May need to assess based on age	20	1.0
Building	Electrical	May need to assess based on age	30	1.0
Building	Fire Protection	See Table 5 in Appendix B	20	1.0
Building	Conveyance	See Table 5 in Appendix B	20	1.0
Building	Equipment	Includes fixed specialty equipment	30	1.0
Building	Site		50	1.0

*Useful life can be utilized for components that cannot be visually inspected.

**Component Condition Weight represents the relative importance of the component compared to other components. By default, these numbers are 1.0. However, based on the agency’s experiences and practices, the inspector can use a different number to lower or raise the importance of a component and thus change how component conditions impact the overall facility condition.

For some components, a visual inspection may be insufficient for establishing conditions. In these cases, an age-based approach is used to estimate condition using useful life for the component listed in Table 3-19 with the

conversion scale shown in Table 3-20. Useful life is the average amount of time in years that an item, component, or system is economically efficient to keep in operation.

Table 3-20. Conversion Scale: Asset Age to FTA TERM Condition Rating

Asset Age as % of ULB	TERM Rating	Condition
New	5	Excellent
< 50%	4	Good
>50% and <100%	3	Adequate
>100% and <125%	2	Marginal
>125%	1	Poor

*Useful life can be utilized for components that cannot be visually inspected.

For Fire Protection and Conveyance, separate inspections are typically performed to assess code compliance. CTDOT uses the results from those inspections in performing their condition assessment, applying the condition assessment scale shown in Table 3-21 for these components.

Table 3-21. Fire Protection and Conveyance Condition Assessment Scale

Rating	Condition	Description
5	Excellent	System is new and there are no identified code issues
4	Good	System is not new, but there are no identified code issues
3	Adequate	Isolated code issues exist that can be addressed through maintenance
2	Marginal	Code issues exist that do not necessitate facility closure
1	Poor	Extensive code issues have been identified that may necessitate facility closure

Given the individual component conditions, the overall condition of the facility can be calculated as:

$$Condition = \frac{\sum_{i=1}^n c_i f_i r_i}{\sum_{i=1}^n f_i r_i}$$

where c_i is the condition of component i , f_i is the weight factor listed in Table 3-19, and r_i is the replacement cost of the component.

However, rolling up the components to a facility-level average rating can present a less complete picture of conditions. For example, if half the components are rated 2 and half are rated 5, the facility would be considered in a state of good repair despite half its components not being a state of good repair. This TAMP instead uses the percent of components rated 3 or above on the TERM scale as the performance measure for facility condition.

Administrative/Maintenance Facility Inventory and Condition

Of the 12 admin/maintenance facilities owned by CTDOT, only 9 require condition assessments, as the 3 ferry facilities are excluded from FTA TAMP reporting requirements. Each of these 9 facilities has had a recent detailed inspection and condition assessment. Table 3-22 summarizes CTDOT’s administrative/maintenance facility inventory and condition.

Table 3-22. CTDOT Administrative/Maintenance Facility Inventory and Condition

Asset Type	Inventory	Components Rated 3 or above on TERM scale	Components Rated below 3 on TERM scale	
Administrative /Maintenance Facility (Commuter Rail)	5 facilities	92%	8%	
Administrative /Maintenance Facility (Bus)	4 facilities	86%	14%	

Passenger Facilities

CTDOT owns 53 passenger facilities for bus rapid transit and commuter rail services, including 10 CTfastrak passenger facilities and 43 rail passenger facilities.

Passenger Facility Condition Assessment and Performance Measures

The condition assessment approach for passenger facilities is similar to that for administrative/maintenance facilities. The approach described here is based on FTA’s guidance detailed in *TAM Facility Performance Measure Reporting Guidebook: Condition Assessment Calculation*. FTA’s guidance is intended to support calculation of FTA’s

mandated SGR performance measure for facilities, which is the percentage of facilities within an asset class rated less than 3 on the five-point TERM scale. However, a facility with an overall condition rating of 3 or greater may still have outstanding SGR needs for certain components.

Major facility components are inspected and rated on a 1 to 5 condition scale. The condition rating values and their descriptions are listed in Table 3-18. The components are listed in Table 3-23.

Regarding the specific components of passenger facilities, note that first nine listed in the table below are assessed for each building in the facility. Three components are assessed for each platform, and Site is assessed for the site as a whole.

Table 3-23. Passenger Facility Components

Inventory Unit	Component	Notes	Typical Useful Life* (years)	Component Condition Weight**
Building	Substructure		30	1.0
Building	Shell		30	1.0
Building	Interior		30	1.0
Building	Plumbing	May need to assess based on age	20	1.0
Building	HVAC	May need to assess based on age	20	1.0
Building	Electrical	May need to assess based on age	30	1.0
Building	Fire Protection	See Table 6 in Appendix B	20	1.0
Building	Conveyance	See Table 6 in Appendix B	20	1.0
Building	Fare Collection		20	1.0
Platform	Structure		30	1.0

Inventory Unit	Component	Notes	Typical Useful Life* (years)	Component Condition Weight**
Platform	Canopy		30	1.0
Platform	Electrical		30	1.0
Site	Site		50	1.0

*Useful life can be utilized for components that cannot be visually inspected.

**Component Condition Weight represents the relative importance of the component compared to other components. By default, these numbers are 1.0. However, based on the agency’s experiences and practices, the inspector can use a different number to lower or raise the importance of a component and thus change how component conditions impact the overall facility condition.

The other details of the assessment process are identical to that described previously for administrative/maintenance facilities. Table 3-20 lists rating values to use if CTDOT uses age as a proxy for condition. Table 3-21 lists specific condition assessment language to use for fire protection and conveyance. Given the individual component conditions, the overall condition of the facility is calculated as:

$$Condition = \frac{\sum_{i=1}^n c_i f_i r_i}{\sum_{i=1}^n f_i r_i}$$

where c_i is the condition of component i , f_i is the weight factor listed in Table 3-23, and r_i is the replacement cost of the component.

Recent rail passenger facility inspections conducted by CTDOT contained sufficient information to meet FTA requirements for conducting facility condition assessment, as well as defining condition states that were converted to FTA’s TERM 1-5 Scale for NTD reporting. The inspections were performed for different facility components using a 10-point scale similar to the NBI condition scale (with values ranging from 0 to 9). NBI conditions were converted to the TERM scale by dividing the rating by 2 and then rounding to the nearest integer value. Thus, a component was deemed to have a TERM rating of 2 if its NBI rating was 5 (fair) or less. The conversion scale is show in Table 3-24.

Table 3-24. Conversion Scale: NBI to TERM

NBI Scale	TERM Rating	Condition
9	5	Excellent
8	4	Good
7		
6	3	Adequate
5	2	Marginal
4		
3		
2	1	Poor
1		
0		

The rail facility inspections were mapped to component conditions as follows:

- The condition for Substructure was established based on the value for Foundations.
- The condition for Shell was established based on the minimum of Roof and Exterior Walls.
- The condition for Interior was established based on the minimum of Interior Walls, Floors, Windows/Skylights/Doors, Stairs/Ramps and Walking Surfaces.
- The condition for Plumbing was established based on the minimum of the two ratings for Drainage and the rating for Restrooms.
- The condition for HVAC was established based on the minimum of HVAC, Duct Work, Compressors, and Blowers.
- The condition for Conveyance was established based on the minimum of Elevator Pit, Elevator Machine Room, Elevator Cab, and Escalator.
- The condition for Site was established based on the value for Site-Electrical.

For rail platforms, the condition was determined for the components Structure, Canopy and Electrical. For each of these the condition was determined by taking the minimum of the subcomponent ratings.



The station data included information on station bridges, but this was considered to be part of the data set of Fixed Guideway – Structures.

This TAMP uses the percent of components rated 3 or above on the TERM scale as the performance measure for facility condition.

Passenger Facility Inventory and Condition

CTDOT owns 53 passenger facilities, including 43 commuter rail stations and 10 CTfastrak stations. Passenger facility assessments and score conversions were available for all facilities. Table 3-25 summarizes CTDOT’s passenger facility inventory and condition.

Table 3-25. CTDOT Passenger Facility Inventory and Condition

Asset Type	Inventory	Components rated 3 or above on TERM scale	Components rated below 3 on TERM scale	
Passenger Facility (Commuter Rail)	43 facilities	74%	26%	
Passenger Facility (Bus Rapid Transit)	10 facilities	100%	0%	

FTA Performance Measures

As mentioned throughout this chapter, FTA has established SGR performance measures for the four capital asset categories required for the PT-TAMP. Transit providers must set one-year performance targets for each applicable performance measure. These targets must be updated and submitted on the A90 form of the Asset Inventory Module (AIM) module to the NTD annually. The NTD AIM is designed to collect basic information on assets and infrastructure used by U.S. transit agencies to deliver service. Beginning in Report Year (RY) 2018, agencies that receive or benefit from Chapter 53 funds from FTA are required to report asset inventory, condition and performance information to the NTD. For rolling stock and equipment, CTDOT uses FTA performance measures to track asset condition. Targets in Connecticut are set using the following business practice process adopted by CTDOT:

$$\text{Target (\%)} = \# \text{ of years to procure asset} / (\text{ULB} + \text{years of procurement})$$

For example, a bus asset with a procurement time of two years and a ULB of 12 years would have a 14% target.

For infrastructure, the FTA performance measure required for NTD reporting is different from CTDOT's measure to track asset condition. The FTA has prescribed that operators submit to NTD a performance measure that measures a percentage of track that is under a speed restriction, a terminology that is tied to the issuance of slow zones. Slow zones are orders put out by a rail provider to inform train operators that a segment of track should be traversed at a slower speed than normal or avoided altogether due to weather, maintenance, or defect. In this case, FTA has requested the collection of all slow zone data with the exception of blanket slow zones (usually weather-related).

CTDOT collected this data from MNR, which submits daily slow zone bulletins to the department to inform of track outages. The FTA requires transit providers to only collect data for the first Wednesday of every month at 9:00 AM, as a

method of keeping data collection simple and representative of day to day. Each month when data is received, CTDOT would track the total track miles under performance restriction. Once 12 months of data are collected, these numbers should be averaged to determine number of track miles on average that are under a restriction, and then divide by the total number of track miles on the system to get a % for the year.

This percentage would be reported to the NTD calculated as shown below:

$$V = \left(\sum_{i=1}^{12} T_i \right) / 12$$

T = Total Track Miles under restriction for month i

I = Month

V = Guideway Performance Metric (Average Track Miles Under Restriction per Month)

$$G = \left(\frac{V}{S} \right) * 100$$

S = Total Track Miles on System

G = Guideway Performance Measure (%)

See Appendix C for the latest slow zone calculations.

For facilities, CTDOT uses the FTA performance measure required for NTD reporting. CTDOT’s condition assessment approach was developed to meet the FTA requirements and deliver condition data for calculating the performance measure. FTA requires facilities to be inspected at least every 4 years, but initially only requires 25% of all facilities to be inspected and reported each year.

Performance Comparison (2017 vs. 2021)

A summary of the FTA performance measures and CTDOT's targets is provided in Tables 3-26 through 3-29.

Revenue and Service Vehicles

Between 2017 and 2021, 98 Tier I transit buses were purchased, resulting in a consistent asset condition. In addition, 4 over-the-road buses and 11 service vehicles were purchased. With these purchases, performance metrics for other vehicle sub classes declined slightly.

While there were no rail vehicles purchased between 2017 and 2021, the condition of the self-propelled passenger car fleet improved as old vehicles were retired from the fleet. Other rail vehicle performance stayed steady or declined slightly.

Facilities

An aspirational target of 0% was initially set across the board for all transit facilities for the 2018 PT TAMP. The Department is implementing a Statewide Public Transportation facilities inspection program for maintenance, administrative, and passenger facilities under the agencies' capital responsibility, which started in the summer of 2019. This program includes inspection of transit district facilities to determine condition at component and an overall condition for current state of repair.

Infrastructure

Infrastructure performance improved slightly from 2017 to 2021, with the % of track under speed restrictions declining from 5% to 3%, meeting the target of 4%.

Table 3-26. FTA Performance Measures and Targets for Rolling Stock

Performance Measure	Asset Class	Previous Performance (SFY17)	Current Performance (SFY21)	Performance Target (SFY22)
Percentage of vehicles that have met or exceed their ULB	Transit Bus	19%	22%	14%
	Articulated Bus	0%	49%	14%
	Cutaway Bus	0%	100%	17%
	Over-the-Road Bus	3%	49%	14%
	Commuter Rail Locomotive (MNR)	100%	37%	13%
	Commuter Rail Locomotive (SLE/HL)	100%	100%	17%
	Commuter Rail Passenger Coach (MNR)	0%	38%	13%
	Commuter Rail Passenger Coach (SLE/HL)	100%	100%	17%
	Commuter Rail Self-Propelled Passenger Car	12%	0%	13%
Ferry Boat	100%	100%	0%	

Table 3-27. FTA Performance Measures and Targets for Equipment

Performance Measure	Asset Class	Previous Performance (SFY17)	Current Performance (SFY21)	Performance Target (SFY22)
Percentage of vehicles that have met or exceed their ULB	Truck	26%	37%	7%
	Automobile	46%	100%	17%
	Sport Utility Vehicle	30%	72%	17%
	Van	55%	100%	17%
	Steel Wheel Vehicle	98%	100%	0%

Table 3-28. FTA Performance Measures and Targets for Infrastructure

Performance Measure	Asset Class	Previous Performance (SFY17)	Current Performance (SFY21)	Performance Target (SFY22)
Percentage of track segments with performance restrictions	Rail Guideway	5%	3%	4%

The passenger facilities reported below consist of 43 rail passenger facilities. The 10 CTfastrak facilities owned by CTDOT are not required to be reported to NTD and thus are not included in the performance measure calculation.

With recent inspections, baseline facility condition data has been collected for administrative and maintenance facilities, which will allow for more precise performance metrics in future TAM updates. While conditions remain the same at the overall facility level, conditions have improved at the component level, shown in Tables 3-22 and 3-25.

Table 3-29. FTA Performance Measures and Targets for Facilities

Performance Measure	Asset Class	Previous Performance (SFY17)	Current Performance (SFY21)	Performance Target (SFY22)
Percentage of facilities within an asset class, rated below condition 3 on the TERM scale	Administrative/ Maintenance	0%	0%	0%
	Passenger	58%	58%	0%

Chapter 4

Analytical Approach

Asset management involves operating, maintaining, and improving assets using analysis to identify a sequence of actions that will achieve a State of Good Repair over the life cycle of the assets. Thus, asset management concepts apply over the full life of an asset, spanning from installation or construction of an asset to its replacement or retirement. As part of asset management practice, CTDOT makes investment decisions that consider not only the current condition, but also the full life cycle and associated costs of assets. Analytical processes and decision support tools help support CTDOT's investment decisions and develop a prioritized list of needs.

Overview

This chapter describes CTDOT’s analytical approach for its transit assets. CTDOT’s approach for analyzing transit investment needs relies on two systems. First, the asset data described in Chapter 3 are stored in a single, integrated database, the Transit Asset Management Database. Also, to perform the analysis and prioritization of SGR needs, CTDOT is using a customized version of the Transit Asset Prioritization Tool (TAPT) developed through the Transit Cooperative Research Program (TCRP) and included with TCRP Report 172.

Deterioration models and costs used with the tool are based on Connecticut data (where available), or alternatively on the TAPT defaults from the FTA Transit Economic Requirements Model (TERM). TERM is a decision tool that helps transit agencies with assessing and prioritizing SGR needs given funding constraints. The TERM scale is a rating system to define levels of condition for use in deterioration curves to determine the remaining life of assets.

Federal Requirements

In 49 CFR 625.25, FTA requires that a TAM plan include 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.”

Transit Asset Management Database

The Transit Asset Management Database is a relational database that integrates the asset condition inventory and condition data used to develop this plan. The database is a SQL Server database with a web-based user interface.

Figure 4-1 shows an example screenshot of the system.

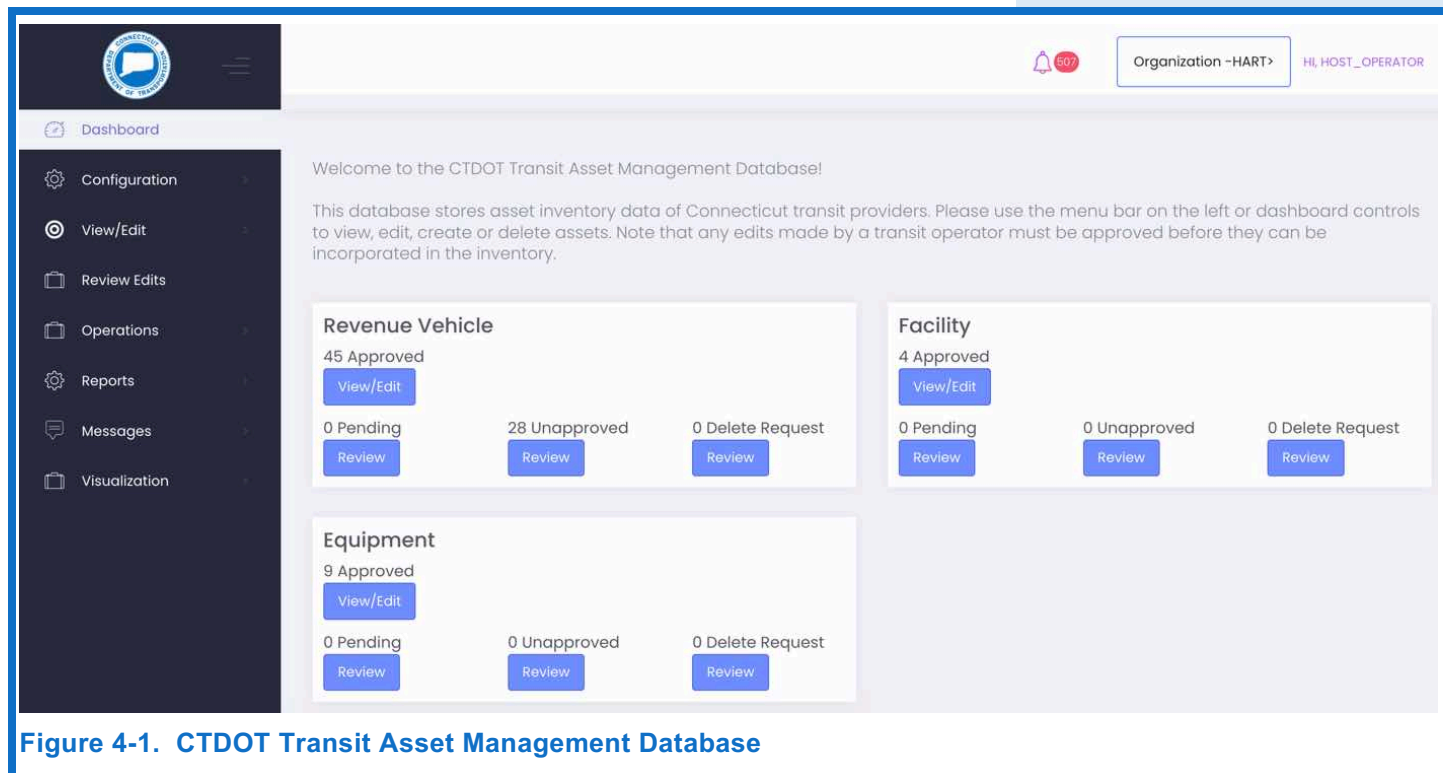


Figure 4-1. CTDOT Transit Asset Management Database

The database is structured to store data on any asset, with the ability to add asset types and attributes without changing the underlying database structure. Also, the database supports specification of parent-child relationships, so that complex asset hierarchies can be specified if needed. For instance, for facilities a record is stored for each individual facility, as well as for each building on the facility site.

Asset types currently stored in the database correspond to those identified in Chapter 3. Note that in the case of revenue vehicles the database stores data by individual vehicles, though analysis and reporting to the National Transit Database (NTD) is typically performed by subfleet.

The attributes stored for each asset necessarily vary by asset type, and include those required to identify the asset and support use of TAPT for modeling investment needs as described in the following section. For instance, for buildings the database stores data on the construction date of the facility, the construction cost, floor area, and the condition of the building components listed in Chapter 3. However, CTDOT and individual transit operators have significant additional information on buildings used for day-to-day management stored in other systems.

Data are exported for use in TAPT using a set of custom views defined by asset type. Also, project team members exported the views to spreadsheet form to facilitate review and verification of the data.

Analytical Tool

CTDOT uses TAPT to support its analytical approach. TAPT is a spreadsheet tool for predicting transit asset conditions and SGR needs. Figure 4-2 is a diagram illustrating the structure of TAPT.

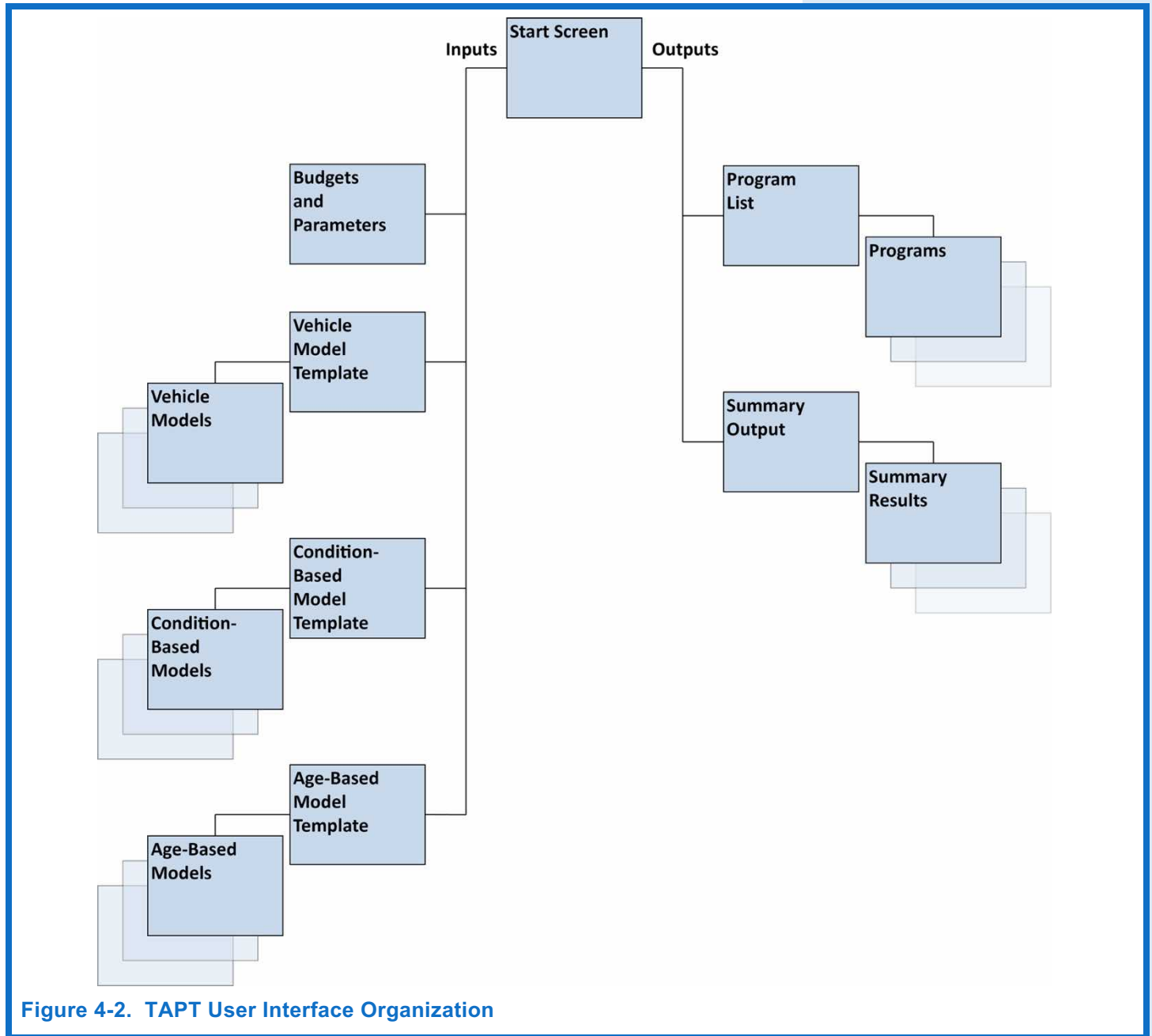


Figure 4-2. TAPT User Interface Organization

As shown in the figure, the tool has a single start screen that supports navigation, generation of new models, and performing an analysis. The tool has templates for vehicle models, age-based-models, and condition-based models. TAPT also includes a single worksheet for entry of major parameters and budgets, as well as worksheets for viewing summary and detailed outputs of an analysis. The tool creates new worksheets with summary outputs and detailed outputs (the program list) for each analysis a user performs.

Figure 4-3 illustrates the start screen of the tool, which provides the tool user the ability to create a new asset model, edit an existing model, run the prioritization model (which uses the asset models), and/or view results.

TAPT

The tool has a series of models for different asset types that recommend when to rehabilitate or replace an asset, and the conditions and performance predicted for the asset over time. Also, the tool supports prediction of the overall performance resulting for a specified funding scenario, and recommends a prioritized list of projects to fund given a budget constraint.

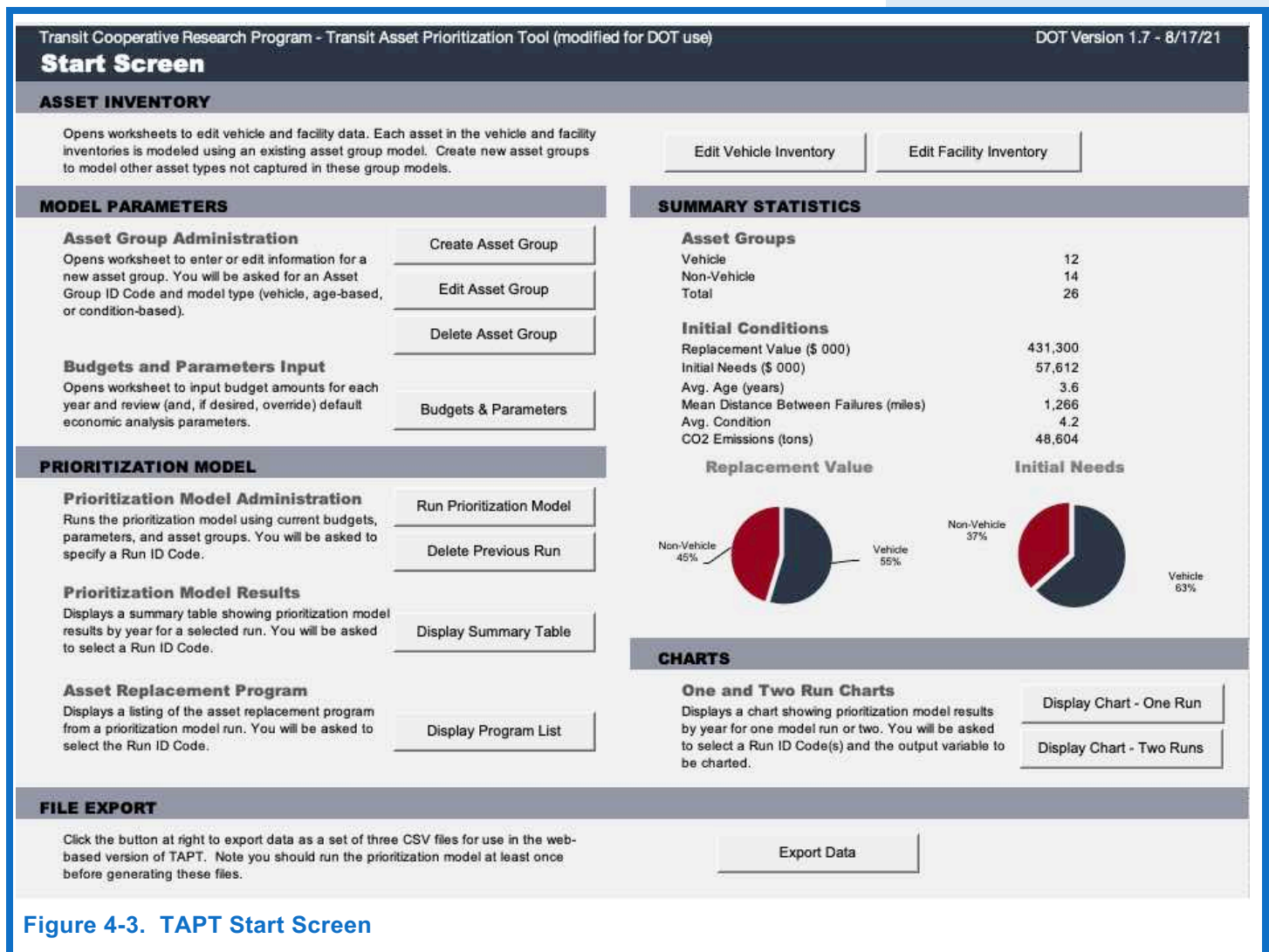


Figure 4-3. TAPT Start Screen

Figure 4-4 illustrates specification of an asset model. In this case a condition-based model is shown. The user specifies the quantity and condition of each asset of a specified type, a transition probability matrix that describes how the asset will deteriorate (or improve in the event an action is performed), and additional cost data (not shown in this screenshot).

The outputs generated using TAPT include lifecycle models for each asset type, a recommended policy specifying the point at which the asset should be rehabilitated or replaced, and predictions of future conditions as an asset ages. The prioritization model uses the asset-specific results to predict future conditions and recommend work given a budget.

“Pipeline Projects”

Alternatively, one can enter a specific set of asset rehabilitation/replacement actions (“pipelined” projects) and view the predicted conditions and performance over time without using the prioritization model to determine when these actions will be implemented.

Transit Cooperative Research Program - Transit Asset Prioritization Tool

Condition-Based Model: Asset Group Facility-HVAC

Asset Type
 Asset Description
 Asset Units of Measure

DEFAULT REPLACEMENT AND REHABILITATION COSTS

Unit Agency Replacement Cost (\$)
 Unit Agency Rehabilitation Cost (\$)

INVENTORY DESCRIPTION

Sub-Group	Asset Condition	Units of Assets	Project Code	Pipeline Year
	1	5-Excellent	1	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

TRANSITION PROBABILITIES

State	Action	5-Excellent		4-Good		3-Adequate		2-Marginal		1-Poor		0-Failed
		Default	Override	Default	Override	Default	Override	Default	Override	Default	Override	Default
5-Excellent	Do Minimum	95.8%	4.2%			0.0%		0.0%		0.0%		0.0%
	Rehab	0.0%		100.0%		0.0%		0.0%		0.0%		0.0%
	Replace	100.0%		0.0%		0.0%		0.0%		0.0%		0.0%
4-Good	Do Minimum	0.0%		93.1%		6.9%		0.0%		0.0%		0.0%
	Rehab	0.0%		100.0%		0.0%		0.0%		0.0%		0.0%
	Replace	100.0%		0.0%		0.0%		0.0%		0.0%		0.0%
3-Adequate	Do Minimum	0.0%		0.0%		89.1%		10.9%		0.0%		0.0%
	Rehab	0.0%		100.0%		0.0%		0.0%		0.0%		0.0%
	Replace	100.0%		0.0%		0.0%		0.0%		0.0%		0.0%
2-Marginal	Do Minimum	0.0%		0.0%		0.0%		83.0%		8.5%		8.5%
	Rehab	0.0%		100.0%		0.0%		0.0%		0.0%		0.0%
	Replace	100.0%		0.0%		0.0%		0.0%		0.0%		0.0%
1-Poor	Do Minimum	0.0%		0.0%		0.0%		0.0%		83.0%		17.0%
	Rehab	0.0%		100.0%		0.0%		0.0%		0.0%		0.0%
	Replace	100.0%		0.0%		0.0%		0.0%		0.0%		0.0%
0-Failed	Replace	100.0%		0.0%		0.0%		0.0%		0.0%	0.0%	

Click for Main Menu

Notes

Figure 4-4. TAPT Model Example

The TAPT modeling approach incorporates the three different asset-level models noted above, as well as a prioritization model that integrates the asset-level models and simulates the allocation of resources to address SGR needs over time and across asset types. Below is a brief description of each of these:

- **Vehicle Model:** the revenue vehicle model takes as input data items reported by urban transit agencies to the NTD specified for a given fleet of vehicles, such as vehicle mileage, revenue passenger miles, maintenance costs, energy consumption and mechanical failures. The model then predicts agency, user and external costs, and mean distance between failures (MDBF) as a function of vehicle mileage. Further, it calculates the mileage at which a given vehicle should be replaced to minimize lifecycle costs, and the increased lifecycle costs that will result each year a needed replacement is deferred. The model includes default assumptions for growth in maintenance costs, rehabilitation costs and failures that are calibrated based on model inputs. Alternatively, one may override the default assumptions.
- **Condition-Based Model:** this model, which is technically a Markovian Decision Model, may be used to model any asset. It predicts the lifecycle agency, user and external costs associated with an asset, as well as the optimal point to perform rehabilitation or replacement, and the increase in lifecycle costs of deferring action. An asset is modeled as existing in one of a number of different condition states (in this case, using the five-point condition scale from TERM), and a set of transition probabilities describes the likelihood of transition from a given state to another given either the asset deteriorates or some action is taken. The model determines the optimal policy, or set of actions to take as a function of condition, to minimize agency, user and external costs. Further, the model explicitly calculates the cost of deferring a recommended action in terms of the increased lifecycle cost resulting from

action deferral. Model defaults are provided for each asset type defined in TERM using TERM data.

- **Age-Based Model:** like the condition-based model, this is a generic model that can be used to model any asset. However, the condition-based model is recommended over this model where condition data are available. In the age-based model, asset rehabilitation or replacement is motivated by the gradually increasing cost of asset maintenance, as well as increasing likelihood of asset failure. This likelihood is modeled using a Weibull distribution. Using the model requires data on asset age, and the model outputs are essentially the same as those produced using the condition-based model.
- **Prioritization Model:** in TAPT asset rehabilitation/replacement is prioritized with an objective of minimizing lifecycle agency, user and external costs subject to a budget constraint. To accomplish this objective, the model establishes candidate rehabilitation/replacement actions, and calculates the costs and impacts of these using the asset-level models. The model then prioritizes potential investments in decreasing order of Prioritization Index (PI), where the PI is defined as the change in lifecycle cost resulting from delaying an action one year relative performing it in the specified year divided by the action cost. In concept the PI is a benefit cost ratio. However, one may tailor the prioritization function to change the weight of different types of benefits and/or specify an additional benefit realized from replacing an asset over and above that modeled by the asset-level models.

See TCRP Report 172 for a detailed description of TAPT, guidance on how to use the spreadsheet tool, and two tutorials using example data.

Implementing the Tool at CTDOT

This section provides additional details on the revisions made to support CTDOT’s use of TAPT. The revisions include creating new screens for refining inventory data and changing underlying code in TAPT to relax some of the tool’s constraints.

Screens for Editing Inventory Data

A major change to TAPT is the addition of screens for importing vehicle data and facility data from the Transit Asset Management Database (and/or other systems). With this functionality the tool user can quickly enter data on a set of vehicle fleets and facilities.

Figure 4-3 illustrates the start screen for the CTDOT version of TAPT providing access to the inventory screens. Relative to the default, this version of the tool includes a new section labeled “Asset Inventory” for two new buttons providing access to the new screens. Figure 4-5 shows a section of the vehicle inventory screen. This screen has one row for each fleet exported from the Transit Asset Management Database. A fleet is a subgroup of vehicles that are operated by the same transit provider and have the same manufacturer, model, and model year. The user can edit the following fields for each fleet, either using imported data or overriding it as appropriate:

- **Fleet ID.** This is formed by concatenating the agency name and a sequence number, both of which can be edited.
- **Vehicle description.** This is formed from Transit Asset Management Database data by concatenating the model year, manufacturer and model.
- **Vehicle Useful Life (miles).** The ULB for the fleet in miles, if defined (by default this is not used).
- **Vehicle Useful Life (years).** The ULB for the fleet in year. This is defined by CTDOT by vehicle type.

- **Vehicle type.** This field specifies which specific vehicle model to use of the types defined in CTDOT’s asset hierarchy.
- **Model year.** This is formed from Transit Asset Management Database data and used to calculate vehicle age.
- **Total current miles/hours.** This is an optional field and is not populated by default. If populated it is used to calculate an effective age for the fleet.
- **Number of vehicles.** This is the number of vehicles in a fleet and is formed from Transit Asset Management Database data.
- **Condition.** The condition of the fleet, measured using the 1-5 TERM scale. This is an optional field and is not populated by default. If populated it is used to calculate an effective age for the fleet.
- **Vehicle age.** This is calculated based on model year or date vehicle is placed into service. Vehicle condition is provided to assist in evaluating effective age.
- **Project code.** This is an optional field that can be used to identify a known project.
- **Pipeline year.** This is an optional field that can be used to identify a specific year when the vehicle will be replaced.
- **Indicator of whether or not to include the vehicle in the modeling.** Vehicles may be excluded if data are incomplete, or if the vehicle is modeled through a separately-defined asset group model.

Transit Cooperative Research Program - Transit Asset Prioritization Tool (modified for DOT use)

Vehicle Inventory

Agency	ID Default	Override	Description	Vehicle Useful Life (miles)	Vehicle Useful Life (years)	Vehicle Type	Model Year	Total Current Miles/Hours	Num. Vehicles	Condition	Age Model Year
ETD	1		2010 Ford E450			Cutaway Bus	2010		1		8
ETD	2		2010 Ford E450			Cutaway Bus	2010		2		8
ETD	3		2011 Ford Startrans			Cutaway Bus	2011		1		7
ETD	4		2012 Ford F550			Cutaway Bus	2012		1		6
ETD	5		2012 Ford Goshen E450			Cutaway Bus	2012		1		6
ETD	6		2012 Ford Phoenix			Cutaway Bus	2012		1		6
ETD	7		2012 Ford Startrans E450 28 FT			Cutaway Bus	2012		1		6
ETD	8		2013 Ford E450			Cutaway Bus	2013		2		5
ETD	9		2013 Ford Goshen E450 28 FT			Cutaway Bus	2013		1		5
ETD	10		2013 Ford Goshen F550			Cutaway Bus	2013		1		5
ETD	11		2015 Ford E450 Phoenix			Cutaway Bus	2015		4		3
GBTA	1		2012 Ford Goshen			Cutaway Bus	2012		4		6
GBTA	2		2017 Dodge Braun			Cutaway Bus	2017		2		1
GBTA	3		2017 Ford Startrans			Cutaway Bus	2017		24		1
GBTA	4		2003 New Flyer			Transit Bus	2003		2		15
GBTA	5		2003 New Flyer			Transit Bus	2003		3		15
GBTA	6		2011 New Flyer			Transit Bus	2011		2		7

Figure 4-5. Connecticut TAPT Vehicle Inventory

The facility inventory is similar in concept to the vehicle inventory. For each facility defined, the screen allows specification of the following items:

- **Facility ID.** This is formed by concatenating the agency name, facility description and a sequence number, all of which can be edited.
- **Condition.** This is specified for ten facility systems – substructure, shell, interior, conveyance, plumbing, HVAC, fire protection, electrical, equipment, and site.
- **Construction year.** This field is used to calculate facility age.
- **Quantity.** This must be specified separately by system, and is typically either the roof area, floor area, or site area.
- **Project code.** This is an optional field that can be used to identify a known project.
- **Pipeline year.** This is an optional field that can be used to identify a specific year when the facility will be replaced/rehabilitated.
- **Indicator of whether or not to include the facility in the modeling.** Facilities may be excluded if data are incomplete, or if the vehicle is modeled through a separately-defined asset group model.

Note that each facility is modeled as a set of ten assets in TAPT, with one asset defined for each of the ten facility systems listed above.

Other TAPT Revisions

Several further revisions were made in TAPT to relax certain constraints in the tool. Specific changes made in this regard include the following:

- The tool was revised to allow modeling of assets listed on the new inventory pages without providing the same level of detail required for developing asset group models. For these assets it is necessary to specify certain basic data outlined above, including specification of what asset group model should be used. Preexisting TAPT functionality is used to develop the asset group models. By default, TAPT is constrained to model only those assets listed in the group model pages.
- The handling of assets excluded from prioritization runs was revised. The preexisting version of the tool allowed for specifying that assets used for building an asset group model should be excluded from prioritization. However, if this option was used both the asset and the model were excluded; in other words, selecting this option was equivalent to deleting the model entirely. For CTDOT, it is desirable to define asset group models, and then use the models without including the specific assets included in developing the model (as they may already be included in the data imported from the Transit Asset Management Database). The tool was revised to support this approach.
- The tool was revised to model up to 5,000 assets, including 3,000 assets listed on the vehicle inventory pages, 1,000 assets listed on the facility inventory page (10 systems for each of 100 facilities), and 1,000 other assets that may be defined as part of the asset group models. The preexisting version of the tool was constrained to model only 1,000 assets. Likewise, the page size was increased for display of model results considering the increase in number of assets.

Modeling Assumptions for Connecticut Transit Assets

This section describes key modeling assumptions and parameters by asset type.

Revenue Vehicles. For buses prototype models were developed for the bus types identified in Chapter 3 using the TAPT vehicle model. These models were then calibrated such that replacement is recommended at the ULB value specified for CTDOT. Vehicle replacement costs were established by adjusting the costs established for the 2018 TAMP based on analysis of recent construction cost inflation in Connecticut.

Rail Vehicles. As in the case prototype models were developed for the bus types identified in Chapter 3 using the TAPT vehicle model. These models were then calibrated such that replacement is recommended at the ULB value specified for CTDOT. The cost established for the 2018 TAMP were adjusted for inflation based on analysis of recent construction cost inflation in Connecticut.

Facilities. The TAPT condition-based model was used to define models for each of the major facility components defined in Chapter 3. In the tool assets were created for each facility component of each building. Platforms were treated as an additional facility component. TAPT defaults (which are in turn derived from those in TERM) were used to predict deterioration rates for each facility component.

Regarding facility costs, the average cost per square foot was determined for passenger buildings and administrative/maintenance facilities. The costs used in the 2018 TAMP were adjusted for inflation based on analysis of recent construction cost inflation in Connecticut. The 2018 costs were established by averaging inflation-adjusted historic construction costs.

CTDOT staff estimated the percentage of the overall facility cost attributed to each facility component.

For platforms a single cost per platform was calculated by averaging the inflation-adjusted historic costs. Overall

facility conditions were predicted by calculating a weighted average condition, with each component weighted based on its replacement value.

Bridges. The TAPT condition-based model was used to develop a model for bridges. TAPT defaults were used for deterioration. CTDOT staff calculated an average cost per bridge for culverts and pedestrian structures, moveable bridges, and fixed bridges.

Track. TAPT condition-based models were developed for tangent track, curved track, wood ties, concrete ties, turnouts, and guideway surfacing. Deterioration models for each of these asset types were developed to match MNR definitions of each condition and MNR estimates of useful life. For instance, for tangent track MNR estimates a useful life of 40 years. The deterioration probabilities for tangent track were specified such that the median years to reach a value of 2 on the TERM scale (100% of the useful life) is 40 years, and the median years to reach a value of 1 on the TERM scale (125% of the useful life) is 50 years. Costs from the 2018 TAMP (in turn based on the Railroad Engineering and Construction Cost Benchmarks published by Compass International Inc.) were adjusted for inflation based on analysis of recent construction cost inflation in Connecticut.

Power. TAPT condition-based models were developed for the power assets described in Chapter 3, grouping these where the same units of measure were used for multiple subtypes. This resulted in models for Catenary Wire, Catenary Insulators and Pulleys, Cable, Catenary Poles, Substations, and Other Power Components. Deterioration models for each of these asset types were developed to match MNR definitions of each condition and MNR estimates of useful life. The costs used in the 2018 TAMP were adjusted for inflation based on analysis of recent construction cost inflation in Connecticut.

Signals. A TAPT age-based model was established for signals using TAPT defaults for deterioration. A single asset was defined for the overall signal system for each rail line (the NEC mainline and the three branch lines). The cost per

track mile was estimated by CTDOT staff based on past project costs.

Service Vehicles. TAPT age-based models were developed for the different types of service vehicles defined in Chapter 3. TAPT defaults were used, calibrating these to CTDOT’s established ULB values. Vehicle replacement costs were established by adjusting the costs established for the 2018 TAMP based on analysis of recent construction cost inflation in Connecticut.

Business Processes to Support the Tool

Although the use of TAPT is an important element of the development of the PT-TAMP, in reality its use is just one of a number of steps in the decision-making process for capital planning. The business process for performing the analysis of SGR needs and using this to develop the capital plan is as follows:

- First, TAPT is populated with available data on the asset inventory, its condition, treatments costs, and other data.
- Next, projects that are in progress or planned in the near term are entered in TAPT as “pipelined” projects. This forces the system to rehabilitate or replace these assets in the specified year.
- Next, initial runs are performed in the system. This generates a set of predicted conditions at different budget levels, as well as a prioritized list of SGR investments recommended in each year.
- The initial model results are reviewed to identify issues in the data, such as incorrectly coded ages, cases where there are additional known investments that need to be pipelined, and/or other issues.
- TAPT is then rerun, generating a new set of results and priorities.
- CTDOT next revises its capital plan using data from TAPT to help inform its decision-making. However, the work that is actually planned may differ significantly

from that recommended by TAPT for a variety of reasons. These include:

- Bundling of related needs differently than that modeled by the system. For instance, if work on a facility is performed, then all work needed would generally be performed given the costs associated with initiating a project. TAPT might recommend work on one facility system one year, to be followed by work on another system in a subsequent project.
 - Differences in costs. TAPT is populated with average unit costs, but the costs for a given project may be greater or less than the average.
 - Need for geographical equity. TAPT does not consider the need to balance investments between different areas or regions, but this is an important factor in “real world” decisions.
 - Limitations in uses of funding. TAPT models a budget as a single fund that can be used without limitation for any project. In reality CTDOT derives funding from multiple sources and there are various stipulations on the use of those funds that must be considered in developing the capital plan. For instance, some funds may be available only for certain asset types, or certain types of work.
 - CTDOT staff incorporate many additional factors and perspectives in prioritizing needs beyond those captured in any model.
- Once the capital plan is revised, the prioritized list of needs generated by TAPT is revised based on actual project plans.

The end result of the above process is a capital plan that reflects available funding and incorporates TAPT priorities to the extent feasible. The process also yields a prioritized list of SGR needs that helps inform decisions concerning where additional and/or future investment should be directed. The final list of prioritized needs included in this PT-TAMP is a product of the staff judgement, TAPT analysis, and institutional experience.

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Chapter 5

Investment Scenarios

Developing investment scenarios at various funding levels enables CTDOT to evaluate funding priorities. The investment scenarios show projected needs and work across the three asset categories in the PT-TAMP. While CTDOT and Connecticut transit providers are making progress towards performance targets at current funding levels, the investment scenarios demonstrate a need for additional funding to achieve SGR.

Overview

This chapter describes the estimated funding available for transit at CTDOT, the estimated uses for that funding, projected asset investment needs, and projected capital projects based on funding scenarios. Funding for transit in Connecticut comes from a mix of federal and state sources. As described in Chapter 4, CTDOT uses TAPT to model asset conditions and predict investments needed to achieve and maintain SGR.

Federal Requirements

In 49 CFR 625.25, FTA requires that a TAM plan include a “provider’s project-based prioritization of investments.” The investment prioritization 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.”

Funding for Transit at CTDOT

Funding for transit in Connecticut historically comes primarily from FTA funds, with the remainder coming from state public transportation bonds. Connecticut public transportation bond funds are used to match federal funds and provide funding for 100% state projects.

Transit funding sources at CTDOT and the bonding process are discussed in detail in CTDOT’s Annual Capital Plan Report. Estimated funding sources for transit over the four-year period of the PT-TAMP, organized by source, are shown in Table 5-1.

Table 5-1. Summary of Estimated Funding for Transit

Description	Value by Fiscal Year (\$M) in current dollars			
	2022	2023	2024	2025
Federal Funds	\$265	\$254	\$257	\$261
State Funds (Bonds Authorized) *	\$248	\$271	\$271	\$271
Total Funding	\$513	\$525	\$528	\$532

*Combination of State Federal Match and 100% State Bonded Projects.

Federal funds for transit come from a number of FTA grant programs, including:

- Section 5305 – Planning Programs
 - 5305(d) Metropolitan Planning
 - 5305(e) State Planning and Research
- Section 5307 – Urbanized Area Formula Funding
- Section 5310 - Enhanced Mobility of Seniors & People with Disabilities
- Section 5311 – Formula Grants for Rural Areas
 - SEC 5311(b)(3) Rural Transportation Assistance Program
- Section 5337 – State of Good Repair Grants Program
- Section 5339 - Bus & Bus Facilities Infrastructure Investment Program

These program section titles correspond to the sections of the US Code in which each program is defined. A breakdown of all estimated federal formula funding for Connecticut by FTA program is shown in Table 5-2, including funding expected from the BIL.

Table 5-2. Summary of Estimated Connecticut Share of FTA Programs

Description	Value by Fiscal Year (\$M) in current dollars			
	2022	2023	2024	2025
SEC 5305(d)	\$1.6	\$1.6	\$1.6	\$1.7
SEC 5305(e)	\$0.4	\$0.4	\$0.4	\$0.4
SEC 5307	\$134.9	\$136.9	\$139.0	\$141.1
SEC 5310	\$4.8	\$4.9	\$5.0	\$5.1
SEC 5311	\$4.2	\$4.3	\$4.3	\$4.4
SEC 5311(b)(3)	\$0.2	\$0.2	\$0.2	\$0.2
SEC 5337 (High Intensity Fixed Guideway)	\$93.6	\$95.0	\$96.4	\$97.8
Hartford	\$0.5	\$0.5	\$0.5	\$0.5
Southwestern	\$93.1	\$94.5	\$95.9	\$97.3
SEC 5337 (High Intensity Motorbus)	\$1.6	\$1.7	\$1.7	\$1.7
Hartford	\$1.6	\$1.7	\$1.7	\$1.7
SEC 5339	\$8.5	\$8.6	\$8.7	\$8.8
Congressionally Directed	\$15.0	\$0.0	\$0.0	\$0.0
WALK Bridge	\$15.0	\$0.0	\$0.0	\$0.0
Total	\$264.8	\$253.5	\$257.3	\$261.2

To help generate investment scenarios for transit assets, the funding by program has been restructured to show funding by use. A summary of estimated funding uses for transit over the four-year period of the PT-TAMP, organized by mode, is shown in Table 5-3 below. This table includes all federal funding, split by uses for SGR and other activities. Funding for non-SGR activities was excluded from the TAPT Model.

Funds are split between Tier I bus, Tier II bus and rail. Statewide bus funding included in the investment scenarios comes from Sections 5307, 5311, 5337, 5339; and earmarks. The Section 5337 funding for Hartford is fixed guideway funding and can be used on CTfastrak and approximately 65% of Section 5307 funding is programmed for bus projects, based on historical trends. Rail funding comes from Sections 5307 and 5337. Section 5337 funding for Southwestern is fixed guideway funding and used for rail projects and approximately 35% of Section 5307 funding is programmed for rail projects, based on historical trends.

The estimates of funding by mode shown in Table 5-3 were calculated based on the January 2022 CTDOT Capital Plan, which did not include BIL funding. The Capital Plan is included in Appendix D.

Table 5-3. Summary of Estimated Funding Uses for Transit

Description	Value by Fiscal Year (\$M) in current dollars			
	2022	2023	2024	2025
Bus – Tier I	\$104	\$18	\$78	\$85
SGR	\$80	\$4	\$72	\$68
Other Uses	\$25	\$14	\$6	\$17
Bus – Tier II	\$69	\$77	\$65	\$37
SGR	\$23	\$29	\$20	\$22
Other Uses	\$46	\$48	\$45	\$15
Rail	\$795	\$720	\$425	\$466
SGR	\$671	\$640	\$410	\$461
Other Uses	\$124	\$80	\$15	\$5
5310 Program	\$5	\$5	\$5	\$5
Total	\$973	\$819	\$573	\$593

Note that because total estimated funding uses shown in Table 5-3 do not include BIL funding, while the available funding shown in Tables 5-1 and 5-2 does include BIL funding, the funding data do not fully align.

Also, Tables 5-1 and 5-2 report new funds made available to the State each year, while Table 5-3 shows funds programmed by year, including carryforward amounts and prior year funds released from older projects.

The funding shown as SGR-related is limited to funding for rehabilitation or replacement of existing assets that are included in the TAMP. One challenge in estimating this value is that improvement projects are not classified as SGR-related, but nonetheless may include work that improves asset conditions. For example, a facility improvement project may expand a facility and add new features (non-SGR activities), while also repairing the HVAC and roof (SGR activities).

In addition, some activities funded by CTDOT clearly are motivated by a need to maintain existing assets in good

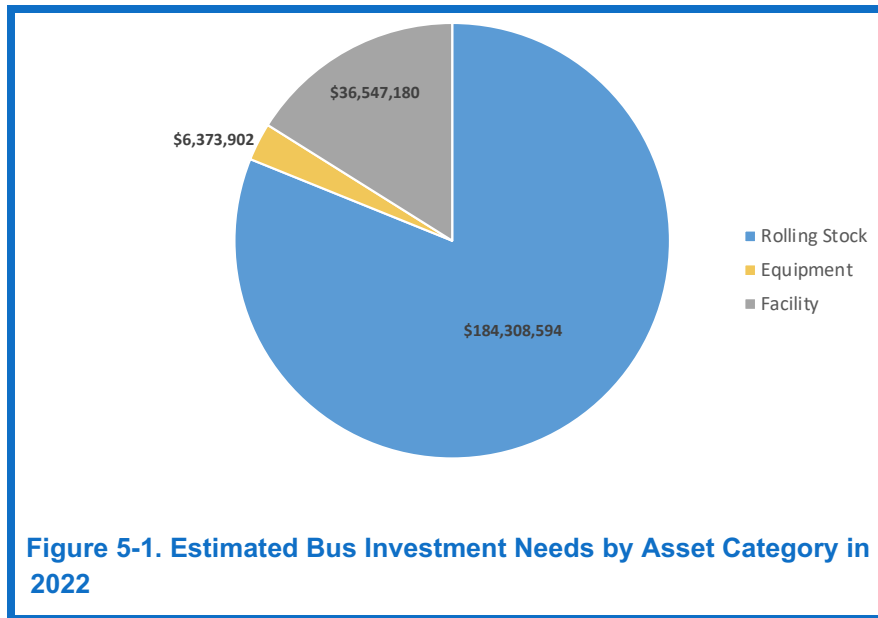
Modeling SGR Needs

TAPT only models certain SGR needs. There are additional needs beyond SGR needs addressed in the capital program, and additional SGR needs short of capital replacement that are addressed in capital and operating budgets.

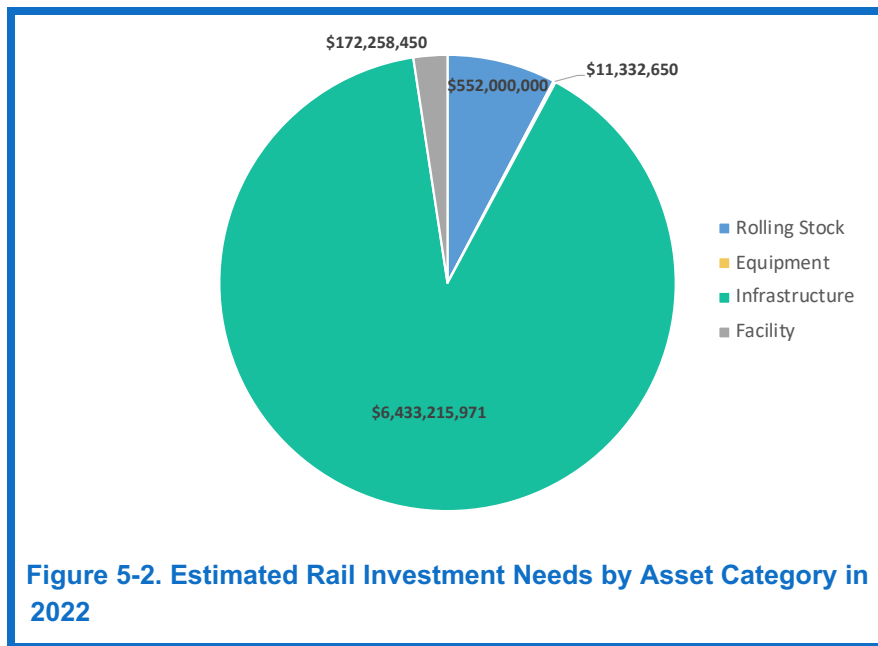
repair, but include assets that are not explicitly included in the TAMP, and thus not classified as SGR-related. For example, bus shelters are not explicitly included in the asset inventory, and not addressed in the TAMP. While CTDOT does invest in maintaining these assets, these investments are not classified as SGR-related in the table.

Current Estimated Investment Needs

Current capital investment needs for Tier I bus assets for 2022 are approximately \$227 million. Figure 5-1 shows these investment needs for 2022, broken down by asset category. Rolling stock constitutes 81% of the need, facilities constitute 16%, and equipment constitutes 3%.



Current capital investment needs for rail for 2022 are approximately \$7.2 billion. Figure 5-2 shows investment needs in 2022 for the rail mode, broken down by asset category. Infrastructure constitutes 90% of CTDOT’s rail mode need, rolling stock constitutes 8%, facility constitutes 2% and equipment constitutes less than 1%.



Investment Scenarios

This section builds on the estimated available funding to define investment scenarios to help identify and prioritize state of good repair investments in Tier I capital assets.

Each investment scenario is generated by modeling transit needs using a certain funding level, or budget. The budget is the variable input. TAPT models only certain SGR activities, so the corresponding budget should only include funding directed to those activities.

The PT-TAMP includes the following investment scenarios:

- Scenario 1 – No Funding
- Scenario 2 – Expected Funding
- Scenario 3 – Achieve SGR

The “No Funding” scenario assumes no available funding for SGR-related activities. This scenario is used to demonstrate how asset conditions would decline in the absence of continued investment.

The “Expected Funding” scenario includes all funding expected to be available for Tier I SGR activities over the period of the plan. These values were calculated by reviewing the 2022 Capital Plan and tagging investments as

SGR and Tier I. This scenario is the same as the estimated SGR funding identified in Table 5-3.

The “Achieve SGR” scenario includes funding levels required to achieve SGR targets for Tier I assets over the period of the plan. Funding increases at the level of inflation (assumed to be 3.5% annually) resulting in flat funding when measured in constant dollars.

The values presented in Table 5-4 are the budgets used for modeling SGR investments in TAPT for the PT-TAMP.

Table 5-4. Modeled Tier I SGR Funds by Scenario

Description	Value by Fiscal Year (\$M) in current dollars				Annual Average (2022-2025)
	2022	2023	2024	2025	
Bus					
No Funding	\$0	\$0	\$0	\$0	\$0
Expected	\$79.8	\$4.4	\$71.8	\$68.1	\$56.0
Achieve SGR	\$64.0	\$66.2	\$68.6	\$71.0	\$67.4
Rail					
No Funding	\$0	\$0	\$0	\$0	\$0
Expected	\$670.5	\$639.5	\$410.1	\$461.3	\$545.3
Achieve SGR	\$1,850.0	\$1914.8	\$1981.8	\$2051.1	\$1949.4

Note that because CTDOT programs bus and rail assets differently in the capital planning and programming process, bus and rail assets are modeled separately in the PT-TAMP.

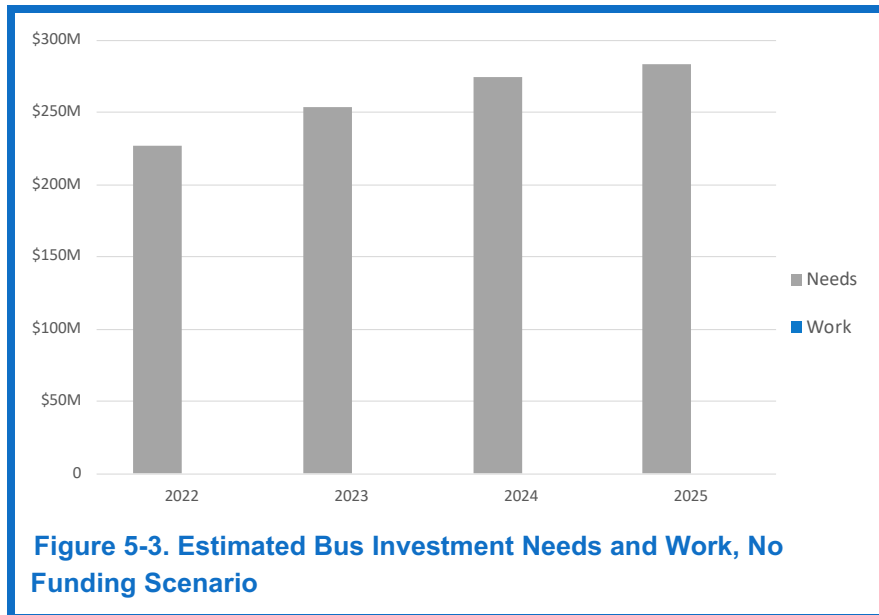
The following sections present the investment scenario results. Modeled work consists of major capital investments in SGR for transit assets. For vehicles, this means fleet replacement. For other assets, it means major rehabilitation or replacement.

Bus Investment Needs and Work

No Funding Scenario

Estimated bus investment needs and projected work in the No Funding scenario are shown in Figure 5-3. Without any

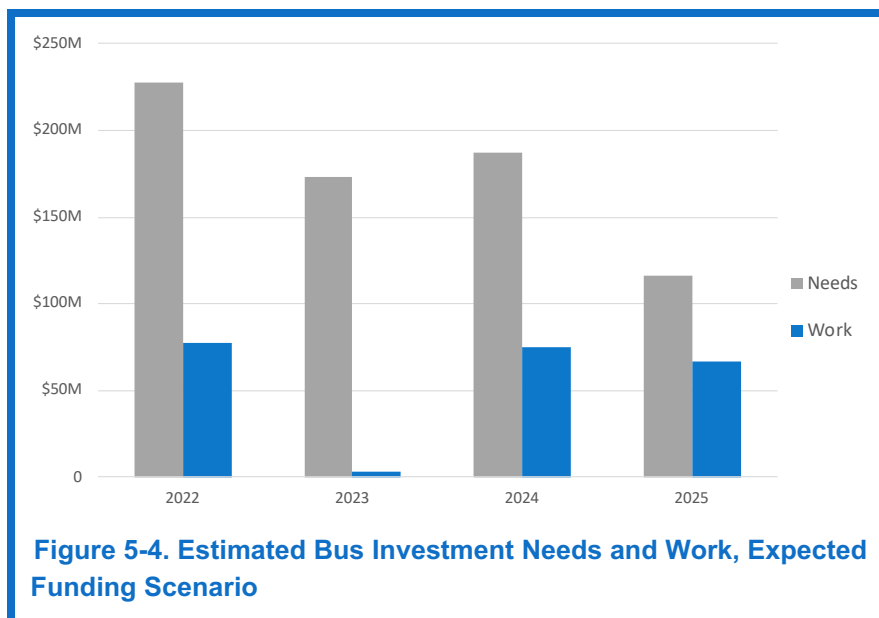
investment, needs would grow from \$227 million in 2022 to approximately \$283 million in 2025.



Expected Funding Scenario

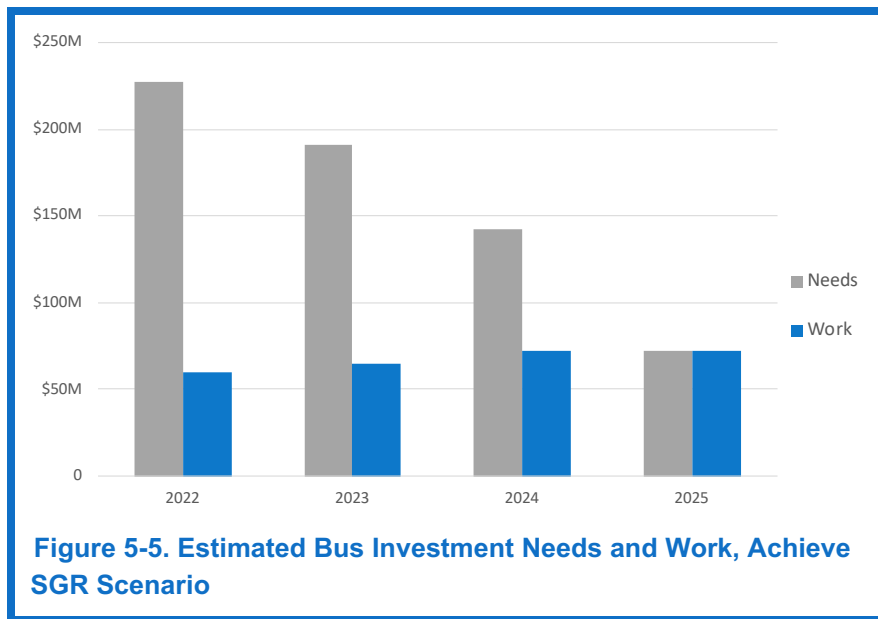
Estimated bus investment needs and projected work in the Expected Funding scenario are shown in Figure 5-4. The figure shows that spending an average of \$56 million per year would reduce the backlog of needs to approximately \$50 million dollars at the end of 2025.

Note that the scale of the y-axis in Figures 5-4 and 5-5 is different from that of Figure 5-3.



Achieve SGR Scenario

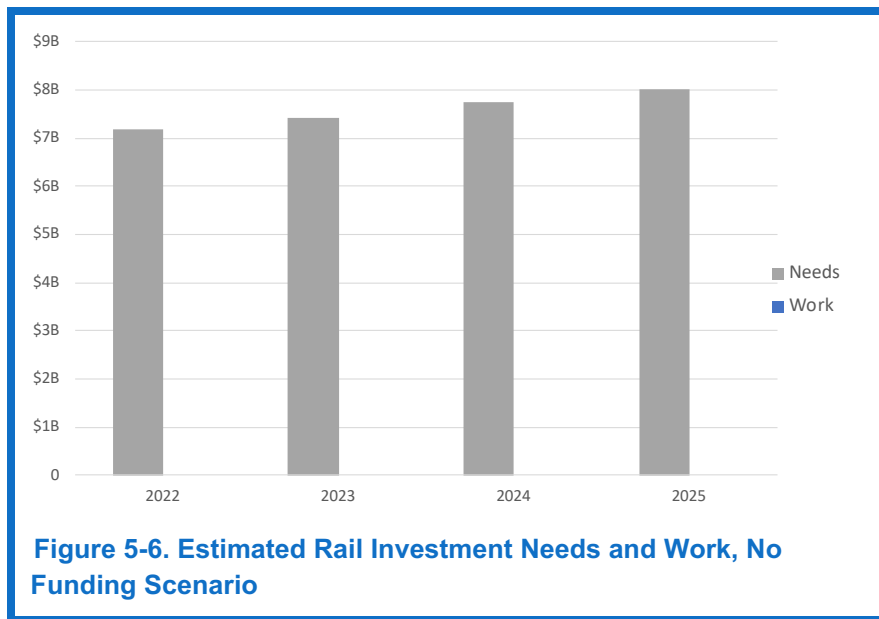
Estimated bus investment needs and projected work in the Achieve SGR scenario are shown in Figure 5-5. In this scenario spending is increased to approximately \$67 million per year, resulting in elimination of the backlog of SGR needs by the end of 2025.



Rail Investment Work and Needs

No Funding Scenario

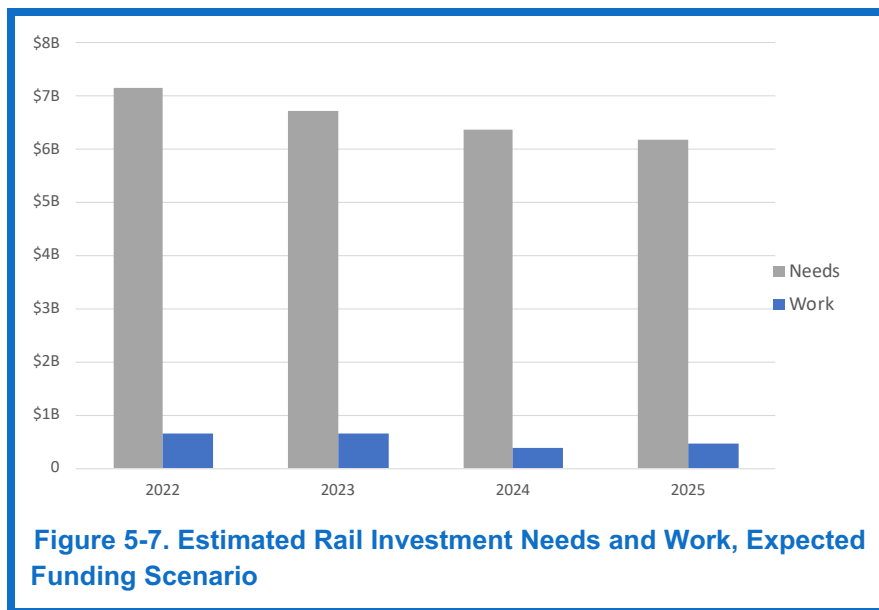
Estimated rail investment needs and projected work in the No Funding scenario are shown in Figure 5-6. Without any investment, needs would grow from \$7.1 billion in 2022 to approximately \$8 billion in 2025.



Expected Funding Scenario

Estimated rail investment needs and projected work in the Expected Funding scenario are shown in Figure 5-7. The figure shows that spending an average of \$545 million per year would reduce the backlog of needs to approximately \$5.7 billion dollars at the end of 2025.

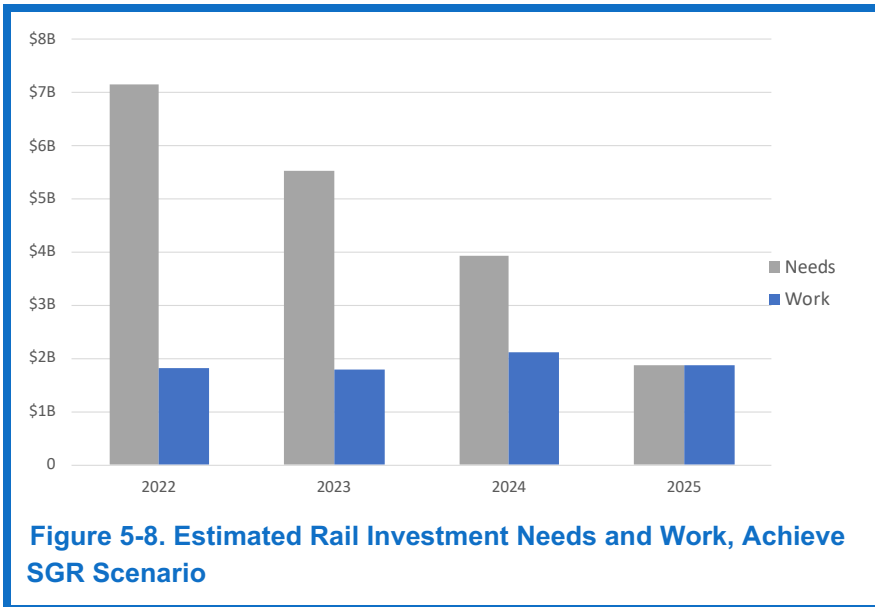
Note that the scale of the y-axis in Figures 5-7 and 5-8 is different from that of Figure 5-6.



Achieve SGR Scenario

Estimated rail investment needs and projected work in the Achieve SGR scenario are shown in Figure 5-8. In this

scenario spending is increased to approximately \$1.9 billion per year, resulting in elimination of the backlog of SGR needs by the end of 2025.



Chapter 6

Investment Plan

The investment plan is a key piece of CTDOT's commitment to achieve and maintain SGR for transit assets. The investments in this chapter reflect CTDOT's TAM goals and objectives and are prioritized based on projected SGR needs and available TAM funding.

Overview

This chapter describes the current capital planning process at CTDOT and presents a prioritized list of SGR investments. Incorporating the inventory and condition data summarized in Chapter 3 into the analytical approach described in Chapter 4, CTDOT has modeled asset performance and investment needs. The list of prioritized investments is an output of TAPT and is aligned with the planned funding of Tier I assets presented in the capital plan.

Federal Requirements

In 49 CFR 625.25, FTA requires that a TAM plan include a “provider’s project-based prioritization of investments.” FTA defines investment prioritization as “a transit provider’s ranking of capital projects or programs to achieve or maintain a state of good repair. An investment prioritization is based on financial resources from all sources that a transit provider reasonably anticipates will be available over the TAM plan horizon period.”

In 49 CFR 625.33, FTA requires that a transit provider must consider the following when developing the investment prioritization:

- Projects to improve an identified unacceptable safety risk
- Estimated available funding for TAM projects
- Requirements under 49 CFR 37.161 and 37.163 concerning maintenance of accessible features and the requirements under 49 CFR 37.43 concerning alteration of transportation facilities

Projects must be ranked in order of priority and anticipated project year, and project rankings must be consistent with agency TAM policy and strategies.

Capital Planning Process

CTDOT provides public transportation services, both bus and rail, to the citizens of Connecticut through contract agreements with numerous operators, including bus transit districts, *CTtransit*, private bus operators, and railroads. CTDOT is responsible for providing the capital investment required to operate these services along with the necessary operating assistance.

Since 1984, CDOT has had a comprehensive transit capital plan. The plan has been updated, expanded, and improved over the years and formal procedures have evolved. The current capital plan combines transit and highway projects and is referred to as the Transportation Capital Infrastructure Program. The plan identifies and programs all transit capital projects for the next five years and includes an estimated cost for each project. The plan is fiscally constrained and it forecasts and programs the capital needs associated with all bus and rail capital projects administered or approved by the Bureau of Public Transportation. This includes all capital projects necessary to support the commuter railroads, CT Transit operations, and transit districts. The plan assigns total estimated project costs and anticipated funding sources to each project.

Funds are programmed to invest in projects that ensure safety, maintain the existing transportation infrastructure, increase the productivity of the transportation system, promote economic development, provide necessary capacity enhancements, and effectively utilize all federal and state funds.

Meetings are held monthly with bus and rail staff to discuss proposed revisions to the Plan including new projects, revised project scopes, revised costs, and/or revised schedules. Strategies and project priorities are reviewed, and the plan is amended to reflect the outcome of each meeting. In addition, the meetings provide a forum for addressing emergency situations.

Ideally, CTDOT's capital plan should address all of the SGR-related needs of CTDOT's transit providers. Thus, this plan

summarizes the funding levels specified in the capital plan. Given that a backlog of needs is predicted even with the investments in the capital plan, this TAMP also provides a prioritized list of additional SGR needs not addressed in the capital plan.

Track Improvement and Mobility Enhancement (TIME)

The cornerstone of the rail program in 2022 is the Track Improvement and Mobility Enhancement (TIME) program, a comprehensive \$8-10 billion plan to upgrade rail speeds and improve rail travel time throughout Connecticut. The plan will rebuild rail bridges including four moveable bridges, straighten track curves, upgrade rail signals, construct a new interlocking, and improve drainage. These improvements plus new rail cars and updated train schedules are expected to save 25 minutes from New Haven to New York City by 2035. The first TIME infrastructure project is now in the engineering phase and will reduce travel time and improve track speed in the Bridgeport/Stratford area. This project includes the replacement of five railroad bridges, track and curve improvements, as well as infrastructure upgrades to the signal, communications, and catenary system. The project will increase maximum authorized speeds to 90 mph between Milford and Bridgeport. Overall, the Rail Capital Program includes investments in Connecticut's six passenger rail lines. The program reprioritizes investment from capacity projects to travel time improvement, customer experience and reliability programs.



Time Project 0300-214: Corridor Overview

Recommended Work by Category

This section presents more detailed results of the investment scenarios introduced in Chapter 5. The following figures show the projected Tier I work recommended by the TAPT model over the four year period of the PT-TAMP, organized by asset category. The TAPT model scenario results are included in Appendix E.

Note that no additional information is presented for the No Funding scenario, as no work is planned for this scenario.

Bus

Expected Funding Scenario

In the Expected Funding scenario, bus rolling stock work makes up the majority of projected spending. Rolling stock work constitutes 78% of estimated transit asset management spending on the bus mode over the four-year period of the plan, while facilities and equipment constitute 19% and 3%, respectively. A breakdown of the expected work by asset category in the Expected Funding scenario is shown in Figure 6-1.

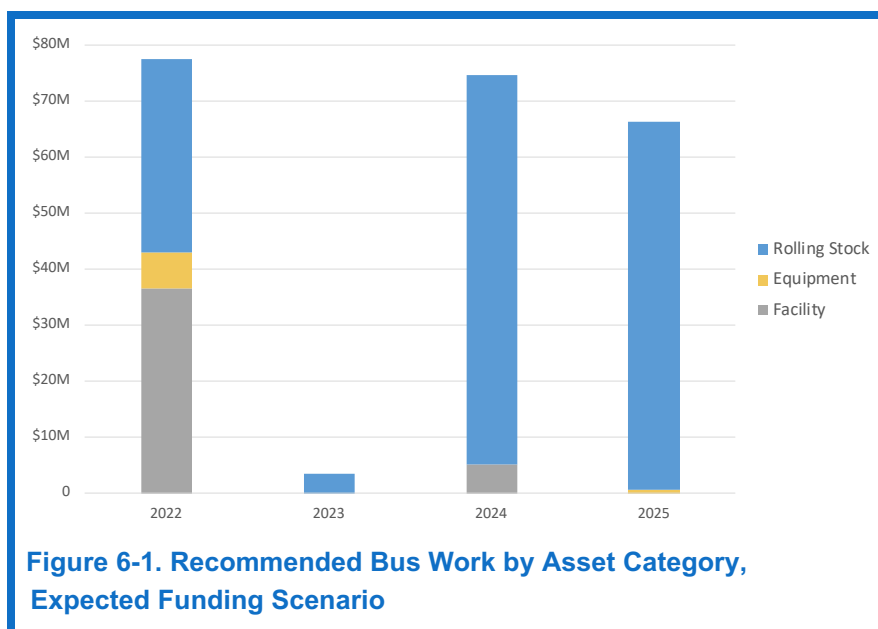
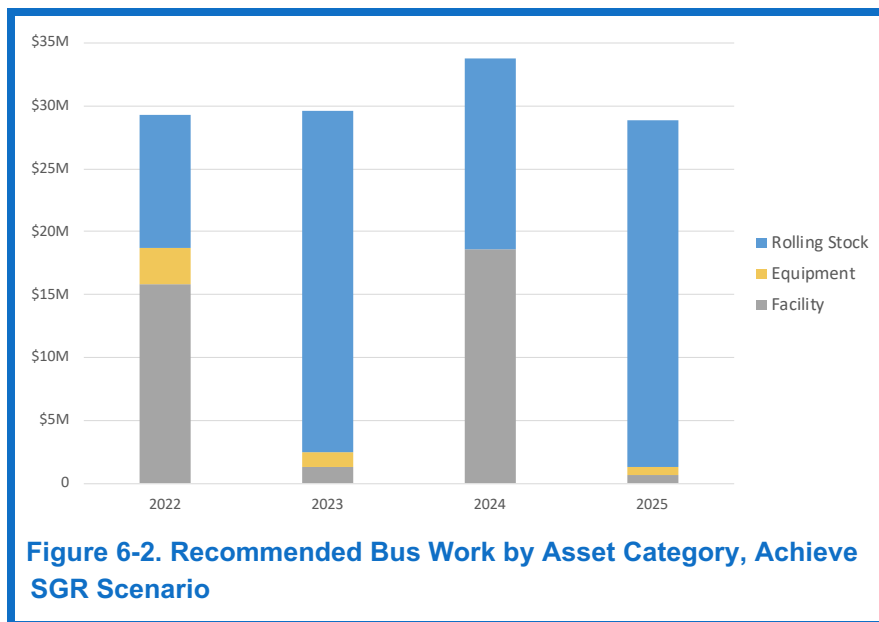


Figure 6-1. Recommended Bus Work by Asset Category, Expected Funding Scenario

Achieve SGR Scenario

In the Achieve SGR scenario, bus rolling stock work makes up the majority of projected spending. Rolling stock work constitutes 82% of estimated transit asset management spending on the bus mode over the four-year period of the plan, while facilities and equipment constitute 15% and 3%, respectively. A breakdown of the expected work by asset category in the Achieve SGR scenario is shown in Figure 6-2.



Rail

Expected Funding Scenario

In the Expected Funding scenario, rail infrastructure work makes up the majority of projected spending. Infrastructure work constitutes 86% of estimated transit asset management spending on the rail mode over the four-year period of the plan, while rolling stock and facilities constitute 13% and 1%, respectively. There is no recommended investment in equipment. A breakdown of the expected work by asset category in the Expected Funding scenario is shown in Figure 6-3.

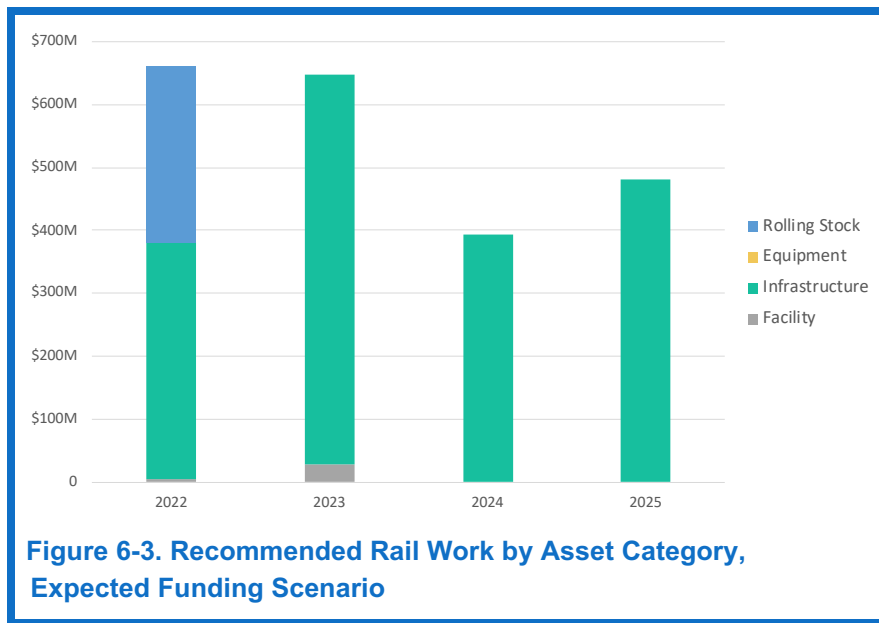


Figure 6-3. Recommended Rail Work by Asset Category, Expected Funding Scenario

Achieve SGR Scenario

In the Achieve SGR scenario, rail infrastructure work makes up the majority of projected spending. Infrastructure work constitutes 89% of estimated transit asset management spending on the rail mode over the four-year period of the plan, while rolling stock and facilities constitute 8% and 3%, respectively. The recommended investment in equipment represents less than 1% of the total. A breakdown of the expected rail work by asset category in the Achieve SGR scenario is shown in Figure 6-4.

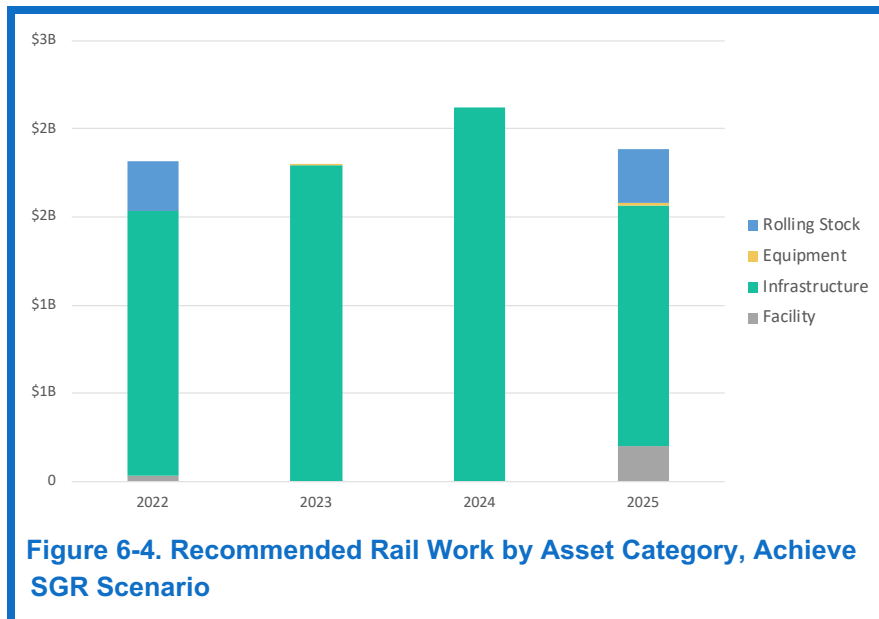


Figure 6-4. Recommended Rail Work by Asset Category, Achieve SGR Scenario

Predicted Asset Performance

The estimated impact of the recommended work on asset condition is summarized by asset category in Figures 6-5 thru 6-8. Each figure shows the current performance of each asset class, and predicted performance by Fiscal Year from 2022-2025 for each funding scenario. 2021 is shown as the current condition of each asset class. Note that for some assets and scenarios, performance is the same across multiple scenarios, meaning that performance lines may not be visible in figures. Performance scenario data is included in Appendix F.

Figure 6-5 shows predicted performance for bus rolling stock. The performance measure on the y-axis is the percent of vehicles at or exceeding the ULB.

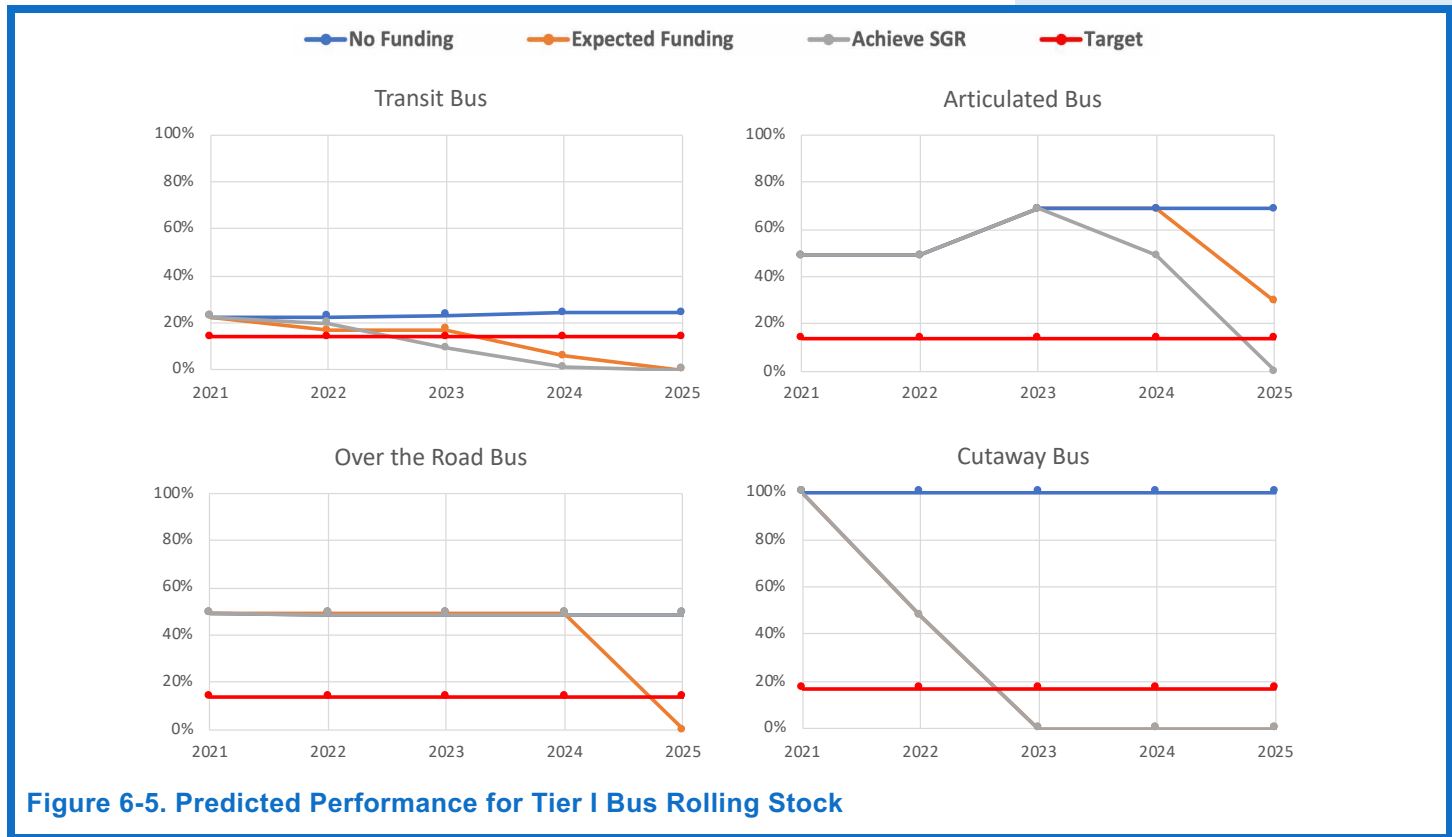


Figure 6-5. Predicted Performance for Tier I Bus Rolling Stock

Figure 6-6 shows predicted performance for rail rolling stock. The performance measure on the y-axis is the percent of vehicles at or exceeding the ULB.

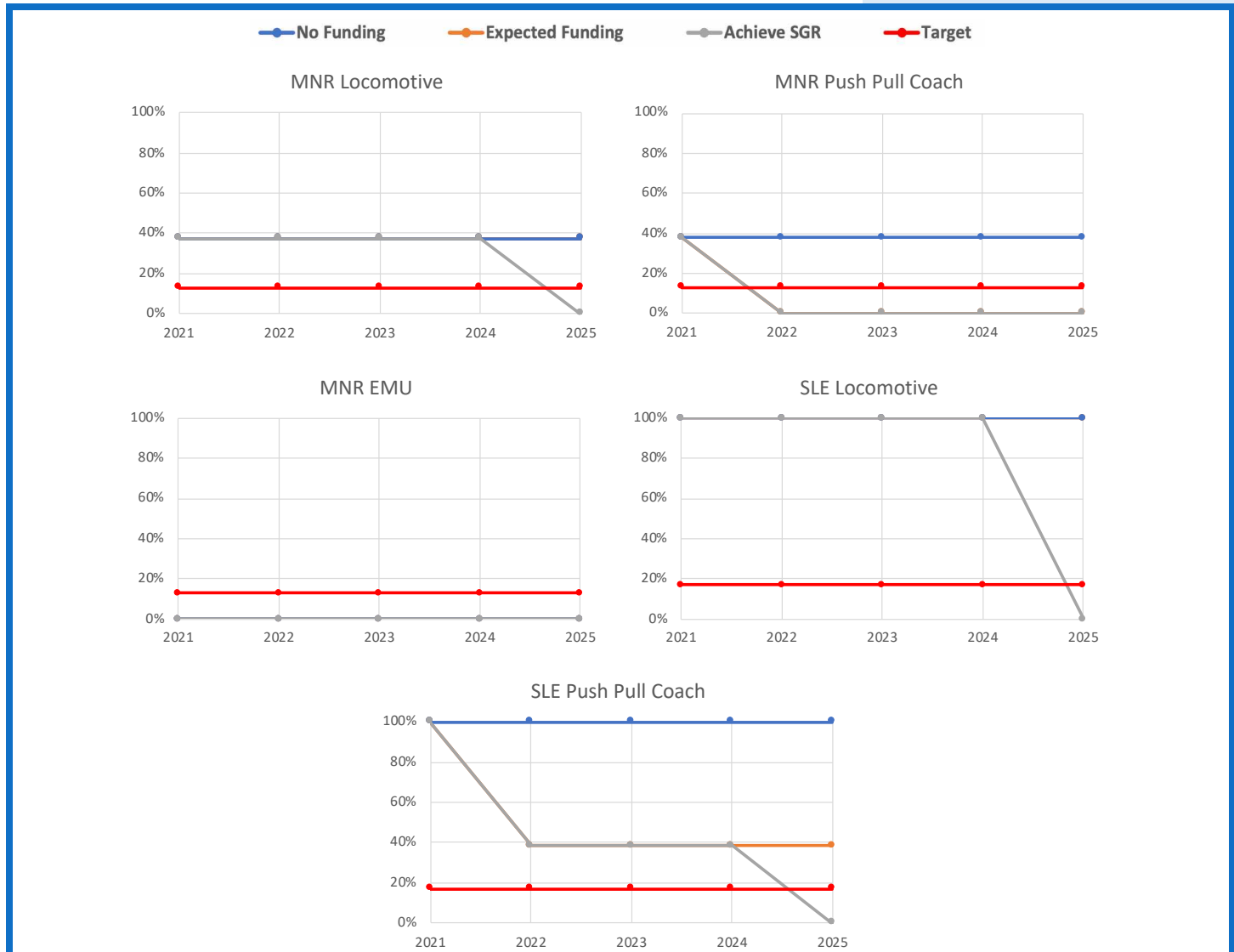


Figure 6-6. Predicted Performance for Rail Rolling Stock

Figure 6-7 shows predicted performance for equipment. The performance measure on the y-axis is the percent of vehicles at or exceeding the ULB.

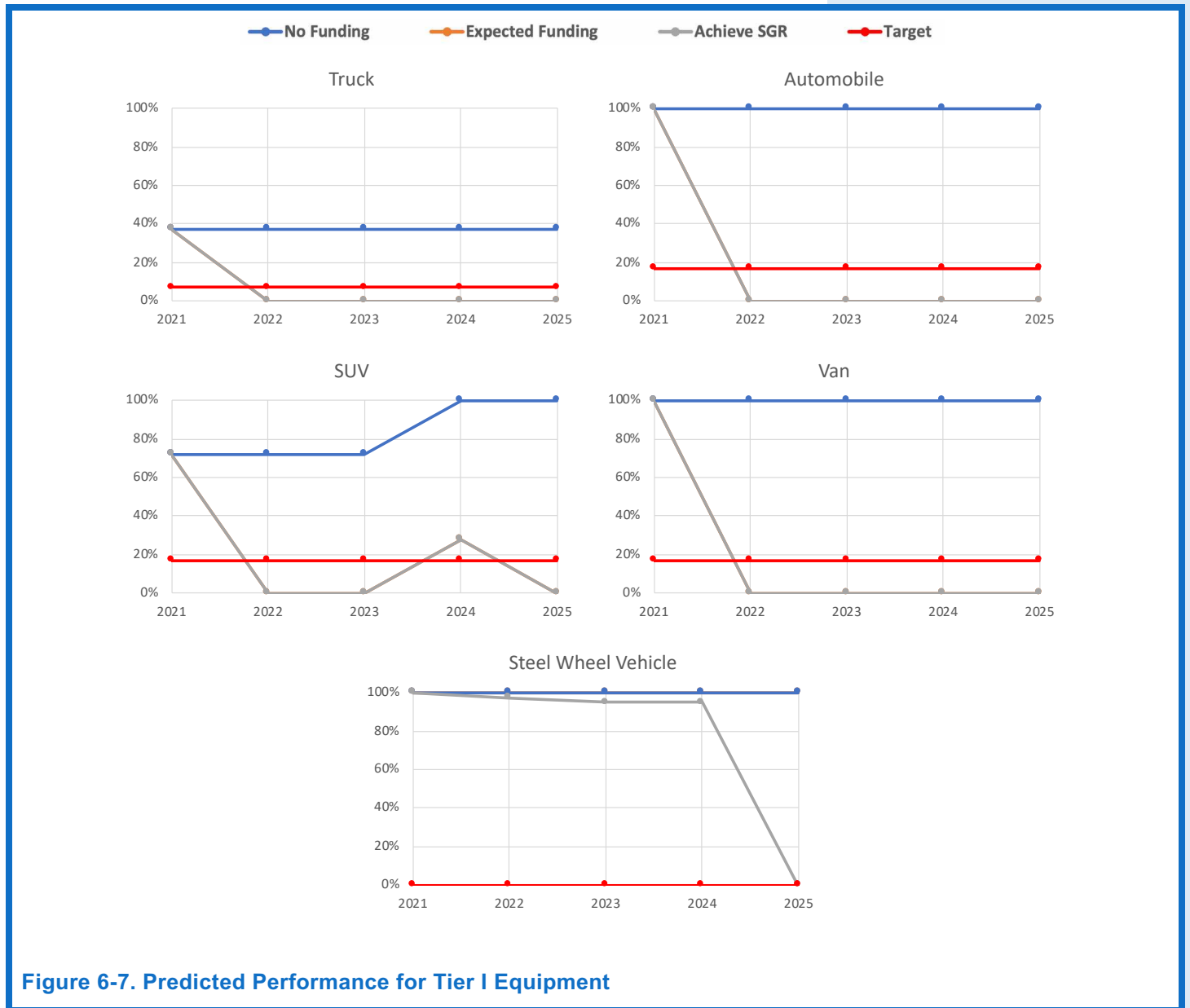


Figure 6-8 shows predicted performance for Tier I facilities. The performance measure on the y-axis is the percent of facility components with a rating of 2-Marginal or 1-Poor on the 5-point TERM scale.

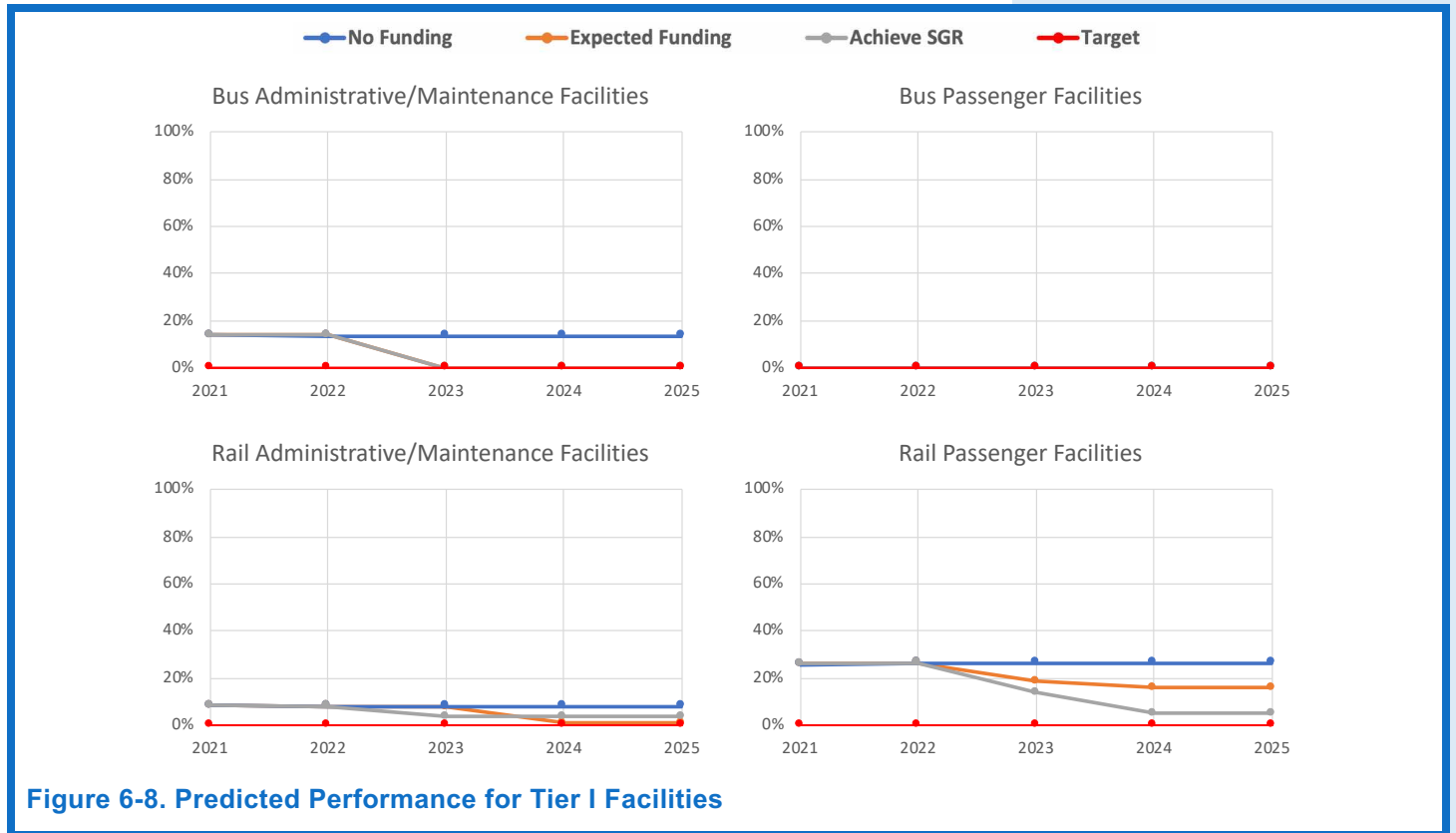


Figure 6-8. Predicted Performance for Tier I Facilities

Prioritized List of Investments

Tier I transit assets were modeled in TAPT using the Expected Funding scenario to generate a prioritized list of SGR needs, with bus and rail assets modeled separately. The full list of recommended investments was compared against the 2022 Capital Plan to validate the results. If an investment identified by TAPT was also included in the Capital Plan, it is assumed to be funded. SGR-related needs left unfunded at the end of 2025 are identified in a separate prioritized list.

Walk Bridge Program

The Walk Bridge is a four-span moveable swing bridge that spans 564 feet over the Norwalk River, a navigable waterway for both recreational and commercial marine traffic in the City of Norwalk. Built in 1896, it is the oldest movable bridge along the New Haven Line and the Northeast Corridor, which is the busiest commuter rail line in the nation. Construction activities for the replacement of Walk Bridge are scheduled to commence in Spring 2023 following the conclusion of design phase and anticipated receipt of permits in early 2023. Advanced projects that are currently in construction nearing completion that will support the replacement of Walk Bridge include the construction of the CP243 interlocking located east and the Danbury Dockyard located west of Walk Bridge both in Norwalk. These two projects are essential for rail operations in the area and will facilitate train movements, maintain commuter service, and reduce delays during the construction of Walk Bridge. The replacement of four single span railroad bridges as well as upgrades to the East Norwalk railroad station located to the east of Walk Bridge are included in the TIME program. These are being designed and constructed as part of the overall Walk Bridge program. Construction activities are projected to extend until the end of 2029. Funding for the various Walk Bridge associated projects encompass a mix of Federal and State resources.



Table 6-1 summarizes the planned SGR-related funding for CTDOT based on the CTDOT Capital Plan. The table shows funding by agency and year and capital project. Note that repaving of the CTfastrak pavement guideway is scheduled and funding, but is not modeled in TAPT for this TAMP.

Table 6-1. Summary of Planned SGR Funding in Capital Plan

Mode	Asset Class/Subclass	Description	Cost by Year (\$'000)			
			2022	2023	2024	2025
Bus	Revenue Vehicles	Bus Replacement/Battery Electric Bus Program	75,000	0	21,250	5,000
Bus	Revenue Vehicles	Small Bus Replacement	1,020	850	850	0
Bus	Facilities - Admin/Maint	Misc Admin Capital/Facility Improvements	3,750	1,000	1,200	1,000
Bus	Facilities - Admin/Maint	Waterbury Facility Improvements	0	2,500	0	0
Bus	Facilities - Admin/Maint	Hartford/Stamford Facility Improvements	0	0	48,450	42,100
Bus	Facilities - Admin/Maint	Move NH Infrastructure Improvements	0	0	0	20,000
Rail	Revenue Vehicles	Rail Fleet Replacement	280,000	0	0	0
Rail	Infrastructure - Track	Track Program	43,750	25,000	11,875	21,250
Rail	Infrastructure - Track	Grade Crossing Renewal	6,200	0	0	0
Rail	Infrastructure - Track	Danbury Branch Slope and Track Stabilization	12,500	0	0	0
Rail	Infrastructure - Structures	Walk Moveable Bridge	246,740	160,000	168,750	110,000
Rail	Infrastructure - Structures	Devon Movable Bridge	0	15,000	0	0
Rail	Infrastructure - Structures	Bridge Design, Rehabilitation and Replacement	38,725	165,250	33,500	93,000
Rail	Infrastructure - Power	Power System Repair/Replacement	14,000	3,000	37,000	33,000
Rail	Infrastructure - Power	Catenary System	0	0	0	30,000
Rail	Infrastructure - Signals	Signal System Replacement - Phase 4	0	0	25,000	0
Rail	Facilities - Admin/Maint	Rail Maintenance Facilities	3,000	3,500	6,500	5,500
Rail	Facilities - Admin/Maint	Stamford Yard Catenary Leads and Car Wash Facility	0	50,000	50,000	0
Rail	Facilities - Admin/Maint	New Haven Rail Yard - Wheel Mill Upgrade	0	31,250	0	0
Rail	Facilities - Admin/Maint	New Haven Rail Yard - Master Complex	0	75,000	5,000	20,000
Rail	Facilities - Admin/Maint	Stamford MOE Building	0	0	62,500	0
Rail	Facilities - Passenger	Station Improvement Program	11,000	25,000	5,000	6,000
Rail	Facilities - Passenger	South Norwalk Station Platform Rehabilitation and Repair	2,600	0	0	0
Rail	Facilities - Passenger	Stamford ITC Improvements	12,000	0	0	0
Rail	Facilities - Passenger	Naugatuck Station	0	12,500	0	0
Rail	Facilities - Passenger	New Haven Union Station Platform Replacement	0	0	0	117,500
Rail	Facilities - Passenger	Derby Shelton Intermodal	0	0	0	25,000
Total, Bus			79,770	4,350	71,750	68,100
Total, Rail			670,515	565,500	405,125	461,250
Total			750,285	569,850	476,875	529,350

Table 6-2 lists the additional SGR investments recommended by TAPT, but not funded as of 2025. The additional investments recommended but not funded the following

The table includes four columns:

- **Mode.** The asset mode, either bus or rail.
- **Description.** The asset type and work.
- **Cost.** The cost of the investment.
- **Rank.** The priority of the investment. Investments are ranked based on the savings in agency and user costs resulting from the recommended investment relative to deferral.

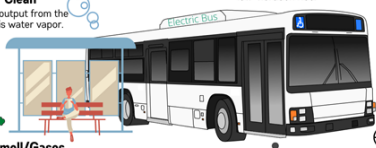
The list of unfunded needs assumes that modeled work in the expected funding scenario, as shown in Figures 6-1 and 6-3, is completed

Table 6-2. Prioritized List of Unfunded SGR Needs

Mode	Description	Cost (\$000)	Priority
Bus	Bus Replacement	38,039	1
Bus	Service Vehicle Replacement	1,769	2
Rail	Station & Platform Rehabilitation/Replacement	142,436	1
Rail	Power System Rehabilitation/Replacement	473,550	2
Rail	Track Rehabilitation/Replacement	454,517	3
Rail	Admin/Maintenance Facility Rehabilitation/Replacement	51,995	4
Rail	Catenary Replacement	256,638	5
Rail	Moveable Bridge Rehabilitation/Replacement	2,000,000	6
Rail	Bridge Rehabilitation/Replacement	834,048	7
Rail	Rail Fleet Replacement	440,000	8
Rail	Steel Wheel Service Vehicle Replacement	11,333	9
Rail	Signal System Rehabilitation/Replacement	400,000	10

Investing in Electric Vehicles

Meet Your New Battery Electric Bus



Noise Level Reduction
Half the noise pollution generated by conventional diesel bus.

Wi-Fi & Smooth Ride
Plug-in and enjoy a quiet, low-vibration ride.

Regenerative Braking Technology
Batteries are recharged when the bus brakes which increases the range the bus can travel between charges.

Quick Acceleration
Can easily accelerate from low speeds to pull in and out of traffic.

Travels at least 180 miles on a single charge

Clean
The only output from the tailpipe is water vapor.

Noxious Smell/Gases Eliminated
Noxious gases and particulate pollution that is detrimental to our health are eliminated.

Fully ADA Accessible
Low-entry ramp design offers unprecedented ease of entry & exit



Connecticut is one of the leading states in the transition from diesel to battery electric buses, with the goal of a statewide fleet with zero tailpipe emissions by 2035. CTDOT is on track to have 30% of the fleet be electric by 2030. CTDOT is also in the process of designing facilities to receive those Battery Electric Buses as they are procured and enter circulation. The Department is diligently planning, through our design and construction efforts, to expand and upgrade existing systems and utilities in order to successfully and efficiently reach the goal of 100% Battery Electric Bus fleet across all our transit operations.

CTDOT is currently in various stages of electrification, with some facilities undergoing assessments for pilot programs, others starting electric design initiatives, with others already undergoing construction and power upgrades with charger installations. Total expected costs will be \$600 million for facility and utility upgrades, \$1 billion in bus purchases, and \$95 million in paratransit purchases. Funding has been, and will continue to be leveraged through federal grant opportunities, as well as state and local matches. By being one of the leaders in the electrification of bus facilities and phasing out diesel buses, we are positively impacting our environment and leading the nationwide effort to be carbon-neutral.

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Chapter 7

Implementation and Monitoring

TAM is a series of processes intended to help preserve asset condition over the life of the asset at minimal cost. Practicing TAM means continuous improvement and TAM practices and processes need to be documented and reevaluated on an ongoing basis. As CTDOT continues implementing TAM and maturing its TAM practices and processes, the agency is always looking for opportunities for improvement. CTDOT has developed a set of implementation tasks to help improve TAM and update the PT-TAMP.



Overview

This chapter supplements the plan’s discussion of current asset management practices in Connecticut with the identification of key implementation activities that will help to continue to improve our TAM practices. The TAMP is a living document that will evolve to reflect changing TAM practices and processes at CTDOT. This plan addresses needs for both Tier I and Tier II implementation, which CTDOT approaches in an integrated manner.

Federal Requirements

In 49 CFR 625.25, FTA requires that a Tier I provider must include the following items in a TAM plan:

- A provider’s TAM plan implementation strategy
- A description of key TAM activities that a provider intends to engage in over the TAM plan horizon period
- A summary or list of the resources, including personnel, that a provider needs to develop and carry out the TAM plan
- 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

In 49 CFR 625.5, implementation strategy is defined as “a transit provider’s approach to carrying out TAM practices, including establishing a schedule, accountabilities, tasks, dependencies, and roles and responsibilities.”

Key asset management activities are defined as “a list of activities that a transit provider determines are critical to achieving its TAM goals.”

TAM Plan Implementation Strategy

CTDOT implementation of TAM began before the FTA rule on TAM was finalized. CTDOT established a PT TAM Unit to coordinate TAM implementation and lead development of the PT-TAMP and Group-TAMP.

In anticipation of the final rule, CTDOT conducted a gap assessment of transit asset management practices in Connecticut. This initial effort had four objectives:

- Assess the current state of transit asset management practices at CTDOT
- Perform a transit asset management gap assessment
- Assess readiness to comply with FTA transit asset management requirements
- Develop implementation plan for addressing gaps

This assessment provided the foundation for the development of an initial TAM implementation plan, which included tasks to improve transit asset management practices.

In May 2019, the Bureau of Public Transportation's Asset Management Group, which reported to the Public Transportation Transit Manager, was organizationally reassigned to the Transportation Asset Management Group in the Bureau of Engineering and Construction.

As CTDOT has made progress developing the initial TAMPs in 2018, progress on implementation of initial identified key activities are discussed, as well as CTDOT's next steps for further implementation.

Key TAM Activities

This section presents a series of key TAM activities that CTDOT either needs or currently is doing to achieve asset management goals, improve TAM practices, and integrate TAM throughout the agency.

Improvement of Asset Inventory Management

CTDOT built the Transit Asset Management Database during the development of the TAMPs, as referenced in Chapter 3. Many of Connecticut transit service providers own, operate and maintain their transit assets; therefore, they are not registered in CORE-CT, the financial register. An integral step in accurate data collection and reporting is validating the Transit Asset Management Database with all transit service providers.

The current version of the Transit Asset Management Asset Database includes a web-based interface for data entry and approval. This version of the database was put into production in 2022 for use as single source of truth for all inventory management for non-CTDOT owned assets operated by Tier II operators. The database tracks condition for assets and has querying capabilities for more efficient annual reporting to FTA National Transit Database. This database supplements the State's Core-CT inventory.

Figure 7-1 below shows an example screen from the data review screen of the system.

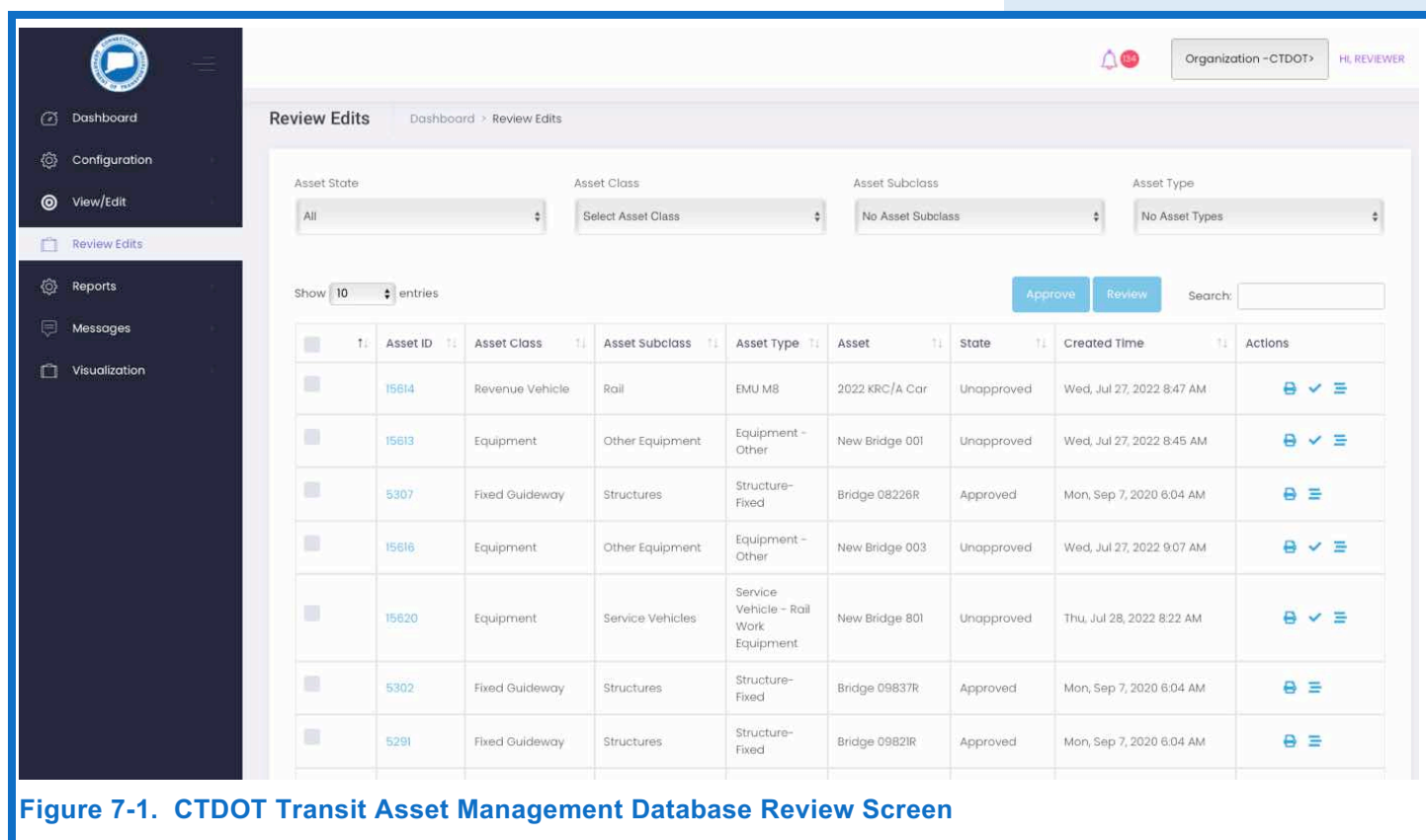


Figure 7-1. CTDOT Transit Asset Management Database Review Screen

Define and Implement Condition Assessment

As part of the development of the TAMP, CTDOT defined a condition assessment approach for rolling stock, equipment, infrastructure, and facilities, included in the Condition Assessment Guidance in Appendix B. In 2019, a statewide public transportation facilities inspection program was put into place to perform condition assessments to meet FTA reporting requirements on facilities for both Tier I and II operators. CTDOT will continue to collect, maintain, and update asset condition data for all assets on a cyclical basis. Part of this effort includes coordination with Amtrak and Metro-North for rail assets.

Also, for CTfastrak, CTDOT is collecting inventory and condition data using a similar approach to CTDOT highway. CTDOT collects pavement inventory and condition data using specially equipped Fugro Roadware Automatic Road Analyzer (ARAN) vans. The entire CTDOT-maintained

mainline is measured biannually. CTDOT performed an initial data collection run of CTfastrak guideway in March 2015, prior to the system opening. Regular data collection, data processing of the CTfastrak, along with integration with the Pavement Management System will continue.

Performance Measures Dashboard

CTDOT currently maintains an online performance measure dashboard that features proprietary measures linked to CTDOT’s mission. FTA TAM performance measures have been included in the dashboard and will be continuously updated for the management of transit assets. Figure 7-2 below shows an example screen from the data review screen of the system.

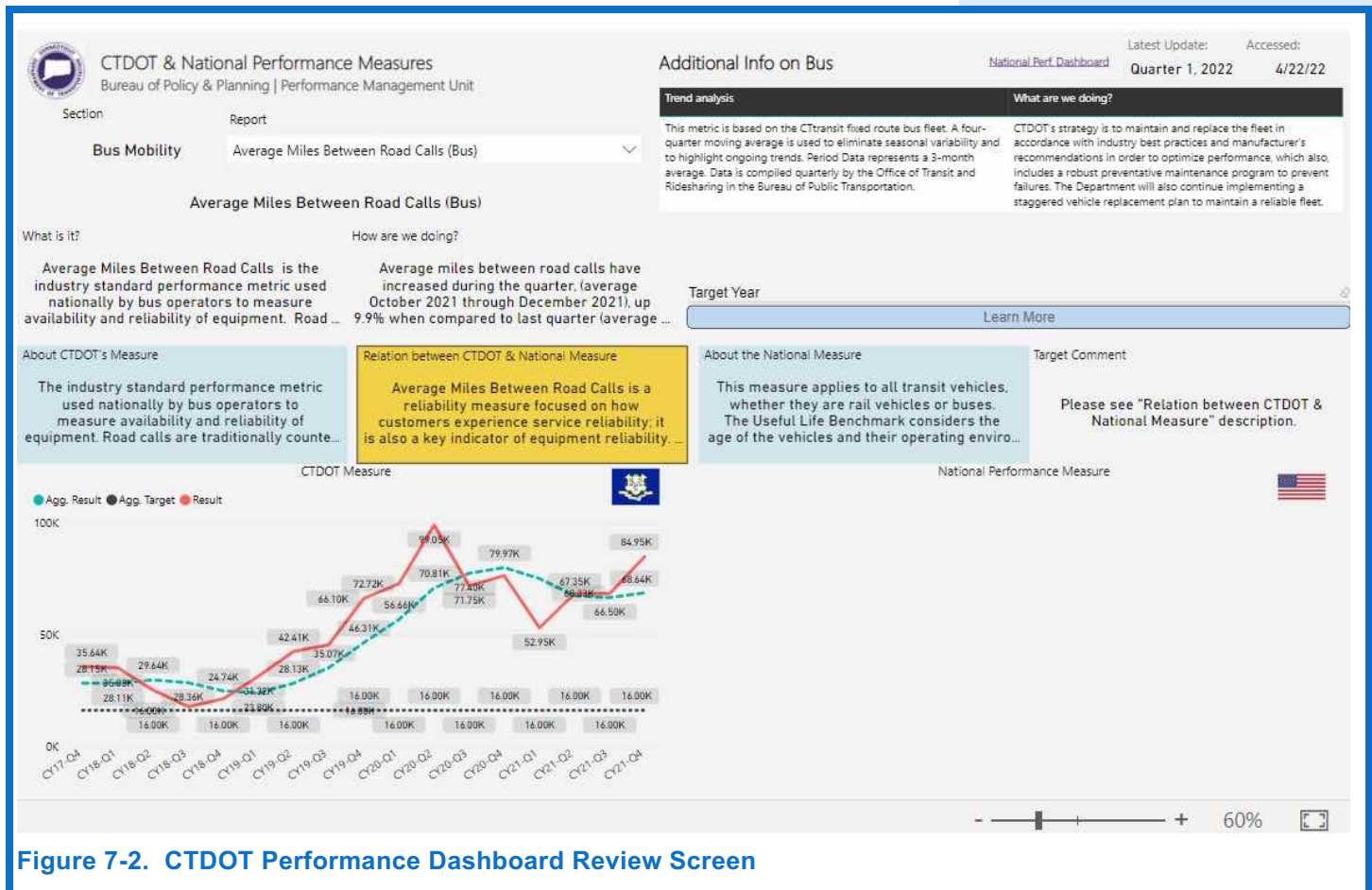


Figure 7-2. CTDOT Performance Dashboard Review Screen

Implement a Statewide Facilities Asset Management System

Using an asset or facilities management system to track day-to-day inspection and maintenance activities is consistent with best practices in asset management. CTDOT and other CT transit providers typically have systems for managing maintenance of their vehicles but tend to need systems for facility management.

CTDOT has begun the process of procuring a multimodal Facilities Management Solution (FMS) to manage CTDOT's entire asset class of buildings within a single system. A comprehensive FMS can help CTDOT record inventory, track assets, and manage the necessary asset management activities to keep all CTDOT's buildings operating in SGR. CTDOT can also use the system to assist in predicting capital programming expenditures in a transparent manner. The software should manage all asset management aspects of the building from maintaining the current inventory, tracking asset condition, performing detailed inspections, rating and ranking building assets by SGR, work order tracking that links back and updated asset condition, building deterioration modeling, and project prioritization and financial modeling multiple funding scenarios.

Once implemented, the vision for the system will be to manage and inspect CTDOT owned facility assets for both bus and rail, including other transit providers as well. This activity is also being considered to address management of other CTDOT asset classes in addition to transit facilities.

Improve Oversight of Maintenance Plans and Activities

CTDOT develops maintenance plans for new facilities, but appeared to need mechanisms for confirming these plans are followed. Further, many older facilities may not have maintenance plans altogether, or have outdated information on who is responsible for certain maintenance tasks. CTDOT also needed better oversight for other guideway assets along rail lines.

The Bureau of Public Transportation has taken initial steps to improve upon these gaps through various actions and activities. The Office of Rail and MNR worked together to update a rail passenger station matrix that outlines which entities are supposed to perform specific maintenance activities for New Haven Line Stations (snow removal, electrical maintenance, cleaning, etc.) The Office of Rail is also working with Amtrak to develop similar matrices for maintenance activities for Amtrak-occupied facilities within the New Haven Rail Yard. See Appendix G for a copy of these matrices.

In addition, the Bureau of Public Transportation has a Rail Regulatory Unit within the Office of Rail to address oversight of other rail guideway assets. Aside from primary responsibilities of improving general oversight of MOW activities by MNR, additional activities to date include developing pilot inspection programs for rail yard facilities and grade crossings. This Unit will continue to work closely with the TAM Group to ensure activities are coordinated and meet FTA compliance.

MNR is in the process of developing an enterprise asset management system for work order management along the rail lines it operates including New Haven Line.

Coordination efforts have focused on ensuring CTDOT has access to this system to further improve its oversight responsibilities for the New Haven Line.

All of CT Transit divisions, including CTfastrak and all bus service providers in Connecticut, have extensive vehicle and facility maintenance plans in place, as required by the FTA. Procedures and specific maintenance inspections on vehicles and facilities are detailed in these plans. The TAM Group will continue to coordinate with all bus transit service providers in Connecticut as they explore and pilot different systems to ensure the oversight of these maintenance plans.

Improve Predictive Capability for Fixed Assets

As part of its initial TAMP development, CTDOT reviewed tools for predicting transit capital needs, including TAPT and FTA's TERM Lite. For the 2018 TAMPs, CTDOT selected TAPT as its predictive modeling approach.

In preparation for the 2022 PT-TAMP CTDOT reviewed its modeling approach and assumptions. CTDOT decided to continue to use TAPT for predictive modeling for the 2022 TAMPs.

In the future, CTDOT will continue to refine the modeling approach for transit assets, particularly for fixed assets. Future modeling will require updated costs and more detailed and comprehensive data, as available. CTDOT will seek technical support for the training of TAPT as it works to integrate a defined prioritization process for the capital plan. Part of this effort includes coordinating with Amtrak and MNR for rail asset data.

The TAM Group works with its transit operators to ensure that the lifecycle needs/costs of the assets are being optimized and captured through a data driven process, to better understand when investments should be made. This iterative process that involves constant communication and development of data for analytical purposes as well as the procurement or development of mature asset management systems/software. Lifecycle strategies differ by each transit operator and by asset class:

Bus

- **Rolling Stock:** CT*transit* Hartford has a software called Asset Works which tracks data on vehicles down to the part. This system provides needed transparency and detail to accurately track lifecycle costs for all vehicles.
- **Guideway:** CT*fastrak* is a 9.4-mile bus-only guideway whose main component is a paved surface similar to a highway asset. The CT*fastrak* system is housed in CTDOT's pavement management system and roadway inventory network CTDOT's adapted Photolog

technology where features of assets are identified and pavement condition tracked.

- **Facilities:** As mentioned earlier, the FMS system by CTDOT is a multimodal approach that includes *CTtransit*. *CTtransit*'s HNS operator is utilizing a pilot version of an FMS called FAMIS. They utilize FAMIS for work orders to maintain all buildings at the Hartford, Hamden, and Stamford CT Transit Division facilities.

Rail

- **Rolling Stock:** MNR adopted a 35-year ULB for New Haven Line rolling stock, based on the commercial life of many car types while incorporating a Reliability Centered Maintenance (RCM) approach. This approach focuses on the ability to study failure rates and types in order to become more proactive in addressing maintenance issues and preserving the life of its rolling stock. Implementing a successful RCM approach can reduce dependency on costly capital repairs while also extending the life of an asset, saving CTDOT substantial financial obligations in the long term.
- **Guideway:** MNR performs day-to-day maintenance of CTDOT's portion of the New Haven Line. As part of MNR's new EAM system INFOR, they are currently implementing Bentley's Optram software package in order to better utilize data that is collected from the geometry cars that test for defects along the rail infrastructure. The ability to better use this data can be an invaluable tool to create more capital projects that are proactive in rail replacement and reduce reliance on emergency maintenance for rail defects.
- **Facilities:** As mentioned earlier, CTDOT will be procuring an FMS that will be able to collect better data on its rail facilities. Having more of this data readily available can provide better insight into operating costs and capital needs, to ensure facilities are constantly in SGR and operating efficiently and safely.

Improving STIP/ Capital Plan Development

An important product of asset management plan development is the prioritized list of SGR needs identified in chapter five. Ideally CTDOT and its partners will refer to this list of needs in developing future STIPs and capital plans. To help accomplish this, the TAM Group will work with Capital Services to improve the connection between the STIP and the Capital Program for Transit Assets.

Maintain and Update Transit Asset Management Plan

FTA requires that a transit provider must update its TAM plan every four years. Additionally, a provider should amend its TAM plan when there is a significant change to inventory, condition, or investment prioritization. CTDOT will work to continue updating the TAMPs on a four-year cycle and to revise the plan to be consistent with any significant changes. Updating the TAMPs will involve updating the inventory data, performing new condition assessments, modeling new investment scenarios, and generating a new list of prioritized SGR investments.

Information Sharing

CTDOT facilitates exchange of information on asset management practices between transit providers in Connecticut. Participants should include CTDOT staff, as well as transit providers under contract to CTDOT, and the transit districts.

The newly created Transit Asset Management Database is crucial not only for developing inventory, but creating a system where data could be authenticated, maintained, and shared amongst various stakeholders who depend on the data collected within this system.

In addition, a long-term vision will be focused on how to integrate the Transit Asset Management database into CTDOT's existing and future data sharing structure. CTDOT's Transportation Enterprise Database (TED) was put

into place as a means of establishing a universal source of data by linking numerous other databases into a universal system

TAM Group will develop a program of periodic peer exchanges and/or facilitated workshops to communicate current status of CTDOT transit asset management activities and facilitate exchange of information on asset management approaches/lessons learned.

TAM Resources

This section describes the TAM resources needed to develop and carry out the TAMPs. While CTDOT is integrating TAM throughout the agency, a TAM Implementation Committee will be created consisting of representatives from transit providers and key CTDOT staff to support future TAM implementation activities. CTDOT also convened working groups consisting of Tier I and Tier II stakeholders to help update the TAMPs.

CTDOT is also using ongoing consultant support for TAM implementation.

Monitoring and Evaluations

CTDOT will monitor, update, and evaluate the TAMPs as an ongoing activity.

The TAM Group will lead the implementation activities, update the plan, and periodically convene workshops to interface with other transit providers. This work includes two of the TAM implementation activities above: “Maintain and Update TAM Plan” and “Information Sharing”.

In addition, the TAM Group will lead a series of further monitoring and evaluation activities in the following key areas:

- Improving Data Governance;
- Linking TAM Performance Targets to Statewide Planning
- Implementing use of asset management targets.
- Updating the asset management needs analysis; and
- Support Tier II asset management implementation.

The following paragraphs discuss specific activities in each of these areas.

Improving Data Governance. Recently, CTDOT prepared a Transit Asset Management Business Requirements document to assess governance of data related to transit TAMP development and NTD reporting, define requirements for public transportation business processes related to these areas, and develop recommendations regarding the use of asset data to support SGR analysis. This document also details functional requirements for any new or improved systems for managing transit asset data. Information from this document informed the development of the web interface for the Transit Asset Management Database described previously. This system provides asset and condition tracking for asset management, and supports the operational needs for the Transit Office, including better oversight of transfer and disposal revenue vehicles.

Updating the Asset Management Needs Analysis.

Although FTA does not require annual updates of this plan, annual updates to the data and assessment of SGR needs to support performance reporting requirements and the

related business processes described above. The TAM Group will update the SGR needs analysis on an annual basis to support these requirements, incorporating the improvements to asset data and the analysis of SGR needs described above. To evaluate progress in this area CTDOT will assess whether the needs analysis is, indeed, updated on an annual basis incorporating updates to asset data and supporting systems.

Linking TAM Performance Targets to Statewide Planning.

CTDOT has established roles and responsibilities through its cooperative agreement with Metropolitan Planning Organization's (MPO) for the establishment of statewide performance targets. CTDOT and transit operators review and update statewide performance targets annually, and reports progress towards achieving statewide performance targets to the NTD. Information is available to the MPO's for use in their updates to the Long Range Transportation Plans, and Transportation Improvement Programs. CTDOT will continue to notify and share updated TAM Plans with the MPO's, every four years.

Implementing Use of Asset Management Targets. Moving forward the measures and targets established for asset management should inform investment decisions, and in particular the identification of and selection of capital projects. The TAM Group will work with CTDOT's Capital Services to ensure that the capital program is structured to achieve these targets once set. To evaluate progress in this area CTDOT will assess the degree to which the targets established in the annual target-setting process are met.

Support Tier II Asset Management Efforts.

Comprehensive implementation of an asset management approach addresses how an asset is managed over its entire lifecycle, from construction or purchase through to its retirement or replacement. Consequently, putting best practices in asset management into place in an agency can impact a number of business functions. Connecticut's transit providers are committed to using an asset management approach to help improve the State of Good Repair of Connecticut's physical transit assets, and make the best use of scarce resources. Over time application of

asset management concepts may impact areas such as how maintenance decisions are made, what staff transit agencies need to meet their mission, and the data and systems they use.

The TAM Group will help support Tier II transit agency efforts to implement asset management concepts more broadly in their agencies through the communication and outreach activities described previously in this section. To evaluate progress in this area CTDOT will assess whether the outreach activities are conducted as described in this document, and the level of participation of the agencies in the various outreach activities. This evaluation will help inform the set of asset management-related activities that are needed in future updates of this plan.

Appendix A. Asset Fact Sheets



Connecticut Tier I Transit Asset Management Plan

Bus Rolling Stock



Description

- CTDOT owns the local bus systems in Hartford, New Haven, Stamford, Waterbury, New Britain, Bristol, Meriden, and Wallingford, and operates them under the CTtransit brand name. CTDOT owns all the rolling stock that provides CTtransit services.
- CTtransit services carry roughly 80% of annual bus ridership in Connecticut.
- CTDOT also owns the bus rapid transit system CTfastrak, which includes fixed guideway between Hartford and New Britain.
- CTDOT's bus rolling stock inventory includes four vehicle types: transit bus, articulated bus, over-the-road bus, and cutaway.

Performance Measures

The percentage of revenue vehicles within a particular asset class that have either met or exceeded their useful life benchmark

- Useful life benchmark (ULB) defines an asset's economic useful life, specified in terms of age, mileage and/or other factors. An agency can use FTA's default ULB values or set its own values. CTDOT has worked with its transit service provider partners to define custom values.
- A revenue vehicle that has not reached or exceeded its ULB is considered to be in a state of good repair (SOGR).

Inventory and Condition



Transit Bus

A bus with front and center doors, normally with a rear-mounted engine, low-back seating, and without luggage compartments or restroom facilities for use in frequent-stop service. This is what is used most typically on fixed route systems. A 40-foot coach is the common type bus used in larger systems. This vehicle can usually hold about 42 ambulatory passengers when two wheelchair tie-downs are provided.

476

Vehicles

78%

Within ULB

12

Years ULB



Articulated Bus

Extra-long (54 ft. to 60 ft.) bus with two connected passenger compartments. The rear body section is connected to the main body by a joint mechanism that allows the vehicles to bend when in operation for sharp turns and curves and yet have a continuous interior.

51

Vehicles

51%

Within ULB

12

Years ULB



Over-the-road Bus

A bus characterized by an elevated passenger deck located over a baggage compartment. These buses have 3 axles and a gross vehicle weight rating of 26,000 pounds.

59

Vehicles

51%

Within ULB

12

Years ULB



Cutaway Bus

A vehicle that consists of a bus body that is mounted on the chassis of a van or light-duty truck. The original van or light-duty truck chassis may be reinforced or extended. Cutaways typically seat 15 or more passengers.

42

Vehicles

0%

Within ULB

5

Years ULB



Total

628
Vehicles

68%
Within ULB



Based on CTDOT data as of June, 2022

**The performance measures herein are for FTA reporting purposes only. Due to the variability of mechanical reliability and operating environment, these measures do not accurately reflect SOGR needs for individual assets.*

***The fleet mix of vehicles is changing going forward, as CTDOT replaces older fossil fuel buses with new electric buses. Many of the vehicles being replaced will be cutaways.*



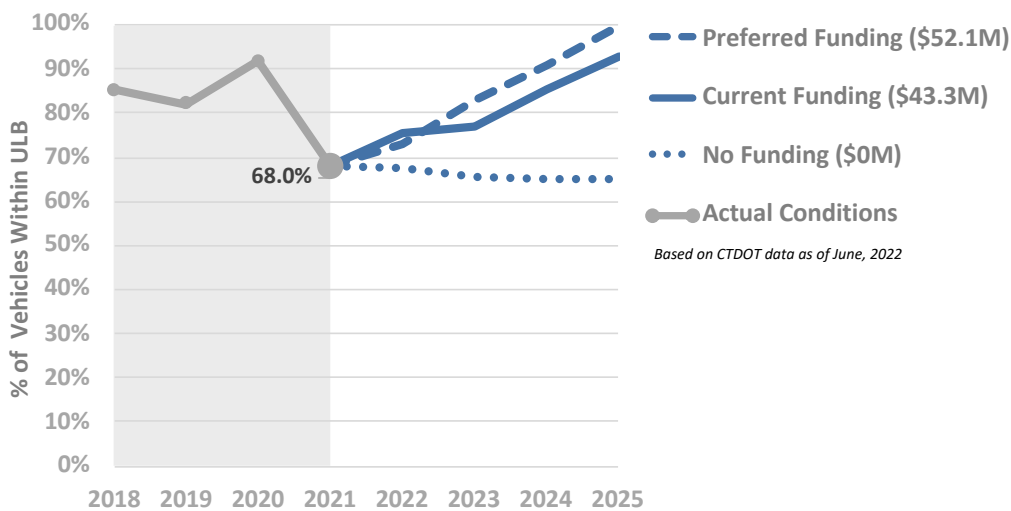
Connecticut Tier I Transit Asset Management Plan

Bus Rolling Stock



Bus Rolling Stock Performance Projections

Percent of Vehicles Within ULB



CTDOT anticipates \$230 million of SOGR needs from 2022-2025 for its Tier I Bus Rolling Stock. This includes an initial backlog in 2022 of \$184 million in SOGR needs.

Current funding for SOGR activities was calculated based on CTDOT's Capital Plan with the help of CTDOT's Capital Services Unit. Connecticut's Capital Plan is a document that lists all projects expected to be federally-funded over a five-year period.

Based on projections made using CTDOT's prioritization tool given current funding, to make progress on its SOGR needs CTDOT should invest approximately \$43 million in revenue vehicles over the four-year analysis period.

*Years referenced in these charts are by State of Connecticut Fiscal Year which runs from July 1st to June 30th.

Current Performance and Targets

Transit providers must set one-year performance targets using the performance measures established by FTA for the four capital asset categories required for a TAM plan, as applicable. These targets must be updated and submitted to the NTD annually.

Performance and Targets for Tier I Bus Rolling Stock

Asset Class	% Vehicles Within ULB		% Vehicles Met or Exceeded ULB	
	Current Performance	Performance Target	Current Performance	Performance Target
Transit Bus	78%	14%	22%	14%
Articulated Bus	51%	14%	49%	14%
Over-the-Road Bus	51%	14%	49%	14%
Cutaway	0%	17%	100%	17%

Transit Funding

Funding for transit in Connecticut historically comes primarily from FTA funds, with the remainder coming from state public transportation bonds. Bond funds are used to match federal funds and provide funding for 100% of state projects.

Funding for Tier I bus assets comes from a variety of federal funding programs, including Sections 5307, 5337, 5339.

Analytical Approach

CTDOT uses a prioritization tool to support its analytical approach, predicting transit asset conditions and SOGR needs.

The tool has a series of models for different asset types that recommend when to rehabilitate or replace an asset, and the conditions and performance predicted for the asset over time. Also, the tool supports prediction of the overall performance resulting for a specified funding scenario, and recommends a prioritized list of projects to fund given a budget constraint.

In this fact sheet, predicted performance changes are shown the year funds are committed; actual performance may lag behind funding.



Connecticut Tier I Transit Asset Management Plan

Rail Rolling Stock



Description

- The New Haven Line (NHL), which serves stations along the Connecticut shore from New Haven to Greenwich and on to Grand Central Terminal in New York City, is operated by Metro-North (MNR) under contract to CTDOT. CTDOT has a capital interest in the rail vehicles that operate on the line.
- Shore Line East (SLE), operated by Amtrak under contract to CTDOT, serves stations from New London to New Haven. SLE service operates CTDOT-owned rolling stock, which are also used on Hartford Line (HL).
- CTDOT's rail rolling stock inventory includes three vehicle types: locomotive, passenger coach, and self-propelled passenger car.

Performance Measures

The percentage of revenue vehicles within a particular asset class that have either met or exceeded their useful life benchmark

- Useful life benchmark (ULB) defines an asset's economic useful life, specified in terms of age, mileage and/or other factors. An agency can use FTA's default ULB values or set its own values. CTDOT has worked with its transit service provider partners to define custom values.
- A revenue vehicle that has not reached or exceeded its ULB is considered to be in a state of good repair (SOGR).

Inventory and Condition



Locomotive

Commuter rail vehicles used to pull or push passenger coaches. Locomotives do not carry passengers themselves. There are 16 locomotives providing service on the NHL and 6 locomotives providing service on SLE and HL. Locomotives on the NHL include models made by GE, GMC, and Brookville. Locomotives on SLE and HL include models made by GE.



Passenger Coach

Rail passenger vehicles not independently propelled and requiring one or more locomotives for propulsion. There are 50 passenger coaches providing service on the NHL and 26 passenger coaches providing service on SLE/HL. The passenger coaches on the NHL are models made by Bombardier, while the passenger coaches on SLE are models made by Maerska.



Self-Propelled Passenger Car

Commuter rail passenger vehicles not requiring a separate locomotive for propulsion. There are 270 self-propelled passenger cars, also called electric multiple units (EMUs), providing service on the NHL. This fleet of vehicles, which consists entirely of Kawasaki M8s, operates on the New Haven Main Line and the New Canaan Branch line. The Waterbury and Danbury branch lines require diesel locomotives.



Total

368

Vehicles

85%

Within ULB



Based on CTDOT data as of June, 2022

**The performance measures herein are for FTA reporting purposes only. Due to the variability of mechanical reliability and operating environment, these measures do not accurately reflect SOGR needs for individual assets. **Note that rail vehicle procurement is an ongoing and everchanging process. Expected timelines for vehicle replacements can shift due to fluctuations in financial expectations.*



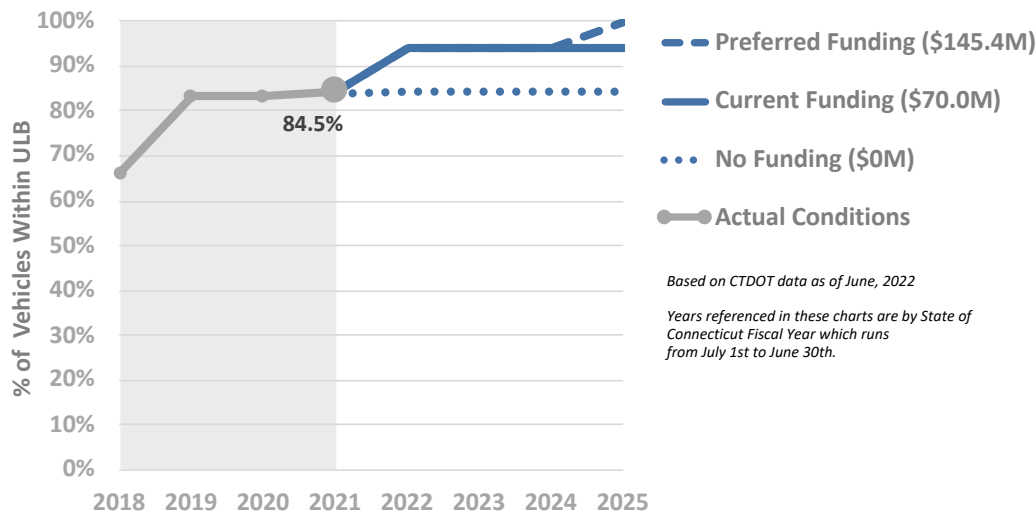
Connecticut Tier I Transit Asset Management Plan

Rail Rolling Stock



Rail Rolling Stock Performance Projections

Percent of Rail Vehicles Within ULB



Based on CTDOT data as of June, 2022

Years referenced in these charts are by State of Connecticut Fiscal Year which runs from July 1st to June 30th.

CTDOT anticipates \$612 million of SOGR needs from 2022-2025 for its rail rolling stock. This includes an initial backlog of \$552 million in 2022.

Current funding for SOGR activities was calculated based on CTDOT's Capital Plan with the help of CTDOT's Capital Services Unit. Connecticut's Capital Plan is a document that lists all projects expected to be federally-funded over a five-year period. Based on projections made using CTDOT's prioritization tool given current funding, to make progress on its SOGR needs CTDOT should invest approximately \$280 million in Tier I rail rolling stock over the four year analysis period.

Current Performance and Targets

Transit providers must set one-year performance targets using the performance measures established by FTA for the four capital asset categories required for a TAM plan, as applicable. These targets must be updated and submitted to the NTD annually. CTDOT set separate ULBs for locomotives and passenger coaches depending on the service line due to different maintenance strategies.

Performance and Targets for Rail Rolling Stock

Asset Class	% Vehicles Within ULB		% Vehicles Met or Exceeded ULB	
	Current Performance	Performance Target	Current Performance	Performance Target
Locomotive (MNR)	63%	13%	37%	13%
Locomotive (SLE/HL)	0%	17%	100%	17%
Passenger Coach (MNR)	62%	13%	38%	13%
Passenger Coach (SLE/HL*)	0%	17%	100%	17%
Self-Propelled Passenger Car	100%	13%	0%	13%

*Note that rolling stock for Hartford Line are classified as intercity assets and thus are not included in performance measures reported to FTA

Transit Funding

Funding for transit in Connecticut historically comes primarily from FTA funds, with the remainder coming from state public transportation bonds. Bond funds are used to match federal funds and provide funding for 100% of state projects.

Federal funding for rail assets comes from a variety of FTA programs, including Sections 5307 and 5337.

Analytical Approach

CTDOT uses a prioritization tool to support its analytical approach, predicting transit asset conditions and SOGR needs.

The tool has a series of models for different asset types that recommend when to rehabilitate or replace an asset, and the conditions and performance predicted for the asset over time. Also, the tool supports prediction of the overall performance resulting for a specified funding scenario, and recommends a prioritized list of projects to fund given a budget constraint.

In this fact sheet, predicted performance changes are shown the year funds are committed; actual performance may lag behind funding.



Connecticut Tier I Transit Asset Management Plan

Service Vehicles



Description

- Service vehicles are defined by FTA as equipment used primarily to support maintenance and repair work for public transportation.
- CTDOT's service vehicles support two modes of travel: bus and commuter rail.
- CTDOT's service vehicles are organized into five types. Trucks, automobiles, SUVs, and vans can be used as staff vehicles. Steel wheel vehicles are used for inspection and maintenance of facilities and rights-of-way.
- No Metro-North rubber tire vehicles are included in the inventory

Performance Measures

The percentage of service vehicles within a particular asset class that have either met or exceeded their useful life benchmark

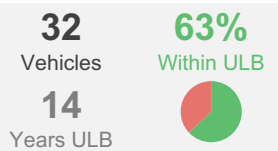
- Useful life benchmark (ULB) defines an asset's economic useful life, specified in terms of age, mileage and/or other factors. An agency can use FTA's default ULB values or set its own values. CTDOT has worked with its transit service provider partners to define custom values.
- A service vehicle that has not reached or exceeded its ULB is considered to be in a state of good repair (SOGR).

Inventory and Condition



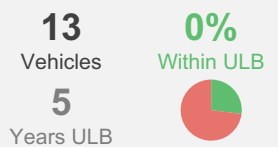
Rubber Tire Vehicle (Truck)

Any motor vehicle designed to transport cargo.



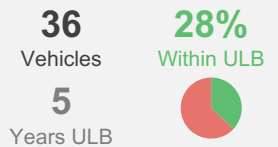
Automobile

Passenger cars, up to and including station wagons in size. Excludes minivans and anything larger.



Sport Utility Vehicle

A high-performance four-wheel drive car built on a truck chassis. It is a passenger vehicle which combines the towing capacity of a pickup truck with the passenger-carrying space of a minivan or station wagon.



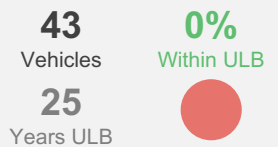
Van

An enclosed vehicle having a typical seating capacity of 8 to 18 passengers and a driver. A van is typically taller and with a higher floor than a passenger car, such as a hatchback or station wagon.



Steel Wheel Vehicle

Any support vehicle that is solely used on a running rail.



Based on CTDOT data as of June, 2022

*The performance measures herein are for FTA reporting purposes only. Due to the variability of mechanical reliability and operating environment, these measures do not accurately reflect SOGR needs for individual assets.



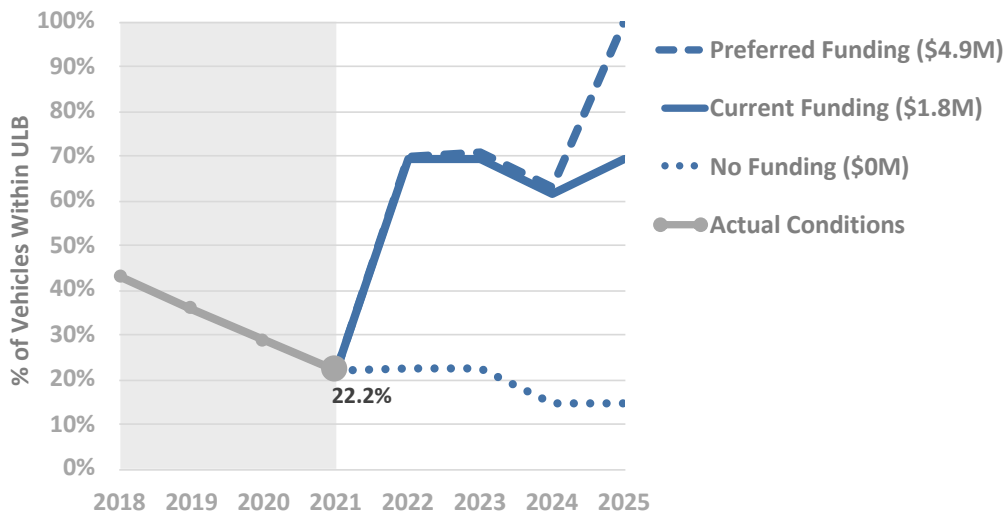
Connecticut Tier I Transit Asset Management Plan

Service Vehicles



Service Vehicles Performance Projections

Percent of Service Vehicles Within ULB



CTDOT anticipates \$20.3 million of SOGR needs from 2022-2025 for its Tier I Service Vehicles. Much of the service vehicles are part of the initial backlog in 2022, totaling around \$17.7 million.

Current funding for SOGR activities was calculated based on CTDOT’s Capital Plan with the help of CTDOT’s Capital Services Unit.

Based on projections made using CTDOT’s prioritization tool given current funding, to make progress on its SOGR needs CTDOT should invest approximately \$7.2 million in Tier I service vehicles over the four-year horizon from 2022-2025.

Years referenced in these charts are by State of Connecticut Fiscal Year which runs from July 1st to June 30th.
Based on CTDOT data as of June, 2022

Current Performance and Targets

Transit providers must set one-year performance targets using the performance measures established by FTA for the four capital asset categories required for a TAM plan, as applicable. These targets must be updated and submitted to the NTD annually.

Performance and Targets for Tier I Service Vehicles

Asset Class	% Vehicles Within ULB		% Vehicles Met or Exceeded ULB	
	Current Performance	Performance Target	Current Performance	Performance Target
Rubber Tire Vehicle (Truck)	63%	7%	37%	7%
Automobile	0%	17%	100%	17%
Sport Utility Vehicle	62%	17%	38%	17%
Van	0%	17%	100%	17%
Steel Wheel Vehicle	0%	0%	100%	0%

Transit Funding

Funding for transit in Connecticut historically comes primarily from FTA funds, with the remainder coming from state public transportation bonds. Bond funds are used to match federal funds and provide funding for 100% of state projects.

Funding for service vehicles comes from a variety of federal funding programs.

Analytical Approach

CTDOT uses a prioritization tool to support its analytical approach, predicting transit asset conditions and SOGR needs.

The tool has a series of models for different asset types that recommend when to rehabilitate or replace an asset, and the conditions and performance predicted for the asset over time. Also, the tool supports prediction of the overall performance resulting for a specified funding scenario, and recommends a prioritized list of projects to fund given a budget constraint.

In this fact sheet, predicted performance changes are shown the year funds are committed; actual performance may lag behind funding.



Connecticut Tier I Transit Asset Management Plan

Rail Infrastructure



Description

- CTDOT owns rail infrastructure on the Northeast Corridor between New Haven and the New York/Connecticut border, as well as the New Canaan, Danbury and Waterbury Branch Lines.

Performance Measures

- For all rail infrastructure assets other than structures, CTDOT assesses condition based on asset age. For each asset type a Useful Life Benchmark (ULB) value is specified in years. ULB defines an asset's economic useful life, specified in terms of age, mileage and/or other factors. Asset condition is approximated by comparing the age of the asset to the ULB. A condition rating is assigned on the five-point TERM scale based on a conversion scale. An asset that is within its ULB is considered to be in a state of good repair (SOGR).
- CTDOT performs visual inspections of structures to assess conditions of the bridge deck, superstructure and substructure using the National Bridge Inventory (NBI) condition scale (with values ranging from 0 to 9). For culverts a single overall culvert rating is specified. A bridge is deemed to be in a SOGR if all of its ratings are 5 or greater. NBI ratings were mapped to the TERM condition scale, with a rating 3 or higher representing SOGR.

Inventory and Condition



Track

Track-related infrastructure; includes running rail, ties, turnouts, and ballast.

243 Track Miles
375 Turnouts
58% Within ULB



Power

Infrastructure related to the transmission of power for signals and traction via the overhead contact system. Includes AC substations, catenary plant, catenary portals, and transmission equipment.

268 Miles of Catenary
171 Miles of Power Cable
9% Within ULB



49 Substation assets
850 Catenary Poles



Communication and Signals

Systems related to the monitoring and safety of train movements. Includes switches and signals, grade crossings, vehicle detection equipment, Intelligent Transportation System technology, and Positive Train Control equipment.

243 Track Miles
59% Within ULB



Structures

Major Infrastructure to supplement safe movement of trains above or below grade. Includes Moveable Bridges, Fixed Bridges, Culverts, Station Pedestrian Bridges/Tunnels, and Retaining Walls.

149 Fixed Structures
35 Culvert Structures
68% Rated 3 or above



5 Moveable Structures
17 Pedestrian Structures

Note: there are 100 off system bridges that are state-owned and CTDOT's capital responsibility, but are not included in the TAM inventory.

Total

60%
 State of Good Repair



Note: this total is an average of all rail infrastructure asset conditions, weighted by asset replacement value.

Based on CTDOT data as of June, 2022

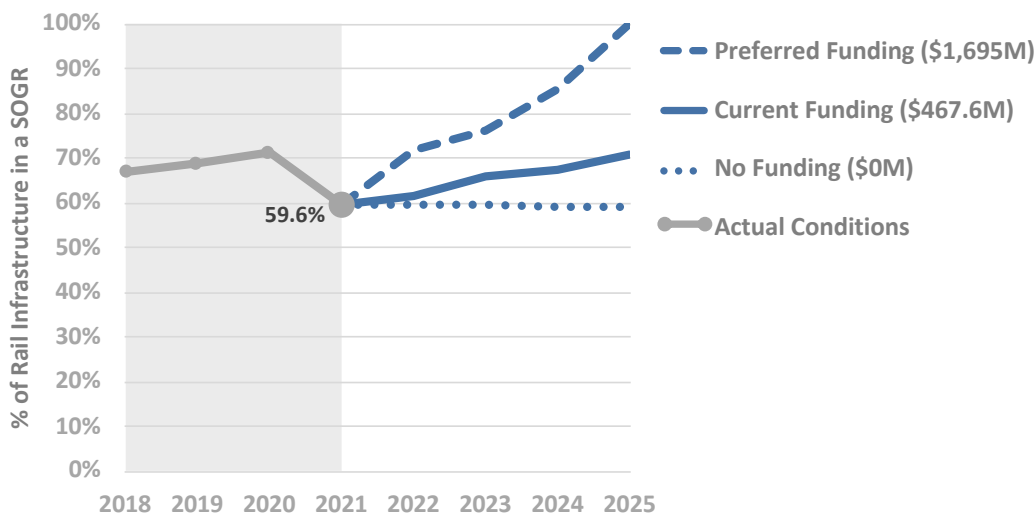


Connecticut Tier I Transit Asset Management Plan Rail Infrastructure



Rail Infrastructure Performance Projections

Rail Infrastructure in a SOGR



CTDOT anticipates \$7.1 billion of SOGR needs from 2022-2025 for its New Haven Line/Branch Line rail infrastructure. This includes an initial SOGR backlog of \$6.4 billion in State Fiscal Year 2022.

Available funding for SOGR activities was calculated based on CTDOT's Capital Plan with the help of CTDOT's Capital Services Unit. Connecticut's Capital Plan is a document that lists all projects expected to be federally-funded over a five-year period.

Based on projections made using CTDOT's prioritization tool given current funding, to make progress on its SOGR needs CTDOT should invest approximately invest over \$1.9 billion in Tier I rail infrastructure over the four-year analysis period.

*Years referenced in these charts are by State of Connecticut Fiscal Year which runs from July 1st to June 30th.
Based on CTDOT data as of June, 2022

Current Performance and Targets

Transit providers must set one-year performance targets using the performance measures established by FTA for the four capital asset categories required for a TAM plan, as applicable. These targets must be updated and submitted to the NTD annually. The FTA performance measure for infrastructure is the percentage of guideway that is under speed restriction.

Performance and Targets for Rail Infrastructure

Asset Class	% Guideway Slow Zone Restriction	
	Current Performance	Performance Target
Rail Guideway	3%	4%

Transit Funding

Funding for transit in Connecticut historically comes primarily from FTA funds, with the remainder coming from state public transportation bonds. Bond funds are used to match federal funds and provide funding for 100% of state projects.

Federal funding for rail assets comes from a variety of FTA programs, including Sections 5307 and 5337.

Analytical Approach

CTDOT uses a prioritization tool to support its analytical approach, predicting transit asset conditions and SOGR needs.

The tool has a series of models for different asset types that recommend when to rehabilitate or replace an asset, and the conditions and performance predicted for the asset over time. Also, the tool supports prediction of the overall performance resulting for a specified funding scenario, and recommends a prioritized list of projects to fund given a budget constraint.

In this fact sheet, predicted performance changes are shown the year funds are committed; actual performance may lag behind funding.



Connecticut Tier I Transit Asset Management Plan

Bus Facilities



Description

- CTDOT owns four administrative or maintenance bus facilities. These are CTtransit facilities in Hartford, Stamford, New Haven, and Waterbury.
- CTDOT owns 10 bus passenger facilities, all of which are on the CTfastrak bus rapid transit service.
- CTDOT has performed recent detailed facility inspections resulting in component-level condition data for all Tier I bus facilities.
- Each facility may include multiple buildings.

Performance Measures

The percentage of facility components rated below condition 3 on the FTA Transit Economic Requirements Model (TERM) scale.

- Facilities are made up of 10 major components (e.g. substructure, shell, HVAC, electrical)
- Major facility components are inspected and rated on a 1 to 5 condition scale, with a rating of 3 or greater indicating a state of good repair.
- For some components, an age-based approach is used to estimate condition using useful life.
- The component condition ratings are averaged using weight factors and replacement cost to calculate the overall condition of a facility for FTA reporting.

Inventory and Condition



Administrative/Maintenance

Administrative facilities are typically offices that house management and supporting activities for overall transit operations such as accounting, finance, engineering, legal, safety, security, customer services, scheduling, and planning. They also include facilities for customer information or ticket sales, but that are not part of any passenger station. Maintenance facilities are those where routine maintenance and repairs or heavy maintenance or unit rebuilds are conducted.

4
Facilities

86%
components
rated 3 or
above



Passenger/Parking

Passenger facilities are significant structures on a separate ROW.

- All motorbus, rapid bus, commuter bus, and trolley bus passenger facilities in a separate ROW that have an enclosed structure (building) for passengers for items such as ticketing, information, restrooms, and concessions
- All transportation, transit or transfer centers, and transit malls if they have an enclosed structure (building) for passengers for items such as ticketing, information, restrooms, concessions, and telephones

10
Facilities

100%
components
rated 3 or
above



Total

14
Facilities

98%
components
rated 3 or above



Based on CTDOT data as of June, 2022

**The performance measures herein are required for FTA reporting purposes only. Condition ratings are used to determine overall SOGR status either through engineering judgement or formal condition assessments, which may not reflect SOGR needs in their entirety.*



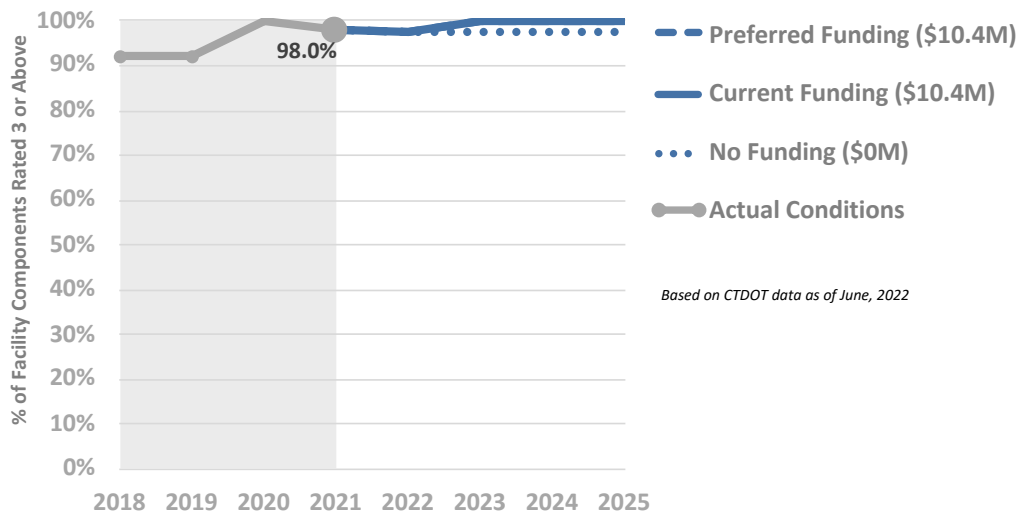
Connecticut Tier I Transit Asset Management Plan

Bus Facilities



Bus Facilities Performance Projections

Percent of Bus Facility Components Rated 3 or Above on FTA TERM Scale



CTDOT anticipates about \$46 million of SOGR needs from 2022-2025 for its Tier I Bus Facilities.

Current funding for SOGR activities was calculated based on CTDOT’s Capital Plan with the help of CTDOT’s Capital Services Unit. Connecticut’s Capital Plan is a document that lists all projects expected to be federally-funded over a five-year period.

Based on projections made using CTDOT’s prioritization tool given current funding, the current funding level will allow CTDOT to meet all SOGR needs by the end of the four year period.

*Years referenced in these charts are by State of Connecticut Fiscal Year which runs from July 1st to June 30th.

Current Performance and Targets

Transit providers must set one-year performance targets using the performance measures established by FTA for the four capital asset categories required for a TAM plan, as applicable. These targets must be updated and submitted to the NTD annually.

Performance and Targets for Tier I Bus Facilities

Asset Class	% Components Rated 3 or Above	% Facilities Rated 3 or Above	% Facilities Rated Below Condition 3	
	Current Performance	Current Performance	Current Performance	Performance Target
Administrative/Maintenance	86%	100%	0%	0%
Passenger	100%	100%	0%	0%

Transit Funding

Funding for transit in Connecticut historically comes primarily from FTA funds, with the remainder coming from state public transportation bonds. Bond funds are used to match federal funds and provide funding for 100% of state projects.

Funding for Tier I bus assets comes from a variety of federal funding programs, including Sections 5307, 5337, 5339.

Analytical Approach

CTDOT uses a prioritization tool to support its analytical approach, predicting transit asset conditions and SOGR needs.

The tool has a series of models for different asset types that recommend when to rehabilitate or replace an asset, and the conditions and performance predicted for the asset over time. Also, the tool supports prediction of the overall performance resulting for a specified funding scenario, and recommends a prioritized list of projects to fund given a budget constraint.

In this fact sheet, predicted performance changes are shown the year funds are committed; actual performance may lag behind funding.



Connecticut Tier I Transit Asset Management Plan Rail Facilities



Description

- CTDOT owns five administrative or maintenance rail facilities. These are the facilities in Bridgeport, Danbury, New Haven, Stamford, and Springdale. However detailed condition data is not available for all facilities.
- CTDOT owns 43 rail passenger facilities, serving Metro North and Shore Line East. Formal condition assessments were performed for all passenger facilities in 2017.
- Each facility may include multiple buildings.

Performance Measures

The percentage of facility components rated below condition 3 on the FTA Transit Economic Requirements Model (TERM) scale.

- Facilities are made up of 10 major components (e.g. substructure, shell, HVAC, electrical)
- Major facility components are inspected and rated on a 1 to 5 condition scale, with a rating of 3 or greater indicating a state of good repair.
- For some components, an age-based approach is used to estimate condition using useful life.
- The component condition ratings are averaged using weight factors and replacement cost to calculate the overall condition of a facility for FTA reporting.

Inventory and Condition



Administrative/Maintenance

Administrative facilities are typically offices that house management and supporting activities for overall transit operations such as accounting, finance, engineering, legal, safety, security, customer services, scheduling, and planning. They also include facilities for customer information or ticket sales, but that are not part of any passenger station. Maintenance facilities are those where routine maintenance and repairs or heavy maintenance or unit rebuilds are conducted.

5
Facilities

92%
components rated 3 or above



Passenger/Parking

Passenger facilities are significant structures on a separate ROW. For rail modes, passenger facilities typically mean a platform area and any associated access structures or accessory spaces accessible to passengers or by staff who are in support of passenger service. Examples include

- All rail passenger facilities (except for light rail, cable car, and streetcar modes)
- All light rail, cable car, and streetcar passenger facilities that have platforms and serve track that is in a separate ROW (not in mixed-street traffic)
- All transportation, transit or transfer centers, and transit malls if they have an enclosed structure (building) for passengers for items such as ticketing, information, restrooms, concessions, and telephones

43
Facilities

74%
components rated 3 or above



Total

48
Facilities

80%
components rated 3 or above



Based on CTDOT data as of June, 2022

**The performance measures herein are required for FTA reporting purposes only. Condition ratings are used to determine overall SOGR status either through engineering judgement or formal condition assessments, which may not reflect SOGR needs in its entirety.*

***Note that facilities on the Hartford Line are classified as intercity assets and thus are not included in the fact sheet.*

****The Danbury rail site doesn't currently hold a facility, but CTDOT plans to build a facility in the future.*



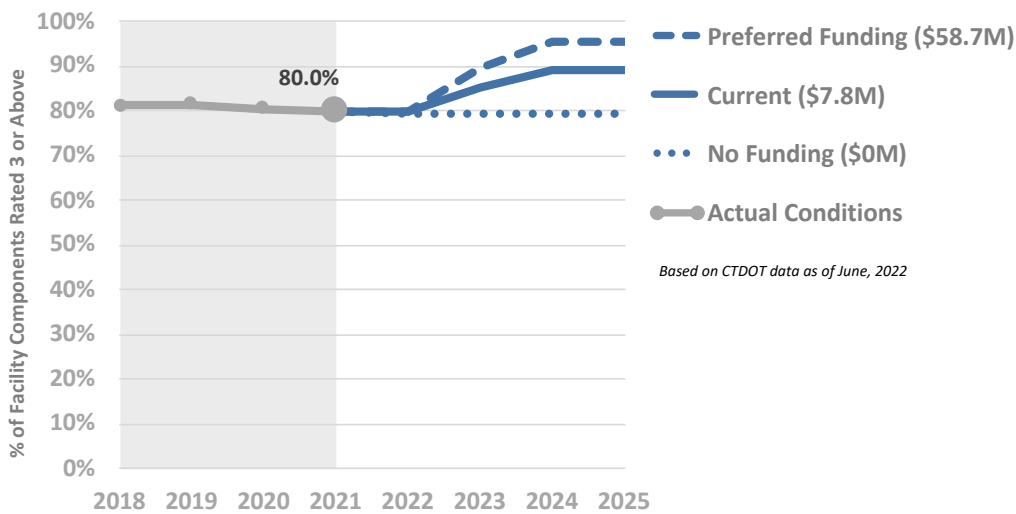
Connecticut Tier I Transit Asset Management Plan

Rail Facilities



Rail Facilities Performance Projections

Percent of Rail Facility Components Rated 3 or Above on FTA TERM Scale



CTDOT anticipates over \$283 million of SOGR needs from 2022-2025 for its Rail Facilities. This includes an initial backlog in 2022 of \$172 million in SOGR needs. While other SOGR needs may arise in this horizon period, the prioritization model was not able to capture other potential needs due to lack of formal condition assessments at some facilities. Current funding for SOGR activities was calculated based on CTDOT’s Capital Plan with the help of CTDOT’s Capital Services Unit.

Based on projections made using CTDOT’s prioritization tool given current funding, to make progress on its SOGR needs CTDOT should invest approximately \$32 million in rail facilities over the four year horizon from 2022-2025.

*Years referenced in these charts are by State of Connecticut Fiscal Year which runs from July 1st to June 30th.

Current Performance and Targets

Transit providers must set one-year performance targets using the performance measures established by FTA for the four capital asset categories required for a TAM plan, as applicable. These targets must be updated and submitted to the NTD annually.

Performance and Targets for Rail Facilities

Asset Class	% Components Rated 3 or Above	% Facilities Rated 3 or Above	% Facilities Rated Below Condition 3	
	Current Performance	Current Performance	Current Performance	Performance Target
Administrative/Maintenance	92%	100%	0%	0%
Passenger	74%	42%	58%	0%

Transit Funding

Funding for transit in Connecticut historically comes primarily from FTA funds, with the remainder coming from state public transportation bonds. Bond funds are used to match federal funds and provide funding for 100% of state projects.

Federal funding for rail assets comes from a variety of FTA programs, including Sections 5307 and 5337.

Analytical Approach

CTDOT uses a prioritization tool to support its analytical approach, predicting transit asset conditions and SOGR needs.

The tool has a series of models for different asset types that recommend when to rehabilitate or replace an asset, and the conditions and performance predicted for the asset over time. Also, the tool supports prediction of the overall performance resulting for a specified funding scenario, and recommends a prioritized list of projects to fund given a budget constraint.

In this fact sheet, predicted performance changes are shown the year funds are committed; actual performance may lag behind funding.

Appendix B. Condition Assessment Guidance

Condition Assessment Guidance

Connecticut Department of Transportation

May 15, 2018

Spy Pond Partners, LLC
with CDM Smith Inc.



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CTDOT Transit Condition Assessment Guidance

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1.0 Introduction

1.1 Background and Purpose

The mission of the Bureau of Public Transportation at Connecticut Department of Transportation (CTDOT) is “to develop, maintain, and operate a system that provides for the safe, efficient and sustainable movement of people and goods.” In pursuit of that mission, CTDOT has three transit objectives:

- Maintain existing systems at a state of good repair and enhance system safety and security
- Improve efficiency and effectiveness of transit service delivery
- Expand services to capture a greater share of existing markets and address specific new markets.

CTDOT faces an unusual challenge because of the transit service delivery model in Connecticut. Unlike many other state DOTs, CTDOT owns transit systems including bus operations throughout the state as well as the Shore Line East and New Haven Line commuter rail service.

Fifty percent of CTDOT’s annual operating budget is dedicated to Public Transportation statewide operations. CTDOT has direct financial responsibility for millions of dollars of transit assets in Connecticut, but contracts out the operation of transit service to private companies. To meet the requirements for developing a transit asset management plan, established in the final rule on Transit Asset Management by the Federal Transit Administration (FTA), CTDOT is obligated to collect data, manage, and report on transit assets throughout the state.

As part of the rule on transit asset management, providers must develop and implement transit asset management (TAM) plans. Transit providers may be required to either develop their own TAM plan or participate in a group TAM plan depending on whether they are Tier I or Tier II. The FTA rule on Transit Asset Management defines Tier I and Tier II providers:

Tier I provider means a recipient that owns, operates, or manages either (1) one hundred and one (101) or more vehicles in revenue service during peak regular service across all fixed route modes or in any one non-fixed route mode, or (2) rail transit.

Tier II provider means a recipient that owns, operates, or manages (1) one hundred (100) or fewer vehicles in revenue service during peak regular service across all non-rail fixed route modes or in any one non-fixed route mode, (2) a subrecipient under the 5311 Rural Area Formula Program, (3) or any American Indian tribe.

States must develop a group TAM plan for Tier II transit providers, while Tier I providers must develop their own TAM plans. Tier II providers may also choose to forgo the group plan and develop individual plans.

A TAM plan needs to include TAM and SGR policy, TAM plan implementation strategy, an asset inventory, condition assessments, a description of systems used to predict capital needs, a project-based prioritization of investments, a description of key TAM activities, a list of TAM resources, and an outline for updating the plan and TAM practices.

The condition assessment must be performed at a level of detail sufficient to support capital planning. Also, ideally, the condition assessment should support calculation of the SGR performance measures FTA has defined for four capital assets categories: equipment (non-revenue vehicles), rolling stock (revenue vehicles), infrastructure (rail fixed-guideway, track, signals, and systems), and facilities. This document establishes an approach for calculating asset condition for each of the four asset categories.

1.2 Document Organization

This guidebook is organized into five main sections:

- **Section 1** describes the background of the project and the organization of this document.
- **Section 2** describes the inventory data and condition assessment approach for revenue vehicles.
- **Section 3** describes the inventory data and condition assessment approach for facilities.
- **Section 4** describes the inventory data and condition assessment approach for fixed guideway.
- **Section 5** describes the inventory data and condition assessment approach for equipment.
- **Appendix A** includes a detailed list of assessment items for Administrative and Maintenance Facilities
- **Appendix B** includes recommended inspection procedures for Administrative and Maintenance Facilities
- **Appendix C** includes a detailed list of assessment items for Passenger Facilities
- **Appendix D** includes a detailed asset hierarchy for rail guideway

2.0 Revenue Vehicles

2.1 Inventory Data

Revenue vehicles are inventoried by vehicle fleet. All vehicles in a given fleet share the same vehicle type, make/model, model year, and operator. Other inventory data collected for a fleet may include, but is not limited to, vehicle length and fuel type. Figures 1 to 4 illustrate the asset hierarchy for revenue vehicles. Figure 1 shows three subclasses of vehicles: bus, rail, and ferryboat. Figure 2 shows the five vehicle types defined for buses, Figure 3 shows the six defined for rail, and Figure 4 shows the three for ferry.

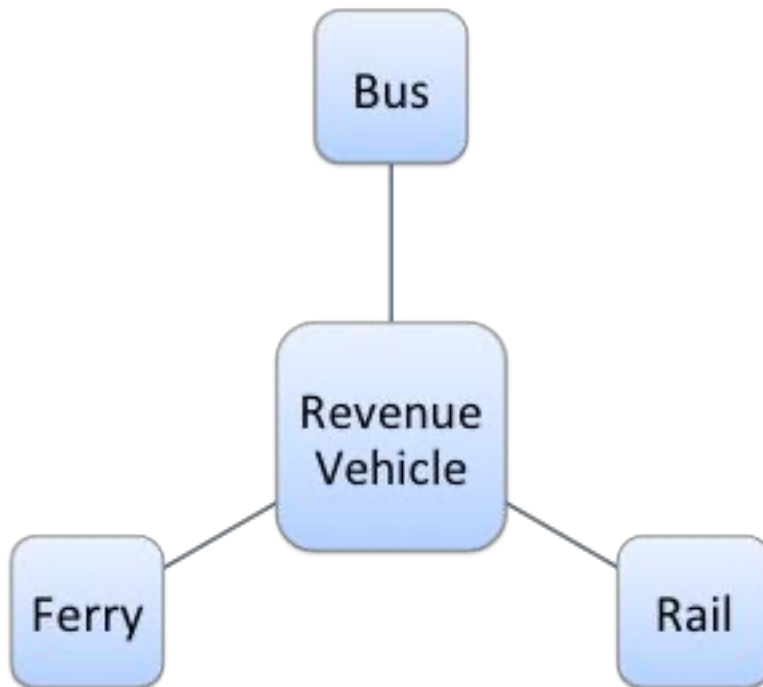


Figure 1. Asset Hierarchy – Revenue Vehicles

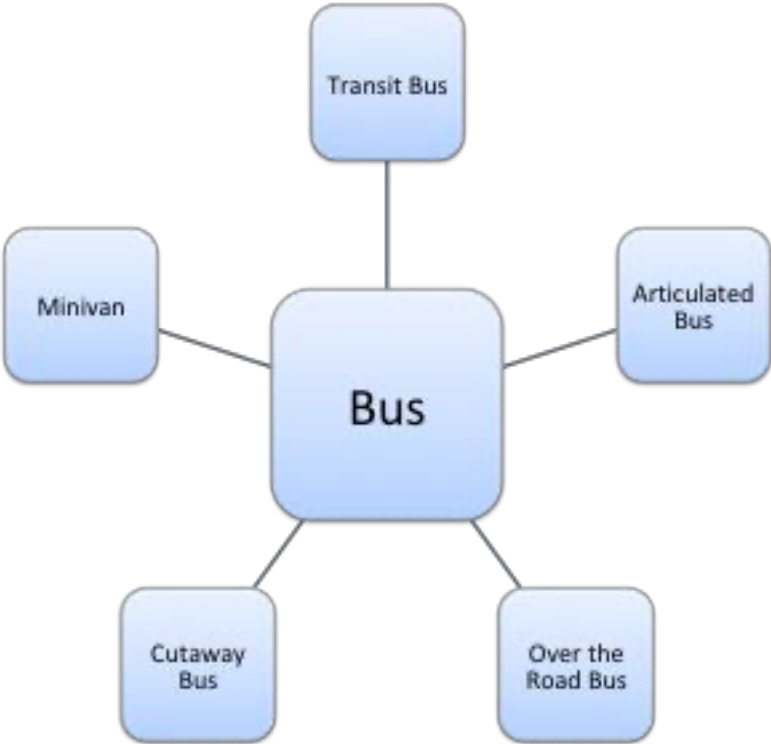


Figure 2. Asset Hierarchy – Revenue Vehicles – Bus

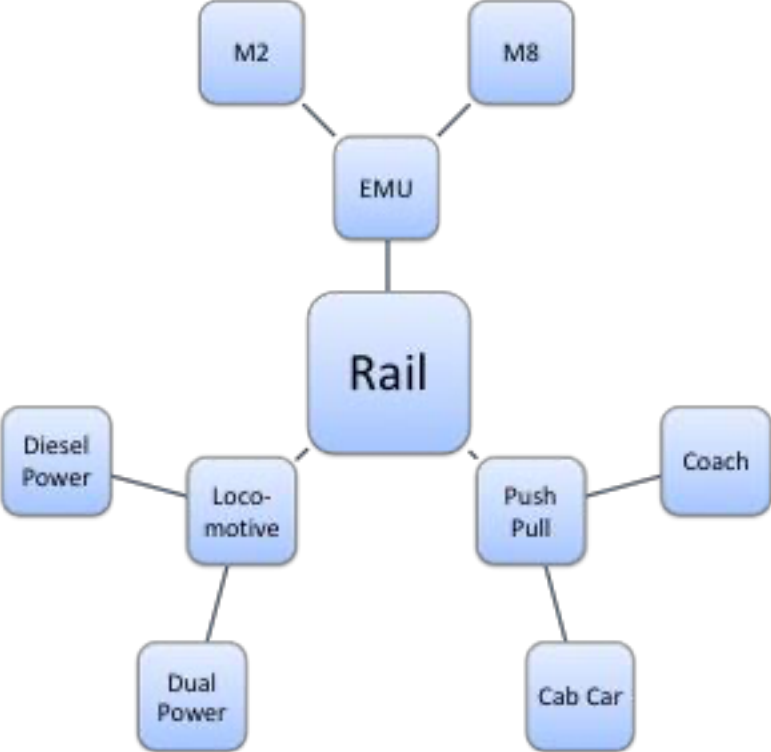


Figure 3. Asset Hierarchy – Revenue Vehicles – Rail

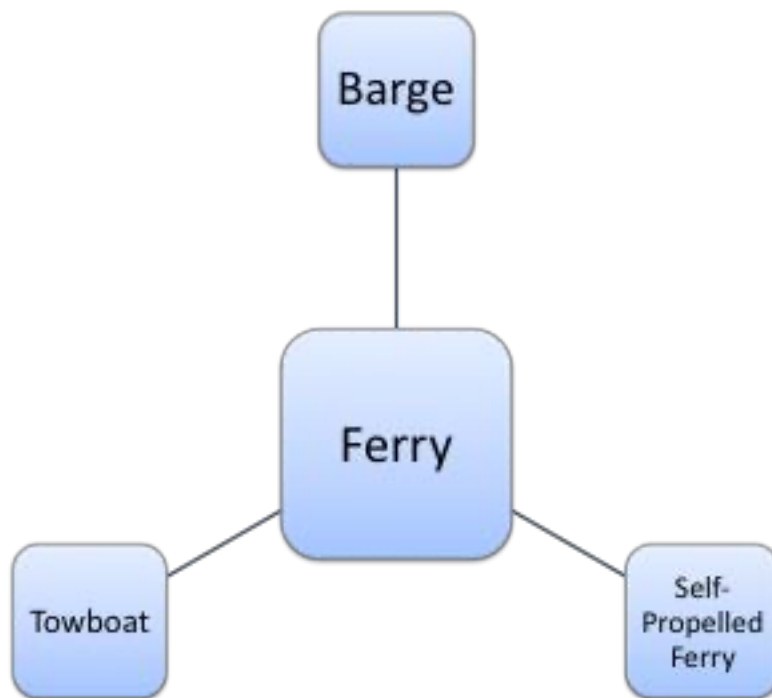


Figure 4. Asset Hierarchy – Revenue Vehicles – Ferry

2.2 Condition Assessment Approach

The purpose of the vehicle condition assessment is to provide an overall snapshot of the current state of repair of a vehicle fleet to aid in decisions concerning when it is most cost effective to replace it.

FTA’s mandated SGR performance measure for revenue vehicles is the percentage of vehicles that have met or exceed their Useful Life Benchmark (ULBs). The ULB is age at which a vehicle has reached the end of its economic useful life. This value may be specified in terms of vehicle age, mileage and/or other factors. FTA provides a set of default ULB values by vehicle type, all of which are specified in terms of vehicle age.

Following FTA’s model, CTDOT uses fleet age as its indicator of vehicle condition. A vehicle is deemed to be in good repair if its age is less than the ULB specified for the corresponding vehicle type. Likewise, a vehicle is deemed to no longer be in good repair if its age equals or exceeds the corresponding ULB.

CTDOT has worked with their Tier I and Tier II service providers in Connecticut to define custom ULB values. Connecticut’s ULB values for revenue vehicles are listed in Table 1.

Table 1. ULB Values for Revenue Vehicles

Tier I	Tier II	Asset Class	ULB (years)
●	●	Transit Bus	12
●		Articulated Bus	12
●	●	Cutaway Bus	5
●		Over the Road Bus	12
	●	Minivan	5
●		Rail Locomotive (Dual Power or Diesel)	25
●		Rail Push Pull (Coach or Cab Car)	25
●		Rail Electric Multiple Unit (M2 or M8 RMU)	25
●		Ferryboat	42

2.3 Assessment of Existing Data

Inventory data including model year (used to determine age) are stored by vehicle in CORE-CT and in inventory registries of Connecticut transit providers including the 12 transit districts participating in the Connecticut Group TAM Plan. For the purpose of developing its TAM Plan, CTDOT extracted revenue vehicle data from CORE-CT and transit providers, aggregated it by fleet, and imported the data into a separate transit asset inventory database, SGRtransdata.

3.0 Facilities

Two types of transit facilities are defined in the Connecticut SGR database: administrative/maintenance facilities, and passenger facilities. The condition assessment approach is similar for both facility types, and relies on visual inspection of primary facility components. However, the specific facility components and available data differ between the two types of facilities. Section 3.1 discusses the recommended condition assessment approach for administrative/maintenance facilities and Section 3.2 discusses the recommended approach for passenger facilities.

3.1 Administrative/Maintenance Facilities

3.1.1 Inventory Data

For administrative/maintenance facilities both the overall facility site and each individual building on the site are included in the inventory. In some cases, there may be only one building on a given site, but larger facilities may include multiple buildings.

Inventory data for the facility site may include, but is not limited to, the site address, operator and land area. Inventory data for buildings may include, but is not limited to, the operator, floor area, construction cost and date.

3.1.2 Condition Assessment Approach

The purpose of the facility condition assessment is to provide an overall snapshot of the current state of repair of a facility to aid in decisions concerning capital investments to improve the facility's condition. This section describes how to assess the condition of an administrative/maintenance facility.

The approach described here is based on FTA's guidance detailed in *TAM Facility Performance Measure Reporting Guidebook: Condition Assessment Calculation*. FTA's guidance is intended to support calculation of FTA's mandated SGR performance measure for facilities, which is the percentage of facilities within an asset class rated less than three on the five-point scale used in the FTA Transit Economic Requirements Model (TERM). As described in FTA's guidance document, the components were established based upon American Society of Testing and Materials (ASTM) documents that provide standards for classification of buildings and related features, but these have been customized in certain respects to address common features of transit facilities.

To assess facility conditions an inspector should assign a value of 1 to 5 to each of the major components of the facility. The condition rating values and their descriptions are listed in Table 2. The components are listed in Table 3. Specific subcomponents the inspector should examine for each component are listed in Appendix A. The inspector may wish to assess the condition of these individual sub-components or simply use the list as a reference when performing the inspection. Further, when performing inspections at a sub-component level for certain sub-components, the inspector may wish to specify the percentage of the sub-component quantity in each condition rather than a single, overall condition. If sub-component conditions are assessed they should be aggregated to obtain an overall score for the component using the approach

CTDOT Transit Condition Assessment Guidance

described here for aggregating component scores. Suggested inspection procedures are included in Appendix B.

Table 2. FTA TERM Condition Assessment Scale

Rating	Condition	Description
5	Excellent	No visible defects, new or near new condition, may still be under warranty if applicable
4	Good	Good condition, but no longer new, may be slightly defective or deteriorated, but is overall functional
3	Adequate	Moderately deteriorated or defective; but has not exceeded useful life
2	Marginal	Defective or deteriorated in need of replacement; exceeded useful life
1	Poor	Critically damaged or in need of immediate repair; well past useful life

The specific components of administrative/maintenance facilities are listed below. Note that the first nine components listed in the table should be assessed for each building in the facility, and the final component, Site, should be assessed for the site as a whole.

Table 3. Administrative/Maintenance Facility Condition Assessment Components

Inventory Unit	Component	Notes	Typical Useful Life* (years)	Component Condition Weight**
Building	Substructure		30	1.0
Building	Shell		30	1.0
Building	Interior		30	1.0
Building	Plumbing	May need to assess based on age	20	1.0
Building	HVAC	May need to assess based on age	20	1.0
Building	Electrical	May need to assess based on age	30	1.0
Building	Fire Protection	See Table 5	20	1.0
Building	Conveyance	See Table 5	20	1.0
Building	Equipment	Includes fixed specialty equipment	30	1.0
Site	Site		50	1.0

*Useful life can be utilized for components that cannot be visually inspected.

**Component Condition Weight represents the relative importance of the component compared to other components. By default, these numbers are 1.0. However, based on the agency's experiences and practices, the inspector can use a different number to lower or raise the importance of a component and thus change how component conditions impact the overall facility condition.

For some components, a visual inspection may be insufficient for establishing conditions. In cases where the inspector finds that he or she cannot assess conditions of a component visually, the inspector should estimate the age of the component (the time since it was constructed or last rehabilitated), and estimate the condition based on the age using useful life for the component listed in Table 3 with the scale shown in Table 4. Useful life is the average amount of time in years that an item, component, or system is economically efficient to keep in operation. This approach will typically be required for Plumbing, HVAC and Electrical, but may also be required for other components. Refer to the discussion of rail guideway assets and Table 7 for further details on this conversion scale.

Table 4. Conversion Scale: Component Age to FTA TERM Condition Rating

Component Age as % of Useful Life	Rating	Condition
New	5	Excellent
≤ 50%	4	Good
>50% ≤100%	3	Adequate
>100% ≤125%	2	Marginal
>125%	1	Poor

For Fire Protection and Conveyance, separate inspections are typically performed to assess code compliance. The inspector should utilize the results from those inspections in performing their condition assessment. Specifically, the inspector should use the condition assessment scale shown in Table 5 for these components.

Table 5. Fire Protection and Conveyance Condition Assessment Scale

Rating	Condition	Description
5	Excellent	System is new and there are no identified code issues
4	Good	System is not new, but there are no identified code issues
3	Adequate	Isolated code issues exist that can be addressed through maintenance
2	Marginal	Code issues exist that do not necessitate facility closure
1	Poor	Extensive code issues have been identified that may necessitate facility closure

Given the individual component conditions, the overall condition of the facility is calculated as:

$$Condition = \frac{\sum_{i=1}^n c_i f_i r_i}{\sum_{i=1}^n f_i r_i}$$

where c_i is the condition of component i , f_i is the replacement cost factor listed in Table 3, and r_i is the replacement cost of the component.

3.1.3 Assessment of Existing Data

Inventory data on Connecticut facilities are stored in CORE-CT and the transit providers' asset registries, but the level of detail stored on each facility varies. Thus, for the purpose of developing its TAM Plan, CTDOT extracted data on administrative/maintenance facilities from CORE-CT and the transit providers' asset registries, then manually reviewed data for each facility. Except in the case of a selected Tier II facilities that have been recently inspected, component-level condition data are not available for administrative/maintenance facilities. However, the overall condition of CTDOT-owned facilities has been previously established. Thus, component-level conditions were manually determined for each facility using the available component-level data, overall facility condition, and facility age. Data for each facility and building were imported into the transit asset inventory database, SGRtransdata.

3.2 Passenger Facilities

3.2.1 Inventory Data

For passenger facilities the overall facility site, each individual building on the site, and each rail platform (if applicable) are included in the inventory. In some cases, there may be only one building and/or platform on a given site, but larger facilities may include multiple buildings and/or platforms.

Inventory data for the facility site may include, but is not limited to, the site address, operator and land area. Inventory data for buildings may include, but is not limited to, the operator, floor area, parking spaces (for parking lots), construction cost and date.

3.2.2 Condition Assessment Approach

The condition assessment approach for passenger facilities is similar to that for administrative/maintenance facilities. The approach described here is based on FTA's guidance detailed in *TAM Facility Performance Measure Reporting Guidebook: Condition Assessment Calculation*. FTA's guidance is intended to support calculation of FTA's mandated SGR performance measure for facilities, which is the percentage of facilities within an asset class rated less than three on the five-point TERM scale.

To assess facility conditions an inspector should assign a value of 1 to 5 to each of the major components of the facility. The condition rating values and their descriptions are listed in Table 2. The components are listed in Table 6. Specific subcomponents the inspector should examine for each component are listed in Appendix C. The inspector may wish to assess the condition of these individual sub-components or simply use the list as a reference when performing the inspection. Further, when performing inspections at a sub-component level, for certain sub-components the inspector may wish to specify the percentage of the sub-component quantity in each condition rather than a single, overall condition. If sub-component conditions are assessed they should be aggregated to obtain an overall score for the component using the approach described here for aggregating component scores. Suggested inspection procedures are included in Appendix B.

Regarding the specific components of passenger facilities, note that first nine listed in the table

below should be assessed for each building in the facility. Three components should be assessed for each platform, and Site should be assessed for the site as a whole.

Table 6. Passenger Facility Condition Assessment Components

Inventory Unit	Component	Notes	Typical Useful Life (years)*	Component Condition Weight**
Building	Substructure		30	1.0
Building	Shell		30	1.0
Building	Interior		30	1.0
Building	Plumbing	May need to assess based on age	20	1.0
Building	HVAC	May need to assess based on age	20	1.0
Building	Electrical	May need to assess based on age	30	1.0
Building	Fire Protection	See Table 5	20	1.0
Building	Conveyance	See Table 5	20	1.0
Building	Fare Collection		20	1.0
Platform	Structure		30	1.0
Platform	Canopy		30	1.0
Platform	Electrical		30	1.0
Site	Site		50	1.0

*Useful life can be utilized for components that cannot be visually inspected.

**Component Condition Weight represents the relative importance of the component compared to other components. By default, these numbers are 1.0. However, based on the agency's experiences and practices, the inspector can use a different number to lower or raise the importance of a component and thus change how component conditions impact the overall facility condition.

The other details of the assessment process are identical to that described previously for administrative/maintenance facilities. Table 4 lists rating values to use if the inspector uses age as a proxy for condition. Table 5 lists specific condition assessment language to use for fire protection and conveyance. Given the individual component conditions, the overall condition of the facility is calculated as:

$$Condition = \frac{\sum_{i=1}^n c_i f_i r_i}{\sum_{i=1}^n f_i r_i}$$

where c_i is the condition of component i , f_i is the replacement cost factor listed in Table 6, and r_i is the replacement cost of the component.

3.2.3 Assessment of Existing Data

Inventory data on Connecticut facilities are stored in CORE-CT and the transit providers' asset registries, but the level of detail stored on each facility varies. Thus, for the purpose of developing its TAM Plan, CTDOT extracted data on passenger facilities from CORE-CT and the transit providers' asset registries, and then manually reviewed data for each facility to establish the inventory. Data for each facility, platform and building were imported into the transit asset inventory database, SGRtransdata.

Existing condition data available for passenger facilities varied by specific type of facility. For Tier II facilities and for CTfastrak stations, an overall condition rating was assigned. For these facilities, component-level conditions were manually determined for each facility using the overall facility condition and facility age.

For rail stations, more detailed assessments were recently performed. These inspections were performed for different facility components using the 10-point National Bridge Inventory (NBI) condition scale (with values ranging from 0 to 4) rather than the 5-point TERM scale described here. NBI conditions were converted to the TERM scale by dividing the rating by 2 and then rounding to the nearest integer value. Thus, a component was deemed to have a TERM rating of 2 if its NBI rating was 5 (fair) or less.

The rail facility inspections were mapped to component conditions as follows:

- The condition for Substructure was established based on the value for Foundations.
- The condition for Shell was established based on the minimum of Roof and Exterior Walls.
- The condition for Interior was established based on the minimum of Interior Walls, Floors, Windows/Skylights/Doors, Stairs/Ramps and Walking Surfaces.
- The condition for Plumbing was established based on the minimum of the two ratings for Drainage and the rating for Restrooms.
- The condition for HVAC was established based on the minimum of HVAC, Duct Work, Compressors, and Blowers.
- The condition for Conveyance was established based on the minimum of Elevator Pit, Elevator Machine Room, Elevator Cab, and Escalator.
- The condition for Site was established based on the value for Site-Electrical.

For rail platforms, the condition was determined for the components Structure, Canopy and Electrical. For each of these the condition was determined by taking the minimum of the subcomponent ratings.

The station data included information on station bridges, but this was considered to be part of the data set of Fixed Guideway – Structures.

4.0 Fixed Guideway

Two types of fixed guideway are defined in the Connecticut SGR database: rail, and bus. Rail guideway includes the Connecticut-owned portion of the Northeast Corridor, as well as three branch lines: New Canaan, Danbury and Waterbury. The inventory is structured such that additional freight rail guideway and related assets may be added if desired. Bus guideway includes the pavement, bridges and ancillary assets associated with the CTfastrak guideway running from New Britain to Hartford. Section 4.1 discusses the recommended condition assessment approach for rail guideway and Section 4.2 discusses the recommended approach for bus guideway.

4.1 Rail

4.1.1 Inventory Data

Rail fixed guideway inventory data is organized into four primary categories: track, power, structure, and signals/communications, as depicted in Figure 5. Each of these four categories is further divided into a two-level hierarchy. Note the hierarchy is based on that recommended by Metro North Railroad (MNR) based on that agency’s work to implement a new enterprise asset management system. The rail guideway asset hierarchy is presented in detail in Appendix D.

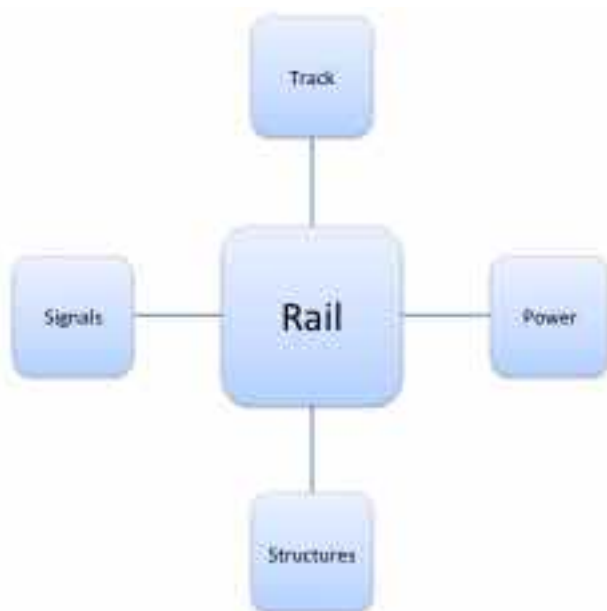


Figure 5. Asset Hierarchy – Fixed Guideway – Rail

Figure 6 shows the hierarchy for Track. Track is classified Main or Special. Main track is further divided into five subcategories, and special track is further divided into two subcategories. Track is inventoried by segment.

Figure 7 shows the hierarchy for Power. Power is divided into four subcategories: Supply System Traction Power; Supply System Transmission Power; Traction Power Distribution; and Signal Power System. Each of these is further divided into four subcategories. Assets in the subcategories Supply System Traction Power, Supply System Transmission Power, and Signal

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Power System are inventoried by site (e.g., by substation). Traction Power Distribution is inventoried by track segment.

Figure 8 shows the hierarchy for Structures. Three basic categories of structures are defined: Undergrade Structure; Retaining Wall and Overhead Structure. Each of these is further subdivided into two or three subcategories. Each individual structure is included in the inventory.

Figure 9 shows the inventory for Signals/Communications. This subcategory is further divided into the following: Signaling; Train Detection Control; Communication/Monitoring; Security System; and Positive Train Control. Assets in this subcategory are inventoried by piece of equipment.

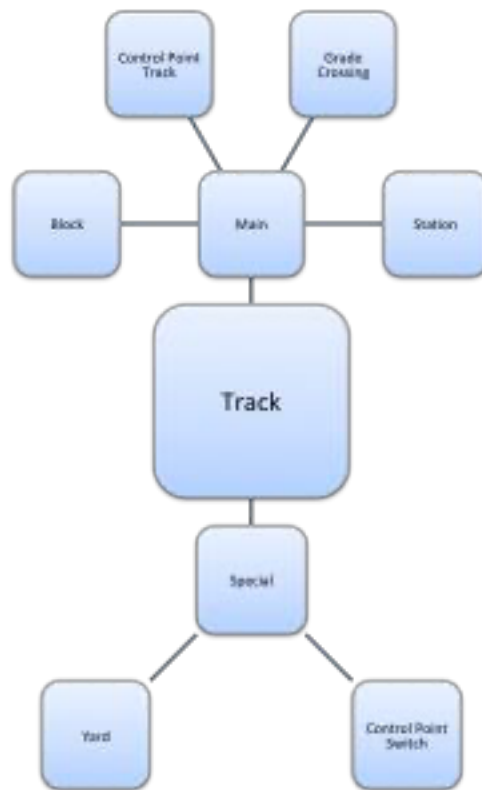


Figure 6. Asset Hierarchy – Fixed Guideway – Rail – Track



Figure 7. Asset Hierarchy – Fixed Guideway – Rail – Power



Figure 8. Asset Hierarchy – Fixed Guideway – Rail – Structure



Figure 9. Asset Hierarchy – Fixed Guideway – Rail – Signal/Communications

4.1.2 Condition Assessment Approach

MNR and Amtrak have each identified a need for a comprehensive condition assessment approach for assessing rail guideway on the Northeast Corridor. Such an approach would ideally consider results of visual inspections, including track walks and other forms of inspection already performed on a routine basis, results obtained from inspection by rail geometry car, and other inputs. However, no such comprehensive approach has yet been defined. Thus, both MNR and Amtrak use asset age as a proxy for condition for most assets, with the notable exception of structures.

For all rail guideway assets other than structures, CTDOT assesses condition based on asset age, using an approach patterned on current MNR and Amtrak practices. For each asset type a ULB value is specified in years. Asset condition is then approximated by comparing the age of the asset (years since it was either constructed or last rehabilitated) to the ULB. A condition rating is assigned on the five-point TERM scale based on Table 7.

As described below in 4.1.3, MNR rail guideway asset data has four condition categories, each defined by age relative to useful life. CTDOT adapted this approach and added a fifth condition category (New/5/Excellent) to allow for mapping of MNR condition data to the TERM five-point scale.

Table 7. Conversion Scale: Rail Guideway Asset Age to FTA TERM Condition Rating

Asset Age as % of ULB	Rating	Condition
New	5	Excellent
≤ 50%	4	Good
>50% and ≤100%	3	Adequate
>100% and ≤125%	2	Marginal
>125%	1	Poor

ULB values for rail guideway assets are discussed in Section 4.1.3.

For structures a detailed assessment approach has already been defined and implemented. CTDOT performs visual inspections of structures in the subcategories Undergrade Structure and Overhead Structure. These are patterned on the approach used for highway bridges. Through the inspection CTDOT assess condition of the bridge deck, superstructure and substructure condition using the 10-point National Bridge Inventory (NBI) condition scale (with values ranging from 0 to 4) rather than the 5-point TERM scale described here. For culverts a single overall culvert rating is specified.

4.1.3 Assessment of Existing Data

Pending implementation by MNR of its new enterprise asset management system, the system of record for data on the rail guideway inventory is the set of track charts maintained for the Northeast Corridor and branch lines. The charts show locations of major assets, and detail when assets were most recently rehabilitated. However, the track charts do not provide the level of detail required to populate the asset inventory illustrated in Figures 6 to 9.

As a supplement to the track charts, MNR maintains a less detailed, summary inventory of rail guideway assets for use in preparation of the Metropolitan Transportation Authority (MTA) Ten Year Needs Assessment (TYNA). This summary inventory groups assets by ULB, and details the asset quantities in each of four condition categories:

- 1: 0 to 50 percent of useful life (4 or 5 on the TERM scale)
- 2: 50 to 100 percent of useful life (3 on the TERM scale)
- 3: 100 to 125 percent of useful life (2 on the TERM scale)
- 4: more than 125 percent of useful life (1 on the TERM scale)

Based on the above definitions, an asset in Category 3 or 4 (1 or 2 on the TERM scale) has exceeded its useful life and is not in good repair. However, in some cases MNR has established that an asset is still in good repair, despite exceeding its useful life, or alternatively, that it is no longer in good repair though it is still less than its useful life. To address such situations MNR tracks assets in a second set of categories that mirror the first set, but include adjustments for engineering judgment.

The MNR data were used to populate data on Track and Power in the CTDOT database. Table 8 summarizes the assets in the summary inventory for Track. Table 9 summarizes the assets for Power.

Table 8. MNR TYNA Summary Inventory - Rail

Category	Subcategory	ULB (years)
Rail	Tangent	40
	Curves <2 degrees	30
	Curves 2-4 degrees	20
	Curves >4 degrees	10
Ties	Concrete	40
	Wood	30
Turnouts	High Speed	25
	Mainline	20
	Yard	30
	Siding	30
Surfacing	Interlockings	4
	Control Point to Control Point	4

Table 9. MNR TYNA Summary Inventory - Power

Category	Subcategory	ULB (years)
Catenary Plant	Overhead Catenary	50
	Sectionalizing Insulators	3
	Synthetic Insulators	3
	Pulleys	15
Cable Plant	AC Feeder Cable	40
	Signal Power 12kV	50
	Catenary Poles	100
AC Substation Plant	Metal Clad	30
	RTU Sectionalizing	30
	Substation Wayside Switchyard	30
	Anchor Bridge Substation	30
	Snow Melter Transformers/Unit Substation	30
	Supply Stations	40
	MOD's	20
Signal Power Plant	Substations	20
	MOD's	20
	Transformers	30
Transmission Plant	Transformers, Small Pad Mount	40
	Yard Power Distribution System	30

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CTDOT's existing structures data were used to populate the data for the category Structure. Condition data in the existing data set are expressed using the 10-point NBI scale. NBI conditions were converted to the TERM scale by dividing the rating by 2 and then rounding to the nearest integer value. Thus, a component was deemed to have a TERM rating of 2 if its NBI rating was 4 (poor) or less.

For the category Signals work remains to be performed to develop a full inventory. Thus, for this category the CTDOT inventory has entries for the Northeast Corridor, New Canaan Branch, Danbury Branch, and Waterbury Branch.

4.2 Bus

4.2.1 Inventory Data

Asset categories defined for Bus Fixed Guideway include Pavement and Structure. CTDOT's approach for inventorying these assets is to extend the approach used for highway assets, for which existing systems and approaches are well defined.

4.2.2 Condition Assessment Approach

For pavement CTDOT uses a Pavement Condition Index (PCI) to measure the condition of CTDOT-maintained pavements. PCI is calculated for each 0.1-mile segment based on five metrics. The overall PCI is a weighted average of the following metrics shown in Table 10 below.

Table 10. Pavement Condition Index Metrics

Metric	Weight	Description
Roughness	10%	An indicator of pavement roughness experienced by road users traveling over the pavements. The International Roughness Index (IRI) is computed from a single longitudinal profile
Rutting	15%	Rutting is quantified for asphalt pavements by measuring the depth of ruts along the wheel path. Rutting is commonly caused by a combination of high traffic volumes, heavy vehicles and the instability of the pavement mix.
Cracking	25%	Cracks in the pavement surface can be caused or accelerated by aging, loading, poor drainage, frost heaves or temperature changes, or construction flaws. Cracking is measured in terms of the percentage of cracked pavement surface.
Disintegration	30%	Disintegration is the wearing away of the pavement surface caused by the dislodging of aggregate particles and loss of asphalt binder. CTDOT calculates the disintegration metric using pavement age.
Drainage	20%	Drainage refers to the ability of the surface of the roadway to drain. CTDOT uses the collected cross slope and grade of the roadway to compute the drainage metric

The PCI is scaled from 1.0 to 9.0, with 9.0 describing a pavement without defects. Within this

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scale, roadways with a PCI less than 4.0 are classified in “Poor” condition, those between 4.0 and less than 6.0 are in “Fair” condition, 6.0 to less than 8.0 PCI indicates “Good” condition, and 8.0 to 9.0 indicates “Excellent” condition. A pavement section for which the PCI is 6 or greater is classified as being in a state of good repair.

For structures CTDOT uses a similar approach for rail and highway bridges. As described previously, bridges are inspected visually. Conditions of bridge decks, superstructures and substructures are assessed using the 10-point NBI scale.

4.2.3 Assessment of Existing Data

CTDOT collects pavement inventory and condition data using specially equipped Fugro Roadware Automatic Road Analyzer (ARAN) vans. The entire CTDOT-maintained mainline is measured each year. CTDOT performed an initial data collection run of CTfastrak guideway in March 2015, prior to the system opening. CTDOT is establishing a process for regular data collection, data processing, and integration with the Pavement Management System.

CTDOT has already inventoried and inspected the bridges on the CTfastrak guideway and is managing these together with other highway bridges.

5.0 Equipment

5.1 Inventory Data

The Equipment asset class includes service vehicles and other equipment with a value of \$50,000 or more. Service vehicles are inventoried by vehicle fleet. All vehicles in a given fleet share the same vehicle type, make/model, model year, and operator. Figure 10 shows the different types of service vehicles inventoried, including four types of “rubber tire” vehicles and two types of rail service vehicles.

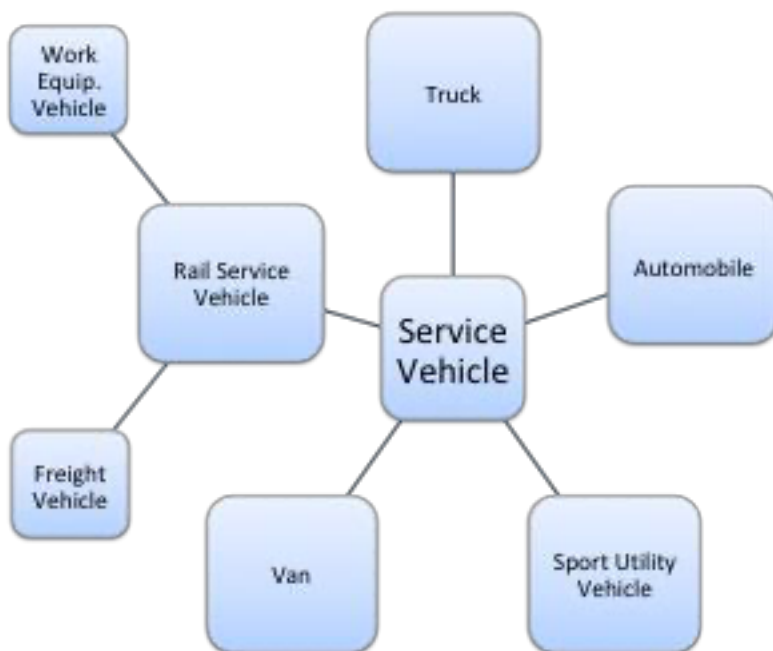


Figure 10. Asset Hierarchy – Equipment – Service Vehicles

Other equipment is inventoried by specific item. Inventory data include, but are not limited to, item descriptions, purchase cost, and purchase date.

5.2 Condition Assessment Approach

CTDOT uses the same basic approach for assessing condition of equipment as it does for revenue vehicles. This approach is discussed in Section 2. Specifically, A ULB value is established for equipment type. A piece of equipment is assessed as being in good repair if its age is less than the corresponding ULB, and not in good repair if it meets or exceeds the ULB. This approach supports reporting of FTA’s mandated SGR performance measure for equipment: the percentage of service vehicles that have met or exceed their ULB. Connecticut’s ULBs for equipment are listed in Table 11.

Table 11. ULBs for Equipment

Tier I	Tier II	Asset Class	ULB (years)
●	●	Trucks and Rubber Tire Vehicles	14
●	●	Automobiles	5
●	●	Sport Utility Vehicles	5
●		Steel Wheel Vehicles	25
●	●	Vans	5

5.3 Assessment of Existing Data

Inventory data including model year (used to determine age) are stored by service vehicle in CORE-CT and the transit providers’ asset registries. For the purpose of developing its TAM Plan, CTDOT extracted revenue vehicle data from CORE-CT and the transit providers’ asset registries, aggregated it by fleet, and imported the data into a separate transit asset inventory database, SGRtransdata.

For other equipment inventory data, such as equipment description, purchase cost, and purchase date, are stored in CORE-CT and the transit providers’ asset registries as well. CTDOT extracted data on other equipment, filtering out data for items costing less than \$50,000 or permanently affixed to a facility, and imported the data into SGRtransdata.

Appendix A. Detailed List of Items for Admin / Maintenance Facility Condition Assessment

Tables A-1 through A-10 present detailed lists of items for condition assessment at administration or maintenance facilities. The tables are organized by the ten components described in the approach. In addition to the items, the tables include notes for inspection (where applicable) and units of measure. This information in this appendix is also included in a separate spreadsheet.

Where these items are assessed, one would typically assign an overall value to the item. But in cases where units of measures are not “inspect as each”, an inspector may determine the percentage of total quantity in each condition.

Table A-1. Substructure

Category	Item	Notes	Unit of Measure
Foundations	Exposed Foundation Elements		inspect as each
	Other Structural Components		inspect as each
Basement	Slab		sq. ft.

Table A-2. Shell

Category	Item	Notes	Unit of Measure
Superstructure	Structural Frame	Columns, pillars, walls	inspect as each
Roof	Roof Waterproofing		inspect as each
	Roof Penetration Flashing Systems	Chimney, skylights, eaves, surroundings	inspect as each
	Roof Drainage Systems	Gutters	inspect as each
Exterior	Building Envelope - Masonry/Concrete Walls		sq. ft.
	Building Envelope - Cladding		sq. ft.
	Building Envelope - Windows and Glazing		sq. ft.
	Building Envelope - Doors, Glazing, Door Hardware		sq. ft.
	Building Envelope - Garage Doors		sq. ft.
	Bird Proofing System		inspect as each
	Exterior Finishes		inspect as each
Shell Appurtenances	Means of Egress	Stairs, fire escapes	inspect as each
	Vertical Openings		inspect as each
	Cat Walks		inspect as each
	Inspection Pits		inspect as each
Building Expansion Joints	Building Expansion Joints		linear ft.

Table A-3. Interior

Category	Item	Notes	Unit of Measure
Partitions	Interior Walls		sq. ft.
	Interior Windows and Glazing		sq. ft.
	Interior Doors, Glazing, Door Hardware		sq. ft.
Stairs	Interior Stairs and Landings		units
Finishes	Flooring System		sq. ft.
	Ceiling System		sq. ft.
	Wall Finishes		sq. ft.
Other	Interior Amenities	Signage, built-in furnishings, appliances	inspect as each
	Built-In Seating		inspect as each

Table A-4. Plumbing

Category	Item	Notes	Unit of Measure
Domestic Water Distribution	Water Heaters		inspect as each
	Water Treatment Systems		inspect as each
	Backflow Prevention		inspect as each
Pumps	Pumps	Sump, well, domestic	inspect as each
Bathroom Fixtures	Bathroom Fixtures		inspect as each
Other Plumbing Items / Fixtures	Other Plumbing Fixtures	Piping, insulation, etc.	inspect as each

Table A-5. HVAC

Category	Item	Notes	Unit of Measure
HVAC	Energy Recovery Units		units
	Heat Pumps		units
	Make-Up Units		units
	Air Handling Units		units
	Boilers		units
	Burners		units
	Furnaces		units
	Unit Heaters		units
	Radiant Heaters		units
	Finned Tube Radiation and Convertors		units
	Air Conditioning Units	Split package, commercial through-the-wall, water-cooled package	units
	Splits and Mini-Splits		units
	Cooling Towers		units
	Condensers	Air-Cooled, evaporative	units
	Chillers		units
	HVAC Air Terminals		units
	Fans	Centrifugal, axial, roof-mounted, propeller	units
	Coils		units
	Heat Exchangers		units
	Reciprocating Compressors		units
	Air Curtains		units
	Water Treatment System		inspect as each
Other HVAC Pumps (excluding heat pumps)		inspect as each	
Other HVAC Components	Piping, ductwork, etc.	inspect as each	

Table A-6. Electrical

Category	Item	Notes	Unit of Measure
Electrical Service / Distribution	Power Distribution / Switchgear	Service entrance through subpanels	inspect as each
	Generator and Transfer Switch		inspect as each
	Transformers	Non-utility owned only	inspect as each
	DC Power Substation / Traction Power Substation		inspect as each
	AC Power Substation		inspect as each
	Service Panels		inspect as each
Backup Power	Uninterruptible Power Supply (UPS)		inspect as each
Lighting	Interior Lighting		inspect as each
	Exterior Lighting		inspect as each
Other Electrical	Other Electrical Components	Conduits, etc.	inspect as each
Lightning Protection System	Lightning Protection System		inspect as each

Table A-7. Fire Protection

Category	Item	Notes	Unit of Measure
Fire Protection	Fire Detection System		inspect as each
	Fire Suppression Systems	Sprinklers, standpipes, extinguishers, hydrants	inspect as each

Table A-8. Conveyance

Category	Item	Notes	Unit of Measure
Elevators	Elevators		units
Escalators	Escalators		units
Lifts	Passenger Lifts		units

Table A-9. Equipment

Category	Item	Notes	Unit of Measure
Stationary Equipment	Hydrogen Fuel Cells		inspect as each
	Photovoltaic Panels		inspect as each
	Paint Booths		inspect as each
	Air Compressors		inspect as each
	Special Work Station Ventilation	Vehicle, welding, soldering, etc.	inspect as each
	Vehicle Washing Equipment		inspect as each
	Fall Protection Systems		inspect as each
	Rail Car Wash		inspect as each
	Sand Blasting System		inspect as each
	Radio Cell Towers		inspect as each
	In-Ground Lifts		inspect as each
	Other Stationary Equipment		inspect as each

Table A-10. Site

Category	Item	Notes	Unit of Measure
Site Equipment	Motor Fuel Island Tanks and FMU		units
	Tank Monitoring System		units
	Fuel Oil Tank		units
	Potable Water Tank		units
	Propane Tank		units
	Generator Tank	Independent from generator, i.e. not a base tank	units
	Chloride and Brine Storage Tanks		units
	Chloride System		inspect as each
	Brine System		inspect as each
Roads / Parking Lots / Sidewalk / Curbing	Access Road		sq. ft.
	Parking Lots		sq. ft.
	Sidewalks and Walkways		sq. ft.
	Pavement Markings		inspect as each
	Bollards and Handrails		inspect as each
Security	Fences		linear ft.
	Gates and Barrier Arms		inspect as each
	Camera / Surveillance System		inspect as each
	Guard Shack		inspect as each
Site Septic, Environmental, & Stormwater Management	Waste Oil Tank		units
	Waste Antifreeze Tank		units
	Wastewater Management / Drainage		inspect as each
	Oil-Water Separator Tank		units
	Sanitary/Stormwater Pumping Systems		inspect as each
	Septic System Tank		units
	Septic System Leaching Fields or Cesspools		inspect as each
	Septic System Reserve Field		inspect as each

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For each of the items listed in Tables A-1 through A-10, an inspector may fill out the following “Yes/No” questions shown in Table A-11. These items were added following discussions with CTDOT and transit provider staff but are not directly applicable to the condition assessment ratings.

Using these questions could help an agency understand the importance of each asset while considering capital planning needs. The determination of safety critical, operations critical or the other fields could be initially made by the manager of the department in which the assets reside. The determination could then be reviewed and approved by Chief Operating Officer and Chief Financial Officer (who keeps the inventory).

An agency using these questions may want to establish further criteria for these items.

Table A-11. Yes/No Questions

Question	Description
Applicable?	Does the item exist at the facility / building? If it does, then answer Yes. If it does not, answer No.
Safety Critical?	A “Yes/No” question intended to highlight safety critical components.
Operations Critical?	A “Yes/No” question intended to highlight operations critical components.
Obsolete / Modernization?	A “Yes/No” question intended to highlight obsolete components.
Operating Savings Opportunity?	A “Yes/No” question intended to highlight operating savings opportunities.

Additional questions for an inspector to consider are listed below in Table A-12.

Table A-12. Additional Questions

Additional Questions
Is there adequate office space?
Is a break area provided?
Are male and female locker rooms and showers provided?
Is the facility ADA compliant?
Is the facility OSHA compliant?
Does a communications (data) system exist?
Does a phone system exist?

Appendix B. Recommended Inspection Procedures for Administrative and Maintenance Facilities

Facility condition assessment involves visual inspection of facility components to determine asset condition. This appendix includes recommended inspection procedures for administrative and maintenance facilities, organized by component and listed in Table B-1. These procedures are adapted from FTA’s guidance document *TAM Facility Performance Measure Reporting Guidebook: Condition Assessment Calculation*.

Table B-1. Recommendation Facility Inspection Procedures

Component	Procedures
Substructure	<ul style="list-style-type: none"> • Foundations: Inspect walls, columns, pilings, other structural elements for signs of decay or structural integrity concerns. • Basement: Inspect non-foundation and structural elements such as facing materials, insulation, slab, floor underpinnings, crawl spaces, etc.
Shell (e.g., roof, exterior structure, walls)	<ul style="list-style-type: none"> • Inspect roof, including roof surface (tiles, membrane, shingles, gravel etc.), gutters, eaves, skylights, flashing, chimney surrounds, and sealants, hardware and painted or coated surfaces. Note evidence of ponding, or roof leaks, significant age – and other indicators that repair may be necessary. Note age of roof(s) and whether warranty is still in effect. • Inspect building envelope, façade, curtain wall system, glazing system, exterior sealants, exterior balconies, doors, stairways, and parapets. Note signs of cracks, openings, missing elements, detached elements, deteriorated sealants, and other issues that may lead to penetration of water into the building. Also, note any concerns with structural integrity. • Inspect fire escapes, noting any loose connections, deteriorated elements, or blockage, that would impact the function or safety of fire escapes. • Inspect gutters and downspouts. Note maintenance needs, need for cleaning, loose elements, and detachment. • Inspect superstructure / structural frame, including columns, pillars, and walls. Note any signs of decay or structural integrity concerns. • Inspect windows, doors, and all finishes (paint, masonry). Note any functionality or safety issues.
Interior	<ul style="list-style-type: none"> • Inspect soundness and finish of drywall, partitions, interior doors, fittings, ceiling tiles, and signage. • Inspect stairs including fire and access issues. • Inspect interior finishes, including materials used on walls, floors, and ceilings, such as tile, paint, and other coatings. Look for roughness and damage.
Plumbing	<ul style="list-style-type: none"> • Inspect fixtures and pipes for water distribution, sanitary waste, rainwater drainage, and any damage or leaks. • If not accessible, determine or estimate the age of plumbing system.

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HVAC	<ul style="list-style-type: none"> Inspect systems and their elements for energy supply, heating and cooling systems, distribution systems, terminal and package units, controls and instrumentation including testing and balancing, and chimneys. Specifically, inspect coils, housing, drains, and wiring and evaluate overall performance of the system. Note apparent or reported age of the equipment, past material element replacements/ upgrades, and the apparent level of maintenance exercised. If heating equipment is shut down or not operational at the time of the walk-through survey, provide an opinion of the condition to the extent observed. Note refrigerants and fuels used and their suitability or need for improvement / upgrade. If elements are not accessible, determine or estimate the age of the HVAC system.
Electrical	<ul style="list-style-type: none"> Inspect electrical service & distribution, noting deficiencies or needed / recommended upgrades Inspect lighting and branch wiring (interior and exterior), communications and security, noting deficiencies or needed / recommended upgrades Examine other electrical system-related pieces such as lightning protection, generators, emergency lighting, and elements related to electrical service and distribution such as conduit, boxes, solar panels and mountings for any damage wire chaffing or loose or corroded connections. Evaluate overall performance of the system. If elements are not accessible, determine or estimate the age of the electrical system.
Fire Protection	<ul style="list-style-type: none"> Inspect sprinklers, standpipes, hydrants, fire alarms, emergency lighting, smoke evacuation, stairwell pressurization, and any other specialized elements relating to overall protection system and code compliance.
Conveyance (e.g., elevators, escalators, wheelchair lifts)	<ul style="list-style-type: none"> Inspect condition, function, and code compliance of elevators, escalators, lifts, and any other fixed apparatuses for the movement of goods or people.
Equipment (e.g., lifts, washing systems)	<ul style="list-style-type: none"> Inspect equipment, noting age, condition, and functional deficiencies or safety issues.
Site (e.g., sidewalks, parking lot, grounds)	<ul style="list-style-type: none"> Inspect roadways/driveways and associated signage, markings, and equipment. Look for cracking or settling of the concrete or asphalt. Inspect parking lots and associated signage, markings, and equipment. Look for cracking or settling of the concrete or asphalt Inspect pedestrian areas and associated signage, markings, and equipment. Inspect the curbing and ramps for cracking, settling, holes, uneven surfaces and trip hazards. Pay special attention to wheelchair ramp areas and other ADA / access considerations Site development such as fences, walls, and miscellaneous structures. Look for corrosion, structural integrity and condition of paint.

CTDOT Transit Condition Assessment Guidance

	<ul style="list-style-type: none">• Landscaping, Site Utilities: Look for signs of drainage problems such as flooded areas, eroded soil and water damage to the asphalt and clogged storm drain inlets.• Visually inspect the irrigation system, if installed. Look for signs of leaks, such as sagging areas in grass and/or pooling water. Look for dead spots in the grass which would indicate lack of water possibly caused by a mechanical failure.
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Appendix C. Detailed List of Items for Passenger Facility Condition Assessment

Tables C-1 through C-10 present detailed lists of items for condition assessment at passenger facilities. The tables are organized by the eleven components described in the approach. In addition to the items, the tables include notes for inspection (where applicable) and units of measure.

This information in this appendix is also included in a separate spreadsheet.

Table C-1. Substructure

Category	Item	Notes	Unit of Measure
Foundations	Exposed Foundation Elements		inspect as each
	Other Structural Components		inspect as each
Basement	Slab		sq. ft.

Table C-2. Shell

Category	Item	Notes	Unit of Measure
Superstructure	Structural Frame	Columns, pillars, walls	inspect as each
Roof	Roof Waterproofing		inspect as each
	Roof Penetration Flashing Systems	Chimney, skylights, eaves, surroundings	inspect as each
	Roof Drainage Systems	Gutters	inspect as each
Exterior	Building Envelope - Masonry/Concrete Walls		sq. ft.
	Building Envelope - Cladding		sq. ft.
	Building Envelope - Windows and Glazing		sq. ft.
	Building Envelope - Doors, Glazing, Door Hardware		sq. ft.
	Building Envelope - Garage Doors		sq. ft.
	Bird Proofing System		inspect as each
	Exterior Finishes		inspect as each
Shell Appurtenances	Means of Egress	Stairs, fire escapes	inspect as each
	Vertical Openings		inspect as each
	Cat Walks		inspect as each
Building Expansion Joints	Building Expansion Joints		linear ft.

Table C-3. Interior

Category	Item	Notes	Unit of Measure
Partitions	Interior Walls		sq. ft.
	Interior Windows and Glazing		sq. ft.
	Interior Doors, Glazing, Door Hardware		sq. ft.
Stairs	Interior Stairs and Landings		units
Finishes	Flooring System		sq. ft.
	Ceiling System		sq. ft.
	Wall Finishes		sq. ft.
Other	Interior Amenities	Signage, built-in furnishings, appliances	inspect as each
	Built-In Seating		inspect as each

Table C-4. Plumbing

Category	Item	Notes	Unit of Measure
Domestic Water Distribution	Water Heaters		inspect as each
	Water Treatment Systems		inspect as each
	Backflow Prevention		inspect as each
Pumps	Pumps	Sump, well, domestic	inspect as each
Bathroom Fixtures	Bathroom Fixtures		inspect as each
Other Plumbing Items / Fixtures	Other Plumbing Fixtures	Piping, insulation, etc.	inspect as each

Table C-5. HVAC

Category	Item	Notes	Unit of Measure
HVAC	Energy Recovery Units		units
	Heat Pumps		units
	Make-Up Units		units
	Air Handling Units		units
	Boilers		units
	Burners		units
	Furnaces		units
	Unit Heaters		units
	Radiant Heaters		units
	Finned Tube Radiation and Convertors		units
	Air Conditioning Units	Split package, commercial through-the-wall, water-cooled package	units
	Splits and Mini-Splits		units
	Cooling Towers		units
	Condensers	Air-Cooled, evaporative	units
	Chillers		units
	HVAC Air Terminals		units
	Fans	Centrifugal, axial, roof-mounted, propeller	units
	Coils		units
	Heat Exchangers		units
	Reciprocating Compressors		units
	Air Curtains		units
	Water Treatment System		inspect as each
Other HVAC Pumps (excluding heat pumps)		inspect as each	
Other HVAC Components	Piping, ductwork, etc.	inspect as each	

Table C-6. Electrical

Category	Item	Notes	Unit of Measure
Electrical Service / Distribution	Power Distribution / Switchgear	Service entrance through subpanels	inspect as each
	Generator and Transfer Switch		inspect as each
	Transformers	Non-utility owned only	inspect as each
	DC Power Substation / Traction Power Substation		inspect as each
	AC Power Substation		inspect as each
	Service Panels		inspect as each
Backup Power	Uninterruptible Power Supply (UPS)		inspect as each
Lighting	Interior Lighting		inspect as each
	Exterior Lighting		inspect as each
Other Electrical	Other Electrical Components	Conduits, etc.	inspect as each
Lightning Protection System	Lightning Protection System		inspect as each

Table C-7. Fire Protection

Category	Item	Notes	Unit of Measure
Fire Protection	Fire Detection System		inspect as each
	Fire Suppression Systems	Sprinklers, standpipes, extinguishers, hydrants	inspect as each

Table C-8. Conveyance

Category	Item	Notes	Unit of Measure
Elevators	Elevators		units
Escalators	Escalators		units

Table C-9. Fare Collection

Category	Item	Notes	Unit of Measure
Fare Collection	Turnstiles		units
	Ticket Machines		units
	Other Fare Collection Items		inspect as each

Table C-10. Platform

Category	Item	Notes	Unit of Measure
Structure	Overlay		inspect as each
	Double Tee		inspect as each
	Joints		inspect as each
	Bearings		inspect as each
	Footing		inspect as each
	Rail Post Foundation		inspect as each
	Rail Post Connection		inspect as each
	Railing Connection		inspect as each
	Paint/Coatings		inspect as each
	Stairs/Ramps		inspect as each
	Other		inspect as each
Canopy (Deck)	Columns		inspect as each
	Structural Connections		inspect as each
	Roof Framing Elements		inspect as each
	Roof Decking		inspect as each
	Drainage System		inspect as each
	Skylights		inspect as each
	Electrical Connections		inspect as each
	Non-Electrical Connections		inspect as each
	Snow Guards		inspect as each
	Column Footings		inspect as each
Electrical	Emergency Lighting		inspect as each
	Platform Lighting		inspect as each
	Grounding		inspect as each
	PA System		inspect as each
	PIDS System		inspect as each
	VMS Signs		inspect as each

Table C-11. Site

Category	Item	Notes	Unit of Measure
Roads / Parking Lots / Sidewalk / Curbing	Access Road		sq. ft.
	Parking Lots		sq. ft.
	Sidewalks and Walkways		sq. ft.
	Pavement Markings		inspect as each
	Bollards and Handrails		inspect as each
Security	Fences		linear ft.
	Gates and Barrier Arms		inspect as each
	Camera / Surveillance System		inspect as each
	Guard Shack		inspect as each
Site Septic, Environmental, & Stormwater Management	Wastewater Management / Drainage		inspect as each
	Oil-Water Separator Tank		units
	Sanitary/Stormwater Pumping Systems		inspect as each
	Septic System Tank		units
	Septic System Leaching Fields or Cesspools		inspect as each
	Septic System Reserve Field		inspect as each

CTDOT Transit Condition Assessment Guidance

For each of the items listed in Tables C-1 through C-11, an inspector may consider the following questions shown in Table C-12.

These items were added following discussions with CTDOT and transit provider staff but are not directly applicable to the condition assessment ratings.

Using these questions could help an agency understand the importance of each asset while considering capital planning needs. The determination of safety critical, operations critical or the other fields could be initially made by the manager of the department in which the assets reside. The determination could then be reviewed and approved by Chief Operating Officer and Chief Financial Officer (who keeps the inventory).

An agency using these questions may want to establish further criteria for these items.

Table C-12. Yes/No Questions

Question	Description
Applicable?	Does the item exist at the facility / building? If it does, then answer Yes. If it does not, answer No.
Safety Critical?	A "Yes/No" question intended to highlight safety critical components.
Operations Critical?	A "Yes/No" question intended to highlight operations critical components.
Obsolete / Modernization?	A "Yes/No" question intended to highlight obsolete components.
Operating Savings Opportunity?	A "Yes/No" question intended to highlight operating savings opportunities.

Additional questions concerning the entire facility for an inspector to consider are listed below in Table C-13.

Table C-13. Additional Questions

Additional Questions
Is there adequate office space?
Is a break area provided?
Are male and female locker rooms and showers provided?
Is the facility ADA compliant?
Is the facility OSHA compliant?
Does a communications (data) system exist?
Does a phone system exist?

Appendix D. Detailed Rail Guideway Asset Hierarchy

CTDOT organizes transit assets according to an asset hierarchy. One of the four top-level categories of the hierarchy is fixed guideway, which is divided into rail and bus assets at the second level. The rail guideway hierarchy is further broken down in three additional levels, presented below in Table D-1. Note that this is an ideal hierarchy based on the approach being developed by MNR. CTDOT’s working hierarchy, based on MNR’s working hierarchy, is presented in Tables 8 and 9.

Table D-1. Detailed Rail Guideway Asset Hierarchy

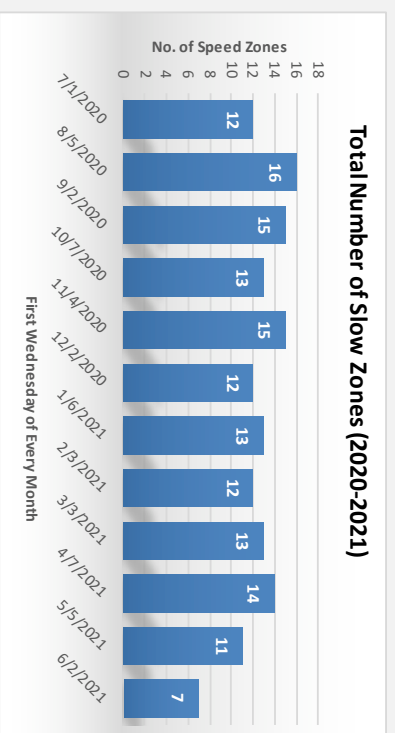
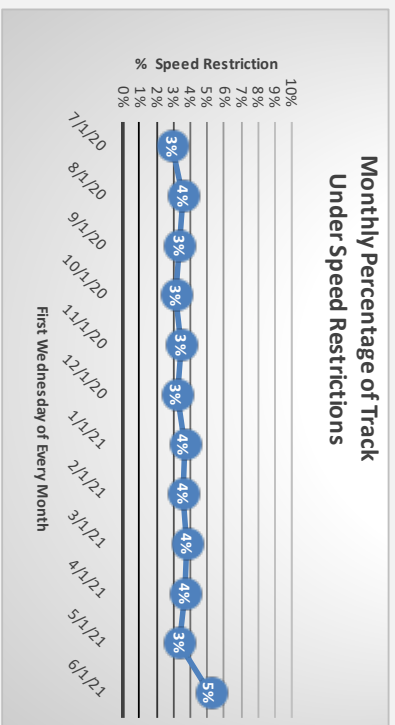
Level 3	Level 4	Level 5
Track	Main	Block
		Control Point Track
		Grade Crossing
		Station
	Branch	Control Point Switch
		Yard
Power	Supply System Traction Power	Equipment
		Site
		Building
		Cable Plant
	Supply System Transmission Power	Equipment
		Site
		Building
		Cable Plant
	Traction Power Distribution	Test Equipment
		Negative Return System
		Catenary Equipment
		Cable Plant
	Signal Power System	Equipment
		Site
		Building
		Cable Plant
Structure	Undergrade Structure	Moveable Bridge
		Fixed Bridge

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		Culvert
	Retaining Wall	Below Grade Retained Cut
		Elevated Retained Fill
	Overhead Structure	Catenary Portal Structure
		Miscellaneous Structure
		Overhead Bridge
Signals/Communications	Signaling	Block Signal System
		Interlocking
		Highway Rail Grade Crossing Network
	Train Detection Control	Train Fault Detection
		Yard Detection
	Communications/Monitoring	Communication Devices
		Fiber Optic System
		Aerial Communication Network
		Outside Cable Plant
		Passenger Communication System
	Security Systems	Integrated Electronic Security System
		Closed Circuit TV
		Fire Alarm System
		Access Control System
	Positive Train Control (Network)	Wayside Communication Network
		Back Office System
		Wayside Maintenance of Way System
		On-Board System

Appendix C. Slow Zone Calculations

SLOW ZONE CALCULATIONS



Slow Zone Percentage	July	August	September	October	November	December	January	February	March	April	May	June
Percentage	3%	4%	3%	3%	3%	3%	4%	4%	4%	4%	3%	5%

SFY 21 - Guideway Performance Measure	3%
SFY 22 - End of Year Target	4%

Appendix D. Capital Plan

PROJECT	PHASE	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST	FFY22 Total Fed & State	Total Federal	Total State	FUNDING SOURCE	REGION	
VARIOUS	ALL	VARIOUS	VARIOUS	Section 5310 Program - FFY 2022 (See Program of Projects)	4,836,895	4,836,895	4,836,895	0		5310	70
VARIOUS	AD	VARIOUS	VARIOUS	Section 5311 Program - FFY 2022 (See Program of Projects)	4,342,935	4,342,935	4,342,935	0		5311	70
DO1702384	PE	NA	VARIOUS	Transit Capital Planning	500,000	500,000	400,000	100,000		5307	70
DO1703000191BE	PE	NHL	VARIOUS	NHL - Station Improvement Program (Design)	4,000,000	4,000,000	0	4,000,000		STATE	78
DO1703040022PE	PE	NHL	VARIOUS	Waterbury Branch High Level Platform Design (Addl Derby)	2,000,000	2,000,000	0	2,000,000		STATE	78
DO170304	PE	NHL	VARIOUS	Waterbury Branch-Waterbury Station Passenger Waiting Area Improve	1,000,000	1,000,000	0	1,000,000		STATE	78
DO1703000191CN	PE	NHL	VARIOUS	NHL - Station Improvement Program (SOGR projects)	5,000,000	5,000,000	0	5,000,000		STATE	78
DO170301	PE	NHL	Stamford	NHL - Station Improvement Program - Stamford (Phase 2 Design)	2,000,000	2,000,000	0	2,000,000		STATE	1
DO1703000516CN	PE	NHL	South Newark	NHL - South Newark Station Platform Rehabilitation and Repair	2,600,000	2,600,000	0	2,600,000		STATE	1
DO1703010507CN	PE	NHL	Stamford	Stamford ITC Improvements - BUILD Grant Award (Addl to meet low bi	12,000,000	12,000,000	0	12,000,000		STATE	1
DO17030100072CN	PE	SLE	VARIOUS	SLE - Public Information Display Upgrades	5,000,000	5,000,000	0	5,000,000		STATE	13
DO170300	PE	NHL	VARIOUS	S program/Tram Program (S-25)	7,000,000	7,000,000	0	7,000,000		STATE	78
DO1703000213CN	PE	NHL	VARIOUS	S program/Tram Program (S-24 Additional)	5,000,000	5,000,000	0	5,000,000		STATE	78
DO1703000175PE	PE	NHL	VARIOUS	Bridge Design	8,000,000	8,000,000	0	8,000,000		STATE	78
DO170300	PE	NHL	VARIOUS	Bridge Replacement Program	10,000,000	10,000,000	0	10,000,000		STATE	78
DO1703010189PE	PE	NHL	VARIOUS	NHL Undergrade Bridges Newark - Addl Design (Strawberry Hill)	600,000	600,000	0	600,000		STATE	1
DO1703010524CN	PE	NHL	Norwalk	NHL - WALK Moveable Bridge - Adv Catenary/Track work	60,500,000	60,500,000	0	60,500,000		STATE	1
DO170300	PE	NHL	VARIOUS	New Haven Line Track Program - Annual (Cyclical)	43,750,000	43,750,000	0	43,750,000		STATE	78
VARIOUS	PE	NHL	VARIOUS	Grade Crossing Renewal	6,200,000	6,200,000	0	6,200,000		STATE	11/12
DO17050179E	PE	Off System	Cromwell	ED - Wethersfield Secondary Track Washout - Cromwell	500,000	500,000	0	500,000		STATE	11/12
DO17050179W	RW	Off System	Cromwell	ED - Wethersfield Secondary Track Washout - Cromwell	100,000	100,000	0	100,000		STATE	11/12
DO17050179CN	PE	Off System	Cromwell	ED - Wethersfield Secondary Track Washout - Cromwell	4,300,000	4,300,000	0	4,300,000		STATE	11/12
VARIOUS	PE	NHL	VARIOUS	Rail Maintenance Facilities SOGR	3,000,000	3,000,000	0	3,000,000		STATE	78
DO1703010520PE	PE	NHL	VARIOUS	New Haven Line Power Program (Phase 1)	6,000,000	6,000,000	0	6,000,000		STATE	78
DO1703010527CN	PE	NHL	VARIOUS	NHL - Powell Circuit Breaker Replacement and Returbishment	6,400,000	6,400,000	0	6,400,000		STATE	78
DO1703010528CN	PE	NHL	VARIOUS	NHL - Motor Generator Set Replacement - Cos Cob and Fair St	600,000	600,000	0	600,000		STATE	78
DO1703010528CN	PE	NHL	VARIOUS	NHL - New Haven Cut Fence Repair - Substation - Howard Ave	1,000,000	1,000,000	0	1,000,000		STATE	8
DO1703010088PE	PE	NHL	New Haven	NHY - Design and Program Management	15,000,000	15,000,000	0	15,000,000		STATE	8
DO170300	PE	ALL	VARIOUS	Rail Fleet (Locomotives / Coaches)	280,000,000	280,000,000	0	280,000,000	PA 15-1, Sec 232-233	STATE	70
DO1703200022CN	PE	Hartford Line	Enfield	Hartford Line - Enfield Station	30,000,000	30,000,000	0	30,000,000	PA 15-1, Sec 232-233	STATE	8
DO1703200023CN	PE	Hartford Line	VARIOUS	Hartford Line-Windsor Locks Station (CSO Breakout) (Additional)	10,000,000	10,000,000	0	10,000,000	PA 15-1, Sec 232-233	STATE	70
DO1703200016CN	PE	Hartford Line	VARIOUS	Hartford Line-Windsor Locks Station (FRA Grant / Additional)	37,190,000	37,190,000	0	37,190,000	FRA, PA 15-1, State	STATE	70
DO170400	PE	CT Transit	VARIOUS	CT Transit Misc Admin Capital/Facility Improvements FY22	3,750,000	3,750,000	3,000,000	750,000		STATE	79
DO170400	PE	CT Transit	VARIOUS	CT Transit Misc Admin Capital/Facility Improvements FY22	2,500,000	2,500,000	2,000,000	500,000		STATE	79
VARIOUS	PE	CT Transit	VARIOUS	CT Transit Bus Replacements/Battery Electric Bus Program	75,000,000	75,000,000	60,000,000	15,000,000		STATE	79
DO170170	PE	CT Transit	VARIOUS	Statewide Bus Shelter Enhancement Program	2,000,000	2,000,000	0	2,000,000		STATE	79
DO170400	PE	CT Transit	VARIOUS	CT Transit Facility Improvements/Electric Upgrades	5,000,000	5,000,000	0	5,000,000		STATE	79
DO170430	PE	CT Transit	Waterbury	CT Transit Facility Waterbury Electric Upgrades/Electric Bus Fleet (Lo	13,134,600	13,134,600	7,404,210	5,730,390	Low-No/State	STATE	79
DO170430	PE	CT Transit	New Haven	CT Transit - Move NH Infrastructure Improvements - Design	2,000,000	2,000,000	0	2,000,000		STATE	8
DO170426	RS	GHTD	Waterbury	CT Transit - Waterbury Electric Upgrades/Electric Bus Fleet (Lo	1,020,000	1,020,000	0	1,020,000		STATE	5
DO170426	RS	GHTD	Hartford	CT Transit - Replace Paratransit Vehicles FY 22	2,300,000	2,300,000	1,840,000	460,000		5307	10
DO170426	RS	GHTD	Hartford	CT Transit - Union Station Rehab/Improvements FY 22	3,500,000	3,500,000	2,800,000	700,000		5307	10
DO170422	EQ	GHTD	Hartford	GHTD - Admin Capital/Misc Support FY 22	1,500,000	1,500,000	1,200,000	300,000		5307	10
DO170422	EQ	GHTD	Hartford	GHTD - Admin Capital/Misc Support FY 22	500,000	500,000	400,000	100,000		5307	11/12
DO170422	EQ	MAT	Middletown	MAT Facility Improvements	5,000,000	5,000,000	0	5,000,000		STATE	11/12
DO170422	EQ	MAT	Middletown	MAT New site/surface parking/building rehab	300,000	300,000	0	300,000		STATE	11/12
DO170422	EQ	MAT	Middletown	MAT - Admin Capital/Misc Support FY 22	575,000	575,000	240,000	335,000		STATE	11/12
DO170427	RS	GNHTD	Hamden	GNHTD - Replace Paratransit Vehicles FY 22	1,800,000	1,800,000	0	1,800,000		STATE	8
DO170410	EQ	GNHTD	Hamden	GNHTD - Admin Capital/Misc Support FY 22	500,000	500,000	400,000	100,000		5307	8
DO170410	EQ	GNHTD	Bridgeport	GNHTD - Admin Capital/Misc Support FY 22	680,000	680,000	544,000	136,000		5307	7
DO170424	EQ	GNHTD	Bridgeport	GNHTD - Admin Capital/Misc Support FY 22	200,000	200,000	160,000	40,000		5307	7
DO170410	EQ	GHTA	Bridgeport	GHTA - Bridgeport Intermodal Center Improvements FY 22	2,314,000	2,314,000	0	2,314,000		STATE	7
DO170424	EQ	MIFHD TD	Milford	GHTA - Radio System FY 2022	250,000	250,000	200,000	50,000		STATE	7
DO170424	EQ	MIFHD TD	Milford	Milford TD - Paratransit Vehicles FY 2022	75,000	75,000	60,000	15,000		5307	8
DO170412	EQ	MIFHD TD	Milford	Milford TD - Facility Improvements	400,000	400,000	320,000	80,000		5307	8
DO170412	EQ	MIFHD TD	Milford	Milford TD - Admin Capital/Misc Support FY 2022	2,250,000	2,250,000	1,800,000	450,000		5307	1
DO170412	EQ	MIFHD TD	Milford	Norwalk TD - Replace Paratransit Vehicles (10) FY 22	1,100,000	1,100,000	880,000	220,000		5307	1
DO170412	EQ	MIFHD TD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 2022	625,000	625,000	500,000	125,000		5307	1
DO170412	EQ	MIFHD TD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 2022	1,525,000	1,525,000	0	1,525,000		STATE	1
DO170036	EQ	VTD	Waterbury	NVCOG/VTD - Admin Capital/Misc Support FY 2022	400,000	400,000	320,000	80,000		5307	5
DO170416	RS	HART	Danbury	HART - Replace Paratransit Vehicles FY 22	500,000	500,000	400,000	100,000		5307	2
DO170416	EQ	HART	Danbury	HART - Admin Capital/Misc Support FY 22	200,000	200,000	160,000	40,000		5307	2

2022-2026 Capital Plan - Transit

PROJECT	PHASE	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST	FFY22 Total Fed & State	Total Federal	Total State	FUNDING SOURCE	REGION
DOT0416	OP	HART	Danbury	HART - Operating Assistance FY 22	615,302	615,302	615,302	0	5307	2
DOT0416	CN	HART	Danbury	HART - Facility Rehab/Improvements FY 22	1,500,000	1,500,000	1,200,000	300,000	5307	2
DOT0416	EQ	HART	Danbury	HART - Radio System FY 2022	600,000	600,000	0	600,000	STATE	2
DOT0414	CN	SEAT	Norwich	SEAT - New Admin/Maint Facility - Design FY 22	1,000,000	1,000,000	800,000	200,000	5307	13
DOT0414	EQ	SEAT	Norwich	SEAT - Admin Capital/Misc Support FY 22	725,000	725,000	580,000	145,000	5307	13
DOT	RW	NWTD	Torrington	NWTD - New Facility Site	1,800,000	1,800,000	0	1,800,000	STATE	3
DOT0478	RS	Estuary TD	Centerbrook	Estuary TD - Replace Small Buses FY 2022	300,000	300,000	240,000	60,000	5307	11/12
DOT0478	EQ	Estuary TD	Centerbrook	Estuary TD - Admin Capital/Misc Support FY 2022	70,000	70,000	56,000	14,000	5307	11/12
DOT0478	EQ	Estuary TD	Centerbrook	Estuary TD - Radio System FY 2022	450,000	450,000	0	450,000	STATE	11/12
DOT0474Q095CN	CN	Windham TD	Windham	Windham TD Facility Improvements	4,000,000	4,000,000	0	4,000,000	STATE	13
DOT0474Q073EQ	EQ	Windham TD	Windham	Windham TD - Radio System FY 2022	750,000	750,000	0	750,000	STATE	13
DOT	ALL	VARIOUS	VARIOUS	Discretionary NOFO Match Requirements	15,000,000	15,000,000	0	15,000,000	STATE	70
DOT01703438EQ	EQ	VARIOUS	VARIOUS	Transit District Match Requirements	7,000,000	7,000,000	0	7,000,000	STATE	70
VARIOUS	CN	VARIOUS	VARIOUS	Transit District Facility Upgrades for Battery Electric Buses	12,500,000	12,500,000	10,000,000	2,500,000	5307	70

PROJECT	PHASE	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST	FFY23 Total Fed & State	Total Federal	Total State	FUNDING SOURCE	REGION
VARIOUS		VARIOUS	VARIOUS	Section 5310 Program - FFY 2023 (See Program of Projects)	4,909,448	4,909,448	4,909,448	0	5310	70
VARIOUS	AD	VARIOUS	VARIOUS	Section 5311 Program - FFY 2023 (See Program of Projects)	4,408,079	4,408,079	4,408,079	0	5311	70
DOT01702384	PE	NA	VARIOUS	Transit Capital Planning	500,000	500,000	400,000	100,000	5307	70
DOT03000191PE	CN	NHL	VARIOUS	NHL - Station Improvement Program (Design)	5,000,000	5,000,000	0	5,000,000	STATE	78
DOT0301	CN	NHL	Fairfield	NHL - Station Improvement Program	20,000,000	20,000,000	16,000,000	4,000,000	5307/5337	78
DOT0304	CN	NHL	VARIOUS	Naugatuck Station	25,000,000	25,000,000	20,000,000	5,000,000	5307/5337	78
DOT03000199CN	NHL	NHL	VARIOUS	NHL - Customer Service Initiative	10,000,000	10,000,000	0	10,000,000	STATE	78
DOT0300	CN	NHL	VARIOUS	5 program/ Timber Program	6,000,000	6,000,000	0	6,000,000	STATE	78
DOT03000175PE	PE	NHL	VARIOUS	Bridge Design	6,500,000	6,500,000	0	6,500,000	STATE	78
DOT0300	CN	NHL	VARIOUS	Bridge Replacement Program	11,500,000	11,500,000	0	11,500,000	STATE	78
DOT0301	CN	NHL	Milford	NHL - Indian River Bridge - Milford	10,000,000	10,000,000	0	10,000,000	STATE	78
DOT03010176CN	CN	NHL	Norwalk	NHL - WALK Moveable Bridge	160,000,000	160,000,000	8,000,000	134,000,000	5307/5337	1
DOT03010176CN	CN	NHL	Norwalk	NHL - WALK Moveable Bridge	186,240,440	186,240,440	109,600,000	76,640,440	FRA/STATE	78
DOT03010187CN	CN	NHL	Norwalk	Replacement - East Ave Bridge, Norwalk	60,000,000	60,000,000	48,000,000	12,000,000	5307/5337	1
DOT03010188CN	CN	NHL	Norwalk	Bridge Replacement Program - Osborn Ave Bridge, Norwalk	15,000,000	15,000,000	12,000,000	3,000,000	5307/5337	1
DOT03010189CN	CN	NHL	Norwalk	Bridge Replacement Program - Fort Point St Bridge, Norwalk	50,000,000	50,000,000	40,000,000	10,000,000	5307/5337	1
DOT03010192CN	CN	NHL	Norwalk	Bridge Replacement Program - Strawberry Hill Ave Bridge, Norwalk	6,250,000	6,250,000	5,000,000	1,250,000	5307/5337	1
DOT03010192CN	PE	NHL	Milford/Stratford	NHL - Devon Moveable Bridge (Additional PE)	15,000,000	15,000,000	12,000,000	3,000,000	5307/5337	7
DOT0300	CN	NHL	VARIOUS	New Haven Line Track Program - Annual (Cyclical)	25,000,000	25,000,000	20,000,000	5,000,000	5307/5337	78
DOT0300	CN	NHL	VARIOUS	New Haven Line Track Program - SOGR	3,500,000	3,500,000	0	3,500,000	STATE	78
DOT03010192CN	CN	NHL	Stamford	Stamford Yard Catenary Leads and Car Wash Facility	50,000,000	50,000,000	40,000,000	10,000,000	5307/5337	1
DOT03010146CN	PE	NHL	VARIOUS	New Haven Line Power Program (Phase 2)	3,000,000	3,000,000	0	3,000,000	STATE	78
DOT03010130CN	CN	NHL	New Haven	NHRY - Wheel Mill Upgrade	31,250,000	31,250,000	25,000,000	6,250,000	5307/5337	8
DOT03010088PE	PE	NHL	New Haven	NH Rail Yard - Master Complex (Car & Diesel Shop)	75,000,000	75,000,000	60,000,000	15,000,000	5307/5337	8
				NHY - Design and Program Management	10,000,000	10,000,000	0	10,000,000	STATE	8
DOT0170	PE	ALL	VARIOUS	Transit Intermodal Fare Technology Upgrades - Design	3,000,000	3,000,000	0	3,000,000	STATE	70
DOT0170	PE	ALL	VARIOUS	EV Charging Stations Program	5,000,000	5,000,000	0	5,000,000	STATE	70
DOT0400	EQ	CT Transit	VARIOUS	CT Transit - Misc Admin Capital/Trac Improvements FY 23	1,000,000	1,000,000	800,000	200,000	5307	79
DOT0170	CN	VARIOUS	VARIOUS	Statewide Bus Shelter Enhancement Program	6,000,000	6,000,000	4,800,000	1,200,000	5307	79
DOT0403	CN	CT Transit	Waterbury	CT Transit Facility Waterbury - Improvements	2,500,000	2,500,000	0	2,500,000	STATE	5
DOT0430	RS	CT Transit	Waterbury	CT Transit/Wtbury - Replace Small Buses 2017 (10) FY 23	850,000	850,000	680,000	170,000	5307	5
DOT	PE	CT Transit	New Haven	CT Transit - Move NH Infrastructure Improvements - Design	12,000,000	12,000,000	9,600,000	2,400,000	5307	8
DOT0426	RS	GHTD	Hartford	GHTD - Replace Paratransit Vehicles FY 23	3,000,000	3,000,000	2,400,000	600,000	5307	10
DOT0426	CN	GHTD	Hartford	GHTD - Union Station Rehab/Improvements FY 23	2,000,000	2,000,000	1,600,000	400,000	5307	10
DOT0426	EQ	GHTD	Hartford	GHTD - Admin Capital/Misc Support FY 23	1,500,000	1,500,000	1,200,000	300,000	5307	10
DOT0422	EQ	MAT	Middletown	MAT - Admin Capital/Misc Support FY 22	300,000	300,000	240,000	60,000	5307	11/12
DOT0427	RS	GNHTD	Hamden	GNHTD - Replace Paratransit Vehicles FY 23	1,500,000	1,500,000	1,200,000	300,000	5307	8
DOT0427	EQ	GNHTD	Hamden	GNHTD - Admin Capital/Misc Support FY 23	500,000	500,000	400,000	100,000	5307	8
DOT0427	CN	GNHTD	Hamden	GNHTD - New Facility FY 21 (Moved to 2023)	32,500,000	32,500,000	26,000,000	6,500,000	5307	8
DOT0410	RS	GBTA	Bridgeport	GBTA Replace Buses (Replace 17 2011 & 2012)	13,750,000	13,750,000	11,000,000	2,750,000	5307	7
DOT0410	RS	GBTA	Bridgeport	GBTA Paratransit Vehicles FY 2023	605,000	605,000	484,000	121,000	5307	7
DOT0410	EQ	GBTA	Bridgeport	GBTA Admin Capital/Misc Support FY 2023	435,000	435,000	348,000	87,000	5307	7
DOT0424	CN	MLED TD	Milford	Milford TD - Facility Improvements	75,000	75,000	60,000	15,000	5307	8
DOT0424	EQ	MLED TD	Milford	Milford TD - Admin Capital/Misc Support FY 2023	400,000	400,000	320,000	80,000	5307	8
DOT0036	RS	VTD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 2023	625,000	625,000	500,000	125,000	5307	1
DOT0412	EQ	NTD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 23	1,250,000	1,250,000	1,000,000	250,000	5307	5
DOT0036	RS	VTD	Waterbury	NVCOG/VTD - Replace Small Buses FY 2023	400,000	400,000	320,000	80,000	5307	5
DOT0416	EQ	VTD	Waterbury	NVCOG/VTD - Admin Capital/Misc Support FY 2023	400,000	400,000	320,000	80,000	5307	5
DOT0416	EQ	HART	Danbury	HART Admin Capital/Misc Support	200,000	200,000	160,000	40,000	5307	2
DOT0416	EQ	HART	Danbury	HART - Middle Engine Rebuild 2017 Gilligs	260,000	260,000	208,000	52,000	5307	2
DOT0416	CN	HART	Danbury	HART - Pulse Point Rehab FY 23	800,000	800,000	640,000	160,000	5307	2
DOT0416	OP	HART	Danbury	HART Operating Assistance	615,302	615,302	615,302	0	5307	2
DOT0414	EQ	SEAT	Norwich	SEAT - Admin Capital/Misc Support FY 23	450,000	450,000	360,000	90,000	5307	13
DOT0478	EQ	SEAT	Norwich	SEAT - Admin Capital/Misc Support FY 2023	56,000	56,000	44,800	11,200	5307	11/12
DOT	ALL	VARIOUS	Centerbrook	Discretionary NORD Match Requirements	6,000,000	6,000,000	0	6,000,000	STATE	70
DOT01703438EQ	EQ	VARIOUS	VARIOUS	Transit District Match Requirements	7,000,000	7,000,000	0	7,000,000	STATE	70
DOT03010114CN	CN	NHL	New Haven	New Haven Union Station Improvements /Parking	65,000,000	65,000,000	0	65,000,000	STATE	8
VARIOUS	CN	VARIOUS	VARIOUS	Transit District Facility Upgrades for Battery Electric Buses	5,000,000	5,000,000	4,000,000	1,000,000	PA 15-1, Sec 232-233 5307	8

PROJECT	PHASE	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST	FFY24 Total Fed & State	Total Federal	Total State	FUNDING SOURCE	REGION
VARIOUS	AD	VARIOUS	VARIOUS	Section 5310 Program - FFY 2024 (See Program of Projects)	4,983,090	4,983,090	4,983,090	0	5310	70
VARIOUS	AD	VARIOUS	VARIOUS	Section 5311 Program - FFY 2024 (See Program of Projects)	4,474,200	4,474,200	4,474,200	0	5311	70
DOT01702384	PE	NA	VARIOUS	Transit Capital Planning	500,000	500,000	400,000	100,000	5307	70
DOT03000191PE	CN	NHL	VARIOUS	NHL - Station Improving Program (Design)	5,000,000	5,000,000	0	5,000,000	STATE	78
DOT0304	CN	NHL	VARIOUS	Waterbury Branch-Waterbury Station Passenger Waiting Area Improve	5,000,000	5,000,000	0	5,000,000	STATE	78
DOT0304	CN	NHL	VARIOUS	Waterbury Branch High Level Platform Construction	80,000,000	80,000,000	64,000,000	16,000,000	5307/5337	78
DOT0300	CN	NHL	VARIOUS	5 program/Timber Program	7,000,000	7,000,000	0	7,000,000	STATE	78
DOT03000175PE	PE	NHL	VARIOUS	Bridge Design	6,500,000	6,500,000	0	6,500,000	STATE	78
DOT0300	CN	NHL	VARIOUS	Bridge Replacement Program	20,000,000	20,000,000	0	20,000,000	STATE	78
DOT03010176CN	CN	NHL	Norwalk	NHL - WALK Moveable Bridge	168,750,000	168,750,000	15,000,000	153,750,000	5307/5337	1
DOT0300	CN	NHL	VARIOUS	New Haven Line Track Program - Annual (Cyclical)	11,875,000	11,875,000	9,500,000	2,375,000	STATE	78
DOT0300	CN	NHL	VARIOUS	Rail Maintenance Facilities SOGR	6,500,000	6,500,000	0	6,500,000	STATE	78
DOT03010154	CN	NHL	VARIOUS	NHL - Signal System Replacement Phase 4 Continued	25,000,000	25,000,000	20,000,000	5,000,000	5307/5337	77
DOT03010520CN	CN	NHL	VARIOUS	New Haven Line Power Program (Phase 1)	35,000,000	35,000,000	28,000,000	7,000,000	5307/5337	78
DOT03010520PE	PE	NHL	VARIOUS	New Haven Line Power Program (Phase 3)	2,000,000	2,000,000	0	2,000,000	STATE	78
DOT03000215CN	CN	NHL	VARIOUS	Network Infrastructure Upgrade Phase 4 CN (FDP 1/31/2024)	30,000,000	30,000,000	24,000,000	6,000,000	5307/5337	78
DOT0300	CN	NHL	VARIOUS	Stamford MCE Building - State of Good Repair	62,500,000	62,500,000	50,000,000	12,500,000	5307/5337	1
DOT03010192CN	CN	NHL	Stamford	Stamford Yard Caterinary Leads and Car Wash Facility	50,000,000	50,000,000	40,000,000	10,000,000	5307/5337	1
DOT0302028CN	CN	NHL	Stamford	Danbury Fueling Facility	6,250,000	6,250,000	5,000,000	1,250,000	5307/5337	2
DOT0301	CN	NHL	New Haven	Danbury Fueling Facility	5,000,000	5,000,000	4,000,000	1,000,000	5307/5337	8
DOT03010889PE	PE	NHL	New Haven	NHY-Master Complex	10,000,000	10,000,000	0	10,000,000	STATE	8
DOT03200008	CN	Hartford Line	West Hartford	NHY - Design and Program Management	62,000,000	62,000,000	0	62,000,000	PA 15-1, Sec 232-233	10
DOT03200008	CN	Hartford Line	Windsor Locks	Hartford Line Double Track - Contract 1 (West Hartford)	62,000,000	62,000,000	0	62,000,000	PA 15-1, Sec 232-233	10
DOT03200008	CN	Hartford Line	Windsor Locks	Hartford Line Double Track - Contract 2 (Windsor Locks)	62,000,000	62,000,000	0	62,000,000	PA 15-1, Sec 232-233	10
DOT0400	EQ	CT Transit	VARIOUS	Hartford Line Double Track - Contract 3 (Enfield)	1,200,000	1,200,000	0	800,000	PA 15-1, Sec 232-233	10
DOT0400	RS	CT Transit	VARIOUS	CT Transit - Misc Admin Capital/ Fac Improvements FY 24	21,250,000	21,250,000	17,000,000	4,250,000	5307	79
DOT0410	CN	VARIOUS	VARIOUS	Statewide Bus Shelter Enhancement Program	6,250,000	6,250,000	5,000,000	1,250,000	5307	79
DOT0400	CN	VARIOUS	VARIOUS	CT Transit Facility Improvements (Hartford/Stamford)	48,450,000	48,450,000	39,700,000	8,750,000	5307/5339	79
DOT0430	RS	CT Transit	Waterbury	CT Transit/Wctby - Replace Small Buses 2017 BEB (10) FY 24	850,000	850,000	680,000	170,000	5307	5
DOT0402	CN	CT Transit	VARIOUS	CT Transit - Move NH Infrastructure Improvements	80,000,000	80,000,000	64,000,000	16,000,000	5307	8
DOT0426	RS	GHTD	Hartford	GHTD - Replace Paratransit Vehicles FY 24	3,000,000	3,000,000	2,400,000	600,000	5307	10
DOT0426	CN	GHTD	Hartford	GHTD - Union Station Rehab/Improvements FY 24	1,000,000	1,000,000	800,000	200,000	5307	10
DOT0426	EQ	GHTD	Hartford	GHTD - Admin Capital/Misc Support FY 24	750,000	750,000	600,000	150,000	5307	10
DOT0422	RS	MAT	Middletown	MAT - Replace 3 2012 30ft Buses FY 24	1,875,000	1,875,000	1,500,000	375,000	5307	11/12
DOT0422	CN	MAT	Middletown	MAT Facility Improvements FY 24	500,000	500,000	400,000	100,000	5307	11/12
DOT0427	RS	GNHTD	Hamden	MAT - Admin Capital/Misc Support FY 24	300,000	300,000	240,000	60,000	5307	11/12
DOT0427	EQ	GNHTD	Hamden	GNHTD - Replace Paratransit Vehicles FY 24	1,800,000	1,800,000	1,440,000	360,000	5307	8
DOT0410	EQ	GNHTD	Hamden	GNHTD - Admin Capital/Misc Support FY 24	500,000	500,000	400,000	100,000	5307	8
DOT0424	CN	GNHTD	Bridgeport	GNHTD - Admin Capital/Misc Support FY 24	575,000	575,000	460,000	115,000	5307	7
DOT0410	CN	GNHTD	Bridgeport	GNHTD - Admin Capital/Misc Support FY 24	200,000	200,000	160,000	40,000	5307	7
DOT0424	EQ	MLED TD	Milford	MLED TD - Facility Improvements FY 24	120,000	120,000	80,000	40,000	5307	8
DOT0412	RS	NTD	Norwalk	Milford TD - Admin Capital/Misc Support FY 24	400,000	400,000	320,000	80,000	5307	8
DOT0412	EQ	NTD	Norwalk	Norwalk TD - Paratransit Vehicles FY 24	1,250,000	1,250,000	1,000,000	250,000	5307	1
DOT0412	CN	NTD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 24	625,000	625,000	500,000	125,000	5307	1
DOT00360199EQ	EQ	VTD	Waterbury	Norwalk TD - Facility SOGR	900,000	900,000	600,000	300,000	5307	1
DOT0416	RS	HART	Danbury	NVCOG/VTD - Admin Capital/Misc Support FY 24	400,000	400,000	320,000	80,000	5307	5
DOT0416	EQ	HART	Danbury	HART -Paratransit Vehicles FY 24	800,000	800,000	640,000	160,000	5307	2
DOT0416	CN	HART	Danbury	HART Admin Capital/Misc Support FY 24	200,000	200,000	160,000	40,000	5307	2
DOT0416	OP	HART	Danbury	HART - Facility Replace Fuel Storage Tanks FY 24	1,000,000	1,000,000	800,000	200,000	5307	2
DOT0414	RS	SEAT	Norwich	HART Operating Assistance FY 24	615,302	615,302	615,302	0	5307	2
DOT0414	EQ	SEAT	Norwich	SEAT Paratransit Vehicles FY 24	375,000	375,000	300,000	75,000	5307	13
DOT	CN	SEAT	Norwich	SEAT - Admin Capital/Misc Support FY 24	300,000	300,000	240,000	60,000	5307	13
DOT0478	CN	NWTD	Torrington	NWTD - New Facility Site	5,000,000	5,000,000	0	5,000,000	STATE	3
DOT0478	EQ	Estuary TD	Centerbrook	Estuary TD - New Facility (moved to 2024)	25,000,000	25,000,000	20,000,000	5,000,000	5307	11/12
DOT	ALL	VARIOUS	VARIOUS	Estuary TD - Admin Capital/Misc Support FY 24	400,000	400,000	320,000	80,000	5307	11/12
DOT01703438EQ	EQ	VARIOUS	VARIOUS	Discretionary MOHO Match Requirements	6,000,000	6,000,000	0	6,000,000	STATE	70
VARIOUS	CN	VARIOUS	VARIOUS	Transit District Match Requirements	7,000,000	7,000,000	0	7,000,000	STATE	70
VARIOUS	CN	VARIOUS	VARIOUS	Transit District Facility Upgrades for Battery Electric Buses	5,000,000	5,000,000	4,000,000	1,000,000	5307	70

2022-2026 Capital Plan - Transit

FFY 2025

PROJECT	PHASE	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST	FFY25 Total	Total Federal	Total State	FUNDING SOURCE	REGION	
VARIOUS		VARIOUS	VARIOUS	Section 5310 Program - FFY 2025 (See Program of Projects)	5,057,837	5,057,837	5,057,837	0		5310	70
VARIOUS	AD	VARIOUS	VARIOUS	Section 5311 Program - FFY 2025 (See Program of Projects)	4,541,314	4,541,314	4,541,314	0		5311	70
DO1702384	PE	NA	VARIOUS	Transit Capital Planning	500,000	500,000	400,000	100,000	STATE	5307	70
DO1703000191PE	CN	NHL	VARIOUS	NHL - Station Improvement Program (Design)	6,000,000	6,000,000	0	6,000,000	STATE	5307	78
DO1703000252PE	CN	NHL	New Haven	NHL - New Haven Union Station Platform Replacement	117,500,000	117,500,000	70,000,000	47,500,000	RAISE/STATE	5307/5337	8
DO170304	CN	NHL	Derby/Shelton	NHL - Derby Shelter Intermodal (FFY 2021 RAISE Grant)	25,000,000	25,000,000	12,400,000	12,600,000	STATE	5307	7
DO170300	CN	NHL	VARIOUS	S program/Trimmer Program	7,000,000	7,000,000	0	7,000,000	STATE	5307	78
DO1703000175PE	PE	NHL	VARIOUS	Bridge Design	6,000,000	6,000,000	0	6,000,000	STATE	5307	78
DO170300	CN	NHL	VARIOUS	Bridge Replacement Program	10,000,000	10,000,000	0	10,000,000	STATE	5307	78
DO1703010176CN	CN	NHL	Norwalk	NHL - WALK Moveable Bridge	110,000,000	110,000,000	24,000,000	86,000,000	STATE	5307/5337	1
DO1703000214CN	CN	NHL	Bridgeport	NHL-TIME Phase 115 Bridges- West Broad, King, Main, Bruce, Bishop)	70,000,000	70,000,000	20,000,000	50,000,000	STATE	5307/5337	78
DO170300	CN	NHL	VARIOUS	New Haven Line Track Program - Annual (Cyclical)	21,250,000	21,250,000	17,000,000	4,250,000	STATE	5307/5337	78
DO170300011	CN	NHL	NewCarraan	New Carraan Branch Siding	40,000,000	40,000,000	32,000,000	8,000,000	STATE	5307/5337	78
DO170300	PE	NHL	VARIOUS	Rail Maintenance Facilities SOGR	5,500,000	5,500,000	0	5,500,000	STATE	5307	78
DO1703010154	EQ	NHL	VARIOUS	NHL - Carenary System - State of Good Repair	30,000,000	30,000,000	0	30,000,000	STATE	5307	77
DO1703010520CN	CN	NHL	VARIOUS	New Haven Line Power Program (Phase 2)	3,000,000	3,000,000	0	3,000,000	STATE	5307/5337	78
DO1703010520PE	PE	NHL	VARIOUS	New Haven Line Power Program (Phase 4)	3,000,000	3,000,000	24,000,000	6,000,000	STATE	5307	78
DO170301	CN	NHL	New Haven	NHY-Master Complex	20,000,000	20,000,000	0	20,000,000	STATE	5307	8
DO1703010088PE	CN	NHL	New Haven	NHY - Design and Program Management	5,000,000	5,000,000	0	5,000,000	STATE	5307	8
DO170170	AQ	ALL	VARIOUS	Transit Intermodal Fare Technology Upgrades - Implementation	15,000,000	15,000,000	0	15,000,000	STATE	5307	70
DO170400	CN	CTTransit	VARIOUS	CTTransit - Misc Admin Capital/ Fac Improvements FY 25	1,000,000	1,000,000	800,000	200,000	STATE	5307	79
DO170400	RS	CTTransit	VARIOUS	CT Transit Bus Replacements/Battery Electric Bus Program	5,000,000	5,000,000	4,000,000	1,000,000	STATE	5307	79
DO170170	RS	VARIOUS	VARIOUS	Statewide Bus Shelter Enhancement Program	1,500,000	1,200,000	1,200,000	300,000	STATE	5307	79
DO170400	CN	CTTransit	VARIOUS	CT Transit Facility Improvements (Hartford/Stamford)	42,100,000	42,100,000	34,600,000	7,500,000	STATE	5307/5339	79
DO170426	EQ	GHTD	Hartford	GHTD - Replace Paratransit Vehicles FY 25	3,000,000	3,000,000	2,400,000	600,000	STATE	5307	10
DO170426	RS	GHTD	Hartford	GHTD - Union Station Rehab/Improvements FY 25	1,000,000	1,000,000	800,000	200,000	STATE	5307	10
DO170426	CN	GHTD	Hartford	GHTD - Admin Capital/Misc Support FY 25	750,000	750,000	600,000	150,000	STATE	5307	10
DO170422	EQ	MAT	Middletown	MAT Facility Improvements FY 25	500,000	500,000	400,000	100,000	STATE	5307	8
DO170422	RS	MAT	Middletown	MAT - Admin Capital/Misc Support FY 25	300,000	300,000	240,000	60,000	STATE	5307	11/12
DO170427	EQ	GNHTD	Hamden	GNHTD - Replace Paratransit Vehicles FY 25	1,750,000	1,750,000	1,400,000	350,000	STATE	5307	8
DO170427	RS	GNHTD	Hamden	GNHTD - Admin Capital/Misc Support FY 25	500,000	500,000	400,000	100,000	STATE	5307	8
DO170410	RS	GRTA	Bridgeport	GRTA Admin Capital/Misc Support FY 25	575,000	575,000	460,000	115,000	STATE	5307	7
DO170410	CN	GRTA	Bridgeport	GRTA - Bridgeport Intermodal Center Improvements FY 25	200,000	200,000	160,000	40,000	STATE	5307	7
DO170424	RS	MLFD TD	Milford	Milford TD - Paratransit Vehicles FY 25	100,000	100,000	80,000	20,000	STATE	5307	8
DO170424	CN	MLFD TD	Milford	Milford TD - Facility Improvements FY 25	400,000	400,000	320,000	80,000	STATE	5307	8
DO170412	EQ	NTD	Milford	Milford TD - Admin Capital/Misc Support FY 25	400,000	400,000	320,000	80,000	STATE	5307	5
DO170412	RS	NTD	Norwalk	Norwalk TD - Paratransit Vehicles FY 25	1,000,000	1,000,000	800,000	200,000	STATE	5307	1
DO170412	RS	NTD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 25	500,000	500,000	400,000	100,000	STATE	5307	1
DO170360199EQ	EQ	VTD	Waterbury	NVCOG/VTD - Admin Capital/Misc Support FY 25	400,000	400,000	320,000	80,000	STATE	5307	5
DO170416	CN	HART	Danbury	HART - Paratransit Vehicles FY 25	750,000	750,000	600,000	150,000	STATE	5307	2
DO170416	EQ	HART	Danbury	HART Admin Capital/Misc Support FY 25	200,000	200,000	160,000	40,000	STATE	5307	2
DO170416	RS	HART	Danbury	HART Operating Assistance FY 25	615,302	615,302	500,000	115,302	STATE	5307	2
DO170414	EQ	SEAT	Norwich	SEAT Paratransit Vehicles FY 25	375,000	375,000	300,000	75,000	STATE	5307	13
DO170414	CN	SEAT	Norwich	SEAT - Admin Capital/Misc Support FY 25	300,000	300,000	240,000	60,000	STATE	5307	13
DO170478	OP	Estuary TD	Centerbrook	Estuary TD - Admin Capital/Misc Support FY 25	400,000	400,000	320,000	80,000	STATE	5307	11/12
DOT	ALL	VARIOUS	VARIOUS	Discretionary NOFO Match Requirements	6,000,000	6,000,000	0	6,000,000	STATE	5307	70
DO1703438EQ	RS	VARIOUS	VARIOUS	Transit District Match Requirements	7,000,000	7,000,000	0	7,000,000	STATE	5307	70
VARIOUS	EQ	VARIOUS	VARIOUS	Transit District Bus Replacements	6,250,000	6,250,000	5,000,000	1,250,000	STATE	5307	70
VARIOUS	CN	VARIOUS	VARIOUS	Transit District Facility Upgrades for Battery Electric Buses	5,000,000	5,000,000	4,000,000	1,000,000	STATE	5307	70

PROJECT	PHASE	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST	FFY26 Total Fed & State	Total Federal	Total State	FUNDING SOURCE	REGION
VARIOUS	VARIOUS	VARIOUS	VARIOUS	Section 5310 Program - FFY 2026(See Program of Projects)	5,133,704	5,133,704	5,133,704	0	5310	70
VARIOUS	AD	VARIOUS	VARIOUS	Section 5311 Program - FFY 2026(See Program of Projects)	4,609,433	4,609,433	4,609,433	0	5311	70
DOT01702384	PE	NA	VARIOUS	Transit Capital Planning	450,000	450,000	360,000	90,000	5307	70
DOT03000191PE	CN	NHL	VARIOUS	NHL - Station Improvement Program (Design)	5,500,000	5,500,000	0	5,500,000	STATE	78
DOT03010522CN	CN	NHL	New Haven	NHL - New Haven Union Station Platform Replacement	81,250,000	81,250,000	45,000,000	36,250,000	5307/5337	8
DOT03000	PE	NHL	VARIOUS	Bridge/Replacement Program	7,000,000	7,000,000	0	7,000,000	STATE	78
DOT03000175PE	CN	NHL	VARIOUS	Bridge Design	6,500,000	6,500,000	0	6,500,000	STATE	78
DOT03000	CN	NHL	VARIOUS	Bridge Replacement Program	10,000,000	10,000,000	0	10,000,000	STATE	78
DOT03000196CN	CN	NHL	VARIOUS	Scour Rehabilitation 4 NHL Bridges	8,125,000	8,125,000	0	8,125,000	STATE	78
DOT00820317CN	CN	Off-System	Middletown	Middletown Swing Bridge - SOGR	25,000,000	25,000,000	6,500,000	18,500,000	5307/5337	11/12
DOT0301076CN	CN	NHL	Norwalk	NHL - WALK Moveable Bridge	11,000,000	11,000,000	0	11,000,000	STATE	78
DOT03000214CN	CN	NHL	Bridgeport	NHL-TIME Phase 1(5 Bridges- West Broad, King, Main, Bruce, Bishop)	117,500,000	117,500,000	24,000,000	93,500,000	5307/5337	1
DOT0300	CN	NHL	VARIOUS	New Haven Line Track Program	15,625,000	15,625,000	78,000,000	39,500,000	5307/5337	8
DOT0300	CN	NHL	VARIOUS	Danbury Branch - Slope and Track Stabilization (FDP 1/15/2025)	12,500,000	12,500,000	12,500,000	0	5307/5337	79
DOT03020232CN	CN	NHL	VARIOUS	Rail Maintenance Facilities SOGR	3,000,000	3,000,000	10,000,000	2,500,000	5307/5337	1
DOT03010154	PE	NHL	VARIOUS	NHL - Catenary System - State of Good Repair	20,000,000	20,000,000	0	20,000,000	STATE	77
DOT03010520CN	EQ	NHL	VARIOUS	New Haven Line Power Program (Phase 3)	15,000,000	15,000,000	12,000,000	3,000,000	5307/5337	78
DOT0301	EQ	NHL	New Haven	NHY - Master Complex	40,000,000	40,000,000	0	40,000,000	STATE	8
DOT03010088PE	EQ	NHL	New Haven	NHY - Design and Program Management	10,000,000	10,000,000	0	10,000,000	STATE	8
DOT0400	PE	CTTransit	VARIOUS	CTTransit - Misc Admin Capital/ Fac Improvements FY 26	1,000,000	1,000,000	0	1,000,000	STATE	8
DOT0400	RS	CTTransit	VARIOUS	CTTransit Bus Replacements/Battery Electric Bus Program	5,875,000	5,875,000	800,000	2,000,000	5307	79
DOT0110	CN	VARIOUS	VARIOUS	Statewide Bus Shelter Enhancement Program	1,500,000	1,500,000	4,700,000	1,175,000	5307	79
DOT0400	CN	CT Transit	VARIOUS	CT Transit Facility Improvements (Hartford/Stamford/NH)	6,250,000	6,250,000	5,000,000	300,000	5307	79
DOT0426	CN	GHTD	Hartford	GHTD - Replace Paratransit Vehicles FY 26	3,000,000	3,000,000	2,400,000	600,000	5307	10
DOT0426	CN	GHTD	Hartford	GHTD - Admin Station Rehab/Improvements FY 26	1,000,000	1,000,000	800,000	200,000	5307	10
DOT0426	CN	GHTD	Hartford	GHTD - Admin Capital/Misc Support FY 26	750,000	750,000	600,000	150,000	5307	10
DOT0422	RS	MAT	Middletown	MAT Facility Improvements FY 26	500,000	500,000	400,000	100,000	5307	11/12
DOT0422	RS	MAT	Middletown	MAT - Admin Capital/Misc Support FY 26	300,000	300,000	240,000	60,000	5307	11/12
DOT0427	CN	GNHTD	Hamden	GNHTD - Replace Paratransit Vehicles FY 26	1,800,000	1,800,000	1,440,000	360,000	5307	8
DOT0410	EQ	GNHTD	Bridgeport	GNHTD - Admin Capital/Misc Support FY 26	500,000	500,000	400,000	100,000	5307	8
DOT0424	CN	GNHTD	Bridgeport	GNHTD - Admin Capital/Misc Support FY 26	575,000	575,000	460,000	115,000	5307	7
DOT0424	EQ	GNHTD	Bridgeport	GNHTD - Admin Capital/Misc Support FY 26	200,000	200,000	160,000	40,000	5307	8
DOT0412	RS	MLFD TD	Milford	Milford TD - Paratransit Vehicles FY 26	375,000	375,000	300,000	75,000	5307	8
DOT0412	RS	MLFD TD	Milford	Milford TD - Admin Capital/Misc Support FY 26	100,000	100,000	80,000	20,000	5307	8
DOT0412	RS	MLFD TD	Milford	Milford TD - Admin Capital/Misc Support FY 26	400,000	400,000	320,000	80,000	5307	8
DOT0360199EQ	RS	NTD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 26	1,250,000	1,250,000	1,000,000	250,000	5307	1
DOT0416	EQ	NTD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 26	500,000	500,000	400,000	100,000	5307	1
DOT0416	CN	VTD	Waterbury	NVCOG/VTD - Admin Capital/Misc Support FY 26	400,000	400,000	320,000	80,000	5307	5
DOT0416	CN	HART	Danbury	HART - Paratransit Vehicles FY 26	800,000	800,000	640,000	160,000	5307	2
DOT0416	RS	HART	Danbury	HART Admin Capital/Misc Support FY 26	200,000	200,000	160,000	40,000	5307	2
DOT0414	CN	HART	Danbury	HART Operating Assistance FY 26	492,302	492,302	492,302	0	5307	2
DOT0478	EQ	SEAT	Norwich	SEAT - Admin Capital/Misc Support FY 26	300,000	300,000	240,000	60,000	5307	13
DOT01703438EQ	RS	Estuary TD	Centerbrook	Estuary TD - Admin Capital/Misc Support FY 26	400,000	400,000	320,000	80,000	5307	11/12
VARIOUS	VARIOUS	VARIOUS	VARIOUS	Transit District Match Requirements	5,000,000	5,000,000	0	5,000,000	STATE	70
VARIOUS	VARIOUS	VARIOUS	VARIOUS	Transit District Facility Upgrades for Battery Electric Buses	3,000,000	3,000,000	2,400,000	600,000	5307	70

2022-2026 Capital Plan - Transit Overprogramming

PROJECT	ROUTE	TOWN	DESCRIPTION	TOTAL COST	YEAR	REGION
DOT03200012CN	Hartford Line	North Haven	Hartford Line North Haven Station	52,000,000	TBD	70
DOT03200013CN	Hartford Line	Newington	Hartford Line-Newington Station	52,000,000	TBD	70
DOT03200014CN	Hartford Line	West Hartford	Hartford Line-West Hartford Station	70,000,000	TBD	70
TBD	VARIOUS	VARIOUS	Electrification (Hartford Line, Waterbury Line, Danbury Line)	TBD	TBD	70

Appendix E. TAPT Results

Program List: Prioritization Run Expected (Bus)

Program Year	Asset ID Code	Description	No. of Assets	Replacement Costs	Project Rank	PI
2022	CTTransit Hartford 2008 Toyota hybrid	Service-Auto	2	69,152	12	1.4779
2022	CTTransit Hartford 2014 Ford Fusion 4 door sedan	Service-Auto	3	103,728	19	0.6543
2022	CTTransit Hartford 2016 Ford Fusion 4 door sedan	Service-Auto	2	69,152	28	0.3023
2022	CTTransit Hartford 2007 Ford P06 (Fusion)	Service-Auto	1	34,576	9	1.5471
2022	CTTransit New Haven 2007 Ford Fusion 4 door sedan	Service-Auto	1	34,576	9	1.5471
2022	CTTransit New Haven 2016 Ford Fusion 4 door sedan	Service-Auto	1	34,576	28	0.3023
2022	CTTransit New Haven 2006 Ford Taurus 4 door sedan	Service-Auto	1	34,576	5	1.5987
2022	CTTransit New Haven 2007 Ford Taurus 4 door sedan	Service-Auto	1	34,576	4	1.6360
2022	CTTransit Stamford 2007 Ford Fusion 4 door sedan	Service-Auto	1	34,576	9	1.5471
2022	CTTransit Hartford 2015 Ford Interceptor	Service-SUV	4	229,921	23	0.4763
2022	CTTransit Hartford 2016 Ford Escape	Service-SUV	1	57,480	27	0.3027
2022	CTTransit Hartford 2017 Ford Interceptor	Service-SUV	7	402,362	40	0.1420
2022	CTTransit New Haven 2011 Ford Escape	Service-SUV	7	402,362	13	1.1481
2022	CTTransit Stamford 2011 Ford Escape	Service-SUV	1	57,480	13	1.1481
2022	CTTransit Stamford 2003 Ford Explorer	Service-SUV	1	57,480	3	1.6812
2022	CTTransit Waterbury 2014 Chevrolet Traverse	Service-SUV	4	229,921	18	0.6549
2022	CTTransit Waterbury 2017 Ford Interceptor	Service-SUV	1	57,480	40	0.1420
2022	CTTransit Hartford 1995 International Service Truck	Service-Truck	3	884,342	20	0.5276
2022	CTTransit Hartford 1999 Chevrolet Pick Up	Service-Truck	2	589,561	26	0.3520
2022	CTTransit Hartford 2003 Freightliner Service Patrol	Service-Truck	1	294,781	39	0.1988
2022	CTTransit New Haven 1998 Chevrolet S3500	Service-Truck	1	294,781	24	0.3941
2022	CTTransit Stamford 1987 Ford L8000	Service-Truck	1	294,781	15	0.9122
2022	CTTransit Stamford 1989 GMC Sierra	Service-Truck	1	294,781	16	0.8147
2022	CTTransit Stamford 1998 Chevrolet 3500	Service-Truck	1	294,781	24	0.3941
2022	CTTransit Waterbury 1995 Service Vehicle	Service-Truck	1	294,781	20	0.5276
2022	CTTransit Waterbury 2006 Plow/Sander	Service-Truck	1	294,781	42	0.1022
2022	CTTransit Hartford 2007 Chevrolet Cargo minivan	Service-Van	2	162,284	6	1.5555
2022	CTTransit Hartford 2015 GMC Savana	Service-Van	3	243,425	22	0.4845
2022	CTTransit New Haven 2000 Chevrolet Cargo minivan	Service-Van	1	81,142	1	1.7112
2022	CTTransit New Haven 2014 Ford E350 shuttle van	Service-Van	2	162,284	17	0.6630
2022	CTTransit New Haven 2007 Chevrolet CG23405	Service-Van	1	81,142	6	1.5555
2022	CTTransit Stamford 2000 Chevrolet 2500 cargo	Service-Van	1	81,142	1	1.7112
2022	CTTransit Waterbury 2007 Ford E150	Service-Van	1	81,142	6	1.5555
2022	CTTransit Hartford 6-2005 New Flyer D40LF A	Transit Bus	5	5,500,000	43	0.0680
2022	CTTransit Hartford 7-2005 New Flyer D40LF B	Transit Bus	5	5,500,000	43	0.0680
2022	CTTransit Hartford 8-2005 New Flyer D40LF C	Transit Bus	2	2,200,000	43	0.0680
2022	CTTransit Hartford 9-2007 New Flyer D40LF A	Transit Bus	5	5,500,000	47	0.0406
2022	CTTransit Hartford 11-2007 New Flyer D40LF C	Transit Bus	5	5,500,000	47	0.0406
2022	CTTransit Hartford 12-2007 New Flyer D40Lf D	Transit Bus	5	5,500,000	47	0.0406
2022	CTTransit Hartford 13-2007 New Flyer D40LF E	Transit Bus	1	1,100,000	47	0.0406
2022	CTTransit Waterbury 11-2016 Ford E450 A	Cutaway Bus	5	856,256	34	0.2183
2022	CTTransit Waterbury 12-2016 Ford E450 B	Cutaway Bus	5	856,256	34	0.2183
2022	CTTransit Waterbury 13-2016 Ford E450 C	Cutaway Bus	5	856,256	34	0.2183
2022	CTTransit Waterbury 14-2016 Ford E450 D	Cutaway Bus	5	856,256	34	0.2183
2022	CTTransit Waterbury 15-2016 Ford E450 E	Cutaway Bus	2	342,503	34	0.2183
2022	CTTransit Stamford Office/Storage 1	Facility-Conveyance	964	963,699	33	0.2372
2022	CTTransit Hartford Admin/Maintenance 1	Facility-Equipment	31,526	31,525,927	31	0.2481
2022	CTTransit Hartford Fuel Cell Storage 2	Facility-Equipment	823	822,951	30	0.2481
2022	CTTransit Stamford Maintenance 2	Facility-Equipment	1,789	1,789,053	32	0.2481
2022	CTTransit Stamford Office/Storage 1	Facility-Site	1,446	1,445,549	46	0.0478

2023	CTTransit Waterbury 16-2017 Ford E450 A	Cutaway Bus	5	856,256	1	0.2183
2023	CTTransit Waterbury 17-2017 Ford E450 B	Cutaway Bus	5	856,256	1	0.2183
2023	CTTransit Waterbury 18-2017 Ford E450 C	Cutaway Bus	5	856,256	1	0.2183
2023	CTTransit Waterbury 19-2017 Ford E450 D	Cutaway Bus	5	856,256	1	0.2183
2024	CTTransit Hartford 10-2007 New Flyer D40LF B	Transit Bus	5	5,500,000	1	0.0680
2024	CTTransit Hartford 14-2007 New Flyer - Highback D40LF	Transit Bus	3	3,300,000	1	0.0680
2024	CTTransit Hartford 15-2008 New Flyer D40LF	Transit Bus	2	2,200,000	3	0.0539
2024	CTTransit Hartford 17-2010 New Flyer - Hybrid XDE40 B	Transit Bus	5	5,500,000	6	0.0281
2024	CTTransit Hartford 18-2010 New Flyer - Hybrid XDE40 C	Transit Bus	3	3,300,000	6	0.0281
2024	CTTransit New Haven 5-2008 New Flyer D35LF	Transit Bus	1	1,100,000	3	0.0539
2024	CTTransit Waterbury 1-2010 New Flyer XD35 A	Transit Bus	5	5,500,000	6	0.0281
2024	CTTransit Waterbury 2-2010 New Flyer XD35 B	Transit Bus	5	5,500,000	6	0.0281
2024	CTTransit Waterbury 3-2010 New Flyer XD35 C	Transit Bus	5	5,500,000	6	0.0281
2024	CTTransit Waterbury 4-2010 New Flyer XD35 D	Transit Bus	2	2,200,000	6	0.0281
2024	CTTransit Waterbury 5-2010 New Flyer Hybrid XDE35 A	Transit Bus	5	5,500,000	6	0.0281
2024	CTTransit Waterbury 6-2010 New Flyer Hybrid XDE35 B	Transit Bus	5	5,500,000	6	0.0281
2024	CTTransit Waterbury 8-2010 New Flyer Hybrid XDE35 D	Transit Bus	2	2,200,000	6	0.0281
2024	Dattco 1-2010 New Flyer D35LFR A	Transit Bus	5	5,500,000	6	0.0281
2024	Dattco 2-2010 New Flyer D35LFR B	Transit Bus	1	1,100,000	6	0.0281
2024	New Britain 3-2010 New Flyer C	Transit Bus	5	5,500,000	6	0.0281
2024	CTTransit Stamford Office/Storage 1	Facility-Equipment	4,818	4,818,497	5	0.0314
2025	CTTransit Hartford 2020 Ford Interceptor	Service-SUV	2	114,961	1	0.1420
2025	CTTransit New Haven 2020 Ford Interceptor	Service-SUV	5	287,401	1	0.1420
2025	CTTransit Stamford 2020 Ford Interceptor	Service-SUV	3	172,441	1	0.1420
2025	CTTransit Hartford 16-2010 New Flyer - Hybrid XDE40 A	Transit Bus	5	5,500,000	4	0.0406
2025	CTTransit Hartford 19-2011 New Flyer - Hybrid XDE35	Transit Bus	3	3,300,000	8	0.0281
2025	CTTransit New Haven 1-2010 Nova LFS-60 A	Articulated Bus	5	7,125,839	13	0.0155
2025	CTTransit New Haven 2-2010 Nova LFS-60 B	Articulated Bus	5	7,125,839	13	0.0155
2025	CTTransit New Haven 3-2010 Nova LFS-60 C	Articulated Bus	2	2,850,335	11	0.0155
2025	CTTransit New Haven 6-2012 New Flyer - Hybrid XDE35	Transit Bus	1	1,100,000	9	0.0165
2025	CTTransit Stamford 1-2010 Nova LFS-60 A	Articulated Bus	5	7,125,839	13	0.0155
2025	CTTransit Stamford 3-2010 Nova LFS-60 C	Articulated Bus	3	4,275,503	11	0.0155
2025	CTTransit Stamford 4-2012 New Flyer - Hybrid XDE40	Transit Bus	4	4,400,000	9	0.0165
2025	CTTransit Waterbury 7-2010 New Flyer Hybrid XDE35 C	Transit Bus	5	5,500,000	4	0.0406
2025	New Britain 1-2010 New Flyer A	Transit Bus	5	5,500,000	4	0.0406
2025	New Britain 2-2010 New Flyer B	Transit Bus	5	5,500,000	4	0.0406

Program List: Prioritization Run Expected (Rail)

Program Year	Asset ID Code	Description	No. of Assets	Replacement Costs	Project Rank	PI
2022	Bridge 08072R	Bridge - Culvert	5,973,800	5,973,800	153	0.1019
2022	Bridge 01302R	Bridge - Fixed	21,084,000	21,084,000	184	0.1019
2022	Bridge 08006R	Bridge - Fixed	12,299,000	12,299,000	153	0.1019
2022	Bridge Walk 2022	Bridge - Moveable	247	247,000,000	141	0.1019
2022	Greenwich (EB) Platform	Platform Elec	17,781	17,781	1	0.4889
2022	Greenwich (WB) Platform	Platform Elec	17,781	17,781	1	0.4889
2022	Riverside (EB) Platform	Platform Elec	94,702	94,702	24	0.4889
2022	Riverside (WB) Platform	Platform Elec	94,702	94,702	24	0.4889
2022	Noroton Heights (EB) Platform	Platform Elec	4,607	4,607	1	0.4889
2022	Noroton Heights (WB) Platform	Platform Elec	4,607	4,607	1	0.4889
2022	Darien (EB) Platform	Platform Elec	1,537	1,537	1	0.4889
2022	Darien (WB) Platform	Platform Elec	1,537	1,537	1	0.4889
2022	Rowayton (EB) Platform	Platform Elec	13,459	13,459	1	0.4889
2022	Powayton (WB) Platform	Platform Elec	13,459	13,459	1	0.4889
2022	East Norwalk (EB) Platform	Platform Elec	19,318	19,318	24	0.4889
2022	East Norwalk (WB) Platform	Platform Elec	19,318	19,318	24	0.4889
2022	Southport (EB) Platform	Platform Elec	165,949	165,949	1	0.4889
2022	Southport (WB) Platform	Platform Elec	165,949	165,949	1	0.4889
2022	Fairfield (EB) Platform	Platform Elec	27,058	27,058	1	0.4889
2022	Fairfield (WB) Platform	Platform Elec	27,058	27,058	1	0.4889
2022	Stratford (EB) Platform	Platform Elec 2	18,242	18,242	1	0.4889
2022	Stratford (WB) Platform	Platform Elec 2	18,242	18,242	1	0.4889
2022	Milford (EB) Platform	Platform Elec 2	23,162	23,162	1	0.4889
2022	Milford (WB) Platform	Platform Elec 2	23,162	23,162	1	0.4889
2022	West Haven (EB) Platform	Platform Elec 2	351	351	1	0.4889
2022	West Haven (WB) Platform	Platform Elec 2	351	351	1	0.4889
2022	Wilton Platform	Platform Elec 2	4,612	4,612	1	0.4889
2022	Cannondale Platform	Platform Elec 2	30,748	30,748	24	0.4889
2022	Branchville Platform	Platform Elec 2	67,469	67,469	1	0.4889
2022	Redding Platform	Platform Elec 2	23,192	23,192	1	0.4889
2022	Bethel Platform	Platform Elec 2	51,480	51,480	1	0.4889
2022	Clinton Platform	Platform Elec 3	703	703	1	0.4889
2022	Track-Curved 1	Track-Curved	26	90,827,826	34	0.2815
2022	MNR 17-1986 Bombardier / Proj 19 Cab	Commuter Rail Coach - MNR	5	40,000,000	261	0.0007
2022	MNR 18-1986 Bombardier / Proj 19 Coach - Trl	Commuter Rail Coach - MNR	10	80,000,000	261	0.0007
2022	MNR 19-1986 Bombardier / Proj 19 Coach - Twt	Commuter Rail Coach - MNR	4	32,000,000	261	0.0007
2022	SLE 1-1991 Mafersa Sociedade/KRC Cab	Commuter Rail Coach - SLE	5	40,000,000	257	0.0030
2022	SLE 3-1991 Mafersa Sociedade/KRC Coach	Commuter Rail Coach - SLE	11	88,000,000	257	0.0030
2022	MNR New Haven - Diesel Maintenance Shop 1	Facility-Conveyance	1,600	1,600,018	29	0.3793
2022	MNR East Norwalk Station 1	Facility-Electrical	2	2,081	30	0.3441
2022	MNR Greenwich Station 1	Facility-Electrical	622	622,443	30	0.3441
2022	MNR Riverside Station 1	Facility-Electrical	622	622,443	30	0.3441
2022	MNR Rowayton Station 1	Facility-Electrical	10	10,095	30	0.3441
2023	Bridge 08154R	Bridge - Culvert	2,635,500	2,635,500	148	0.1168
2023	Bridge 08266R	Bridge - Culvert	3,162,600	3,162,600	118	0.1168
2023	Bridge 01312R	Bridge - Fixed	24,246,600	24,246,600	118	0.1168
2023	Bridge 01318R	Bridge - Fixed	27,233,500	27,233,500	118	0.1168
2023	Bridge 01321R	Bridge - Fixed	21,084,000	21,084,000	148	0.1168
2023	Bridge 01348R	Bridge - Fixed	21,611,100	21,611,100	118	0.1168
2023	Bridge 02237R	Bridge - Fixed	50,425,900	50,425,900	148	0.1168
2023	Bridge Walk 2023	Bridge - Moveable	160	160,000,000	107	0.1168

2023	Bridge Devon 2023	Bridge - Moveable	15	15,000,000	107	0.1168
2023	Bridge 08015R	Bridge - Pedestrian	8,082,200	8,082,200	118	0.1168
2023	Cos Cob (EB) Platform	Platform Elec	86,884	86,884	3	0.3288
2023	Cos Cob (WB) Platform	Platform Elec	86,884	86,884	3	0.3288
2023	Stamford (A) Platform	Platform Elec	1,933	1,933	3	0.3288
2023	Greens Farms (EB) Platform	Platform Elec	129,052	129,052	3	0.3288
2023	Greens Farms (WB) Platform	Platform Elec	129,052	129,052	3	0.3288
2023	Danbury Platform	Platform Elec 2	31,802	31,802	3	0.3288
2023	Ansonia Platform	Platform Elec 2	1,845	1,845	1	0.3288
2023	Beacon Falls Platform	Platform Elec 2	922	922	1	0.3288
2023	Naugatuck Platform	Platform Elec 3	3,075	3,075	3	0.3288
2023	Branford (EB) Platform	Platform Elec 3	11,684	11,684	3	0.3288
2023	Branford (WB) Platform	Platform Elec 3	11,684	11,684	3	0.3288
2023	Power-Substations 2	Power-Substations	2	54,467,000	20	0.2476
2023	Power-Substations 8	Power-Substations	2	54,467,000	20	0.2476
2023	Power-Substations 11	Power-Substations	1	27,233,500	20	0.2476
2023	Power-Substations 13	Power-Substations	1	27,233,500	20	0.2476
2023	Power-Substations 22	Power-Substations	1	27,233,500	20	0.2476
2023	Turnouts 1	Turnouts	58	74,072,924	19	0.2808
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-Substructure	578	578,151	187	0.0884
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-Shell	934	933,937	187	0.0884
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-Interior	578	578,151	187	0.0884
2023	MNR New Haven - Transportation Building 1	Facility-Conveyance	590	589,714	16	0.2939
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-Conveyance	178	177,893	16	0.2939
2023	MNR Stamford - Rail Yard Maintenance Building 1	Facility-Conveyance	1,439	1,439,025	16	0.2939
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-Plumbing	178	177,893	175	0.0963
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-HVAC	400	400,259	175	0.0963
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-Fire	311	311,312	52	0.2003
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-Electrical	400	400,259	52	0.2003
2023	MNR New Haven - Diesel-CSR Shop 1	Facility-Equipment	5,940	5,940,347	12	0.3071
2023	MNR New Haven - Diesel Maintenance Shop 1	Facility-Equipment	8,000	8,000,090	12	0.3071
2023	MNR New Haven - EMU-CSR Shop 1	Facility-Equipment	5,384	5,383,638	12	0.3071
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-Equipment	889	889,464	12	0.3071
2023	MNR New Haven - Wheel Mill Facility Building 1	Facility-Site	267	266,839	213	0.0584
2024	Bridge 03638R	Bridge - Fixed	35,140,000	35,140,000	78	0.1300
2024	Bridge Walk 2024	Bridge - Moveable	169	169,000,000	78	0.1300
2024	Power-Substations 3	Power-Substations	2	54,467,000	1	0.2476
2024	Power-Substations 4	Power-Substations	2	54,467,000	1	0.2476
2024	Power-Substations 9	Power-Substations	1	27,233,500	1	0.2476
2024	Power-Substations 29	Power-Substations	1	27,233,500	1	0.2476
2025	Bridge 03678R	Bridge - Fixed	21,084,000	21,084,000	77	0.1418
2025	Bridge 03691R	Bridge - Fixed	14,758,800	14,758,800	77	0.1418
2025	Bridge 03692R	Bridge - Fixed	21,084,000	21,084,000	77	0.1418
2025	Bridge 03723R	Bridge - Fixed	21,084,000	21,084,000	77	0.1418
2025	Bridge Walk 2025	Bridge - Moveable	110	110,000,000	73	0.1418
2025	Power-Substations 5	Power-Substations	2	54,467,000	1	0.2476
2025	Power-Substations 7	Power-Substations	2	54,467,000	1	0.2476
2025	Power-Substations 12	Power-Substations	1	27,233,500	1	0.2476
2025	Power-Substations 15	Power-Substations	1	27,233,500	1	0.2476
2025	Power-Substations 19	Power-Substations	1	27,233,500	1	0.2476
2025	Power-Substations 21	Power-Substations	1	27,233,500	1	0.2476
2025	Power-Substations 23	Power-Substations	1	27,233,500	1	0.2476

Program List: Prioritization Run SGR (Bus)

Program Year	Asset ID Code	Description	No. of Assets	Replacement Costs	Project Rank	PI
2022	CTTransit Hartford 2008 Toyota hybrid	Service-Auto	2	69,152	12	1.4779
2022	CTTransit Hartford 2014 Ford Fusion 4 door sedan	Service-Auto	3	103,728	19	0.6543
2022	CTTransit Hartford 2016 Ford Fusion 4 door sedan	Service-Auto	2	69,152	28	0.3023
2022	CTTransit Hartford 2007 Ford P06 (Fusion)	Service-Auto	1	34,576	9	1.5471
2022	CTTransit New Haven 2007 Ford Fusion 4 door sedan	Service-Auto	1	34,576	9	1.5471
2022	CTTransit New Haven 2016 Ford Fusion 4 door sedan	Service-Auto	1	34,576	28	0.3023
2022	CTTransit New Haven 2006 Ford Taurus 4 door sedan	Service-Auto	1	34,576	5	1.5987
2022	CTTransit New Haven 2007 Ford Taurus 4 door sedan	Service-Auto	1	34,576	4	1.6360
2022	CTTransit Stamford 2007 Ford Fusion 4 door sedan	Service-Auto	1	34,576	9	1.5471
2022	CTTransit Hartford 2015 Ford Interceptor	Service-SUV	4	229,921	23	0.4763
2022	CTTransit Hartford 2016 Ford Escape	Service-SUV	1	57,480	27	0.3027
2022	CTTransit Hartford 2017 Ford Interceptor	Service-SUV	7	402,362	40	0.1420
2022	CTTransit New Haven 2011 Ford Escape	Service-SUV	7	402,362	13	1.1481
2022	CTTransit Stamford 2011 Ford Escape	Service-SUV	1	57,480	13	1.1481
2022	CTTransit Stamford 2003 Ford Explorer	Service-SUV	1	57,480	3	1.6812
2022	CTTransit Waterbury 2014 Chevrolet Traverse	Service-SUV	4	229,921	18	0.6549
2022	CTTransit Waterbury 2017 Ford Interceptor	Service-SUV	1	57,480	40	0.1420
2022	CTTransit Hartford 1995 International Service Truck	Service-Truck	3	884,342	20	0.5276
2022	CTTransit Hartford 1999 Chevrolet Pick Up	Service-Truck	2	589,561	26	0.3520
2022	CTTransit Hartford 2003 Freightliner Service Patrol	Service-Truck	1	294,781	39	0.1988
2022	CTTransit New Haven 1998 Chevrolet S3500	Service-Truck	1	294,781	24	0.3941
2022	CTTransit Stamford 1987 Ford L8000	Service-Truck	1	294,781	15	0.9122
2022	CTTransit Stamford 1989 GMC Sierra	Service-Truck	1	294,781	16	0.8147
2022	CTTransit Stamford 1998 Chevrolet 3500	Service-Truck	1	294,781	24	0.3941
2022	CTTransit Waterbury 1995 Service Vehicle	Service-Truck	1	294,781	20	0.5276
2022	CTTransit Waterbury 2006 Plow/Sander	Service-Truck	1	294,781	42	0.1022
2022	CTTransit Hartford 2007 Chevrolet Cargo minivan	Service-Van	2	162,284	6	1.5555
2022	CTTransit Hartford 2015 GMC Savana	Service-Van	3	243,425	22	0.4845
2022	CTTransit New Haven 2000 Chevrolet Cargo minivan	Service-Van	1	81,142	1	1.7112
2022	CTTransit New Haven 2014 Ford E350 shuttle van	Service-Van	2	162,284	17	0.6630
2022	CTTransit New Haven 2007 Chevrolet CG23405	Service-Van	1	81,142	6	1.5555
2022	CTTransit Stamford 2000 Chevrolet 2500 cargo	Service-Van	1	81,142	1	1.7112
2022	CTTransit Waterbury 2007 Ford E150	Service-Van	1	81,142	6	1.5555
2022	CTTransit Hartford 6-2005 New Flyer D40LF A	Transit Bus	5	5,500,000	43	0.0680
2022	CTTransit Hartford 7-2005 New Flyer D40LF B	Transit Bus	5	5,500,000	43	0.0680
2022	CTTransit Hartford 8-2005 New Flyer D40LF C	Transit Bus	2	2,200,000	43	0.0680
2022	CTTransit Waterbury 11-2016 Ford E450 A	Cutaway Bus	5	856,256	34	0.2183
2022	CTTransit Waterbury 12-2016 Ford E450 B	Cutaway Bus	5	856,256	34	0.2183
2022	CTTransit Waterbury 13-2016 Ford E450 C	Cutaway Bus	5	856,256	34	0.2183
2022	CTTransit Waterbury 14-2016 Ford E450 D	Cutaway Bus	5	856,256	34	0.2183
2022	CTTransit Waterbury 15-2016 Ford E450 E	Cutaway Bus	2	342,503	34	0.2183
2022	CTTransit Stamford Office/Storage 1	Facility-Conveyance	964	963,699	33	0.2372
2022	CTTransit Hartford Admin/Maintenance 1	Facility-Equipment	31,526	31,525,927	31	0.2481
2022	CTTransit Hartford Fuel Cell Storage 2	Facility-Equipment	823	822,951	30	0.2481
2022	CTTransit Stamford Maintenance 2	Facility-Equipment	1,789	1,789,053	32	0.2481
2022	CTTransit Stamford Office/Storage 1	Facility-Site	1,446	1,445,549	46	0.0478
2023	CTTransit Hartford 9-2007 New Flyer D40LF A	Transit Bus	5	5,500,000	5	0.0539
2023	CTTransit Hartford 10-2007 New Flyer D40LF B	Transit Bus	5	5,500,000	5	0.0539
2023	CTTransit Hartford 11-2007 New Flyer D40LF C	Transit Bus	5	5,500,000	5	0.0539

2023	CTTransit Hartford 12-2007 New Flyer D40Lf D	Transit Bus	5	5,500,000	5	0.0539
2023	CTTransit Hartford 13-2007 New Flyer D40LF E	Transit Bus	1	1,100,000	5	0.0539
2023	CTTransit Hartford 14-2007 New Flyer - Highback D40LF	Transit Bus	3	3,300,000	5	0.0539
2023	CTTransit Hartford 15-2008 New Flyer D40LF	Transit Bus	2	2,200,000	11	0.0406
2023	CTTransit New Haven 5-2008 New Flyer D35LF	Transit Bus	1	1,100,000	11	0.0406
2023	CTTransit Waterbury 2-2010 New Flyer XD35 B	Transit Bus	5	5,500,000	13	0.0165
2023	CTTransit Waterbury 4-2010 New Flyer XD35 D	Transit Bus	2	2,200,000	13	0.0165
2023	CTTransit Waterbury 6-2010 New Flyer Hybrid XDE35 B	Transit Bus	5	5,500,000	13	0.0165
2023	CTTransit Waterbury 7-2010 New Flyer Hybrid XDE35 C	Transit Bus	5	5,500,000	13	0.0165
2023	CTTransit Waterbury 16-2017 Ford E450 A	Cutaway Bus	5	856,256	1	0.2183
2023	CTTransit Waterbury 17-2017 Ford E450 B	Cutaway Bus	5	856,256	1	0.2183
2023	CTTransit Waterbury 18-2017 Ford E450 C	Cutaway Bus	5	856,256	1	0.2183
2023	CTTransit Waterbury 19-2017 Ford E450 D	Cutaway Bus	5	856,256	1	0.2183
2023	Dattco 1-2010 New Flyer D35LFR A	Transit Bus	5	5,500,000	13	0.0165
2023	New Britain 3-2010 New Flyer C	Transit Bus	5	5,500,000	13	0.0165
2024	CTTransit Hartford 16-2010 New Flyer - Hybrid XDE40 A	Transit Bus	5	5,500,000	2	0.0281
2024	CTTransit Hartford 17-2010 New Flyer - Hybrid XDE40 B	Transit Bus	5	5,500,000	2	0.0281
2024	CTTransit Hartford 18-2010 New Flyer - Hybrid XDE40 C	Transit Bus	3	3,300,000	2	0.0281
2024	CTTransit Hartford 19-2011 New Flyer - Hybrid XDE35	Transit Bus	3	3,300,000	12	0.0165
2024	CTTransit New Haven 2-2010 Nova LFS-60 B	Articulated Bus	5	7,125,839	13	0.0101
2024	CTTransit Stamford 1-2010 Nova LFS-60 A	Articulated Bus	5	7,125,839	13	0.0101
2024	CTTransit Waterbury 1-2010 New Flyer XD35 A	Transit Bus	5	5,500,000	2	0.0281
2024	CTTransit Waterbury 3-2010 New Flyer XD35 C	Transit Bus	5	5,500,000	2	0.0281
2024	CTTransit Waterbury 5-2010 New Flyer Hybrid XDE35 A	Transit Bus	5	5,500,000	2	0.0281
2024	CTTransit Waterbury 8-2010 New Flyer Hybrid XDE35 D	Transit Bus	2	2,200,000	2	0.0281
2024	Dattco 2-2010 New Flyer D35LFR B	Transit Bus	1	1,100,000	2	0.0281
2024	New Britain 1-2010 New Flyer A	Transit Bus	5	5,500,000	2	0.0281
2024	New Britain 2-2010 New Flyer B	Transit Bus	5	5,500,000	2	0.0281
2024	CTTransit Stamford Office/Storage 1	Facility-Equipment	4,818	4,818,497	1	0.0314
2025	CTTransit Hartford 2020 Ford Interceptor	Service-SUV	2	114,961	1	0.1420
2025	CTTransit New Haven 2020 Ford Interceptor	Service-SUV	5	287,401	1	0.1420
2025	CTTransit Stamford 2020 Ford Interceptor	Service-SUV	3	172,441	1	0.1420
2025	Collins 1-2010 MCI	Over-the-Road Bus	5	4,101,181	10	0.0115
2025	CTTransit Hartford 1-2011 Nova - Hybrid LFS-60 A	Articulated Bus	5	7,125,839	17	0.0101
2025	CTTransit Hartford 2-2011 Nova - Hybrid LFS-60 B	Articulated Bus	5	7,125,839	17	0.0101
2025	CTTransit Hartford 52-2010 MCI - Highback D4500	Over-the-Road Bus	2	1,640,472	10	0.0115
2025	CTTransit New Haven 1-2010 Nova LFS-60 A	Articulated Bus	5	7,125,839	8	0.0155
2025	CTTransit New Haven 3-2010 Nova LFS-60 C	Articulated Bus	2	2,850,335	6	0.0155
2025	CTTransit New Haven 6-2012 New Flyer - Hybrid XDE35	Transit Bus	1	1,100,000	4	0.0165
2025	CTTransit Stamford 2-2010 Nova LFS-60 B	Articulated Bus	5	7,125,839	8	0.0155
2025	CTTransit Stamford 3-2010 Nova LFS-60 C	Articulated Bus	3	4,275,503	6	0.0155
2025	CTTransit Stamford 4-2012 New Flyer - Hybrid XDE40	Transit Bus	4	4,400,000	4	0.0165
2025	CTTransit Stamford 11-2010 MCI - Highback D4500	Over-the-Road Bus	5	4,101,181	10	0.0115
2025	Dattco 4-2010 MCI D4500 A	Over-the-Road Bus	5	4,101,181	10	0.0115
2025	Dattco 5-2010 MCI D4500 B	Over-the-Road Bus	5	4,101,181	10	0.0115
2025	Dattco 6-2010 MCI D4500 C	Over-the-Road Bus	5	4,101,181	10	0.0115
2025	Dattco 7-2010 MCI D4500 D	Over-the-Road Bus	2	1,640,472	10	0.0115

Program List: Prioritization Run SGR (Rail)

Program Year	Asset ID Code	Description	No. of Assets	Replacement Costs	Project Rank	PI
2022	Catenary Wire 1	Catenary Wire	120	202,608,806	96	0.1696
2022	Guideway Surfacing 1	Guideway Surfacing	59	12,999,340	83	0.2260
2022	Greenwich (EB) Platform	Platform Elec	17,781	17,781	1	0.4889
2022	Greenwich (WB) Platform	Platform Elec	17,781	17,781	1	0.4889
2022	Cos Cob (EB) Platform	Platform Elec	86,884	86,884	36	0.2738
2022	Cos Cob (WB) Platform	Platform Elec	86,884	86,884	36	0.2738
2022	Riverside (EB) Platform	Platform Elec	94,702	94,702	24	0.4889
2022	Riverside (WB) Platform	Platform Elec	94,702	94,702	24	0.4889
2022	Stamford (A) Platform	Platform Elec	1,933	1,933	36	0.2738
2022	Noroton Heights (EB) Platform	Platform Elec	4,607	4,607	1	0.4889
2022	Noroton Heights (WB) Platform	Platform Elec	4,607	4,607	1	0.4889
2022	Darien (EB) Platform	Platform Elec	1,537	1,537	1	0.4889
2022	Darien (WB) Platform	Platform Elec	1,537	1,537	1	0.4889
2022	Rowayton (EB) Platform	Platform Elec	13,459	13,459	1	0.4889
2022	Powayton (WB) Platform	Platform Elec	13,459	13,459	1	0.4889
2022	East Norwalk (EB) Platform	Platform Elec	19,318	19,318	24	0.4889
2022	East Norwalk (WB) Platform	Platform Elec	19,318	19,318	24	0.4889
2022	Greens Farms (EB) Platform	Platform Elec	129,052	129,052	36	0.2738
2022	Greens Farms (WB) Platform	Platform Elec	129,052	129,052	36	0.2738
2022	Southport (EB) Platform	Platform Elec	165,949	165,949	1	0.4889
2022	Southport (WB) Platform	Platform Elec	165,949	165,949	1	0.4889
2022	Fairfield (EB) Platform	Platform Elec	27,058	27,058	1	0.4889
2022	Fairfield (WB) Platform	Platform Elec	27,058	27,058	1	0.4889
2022	Stratford (EB) Platform	Platform Elec 2	18,242	18,242	1	0.4889
2022	Stratford (WB) Platform	Platform Elec 2	18,242	18,242	1	0.4889
2022	Milford (EB) Platform	Platform Elec 2	23,162	23,162	1	0.4889
2022	Milford (WB) Platform	Platform Elec 2	23,162	23,162	1	0.4889
2022	West Haven (EB) Platform	Platform Elec 2	351	351	1	0.4889
2022	West Haven (WB) Platform	Platform Elec 2	351	351	1	0.4889
2022	Wilton Platform	Platform Elec 2	4,612	4,612	1	0.4889
2022	Cannondale Platform	Platform Elec 2	30,748	30,748	24	0.4889
2022	Branchville Platform	Platform Elec 2	67,469	67,469	1	0.4889
2022	Redding Platform	Platform Elec 2	23,192	23,192	1	0.4889
2022	Bethel Platform	Platform Elec 2	51,480	51,480	1	0.4889
2022	Danbury Platform	Platform Elec 2	31,802	31,802	36	0.2738
2022	Ansonia Platform	Platform Elec 2	1,845	1,845	36	0.2738
2022	Beacon Falls Platform	Platform Elec 2	922	922	36	0.2738
2022	Naugatuck Platform	Platform Elec 3	3,075	3,075	36	0.2738
2022	Branford (EB) Platform	Platform Elec 3	11,684	11,684	36	0.2738
2022	Branford (WB) Platform	Platform Elec 3	11,684	11,684	36	0.2738
2022	Clinton Platform	Platform Elec 3	703	703	1	0.4889
2022	Power-Substations 1	Power-Substations	2	54,467,000	51	0.2476
2022	Power-Substations 2	Power-Substations	2	54,467,000	51	0.2476
2022	Power-Substations 3	Power-Substations	2	54,467,000	51	0.2476
2022	Power-Substations 4	Power-Substations	2	54,467,000	51	0.2476
2022	Power-Substations 5	Power-Substations	2	54,467,000	51	0.2476
2022	Power-Substations 6	Power-Substations	2	54,467,000	51	0.2476
2022	Power-Substations 7	Power-Substations	2	54,467,000	51	0.2476
2022	Power-Substations 8	Power-Substations	2	54,467,000	51	0.2476
2022	Power-Substations 9	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 10	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 11	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 12	Power-Substations	1	27,233,500	51	0.2476

2022	Power-Substations 13	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 14	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 15	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 16	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 17	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 18	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 19	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 20	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 21	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 22	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 23	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 24	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 25	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 26	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 27	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 28	Power-Substations	1	27,233,500	51	0.2476
2022	Power-Substations 29	Power-Substations	1	27,233,500	51	0.2476
2022	Tower Wire Car - Train T-13	Service-Rail	1	263,550	85	0.2017
2022	Track-Curved 1	Track-Curved	26	90,827,826	34	0.2815
2022	Track-Tangent 1	Track-Tangent	48	115,962,000	84	0.2141
2022	Turnouts 1	Turnouts	58	74,072,924	35	0.2808
2022	MNR 17-1986 Bombardier / Proj 19 Cab	Commuter Rail Coach - MNR	5	40,000,000	261	0.0007
2022	MNR 18-1986 Bombardier / Proj 19 Coach - Trl	Commuter Rail Coach - MNR	10	80,000,000	261	0.0007
2022	MNR 19-1986 Bombardier / Proj 19 Coach - Twt	Commuter Rail Coach - MNR	4	32,000,000	261	0.0007
2022	SLE 1-1991 Mafersa Sociedade/KRC Cab	Commuter Rail Coach - SLE	5	40,000,000	257	0.0030
2022	SLE 3-1991 Mafersa Sociedade/KRC Coach	Commuter Rail Coach - SLE	11	88,000,000	257	0.0030
2022	MNR Riverside Station 1	Facility-Interior	910	909,724	89	0.1762
2022	MNR New Haven - Transportation Building 1	Facility-Conveyance	590	589,714	80	0.2372
2022	MNR New Haven - Diesel Maintenance Shop 1	Facility-Conveyance	1,600	1,600,018	29	0.3793
2022	MNR New Haven - Wheel Mill Facility Building 1	Facility-Conveyance	178	177,893	80	0.2372
2022	MNR Stamford - Rail Yard Maintenance Building 1	Facility-Conveyance	1,439	1,439,025	80	0.2372
2022	MNR Milford (EB) Station 1	Facility-HVAC	3	2,782	86	0.1855
2022	MNR Milford (WB) Station 1	Facility-HVAC	569	569,105	86	0.1855
2022	MNR Southport Station 1	Facility-HVAC	1	643	86	0.1855
2022	MNR New Haven - Wheel Mill Facility Building 1	Facility-Fire	311	311,312	90	0.1709
2022	MNR New Haven - Wheel Mill Facility Building 1	Facility-Electrical	400	400,259	90	0.1709
2022	MNR Cos Cob Station 1	Facility-Electrical	2	1,590	94	0.1709
2022	MNR East Norwalk Station 1	Facility-Electrical	2	2,081	30	0.3441
2022	MNR Fairfield (EB) Station 1	Facility-Electrical	622	622,443	94	0.1709
2022	MNR Fairfield (WB) Station 1	Facility-Electrical	1,109	1,109,219	90	0.1709
2022	MNR Greens Farms Station 1	Facility-Electrical	3	3,122	90	0.1709
2022	MNR Greenwich Station 1	Facility-Electrical	622	622,443	30	0.3441
2022	MNR Riverside Station 1	Facility-Electrical	622	622,443	30	0.3441
2022	MNR Rowayton Station 1	Facility-Electrical	10	10,095	30	0.3441
2022	MNR New Haven - Diesel-CSR Shop 1	Facility-Equipment	5,940	5,940,347	50	0.2481
2022	MNR New Haven - Diesel Maintenance Shop 1	Facility-Equipment	8,000	8,000,090	47	0.2481
2022	MNR New Haven - EMU-CSR Shop 1	Facility-Equipment	5,384	5,383,638	47	0.2481
2022	MNR New Haven - Wheel Mill Facility Building 1	Facility-Equipment	889	889,464	47	0.2481
2023	Bridge 08003R	Bridge - Fixed	14,056,000	14,056,000	45	0.1168
2023	Bridge 08006R	Bridge - Fixed	12,299,000	12,299,000	45	0.1168
2023	Bridge 08086R	Bridge - Fixed	12,299,000	12,299,000	45	0.1168
2023	Bridge 08218R	Bridge - Fixed	1,757,000	1,757,000	45	0.1168
2023	Bridge 08264R	Bridge - Fixed	72,564,100	72,564,100	45	0.1168
2023	Bridge 04288R Walk Movable	Bridge - Moveable	110	110,000,000	45	0.1168
2023	Bridge 08080R Devon Movable	Bridge - Moveable	1,000	1,000,000,000	45	0.1168
2023	Bridge Walk 2023	Bridge - Moveable	160	160,000,000	45	0.1168
2023	Bridge Walk 2025	Bridge - Moveable	110	110,000,000	45	0.1168
2023	Guideway Surfacing 2	Guideway Surfacing	105	23,134,419	2	0.1576

2023	New Haven (C) Platform	Platform Canopy 2	264	264	4	0.1471
2023	Talmadge Hill Platform	Platform Canopy 2	65,712	65,712	4	0.1471
2023	New Canaan Platform	Platform Canopy 2	5,622	5,622	4	0.1471
2023	Derby Platform	Platform Canopy 2	12,139	12,139	4	0.1471
2023	Ansonia Platform	Platform Canopy 2	12,233	12,233	4	0.1471
2023	Seymour Platform	Platform Canopy 2	5,341	5,341	4	0.1471
2023	Greenwich (EB) Platform	Platform Structure 1	368,794	368,794	11	0.1448
2023	Greenwich (WB) Platform	Platform Structure 1	368,794	368,794	11	0.1448
2023	Old Greenwich (EB) Platform	Platform Structure 1	136,343	136,343	11	0.1448
2023	Noroton Heights (EB) Platform	Platform Structure 1	96,635	96,635	11	0.1448
2023	Noroton Heights (WB) Platform	Platform Structure 1	96,635	96,635	11	0.1448
2023	Darien (EB) Platform	Platform Structure 1	563,997	563,997	11	0.1448
2023	Darien (WB) Platform	Platform Structure 1	563,997	563,997	11	0.1448
2023	Rowayton (EB) Platform	Platform Structure 1	84,072	84,072	11	0.1448
2023	Powayton (WB) Platform	Platform Structure 1	84,072	84,072	11	0.1448
2023	South Norwalk (EB) Platform	Platform Structure 1	203,461	203,461	11	0.1448
2023	South Norwalk (WB) Platform	Platform Structure 1	203,461	203,461	11	0.1448
2023	East Norwalk (EB) Platform	Platform Structure 1	93,824	93,824	11	0.1448
2023	East Norwalk (WB) Platform	Platform Structure 1	93,824	93,824	11	0.1448
2023	Westport (EB) Platform	Platform Structure 1	86,181	86,181	11	0.1448
2023	Westport (WB) Platform	Platform Structure 1	86,181	86,181	11	0.1448
2023	Fairfield (EB) Platform	Platform Structure 1	61,495	61,495	11	0.1448
2023	Fairfield (WB) Platform	Platform Structure 1	61,495	61,495	11	0.1448
2023	Bridgeport (EB) Platform	Platform Structure 2	791	791	11	0.1448
2023	Bridgeport (WB) Platform	Platform Structure 2	791	791	11	0.1448
2023	Stratford (EB) Platform	Platform Structure 2	39,533	39,533	11	0.1448
2023	Stratford (WB) Platform	Platform Structure 2	39,533	39,533	11	0.1448
2023	Milford (WB) Platform	Platform Structure 2	57,981	57,981	11	0.1448
2023	New Haven State Street Platform	Platform Structure 2	17,570	17,570	11	0.1448
2023	Glenbrook Platform	Platform Structure 2	44,628	44,628	11	0.1448
2023	Springdale Platform	Platform Structure 2	32,505	32,505	11	0.1448
2023	Meritt 7 Platform	Platform Structure 2	28,991	28,991	11	0.1448
2023	Wilton Platform	Platform Structure 2	87,850	87,850	11	0.1448
2023	Derby Platform	Platform Structure 2	3,514	3,514	11	0.1448
2023	Ansonia Platform	Platform Structure 2	9,224	9,224	11	0.1448
2023	Seymour Platform	Platform Structure 2	3,163	3,163	11	0.1448
2023	Power-Cable 1	Power-Cable	171	53,936,245	1	0.1696
2023	Power-Poles 1	Power-Poles	850	11,111,268	44	0.1169
2023	Tamper	Service-Rail	1	263,550	43	0.1205
2023	Ties-Concrete 1	Ties-Concrete	4	6,184,640	42	0.1206
2023	Ties-Wood 1	Ties-Wood	6	8,117,340	41	0.1354
2023	Track-Curved 2	Track-Curved	21	73,360,937	3	0.1477
2023	Turnouts 2	Turnouts	48	61,301,730	10	0.1471
2024	Bridge 08072R	Bridge - Culvert	5,973,800	5,973,800	1	0.1300
2024	Bridge 08154R	Bridge - Culvert	2,635,500	2,635,500	1	0.1300
2024	Bridge 01302R	Bridge - Fixed	21,084,000	21,084,000	1	0.1300
2024	Bridge 01318R	Bridge - Fixed	27,233,500	27,233,500	1	0.1300
2024	Bridge 02237R	Bridge - Fixed	50,425,900	50,425,900	1	0.1300
2024	Bridge 03638R	Bridge - Fixed	35,140,000	35,140,000	1	0.1300
2024	Bridge 03639R	Bridge - Fixed	25,125,100	25,125,100	1	0.1300
2024	Bridge 03680R	Bridge - Fixed	25,652,200	25,652,200	1	0.1300
2024	Bridge 03686R	Bridge - Fixed	45,330,600	45,330,600	1	0.1300
2024	Bridge 03691R	Bridge - Fixed	14,758,800	14,758,800	1	0.1300
2024	Bridge 03692R	Bridge - Fixed	21,084,000	21,084,000	1	0.1300
2024	Bridge 03963R	Bridge - Fixed	21,084,000	21,084,000	1	0.1300
2024	Bridge 04224R	Bridge - Fixed	7,379,400	7,379,400	1	0.1300
2024	Bridge 08005R	Bridge - Fixed	21,084,000	21,084,000	1	0.1300
2024	Bridge 08022R	Bridge - Fixed	20,556,900	20,556,900	1	0.1300

2024	Bridge 08025R	Bridge - Fixed	21,084,000	21,084,000	1	0.1300
2024	Bridge 08035R	Bridge - Fixed	14,407,400	14,407,400	1	0.1300
2024	Bridge 08041R	Bridge - Fixed	21,084,000	21,084,000	1	0.1300
2024	Bridge 08054R	Bridge - Fixed	21,084,000	21,084,000	1	0.1300
2024	Bridge 08059R	Bridge - Fixed	35,842,800	35,842,800	1	0.1300
2024	Bridge 08071R	Bridge - Fixed	22,138,200	22,138,200	1	0.1300
2024	Bridge 08075R	Bridge - Fixed	31,801,700	31,801,700	1	0.1300
2024	Bridge 08098R	Bridge - Fixed	21,084,000	21,084,000	1	0.1300
2024	Bridge 08209R	Bridge - Fixed	2,284,100	2,284,100	1	0.1300
2024	Bridge 08210R	Bridge - Fixed	9,487,800	9,487,800	1	0.1300
2024	Bridge 08219R	Bridge - Fixed	1,932,700	1,932,700	1	0.1300
2024	Bridge 08268R	Bridge - Fixed	9,312,100	9,312,100	1	0.1300
2024	Bridge 08008R Cos Cob Movable	Bridge - Moveable	1,000	1,000,000,000	1	0.1300
2024	Bridge Walk 2022	Bridge - Moveable	247	247,000,000	1	0.1300
2024	Bridge Walk 2024	Bridge - Moveable	169	169,000,000	1	0.1300
2024	Bridge 08015R	Bridge - Pedestrian	8,082,200	8,082,200	1	0.1300
2025	Bridge 08261R	Bridge - Culvert	2,284,100	2,284,100	2	0.1418
2025	Bridge 08266R	Bridge - Culvert	3,162,600	3,162,600	2	0.1418
2025	Bridge 01312R	Bridge - Fixed	24,246,600	24,246,600	2	0.1418
2025	Bridge 01321R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 01348R	Bridge - Fixed	21,611,100	21,611,100	2	0.1418
2025	Bridge 03678R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 03693R	Bridge - Fixed	57,981,000	57,981,000	2	0.1418
2025	Bridge 03723R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 03946R	Bridge - Fixed	22,665,300	22,665,300	2	0.1418
2025	Bridge 04131R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 04198R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 04200R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 04271R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 08013R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 08044R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 08045R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 08047R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 08049R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 08055R	Bridge - Fixed	17,921,400	17,921,400	2	0.1418
2025	Bridge 08060R	Bridge - Fixed	18,799,900	18,799,900	2	0.1418
2025	Bridge 08070R	Bridge - Fixed	22,841,000	22,841,000	2	0.1418
2025	Bridge 08074R	Bridge - Fixed	25,125,100	25,125,100	2	0.1418
2025	Bridge 08077R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 08097R	Bridge - Fixed	22,489,600	22,489,600	2	0.1418
2025	Bridge 08207R	Bridge - Fixed	4,743,900	4,743,900	2	0.1418
2025	Bridge 08215R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 08217R	Bridge - Fixed	1,932,700	1,932,700	2	0.1418
2025	Bridge 08260R	Bridge - Fixed	21,084,000	21,084,000	2	0.1418
2025	Bridge 08267R	Bridge - Fixed	18,097,100	18,097,100	2	0.1418
2025	Bridge 08287R	Bridge - Fixed	16,164,400	16,164,400	2	0.1418
2025	Bridge Devon 2023	Bridge - Moveable	15	15,000,000	1	0.1418
2025	Catenary Wire 2	Catenary Wire	32	54,029,015	81	0.0817
2025	Guideway Surfacing 3	Guideway Surfacing	66	14,541,635	80	0.0855
2025	Tie Inserter w/ Crane	Service-Rail	1	263,550	66	0.0982
2025	Wire Reel Car Road	Service-Rail	1	263,550	87	0.0294
2025	Tie Shear	Service-Rail	1	263,550	73	0.0937
2025	Railroad Flat Well Car	Service-Rail	3	790,650	75	0.0892
2025	Railroad Box Car	Service-Rail	5	1,317,750	75	0.0892
2025	Caboose	Service-Rail	1	263,550	75	0.0892
2025	Railroad Hopper	Service-Rail	28	7,379,400	74	0.0892
2025	Railroad Storage Box Car	Service-Rail	1	263,550	75	0.0892
2025	New Canaan	Signal System	8	32,000,000	86	0.0511

2025	NEC - CP 248 - New Haven	Signal System	92	368,000,000	82	0.0787
2025	Ties-Concrete 2	Ties-Concrete	7	10,823,120	85	0.0572
2025	Ties-Wood 2	Ties-Wood	59	79,820,510	84	0.0718
2025	Track-Tangent 2	Track-Tangent	26	62,812,750	39	0.1200
2025	MNR 16-1971 GMC EMD/AMF GP40	Locomotive - MNR	6	96,000,000	79	0.0890
2025	SLE 2-1991 Mafersa Sociedade/KRC Cab	Commuter Rail Coach - SLE	3	24,000,000	89	0.0046
2025	SLE 4-1991 Mafersa Sociedade/KRC Coach	Commuter Rail Coach - SLE	7	56,000,000	89	0.0046
2025	SLE 5-1993 GE/P40 Genesis A	Locomotive - SLE	6	96,000,000	88	0.0232
2025	MNR New Haven - Wheel Mill Facility Building 1	Facility-Substructure	578	578,151	49	0.1140
2025	MNR Derby Station 1	Facility-Substructure	862	861,844	45	0.1140
2025	MNR New Haven Station 1	Facility-Substructure	41,107	41,107,221	45	0.1140
2025	MNR New Haven - EMU-CSR Shop 1	Facility-Shell	5,653	5,652,820	49	0.1140
2025	MNR New Haven - Wheel Mill Facility Building 1	Facility-Shell	934	933,937	49	0.1140
2025	MNR Bridgeport (WB) Station 1	Facility-Shell	1,009	1,009,045	49	0.1140
2025	MNR Noroton Heights Station 1	Facility-Shell	1,436	1,436,407	45	0.1140
2025	MNR Rowayton Station 1	Facility-Shell	23	23,296	49	0.1140
2025	MNR Stamford Station 1	Facility-Shell	4,569	4,568,576	49	0.1140
2025	MNR Wilton Station 1	Facility-Shell	8	7,990	49	0.1140
2025	MNR New Haven - Wheel Mill Facility Building 1	Facility-Interior	578	578,151	49	0.1140
2025	MNR Branchville Station 1	Facility-Interior	910	909,724	49	0.1140
2025	MNR Cannondale Station 1	Facility-Interior	910	909,724	49	0.1140
2025	MNR Danbury Station 1	Facility-Interior	714	713,710	49	0.1140
2025	MNR Derby Station 1	Facility-Interior	910	909,724	49	0.1140
2025	MNR New Haven Station 1	Facility-Interior	43,391	43,390,955	45	0.1140
2025	MNR Noroton Heights Station 1	Facility-Interior	910	909,724	49	0.1140
2025	MNR Rowayton Station 1	Facility-Interior	15	14,754	49	0.1140
2025	MNR Seymour Station 1	Facility-Interior	910	909,724	49	0.1140
2025	MNR Stratford (EB) Station 1	Facility-Interior	26,108	26,108,468	49	0.1140
2025	MNR Wilton Station 1	Facility-Interior	5	5,060	49	0.1140
2025	MNR Bridgeport Rail Facility Building 1	Facility-Conveyance	1,017	1,016,530	68	0.0945
2025	MNR New Haven - Diesel-CSR Shop 1	Facility-Conveyance	1,188	1,188,069	71	0.0945
2025	MNR New Haven - Storehouse 1	Facility-Conveyance	2,446	2,446,025	67	0.0945
2025	MNR New Haven - EMU Maintenance Shop 1	Facility-Conveyance	1,836	1,836,107	71	0.0945
2025	MNR New Haven - Blowing Area Shelter 1	Facility-Conveyance	185	184,881	68	0.0945
2025	MNR New Haven - Training Building 1	Facility-Conveyance	1,442	1,442,202	68	0.0945
2025	Amtrak Guilford Station 1	Facility-Conveyance		0	91	0.0000
2025	MNR New Haven - Wheel Mill Facility Building 1	Facility-Plumbing	178	177,893	32	0.1240
2025	MNR East Norwalk Station 1	Facility-Plumbing	0	160	34	0.1240
2025	MNR Seymour Station 1	Facility-Plumbing	48	47,880	34	0.1240
2025	MNR Stratford (EB) Station 1	Facility-Plumbing	1,374	1,374,130	34	0.1240
2025	MNR New Haven - Diesel Maintenance Shop 1	Facility-HVAC	3,600	3,600,041	34	0.1240
2025	MNR New Haven - Wheel Mill Facility Building 1	Facility-HVAC	400	400,259	34	0.1240
2025	MNR Riverside Station 1	Facility-HVAC	479	478,802	32	0.1240
2025	MNR Bridgeport Rail Facility Building 1	Facility-Equipment	5,083	5,082,650	40	0.1141
2025	MNR New Haven - Storehouse 1	Facility-Equipment	12,230	12,230,126	42	0.1141
2025	MNR New Haven - EMU Maintenance Shop 1	Facility-Equipment	9,181	9,180,536	40	0.1141
2025	MNR New Haven - Blowing Area Shelter 1	Facility-Equipment	924	924,407	42	0.1141
2025	MNR New Haven - Training Building 1	Facility-Equipment	7,211	7,211,009	44	0.1141
2025	MNR New Haven - Wheel Mill Facility Building 1	Facility-Site	267	266,839	83	0.0760

Appendix F. Performance Projections Data

Vehicles - % of vehicles met or exceeded ULB

<u>Transit Bus</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	22.5%	16.6%	17.2%	5.9%	0.0%
No Funding	22.5%	22.5%	23.1%	24.2%	24.2%
Achieve SGR	22.5%	20.0%	9.2%	1.1%	0.0%
Target	14.0%	14.0%	14.0%	14.0%	14.0%

<u>Articulated Bus</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	49.0%	49.0%	68.6%	68.6%	29.4%
No Funding	49.0%	49.0%	68.6%	68.6%	68.6%
Achieve SGR	49.0%	49.0%	68.6%	49.0%	0.0%
Target	14.0%	14.0%	14.0%	14.0%	14.0%

<u>Over the Road Bus</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	49.2%	49.2%	49.2%	49.2%	49.2%
No Funding	49.2%	49.2%	49.2%	49.2%	49.2%
Achieve SGR	49.2%	49.2%	49.2%	49.2%	0.0%
Target	14.0%	14.0%	14.0%	14.0%	14.0%

<u>Cutaway Bus</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	100.0%	47.6%	0.0%	0.0%	0.0%
No Funding	100.0%	100.0%	100.0%	100.0%	100.0%
Achieve SGR	100.0%	47.6%	0.0%	0.0%	0.0%
Target	17.0%	17.0%	17.0%	17.0%	17.0%

<u>MNR Locomotives</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	37.5%	37.5%	37.5%	37.5%	37.5%
No Funding	37.5%	37.5%	37.5%	37.5%	37.5%

Achieve SGR	37.5%	37.5%	37.5%	37.5%	0.0%
Target	13.0%	13.0%	13.0%	13.0%	13.0%

MNR Push Pull

<u>Coaches</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	38.0%	0.0%	0.0%	0.0%	0.0%
No Funding	38.0%	38.0%	38.0%	38.0%	38.0%
Achieve SGR	38.0%	0.0%	0.0%	0.0%	0.0%
Target	13.0%	13.0%	13.0%	13.0%	13.0%

<u>MNR EMU's</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	0.0%	0.0%	0.0%	0.0%	0.0%
No Funding	0.0%	0.0%	0.0%	0.0%	0.0%
Achieve SGR	0.0%	0.0%	0.0%	0.0%	0.0%
Target	13.0%	13.0%	13.0%	13.0%	13.0%

<u>SLE Locomotives</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	100.0%	100.0%	100.0%	100.0%	100.0%
No Funding	100.0%	100.0%	100.0%	100.0%	100.0%
Achieve SGR	100.0%	100.0%	100.0%	100.0%	0.0%
Target	17.0%	17.0%	17.0%	17.0%	17.0%

<u>SLE Push Pull</u>	Current	Projected			
<u>Coaches</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	100.0%	38.5%	38.5%	38.5%	38.5%
No Funding	100.0%	100.0%	100.0%	100.0%	100.0%
Achieve SGR	100.0%	38.5%	38.5%	38.5%	0.0%
Target	17.0%	17.0%	17.0%	17.0%	17.0%

<u>Truck</u>	Current	Projected			
Year	2021	2022	2023	2024	2025

Expected Funding	37.5%	0.0%	0.0%	0.0%	0.0%
No Funding	37.5%	37.5%	37.5%	37.5%	37.5%
Achieve SGR	37.5%	0.0%	0.0%	0.0%	0.0%
Target	7.0%	7.0%	7.0%	7.0%	7.0%

<u>Automobile</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	100.0%	0.0%	0.0%	0.0%	0.0%
No Funding	100.0%	100.0%	100.0%	100.0%	100.0%
Achieve SGR	100.0%	0.0%	0.0%	0.0%	0.0%
Target	17.0%	17.0%	17.0%	17.0%	17.0%

<u>SUV</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	72.2%	0.0%	0.0%	27.8%	0.0%
No Funding	72.2%	72.2%	72.2%	100.0%	100.0%
Achieve SGR	72.2%	0.0%	0.0%	27.8%	0.0%
Target	17.0%	17.0%	17.0%	17.0%	17.0%

<u>Van</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	100.0%	0.0%	0.0%	0.0%	0.0%
No Funding	100.0%	100.0%	100.0%	100.0%	100.0%
Achieve SGR	100.0%	0.0%	0.0%	0.0%	0.0%
Target	17.0%	17.0%	17.0%	17.0%	17.0%

<u>Steel Wheel Vehicles</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	100.0%	100.0%	100.0%	100.0%	100.0%
No Funding	100.0%	100.0%	100.0%	100.0%	100.0%
Achieve SGR	100.0%	97.6%	95.1%	95.1%	0.0%
Target	0.0%	0.0%	0.0%	0.0%	0.0%

Facilities - % of components rated below 3

<u>Bus Admin/Maint</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	13.9%	13.9%	0.0%	0.0%	0.0%
No Funding	13.9%	13.9%	13.9%	13.9%	13.9%
Achieve SGR	13.9%	13.9%	0.0%	0.0%	0.0%
Target	0.0%	0.0%	0.0%	0.0%	0.0%

<u>Bus Passenger</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	0.0%	0.0%	0.0%	0.0%	0.0%
No Funding	0.0%	0.0%	0.0%	0.0%	0.0%
Achieve SGR	0.0%	0.0%	0.0%	0.0%	0.0%
Target	0.0%	0.0%	0.0%	0.0%	0.0%

<u>Rail Admin/Maint</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	8.3%	8.3%	7.8%	0.9%	0.9%
No Funding	8.3%	8.3%	8.3%	8.3%	8.3%
Achieve SGR	8.3%	8.3%	3.7%	3.7%	3.7%
Target	0.0%	0.0%	0.0%	0.0%	0.0%

<u>Rail Passenger</u>	Current	Projected			
Year	2021	2022	2023	2024	2025
Expected Funding	26.3%	26.3%	18.5%	15.9%	15.9%
No Funding	26.3%	26.3%	26.3%	26.3%	26.3%
Achieve SGR	26.3%	26.3%	13.9%	5.1%	5.1%
Target	0.0%	0.0%	0.0%	0.0%	0.0%

Appendix G. Maintenance Responsibility Matrix

Master Facility Maintenance Manual - Appendix A - Maintenance Activities Summary	Year Built	Project	System	Maintenance Manual Paragraph	Equip Tag Nos.	Make	Model	Designation	Quantity	Unit	Size	Pumps	Heaters	Coolers	Boilers	Unit Heaters	HVAC Units	Air Filters	Water Filters	Oil Filters	Belts	Fans	Location	CROT Contractor	Amtrak Group	Responsible	Metro North Group	MNR Contractor
CSR Building (Car Shop)																							Missing from Manual					
Year Built																							Info Missing					
Project																												
System																												
Compressed Air	1			1.1		Ingersoll Rand	Two-Stage Reciprocating Air Compressor 130 Model 2545	Compressed Air																				
	1.2			1.2		Ingersoll Rand	Ninawa Z5-150 CFM D127NC	Industrial Air Compressor																				
	1.3			1.3		Ingersoll Rand	F35-F2378 (G, H, A, D)	Air Compressor Cycling Refrigerated Dryer																				
	1.4			1.4				Filter for Compressed Air																				
								Air Compressor R piping																				
Fire Protection	2.0			2.0																								
	2.1			2.1		Viking		Wet Pipe Sprinkler System																				
	2.1.1			2.1.1		Viking		Wet Pipe Sprinkler Heads																				
	2.1.2			2.1.2		Viking		Check Valves - Wet System																				
	2.1.3			2.1.3		Viking		Fire Protection - Backflow Preventer																				
	2.1.4			2.1.4				Alarm Check Valve																				
	2.2			2.2				Mounting Fire Pump, Jockey Pump																				
	2.2.1			2.2.1				Mounting Fire Pump, Jockey Pump																				
	2.3			2.3				For Jockey Pump																				
								Fire Detection System - Fire Alarm System																				
								Fire Extinguishers																				
								Fire wash station																				
Water Supply	3.0			3.0																								
	3.1			3.1				Domestic Hot Water Circulating Pumps																				
	3.2			3.2		RHEEM RUJ0	G100-80	Gas Fired Domestic Water Heater																				
	3.3			3.3				Drinking Fountains & Water Coolers																				
	3.4			3.4				General Duty Valves & Backflow Preventers																				
Electrical	4.0			4.0																								
	4.1			4.1		Siemens & Square D		Panelboards																				
	4.2			4.2		Siemens & Square D		Switchboards																				
	4.3			4.3		Square D, GE, Siemens		Safety Switches																				
	4.4			4.4		MAC Products		D.C. Switchboard for Traction Power and Aux Power																				
	4.5			4.5		MAC Products		Single Disconnect Switch for Aux Power Connector																				
	4.6			4.6		MAC Products		Traction Power Switch For Local Disconnect																				
	4.7			4.7		MAC Products		Overhead Trolley and D.C. Stringer System																				
	4.8			4.8		MAC Products		For Aux Power and Traction Power																				
	4.9			4.9		SMC Electrical Products		Traction Power Substation																				
	4.10			4.10		SMC Electrical Products		Traction Power Substation Rectifier																				
	4.11			4.11		GE, Square D, HPS, AOMF		Low Voltage General Purpose Transformers																				
	4.12			4.12				Lightning Protection System																				
Lighting	5			5.1																								
						Powerswitch, Inc.		Blue Light System																				
								Interior Building																				
								Exterior Building																				
								Site Lighting																				
Communications, Data and Security	6			6.1																								
								Public Address and Mass Notification System, Intercom System																				
								Telephone System																				
								Intercom Paging																				
								Data Network																				
								CCTV Surveillance																				
								Access Control																				
								Intrusion Detection																				
								Video Surveillance																				
								Traffic/Pedestrian Control																				
Waste	7																											
								Sump Pump																				
HVAC	8			8																								
	8.1			8.1		Greenheck	GB	Bit Drive Centrifugal Hood Exhaust Fans																				
	8.2			8.2		Greenheck	SP-A, CSP-A, SP-B, CSP-B	Ceiling Exhaust and Inline Fans																				
	8.3			8.3		Greenheck	SQand B&Q	Direct Drive Centrifugal Inline Exhaust Fans																				
	8.4			8.4		Loren Cook Company	Gemini	Ceiling and Cabinet Fans																				
	8.5			8.5		Trane	TTA120A400	Split System Air Conditioning Units-Packaged Compressor & Condenser																				
	8.6			8.6		AHU-1/ACCU-1	TWE120A300	Split System Air Conditioning Units-Packaged Compressor & Condenser																				
	8.7			8.7		AHU-2/ACCU-2	Floating Air	Air-Conditioners																				
	8.8			8.8				Electric Unit Heater																				
	8.8			8.8				Gas Fired Duct Heater																				
	8.9			8.9				Gas Fired Duct Heater																				
								Indoor Indirect Gas Fired Heating Units																				

