



Connecticut Department of Transportation

2018-2021

Transit Asset Management Group Plan

Tier II Plan in accordance with 49 CFR §625.5



Northeastern Connecticut Transit District



September 2018

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STATE OF CONNECTICUT

DEPARTMENT OF TRANSPORTATION

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Office of the
Commissioner

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October 1, 2018

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
Public Transportation Transit Asset Management Plan (Tier 1 Providers)
Transit Asset Management Group Plan (Tier 2 Providers)

The Connecticut Department of Transportation (Department) has completed the development of Transit Asset Management Plans (TAMPs) for Tier 1 and Tier 2 Providers to comply with the TAM Final Rule deadline of October 1, 2018.

Both TAMPs include Fiscal Year 2018 State of Good Repair (SGR) performance goals that pertain to SGR measures for revenue vehicles, service vehicles, rail guideway and facility asset classes.

TAMPs will be shared with Connecticut's eight Metropolitan Planning Organizations for inclusion into their amended Metropolitan Transportation Plans after October 1, 2018.

Should you have any questions, please contact Ms. Sharon Okoye, Public Transportation Asset Management Lead, at (860) 594-2367.

Sincerely,

James Redeker
Commissioner

cc: Mr. Matthew Keamy, FTA Program Management Office
Ms. Leah Sirmin, FTA Planning and Program Development
Mr. Sergio Coronado, FTA Planning and Program Development (Tribes)
Transit Districts

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Message from the Commissioner

It is my pleasure, as Commissioner of the Connecticut Department of Transportation (CTDOT), to present the State's initial Transit Asset Management Group Plan. This plan is the first of its kind in Connecticut, and goes beyond federal mandates and demonstrates a strong commitment to achieving a State of Good Repair for our transportation system. Connecticut's transportation system is multimodal and supports the economy by enabling the efficient movement of people, goods, and services. Connecticut is a vital transportation link between northern New England and New York, New Jersey and the Mid-Atlantic states. The transportation system also links our communities; helping connect neighborhoods, towns, and cities. In order for Connecticut's economy to function properly and grow, the transportation system must be maintained and updated.

This document presents a plan developed in partnership with CTDOT Public Transportations' Tier 2 service providers, to achieve a systematic and comprehensive asset management system for the State's public transportation assets in order to provide safe and reliable service for the citizens of Connecticut.

CTDOT will provide guidance during implementation of this plan, as it aligns with the Department's priority to maintain and preserve the statewide public transportation system.

James P. Redeker
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.

New federal regulations for tracking and reporting system performance for transit assets will require changes to our current practices by Connecticut's service providers. In some cases asset condition reported herein are based on professional judgement in the absence of technical data. CTDOT has developed a documented approach for future data collection consistent with FTA guidance which will be reflected in the next TAMP update.

CTDOT will initiate in-depth 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 Transit Asset Management Group 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.

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List of Acronyms

AIM	Asset Inventory Module
ARSA	Amended and Restated Service Agreement
CPI	Consumer Price Index
CSS	Context-Sensitive Solutions
CTDOT	Connecticut Department of Transportation
ETD	Estuary Transit District
FAST	Fixing America’s Surface Transportation
FHWA	Federal Highway Administration
FMS	Facilities Management Solution
FTA	Federal Transit Administration
GBTA	Greater Bridgeport Transit
GNHTD	Greater New Haven Transit District
Group-TAMP	Transit Asset Management Group Plan
HART	Housatonic Area Regional Transit
ITS	Intelligent Transportation Systems
LRTP	Long Range Transportation Plan
LCP	Life Cycle Planning
MAP-21	Moving Ahead for Progress in the 21st Century
MAT	Middletown Area Transit District
MDBF	Mean Distance Between Failures
MlfdTD	Milford Transit District
MPO	Metropolitan Planning Organization
NECTD	Northeastern Connecticut Transit District
NTD	National Transit Database
NWCTD	Northwestern Connecticut Transit District

NWLKTD	Norwalk Transit District
PT-TAMP	Public Transportation Transit Asset Management Plan
PI	Prioritization Index
ROW	Right-of-Way
SEAT	Southeast Area Transit District
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
ULB	Useful Life Benchmark
VTD	Valley Transit District
WRTD	Windham Region Transit District

CHAPTER 1

Introduction

The Connecticut Department of Transportation is the sponsoring agency for the development of this Transit Asset Management Group Plan. The plan documents asset management processes and policies for Tier II transit providers in Connecticut, summarizes the inventory and condition of transit assets, and prioritizes state of good repair investments. This document is designed to meet Federal Transit Administration's TAM requirements, and 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) is the sponsoring agency for the creation of this Transit Asset Management Group Plan (Group-TAMP) for Connecticut's small transit providers. The Group-TAMP summarizes transit assets in Connecticut, lays out existing asset management processes, and identifies priority SGR investments.

A separate document has been developed for the Tier I service providers in Connecticut which includes the three modes of bus, rail and ferry.

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.

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 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

Each provider, Tier I or Tier II, must designate an accountable executive who is responsible for accepting and approving the group 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 group TAM plan must cover a period of four years. The initial group TAM plan must be completed by October 1, 2018, and the plan must be updated every four years.

Tier II Transit Providers in Connecticut

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.

In non-CTtransit service areas, thirteen local transit districts were created to assume operation of bus services. The local districts provide bus transit services under the direction of local Boards of Directors representing the member towns. CTDOT enters into transit operating assistance contracts with the districts to cover operating deficits up to a predetermined budget amount. Some municipalities do provide some financial support to these

transit districts but the state supports about 90% of the deficit funding in the urban systems, and the state and federal government provide 83% of the deficit funding in the rural systems.

Group-TAMP Transit Providers in Connecticut

Twelve of the fourteen transit districts in Connecticut represented in this Group-TAMP, are listed in Table 1-1. Greater Hartford Transit District is considered a Tier 1 provider; therefore, is developing its own Tier 1 TAM Plan. Greater Waterbury Transit District does not operate transit service and is not included in this plan.

The following are descriptions of the participating Tier II transit provider's service areas for their member Towns. In addition to the transit districts, the Group-TAMP includes subrecipients of the 5310 Program, Town of Mansfield and the Mashantucket Pequot Tribal Nation.

Transit Districts

Greater Bridgeport Transit Authority (www.gogbt.com)

The Authority serves the cities of Bridgeport, Fairfield, Stratford, and Trumbull. Fixed route bus service is provided Monday through Saturday, and ADA paratransit service is provided 7 days a week.

Estuary Transit District d.b.a. 9 Town Transit (www.9towntransit.com)

The Estuary Transit District serves Chester, Clinton, Deep River, Durham, Essex, East Haddam, Haddam, Killingworth, Lyme, Old Lyme, Old Saybrook and Westbrook. The district provides demand response and flexible fixed route services throughout the region with its 9 Town Transit bus services. Connections are made in Madison, Middletown and New London to neighboring bus services.

Greater New Haven Transit District (www.gnhtd.org)

The District provides complementary ADA service, under contract to CTDOT, to the New Haven area, including Branford, East Haven, Hamden, New Haven, North Branford, North Haven, Orange, West Haven, Woodbridge, as well as more limited service to Ansonia, Cheshire, Guilford, Madison, Seymour, Shelton, Wallingford and Waterbury. In addition the District provides Regional Rides Program, which is an integrated elderly/disabled program available to residents of eleven towns in the New Haven region. Transportation is offered 7 days a week.

Housatonic Area Regional Transit (HART) (www.hartransit.com)

The District provides fixed route service on 11 routes, 7 days a week (limited Sunday routes). Fixed route service is also provided to the village of Brewster, NY and the MTA Harlem Line railroad station. Senior/disabled

Dial-a-Ride service is provided to Danbury, Bethel, Brookfield, New Fairfield, Newtown, Redding, and Ridgefield.

Middletown Area Transit District (MAT) (www.middletownareatransit.org)

The Middletown Transit District operates urban and rural fixed route service as well as senior/disabled paratransit services in five towns including Portland, East Hampton, Middlefield, Durham and Middletown. Fixed route bus service operates 6 days a week, Monday through Saturday.

Milford Transit District (www.milfordtransit.com)

Milford Transit serves the city of Milford with fixed route bus service and ADA van service. There are four local routes, operating Monday through Saturday, and one bus route connecting Milford to Norwalk as part of the Coastal Link, which operates 7 days a week. The ADA van service also travels to Greater New Haven and Greater Bridgeport, and operates 7 days a week.

Northeastern Connecticut Transit District (NECTD) (www.nectd.org)

The District provides deviated fixed route service (Monday through Sunday) for Brooklyn, Killingly, Putnam and Thompson. NECTD further provides point-to-point services for elderly and disabled persons through the Municipal Grant Program for Brooklyn, Canterbury, Eastford, Hampton, Killingly, Plainfield, Pomfret, Putnam, Sterling, Thompson, Voluntown and Woodstock.

Northwestern Connecticut Transit District (NWCTD) (www.nwcttransit.com)

Provides service in Torrington, Harwinton, Winchester, Litchfield, Morris, Kent, Sharon, Falls Village, Colebrook, Goshen, Salisbury, Norfolk, New Hartford, Cornwall, Canaan, and Barkhamsted. Service operates over 5 fixed routes Monday through Friday and on 1 route Saturdays. Paratransit service for all towns, seniors ride for a suggested donation.

Norwalk Transit District (www.norwalktransit.com)

The District services the communities of Norwalk, Westport, Wilton, Greenwich, and via the Coastal link to Fairfield, Bridgeport, Stratford, and Milford. Fixed routes for bus service on 23 routes operate Monday through Saturday, and Coastal Link service runs on Sunday. Norwalk Transit District provides local and inter-town door-to-door services for the disabled in seven towns, complementary ADA service in Westport and Norwalk, and under contract to CTDOT, complementary ADA service in Stamford, Darien, and Greenwich.

Southeast Area Transit District (SEAT) (www.seatbus.com)

Fixed route service is provided Monday through Saturday over 19 routes to nine towns, including Norwich, New London, Groton, Waterford, East Lyme, Griswold, Montville, and Stonington. Four buses operate on Sunday between the New London train station, Mystic, and the Foxwoods Resort.

Complementary ADA paratransit service is provided through the Eastern Connecticut Transportation Consortium.

Valley Transit District (www.valleytransit.org)

Valley Transit District's primary responsibility is to provide Dial-a-Ride service. Valley Transit District also provides complementary ADA paratransit service to the towns of Ansonia, Derby, Seymour, and Shelton. Rides are available Monday through Friday between 6 a.m. and 5 p.m., and Saturday from 9 a.m. to 6 p.m.

Windham Region Transit District (WRTD) (www.wrtd.net)

Operates fixed route rural bus service in Mansfield and Windham Monday through Saturday, and demand-response service in Ashford, Chaplin, Columbia, Coventry, Hampton, Lebanon, Mansfield, Scotland, Willington, and Windham. Complementary ADA paratransit service throughout 10 towns is contracted.

5310 Program and Other Participating Transit Providers

Enhanced Mobility for Seniors and Individuals with Disabilities. The Section 5310 grant program is open to private nonprofit organizations, states or local government authorities, and operators of public transportation. CTDOT conducts a competitive selection process for the Section 5310 grant program. Each year, application materials are made available to eligible recipients, which are reviewed and prioritized for award by CTDOT and the Regional Council of Governments.

CTDOTs 5310 grant program funds 111 cutaway vehicles operating "Open Door" transportation services throughout 54 Towns and or nonprofit organizations. The list of 5310 subrecipients is included in Appendix A.

Town of Mansfield

(<http://www.mansfieldct.gov/TransportationCenter>)

The Town owns and operates the Nash-Zimmer Transportation Center. The Nash-Zimmer Transportation Center serves as a central transportation hub for UConn, Windham Region Transit District, CTtransit and inter-city bus systems including Peter Pan. The Center is the Town of Mansfield's transportation hub where residents and visitors can catch a bus, store their bike or park their car. The facility is located adjacent to the Downtown Storrs parking garage at 23 Royce Circle, Storrs Mansfield, CT and operates Monday through Friday 7AM to 7PM, and Saturday 10AM to 6PM.



Mashantucket Pequot Tribal Nation

(<https://www.mptn-nsn.gov/CommunityBus.aspx>) opted to participate in the CTDOT Group-TAMP through recommendation from the FTA's Region 1 office. Mashantucket Pequot Tribal Nation is an American Indian tribe in Connecticut and as per 49 CFR 625.5 is a Tier II provider.

Mashantucket Pequot's own two revenue vehicles and additionally provides transportation service through twenty-five vehicles owned and operated by Foxwoods Casino. Bus Service is provided at sixteen bus stop locations on the Reservation to Foxwoods Casino.

Table 1-1. Group-TAMP Participants and Accountable Executives

Transit Provider	Accountable Executive
Greater Bridgeport Transit Authority	Doug Holcomb, General Manager/CEO
The Estuary Transit District	Joseph Comerford, Executive Director
Greater New Haven Transit District	Kimberly Dunham, Executive Director
Housatonic Area Regional Transit District	Eric Bergstraesser, CEO
Middletown Transit District	Lisa Seymour, Administrator
Milford Transit District	Henry Jadach, Executive Director
Northeastern Connecticut Transit District	John Filchak, Executive Director
Northwestern Connecticut District	Carol Deane, Executive Director
Norwalk Transit District	Kimberlee Morton, CEO
Southeast Area Transit District	Michael Carroll, General Manager
Valley Transit District	Mark Pandolfi, General Manager
Windham Region Transit District	Joseph Comerford, Interim
Town of Mansfield	Cynthia van Zelm, Executive Director Mansfield Downtown Partnership
Mashantucket Pequot Tribal Nation	Kevin Gove, Public Works Executive Director

Agency Structure Regarding TAM

CTDOT is the sponsor of this Group-TAMP and also developed its own Tier I TAM plan. Each transit district was able to participate in a series of working group meetings coordinated by CTDOT to develop the Group-TAMP.

CTDOT has a Transit Asset Management Unit (PT TAM Unit) within the Bureau of Public Transportation which reports to the Bureau Chief. The PT TAM Unit is responsible for preparing the Tier I and Tier II TAM Plans, collaborating with contracted transit providers for National Transit Database (NTD) reporting requirements and coordinating with the agency lead for future development of CTDOT's multimodal TAM plan. A TAM Implementation Committee will be created to support future TAM

implementation activities. The current Bureau of Public Transportation structure for TAM is presented in Figure 1-1.

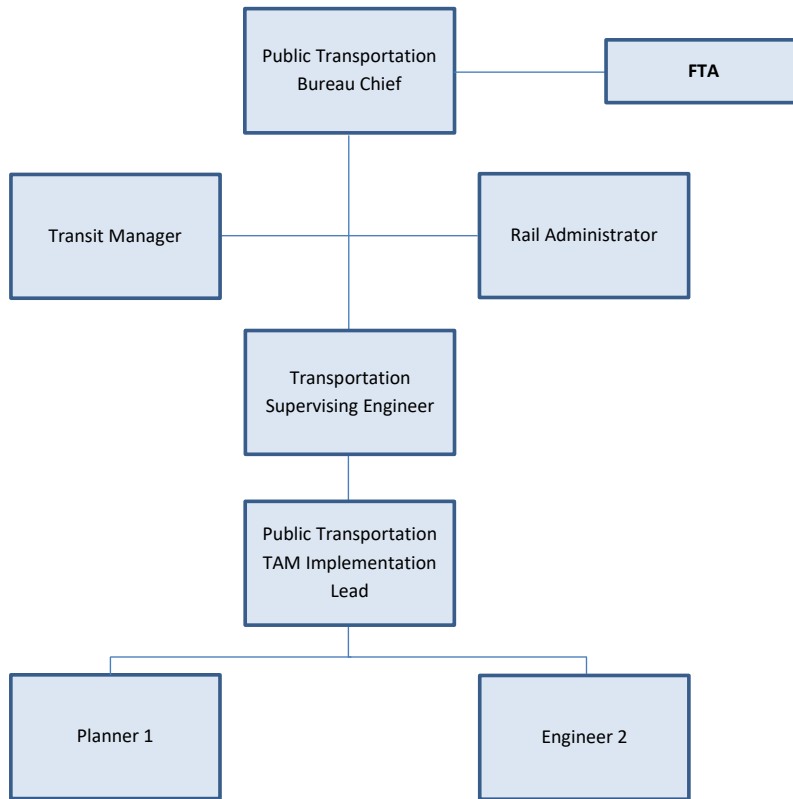


Figure 1-1. Bureau of Public Transportation TAM Organizational Structure

Group-TAMP

Purpose of the Group-TAMP

The Group-TAMP is a federally-required document intended to document TAM practices and processes at Tier II transit providers in Connecticut. The Group-TAMP will help transit providers manage transit assets to enhance safety, reduce maintenance costs, increase reliability, and improve performance. TAM will help transit providers maintain the transportation system in SGR with the most efficient use of financial resources.

Scope of the Group-TAMP

This is a Group-TAMP for Tier II providers, sponsored by CTDOT. The Tier II providers in this Group-TAMP have assets in three of the four categories defined by FTA: rolling stock, equipment, and facilities. A summary of transit assets in this plan is shown in Figure 1-2.

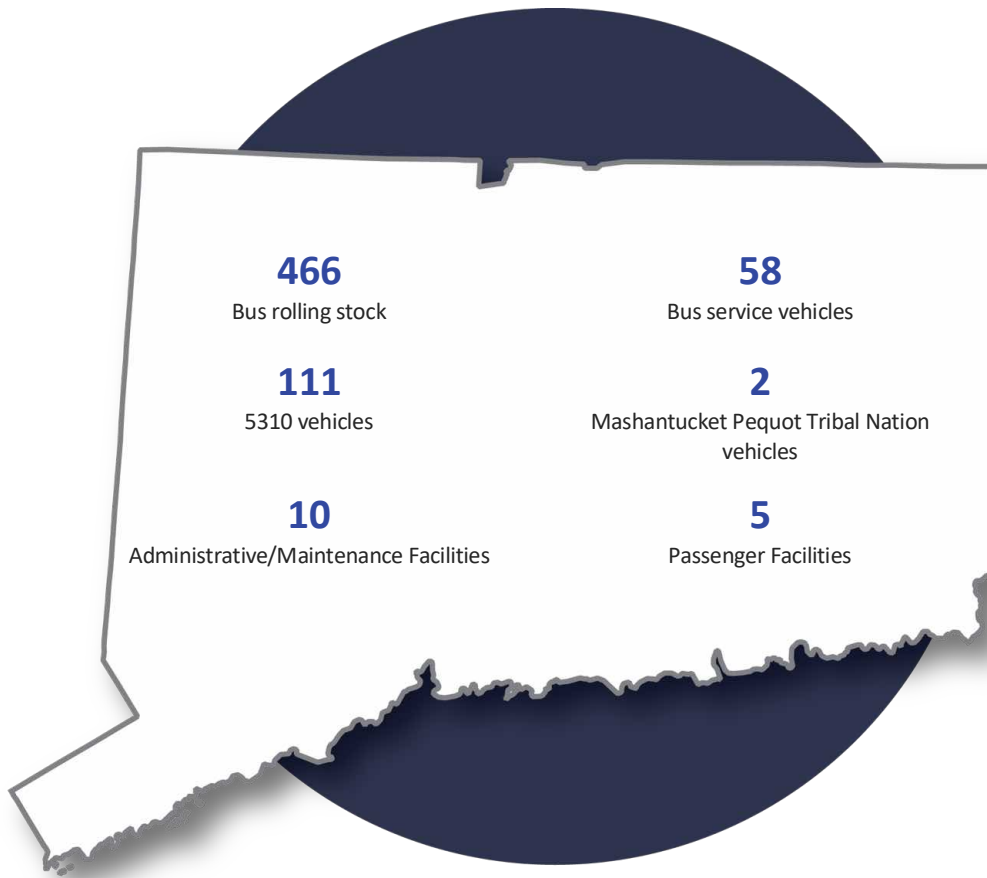


Figure 1-2. Connecticut Group-TAMP Inventory Summary

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

Related CTDOT Plans

Transportation Infrastructure Capital Plan Report

<http://www.ct.gov/dot/cwp/view.asp?a=1383&q=454340>

Let's Go CT!

<http://www.transformct.info>

Statewide Transportation Improvement Program

<http://www.ct.gov/dot/cwp/view.asp?a=3529&q=447186>

Statewide Long-Range Transportation Plan

<http://www.ct.gov/dot/cwp/view.asp?a=1383&q=259760>

Public Transportation Transit Asset Management Plan

Group-TAMP Building Process

The Group-TAMP building process began in July 2017. Initially twelve Connecticut transit districts, CTDOT, and the FTA were involved in the development of this Group-TAMP.

The PT TAM Unit reviewed existing asset hierarchies and developed new asset hierarchies, developed approaches for assessing asset condition, and modeled SGR needs. Documents produced during these initial stages laid the foundation for the writing of the Group-TAMP. Asset fact sheets have been developed as part of the Group-TAMP building process to provide quick reference summaries for each asset highlighting the asset's inventory and condition, targets, and needs.

CTDOT formed a working group of relevant staff for the Group-TAMP, including representatives from the transit districts. The working group supported the development of the Group-TAMP and met periodically to review and provide feedback on the Group-TAMP development process.

5310 participants were surveyed for validation of "open door" service requirements by FTA for participation. Inventory data of 5310 assets used in the provision of "open door" service was supplied by the 5310 participants and validated by the PT TAM Unit.

The Town of Mansfield and Mashantucket Pequot Tribal Nation were added to the Group-TAMP and supplied the inventory and condition data for their transit assets. As CTDOT moves forward with TAM implementation, support and participation from all Group Plan participants will be essential. This Group-TAMP is a living document that will be reviewed and updated every four years.

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 transit providers across Connecticut by reducing costs.



Overview

As indicated by their participation in this Group-TAMP, the Tier II transit providers in Connecticut are committed to the same goals and objectives as CTDOT. Separately from this Group-TAMP, each provider has developed specific facility and vehicle management plans which detail their policies and practices for managing those assets.

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 Group-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 state of good repair (SGR) and lays out CTDOT's TAM policy.

Federal Legislative Context

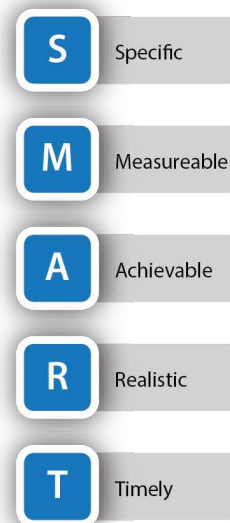
Tier II providers are not required to include a TAM and SGR policy in their individual or group TAM plan. However, it is good practice to define and document asset management goals, objectives and policies.

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 state. Tier II transit providers support these goals and objectives.

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 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 agency 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. Tier II transit providers added to the list of TAM objectives at a TAM workshop during the Group-TAMP development process.

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

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

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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 an agency'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 transit asset inventory and condition for Connecticut Group-TAMP participants. This Group-TAMP addresses bus rolling stock; equipment; and bus facilities.

Federal Legislative Context

FTA requires that Group-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.
- **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.

For Group-TAMP, the Sponsor must set unified performance targets for each asset class in the plan. These targets must be reported to the NTD by the Sponsor on behalf of the Group-TAMP participants.

Useful Life Benchmark

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

Connecticut Group-TAMP Assets

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

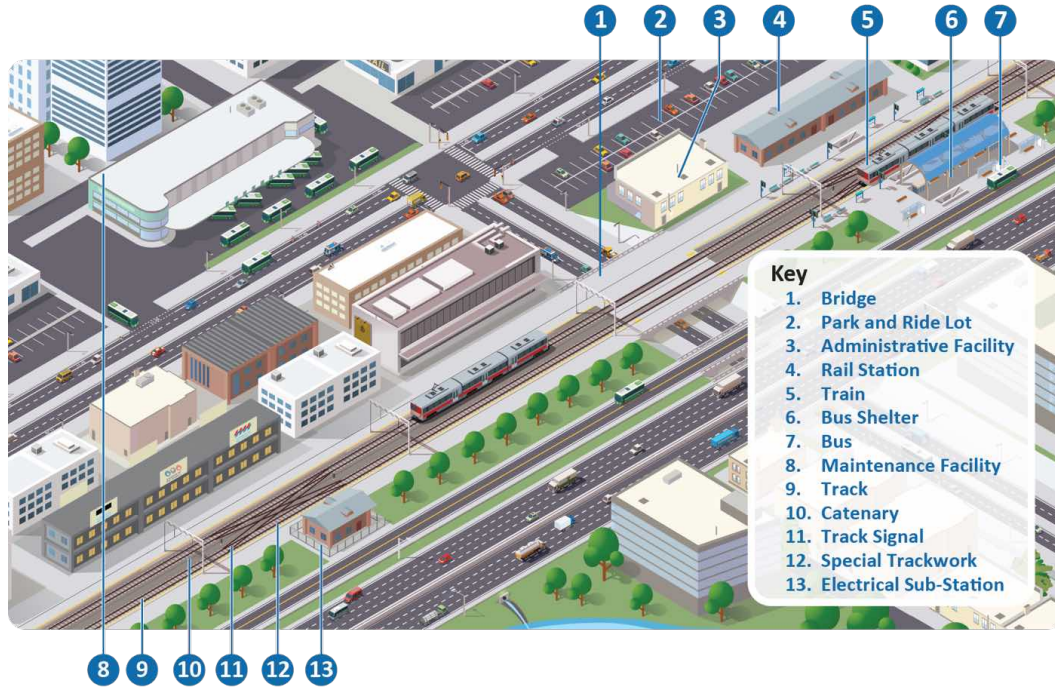


Figure 3-1. Transportation Assets in Connecticut

This Group-TAMP focuses on three transit assets categories: rolling stock, equipment, and facilities. Plan participants own or operate bus service; equipment; and passenger and maintenance facilities for bus. The Group-TAMP asset hierarchy is presented in Figure 3-2.

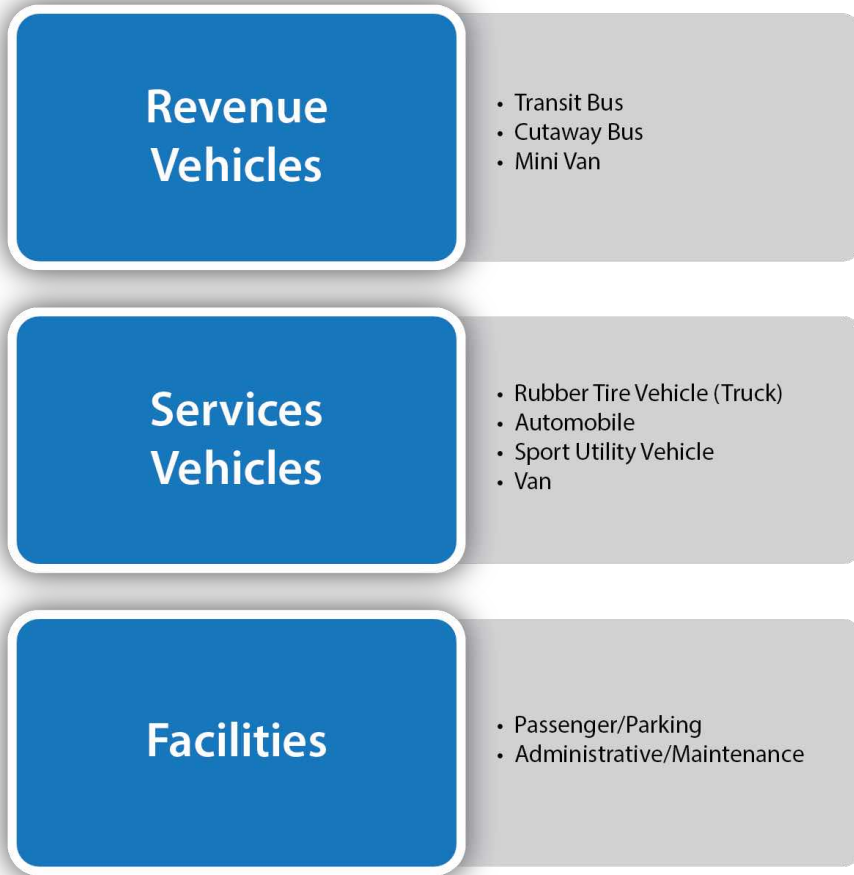


Figure 3-2. Group-TAMP Asset Hierarchy

Connecticut Group-TAMP Transit System Summary

The combined assets of the twelve Transit District TAM plan participants include:

- 466 revenue vehicles
- 58 service vehicles
- 10 administrative / maintenance facilities
- 4 passenger facilities

Additional Tier II providers are included in the inventory. The combined assets of these other Tier II providers include:

- 111 vehicles (funded under FTA Section 5310)
- 1 passenger facility – Town of Mansfield
- 2 revenue vehicles – Mashantucket Pequot Tribal Nation

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

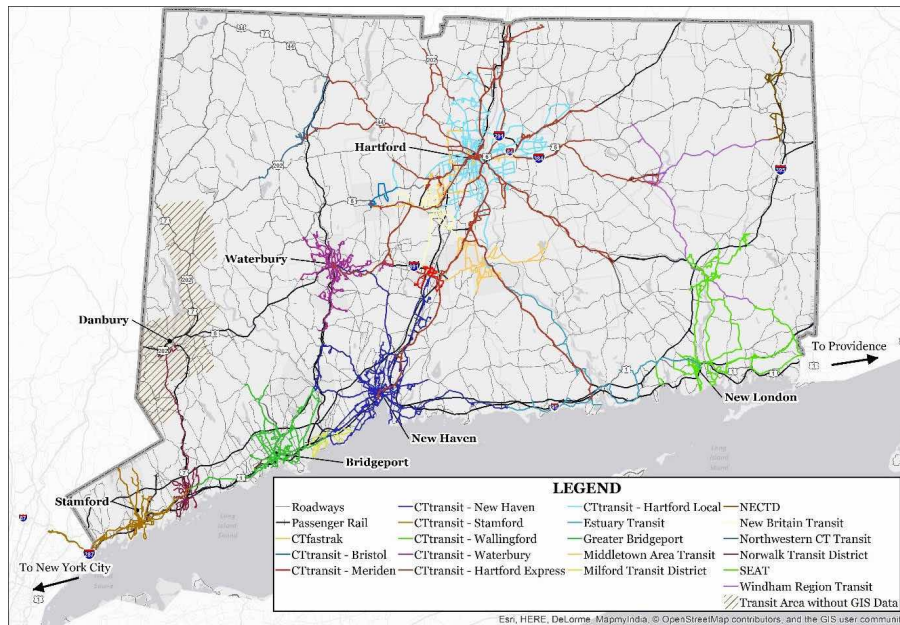


Figure 3-3. Bus Service in Connecticut

Transit districts are shown below in Figure 3-4. Note that Greater Hartford Transit District is a Tier I provider and is not included in this plan. Also, Greater Waterbury does not provide transit services and is not included in this plan. Northeastern CT Transit District also serves the Towns of Hampton and Voluntown.

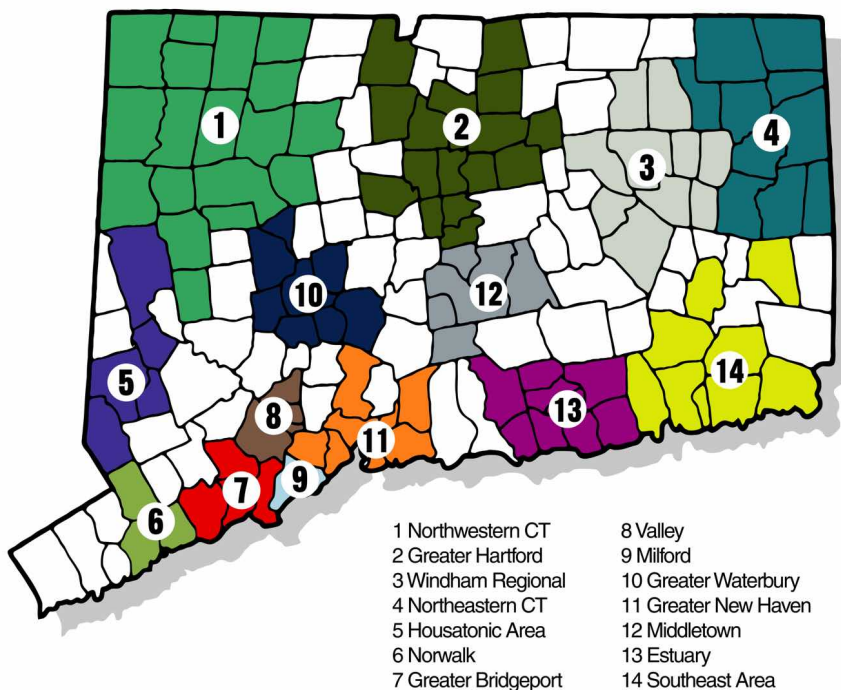


Figure 3-4. Transit Districts in Connecticut

Monitoring and measuring transit asset conditions enables transit providers 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 Group-TAMP uses definitions of asset condition and SGR developed by CTDOT and the Group-TAMP participants and consistent with FTA’s mandated performance measures.

Communication

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

Asset Data and Inventory Development

In CTDOT's Transit Gap Analysis, conducted prior to the development of the Group-TAMP, one gap was that CTDOT lacked a sophisticated asset inventory system that contained sufficient data to support capital decision making. CTDOT's existing system for inventory tracking is a statewide financial management system called CORE-CT that is stewarded by the Bureau of Finance and Administration. While CORE-CT provides useful information such as asset ID's, asset age, and asset costs, the system provides limited asset management capabilities. As part of the development of the PT-TAMP, CTDOT defined and populated an asset inventory, the SGR Transit Database.

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 transit districts and staff to determine what should be considered a capital asset, what information should be collected, and where it should be stored.

The second task was the collection of inventory data from the transit service providers and CTDOT Capital Services unit. Transit asset inventory and condition data was collected from the individual transit service providers and authenticated by the PT TAM Unit. Data was input into the SGR Transit Database after final validation of the transit asset inventory by the PT TAM Unit. The data resources contributing to the SGR Transit Database are depicted in Figure 3-5.

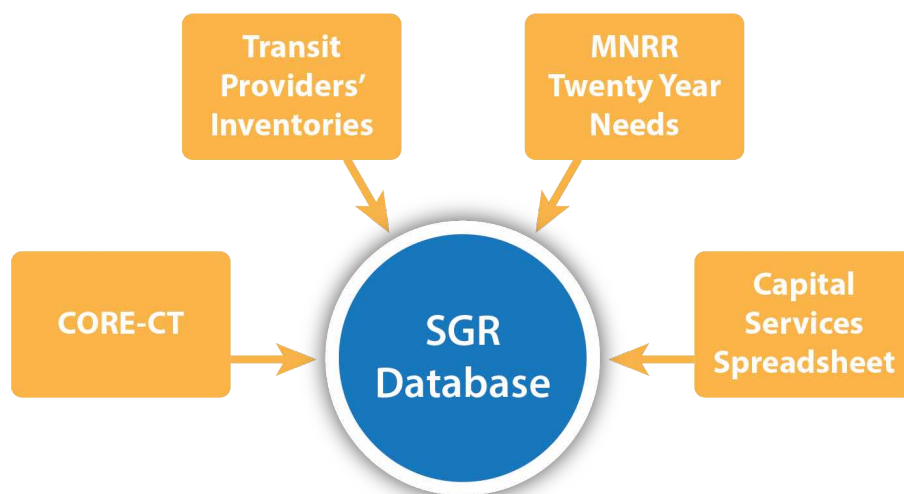


Figure 3-5. Data Resources for SGR Inventory

Rolling Stock and Equipment

Bus

The PT TAM Unit held several meetings with working groups composed of the transit service providers and CTDOT staff. The process of developing an asset inventory is one of the key elements of the TAMP Plan. 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 SGR Transit Database.

Facilities

Administrative/Maintenance

Inventory data on Tier II facilities and the level of detail stored on each facility is limited. Thus, for the purpose of developing its Group-TAMP, CTDOT extracted data on administrative/maintenance facilities from various sources.

Existing condition data available for administrative/maintenance facilities varied by specific type of facility. Some transit districts, such as GBTA and Norwalk Transit, recently performed detailed, component-level condition assessments. For these facilities, the PT TAM Unit extracted component-level data to calculate the overall condition of the facility, according to the condition assessment approach presented in this chapter.

For other facilities, 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.

Passenger

Inventory data on Connecticut Tier II passenger facilities are stored in the transit providers' asset registries. The level of detail stored on each facility varies. Thus, for the purpose of developing its Group-TAMP, CTDOT extracted data on passenger facilities from the transit providers' asset registries and imported the data to the SGR Transit Database.

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. This Group-TAMP includes bus rolling stock.

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.

Transit districts provide bus service in areas not already served by CTDOT and CTtransit. The districts provide both fixed route, deviated fixed route and demand response service, and are managed by Boards of Directors representing the towns in the districts. Districts operate a variety of vehicle types, which are defined in the 2017 NTD Glossary¹.

Rolling Stock

Revenue vehicle used
in providing public
transportation

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

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.



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 8 or more passengers and may accommodate some standing passengers.



Minivan: A light duty vehicle having a typical seating capacity of up to four passengers plus a driver; and may accommodate a wheelchair. A minivan is smaller, lower and more streamlined than a full-sized van, but it is typically taller and has a higher floor than a passenger car. Minivans normally cannot accommodate standing passengers.

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 the Northeast further adds to the deterioration of vehicles caused by salt and chemical treatments of the roads in Connecticut. The 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
Cutaway	10	5
Minivan	8	5

Bus Inventory and Conditions

Inventory registries of Connecticut transit providers are individually maintained by the providers. CTDOT Capital Services Unit maintains an inventory of all Connecticut transit providers’ buses. For the purpose of developing the Group-TAMP, PT-TAM unit compared and validated revenue vehicle data from CORE-CT where applicable, CT Capital Services and transit providers’ registries, aggregated it by fleet, and imported the data into the SGR Transit Database.

In total, the Group-TAMP participants own 466 revenue vehicles, as well as 111 vehicles funded through FTA Section 5310 and 2 revenue vehicles owned by the Mashantucket Pequot Tribal Nation. Condition data for vehicles funded through FTA Section 5310 are not included in the TAPT prioritization model discussed in chapter four.

Table 3-2 summarizes bus inventory and condition for all transit districts in the Group-TAMP.

Table 3-2. Tier II Bus Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Transit Bus	183 vehicles	76%	24%	
Cutaway Bus	277 vehicles	54%	46%	
Minivan	6 vehicles	100%	0%	

Tables 3-3 through Table 3-16 summarize bus inventory and condition, organized by transit provider.

Table 3-3. ETD Bus Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Cutaway Bus	16 vehicles	25%	75%	

Table 3-4. GBTA Bus Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Transit Bus	57 vehicles	91%	9%	
Cutaway Bus	30 vehicles	87%	13%	

Table 3-5. GNHTD Bus Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Cutaway Bus	73 vehicles	77%	23%	
Minivan	6 vehicles	100%	0%	

Table 3-6. HART Bus Inventory and Condition



Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Transit Bus	28 vehicles	100%	0%	
Cutaway Bus	40 vehicles	58%	42%	

Table 3-7. MAT Bus Inventory and Condition



Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Transit Bus	10 vehicles	100%	0%	
Cutaway Bus	10 vehicles	100%	0%	

Table 3-8. MlfdTD Bus Inventory and Condition



Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Transit Bus	10 vehicles	90%	10%	
Cutaway Bus	11 vehicles	100%	0%	

Table 3-9. NECTD Bus Inventory and Condition


Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Cutaway Bus	10 vehicles	0%	100%	

Table 3-10. NWCTD Bus Inventory and Condition


Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Cutaway Bus	20 vehicles	25%	75%	

Table 3-11. NWLKT D Bus Inventory and Condition



Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Transit Bus	50 vehicles	50%	50%	
Cutaway Bus	31 vehicles	32%	68%	

Table 3-12. SEAT Bus Inventory and Condition



Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Transit Bus	23 vehicles	52%	48%	
Cutaway Bus	5 vehicles	100%	0%	

Table 3-13. VTD Bus Inventory and Condition


Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Cutaway Bus	14 vehicles	0%	100%	

Table 3-14. WRTD Bus Inventory and Condition




Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Transit Bus	5 vehicles	60%	40%	
Cutaway Bus	17 vehicles	0%	100%	

Table 3-15. FTA Section 5310 Bus Inventory and Condition

Asset Type	Inventory
Cutaway Bus	111 vehicles

Table 3-16. Mashantucket Pequot Tribal Nation

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Cutaway Bus	2 vehicles	100%	0%	

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 rights-of-way.

Note that the transit providers inventory includes a small number of additional pieces of equipment valued at \$50,000 or more, but these are not detailed here. Please refer to Appendix G for a detailed list.

Service Vehicle Types



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



Rubber Tire Vehicles (Trucks): 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.

Equipment Condition Assessment and Performance Measures

Connecticut’s transit districts use the same basic approach for assessing condition of equipment as for rolling stock. Specifically, a 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 ULBs for equipment are listed in Table 3-17.

Table 3-17. Custom ULB Values for Equipment

Asset Type	FTA Default ULB (years)	Connecticut ULB (years)
Truck	14	14
Automobile	8	5
Sport utility vehicle	8	5
Van	8	5

Equipment Inventory and Condition

In total, the Group-TAMP participants own 58 service vehicles. Table 3-18 summarizes service vehicle inventory and condition for all transit districts in the Group-TAMP. Equipment other than service vehicles valued below \$50,000 is not required to be included in this inventory. Many of the Tier II transit providers have equipment valued below \$50,000 which is not reflected in this inventory.

Table 3-18. Tier II Bus Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Truck	22 vehicles	68%	32%	
Automobile	3 vehicles	0%	100%	
SUV	28 vehicles	71%	29%	
Van	5 vehicles	60%	40%	

Tables 3-19 thru 3-28 summarize equipment inventory and condition, organized by service provider.

Table 3-19. ETD Equipment Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
SUV	3 vehicles	67%	33%	

Table 3-20. GBTA Equipment Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Truck	6 vehicles	50%	50%	
Automobile	2 vehicles	0%	100%	
SUV	6 vehicles	50%	50%	

Table 3-21. GNHTD Equipment Inventory and Condition



Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Truck	2 vehicles	100%	0%	
SUV	4 vehicles	100%	0%	

Table 3-22. HART Equipment Inventory and Condition




Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Truck	3 vehicles	67%	33%	
SUV	5 vehicles	60%	40%	
Van	2 vehicles	0%	100%	

Table 3-23. MAT Equipment Inventory and Condition



Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Truck	2 vehicles	100%	0%	
Van	1 vehicles	100%	0%	

Table 3-24. MlfdTD Equipment Inventory and Condition



Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Truck	2 vehicles	100%	0%	
SUV	1 vehicles	100%	0%	

Table 3-25. NWLKTD Equipment Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Truck	2 vehicles	50%	50%	
Automobile	1 vehicles	0%	100%	
SUV	3 vehicles	67%	33%	

Table 3-26. SEAT Equipment Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Truck	4 vehicles	75%	25%	
SUV	4 vehicles	75%	25%	
Van	2 vehicles	100%	0%	

Table 3-27. VTD Equipment Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
Truck	1 vehicles	0%	100%	
SUV	1 vehicles	100%	0%	

Table 3-28. WRTD Equipment Inventory and Condition

Asset Type	Inventory	Vehicles below ULB	Vehicles met or exceeded ULB	
SUV	1 vehicles	100%	0%	

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

Facilities

Connecticut transit districts own and operate two basic types of transit facilities: 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.

Facility 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. Examples include

- 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

Administrative/Maintenance Facilities

Administrative/Maintenance Facility Condition Assessment and Performance Measures

Connecticut transit districts assess facility condition 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. CTDOT’s approach, which was developed with input from the transit districts, is detailed in a Condition Assessment Guidance document.

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 3-29. The components are listed in Table 3-30.

Table 3-29. 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 3-30. 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	20	1.0
Building	Conveyance	See Table 5	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 3-30 with the conversion scale shown in Table 3-31. Useful life is the average amount of time in years that an item, component, or system is economically efficient to keep in operation.

Table 3-31. 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. Transit districts use the results from those inspections in performing their condition assessment, applying the condition assessment scale shown in Table 3-32 for these components.

Table 3-32. 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 weight factor listed in Table 3-19, and r_i is the replacement cost of the component.

Administrative/Maintenance Facility Inventory and Condition

Inventory data on Connecticut facilities are stored in the SGR Transit Database. The Transit Districts own their administrative/maintenance facilities, with the exception of WRTD and SEAT in which CTDOT has 100% capital responsibility. Thus, for the purpose of developing its Group-TAMP, CTDOT extracted data on administrative/maintenance facilities from the transit providers’ asset registries, then manually reviewed data for each facility.

Except in the case of NWLKT and GBTA facilities that have recently undergone a formal condition assessment, component-level condition ratings were established using engineering judgement to determine an overall facility rating. The VTD administrative/maintenance facility recently built and opened in 2018 underwent a Commissioning Final Report on June, 25, 2018 which concluded the facility should be rated a 5 on the TERM scale.

In total, the transit districts own ten administrative/maintenance facilities, three of which have current condition data based on a formal condition assessment as shown in Table 3-33. Note that regardless of whether a formal condition assessment has been performed, a facility with an overall condition

rating of 3 or greater may still have outstanding SGR needs for certain components.

Table 3-33. Administrative/Maintenance Facility Formal Condition Assessments by Transit District

Transit District	Administrative/Maintenance Facilities Formal condition assessment
GBTA	Yes
NWLK	Yes
VTD	Yes
GNHTD	No
HART	No
MAT	No
MLFD TD	No
SEAT	No
WRTD	No

Tables 3-34 through 3-36 summarize the administrative/maintenance facility inventory and condition for Connecticut transit districts for which formal condition assessments have been performed.

Table 3-34. GBTA Administrative/Maintenance Facility Inventory and Condition


Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Administrative/Maintenance Facility	1 facilities	100%	0%	

Table 3-35. NWLK TD Administrative/Maintenance Facility Inventory and Condition


Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Administrative/Maintenance Facility	1 facilities	100%	0%	

Table 3-36. VTD Administrative/Maintenance Facility Inventory and Condition

Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Administrative/Maintenance Facility	1 facilities	100%	0%	

Tables 3-37 through 3-42 summarize the administrative/maintenance facility inventory and condition for Connecticut transit districts for which formal condition assessments have not been performed. These condition ratings are based on visual engineering inspections.

Table 3-37. GNHTD Administrative/Maintenance Facility Inventory and Condition


Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Administrative/Maintenance Facility	1 facilities	100%	0%	

Table 3-38. HART Administrative/Maintenance Facility Inventory and Condition


Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Administrative/Maintenance Facility	1 facilities	100%	0%	

Table 3-39. MAT Administrative/Maintenance Facility Inventory and Condition


Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Administrative/Maintenance Facility	2 facilities	100%	0%	

Table 3-40. MfD Administrative/Maintenance Facility Inventory and Condition


Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Administrative/Maintenance Facility	1 facilities	100%	0%	

Table 3-41. SEAT Administrative/Maintenance Facility Inventory and Condition



Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Administrative/Maintenance Facility	1 facilities	100%	0%	

Table 3-42. WRTD Administrative/Maintenance Facility Inventory and Condition

Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Administrative/Maintenance Facility	1 facilities	100%	0%	

Passenger Facilities

In total, Connecticut transit districts own 4 passenger facilities and the Tier II provider of the Town of Mansfield owns 1 passenger facility.

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.

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 3-29. The components are listed in Table 3-43.

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 3-43. Passengers 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	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	
Platform	Electrical		30	
Site	Site		50	

*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 3-31 lists rating values to use if the agency uses age as a proxy for condition. Table 3-32 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 3-43, and r_i is the replacement cost of the component.

Passenger Facility Inventory and Condition

Inventory data on CTDOT facilities are stored in the SGR Trans Database. For Tier II facilities, 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.

In total, the transit providers own five passenger facilities. Table 3-44 summarizes passenger facility inventory and condition for all transit providers in the Group-TAMP. These condition ratings are based on visual engineering inspections.

Table 3-44. Tier II Passenger Facility Inventory and Condition

Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Passenger Facility	5 facilities	100%	0%	

Tables 3-45 thru 3-49 summarize passenger facility inventory and condition.

Table 3-45. GBTA Passenger Facility Inventory and Condition


Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Passenger Facility	1 facilities	100%	0%	

Table 3-46. HART Passenger Facility Inventory and Condition


Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Passenger Facility	1 facilities	100%	0%	

Table 3-47. MAT Passenger Facility Inventory and Condition

Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Passenger Facility	1 facilities	100%	0%	

Table 3-48. NWLKTD Passenger Facility Inventory and Condition


Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Passenger Facility	1 facilities	100%	0%	

Table 3-49. Town of Mansfield Passenger Facility Inventory and Condition

Asset Type	Inventory	Rated 3 or above on TERM scale	Rated below 3 on TERM scale	
Passenger Facility	1 facilities	100%	0%	

FTA Performance Measures

As mentioned throughout this chapter, FTA has established SGR performance measures for the three capital asset categories required for a Group-TAMP. Transit providers must set one-year performance targets for each applicable performance measure. These targets must be updated and submitted to the NTD annually. For a Group-TAMP, the Sponsor must set unified performance targets for each asset class in the plan. These targets must be reported to the NTD by the Sponsor on behalf of the Group-TAMP participants.

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:

$$\text{Target (\%)} = \# \text{ of years to procure asset} / \text{ULB} + 2 \text{ years to procure}$$

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

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. Please refer to Appendix D to show which facilities have been formally inspected and those facilities still outstanding.

A summary of the FTA performance measures and Group-TAMP targets is provided in Tables 3-50 thru 3-52.

Table 3-50. FTA Performance Measures and Targets for Rolling Stock

Performance Measure	Asset Class	Current Performance	Performance Target
Percentage of vehicles that have met or exceed their ULB	Transit Bus	24%	14%
	Cutaway Bus	46%	17%
	Minivan	0%	17%

Table 3-51. FTA Performance Measures and Targets for Equipment

Performance Measure	Asset Class	Current Performance	Performance Target
Percentage of equipment that have met or exceed their ULB	Rubber Tire Vehicle (truck)	32%	7%
	Automobile	100%	17%
	SUV	29%	17%
	Van	40%	17%

Table 3-52. FTA Performance Measures and Targets for Facilities

Performance Measure	Asset Class	Current Performance	Performance Target
Percentage of facilities within an asset class, rated below condition 3 on the TERM scale.	Administrative/Maintenance	0%	0%
	Passenger	0%	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

As the sponsor for Connecticut’s Group-TAMP, CTDOT coordinated with participants in gathering asset data, developing an analytical process, and modeling transit investment needs for Tier II providers. This chapter describes CTDOT’s analytical approach for its transit assets, which is also the approach for the transit assets of Tier II providers in this Group-TAMP.

CTDOT’s approach for analyzing transit investment needs relies on two systems. First, the asset data described in Chapter 3 are stored in single, integrated database, the SGR Transit 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).

Federal Legislative Context

In 49 CFR 625.25, FTA requires that a group 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.”

SGR Transit Database

The SGR Transit Database is a relational database that integrates the asset condition inventory and condition data used to develop this plan. The database is a MySQL database deployed on the Amazon Relational Database Service. Pending development of customized forms, CTDOT and contractor staff access the database using commercial off the shelf (COTS) database clients, such as MySQLWorkbench. Figure 4-1 shows the database schema.

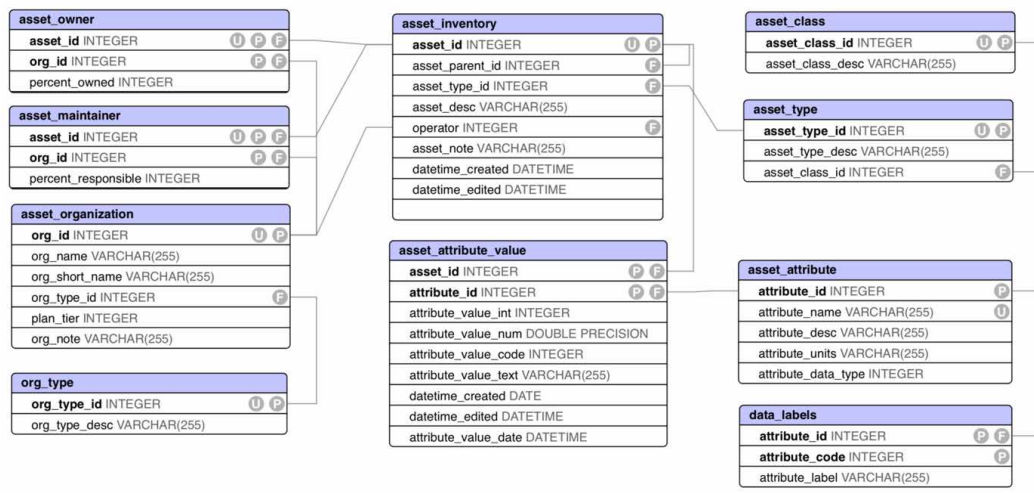


Figure 4-1. SGR Transit Database Schema

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.

In the database the list of assets is stored in the table `asset_inventory`. This table provides a description of each asset, identifies the asset type, and specify the organization responsible for operating the asset. The attribute values for each asset are stored in the table `asset_attribute_value`. This table has one record for each attribute of each asset. Additional tables specify organizations that may own, operate or maintain assets, as well as which organizations own and operate the various assets.

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 vehicle fleet, though the database structure supports specification of individual vehicles as well. 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. These views are accessed through MySQLWorkbench or other database clients. Also, project team members exported the views to spreadsheet form to facilitate review and verification of the data.

Analytical Tool

As noted above, CTDOT used TAPT to support its analytical approach. TAPT is a spreadsheet tool for predicting transit asset conditions and SGR 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.

Figure 4-2 is a diagram illustrating the structure of TAPT. 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.

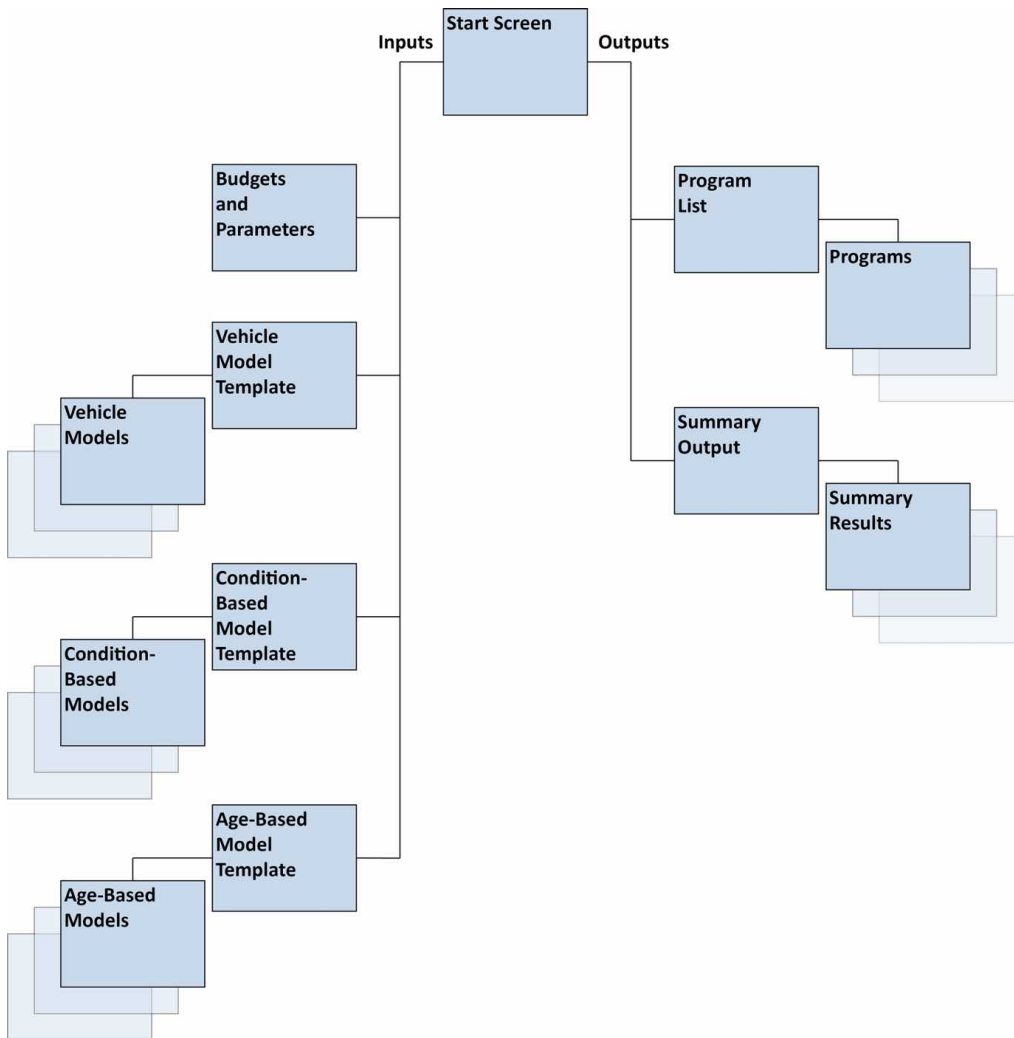


Figure 4-2. TAPT User Interface Organization

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.

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.

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.

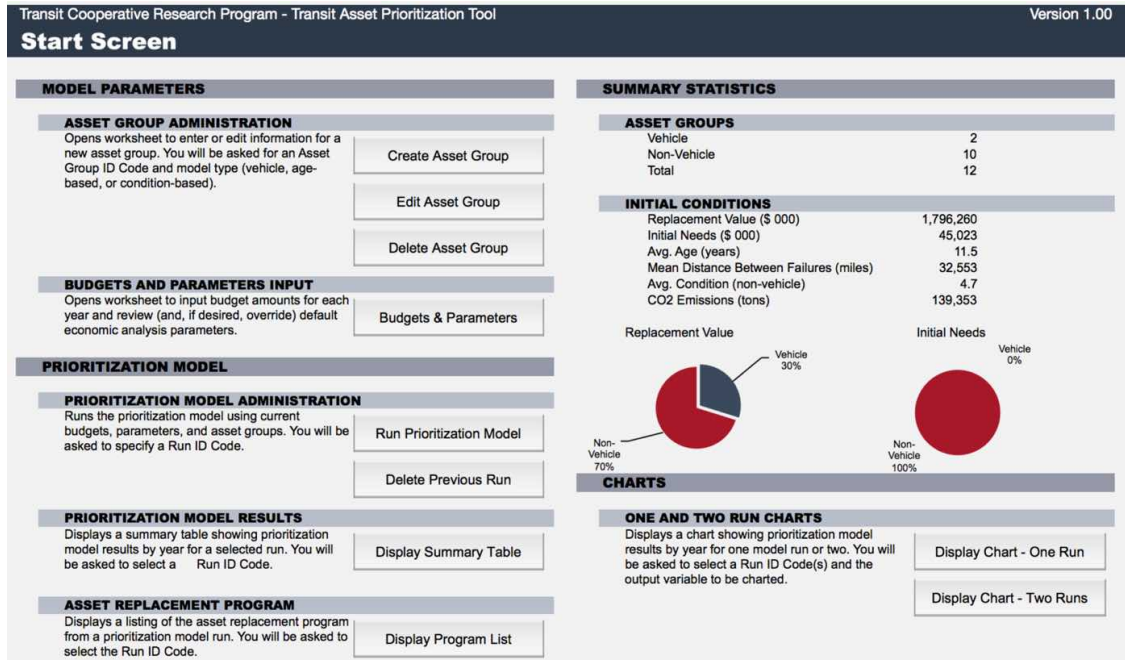


Figure 4-3. TAPT Start Screen

Transit Cooperative Research Program - Transit Asset Prioritization Tool
Condition-Based Model: Asset Group Roof

Asset Type: Facilities-Maintenance Building
 Asset Description: Roof
 Asset Units of Measure: square feet

DEFAULT REPLACEMENT AND REHABILITATION COSTS

Unit Agency Replacement Cost (\$) 20.75
 Unit Agency Rehabilitation Cost (\$) 26.75

INVENTORY DESCRIPTION

Asset Condition	Units of Assets	Project Code	Pipeline Year
2-Marginal	3,800	Roof-Maint01	
3-Adequate	3,750	Roof-Maint02	
2-Marginal	33,200	Roof-Maint03	
4-Good	5,300	Project-Maint04	
2-Marginal	9,250	Roof-Maint05	
3-Adequate	4,800	Project-Maint06	
3-Adequate	47,400	Project-Maint07	
4-Good	6,200	Roof-Maint08	
1-Poor	150	Project-Maint09	
3-Adequate	45,200	Roof-Maint10	
3-Adequate	9,700	Project01	2018
4-Good	6,100	Roof-Admin01	
2-Marginal	4,100	Roof-Admin02	
5-Excellent	9,100	Roof-Admin03	
5-Excellent	1,700	Roof-Admin04	

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	98.3%	85.0%	3.7%	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rehab	0.0%		100.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Replace	100.0%		0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4-Good	Do Minimum	0.0%		93.7%	75.0%	6.3%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rehab	0.0%		100.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Replace	100.0%		0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3-Adequate	Do Minimum	0.0%		0.0%		89.9%	60.0%	10.1%	40.0%	0.0%	0.0%	0.0%
	Rehab	0.0%		100.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Replace	100.0%		0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2-Marginal	Do Minimum	0.0%		0.0%		0.0%		84.1%	50.0%	7.9%	25.0%	25.0%
	Rehab	0.0%		100.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Replace	100.0%		0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1-Poor	Do Minimum	0.0%		0.0%		0.0%		0.0%		84.1%	50.0%	50.0%
	Rehab	0.0%		100.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Replace	100.0%		0.0%		0.0%	0.0%	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%	0.0%

Click for Main Menu

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 two new screens to the system, including screens for importing vehicle data and facility data from the SGR Transit Database (and/or other systems). With this functionality the tool user can quickly enter data on a set of vehicle fleets and facilities.

Figure 4-5 illustrates the start screen for the CTDOT version of TAPT providing access to the new 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 4-6 shows a section of the vehicle inventory screen. This screen has one row for each fleet exported from the SGR Transit 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 SGR Transit 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 SGR Transit 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 SGR Transit 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.

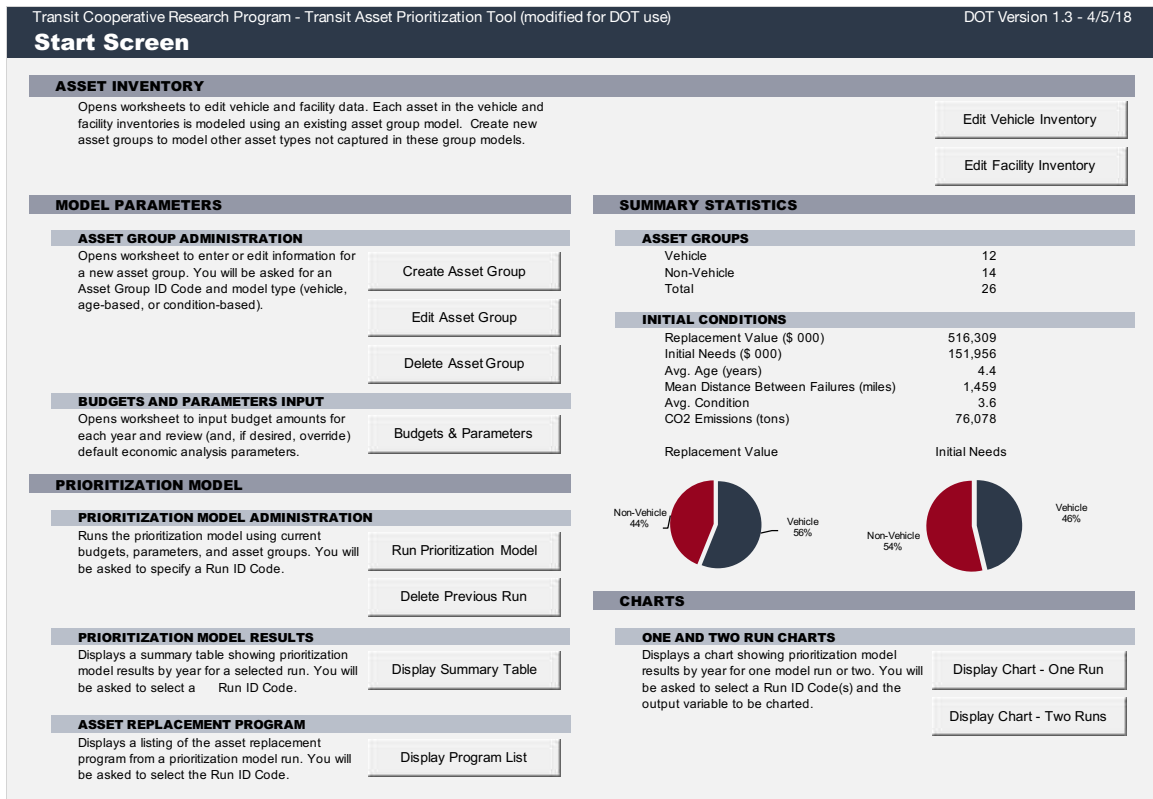


Figure 4-5. DOT TAPT Start Screen

Transit Cooperative Research Program - Transit Asset Prioritization Tool (modified for DOT use)											
Vehicle Inventory											
Agency	ID		Description	Vehicle Useful		Vehicle Type	Model Year	Total Current Miles/Hours	Num.		Age Model Year
	Default	Override		Life (miles)	Life (years)				Vehicles	Condition	
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		2017 Ford Startrans			Cutaway Bus	2017		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 4-6. 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 SGR Transit 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 category for Group TAMP assets.

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 through review of CTDOT data on recent bus purchases, adjusting historic costs to 2017 costs using the Consumer Price Index (CPI).

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 by averaging inflation-adjusted historic construction costs. CTDOT staff estimated the percentage of the overall facility cost attributed to each facility component.

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 through review of CTDOT data on recent service vehicle purchase, adjusting historic costs to 2017 costs using the CPI.

Business Processes to Support the Tool

Although the use of TAPT is an important element of the development of the Group-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, runs are performed in TAPT for buses. 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 incorporated 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 Group-TAMP is a product of the staff judgement, TAPT analysis, and institutional experience.

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 Group-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 bus 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 Legislative Context

In 49 CFR 625.25, FTA requires that a group 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 group 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.

Recently, the State of Connecticut implemented Let’s Go CT, a program which in part provides an influx of transit funds and accounts for a large percentage of transit funding in the short term. 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 Group-TAMP, organized by source, are shown in Table 5-1.

Note that the investment scenarios are not divided into Tier I and Tier II for the bus mode assets. This approach reflects CTDOT’s capital planning practices and allows CTDOT to analyze the needs of the entire transit system. The prioritized list of investment needs, presented in Chapter 6, is Tier-specific.

Table 5-1. Summary of Estimated Funding for Transit

Description	Value by Fiscal Year (\$M) in 2018 dollars			
	2018	2019	2020	2021
Federal Funds	\$193	\$192	\$195	\$195
FTA Funds	\$188	\$192	\$195	\$195
FTA Special Funds/Earmarks/New Starts	\$5	\$0	\$0	\$0
State Funds (Bonds Authorized)*	\$236	\$246	\$236	\$236
Let's GO CT	\$15	\$438	\$527	\$330
Let's Go CT Ramp-Up (Bonds Authorized)**	\$15	\$438	\$527	\$0
Additional State Funds Required to Sustain Program	\$0	\$0	\$0	\$330
Total Funding	\$445	\$876	\$958	\$761

*Combination of State Federal Match and 100% State Bonded Projects. Authorized only through 2019 in Accordance with the approved biennial Budget

**Authorized only but not appropriated through 2020

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 estimated federal funding by FTA program is shown in Table 5-2.

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

Description	Value by Fiscal Year (\$) in 2018 dollars			
	2018	2019	2020	2021
SEC 5305(d)	\$1,164,020	\$1,186,835	\$1,207,011	\$1,207,011
SEC 5305(e)	\$303,924	\$309,881	\$315,149	\$315,149
SEC 5307	\$104,585,517	\$106,635,393	\$108,448,195	\$108,448,195
Enhancement	\$0	\$0	\$0	\$0
Small Intensive Cities	\$2,424,030	\$2,471,541	\$2,513,557	\$2,513,557
Capital	\$102,161,487	\$104,163,852	\$105,934,638	\$105,934,638
SEC 5310	\$4,240,000	\$4,323,000	\$4,397,000	\$4,397,000
SEC 5311	\$3,119,678	\$3,180,824	\$3,234,898	\$3,234,898
SEC 5311(b)(3)	\$111,390	\$113,573	\$115,504	\$115,504
SEC 5337 (High Intensity Fixed Guideway)	\$69,134,272	\$70,489,304	\$71,687,622	\$71,687,622
Hartford	\$365,136	\$372,293	\$378,622	\$378,622
Southwestern	\$68,769,136	\$70,117,011	\$71,309,000	\$71,309,000
SEC 5337 (High Intensity Motorbus)	\$1,262,945	\$1,287,699	\$1,309,590	\$1,309,590
Hartford	\$1,262,945	\$1,287,699	\$1,309,590	\$1,309,590
SEC 5339	\$4,514,968	\$4,603,461	\$4,681,720	\$4,681,720
Earmarks	\$5,050,000	\$0	\$0	\$0
LOW-NO - GBTA	\$1,450,000	\$0	\$0	\$0
SEC 5339 Discretionary - Norwalk TD	\$3,600,000	\$0	\$0	\$0
Total	\$193,487,052	\$192,130,418	\$195,396,635	\$195,396,635

In order to generate investment scenarios for transit assets, the funding must be organized by mode (use) rather than by program (source). A summary of estimated funding uses for transit over the four-year period of the Group-TAMP, organized by mode, is shown in Table 5-3 below. This table includes all federal funding, however funding for non-SGR activities was excluded from the TAPT Model.

Federal fund use is split between bus and rail assets. Statewide bus funding for 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. The estimates of federal funding by mode shown in Table 5-3 are averages which can fluctuate depending on the projects being undertaken by mode each year. Table 5-3 also includes FTA planning funds.

For state public transportation bond funding, CTDOT traditionally assumes 20% will be dedicated to the bus program and 80% to the rail program. Again, within the State Public Transportation Bonds, the Bond funds are divided into State Match for Federal and projects with 100% State Funding. These estimates are an average which can fluctuate depending on actual projects underway in any given year.

Let's Go CT funding is authorized but not appropriated through 2020 only. The breakdown of Let's Go CT funding is required by legislation, not estimated. For year 2021, the estimated additional state funds required to sustain Let's Go CT are included.

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

Description	Value by Fiscal Year (\$M) in 2018 dollars			
	2018	2019	2020	2021
Bus	\$130	\$156	\$127	\$127
Federal	\$82	\$79	\$80	\$80
State Match	\$21	\$20	\$20	\$20
PT State Bonds	\$27	\$29	\$27	\$27
Let's Go CT	\$0	\$28	\$0	\$0
Other (FTA planning funds)	\$1	\$1	\$2	\$2
5310 Program	\$5	\$5	\$5	\$5
Total	\$146	\$162	\$133	\$133

Current Estimated Investment Needs

Current capital investment needs for bus for 2018 are approximately \$74 million. Figure 5-1 shows these investment needs for 2018 for the bus mode, broken down by asset category. Rolling stock constitutes 92% of CTDOT's bus mode need, equipment constitutes 5%, and facility constitutes 3%.

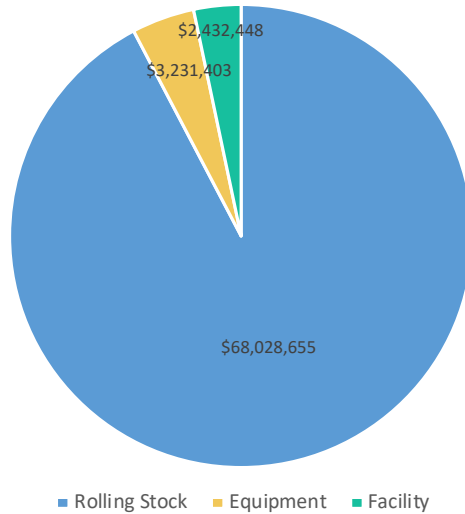


Figure 5-1. Estimated Investment Needs by Asset Category in 2018 (Bus Mode)

Investment Scenarios

This section builds on the estimated available funding to generate investment scenarios to help identify and prioritize state of good repair investments in capital assets. As described in Chapter 4, CTDOT uses TAPT to predict transit asset conditions and SGR investment needs. The Group-TAMP includes multiple investment scenarios:

- Scenario 1 - Federal Program with State Match Only
- Scenario 2 - Federal Program with State Match plus Remaining PT Annual Bond Program Funds
- Scenario 3 - Federal Program with State Match plus Remaining PT Annual Bond Program Funds plus Let's Go CT Program Funds

Projected Funding Level by Scenario

Each investment scenario is generated by modeling transit needs using a certain funding level, or budget. The budget is the variable input. TAPT

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.

models only certain SGR activities, so the corresponding budget should only include funding directed to those activities. For that reason, each SGR funding level used as a budget in the investment scenarios is derived from Table 5-3.

A budget for each of the three investment scenarios was defined in a multi-step process. The first step was to review the 2018 STIP and 2017 capital plan to categorize transit funding as either SGR or non-SGR activities for the four-year period of the Group-TAMP, organized by bus mode. Based on that review, the following percentages were calculated. Table 5-4 shows the percent of total funds used for modeled SGR activities, by source.

Table 5-4. Percent of Total Funds Used for Modeled SGR Activities, by Source

Description	Federal	State Match	PT State Bonds	Let's Go CT
Bus	49.0%	49.0%	0.0%	0.0%

Next, the total estimated SGR funding for bus, calculated by multiplying the percentages in Table 5-4 by the values in Table 5-3, was divided by the total overall funding for bus to calculate an estimated percent of total funds used for modeled SGR activities. As shown in Table 5-5, 36.5% of funds for bus are estimated to be used for SGR activities.

Table 5-5. Percent of Total Funds Used for Modeled SGR Activities

Description	Federal
Bus	36.5%

These percentages were applied to the total funding for transit in each investment scenario, shown in Table 5-6, in order to generate an estimated annual funding level for SGR activities, by year and mode.

Table 5-6. Total Funds by Scenario

Description	Funds (\$M) in current dollars			
	2018	2019	2020	2021
Bus				
Scenario 1	\$102.5	\$98.8	\$100.0	\$100.0
Scenario 2	\$129.5	\$127.8	\$127.0	\$127.0
Scenario 3	\$129.5	\$155.8	\$127.0	\$127.0

The estimated SGR funding by year was adjusted for inflation assuming a 3% inflation rate and averaged to yield an average annual SGR funding level for each scenario. The values presented in Table 5-7 are the budgets used for modeling SGR investments in TAPT for the Group-TAMP.

Table 5-7. SGR Funds by Scenario

Description	Funds (\$M) in constant dollars				
	2018	2019	2020	2021	Annual Average (2018-2021)
Bus					
Scenario 1	\$37.4	\$35.0	\$34.4	\$33.4	\$35.0
Scenario 2	\$47.2	\$45.2	\$43.6	\$42.4	\$44.6
Scenario 3	\$47.2	\$55.1	\$43.6	\$42.4	\$47.1

The following sections present the investment scenario results.

Bus Mode

Scenario 1

Estimated investment needs and projected work in Scenario 1 are shown in Figure 5-2. Given federal funding and state match, projected work will reduce needs from \$74 million in 2018 to around \$56 million in 2021.

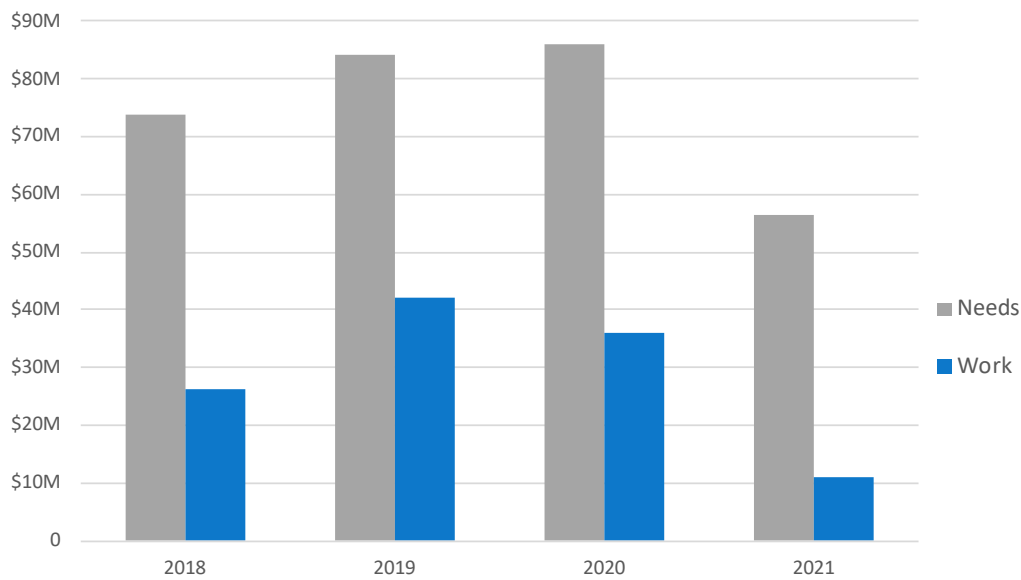


Figure 5-2. Estimated Investment Needs and Work, Scenario 1 (Bus Mode)

Scenario 2

Estimated investment needs and projected work in Scenario 2 are shown in Figure 5-3. Total need in 2021, \$55 million, will be met.

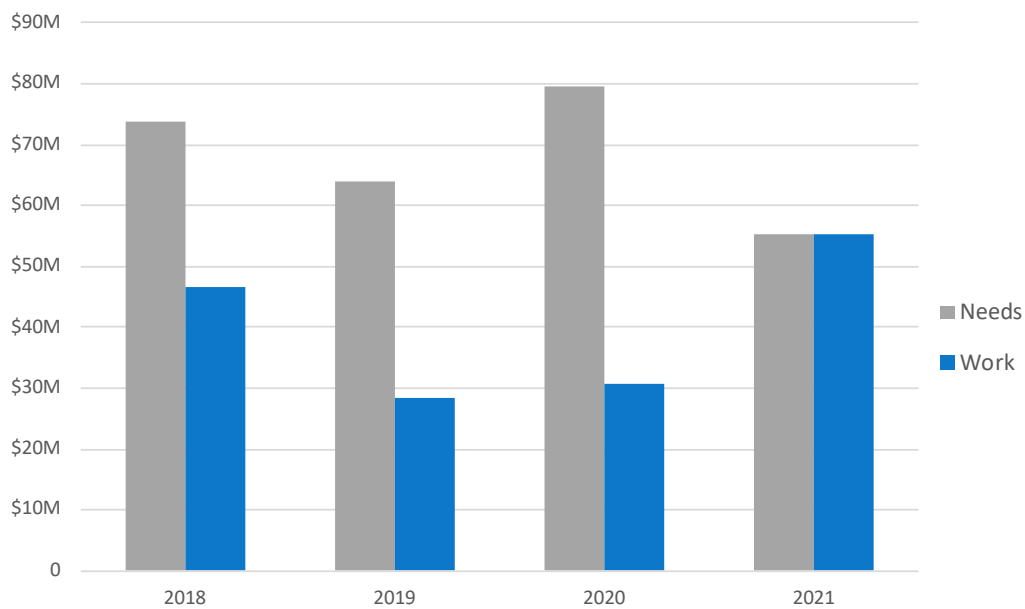


Figure 5-3. Estimated Investment Needs and Work, Scenario 2 (Bus Mode)

Scenario 3

Estimated investment needs and projected work in Scenario 3 are shown in Figure 5-4. Total need in 2020 (\$79 million) and 2021 (\$20 million) will be met.

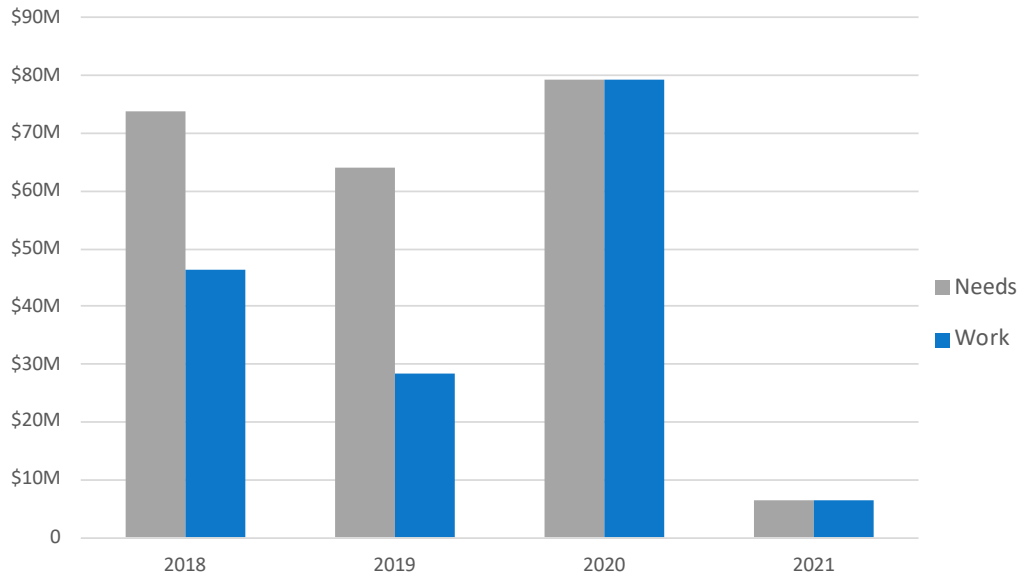


Figure 5-4. Estimated Investment Needs and Work, Scenario 3 (Bus Mode)

CHAPTER 6

Investment Plan

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



Connecticut Department of Transportation
TRANSIT ASSET MANAGEMENT GROUP PLAN

Overview

This chapter describes the current capital planning process at CTDOT and Tier II transit providers 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 II assets presented in the capital plan.

Federal Legislative Context

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

This section presents a summary of CTDOT’s current capital planning process and how funds are allocated to Tier II providers.

CTDOT is the designated recipient for all FTA programs and is responsible for service and planning decisions for rail, fixed-route bus and complementary paratransit service in the urbanized and rural areas of the state. As the designated recipient, CTDOT programs and plans the formula funding from Section 5307 (the largest FTA source of funds) and creates a funding pool from which capital projects in regions around the state are funded. CTDOT does not utilize a formula to reallocate Section 5307

formula funds to the bus operators; rather, the funding pool allows for a cooperative, nondiscriminatory allocation of funds to different regions based on annual needs. The disbursement of these funds is approved by the Metropolitan Planning Organizations in the Statewide Transportation Improvement Program (STIP). Sub-area split agreements that reflect the annual disbursement of funds by region are created by CTDOT and executed by the operators from each region. This program allows local transit operators to fund major projects for which they may otherwise have never accumulated adequate funds.

Also, Section 5310 funds capital and operating expenses for programs to serve the special needs of transit dependent populations and enhances mobility for seniors and persons with disabilities. CTDOT conducts a competitive selection process for the Section 5310 grant program. Annually, applications are made available to eligible recipients which are reviewed and prioritized for award by CTDOT and the Regional Councils of Government.

CTDOT's process to develop the capital plan predates the TAM plan requirement and the use of TAPT to prioritize investments. The capital plan is CTDOT's definitive list of planned investments for Tier II providers. The prioritized list of investments presented in the following section is a list of SGR investments recommended by TAPT and is complementary to the capital planning process.

Recommended Work by Category

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

Bus Mode

Scenario 1

A breakdown of the expected work by asset category in Scenario 1 is shown in Figure 6-1. Rolling stock work makes up the majority of projected spending in the first two years, followed by increase investment in facilities. Rolling stock work constitutes 65% of estimated transit asset management spending on the bus mode over the four-year period of the plan, while facilities and equipment constitute 32% and 3%, respectively.

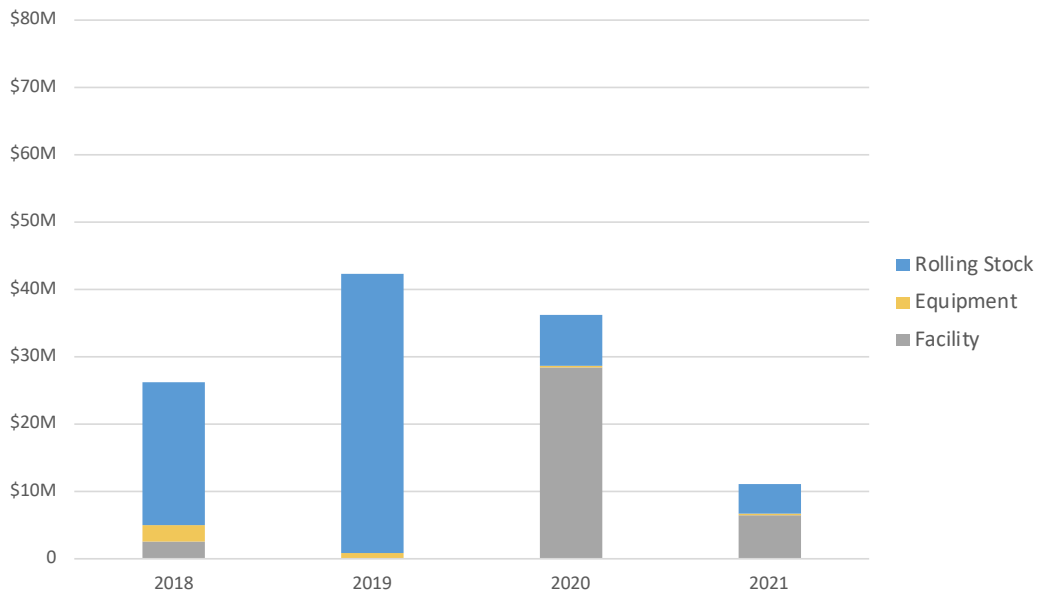


Figure 6-1. Recommended Work by Asset Category, Scenario 1 (Bus Mode)

Scenario 2

In Scenario 2, rolling stock work makes up the majority of projected spending. Rolling stock work constitutes 74% of estimated transit asset management spending on the bus mode over the four-year period of the plan, while facilities and equipment constitute 23% and 3%, respectively. A breakdown of the expected work by asset category in Scenario 2 is shown in Figure 6-2.

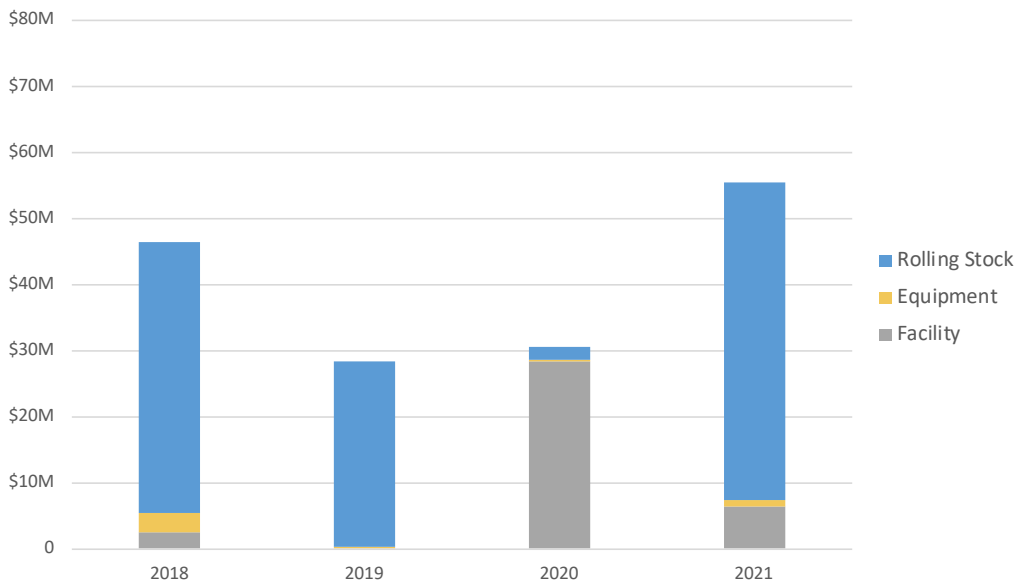


Figure 6-2. Recommended Work by Asset Category, Scenario 2 (Bus Mode)

Scenario 3

In Scenario 3, rolling stock work makes up the majority of projected spending. Rolling stock work constitutes 74% of estimated transit asset management spending on the bus mode over the four-year period of the plan, while facilities and equipment constitute 23% and 3%, respectively. The only difference between Scenario 2 and 3 is that rolling stock work is moved forward from 2021 to 2020 in Scenario 3. A breakdown of the expected work by asset category in Scenario 3 is shown in Figure 6-3.

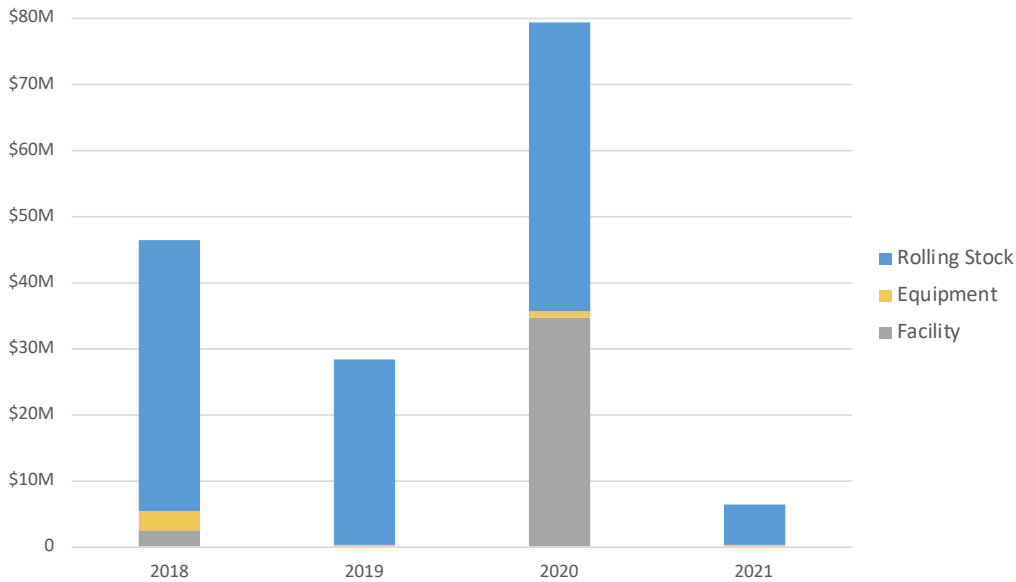


Figure 6-3. Recommended Work by Asset Category, Scenario 3 (Bus Mode)

Predicted Asset Performance

The estimated impact of the recommended work on asset condition is summarized by asset category in Figures 6-4 thru 6-6. Each figure shows the current performance of each asset class, and predicted performance by Fiscal Year from 2018-2021 for each funding scenario.

Figure 6-4 shows predicted performance for bus rolling stock. The performance measure on the y-axis is the percent of vehicles at or exceeding the ULB.

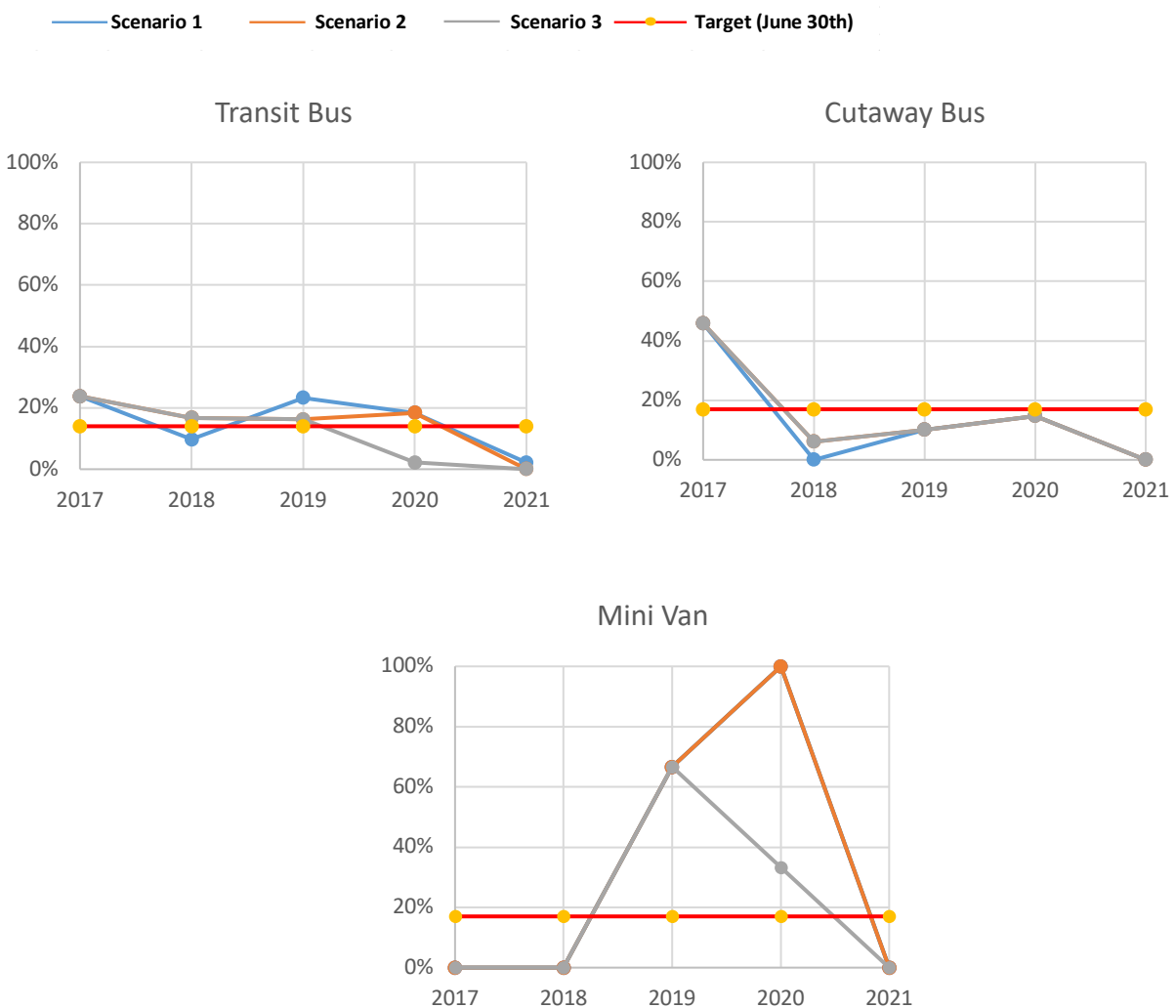


Figure 6-4. Predicted Performance for Rolling Stock

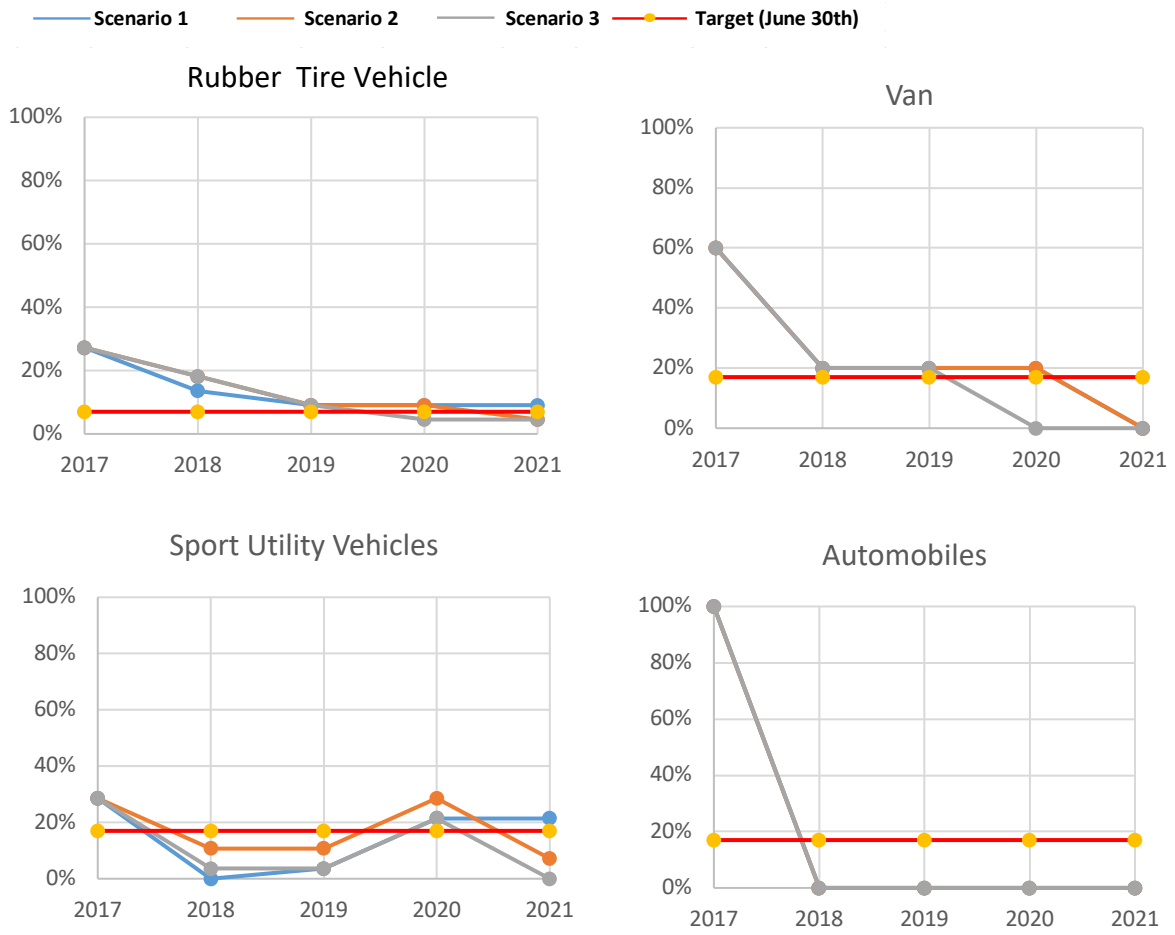


Figure 6-5. Predicted Performance for Equipment

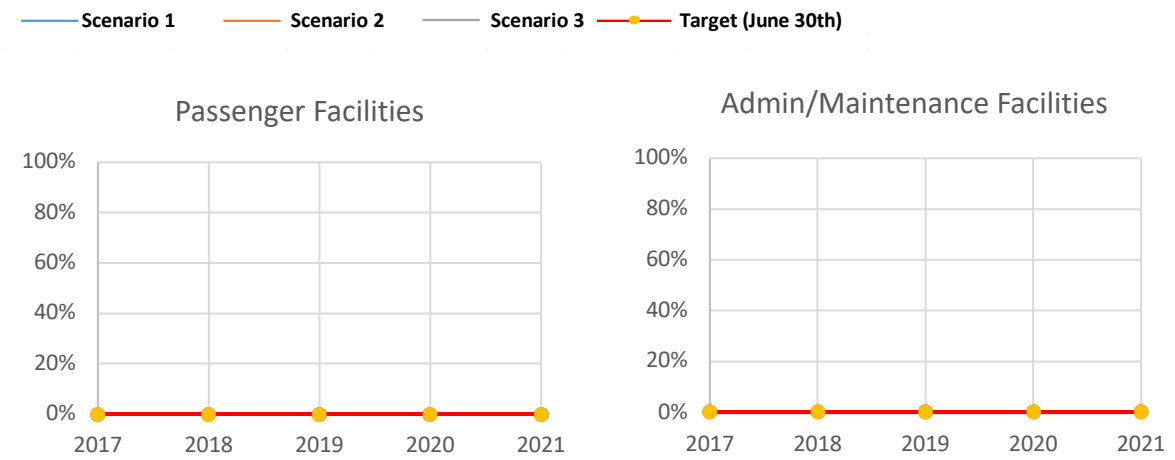


Figure 6-6. Predicted Performance for Facilities

Prioritized List of Investments

This section presents CTDOT’s prioritized list of investment needs for Tier II assets. CTDOT modeled transit assets in TAPT using an unconstrained budget scenario to generate a prioritized list of SGR needs, shown in Table 6-1. The investments are all asset rehabilitation/ replacement projects. Investments are ranked in decreasing priority according to the Prioritization Index described in Chapter 4. The table of investments has eight columns:

- **Year.** The program year of the investment. (Year Enters SGR Backlog for Unconstrained Model)
- **Rank.** The priority of the investment within the program year, descending from 1. Rank is assigned according to the Prioritization Index value of the investment.
- **Asset Name.** The specific asset(s) in the investment. For vehicle fleets, information can include owner/operator, make, model, year. For facilities, information can include facility type and building. For guideway assets, information can include asset type, bridge ID, and condition grouping.
- **Description.** The asset type, as defined in the asset hierarchies presented in Chapter 3. For facilities, this also includes the component (e.g. substructure, shell, interior etc.).
- **Count.** The number or extent of assets. For vehicle fleets, this means the number of vehicles. Linear assets are represented in miles.
- **Cost.** The cost of the investment.
- **Funded.** The status of the investment in the capital plan. If the investment is fully funded in the capital plan, the cell will read “Y”. If the investment is partially funded in the capital plan, the cell will read “P”. If the investment is not funded in the capital plan, the cell will read “N”.
- **Project.** This column maps existing capital program projects to the needs identified by the TAPT model. See Appendix F for Capital Plan.

Tier II Investment Prioritization

Overall the modeling results are generally consistent with CTDOT’s capital plan, but have not been specifically reconciled with the plan. Projects identified in the prioritization list are taken directly from CTDOT’s 2017-2021 Capital Plan in Appendix F. A number of assets have been left out of modeling due to lack of data, insufficient data, or newly constructed assets.

The prioritized list of Tier II investments is shown in Table 6-1. The top priorities are replacements of cutaways and service vehicles. Service vehicles are replaced differently than revenue vehicles in Connecticut. Age, mileage, condition and service hours in addition to the transit providers' overall assessment of the vehicle all factor into the replacement year. So in reality those service vehicles rising to the top of this prioritized list of Tier II investments might not be replaced for years beyond their ULB.

For Capital Plan programming purposes service vehicles are grouped under the SCV Vehicle and Administrative Capital/Miscellaneous Support Equipment line in the Capital Plan. Funding is available for replacement but ultimately CTDOT depends on the transit providers to assess the service vehicles for safe operation and request replacement when necessary.

Other priorities include facility work and the replacement of transit buses.

Table 6-1. Draft Initial Prioritized List of Investments – Tier II

Year	Rank	Asset Name	Description	Count	Cost	Funded	Project
2018	1	NWLKTD 2004 Ford Econoline E350	Cutaway Bus	9	\$634,653	Y	DOT0412 *
2018	1	NWLKTD 2004 Ford Econoline E450	Cutaway Bus	1	\$70,517	Y	DOT0412 *
2018	3	HART 2007 Ford E450/StarTrans	Cutaway Bus	6	\$423,102	Y	DOT0416
2018	4	HART 2007 Ford E450/StarTrans	Cutaway Bus	2	\$141,034	Y	DOT0416
2018	4	NWCTD 2007 Ford Startrans	Cutaway Bus	1	\$70,517	P	Various
2018	6	NECTD 2008 Ford Startrans	Cutaway Bus	1	\$70,517	P	Various
2018	6	NECTD 2008 Ford Supreme	Cutaway Bus	2	\$141,034	P	Various
2018	6	NECTD 2008 Ford Van	Cutaway Bus	2	\$141,034	P	Various
2018	6	NWLKTD 2008 Ford Startrans	Cutaway Bus	1	\$70,517	P	DOT0412
2018	6	WRTD 2008 Ford Supreme	Cutaway Bus	1	\$70,517	Y	DOT04740091RS
2018	11	HART 1999 Ford Econoline	Service-Van	1	\$46,182	P	DOT0416
2018	12	NWCTD 2009 Ford Supreme	Cutaway Bus	7	\$493,619	P	Various
2018	12	WRTD 2009 Ford Startrans	Cutaway Bus	1	\$70,517	Y	DOT04740091RS
2018	12	WRTD 2009 Ford Startrans Van	Cutaway Bus	1	\$70,517	Y	DOT04740091RS
2018	15	SEAT 2004 Ford Explorer	Service-SUV	1	\$32,715	P	DOT0414
2018	16	NWLKTD 2005 Ford Freestyle	Service-SUV	1	\$32,715	P	DOT0412
2018	17	NWLKTD 2005 Ford Sedan 500 AW	Service-Auto	1	\$19,679	P	DOT0412
2018	18	HART 2005 Ford E350	Service-Van	1	\$46,182	P	DOT0416
2018	19	ETD 2010 Ford E450	Cutaway Bus	1	\$70,517	Y	DOT0478
2018	19	ETD 2010 Ford E450	Cutaway Bus	2	\$141,034	Y	DOT0478
2018	19	NECTD 2010 Ford Startrans	Cutaway Bus	1	\$70,517	P	Various

Year	Rank	Asset Name	Description	Count	Cost	Funded	Project
2018	19	NECTD 2010 Ford Startrans	Cutaway Bus	4	\$282,068	P	Various
2018	23	NWLKTD 2010 Ford Phoenix E450	Cutaway Bus	10	\$705,170	Y	DOT0412 *
2018	24	GBTA 1982 GMC TOW truck	Service-Truck	1	\$167,775	P	DOT0410
2018	25	ETD 2011 Ford Startrans	Cutaway Bus	1	\$70,517	Y	DOT0478
2018	25	NWCTD 2011 Ford Startrans	Cutaway Bus	4	\$282,068	P	Various
2018	25	WRTD 2011 Ford Startrans	Cutaway Bus	3	\$211,551	P	Various
2018	25	WRTD 2011 Ford Startrans Vans	Cutaway Bus	6	\$423,102	Y	DOT04740091RS
2018	29	HART 2009 Ford Escape	Service-SUV	2	\$65,430	P	DOT0416
2018	30	GBTA 2009 Toyota Camry	Service-Auto	2	\$39,358	P	DOT0410
2018	31	GBTA 2010 GMC Terrain SLE	Service-SUV	1	\$32,715	P	DOT0410
2018	32	ETD 2012 Ford F550	Cutaway Bus	1	\$70,517	Y	DOT0478
2018	32	ETD 2012 Ford Goshen E450	Cutaway Bus	1	\$70,517	Y	DOT0478
2018	32	ETD 2012 Ford Phoenix	Cutaway Bus	1	\$70,517	Y	DOT0478
2018	32	ETD 2012 Ford Startrans E450 28 FT	Cutaway Bus	1	\$70,517	Y	DOT0478
2018	32	GBTA 2012 Ford Goshen	Cutaway Bus	4	\$282,068	Y	DOT0410
2018	32	NWCTD 2012 Ford E450	Cutaway Bus	3	\$211,551	P	Various
2018	32	VTD 2012 Ford Supreme	Cutaway Bus	14	\$987,238	Y	DOT00360199RS
2018	32	WRTD 2012 Goshen Coach	Cutaway Bus	2	\$141,034	P	Various
2018	40	ETD 2011 Ford Escape	Service-SUV	1	\$32,715	P	DOT0478
2018	40	GBTA 2011 Chevrolet Tahoe	Service-SUV	2	\$65,430	P	DOT0410
2018	42	NWLKTD Admin/Maint	Facility-Fire	1	\$1,064,196	P	DOT0412
2018	43	ETD 2013 Ford Goshen F550	Cutaway Bus	1	\$70,517	Y	DOT0478
2018	43	ETD 2013 Ford E450	Cutaway Bus	2	\$141,034	Y	DOT0478
2018	43	ETD 2013 Ford Goshen E450 28 FT	Cutaway Bus	1	\$70,517	Y	DOT0478
2018	43	GNHTD 2013 Ford E350 Goshen	Cutaway Bus	13	\$916,721	Y	DOT0427 *
2018	43	GNHTD 2013 Ford E450 Goshen	Cutaway Bus	4	\$282,068	Y	DOT0427
2018	43	HART 2013 Ford E450/Goshen Coach	Cutaway Bus	9	\$634,653	Y	DOT0416
2018	43	WRTD 2013 Goshen Coach	Cutaway Bus	3	\$211,551	Y	DOT04740091RS
2018	50	VTD 1999 Ford F250 Pickup	Service-Truck	1	\$167,775	P	DOT00360199EQ
2018	51	NWLKTD 2001 Ford Utility Truck	Service-Truck	1	\$167,775	P	DOT0412
2018	52	NWLKTD Admin/Maint	Facility-Electrical	1	\$1,368,252	P	DOT0412
2018	53	GBTA 2003 New Flyer	Transit Bus	2	\$848,172	Y	DOT0410
2018	53	GBTA 2003 New Flyer	Transit Bus	3	\$1,272,258	Y	DOT0410
2018	53	NWLKTD 2003 Orion VII	Transit Bus	19	\$8,057,634	P	DOT0412
2018	53	SEAT 2003 New Flyer	Transit Bus	1	\$424,086	P	DOT0414
2018	53	SEAT 2003 New Flyer	Transit Bus	1	\$424,086	P	DOT0414
2018	58	MlfdTD 2004 New Flyer	Transit Bus	1	\$424,086	Y	DOT0424
2018	58	NWLKTD 2004 Gillig	Transit Bus	3	\$1,272,258	P	DOT0412
2018	58	SEAT 2004 Gillig	Transit Bus	1	\$424,086	P	DOT0414
2018	61	GBTA 2003 GMC 4500Dump Truck	Service-Truck	1	\$167,775	P	DOT0410
2018	62	NWLKTD 2006 Gillig	Transit Bus	3	\$1,272,258	Y	DOT0412
2018	62	SEAT 2006 Gillig	Transit Bus	2	\$848,172	Y	DOT0414
2018	62	SEAT 2006 New Flyer	Transit Bus	3	\$1,272,258	Y	DOT0414
2018	62	SEAT 2006 New Flyer	Transit Bus	3	\$1,272,258	Y	DOT0414

Year	Rank	Asset Name	Description	Count	Cost	Funded	Project
2018	62	WRTD 2006 Gillig	Transit Bus	2	\$848,172	P	Various
2018	67	GBTA 2004 Skid Steer	Service-Truck	1	\$167,775	P	DOT0410
2018	67	HART 2004 Ford F450	Service-Truck	1	\$167,775	P	DOT0416
2019	1	HART 2014 Ford E450/ Goshen Coach	Cutaway Bus	4	\$282,068	Y	DOT0416
2019	1	HART 2014 Ford E450/Goshen Coach	Cutaway Bus	3	\$211,551	Y	DOT0416
2019	1	NWLKTD 2014 Chevrolet Pegasus	Cutaway Bus	10	\$705,170	P	DOT0412
2019	4	HART 2007 Gillig	Transit Bus	10	\$4,240,860	Y	DOT0416
2019	4	SEAT 2007 New Flyer	Transit Bus	6	\$2,544,516	Y	DOT0414
2019	4	SEAT 2007 New Flyer	Transit Bus	2	\$848,172	Y	DOT0414
2019	7	GBTA 2014 Chevrolet Tahoe	Service-SUV	1	\$32,715	P	DOT0410
2020	1	ETD 2015 Ford E450 Phoenix	Cutaway Bus	4	\$282,068	Y	DOT0478
2020	1	GNHTD 2015 Ford E350 Goshen	Cutaway Bus	11	\$775,687	Y	DOT0427
2020	1	GNHTD 2015 Ford E450 Goshen	Cutaway Bus	3	\$211,551	Y	DOT0427
2020	1	MAT 2015 Goshen E350	Cutaway Bus	10	\$705,170	Y	DOT0422
2020	5	HART Passenger Facility	Facility-Equipment	1	\$15,370	P	DOT0416
2020	5	MAT Parking	Facility-Equipment	1	\$9,865	P	DOT0422
2020	7	GBTA Maint	Facility-Equipment	1	\$3,936,000	Y	DOT0410
2020	7	GNHTD Admin/Maint	Facility-Equipment	1	\$580,560	Y	DOT04270056CN
2020	7	SEAT Admin/Maint	Facility-Equipment	1	\$1,830,240	P	DOT0414
2020	10	GBTA Maint	Facility-Conveyance	1	\$787,200	P	DOT0410
2020	10	GNHTD Admin/Maint	Facility-Conveyance	1	\$116,112	Y	DOT04270056CN
2020	10	MAT Parking	Facility-Conveyance	1	\$39,459	P	DOT0422
2020	13	HART Passenger Facility	Facility-Conveyance	1	\$61,482	P	DOT0416
2020	13	NWLKTD Admin/Maint	Facility-Conveyance	1	\$608,112	P	DOT0412
2020	13	SEAT Admin/Maint	Facility-Conveyance	1	\$366,048	P	DOT0414
2020	16	NWLKTD 2008 Gillig	Transit Bus	4	\$1,696,344	P	DOT0412
2020	16	NWLKTD 2008 Gillig	Transit Bus	3	\$1,272,258	P	DOT0412
2020	16	SEAT 2008 New Flyer	Transit Bus	2	\$848,172	P	DOT0414
2020	16	WRTD 2008 Gillig	Transit Bus	3	\$1,272,258	Y	DOT04740091RS
2020	20	GNHTD 2015 Dodge Caravan	Van	4	\$184,728	Y	DOT0427
2020	21	SEAT 2015 Dodge Caravan	Service-Van	1	\$46,182	P	DOT0414
2020	22	SEAT 2006 RAM Pickup	Service-Truck	1	\$167,775	P	DOT0414
2021	1	GNHTD 2016 Ford Goshen E350	Cutaway Bus	18	\$1,269,306	P	DOT0424
2021	1	HART 2016 Ford E450/Goshen Coach	Cutaway Bus	1	\$70,517	P	DOT0424
2021	1	HART 2016 Ford E350/ Goshen Coach	Cutaway Bus	4	\$282,068	P	DOT0478
2021	1	HART 2016 Ford E350/Goshen Coach	Cutaway Bus	5	\$352,585	P	DOT0427
2021	1	MlfdTD 2016 Ford E450	Cutaway Bus	8	\$564,136	P	DOT0414
2021	1	SEAT 2016 Ford Phoenix E450	Cutaway Bus	5	\$352,585	P	DOT0414
2021	7	MlfdTD 2009 New Flyer	Transit Bus	4	\$1,696,344	P	DOT0422
2021	8	GNHTD 2016 Dodge Caravan	Van	2	\$92,364	P	DOT0414
2021	9	HART 2016 Ford Escape	Service-SUV	1	\$32,715	P	DOT0416

Year	Rank	Asset Name	Description	Count	Cost	Funded	Project
2021	9	HART 2016 Ford Explorer	Service-SUV	1	\$32,715	P	DOT0416
2021	9	NWLKTD 2016 Ford Explorer	Service-SUV	2	\$65,430	P	DOT0412
2021	9	VTD 2016 Ford Escape	Service-SUV	1	\$32,715	P	DOT00360199EQ
2021	9	WRTD 2016 Jeep Patriot	Service-SUV	1	\$32,715	P	Various

This list is generated from asset data inventory in March 2018.

“*” indicates the recommended investment was completed in program year 2018.

“Y” indicates the recommended investment is programmed in the capital plan.

“P” indicates the recommended investment is partially programmed in the capital plan.

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 Group-TAMP.



Overview

This chapter supplements the plan’s discussion of current asset management practices in Connecticut with identifying key implementation activities that will help to continue improving our TAM practices. The Group-TAMP is a living document that will evolve to reflect changing TAM practices and processes at CTDOT. Although implementation and monitoring is an element of TAM Rules required solely for Tier I providers, this plan addresses needs for both Tier I and Tier II implementation, which CTDOT approaches in an integrated manner. CTDOT will take the lead on addressing these needs and will form an Implementation Committee, in which Tier II transit providers will be invited to participate, to ensure consistency in implementation activities where both tiers will benefit.

Federal Legislative Context

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 is 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 TAM working groups 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

The effort was organized into a series of tasks designed to achieve the objectives.

CTDOT reviewed transit asset management materials to gain understanding of the current state of practice at the agency. As part of the review of current practices, the TAM group interviewed CTDOT staff from a variety of offices and staff from transit providers that operate in Connecticut. These in-person interviews helped the project team form an understanding of current transit asset management practices in Connecticut and also illustrated potential gaps in current practices. The interviews, along with the review of existing materials and the gap analysis survey, informed the writing of the gap assessment.

CTDOT also performed a literature review of best practices in asset management, including transit asset management self-assessment tools and maturity models. The review included documents from federal agencies, state agencies, local agencies, and other organizations.

Based on the review of best practices, the TAM group developed a CTDOT transit asset management self-assessment which included 27 multiple choice questions. The survey was sent to 80 individuals representing five different groups: CTDOT, transit districts, CTtransit, Amtrak, and Metro-North. The self-assessment served as a gap analysis survey. Following the completion of the survey, the TAM group compiled survey results and prepared a summary of the results.

The PT TAM Unit organized and facilitated a transit asset management workshop at CTDOT to present the results of the gap analysis. Group sessions were used to brainstorm implementation tasks to address the gaps.

Using the workshop results, the PT TAM Unit drafted a gap assessment document comparing existing transit asset management practices to best practices and needs for supporting development of an FTA-compliant asset management plan. The gaps represent the deficiencies in current practices relative to best practices and/or practices needed to fulfill FTA's asset management requirements. The gaps were organized into four types:

- Inventory and Condition Gaps
- Business Process Gaps
- Information Systems Gaps
- Staffing Gaps

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

As CTDOT has made progress on implementing TAM and developing the PT-TAMP and Group-TAMP, the initial implementation tasks have been updated based on completed work. This chapter includes implementation tasks which represent CTDOT's next steps in its implementation of TAM.

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 (and in some cases, statewide).

Development of Asset Hierarchy and Inventory (Tier I and Tier II)

CTDOT built the SGR Transit Database during the development of the PT-TAMP and Group-TAMP, 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 SGR Transit Database with all transit service providers. CTDOT will continue to develop the SGR Transit Database into a more robust system and to coordinate data collection with transit providers.

Continue Condition Assessment (Tier I and Tier II)

As part of the development of the PT-TAMP and Group-TAMP, CTDOT defined a condition assessment approach for rolling stock, equipment, infrastructure, and facilities. The guidance document is included in Appendix C. CTDOT will continue to implement the condition assessment approach and assess the condition of transit assets. In particular, both administrative/maintenance and passenger facilities need condition assessments. CTDOT will collect, maintain, and update asset condition data. Tier II providers participated in the development of the condition assessment approach and will use the guide as part of their assessments.

Performance Measure Data Collection and Reporting (Tier I and Tier II)

FTA requires that a provider must set performance targets annually for the following program year. These targets must be reported to the NTD in the provider's annual data report. CTDOT will collect data to calculate federally required performance measures for rolling stock, equipment, infrastructure, and facilities. CTDOT will set performance targets for each performance measure and report both targets and asset condition to the NTD annually. CTDOT will meet annually with Tier II providers to update performance targets for Tier II measures.

Implement a Statewide Facilities Asset Management System (Tier 1, Tier II optional)

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 the CTDOT's entire asset class of buildings within a single system. A comprehensive FMS can inventory, track, and perform the necessary asset management practices that will keep all the CTDOT's buildings operating in SGR and assist management in predicting capital programming expenditures in a transparent manner.

CTDOT went through an RFI process to gather information on FMS in 2017, and is now considering an RFP moving forward. The solution 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, to project prioritization and financial modeling multiple funding scenarios.

Once implemented, the system will be used for managing CTDOT-owned facility assets, but could be made available for other CT transit providers to use as well. This activity is also being considered to address management of other CTDOT asset classes in addition to transit facilities, and was a requested requirement for FMS in the RFI process.

Improve Predictive Capability for Fixed Assets (Tier I and Tier II)

As part of PT-TAMP and Group-TAMP development, CTDOT reviewed tools for predicting transit capital needs, including TAPT and FTA's TERM Lite. CTDOT selected TAPT as the predictive approach, loaded inventory and condition data, and generated predictions of SGR needs and work.

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.

The PT TAM Unit will also need to work 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 will be an 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 will differ by each transit operator and by asset class:

- **Rolling Stock:** CTtransit 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:** CTfastrak is a 9 mile bus only guideway whose main component is a paved surface similar to a highway asset. It was determined that in order to track condition and predictive capabilities, the CTfastrak system is best housed in CTDOT's pavement management system and roadway inventory network. Improvement activities include geocoding the Fastrak route into the CTDOT GIS system, and then using CTDOT's adapted Photolog technology to ID features and track pavement condition. The PT TAM Unit has coordinated with Policy and Planning and Engineering to place the CTfastrak into these systems by December 2018.
- **Facilities:** As mentioned earlier, the FMS system by CTDOT is a multimodal approach that includes CTtransit. CTtransit's HNS operator has decided to accelerate this process by obtaining a pilot version of a FMS called FAMIS. They have begun data collection for this pilot and will include all buildings at the Hartford, Hamden, and Stamford facilities.

Maintain and Update Transit Asset Management Plan (Tier I and Tier II)

FTA requires that a transit provider must update its PT-TAMP and Group-TAMP every four years. Additionally, a provider should amend its PT-TAMP and Group-TAMP when there is a significant change to inventory, condition, or investment prioritization. CTDOT will work to update the PT-TAMP and Group-TAMP on a four-year cycle and to revise the plan to be consistent with any significant changes. Updating the PT-TAMP and Group-TAMP 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 will lead a set of activities to facilitate 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 other CT transit providers and the transit districts.

PT TAM Unit 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. PT TAM Unit will organize, conduct, and summarize these activities for the participants.

TAM Resources

This section describes the TAM resources needed to develop and carry out the Group-TAMP. While CTDOT is integrating TAM throughout the agency, there is a TAM group which currently includes three staff members dedicated to TAM. This group is responsible for developing, maintaining, and updating the Group-TAMP, and for coordinating, setting, and submitting performance measures and targets to the NTD.

A TAM Implementation Committee will be created consisting of representatives from transit providers and key CTDOT staff to support future TAM implementation activities.

CTDOT will need to further develop its new SGR transit database, cost yet to be determined. CTDOT is also using ongoing consultant support for TAM implementation.

Monitoring and Evaluations

CTDOT will monitor, update, and evaluate the PT-TAMP and the Group-TAMP as an ongoing activity.

The PT TAM unit 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 PT TAM unit will lead a series of further monitoring and evaluation activities in the following key areas:

- Implementing use of asset management targets;
- Improving STIP and capital plan development;
- Informing long range plan development;
- Improving data collection;
- Updating the asset management needs analysis; and
- Support Tier II asset management implementation.

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

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 PT TAM Unit will work with CTDOT capital planning and programming staff to establish targets, and 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.

Improving STIP and Capital Plan Development. An important product of asset management plan development is the prioritized list of SGR needs identified in Chapter 5. Ideally CTDOT and its partners will refer to this list of needs in developing future STIPs and capital plans. To help accomplish this PT TAM Unit will work with the CTDOT’s Council of Government Coordination Unit to improve the connection between the STIP and the Capital Program for Transit Assets. To evaluate progress in this area CTDOT will assess whether the needs identified in this plan are incorporated in future STIP updates to the extent needed funds are available.

Informing Long Range Plan Development. Moving forward it is important for CTDOT and its planning partners to incorporate consideration of transit

asset management performance targets and the set of identified SGR needs in the planning process. To help accomplish this CTDOT is working on a reporting mechanism to link prioritized projects and targets to the MPOs' long range planning and programming process. To evaluate progress in this area CTDOT will determine whether such a reporting mechanism has been established, and if so whether it has been used in the planning process.

Improving Data Collection. The PT TAM Unit will be responsible for managing the annual update of asset inventory and condition data. Inventory will be updated in the SGR Transit Database.

As condition assessments are performed for various fixed assets, the condition of the assets can be updated in the SGR Transit Database. For rolling stock, equipment, and facilities, the condition data can be used directly to calculate the FTA TAM performance measures.

The PT-TAM Unit will coordinate with MPO's and transit providers to set targets annually through a set of information sharing activities. These targets will be incorporated into an annual data report and narrative report submitted to the NTD. The data report will include current condition and the FTA TAM performance targets for the following year. The narrative report will include a description of any changes in transit system condition and describe progress made towards performance targets. The PT TAM Unit will be responsible for drafting the narrative report.

To improve data collection the PT-TAM unit will implement a set of data quality assurance/quality control (QA/QC) processes to verify the accuracy and completeness of inventory and condition data. These processes will specify the process for updating the data, and responsibility for maintenance and upkeep of asset management data (data governance), as well as specific steps to verify data quality and completeness. To evaluate progress in this area CTDOT will assess whether CTDOT is successful in timely completion of required reporting. Also, CTDOT will assess whether the QA/QC processes have been established and are being followed.

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 PT-TAM unit 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.

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 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 PT-TAM unit 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. FTA Section 5310 Subrecipients

Tier II

5310 Fleet - Cutaway Bus

5310 Legal Owner	Model	Type	Year	Total
Ability Beyond Disability, Inc.	Ford	E -350	2012	
	Ford	E-350	2012	
	Ford	E-350	2014	
	Ford	E-350	2016	
	Ford	E-350	2017	
	Ford	E-350	2017	
	Ford	E-350	2017	
Geer Nursing & Rehabilitation Center	Ford	E-350	2014	1
Hockanum Valley Community Council	Ford	E-350	2009	
	Ford	Goshen	2012	
	Ford	E-450	2013	
	Ford	Star Trans	2009	
	Ford	GC11	2013	
	Ford	E-450	2016	
Norwalk Senior Center	Ford	Star Trans	2013	1
Sphere, Inc	Ford	E-450	2012	1
The Arc of Litchfield County, Inc	Ford	Star Trans	2013	
	Ford	Star Trans	2015	
	Ford	Star Trans	2017	
The Wheels Program of New Milford	Ford	E-350	2016	1
Town of Ashford	Ford	E-350	2017	1
Town of Avon	Ford	E-350	2013	1
Town of Beacon Falls	Ford	E-350	2015	1
Town of Canton	Chevy	Goshen	2016	1
Town of Cheshire	Ford	E-350	2010	
	Ford	E-350	2016	
	Ford	E-350	2016	
	Ford	E-350	2017	
Town of Colchester	Ford	E-450	2010	
	Ford	E-350	2012	
	Ford	E-350	2017	
Town of Cromwell	Ford	E-450	2012	1
Town of East Windsor	Ford	E-350	2007	
	Ford	E-350	2011	
	Ford	E-450	2012	
Town of Enfield	Ford	E-450	2009	
	Ford	E-450	2010	
	Ford	E-350	2011	
	Ford	E-450	2012	
	Ford	E-450	2013	

Tier II

5310 Fleet - Cutaway Bus

5310 Legal Owner	Model	Type	Year	Total
	Ford	E-450	2015	
	Ford	E-450	2015	7
Town of Farmington	Ford	E-350	2013	1
Town of Glastonbury	Ford	E-450	2016	1
Town of Goshen	Ford	E-350	2017	1
Town of Griswold	Ford	E-450	2016	1
Town of Groton	Ford	E-450	2017	1
Town of Hebron	Ford	E-350	2016	
	Ford	E-450	2017	2
Town of Ledyard	Ford	E-350	2013	1
Town of Litchfield	Ford		2015	1
Town of Manchester	Ford	E-350	2012	
	Ford	E-350	2013	2
Town of Mansfield	Ford	E-350	2012	1
Town of Marlborough	Ford	E-350	2012	1
Town of Middlebury	Ford	E-450	2014	1
Town of Montville	Ford	SD	2013	1
Town of New Milford	Ford	E-350	2010	
	Ford	E-350	2014	2
Town of Orange	ford	E-350	2016	
	Ford	E-35-	2017	2
Town of Plainville	Ford	E-350	2011	
	Ford	E-350	2017	2
Town of Prospect	Ford	E350	2009	
		E-350	2016	2
Town of Rocky Hill	Ford	E-350	2008	
	Ford	E-350	2009	
	Ford	E-350	2013	3
Town of Roxbury	Ford	Transit	2015	1
Town of Sherman	Ford	E-350	2016	1
Town of Simsbury	Chevy	Goshen	2016	
	Chevy	Star Tran	2014	2
Town of Somers	Ford	E-350	2016	1
Town of South Windsor	Ford	E-450	2009	
	Ford	E-450	2012	
	Ford	E-450	2017	3
Town of Southbury	Ford	E-350	2016	
	Ford	E-350	2017	2
Town of Sprague	Ford	E-350	2013	
	Ford	E-350	2017	2

Tier II 5310 Fleet - Cutaway Bus

5310 Legal Owner	Model	Type	Year	Total
Town of Stafford	Ford	E-450	2016	1
Town of Stratford	Ford	E-350	2007	4
	Ford	E-350	2009	
	Ford	E-350	2012	
	Ford	E-350	2017	
Town of Suffield	Ford	Star Tran	2009	3
	Ford	Supreme	2011	
	Ford	Goshen	2012	
Town of Trumbull	Ford	E-350	2012	3
	Ford	E-350	2013	
	Ford	E-350	2017	
Town of Waterford	Ford	E-350.	2009	3
	Ford	E-350	2013	
	Ford	E-350	2017	
Town of Watertown	Ford	E-450	2008	2
	Ford	E-450	2014	
Town of Windsor	Ford	Goshen	2013	3
	Ford	E-350	2015	
	Ford	E-350	2015	
Town of Windsor Locks	Ford	E-350	2010	2
	Ford	E-350	2016	
Town of Wolcott	Ford	Econoline	2006	3
	Ford	E-450	2011	
	Ford	Goshen	2013	
Town of Woodbridge	Ford	Goshen	2015	1
Transportation Assoc. of Greenwich	Ford	Star Tran	2009	4
	Ford	E-350	2013	
	Ford	Goshen	2014	
	Ford	Goshen	2016	
Sunrise Northeast, Inc.	Ford	E-350	2017	1
Torrington	Ford	E-350	2016	1
Total				111

Appendix B. Asset Fact Sheets



Connecticut Tier II Transit Asset Management Plan

Bus Rolling Stock



Description

- In non-CT transit service areas, twelve local transit districts provide bus transit services under the direction of local Boards of Directors representing the member towns.
- CTDOT supports about 90% of the deficit funding in the urban systems, and the state and federal government provide 83% of the deficit funding in the rural systems.
- CTDOT has a capital interest in bus rolling stock for the 12 transit districts.
- Transit district bus rolling stock inventory includes three vehicle types: transit bus, cutaway, and minivan.

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 have met the performance metric.

Inventory and Condition



Transit Bus

A bus with front and center doors, low floor, normally with a rear-mounted engine, and low-back seating. This vehicle can usually hold about 42 ambulatory passengers when two wheelchair tiedowns are provided.

183
Vehicles

12
Years ULB

76%
Below 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 and may accommodate some standing passengers.

277
Vehicles

5
Years ULB

54%
Below ULB



Minivan

A light duty vehicle having a typical seating capacity of up to seven passengers plus a driver. A minivan is smaller, lower and more streamlined than a full-sized van, but it is typically taller and has a higher floor than a passenger car. Minivans normally cannot accommodate standing passengers.

6
Vehicles

5
Years ULB

100%
Below ULB



Based on CTDOT data as of March, 2018

**The Performance measures herein are for FTA reporting purposes only. Due to the variability of mechanical reliability and operating environment, the age based metric prescribed by FTA does not fully reflect SGR needs.*

Current Performance and Targets

A group TAM plan sponsor must set unified, 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. These targets must be coordinated with the Tier II transit providers.

Performance and Targets for Tier II Bus Rolling Stock

Asset Class	% Vehicles Below ULB		% Vehicles Met or Exceeded ULB	
	Current Performance	Performance Target	Current Performance	Performance Target
Transit Bus	76%	14%	24%	14%
Cutaway	54%	17%	46%	17%
Minivan	100%	17%	0%	17%



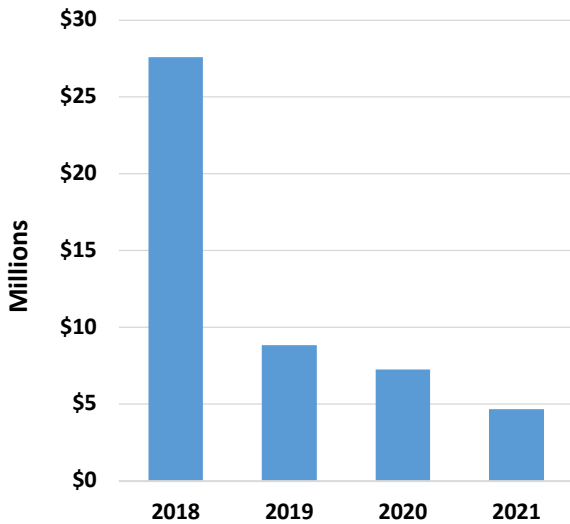
Connecticut Tier II Transit Asset Management Plan

Bus Rolling Stock



2018-2021 Investment Needs

Estimated Investment Needs for Tier II Bus Rolling Stock (TAPT Modeling Results)



CTDOT anticipates about \$48.4 million of SGR needs from 2018-2021 for its Tier II rolling stock. Most SGR needs for rolling stock are part of the initial backlog in 2018, totaling around \$27.6 million.

The majority of the backlog is the cutaway vehicles amongst numerous transit districts. There are also several transit buses that make up the backlog throughout the 4 year horizon. In addition, there are also two vans from Greater New Haven Transit District that enter the backlog in 2021.

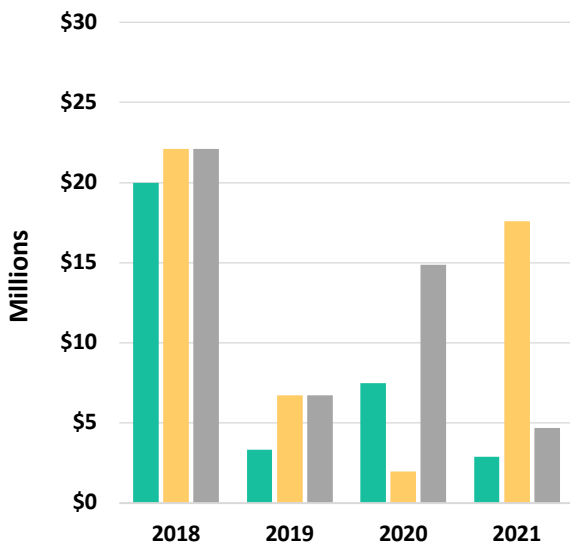
*Years referenced in these charts are by State of Connecticut Fiscal Year which runs from July 1st to June 30th.

Transit Funding

As the designated recipient for all FTA funding, CTDOT programs and plans the formula funding from Section 5307 (the largest FTA source of funds) and creates a funding pool from which capital projects in regions around the state are funded. The disbursement of these funds based on annual needs is approved by the MPOs in the STIP. Sub-area split agreements that reflect the annual disbursement of funds by region are created by CTDOT and executed by the transit operators from each region. 5311 funding is available to five rural transit districts.

2018-2021 Investment Scenarios

Recommended Investments for Tier II Bus Rolling Stock (TAPT Modeling Results)



- **Scenario 1:** Federal with State Match Only
- **Scenario 2:** Federal with State Match + Public Transportation State Bonds
- **Scenario 3:** Federal with State Match + Public Transportation State Bonds + Lets Go CT

Funding Scenarios were developed by CTDOT's Capital Services Unit to reflect how different available funding sources impact what is programmed in CTDOT's 5 year capital plan. Connecticut's 2017-2021 Capital Plan is a document that lists all projects expected to be federally-funded over a five-year period.

In Scenario 1, the TAPT model recommends funding about \$33.7 million for rolling stock replacement for the 4 year horizon from 2018-2021. In Scenarios 2 and 3, the model recommends eliminating the entire \$48.4 million SGR backlog during the 4 year horizon from 2018-2021.

Analytical Approach

CTDOT uses the Transit Asset Prioritization Tool (TAPT) to support its analytical approach for Connecticut transit districts. TAPT is a spreadsheet tool for predicting transit asset conditions and SGR 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.

Based on CTDOT data as of March, 2018



Connecticut Tier II 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.
- Tier II service vehicles support bus transit.
- Tier II service providers own 58 service vehicles that are organized into four types. Rubber tire vehicles (trucks), automobiles, SUVs, and vans, which can be used as staff vehicles.

Performance Measures

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

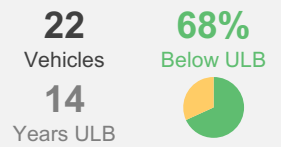
- Useful life benchmark (ULB) defines an asset's economic useful life, specified in terms of age, mileage and/or other factors. An agency can use FTA's default ULB values or set its own values. CTDOT has worked with its transit service provider partners to define custom values.
- A service vehicle that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

Inventory and Condition



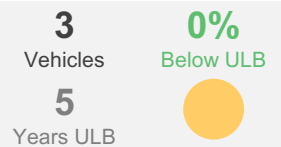
Rubber Tire Vehicles (Trucks)

Any motor vehicle designed to transport cargo.



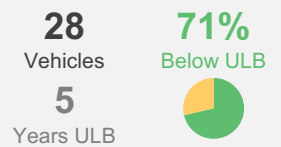
Automobiles

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



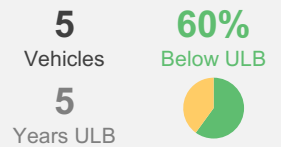
Sport Utility Vehicle

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.



Based on CTDOT data as of March, 2018

*The Performance measures herein are for FTA reporting purposes only. Due to the variability of mechanical reliability and operating environment, the age based metric prescribed by FTA does not fully reflect SGR needs.

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 II Service Vehicles

Asset Class	% Vehicles Below ULB		% Vehicles Met or Exceeded ULB	
	Current Performance	Performance Target	Current Performance	Performance Target
Rubber Tire Vehicle (Truck)	68%	7%	32%	7%
Automobile	0%	17%	100%	17%
Sport Utility Vehicle	71%	17%	29%	17%
Van	60%	17%	40%	17%



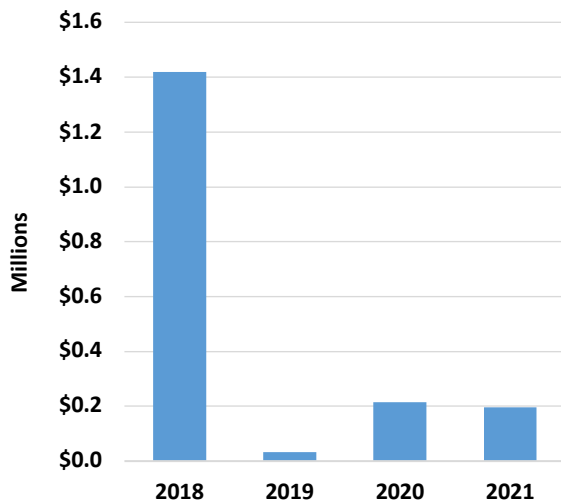
Connecticut Tier II Transit Asset Management Plan

Service Vehicles



2018-2021 Investment Needs

Estimated Investment Needs for Tier II Service Vehicles (TAPT Modeling Results)



CTDOT anticipates about \$1.8 million of SGR needs from 2018-2021 for its Tier II Service Vehicles. Most of the SGR needs are part of the initial backlog. The TAPT modeled SGR needs include the overwhelming majority of service vehicles amongst Tier II providers.

For Capital Plan programming purposes, service vehicles are grouped under the SCV Vehicle and Administrative Capital/Miscellaneous Support Equipment line in the Capital Plan. Funding is available for replacement but ultimately depends on the transit providers to assess the service vehicles for safe operation and request replacement when necessary.

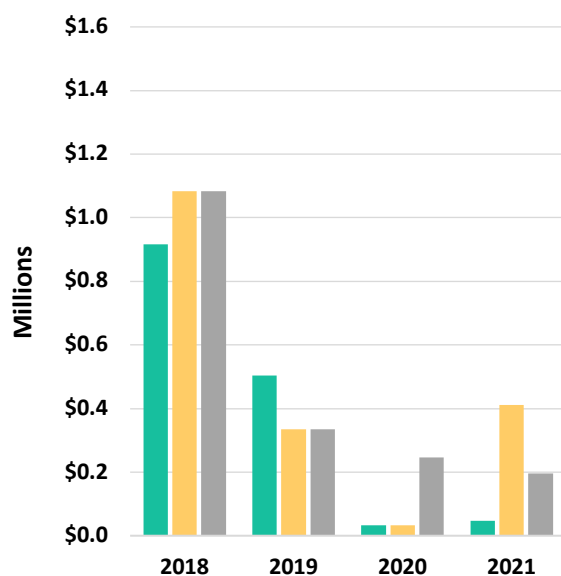
*Years referenced in these charts are by State of Connecticut Fiscal Year which runs from July 1st to June 30th.

Transit Funding

As the designated recipient for all FTA funding, CTDOT programs and plans the formula funding from Section 5307 (the largest FTA source of funds) and creates a funding pool from which capital projects in regions around the state are funded. The disbursement of these funds based on annual needs is approved by the MPOs in the STIP. Sub-area split agreements that reflect the annual disbursement of funds by region are created by CTDOT and executed by the transit operators from each region.

2018-2021 Investment Scenarios

Recommended Investments for Tier II Service Vehicles (TAPT Modeling Results)



Scenario 1: Federal with State Match Only

Scenario 2: Federal with State Match + Public Transportation State Bonds

Scenario 3: Federal with State Match + Public Transportation State Bonds + Lets Go CT

Funding Scenarios were developed by CTDOT's Capital Services Unit to reflect how different available funding sources impact what is programmed in CTDOT's 5 year capital plan. Connecticut's 2017-2021 Capital Plan is a document that lists all projects expected to be federally-funded over a five-year period.

In Scenario 1, the TAPT model recommends investing around \$1.5 million over the 4 year horizon from 2018-2021 to address most of the SGR needs. In Scenarios 2 and 3, the TAPT model recommends eliminating the entire \$1.8 backlog by 2021, due to sufficient funding.

Analytical Approach

CTDOT uses the Transit Asset Prioritization Tool (TAPT) to support its analytical approach. TAPT is a spreadsheet tool for predicting transit asset conditions and SGR 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.

Based on CTDOT data as of March, 2018



Connecticut Tier II Transit Asset Management Plan

Bus Facilities



Description

- Tier II transit providers in Connecticut own 10 administrative or maintenance facilities and five passenger facilities.
- The following providers own facilities: GBTA, HART, MAT, MfDfTD, GNHTD, NWLKT, SEAT, WRTD, VTD. The Nash-Zimmer Transportation Center owned by the Town of Mansfield is also included.
- GBTA and NWLKT have performed formal condition assessments, while condition data for the other facilities is based on engineering judgement.

Performance Measures

The percentage of facilities within a particular asset class rated below condition 3 on the FTA Transit Economic Requirements Model (TERM) scale.

- Major facility components are inspected and rated on a 1 to 5 condition scale. The component condition ratings are averaged using weight factors and replacement cost to calculate the overall condition of a facility.
- 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.
- A facility that has a condition rating of 3 or greater has met the performance metric.

Inventory and Condition

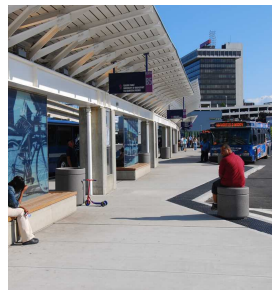


Administrative/Maintenance

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.

10
Facilities

100%
Rated 3 or above



Passenger/Parking

Passenger facilities are significant structures on a separate ROW. Examples include

- 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

5
Facilities

100%
Rated 3 or above



Based on CTDOT data as of March, 2018

**Performance measure herein is required for FTA reporting purposes only. Condition Ratings are used to determine overall SGR status either through engineering judgement or formal condition assessments, which may not reflect SGR needs in its entirety.*

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 II Bus Facilities

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



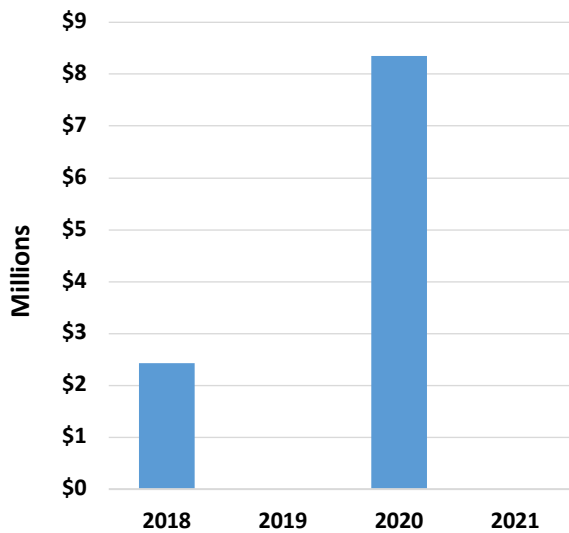
Connecticut Tier II Transit Asset Management Plan

Bus Facilities



2018-2021 Investment Needs

Estimated Investment Needs for Tier II Bus Facilities (TAPT Modeling Results)



CTDOT anticipates about \$10.8 million of SGR needs from 2018-2021 for its Tier II Bus Facilities. The modeled SGR needs show an initial backlog of around \$2.4 million, and anticipates around \$8.3 million in State Fiscal Year 2020. While other SGR needs may arise in this horizon period, the TAPT model was not able to capture other potential needs due to lack of formal condition assessments at some facilities.

The TAPT model SGR needs include various component level work at the Norwalk Transit District Admin Facility in FY 2018 and various component level work at several other transit district facilities in FY 2020.

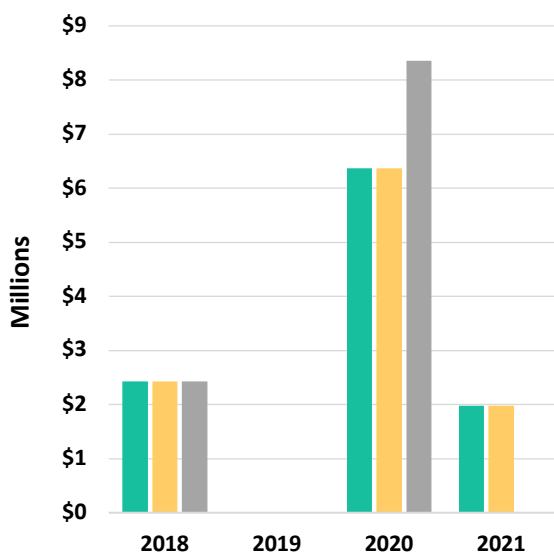
*Years referenced in these charts are by State of Connecticut Fiscal Year which runs from July 1st to June 30th.

Transit Funding

As the designated recipient for all FTA funding, CTDOT programs and plans the formula funding from Section 5307 (the largest FTA source of funds) and creates a funding pool from which capital projects in regions around the state are funded. The disbursement of these funds based on annual needs is approved by the MPOs in the STIP. Sub-area split agreements that reflect the annual disbursement of funds by region are created by CTDOT and executed by the transit operators from each region.

2018-2021 Investment Scenarios

Recommended Investments for Tier II Bus Facilities (TAPT Modeling Results)



- Scenario 1:** Federal with State Match Only
- Scenario 2:** Federal with State Match + Public Transportation State Bonds
- Scenario 3:** Federal with State Match + Public Transportation State Bonds + Lets Go CT

Funding Scenarios were developed by CTDOT's Capital Services Unit to reflect how different available funding sources impact what is programmed in CTDOT's 5 year capital plan. Connecticut's 2017-2021 Capital Plan is a document that lists all projects expected to be federally-funded over a five-year period.

In all Scenarios, the TAPT model recommends CTDOT invest nearly \$10.8 million in Tier II bus facilities over the 4 year horizon from 2018-2021 to address all modeled SGR needs.

Analytical Approach

CTDOT uses the Transit Asset Prioritization Tool (TAPT) to support its analytical approach. TAPT is a spreadsheet tool for predicting transit asset conditions and SGR 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.

Based on CTDOT data as of March, 2018

Appendix C. 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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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.

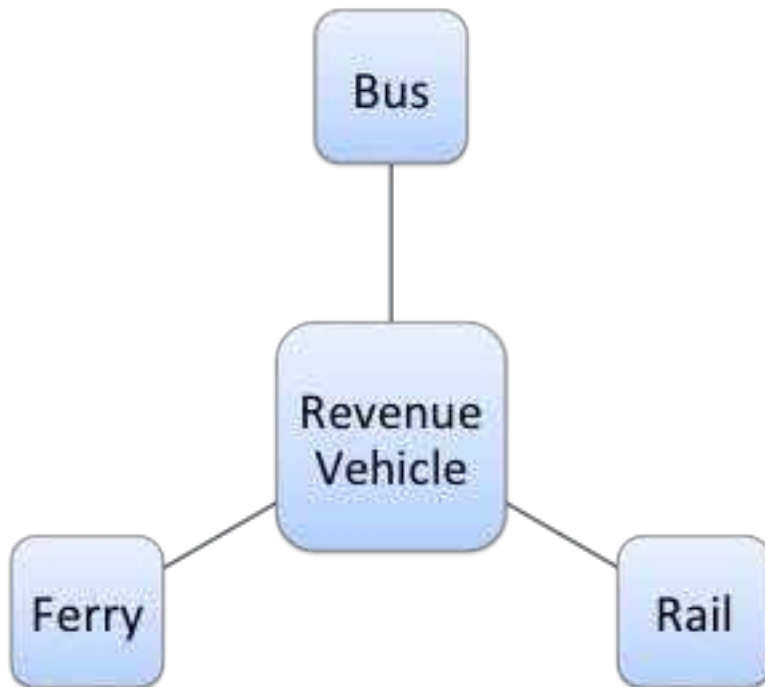


Figure 1. Asset Hierarchy – Revenue Vehicles

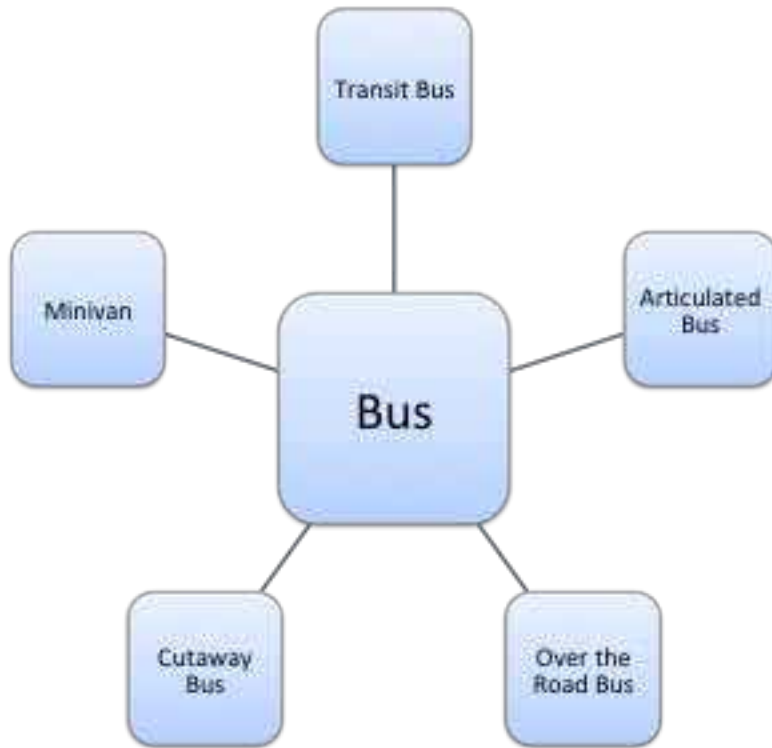


Figure 2. Asset Hierarchy – Revenue Vehicles – Bus

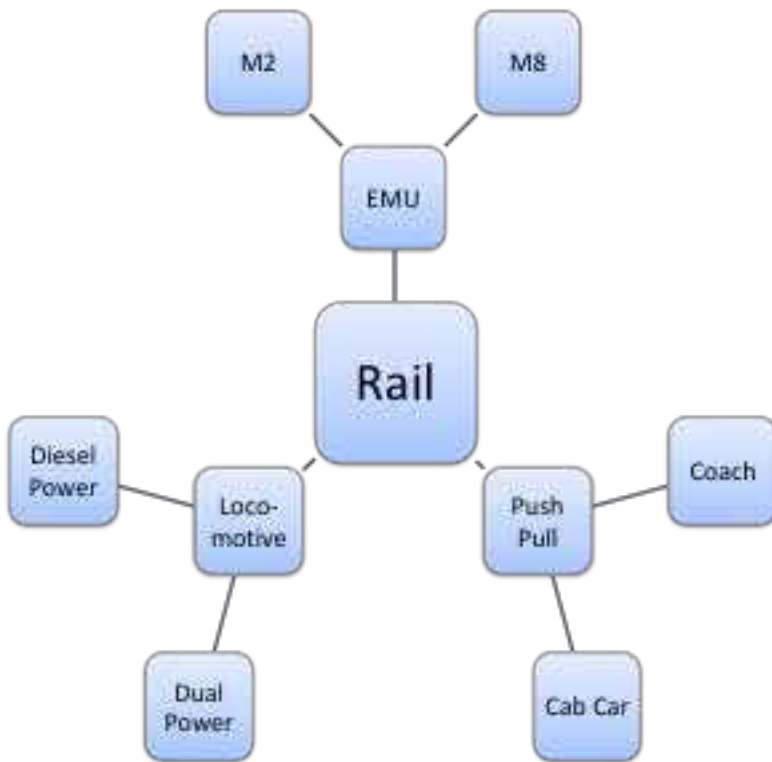


Figure 3. Asset Hierarchy – Revenue Vehicles – Rail

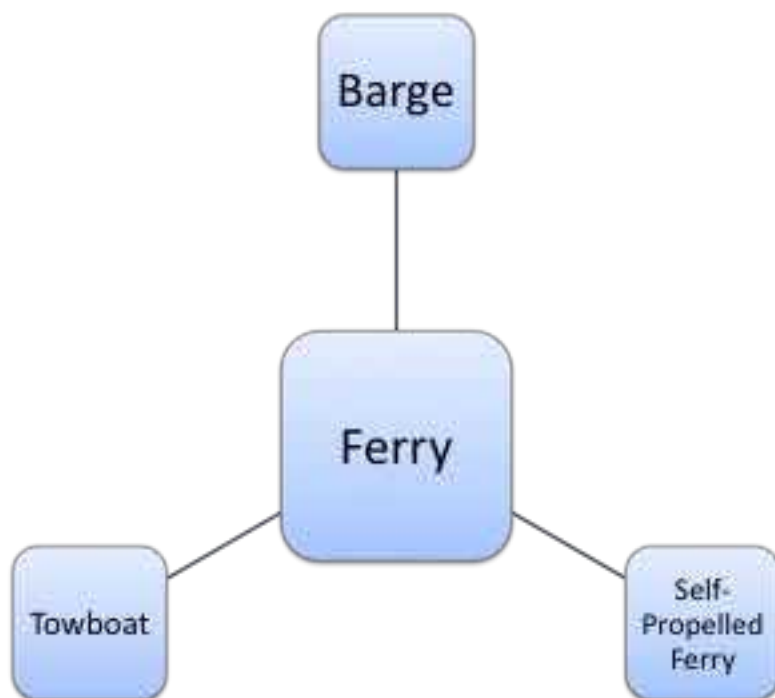


Figure 4. Asset Hierarchy – Revenue Vehicles – Ferry

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

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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.

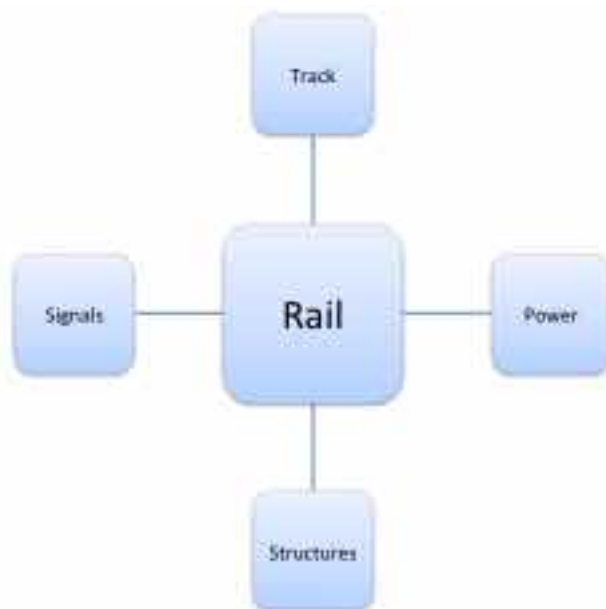


Figure 5. Asset Hierarchy – Fixed Guideway – Rail

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.

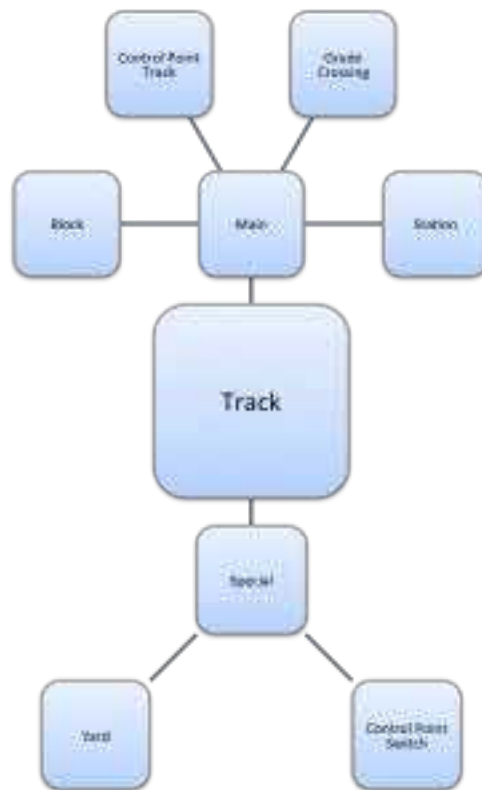


Figure 6. Asset Hierarchy – Fixed Guideway – Rail – Track



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

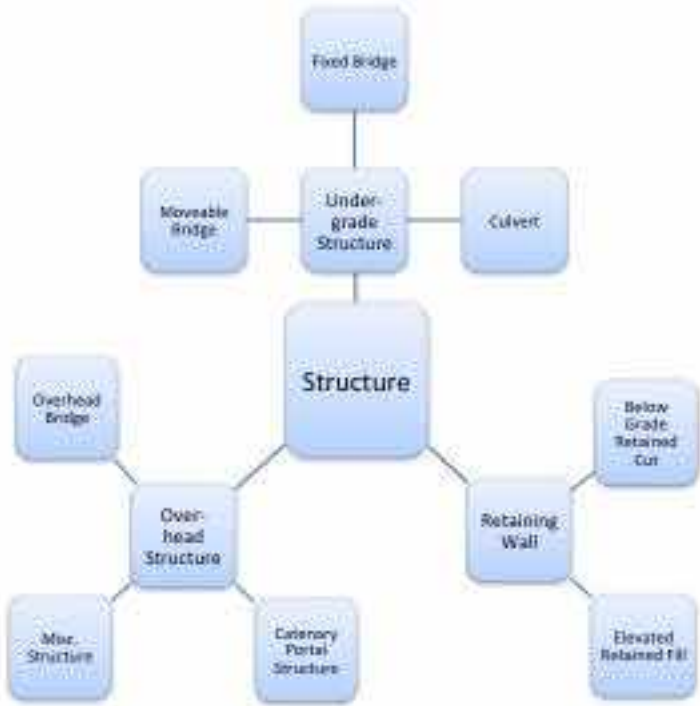


Figure 8. Asset Hierarchy – Fixed Guideway – Rail – Structure



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.

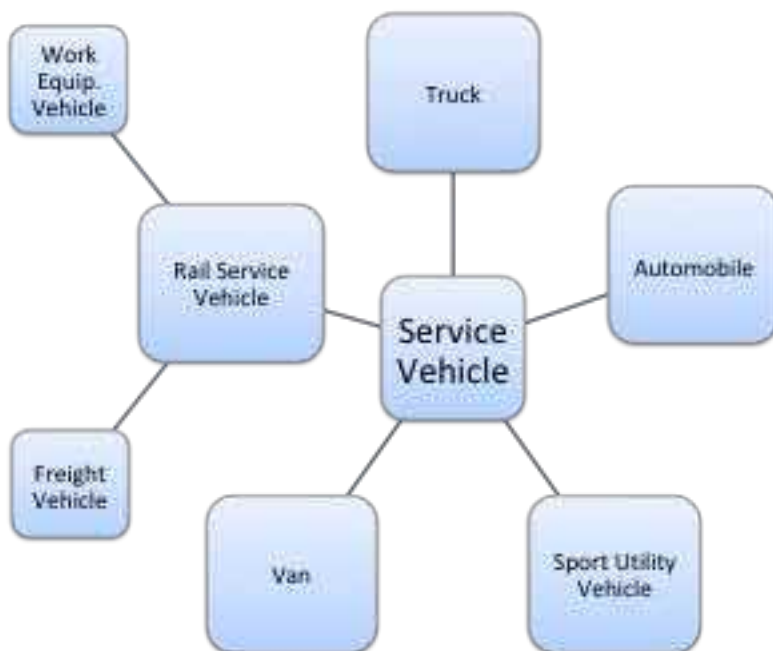


Figure 10. Asset Hierarchy – Equipment – Service Vehicles

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.

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	<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 D. Tier II Facilities

Tier II Facilities

Passenger/Parking vs Admin/Maintenance Type	Operator	Site	Facility Name	Platforms, Buildings, Ped Structures	No. of Structures	Inspected	Month / Year	Rating Submitted to NTD	TERM (1-5)	In SGR?	Month / Year	
A/M	GBTA	GBTA Admin and Maintenance	GBTA Admin and Maintenance		2	Yes	Aug-17	Oct-18	3	Yes	Aug-21	
A/M	GNHTD	GNHTD Maintenance Facility	GNHTD Maintenance Facility		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
A/M	HART	HART Maintenance Facility	HART Maintenance Facility		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
A/M	MTD	Milford Maintenance Facility	Milford Maintenance Facility		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
A/M	MAT	Middletown Admin Facility #1	Middletown Admin Facility #1		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
A/M	MAT	Middletown Maint Facility #2	Middletown Maint Facility #2		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
A/M	NWLKTD	Norwalk Maintenance Facility	Norwalk Maintenance Facility		1	Yes	Nov-16	Oct-18	3	Yes	Nov-20	
A/M	WRTD	Maintenance Facility	Maintenance Facility		2	No	Oct-18	TBD	N/A	N/A	Oct-22	
A/M	VTD	Valley Maint and Car Wash (New)	Valley Maint and Car Wash (New)		2	Yes	Jun-18	Oct-18	5	Yes	Jun-22	
A/M	SEAT	SEAT Maint Facility	SEAT Maint Facility		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
P/P	GBTA	Bridgeport Intermodal Center	Bridgeport Intermodal Center		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
P/P	NWLKTD	Norwalk Pulse Point	Norwalk Pulse Point		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
P/P	HART	Hart Wheels Hub	Hart Wheels Hub		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
P/P	MAT	Middletown Transfer Center	Middletown Transfer Center		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
P/P	Mansfield	Nash - Zimmer	Nash - Zimmer		1	No	Oct-18	TBD	N/A	N/A	Oct-22	
Total					15				18	3		3.7

Appendix E. TAPT Results

Scenario 1

Program List: Scenario 1 - Bus (State Match Only)

Program Year	Project Rank	Asset Name	Description	No. of Units	Replacement Costs	PI	Programmed	Project Number
2018	1	NWLKTD 1-2004 Ford Econoline E350	Cutaway Bus	9	634,653	4.8544	Y	DOT0412 *
2018	1	NWLKTD 2-2004 Ford Econoline E450	Cutaway Bus	1	70,517	4.8544	Y	DOT0412*
2018	3	HART 1-2007 Ford E450/StarTrans	Cutaway Bus	6	423,102	2.5390	Y	DOT0416
2018	4	HART 2-2007 Ford E450/StarTrans	Cutaway Bus	2	141,034	2.5390	Y	DOT0416
2018	4	NWCTD 1-2007 Ford Startrans	Cutaway Bus	1	70,517	2.5390	P	Various
2018	6	NECTD 1-2008 Ford Startrans	Cutaway Bus	1	70,517	1.9768	P	Various
2018	6	NECTD 2-2008 Ford Supreme	Cutaway Bus	2	141,034	1.9768	P	Various
2018	6	NECTD 3-2008 Ford Van	Cutaway Bus	2	141,034	1.9768	P	Various
2018	6	NWLKTD 3-2008 Ford Startrans	Cutaway Bus	1	70,517	1.9768	Y	DOT0412
2018	6	WRTD 1-2008 Ford Supreme	Cutaway Bus	1	70,517	1.9768	Y	DOT04740091RS
2018	11	HART 1999 Ford Econoline	Service-Van	1	46,182	1.6632	P	DOT0416
2018	12	CTTransit New Haven 2000 Chevrolet Cargo minivan	Service-Van	1	46,182	1.6372	P	Various
2018	12	CTTransit Stamford 2000 Chevrolet 2500 cargo	Service-Van	1	46,182	1.6372	P	Various
2018	14	NWCTD 2-2009 Ford Supreme	Cutaway Bus	7	493,619	1.4948	P	Various
2018	14	WRTD 2-2009 Ford Startrans	Cutaway Bus	1	70,517	1.4948	Y	DOT04740091RS
2018	14	WRTD 3-2009 Ford Startrans Van	Cutaway Bus	1	70,517	1.4948	Y	DOT04740091RS
2018	17	SEAT 2004 Ford Explorer	Service-SUV	1	32,715	1.3911	P	DOT0414
2018	18	NWLKTD 2005 Ford Freestyle	Service-SUV	1	32,715	1.2806	P	DOT0412
2018	19	NWLKTD 2005 Ford Sedan 500 AW	Service-Auto	1	19,679	1.2797	P	Various
2018	20	HART 2005 Ford E350	Service-Van	1	46,182	1.2794	P	DOT0416
2018	21	ETD 1-2010 Ford E450	Cutaway Bus	1	70,517	1.0813	Y	DOT0478
2018	21	ETD 2-2010 Ford E450	Cutaway Bus	2	141,034	1.0813	Y	DOT0478
2018	21	NECTD 4-2010 Ford Startrans	Cutaway Bus	1	70,517	1.0813	P	Various
2018	21	NECTD 5-2010 Ford Startrans	Cutaway Bus	4	282,068	1.0813	P	Various
2018	25	NWLKTD 4-2010 Ford Phoenix E450	Cutaway Bus	10	705,170	1.0813	Y	DOT0412*
2018	26	CTTransit New Haven 2007 Ford Fusion 4 door sedan	Service-Auto	2	39,358	0.9972	P	Various
2018	26	CTTransit Stamford 2007 Ford Fusion 4 door sedan	Service-Auto	1	19,679	0.9972	P	Various
2018	28	CTTransit Hartford 2007 Chevrolet Cargo minivan	Service-Van	2	92,364	0.9970	P	Various
2018	28	CTTransit Stamford 2007 Chevrolet CG23405 Cargo	Service-Van	1	46,182	0.9970	P	Various
2018	28	CTTransit Waterbury 2007 Ford E150	Service-Van	1	46,182	0.9970	P	Various
2018	31	GBTA 1982 GMC TOW truck	Service-Truck	1	167,775	0.8932	P	DOT0410
2018	32	CTTransit Hartford 2008 Toyota hybrid	Service-Auto	2	39,358	0.8309	P	Various
2018	33	ETD 3-2011 Ford Startrans	Cutaway Bus	1	70,517	0.7266	Y	DOT0478
2018	33	NWCTD 3-2011 Ford Startrans	Cutaway Bus	4	282,068	0.7266	P	Various
2018	33	WRTD 4-2011 Ford Startrans	Cutaway Bus	3	211,551	0.7266	P	Various
2018	33	WRTD 5-2011 Ford Startrans Vans	Cutaway Bus	6	423,102	0.7266	Y	DOT04740091RS
2018	37	HART 2009 Ford Escape	Service-SUV	2	65,430	0.6555	P	DOT0416
2018	38	GBTA 2009 Toyota Camry	Service-Auto	2	39,358	0.6549	P	DOT0410
2018	39	CTTransit Stamford 1990 M7-Plow/Dump and Sand Truck	Service-Truck	2	335,550	0.5069	P	Various
2018	40	GBTA 2010 GMC Terrain SLE	Service-SUV	1	32,715	0.4768	P	DOT0410
2018	41	ETD 4-2012 Ford F550	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	ETD 5-2012 Ford Goshen E450	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	ETD 6-2012 Ford Phoenix	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	ETD 7-2012 Ford Startrans E450 28 FT	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	GBTA 1-2012 Ford Goshen	Cutaway Bus	4	282,068	0.4219	Y	DOT0410
2018	41	NWCTD 4-2012 Ford E450	Cutaway Bus	3	211,551	0.4219	P	Various
2018	41	VTD 1-2012 Ford Supreme	Cutaway Bus	14	987,238	0.4219	Y	DOT00360199RS
2018	41	WRTD 6-2012 Goshen Coach	Cutaway Bus	2	141,034	0.4219	P	Various
2018	49	CTTransit Stamford 2011 Ford Escape	Service-SUV	3	98,145	0.3031	P	Various
2018	49	ETD 2011 Ford Escape	Service-SUV	1	32,715	0.3031	P	DOT0478
2018	49	GBTA 2011 Chevrolet Tahoe	Service-SUV	2	65,430	0.3031	P	DOT0410
2018	52	CTTransit New Haven 2011 Ford Escape	Service-SUV	5	163,575	0.3031	P	Various
2018	53	CTTransit Hartford 1995 International Service Truck	Service-Truck	1	167,775	0.2897	P	Various
2018	53	CTTransit Waterbury 1995 International Service Truck	Service-Truck	1	167,775	0.2897	P	Various
2018	55	CTTransit Stamford 1997 M8-Rack Body & Plow	Service-Truck	1	167,775	0.2126	P	Various
2018	56	NWLKTD Admin/Maint 1	Facility-Fire	1	1,064,196	0.1709	P	DOT0412
2018	57	ETD 10-2013 Ford Goshen F550	Cutaway Bus	1	70,517	0.1602	Y	DOT0478
2018	57	ETD 8-2013 Ford E450	Cutaway Bus	2	141,034	0.1602	Y	DOT0478
2018	57	ETD 9-2013 Ford Goshen E450 28 FT	Cutaway Bus	1	70,517	0.1602	Y	DOT0478
2018	57	GNHTD 1-2013 Ford E350 Goshen	Cutaway Bus	13	916,721	0.1602	Y	DOT0427*
2018	57	GNHTD 2-2013 Ford E450 Goshen	Cutaway Bus	4	282,068	0.1602	Y	DOT0427
2018	57	HART 3-2013 Ford E450/Goshen Coach	Cutaway Bus	9	634,653	0.1602	Y	DOT0416
2018	57	WRTD 7-2013 Goshen Coach	Cutaway Bus	3	211,551	0.1602	Y	DOT04740091RS
2018	64	CTTransit Hartford 1999 Chevrolet Pick Up	Service-Truck	1	167,775	0.1424	P	Various
2018	64	VTD 1999 Ford F250 Pickup	Service-Truck	1	167,775	0.1424	P	DOT00360199EQ
2018	66	CTTransit Stamford 2-2001 New Flyer	Transit Bus	2	848,172	0.0973	Y	DOT0403
2018	66	New Britain 1-2001 New Flyer	Transit Bus	1	424,086	0.0973	Y	Various
2018	68	NWLKTD 2001 Ford Utility Truck	Service-Truck	1	167,775	0.0796	P	DOT0412

Program Year	Project Rank	Asset Name	Description	No. of Units	Replacement Costs	PI	Programmed	Project Number
2018	69	NWLKTD Admin/Maint 1	Facility-Electrical	1	1,368,252	0.0781	P	DOT0412
2018	70	GBTA 4-2003 New Flyer	Transit Bus	2	848,172	0.0581	Y	DOT0410
2018	70	GBTA 5-2003 New Flyer	Transit Bus	3	1,272,258	0.0581	Y	DOT0410
2018	70	NWLKTD 6-2003 Orion VII	Transit Bus	19	8,057,634	0.0581	P	DOT0412
2018	70	SEAT 2-2003 New Flyer	Transit Bus	1	424,086	0.0581	P	DOT0414
2018	70	SEAT 3-2003 New Flyer	Transit Bus	1	424,086	0.0581	P	DOT0414
2019	1	HART 4-2014 Ford E450/ Goshen Coach	Cutaway Bus	4	282,068	0.1602	Y	DOT0416
2019	1	HART 5-2014 Ford E450/Goshen Coach	Cutaway Bus	3	211,551	0.1602	Y	DOT0416
2019	1	NWLKTD 5-2014 Chevrolet Pegasus	Cutaway Bus	10	705,170	0.1602	P	DOT0424
2019	4	CTTransit New Haven 3-2004 New Flyer	Transit Bus	41	17,387,526	0.0581	Y	Various
2019	4	Dattoo 1-2004 New Flyer	Transit Bus	1	424,086	0.0581	Y	Various
2019	4	MifdTD 3-2004 New Flyer	Transit Bus	1	424,086	0.0581	Y	DOT0424
2019	4	NWLKTD 7-2004 Gillig	Transit Bus	3	1,272,258	0.0581	P	DOT0424
2019	4	SEAT 4-2004 Gillig	Transit Bus	1	424,086	0.0581	P	DOT0414
2019	9	CTTransit Hartford 2003 Freightliner Service Patrol	Service-Truck	1	167,775	0.0511	P	Various
2019	9	GBTA 2003 GMC 4500Dump Truck	Service-Truck	1	167,775	0.0511	P	DOT0410
2019	11	CTTransit Hartford 3-2005 New Flyer	Transit Bus	48	20,356,128	0.0402	Y	Various
2019	12	GBTA 2004 Skid Steer	Service-Truck	1	167,775	0.0247	P	DOT0410
2019	12	HART 2004 Ford F450	Service-Truck	1	167,775	0.0247	P	DOT0416
2020	1	ETD 11-2015 Ford E450 Phoenix	Cutaway Bus	4	282,068	0.1602	Y	DOT0478
2020	1	GNHTD 3-2015 Ford E350 Goshen	Cutaway Bus	11	775,687	0.1602	Y	DOT0427
2020	1	GNHTD 4-2015 Ford E450 Goshen	Cutaway Bus	3	211,551	0.1602	Y	DOT0427
2020	1	MAT 1-2015 Goshen E350	Cutaway Bus	10	705,170	0.1602	Y	DOT0422
2020	5	CTTransit New Haven 2014 Ford Escape	Service-SUV	1	32,715	0.1423	P	Various
2020	5	CTTransit Waterbury 2014 Chevrolet Traverse	Service-SUV	4	130,860	0.1423	P	Various
2020	5	GBTA 2014 Chevrolet Tahoe	Service-SUV	1	32,715	0.1423	P	DOT0410
2020	8	CTTransit Hartford 2014 Ford Fusion 4 door sedan	Service-Auto	3	59,037	0.1419	P	Various
2020	9	CTTransit New Haven 2014 Ford E350 shuttle van	Service-Van	2	92,364	0.1418	P	Various
2020	10	NWLKTD 8-2006 Gillig	Transit Bus	3	1,272,258	0.0402	Y	DOT0412
2020	10	SEAT 5-2006 Gillig	Transit Bus	2	848,172	0.0402	Y	DOT0414
2020	10	SEAT 6-2006 New Flyer	Transit Bus	3	1,272,258	0.0402	Y	DOT0414
2020	10	SEAT 7-2006 New Flyer	Transit Bus	3	1,272,258	0.0402	Y	DOT0414
2020	10	WRTD 8-2006 Gillig	Transit Bus	2	848,172	0.0402	P	Various
2020	15	CTTransit Hartford Admin/Maintenance 1	Facility-Equipment	1	17,940,583	0.0314	Y	DOT04010017CN
2020	15	HART Passenger Facility 1	Facility-Equipment	1	15,370	0.0314	P	DOT0416
2020	15	MAT Parking 1	Facility-Equipment	1	9,865	0.0314	P	DOT0422
2020	18	CTTransit Hartford Fuel Cell Storage 1	Facility-Equipment	1	468,384	0.0314	P	DOT0400
2020	18	CTTransit Stamford Maintenance 1	Facility-Equipment	1	801,960	0.0314	P	DOT0400
2020	18	CTTransit Stamford Office/Storage 1	Facility-Equipment	1	2,706,000	0.0314	P	DOT0400
2020	18	GBTA Maint 1	Facility-Equipment	1	3,936,000	0.0314	Y	DOT0410
2020	18	GNHTD Admin/Maint 1	Facility-Equipment	1	580,560	0.0314	Y	DOT04270056CN
2020	18	SEAT Admin/Maint 1	Facility-Equipment	1	1,830,240	0.0314	P	DOT0414
2021	1	CTTransit Waterbury 4-2016 Ford E450	Cutaway Bus	22	1,551,374	0.1602	Y	DOT0400
2021	1	GNHTD 5-2016 Ford Goshen E350	Cutaway Bus	18	1,269,306	0.1602	Y	DOT0427
2021	1	HART 6-2016 Ford E450/Goshen Coach	Cutaway Bus	1	70,517	0.1602	Y	DOT0416
2021	1	HART 7-2016 Ford E350/ Goshen Coach	Cutaway Bus	4	282,068	0.1602	P	DOT0416
2021	1	HART 8-2016 Ford E350/Goshen Coach	Cutaway Bus	5	352,585	0.1602	P	DOT0416
2021	1	MifdTD 1-2016 Ford E450	Cutaway Bus	8	564,136	0.1602	P	DOT0424
2021	1	SEAT 1-2016 Ford Phoenix E450	Cutaway Bus	5	352,585	0.1602	P	DOT0414
2021	8	CTTransit Hartford 2015 Ford Interceptor	Service-SUV	4	130,860	0.1423	P	Various
2021	9	CTTransit Hartford 2015 GMC Savana Parts Van	Service-Van	3	138,546	0.1418	P	Various
2021	9	SEAT 2015 Dodge Caravan	Service-Van	1	46,182	0.1418	P	DOT0414
2021	11	CTTransit Hartford Admin/Maintenance 1	Facility-Conveyance	1	3,588,117	0.0945	P	DOT0400
2021	11	CTTransit Hartford Fuel Cell Storage 1	Facility-Conveyance	1	93,677	0.0945	P	DOT0400
2021	11	CTTransit Stamford Office/Storage 1	Facility-Conveyance	1	541,200	0.0945	P	DOT0400
2021	11	GBTA Maint 1	Facility-Conveyance	1	787,200	0.0945	P	DOT0410
2021	11	GNHTD Admin/Maint 1	Facility-Conveyance	1	116,112	0.0945	Y	DOT04270056CN
2021	11	HART Passenger Facility 1	Facility-Conveyance	1	61,482	0.0945	P	DOT0416
2021	11	MAT Parking 1	Facility-Conveyance	1	39,459	0.0945	P	DOT0422
2021	11	SEAT Admin/Maint 1	Facility-Conveyance	1	366,048	0.0945	P	DOT0414
2021	19	CTTransit Stamford Maintenance 1	Facility-Conveyance	1	160,392	0.0945	P	DOT0400
2021	19	NWLKTD Admin/Maint 1	Facility-Conveyance	1	608,112	0.0945	P	DOT0412

* Replacement in PY18
Y Programmed in Capital Plan
P Partially Funded or Authorized but Not Allocated

Scenario 2

Program List: Scenario 2 - Bus (State Match and Bonding)

Program Year	Project Rank	Asset Name	Description	No. of Units	Replacement Costs	PI	Programmed	Project Number
2018	1	NWLKTD 1-2004 Ford Econoline E350	Cutaway Bus	9	634,653	4.8544	Y	DOT0412 *
2018	1	NWLKTD 2-2004 Ford Econoline E450	Cutaway Bus	1	70,517	4.8544	Y	DOT0412*
2018	3	HART 1-2007 Ford E450/StarTrans	Cutaway Bus	6	423,102	2.5390	Y	DOT0416
2018	4	HART 2-2007 Ford E450/StarTrans	Cutaway Bus	2	141,034	2.5390	Y	DOT0416
2018	4	NWCTD 1-2007 Ford Startrans	Cutaway Bus	1	70,517	2.5390	P	Various
2018	6	NECTD 1-2008 Ford Startrans	Cutaway Bus	1	70,517	1.9768	P	Various
2018	6	NECTD 2-2008 Ford Supreme	Cutaway Bus	2	141,034	1.9768	P	Various
2018	6	NECTD 3-2008 Ford Van	Cutaway Bus	2	141,034	1.9768	P	Various
2018	6	NWLKTD 3-2008 Ford Startrans	Cutaway Bus	1	70,517	1.9768	Y	DOT0412
2018	6	WRTD 1-2008 Ford Supreme	Cutaway Bus	1	70,517	1.9768	Y	DOT04740091RS
2018	11	HART 1999 Ford Econoline	Service-Van	1	46,182	1.6632	P	DOT0416
2018	12	CTTransit New Haven 2000 Chevrolet Cargo minivan	Service-Van	1	46,182	1.6372	P	Various
2018	12	CTTransit Stamford 2000 Chevrolet 2500 cargo	Service-Van	1	46,182	1.6372	P	Various
2018	14	NWCTD 2-2009 Ford Supreme	Cutaway Bus	7	493,619	1.4948	P	Various
2018	14	WRTD 2-2009 Ford Startrans	Cutaway Bus	1	70,517	1.4948	Y	DOT04740091RS
2018	14	WRTD 3-2009 Ford Startrans Van	Cutaway Bus	1	70,517	1.4948	Y	DOT04740091RS
2018	17	SEAT 2004 Ford Explorer	Service-SUV	1	32,715	1.3911	P	DOT0414
2018	18	NWLKTD 2005 Ford Freestyle	Service-SUV	1	32,715	1.2806	P	DOT0412
2018	19	NWLKTD 2005 Ford Sedan 500 AW	Service-Auto	1	19,679	1.2797	P	Various
2018	20	HART 2005 Ford E350	Service-Van	1	46,182	1.2794	P	DOT0416
2018	21	ETD 1-2010 Ford E450	Cutaway Bus	1	70,517	1.0813	Y	DOT0478
2018	21	ETD 2-2010 Ford E450	Cutaway Bus	2	141,034	1.0813	Y	DOT0478
2018	21	NECTD 4-2010 Ford Startrans	Cutaway Bus	1	70,517	1.0813	P	Various
2018	21	NECTD 5-2010 Ford Startrans	Cutaway Bus	4	282,068	1.0813	P	Various
2018	25	NWLKTD 4-2010 Ford Phoenix E450	Cutaway Bus	10	705,170	1.0813	Y	DOT0412*
2018	26	CTTransit New Haven 2007 Ford Fusion 4 door sedan	Service-Auto	2	39,358	0.9972	P	Various
2018	26	CTTransit Stamford 2007 Ford Fusion 4 door sedan	Service-Auto	1	19,679	0.9972	P	Various
2018	28	CTTransit Hartford 2007 Chevrolet Cargo minivan	Service-Van	2	92,364	0.9970	P	Various
2018	28	CTTransit Stamford 2007 Chevrolet CG23405 Cargo	Service-Van	1	46,182	0.9970	P	Various
2018	28	CTTransit Waterbury 2007 Ford E150	Service-Van	1	46,182	0.9970	P	Various
2018	31	GBTA 1982 GMC TOW truck	Service-Truck	1	167,775	0.8932	P	DOT0410
2018	32	CTTransit Hartford 2008 Toyota hybrid	Service-Auto	2	39,358	0.8309	P	Various
2018	33	ETD 3-2011 Ford Startrans	Cutaway Bus	1	70,517	0.7266	Y	DOT0478
2018	33	NWCTD 3-2011 Ford Startrans	Cutaway Bus	4	282,068	0.7266	P	Various
2018	33	WRTD 4-2011 Ford Startrans	Cutaway Bus	3	211,551	0.7266	P	Various
2018	33	WRTD 5-2011 Ford Startrans Vans	Cutaway Bus	6	423,102	0.7266	Y	DOT04740091RS
2018	37	HART 2009 Ford Escape	Service-SUV	2	65,430	0.6555	P	DOT0416
2018	38	GBTA 2009 Toyota Camry	Service-Auto	2	39,358	0.6549	P	DOT0410
2018	39	CTTransit Stamford 1990 M7-Plow/Dump and Sand Truck	Service-Truck	2	335,550	0.5069	P	Various
2018	40	GBTA 2010 GMC Terrain SLE	Service-SUV	1	32,715	0.4768	P	DOT0410
2018	41	ETD 4-2012 Ford F550	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	ETD 5-2012 Ford Goshen E450	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	ETD 6-2012 Ford Phoenix	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	ETD 7-2012 Ford Startrans E450 28 FT	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	GBTA 1-2012 Ford Goshen	Cutaway Bus	4	282,068	0.4219	Y	DOT0410
2018	41	NWCTD 4-2012 Ford E450	Cutaway Bus	3	211,551	0.4219	P	Various
2018	41	VTD 1-2012 Ford Supreme	Cutaway Bus	14	987,238	0.4219	Y	DOT00360199RS
2018	41	WRTD 6-2012 Goshen Coach	Cutaway Bus	2	141,034	0.4219	P	Various
2018	49	CTTransit Stamford 2011 Ford Escape	Service-SUV	3	98,145	0.3031	P	Various
2018	49	ETD 2011 Ford Escape	Service-SUV	1	32,715	0.3031	P	DOT0478
2018	49	GBTA 2011 Chevrolet Tahoe	Service-SUV	2	65,430	0.3031	P	DOT0410
2018	52	CTTransit New Haven 2011 Ford Escape	Service-SUV	5	163,575	0.3031	P	Various
2018	53	CTTransit Hartford 1995 Intemational Service Truck	Service-Truck	1	167,775	0.2897	P	Various
2018	53	CTTransit Waterbury 1995 Intemational Service Truck	Service-Truck	1	167,775	0.2897	P	Various
2018	55	CTTransit Stamford 1997 M8-Rack Body & Plow	Service-Truck	1	167,775	0.2126	P	Various
2018	56	NWLKTD Admin/Maint 1	Facility-Fire	1	1,064,196	0.1709	P	DOT0412
2018	57	ETD 10-2013 Ford Goshen F550	Cutaway Bus	1	70,517	0.1602	Y	DOT0478
2018	57	ETD 8-2013 Ford E450	Cutaway Bus	2	141,034	0.1602	Y	DOT0478
2018	57	ETD 9-2013 Ford Goshen E450 28 FT	Cutaway Bus	1	70,517	0.1602	Y	DOT0478
2018	57	GNHTD 1-2013 Ford E350 Goshen	Cutaway Bus	13	916,721	0.1602	Y	DOT0427*
2018	57	GNHTD 2-2013 Ford E450 Goshen	Cutaway Bus	4	282,068	0.1602	Y	DOT0427
2018	57	HART 3-2013 Ford E450/Goshen Coach	Cutaway Bus	9	634,653	0.1602	Y	DOT0416
2018	57	WRTD 7-2013 Goshen Coach	Cutaway Bus	3	211,551	0.1602	Y	DOT04740091RS
2018	64	CTTransit Hartford 1999 Chevrolet Pick Up	Service-Truck	1	167,775	0.1424	P	Various
2018	64	VTD 1999 Ford F250 Pickup	Service-Truck	1	167,775	0.1424	P	DOT00360199EQ
2018	66	CTTransit Stamford 2-2001 New Flyer	Transit Bus	2	848,172	0.0973	Y	DOT0403
2018	66	New Britain 1-2001 New Flyer	Transit Bus	1	424,086	0.0973	Y	Various

Program Year	Project Rank	Asset Name	Description	No. of Units	Replacement Costs	PI	Programmed	Project Number
2018	68	NWLKTD 2001 Ford Utility Truck	Service-Truck	1	167,775	0.0796	P	DOT0412
2018	69	NWLKTD Admin/Maint 1	Facility-Electrical	1	1,368,252	0.0781	P	DOT0412
2018	70	GBTA 4-2003 New Flyer	Transit Bus	2	848,172	0.0581	Y	DOT0410
2018	70	GBTA 5-2003 New Flyer	Transit Bus	3	1,272,258	0.0581	Y	DOT0410
2018	70	NWLKTD 6-2003 Orion VII	Transit Bus	19	8,057,634	0.0581	P	DOT0412
2018	70	SEAT 2-2003 New Flyer	Transit Bus	1	424,086	0.0581	P	DOT0414
2018	70	SEAT 3-2003 New Flyer	Transit Bus	1	424,086	0.0581	P	DOT0414
2018	75	CTTransit New Haven 3-2004 New Flyer	Transit Bus	41	17,387,526	0.0402	Y	Various
2018	75	Dattco 1-2004 New Flyer	Transit Bus	1	424,086	0.0402	Y	Various
2018	75	MfdTD 3-2004 New Flyer	Transit Bus	1	424,086	0.0402	P	DOT0424
2018	75	NWLKTD 7-2004 Gillig	Transit Bus	3	1,272,258	0.0402	P	DOT0412
2018	75	SEAT 4-2004 Gillig	Transit Bus	1	424,086	0.0402	P	DOT0414
2018	80	CTTransit Hartford 2003 Freightliner Service Patrol	Service-Truck	1	167,775	0.0247	P	Various
2018	80	GBTA 2003 GMC 4500Dump Truck	Service-Truck	1	167,775	0.0247	P	DOT0410
2019	1	HART 4-2014 Ford E450/ Goshen Coach	Cutaway Bus	4	282,068	0.1602	Y	DOT0416
2019	1	HART 5-2014 Ford E450/Goshen Coach	Cutaway Bus	3	211,551	0.1602	Y	DOT0416
2019	1	NWLKTD 5-2014 Chevrolet Pegasus	Cutaway Bus	10	705,170	0.1602	P	DOT0424
2019	4	CTTransit Hartford 3-2005 New Flyer	Transit Bus	48	20,356,128	0.0402	Y	Various
2019	5	GBTA 2004 Skid Steer	Service-Truck	1	167,775	0.0247	P	DOT0410
2019	5	HART 2004 Ford F450	Service-Truck	1	167,775	0.0247	P	DOT0416
2019	7	NWLKTD 8-2006 Gillig	Transit Bus	3	1,272,258	0.0234	Y	DOT0412
2019	7	SEAT 5-2006 Gillig	Transit Bus	2	848,172	0.0234	Y	DOT0414
2019	7	SEAT 6-2006 New Flyer	Transit Bus	3	1,272,258	0.0234	Y	DOT0414
2019	7	SEAT 7-2006 New Flyer	Transit Bus	3	1,272,258	0.0234	Y	DOT0414
2019	7	WRD 8-2006 Gillig	Transit Bus	2	848,172	0.0234	P	Various
2019	12	CTTransit Stamford 5-2003 MCI	Over-the-Road Bus	2	973,214	0.0148	Y	Various
2020	1	ETD 11-2015 Ford E450 Phoenix	Cutaway Bus	4	282,068	0.1602	Y	DOT0478
2020	1	GNHTD 3-2015 Ford E350 Goshen	Cutaway Bus	11	775,687	0.1602	Y	DOT0427
2020	1	GNHTD 4-2015 Ford E450 Goshen	Cutaway Bus	3	211,551	0.1602	Y	DOT0427
2020	1	MAT 1-2015 Goshen E350	Cutaway Bus	10	705,170	0.1602	Y	DOT0422
2020	5	CTTransit New Haven 2014 Ford Escape	Service-SUV	1	32,715	0.1423	P	Various
2020	5	CTTransit Waterbury 2014 Chevrolet Traverse	Service-SUV	4	130,860	0.1423	P	Various
2020	5	GBTA 2014 Chevrolet Tahoe	Service-SUV	1	32,715	0.1423	P	DOT0410
2020	8	CTTransit Hartford 2014 Ford Fusion 4 door sedan	Service-Auto	3	59,037	0.1419	P	Various
2020	9	CTTransit New Haven 2014 Ford E350 shuttle van	Service-Van	2	92,364	0.1418	P	Various
2020	10	CTTransit Hartford Admin/Maintenance 1	Facility-Equipment	1	17,940,583	0.0314	Y	DOT04010017CN
2020	10	HART Passenger Facility 1	Facility-Equipment	1	15,370	0.0314	P	DOT0416
2020	10	MAT Parking 1	Facility-Equipment	1	9,865	0.0314	P	DOT0422
2020	13	CTTransit Hartford Fuel Cell Storage 1	Facility-Equipment	1	468,384	0.0314	P	DOT0400
2020	13	CTTransit Stamford Maintenance 1	Facility-Equipment	1	801,960	0.0314	P	DOT0400
2020	13	CTTransit Stamford Office/Storage 1	Facility-Equipment	1	2,706,000	0.0314	P	DOT0400
2020	13	GBTA Maint 1	Facility-Equipment	1	3,936,000	0.0314	Y	DOT0410
2020	13	GNHTD Admin/Maint 1	Facility-Equipment	1	580,560	0.0314	Y	DOT04270056CN
2020	13	SEAT Admin/Maint 1	Facility-Equipment	1	1,830,240	0.0314	P	DOT0414
2021	1	CTTransit Waterbury 4-2016 Ford E450	Cutaway Bus	22	1,551,374	0.1602	Y	DOT0400
2021	1	GNHTD 5-2016 Ford Goshen E350	Cutaway Bus	18	1,269,306	0.1602	Y	DOT0427
2021	1	HART 6-2016 Ford E450/Goshen Coach	Cutaway Bus	1	70,517	0.1602	P	DOT0416
2021	1	HART 7-2016 Ford E350/ Goshen Coach	Cutaway Bus	4	282,068	0.1602	P	DOT0416
2021	1	HART 8-2016 Ford E350/Goshen Coach	Cutaway Bus	5	352,585	0.1602	P	DOT0416
2021	1	MfdTD 1-2016 Ford E450	Cutaway Bus	8	564,136	0.1602	P	DOT0424
2021	1	SEAT 1-2016 Ford Phoenix E450	Cutaway Bus	5	352,585	0.1602	P	DOT0414
2021	8	CTTransit Hartford 2015 Ford Interceptor	Service-SUV	4	130,860	0.1423	P	Various
2021	9	CTTransit Hartford 2015 GMC Savana Parts Van	Service-Van	3	138,546	0.1418	P	Various
2021	9	SEAT 2015 Dodge Caravan	Service-Van	1	46,182	0.1418	P	DOT0410
2021	11	CTTransit Hartford Admin/Maintenance 1	Facility-Conveyance	1	3,588,117	0.0945	P	DOT0400
2021	11	CTTransit Hartford Fuel Cell Storage 1	Facility-Conveyance	1	93,677	0.0945	P	DOT0400
2021	11	CTTransit Stamford Office/Storage 1	Facility-Conveyance	1	541,200	0.0945	P	DOT0400
2021	11	GBTA Maint 1	Facility-Conveyance	1	787,200	0.0945	Y	DOT0410
2021	11	GNHTD Admin/Maint 1	Facility-Conveyance	1	116,112	0.0945	Y	DOT04270056CN
2021	11	HART Passenger Facility 1	Facility-Conveyance	1	61,482	0.0945	P	DOT0416
2021	11	MAT Parking 1	Facility-Conveyance	1	39,459	0.0945	P	DOT0422
2021	11	SEAT Admin/Maint 1	Facility-Conveyance	1	366,048	0.0945	P	DOT0414
2021	19	CTTransit Stamford Maintenance 1	Facility-Conveyance	1	160,392	0.0945	P	DOT0400
2021	19	NWLKTD Admin/Maint 1	Facility-Conveyance	1	608,112	0.0945	P	DOT0412
2021	21	CTTransit Hartford 4-2007 New Flyer	Transit Bus	64	27,141,504	0.0402	Y	DOT0400
2021	21	HART 10-2007 Gillig	Transit Bus	10	4,240,860	0.0402	P	DOT0416
2021	21	SEAT 8-2007 New Flyer	Transit Bus	6	2,544,516	0.0402	P	DOT0414
2021	21	SEAT 9-2007 New Flyer	Transit Bus	2	848,172	0.0402	P	DOT0414

Program Year	Project Rank	Asset Name	Description	No. of Units	Replacement Costs	PI	Programmed	Project Number
2021	25	GNHTD 8-2015 Dodge Caravan	Van	4	184,728	0.0280	Y	DOT0427
2021	26	CTTransit Waterbury 2006 Chevrolet Dump Truck	Service-Truck	1	167,775	0.0247	P	Various
2021	26	SEAT 2006 RAM Pickup	Service-Truck	1	167,775	0.0247	P	DOT0410
2021	28	CTTransit Hartford 5-2008 New Flyer	Transit Bus	2	848,172	0.0234	Y	DOT0400
2021	28	New Britain 2-2008 New Flyer	Transit Bus	1	424,086	0.0234	Y	DOT0400
2021	28	NWLKTD 10-2008 Gillig	Transit Bus	4	1,696,344	0.0234	P	DOT0412
2021	28	NWLKTD 9-2008 Gillig	Transit Bus	3	1,272,258	0.0234	P	DOT0412
2021	28	SEAT 10-2008 New Flyer	Transit Bus	2	848,172	0.0234	P	DOT0414
2021	28	WRD 9-2008 Gillig	Transit Bus	3	1,272,258	0.0234	Y	DOT04740091RS
2021	34	MfdTD 4-2009 New Flyer	Transit Bus	4	1,696,344	0.0077	P	DOT0424
2021	35	Nason/Kelley 1-2007 MCI	Over-the-Road Bus	1	486,607	0.0074	Y	DOT0400
2021	36	GNHTD 9-2016 Dodge Caravan	Van	2	92,364	0.0063	Y	DOT0427
2021	37	CTTransit Hartford 2016 Ford Escape	Service-SUV	1	32,715	0.0009	P	Various
2021	37	HART 2016 Ford Escape	Service-SUV	1	32,715	0.0009	P	DOT0416
2021	37	HART 2016 Ford Explorer	Service-SUV	1	32,715	0.0009	P	DOT0416
2021	37	NWLKTD 2016 Ford Explorer	Service-SUV	2	65,430	0.0009	P	DOT0412
2021	37	VTD 2016 Ford Escape	Service-SUV	1	32,715	0.0009	P	DOT00360199EQ
2021	37	WRD 2016 Jeep Patriot	Service-SUV	1	32,715	0.0009	P	Various
2021	43	CTTransit Hartford 2016 Ford Fusion 4 door sedan	Service-Auto	2	39,358	0.0006	P	Various
2021	43	CTTransit New Haven 2016 Ford Fusion 4 door sedan	Service-Auto	1	19,679	0.0006	P	Various

- * Replacement in PY18
- Y Programmed in Capital Plan
- P Partially Funded or Authorized but Not Allocated

Scenario 3

Program List: Scenario 3 - Bus (State Match, State Bond, and Lets Go CT)

Program Year	Project Rank	Asset Name	Description	No. of Units	Replacement Costs	PI	Programmed	Project Number
2018	1	NWLKTD 1-2004 Ford Econoline E350	Cutaway Bus	9	634,653	4.8544	Y	DOT0412 *
2018	1	NWLKTD 2-2004 Ford Econoline E450	Cutaway Bus	1	70,517	4.8544	Y	DOT0412*
2018	3	HART 1-2007 Ford E450/StarTrans	Cutaway Bus	6	423,102	2.5390	Y	DOT0416
2018	4	HART 2-2007 Ford E450/StarTrans	Cutaway Bus	2	141,034	2.5390	Y	DOT0416
2018	4	NWCTD 1-2007 Ford Startrans	Cutaway Bus	1	70,517	2.5390	P	Various
2018	6	NECTD 1-2008 Ford Startrans	Cutaway Bus	1	70,517	1.9768	P	Various
2018	6	NECTD 2-2008 Ford Supreme	Cutaway Bus	2	141,034	1.9768	P	Various
2018	6	NECTD 3-2008 Ford Van	Cutaway Bus	2	141,034	1.9768	P	Various
2018	6	NWLKTD 3-2008 Ford Startrans	Cutaway Bus	1	70,517	1.9768	Y	DOT0412
2018	6	WRTD 1-2008 Ford Supreme	Cutaway Bus	1	70,517	1.9768	Y	DOT04740091RS
2018	11	HART 1999 Ford Econoline	Service-Van	1	46,182	1.6632	P	DOT0416
2018	12	CTTransit New Haven 2000 Chevrolet Cargo minivan	Service-Van	1	46,182	1.6372	P	Various
2018	12	CTTransit Stamford 2000 Chevrolet 2500 cargo	Service-Van	1	46,182	1.6372	P	Various
2018	14	NWCTD 2-2009 Ford Supreme	Cutaway Bus	7	493,619	1.4948	P	Various
2018	14	WRTD 2-2009 Ford Startrans	Cutaway Bus	1	70,517	1.4948	Y	DOT04740091RS
2018	14	WRTD 3-2009 Ford Startrans Van	Cutaway Bus	1	70,517	1.4948	Y	DOT04740091RS
2018	17	SEAT 2004 Ford Explorer	Service-SUV	1	32,715	1.3911	P	DOT0414
2018	18	NWLKTD 2005 Ford Freestyle	Service-SUV	1	32,715	1.2806	P	DOT0412
2018	19	NWLKTD 2005 Ford Sedan 500 AW	Service-Auto	1	19,679	1.2797	P	Various
2018	20	HART 2005 Ford E350	Service-Van	1	46,182	1.2794	P	DOT0416
2018	21	ETD 1-2010 Ford E450	Cutaway Bus	1	70,517	1.0813	Y	DOT0478
2018	21	ETD 2-2010 Ford E450	Cutaway Bus	2	141,034	1.0813	Y	DOT0478
2018	21	NECTD 4-2010 Ford Startrans	Cutaway Bus	1	70,517	1.0813	P	Various
2018	21	NECTD 5-2010 Ford Startrans	Cutaway Bus	4	282,068	1.0813	P	Various
2018	25	NWLKTD 4-2010 Ford Phoenix E450	Cutaway Bus	10	705,170	1.0813	Y	DOT0412*
2018	26	CTTransit New Haven 2007 Ford Fusion 4 door sedan	Service-Auto	2	39,358	0.9972	P	Various
2018	26	CTTransit Stamford 2007 Ford Fusion 4 door sedan	Service-Auto	1	19,679	0.9972	P	Various
2018	28	CTTransit Hartford 2007 Chevrolet Cargo minivan	Service-Van	2	92,364	0.9970	P	Various
2018	28	CTTransit Stamford 2007 Chevrolet CG23405 Cargo	Service-Van	1	46,182	0.9970	P	Various
2018	28	CTTransit Waterbury 2007 Ford E150	Service-Van	1	46,182	0.9970	P	Various
2018	31	GBTA 1982 GMC TOW truck	Service-Truck	1	167,775	0.8932	P	DOT0410
2018	32	CTTransit Hartford 2008 Toyota hybrid	Service-Auto	2	39,358	0.8309	P	Various
2018	33	ETD 3-2011 Ford Startrans	Cutaway Bus	1	70,517	0.7266	Y	DOT0478
2018	33	NWCTD 3-2011 Ford Startrans	Cutaway Bus	4	282,068	0.7266	P	Various
2018	33	WRTD 4-2011 Ford Startrans	Cutaway Bus	3	211,551	0.7266	P	Various
2018	33	WRTD 5-2011 Ford Startrans Vans	Cutaway Bus	6	423,102	0.7266	Y	DOT04740091RS
2018	37	HART 2009 Ford Escape	Service-SUV	2	65,430	0.6555	P	DOT0416
2018	38	GBTA 2009 Toyota Camry	Service-Auto	2	39,358	0.6549	P	DOT0410
2018	39	CTTransit Stamford 1990 M7-Plow/Dump and Sand Truck	Service-Truck	2	335,550	0.5069	P	Various
2018	40	GBTA 2010 GMC Terrain SLE	Service-SUV	1	32,715	0.4768	P	DOT0410
2018	41	ETD 4-2012 Ford F550	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	ETD 5-2012 Ford Goshen E450	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	ETD 6-2012 Ford Phoenix	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	ETD 7-2012 Ford Startrans E450 28 FT	Cutaway Bus	1	70,517	0.4219	Y	DOT0478
2018	41	GBTA 1-2012 Ford Goshen	Cutaway Bus	4	282,068	0.4219	Y	DOT0410
2018	41	NWCTD 4-2012 Ford E450	Cutaway Bus	3	211,551	0.4219	P	Various
2018	41	VTD 1-2012 Ford Supreme	Cutaway Bus	14	987,238	0.4219	Y	DOT00360199RS
2018	41	WRTD 6-2012 Goshen Coach	Cutaway Bus	2	141,034	0.4219	P	Various
2018	49	CTTransit Stamford 2011 Ford Escape	Service-SUV	3	98,145	0.3031	P	Various
2018	49	ETD 2011 Ford Escape	Service-SUV	1	32,715	0.3031	P	DOT0478
2018	49	GBTA 2011 Chevrolet Tahoe	Service-SUV	2	65,430	0.3031	P	DOT0410
2018	52	CTTransit New Haven 2011 Ford Escape	Service-SUV	5	163,575	0.3031	P	Various
2018	53	CTTransit Hartford 1995 Intemational Service Truck	Service-Truck	1	167,775	0.2897	P	Various
2018	53	CTTransit Waterbury 1995 Intemational Service Truck	Service-Truck	1	167,775	0.2897	P	Various
2018	55	CTTransit Stamford 1997 M8-Rack Body & Plow	Service-Truck	1	167,775	0.2126	P	Various
2018	56	NWLKTD Admin/Maint 1	Facility-Fire	1	1,064,196	0.1709	P	DOT0412
2018	57	ETD 10-2013 Ford Goshen F550	Cutaway Bus	1	70,517	0.1602	Y	DOT0478
2018	57	ETD 8-2013 Ford E450	Cutaway Bus	2	141,034	0.1602	Y	DOT0478
2018	57	ETD 9-2013 Ford Goshen E450 28 FT	Cutaway Bus	1	70,517	0.1602	Y	DOT0478
2018	57	GNHTD 1-2013 Ford E350 Goshen	Cutaway Bus	13	916,721	0.1602	Y	DOT0427*
2018	57	GNHTD 2-2013 Ford E450 Goshen	Cutaway Bus	4	282,068	0.1602	Y	DOT0427
2018	57	HART 3-2013 Ford E450/Goshen Coach	Cutaway Bus	9	634,653	0.1602	Y	DOT0416
2018	57	WRTD 7-2013 Goshen Coach	Cutaway Bus	3	211,551	0.1602	Y	DOT04740091RS
2018	64	CTTransit Hartford 1999 Chevrolet Pick Up	Service-Truck	1	167,775	0.1424	P	Various
2018	64	VTD 1999 Ford F250 Pickup	Service-Truck	1	167,775	0.1424	P	DOT00360199EQ
2018	66	CTTransit Stamford 2-2001 New Flyer	Transit Bus	2	848,172	0.0973	Y	DOT0403
2018	66	New Britain 1-2001 New Flyer	Transit Bus	1	424,086	0.0973	Y	Various

Program Year	Project Rank	Asset Name	Description	No. of Units	Replacement Costs	PI	Programmed	Project Number
2018	68	NWLKTD 2001 Ford Utility Truck	Service-Truck	1	167,775	0.0796	P	DOT0412
2018	69	NWLKTD Admin/Maint 1	Facility-Electrical	1	1,368,252	0.0781	P	DOT0412
2018	70	GBTA 4-2003 New Flyer	Transit Bus	2	848,172	0.0581	Y	DOT0410
2018	70	GBTA 5-2003 New Flyer	Transit Bus	3	1,272,258	0.0581	Y	DOT0410
2018	70	NWLKTD 6-2003 Orion VII	Transit Bus	19	8,057,634	0.0581	P	DOT0412
2018	70	SEAT 2-2003 New Flyer	Transit Bus	1	424,086	0.0581	P	DOT0414
2018	70	SEAT 3-2003 New Flyer	Transit Bus	1	424,086	0.0581	P	DOT0414
2018	75	CTTransit New Haven 3-2004 New Flyer	Transit Bus	41	17,387,526	0.0402	Y	Various
2018	75	Dattco 1-2004 New Flyer	Transit Bus	1	424,086	0.0402	Y	Various
2018	75	MfdTD 3-2004 New Flyer	Transit Bus	1	424,086	0.0402	P	DOT0424
2018	75	NWLKTD 7-2004 Gillig	Transit Bus	3	1,272,258	0.0402	P	DOT0412
2018	75	SEAT 4-2004 Gillig	Transit Bus	1	424,086	0.0402	P	DOT0414
2018	80	CTTransit Hartford 2003 Freightliner Service Patrol	Service-Truck	1	167,775	0.0247	P	Various
2018	80	GBTA 2003 GMC 4500Dump Truck	Service-Truck	1	167,775	0.0247	P	DOT0410
2019	1	HART 4-2014 Ford E450/ Goshen Coach	Cutaway Bus	4	282,068	0.1602	Y	DOT0416
2019	1	HART 5-2014 Ford E450/Goshen Coach	Cutaway Bus	3	211,551	0.1602	Y	DOT0416
2019	1	NWLKTD 5-2014 Chevrolet Pegasus	Cutaway Bus	10	705,170	0.1602	P	DOT0424
2019	4	CTTransit Hartford 3-2005 New Flyer	Transit Bus	48	20,356,128	0.0402	Y	Various
2019	5	GBTA 2004 Skid Steer	Service-Truck	1	167,775	0.0247	P	DOT0410
2019	5	HART 2004 Ford F450	Service-Truck	1	167,775	0.0247	P	DOT0416
2019	7	NWLKTD 8-2006 Gillig	Transit Bus	3	1,272,258	0.0234	Y	DOT0412
2019	7	SEAT 5-2006 Gillig	Transit Bus	2	848,172	0.0234	Y	DOT0414
2019	7	SEAT 6-2006 New Flyer	Transit Bus	3	1,272,258	0.0234	Y	DOT0414
2019	7	SEAT 7-2006 New Flyer	Transit Bus	3	1,272,258	0.0234	Y	DOT0414
2019	7	WRD 8-2006 Gillig	Transit Bus	2	848,172	0.0234	P	Various
2019	12	CTTransit Stamford 5-2003 MCI	Over-the-Road Bus	2	973,214	0.0148	Y	Various
2020	1	ETD 11-2015 Ford E450 Phoenix	Cutaway Bus	4	282,068	0.1602	Y	DOT0478
2020	1	GNHTD 3-2015 Ford E350 Goshen	Cutaway Bus	11	775,687	0.1602	Y	DOT0427
2020	1	GNHTD 4-2015 Ford E450 Goshen	Cutaway Bus	3	211,551	0.1602	Y	DOT0427
2020	1	MAT 1-2015 Goshen E350	Cutaway Bus	10	705,170	0.1602	Y	DOT0422
2020	5	CTTransit New Haven 2014 Ford Escape	Service-SUV	1	32,715	0.1423	P	Various
2020	5	CTTransit Waterbury 2014 Chevrolet Traverse	Service-SUV	4	130,860	0.1423	P	Various
2020	5	GBTA 2014 Chevrolet Tahoe	Service-SUV	1	32,715	0.1423	P	DOT0410
2020	8	CTTransit Hartford 2014 Ford Fusion 4 door sedan	Service-Auto	3	59,037	0.1419	P	Various
2020	9	CTTransit New Haven 2014 Ford E350 shuttle van	Service-Van	2	92,364	0.1418	P	Various
2020	10	CTTransit Hartford Admin/Maintenance 1	Facility-Equipment	1	17,940,583	0.0314	Y	DOT04010017CN
2020	10	HART Passenger Facility 1	Facility-Equipment	1	15,370	0.0314	P	DOT0416
2020	10	MAT Parking 1	Facility-Equipment	1	9,865	0.0314	P	DOT0422
2020	13	CTTransit Hartford Fuel Cell Storage 1	Facility-Equipment	1	468,384	0.0314	P	DOT0400
2020	13	CTTransit Stamford Maintenance 1	Facility-Equipment	1	801,960	0.0314	P	DOT0400
2020	13	CTTransit Stamford Office/Storage 1	Facility-Equipment	1	2,706,000	0.0314	P	DOT0400
2020	13	GBTA Maint 1	Facility-Equipment	1	3,936,000	0.0314	Y	DOT0410
2020	13	GNHTD Admin/Maint 1	Facility-Equipment	1	580,560	0.0314	Y	DOT04270056CN
2020	13	SEAT Admin/Maint 1	Facility-Equipment	1	1,830,240	0.0314	P	DOT0414
2020	19	CTTransit Hartford 4-2007 New Flyer	Transit Bus	64	27,141,504	0.0234	Y	DOT0400
2020	19	HART 10-2007 Gillig	Transit Bus	10	4,240,860	0.0234	Y	DOT0427
2020	19	SEAT 8-2007 New Flyer	Transit Bus	6	2,544,516	0.0234	P	DOT0416
2020	19	SEAT 9-2007 New Flyer	Transit Bus	2	848,172	0.0234	P	DOT0416
2020	23	CTTransit Hartford Admin/Maintenance 1	Facility-Conveyance	1	3,588,117	0.0143	P	DOT0400
2020	23	CTTransit Hartford Fuel Cell Storage 1	Facility-Conveyance	1	93,677	0.0143	P	DOT0400
2020	23	CTTransit Stamford Office/Storage 1	Facility-Conveyance	1	541,200	0.0143	P	DOT0400
2020	23	GBTA Maint 1	Facility-Conveyance	1	787,200	0.0143	Y	DOT0410
2020	23	GNHTD Admin/Maint 1	Facility-Conveyance	1	116,112	0.0143	Y	DOT04270056CN
2020	23	MAT Parking 1	Facility-Conveyance	1	39,459	0.0143	P	DOT0422
2020	29	CTTransit Stamford Maintenance 1	Facility-Conveyance	1	160,392	0.0143	P	DOT0400
2020	29	HART Passenger Facility 1	Facility-Conveyance	1	61,482	0.0143	P	DOT0416
2020	29	NWLKTD Admin/Maint 1	Facility-Conveyance	1	608,112	0.0143	P	DOT0412
2020	29	SEAT Admin/Maint 1	Facility-Conveyance	1	366,048	0.0143	P	DOT0414
2020	33	CTTransit Hartford 5-2008 New Flyer	Transit Bus	2	848,172	0.0077	Y	DOT0400
2020	33	New Britain 2-2008 New Flyer	Transit Bus	1	424,086	0.0077	Y	DOT0400
2020	33	NWLKTD 10-2008 Gillig	Transit Bus	4	1,696,344	0.0077	P	DOT0412
2020	33	NWLKTD 9-2008 Gillig	Transit Bus	3	1,272,258	0.0077	P	DOT0412
2020	33	SEAT 10-2008 New Flyer	Transit Bus	2	848,172	0.0077	P	DOT0414
2020	33	WRD 9-2008 Gillig	Transit Bus	3	1,272,258	0.0077	Y	DOT04740091RS
2020	39	GNHTD 8-2015 Dodge Caravan	Van	4	184,728	0.0063	Y	DOT0427
2020	40	Nason/Kelley 1-2007 MCI	Over-the-Road Bus	1	486,607	0.0041	Y	DOT0400
2020	41	CTTransit Hartford 2015 Ford Interceptor	Service-SUV	4	130,860	0.0009	P	Various
2020	42	CTTransit Hartford 2015 GMC Savana Parts Van	Service-Van	3	138,546	0.0005	P	Various
2020	42	SEAT 2015 Dodge Caravan	Service-Van	1	46,182	0.0005	P	DOT0410

Program Year	Project Rank	Asset Name	Description	No. of Units	Replacement Costs	PI	Programmed	Project Number
2020	44	CTTransit Waterbury 2006 Chevrolet Dump Truck	Service-Truck	1	167,775	0.0002	P	Various
2020	44	SEAT 2006 RAM Pickup	Service-Truck	1	167,775	0.0002	P	DOT0410
2021	1	CTTransit Waterbury 4-2016 Ford E450	Cutaway Bus	22	1,551,374	0.1602	Y	DOT0400
2021	1	GNHTD 5-2016 Ford Goshen E350	Cutaway Bus	18	1,269,306	0.1602	Y	DOT0427
2021	1	HART 6-2016 Ford E450/Goshen Coach	Cutaway Bus	1	70,517	0.1602	P	DOT0416
2021	1	HART 7-2016 Ford E350/ Goshen Coach	Cutaway Bus	4	282,068	0.1602	P	DOT0416
2021	1	HART 8-2016 Ford E350/Goshen Coach	Cutaway Bus	5	352,585	0.1602	P	DOT0416
2021	1	MfdTD 1-2016 Ford E450	Cutaway Bus	8	564,136	0.1602	P	DOT0424
2021	1	SEAT 1-2016 Ford Phoenix E450	Cutaway Bus	5	352,585	0.1602	P	DOT0414
2021	8	MfdTD 4-2009 New Flyer	Transit Bus	4	1,696,344	0.0077	P	DOT0424
2021	9	GNHTD 9-2016 Dodge Caravan	Van	2	92,364	0.0063	Y	DOT0427
2021	10	CTTransit Hartford 2016 Ford Escape	Service-SUV	1	32,715	0.0009	P	Various
2021	10	HART 2016 Ford Escape	Service-SUV	1	32,715	0.0009	P	DOT0416
2021	10	HART 2016 Ford Explorer	Service-SUV	1	32,715	0.0009	P	DOT0416
2021	10	NWLKTD 2016 Ford Explorer	Service-SUV	2	65,430	0.0009	P	DOT0412
2021	10	VTD 2016 Ford Escape	Service-SUV	1	32,715	0.0009	P	DOT00360199EQ
2021	10	WRTD 2016 Jeep Patriot	Service-SUV	1	32,715	0.0009	P	Various
2021	16	CTTransit Hartford 2016 Ford Fusion 4 door sedan	Service-Auto	2	39,358	0.0006	P	Various
2021	16	CTTransit New Haven 2016 Ford Fusion 4 door sedan	Service-Auto	1	19,679	0.0006	P	Various

- * Replacement in PY18
- Y Programmed in Capital Plan
- P Partially Funded or Authorized but Not Allocated

Appendix F. Five Year Capital Plan (FY 2017-2021)

2017-2021 Capital Plan - Public Transportation Constrained

FFY 2018

Total Funding (Non Ramp Up) Programmed in Current Year
Total Ramp Up Funding Programmed in Current Year
Total Funding Programmed in Current Year

	FFY18 Total Fed & State	Total Fed	Total State
	646,642,032	361,645,181	284,996,851
	224,600,000	-	224,600,000
	871,242,032	361,645,181	509,596,851

PROJECT	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST				FUNDING SOURCE			REGION
DO70301	NHL	VARIOUS	Bridge Replacement Program-East Ave Bridge, Norwalk	34,000,000	10,000,000	0	34,000,000	STATE	1		
DO70301	NHL	VARIOUS	Bridge Replacement Program-Osborne Ave Bridge, Norwalk	10,000,000	15,000,000	0	10,000,000	STATE	1		
DO70301	NHL	VARIOUS	Bridge Replacement Program-Fort Point St Bridge, Norwalk	15,000,000	30,000,000	0	15,000,000	STATE	1		
DO70301	NHL	Greenwich	NHL Bridge Repair-Cos Cob	30,000,000	30,000,000	0	30,000,000	Ramp Up	1		
DO70301	NHL	Stamford	Stamford Parking/Pedestrian Bridge	18,000,000	18,000,000	0	18,000,000	Ramp Up	1		
DO703010161CN	NHL	Westport	Maple Lane Bridge (moved to 2018)	15,000,000	15,000,000	0	3,000,000	5307/5337	1		
DO703010176CN	NHL	Norwalk	NHL - WALK Moveable Bridge	700,000,000	200,077,620	153,430,161	46,647,459	ER/5337	1		
DO703010181CN	NHL	Norwalk	NHL - WALK Moveable Bridge ROW	800,000,000	20,000,000	0	20,000,000	STATE	1		
DO70303	NHL-NCB	Norwalk	NHL - CP 243 (WALK Bridge)	190,000,000	55,000,000	0	55,000,000	STATE	1		
DO70403	CT Transit	Stamford	New Canaan Branch Improvements	4,500,000	4,500,000	0	4,500,000	Ramp Up	1		
DO70412	NTD	Norwalk	Route 1 BRT - Norwalk/Stamford (Buses)	5,600,000	5,600,000	0	5,600,000	Ramp Up	1		
DO70412	NTD	Norwalk	Norwalk TD Replace 2006 Buses (3 35ft)	1,750,000	1,750,000	0	350,000	5307	1		
DO70412	NTD	Norwalk	Norwalk TD - Facility Improvements	12,500,000	12,500,000	0	2,500,000	5307	1		
DO70412	NTD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 18	1,850,000	1,850,000	1,480,000	370,000	5307	1		
DO70416	HART	Danbury	HART -Paratransit Vehicles FY 18	750,000	750,000	600,000	150,000	5307	2		
DO70416	HART	Danbury	HART Admin Capital/Misc Support	200,000	200,000	160,000	40,000	5307	2		
DO70416	HART	Danbury	HART Operating Assistance	492,302	492,302	492,302	-	5307	2		
DO700360199EQ	VTD	Waterbury	NVCOG/VTD - Admin Capital/Misc Support FY 18	200,000	200,000	160,000	40,000	5307	5		
DO70410	GBTA	Bridgeport	GBTA Admin Capital/Misc Support FY 18	625,000	625,000	500,000	125,000	5307	7		
DO70410	GBTA	Bridgeport	GBTA - Radio System Replacement	750,000	750,000	600,000	150,000	5307	7		
DO70410	GBTA	Bridgeport	GBTA - Bridgeport Intermodal Center Improvements	150,000	150,000	120,000	30,000	5307	7		
DO70410	GBTA	Bridgeport	GBTA - Rehab Bus Storage Garage	3,300,000	3,300,000	2,640,000	660,000	5307	7		
DO70410	GBTA	Bridgeport	GBTA - Facility Improvements - Bus Hub	450,000	450,000	360,000	90,000	5307	7		
DO70300138CN	NHL	New Haven	NHL - WestEnd Yard	100,000,000	23,750,000	19,000,000	4,750,000	5307/5337	8		
DO70301	NHL	New Haven	New Haven Station/Parking	17,000,000	17,000,000	0	17,000,000	Ramp Up	8		
DO703010088PE	NHL	New Haven	NHY - Continued Design and Program Management	5,000,000	5,000,000	0	5,000,000	STATE	8		
DO703010183CN	NHL	VARIOUS	NHY - Pedestrian Bridge-North	41,250,000	41,250,000	33,000,000	8,250,000	5307/5337	8		
DO70424	SLE	Madison	SLE-Madison RR Station and Garage	15,000,000	15,000,000	0	15,000,000	Ramp Up	8		
DO70424	MLED TD	Milford	Milford TD Paratransit Vehicles FY 18	500,000	500,000	400,000	100,000	5307	8		
DO70424	MLED TD	Milford	Milford TD Facility Improvements	50,000	50,000	40,000	10,000	5307	8		
DO70424	MLED TD	Milford	Milford TD Admin Capital/Misc Support FY 18	375,000	375,000	300,000	75,000	5307	8		
DO70427	GNHTD	Hamden	GNHTD Paratransit Vehicles FY 18	1,875,000	1,875,000	1,500,000	375,000	5307	8		
DO70427	GNHTD	Hamden	GNHTD Admin Capital/Misc Support FY 18	500,000	500,000	400,000	100,000	5307	8		
DO70426	GHTD	Hamden	GNHTD New Facility	25,000,000	25,000,000	20,000,000	5,000,000	5307	8		
DO70426	GHTD	Hamden	GNHTD Paratransit Vehicles FY 18	3,000,000	3,000,000	2,400,000	600,000	5307	10		
DO70426	GHTD	Hamden	GHTD Union Station	1,750,000	1,750,000	1,400,000	350,000	5307	10		
DO70426	GHTD	Hartford	GHTD Admin Capital/Misc Support	1,300,000	1,300,000	1,040,000	260,000	5307	10		
DO70414	SEAT	Norwich	SEAT Replace Buses 2006 (2 30ft/3 35ft/3 40ft)	6,875,000	6,875,000	5,500,000	1,375,000	5307	13		
DO70414	SEAT	Norwich	SEAT Admin Capital FY 18	625,000	625,000	500,000	125,000	5307	13		
DO701702384	NA	Norwich	Transit Capital Planning	450,000	450,000	360,000	90,000	5307	13		
DO70400	CT Transit	VARIOUS	Bus Service Expansion Fleet	22,000,000	22,000,000	0	22,000,000	Ramp Up	70		
VARIOUS	VARIOUS	VARIOUS	Section 5310 Program - FFY 2018 (See Program of Projects)	3,522,895	3,522,895	3,522,895	-	5310	70		
VARIOUS	VARIOUS	VARIOUS	Section 5311 Program - FFY 2018 (See Program of Projects)	3,184,637	3,184,637	3,184,637	-	5311	70		
VARIOUS	VARIOUS	VARIOUS	Hartford Line	57,500,000	57,500,000	0	57,500,000	Ramp Up	70		
DO703010154	NHL	VARIOUS	NHL - Signal System Replacement Phase 3	19,375,000	19,375,000	15,500,000	3,875,000	5307/5337	77		
DO70300	NHL	VARIOUS	NHL - Station Improvement Program (3000191PE projects)	22,625,000	22,625,000	8,500,000	14,125,000	5307/5337	78		
DO70300	NHL	VARIOUS	5 program/Timber Program	3,195,596	3,195,596	0	3,195,596	STATE	78		
DO70300	NHL	VARIOUS	Bridge Replacement Program	10,000,000	10,000,000	0	10,000,000	STATE	78		
DO70300	NHL	VARIOUS	New Haven Line Track Program	25,000,000	25,000,000	20,000,000	5,000,000	5307/5337	78		
DO70300	NHL	VARIOUS	Grade Crossing Renewal Program	3,000,000	3,000,000	0	3,000,000	STATE	78		
DO70300	NHL	Various	NHL Stations (Orange/Barnum/Meritt 7)	20,000,000	20,000,000	0	20,000,000	Ramp Up	78		

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FFY 2018

Total Funding (Non Ramp Up) Programmed in Current Year
Total Ramp Up Funding Programmed in Current Year
Total Funding Programmed in Current Year

	FFY18 Total Fed & State	Total Fed	Total State
	646,642,032	361,645,181	284,996,851
	224,600,000	-	224,600,000
	871,242,032	361,645,181	509,596,851

PROJECT	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST	TOTAL PROJECT COST			FUNDING SOURCE	REGION
DOT03000175PE	NHL	VARIOUS	Bridge Design	5,400,000	5,400,000	0	5,400,000	STATE	78
DOT03000196CN	NHL	VARIOUS	Scour Rehabilitation 4 NHL Bridges (moved to 2018 FDP 11/17)	2,500,000	2,500,000	0	2,500,000	STATE	78
DOT03000199CN	NHL	VARIOUS	NHL - Customer Service Initiative	11,000,000	11,000,000	0	11,000,000	STATE	78
DOT03000202CN	NHL	VARIOUS	Network Infrastructure Upgrade Phase 3 CN	21,250,000	21,250,000	0	4,250,000	5307/5337	78
VARIOUS	CT Transit	VARIOUS	CT Transit Bus Replacements	8,726,294	8,726,294	6,981,035	1,745,259	5307/5339	79
VARIOUS	CT Transit	VARIOUS	CT Facility Improvements/Misc Admin Capital	1,517,688	1,517,688	1,214,150	303,538	5307	79
DOT03040016CN	NHL-WTRBY	VARIOUS	Waterbury Branch Signal System	35,000,000	35,000,000	0	35,000,000	Ramp Up	81
DOT0472	NWTD	Torrington	NWTD Facility	16,500,000	16,500,000	13,200,000	3,300,000	5307	8/4
DOT0820317CN	Off-System	Middletown	Middletown Swing Bridge (Jan 18)	2,000,000	2,000,000	0	2,000,000	STATE	11/12
DOT0422	MAT	Middletown	MAT - Engine overhaul Gilligs	150,000	150,000	120,000	30,000	5307	11/12
DOT0422	MAT	Middletown	MAT Misc Support	350,000	350,000	280,000	70,000	5307	11/12
DOT0478	Estuary TD	Centerbrook	Estuary TD - New Facility Design/ROW	1,800,000	1,800,000	1,440,000	360,000	5307	11/12
DOT0478	Estuary TD	Centerbrook	Estuary TD - Bus Replacement	875,000	875,000	700,000	175,000	5307	11/12
DOT0478	Estuary TD	Centerbrook	Estuary TD - Admin Capital/Misc Support FY 18	275,000	275,000	220,000	55,000	5307	11/12
TOTAL:				871,242,031	871,242,031	361,645,180	509,596,851		

2017-2021 Capital Plan - Public Transportation Constrained

FFY 2019

Total Funding (Non Ramp Up) Programmed in Current Year
Total Ramp Up Funding Programmed in Current Year
Total Funding Programmed in Current Year

	FFY19 Total Fed & State	Total Fed	Total State
	414,606,161	175,483,662	239,122,499
	410,000,000	0	410,000,000
	824,606,161	175,483,662	649,122,499

PROJECT	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST			FUNDING SOURCE			REGION
DOT03010176CN	NHL	Norwalk	NHL - Walk/Moveable Bridge	700,000,000	136,082,060	60,865,648	75,216,412	5307/5337	1	
DOT0412	NTD	Norwalk	Norwalk TD Paratransit Vehicles FY 19	1,000,000	1,000,000	800,000	200,000	5307	1	
DOT0412	NTD	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 19	675,000	675,000	540,000	135,000	5307	1	
VARIOUS	NHL	VARIOUS	SAGA	15,000,000	15,000,000	0	15,000,000	Ramp Up	1	
DOT0416	HART	Danbury	HART -Paratransit Vehicles FY 19	687,500	687,500	550,000	137,500	5307	2	
DOT0416	HART	Danbury	HART Admin Capital/Misc Support	200,000	200,000	160,000	40,000	5307	2	
DOT0416	HART	Danbury	HART Operating Assistance	492,302	492,302	5,000,000	0	5307	2	
DOT0416	HART	Danbury	HART - Replace Buses 10 35 ft	6,250,000	6,250,000	5,000,000	1,250,000	5307	2	
DOT0036	VTD	Waterbury	NVCOG/VTD - Admin Capital/Misc Support FY 19	200,000	200,000	160,000	40,000	5307	5	
DOT0036	VTD	Waterbury	NVCOG/VTD - Bus Shelter Replacement FY 19	250,000	250,000	200,000	50,000	5307	5	
DOT0036	VTD	Waterbury	Barnum Station	146,000,000	22,000,000	0	22,000,000	STATE	7	
DOT00150373CN	NHL	Bridgeport	Bridgeport Paratransit Vehicles FY 19	3,125,000	3,125,000	2,500,000	625,000	5307	7	
DOT00410	GRBA	Bridgeport	GRBA Admin Capital/Misc Support FY 19	450,000	450,000	360,000	90,000	5307	7	
DOT00410	GRBA	Bridgeport	GRBA - Bridgeport Intermodal Center Improvements	150,000	150,000	120,000	30,000	5307	7	
DOT00410	GRBA	Bridgeport	GRBA - Middle Repower/Overhaul 15 Gilligs	915,000	915,000	732,000	183,000	5307	7	
DOT00410	GRBA	Bridgeport	GRBA - West End Yard	100,000,000	45,000,000	20,000,000	25,000,000	5307/5337	8	
DOT0300138CN	NHL	New Haven	NHY - Design and Program Management	30,000,000	30,000,000	0	30,000,000	STATE	8	
DOT0301	NHL	New Haven	NHY - West End Yard	500,000	500,000	400,000	100,000	5307	8	
DOT0424	MLED/TD	Milford	Milford TD Paratransit Vehicles FY 19	500,000	500,000	400,000	100,000	5307	8	
DOT0424	MLED/TD	Milford	Milford TD Facility Improvements	375,000	375,000	300,000	75,000	5307	8	
DOT0424	MLED/TD	Milford	Milford TD Admin Capital/Misc Support FY 19	2,300,000	2,300,000	1,840,000	460,000	5307	8	
DOT0427	GNHTD	Hamden	GNHTD Paratransit Vehicles FY 19	600,000	600,000	480,000	120,000	5307	8	
DOT0427	GNHTD	Hamden	GNHTD Admin Capital/Misc Support FY 19	3,250,000	3,250,000	2,600,000	650,000	5307	10	
DOT0426	GHTD	Hartford	GHTD Paratransit Vehicles FY 19	1,000,000	1,000,000	800,000	200,000	5307	10	
DOT0426	GHTD	Hartford	GHTD Union Station	500,000	500,000	400,000	100,000	5307	10	
DOT0426	GHTD	Hartford	GHTD Admin Capital/Misc Support FY 19	5,000,000	5,000,000	4,000,000	1,000,000	5307	13	
DOT0414	SEAT	Norwich	SEAT Replace Buses 2007 35 ft Buses	625,000	625,000	500,000	125,000	5307	13	
DOT0414	SEAT	Norwich	SEAT Admin Capital FY 19	450,000	450,000	360,000	90,000	5307	13	
DOT01702384	NA	VARIOUS	Transit Capital Planning	98,000,000	98,000,000	0	98,000,000	Ramp Up	70	
DOT0300	NHL/SE	VARIOUS	Section 5310 Program - FFY 2019 (See Program of Projects)	3,591,944	3,591,944	3,591,944	0	5310	70	
VARIOUS	VARIOUS	VARIOUS	Section 5311 Program - FFY 2019 (See Program of Projects)	3,247,056	3,247,056	3,247,056	0	5311	70	
VARIOUS	VARIOUS	VARIOUS	Hartford Line	267,000,000	267,000,000	0	267,000,000	Ramp Up	70	
VARIOUS	VARIOUS	VARIOUS	Transit District Bus Replacements	11,562,500	11,562,500	9,250,000	2,312,500	5307	70	
DOT03010154	NHL	VARIOUS	NHL - Signal System Replacement Phase 3	34,346,063	34,346,063	27,476,850	6,869,213	5307/5337	77	
DOT0300	NHL	VARIOUS	NHL - Station Improvement Program (3000191PE projects)	15,000,000	15,000,000	0	15,000,000	STATE	78	
DOT0300	NHL	VARIOUS	S Program/ Timber Program	3,800,000	3,800,000	0	3,800,000	STATE	78	
DOT0300	NHL	VARIOUS	Bridge Replacement Program	17,284,409	17,284,409	0	17,284,409	STATE	78	
DOT0300	NHL	VARIOUS	Grade Crossing Renewal Program	3,500,000	3,500,000	0	3,500,000	STATE	78	
DOT0300	NHL	VARIOUS	Network Infrastructure Upgrade Phase 4 PE	2,500,000	2,500,000	0	2,500,000	STATE	78	
DOT0300	NHL	VARIOUS	NHL Stations (Orange/Barnum/Merritt J)	30,000,000	30,000,000	0	30,000,000	Ramp Up	78	
DOT03000175PE	NHL	VARIOUS	Bridge Design	5,000,000	5,000,000	0	5,000,000	STATE	78	
DOT03000199CN	NHL	VARIOUS	NHL - Customer Service Initiative	10,000,000	10,000,000	0	10,000,000	STATE	78	
VARIOUS	NHL	VARIOUS	Interlocking & Drainage	3,000,000	3,000,000	0	3,000,000	STATE	78	
VARIOUS	NHL	VARIOUS	Code Compliance Upgrades of Rail Maintenance Facilities	5,000,000	5,000,000	0	5,000,000	STATE	78	
VARIOUS	CT Transit	VARIOUS	CT Transit Bus Replacements	27,647,329	27,647,329	22,117,863	5,529,466	5307/5339	79	
VARIOUS	CT Transit	VARIOUS	CT Facility Improvements/Misc Admin Capital	6,250,000	6,250,000	5,000,000	1,250,000	5307	79	
DOT0422	MAT	Middletown	MAT Misc Support	325,000	325,000	260,000	65,000	5307	11/12	
DOT0478	Estuary TD	Centerbrook	Estuary TD - Bus Replacement	375,000	375,000	300,000	75,000	5307	11/12	
DOT0478	Estuary TD	Centerbrook	Estuary TD - Admin Capital/Misc Support FY 19	50,000	50,000	40,000	10,000	5307	11/12	
TOTAL:				824,606,162	175,483,663	649,122,499				

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FFY 2020

Total Funding (Non Ramp Up) Programmed in Current Year
Total Ramp Up Funding Programmed in Current Year
Total Funding Programmed in Current Year

	FFY20 Total Fed & State	Total Fed	Total State
	418,121,714	178,466,884	239,654,830
	827,000,000	-	827,000,000
	945,121,714	178,466,884	766,654,830

PROJECT	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST			FUNDING SOURCE			REGION
				TOTAL PROJECT COST	Fed & State	Total Fed	Total State	FUNDING SOURCE	REGION	
DOT03010176CN	NHL	Norwalk	NHL - WALK/Koveable Bridge	700,000,000	173,625,455	94,900,364	78,725,091	5307/5337	1	
DOT0303	NHL-NCB	VARIOUS	New Canaan Branch Improvements	15,000,000	15,000,000	0	15,000,000	5307	1	
DOT0412	NTD	Norwalk	Norwalk TD Replace Buses	4,000,000	4,000,000	3,200,000	800,000	5307	1	
DOT0416	Norwalk	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 2020	375,000	375,000	300,000	75,000	5307	1	
DOT0416	HART	Danbury	HART -Paratransit Vehicles FY 2020	750,000	750,000	600,000	150,000	5307	2	
DOT0416	HART	Danbury	HART Admin Capital/Misc Support	200,000	200,000	160,000	40,000	5307	2	
DOT0416	HART	Danbury	HART - Midlife overhaul 2014 buses	625,000	625,000	500,000	125,000	5307	2	
DOT0416	HART	Danbury	HART Operating Assistance	492,302	492,302	492,302	0	5307	2	
DOT00360199EQ	VTD	Waterbury	NYCOG/VTD - Admin Capital/Misc Support FY 2020	200,000	200,000	160,000	40,000	5307	5	
DOT00150373CN	NHL	Bridgeport	Barnum Station	146,000,000	20,000,000	0	20,000,000	STATE	7	
DOT0410	GBTA	Bridgeport	GBTA Admin Capital/Misc Support FY 20	500,000	500,000	400,000	100,000	5307	7	
DOT0410	GBTA	Bridgeport	GBTA - Bridgeport Intermodal Center Improvements	150,000	150,000	120,000	30,000	5307	7	
DOT0410	GBTA	Bridgeport	GBTA - Paratransit Vehicle Replacement	520,000	520,000	416,000	104,000	5307	7	
DOT03000138CN	NHL	New Haven	NHY - West End Yard	100,000,000	65,000,000	0	65,000,000	STATE	8	
DOT0310	SLE	Madison	SLE-Madison RR Station and Garage	17,000,000	17,000,000	0	17,000,000	Ramp Up	8	
DOT0424	MLFD TD	Millford	Millford TD Paratransit Vehicles FY 2020	500,000	500,000	400,000	100,000	5307	8	
DOT0424	MLFD TD	Millford	Millford TD Facility Improvements	50,000	50,000	40,000	10,000	5307	8	
DOT0424	MLFD TD	Millford	Millford TD Admin Capital/Misc Support FY 2020	375,000	375,000	300,000	75,000	5307	8	
DOT0427	GNHTD	Hamden	GNHTD Paratransit Vehicles FY 2020	2,500,000	2,500,000	2,000,000	500,000	5307	8	
DOT0427	GNHTD	Hamden	GNHTD Admin Capital/Misc Support FY 2020	750,000	750,000	600,000	150,000	5307	8	
DOT0426	GHTD	Hardford	GHTD Paratransit Vehicles FY 2020	3,250,000	3,250,000	2,600,000	650,000	5307	10	
DOT0426	GHTD	Hardford	GHTD Union Station	1,000,000	1,000,000	800,000	200,000	5307	10	
DOT0426	GHTD	Hardford	GHTD Admin Capital/Misc Support FY 2020	500,000	500,000	400,000	100,000	5307	10	
DOT0414	SEAT	Norwich	SEAT Replace Buses 2008 40 ft buses	3,750,000	3,750,000	3,000,000	750,000	5307	13	
DOT0414	SEAT	Norwich	SEAT Admin Capital FY 2020	1,000,000	1,000,000	800,000	200,000	5307	13	
DOT01702384	NA	VARIOUS	Transit Capital Planning	450,000	450,000	360,000	90,000	5307	70	
VARIOUS	NHL/SLE	VARIOUS	Section 5310 Program - FFY 2020 (See Program of Projects)	435,000,000	435,000,000	0	435,000,000	Ramp Up	70	
VARIOUS	VARIOUS	VARIOUS	Section 5311 Program - FFY 2020 (See Program of Projects)	3,302,256	3,302,256	3,302,256	0	5311	70	
VARIOUS	VARIOUS	VARIOUS	NHL - Signal System Replacement Phase 3	25,000,000	25,000,000	20,000,000	5,000,000	5307/5337	77	
DOT0300	NHL	VARIOUS	S Program/ Timber Program	5,000,000	5,000,000	0	5,000,000	STATE	78	
DOT0300	NHL	VARIOUS	Bridge Replacement Program	7,000,000	7,000,000	0	7,000,000	STATE	78	
DOT0300	NHL	VARIOUS	New Haven Line Track Program	6,250,000	6,250,000	5,000,000	1,250,000	5307/5337	78	
DOT0300	NHL	VARIOUS	Grade Crossing Renewal Program	6,900,000	6,900,000	0	6,900,000	STATE	78	
DOT0300	NHL	VARIOUS	Network Infrastructure Upgrade Phase 4 CN	20,000,000	20,000,000	0	20,000,000	STATE	78	
DOT0300	NHL	VARIOUS	NHL Stations (Orange/Barnum/Meritt 7)	30,000,000	30,000,000	0	30,000,000	Ramp Up	78	
VARIOUS	NHL	VARIOUS	Bridge Design	5,500,000	5,500,000	0	5,500,000	STATE	78	
VARIOUS	NHL	VARIOUS	Interlocking & Drainage	8,000,000	8,000,000	0	8,000,000	STATE	78	
VARIOUS	NHL	VARIOUS	Code Compliance Upgrades of Rail Maintenance Facilities	4,500,000	4,500,000	0	4,500,000	STATE	78	
DOT0400	CT Transit	VARIOUS	CT Transit Bus Replacements	9,048,584	9,048,584	7,238,867	1,809,717	5339	79	
DOT0400	CT Transit	VARIOUS	CT Facility Improvements/Misc Admin Capital	11,655,110	11,655,110	9,324,088	2,331,022	5307	79	
DOT0422	MAT	Middletown	MAT - Paratransit Vehicle Replacement	350,000	350,000	280,000	70,000	5307	11/12	
DOT0422	MAT	Middletown	MAT Transit Support	400,000	400,000	320,000	80,000	5307	11/12	
DOT0478	Estuary TD	Centerbrook	Estuary TD - Admin Capital/Misc Support FY 2020	20,000,000	20,000,000	16,000,000	4,000,000	5307	11/12	
VARIOUS	Estuary TD	Centerbrook	Estuary TD - New Facility	30,000,000	30,000,000	0	30,000,000	5307	11/12	
VARIOUS	Hardford Line	Hardford Line	Hardford Line	30,000,000	945,121,714	178,466,884	766,654,830	Ramp Up		
TOTAL:				30,000,000	945,121,714	178,466,884	766,654,830			

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FFY 2021

Total Funding (Non Ramp Up) Programmed in Current Year
Total Ramp Up Funding Programmed in Current Year
Total Funding Programmed in Current Year

	FFY21 Total Fed & State	Total Fed	Total State
	747,981,714 0	178,466,884 0	569,514,830 0
Total	747,981,714	178,466,884	569,514,830

PROJECT	ROUTE	TOWN	DESCRIPTION	TOTAL PROJECT COST			FUNDING SOURCE			REGION
				TOTAL PROJECT COST	Fed & State	Total Fed	Total State	FUNDING SOURCE	REGION	
DOT00360199EQ	VTD	Waterbury	NVCOG/VTD - Admin Capital/Misc Support FY 2021	225,000	225,000	180,000	45,000	5307	1	
DOT0400	CT Transit	VARIOUS	CT Facility Improvements/Misc Admin Capital	1,250,000	1,250,000	1,000,000	250,000	5307	1	
DOT0412	NHL	Norwalk	Norwalk TD - Admin Capital/Misc Support FY 2021	500,000	500,000	400,000	100,000	5307	1	
		VARIOUS	Bridge Replacement Program Elm, Canal, Greenwich	100,000,000	30,000,000	0	30,000,000	STATE	1	
DOT0414	SEAT	Norwich	SEAT Admin Capital FY 2021	750,000	750,000	600,000	150,000	5307	2	
DOT0416	HART	Danbury	HART -Paratransit Vehicles FY 2021	750,000	750,000	600,000	150,000	5307	2	
DOT0416	HART	Danbury	HART Admin Capital/Misc Support FY 2021	900,000	900,000	720,000	180,000	5307	2	
DOT0416	HART	Danbury	HART Operating Assistance	492,302	492,302	0	0	5307	2	
DOT00360199EQ	VTD	Waterbury	NVCOG/VTD - Paratransit Vehicles FY 2021	1,250,000	1,250,000	1,000,000	250,000	5307	5	
DOT0410	GRFA	Bridgeport	GRFA Replace Buses	10,460,000	10,460,000	8,000,000	2,460,000	5307	7	
DOT0410	GRFA	Bridgeport	GRFA Admin Capital/Misc Support FY 2021	625,000	625,000	500,000	125,000	5307	7	
DOT0424	MLFD TD	Millford	Millford TD Paratransit Vehicles FY 2021	750,000	750,000	600,000	150,000	5307	7	
	NHL	New Haven	NHY - Service and Inspection Shop	75,000,000	75,000,000	0	75,000,000	STATE	7	
	NHL/SLE	VARIOUS	Rail Fleet	200,000,000	200,000,000	0	200,000,000	STATE	8	
DOT0390	NTD	Norwalk	Norwalk TD Paratransit Vehicles FY 2021	1,500,000	1,500,000	1,200,000	300,000	5307	8	
DOT0412	MLFD TD	Millford	Millford TD Facility Improvements	50,000	50,000	40,000	10,000	5307	8	
DOT0424	MLFD TD	Millford	Millford TD Admin Capital/Misc Support FY 2021	375,000	375,000	300,000	75,000	5307	8	
DOT0427	GNHTD	Hamden	GNHTD Paratransit Vehicles FY 2021	2,500,000	2,500,000	2,000,000	500,000	5307	8	
DOT0427	GNHTD	Hamden	GNHTD Admin Capital/Misc Support FY 2021	750,000	750,000	600,000	150,000	5307	8	
DOT0426	GHTD	Hardford	GHTD Paratransit Vehicles FY 2021	3,250,000	3,250,000	2,600,000	650,000	5307	10	
DOT0426	GHTD	Hardford	GHTD Union Station	1,500,000	1,500,000	1,200,000	300,000	5307	10	
DOT0426	GHTD	Hardford	GHTD Admin Capital/Misc Support FY 2021	750,000	750,000	600,000	150,000	5307	10	
DOT0478	Esuary TD	Centerbrook	Esuary TD - Admin Capital/Misc Support FY 2021	687,500	687,500	550,000	137,500	5307	13	
DOT0390	NHL	VARIOUS	NHL Stations (Orange/Barnum/Meritt 7)	50,000,000	50,000,000	0	50,000,000	STATE	70	
VARIOUS	VARIOUS	VARIOUS	Section 5310 Program - FFY 2021 (See Program of Projects)	3,653,007	3,653,007	3,653,007	0	5310	70	
VARIOUS	VARIOUS	VARIOUS	Section 5311 Program - FFY 2021 (See Program of Projects)	80,000,000	3,302,256	3,302,256	0	5311	70	
VARIOUS	Hardford Line	VARIOUS	Hardford Line	80,000,000	80,000,000	0	80,000,000	STATE	77	
DOT03010154	NHL	VARIOUS	NHL - Signal System Replacement Phase 3	25,000,000	25,000,000	20,000,000	5,000,000	5307/5337	77	
DOT03010154	NA	VARIOUS	Transit Capital Planning	450,000	450,000	360,000	90,000	5307	78	
DOT0300	NHL	VARIOUS	Network Infrastructure Upgrade Phase 3/4	15,000,000	15,000,000	12,000,000	3,000,000	5307/5337	78	
DOT03000175	NHL	VARIOUS	Bridge Design	4,750,000	4,750,000	0	4,750,000	STATE	78	
DOT03010176GN	Norwalk	VARIOUS	NHL - WALK Moveable Bridge	700,000,000	121,625,455	54,900,364	66,725,091	5307/5337	78	
VARIOUS	NHL	VARIOUS	Code Compliance Upgrades of Rail Maintenance Facilities	4,500,000	4,500,000	0	4,500,000	STATE	78	
VARIOUS	NHL	VARIOUS	Interlocking & Drainage	12,000,000	12,000,000	0	12,000,000	STATE	78	
VARIOUS	NHL	VARIOUS	New Haven Line Track Program	25,000,000	25,000,000	20,000,000	5,000,000	5307/5337	78	
VARIOUS	NHL	VARIOUS	NHL - Station Improvement Program (3000191PE projects)	10,350,000	10,350,000	0	10,350,000	STATE	78	
VARIOUS	NHL	VARIOUS	S program/Timber Program	6,700,000	6,700,000	0	6,700,000	STATE	78	
VARIOUS	CT Transit	VARIOUS	CT Transit Bus Replacements	20,111,194	20,111,194	16,088,955	4,022,239	5339	79	
DOT0422	MAT	VARIOUS	CT Transit Facility Improvements (Hardford/Stamford)	30,625,000	30,625,000	24,500,000	6,125,000	5307	79	
DOT0422	MAT	Middletown	MAT - Engine overhaul Gillis	250,000	250,000	200,000	50,000	5307	11/12	
DOT0422	MAT	Middletown	MAT Misc Support	350,000	350,000	280,000	70,000	5307	11/12	
TOTAL:				747,981,714	747,981,714	178,466,884	569,514,830			

Appendix G. Equipment over \$50,000

**Tier II
Equipment (\$50,000)**

March, 2018

Operator	ID#	Description of Asset	Acquisition	Cost	Age
Bridgeport	9862KY-ZWW	La Mountain Bros Gasbou DEF System	6/7/12	\$ 72,596.00	6
Bridgeport		S&A Fleetwatch Fuel System	9/23/04	\$ 77,698.00	14
Bridgeport	DQHAB-7465525	Northeast Generator 300 KW back up	2/13/09	\$ 119,800.00	9
Estuary		Ecolane Scheduling Software	6/1/10	\$ 72,070.00	8
GNHTD	Model 232D	H.O. Penn Catepillar Skid Steer	9/30/16	\$ 53,128.67	2
GNHTD		Generac 150 Kx model generator	Apr-12	\$ 64,985.22	6
HART	M5700	Tennant Scrubber/Sweeper	5/15/14	\$ 65,998.18	4
SEAT		GFI mobile Fareboxes	11/18/11	\$ 415,293.49	7
SEAT		Syncromomatics/TMS AVL software	11/11/14	\$ 594,341.05	4
SEAT		Appollo Video Bus mobile security cameras	8/3/17	\$ 102,252.00	1
SEAT		Elec Registering Farebox system -GFC	5/1/94	\$ 259,322.00	