

# Transportation in Connecticut

## The Existing System

2014



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# TRANSPORTATION IN CONNECTICUT

## THE EXISTING SYSTEM

2014



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## Introduction

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This reference document summarizes the roles of the Connecticut Department of Transportation (CTDOT) with respect to the State of Connecticut's airports, bridges, highways, bus systems, rail systems, water transportation services and facilities, and bikeways and multi-use trails. This document is an update of the

report originally published in 2007. Transportation facilities and services provided or funded by CTDOT are discussed, overviews of the physical conditions of the infrastructure of these systems are presented, factors affecting the conditions of or demand on the facilities are identified, and the ability of these facilities and systems to meet current and future demand is discussed. For reference purposes, the locations of rail lines, rail stations, State-owned airports, municipal airports, deep water ports, ferry terminals and primary highways in Connecticut are shown in Figure 1.

Connecticut's transportation network is the foundation for the state's economic base because it is the means by which people and goods are moved. The State of Connecticut's economic vitality is tied to its ability to maintain, improve the efficiency of, integrate and expand its transportation systems to meet current and future state, regional and national mobility needs, as well as, to ensure the safety of the traveling public. For Connecticut's communities to prosper, it is essential that the transportation network be adequately maintained and strategically improved using processes that take into consideration regional and local land use planning and the state's natural and historic resources. It is also important that maintenance and improvements to the transportation network in Connecticut be coordinated and integrated with plans to maintain and improve the transportation networks in the adjacent states of New York, Massachusetts, and Rhode Island. The locations of major cities and transportation facilities within a 100-mile radius of Hartford are shown in Figure 2.

Resources and funding for transportation projects and services will continue to be limited in the foreseeable future. For this reason, maintaining the existing transportation system in a state of good repair is one of the Department's highest priorities. While preserving the existing system is costly and requires adequate and reliable allocations of resources and funding for continued maintenance, it is the most cost-effective method for providing a functional transportation network and sustaining economically vibrant communities.



Figure -1 Existing Transportation System

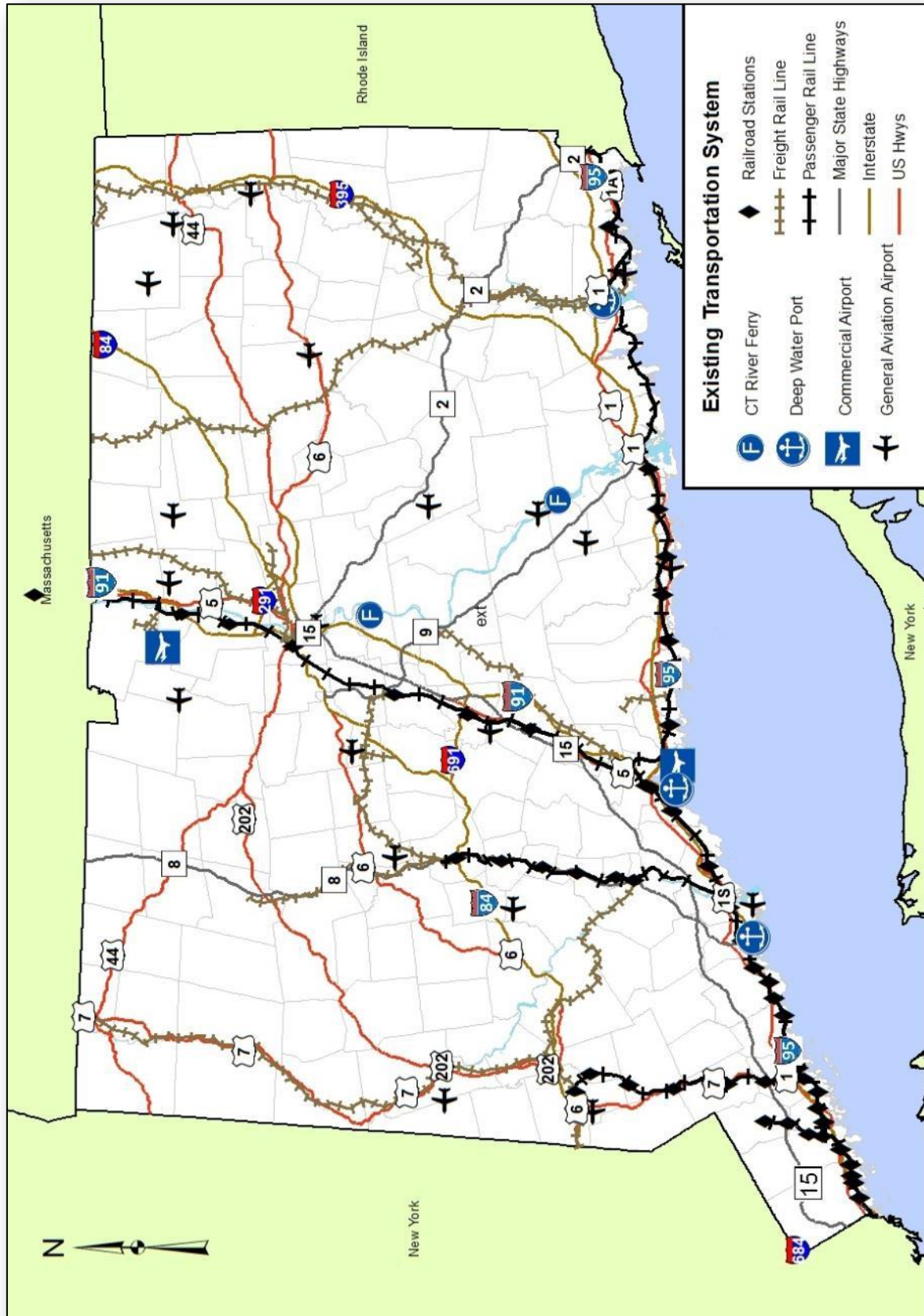


Figure - 2. Major Cities and Facilities within a 100-Mile Radius of Hartford



# 1 HIGHWAY SYSTEM

Connecticut's highway system provides the backbone to the state's multi-modal transportation network. CTDOT is responsible for all aspects of the planning, development, maintenance, and improvement of the state roadway transportation system (CGS Section 13b-3). In Connecticut there are 21,474.21 miles of public roadways. CTDOT is directly responsible for overseeing all design, construction, maintenance, and improvements for the 3,734.26 miles of State-maintained roadways consisting of State routes, stubs, bypasses, and ramps serving as main line. This includes 1,392.01 miles of Interstate and other Enhanced National Highway System (NHS) roadways in Connecticut. This translates to 9,833.66 through-lane miles (not including ramps) of state roadways. The Department is also responsible for the maintenance of 3,990 bridges and structures along the highway system (Bridges are discussed in depth in chapter 2). The miles of public road that are maintained by the State and the Towns are listed below:

**Table 1-1. Public Road Mileage**

TYPES OF ROADS	MILEAGE
<b>State Road Mileage</b>	
NHS - Interstate	346.17
Other NHS	1,045.84
<b>NON-NHS</b>	
State Routes & Roads	2,328.18
State Park Roads	72.05
State Forest Roads	178.89
State Institution Roads	55.73
U.S. Navy Roads	47.05
U.S. Army Roads	5.35
U.S. Fish & Wildlife Service Roads	0.13
National Park Service Roads	0.45
Bureau of Indian Affairs Roads	3.10
Indian Nation Roads	52.40
<b>2013 State Route &amp; Road Mileage Subtotal</b>	<b>4,135.34</b>
<b>Town Road Mileage</b>	
NHS	50.04
Non-NHS	17,288.83
<b>Town Road Mileage Subtotal</b>	<b>17,338.87</b>
<b>2013 Total of State and Town Maintained Roads</b>	<b>21,474.21</b>

Source: CTDOT Bureau of Policy & Planning. Table updated in September 2014. Data listed is as of December 31, 2013.

Special Notes: Table 1-1 Mileages do not include ramps serving as main line.



With respect to town-maintained roads, CTDOT ensures that the 2,859.06 miles of town-maintained roads (rural and urban), classified as either collector or arterial, are designed and constructed to AASHTO specifications. Collectors are defined as routes that collect traffic from local streets and channel it into the arterials. Arterials are routes that serve major centers of activity and have the second highest traffic volumes.

CTDOT's specific maintenance and improvement responsibilities include the following:

- Removing snow and ice from interstate highways and state roads
- Resurfacing damaged roadway pavement
- Replacing damaged guiderail
- Maintaining signalization, illumination, and bridges for the existing highway system
- Inspecting overhead sign supports
- Performing geotechnical engineering services
- Analyzing projects in construction
- Conducting annual pavement condition surveys
- Providing safety improvements along the state transportation system
- Revising traffic control signals for safety and traffic flow

Other highway-related responsibilities of CTDOT include the following:

- Reviewing major traffic generators for State Traffic Commission compliance
- Evaluating highway engineering projects for environmental compliance and potential involvement with hazardous and/or contaminated materials
- Implementing various programs designed to promote travel safety

## 1.1 Highway System Components

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The highway system in Connecticut consists of pavement, traffic signals, pavement markings, traffic signs, highway lighting, guiderail, intelligent transportation systems, weigh-in-motion systems, highway rest areas, highway commercial service areas, commuter parking facilities, salt storage sheds, and various other highway maintenance facilities. These components, the physical condition of the components, the factors affecting the physical conditions of the components, and the abilities of these components to meet current and future demand are discussed in this section.

### 1.1.1 Pavement

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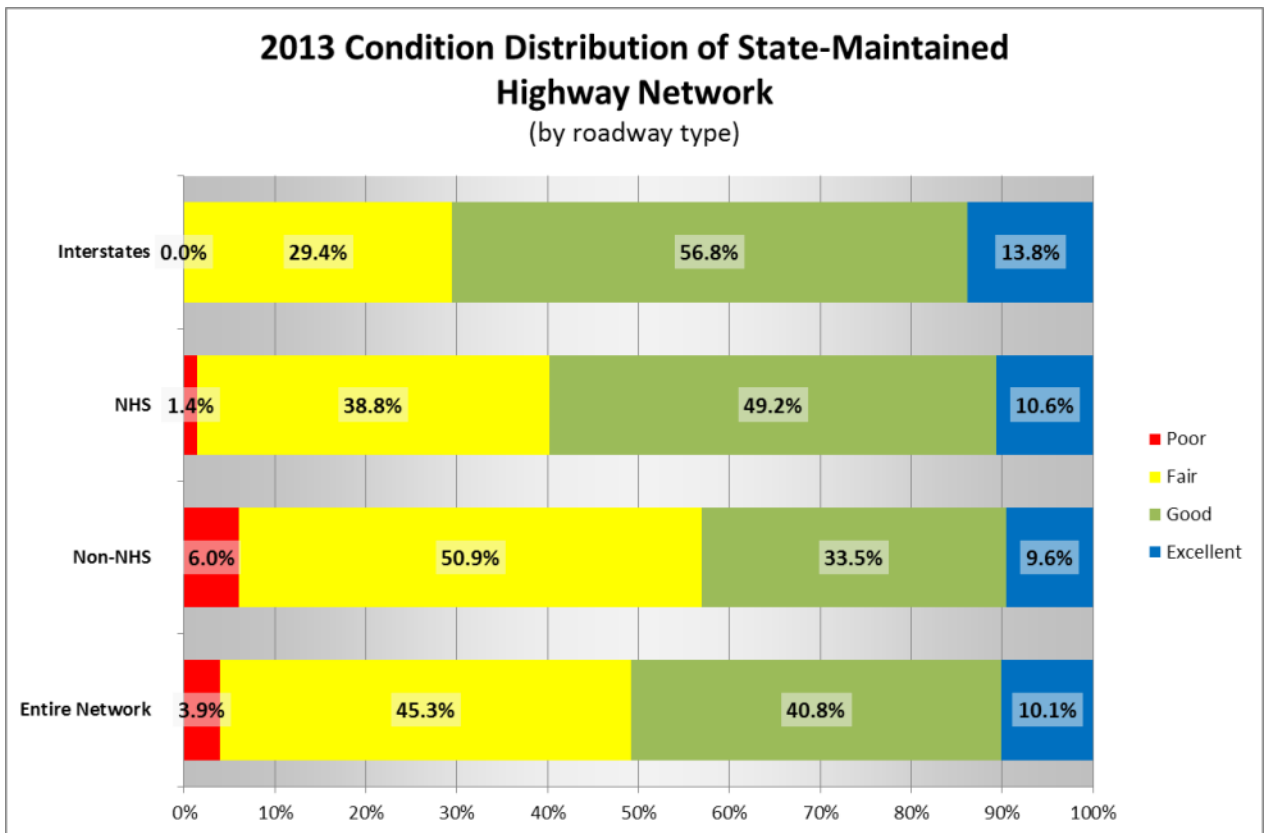
The state highway network comprises 4,160.97 miles which includes total state route mileage and ramps, turning roadways, and connectors.

#### ***Pavement Condition, 2013***

Pavement condition is expressed in terms of a Pavement Condition Index (PCI), which is on a scale of 1.0 to 9.0, with 9.0 describing a pavement without defects. Within this 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. Pavement condition is calculated based on five components: cracking, rideability (as expressed by the International Roughness Index, or IRI), rutting (distortion in the wheelpaths), raveling, and drainability.

To calculate the PCI, CTDOT collects pavement condition data using two vehicles instrumented with roughness, rutting, and geometry sensors as well as digital imaging systems. Cracking length, orientation, and position within the lane are measured using pattern-recognition software. Data is collected in the right lane in each direction of travel and 100% of the driven length is measured. The data is then processed to arrive at the individual distress indices used in the formulation of the PCI. The condition of the state-maintained highway network in 2013 is presented in Figure 1-2 below. The results indicate that approximately 50% of the overall network length is in good-or-better condition. The higher-functional-class roads are in somewhat better condition – Interstates and expressways are in good or better condition for approximately 70% of the length, while the secondary (non-NHS) system is in fair or poor condition for approximately 57% of the length. This reflects the prioritization of preservation projects to favor roadways with higher traffic volumes.

**Figure 1-2. 2013 Condition Distribution of State Maintained Highway Network**



### **Factors Affecting Pavement Condition**

Many factors affect pavement condition on the roadways in Connecticut, including type and volume of traffic, environmental issues, design practices, construction practices, and the age of the network. These factors are discussed below:

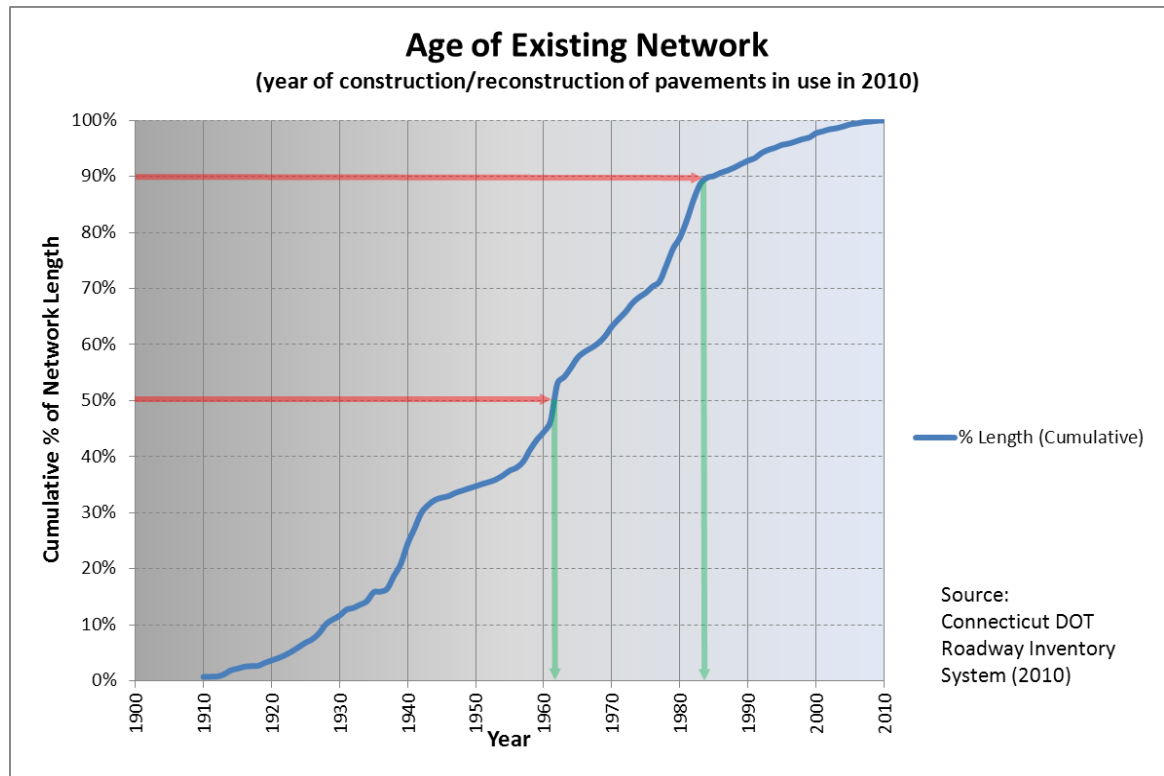
- Type and Volume of Traffic.** The pavement structure is fatigued by the cyclic wheel loads imparted by vehicles. This cumulative damage is measured in the number of Equivalent Standard Axle Loads (ESALs). One ESAL is equal to an 18,000-pound axle load. The heavier the vehicle, the larger the load applied, and the greater the damage potential. One truck loaded to the legal maximum can have the same damage effect on the pavement as 1,000 cars. In addition to the ever-increasing number of trucks on our roadways, there is the problem of overweight vehicles. The damage caused by these vehicles can lead to premature pavement failure and is not easily quantified. Continued

enforcement of maximum weight restrictions is critical to the long-term performance of highway systems (pavements and bridges).

- **Environmental Issues.** Environmental factors can have a profound effect on the performance of the pavement. In fact, New England's extreme variability in weather is the largest factor beyond traffic loading that causes deterioration of pavements. Contraction of the pavements during low winter temperatures leads to pavement shrinkage cracks. Water entering the cracks through the surface saturates the base layers of the pavement structure and can enhance the development of frost heaves during intermittent freeze and thaw cycles. In the spring, saturated pavement structures lose some of their load-bearing capabilities and are more susceptible to damage from heavy vehicles. This can result in the formation of potholes and localized pavement failures. The extremely high surface temperatures that can be experienced during summer heat waves cause loss of rigidity in the pavement structure. This is when rutting, which is a permanent deformation, occurs under heavy truck wheel loads. Changes in climate that result in more frequent flooding of roadways or an increase in the frequency or length of periods of extremely high temperatures will result in greater damage to the pavement.
- **Design Practices.** Nationally, with much pavement research having been completed, pavement design practices are evolving from empirical design procedures to mechanistic/performance-related design processes. Correspondingly, the State is in the process of implementing the AASHTO Mechanistic Empirical Pavement Design Guide procedures (MEPDG). In the longer term, substantial amounts of performance data need to be collected and analyzed in order to develop true performance-related design processes.
- **Construction Practices.** It is crucial that all of our pavements be constructed with the materials specified and in accordance with CTDOT's specifications. The longevity of a pavement can be significantly impacted by poor construction practices.
- **Age of Network.** The majority of our most vital highways – the Interstate system – were constructed in the 1950s and 1960s; the majority of the remainder of the network was built even before and is still in service. Figure 1-3 shows the distribution of year of original construction or reconstruction of the pavements that are used by motorists today. All of these pavements have been rehabilitated at one point or another; however, they are continuously subject to increased traffic and greater loads than they were designed to handle. The increasing traffic volumes and heavier loads have resulted in continual deterioration of the underlying layers of the pavement structure. This situation has made the subsequent rehabilitation of pavements increasingly more extensive and costly.



Figure 1-3. Age of Existing Network



- ♦ **Prices of Fuel and Asphalt.** The prices of fuel and asphalt can affect CTDOT’s ability to implement its Pavement Resurfacing Program. In years (such as 2007 and 2008) during which the prices of these commodities increased significantly, CTDOT reduced the number of resurfacing projects that it undertook in order to stay within its budget.

As discussed earlier, design practices are important factors affecting roadway pavement. The most important development in asphalt mix design and construction in recent times has been the implementation of the Superpave (Superior Performing Asphalt Pavements) system. Superpave is a performance-based design process that was a product of the Strategic Highway Research Program (SHRP). In Connecticut, the implementation process has been completed. Currently, CTDOT requires that Superpave technology be used for all new projects. A second important development is the increased use of superior asphalt binders for major roadways. CTDOT began using polymer-modified asphalts for its major highway pavement surfaces in 2011. These asphalt binders provide improved durability as well as resistance to rutting in heavily-trafficked roadways and hot temperatures. Finally, CTDOT is allowing and encouraging the use of warm-mix asphalt technology, which is capable of reducing energy use and emissions in the production of hot-mix asphalt.

CTDOT addresses construction practices through two organizational vehicles. The first is CTDOT’s Pavement Advisory Team (PAT). The PAT was formed in 1995 to improve construction practices through increasing CTDOT and industry awareness of pavement problems and to provide expertise in specific pavement problems. The second vehicle is CTDOT’s participation, since 1994, in the Hot-Mix Asphalt (HMA) Task Force on Pavements, which has recently evolved into the HMA Executive Committee. This organization, which brings together CTDOT, the HMA industry, and academics, meets on a regular basis and is charged with addressing HMA issues (including construction practices), providing training, conducting pavement studies, and recommending policy and specification changes.

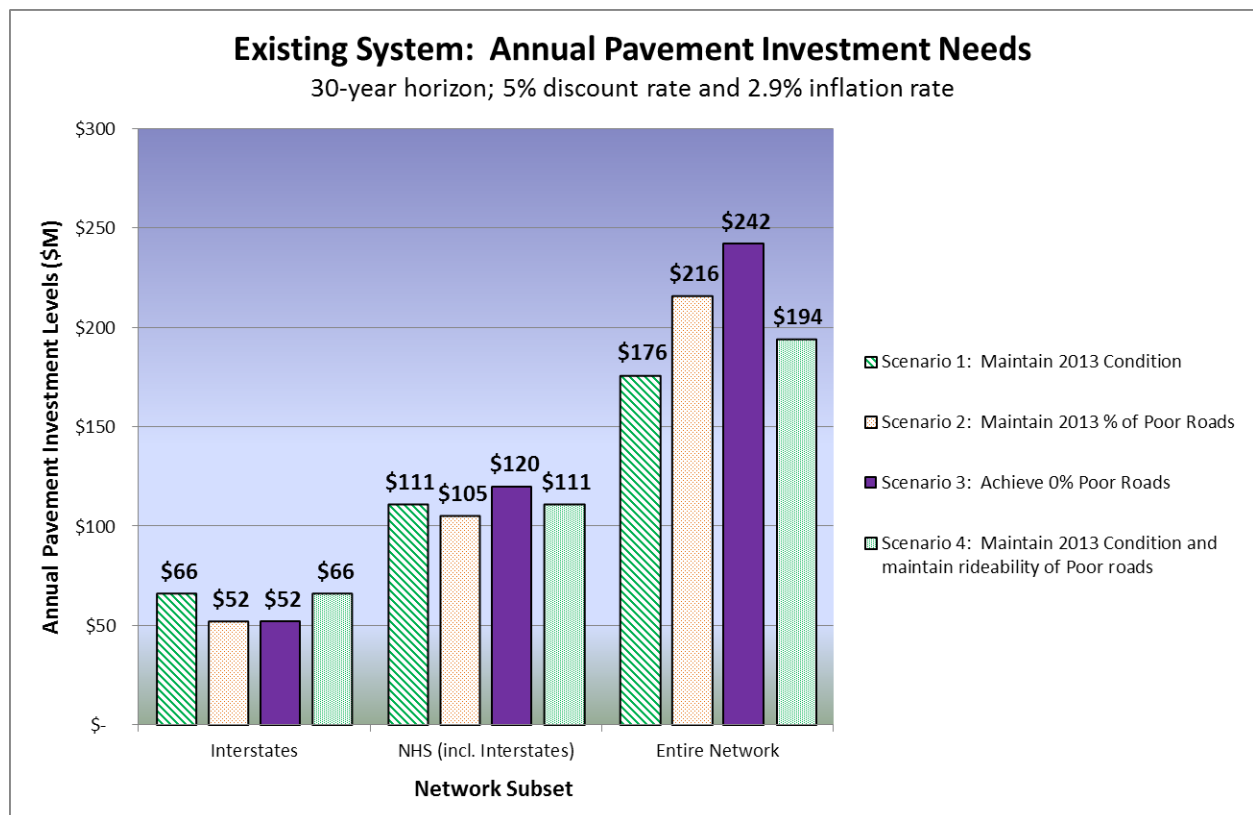
The extensive costs associated with the rehabilitation or reconstruction of pavements has led most states including Connecticut to look more deeply into a concept known as pavement preservation. There have been many studies performed since the 1970s that conclude it is more cost effective to keep highway pavements in good condition than to let them reach a poor condition level. The cost to repair a poor pavement one time can be easily 20 times the cost of performing preventative maintenance treatments periodically over a thirty year horizon. The user costs associated with traveling on deteriorated and rough pavements can also be substantial for vehicle repairs, energy use, and travel time delays. In 2010, the State began dedicating a specific level of funds to address preservation of good pavements, rather than subscribing entirely to the concept of addressing “the worst first.” A balanced program of maintenance, preservation, overlays and rehabilitation will be developed with the application of the Pavement Management System concepts.

**Ability of Pavements to Meet Current and Future Demand (Pavement Investment Needs)**

Beyond reporting current conditions, CTDOT uses its Pavement Management System to study the impacts of alternative pavement-investment strategies on overall system condition over a multi-year horizon, through pavement-condition monitoring and pavement-deterioration modeling. The approach allows the optimization of resources for preserving the State’s pavement assets in a sustainable way. Figure 1-4 shows the pavement investments needed on an annual basis to achieve and maintain four condition goals using a 30-year horizon:

- Scenario 1 – Maintain 2013 overall average system conditions.
- Scenario 2 – Limit the percent of roadway length in “Poor” condition at 2012 levels.
- Scenario 3 – Eliminate the percent of roadway length in “Poor” conditions.
- Scenario 4 – Same as Scenario 1 (maintain current conditions) but intervene to maintain rideability and a minimum condition level on roads falling into the “Poor” category.

**Figure 1-4. Annual Pavement Investment Needs (30-year horizon)**



An important note on Figure 1-4 is that the pavement costs are not equal to project costs; non-pavement appurtenances and costs are not included, so the actual funding required to achieve these investment levels is likely to be higher and is a function of the necessity to upgrade or repair other highway assets beyond pavement. An example would be the need to install or upgrade intelligent transportation systems infrastructure or safety or lighting systems.

The Pavement Management System optimizes investments based on maximum benefit-to-cost ratios. The benefits are a function of improved conditions, as a result of the pavement intervention, and the traffic volume (number of users receiving the benefit of improved condition). Costs are agency costs directly related to pavement. Current cost and performance data indicates that it is invariably more cost-effective to maintain good condition than it is to repair the worst roads first. Structural repairs are much more complex and expensive than preservation investments that maintain structural integrity by early and preventive intervention. Following the benefit-cost (b/c) ratio criterion, a goal of limiting roads in poor condition is achieved only after investments that preserve structure and condition are made. Scenario 4 presents a two-goal strategic approach that “band-aids” poor roads. This leads to lower required yearly pavement investment levels; the compromise is that a backlog of structural needs is built up by only marginally addressing the condition of poor roads. At some point, the backlog would have to be addressed and would require a major capital investment (approximately equal to the accumulated difference in investment levels between Scenario 4 and those that follow optimized b/c ratios and address structural condition of poor roads).

### **1.1.2 Traffic Signals**

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CTDOT maintains approximately 2,500 traffic signals, 230 flashing beacons, and 300 signs with flashers. Approximately 850 intersections are currently controlled by centralized and on-street computerized systems. CTDOT does have a database of signal locations, but it does not currently include the age of the equipment. Traffic signals are upgraded in projects and components are replaced by CTDOT’s Division of Highway Maintenance when failures occur. The Department continues to expand the usage of energy efficient lamps (LEDs).

#### ***Factors Affecting Physical Condition or Demand for Signals***

Annually, approximately 15 new traffic signals are added to the number of traffic signals maintained by the State. Traffic signal hardware may have a service life of 20 years or more. The traffic signal electronics have a service life of 7 to 10 years.

#### ***Ability of Signals to Meet Current and Future Demand***

Traffic signals are one of the tools for managing traffic congestion, especially in the State’s urban areas. Systems that are appropriately designed, properly operated, and maintained provide safety benefits, reduce travel times and vehicle operating cost, and reduce fuel consumption and vehicle emissions. Traffic signal timings for both isolated intersections and coordinated signal systems should be reviewed and updated periodically in response to changing traffic conditions. Intersection movement counts and resources needed to accomplish this task are generally not available. Currently, CTDOT’s Office of Maintenance has limited funds to replace damaged and worn out electronic equipment. Traffic signals are replaced as part of roadway reconstruction projects, congestion mitigation projects, and traffic signal projects using STP funding or other funding sources that may be available. Additional funds and resources are needed to keep the State’s traffic signals operational; however, demand exceeds Department resources.

### 1.1.3 Pavement Markings

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CTDOT maintains 4,160.97 miles of roadway and ramps resulting in approximately 16,000 miles of pavement markings. Pavement markings have different useful lives determined by the type of material used for the marking, the location of the marking in relation to vehicle paths, and the volume of traffic that passes over the marking.

Pavement markings provide guidance during both day and night. The markings are made to be reflective for nighttime visibility by incorporating, in the material, small glass or ceramic beads. Pavement markings should be replaced when they are no longer reflective at night.

#### ***Condition of Pavement Markings***

Snow plowing and road salting greatly accelerate the deterioration of certain types of pavement marking material. Because of environmental requirements and climatic conditions, pavement markings cannot be successfully installed during the winter months. During those time periods, pavement markings in some areas may be considered to be in fair or poor condition. In the spring, when painting can commence, the markings that have deteriorated over the winter are repainted. After repainting, the markings are in good condition.

#### ***Factors Affecting Condition of and Demand for Pavement Markings***

The condition of pavement markings is affected by weather and the status of the adoption of reflectivity standards by the federal government. These factors are discussed below:

- ***Weather.*** The frequency of snow and ice conditions that require snow plowing and road salting affects the condition of certain pavement marking material.
- ***Adoption of Federal Reflectivity Standards.*** Currently there are no reflectivity standards for pavement markings. FHWA is developing the establishment of minimum reflectivity standards for pavement markings. Mobile devices are being developed by the industry to measure the reflectivity of pavement markings while traveling at highway speeds. When minimum standards are developed, CTDOT may be required to monitor pavement markings' reflectivity and maintain markings to that minimum level of reflectivity. The impact of minimum reflectivity standards, if any, will not be known until the standards are published.

Currently, CTDOT requires a minimum retro-reflective reading of 400 millicandelas (mcd) for white epoxy and 325 mcd for yellow epoxy one to two weeks after installation.

#### ***Ability of Pavement Markings to Meet Current and Future Demand***

CTDOT utilizes durable pavement markings on Interstates and other expressways. When these markings are installed while the highway is being resurfaced, they exhibit longevity.

CTDOT utilizes durable epoxy paints to the extent funds are available. Durable markings have been used for special types of markings, such as crosswalks and markings at railroad at-grade crossings. Pavement markings on other roads are painted with water borne and epoxy paints. Approximately 90 percent of all markings on expressways are of durable material and 50 percent of the markings on the secondary system are epoxy.

CTDOT is currently installing a groove in newer pavements in which pavement markings for lane and shoulder lines are installed. Traditional pavement markings contain retro-reflective beads, but these beads are vulnerable to plow blades and are typically scraped off each winter. Recessed markings are set into the pavement and thereby maintain their retro-reflectivity. The groove is less than 1/8" deep, about the thickness of a nickel.

As a comparison, non-recessed pavement markings on freeways typically last 1-3 years. Recessed pavement markings need to be replaced half as often as traditional markings. The groove only needs to be cut once and then paint can be re-applied at any time during the pavement's life. Less frequent re-painting not only results in cost savings, but also less congestion and increased safety for motorists and maintenance crews.

The replacement of pavement markings has a current annual funding of approximately \$8 million.

#### 1.1.4 Traffic Signs

CTDOT maintains thousands of signs on expressways, ramps and State-maintained roadways in order to provide regulatory, warning, and guidance information for road users. The Department uses the MUTCD as the standard for selection of highway signing. These standards address the design and use of each sign regarding its size, shape, color, location, and reflectivity. Sign retro-reflectivity is one of several factors associated with user recognition and maintaining nighttime and adverse weather visibility. Many new sign face materials that provide for fluorescent versions of standard sign colors have recently been approved for use. This brighter sign sheeting has been selected for use on regulatory signs such as "Stop," "Wrong Way," and "Do Not Enter" signs; on warning signs related to school zones; as well as all construction signs.

The following discussion of CTDOT's long-range plan for signing deals with a need for the Department to develop a statewide sign inventory and maintenance management program in order to comply with a 2007 FHWA and MUTCD requirement to maintain sign retro-reflectivity. In the past, only the State's expressway system was programmed for full sign replacement projects at an approximate 15 to 20 year cycle, which is the approximate life cycle of sign sheeting. Non-expressway signing was normally installed and replaced only where it was within the limits of a roadway or permit project or by maintenance forces on an "as needed basis." This sign replacement method is not currently in the capital improvement plan. On occasion, there are safety related signing projects that address a specific sign type or roadway condition. Such statewide projects have included signing for steep hills, curve warning, schools and stop signs.

Figure 1-5. Typical Signs



#### ***Condition of Traffic Signs***

Signing on the State's expressway system has been updated by large resigning projects and by other construction projects that affect the expressway system. The large extruded aluminum highway signs and their associated supports are often revised and, in effect, replaced to reflect new roadway configurations. In areas not impacted by such projects, signs with deteriorated reflectivity and/or structurally deficient supports are replaced or repaired on a priority basis. In some cases, this practice results in the installation of signs that have supports and sign faces that are different ages. The overall condition of the signing on the State's expressway system therefore ranges from brand new to those installations approaching their service life. Signs on non-expressways can often remain unchanged for many years and therefore are found to have

exceeded their service life and provide little to no retro-reflectivity. Replacement of these signs is typically accomplished when they are located within the limits of a roadway improvement project or when replaced or revised by state maintenance due to damage, vandalism or an engineering request to replace or revise signing due to an improvement generally unrelated to the service condition.

### ***Factors Affecting Condition of or Demand for Traffic Signs***

The condition of or demand for traffic signs is affected by the age of the system, the environment and weather. These factors are discussed below:

- **Age.** A sign installation is made up of the sign face that contains the message that is intended to be relayed to motorists and the structure that holds up the sign face. Both of these components deteriorate with the passage of time. As sign faces age, the reflectivity of the sign diminishes. Currently sign faces with lower reflectivity are selected for replacement based on engineering judgment.
- **Environment and Weather.** Sign structures are exposed to the elements and can be weakened by a variety of factors including corrosion and wind loads. CTDOT, therefore, systematically assesses the structural adequacy of all overhead sign supports. This effort produces a list of sign installations where repairs and/or replacement work is necessary. Such work is undertaken on a priority basis. If changes in the climate result in more intense and more frequent storms, the Department may need to replace some signs more frequently and may need to increase the frequency at which it assesses the structural adequacy of overhead sign supports.

### ***Ability of Traffic Signs to Meet Current and Future Demands***

The Department has engaged a qualified engineering firm to develop a statewide sign inventory and maintenance management program in order to comply with the FHWA and MUTCD requirements to maintain sign retro-reflectivity. The consultant engineer is inventorying all existing highway signs on all State-maintained roadways and will submit the final sign inventory and data management program to the Department for continued use and ownership. This data will be used to program sign replacement in future signing projects. The sign replacement and management method for all future signing projects will be by “blanket replacement.”

Signs on the State's expressway system are intended to aid all motorists with the driving task. The signs make motorists aware of the laws that must be obeyed, major destinations, and changing roadway features that require adjustments by the driver. The next 20 years are not expected to change this philosophy. As technology progresses, CTDOT will continue to reassess the costs, service life, and reflective sheeting type that will be used. There have been several changes to the 2009 Edition of the MUTCD to address the nation's growing percentage of the people over age 65. The Department must also continue to research and implement the use of new materials and technologies to increase the visibility of the signs and facilitate the mobility and safety of older drivers, pedestrians, and users of other non-motorized forms of transportation.

### **1.1.5 Highway Lighting**

CTDOT's goal is to provide efficient, well-maintained, quality highway lighting on portions of the state highway system where required. CTDOT maintains approximately 25,000 individual lights along state highways. The ages of the various lighting systems vary. The date of installation or major replacement spans from the early 1960s to the present. The overall useful life of the lighting systems averages about 25-30 years. The useful life is based on normal deterioration; aside from physical damage, normal maintenance, changes in safety standards, or technology advances.

### ***Condition of Highway Lighting***

The overall condition of the lighting systems is mostly "GOOD"; however, there are a few locations in need of work, some of which is scheduled.

### ***Factors Affecting Condition of and Demand for Highway Lighting***

The following factors affect the physical condition of highway lighting:

- ***Environmental factors*** and conditions such as water, snow, ice, salt, heat, cold, wind, and lightning can negatively affect the physical condition of highway lighting by causing corrosion, physical damage, and deterioration.
- ***Electrical component malfunction*** by the lamp, ballast, wiring, and service components.
- ***Physical damage*** or knockdown by errant vehicles affects the condition of highway lighting.
- ***Vandalism.***

The following factors affect the demand for highway lighting:

- ***Geometric factors*** such as the number of lanes, width of the lanes, roadway grades, sight distance, and whether parking is permitted along a specific section of roadway.
- ***Operational factors*** such as changes in traffic patterns or traffic volumes, whether there are traffic signals in operation, whether left turn lanes exist, width of the median, operating speed, and amount of pedestrian traffic along a specific section of roadway.
- ***Environmental factors*** such as amount of development, type of development, setback distances, whether medians exist, amount of advertising or area lighting, and crime rate in the existing vicinity.
- ***Accident factors*** such as the identification of high accident locations and the ratio of night to day accidents.
- ***Public support*** in the form of requests for highway lighting, or public opposition for various reasons: financial or special interest such as the "Dark Skies Legislation."
- ***Advances or revisions in technical standards*** such as illumination criteria, breakaway standards; or new technology such as new lamp sources, or new materials, can lead to conversion or replacement of lighting systems or components.
- ***Project scoping***, including construction of new roadways, reconstruction of roadways, or other roadway improvements can lead to the need for new, extended or revised highway lighting.

### ***Ability of Highway Lighting to Meet Current and Future Demands***

The highway lighting systems meet current demand; and, with proper adjustments for maintenance, obsolescence, and growth, will meet future demand.

### **1.1.6 Guiderail**

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CTDOT is responsible for maintaining and replacing guiderail on all expressways and state routes. In 1993, new performance criteria for roadside safety hardware were identified by the National Cooperative Highway Research Program (NCHRP) in the publication *Report 350: Recommended Procedures for the Safety Performance and Evaluation of Highway Features*. On September 29, 1994, the Federal Highway Administration (FHWA) issued the publication, *Traffic Barrier Safety Policy and Guidance*, which outlined specific mandates regarding installations of guiderail and crash-worthy end treatments. The American Association of State Highway and Transportation Officials (AASHTO) recently published the Manual for Assessing Safety Hardware (MASH), which is an update to NCHRP Report 350. CTDOT is currently working with the FHWA on an implementation plan for the new MASH guidelines.

The Connecticut Guiderail Program was instituted to support CTDOT's efforts in the execution of the FHWA mandates. The program began with an inventory of all deficient guiderail systems on the NHS. A series of guiderail improvement projects has been designed and constructed. One guiderail improvement project is scheduled to be constructed each year, contingent on federal funding.

### **1.1.7 Intelligent Transportation Systems (Physical Components of Systems)**

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The current Intelligent Transportation Systems (ITS) components (shown in Figure 1-6), involving Closed Circuit Television Cameras (CCTV), Traffic Flow Monitoring (TFM) detectors, Variable Message Signs (VMS), Highway Advisory Radio (HAR) transmitters, Roadway Weather Information Systems (RWIS) and coordinated traffic signal systems have been installed and operated since 1993. CTDOT presently has more than 213 miles of ITS on I-84, I-91, I-95, I-384, I-395 and Route 2, Route 3, Route 8, Route 9, Route 15, including 324 cameras, 256 TFM, 137 VMS, 11 HAR stations, 14 RWIS and 944 computerized traffic signals. The components are all subject to repair and maintenance and, except for the signal systems, are under Department of Administrative Services contract. As the ITS system components near the end of their useful lifespan (typically 10-20 years for devices such as CCTV, TFM, VMS, HAR and RWIS), it will be necessary to replace the equipment. Construction projects are in progress to provide the required services to replace the aging system components.

New ITS projects have been initiated for replacing the I-95 system in the Bridgeport and New Haven Regions are beginning design as well as a VMS replacement project in the Hartford area. Future design projects are scheduled for other congested highway segments, such as I-84 in Danbury/Waterbury area and the I-91/I-691 interchange in Meriden.



Figure 1.1-6. Intelligent Transportation System



### **1.1.8 ITS – Connecticut Highway Assistance Motorist Patrol (CHAMP)**

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This employee-based service patrol provides aid to travelers in the Greater Hartford Area/ I-84 Waterbury-Danbury and along I-95 from Greenwich to Stonington. Champ consists of fifteen trucks, operating between the hours of 5:30 a.m. and 7 p.m. weekdays. Champ program provides assistance to approximately 20,000 motorists annually. Each truck has a conventional cab and chassis with a utility body installed for the storage of equipment, an arrow board for traffic movement, a rear crash attenuator, and a special front push bumper. The vehicles are also equipped with a variety of tools for jump starting, changing tires, and making other minor repairs along with spare gas and diesel fuel. The useful life for the current CHAMP trucks is five years.

### **1.1.9 Work Zone Safety and Mobility Initiatives**

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The Work Zone Safety and Mobility Rule (Rule) was published in the Federal Register (69 FR 54562) on September 9, 2004, with an effective date of October 12, 2007. The Rule was updated to address the changing times of more traffic, more congestion, more work zones on existing roads carrying traffic, and safety issues. Several other rules and regulations have been enacted as a result of the Rule. One example is that a Temporary Traffic Control Devices Rule became effective as of December 4, 2008. This rulemaking is in response to section 1110 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and supplements FHWA's Work Zone Safety and Mobility Rule (Subpart J) to address conditions for the appropriate use of, and expenditure of funds for, uniformed law enforcement officers, positive protective measures between workers and motorized traffic, and installation and maintenance of temporary traffic control devices during construction, utility, and maintenance operations.

CTDOT addresses the requirements of the Rule in plans, processes, procedures, and guidance and employs a multi-disciplinary team in partnership with the FHWA for implementation on Federal-aid projects as well as non-Federal-aid projects when appropriate. Efforts by CTDOT to address particular areas related to work zone safety and mobility include the following:

- Assessing and Managing Work Zone Impacts
- Use of Work Zone Data
- Work Zone Training
- Process Reviews
- Significant Projects
- Transportation Management Plans (TMPs)
- Public Information and Outreach

Three primary areas of focus are the assessment and management of work zone impacts, conducting process reviews to comply with the requirements of 23 CFR Part 630, Preconstruction Procedures, Subpart J – Work Zone Safety and Mobility, and having a strong public information and public outreach component.

CTDOT issued a Work Zone Safety and Mobility Implementation Plan (Plan) in August 2007, which provides guidance to various offices within the agency on complying with the Rule and identifies the various action items that need to be addressed. Some of the action items are: data collection and reporting during project construction; data retention and analysis; early evaluation and documentation in the identification of "significant" proposed projects; establishment of specific project scope and limits; development of a Traffic Control plan, Transportation Operations plan and Public Outreach/Public Information program components, as warranted.

CTDOT and the FHWA have conducted two work zone safety and mobility process reviews, one in 2011 and another completed recently in 2013. As a result of the 2011 process review, CTDOT has developed and FHWA has accepted a formal action plan entitled the Work Zone Improvement Plan (WZIP). The primary objective of the WZIP is to minimize work zone congestion and delays and enhance the safety of workers and motorists. This will be done through the establishment of policies, strategies, processes and tools to manage work zone mobility and safety impacts during project planning, design, and construction and maintenance activities. A number of intermediate goals and actions are included in the WZIP to work towards the use of safety performance measures. Typical safety performance measures relate to the number and rate of fatalities and/or crashes and incidents, emergency response times, public perceptions of safety, etc., for the relevant transportation modes.

The third area of discussion is the public outreach and awareness efforts by CTDOT. Since the inception of the National Work Zone Awareness Campaign in 1999, CTDOT has chaired the Work Zone Safety Awareness Working Group that includes members from private, public, federal, and state stakeholders. These members partner with CTDOT to promote and reinforce safety campaigns, programs and initiatives in all areas of highway safety. The group's primary objective is to increase public awareness of work zone safety and facilitate intradepartmental and interagency communication and support related to work zone safety awareness. Expansion to include social media and advertising at major venues and events in the state has increased work zone safety awareness exposure.

For more information on work zone safety including laws and regulations, research, safety products, standards and practices visit the National Work Zone Safety Information Clearinghouse at <http://www.workzonesafety.org/> which is dedicated to providing the transportation construction industry and the general public with comprehensive information to improve motorist, worker and pedestrian safety in roadway work zones

#### **1.1.10 Weigh-in-Motion Systems (WIM) and the Traffic Monitoring Programs**

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Traffic Monitoring is the process of collecting data on the existing number and characteristics of vehicles using Connecticut's roadway system. Statistics on current and historical traffic provide the foundation on which to evaluate the transportation system and plan for future transportation needs. Users of the data range from businesses seeking to relocate, to the Congress determining an equitable apportionment of transportation funds. The data is used by environmental and project planners as well as traffic and design engineers to evaluate the transportation system and to plan for future transportation needs.

Once every three years, all State-maintained roadways are counted to determine the average daily traffic of the roadway. Counters are placed across the roadways for a 24 hour -48 hour period and record not only the daily traffic, but also the hourly breakdown of the traffic. For expressways, counters are placed on the ramps and mainline volumes are calculated from known controls on the mainline. Counts are taken by portable traffic recorders with tubes laid across the pavement. This equipment automatically records the vehicles as they pass over the tubes. An average of 5,000 counts is taken for this purpose each year. Coverage counts provide the broad picture of growth and traffic changes on Connecticut's roadway system.

In addition, for specific transportation projects or studies, short-term counts are often taken as part of the planning, environmental and design process. These counts provide additional information on current roadway usage, daily, weekly and seasonal characteristics as well as hourly and 15 minute volumes for the roadway. As above, these counts are taken by portable traffic recording equipment with tubes across the pavement. The duration of these counts varies depending on project need, but usually ranges from 24 hour to a week. These counts

supplement the regularly scheduled coverage counts and provide the base from which traffic projections are developed for transportation projects.

A growing area of importance for transportation planning is truck statistics. Trucks are a critical component of pavement wear. Understanding the number and weight of trucks on our roadway system plays a major role in scheduling and planning of pavement reconstruction and repaving. The weigh in motion program provides these statistics. Major technological advances in the past few years now allow us to develop statistics on truck traffic without stopping or inconveniencing truckers. Trucks are classified and weighed as they pass over sensors on or cut into pavement.

Connecticut was the first state to install and evaluate quartz-piezoelectric WIM sensor technology. There are 36 WIM sites with “Piezos” in the pavement to obtain vehicle weights, speed, classification and volume. CTDOT operates a main line WIM system for the Union weigh station on I-84. There is the same type of site in Greenwich on I-95. The facility checks the credentials and gross weight of commercial vehicles traveling at highway speeds. Vehicles possessing the required credentials and that are of proper weight are allowed to bypass the weigh station, while noncompliant vehicles must stop for an examination.

Statistics on the seasonal variation of traffic and the daily fluctuation of traffic within the year are developed from permanent traffic recording sites. Each site is composed of sensors cut into the pavement and computer equipment, which allows for the continuous recording of traffic data. Data is collected continuously, 24 hours a day, 365 days a year (366 days on leap year). Data is automatically transmitted to the Office by telephone wires and provides both a long term historical picture of traffic as well as detailed characteristics of traffic fluctuation. It provides the basis for determining design hourly traffic factors, fluctuations in traffic on recreational roads, weekend traffic patterns and a host of other statistics, which are critical in the transportation process. They provide the controls for adjusting short-term counts to average daily traffic. There are currently 40 automatic traffic recorder (ATR) stations within Connecticut. In addition to providing volume data, many have the capability of providing information on the types of vehicles.

For intersection design and intersection analysis the hourly and 15 minute numbers of vehicles making individual turns are often required. The number of vehicles making left hand turns, right hand turns, and going straight through an intersection determine the type and form of traffic control devices needed, whether the intersection requires signalization, stop signs, left or right hand turning lanes. Turning movements are done by portable traffic recorders or manual counting procedures.

Vehicle classification data is collected to determine the breakdown of the types of vehicles on Connecticut’s roads. Vehicles are stratified into 13 categories ranging from motorcycles, to passenger cars, to buses, to trailer trucks, to multi trailers. Vehicle classification data is collected at 100 locations and allows the development of factors to estimate vehicle classification data by roadway type and traffic volume. There are 67 Traffic Monitoring System (TMS) classification sites in the pavement on various functional classified roads within Connecticut

Researching efficiencies of the TMS is an ongoing pursuit within the Department with the addition of Automatic WIM to the ATR stations. The Department is updating the computer infrastructure to add this component to the programs.

### **1.1.11 Highway Rest Areas**

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For the convenience of the motoring public, CTDOT maintains seven highway rest areas that have parking facilities, lavatories, vending machines, picnic tables, and K-9 areas. Most have telephones, information booths, and seasonal dumping facilities for recreational vehicles (RVs).

The highway rest areas do not have restaurants, fuel, or convenience store facilities on the premises. Summary information on these highway rest areas is presented in table 1-1.

**Table 1-2. Connecticut Rest Areas**

Town	RV Dumping Facility	Location	Building Number	Year Constructed	Condition
Danbury	*	I-84 E/B	81-295	1971	Fair
Southington	*	I-84 E/B	81-323	1972	Fair
West Willington		I-84 E/B	81-572	1977	Poor
West Willington	*	I-84 W/B	81-573	1977	Poor
Middletown	*	I-91 N/B	81-076	1979	Fair
Wallingford	*	I-91 S/B	81-301	1973	Fair
North Stonington		I-95 S/B	81-296	1971	Fair

Source: CTDOT Office of Properties and Facilities Services. Table updated in February 2010.

All of these rest areas are in fair to poor condition. Most need major repairs such as roof replacements, septic system replacement, air conditioning work, sink and mirror replacement, and well pump replacement.

The Department is currently developing plans to rehabilitate the septic systems at the eastbound and westbound rest areas on I-84 in Willington. Each new septic system will include nitrogen pre-treatment system, an equalization tank and a replacement leaching field. The project will also include improvements to the rest area facilities, including plumbing and fixture replacement, retiled restrooms, standby generators and electrical upgrades. The new septic systems will be permitted by the Connecticut Department of Energy and Environmental Protection (DEEP). Construction is scheduled to start in spring 2015 and conclude later that year.

### **1.1.12 Highway Commercial Service Plazas**

The State of Connecticut has 23 highway commercial service plazas that offer fuel and restaurant or convenience store facilities in addition to lavatories, telephones, and parking facilities. Ten of these facilities are adjacent to I-95, three are adjacent to I-395, and ten are adjacent to Route 15.

Prior long-term agreements with both ExxonMobil Oil Corporation and McDonald's Corporation expired and a new Concession Agreement between CTDOT and Project Service LLC became effective on December 7, 2009. This 35-year agreement includes significant private sector capital investment by the new operator to redevelop each of the 23 Service Plazas. Approximately \$178 million is estimated to be invested within the first five years and another \$52 million is estimated to be reinvested over the term of the agreement. This agreement resulted from an RFP process focused on finding a single entity that would be responsible for the physical facility operation and redevelopment of all of the Service Plazas in such a way that they would enhance the face of the State of Connecticut through more efficient, effective, and attractive facilities with expanded service offerings serving the motoring public. The goal is to improve the Service Plazas in all aspects of their operation including, but not limited to: safety; physical appearance of both buildings and sites; a greater variety of food offerings including more health conscience choices; increasing the number of on-site truck parking spaces along I-95; reducing

air pollution via new technologies such as idle reduction for trucks; providing local and statewide tourism information via more creative and interactive methods; and improving the quality and functionality of the buildings. Another significant enhancement was that each of the renovations includes full stand-by generator capability so the plazas remain fully operational including dispensing fuel even during power outages. The RFP required that one entity take responsibility for this effort so that the designs of the redevelopment would be properly coordinated between the food, fuel, environmental, and traffic needs of the sites. In addition, this unique approach places the total responsibility for every aspect of the maintenance and operations at each of the Service Plazas under a single point of control and contact, giving the State a single entity to deal with for any issue that may arise. Table 1-3 summarizes the renovations that are currently proposed at each of the service plazas.

**Figure 1-7. Typical Rendering of I-95 Darien and Milford Service Plazas and Picture of I-95 NB Service Plaza in Milford:**



### ***Condition of I-95 Service Plazas***

The ten (10) I-95 commercial Service Plazas were originally constructed in the late 1950s. Prior to their renovation most of these facilities underutilized the available building square footage and had inadequate truck parking areas and problematic vehicle traffic patterns. They were formerly operated separately by McDonald's Corporation to provide food service and Exxon Mobil Corporation to provide fuel service until December 7, 2009 when the new Concession Agreement took effect. The facilities were in generally poor, outdated condition and far from the current state-of-the-art in Service Plaza design. The redevelopment program that is required under the current Concession Agreement is dramatically improving the conditions, the functionality, and the service offerings at each of the tired and outdated facilities. As of January 1, 2015, eight of the ten I-95 service plazas have been renovated and reopened to the public. The first of the I-95 locations renovated were the Milford (N/B) and (S/B) Service Plazas. The old Milford (S/B) Service Plaza was completely replaced with a new state-of-the-art building that was prominently located on the site to maximize its functionality and safety. The existing building and grounds at Milford (N/B) were thoroughly renovated to improve the image and functionality of the overall service plaza. The Milford plaza renovations were followed by the renovations at Darien (N/B) and (S/B) then Branford (N/B) and (S/B) then Madison (N/B) and Fairfield (N/B). Both of the Darien plazas were similar to Milford (S/B) in that they were full building demolitions that were replaced with all new larger facilities. All sites are being modified to improve traffic flow and public safety. Construction is also currently underway at Fairfield (S/B) and Madison (S/B). Fairfield (S/B) is expected to reopen to the public in February of 2015 and Madison (S/B) should reopen in May of 2015. Once Madison (S/B) reopens in May of 2015 all of the I-95 service plaza renovations will be completed. All of the I-95 Service Plazas are receiving extensive renovations with most also scheduled for significant square footage additions to their current buildings. All of the Service Plaza sites on I-95 will receive new, relocated and redesigned fuel islands that utilize a "dive-in" design (similar to what is presently on the Mass

Turnpike) which is intended to process fueling traffic quicker and reduce the underutilization of dispensers that are difficult to access in the old “in-line” configuration.

### ***Factors Affecting Ability of I-95 Service Plazas to Meet Current and Future Demands***

Key factors affecting the ability of these facilities to meet future demands include: higher traffic volumes; current size and condition of buildings; physical site limitations including amount of land owned and available for cost effective expanded development; environmental conditions such as adjacent wetlands, off-site community encroachment, etc.); insufficient truck parking areas during the overnight hours; lack of security to dissuade undesirable activities; and potential opposition by local interests to the specific redevelopment projects.

### ***Ability of I-95 Service Plazas to Meet Current and Future Demands***

The I-95 commercial Service Plazas redevelopment project is designed to accommodate the current and future demands of the traveling public within the physical limiting parameters of each individual site. Among the new facilities’ operational improvements are a greater variety of and healthier food offerings; improved safety elements such as better lighting and improved vehicular movement on-site; new “dive-in” fueling dispensers; enhanced tourism interface; innovative technologies for air pollution reduction and future alternative energy provision, addition of related retail services; and an increase of 120 truck parking spaces south of the I-91 interchange. There will continue to be a shortfall between future truck parking needs and the current ability of the I-95 Service Plaza sites to meet those needs, even with site redevelopment. .

In addition, electric vehicle (EV) DC fast charger units (Level 3) have been installed at the following plazas: Milford NB (Tesla only); Milford SB (Tesla only); Darien NB (Tesla only); and, Darien SB (CHAdEMO & Tesla). Additional EV chargers are planned for Madison NB (CHAdEMO only). Sites with CHAdEMO charging are also planned to have SAE Combo charging capability installed at a future date.

With respect to security, the I-95 Service Plazas are open 24 hours a day, 365 days a year. Prior to the current Concession Agreement, there was little being done to prevent undesirable activities. Project Service LLC has committed to elevating the level of security and for making the plazas more family friendly through the installation of numerous internal and external security cameras and are providing offices for Connecticut State Police patrolmen to use at many of the locations. Safety of the Service Plaza operations should also inherently increase through the safety conscious designs of the site redevelopment that are strategically intended to keep truck traffic segregated from passenger cars and pedestrian traffic.

### ***1.1.12.1 Route 15 Service Plazas***

#### ***Condition of Route 15 Service Plazas***

Six of the ten Route 15 facilities were originally constructed during the 1940s and four were constructed in the 1950s. Until recently, similar to I-95, they were operated by ExxonMobil Oil Corporation and had their last substantial renovations in 1988. Effective as of December 7, 2009, they are now maintained and operated by the same single entity, Project Service LLC that is also responsible for all of the other plaza renovations and operations as well. Eight of the ten Route 15 service plazas have been renovated and reopened to the public. New Canaan (N/B) and (S/B) are currently the only Route 15 plazas that are still under construction and these are expected to reopen to the public in May of 2015. The renovations on Route 15 are for the first time introducing fresh, made-to-order food offerings at each of the plazas. In addition to Mobil fuel, a convenience store and Dunkin Donuts will be provided at every location and Subway will also be provided at seven of the ten locations (everywhere there is sufficient room to accommodate the operational needs). In the past, the only food offerings on this road were

prepackaged sandwiches and the typical candy / cracker / nut-type food products. “Dive-in” style fuel pumps are also being installed further away from the deceleration lane to improve safety at all locations where there is sufficient room to do so.

### ***Factors Affecting Ability of Route 15 Service Plazas to Meet Current & Future Demands***

Key factors affecting the ability of these facilities to meet current and future demands include the following: higher traffic volumes; current size limitations and condition of buildings; physical site limitations including the amount of land owned and available for cost effective development; environmental conditions such as flood plains and adjacent wetlands; listing on the State Register as contributing structures in a Historic District (cannot add-on to building fronts or sides); adequacy of utility (including septic) systems; limited redesign potential of Service Plaza acceleration and deceleration lanes; and other site safety concerns such as the close proximity of the current “in-line” fuel islands to the highway, as well as to the buildings themselves.

### ***Ability of Route 15 Service Plazas to Meet Current & Future Demands***

The ability of these Service Plazas to fully meet the current and future demands of the traveling public are primarily impacted by the size of the property owned which limits the number of parking spaces on the site and the expansion potential of the existing buildings. Additionally, architectural historic preservation concerns associated with the six locations on the Merritt Parkway also severely constrain the redevelopment / building expansion options.

The proposed redevelopment program intends to improve the Service Plazas’ safety and functionality by:

- Relocating (wherever possible) the fuel islands away from their current location, in front of the buildings, to positions further toward the exit of the plazas in order to increase the deceleration time for vehicles entering the site as well as increase the separation distance from the fuel island to the highway deceleration lane openings. These relocations will occur at all but two of the Route 15 sites.
- Redesigning (wherever possible) the new fuel islands in a “dive-in” configuration (similar to what is presently on the Mass Turnpike) intended to process traffic quicker and reduce the underutilization of dispensers that are difficult to access in the current “in-line” style..
- Adding concrete barriers between the highway and the service plazas where they do not presently exist to protect the plaza operations.
- Completely renovating the interiors of the existing buildings and adding small additions toward the back or side of the existing buildings (wherever possible) to accommodate the introduction of fresh food offerings to be served by Subway (at seven locations) and Dunkin Donuts (at all ten locations).

In addition, electric vehicle (EV) DC fast charger units (Level 3) have been installed at the following plazas: Greenwich NB (Tesla & CHAdeMO) and Greenwich SB (Tesla only). Sites with CHAdeMO charging are also planned to have SAE Combo charging capability installed at a future date.



### **1.1.12.2 I-395 Service Plazas**

#### ***Condition of I-395 Service Plazas***

The three I-395 facilities originally were constructed in 1958. They were formerly operated by ExxonMobil Oil Corporation until December 7, 2009, when they transitioned to Project Service LLC under the new Concession Agreement. These Service Plazas always sold fuel and had convenience stores, but they did not offer freshly prepared food. They are smaller in scale than the I-95 locations and were similar in operation style to the former Route 15 facilities with the exception of truck traffic. Significant renovations were last performed in 1988. The renovations at all three of the I-395 locations have been completed and they are reopened to traffic. Each plaza now offers a Subway, a Dunkin Donuts, and an expanded Alltown (Alliance) convenience store. There were no pavement improvements at these facilities as they were resurfaced in 1999 and remain in reasonably good condition. In 1998, a new septic system was installed to serve both Plainfield Service Plazas. The Montville septic system was refurbished. A new water supply (well) was installed at the Montville service area to separate it from the State Police Troop E Barracks on the opposite side of I-395. The traffic demands in this part of the State are not as heavy as many locations on I-95 and the existing Service Plazas should be able to accommodate future needs with the completed facility and site modifications.

#### ***Factors Affecting Ability of I-395 Service Plazas to Meet Current and Future Demand***

Key factors affecting the ability of these facilities to meet future demands include: septic and potable water issues at Montville and Plainfield; size and condition of facilities; and environmental conditions such as flood plains and wetlands.

#### ***Ability of I-395 Service Plazas to Meet Current and Future Demand***

A new independent potable well system and water storage tank was installed to serve the Montville Service Plaza, disconnecting it from the existing off-site system. In addition, the existing septic system was also replaced in Montville and substantially expanded in Plainfield. Renovations to the interiors of the buildings now offer freshly prepared food options by Subway and Dunkin Donuts. The current traffic volumes at these locations do not warrant any major site redevelopment at this time.

**Table 1-3. Proposed Improvements at Connecticut’s Highway Commercial Service Plazas**

Service Plaza Location:	Proposed Renovation Activity/Timeline
<b>I-95</b>	
Darien Northbound	<ul style="list-style-type: none"> <li>• Building – full demolition and complete new (24,000 SF) structure providing a Tourism Welcome Center, 9 food venues, a gift store that sells CT made / related goods, and a large convenience store.</li> <li>• Site – relocated “dive-in” fuel islands that provide 24 fueling positions, significant reconfiguration providing 8 added truck parking spaces and 11 bus parking spaces;</li> <li>• Started: March 22, 2012 – Completed: June 6, 2013</li> </ul>
Darien Southbound	<ul style="list-style-type: none"> <li>• Building – full demolition and complete new (24,000 SF) structure, providing 9 food venues, a gift store that sells CT made / related goods, and a large convenience store,</li> <li>• Site – relocated “dive-in” fuel islands that provide 20 fueling positions, significant reconfiguration providing 51 added truck parking spaces and 15 bus parking spaces;</li> <li>• Started: April 30, 2012 – Completed: August 30, 2013</li> </ul>
Fairfield Northbound	<ul style="list-style-type: none"> <li>• Building - complete interior and exterior renovation</li> <li>• Site – relocated fuel islands, significant reconfiguration;</li> <li>• Start: July 10, 2013 – Completed: December 12, 2014</li> </ul>
Fairfield Southbound	<ul style="list-style-type: none"> <li>• Building - complete interior and exterior renovation</li> <li>• Site – relocated fuel islands, significant reconfiguration;</li> <li>• Start: September 23, 2013 – Completion: February of 2015</li> </ul>
Milford Northbound	<ul style="list-style-type: none"> <li>• Building - complete interior and exterior renovation (including a large seating area addition) providing 6 food venues, a gift store that sells Ct made / related goods, and a large convenience store,</li> <li>• Site – relocated “dive-in” fuel islands providing 16 fueling positions, significant reconfiguration providing 20 added truck parking spaces and 5 bus parking spaces and three venue (McDonald’s, Dunkin Donuts, and Subway) drive-thrus;</li> <li>• Started: December 1, 2010 – Completed: March 15, 2012</li> </ul>
Milford Southbound	<ul style="list-style-type: none"> <li>• Building – full demolition and complete new (24,000 SF) structure providing 8 food venues, a gift store that sells CT made / related goods, and a large convenience store,</li> <li>• Site – relocated “dive-in” fuel islands providing 16 fueling positions, significant reconfiguration providing 22 additional truck parking spaces and three venue (McDonald’s, Dunkin Donuts, and Subway) drive-thrus:</li> <li>• Started: December 1, 2010 – Completed: April 20, 2012</li> </ul>
Branford Northbound	<ul style="list-style-type: none"> <li>• Building - complete interior and exterior renovation (including a dining area addition) providing 5 food venues and a large convenience store,</li> <li>• Site – relocated “dive-in” fuel islands providing 16 fueling positions, significant reconfiguration;</li> <li>• Started: April 17, 2012 – Completed: September 25, 2013</li> </ul>
Branford Southbound	<ul style="list-style-type: none"> <li>• Building - complete interior and exterior renovation</li> <li>• Site – relocated fuel islands, significant reconfiguration;</li> <li>• Started: September 4, 2012 – Completed: January 31, 2014</li> </ul>
Madison Northbound	<ul style="list-style-type: none"> <li>• Building - complete interior and exterior renovation</li> <li>• Site – relocated fuel islands, significant reconfiguration;</li> <li>• Started: September 25, 2013 – Completed: November 21, 2014</li> </ul>
Madison Southbound	<ul style="list-style-type: none"> <li>• Building - complete interior and exterior renovation</li> <li>• Site – relocated fuel islands, significant reconfiguration;</li> <li>• Start: 1<sup>st</sup> quarter 2014 – Completion: May of 2015</li> </ul>

<b>Route. 15 - Merritt Parkway</b>	
Greenwich Northbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation, addition in rear</li> <li>• Site - relocated fuel pumps for safety;</li> <li>• Started: November 26, 2012 – Completed: January 17, 2014</li> </ul>
Greenwich Southbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation, addition in rear</li> <li>• Site - relocated fuel pumps for safety;</li> <li>• Started: November 26, 2012 – Completed: February 11, 2014</li> </ul>
Fairfield Northbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation, addition in rear providing Subway, Dunkin Donuts, and a convenience store,</li> <li>• Site - relocated “dive-in” fuel pumps for safety, reconfigure parking;</li> <li>• Started: February 1, 2012 – Completed: November 9, 2012</li> </ul>
Fairfield Southbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation providing a Dunkin Donuts and a convenience store;</li> <li>• Site - relocated fuel pumps for safety, reconfigure parking;</li> <li>• Started: February 1, 2012 – Completed: December 21, 2012</li> </ul>
New Canaan Northbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation, addition in rear</li> <li>• Site - relocate fuel pumps for safety;</li> <li>• Started: February 12, 2014 – Completion: May of 2015</li> </ul>
New Canaan Southbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation, addition in rear;</li> <li>• Started: March 7, 2014 – Completion: May of 2015</li> </ul>
<b>Route. 15 - Wilbur Cross Parkway</b>	
Orange Northbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation, addition in rear providing Subway, Dunkin Donuts, and a convenience store;</li> <li>• Site - relocated “dive-in” pumps for safety, reconfigure parking to add 8 more parking spaces;</li> <li>• Started: January 28, 2013 – Completed: December 21, 2013</li> </ul>
Orange Southbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation, addition in rear providing Subway, Dunkin Donuts, and a convenience store;</li> <li>• Site – relocated “dive-in” pumps for safety, reconfigure parking to add 8 more parking spaces;</li> <li>• Started: January 28, 2013 – Completed: December 21, 2013</li> </ul>
North Haven Northbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation, addition in rear providing Subway, Dunkin Donuts, and a convenience store;</li> <li>• Site - relocated “dive-in” pumps for safety, reconfigured parking to add 12 more parking spaces;</li> <li>• Started: July 28, 2010 – Completed: April 21, 2011</li> </ul>
North Haven Southbound	<ul style="list-style-type: none"> <li>• Building – complete interior renovation, addition in rear providing Subway, Dunkin Donuts, and a convenience store;</li> <li>• Site - relocated “dive-in” pumps for safety, reconfigure parking adding 7 more spaces;</li> <li>• Started: October 12, 2010 – Completed: June 29, 2011</li> </ul>
<b>I-395</b>	
Montville Southbound	<ul style="list-style-type: none"> <li>• Building – full interior renovation adding a Subway, Dunkin Donuts, and convenience store plus cosmetic exterior work.</li> <li>• Site – septic and well improvements;</li> <li>• Started: October 9, 2012 – Completed: November 15, 2013</li> </ul>
Plainfield Northbound and Southbound	<ul style="list-style-type: none"> <li>• Building – full interior renovation adding a Subway, Dunkin Donuts, and convenience store plus cosmetic exterior work;</li> <li>• Started: October 3, 2011 – Completed: September 28, 2012</li> </ul>

### 1.1.13 Highway System Facilities

CTDOT maintains approximately 100 highway related facilities including administration buildings, district offices, rest areas, and maintenance and repair facilities located throughout the state. Most of the maintenance facilities also contain salt sheds on the same site, although some salt sheds are located at satellite locations. Figure 1-8 is a map showing the location of CTDOT's maintenance facilities and salt sheds.

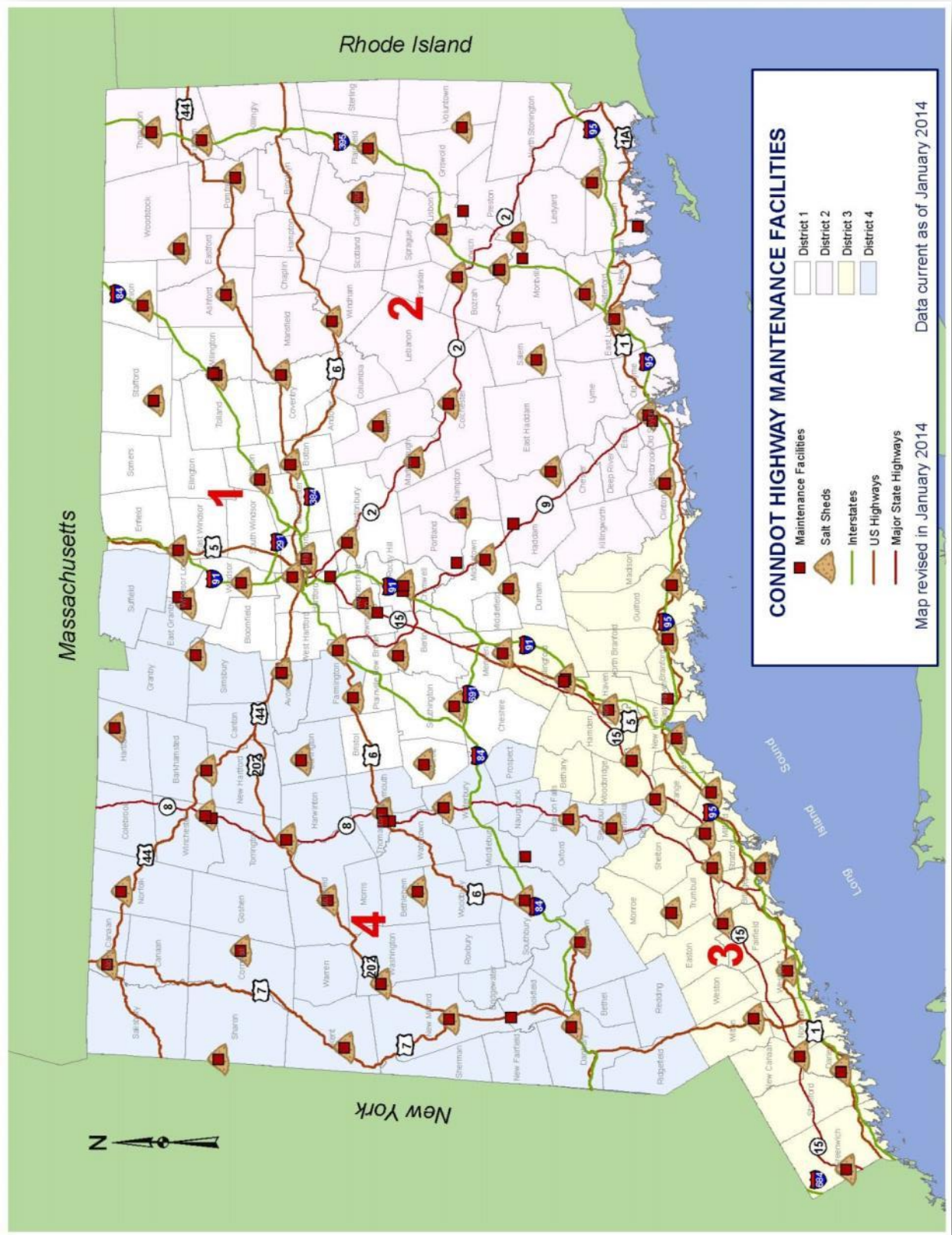
These facilities are maintained regularly and renovation work is programmed through a "10 Year" Major Capital Program. The current program is dated June 2014. The Department is currently preparing to undertake a comprehensive condition survey of all the highway system facilities as part of an ongoing asset management program. Below is a list of facilities that, as of December 2013, have not been renovated since 1990 and are scheduled for renovation, relocation or replacement in the current Major Capital Program.

**Table 1-4. Highway System Facilities scheduled for renovation, relocation or replacement in the current "10 Year" Major Capital Program**

Brookfield Repair	Plainfield Signs and Markings
Canterbury Maintenance	Pomfret Maintenance
Colchester Repair & Electrical (In Construction - Will replace the Montville, Lisbon, and Higganum facilities)	Putnam Maintenance and Repair
East Hartford Signs and Markings	Rocky Hill Ferry Restroom
East Hartford Maintenance	Rocky Hill Repair
Emergency Generator Installations at Various Locations	Roof Replacements at Various Locations
Farmington Maintenance	Simsbury Maintenance
Franklin Bridge Repair	Southington Maintenance
Marlborough Maintenance	Union Maintenance
Milford Maintenance, Electrical and Repair	Vernon Maintenance
New Milford Bridge Maintenance	West Willington Rest Areas (East and West Bound, Replacement of Septic Systems Only)
Newington Administration Building (Parking Lot and Chillers only)	Wethersfield Maintenance (Goff Rd.)
Occum (Norwich) Maintenance	Wolcott Garage
Orange Maintenance	

Source: CTDOT Bureau of Engineering & Construction. Table updated in June 2014.

Figure 1.1-8. Highway System Facilities and Maintenance Districts



### 1.1.14 Commuter Parking Facilities

The statewide network of commuter parking facilities consists of 178 parking facilities serving carpoolers, vanpoolers, and bus riders and an additional 50 parking facilities serving rail commuters using the New Haven Commuter Line, Shore Line East, and Amtrak. (For additional information on railroad stations and rail parking facilities, please see the Rail System Components section of this document.)

There are a total of approximately 16,200 parking spaces for use by commuters, excluding parking spaces at or near rail stations. Based on usage counts taken in 2013, the average daily usage was approximately 6,200 vehicles per day or 38 percent for these non-rail commuter parking facilities. There are 49 commuter parking lots which provide express bus service and 87 lots which provide local bus service; 17 of these lots have both local and express bus service. The remaining commuter parking facilities are used exclusively for carpooling and vanpooling purposes.

With respect to the general condition of the 178 non-rail commuter parking facilities, 99 percent of the lots are paved and 91 percent of the lots are lighted. Pavement and amenities in the facilities are maintained on a continuing basis and repaired or replaced when necessary.

A Light Emitting Diode (LED) lighting retrofit project, which was funded by the Department of Energy and Environmental Protection (DEEP), was completed during the 2013 summer construction season. This project was performed by CTDOT maintenance forces and replaced High Pressure Sodium (HPS) type light fixtures with LED type light fixtures at illuminated commuter parking lots maintained by CTDOT. A total of 123 lots were retrofitted with these more energy efficient LED type light fixtures and this conversion has reduced energy consumption at the retrofitted commuter lots by more than 40%. The LED type lighting systems are also expected to significantly reduce maintenance requirements.

A complete list of the commuter parking facilities with their capacities and, amenities, along with maps showing their locations is available on CTDOT's web site at [www.ct.gov/dot](http://www.ct.gov/dot). To view the list, go to "Travel Information Map," then under Travel Resources click on "Park & Ride".



## 1.2 Current and Future Demand

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It will become increasingly challenging during the next 20 years to enable the State of Connecticut's highway system to accommodate new and additional demands. Key factors that will affect the extent to which the state's highway system can be maintained and improved to meet current and future mobility demands are included in this section.

### 1.2.1 Behavioral and Demographic Patterns

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Factors such as time pressures on multi-worker households and the consequent need to "work-trip-chain" (to link the work trip with other trips to meet household needs), continued dispersal of populations out from metropolitan areas, the number of households in which workers commute to different locations, the changing nature of work (job dispersal resulting from more work being done in small work units of a few people or even one person), the number of service-oriented jobs requiring workers to work at odd hours and on weekends and the "humanizing" of the work place and consequent flexibility in work scheduling combine to make use of the private vehicle the most desirable means of travel for a significant majority of individuals. Alan Pisarski in *Commuting in America II*, concludes that "there is little in present patterns of behavior and demography to suggest that there will be a significant reversal in the private-vehicle orientation of commuters." Pisarski feels that "as long as the private vehicle remains at all affordable to own and operate, the pattern will continue." Increases in the cost of fuel and greater public concern about climate change are factors that could result in greater public demand for and use of public transportation and in lifestyle choices that reduce the frequencies or lengths of individuals' commutes to work.

### 1.2.2 Extent to Which Roads in Suburban and Rural Areas Can Be Maintained, Improved or Enhanced to Respond to Needs of Drivers, Bicyclists and Pedestrians

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In many areas of the state, the shift of jobs and workers to the suburbs and beyond in conjunction with the increased use of the private automobile in response to personal time pressures and the continued use of trucks for a significant percentage of goods movement in Connecticut, has resulted in, and will continue to result in, significant increases in the traffic volumes and a more diverse mix of vehicles on many state and municipal roads and bridges that were not designed to handle such volumes and mixes. Many of these roads will require higher levels of maintenance; improvements (such as the addition of turning lanes, intersection improvements to increase turning radii, and signalization to maintain and improve traffic flow); and modifications and enhancements (such as sidewalks, wider shoulders, bike lanes, medians, and crosswalk signals) to address safety and pedestrian access issues. The extent to which the State and municipalities will be able to address such current and future highway-related mobility needs is affected by public support for or opposition to projects; environmental factors, such as impact on air quality and the presence of wetlands, watersheds, endangered species, and historic structures; and availability of funds to undertake such projects.

### 1.2.3 Application of Technology and Innovative Approaches to Maintain Traffic Flow

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Intelligent Transportation Systems (ITS), formerly called Intelligent Vehicle Highway Systems (IVHS), applies advanced technologies to transportation needs to increase the efficiency and mobility of existing transportation systems. Incorporating ITS into an intermodal strategic transportation system provides a number of benefits, including more efficient use of our infrastructure, energy resources and improvements in safety, mobility, accessibility, and

productivity. The continued advancement and expansion of ITS are critical aspects of meeting future transportation needs and mobility requirements.

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#### **1.2.4 ITS, New Materials, New Equipment, and New Processes and Procedures**

In addition to ITS, the development, use, and application of new materials, equipment, processes, and procedures to maintain and repair transportation systems will become an increasingly important means of minimizing travel delays in Connecticut. New materials, techniques, and equipment that enable CTDOT to maintain the highways more cost-effectively or with less disruption to traffic flow could expand and improve CTDOT's ability to meet the mobility needs of highway users. CTDOT will continue to explore and implement, when feasible and financially possible, new approaches, technology, materials, and procedures to meet the mobility needs and address traffic flow problems in Connecticut.

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#### **1.2.5 Changes in Vehicles**

Within the next 20 years, innovation and new technology will result in changes in the types and designs of vehicles that use the highway system and in the materials and means used to maintain and improve the highway system. Such advances will impact, probably both positively and negatively, CTDOT's ability to meet current and future needs. Vehicle types and designs which further increase the diversity of sizes and weights of vehicles using the highways will make it more challenging to maintain and improve the highway system to meet the safety needs of all highway users.

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#### **1.2.6 Aging of the Population**

In 2010, 14.2 percent of Connecticut's population was age 65 and older. By 2025, approximately 21 percent of the population is projected to be 65 or older, and almost half of these older persons are projected to be 75 or older. This upcoming change in demographics is significant, particularly considering that a relatively large number of Connecticut residents maintain operator licenses in their senior years. This situation is resulting in the exploration and identification of ways to improve the mobility and safety of older persons as drivers, passengers, and pedestrians. A considerable amount of research is being conducted to provide more insight into the needs of older drivers and the types of measures that tend to facilitate their use of the streets and highways. As research data becomes available and standards and assumptions are reevaluated and revised, CTDOT will need to implement cost-effective measures that have the potential to improve the mobility and safety of older persons.

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#### **1.2.7 Changes in How and Where Businesses Operate and Locate**

Technological innovations have resulted and will continue to result in changes in how and where businesses locate and operate. Changes in how businesses can operate, in turn, trigger changes in the transportation needs of businesses. For example, within the past decade, innovations in the telecommunications industry and in the development of containers have enabled many companies to compete in global markets, to shift to "just-in-time" delivery of inventory, and to realize cost savings by using multimodal transportation.

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#### **1.2.8 Alternative Fuels**

The transportation sector of the U.S. economy relies on petroleum (gasoline, diesel) as the primary fuel, as is illustrated by the thick green flow in Figure 1. An emerging trend, however, are alternative fuel choices for transportation modes. Driven by domestic energy discoveries; air



pollution and greenhouse gas emissions; and energy security issues, viable alternatives to petroleum are becoming both widely available and affordable, including:

- Natural Gas – natural gas (methane) possesses a lower BTU content than petroleum, but burns cleaner and is available from a wide-range of sources, including the nearby Marcellus & Utica Shale deposits in the Appalachian Mountain region. Natural gas variants for transportation include:
  - *Compressed Natural Gas (CNG)* - used more widely at a fleet level in Connecticut, with several private companies converting fleets to CNG, as well as multiple bus transit agencies in CT;
  - *Liquefied Natural Gas (LNG)* – while not widely available at present, a network of 250 LNG fueling stations is presently planned for the U.S. to support long-haul trucking;
  - *Biomethane* – natural gas from landfills and sewage treatment plans is also a new and promising resource; and
  - *Natural Gas-Derived Fuels* – natural gas can be “reformed” to yield hydrogen to power fuel cells in vehicles.
- Electricity – formerly electricity primarily powered electrified rail corridors (Metro-North), but a proliferation of electrically-powered automobiles has been growing. The State of Connecticut is a signatory to the ZEV Eight-State Memorandum of Understanding, committing Connecticut to help deploy over 3 million vehicles in the signatory states by 2025, including:
  - Battery-Electric Vehicles (BEV) – fully battery powered vehicles, such as the Tesla Model S and Nissan Leaf, qualify as a zero emission vehicle (ZEV). Ranges vary from 60 up to 250 miles. Primary refueling is usually at the owner’s residence.
  - Extended-Range Electric Vehicles (EREV) –
  - Fuel Cell Electric Vehicles (FCEV) – planned for widespread release in 2015, fuel cell vehicles will use hydrogen
- Hydrogen – produced from either natural gas (“brown hydrogen”) or electrolysis of water (“blue hydrogen”), hydrogen is used as fuel for fuel cell-powered electric vehicles (FCEV). Two manufacturers, Toyota and Hyundai, are releasing FCEV’s by 2015, but widespread hydrogen fueling infrastructure is lagging in CT.

### **1.2.9 Highway Modes**

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The larger the percentage of passenger and goods movement trips made in Connecticut by rail (as opposed to automobile or truck), the more effective the existing highway system can be in handling the high volumes of automobile and truck traffic on various highways in the state. As discussed in Chapter III, the ability of Connecticut’s rail passenger system to increase ridership on the New Haven Line and, hence, reduce highway congestion on I-95 in Connecticut, is largely a function of the availability of parking at or within reasonable walking distance of the rail stations and the availability of additional rail passenger equipment. Should parking be available within a reasonable walking distance of a rail station, the cost and convenience of making a trip by rail versus by automobile are the major factors that determine which mode will be chosen.

### **1.2.10 Funding**

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A major factor that affects CTDOT’s ability to respond to transportation system-related mobility needs is funding. CTDOT will be able to respond to demands to maintain and improve the transportation system to meet current and future needs only to the extent that funds are available to do so.

## 1.2.11 Highway Capacity

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The increasing number of vehicles on the state's highways and the increasing number of miles traveled by these vehicles are resulting in an increasing percentage of highways in the State of Connecticut that are approaching capacity or that are over capacity. As shown in Figure 1-9, statewide in 2011, 9 percent of all state routes were over capacity and 5 percent were approaching capacity. In 2035, the number of all state routes over capacity is expected to grow to 18 percent.

Figures 1-10 and 1-11 show the capacity status in 2011 and the projected capacity status in 2035 of Connecticut's NHS expressway and NHS non-expressway segments. In 2011, 18 percent of Connecticut's NHS expressways, 20 percent of the state's NHS non-expressways and 6 percent of Connecticut's non-NHS state routes were over capacity and, respectively, another 11 percent, 7 percent and 3 percent of these facilities were approaching capacity. With the current funding and resources available, the portions of Connecticut's NHS and non-NHS routes that are over capacity due to congestion will continue to grow. Within the next 20 years, if the present patterns of demography and behavior continue and there is little change in the factors affecting goods movement, it is likely that the number of transportation corridors experiencing congestion will continue to increase. By the year 2035, it is projected that 40 percent of the NHS expressways, 32 percent of the state's NHS non-expressways, and 11 percent of Connecticut's non-NHS state routes will be over capacity and 8 percent, 9 percent, and 4 percent, respectively, of the aforementioned systems will be approaching capacity.

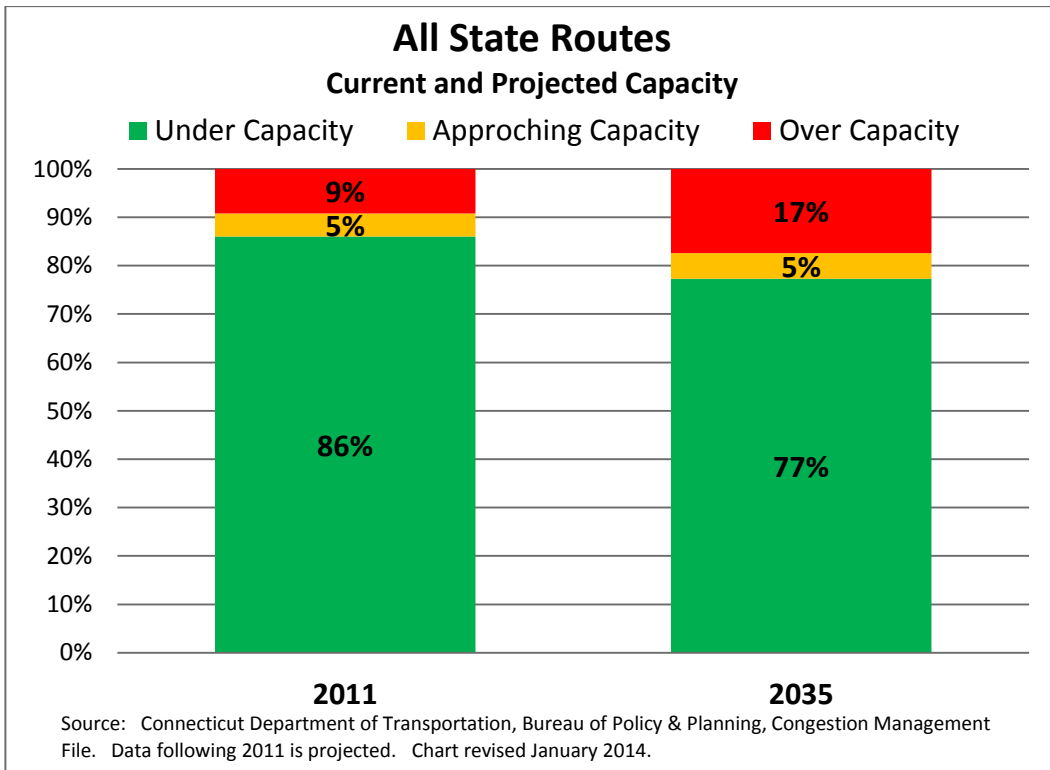
Table 1-5 presents the current (2011) and the projected (2035) capacity status of state-numbered routes by planning region. Regionally, the percent of state-numbered route miles over capacity in 2011 ranged from highs of 30 percent (42.77 miles) and 28 percent (49.16 miles) in the Greater Bridgeport and South Western planning regions, respectively, to lows of less than 1 percent in the Northwestern, Litchfield Hills, CT River Estuary, Windham and Northeastern planning regions. In 2035, of the 3,746.50 miles of state-numbered routes in Connecticut, 199.04 miles (5 percent) will be approaching capacity and 652.37 miles (18 percent) will be over capacity. Forecasts show that in 2035 state-numbered route miles over capacity will range from highs of 38 percent (54.24 miles) in the Greater Bridgeport planning region and 37 percent (65.84 miles) in the South Western planning region to lows of less than 1 percent in the Northwestern (0 miles) and Northeastern (2.33 miles) planning regions .

**Table 1.2. Capacity of All State Routes by Planning Region**

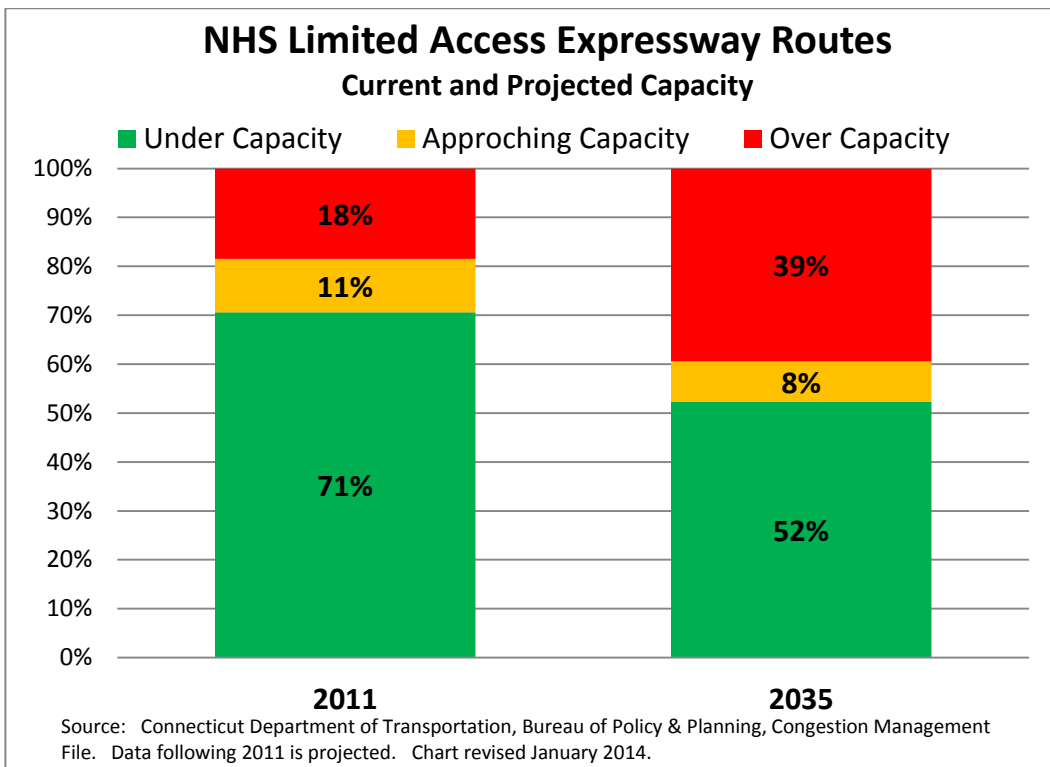
<b>2011</b>		Approaching Capacity		Over Capacity		<b>2035</b>		Approaching Capacity		Over Capacity	
Planning Region	Total Miles of State Routes	Miles	Percent	Miles	Percent	Planning Region	Total Miles of State Routes	Miles	Percent	Miles	Percent
South Western	178.69	15.45	9%	49.16	28%	South Western	178.69	12.17	7%	65.84	37%
Housatonic Valley	216.81	19.43	9%	16.38	8%	Housatonic Valley	216.81	19.78	9%	28.90	13%
Northwestern	183.91	0.00	0%	0	0%	Northwestern	183.91	0.00	0%	0.00	0%
Litchfield Hills	252.18	0.87	0%	0.4	0%	Litchfield Hills	252.18	3.87	2%	5.56	2%
Central Naugatuck Valley	248.10	10.52	4%	17.33	7%	Central Naugatuck Valley	248.10	20.35	8%	39.00	16%
Greater Bridgeport	65.15	5.23	8%	17.69	27%	Greater Bridgeport	65.15	3.89	6%	22.52	35%
South Central	144.01	15.29	11%	42.77	30%	South Central	144.01	12.56	9%	54.24	38%
Central	384.58	37.07	10%	55.74	14%	Central	384.58	24.06	6%	91.56	24%
Capitol	143.79	12.72	9%	14.69	10%	Capitol	143.79	12.28	9%	45.84	32%
Midstate	670.71	46.65	7%	98.42	15%	Midstate	670.71	53.28	8%	200.44	30%
Ct River Estuary	172.60	6.15	4%	16.13	9%	Ct River Estuary	172.60	9.14	5%	29.78	17%
Southeastern	140.91	0.88	1%	0	0%	Southeastern	140.91	4.67	3%	12.65	9%
Windham	464.81	8.25	2%	10.96	2%	Windham	475.19	17.88	4%	43.44	9%
Northeastern	201.73	0.71	0%	1.51	1%	Northeastern	201.73	4.77	2%	10.27	5%
State Total	268.14	0.49	0%	1.64	1%	State Total	268.14	0.34	0%	2.33	1%
	3736.12	179.71	5%	342.82	9%		3746.50	199.04	5%	652.37	17%

Source: CTDOT Bureau of Policy & Planning, Congestion Management File. Graphic revised as of January 2014. Percentages are rounded up or down to nearest whole number.

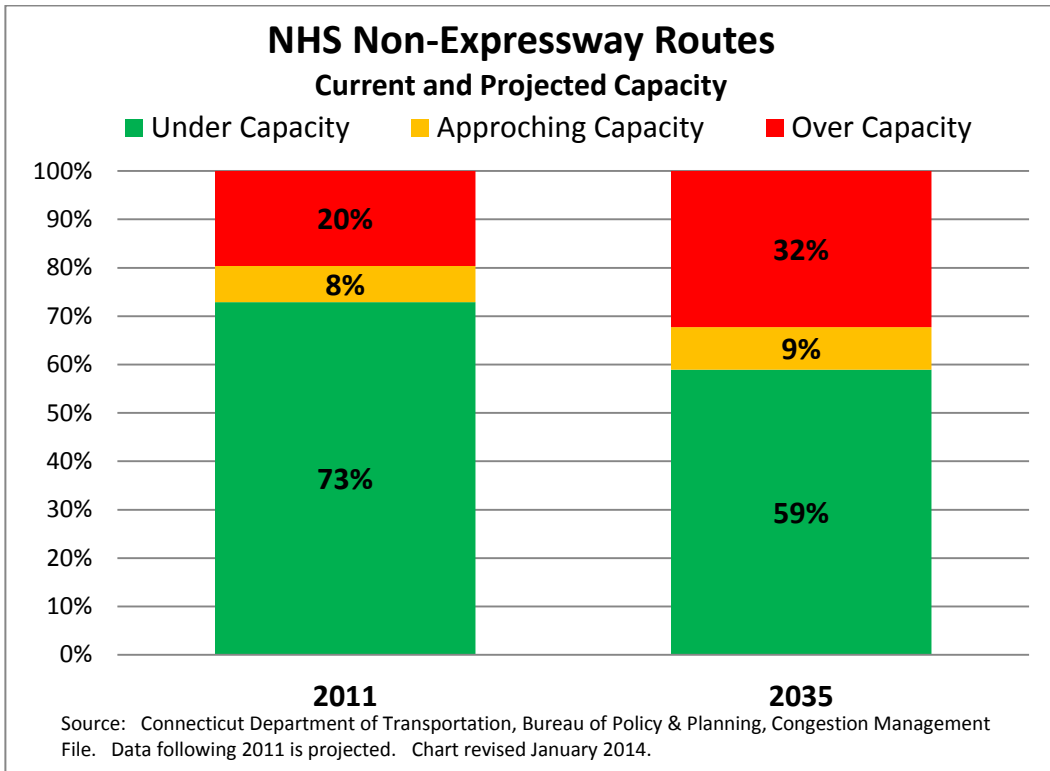
**Figure 1-9. Capacity Status - All State Highways & Routes**



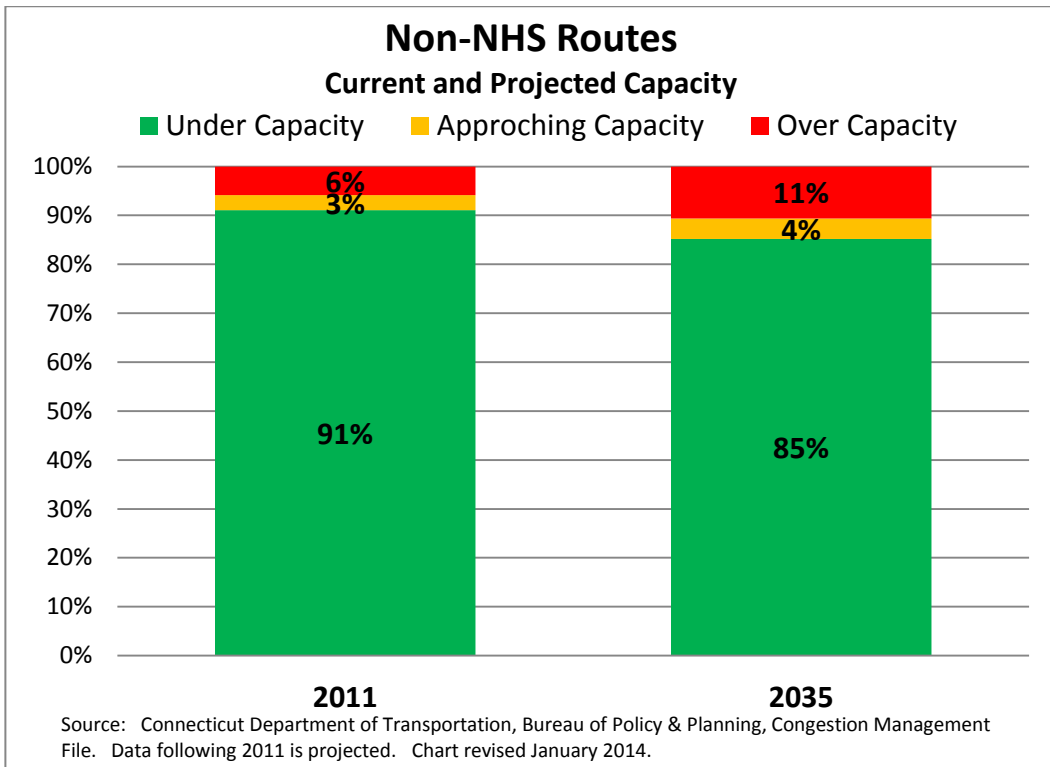
**Figure 1-10. Capacity Status – NHS Limited Access Expressway Routes**



**Figure 1-11. Capacity Status - NHS Non-Expressway Routes**



**Figure 1-12. Capacity Status – Non-NHS Routes**



## 2 BRIDGES



CTDOT's Bureau of Engineering and Construction is responsible for ensuring the safety of the traveling public and protecting the state's capital investment in highway bridges. CTDOT inspects, evaluates, and inventories the structural condition, strength, and functional capacity of several thousand structures. Table 2-1 provides a summary of the bridge inventory maintained by the Bridge Safety and Evaluation (BSE) Section.

**Table 2-1. Connecticut Bridge Inventory**

	Listed on National Bridge Inventory	Not Listed on National Bridge Inventory	Total	CTDOT Responsible for Maintenance
<b>Highway Bridges</b>				
<b>State</b>	2,813	1,020	3,833	3,833
<b>Local</b>	1,251	1	1,252	0
<b>Adopted</b>	55	3	58	58
<b>Orphaned</b>	79	2	81	81
<b>DEEP Bridges</b>	13	0	13	0
<b>Private</b>	4	5	9	0
<b>Other Structures</b>				
<b>Tunnels</b>	1	0	1	1
<b>Buildings over Roadways</b>	3	0	3	0
<b>Pedestrian Bridges</b>	23	5	28	17
<b>Railroad Bridges – Private*</b>	1	0	1	0
<b>Total</b>	4,243	1,036	5,279	3,990

Source: CTDOT Bureau of Engineering & Construction. Graphic revised in December 2013. Data current as of April 2, 2013.

Special Notes: Orphaned bridges are bridges over a railroad that support a municipal road and whose ownership is unknown. CTDOT is responsible for maintenance of structural components only. Adopted bridges were originally orphaned bridges but the State has subsequently taken responsibility for their maintenance.

\* Information on State-inspected and State-maintained railroad bridges is included in Chapter 5, Rail Services and Facilities.

## 2.1 Bridge Inspections

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All structures are inspected utilizing in-house or consultant services. The primary goal of the inspection program is to identify deficiencies and recommend repairs, rehabilitation, or replacement in a timely manner, to ensure the safety of the traveling public.

The frequency of inspection is every two years. However, structures that are in poor condition can be inspected as frequently as every month.

All bridges, whether state or town-maintained, having spans greater than 20 feet are included in the National Bridge Inventory (NBI). The Department reports on the condition of the NBI to the Federal Highway Administration (FHWA) on an annual basis. The federal funding that CTDOT receives annually is predicated on the NBI and the condition of the bridges contained therein.

**Figure 2-1. Underbridge Bridge Inspection Equipment**



## 2.2 Bridge Ratings

Bridges are primarily rated by structural condition and strength. Rating a bridge's structural condition involves careful inspection and evaluation of the three main components: (1) deck and riding surface; (2) superstructure (structural supports beneath the deck); and (3) the substructure (piers and abutments).

Each of the three major components is comprised of a number of sub-elements. The evaluation of the sub-elements results in a numerical rating from zero (failed condition) to nine (excellent condition). The lowest rating among the three main components becomes the bridge's overall rating. Table 2-2 shows the Structural Condition Ratings used for bridges. Table 2-3 provides a detailed summary of bridge condition ratings by planning region.

Railroad bridges are only rated for structural condition and strength. To read more about railroad bridges refer to Chapter 5 Rail Services & Facilities.

**Table 2-2. Structural Condition Ratings for Bridges**

Classification	Rating	Condition	Classification
Excellent			
	9	Excellent:	New
Good			
	8	Very good:	No problems noted
	7	Good:	Some minor problems
Fair			
	6	Satisfactory:	Structural elements show some minor deterioration
	5	Fair:	All primary structural elements are sound, but may have minor section loss, cracking, spalling or scour
Poor			
	4	Poor:	Advanced section loss, deterioration, spalling or scour
	3	Serious:	Losses of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present
	2	Critical:	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken
	1	Imminent failure:	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put back in light service
	0	Failed:	Out of service-beyond corrective action
Source: CTDOT Bureau of Engineering & Construction. Information in table is current as of December 2013.			



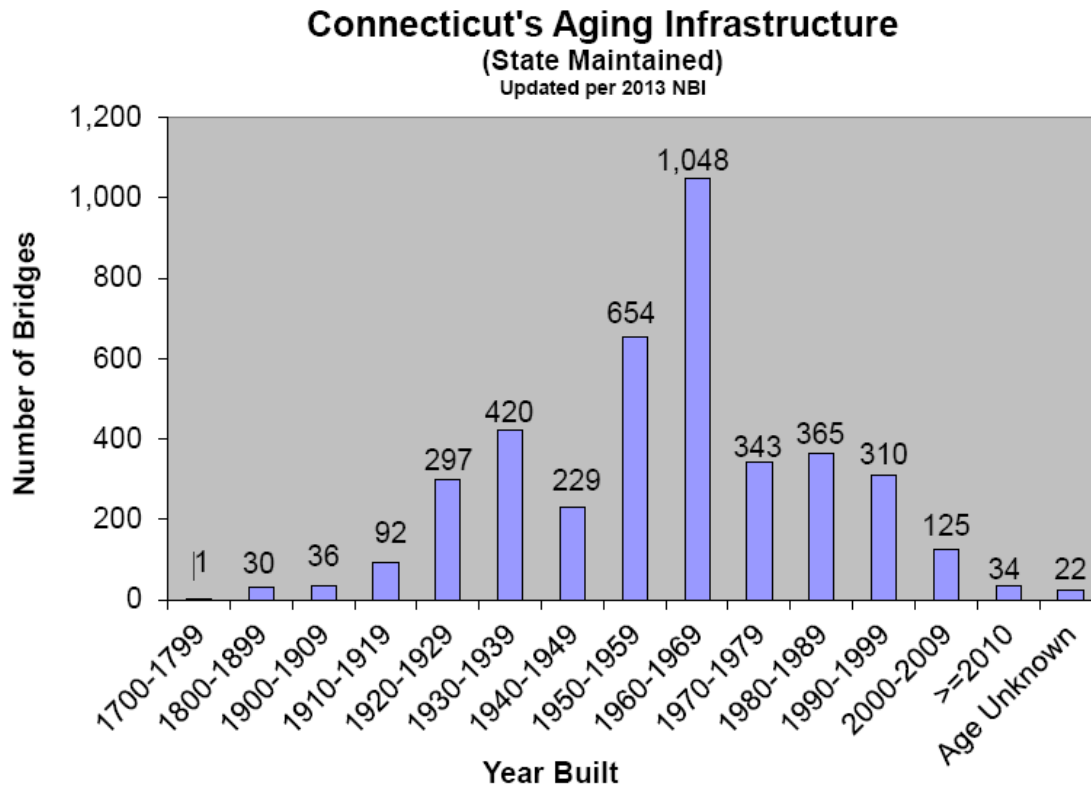
**Table 2-3. Bridge Condition Ratings (Good, Fair, Poor) by Planning Region**

	South Western	Housatonic Valley	Northwestern	Litchfield Hills	Central Naugatuck	Valley	Greater Bridgeport	South Central	Central	Capitol	Midstate	Ct River Estuary	Southeastern	Windham	Northeastern	Unaffiliated	Grand Total
<b>Bridges Listed on National Bridge Inventory</b>																	
<b>STATE</b>																	
Good	36	46	24	38	53	11	67	134	38	202	31	48	70	29	53	3	883
Fair	140	98	32	64	158	40	136	235	113	322	79	47	184	41	78	8	1775
Poor	32	10	2	4	20	6	11	26	14	38	11	7	29	7	6	-	223
State Bridges, NBI Subtotal	208	154	58	106	231	57	214	395	165	562	121	102	283	77	137	11	2881
(Load Posted)	-	-	1	-	-	-	-	-	-	1	1	-	-	1	1	-	5
<b>LOCAL</b>																	
Good	17	36	21	44	38	6	11	63	27	87	25	20	30	27	30	2	484
Fair	65	43	24	43	48	7	23	70	35	74	15	17	28	36	48	11	587
Poor	27	11	7	13	12	2	14	17	16	22	7	6	14	5	6	1	180
Local Bridges, NBI Subtotal	109	90	52	100	98	15	48	150	78	183	47	43	72	68	84	14	1251
(Load Posted)	10	6	3	2	2	-	4	4	1	8	2	4	1	4	7	1	59
<b>ORPHAN</b>																	
Good	-	9	-	-	-	-	-	13	6	3	-	5	8	-	1	-	45
Fair	-	6	-	-	-	-	-	15	4	2	-	-	5	-	-	-	32
Poor	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	2
Orphan Bridges, NBI Subtotal	0	15	0	0	0	0	0	29	10	5	0	5	14	0	1	0	79
(Load Posted)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
<b>Bridges, NBI Total</b>	<b>317</b>	<b>259</b>	<b>110</b>	<b>206</b>	<b>329</b>	<b>72</b>	<b>262</b>	<b>574</b>	<b>253</b>	<b>750</b>	<b>168</b>	<b>150</b>	<b>369</b>	<b>145</b>	<b>222</b>	<b>25</b>	<b>4211</b>
<b>State-Maintained Bridges Not Listed on National Bridge Inventory (State, Adopted, Orphan)</b>																	
Good	4	23	14	35	24	2	3	30	8	56	22	13	31	9	26	-	300
Fair	34	36	49	52	46	18	22	46	16	86	38	22	59	36	37	9	606
Poor	8	6	3	6	8	1	9	10	1	7	17	11	22	2	8	0	119
<b>State Bridges, Non-NBI Total</b>	<b>46</b>	<b>65</b>	<b>66</b>	<b>93</b>	<b>78</b>	<b>21</b>	<b>34</b>	<b>86</b>	<b>25</b>	<b>149</b>	<b>77</b>	<b>46</b>	<b>112</b>	<b>47</b>	<b>71</b>	<b>9</b>	<b>1025</b>
<b>All Bridges</b>																	
Good	57	114	59	117	115	19	81	240	79	348	78	86	139	65	110	5	1712
Fair	239	183	105	159	252	65	181	366	168	484	132	86	276	113	163	28	3000
Poor	67	27	12	23	40	9	34	54	31	67	35	24	66	14	20	1	524
<b>Grand Total</b>	<b>363</b>	<b>324</b>	<b>176</b>	<b>299</b>	<b>407</b>	<b>93</b>	<b>296</b>	<b>660</b>	<b>278</b>	<b>899</b>	<b>245</b>	<b>196</b>	<b>481</b>	<b>192</b>	<b>293</b>	<b>34</b>	<b>5236</b>
<b>(Load Posted)</b>	<b>10</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>-</b>	<b>4</b>	<b>4</b>	<b>1</b>	<b>9</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>5</b>	<b>8</b>	<b>1</b>	<b>64</b>
Source: CTDOT Bureau of Engineering & Construction. Data is current as of April 2, 2013. Graphic was revised in December 2013.																	
Special Notes: Orphan bridges are bridges over a railroad that support a municipal road and whose ownership is unknown. CTDOT is responsible for maintenance of structural components only. Adopted bridges were originally orphan bridges but the State has subsequently taken responsibility for their maintenance. Adopted and DEP bridges are included with State Bridge calculations. Private and pedestrian bridges are not included in calculations.																	

## 2.3 Factors Affecting the Condition of Bridges

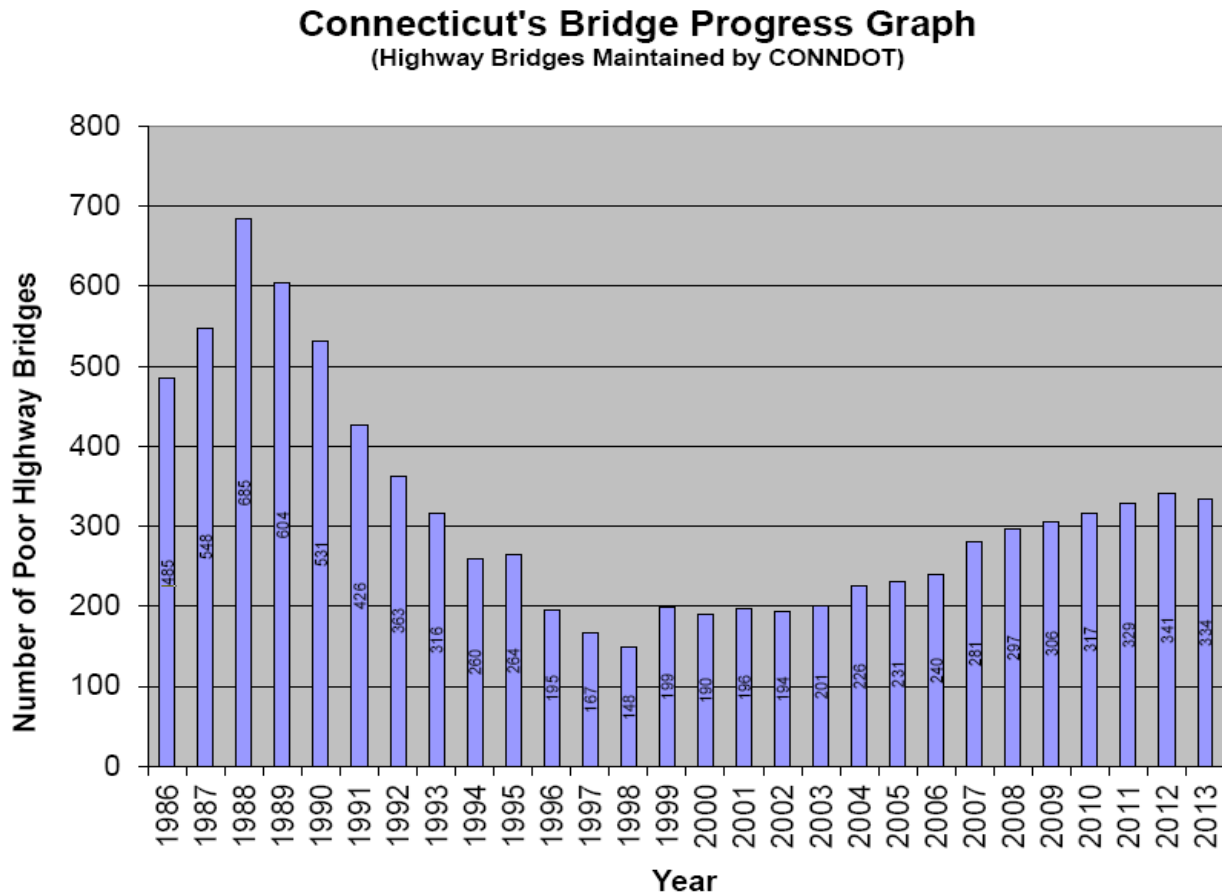
The primary reasons bridges deteriorate are age, weather, loads, volume of traffic, and deicing operations. As bridges deteriorate, their condition ratings gradually decline to a poor rating. Preventative maintenance can extend the useful life of a structure substantially; however, at some point a major rehabilitation or replacement will ultimately be required.

Figure 2-2. Age Distribution of CTDOT Maintained Bridges



When a structure receives its initial poor rating, the bridge is identified as a candidate for major rehabilitation or replacement. Steps are taken to ensure that the bridge is programmed for rehabilitation or replacement. Very often, this takes several years because of environmental, right-of-way, and traffic-related concerns that must be addressed before construction can commence. Experience has shown that it is necessary to initiate this process when the first poor rating is identified in order to provide sufficient time for design and construction.

Figure 2-3. Number of CTDOT Poor Bridges



## 2.4 Railroad Bridges

Information on State-inspected and State-maintained railroad bridges is included in Chapter 5 Rail Services and Facilities.

## 2.5 Local (Town) Highway Bridges

The Bridge Safety and Evaluation Section also inspects all town-maintained bridges that have spans greater than 20 feet. In other words, the Department inspects all bridges contained on the National Bridge Inventory. However, repairs, maintenance, rehabilitation, and replacement of these town-maintained structures are the responsibility of the respective municipalities. An overview of the condition of local bridges by planning region is presented in Table 2-3.

## 3 BIKEWAYS, WALKWAYS, AND TRAILS

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Non-motorized facilities are an integral part of the Connecticut transportation system. The Connecticut Department of Transportation (CTDOT) values the benefits that non-motorized facilities bring to our transportation system, including transportation system and demand management, increased health and livability for our constituents and communities, economic vitality, connection to transit and opportunities for transportation equity for our constituents regardless of age, ability and socioeconomic status. It is our aim to consider the needs of all users in every project and to that end we have developed and continue to develop policies and guidance that support the construction of infrastructure and programs which support non-motorized modes of travel.

For these reasons policies have been enacted, both at the State and Federal level that support the inclusion of non-motorized modes in the planning, design, construction and maintenance of public transportation facilities. The state tracks our progress toward a more “complete” state transportation network. The Department exhibits new and improved facilities each year. While we believe that the demand is gaining strength; the state would benefit from a larger data collection effort. Providing transportation for all modes is routine, however it is also an area of focus for several specific programs as well.

It is through these actions that the Department encourages, and promotes bicycling and walking throughout Connecticut by providing for the safe, convenient and enjoyable use of these modes of transportation. This is the vision laid out in the 2009 Connecticut Statewide Bicycle and Pedestrian Transportation Plan (2009), which is discussed later in this chapter. Further, “Any person will be able to walk, bicycle, or use other types of non-motorized transportation modes safely and conveniently throughout the State. A network of on-road facilities and multiuse trails will connect towns, regions and Connecticut to neighboring states. Specifically, residential areas, employment centers, recreation and cultural attractions and schools will accommodate the walking and bicycling needs of users, both within the development and to nearby destinations.”

### 3.1 Federal Policy & Goals

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MAP-21 legislation was passed in 2012. This transportation bill consisted of a two year spending authorization. In brief, this law consolidated previous programs that funded transportation alternatives (Transportation Enhancement Program, Safe Routes to School, Recreational Trails Program and other discretionary spending programs), into the Transportation Alternatives Program (TAP). Additionally, Safe Routes to School, and the program’s coordinator, are no longer a mandated expenditure. The Recreational Trails Program, run by the CT Department of Energy and Environmental Protection (DEEP) continues to receive federal funding a TAP program suballocation.

There were also several programmatic changes. CTDOT is no longer an eligible entity; which makes CTDOT incapable of being the project sponsor for TAP projects. The allocation of money is now based on population, which has greatly decreased the amount allocated to our rural regions. The eligible project criteria changed to focus more on bicycling and walking and allowing the use of TAP funds for highway to boulevard conversion, environmental mitigation. The Recreational Trails Program and the Safe Routes to School program are optional under MAP-21. Finally, the TAP funds may also be transferred out of the program completely, further jeopardizing non-motorized transportation initiatives; however the Department is continuing its commitment to the TAP program.

With a smaller pot of money, the Department has funded the Metropolitan & Rural Transportation Planning Organizations (MPOs/RTPOs) projects based on their prioritization and feasibility, ensuring that each region would be able to complete a project in the budgeted time period. The Department has made considerable investment in trails to bolster the decline in funding, as documented in the Statewide Multi-Use Trail Vision (2012). We have also taken on several trail projects where the Department's expertise in engineering and our land holdings make us the most reasonable project sponsor. Some of these accomplishments will be highlighted in a subsequent section.

While other federal programs such as CMAQ, HSIP and FTA are potential funding sources; non-motorized projects have not historically competed well for these funds. As competition for funds increases, non-motorized projects will need to be innovative with respect to funding. Documentation of demand and safety need will be heightened as these projects compete with traditional transportation projects.

The United States Department of Transportation (USDOT) "Complete Streets Policy" statement on bicycle and pedestrian accommodation regulations and recommendations, signed on March 11, 2010 reflects the Department's support for the development of fully integrated active transportation networks, particularly the establishment of well-connected walking and bicycling networks. The USDOT policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. Every transportation agency, including USDOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems.

In support of this commitment, transportation agencies and local communities should go beyond minimum design standards and requirements to create safe, attractive, sustainable, accessible, and convenient bicycling and walking networks. Such actions should include:

- Considering walking and bicycling as equal with other transportation modes;
- Ensuring that there are transportation choices for people of all ages and abilities, especially children;
- Going beyond minimum design standards:
- Integrating bicycle and pedestrian accommodation on new, rehabilitated, and limited-access bridges;
- Collecting data on walking and biking trips;
- Setting mode share targets for walking and bicycling and tracking them over time;
- Removing snow from sidewalks and shared-use paths;
- Improving non-motorized facilities during maintenance projects.

To implement provisions of this legislation, FHWA developed a new policy that places increased emphasis on bicycling and pedestrian modes of transportation. FHWA has adopted the goal of doubling the percentages of transportation trips made by bicycling and walking. The [2012 American Community Survey Questionnaire, conducted by the U.S. Census Bureau](#), shows that nationwide 2.8 percent of trips to work were made by walking and 0.6 percent were made by biking. In Connecticut the numbers are estimated at 2.9 percent walking and 0.3 percent biking. Nationwide surveys also found that almost 50 percent of all trips are less than three miles in length. Given that three miles is well within the range of bicyclists, if not walkers, there appears to be a significant number of trips that could be switched from the automobile to non-motorized modes of travel.

In addition to its goal to double the percentage of trips made by bicycling and walking, FHWA has also adopted the goal of reducing by ten percent, the number of injuries and fatalities to bicyclists and pedestrians nationwide.

FHWA reported that, in 2008 in the U.S., 4,378 pedestrians and 716 bicyclists were killed in accidents involving motor vehicles and an estimated 69,000 pedestrians and 52,000 bicyclists were injured.

In 2011 in Connecticut, 26 pedestrians and 8 bicyclists were killed and 662 pedestrians and 405 bicyclists were seriously or severely injured in accidents involving motor vehicles. It should be noted that more than half of all the bicycle and pedestrian crashes occurred in the seven most populated towns: Bridgeport, Hartford, New Haven, Stamford, Waterbury, Norwalk, and New Britain. To strive to meet FHWA's goal of reducing injuries and fatalities by ten percent, CTDOT has distributed safety-related materials, including recorded public service announcements, to schools and police departments located throughout the State of Connecticut.

## 3.2 State Policy & Goals

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The State of Connecticut has several key pieces of legislation that have contributed to our success in non-motorized transportation.

### ***Public Act 09-154 - An Act Improving Bicycle and Pedestrian Access***

This law, enacted in 2009, is also referred to as the “Complete Streets Law”. Its most powerful language states: “Accommodations for all users shall be a routine part of the planning, design, construction and operating activities of all highways, as defined in section 14-1 of the general statutes, in this state.” This represents some of the strongest Complete Streets language in the country according to Smart Growth America’s “Complete Streets policy analysis 2011” report (<http://www.smartgrowthamerica.org/documents/cs/resources/cs-policyanalysis.pdf>). The law also says “From funds received by the department or any municipality for the construction, restoration, rehabilitation or relocation of highways, roads or streets, a reasonable amount shall be expended to provide facilities for all users, including, but not limited to, bikeways and sidewalks with appropriate curb cuts and ramps.” Additionally CTDOT was mandated to report what amount was spent on bicycle and pedestrian accommodation, and that this amount would not equal less than 1% of the total amount of any funds received in any fiscal year. In 2013, 4.78% of the total funds awarded for the construction, maintenance and repair of roads in the state were spent on elements of projects that improve accessibility for pedestrians and bicyclists. This amounted to \$14,345,529.70 of the \$300,086,493.49 annual budget.

Public Act 09-154 also included a provision for the establishment of the Connecticut Bike and Pedestrian Advisory Board. This diverse group of constituents is appointed by the Governor and the Legislature to report on the actions of the State with respect to our accommodation of non-motorized users. More can be found regarding this group at: <http://www.ctbikepedboard.org/>

### ***Public Act 08-101- Share the Road Campaign***

In October 2008, the Connecticut State legislature passed Public Act 08-101, commonly known as the “3-Foot Passing Law.” The law requires motorists overtaking and passing bicycles to allow at least 3 feet of room. The law also contained a provision requiring CTDOT to design and implement a “Share the Road” campaign designed to make motorists aware of the new law and of the vulnerability of cyclists as road users.

## **Public Act 14-31 - An Act Concerning the Penalty for Causing Harm to a Vulnerable User of a Public Way**

Effective October 1, 2014, An person operating a motor vehicle on a public way who fails to exercise reasonable care and causes the serious physical injury or death of a vulnerable user of a public way, provided such vulnerable user has shown reasonable care in such user's use of the public way, shall be fined not more than one thousand dollars.

**Figure 3-1. Share the road**



Radio ads were created and airtime was purchased on a number of radio stations in the Capitol region to broadcast the ads, typically during traffic condition reports. In addition, a new “Share the Road” website ([www.sharetheroadct.org](http://www.sharetheroadct.org)) was created to provide information on sharing the road safely to motorists, cyclists, pedestrians and equestrians. The website was designed to attract and count visitors, and determine which of the different media elements was most effective in promoting the campaign message. While the campaign is over, the Share the Road website and Facebook page are still active and providing information to constituents.

In addition to legislation, several CTDOT policies have recently been established. Eleven foot lane widths are now the standard for travel lanes on most state roads. This allows a wider shoulder available to cyclists, with very little added expense. Federally and state funded sidewalk-only projects are now permitted, and are financed with the same local cost sharing as other eligible projects for that funding source. This is a departure from the previous process in which the local municipality had to pay the State and Local share of sidewalk projects.

Additionally, there is greater flexibility being demonstrated within the Department. While formal CTDOT Complete Streets Guidance is still forth coming, bike lanes and sharrows (a shared lane marking) are being approved for use in projects. Traffic signals are being reworked to accommodate cyclists and pedestrians more fully. CTDOT and DEEP are collaborating to provide recreational and transportation connections and to provide project efficiencies. Formal and comprehensive guidance is still necessary, but the Department is making important progress in refocusing on a more holistic way of providing transportation for all.

### **3.3 Facilities**

CTDOT's commitment to bicycling and walking is paying off. The Department has steadily climbed the League of American Cyclists' Bike Friendly States rankings (<http://www.bikeleague.org/content/states>) over the past several years. In 2008 41 states outranked Connecticut but by 2013 we held the 21<sup>st</sup> ranking. This national survey ranks the states on five core areas including Legislation & Enforcement, Policies & Programs, Infrastructure & Funding, Education & Encouragement, and Evaluation & Planning. It should be noted that the ranking now includes walking in addition to biking modes.

The State of Connecticut boasts close to 300 miles of multi-use trails and while they are not all the direct result of the CTDOT, the Department is a major player in trail development. In 2012 CTDOT in cooperation with the DEEP published the “Statewide Multi-Use Trail Vision” which cataloged major trails and identified gaps. This document sets priorities for a 5 year plan to close critical gaps on the East Coast Greenway, which forms the backbone of our trail network. This vision is comprised of \$70 million worth of trail investments and will rely upon bonding commission approval.

In addition to closing trail gaps along the East Coast Greenway CTDOT performed a signage project in FYs 2012 and 2013 to sign the route through Connecticut. This required municipal, DEEP and CTDOT cooperation in addition to coordination done with the East Coast Greenway Alliance. Connecticut is one of few states boasting signage.

**Figure 3-2. East Coast Greenway Pedestrian Bridge, Andover CT**



As new construction projects are designed, they now require the completion of a “Bicycle and Pedestrian Needs Assessment Form” in the Scoping phase. This form documents the designer’s effort to include non-motorized users in the design process as required in P.A. 09-154. This form continues to evolve to better aid designers. One stand out example of Complete Streets design at the Department has been the “road dieting” of Route 44 in East Hartford. This project reduces the auto lanes from four to two, providing formal parking, bus turn-outs and bike lanes. This project is indicative of the direction that the Department is headed in.

An American’s with Disabilities (ADA) Transition Plan (2011) is now underway and will bring many of our State highways up to ADA standards. This plan covers traffic signals, new construction and significant alterations to the highway. In addition to reviewing and revising our practices, the transition plan also documents compliance projects that focus on areas that require projects to specifically address ADA compliance. To that end \$500,000 will be spent annually for Fiscal years 2012-2016 to design and construct ADA compliance projects.

[http://www.ct.gov/dot/lib/dot/documents/ddbe/ADATransition\\_Plan\\_March\\_2011.pdf](http://www.ct.gov/dot/lib/dot/documents/ddbe/ADATransition_Plan_March_2011.pdf) once

### 3.4 Demand for and Use of Bikeways & Pedestrian Facilities

In recent years, more and more people have come to recognize the benefits and advantages of bicycling for health and recreation. At the same time, increases in fuel prices and traffic congestion have made bicycling an attractive alternative mode of transportation, especially for people who live within a limited distance from their work places. Public attitudes in support of recreation, physical fitness, energy conservation, and other environmental initiatives have contributed to the growth of bicycling. The [2011 Statewide Comprehensive Outdoor Recreation Plan](http://www.ct.gov/deep/lib/deep/outdoor_recreation/scorp/scorp_2011_webversion.pdf), which can be found on the Department of Energy and Environmental Protection’s website ([http://www.ct.gov/deep/lib/deep/outdoor\\_recreation/scorp/scorp\\_2011\\_webversion.pdf](http://www.ct.gov/deep/lib/deep/outdoor_recreation/scorp/scorp_2011_webversion.pdf)), listed



multi-use trails as the number 1 requested facility type. In addition, growing traffic volumes on local, as well as, State-maintained roads have helped to make bikeways, such as rails-to-trails, very popular among cyclists. CTDOT has collaborated with the Department of Energy and Environmental Protection (CTDEEP) and municipal planning organizations in the development of trails on abandoned railroad rights of way. As the public comes to appreciate the attractions and benefits of such trails, the demand grows for additional facilities. Further, with nationally-recognized Millennium Trails, such as the East Coast Greenway, passing through Connecticut, there is more incentive to complete existing corridors and create new ones.

The use of bikeways, walkways, and trails has increased within the past ten years and is likely to continue to increase in the future as various trail segments are connected. The success of the Farmington Canal Rail-Trail in Cheshire and Hamden and the Captain John Bissell Greenway and Charter Oak Greenway (the multi-use trails along I-84, I-291, and I-384 in East Hartford and Manchester) has served to increase the public's awareness of the potential of these facilities and their desire for safer accommodations on existing roadways. According to the Rails-to-Trails Conservancy, conversion of abandoned rail rights-of-way to multi-use trails is a growing trend and may be an important way for communities to provide auto-free pathways for transportation and recreation.

### 3.5 Safe Routes to School Program

The Safe Routes to School Program (SRTS) was established by SAFETEA-LU. The programs aim is to encourage more students in elementary and middle schools (grades K-8) to walk and bike to school, as an alternative to using other modes of transportation, thus promoting a healthier lifestyle. CTDOT received approximately \$13 million in total SRTS funding for federal fiscal years 2005 to 2012. Of the total funding received to date, over \$9 million in infrastructure funding has been awarded. The remainder of the funding has been programmed to provide for non-infrastructure related activities that assist eligible schools in planning for educational, encouragement, enforcement strategies for safe, active transportation to and from school, as well as evaluation of the success of these strategies.

Figure 3-4. Safe Routes to School



The SRTS program has an ongoing assistance program to help elementary and middle schools all over Connecticut plan for strategies in providing bicycle and pedestrian safety education, encouragement activities, and enforcement in school zones. The assistance program includes an engineering site assessment to recommend needed safety improvements around schools for pedestrians and cyclist. Additional information about the program can be found at [www.walkitbikeitct.org](http://www.walkitbikeitct.org).

The passage of the federal transportation bill, Moving Ahead for Progress in the 21st Century (MAP- 21), effective October 1, 2012, provided for the program to continue through federal fiscal years (FFY) 2013 and 2014, although set aside funding is no longer available for the program.

## 3.6 Other Activities

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### 3.6.1 Bike to Work

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Since 2000, CTDOT, in collaboration with the Capitol Region Council of Governments and later BikeWalkCT (2004), sponsored Bike to Work Days during the months of April through September. During these months, commuters who own bikes are encouraged to ride their bikes to work on the last Friday of the month to demonstrate the potential for cycling as a supplemental means of commuting to work. An advertising campaign features pre-ride breakfasts hosted by several towns as encouragement to participants.

In 2013, 687 participants, at 176 different employers, participated in the May 17<sup>th</sup> bike to work day. At CTDOT 26 participants logged over 229 miles. CTDOT also collaborated with CTRides to cross promote biking, transit, rideshare and other commuting options. For more information on this program, contact BikeWalkCT, <http://www.bikewalkct.org/bike-to-work.html>, and [www.ctrides.com](http://www.ctrides.com).

**Figure 3-3. Various Bicycle Accommodations**



### 3.6.2 Safety Fairs and Bicycle Rodeos

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CTDOT makes a variety of safety materials available at no cost, including safety brochures for cyclists and motorists, reflective safety stickers, and “Share the Road” bumper stickers. The Department tries to maintain a visible presence at health fairs and bicycle rodeos, which provide good opportunities to distribute these items and promote awareness of safety for cyclists and pedestrians.

### 3.6.3 2009 Statewide Bicycle and Pedestrian Plan

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In 2009 the Connecticut Department of Transportation (CTDOT) finalized a new Bicycle and Pedestrian Transportation plan to replace the existing plan, which was published in 1999. The Plan, funded by CTDOT and Federal Highway Administration, was prepared over an 18-month period by Fitzgerald & Halliday Inc., with assistance from Alta Transportation + Design and Didona Associates.

Development of the Plan was guided by a Steering Committee comprised of regional planning agency staff, bicycle advocates, public health and tourism officials and CT DOT staff. Numerous public meetings were held throughout the state during the fall of 2009 to get input on issues and receive feedback the draft plan.

The completed plan provides direction for developing policies and programs for non-motorized transportation – walking, bicycling and horse riding. The plan states that bicycling and walking have health and environmental benefits. It developed goals, strategies and implementation options to advance bicycling and walking, especially within projects and properties designed and maintained by CTDOT. Key goals of the Plan are:

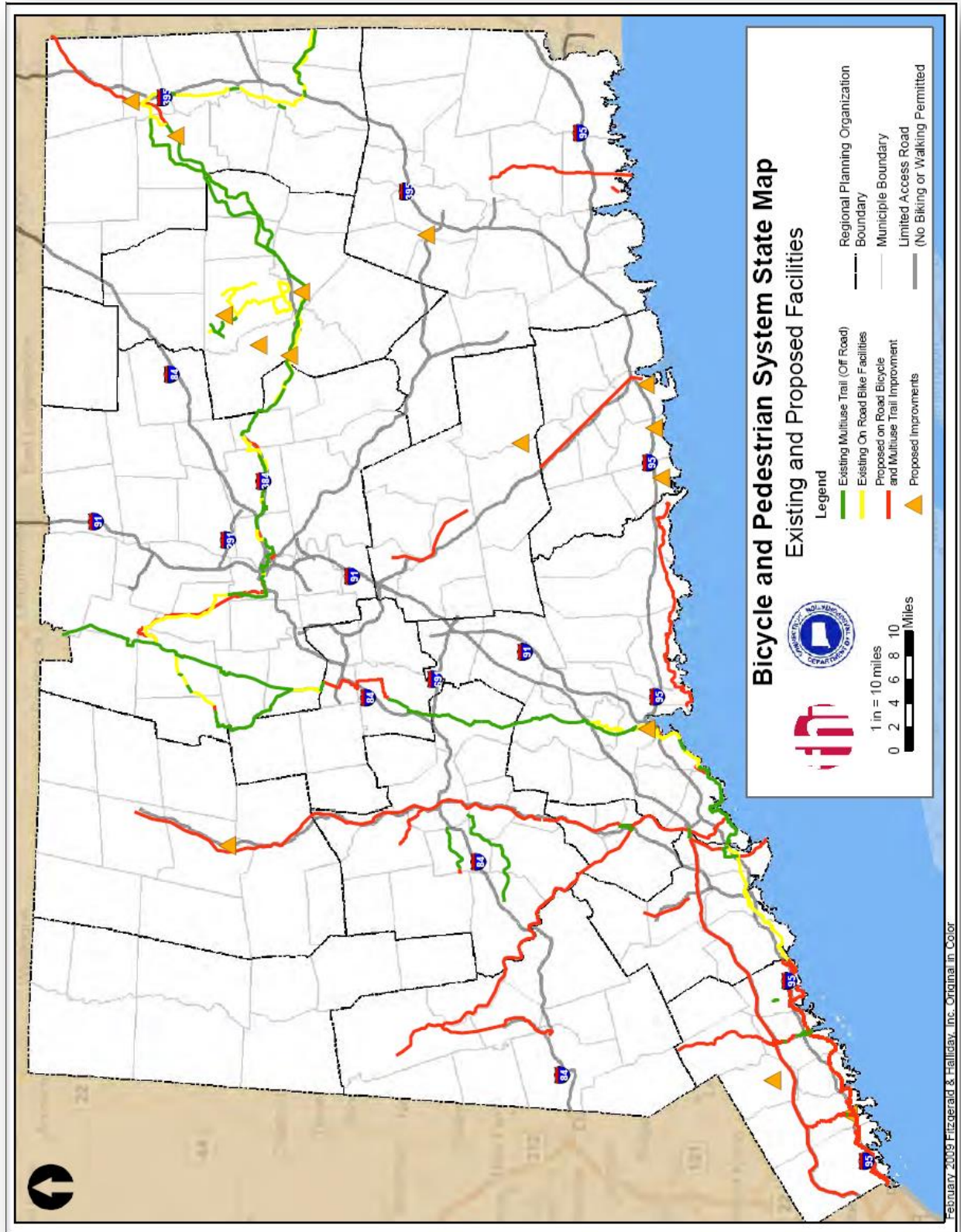
- Develop and maintain safe, convenient and comfortable facilities
- Connect pedestrians and bicycles to other modes of transportation – roads, rail and bus
- Improve connectivity between neighborhoods, commercial centers and employment
- Improve pedestrian and bicycle safety education
- Leverage funding opportunities by providing matching funds and technical support

A copy of the 2009 Statewide Bicycle and Pedestrian Plan is available on the Department's website at <http://www.ct.gov/dot/cwp/view.asp?a=3531&q=259656>.

The consultant was also tasked with creating a new statewide bicycle map to replace the existing map, which was printed in 2002. The new map incorporates a “suitability matrix” which uses color coding to indicate the suitability of state roads for cycling, based upon existing shoulder width and average daily traffic volume of cars and trucks. The Department's shift from recommending specific routes, as was done on the 2002 statewide bicycle map, to a suitability-based matrix, allows cyclists greater autonomy in their personal route choice and planning.

At the time of finalization of the plan and map, no funds were available to print the map in sufficient quantities to allow distribution. Therefore, every effort was made to create a host website for the map which would be user-friendly and meet the needs of cyclists. The map is presently hosted on-line at <http://www.ctbikemap.org/bikemap.html>.

Figure 3-5. Bicycle and Pedestrian Facilities Map (from 2009 Statewide Bicycle and Pedestrian Plan)



## 4 TRANSIT AND RIDESHARING

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CTDOT's Bureau of Public Transportation, through the Office of Transit and Ridesharing, oversees and financially supports bus and ridesharing services for the citizens of Connecticut. The Department directly and indirectly provides urban fixed-route bus services, Americans with Disabilities Act (ADA) paratransit services, non-ADA paratransit services (dial-a-ride), commuter express bus services, rural transit services, rail-bus Commuter Connection services, and ridesharing and transportation demand management services via Connecticut Transit (CTTRANSIT), the State-owned and controlled bus operation, and 14 active local transit districts, private bus operators, and a transportation demand management contractor.

In state fiscal year 2013, urban fixed-route bus systems provided more than 38.7 million passenger trips; about 77 percent of those trips were provided in the eight CTTRANSIT service areas. More than 889,000 trips were provided on the federally mandated ADA paratransit services for the disabled. Dial-a-ride services transported more than 103,000 passengers. Rural services provided 439,000 trips. Commuter express services provided more than 1.45 million passenger trips.

CTDOT provides funding to cover the vast majority of the operating deficits of all the bus services. CTDOT provides the non-federal share of federal capital grants for construction and rehabilitation of maintenance facilities, purchase of rolling stock, and certain other miscellaneous capital items.

CTDOT is the designated recipient of Connecticut's share of the Federal Transit Administration (FTA) Section 5309 Capital Funding Program and Section 5311 Non-urbanized Area program. CTDOT is a designated recipient of funds from the FTA Section 5307 Urbanized Area Program. CTDOT uses the FTA funds and state bond funds to make capital infrastructure improvements and to acquire rolling stock. CTDOT is a designated recipient for Section 5316 (Job Access and Reverse Commute), Section 5317 (New Freedom Initiative), Section 5310 (Enhanced Mobility for Seniors and Persons with Disabilities), and Section 5340 (Growing States and High-Density States) funding.

### 4.1 Bus Transit Services

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CTDOT owns the urban fixed-route bus systems in the Hartford, New Haven, Stamford, Waterbury, New Britain, Bristol, Meriden, and Wallingford urban areas. These services are operated by private contractors under the CTTRANSIT brand name. Information on all CTTRANSIT-branded services can be found on the system website at [www.CTTRANSIT.com](http://www.CTTRANSIT.com).

The Department is in the process of establishing dedicated Bus Rapid Transit (BRT) service along a 9.4-mile fixed guideway corridor between downtown New Britain and downtown Hartford. This service, now branded as CTfastrak, which is scheduled to commence on March 28, 2015, will provide more competitive travel times when compared to automobiles and buses traveling on the regular roadway network. In addition to being more time efficient, this BRT service is being designed to permit bus access at intermediate points so that circulator routes can readily serve surrounding neighborhoods and then enter the guideway, thus providing a one-seat ride. Additional information on CTfastrak is provided in the "Bus Transit System Assets" section of this document or at [www.ctfastrak.com](http://www.ctfastrak.com).

Commuter express service between Hartford and more than 20 surrounding towns is provided by both CTTRANSIT and private operators under contract to CTDOT. Links to route maps and schedules for all Hartford area commuter express buses, including those operated by private

operators, are provided on the “Commuter Express” page on the CTTRANSIT website ([www.CTTRANSIT.com](http://www.CTTRANSIT.com)).

Commuter express service between Stamford, CT and White Plains, NY is provided by the I-BUS, operated by CTTRANSIT. Information on the I-BUS can be obtained on the website at [www.CTTRANSIT.com](http://www.CTTRANSIT.com) or by calling CTTRANSIT at (203) 327-7433 or toll free in area codes 914 & 203: (888) BUS-RIDE.

In addition to the CTTRANSIT fixed route and express bus services, the following 15 transit districts operate urban, rural, and ADA paratransit services in the state:

1. Estuary Transit District,
2. Greater Bridgeport Transit Authority,
3. Greater Hartford Transit District (GHTD),
4. Greater New Haven Transit District (GNHTD),
5. Greater Waterbury Transit district (GWTD),
6. Housatonic Area Regional Transit District (HART),
7. Meriden Transit District, (express bus through a contractor),,
8. Middletown Area Transit(MAT),
9. Milford Transit District,
10. Northeastern Connecticut Transit District,
11. Northwestern Connecticut Transit District,
12. Norwalk Transit District,
13. Southeast Area Transit District (SEAT),
14. Valley Transit District, ), and
15. Windham Transit District.

The Central Connecticut Regional Planning Agency (CCRPA) provides oversight and administrative services to support operation of the ADA paratransit services in their area (the major New Britain, Bristol and Plainville areas).

Additional information on the CTTRANSIT bus services and the public bus services in Connecticut operated by the transit districts is provided below, and on the Department’s website, [www.ct.gov/dot](http://www.ct.gov/dot), which includes links to “Travel Information” and to an interactive “CT Travel Info Map” with links to public transportation service providers and a trip planning function. Links to information on public bus services by town, as well as ridesharing options, are provided at [www.ctrides.com](http://www.ctrides.com).

#### **4.1.1 CTTRANSIT**

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CTTRANSIT ([www.CTTRANSIT.com](http://www.CTTRANSIT.com)), the state-owned bus service, is the largest bus operation in Connecticut. There are eight divisions serving different areas of the state. Check [www.CTTRANSIT.com](http://www.CTTRANSIT.com) for specific route information. The Hartford, New Haven and Stamford divisions are operated by First Transit, Inc.

##### ***The CTTRANSIT Hartford Division***

The Hartford Division operates over 30 local and 12 express bus routes. Local routes operate 7 days a week and serve 26 towns in the Capital Region. CTTRANSIT's Hartford Division makes connections with Middletown Area Transit, and the CTTRANSIT New Britain division.

### ***CTTRANSIT New Haven Division***

The New Haven Division operates 7 days a week over 22 local routes, connecting with other state-owned or subsidized bus services in Meriden, Wallingford, Milford, Madison and the lower Naugatuck Valley areas, as well as with the New Haven Line and Shore Line East rail services.

### ***CTTRANSIT Stamford Division***

The Stamford Division operates 15 local bus routes 7 days a week. CTTRANSIT Stamford buses connect with other state-subsidized services in Norwalk, with the New Haven Line in several locations, the Harlem Line on Metro-North Railroad, and with Bee-Line buses in Westchester County New York. The Stamford Division also operates the I-BUS, an express service between downtown Stamford and White Plains, New York.

### ***CTTRANSIT Waterbury Division***

The Waterbury Division operates fixed route, ADA paratransit services and Non-ADA senior/disabled paratransit service in the Waterbury area through a contract with the Northeast Transportation Company. Fixed route and paratransit bus service is provided to Waterbury, Watertown, Middlebury, Wolcott, Prospect and Naugatuck. Service runs seven days a week.

### ***CTTRANSIT New Britain Division and Bristol Division***

The New Britain Transportation Company (NBT) operates ten bus routes in Berlin, New Britain, Cromwell, Newington, Plainville, Bristol and Meriden. Fixed route bus service operates Monday through Saturday. DATTCO operates fixed route service in New Britain on the East Street and South Street routes. Beginning July 1, 2014 complementary ADA service will be operated by First Transit, Inc. and administered by the Central Connecticut Regional Planning Agency (CCRPA).

### ***CTTRANSIT Meriden Division and Wallingford Division***

The Meriden and Wallingford Divisions operate fixed route services in their respective areas through a contract with Northeast Transportation Company, with four local routes. Complementary ADA services are also operated by Northeast Transportation Company.

## **4.1.2 Other Public Bus Operations in Connecticut**

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### ***Central Connecticut Regional Planning Agency (busoncall.com) ([www.ccrpa.org](http://www.ccrpa.org))***

CCRPA offers transportation to persons who, due to disability, are unable to travel on regular CTTRANSIT buses. The service is provided in compliance with the Americans with Disabilities Act and is designed to provide disabled persons equal access to public transportation. ADA service is provided to Bristol, Kensington, New Britain and Plainville. Rides available Monday Through Saturday between 6 a.m. and 6 p.m. (varies by town). Not available on Sundays or holidays. For information please call 860-589-7820 or 860-224-9888. For a reservation please call 1-800-997-0700.

### ***Estuary Transit District ([www.estuarytransit.org](http://www.estuarytransit.org))***

The Estuary Transit District serves Chester, Clinton, Deep River, Essex, Killingworth, Lyme, Old Lyme, Old Saybrook, Westbrook, East Haddam Middletown and New London. The district provides the tri-town flexible route, demand response, medical outpatient, and the Shoreline and the New London Shuttles, which also are flexible route services operating between Old Saybrook and Madison, and Old Saybrook and New London respectively. Services operate Monday through Friday.

**Greater Bridgeport Transit Authority ([www.gbtabus.com](http://www.gbtabus.com))**

The Authority serves the cities of Bridgeport, Fairfield, Stratford, Trumbull and Monroe. Fixed route bus service is provided Monday through Sunday , Non-ADA senior/disabled paratransit service and ADA paratransit service (which is subcontracted) is provided Monday - Saturday, with limited service on Sundays.

**Greater Hartford Transit District ([www.hartfordtransit.org](http://www.hartfordtransit.org))**

The District provides Elderly and Disabled transportation and ADA complementary paratransit service in the greater Hartford Region 7 days a week. Communities served include Bloomfield, Cromwell, East Hartford, Ellington, Farmington, Glastonbury, Hartford, Manchester, Middletown, New Britain, Newington, Rocky Hill, South Windsor, Vernon, West Hartford, Wethersfield, Windsor, and Windsor Locks.. On behalf of the State of Connecticut Department of Transportation, the District also serves as Administrator of the Insurance Consortium which procures general automobile, property damage and excess automobile liability insurance on behalf of twelve transit districts in the state, and the Drug and Alcohol Testing Program (Consortium) in which forty member locations across Connecticut are served. Members secure testing and program support services as well as a variety of resources and training to assist in the effective operation of drug and alcohol testing programs under CFR Parts 40 and 655 as dictated by the Federal Transit Administration.

**Greater New Haven Transit District ([www.gnhtd.org](http://www.gnhtd.org))**

The District provides complementary ADA paratransit service, under contract to CTDOT, to the greater 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. Transportation is offered 7 days a week.

**Greater Waterbury Transit District (GWTD) ([gwttd8@aol.com](mailto:gwttd8@aol.com))**

The district serves the elderly and disabled population in the towns of Cheshire, Middlebury, Naugatuck, Prospect, Thomaston, Waterbury, Watertown, and Wolcott with Non-ADA senior/disabled paratransit service.

**Housatonic Area Regional Transit (HART) ([www.hartct.org](http://www.hartct.org))**

The District provides fixed route service on 11 routes, 7 days a week (limited Sunday routes). Rail Shuttle service is also provided to the MTA Harlem Line Brewster, Katonah, and Southeast stations. Senior/disabled Dial-a-Ride service is provided to Danbury, Bethel, Brookfield, New Fairfield, Newtown, Redding, and Ridgefield.

**Meriden Transit District ([www.cityofmeriden/content/Transit\\_District](http://www.cityofmeriden/content/Transit_District))**

The Meriden Transit District serves the city of Meriden with express commuter bus service to and from the city of Hartford. The District provides 4 trips daily, Monday - Friday. The two AM trips leave Meriden at 6:30am and 6:50am and arrive in Hartford at 6:50am and 7:10am respectively. The two PM trips leave Hartford at 4:55pm and 5:50pm and arrive in Meriden at 5:15pm and 6:10pm respectively. There is no service on weekends.

**Middletown Transit District (MAT) ([www.middletownareatransit.org](http://www.middletownareatransit.org))**

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



**Milford Transit District ([www.milfordtransit.com](http://www.milfordtransit.com))**

Milford Transit serves the city of Milford with fixed route bus service, ADA van service and Non-ADA senior/disabled paratransit 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 ([www.nectd.org](http://www.nectd.org))**

The District provides service through flexible routes in Brooklyn, Killingly, Putnam, and Thompson. Bus service operates Monday through Friday, between approximately 8a.m. and 6p.m. Information on services can be obtained by calling 860-774-3902.

**Northwestern Connecticut Transit District ([www.nwCTTRANSIT.com](http://www.nwCTTRANSIT.com))**

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

**Norwalk Transit District ([www.norwalktransit.com](http://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 provided 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](http://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, Ledyard, and Stonington. One bus operates 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 (ECTC).

**Valley Transit District ([www.valleytransit.org](http://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.wrdt.net](http://www.wrdt.net))**

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

## 4.2 Transit Services for Disabled Persons

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There are several programs that provide transportation to people who cannot or choose not to drive their vehicles due to disability.

- On State-subsidized, fixed route bus and rail services, elderly and disabled riders are eligible for reduced fares.
- The federal Americans with Disabilities Act (ADA) of 1990 requires operators of fixed-route bus services to provide complementary paratransit services to individuals who are unable to use the fixed route bus due to a qualifying disability for trips with both an origin and a destination within 3/4 of a mile of the fixed-route bus service.
- The State-managed Section 5310 program provides grants towards the purchase of specially-designed, wheelchair-accessible vehicles for municipalities and non-profit organizations serving the elderly and disabled for whom mass transportation is unavailable, insufficient, or inappropriate.
- A municipal grant program established by CGS 13b-38bb provides matching grants to municipalities to provide services to seniors and people with disabilities. There is \$5 million in State funding appropriated to the program which is allocated to municipalities based on the formula in the statute. Municipalities, transit districts, and regional planning organizations are eligible applicants. In 2006, the first year of the program, 133 municipalities applied with 55 providing services independently and 78 participating in some kind of transportation coordination with other municipalities, transit districts, or regional planning agencies. As of SFY 2014, 151 municipalities applied; 59 were providing services independently and 92 were providing services in coordination with other municipalities, transit districts or regional planning agencies.

## 4.3 Ridesharing and Transportation Demand Management Services

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CTDOT funds a program to develop and implement programs that promote carpooling, vanpooling, mass transit, and other strategies in order to reduce the number of single occupancy vehicles on the highways. CTDOT looks to ridesharing programs as a complement to transit programs all of which contribute to quality of life issues, economic development, air quality, the conservation of fuel, and more efficient use of Connecticut's highways.

Since the energy shortage of the mid 1970s, CTDOT has been continually expanding its efforts to encourage people to rideshare and to use transit. For example, throughout Connecticut, CTDOT has established Park & Ride facilities which enable commuters to leave their cars at the lots and travel by vanpool, carpool, or bus. More information on Park & Ride facilities can be found under the Highway Systems section of this document. The locations of all the park and ride lots in Connecticut, as well as the features and amenities available at the lots, are shown on Connecticut's Interactive Travel Information Map. This map can be accessed from the Department's website: [www.ct.gov/dot](http://www.ct.gov/dot) or by clicking on the following link: [http://www.dotdata.ct.gov/iti/master\\_iti.html](http://www.dotdata.ct.gov/iti/master_iti.html). To view the locations of Park and Ride facilities on this map, under "Travel Resources" click on the "Park & Ride" box.

CTDOT, in conjunction with the ridesharing brokerage subcontractor, develops programs to encourage ridesharing and transit use. Programs include outreach to employers to deliver the ridesharing message to employees at the work site; developing and distributing materials detailing the value of transit and ridesharing for the commuter; facilitating the establishment of telecommuting programs; and providing incentives to employers and commuters to try transit, carpooling and ridesharing using various financial and non-financial mechanisms. CTDOT encourages employers and employees to take advantage of the federal employee commute

benefit program. The Commuter Tax Benefit program, as implemented in Connecticut and promoted by the Connecticut Department of Transportation, allows commuters the opportunity to pay for a portion of their commuting expenses with pre-tax dollars. This results in a tax savings for Connecticut commuters and a reduced taxable payroll for Connecticut employers.

As of the writing of this report, federal tax law allows commuters to set aside up to \$130\* per month (\$1,560 a year) to pay for transit or vanpool fares plus up to \$250\* per month (\$3,000 a year) for qualified parking. Qualified parking is parking at or near an employer's worksite, or at a facility from which an employee commutes via transit, vanpool or carpool. \*These are the tax-free amounts as of January 1, 2014. There is ongoing negotiation in Congress to expand the transit benefit to match the parking benefit as had been the case before December 31, 2013.

Additional information about the commute benefit program can be found at the Department's Commuter Services web site at [www.commutertaxbenefit.org](http://www.commutertaxbenefit.org). Information on the rideshare program can be found at [www.ctrides.com](http://www.ctrides.com).

## 4.4 Bus Transit System Assets

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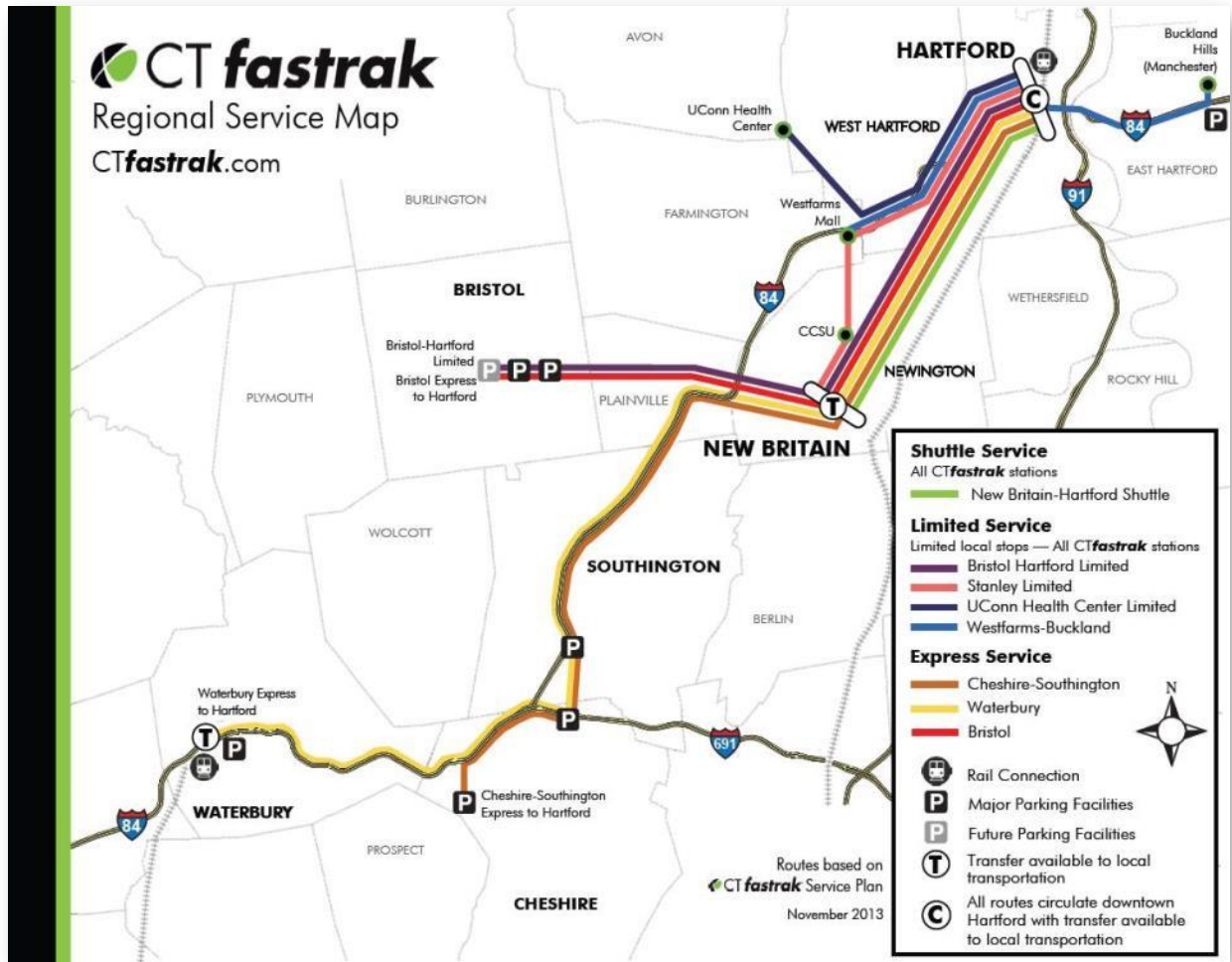
The primary assets of the bus transit system in Connecticut are transit facilities, rolling stock (vehicles), and related operating equipment such as radio systems and farebox and revenue collection systems. In the future, CTfastrak, formally known as the New Britain to Hartford Busway, will be one of Connecticut's primary transit system assets. These components are discussed below:

### 4.4.1 CTfastrak

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CTfastrak will be a dedicated Bus Rapid Transit (BRT) facility along a 9.4-mile corridor between downtown New Britain and downtown Hartford. Buses using this corridor will have more competitive travel times when compared with automobiles, since they will bypass congestion on arterial streets and I-84. The locations of CTfastrak corridor and stations are shown in Figure 4-1. The CTfastrak project will include associated improvements to the transit and transportation system that are necessary to make the busway corridor possible. The recommended corridor for CTfastrak follows an abandoned railroad right-of-way from New Britain to approximately 2000 feet south of Newington Junction (a distance of approximately 4.4 miles). From this point north, the busway corridor lies within the active Amtrak railroad right-of-way and is, for the most part, parallel to the active Amtrak rail line (a distance of approximately 5.0 miles).

Figure 4-1 CTfastrak Regional Service



Eleven transit stations will serve the users of CTfastrak. The facility will permit bus access at intermediate points, so that circulator buses that provide service on routes in surrounding neighborhoods and can then use the busway corridor, thus providing a one-seat ride. In addition, CTfastrak will include express, shuttle, circulator, and connecting feeder bus service. A multi-use trail will be constructed adjacent to or near CTfastrak from downtown New Britain to the Newington Junction Station in Newington. Construction is scheduled to be completed by the end of 2014 and revenue operation is anticipated to start in the first quarter of 2015. The estimated total cost for CTfastrak project is \$567 million, which includes all costs for design, construction, construction inspection, property acquisition, purchase of vehicles, finance charges, etc. Additional information on CTfastrak, including the project history, project schedule, latest project information, drawings of stations, and an interactive map, is provided at [www.ctfastrak.com](http://www.ctfastrak.com).

#### 4.4.2 Bus Transit Facilities

CTDOT owns the bus storage and maintenance facilities for the three divisions of CTTTRANSIT in Hartford, New Haven, and Stamford. CTDOT also owns the bus storage and maintenance facility in Preston operated by the Southeast Area Transit District (SEAT). All of the other service providers control their own facilities, or their contract operators control facilities.

Through the Public Transportation Management System (PTMS), bus transit facilities have been inventoried. A physical condition survey and operational evaluation of each of the facilities was done. The evaluation was done for both the CTDOT-owned and all the Transit District-owned facilities. A rating scale was used to measure the condition and operating capability of each facility. Based on the condition of the facility, improvements are programmed in the Public Transportation Capital Management Plan. The facilities are inspected and evaluated every five years and the capital plan is updated accordingly.

#### **4.4.2.1 CTDOT-Owned Bus Facilities**

The following bus facilities are or will be owned by CTDOT:

CTTRANSIT - Hartford Division. The Hartford bus storage and maintenance facility was opened in 1990. The facility is in excellent condition. It was designed for a 280-bus fleet and also houses First Transit, Inc. management personnel. The facility appears to be suitable for future estimated growth with some modifications to accommodate CTfastrak services beginning in 2015.

CTTRANSIT - New Haven Division. The recently completed CT Transit New Haven Division operations and maintenance center is a 285,000-square-foot, environmentally friendly facility that replaced an obsolete 62-year-old garage. The new facility has the capacity to support the current operations in the greater New Haven area as well as service expansion in the future. Located on State Street in Hamden, Connecticut, the new facility will accommodate the operations maintenance and administrative requirements of about 150 buses and 20 support vehicles.

CTTRANSIT – Stamford. The Stamford Bus Storage and Maintenance Facility was rehabilitated and expanded in 2004, to accommodate the current operations of CTTransit in the Stamford urban area. The new facility was designed for a 100+ bus fleet with increased office space for administrative staff.

SEAT- Preston. The SEAT bus storage and maintenance facility was opened in 1982. A condition assessment revealed that the facility required some major and minor improvements. Some of these improvements have been recently been completed, including the replacement of fuel tanks and repairs to the boiler and the reclamation system for the bus washer. Additional renovations are planned.

SEAT – Norwich Transportation Center. The Norwich Transportation Center, completed in 2012, is the main hub for Southeast Area Transit (SEAT) commuter buses. A new three story parking garage with 167 parking spaces is part of the new facility. Other plans for the center include access to possible future rail passenger service, access to possible future passenger river ferry service, as well as local taxi service and convenient access to downtown Norwich.

Waterbury Bus Maintenance and Storage Facility – Waterbury/Watertown. The new facility will be located two miles north of the current garage in Watertown Connecticut. The facility will replace a smaller older building located on Thomaston Avenue in Waterbury. It will be designed to meet the current and future operational and maintenance needs of the area. The facility will be operated by the North East Transportation Company.

#### **4.4.2.2 Transit District Maintenance Facilities**

The following transit districts own their own facilities (if a transit district is not listed, it contracts for service and the contractor owns the facility); each is discussed in greater detail below:

Greater Bridgeport Transit Authority (GBTA). The GBTA bus garage and maintenance facility was built in 1987. It also houses the Transit Authority's administrative offices. The facility is in

very good condition. It is suitable for the current operation and for future estimated growth. GBTA has been considered for a facility improvement proposal.

Housatonic Area Regional Transit (HART). HART opened an expanded facility in 1998 which includes additional space for the administrative offices. The expanded facility is suitable for the current operation and for future estimated growth.

Valley Transit District. The Valley Transit District's maintenance facility was built in 1981. The facility is in good condition and also houses the administrative offices. It is suitable for the current operation and for future estimated growth.

Northeastern Connecticut Transit District. The Northeastern Connecticut Transit District's bus garage and maintenance facility is located in Killingly. The facility was built in 1994 and is in excellent condition. The administrative offices, maintenance garage, and bus storage functions are all in one building. The facility is suitable for the current operation and for future estimated growth.

Milford Transit District. The Milford Transit District bus garage and maintenance facility opened in October 1999. The facility was constructed for the current operation and for future estimated growth.

Middletown Transit District. The Middletown Transit District maintenance functions are performed out of a converted garage/factory building. A new maintenance and storage facility is under construction. This facility will provide a modern environment for maintenance and administrative functions.

Greater New Haven Transit District. The Greater New Haven Transit District administrative offices and operating and maintenance facilities are currently located in Hamden in a new building the district purchased during the summer of 2000.

Norwalk Transit District. The Norwalk Transit District administrative and maintenance facility opened in September 2001. The facility includes administrative office space and a maintenance garage. The facility is suitable for current operation, as well as for future growth.

Northwest Connecticut Transit District. Plans call for a site to be acquired for a 13,500-square-foot facility which will house administrative, operations, maintenance, and storage functions of the Northwest Connecticut Transit District (NWCTD). Construction is scheduled to commence in 2010. The estimated cost is \$8 million.

#### **4.4.3 Rolling Stock**

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CTDOT maintains an inventory of all of the bus rolling stock operated by systems that receive capital and/or operating funds from CTDOT. The inventory is maintained in the PTMS and vehicle replacements are programmed in the Public Transportation Capital Management Plan. Vehicle replacements are programmed according to FTA guidelines. A standard size bus (35 – 40 feet) has a service life of 12 years. A medium (30-foot) bus has a service life of 10-12 years. A small bus (under 30 feet) has a service life of 7-10 years. All other vehicles (such as regular and specialized vans) have a service life of four years or 100,000 miles. The average ages of full-size buses in operation in Connecticut are presented in Table II 1.

##### ***Condition of Rolling Stock***

CTDOT's Bureau of Public Transportation keeps track of the age and condition of the state transit fleet and the transit facilities in the PTMS. The vehicles are programmed for replacement in the Bureau's capital plan according to their mileage and/or age and based upon funding availability. Through the capital plan review process, the fleet information is kept up-to-date.

In the next few years, many transit buses across Connecticut will have reached the end of their useful life as defined by the Federal Transit Administration (FTA) and will be eligible for replacement. Operating buses beyond their useful life becomes a burden on the operating budget. If replacement is deferred, vehicles may need additional overhaul to maintain safety and economy of operation until replacement. The maintenance of vehicles-in-service is the operator's responsibility. Through the approved budgets included in annual operating agreements, CTDOT funds preventive maintenance and running repairs for services provided by all transit and paratransit service operators.

#### **4.4.4 Bus Shelters and Bus Stop Signs**

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Bus stop signs are provided by the local transit operator and usually are installed by the locality in coordination with the transit operator. Bus stop shelters have been funded by various sources including federal and special state funds. In some cases, CTDOT operating or transit capital funds are used. Some localities offset maintenance costs by selling advertising on the shelters.

#### **4.4.5 Farebox and Revenue Collection System (Statewide)**

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The current CTTRANSIT farebox system is 20 years old and is reaching the end of its useful life. The current fare collection system's magnetic stripe card technology and operating software limit fare payment and marketing options. The mechanical design of the fare collection system has resulted in reliability problems resulting in increased operating expense. The existing system will not support "Smart Card" technology, thereby limiting the ability to implement a regional fare card system within Connecticut and the surrounding states. The current fareboxes do not validate paper currency, therefore bills larger than \$1 cannot be used, and occasionally fares are "paid" with counterfeit or photocopied bills. The manufacturer of the fareboxes no longer will provide upgrades to the software that currently operates the system.

The State is upgrading its revenue collection system to meet current and future demand. The new system will upgrade all hardware and software in the revenue collection system as well as provide upgrades to allow for the incorporation of smart card technology and mobile phone technology. Installation of the new system will be phased in at CTTRANSIT systems across the state in 2015.

### **4.5 Factors Affecting Physical Condition of Systems Components**

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The main components of the transit system are rolling stock, transit facilities, the radio system, and the farebox and revenue collection system. The key factors that affect the condition of these components are age, weather and road condition, and availability of funding for ongoing maintenance, preservation, and upgrading of maintenance facilities.

## 4.6 Factors Affecting Demand for Transit & Ridesharing

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Factors that will affect the demand for transit and ridesharing services are personal preference and convenience, availability and accessibility of transit, ownership of an automobile, the ability to use an automobile, desire to use an automobile, cost of transit and costs of owning and driving an automobile. These factors and their effects on transit and ridesharing are discussed below:

- **Personal Preference, Convenience, and Necessity.** The automobile is the mode of choice for many Americans because it provides independence and convenience. The suburbanization of Connecticut over the past several decades and shifts in job locations, hours of work, and commuting patterns coupled with changes in family structures and needs have made life without an automobile difficult or undesirable. The desire and necessity of individuals to link trips to meet child care and household needs is another reason why some individuals find driving alone more convenient than taking the bus or carpooling.
- **Ownership of and/or Desire and Ability to Use an Automobile.** Many bus riders are transit-dependent people who may not have their own means of transportation for a particular trip. This type of rider has limited modal choices. Included in this group are individuals who cannot afford alternative means of transportation, individuals who are too young to drive an automobile; individuals who have physical or mental impairments that restrict, temporarily or permanently, their ability to drive an automobile; and individuals (such as tourists, visitors, or students) who do not have the use of or do not want to use an automobile while they are in a particular location.
- **Congestion.** In certain areas of the state, the level of congestion can “push” certain travelers to transit. Along the I-95 corridor between New Haven and the New York state line, peak period congestion can be very bad and without the New Haven Line rail, congestion in the corridor would be unmanageable. Similarly, but perhaps to a lesser degree, congestion is an issue in the Capitol area. In response to a study by the Capitol Region Council of Governments in the mid-90s, CTDOT conducted a corridor study to examine options to keep congestion to manageable levels while still providing adequate levels of mobility. As a result, CTDOT is pursuing the CTfastrak project based upon the determination that any expansion of the I-84 highway corridor between New Britain and Hartford would cause extensive environmental and social impact. The project will provide a viable transit alternative to the automobile, thereby managing current and future congestion, improving air quality, and enhancing mobility and the quality of life in the region.
- **“Choice Riders.”** Increasing fuel prices and congestion may result in an increase in the number of people who choose to ride the bus or rideshare. Some people will choose to rideshare or take public transportation to eliminate the stress of driving or to reduce their costs of commuting to work, school, or other activities. Others may want the dependability that bus and rail transportation can provide when compared to the variability of travel times on the highway system. These choice riders represent a growing market, especially for long-distance trips, such as those served by commuter rail and express bus services.
- **Aging of the Population.** The aging of the population will increase demand for urban and rural transit and ADA and non-ADA paratransit services. The number of older persons who are able to continue to live in their own homes but who are unable to drive is growing. This trend to “age-in-place” will occur gradually and will need to be adapted to over the course of the next decade or two. Better and more efficient specialized transportation services and more housing options within walking distance of transit services and facilities will be needed for this group to allow them to maintain their mobility and independence. Along with greater demand and support for more and better transit,



there will be greater demand to provide more passenger amenities such as benches, lighting and shelters at transit stops and better maintenance (such as snow removal) at transit stops and of sidewalks that provide access to bus stops and transit facilities. The municipal grant program described in Section G is one of the types of programs that will help expand services for the aging population and for people with disabilities.

- “Younging” of the population. Recently transit systems around the country have benefitted from another demographic trend – that of the “millennial” generation who seem less interested in owning and operating a car and more interested in living in livable and walkable communities. As rapid transit and rail projects around the country generate interest in more transit oriented development and sustainable and livable communities, transit will potentially have a growing role in offering mobility to these newly evolving communities.
- Federal Surface Transportation Authorization Legislation. The current authorization for federal transportation programs expires on September 30, 2014. There is considerable uncertainty with respect to how the highway and transit programs will be funded after that time. Funding uncertainty can create a barrier to good comprehensive long-range planning, and funding shortfalls can result in cutbacks in capital programs and eventually operating programs.

## 4.7 Ability to Meet Current & Future Demand

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CTDOT’s ability to meet current and future demand for bus transit services is impacted by a number of factors. They are discussed below:

- Rolling Stock. Based on existing routes and current usage trends, it is anticipated that the fleet is capable of satisfying a minimal future ridership growth. However, bus ridership has steadily increased over the past ten years. Should ridership continue to increase due to increases in fuel prices or attraction of more “choice riders,” expansions in service levels would require fleet expansions and CTDOT may need additional funding to purchase additional buses. To reduce the funding required to expand the fleet, in addition to low-floor buses with smaller seating capacities that have been phased into service, larger articulated buses have been added to the fleet to handle high peak loads. Further, innovative services using smaller or alternative-fuel vehicles will require those vehicles to be purchased.
- With respect to the existing fleet, replacement of vehicles on a timely basis provides Connecticut commuters with new, cleaner, and more fuel efficient buses thus enhancing the safety and reliability of public transportation. The timely replacement of vehicles also avoids the additional maintenance costs of operating older buses.
- Fareboxes. A new fare collection system will improve service reliability and revenue accountability, reduce maintenance costs, and reduce driver/customer conflicts. Also, a new system could provide currency validation, increase payment options including smart cards, make it easier for customer use, and result in increased ridership. New fareboxes will provide a faster fare payment transaction, thereby reducing dwell time and improving on-time performance. By improving operational effectiveness and the overall customer experience, new fareboxes will help the bus system continue to provide a safe and viable transportation alternative. This, in-turn, will improve air quality, reduce congestion, and enhance the quality of life in the region.
- Funding. A major factor that affects CTDOT's ability to respond to transportation system-related mobility needs is funding. CTDOT will be able to respond to demands to maintain and improve the bus transit system to meet current and future needs only to the extent that funds are available to do so.

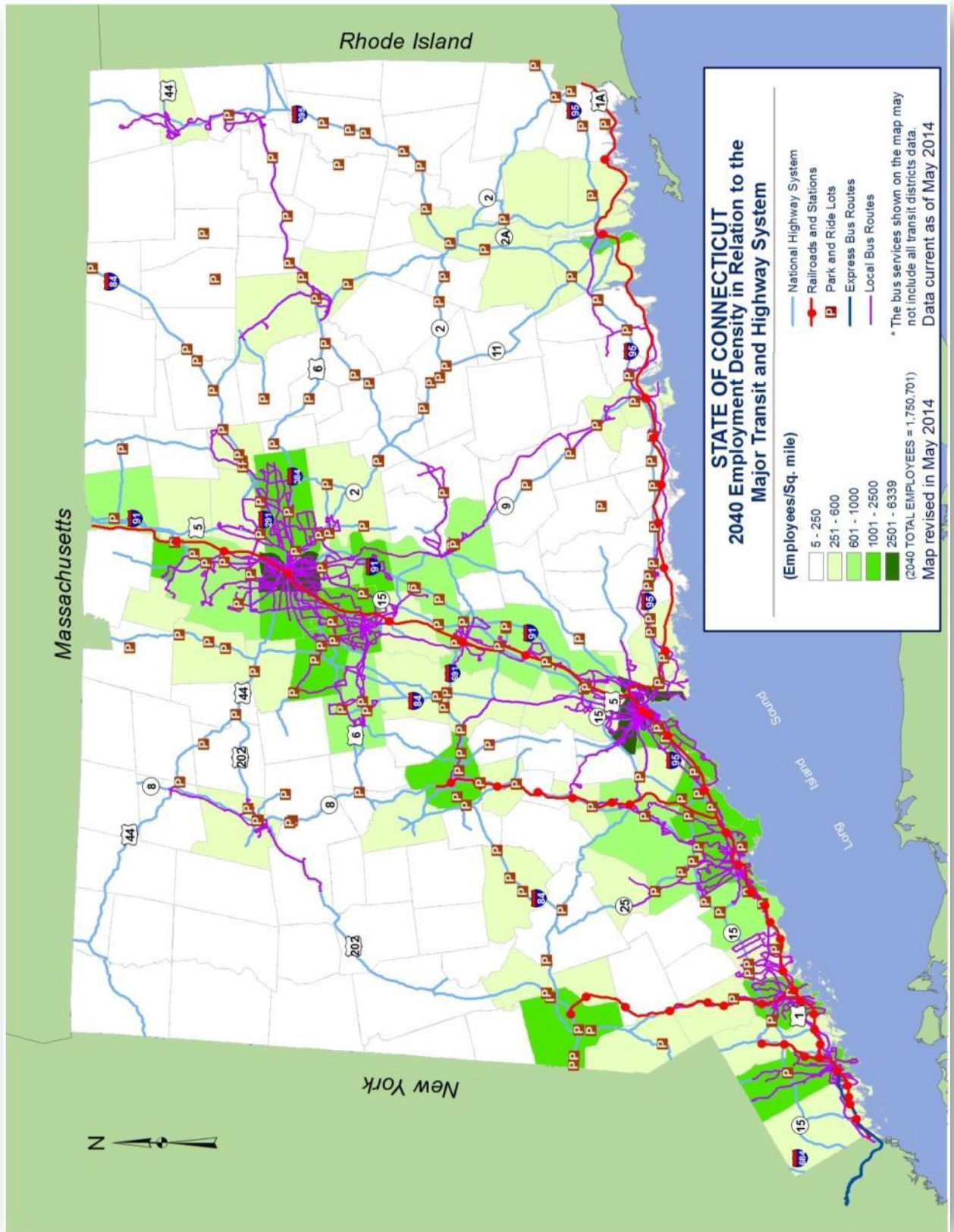
With respect to ability to meet demand in areas not currently served by fixed-route bus service, CTDOT is attempting, to the extent possible with existing transit funding, to meet demands for bus service in areas or during hours where there are unmet transportation needs. Transportation needs resulting from an increase in the number of suburban home and work sites, as well as, shifts over the past decades from the traditional downtown-centered commute patterns to suburb-to-suburb commute patterns are costly and difficult to address with traditional fixed-route bus service. CTDOT's Office of Transit and Ridesharing continues to encourage the development of alternative transit operations, such as those operated with flexible routing and smaller vehicles. The new municipal grant program will help to expand services in areas where traditional public transit cannot be effectively provided, but where a locally coordinated system of dial-a-ride services can better address the local needs.

Additional service changes have been implemented to improve reverse commute and evening and weekend services, aiding persons looking for work in the non-traditional work shifts and at outlying employment sites.

The Job Access program was expanded to offer services virtually statewide. The Connecticut Department of Social Services and CTDOT provide funding for these services. CTDOT has received grants from the FTA Job Access and Reverse Commute program, lately averaging about \$1.5 million annually. The grants are matched by Job Access funding from the other state agencies and a substantial appropriation of state transportation operating dollars to create a total program of about \$7 million annually.

Bus transit systems can be adaptable to changes in job locations, land usage, travel patterns, and service needs in general. Figure 4-3 shows areas anticipated to experience significant levels of employment by 2040 in relation to the major transit and highway systems in Connecticut. If the need for significant additional service is warranted, additional funding would be required to purchase more equipment and to subsidize any major increases in services.

Figure 4-3. 2040 Employment Density in Relation to the Major Transit & Highway System



## 5 RAIL SERVICES & FACILITIES

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This section provides information on the rail passenger services, rail freight services and rail facilities in Connecticut. More specifically, it includes information on CTDOT's roles with respect to commuter rail service, Amtrak's intercity service and various rail freight programs; the components of the rail system; and the ability of the rail passenger and rail freight systems in Connecticut to meet current and future demand.

### 5.1 Rail Passenger Services

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Connecticut is served by the following three passenger rail operations.

- The **New Haven Line (NHL) commuter service** operates between New Haven, Connecticut and Grand Central Terminal in New York City with three connecting branches: New Canaan, Danbury and Waterbury.
- The **Shore Line East (SLE) commuter service** operates between New Haven and New London with four SLE express trains that operate west of New Haven to Bridgeport and Stamford.
- **Amtrak intercity passenger service is provided** along the Northeast Corridor (NEC) between New York and Boston, and the inland route between New Haven, Hartford and Springfield, Massachusetts (NHHS).

CTDOT's Bureau of Public Transportation, through its Office of Rail, oversees and financially supports the provision of three of the passenger services: the NHL, SLE and the NHHS services. CTDOT contracts with the Metropolitan Transportation Authority's Metro-North Railroad (MTA/MNR) to operate the NHL and with Amtrak to operate the SLE and NHHS service. CTDOT sets fares and service levels on the Connecticut portion of the NHL, SLE and NHHS. Information on the NHL and the SLE services is available on [www.ctrides.com](http://www.ctrides.com) and the NHHS service on [www.Amtrak.com](http://www.Amtrak.com). CTDOT does not regulate or subsidize the Amtrak NEC intercity passenger service between New York and Boston. CTDOT provides both capital and operating funding for the NHL, SLE and NHHS services. The Department is a designated recipient of Connecticut's share of the FTA Section 5309 Capital Funding Program for the NHL and is a designated recipient of the state's share of the FTA Section 5307 Urbanized Area Program. CTDOT uses the FTA funds and state bond funds to make capital infrastructure improvements and to acquire rolling stock for the NHL, SLE and NHHS. In 2006, Public Act 06-136 instructed the Department to explore expanded SLE service. CTDOT's findings are discussed later in this section.

#### 5.1.1 New Haven Line (NHL)

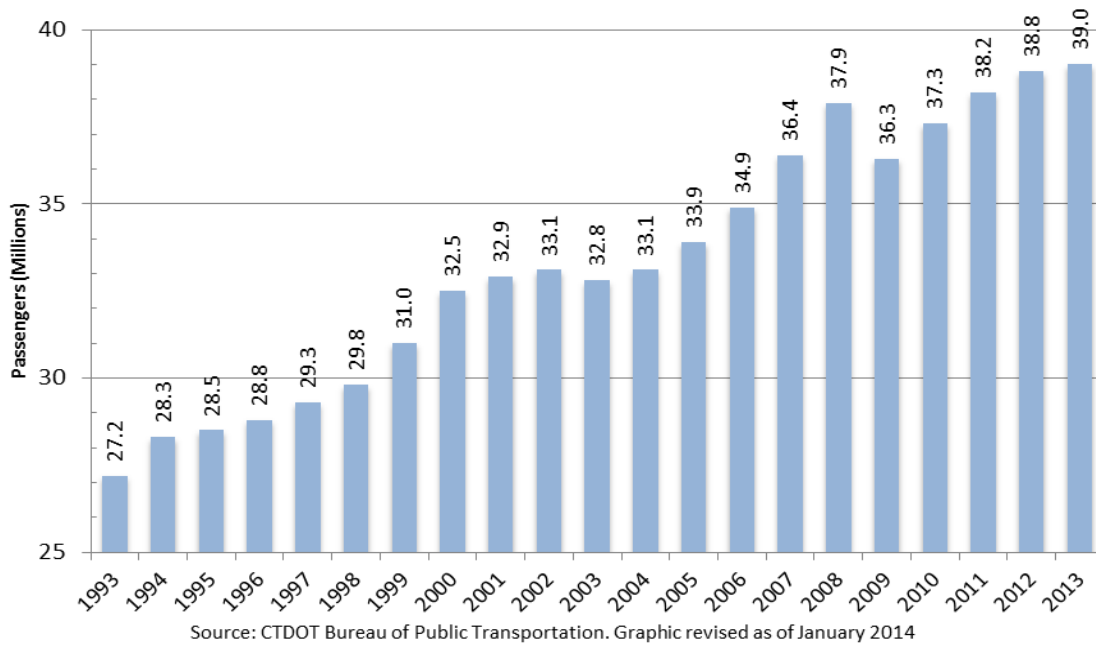
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CTDOT and the Metropolitan Transportation Authority (MTA) of New York jointly oversee and subsidize the operation of the NHL. Metro-North Railroad (MNR) is the contract operator under an agreement with CTDOT and MTA.

CTDOT owns the 235 track miles of the NHL between New Haven and Greenwich and the three branch lines within Connecticut and is responsible for all capital improvements in Connecticut. CTDOT also owns over 60 percent of the NHL's rolling stock; MTA owns the remaining NHL rolling stock. CTDOT uses state monies to fund the State of Connecticut's share of the operating subsidy for the NHL.

The NHL service is considered a vital transportation link in that it relieves traffic on the most congested portion of I-95 between New Haven and the New York state line and provides easy access to New York City. Based on the 2000 Census journey to work data, the NHL captures about 81 percent of the work trips bound for New York City. There are 38 station stops on the Connecticut portion of the NHL. Nearly 80,000 one-way passenger trips are made on this line segment each weekday. As shown in Figure 5-1, annual ridership on the NHL has increased significantly since 1993. In 2012 the total NHL ridership was 38.8 million—an increase of 1.6 percent over the previous year.

**Figure 5-1. Annual Connecticut New Haven Line Ridership**



During the 2012 calendar year, Stamford was the busiest NHL train station outside of Grand Central Terminal.

Danbury Branch weekday service has been increased from 22 trains to 28 trains per weekday in November 2013 due to the substantial completion of the Danbury Branch Signal project.

Over the past few years the CTDOT has integrated various rail and bus commuter services. These programs include the Commuter Connection services, which are bus routes timed to meet specific train departures and arrivals at the railroad stations in Greenwich, Stamford, South Norwalk, Stratford, Milford and New Haven. If a train or bus is delayed, the other mode of transit will wait for boarding passengers. Additionally, all Stamford local bus routes originate from the Stamford train station and many area employers offer private shuttles to their employment locations.

**Future Plans**

CTDOT is committed to ensuring that the NHL continues to be a convenient and reliable alternative to driving by expanding its accessibility and capacity. Thousands of new parking spaces have recently been added or are planned to keep pace with increasing ridership. This includes approximately 650 spaces built as part of the new West Haven rail station (completed August 2013), 500 new spaces in Bridgeport (completed April 2012), 1,400 spaces at the Fairfield Metro rail station in Fairfield (completed in December 2011), up to 1,200 and 300 new spaces of expanded parking at the New Haven Union Station and Stamford Transportation Center complexes respectively (future/pending TOD projects), as well as 125 new spaces in

Stratford which opened in December 2014. Pre-design consideration is underway for new/additional parking at Orange and Merritt 7 stations.

The Department also plans to continue to increase the number of available seats on NHL trains. The Department and Metro North Railroad has taken delivery of the original order of 380 cars of the 405 new M-8 rail cars ordered. The Department and Metro North Railroad added an additional 25 “S” cars to the order those cars are scheduled for delivery and acceptance in 2015. This new fleet of M-8’s allows for forecasted growth on the New Haven Line. The total order of 405 rail cars will continue to be delivered and go through their commissioning testing and be accepted for service. These new rail cars will replace the older M-2 M-4 M-6 fleets currently operating on the New Haven Line.

**Figure 5-2. M-8 Rail Car Fleet**

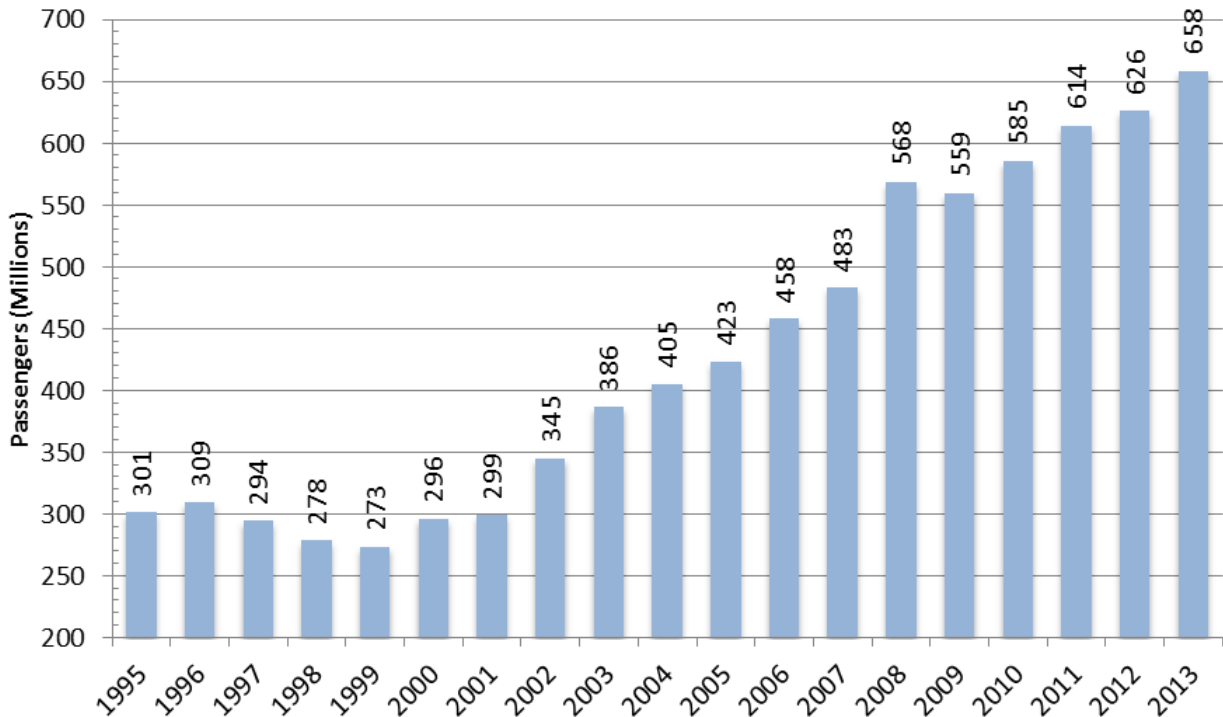


### **5.1.2 Shore Line East (SLE)**

CTDOT contracts with Amtrak to operate the SLE commuter rail service between New Haven and New London, a service area that is located within Amtrak's Boston Division of the North East Corridor (NEC). Four SLE trains are extended to provide express service to/from New Haven to Bridgeport and Stamford. In 2013 SLE weekend service (New Haven to Old Saybrook) was extended to New London. CTDOT provides passenger equipment and funding for the operation and oversees Amtrak's performance as a service provider. CTDOT uses 100 percent state funds to cover the operating deficit and state and FTA monies to fund station improvements for this service.

There are seven passenger stations (west of New Haven and State Street) with connecting service to the NHL and points west provided at New Haven. Annual ridership on SLE increased from 626,000 in 2012 to 658,000 in 2013, an increase of 4.9 percent.

**Figure 5-3. Annual Connecticut Shore Line East Ridership**



Source: CTDOT Bureau of Public Transportation. Graphic revised as of January 2014

**Future Plans**

As required by Public Act 06-136, CTDOT has examined the possible expansion of SLE service. The state is investigating options to expand service on weekends and evenings. Obstacles to enhanced service include the need to negotiate any expansion with Amtrak, the owner of the railroad; a 2003 lease agreement with Amtrak will need an amendment and revised budget tied to increased service for the NEC Access Rights. The Department has also identified a number of operational restrictions that would have to be addressed in the event of expanded SLE service, including the need for additional personnel and equipment, increased operating and maintenance costs, securing agreements with various entities for added train traffic over three movable bridges, and additional infrastructure improvements which may be required by Amtrak to accommodate enhanced service.

CTDOT has developed, and made progress on, three proposed phases of expansion of SLE service. Phase One is complete, Phase Two has had significant progress, and Phase Three will be implemented as north side platforms at the Shore Line East stations are added to the service.

### 5.1.3 Amtrak Intercity Rail Service

Amtrak intercity rail service through Connecticut is provided along the NEC (Boston - New York City - Washington D.C.) and along the New Haven-Springfield Line (New Haven - Hartford-Springfield or NHHS). Limited Amtrak rail service (The Vermonter) continues to and from Brattleboro, VT. Amtrak operates over its own right of way east of New Haven to Boston and between New Haven and Springfield and operates over the CTDOT-owned NHL between New Haven and Greenwich. Connecticut provides funding for the operation of the Amtrak Northeast Region NHHS service along with the states of Massachusetts and Vermont.

#### ***Future Plans***

CTDOT has begun construction, using a combination of FRA High Speed Intercity Passenger Rail Funding and State Bonds, on a project that will significantly increase passenger rail service between New Haven and Springfield. The project will add a second track, add interlockings, increase track speeds, and enhancing stations including high level platforms in anticipation of expanding service from the current 12 trains per day to a total of 34 trains per day by the end of 2016.

Amtrak's intercity service serves a total of 12 rail-passenger stations in Connecticut. These stations are listed in Table 5-1, which shows Amtrak Connecticut ridership by station for 2011 through 2013. As shown in Figure 5-4, from 2007 to 2013, total Amtrak ridership at stations in Connecticut increased from 1,508,000 to 1,730,000



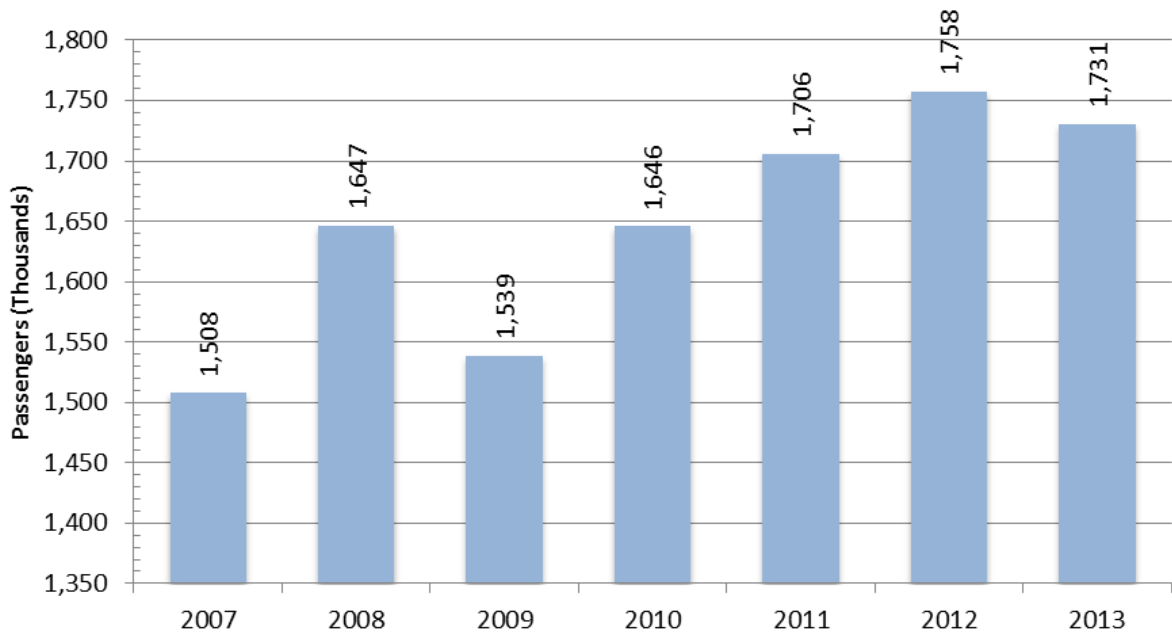


**Table 5-1. Annual Ridership by Station - Amtrak**

Station	2011	2012	2013
Berlin [Kensington]	23,216	23,825	25,327
Bridgeport	76,653	84,446	80,309
Hartford	169,933	175,406	183,474
Meriden	34,049	33,878	34,905
Mystic	23,091	25,983	23,490
New Haven	727,414	740,736	730,781
New London	164,629	171,673	160,093
Old Saybrook	65,937	65,315	60,310
Stamford	380,021	388,599	383,516
Wallingford	15,449	17,998	16,919
Windsor Locks	15,254	18,209	18,445
Windsor	10,122	11,544	13,076
<b>Total</b>	<b>1,705,768</b>	<b>1,757,612</b>	<b>1,730,645</b>

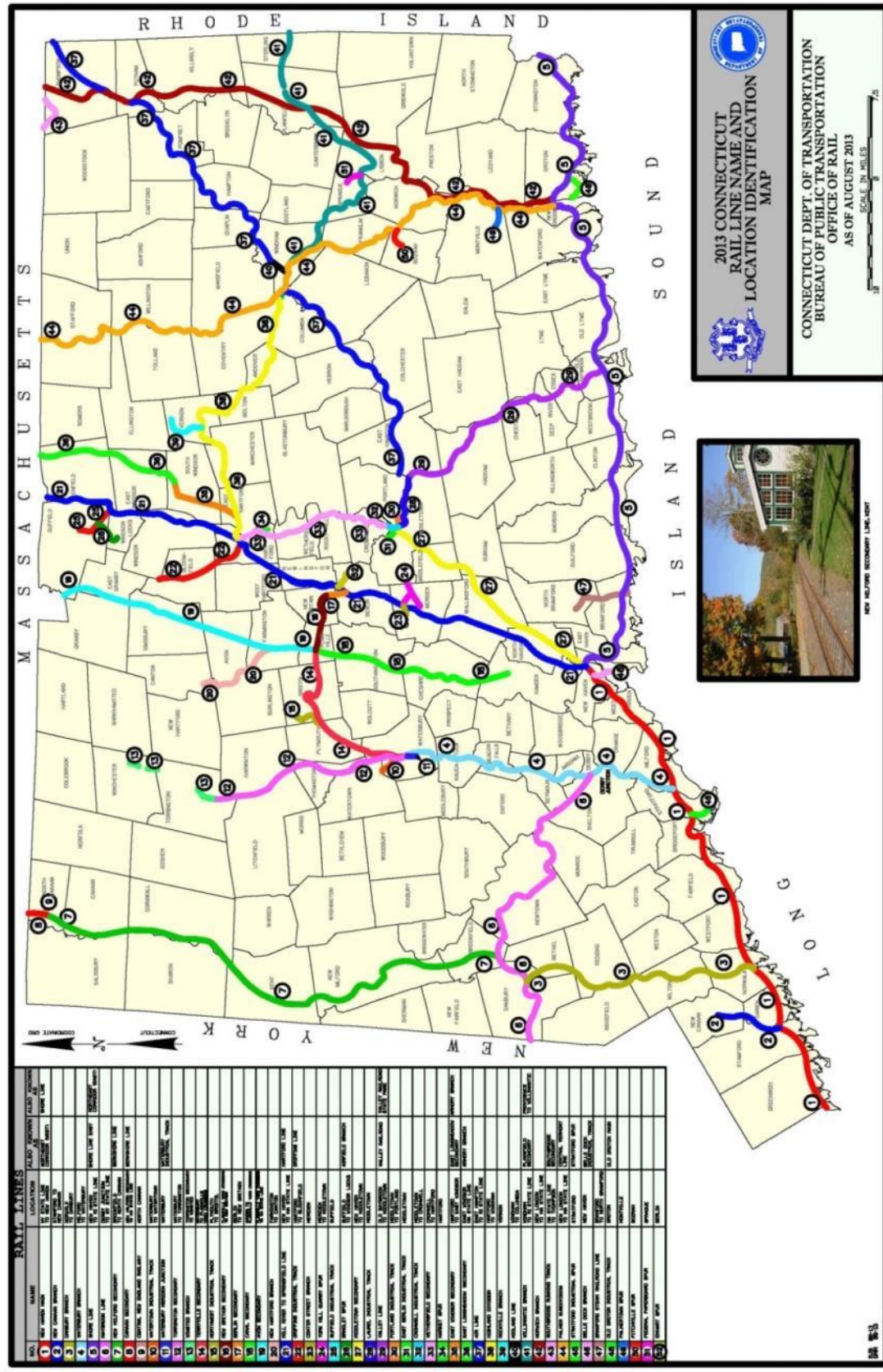
Source: National Assoc. Of Railroad Passengers 2013 Fact Sheet: Amtrak In Connecticut. Table Revised March 2014

**Figure 5-4. Annual Connecticut Amtrak Ridership**



Source: CTDOT Bureau of Public Transportation. Graphic revised as of January 2014

Figure 5-5. Rail Line Name and Location Identification Map





**Table 5-2. Railway Line Ownership - Active Rail Lines and Key to Figures 5-5 & 5-6**

Map Key	Location	Owner	Passenger Service	Local Freight Service	FRA Class
1	NY State Line (Greenwich) to New Haven 1). New Haven Main Line 2). Northeast Corridor (west)	Connecticut DOT October 1985 No 7001-Misc-319	Metro-North (New Haven Main Line) Amtrak (Northeast Corridor-Intercity)	CSX Corporation	4
2	New-Canaan Branch Stamford to New Canaan	Connecticut DOT October 1985 No 7001-Misc-319	Metro-North	CSX Corporation	3
3	Danbury Branch Norwalk to Danbury	Connecticut DOT October 1985 No 7001-Misc-319	Metro-North	Providence & Worcester	3
4	Waterbury Branch 1). Milford to Derby JCT 2). Derby JCT to Waterbury	Connecticut DOT October 1985 No 7001-Misc-319	Metro-North	Providence & Worcester (Milford to Derby Junction) SPRINGFIELD TERMINAL (Derby Junction to Waterbury)	3
5	New Haven to Rhode Island State Line (Stonington) 1). New Haven – London 2). Northeast Corridor (east)	Amtrak	Amtrak (Northeast Corridor-Intercity) (Shore Line East-CT Commuter [New Haven to New London])	Providence & Worcester	4-7
6	1). Derby Junction to NY State Line (Danbury) 2). Brookfield to New Milford	Housatonic Railroad	None	Housatonic Railroad	1
7	New Milford to Mass State Line (North Canaan)	Connecticut DOT September 1980 No 7001-Misc-217 January 1991 No 11.28-99(90)	None	Housatonic Railroad	2
8	Waterbury to Torrington	Connecticut DOT July 1982 No 7001-Misc-280	Naugatuck Railroad (Seasonal Scenic Service)	Naugatuck Railroad	1
9	1). Waterbury to Berlin 2). Southington to Plainville	Pan Am Railways	None	Pan Am Railways	2
10	1). New Haven to 2). Mass State Line (Enfield)	Amtrak	Amtrak	Connecticut Southern Railroad	4
11	New Haven to North Haven	CSX Corporation	None	Providence & Worcester	1
12	Suffield to Windsor Locks	Connecticut DOT February 1947 No 5001-Misc-242	None	Connecticut Southern Railroad	1
13	North Haven to Durham	Tilcon	None	Providence & Worcester	2

TABLE CONTINUED ON NEXT PAGE

Map Key	Location	Owner	Passenger Service	Local Freight Service	FRA Class
14	1). Middletown to Middletown 2). Durham to Middletown 3). Hartford to Middletown 4). Middletown to Portland	Connecticut DOT May 1987 No 7001-Misc-320	None	Providence & Worcester	1-2
15	Branford to North Branford	Branford Steam	None	Branford Steam Railroad	2
16	Old Saybrook to Haddam	Connecticut DEP August 1969	Valley Railroad (Seasonal Scenic Service - Essex Steam Train)	None	1
17	New London to Mass State Line (Stafford)	New England Central Railroad	None	New England Central Railroad (Formerly Central Vermont)	3
18	1). Groton to Mass State Line (Thompson) 2). Groton to Old Groton (Groton) 3). New Haven to Belle Dock (New Haven) 4). Plainfield to Sprague	Providence & Worcester	None None	Providence & Worcester	3 1 – 2
19	1). South Windsor to 2). Mass State Line (Enfield)	Connecticut DOT	None	Central New England Railroad	1
20	1). East Hartford to South Windsor 2). Hartford to Manchester 3). Windsor Locks to Suffield 4). Hartford to Hartford	Connecticut Southern Railroad	None	Connecticut Southern Railroad	E 1 1 1
21	1). Windham to Sprague 2). Plainfield to Plainfield 3). Windham to Columbia	Connecticut DOT	None	Providence & Worcester	1
22	Stratford	American Premier Underwriters	None	CSX Corporation	1
23	Terryville	Springfield Terminal Railroad	None	Springfield Terminal Railroad	1
24	Terryville	City of Bristol	None	Springfield Terminal Railroad	1

E = Excepted Track – does not meet all requirements for FRA Class 1 (temporary condition)

Source: CTDOT Bureau of Public Transportation. Graphic reflects information as of October 2006

## 5.2 Rail Freight Services & Programs

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Connecticut's rail freight system is comprised of services provided by a number of railroads and programs overseen by CTDOT. These components are discussed below:

### 5.2.1 Services

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Rail freight service in Connecticut is provided by the following railroads: CSX Corporation, Providence & Worcester Railroad Company, Housatonic Railroad Company, Pan Am Railways - Springfield Terminal Railroad, Branford Steam Railroad, New England Central Railroad, Naugatuck Railroad, Central New England Railroad, and Connecticut Southern Railroad. The lines (tracks) on which these companies operate are identified in Table 5-2 and shown on Figure 5-5.

Most rail shipments entering Connecticut fall within a limited range of bulk commodities: crushed stone, lumber, rolled paper, steel, chemicals, and waste products. The manufacturing and distribution companies that currently receive these goods by rail accept significantly longer shipment times than would be required for truck shipment of their low-value, non-time-sensitive raw materials and products. Shipments from the west are generally routed via Selkirk, New York, then pass through either the Oak Point Yard in New York City, or the West Springfield Yard, before reaching much of the state's rail network.

In recent years, annual rail shipments originating or terminating within the state have amounted to 50,000 carloads carrying about three to four million tons. More detailed information on rail freight traffic in Connecticut will be presented in the *2012-2016 Connecticut State Rail Plan* published in the 2012.

### 5.2.2 Programs

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CTDOT oversees the following rail freight programs: the Gross Earnings Tax Exemption Program, Rail Preservation and Improvement Program, Rail Regulatory Program and Rail Freight Infrastructure Program. These programs are discussed in greater detail in the following sections.

#### 5.2.2.1 Gross Earnings Tax Exemption Program

In accordance with Section 12-249 of the *Connecticut General Statutes* (CGS), each corporation operating a railroad in the State of Connecticut shall pay a tax computed upon its gross earnings within the state as disclosed in an annual return to the Department of Revenue Services. Gross earnings have been determined to be all receipts classified as railway operating revenues by the Interstate Commerce Commission. Section 12-255 of the CGS states that the gross earnings tax shall be in lieu of all other taxes in the state, except for taxes assessed on property not used exclusively for railroad purposes.

Section 13b-226 of the CGS declares the improvement of railroads transporting freight or passengers within Connecticut or between Connecticut and other states to be a "public purpose" and that the gross earnings tax may be exempted on a dollar for dollar basis with expenditures made to effect specific railroad improvements in a given calendar year.

On or before November 1 each year, a railroad company wishing to participate in the Gross Earnings Tax Exemption Program must submit for approval a list of projects to be undertaken in the upcoming calendar year. The Rail Administrator, properly designated by the Commissioner of Transportation, will then issue an approved list of projects to the participating railroads on or before December 31.

The list of projects may be amended from time to time throughout the year at the request of the railroad. A company need not complete all of the approved projects during the year since a provision has been made for partial exemption. However, expenditures that exceed a company's gross earnings tax liability in any year may not be carried over to subsequent years. In the administration of the program, a monthly reporting requirement has been established to track the progress of each railroad's effort to complete projects from the approved list. Following year's end, an auditor's review is performed to determine each company's actual expenditures to determine the amount to be certified by the Commissioner of Transportation as eligible to be exempted. A formal certification of eligibility by the Commissioner of Transportation must be provided to the Governor and the Chairpersons of the Transportation and Revenue Finance and Bonding Committees by March 1 of the following year.

Generally, each of the freight railroads operating in the state participates in the Gross Earnings Tax Exemption Program. Amtrak and the Metro-North Commuter Railroad do not participate, as each enjoys its own legislative tax exemption. Of the freight companies participating, gross earnings tax liabilities (and annual exemptions) range from one thousand to several hundred thousand dollars annually.

### **5.2.2.2 Rail Preservation and Improvement Program**

The Rail Preservation and Improvement Program was formally established in 1983. In its present form, the program is a remnant of Connecticut's many activities before, during, and after the restructuring of the rail system in the Northeast during the mid-1970s. At that time, CTDOT purchased abandoned rail rights of way, financially assisted railroads in rehabilitating lines, and rehabilitated and subsidized operations on branch lines which were excluded from the Final System Plan. (The Final System Plan was a Congressionally-mandated plan that designated which of the lines that were owned by bankrupt railroads in the Northeast would be operated by Conrail or other railroads.)

By the early 1980s, the federally-funded Local Rail Service Assistance Program that was established in 1973 had been substantially revised by Congress. The level of federal funding was reduced and the use of federal funds for operating assistance was prohibited. As a consequence of reduced federal funding, CTDOT developed its own rail capital assistance program.

In the early years of the Rail Preservation and Improvement Program, CTDOT would regularly solicit projects from all freight railroads operating in the state. At that time, when dwindling federal funds were still being used in combination with state funds, project eligibility was generally based on a benefit to cost methodology approved by the FRA. However, in more recent years when no federal funds were involved, projects were selected based upon obvious merits and the degree to which a project will contribute to the preservation or improvement of rail freight service in Connecticut.

### **5.2.2.3 Rail Regulatory Program**

CTDOT's authority in the Rail Regulatory area extends to all matters relating to railroad construction and operations that are not specifically governed by federal law or regulation. The major statutory responsibilities of the program include periodic inspections of all active railroads; at-grade rail crossing safety and construction; and statewide railroad complaint and accident investigation. As required by state statute, dockets are established, formal hearings are conducted, and legally binding decisions are rendered in relation to these matters.

#### 5.2.2.4 Rail Freight Infrastructure Program

The intent of the Rail Freight Infrastructure Program (RFIP) is to (1) preserve, expand, or establish essential rail freight service where economically feasible, and (2) preserve or stimulate economic development through the generation of new or expanded commercial rail freight service.

Pursuant to Section (§) 13b-236 of the Connecticut General Statutes (CGS), the Department of Transportation (Department) shall provide a program of competitive grants for commercial rail freight lines operating in the state for improvements and repairs to, and the modernization of, existing rail, rail beds, and related facilities. The Department will periodically solicit proposals from commercial freight railroads operating in Connecticut, who can then apply for project funding pursuant to this RFIP. Funding for the RFIP is subject to available funding authorized by the Connecticut General Assembly.

### 5.3 Rail System Components

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The rail systems in Connecticut are comprised of tracks, at-grade crossings, power systems, power system substations, signal systems, rolling stock, rail stations and platforms, parking lots and structures, and maintenance facilities. Summary information on the condition of these components, factors affecting the conditions of or demand on the specific components, and the ability of these components to meet current and future demand, is presented in this subsection

#### 5.3.1 Tracks

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There are 628.5 route miles of railroad track in Connecticut. The locations and ownership of the various segments of track in Connecticut are shown in Figure 5-6 and listed in Table 5-2. Table 5-2 also indicates whether the track is used for passenger and/or freight service.

##### **Condition of Tracks**

There are cyclical programs that are jointly developed by CTDOT, Office of Rail Operations, and Metro-North Railroad (MNR) to address the continued replacement of rails, ties, turnouts, and surfacing the track. These programs are identified in the *Capital Project Management Plan* (CPMP) as the C-Programs. Presently, there is adequate funding for current projects, with a projected under-funding in years out. The projects currently in place will address approximately 75 percent of track miles that require the cyclical surfacing on a three year average. CTDOT has condition measures for evaluating rail track structure. These measures are based on a cyclical program for replacement of track, ties, and surfacing. Tangent track and curves 1° and under have a 40-year replacement cycle for rail; track with curves over 1° has a 20-year replacement cycle. CTDOT has a seven-year renewal program for maintaining and replacing existing ties on the main line and a ten-year renewal program for addressing existing ties on branch lines. There is a 30-year replacement schedule for new ties and a 50-year replacement schedule for new concrete ties. With respect to surfacing, inspection is performed every three to five years. On average, 50 percent of the track will need resurfacing after four years.

Trackage owned by the private operators is maintained according to similar standards set by each company. Tracks in Connecticut statewide ranged in FRA classification from Class 7 (maximum allowable operating speeds of 125 m.p.h. for passenger trains) to Class 1 (maximum allowable operating speeds of 15 m.p.h. for passenger trains and 10 m.p.h. for freight trains). The classifications of the track segments are listed in Table 5-2.



### **Factors Affecting Condition of Tracks**

Factors affecting track conditions are the volume of traffic, type of traffic, drainage, and curvature. Each segment is different: Lines with limited freight service are usually maintained at Class 1 or 2, while passenger lines owned by CTDOT or Amtrak are maintained at Class 3 - 7.

Drainage is a major component of maintaining the track structure of any railroad. NHL drainage is presently addressed in isolated areas that present an immediate problem. A comprehensive study of the drainage conditions on NHL and Branch Lines may be necessary to determine what appropriate action is needed to correct these conditions.

### **Ability of Tracks to Meet Current and Future Needs**

The various track segments are able to accommodate current and future needs for the foreseeable future.

### **5.3.2 At-Grade Railroad Crossings**

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There are 668 highway-rail grade crossings in Connecticut, including 343 public motor vehicle crossings, 325 private motor vehicle crossings, and 9 pedestrian crossings. The Connecticut Rail-Highway Grade Crossing Program provides for the installation of automatic warning devices at crossings based upon a hazard index which is calculated using accident data, the number of train movements, a protection factor based on the type of existing warning devices at the crossing, and other considerations. CTDOT designs and constructs between 2 and 5 crossings per year under the program. While crossings are often constructed using public funds, the *Connecticut General Statutes* (CGS) require that railroad companies fund the maintenance of at-grade crossings.

CTDOT, in conjunction with Amtrak, has deployed and tested the next generation of at-grade railroad crossings which employ Intelligent Transportation Systems (ITS) technology. This four-quadrant gate system in Groton, Connecticut features an automatic train stop mechanism which notifies approaching trains of an obstruction on the track via an in-cab signaling system. If the engineer fails to slow the train, the system will automatically bring the train to a stop.

Operation Lifesaver is a national non-profit public information program, established in 1972, to improve public safety by reducing the number of injuries and fatalities associated with at-grade railroad crossing crashes and incidents of trespass on railroad rights-of-way. The Connecticut Operation Lifesaver Committee sponsors rail safety information booths at local fairs and other public events and frequent rail safety presentations for target audience groups and other members of the general public including students, school and transit bus drivers, drivers' education students, truck drivers, police officers, and emergency first responders. Additional information on this initiative can be found on the internet at [www.oli.org](http://www.oli.org).

### **5.3.3 Electric Traction Power System Program**

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Trains on the New Haven Main Line and New Canaan Branch are electrically powered. Traction power to propel the trains is received from overhead wires, known as catenary. The electric traction power system operates nominally at 12.8 kVAC at 60 Hz (hertz), except for the segment of the Harlem Line, from Woodlawn to Grand Central Terminal. The electric utility company supplies power from three points at 115 kV. The voltage is then reduced by transformers to a level acceptable for train operations and is distributed by 13 railroad wayside substations. From Woodlawn to Grand Central Terminal, the New Haven Line (NHL) uses 650 VDC power, supplied by a third rail.

The electric traction system was originally constructed by the New York, New Haven & Hartford Railroad (NYNH&H) in 1906 from Woodlawn to Stamford and extended from Stamford to New

Haven in 1914. Power was originally generated by the railroad's coal burning power plant at Cos Cob. Power was supplied at 11.5 kV, 25 Hz, which was understood to be the most efficient system for high AC voltage electrification. The railroad chose the AC system because it was more efficient for the higher speeds and traffic levels envisioned for the NYNH&H Main Line than the system chosen by the New York Central for its 1904 DC power electrification of Grand Central Terminal. In later years, the AC system would be copied by the Pennsylvania Railroad for its electrification to Washington, DC, and to Harrisburg, PA. The Cos Cob power plant would be converted to gas fired turbines.

By the early 1960s, the railroads in the northeast were on the verge of bankruptcy, and the physical plant was suffering from years of what was euphemistically termed *deferred maintenance*. Simultaneously, there began a shift of understanding of transportation from individual carriers' service areas to regional corridors. In addition to this, commercial electric power became widespread, developing into a national grid, and standardizing at 60 Hz AC power at a variety of voltages. The Northeast Corridor was envisioned as encompassing the railroad system from Washington, DC, to Boston, MA, including the obsolescent 11.5 kV, 25 Hz electrification. It was understood, from the beginning of planning efforts, that this would be converted to commercial voltage and frequency. This choice was made because of the economies inherent in moving to the industry standard, and in recognition of the greater reliability of a national grid as opposed to a single power plant. The nearest commercial equivalent, 12.8 kV, 60Hz, was chosen to replace the old system, as this would require a minimum of re-engineering of the physical plant. In the mid-1980s the system was converted to commercial power.

The three supply points, that replaced the generating plant, are named Cos Cob, Sasco Creek, and Devon located in Greenwich, Westport, and Milford, Connecticut, respectively. A fourth supply point was completed in New Haven known as supply station 1086. The 13 wayside substations are spaced approximately 5 miles apart over 72 miles of the NHL. These wayside substations balance the voltage of the intermediate powered sections between them and keep the sections at equal potentials that provide a healthy, robust, reliable, and safe system while trains draw the voltage down (load) as they navigate the entire route. These facilities also allow the entire traction power system to be sectionalized. Desired sections can be taken out of service for maintenance, emergencies, and capital enhancements to the NHL whether electrical, operational, or structural in nature.

Subsequent to the decision to convert the NHL to 12.8 kV, the Northeast Corridor Improvement Program, (NECIP) planners chose a 25 kV system for all NECIP electrification projects. This was chosen primarily because it would require only half as many wayside substations, but required more extensive re-engineering of physical plant and rolling stock. This prevented NHL electric rolling stock from operating east of New Haven and west of New Rochelle, because their transformers were not equipped to handle at the higher voltage. It also made electric locomotives used on the Northeast Corridor more complicated, because they would have to be wired to use the legacy 25 Hz system, south of Philadelphia, as well as the *two* 60 Hz systems to the north. In addition to this, the new M-8 equipment, now being procured, must also be tri-current stock, having to accommodate two levels of 60Hz power, and the legacy DC electrification at GCT.

**Figure 5-7. Photograph of the New Haven Line Catenary**



***Condition of and Factors Affecting Condition of Power System***

Originally oil-filled circuit breakers were used at the waysides to control over voltage occurrences sensed by relays. However, just like the antiquated fuses once used in residential homes, these devices are being replaced by state-of-the-art indoor, draw-out type circuit breaker technology. As of May 2006, there were only five wayside substations which had not yet been fully replaced; it is anticipated that all of them will be replaced by the winter of 2013.

The catenary wires (conductors) between New Haven and the Connecticut-New York state line are more than 100 years old. Maintenance and inspection costs per/track mile are more than twice the level they would be if the proposed replacement catenary system was in place. Catenary wires have lost their elasticity and cannot maintain a satisfactory range of tension to keep the wire in constant conductivity with the electric current collector of the train, known as the pantograph. These wires are subjected to extreme ambient temperatures at both ends of the spectrum, causing quick cycles of expansion and contraction during a given 24 hour period. Due to the age of the wires, the ability to recover the specified tension has been significantly compromised. Since both points of any given span of wire are fixed to a structure at 300-foot increments on the NHL Main Line, the wire is either under-tensioned or over-tensioned during times of extreme heat or cold, respectively.

While the train is traveling a number of pantographs make contact with the wire, depending on the size and type, they should never lose contact if the wire tension is within a satisfactory tolerance. When under-tensioned, the wire begins to sag allowing the pantographs to push up more than desired, creating more oscillation in the span, increasing the potential of the pantograph losing contact and riding up and over the wire thus, tearing the wire(s) down. When over-tensioned, the wire is rigid and not “forgiving,” creating the potential for “hard-spots.” When the pantograph is riding along a segment of wire that has a relatively level or gradual change of grade and suddenly hits a sharp drop in grade, the point of contact is referred to as a hard-spot. This occurs when the system profile changes to accommodate an overhead structure such as a bridge and track geometry or topography prohibits the installation of a more gradual wire gradient. The potential for pantograph and wire damage is significantly increased. During both

temperature scenarios, the lack of proper alignment of the catenary wires over the centerline of track negatively impacts pantograph security.

New catenary wire auto-tension (constant-tension) technology has been implemented to preclude the continually declining reliability of the catenary system and the lack of replacement components. Also, the space between wires supporting the contact wire (system depth) will allow a lower contact wire elevation thus, reducing the number of and severity of hard-spots.

The existing catenary system is in the process of being replaced in six phases. Phases A, B, D have been completed at a combined cost of \$170 million. Phases C1b is currently underway and is scheduled to be completed in 2014. Phases C1A & C2 are just beginning. All phases are due to be completed by 2017. The estimated cost for the remaining three phases is \$ 260 million for a total cost of \$430 million.

### ***Ability of Power System to Meet Current and Future Demand/Needs***

CTDOT has completed a Traction Power Study (TPS) of the entire NHL. A very successful and sophisticated computer model has been developed as a result of the TPS. The model assumes that all the Electric Traction Power System Program improvements stated above are complete and a 2020 Train Operating Schedule is in place. This forms the baseline infrastructure. Future changes on the NHL, no matter what discipline, can be added or deleted from the database, simulated and the impacts analyzed.

The model has further documented the need for an additional power supply point in New Haven to support NHL service in 2020. The power system will ensure the reliability and provide the capacity needed to operate future levels of Amtrak and NHL service.

### **5.3.4 Signal Systems**

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The Signal Control System on the New Haven Main Line is a Centralized Traffic Control (CTC) with signal control passage of trains at control points (CPs), also referred to as interlockings. Train speeds are indicated by cab signals, and go-no-go wayside signals incorporated into automatic train control. The New Canaan Branch is a continuation of the main line CTC with automatic train control, cab signals, and go-no-go signals. While the Danbury Branch currently is manual block territory, a new CTC signal system will be in place by 2014 at an approximate cost of \$72 million. The Waterbury Branch is manual block territory. CTDOT plans to initiate a feasibility study which will evaluate transit needs along the Waterbury and New Canaan Branch Lines and recommend service improvements, including possible signal system upgrades.

### ***Condition of Signal System***

The first signal system upgrade took place along with the 60-cycle conversion of the traction power system between 1980 and 1985 in Connecticut. Subsequent system modifications and component upgrades have been ongoing.

A mechanical relay signal system traditionally lasts about 30 years. Technological advances have demanded the use of electronics for more recent system modifications. These components can be expected to have an operating life of 15 years. Following are the expected and useful life of some of the other signal system components: A switch machine should be rebuilt every 9 years and replaced every 30 years. Signal cable can last about 30 years. Batteries, battery chargers, and related systems last about 15 years. For the CTC office equipment, the following applies: cathode-ray tubes (CRTs) last about four years before they need to be replaced; the centralized processing unit (CPU) needs to be replaced every five years; uninterrupted power supply batteries last about ten years; the control software and program logic, about ten years; and the operating consoles, about five years.

There are other high-cycle replacement parts such as continuous-working code relays, 100 Hz converters, code-following relays, flasher relays, lights, bulbs, and control panels. Wayside buildings and cases need repair and support every 15 years with possible replacement at 30 years of age. Generally speaking, the present system is quickly and systematically approaching the end of its expected life.

### ***Factors Affecting Condition of Signal System***

Factors affecting the condition of the signal system are the characteristics and reliability of the signal power feed, the environment, electromagnetic fields (introduced by 115 / 345 kV transmission line and 13.8 kV traction power systems), limited access to components, normal wear and tear, and limited forward compatibility of hardware and software components.

### ***Ability of Signal System to Meet Current and Future Needs***

Assuming the 30-year expected life, replacement should commence by the 2010-2015 period, if not sooner. Many components will continue to require maintenance and/or replacement at shorter periods as previously noted. The current system is sufficient to operate, according to the rules and regulations in effect with the present trainsets. The on-order trainsets (M-8s in particular) will be equipped with the appropriate signal code aspect to reach their full operating potential.

## **5.3.5 Rolling Stock**

CTDOT currently owns 518 vehicles (rolling stock units). The equipment type, book count, average age, unit size, unit seating (if applicable), and service that the vehicles are used for are presented in Table 5-4. Pictures of and detailed information on this equipment are presented in the publication, *Connecticut Department of Transportation Rail Rolling Stock*, prepared by CTDOT's Office of Rail Operations.

**Figure 5-8. Rolling Stock on Shore Line East**



**Table 5-4. CTDOT Owned Rail Rolling Stock Unit Summary**

Type	Book Count	Average Age (Years)	Unit Size
Work Equipment			
Ballast Hopper Car (NHL)	30	36	CAR
Material Transport Car (NHL)	6	34	CAR
General Service Flat Car (NHL)	2	58	CAR
Depressed Flat Car (Well Car) (NHL)	1	57	CAR
Steel Caboose (NHL)	1	72	CAR
Wire Train Tower Car (NHL)	1	18	CAR
Wire Train Wire Reel Car (NHL)	1	18	CAR
Wire Train Crew Car (NHL)	1	18	CAR
Wire Train Workshop Car (NHL)	1	18	CAR
Parlor Car Wire Combo (NHL)	1	18	CAR
Baggage Car Wire Train Combo (NHL)	1	18	CAR
<b>Work Equipment Total</b>	<b>46</b>		
Diesel Locomotives			
P-40 (SLE)	8	24	LOCOMOTIVE
GP-40-2H Locomotive (SLE)	6	18	LOCOMOTIVE
BL-20GH (NHL)	6	6	LOCOMOTIVE
Genesis Locomotive (NHL)	4	13	LOCOMOTIVE
<b>Sub Total</b>	<b>24</b>		
Electric Coaches			
M-2 Coach	49	39	PAIR
M-4 Coach	34	25	TRIPLET
M-6 Coach	28	17	TRIPLET
M-8 Coach	254(274)	3	PAIR
<b>Sub Total</b>	<b>365</b>		
Coaches			
Bombardier Push / Pull Coach (NHL)	20	26	COACH
Bombardier Push / Pull Coach (NHL)	20	21	COACH
Bombardier Push / Pull Coach (NHL)	10	12	COACH
Maferesa Push / Pull Coach (SLE)	33	22	COACH
<b>Sub Total</b>	<b>83</b>		
<b>Passenger Vehicle Total</b>	<b>448</b>		
<b>TOTAL</b>	<b>518</b>		

Rail Rolling Stock Source: CTDOT Bureau of Public Transportation. Graphic Revised as of December 2014

### ***Condition of Rolling Stock***

As part of its PTMS, CTDOT maintains a database that contains the information necessary and required to program the future replacement or rehabilitation of the rolling stock. CTDOT also has condition measures for evaluating rail rolling stock. These measures are based on specific replacement criteria for the rail rolling stock, and replacement criteria have been developed and refined over the years. The criteria are based on past CTDOT experience as well as industry standards. Electric multiple unit equipment, locomotives, and coaches are on a 30-year replacement schedule for new equipment and a 15-year replacement schedule for equipment which is remanufactured. However, the useful life of rail rolling stock may be extended beyond 30 years, if properly maintained.

The Department is currently in process of soliciting proposals for an overhaul program for the 8-CTDOT owned P-40 locomotives utilized in providing service on the SLE, this work is anticipated to begin in late 2014 and continue into 2016.

The rail rolling stock used to provide service in Connecticut is in a state of good repair (SOGR). As shown in Table 5-4, the passenger vehicles having an average age of 20 years or more have had at least one complete remanufacture or overhaul.

### ***Factors Affecting Condition of Rolling Stock***

Miles traveled and maintenance are the basic factors that affect the condition of the rolling stock. To minimize this effect, NHL and SLE fleet equipment are rotated to equalize miles traveled. To ensure the equipment is in safe working order, the passenger rolling stock is maintained in compliance with FRA safety standards CFR 49 part 238 and all FRA inspection regulations.

### ***Ability of Rolling Stock to Meet Current and Future Demand/Needs***

CTDOT working together with Metro North Railroad has made a commitment to future growth and increased number of trains operated on the NHL with the M-8 rail car contract. The M-8 rail order of 405 cars will allow for scales of economy with maintenance of a single fleet of cars. With this investment in the new M-8 rolling stock equipment CTDOT is providing the public the latest in rail car technologies, safety and gains the benefit of a safe and efficient public transportation system that will accommodate passenger demand for the near future. This investment will address fleet reliability, ridership service and demand, and Americans with Disabilities Act (ADA) requirements. In addition, further rail cars and locomotives will be required to proceed with phases two and three of SLE expansion plans.

### ***Rail Rolling Stock Safety Enhancements***

Rail rolling stock design safety enhancements for current and future equipment are being determined by the American Public Transportation Association Passenger Rail Equipment Safety Standards Task Force (APTA PRESS Task Force). The group was initiated in 1996 as a result of pending FRA regulations pertaining to passenger rail car safety issues. Its purpose is to better address the safety issues under consideration and to minimize economic impacts of proposed new rules.

The APTA PRESS Task Force, comprising representatives of 17 member passenger railroads, rolling stock equipment manufacturers, rail labor unions, and FRA personnel jointly develop improved standards and recommended practices to increase safety for various elements of rail vehicle design, maintenance, inspection, and emergency preparedness.

Members participate in construction/structural, electrical, mechanical, and passenger systems sub-committees to develop the standards and practices. After these standards and practices are developed, a residual core group will review and resolve issues that may result after

incorporation of the new standards and will continue to assess future safety needs of the rail passenger industry.

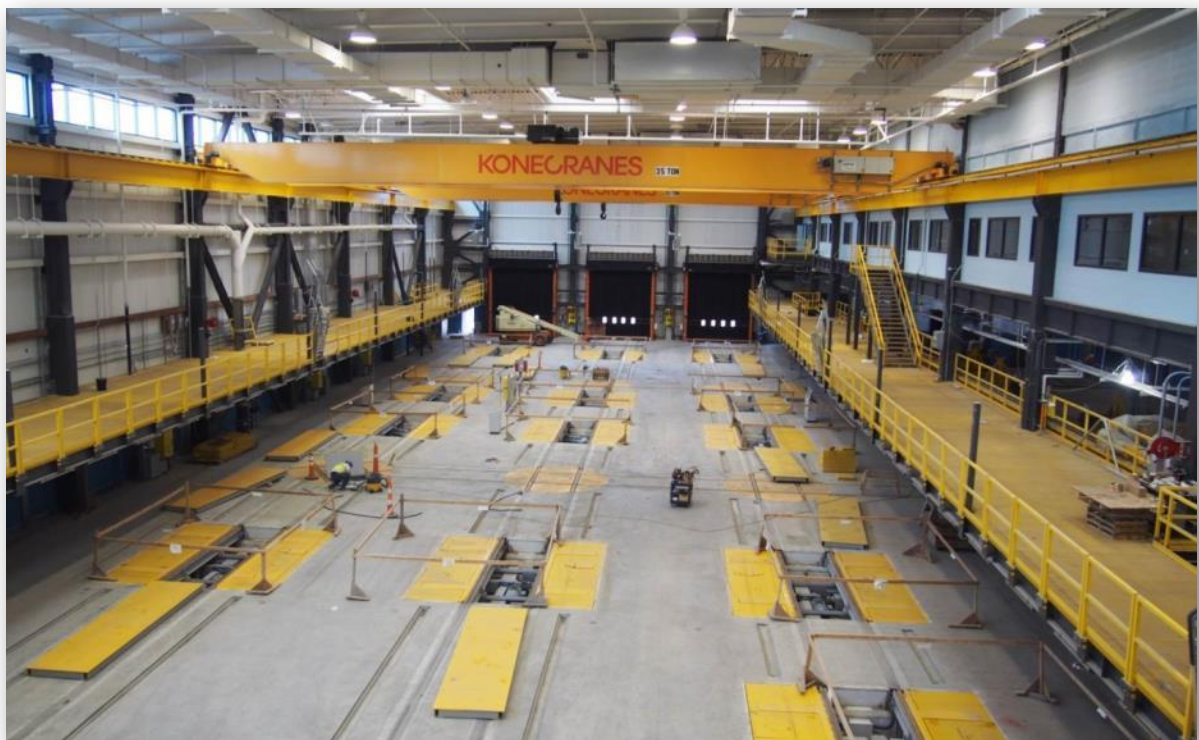
Since 1999, a total of 62 new standards and practices have been adopted by APTA. A majority of the specifications refer to new rolling stock equipment. These standards have been incorporated in the design of the M-8s that are currently operating and achieving reliability and availability targets as projected.

Some of the recommended standards pertain to existing equipment. CTDOT instructed its designated operators to implement the recommended standards and complete modifications to CTDOT-owned rolling stock. MNR completed the modifications to the equipment utilized on the NHL and branch lines, and Amtrak completed modifications to rolling stock used to operate the SLE service.

### **5.3.6 Maintenance of Equipment (MOE) Facilities**

CTDOT is responsible for the Maintenance of Equipment (MOE) facilities of the NHL and SLE commuter rail services. The NHL has repair and inspection MOE facilities in New Haven and Stamford. The NHL facility in New Haven is used to make periodic inspections and running/intermediate repairs that require less than three days to complete. Stamford has two NHL MOE facilities, an inspection/running repair facility, and a heavy repair facility. The SLE has a repair and inspection facility in New Haven.

**Figure 5-9. Component Change Out Facility, New Haven Rail Yard**



#### ***Condition of MOE Facilities***

The Service and Inspection Shop, in the New Haven Rail Yard, began operation in December 2006. This facility compliments an older NHL facility in New Haven which dates back some 30 years and is in good condition. Currently CTDOT is constructing a Component Change Out facility, a service and inspection shop, a wheel true facility, and other shops equipped to maintain



the fleet with state-of-the-art equipment and technology to support the M-8 fleet. The total cost for design and construction of the new rail car maintenance facility is estimated to be \$800 million. The new Running Repair Shop will be available for maintenance of both the old and new fleet.

CTDOT has in place measures and standards for evaluating the condition of transit assets such as rail maintenance facilities. The major components of rail maintenance facilities such as the roof, heating, ventilation, air conditioning, windows, doors, siding, floor, ceiling, interior walls, bathrooms, etc. are inspected and rated on a scale of one to five, with one being new or like-new condition and five being very serious deterioration or dangerous. Facilities are inspected every five years and improvements are programmed based on the condition reports.

### ***Factors Affecting Condition of MOE Facilities***

Normal use affects the conditions of the MOE facilities; routine maintenance is performed to reduce this effect.

### ***Ability of MOE Facilities to Meet Current and Future Needs/Demand***

The existing facilities in Stamford and New Haven have been over-extended. The older NHL maintenance facility in New Haven has been operating 24/7 (around-the-clock). The new Running Repair Shop at the New Haven Rail Yard, an aerial view of which can be seen in Figure 5-10, has helped to ease this burden. Further expansion of maintenance facilities in New Haven will continue this trend and support the complete maintenance needs of the entire NHL fleet in a fully integrated manner. The SLE MOE facility is able to accommodate the rolling stock used on the SLE service. However, any expansion of the service may require adding additional capacity to the facility.

**Figure 5-10. Union Station and New Haven Rail Yard, New Haven, Connecticut**



### 5.3.7 Rail Stations and Platforms

A total of 52 stations provide access to the various passenger rail services in Connecticut. NHL commuter rail service is provided by MNR at 38 stations, and SLE commuter rail service is provided by Amtrak at 7 stations. Northeast Corridor intercity rail service is provided by Amtrak at an additional 7 stations. Each of these stations has some degree of auto access and parking. Nearly all of the stations have taxi service available. The following stations have commuter connections services: Union Station and State Street Station in New Haven, Milford, Station Westport Station, South Norwalk Station, Stamford Station and Greenwich Station. Several stations - Stamford, Westport, Bridgeport, Danbury, and New Haven - also have reasonably convenient connections available to local bus service. Others, such as Hartford, Waterbury, Norwalk, New London, Greenwich, and Fairfield have access provided by only one or two routes.

Additional information on support facilities and physical attributes of individual stations is presented in *Connecticut's Public Transportation Management System*. The ownership, maintenance responsibility, and conditions vary among the NHL, SLE, and Amtrak intercity rail stations. All but three NHL rail stations are owned by CTDOT and leased to the city or town in which they are located. Table 5-5 shows the entities responsible for the ownership, operation, and parking at each station. The SLE-only stations are owned by CTDOT and maintained by a CTDOT contractor. There are no parking fees at these SLE stations. The ownership, maintenance responsibility, conditions, and parking fees vary at Amtrak intercity facilities. CTDOT does not routinely maintain a conditions assessment or detailed parking data for Amtrak intercity facilities.

Figure 5-11. Shore Line East at Clinton Station



**Table 5-5. Connecticut Rail Station Responsibility and Service Matrix**

Station Location	Owner	Operation	Parking	Remarks	Rail Service (Provider)
Ansonia	CTDOT	CTDOT	Town	Branch platforms State-owned	NHL (METRO NORTH)
Beacon Falls	CTDOT	CTDOT	Town	Town maintains parking lot	NHL (METRO NORTH)
Berlin	AMTRAK	AMTRAK	CTDOT	Branch platforms AMTRAK-owned	Northeast Corridor (AMTRAK)
Bethel	CTDOT	Town	Town	Town handles all aspects	NHL (METRO NORTH)
Branford	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects of SLE Stations through Fac Mgmt Co	SLE (AMTRAK)
Bridgeport	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects through Fac Mgmt Co	NHL (Metro North), SLE (AMTRAK) Northeast Corridor (AMTRAK)
Clinton	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects of SLE Stations through Fac Mgmt Co	SLE (AMTRAK)
Danbury	CTDOT	City	City	City handles all aspects	NHL (METRO NORTH)
Darien	CTDOT	Town	Town	Town handles all aspects	NHL (METRO NORTH)
Darien-Noroton Heights	CTDOT	Town	Town	Town handles all aspects	NHL (METRO NORTH)
Derby/ Shelton	CTDOT	Valley COG	Valley COG	Valley Council Of Govts	NHL (METRO NORTH)
Fairfield	CTDOT	FPA	FPA	Fairfield Parking Authority	NHL (METRO NORTH)
Fairfield Metro	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects through Fac Mgmt Co	NHL (METRO NORTH)
Greenwich	Private	Private	Town/Private	CDOT owns platforms	NHL (METRO NORTH)
Greenwich-Cos Cob	CTDOT	Town	Town	Town handles all aspects	NHL (METRO NORTH)
Greenwich-Old Greenwich	CTDOT	Town	Town	Town handles all aspects	NHL (METRO NORTH)
Greenwich-Riverside	CTDOT	Town	Town	Town handles all aspects	NHL (METRO NORTH)
Guilford	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects of SLE Stations through Fac Mgmt Co	SLE (AMTRAK)
Hartford	Private	Private	Private	Greater Hartford Transit District owns & operates station. Branch platforms AMTRAK-owned	Northeast Corridor (AMTRAK)
Madison	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects of SLE Stations through Fac Mgmt Co	SLE (AMTRAK)
Meriden	CTDOT	CTDOT	CTDOT	Amtrak owns platform- CTDOT utilizes facility management company for building and lot	Northeast Corridor (AMTRAK)
Milford	CTDOT	City	City	Milford Transit District	NHL (METRO NORTH)
Mystic	AMTRAK	AMTRAK	AMTRAK	Provides Amtrak service only	Northeast Corridor (AMTRAK)
Naugatuck	CTDOT	CTDOT	CTDOT	Old RR station not used for trains	NHL (METRO NORTH)
New Canaan	CTDOT	Town	Town	Town handles all aspects	NHL (METRO NORTH)
New Canaan-Talmadge Hill	CTDOT	Town	Town	Town handles all aspects except lights	NHL (METRO NORTH)
New Haven – State Street	CTDOT	CTDOT	None	CTDOT handles all aspects through Fac Mgmt Co	NHL (Metro North), SLE (AMTRAK)
New Haven – Union Station	CTDOT	NHPA	NHPA	New Haven Parking Authority handles station and parking garage.	NHL (METRO NORTH) SLE (AMTRAK) Northeast Corridor (AMTRAK)

Station Location	Owner	Operation	Parking	Remarks	Rail Service (Provider)
New London	Private	Private	City	CTDOT handles all aspects of SLE / Amtrak owns platforms	SLE (AMTRAK) Northeast Corridor (AMTRAK)
Norwalk, East Norwalk	CTDOT	City	City	Norwalk Parking Authority	NHL (METRO NORTH)
Norwalk-Merritt 7	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects through Fac Mgmt Co	NHL (METRO NORTH)
Norwalk-Rowayton	CTDOT	City / 6 <sup>th</sup> Taxing	City / 6 <sup>th</sup> Taxing	Sixth Taxing District	NHL (METRO NORTH)
Norwalk-South Norwalk	CTDOT	City	City	CTDOT owns platforms Norwalk Parking Authority	NHL (METRO NORTH)
Old Saybrook	AMTRAK	AMTRAK	Private/State	CTDOT owns satellite parking lot.	SLE (AMTRAK) Northeast Corridor (AMTRAK)
Ridgefield-Branchville	CTDOT	Town	Town	Town handles parking & station bldg.	NHL (METRO NORTH)
Seymour	Town	CTDOT	Town	Branch platforms State-owned	NHL (METRO NORTH)
Southport	CTDOT	FPA	FPA	Fairfield Parking Authority	NHL (METRO NORTH)
Stamford	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects through Fac Mgmt Co	NHL (Metro North), SLE (AMTRAK) Northeast Corridor (AMTRAK)
Stamford-Glenbrook	CTDOT	City	City	City handles parking only	NHL (METRO NORTH)
Stamford-Springdale	CTDOT	City	City	City handles parking only	NHL (METRO NORTH)
Stratford	CTDOT	Town	Town	Town handles all aspects of the station	NHL (METRO NORTH)
Wallingford	City	City	City	Branch platforms AMTRAK-owned	Northeast Corridor (AMTRAK)
Waterbury	CTDOT	CTDOT	CTDOT	Old RR station not used for trains	NHL (METRO NORTH)
West Redding	CTDOT	Town	Town	Town handles all aspects	NHL (METRO NORTH)
West Haven	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects through Fac Mgmt Co	NHL (METRO NORTH)
Westbrook	CTDOT	CTDOT	CTDOT	CTDOT handles all aspects of SLE Stations	SLE (AMTRAK)
Westport	CTDOT	WPD	WPD	Westport Police Dept	NHL (METRO NORTH)
Westport-Green's Farms	CTDOT	WPD	WPD	Westport Police Dept	NHL (METRO NORTH)
Wilton	CTDOT	CTDOT	CTDOT	CTDOT handles aspects through Fac Mgmt Co	NHL (METRO NORTH)
Wilton-Cannondale	CTDOT	CTDOT	CTDOT	CTDOT handles aspects through Fac Mgmt Co	NHL (METRO NORTH)
Windsor	Town	Town	Town	Branch platforms AMTRAK-owned	Northeast Corridor (AMTRAK)
Windsor Locks	Amtrak	Amtrak	Amtrak	Branch platforms AMTRAK-owned CTDOT owns commuter parking lot	Northeast Corridor (AMTRAK)

Source: CTDOT NHL Train Station Visual Inspection Report – January 2007, CTDOT SLE CT Commuter Rail (effective as of April 2, 2007) and AMTRAK system Timetable (effective as of April 2, 2007), Table updated by Office of Rail Operations , January 2014

**Figure 5-12 West Haven Station, West Haven, Connecticut**



### ***Condition of Rail Stations and Platforms***

In accordance with the Bureau of Public Transportation's state-of-good-repair policy, funding is programmed annually in the Bureau's Capital Project Management Plan to ensure that all facilities owned or controlled by CTDOT are maintained, upgraded, or overhauled as industry standards and equipment life cycles require. The leases for the NHL rail stations which are owned by CTDOT and leased to cities or towns require that the stations be maintained in a state of good repair by the municipality. Fees collected for parking and subleases are expected to be used for this purpose. Major building improvements and repairs generally are funded by CTDOT. In 2006, the Department was directed to inspect all NHL train stations. This analysis found that the general condition of all stations is good. Worn platforms, concrete stains, uneven walks, rusty catenary structures, peeling paint, meager amenities, trash, weathered metal surfaces, and other unpleasant conditions contribute to the uninviting appearance of many NHL stations. However, station facilities are structurally sound; the platforms are functional; canopies provide protection from the elements; and paths are negotiable.

In 2012, CTDOT completed an extensive Preliminary Engineering Study also known as "Phase C" – State Project 300-0148 for 32 New Haven Line rail station facilities evaluating the "state of good repair" of each. These findings will enable CTDOT to prioritize specific work at various locations based on available funding.

### ***Station Usage***

Daily ridership at the 52 rail stations in Connecticut ranges from five to ten daily passengers at lower volume Amtrak stations to more than 5,500 daily passengers at Stamford.

### ***Ability of Stations and Platforms to Meet Current and Future Needs/Demand***

Station and platform upgrades are needed to meet both current and future demand. Based upon a recent assessment of station facilities along the New Haven Line and associated branch lines, the estimated cost to bring existing passenger stations to a state of good repair is greater than \$15 million. At the urging of the Governor, CTDOT is establishing a program of repairs, upgrades, and improvements to enhance the appearance, safety, and functionality of all 38 NHL Stations. The Department has categorized needed improvements into four areas: maintenance repairs, amenity upgrades, governance improvements, and major capital improvements. Each is discussed below:

- ***Maintenance Repairs.*** These improvements include housekeeping, rust removal, paint touch-up, minor concrete repairs, graffiti removal, railing repairs, broken lights, storm damage, sign replacement, landscaping, and other normal maintenance activities.
- ***Amenity Upgrades.*** These improvements include, but are not limited to, station trailblazing signs, entrance signs, station kiosks, and the removal of vending machines and newspaper boxes from platforms and paths.
- ***Governance Improvements.*** These improvements may include railing replacement, sidewalk installation, light fixture replacement, platform/canopy repairs, tactile edge installation, major concrete repairs, signage reviews, and ADA upgrades. Governance improvements involve tasks that require the preparation of design plans and a contract bid package and are more costly and complex to undertake.
- ***Major Capital Improvements.*** These improvements may include the installation or extension of high-level platforms and canopies, the replacement or addition of shelters, and major ADA improvements. CTDOT estimates that \$100 million will be needed over the next five to ten years to complete the first three categories of work. Major capital improvement costs are estimated at an additional \$289 million. These estimates are by no means the full responsibility of the state and funding sources have not yet been identified.

Establishing bi-directional service on SLE (phase three of SLE expansion proposal) would require significant station improvements to the Branford, Guilford, Madison, Clinton, and Westbrook stations. Station-specific needs are available in individual station inspection reports, which are available on the internet at [http://www.ct.gov/dot/station\\_report](http://www.ct.gov/dot/station_report).

### 5.3.8 Rail Station Parking

Over 18,000 parking spaces are available at the state's 52 rail stations. The number of parking spaces provided at each station varies from approximately 20 spaces at Seymour's NHL station to more than 1,000 at the New Haven, Bridgeport, Greenwich, Stamford, Westport, and Fairfield stations.

**Figure 5.3. Parking Facility at Railroad Station in Branford, Connecticut**



Stamford, Norwalk, Bridgeport, and New Haven have parking structures. Despite this, the majority of the parking facilities are surface lots constructed parallel to the rail lines. While owned by CTDOT, most of the lots are actually leased and operated by the individual towns in which they are located. Parking fees typically cover a portion of the cost of upkeep, snow removal, and policing, but capital improvements, such as major rehabilitation and construction, are typically funded by the state.

The SLE-only stations are owned and maintained by CTDOT, through a contracted Facility Management Company with certain properties supporting station platforms and parking under lease with Amtrak. There are no parking fees at these stations.

The ownership, maintenance responsibility, conditions, and parking fees vary at Amtrak intercity facilities.

#### ***Condition of Rail Station Parking***

In accordance with the Bureau of Public Transportation's state of good repair policy, funding is programmed annually in the Bureau's Capital Project Management Plan to ensure that all facilities owned or controlled by CTDOT are maintained, upgraded, or overhauled as industry standards and equipment life cycles require. However, all but three NHL rail stations are owned by CTDOT and leased to the city or town in which they are located. Such leases require that the stations be maintained in a state of good repair by the municipality. Fees collected for parking and subleases are expected to be used for this purpose. In general, the busier parking areas

are in good condition while some of the less occupied lots at the smaller stations have pavement cracks and potholes.

CTDOT does not maintain a conditions assessment or detailed parking data for Amtrak intercity facilities.

### ***Use of Rail Station Parking***

On both the NHL and SLE lines, the parking utilization rate is extremely high. More parking is needed to address current and future demand, and CTDOT is working to develop and fund an expansion strategy. Overall, the average utilization of parking spaces at the rail stations in Connecticut is approximately 80 percent.

Many towns that control these parking facilities issue parking permits for reserved spaces. Because each parking permit holder does not use the space every day, it is common practice to over sell parking permits; more permits are sold than there are spaces. The level of permits issued must be constantly monitored to ensure that spaces are available for all permit holders.

### ***Factors Affecting Ability to Meet Demand for Rail Station Parking***

The following factors affect the ability to meet demand for parking at rail stations:

- ***Availability of Land.*** Most of the easy options for expanding parking capacity have been exhausted. Undeveloped parcels suitable for parking expansion in reasonable proximity to NHL stations are extremely limited. Significant expansion of rail parking will require either parking structures or conversion of developed land.
- ***Environmental.*** Even when vacant or underutilized land can be found for parking expansion, prior uses have often rendered the land contaminated to such a degree that it is not cost effective to build on.
- ***Public Opposition.*** In a few places, where parcels are available for surface parking expansion, CTDOT has encountered local opposition to its efforts to expand parking on such parcels. Local opposition to parking structures also has been very strong and local concern about losing taxable property to public transit use has been expressed. However, recent developments have been encouraging. The impressive West Haven rail station was completed in August 2013 with planning underway for a new station in Orange. Fairfield Metro rail station was completed in December 2011.
- ***Cooperation of Towns in which Rail Stations are Located.*** The cooperation of towns along the NHL will be necessary to carry out the parking expansion. Residents in the towns and cities in which NHL stations are located must develop an understanding of the importance of the NHL as a regional transportation resource. They must understand and accept the fact that NHL stations exist to serve the regional transportation demand and are not the sole resource of the community in which they are located.
- ***Funding.*** The federal Congestion Mitigation and Air Quality (CMAQ) program and state bond funds are the primary sources of funds for NHL parking projects, although both of these sources are limited. Expansion of service on SLE will require a significant capital expenditure for parking facilities. CTDOT estimates phases one and two of the proposal would require \$6 million each for parking upgrades, and that phase three would require an additional \$12 million.
- ***Use of Parking Lot Revenues.*** The lease agreement with the towns for stations and parking provide for no lease payment to the State, however, all revenues generated by the facilities that are not used for the operation and maintenance are deposited in a "Reinvestment Fund." This fund is to be used, with the State's approval, for improvements to the station buildings, station services, and parking facilities at each location.



## 5.4 Railroad Bridges

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CTDOT is responsible for ensuring the safety of the traveling public and protecting the State's capital investment in railroad bridges. CTDOT's Office of Rail inspects, evaluates and maintains an inventory of the structural condition, strength and functional capacity of the railroad bridges on these lines. Table 5-7 is a summary of the bridge inventory maintained by the Office of Rail.

The State owns 325 bridges and inspects 306 bridges on active, inactive and abandoned rail right-of-way. There are four major subdivisions that are operated by Metro-North and carry passenger trains (the New Haven Line Main Line (NHL), the Danbury Branch, the New Canaan Branch and the Waterbury Branch). Various other lines are operated by short-line freight railroads. Additionally there are lines with no rail use. Railroad bridges on these lines are inspected on a two year basis. Railroad bridges on lines operated by the Metro-North Railroad are inspected on an annual basis. The frequency of inspection for railroad bridges operated by Off-System railroads (those bridges not on the New Haven Rail Line and operated by freight railroads) is also every year. However, Inactive and abandoned structures can be placed on a two-year inspection interval. The primary goal of the inspection program is to identify deficiencies and recommend repairs, rehabilitation or replacement in a timely manner.

The Office of Rail hires consultants to inspect the railroad bridges. Any noted maintenance work is performed by the operating railroad. On average, 10-15 NHL bridges are repaired per year. Bridges on freight lines are repaired as needed.

**Figure 5-14. Railroad Swing Truss Bridge, Middletown CT**



**Table 5-7 Connecticut Railroad Bridge Inventory**

Location	Owner	Railroad	Total Bridges
New Haven Main	ConnDOT	Metro-North Railroad	136
Greenwich to New Haven			
New Canaan Branch	ConnDOT	Metro-North Railroad	5
Stamford to New Canaan			
Danbury Branch	ConnDOT	Metro-North Railroad	26
Norwalk to Danbury			
Waterbury Branch	ConnDOT	Metro-North Railroad	36
Mifflord to Waterbury			
New Milford Secondary	ConnDOT	Housatonic Railroad	23
New Milford to North Canaan			
Torrington Industrial Track	ConnDOT	Naugatuck Railroad	23
Waterbury to Torrington			
Willimantic Branch	ConnDOT	Providence & Worcester Railroad	8
Windham to Plainfield			
Wethersfield Secondary	ConnDOT	Providence & Worcester Railroad	9
Rocky Hill to Hartford			
Portland Industrial Track	ConnDOT	Providence & Worcester Railroad	1
Middletown to Portland			
Middletown Secondary	ConnDOT	Providence & Worcester Railroad	8
Durham to Middletown			
Laurel Industrial Track	ConnDOT	Providence & Worcester Railroad	8
Middletown			
East Berlin Industrial Track	ConnDOT	Providence & Worcester Railroad	1
Middletown			
Cromwell Industrial Track	ConnDOT	Providence & Worcester Railroad	2
Cromwell			
Griffins Industrial Track	ConnDOT	Central New England Railroad	3
Hartford to Bloomfield			
East Longmeadow Secondary	ConnDOT	Central New England Railroad	8
South Windsor to Enfield			
Torrington Industrial Track	ConnDOT	Pan America Railways	4
Waterbury			
AIRLINE VL MAP 54-64/29	ConnDOT	Abandoned Railroad	4
Plainfield			
VAL. MAP 57-72/54	ConnDOT	Inactive Railroad	1
Winstead			
<b>Total</b>			<b>306</b>

## Condition

Bridges are primarily rated by structural condition and strength. Rating a bridge's structural condition involves a careful inspection and evaluation of the two main components: (1) superstructure (structural supports); and (2) the substructure (piers and abutments).

Each of the two major components is comprised of a number of sub-elements. The evaluation of the sub-elements results in a numerical rating from zero (failed condition) to nine (excellent condition). The lowest rating among the two main components becomes the bridge's overall rating. Table 5-7 provides a summary of the condition of railroad bridges in Connecticut. Table 5-8 provides a description of structural condition ratings used for railroad bridge inspection.

**Table 5-8. Structural Condition Ratings for Railroad Bridges**

CODE	DESCRIPTION
N	NOT APPLICABLE
9	EXCELLENT CONDITION
8	VERY GOOD CONDITION – no problems noted.
7	GOOD CONDITION – some minor problems.
6	SATISFACTORY CONDITION – structural elements show some minor deterioration.
5	FAIR CONDITION – all primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
4	POOR CONDITION – advanced section loss, deterioration, spalling, or scour.
3	SERIOUS CONDITION – loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	CRITICAL CONDITION – advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1	“IMMINENT” FAILURE CONDITION – major deterioration or section loss present in critical structural components, or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put bridge back in light service.
0	FAILED CONDITION – out of service; beyond corrective action.

**Table 5-9. Railroad Bridge Condition Rating by Location as of December 2013**

Railroad / Rail Line Location	Number of Bridges at Each Condition Rating ( )								Total Bridges
	Very Good (9)	Good (7)	Satisfactory (6)	Fair (5)	Poor (4)	Serious (3)	Critical (2)	N/A N/A	
Metro - North Railroad / New Haven Main Greenwich to New Haven	3	25	21	55	28	2	0	2	136
Metro - North Railroad / New Canaan Branch Stamford to New Canaan	0	1	0	2	2	0	0	0	5
Metro - North Railroad / Danbury Branch Norwalk to Danbury	0	5	7	11	3	0	0	0	26
Metro - North Railroad / Waterbury Branch Milford to Waterbury	3	3	6	13	10	1	0	0	36
Housatonic Railroad / New Milford Secondary New Milford to North Canaan	0	0	8	7	6	2	0	0	23
Naugatuck Railroad / Torrington Industrial Track Waterbury to Torrington	0	2	7	7	6	0	0	1	23
Providence & Worcester Railroad / Willimantic Branch Windham to Plainfield	0	0	1	6	1	0	0	0	8
Providence & Worcester Railroad / Wethersfield Secondary Rocky Hill to Hartford	0	1	4	4	0	0	0	0	9
Providence & Worcester Railroad / Portland Industrial Track Middletown to Portland	0	0	0	0	1	0	0	0	1
Providence & Worcester Railroad / Middletown Secondary Durham to Middletown	0	2	0	4	1	1	0	0	8
Providence & Worcester Railroad / Laurel Industrial Track Middle town	0	0	0	3	5	0	0	0	8
Providence & Worcester Railroad / East Berlin Industrial Track Middletown	0	0	0	0	1	0	0	0	1
Providence & Worcester Railroad / Cromwell Industrial Track Cromwell	0	0	0	0	2	0	0	0	2
Central New England Railroad / Griffins Industrial Track Hartford to Bloomfield	0	0	0	2	1	0	0	0	3
Central New England Railroad / East Longmeadow Secondary South Windsor to Enfield	0	0	2	3	3	0	0	0	8
Pan America Railways / Torrington Industrial Track Waterbury	0	0	0	0	3	1	0	0	4
Abandoned Railroad / AIRLINE VL MA P 54-64/ 29 Plainfield	0	0	1	1	0	0	0	2	4
Inactive Railroad / VAL. MA P 57- 72/ 54 Winstead	0	0	0	1	0	0	0	0	1
<b>Total</b>									<b>306</b>

The inspection reports, condition rating and load rating (strength) of the bridge are used to identify projects for major repairs, rehabilitation or replacement. These are evaluated for inclusion in CTDOT's rail capital program and coordinated with other major projects on the railroad. On average, two such projects go to construction each year. In the spring of 2007 a construction contract was awarded to replace or rehabilitate five railroad bridges between Fairfield and Bridgeport (bridges over North Benson Road and Westway Road in Fairfield, bridges over Fairfield Avenue and South Avenue in Bridgeport, and the elimination of Main Street in Bridgeport). Construction is scheduled to be completed in 2014. The rehabilitation of two bridges in Greenwich (bridges over Sound Beach Avenue and Tomac Avenue) is currently in the design phase, with construction anticipated to begin in 2014

### ***Factors Affecting the Condition of Railroad Bridges***

The primary factors that lead to deterioration of bridges are weather, loads, volume of railroad traffic and deicing operations. As bridges deteriorate their condition ratings over time and gradually decline to a poor rating. Preventative maintenance can extend the useful life of a structure substantially; however, major repairs, rehabilitation or replacement will ultimately be required.

When a structure receives its initial poor rating, the bridge is identified as a candidate for major repair, rehabilitation or replacement. Steps are then taken to ensure that the bridge is programmed for rehabilitation or replacement. Very often this takes several years since there are environmental, right-of-way and railroad traffic related concerns that must be addressed before construction can commence. Experience has shown that initiating this process when the first poor rating is identified allows sufficient time for design and construction of the required repairs, rehabilitation or replacement.

### ***Ability of Railroad Bridges to Meet Current and Future Demand***

The factors affecting the ability of the railroad bridges to meet current and future demands are age, condition, and use. The current program to perform maintenance repairs to bridges requiring short-term work allows for an extended life of the structure. Funding is currently available and programmed into future years to continue maintenance, rehabilitation, and replacement of the railroad bridges on the state system.

When work on rail bridges requires track outages, careful staging of the work must be undertaken. Timeframes for required projects must be developed in such a manner so as to have the least possible affect on the operation of trains and maintaining schedules. Coordination with other rail infrastructure projects is required.

## 5.5 Factors Affecting Ability of Rail Passenger System to Meet Current and Future Demand

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A number of factors affect the ability of the rail passenger system in Connecticut to meet current and future demand, including the following:

- **Availability of Parking.** The availability of parking is a factor for all rail commuters. However, the availability of parking for the intrastate rail commuter or the occasional user is a significant factor in selecting rail as the means of travel. After the morning peak, spaces are often limited. Given the traffic congestion and cost to park in Manhattan, driving is seldom considered as a viable option for the Manhattan commuter. Generally speaking, the more captive Manhattan commuter will go to greater lengths to access a NHL station (i.e. ridesharing, kiss and ride, and shuttle service from satellite lots).
- **Cost of Parking at Rail Stations.** The cost for parking is a factor for all rail commuters. However, the cost to park may often be less of a factor for Connecticut commuters destined for Grand Central Terminal than for intrastate commuters since the parking fee represents a greater percentage of the total trip cost for intrastate commuters. The intrastate commuter is not generally considered to be a captive rider and is more sensitive to the trip cost, including parking fees. The total trip cost must be considered by CTDOT when developing strategies to attract commuters from I-95 and the Merritt Parkway.
- **Management Arrangements for the Parking Facilities.** As is the case with NHL station management, in most cases, station parking facilities are owned by CTDOT and leased to the city or town in which the station is located. Parking fees and regulations are established by the affected municipality, subject to the approval of CTDOT. In May 2005, a consultant hired by CTDOT to evaluate how Connecticut's NHL stations and parking facilities are governed and operated submitted its final report, titled *Connecticut Rail Station Governance Study – Final Report*. The purpose of the evaluation was to provide CTDOT with sufficient information to determine if a change should or can be made in how the stations and parking are governed in order to improve serviceability, financial effectiveness, and service quality. A key recommendation of the study is that the Department develop a Standards and Practices Manual for the operation of stations and parking facilities. It also advises CTDOT to consider three governance options: (1) a minimal strategy in which governance is essentially left as-is, but with the incorporation of new leases and the use of a Standards and Practices Manual; (2) a Memorandum of Understanding, in which the Department negotiates with owners of non-CTDOT parking to develop standard operations across all facilities; or (3) governance by a single entity, in which the management of all stations and parking is assumed by the State and operated by the Department, either with its own employees, under a contract, or by a created authority. CTDOT is currently in the process of implementing the findings of the study.
- **Availability of Public Transportation Service at Rail Stations.** Most major rail stations (Greenwich, Stamford, South Norwalk, Westport, Bridgeport, and New Haven) have connecting bus services, both local services and dedicated feeder/distributor routes. Feeder/distributor bus service, known as Commuter Connection service, is coordinated with trains, mostly during peak hours. Schedules of Metro-North trains are subject to change every four months and are typically coordinated with other carriers. This means that there are almost always buses ready to meet trains. The Commuter Connection schedules are adjusted as necessary when there are changes in NHL schedules changes. The fixed-route services are typically not adjusted with every rail schedule

change since they serve the larger market of bus riders, not just the rail commuters. There is a need to have high profile marketing of the availability of train and bus connections during these times.

- **Funding.** The amounts of state and federal funding available to Connecticut for the operation and purchase of equipment and the construction and maintenance of transit facilities affect the ability of the rail passenger system to meet current and future demand. The transit districts and CTTransit would require additional funding from the state or local sources to increase the operating hours of fixed-route bus services to provide more bus service to rail stations.
- **Transit Funding Policies.** Modifications to the federal surface transportation program structure can affect funding strategies for the construction and maintenance of transit facilities and equipment.
- **Comfort and Security of Waiting Areas.** Comfort and security of waiting areas are factors that can affect passengers' use of the facilities. Some train stations are historic in style and have superior waiting areas with respect to amenities, security, illumination, and other comfort factors. CTDOT has an on-going program to upgrade and modernize the variety of waiting areas on the rail transit lines to improve passenger comfort and security.
- **Americans with Disabilities Act (ADA) Accessibility.** In compliance with the ADA, twelve NHL stations and one SLE station were selected as Key Stations. These stations are required to be accessible to the disabled as defined by the law. The NHL Key Stations are New Haven, Milford, Bridgeport, Fairfield, Westport, South Norwalk, Darien, Stamford, Greenwich, Waterbury, Danbury, and New Canaan. CTDOT has completed upgrades to all of these facilities with the exception of Fairfield, which was re-designated as the new Fairfield Metro station completed in December 2011. While Key Station status has allowed for a concentration of ADA upgrades at targeted facilities, it is the intent of the Department to gradually bring all facilities up to code.

## 5.6 Ability of Rail Passenger System to Meet Current and Future Demand

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The rail passenger system in Connecticut is an important resource in meeting transportation demand. The state of the commuter rail system infrastructure remains strong and is adaptable to increased traffic levels commensurate with resource allocation. Performance measures such as on-time performance and seat availability, developed as part of CTDOT's PTMS, are used to adjust schedules, modify resource deployment, and initiate programs to ensure that safe, reliable, and efficient public transportation is provided.

The ability of the New Haven Line, New Haven Hartford Springfield (NHHS) Line and Shore Line East (SLE) to meet current and future demand is dependent upon CTDOT's ability to maintain and replace its fleet of rail cars and to provide adequate parking to keep pace with increasing ridership. In recent years, the State of Connecticut has made a substantial financial commitment to addressing rail passenger needs in Connecticut.

The Department is committed to maintaining its existing fleet while it continues to take delivery of the 405 new M-8 rail car fleet through 2015 that will serve Connecticut commuters for decades to come. This new, state-of-the-art fleet, coupled with the construction of new facilities at the New Haven Rail Yard designed specifically to service the new M-8 cars, is anticipated to greatly increase reliability, efficiency, and passenger satisfaction.

On the SLE, CTDOT completed a repair/modification project to bring the 33 Mafersa rail cars purchased from Virginia Railway Express into a state of good repair. This fleet of cars has been

providing safe and reliable service to the public and will continue to do so until this equipment is replaced with the next generation of diesel hauled equipment sometime in the near future

Providing an adequate number of parking spaces for individuals who patronize the New Haven and Shore Line East lines is also critical to CTDOT's ability to meet current and future demand. The state has added over 5,000 new parking spaces to the two lines through the construction of new parking facilities at New Haven, West Haven, Stratford, Bridgeport, Fairfield Metro, Merritt 7, Branford, Westbrook and Old Saybrook. In addition, new rail stations have been constructed at Fairfield Metro, West Haven, Madison and Westbrook will further increase accessibility to passenger rail service.

Ultimately, the ability to meet current and future demand for rail passenger service is dependent on the availability of funding to maintain existing rail facilities and rail cars, to routinely replace or refurbish rail cars when they exceed their useful lives, to purchase additional rail cars to meet demand, and to cover operating expenses. In future years, a continuing and consistent level of funding will be needed to maintain these investments and expand service. Dedicated funding for rail capital and operating costs should be set aside to support rail operations, equipment, and infrastructure so that the rail system does not become subject to deferred maintenance and consequent decline in quality of service that occurred in the past.

## 5.7 Factors Affecting Demand for Rail Freight Service in Connecticut

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The following factors affect or have affected the volume of freight transported in Connecticut by rail:

- **Location of Rail Freight Routes and Intermodal Terminals in Adjacent States.** One of the major container ports in the world, and one of the largest intermodal rail yards in the country are located in northeastern New Jersey, within one hundred miles of central Connecticut. A major intermodal yard with connections to the west is located just over the state line in West Springfield, Massachusetts. The close proximity of these facilities to business and industries in Connecticut and the fact that Connecticut does not have a direct freight connection to the western and southern United States (The main rail line for New England is the Boston to Albany Line that runs through southern Massachusetts, within ten miles of Connecticut's border.) results in a significant percentage of the goods originating in or destined for Connecticut being handled at these intermodal facilities and transported to or from Connecticut locations by truck.
- **Rail Connections to Ports.** CTDOT is conducting a preliminary assessment of the state's three deep water ports (New Haven, Bridgeport and New London), to determine the need and feasibility of enhancing rail links to these ports. Currently, an incomplete rail connection to the Port of New Haven continues to require drayage of commodities by some shippers using that facility. Although the new Tomlinson Bridge across the Quinnipiac River has a rail line, the existing line along Waterfront Street in the port area lacks the connections needed for direct ship-to-railcar capabilities. The City of New Haven and regional planning agency officials are meeting with the port operators and the local electric company to design and plan for the development of an adequate rail connection to the port terminals. The Port of Bridgeport has no direct rail access. The Port of New London has a rail connection that extends as far as Canada. **Freight Rail Access.** The scarcity of Hudson River rail crossings makes through-shipping of freight impractical for many commodities and products.
- **286,000 Pound Weight Restrictions.** Most freight and passenger lines in Connecticut are restricted to the lower 263,000 pound weight limit. Increasing to the more common



286,000 pound weight limit will enable local freight railroad to provide improved access to the national freight rail system.

- **Clearance Problems.** There are some vertical clearance problems on the line between New York City and New Haven. Many of the highway bridges that cross the rail line leave inadequate clearances for certain types of equipment to safely operate under the electric catenary system.
- **Small Size of State.** Competition from the trucking industry is strong due to the short distances involved in movement into and through the state.
- **Types and Sizes of Businesses and Services in Connecticut.** The state increasingly is oriented to business and service activities that do not generate large volumes of freight. Cutbacks in defense spending have reduced output in this key industrial sector.
- **Unbalanced Traffic Flows.** Connecticut is a net consumer of goods. That is, we receive more commodities than we produce and ship out. In the future, however, the volume of goods shipped out via rail may increase.
- **Manufacturing Needs: The Increase in the Use of Just-in-Time Delivery.** This is a method by which manufacturing and transportation methods are coordinated to ensure that the materials needed for manufacturing are delivered to the plant just at the time they are needed. This requires a high degree of sophistication and cooperation, but it drastically reduces the amount of supplies needed to be kept on hand, thus limiting the amount of inventory and warehousing needed.
- **Fundamental Changes in the Way Goods are Manufactured, Shipped, and Received.** The weakening and dilution of the state's industrial base, and the shortening and tightening of the product stream have led to fundamental changes in the way goods are manufactured, shipped, and received. Rarely do plants receive rail cars full of materials to be converted into finished products, with all phases of manufacturing and assembly taking place under one roof. Rather, manufacturing is dispersed over several locations with any one plant having a limited role. The changes in materials management, specifically, just-in-time delivery, mean that sites are getting smaller, requiring more frequent deliveries of materials. A similar situation exists with these sites' outbound shipments.
- **Freight Trackage Rights Fees.** High Amtrak freight trackage rights fees are counterproductive to enhancing rail freight providers' abilities to compete with the trucking industry in Connecticut.
- **Competitive Access for Class 1 Carriers.** Connecticut remains committed to maintaining adequate rail access to diverse market areas and improving service to areas west of the Hudson River, where 98 percent of the state's rail freight originates. Connecticut's railroads provide good, responsive local service, but they must have connections to the national markets in order to provide optimum access, and there must be a minimum of interline transfers in order to keep costs low. Therefore, CTDOT supports and encourages the provision of service to the region by carriers with wide market reach and competitive interchange rates.

Connecticut is adequately served via the east-west CSX Line in Massachusetts and by four north-south lines; the Housatonic Railroad from Pittsfield, Massachusetts; Amtrak's New Haven-Springfield Line from Springfield, Massachusetts; the NERC Line from Palmer, Massachusetts; and the Providence & Worcester (P&W) Line from Worcester, Massachusetts.

## 5.8 Ability of Rail Freight System to Meet Current and Future Demand

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To compete effectively, rail freight must respond to customer service requirements. The existing rail freight service providers and the rail freight system in Connecticut presently are able to meet the service requirements of current customers. However, physical, operational, and institutional issues in the region may prevent the rail system from absorbing further freight growth. In addition, regional and shortline railroads are critical elements of the intermodal freight transportation and distribution networks in the region, but their continued viability is vulnerable in some cases. The *Northeast Rail Operations Study*, conducted by the I-95 Corridor Coalition, states that the decline of regional and shortline railroads would have significant impacts on the region's transportation system and economic competitiveness.

The study holds that rail freight issues cannot be overlooked in the statewide and metropolitan transportation planning and programming processes. The region must work collaboratively to identify and address key issues affecting the rail freight system, including a better understanding of existing and planned rail improvements, identifying gaps where further investment would improve operations, prioritizing regional rail improvements, and identifying methods to better quantify public benefits of rail improvements.

One challenge is that the best reliable data regarding goods movement is limited, costly, and typically not readily available. As a result, any substantive evaluation of freight movement into, through, and within Connecticut would likely require a contract consultant and substantial investment of funds and time. While CTDOT can encourage the use of the rail freight system to ease truck traffic, the ultimate decision to utilize one mode of transportation over another lies with shippers and receivers

## 6 WATER TRANSPORTATION

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CTDOT is responsible for overseeing, managing, and coordinating various water transportation-related facilities, services, and activities. CTDOT's State Maritime Office within the Bureau of Public Transportation is responsible for the licensing of Connecticut marine pilots; assisting State Harbor Masters; operating Connecticut State Ferry Service; and the planning, development, and operation of the State Pier Facility which consists of Admiral Harold E. Shear State Pier and former Central Vermont Railroad Pier in the Port of New London. The Maritime Office has been involved with security of the three major commercial ports in the state- New London, New Haven, and Bridgeport – through participation in the U.S. Coast Guard Sector Long Island Sound Area Maritime Security Committee. As the property owner, the Office applies for Port Security Grants for the State Pier Facility, offered on an annual basis by the Department of Homeland Security. The locations of Connecticut's deep water ports are shown in Figure – 1 and Figure - 2 at the beginning of this document.

### 6.1 Connecticut State Ferry Service

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CTDOT's State Maritime Office's Ferry Service is comprised of two separate, seasonal ferry services across the Connecticut River between the towns of Chester and Hadlyme, and Rocky Hill and Glastonbury, the latter being the nation's oldest continuously running ferry service. These historic ferry services provide a highway link across the Connecticut River between Chester and Hadlyme on Route 148, and between Rocky Hill and Glastonbury on Route 160. The ferries load directly from Route 148 and Route 160 where the roadways meet the river. The Connecticut State Ferry Service also provides one of the safest links across the Connecticut River for bicyclists and pedestrians. The Chester-Hadlyme ferry service and the Rocky Hill-Glastonbury ferry service both operate from April through November. Both services operate from 7:00 a.m. until 6:45 p.m. on weekdays and from 10:30 a.m. until 5:00 p.m. on weekends. Mechanical problems, severe weather, and river conditions may temporarily interrupt service.

**Figure 6-1 – Rocky Hill Ferry**

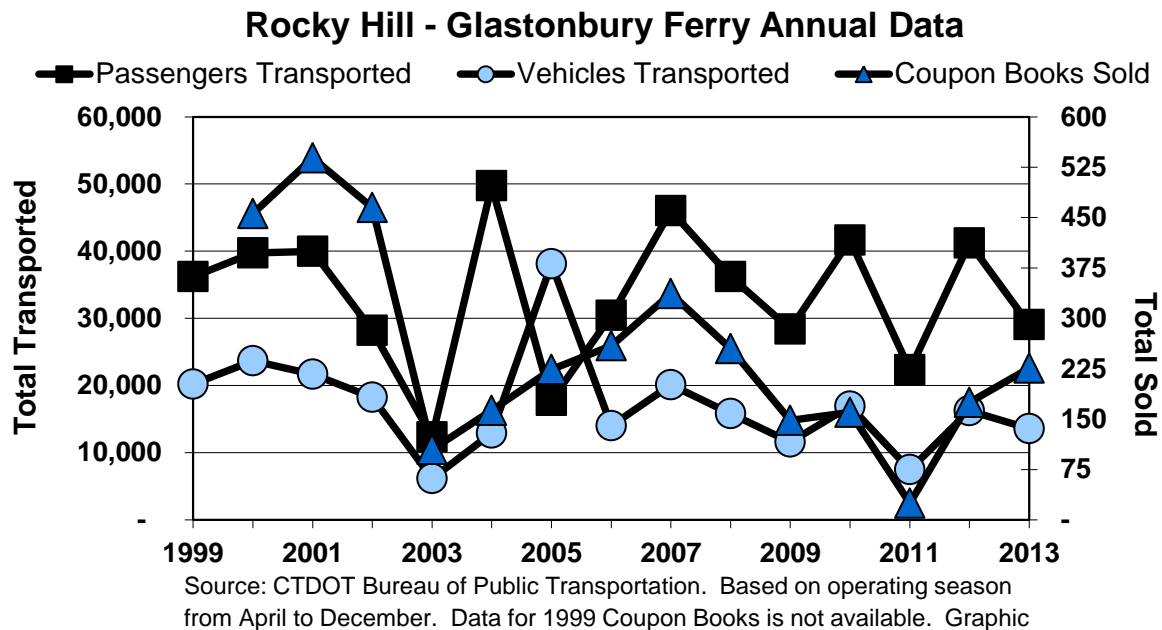


**Current Use**

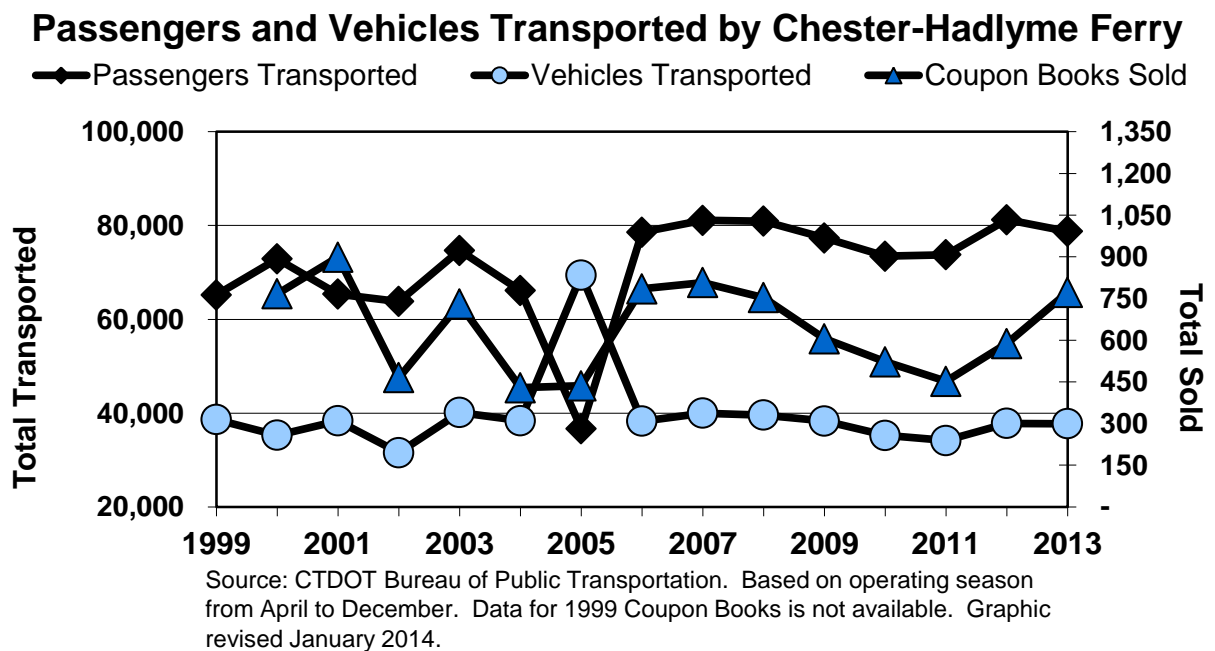
The Connecticut State Ferry Service is used by both daily commuters and tourists. The ferry is used predominately on weekends by tourists and residents for both social and recreational trips. The numbers of crossings made and numbers of vehicles and passengers carried between 1999 and 2013 by the Rocky Hill-Glastonbury and Chester-Hadlyme ferry services are shown in Figure 6-2 and Figure 6-3 respectively.

Commuter (coupon) book sales are the highest they have been in ten years, though ridership has remained essentially steady. Ridership on the ferries is not projected to increase significantly due to limited capacity.

**Figure 6-2. Rocky Hill - Glastonbury Ferry Annual Data**



**Figure 6-3. Chester-Hadlyme Ferry Annual Data**



### ***Ability to Meet Current Demand***

The two ferry routes each operate with one vessel. On the Chester-Hadlyme route, the Selden III has a maximum carrying capacity of 49 passengers, 8 automobile, and as many motorcycles, mopeds and bicycles that will fit within the maximum weight limitation. The Selden III has been in service since 1949. Vehicles up to five tons can be transported. Operating at full capacity, the ferry is capable of carrying approximately 1,000 vehicles per weekday and 540 vehicles per day on weekends.

The Hollister III and its tug, the Cumberland, on the Rocky Hill-Glastonbury ferry route has a maximum carrying capacity of 19 passengers, 3 to 5 vehicles and as many motorcycles, mopeds and bicycles that will fit within the maximum weight limitation. Both the Hollister III and the Cumberland have been in service since 1955. Operating at full capacity, this ferry is capable of carrying approximately 500 vehicles per weekday and 250 vehicles per day on weekends.

The vessels, although old, are in good condition and are adequate for the next five to ten years. The United States Coast Guard performs periodic safety inspections of the vessels, and annual inspections and repairs are made with a commitment to safety. A capital improvement project at the ferry slips and docking areas in Chester and Hadlyme that incorporated historic era light poles and stone pillars with iron fencing was completed in 2002. The new lighting and the overhauled tower hoists have improved the reliability and safety of the operation. At the Rocky Hill-Glastonbury ferry, a project was completed in 2009 to improve vehicle loading areas and to dredge the landings on both sides of the river. A new ferry office at the Rocky Hill landing will be completed in August 2014. The diesel engines in both ferries were replaced with Tier II compliant engines during the 2011-2012 winter overhaul period.

### ***Future Use and Growth of the Connecticut State Ferry Service***

The Maritime Administration (MARAD) is promoting increased use of water transportation through its America's Marine Highway (AMH) initiative. The eastern seaboard has been designated M-95. Long Island Sound has been designated as M-295, an inland waterway that could support short sea shipping as well as passenger high speed ferry (HSF) system as relief to congestion on I-95. The AMH initiative could result in funding authorization at the federal level for Connecticut to be a candidate state for using the Long Island Sound waterway as a means of increasing freight and passenger capacity in this vital corridor.

### ***Factors Affecting Ability of Ferry Service to Meet Current and Future Demand***

Factors that affect the ability of the Connecticut State Ferry Service to expand its service are ridership, condition of the ferries, personnel and funding as discussed below:

- ***Ridership.*** As the ridership increases, the Department will need to be prepared in a timely fashion to respond to the change in demand.
- ***Condition of Ferries.*** The Connecticut River Ferry vessels, although old, are in good condition and are adequate for the short term. However, in the long term, the vessels will need to be replaced. HSF vessels will need to be added, through lease or purchase, in order to establish a service between CT and NYC.
- ***Personnel.*** An increase in ridership would require additional personnel in order to maintain a safe operation. An expansion of the daily schedule would require additional personnel. An expansion of ferry service to new locations would similarly require additional personnel and vessels. The absence of any crewman due to long term illness, worker's compensation or retirement can cause a disruption to the seven-day-a-week service.
- ***Funding.*** Having adequate financial resources to maintain current operations is a continuing problem. Studies have shown that HSF routes can be established without a state operating subsidy.

## 6.2 State Pier Complex

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The New London State Pier Facility is situated in Southeastern Connecticut, approximately 100 miles south of Boston, Massachusetts and 130 miles northeast of New York City. The State Pier Facility is located approximately 3 miles upstream from the mouth of the Thames River and just minutes from downtown New London. The State Pier Facility has excellent access to Interstates 95 and 395, the New England Central Railroad (NECR) line, and Atlantic shipping routes. These connections link the State Pier Facility to the State, region, Canada and beyond.

The State Pier Facility has two main finger pier structures: the Admiral Harold E. Shear State Pier and the Central Vermont Railroad (CVRR) Pier, which are located approximately 3.8 miles upriver from the deep waters of Long Island Sound via the main navigational channel. CTDOT has a contract with a private stevedore company, Logistec, USA, to operate a marine terminal at the Admiral Shear State Pier. Logistec, USA is under contract to manage the cargo operations at the State Admiral Shear State Pier Facility as well as to provide security for the entire complex in accordance with the Maritime Transportation Security Act (MTSA). Additionally, the Department has a leasing agreement with the Thames River Seafood Cooperative for use of the western most part of the CVRR Pier as a support facility for scallop and other fishing vessels.

**Figure 6-4. Aerial View of the State Port Complex, New London**



## ***Facilities***

The State Pier has two berths alongside the 1,000-foot concrete pier, with 200 feet of apron width. The advertised controlling depth is 35 feet mean low water (MLW) along the east side and 30 feet MLW at the western berth. There is also a quay wall providing 500 feet of wharf space with controlling depths of 14-16 feet at MLW with potable water and electricity available. A new fender system on both sides of State Pier allows vessels to berth close to the pier face thereby minimizing crane reaches. Posted pier loading is restricted to storage of 1,000 pounds per square foot, truck loads up to HS 25 ratings and fork lift loads of 100 pounds per axle maximum load. Crane loads are limited to 1,000 pounds per square foot. The main work space on the apron is illuminated by a high-level pier lighting system installed in 2010.

The Central Vermont Railroad (CVRR) Pier consists of a rectangular “finger” pier that is bounded on the east by the Admiral Shear Pier and to the west by Winthrop Cove and upland area. This pier is constructed of a perimeter cut stonewall, with the interior being earth filled with a paved bituminous surface. The pier dimensions are approximately 1,000 feet in length, with a principal width of 225 feet, for a length of 270 feet at the outboard or the southern end of the pier. However, the moorings lack a deep berth. The pier does accept various types of shallow draft vessels such as barges, fishing vessels, and pilot boats, which functionally do not require a deep draft, thus enhancing the versatility of the complex.

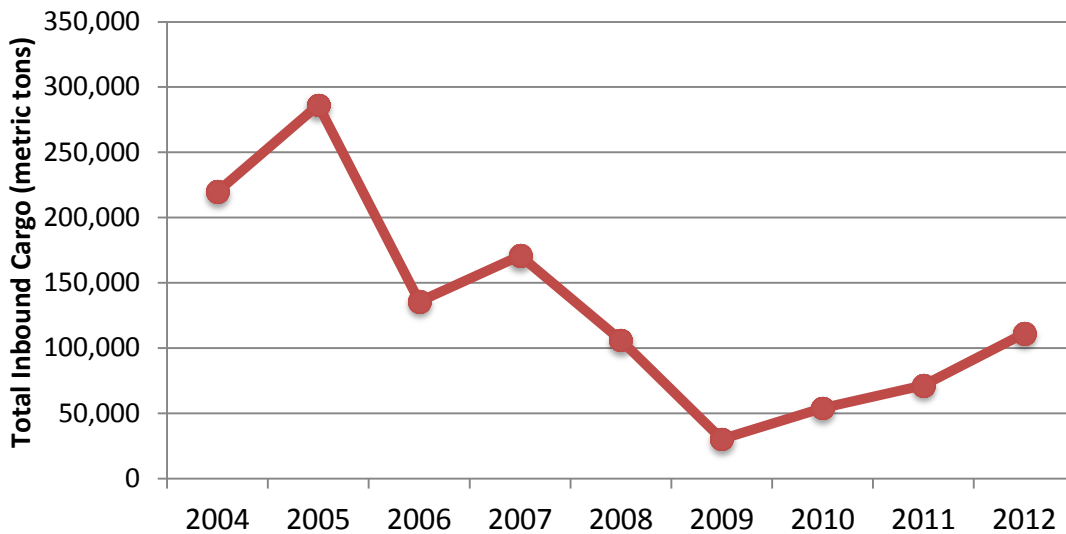
A project completed in 2005 further enhanced the CVRR Pier by providing power and potable water to its west side; fire suppression, and lighting along its center. Other improvements that were made to the pier to accommodate commercial fishing included the following: vehicle access delineation, security lighting, eyebolts for vessel fenders, cleats for securing vessels, and water and electrical services.

The facility incorporates six primary structures consisting of warehouses, a garage, an administration building and other supporting structures. There is 106,200 square feet of warehouse space on site, located between three primary structures: a new warehouse at 50,000 square feet; another one is 53,000 square feet, and the third which is currently used to store equipment is 3200 square feet. The two larger warehouses have direct rail access and rail/truck loading docks. The newest warehouse was designed for handling lumber products, pulp and paper commodities, with above average ceiling heights and heavy per square foot floor load weights. The facility is in excellent condition and suitable for a number of warehousing, transit or processing activities. The other warehouse structures have average warehouse height ceilings with reinforced concrete and steel floors designed for heavy loads. While stacking capabilities are limited due to the ceiling height, there is adequate space for wide distribution of stored commodities. There is also an Administration Building, which houses CTDOT personnel and port operations personnel, and portable trailers that serve as the security building.

### Current Use

The State Pier has been primarily used as a lumber port and storage facility, with some copper, steel, and other commerce being minimal. Cargo such as chemicals, wood pulp, core stock, aluminum, copper, lumber, coiled steel, rebar, steel plates, and general cargoes are all principal waterborne commodities targeted to be handled at the pier. Figure 6-5 shows the inbound cargo from 2004 to 2012. Table 6-1 shows the number of vessels and metric tons of various types of cargo for the same years.

**Figure 6-5. Admiral Harold E. Shear (New London) State Pier Inbound Cargo 2004-2012**



**Table 6 1. Admiral Harold E. Shear (New London) State Pier Cargo**

Year	Number of Cargo Ships	Forest Products Tonnage	Copper/Steel <sup>s</sup> Tonnage	Other Cargo	Total Tonnage	Number of Passenger Ships
2012	31	-	111,100	-	111,100	-
2011	16	-	60,672 <sup>s</sup>	10,758 <sup>cc</sup>	71,430	-
2010	13	-	46,391 <sup>s</sup>	7,476 <sup>cc</sup> 230 <sup>trans</sup>	54,097	2
2009	5	30,139	-	-	30,139	-
2008	14	99,216	6,678	-	105,894	9
2007	30	81,421	89,353	-	170,774	7
2006	39	121,480	14,217	-	135,697	1
2005	41	126,670	78,552	81,000 <sup>hl</sup>	286,222	-
2004	49*	136,945	82,932	-	219,877	3

<sup>cc</sup> Calcium Chloride; <sup>s</sup> Steel only; <sup>hl</sup> Heavy lift; <sup>trans</sup> Transformers

\*1/2004 – 3 ships with Heavy Lift cargo – tonnage not reported

Source: sector.org “Admiral Harold E. Shear State Pier, New London, CT Shipping Report – 2004 – 2012.PDF”. Graphic revised as of June 2014.



The administration building at the pier is used the principle office of the CTDOT Maritime Planner and Harbor Liaison personnel. The building has a conference room used to conduct meetings of the Connecticut Maritime Commission (CTMC) the Connecticut Pilot Commission (CPC), and other maritime related organizations. Other activities include the Administration of the Connecticut State Ferries and project engineers working on nearby highway construction projects.

### ***Future Use of State Port Complex***

During the recession of 2008-2012, most of the commodities handled at the State Pier Facility have arrived primarily by rail, rather than by vessel. The current terminal operator in New London has invested limited resources into marketing the State Pier Facility. In addition, the State has diversified its attention in regard to transportation needs which has limited its focus on port effectiveness. Therefore, the current operational scenario at the State Pier Facility needs improvement, and possibly a whole new approach to management of the Facility. This may include a new public agency focused on port activities, a new commercial terminal operator including a non-marine operator such as a railroad, or the State hiring professional staff to operate the facility under their jurisdiction.

A State Pier Needs and Deficiency Study was completed in 2010. The logistics enabling quicker turnaround of products, transferring goods from waterborne to other land transportation modes, is vital in the marine economy. The most efficient use of the State Pier is most likely as an inter-modal transfer facility with interim storage for immediate transfer. The rail line connection allows heavy and bulk products to be imported and exported with direct ship-to-railcar transfer. The CVRR pier enhances the possibility of diverse groups of marine trades working together. The Study recommended infrastructure changes to the Facility to increase the type and quantity of cargo that could be handled. The Department is conducting the engineering and design work as a preliminary step to making the recommended infrastructure improvements.

### ***Ability of State Port Complex to Meet Current and Future Demand***

The State Pier facility is currently able to adequately meet the demands of the shipping community for commodities that were traditionally handled through the Port of New London. The advantage of intermodal interchanges now available, allowing direct movement of goods between ship and rail, should provide a new area of commerce at the State Pier.

The strategic infrastructure improvement plan includes dredging to the maximum depth available alongside the State Pier (especially the west side) and CVRR Pier, to respond to trends in ocean shipping. The trend is towards the use of larger vessels in order to reduce the rates charged to shippers to move between seaports, as well as the move from bulk to containerized cargo. Because the water depth along the pier affects the ability of vessels to use the port, maintenance dredging plans should be initiated. The timing of such an effort is also critical. It should coincide with the full utilization of the pier. The main channel in New London Harbor has more than adequate depth, and was last dredged in 1996 as part of an operation by the U.S. Department of Defense to accommodate their needs at the sub base.

The issue of dredging is a sensitive one in many areas of the country; Connecticut in particular, due to the environmental protection issues surrounding Long Island Sound. There are several forums available for the public, commercial marine activities, and environmental protection groups to discuss the concerns relative to dredging projects. Dredging and the disposal of dredged sediment is a topic that CTDOT will continue to be confronted with, and strategies and policies for these projects need to be continuously studied and developed. The New England District of the Army Corps of Engineers is near completion of a Long Island Sound (LIS) Dredge Material Disposal Plan (DMMP). More can be found about the LIS DMMP at <http://www.nae.usace.army.mil/Missions/ProjectsTopics/LongIslandSoundDMMP.aspx> .

## 6.3 Port of New Haven

The Port of New Haven is located on New Haven Harbor less than 500 yards off Exit 49 from I-95, and has immediate access to I-91 and Route 1. The modes of transportation served are vessels, barges, train, and trucks. With more than a half-dozen owners, the ownership and management of New Haven's port is more complex than that of Bridgeport. Magellan Midstream Partners, a Tulsa-based company, has 3 docks and 54 storage tanks that hold 3.9 million barrels of petroleum products in New Haven. Motiva has 1.7 million barrels of storage, its second-largest operation in the United States. The locally-based company, New Haven Terminal, which at one time owned and operated most of the ports of New Haven and Bridgeport and operated the State Pier in New London for the state, operates a terminal with 2.5 million barrels of storage. It leases out its non-petroleum terminal to Coastline, which, in turn, leases the operation to Harborside. Coastline also owns a terminal in New Haven. Gateway Terminal, also locally-based, is another owner in New Haven.

**Figure 6-6. Port of New Haven**



### ***Facilities***

There are three berthing facilities; two can accommodate vessels drawing 36 feet at MLW and one can accommodate vessels drawing from 39 feet MLW. New Haven Port facilities are very capable of handling any type of Break-Bulk cargo.

The Stevedoring Equipment that is used to move the cargo has 5 shore cranes that move up to a 250-ton load with 61 forklifts that have a 26-ton capacity.

The truck facility has the capability for loading up to 200 trucks per day from the ground or via loading docks.

Rail freight service at the port is provided by the Providence & Worcester Railroad which connects to nine other rail lines: Canadian National, Canadian Pacific, CSX, Pan Am Railways,

New England Central Railroad, New York and Atlantic, Housatonic Railroad, Connecticut Southern, and Norfolk Southern.

The storage facility at the Port of New Haven has approximately 400,000 square feet of inside storage and approximately 50 acres of outside storage space available. Bonded storage is available and London Metal Exchange (LME)-approved warehousing is available for zinc, aluminum, lead, tin, and nickel.

### ***Current Use***

Among the goods that come through New Haven are petroleum products, steel and lumber, cargo commonly referred to as break bulk, is not in containers. New Haven also handles such bulk items as salt, sand and pumice, and ships out scrap metal.

### ***Ability of Port to Meet Current and Future Demand***

The Port of New Haven is currently able to adequately meet the demands of the shipping community for commodities that were traditionally handled through the facility. One of the challenges facing the Port's ability to meet future demand is that of dredging. The port was maintenance dredged during the spring of 2014. The Army Corps of Engineers (ACOE) is responsible for maintaining federally designated navigation channels to their respective project depths, but Connecticut is in need of a Dredged Material Management Plan (DMMP) in order to compete for funding., The ACOE, is responsible for developing the DMMP, has been properly funded and has an April 2015 deadline to complete it.

Incomplete rail connectivity to the terminal area also has the potential to affect the Port's ability to meet future demand, with respect to ship-to-railcar capabilities. The construction on the Pearl Harbor Memorial Bridge has presented highway connectivity issues that should be rectified by 2015 when the project is completed.

## 6.4 Port of Bridgeport

The Port of Bridgeport is comprised of 2 natural harbors – Bridgeport Harbor and Black Rock Harbor. Both harbors are located on the north shore of Long Island Sound, situated north of the Stratford Shoal across from Port Jefferson, Long Island. Bridgeport Harbor is at the mouth of the Pequonnock River and includes the Yellow Mill and Johnson Creek tributary channels. Black Rock Harbor, located approximately 2 miles west of Bridgeport Harbor, separates into the east and west branches of Cedar Creek at its upper limit.

Bridgeport Harbor, the principal commercial harbor, and its terminals are strategically located off Interstate 95, within one-quarter mile of the exit 27 or 29 interchanges. Bridgeport Harbor is also within 1 mile of Connecticut Routes 25 and 8, approximately 5 miles from Sikorsky Airport (a private/corporate jet center), within 50 miles of midtown New York and nearby major New York airports, and within 2 hours of Providence, RI. Modes of transportation in/at the Port include vessels (ferries, barges, tugs), trucks and commuter railroad. The majority of commercial waterfront facilities in Bridgeport are privately owned and operated, although the Bridgeport Port Authority owns two facilities in Bridgeport Harbor – the Water Street Dock and Terminal on the west shore of the Harbor and the Bridgeport Regional Maritime Complex, located on the east shore of the Harbor. Other major commercial facilities in Bridgeport Harbor include the PSE&G power plant, the former CILCO Terminal and Motiva (Shell) fuel terminal.

**Figure 6-7. Port of Bridgeport**



### ***Facilities & Current Use***

Located within the downtown business center abutting Metro-North Commuter Railroad, the Water Street Dock and Terminal has unhindered access to Bridgeport Harbor and Long Island Sound. It is currently the landing site for the Bridgeport-Port Jefferson Ferry, a year round

service providing traditional ferry ridership to pedestrians and vehicles between Bridgeport and Port Jefferson, Long Island. The Water Street Dock also houses a First Responders dock and is the future landing site for a High Speed Ferry operation anticipated to provide commuter service at designated points between Bridgeport and New York City.

The Bridgeport Regional Maritime Complex is a 44 acre parcel of which 23 acres has been a dedicated a shipyard operation (“Bridgeport Shipyard”). Located one-quarter mile south of Interstate 95 at the exit 29 interchange, the Bridgeport Shipyard facility provides 1,350 linear feet of waterfront with unimpeded access to Bridgeport Harbor and Long Island Sound. The Bridgeport Shipyard has a 160’ pier, 18’ MLW, 360’ of bulkhead and contains 3 separate buildings providing over 100,000 sf. of assembly and fabrication space. The Bridgeport Regional Maritime Complex is also an approved General Purpose site within Foreign-Trade Zone No. 76.

The former CILCO Terminal is located on the eastern side of Bridgeport Harbor with unhindered access to Bridgeport Harbor and Long Island Sound. Owned by Coastline Terminals of CT, CILCO Terminal has been divided and sold off by Coastline; the principal purchaser of the Cilco Terminal facilities is an arm of McAllister Towing, parent company of the Bridgeport-Port Jefferson Steamship Co. In 2008, the Bridgeport-Port Jefferson Steamship presented plans to turn a portion of this facility into a new landing facility for their Port Jefferson Ferry operation.

Motiva Enterprises is a fuel terminal and tank farm that brings in about 250 barges of petroleum products annually. The Motiva facility is located on the west shore of Bridgeport Harbor and provides unimpeded access to Long Island Sound.

A fourth major terminal located in Bridgeport Harbor is the PSEG power plant. PSEG provides electrical power to the majority of households and business facilities in southwestern CT. Located on the eastern shore of Bridgeport Harbor, the PSEG facility has unimpeded access to the Harbor as well as Long Island Sound. PSEG routinely brought in material required for power generation by water; however PSEG has been utilizing trucks to provide material more frequently.

### ***Ability of the Port Complex to Meet Current and Future Demand***

The geographic location of Port Terminal facilities provide economically feasible primary and secondary modes of waterborne transportation and commerce between Connecticut and numerous locations in New York and Long Island. Bridgeport Harbor’s location and land mass also provide reasonable docking and staging facilities for rescue and/or resiliency staging efforts with reasonable reach to the Connecticut shoreline communities, New York (including Long Island), New Jersey, Rhode Island and parts of Massachusetts.

The main channel and turning basin in Bridgeport Harbor are part of a Federal Navigation Project (FNP) that authorizes a MLW depth of 35’, tapering down to 18’ as one travels up the Pequonnock River and Yellow Mill River. ACOE is responsible for maintaining the federally designated channel to their respective project depths.

The last dredging of the Harbor was completed by the ACOE in 1964. Lack of maintenance by the ACOE has caused the main channel to shoal up to 27’ in areas, and upper passages of the Pequonnock and Yellow Mill Rivers suffer from shoaling as well. The lack of dredging and shoaling of the channels has created navigation hazards in the Harbor and loss of waterfront commerce. The Port of Bridgeport has formally requested dredging of its FNP channels and the ACOE has conducted all required processes to complete the task. However, ACOE has not recommended the project for funding, in part because waterfront commerce has been substantially reduced (due to lack of dredging).

## 6.5 CTDOT's Future Role

One of the most important roles that CTDOT must play in the future is one of coordination. The interest in developing commercial, recreational, and scenic uses for Connecticut coastal property is at an all-time high. Connecticut's port facilities, including the New Haven and Bridgeport marine terminals, traditionally have been operated by privately held firms. In recent years, however, some of the facilities have deteriorated, and the companies operating them have had financial difficulties that have prevented them from performing the needed maintenance and upgrades.

The state agencies involved with waterfront development - CTDOT, CTDEEP, and the Department of Economic and Community Development (DECD) - have been asked to participate in the municipal planning of commercial port facilities and recreational ports. The participation has included review of municipal harbor management plans; review of regional transportation improvement programs; supporting municipal port district/authority initiatives; allocating funds for port access and commercial development; and some committee participation, including attendance and participation on several committees which have formed recently in the Long Island Sound Region. The names and a brief description of these committees are provided in Table 6-2

In 2012, the Connecticut Office of Policy and Management contracted for a Study of a Strategy for the Economic Development of the New Haven, New London and Bridgeport ports in accordance with Public Act 11-57(13)(f). The Port Study provided recommendations on the types of cargo that should be pursued by each of the state's deep draft ports. The Study also recommended the creation of a Connecticut Port Authority (CPA) as a means of centralizing the planning for the three ports and more importantly the marketing of the port facilities. Legislation introduced during the 2013 Session to create a CPA did not pass. The CPA legislation was introduced again during the 2014 Session and passed.

**Table 6-2. Water Transportation Committees in the Long Island Sound Region**

Long Island Sound High Speed Ferry Task Force	A group which has taken on the task of addressing the concerns of recreational users of the Sound relative to the introduction and expansion of high speed ferry service in Long Island Sound.
Harbor Master Focus Group	A group of state-appointed Harbormasters concerned with issues surrounding the enforcement of the state's boating and mooring laws, harbor management ordinances, and harbor management practices in Connecticut harbors.
Long Island Sound Ferry Coalition	A group of public agency representatives, with various jurisdictional coverage from all around Long Island Sound, with the expressed intention of identifying the current systems and promoting their use by developing a clearinghouse format of information, which is available on the internet at <a href="http://www.nymtc.org/ferry_site/index.html">http://www.nymtc.org/ferry_site/index.html</a> . Additionally, this group is hoping to streamline the process of increasing capacities of existing ferry routes, and implementing new service when there is a market demand identified by a potential operator.

Connecticut Maritime Commission	A successor agency to the Connecticut Port Authority that was created to: (1) advise the Commissioner of Transportation, the Governor, and the General Assembly concerning the state's maritime policy and operations; (2) develop and recommend to the Governor and the General Assembly a maritime policy for the state; (3) support the development of Connecticut's maritime commerce and industries, including its deep water ports; (4) recommend investments and actions, including dredging, required in order to preserve and enhance maritime commerce and industries; (5) conduct studies and present recommendations concerning maritime issues; and (6) support the development of Connecticut's ports, including; identifying new opportunities for the ports, analyzing the potential for and encouraging private investment in the ports and recommending policies which support port operations. In December 2005, the Connecticut Maritime Commission submitted a Maritime Policy Statement to the Governor and the legislature for their consideration. A key element of the Policy Statement was dredging. In the 2007 Legislative Session, the Commission supported proposed legislation to establish a State Harbor Improvement Fund to facilitate the dredging of Connecticut harbors in a timely manner. Further information regarding the Commission, including a monthly meeting schedule, agenda, and minutes, is available on the CTDOT homepage.
Connecticut Maritime Coalition	Launched in 2000, the Connecticut Maritime Coalition is a non-profit trade association facilitating the competitiveness of Connecticut's maritime industries. A lobbying group, the Coalition is mostly composed of small and medium-sized business. The group attempts to reach a consensus on the issues facing the maritime industries in Connecticut and an approach to solve these issues, with the goal to serve as the linchpin between maritime businesses and policy makers.
Harbor Management Association	The mission of the Connecticut Harbor Management Association is to assist and support Connecticut Harbor Management Commissions by facilitating the exchange of information and ideas among commissions and by providing liaison between commissions and local, state and federal agencies involved in the management of Connecticut's marine and harbor resources.
Long Island Sound Assembly	The Long Island Sound Assembly first met in September of 1990 to receive recommendations from three advisory Councils on the use and preservation of Long Island Sound. Reports compiled from these recommendations are submitted to the Connecticut General Assembly each year. The Assembly consists of seven members of each Long Island Sound advisory council. The members are appointed by the chairman of each advisory council.
Connecticut Pilot Commission	Pursuant to Connecticut General Statute (CGS) 263, sec 15-13c, the Connecticut Pilot Commission (CPC) advises the Commissioner of Transportation (CTDOT) on issues related to the licensure of marine pilots, the safe conduct of vessels, pilotage rates and the protection of the ports and waters of Connecticut. The nine Commission members, including appointees of the Governor and various legislative leaders, a designee of the Commissioner of Transportation and a pilot representative, represent a broad spectrum of business, maritime, and environmental interests. The Commission currently includes members with expertise in admiralty and environmental law, shipping, stevedoring and port operations as well as experience as Merchant Marine, Navy, and Coast Guard officers. Further information regarding the Commission, including a monthly meeting schedule, agenda and minutes, is available on the CTDOT web page.

Source: CTDOT Bureau of Public Transportation. Table revised June 2014.

## 7 AIRPORTS

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The Connecticut Airport Authority (CAA) was established in July 2011 as a result of Public Act 11-84. The CAA principal role is to develop, improve, and operate Bradley International Airport (BDL), as well as the state's five other general aviation airports while also ensuring growth, and safety of any other general aviation in Connecticut airports CAA subsequently owns, operates, and manages. The act authorizes DOT, which exercises most airport-related powers, duties, and functions, to transfer them to CAA.

The act also established an 11-member board to govern CAA. The new board, which consists of gubernatorial and legislative appointees and state officials, replaces the BDL Board of Directors. It has many of the BDL board's powers plus the power to hire staff, retain consultants, procure goods and services, apply for federal and state funds, enter into contracts, borrow money, and issue CAA's bonds.

Prior law assigned airport-related powers, duties, and functions to several agencies. The act's provisions for transferring them to CAA vary depending on the agency. The act automatically transfers to CAA all powers and duties previously assigned to the Office of Policy and Management, Department of Administrative Services, Department of Information Technology, State Property Review Board, and Contracting Standards Board.

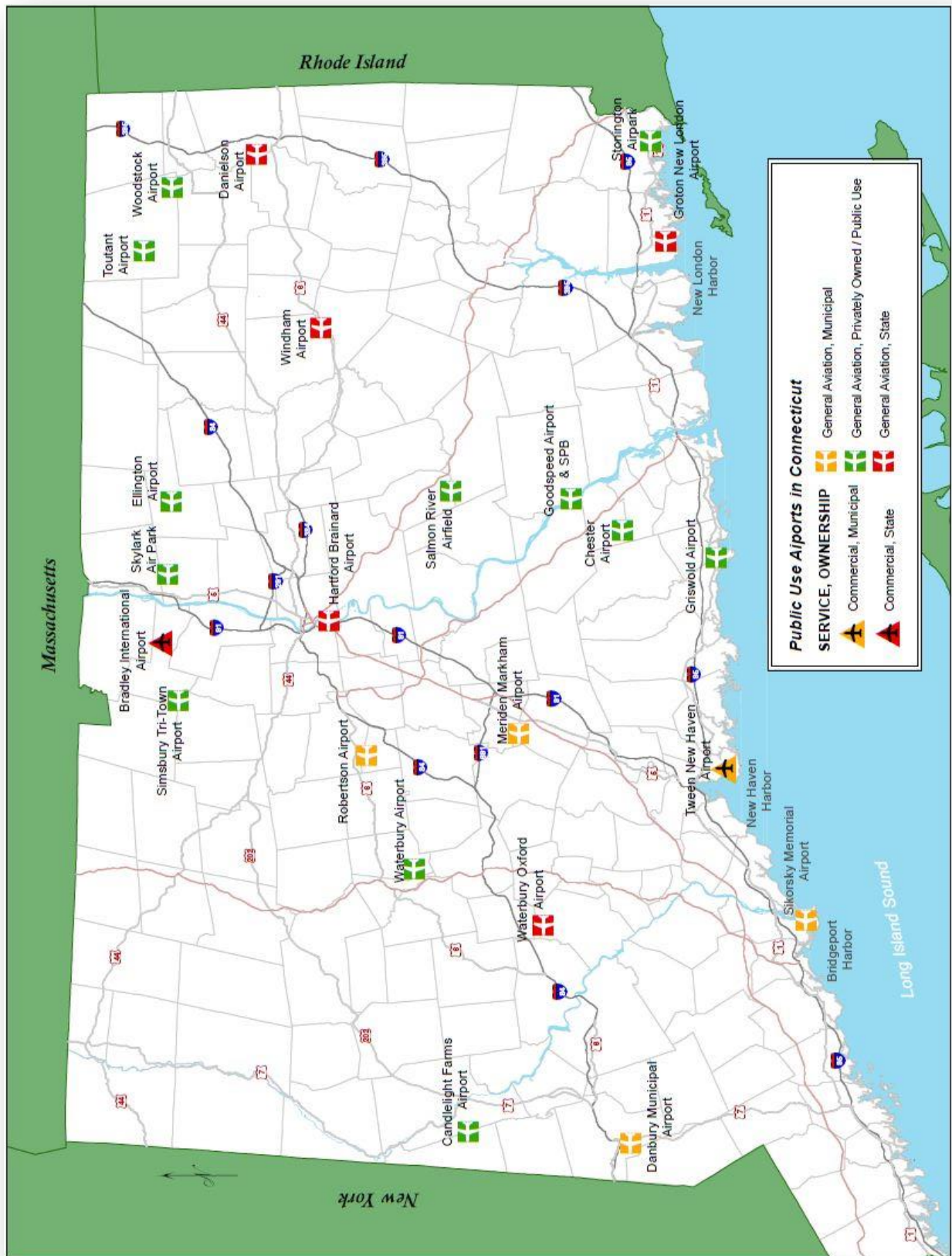
The CAA has a number of responsibilities which include the following:

- Managing, Operating, Maintaining along with Capital Improvement projects (overseeing projects from conception to completion) at the following six CAA airports: Bradley International Airport, Hartford-Brainard Airport, Groton-New London Airport, Waterbury-Oxford Airport, Windham Airport, and Danielson Airport
- Licensing and inspecting all public and private airports and helipads within the state
- Distributing federal funding and state grants-in-aid to municipal airports for improvements and studies
- Promoting economic development

The locations of the CAA-owned, municipal, and privately owned airports in Connecticut that the CAA licenses and inspects are shown in Figure 7-1. Information on CAA-owned and municipal airports is presented in this section. A comprehensive review of the state's aviation system can be found in the *Connecticut Statewide Airport System Plan*, prepared by CTDOT's Office of Airport Planning, dated June 2006



Figure 7-1. Airports in Connecticut



## 7.1 CAA Owned Airports

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BDL is the state's primary air carrier facility; HFD is a reliever airport for BDL. GON, OXC, IJD, and LZD are all classified in the FAA's National Plan of Integrated Systems (2007-2011) (NPIAS) as general aviation airports. This subsection contains both general and airport-specific information on these airports.

### CAA Connecticut Airport Authority Responsibilities

- CAA is responsible for the following six airports:
- Bradley International Airport (BDL)
- Hartford-Brainard Airport (HFD)
- Groton-New London Airport (GON)
- Waterbury-Oxford Airport (OXC)
- Windham Airport (IJD)
- Danielson Airport (LZD)

#### 7.1.1.1 *Airside and Landside Facility Components: General Information*

Airside and landside components at the CAA-owned airports include the following: pavement (runways and taxiways), pavement markings, airport signing, landing aids, airport operations facilities, passenger facilities, freight facilities, and general aviation facilities. General information on airside and landside components that is applicable to all of the CAA-owned airports is discussed in greater detail in this subsection. Information that is airport-specific is presented in the descriptions of the individual CAA-owned airports.

#### **Pavement**

The pavement used at all CAA-owned airports is an approved Federal Aviation Administration (FAA) mix. It is estimated that the structural life of bituminous concrete pavement used on the runways and taxiways at the CAA-owned airports is approximately 20 years. As part of CTDOT's Grant Assurances to the FAA, it is assured that CAA will maintain the pavement and keep it in a state of good repair for that amount of time. CAA personnel are continually re-evaluating the pavements at the airports to implement future pavement improvement programs. In 1995, the Bureau of Aviation & Ports analyzed the pavement conditions at five of the six CAA-owned airports (excluding BDL). A *Pavement Management Plan* was prepared for each facility. A copy of each plan is on file at each airport. In 2014 the CAA will be developing Pavement Management Plans for all of the airports in accordance to FAA Advisory Circulars. The Plan will assign Pavement Condition numbers to be used to prioritize rehabilitation projects.

#### **Factors Affecting Condition of Pavement**

Many factors affect the condition of the pavement at airports; the most significant ones are listed and discussed below:

- **Aircraft Weight and Traffic.** The impact of the aircraft wheel load fatigues the pavement structure. Any additional load over the allowable load (the theoretical maximum gross weight of the design aircraft at a particular pass level) on the aeronautical pavements will significantly reduce the remaining structural life of the pavement.
- **Snow and Ice Removal.** Deicing chemicals put on the pavement slowly deteriorate the pavement and could reduce the structural life of the pavement.

- **Shell Removal.** The runways at Groton-New London Airport, which is located on the coast, must be plowed or swept daily to remove shells that seagulls drop on the pavement. This activity slowly deteriorates the structural integrity of the pavement.
- **Removal of Rubber Deposits.** Some runway pavements are grooved to increase drainage and enhance friction. When the grooves on the runways become filled with rubber deposits, high-pressure water is commonly used to remove such deposits. Over time, this can loosen stones in the pavement allowing water to saturate the pavement and cause a loss in load bearing capabilities.
- **Construction Practices and Materials Use.** The materials and construction processes used for airport pavement impact the longevity of a pavement.

### **Pavement Markings**

Pavement markings provide guidance during both day and night operations. Pavement markings at all of the CAA-owned airports are maintained in accordance with FAA Advisory Circular 150/5340-1H, which depicts how an airport should be marked according to runway categories. The markings are repainted every year. The factors that affect the condition of and demand for airport pavement marking are listed in Table 7-1.

**Table 7-1. Factors Affecting Condition of and Demand for Pavement Markings at All CAA-owned Airports**

<b>Environment</b>	Snow plowing and deicing chemicals deteriorate the pavement markings. Conditions that necessitate frequent plowing and deicing at an airport increase the rate of deterioration of the pavement markings.
<b>Traffic</b>	The number of aircraft and vehicles that pass over the markings affects the rate of deterioration of the pavement markings. The greater the volume of traffic over the markings, the faster the rate of deterioration.

Source: CAA

### **Airport Signing**

All runways and taxiways are signed in accordance with FAA Advisory Circular 150/5340-18C to ensure that all aircraft are aware of their location at all times. The FAA is constantly working on better signs, sign locations, sign materials, and visibility to make airports safer. The factors that affect the condition of and demand for airport signing are listed in Table 7-2.

**Table 7-2. Factors Affecting Condition of and Demand for Airport Signing at All CAA-owned Airports**

<b>Routine Maintenance &amp; Winter Weather</b>	Runway edge lights are sometimes damaged by grass-cutting equipment. Signs and runway edge lighting covered by snow are sometimes hit by plows and blowers.
<b>FAA Regulations - Airport Expansion</b>	As new taxiways are constructed at the airports and as the FAA Advisory Circular changes, it will become necessary to modify the existing signs and add new signs to meet FAA regulations.
<b>FAA Regulations - Rehabilitation of Pavement</b>	There will be a need to re-stripe all new pavements to meet FAA regulations as the airports rehabilitate pavements that have come to the end of their useful design life.

Source: CAA

## Landing Aids

Airport lighting serves an integral function in the daily operations at CAA-owned airports. The airports utilize a complex system of runway, taxiway, and approach lighting to aid aircraft in landings and departures during night and/or inclement weather operations. It is the goal of the CAA to maintain the current standards for landing and lighting aids at the airports, while studying the implementation of additional aids to more efficiently serve the public using the airports.

## Security

Security at CAA-owned airports became a priority after the terrorist attacks that occurred on September 11, 2001. Security measures in place at BDL and Groton-New London Airport have been enhanced along with security enhancement project at the remaining CAA-owned general aviation airports. Security enhancements include the installation of additional fencing and gates, the issuance of photo identification cards, and the installation of closed circuit television cameras.

**Table 7-3. Overview of Runway Characteristics at the State-owned Airports**

Runway	Length (feet)	Width (feet)
Bradley International Airport (BDL)		
6-24	9,510	200
15-33	6,847	150
1-19	4,268	100
Hartford-Brainard Airport (HFD)		
2-20	4,418	150
11-29	2,315	70
Turf (NE/SW)	2,309	150
Groton-New London Airport (GON)		
5-23	5,000	150
15	4,000	100
Windham Airport (IJD)		
9-27	4,278	100
18-36	2,797	150
Waterbury Oxford Airport (OXC)		
18-36	5,800	100
Danielson Airport (5B3)		
13-31	2,700	75

Source: CTDOT Bureau of Aviation & Ports. Data is as of October 2006 for BDL and June 2006 for GA airport data.

### **7.1.1.2 Factors Affecting Ability to Meet Current and Future Demands**

There are many elements that can affect an Airports ability to meet current and future demands. These factors include new environmental concerns and regulations, closure of other airports as well as funding.

- **New Environmental Concerns and Regulations.** The impact of new environmental regulations and FAA mandates on safety area improvements and the continual operation of the airport will need to be addressed as new regulations and new environmental concerns are identified. A detailed list and analysis of these factors can be located within this document by airport. This includes: Trees penetrating the FAA-mandated FAR Part 77 imaginary flight surfaces. This is a major concern to each and every Airport. The ability of the airport to improve and expand the runway safety areas. Regulated wetlands in some cases surrounding the airport thus any improvement to the airport will require careful planning by CAA with permitting from CTDEEP and the U.S. Army Corps of Engineers.
- **Closure of Other Airports.** The continued closure of privately owned airports which are open to the public has the potential to result in additional demands being placed on CAA owned Airports. If this trend persists, additional funds will be required at State-owned airports to accommodate relocating aircraft.
- **Funding and the Airport's Need to Grow.** A major factor that affects the airport's ability to meet these current and future demands is funding. The airport will be able to meet these demands only to the extent that funding is available to do so.

## 7.1.2 Bradley International Airport (BDL)

Figure 7-2. Aerial Photograph of Bradley International Airport



Bradley International Airport as shown above is Connecticut's primary air carrier facility and New England's second largest airport. It occupies 2,358 acres of land in the towns of Windsor Locks, East Granby, Suffield, and Windsor, serving more than six million people in Connecticut and western Massachusetts. It is an alternate airport for New York and Boston air traffic and functions as a base for both the Army and Air National Guards

Services available at BDL include scheduled domestic air carriers, scheduled international service to Canada, scheduled commuter/regional airlines, domestic and international charter flights, cargo and mail, and general aviation aircraft facilities.

BDL is owned by the Connecticut Airport Authority (CAA) and is operated entirely on a self-sustaining basis from revenues generated by the airport and federal funds from the Airport Improvement Program. No state funds are utilized to operate BDL. The airport is treated as an enterprise fund of the State of Connecticut, operated by CAA. All of the operations, maintenance, and development expenses of the airport are funded through user charges and the capital financing mechanisms available to the airport. Additional information on the BDL Enterprise Fund is provided in CTDOT's May 2006 publication, *Transportation in Connecticut: Trends and Planning Data*, which is available on the Department's web site.

Comprehensive information on the services, facilities, and plans for BDL is presented in the *Bradley International Airport Master Plan*. This plan was completed in July 2006.

### 7.1.2.1 Current Use

BDL is served by 7 airlines, including two low-fare carriers. Table 7-4 lists the air-carrier and regional/commuter airlines operating scheduled service at the airport as of January 2014

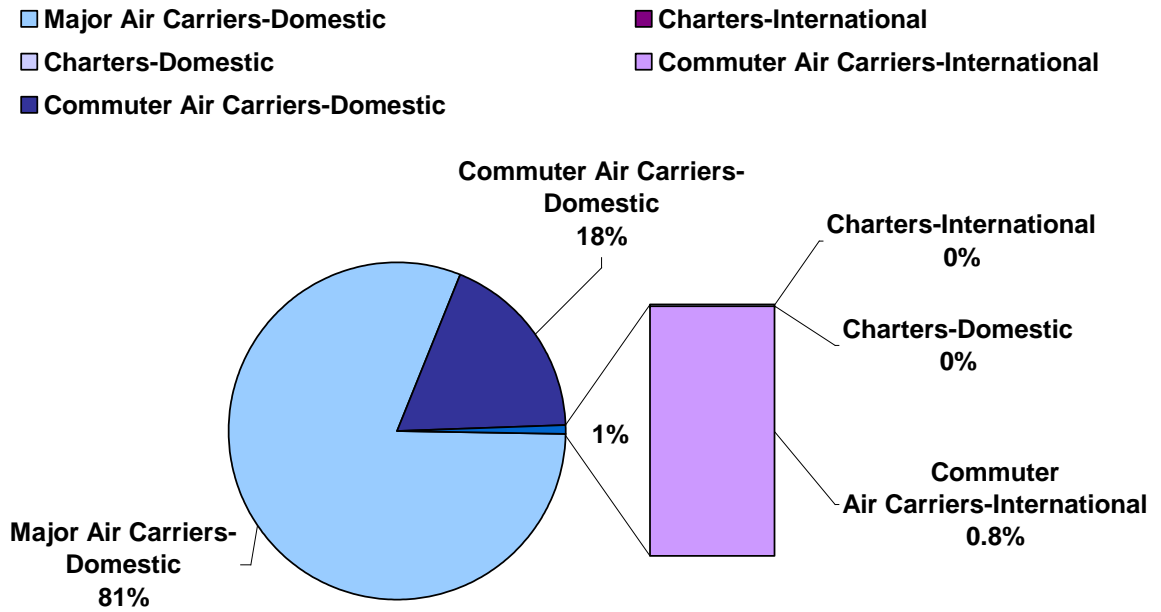
**Table 7-4. Airlines Operating at Bradley International Airport**

Legacy and Low-Fare Carriers	Air Canada, American, Delta, Jet Blue, Southwest, United, US Airways
Regional Carriers	Air Canada, American Eagle, United Express and US Airways

Source: CAA. Graphic revised in January 2014

Figure 7-3 shows passenger traffic at BDL in 2010 by carrier type. It shows that 81 percent of the passenger traffic was Major Air Carriers-Domestic, 18 percent was Commuter Air Carriers-Domestic, 1 percent was Charters-Domestic and .8 percent was Commuter Air Carriers-International.

**Figure 7-3. 2010 Passenger Traffic at Bradley International Airport by Carrier Type**



Source: CTDOT Bureau of Aviation & Ports. Graphic revised in June 2010.

**Table 7-5. Non-Stop Service Out of Bradley International Airport**

Destination	Airline	Destination	Airline
Amsterdam, Netherlands	Northwest	Miami	American
Atlanta	Delta, AirTran/Southwest	Minneapolis	Delta
Baltimore	Southwest	Montreal	Air Canada
Cancun	Delta - Seasonal	Newark	United
Charlotte	US Airways	Orlando	JetBlue Southwest
Chicago-Midway	Southwest	Philadelphia	US Airways
Chicago-O'Hare	United, American	Pittsburgh	US Airways
Cincinnati	Delta	Raleigh	Delta
Cleveland	Continental	San Juan	JetBlue
Dallas	American	Tampa	Southwest, JetBlue
Denver	Southwest	Toronto	Air Canada
Detroit	Delta	Washington-Dulles	United
Ft. Lauderdale	JetBlue, Southwest	Washington-Reagan	US Airways
Ft. Myers	JetBlue, Southwest	West Palm Beach	JetBlue
Los Angeles	American		

Source: CAA, Graphic revised in April 2013

Scheduled service is to U.S. destinations and Canada. Virtually all of the jet service is to hub cities of the various airlines. The major cities to which nonstop, jet service from BDL is provided as of January 2014 are listed in Table 7-5. Commuter destinations to which service is provided from BDL include Montreal, Toronto, Philadelphia and Newark.

### **7.1.2.2 Airside and Landside Facility Components at BDL**

The existing facilities at BDL consist of three runways with connecting taxiways and apron areas, a passenger terminal, three air-cargo complexes, an aircraft maintenance facility, two general aviation terminals with additional general aviation facilities, a fire rescue training facility, two fire crash and rescue buildings, a new maintenance facility, a federal inspection building, and two military areas belonging to the Air National Guard and the Army National Guard. These facilities and their components are discussed below.

#### **Pavement**

BDL has three runways that are serviced by a network of 16 taxiways. This network of pavement comprises an equivalent of 70 linear miles of roadway pavement. The characteristics of these runways are listed below.

**Table 7-6. Runway Characteristics at BDL**

Runway	Length (Feet)	Width (Feet)
6-24	9,510	200
15-33	6,847	150
1-19	4,268	100

Source: Airport 5010 records 2012.



### ***Condition of Pavement***

The pavement condition was evaluated using existing condition plans and non-destructive testing to formulate a Pavement Condition Index (PCI) for each section of pavement. The sections were then prioritized using this rating. The final priority is used in the selection of future paving projects. The two runways at Bradley were both reconstructed in 2009. The Office of Planning, Engineering and Environmental will be updating the Pavement Management Plan in 2014 and will incorporate future project needs into the Airport Capital Plan.

### ***Pavement Markings***

The pavement markings at BDL are visually inspected once a year and any areas that are not up to FAA standards are repainted. If they meet all standards they are repainted at no more than five-year intervals. In an effort to eliminate confusion and improve the visibility of markings for pilots, the FAA has mandated that all runway holding position, taxiway centerline, and movement line markings be one foot wide and surrounded by black paint. The FAA also requires that any old markings that have been blacked out be eradicated.

### ***Airport Signing***

At BDL, after an aircraft has landed, the tower controls all of its movements to the gate with taxiway designations; signing to designate the path that the aircraft must take. BDL completed a project in 1992 to replace all signs to meet current FAA regulations. In the fall of 2000, runway guard lights were installed to assist pilots in aircraft movements across Runway 6-24. The guard lights are a visual guidance to pilots to prevent an unauthorized crossing of an active runway.

### ***Landing Aids***

During periods of inclement weather, when the vertical visibility (ceiling) is less than 1,000 feet or forward visibility (Runway Visual Range) is less than three miles, an airport operates under Instrument Meteorological Conditions (IMC). Instrument Flight Rules (IFR) weather conditions occur about 13 percent of the time at BDL. BDL is well equipped to accommodate aircraft operations during IFR conditions.

### ***Passenger Terminal Facilities***

Passenger terminal facilities Terminal A with 11 aircraft gate positions, a newly-constructed Terminal and East Concourse with 12 aircraft gate positions. These facilities include many amenities for the traveler, including restaurants, shopping, at-grade parking lots, a parking garage, shuttle service, and ground transportation to all points within Connecticut and western Massachusetts.

### ***Air Freight Facilities***

Currently BDL has three cargo complexes: the Roncari Freight Facility (constructed in 1984), Aviation Facilities Company (AFCO) (constructed in 1990), and the UPS Air Express Sorting Hub (completed in 1997). These facilities are in excellent condition.

#### ***7.1.2.3 Ability of Airside and Landside Facility Components at BDL to Meet Current and Future Demand***

Based on forecasts of demand for air cargo buildings and all-cargo aircraft parking aprons, Bradley is in a good position to meet the future demands. On-airport cargo facility development should emphasize apron areas for all-cargo aircraft and cargo buildings that take advantage of direct access to these apron areas. Other air cargo buildings may be located off-airport, as certain existing operators have chosen to do, when the functional requirements allow.

One potential area for additional facilities is north of Runway 15-33 adjacent to the new Air Traffic Control Tower (ATCT) and fire school. This site (of 20-30 acres) would have airfield access from Taxiway J. Landside access would also require roadway improvements. Another area is opposite the AFCO facility east of Runway 15. There are other possible sites located on the northwest side of Runway 24; however there are environmental requirements which would need resolution before any construction could take place. Pictures of the locations listed above can be seen in the *Bradley International Airport Master Plan Update* which was published in August 2006.

The aforementioned areas are estimated to have sufficient capacity to meet the forecast needs of the airport through the planning period of 2025. Successful resolution of environmental issues is the key to developing these prime cargo facility sites.

#### .General Aviation (GA) Facilities at BDL

BDL plays an important role in general aviation (GA) in Connecticut. It has two fixed base operators, TACAIR and Signature Flight Support, as well as, private facilities serving corporate aircraft for companies based in the greater Hartford area. These GA facilities include storage and maintenance hangars, aircraft aprons for based and transient aircraft, and GA terminal facilities. The present GA terminal facilities are in good condition and of adequate size to serve anticipated levels of activity.

#### **7.1.2.4 Ability of General Aviation (GA) Facilities at BDL to Meet Current and Future Demand**

The present GA terminal facilities are of adequate size to serve anticipated year levels of activity. Since the airport has had close to 90 based aircraft in the past without any additional hangar or apron facilities, it is expected that forecasted based aircraft can be accommodated with a minimum of additional facilities. One change in GA, however, may be to provide additional hangar space for based aircraft. This is predicated on the based aircraft forecast, which projects an increase in size and value of these aircraft. Additional private corporate hangars are expected to account for the increase in hangar capacity. In the spring of 2002 Bombardier Aerospace completed a new 100,000-square-foot facility to accommodate its new line of aircraft. In addition, TACAIR completed a new hangar and office facility in the spring of 2003. In 2008 Embraer completed construction of a new hangar and office complex to service their fleet of aircraft.

#### **Air Operations Facilities**

The FAA, which controls all air operations, operates a 24-hour, state-of-the-art air traffic control tower and a terminal radar approach and departure center at the airport.

#### **Parking**

Surface parking is provided on-airport for passengers, visitors, and employees. On-airport parking consists of a recently constructed parking garage with short- and long-term parking, surface Short-Term Parking Lot B; Long-Term Parking Lots 1, 2, 3, 4, 5A, 5B (with shuttle service); and an employee parking lot (also with shuttle service). The total number of public parking spaces available on-airport is 7,830.

The short and long-term parking lots are both revenue-generating and are privately managed by APCOA, Bradley Parking Co., LLC. under contract with CTDOT. In addition to on-airport parking, 11 privately owned, off-airport parking lots operate "valet" parking services using shuttle vans to the terminals.

### 7.1.2.5 Factors Affecting Ability to Meet Current and Future Demand at BDL

The ability to meet the future passenger and cargo aviation demands at BDL will become increasingly challenging to ensure the continued level of service at the airport. Some key factors that will affect the ability of the airport to meet the current and future aviation demands are listed below.

- **Increasing Air Traffic.** Over the next 20 years experts predict that all air traffic operations will increase at a modest rate. Bradley has a unified terminal with 23 gates. The new terminal and concourse is a state-of-the-art 260,000-square-foot facility with 12 aircraft gates.
- **Ability of Pavement to Meet Current and Future Demand.** As the airlines' fleet mixes change, studies will have to be undertaken to determine whether the taxiways and runways are geometrically sufficient and structurally adequate to accommodate what may be a fleet of newer, larger, and heavier aircraft expected to be used by the airlines.
- **Ability to Construct Additional Air Cargo Facilities.** The ability of the airport to meet future air cargo demands is contingent on the ability to construct new freight facilities on or near the airport. Forecasts of demand for air cargo buildings indicate that a significant increase in both on-airport and off-airport air cargo facilities will be required to meet future demand. Air cargo has decrease over the past few years due to the economic downturn but we are beginning to see an upward trend.
- **Environmental Awareness and New Regulations.** Environmental regulations and mandates need to be addressed as to their impact on expansion and continual operation of the airport. A major environmental concern at the airport has been the deicing of aircraft during inclement weather operations. Runoff from the areas where the aircraft were being deiced was slowly leaching into the watershed that surrounded the southern part of the terminal complex. To address this problem the airport constructed a glycol collection facility (GCF) and a remote aircraft deicing area (RADA) where aircraft are deiced in one location immediately prior to takeoff. This RADA is comprised of an apron that will ultimately allow five Boeing-757 type aircraft to be deiced simultaneously. The GCF has a closed drainage system that collects the byproduct of the deicing procedure through a series of catch basins at two of the three concourses and stores the waste water in underground holding tanks. The glycol can then be recovered from the waste water and sold as a recycled fluid. The cleansed water is discharged to a local treatment plant. The GCF facility was completed in January of 2001. Another environmental concern with an impact on expansion is the existence of endangered species on airport property. The Airport is currently working on a mitigation plan to address the concerns.
- **Introduction of Larger Aircraft.** The current industry trend has been for airlines to replace their aging fleets of aircraft with new larger more efficient aircraft. It has been projected that air carriers will be using larger aircraft similar to the new Boeing-777 more frequently. These new aircraft have different design standards for airport facilities than the current aircraft being flown. Old terminals throughout the country will have to be refurbished and renovated to meet these new standards or new terminals will have to be built. The new BDL terminal and renovations to the existing terminals will accommodate the air carriers serving the airport. Future studies will have to be initiated and completed to determine whether the taxiways and runways are geometrically sufficient and structurally sound enough to accommodate the new, larger heavier aircraft expected to be used by the airlines. Proper planning will be required to enable BDL to meet these future demands.

### 7.1.3 Hartford-Brainard Airport (HFD)

HFD occupies 206.5 acres of land located approximately two miles southeast of downtown Hartford along the western bank of the Connecticut River. It is classified by the FAA, in its National Plan of Integrated Airport Systems (NPIAS), as a reliever airport for Bradley International Airport (BDL). It is home to one Fixed Base Operator (FBO), Atlantic Aviation, which provides air taxi service and services for general aviation aircraft. In addition, Hartford Tees, Inc. and Connecticut Hangars Inc. provide t-hangar facilities for the airport users. Comprehensive information on the services, facilities, and plans for HFD is presented in the *Hartford-Brainard Airport Master Plan*. A Master Plan Update completed August 2014. The Connecticut Department of Education moved the Aviation Mechanics School to HFD in the fall of 2008.

HFD is owned by the State of Connecticut CAA. It receives funding from the state's General Fund and federal assistance from the FAA.

**Figure 7-4. Aerial Photograph of Hartford-Brainard Airport**



#### 7.1.3.1 Current Use

HFD is classified as a reliever airport for BDL and, as such, it is used to a great extent for general aviation. The current airport has 136 based aircraft. Military and air taxi operations account for the remaining operations. The numbers of operations at HFD for calendar year 2011 are listed below.

**Table 7-7. Operations at Hartford-Brainard Airport**

Operation Type	Number of Operations	Percent of Total Operations
Air Taxi	5,522	6.8 %
General Aviation - Local	38,500	47.3 %
General Aviation - Itinerant	36,927	45.3 %
Military	525	0.6%
Total	81,474	

Source: CTDOT Bureau of Aviation & Ports - FAA Airport Traffic Record, Form 7230-1. Table updated in December 2011

### **7.1.3.2 Airside and Landside Facility Components**

The existing facilities at HFD consist of two physical pavements with connecting taxiways and apron areas, one turf runway, a general aviation terminal, an administration building, a fire rescue and maintenance facility, an FAA control tower, and a military area belonging to the Air National Guard. These facilities and their components are discussed below:

#### ***Pavement***

HFD has three runways that are serviced by a network of nine taxiways. Since the completion of the Bureau of Aviation & Ports Pavement Management Plan in 1995, all of the major runways, taxiways and aircraft aprons have been rehabilitated. An update to the Pavement Management Plan was completed in 2009.

#### ***Pavement Markings***

The pavement markings are visually inspected annually and areas that do not meet FAA standards are repainted. HFD repainted a majority of the markings in the spring of 2003 in order to meet new FAA mandates for Runway Holding Position markings. Any old markings that have been blacked out will also be eradicated.

#### ***Airport Signing***

At HFD, after the aircraft has landed, the tower controls all its movements to the aircraft apron with taxiway designations and the aircraft, in turn, uses signing to follow the path. As of February 2010, the signs on the airport were in good condition, functioned very well, and met current FAA standards. As part of the Master Planning process additional visual signage to show the noise abatement procedure in effect has been produced and will replace the text signage at the end of the runway.

#### ***Landing Aids***

During periods of inclement weather, when the vertical visibility (ceiling) is less than 1,000 feet or forward visibility (Runway Visual Range) is less than three miles, an airport is operating under IMC. IFR weather conditions occur about 13 percent of the time at HFD. HFD has only one runway equipped to accommodate aircraft operations during IFR conditions.

#### ***General Aviation (GA) Facilities***

The present GA facilities also include five t-hangars that provide storage areas for additional based aircraft. The GA facilities are in good condition; three of the t-hangars were rehabilitated in 1998 and two were constructed in 2002. The facilities are of adequate size to serve the anticipated level of service in the future.

#### ***Air Operations Facilities***

The FAA, which controls air operations, operates an air traffic control tower with contract personnel. The tower is equipped and staffed to provide Visual Flight Rule (VFR) separation of arriving and departing aircraft and separation of aircraft on the ground at aircraft movement areas, i.e. runways and taxiways. IFR operations are handled by BDL's FAA control tower.

### **7.1.3.3 Factors Affecting the Ability to Meet Current and Future Demands**

The ability to meet the future aviation demands at HFD will become increasingly challenging to ensure the continued level of service at the airport. Key factors that will affect the ability of the airport to meet the current and future aviation demands include the following:

- **New Environmental Concerns and Regulations.** New environmental regulations and mandates will need to be addressed as to their impact on safety area improvements and on the continual operation of the airport. An ongoing concern at the airport is trees penetrating the Federal Aviation Regulations (FAR) Part 77 imaginary flight surfaces. These imaginary surfaces rise from the airport's runway environment at certain slopes, based on the type of approach, and should be clear of all obstructions. Currently trees penetrate some approach and some transitional surfaces at the airport. Most of the penetrations are trees growing in the Connecticut River flood plain. The removal of these trees will require permits from the Connecticut Department of Energy and Environmental Protection (CTDEEP), the U.S. Army Corps of Engineers (ACOE), and local coordination with city officials and the public.
- The state currently has an ongoing project to determine the extent of obstructions and whether they need to be removed or marked with obstruction lights. Another concern will be the ability of the airport to improve and expand the runway safety areas. The airport would need to acquire land rights from the Metropolitan District Commission (MDC) and would need to acquire permits from CTDEEP and ACOE to fill and grade within regulated wetlands.
- **New and Improved Navigational Aids.** HFD will need to address updating the current navigational aids to be able to meet the future demands due to increased corporate jet traffic. To meet this demand, the airport now has a global positioning system (GPS) approach for Runway 2 and has requested one for Runway 20. The airport may experience additional corporate service by implementing these navigational aids. This may lower the approach minimums and allow more of the traffic that currently gets diverted to BDL in inclement weather to land at HFD, which is a major function of HFD.

#### 7.1.4 Groton-New London Airport (GON)

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GON occupies approximately 489 acres in southeastern Connecticut in the town of Groton. It lies along the Long Island Sound coastline at the inlet of the Poquonnock River. It is located 89 air miles southwest of Boston, 53 miles southeast of Hartford/Springfield, 48 miles southwest of Providence, and 108 miles northeast of New York. It is classified in the FAA's NPIAS (2007-2011) as a general aviation airport. Comprehensive information on the services, facilities, and plans for the airport is presented in the *Groton-New London Airport Master Plan completed in May 2013*. GON is owned by the State of Connecticut and operated by the Connecticut Airport Authority. It receives funding from the state's General Fund and federal assistance from the FAA.

##### 7.1.4.1 Current Use

GON is used mostly for general aviation, military, and air taxi. The numbers of operations at the airport for calendar year 2013 are listed in Table 7-8. As of January the airport had 62 based aircraft.

##### 7.1.4.2 Airside and Landside Facility Components

The existing facilities at GON consist of two paved runways with connecting taxiways, apron areas, a terminal building with administration offices, a fire/rescue building, and a maintenance building. The military presence at the airport is the Connecticut Aviation Classification Repair 1109<sup>th</sup> Theatre Aviation Sustainment Maintenance Group or Tasma operated by the Army National Guard. These facilities and their components are discussed below:

**Figure 7-5. Aerial Photograph of Groton-New London Airport**



***Pavement***

GON has two runways: Runway 5-23 and Runway 15-33. These runways are serviced by a network of six taxiways. Since the completion of the Pavement Management Plan in 1995, Runway 5-23 has been rehabilitated. The reconstruction of Runway 15-33 was completed in the fall of 2002.

**Table 7-8. Operations at Groton-New London Airport**

Operation Type	Number of Operations	Percent of Total Operations
Air Carrier	0	0 percent
Air Taxi	1654	4.7 percent
General Aviation- Local	10,434	29.1 percent
General Aviation - Itinerate	21,402	59.7 percent
Military	2,313	6.5 percent
<b>Total</b>	<b>35,803</b>	

Source: Groton Tower Air Traffic Operational Count – Table updated January 2014

### ***Pavement Markings***

The pavement markings at GON are visually inspected annually and areas that do not meet current FAA standards are repainted. A majority of the markings were repainted by the fall of 2005 due to construction projects and new FAA mandates for runway holding position markings.

### ***Airport Signing***

At GON, after the aircraft has landed, the tower controls all its movements to the aircraft apron with taxiway designations and the aircraft, in turn, uses signing to follow the path. GON replaced all signs in 1993 to meet current FAA regulations. As of February 2010, the signs on the airport were in good condition, functioned very well, and met current FAA standards.

### ***Landing Aids***

During periods of inclement weather, when the vertical visibility (ceiling) is less than 1,000 feet or forward visibility - Runway Visual Range (RVR) is less than three miles, an airport is operating under IMC. IFR weather conditions occur about 20 percent of the time at GON. GON has two runways equipped to accommodate aircraft operations during IFR conditions

### ***Passenger Terminal Facilities***

The passenger terminal facility that was originally constructed in 1963 was renovated in 1997 and is structurally sound. The renovations included a new roof, a new heating and ventilation air-conditioning system, Americans with Disabilities Act (ADA) compliance, new carpeting, and other improvements. The building has an area of 10,593 square feet and houses the commuter and charter airlines, rental car offices, and a flight school.

### ***General Aviation (GA) Facilities***

There is presently one fixed base operator located at the airport. It is Mystic Jet Center, established in 2013, when Columbia Air Services and Lanmar Aviation merged their aircraft and fueling services on-airport. Columbia separately performs aircraft sales, avionics and maintenance services; while Lanmar separately performs aircraft maintenance services and T-hangar rental and sales services. Columbia's facilities consist of three 15,000-square-foot conventional hangars used mainly for aircraft maintenance, and combined office space that comprises approximately 9,750 square feet, and a new terminal building. Parking for 76 automobiles is available adjacent to the hangars. An above ground fuel storage facility is located northwest of the new hangar on Tower Avenue. The facility meets current fuel-farm construction requirements, is housed in its own building, and provides storage for 20,000 gallons of Jet-A fuel and 12,000 gallons of 100 low-lead aviation gasoline. Lanmar Aviation's facility consists of a 10,000-square-foot hangar along with office space that comprises approximately 5,000 square feet. Parking for 60 vehicles is available along with an above ground storage facility, a self-fueling station for aircraft and a t-hangar facility that houses approximately ten aircraft. In the spring of 2004 Lanmar completed construction of a new facility consisting of 20,000 square feet of hangar space, 3,750 square feet of office space along with a new aircraft ramp and parking lot. In 2005, the company constructed a new 34-unit t-hangar facility adjacent to this facility.

### ***Air Operations Facilities***

GON is located within the jurisdiction of Boston Air Route Traffic Control Center (ARTCC). IFR arrivals and departures are under the control of Providence Approach/Departure Control. The FAA, which controls air operations, operates the air traffic control tower with contract personnel. The tower is equipped and staffed to provide VFR separation of arriving and departing aircraft and control of taxiing aircraft in movement areas, i.e. runways and taxiways.



## **Public Parking**

At-grade parking is provided on-airport at no charge for passengers, visitors, and employees. On-airport parking consists of 245 parking spaces with eight handicap spaces. The parking lot currently is in fair condition and is of adequate size to meet the projected future demand. In the fall of 2001, new lighting, which included new poles, bases, conduit, and wire, was installed in the parking lot.

### **7.1.4.3 Factor's Affecting the Ability to Meet Current and Future Demands**

The growth in operations experienced in the 1980s reflects the growth in the economy during that period and the healthy level of commuter service at the airport. The subsequent decline in operations stems from the recession experienced during the early 1990s and a drop in commuter service. Overall, the operational trends experienced at GON are occurring at other small regional airports throughout the state, as well as the nation. The Department has completed a Master plan in May 2013

It will become increasingly challenging to ensure the continued level of commercial air service at GON and to meet the future aviation demands. Key factors that will affect the ability of the airport to meet the current and future aviation demands include the following:

- **Environmental Concerns and Regulations.** GON is located in the Connecticut Coastal Area Management (CAM), which brings with it more stringent environmental regulations. The impact of environmental regulations and mandates on safety area improvements and the continual operation of the airport will need to be addressed. A concern relative to the operation of the airport is tree penetration of the FAA-mandated FAR Part 77 imaginary flight surfaces. These imaginary surfaces rise from the airport's runway environment at certain slopes, based on the type of approach, and should be clear of all obstructions. Currently trees penetrate three runway approaches at the airport. The removal of these trees will require permits from ConnDEEP, the U.S. Army Corps of Engineers (ACOE), and local coordination with city officials and the public. The state currently has on-going projects to determine the extent of obstructions at the airport and an Environmental Impact Statement for the proposed runway safety area improvements has been completed.
- **New and Improved Navigational Aids.** The updating of the airport's current navigational aids to meet the future demands on the airport due to increased air traffic, including scheduled air service, will need to be addressed.
- **Runway Safety Improvements.** Recent FAA studies show that most on-airport aircraft accidents occur within 1,000 feet of the runway ends. FAA Advisory Circular 150/5300-13 requires 500-foot-wide runway side safety areas and 1,000-foot-long extended runway safety areas for a runway comparable to Runway 5-23. In 2011 the DOT Installed an Engineer Materials Arrestor System (EMAS) System at the ends of Runway 5-23, which is defined in FAA Advisory Circular 150-5220-22A as a "high energy absorbing materials of selected strength which will reliably and predictably crush under the weight of an aircraft". The system is used to stop and aircraft that has overrun the runway.

### 7.1.5 Waterbury-Oxford Airport (OXC)

OXC occupies 430 acres of land in the towns of Oxford and Middlebury. It is classified in the FAA's NPIAS as a general aviation airport. The role and level of service are determined by the type of aircraft the airport can accommodate. It is home to one fixed base operator, Keystone Aviation, two multiple services operators, Executive Flight and Double Diamond (a multiple services operator has similar rights as a fixed base operator, excluding fuel sales), a 12-unit t-hangar complex, and a 48-unit t-hangar facility run by Keystone Aviation Services.

In 2001 a new hangar and Control Tower were constructed on the west side along with a 500-foot clear span hangar and office facility on the east side of the airport. The new control tower was officially opened in the spring of 2002. In the fall of 2002, Double Diamond completed a new hangar and office complex. Keystone Aviation completed construction of a new hangar and office complex in the southeast portion of the airport in 2005 and is constructing an on-airport restaurant with transient aircraft parking. This facility is opened in the fall of 2007. Construction was completed on a two-bay maintenance facility on the west side of the airport, adjacent to the existing maintenance facility. Comprehensive information on the services, facilities, and plans for the airport is presented in the *Waterbury-Oxford Airport Master Plan* (1995). An update of the Master Plan was completed in the fall of 2006, with approval by the FAA in 2007. Also, a FAR Part 150 Noise Study was completed in the fall of 2008.

OXC is owned by the State of Connecticut and operated by Connecticut Airport Authority. It receives funding from the state's General Fund and federal assistance from the FAA.

**Figure 7-6. Aerial Photograph of Waterbury-Oxford Airport**



### 7.1.5.1 Current Use

OXC is used to a great extent by private corporations for business travel. As of February 2010, the airport had a total of 263 based aircraft. The numbers of operations at the airport for the calendar year 2014 are listed below:

**Table 7-9. Operations at Waterbury-Oxford Airport**

Operation Type	Number of Operations	Percent of Operations
Air Taxi	4,573	16.84 Percent
General Aviation - Local	17,141	8.46 Percent
General Aviation - Itinerate	23,012	4.18 Percent
Military	1,292	3.02 Percent
Total	46,018	

Source: CAA- FAA Airport Traffic Record, Form 7230-1. Table updated in January 2014.

### 7.1.5.2 Airside and Landside Facility Components

The existing facilities at Waterbury-Oxford Airport (OXC) consist of one runway with connecting taxiways, apron areas, a general aviation terminal, an administration building, a fire-rescue and maintenance facility, a control tower, Restaurant / Catering facility 235,000 Square feet of hangars and proposed new 150,000 square foot hangar complex. These facilities and their components are identified and discussed below:

#### ***Pavement***

OXC has one runway, Runway 18-36, with the following characteristics: 5,800 feet in length and 100 feet in width. However, only 5,000 feet of this runway is useable for landing due to displaced thresholds. A Pavement Management Plan update was completed in 2009. Upcoming projects include rehab of portions of Taxiway B and rehab of the Runway in 2016.

#### ***Pavement Markings***

The pavement markings at Waterbury-Oxford are visually inspected annually and areas that do not meet FAA standards are repainted.

#### ***Airport Signing***

At OXC, after the aircraft has landed, the pilot uses the runway and taxiway signs for guidance to a destination on the airport. During pavement reconstruction and routine maintenance, OXC is continually replacing signs to meet all current FAA regulations. As of February 2010, the signs on the airport were in very good condition, functioned well, and met all current FAA standards. The runway signage will be part of the runway rehab project.

#### ***Landing Aids***

During periods of inclement weather, when the vertical visibility (ceiling) is less than 1,000 feet or forward visibility - Runway Visual Range (RVR) is less than three miles, an airport is operating under IMC. OXC has only one runway, 18-36, equipped to accommodate aircraft operations during IFR conditions.

#### ***General Aviation (GA) Facilities***

OXC plays an important role in general aviation in Connecticut as it is the only general aviation airport in the state with a 5,000-foot runway. (There are only six runways open to the public in

Connecticut that are 5,000 feet or greater in length: , the others are at Groton-New London Airport and Tweed-New Haven Airport.) OXC has one fixed base operator, Keystone Aviation, and two multiple services operators, Executive Flight and Double Diamond Aviation, that provide storage and maintenance facilities and apron areas for based and transient aircraft, and general aviation terminal facilities. The present general aviation facilities also include a 12-unit t-hangar and a 48-unit t-hangar which are presently leased to a private second party.

The general aviation facilities are in good condition and of adequate size to serve current levels of activity. One change in general aviation, however, may be to provide additional hangar space for based aircraft. This is predicated on the based aircraft forecast, which projects an increase in based aircraft. Additional private corporate hangars are being built to increase hangar capacity. Keystone Aviation has proposed and contracted for the construction of seven new hangars and maintenance facilities

### ***Air Operations Facilities***

The FAA, which controls air operations, operates an air traffic control tower with contract personnel. The tower is equipped and staffed to provide Visual Flight Rule (VFR) separations of arriving and departing aircraft and separation of aircraft on the ground at aircraft movement areas, i.e. runways and taxiways. IFR operations are handled by the tower.

### **7.1.5.3 Ability to Meet Current and Future Demands**

The ability to meet the future aviation demands at OXC was studied in an Airport Master Plan Update (AMPU) which was approved by the FAA in 2007. Some key factors that will affect the ability of the airport to meet the current and future aviation demands are as follows:

- ***New Environmental Concerns and Regulations.*** The impact of new environmental regulations and FAA mandates on safety area improvements and the continual operation of the airport will need to be addressed. Regulated wetlands surround the perimeter of the airport and any improvements to the airport will require careful planning by CTDOT, with permitting from CTDEEP and the U.S. Army Corps of Engineers (ACOE). The airport also has numerous penetrations into the FAA FAR Part 77 imaginary flight surfaces. A large percentage of these penetrations are trees. The removal of these trees also will require careful planning and coordination with CTDEEP and ACOE, especially since the trees are growing in regulated wetlands.
- ***Improved Navigational Aids.*** To better accommodate IFR conditions, OXC will need to address complementing its existing ILS on Runway 36 with additional landing aids to lower the existing minimums. An approach lighting system and upgrading the existing middle marker will enhance the ILS for Runway 36 and provide the additional safety required by pilots. An additional consideration that is necessary to enhance the ILS for Runway 36 is the relocation or burial of the high tension power lines at the approach end(note: the Eastern set of lines is in the process of being lowered to comply with the airport surfaces). At their present location the power lines would impair any improvements to the airport's ILS to Runway 36.

## 7.1.6 Windham Airport (IJD)

IJD occupies 280 acres of land in the Town of Windham. It is classified in the FAA's NPIAS as a general aviation airport. Windham Aviation was the sole fixed base operator at the airport, providing maintenance, flight instruction, aircraft rental, and fuel for the based and itinerant aircraft at the airport. They concluded their operations there in 2012 and since then there has been no fuel associated with the Airport. However the CAA plans to install a "self-serve" fuel farm. IJD is owned by the State of Connecticut and is managed by CAA

**Figure 7-7. Aerial Photograph of Windham Airport**



### 7.1.6.1 Current Use

IJD is used primarily for general aviation. The numbers of operations at the airport for the 12 months ending on August 31, 2014 are listed below:.

**Table 7-10. Operations at Windham Airport**

Operation Type	Number of Operations	Percent of Total Operations
Air Taxi	100	0.7%
General Aviation - Local	8,000	56.1%
General Aviation - Itinerate	5,800	40.7%
Military	200	1.4%
Total	14,250	

Source: FAA Airport Master Record, Form 5010. Operations for the 12 Months Ending 8/31/2014.

### **7.1.6.2 Airside and Landside Facility Components**

Windham Airport (IJD) has general aviation facilities and two paved runways with connecting taxiways, apron areas, and t-hangars. These facilities and their components are discussed below:

#### ***Pavement***

Runway 9-27 is 4,278 feet long and 100 feet wide. Runway 18-36 is 2,797 feet long and 150 feet wide. The two runways at IJD are serviced by a network of four taxiways.. A Pavement management Plan update was completed in 2009. Taxiway B was extended to be full parallel Taxiway for Runway 18-36

#### ***Pavement Markings***

All of the pavement markings at IJD have been repainted within the last five years as the pavements have been rehabilitated. The markings are visually inspected annually and repainted as needed to meet FAA standards. All Runway Hold Markings have been updated to the current FAA Advisory Circular.

#### ***Airport Signing***

At IJD, after the aircraft has landed, the pilot uses the runway and taxiway signs for guidance to a destination on the airport. When undertaking pavement reconstruction and routine maintenance activities, IJD continually replaces signs to meet all current FAA regulations. As of February 2010, the signs on the airport were in good condition, functioned very well, and met current FAA regulations.

#### ***Landing Aids***

During periods of inclement weather, when the vertical visibility (ceiling) is less than 1,000 feet or forward visibility - Runway Visual Range (RVR) is less than three miles, an airport is operating under IMC. IFR weather conditions occur about 13 percent of the time at IJD. There is currently no Air Traffic Control Tower at this airport.

In terms of runway approaches, both runways have two possible approach ends. The instrument runway at IJD is Runway 27, which utilizes a non-precision localizer approach. IJD also has a circling approach based on the Norwich Very High Frequency Omni Range Station (VOR) with an attendant GPS overlay

#### ***General Aviation (GA) Facilities***

IJD's fixed base operator, Windham Aviation, is located in the southeast part of the airport. It provides aircraft services, aircraft sales, and maintenance for planes and avionics, flight training, and air charter services. IJD's facilities consist of one 9,828-square-foot hangar and office space and one 5,610-square-foot hangar. Parking for 34 automobiles, including two handicap spaces, is adjacent to the office/hangar facility. Also, Jet-A and 100 low lead fuels are available on site. As of 2012, the airport had 68 based aircraft.

### 7.1.6.3 Ability to Meet Current and Future Demands

The ability to meet the future aviation demands at IJD is contingent on the CAA accomplishing several improvement projects at the airport. Key factors that will affect the ability of the airport to meet the current and future aviation demands include the following:

- **New Environmental Concerns and Regulations.** The impact of new environmental regulations and mandates on safety area improvements and the continual operation of the airport will need to be addressed. The trees penetrating the FAA-mandated FAR Part 77 imaginary flight surfaces are a major concern to the operation of the airport. These imaginary surfaces rise from the airport's runway environment at certain slopes, based on the type of approach, and must be clear of all obstructions. Currently trees and ground surfaces penetrate or affect all four runway approaches at the airport. Another concern will be the ability of the airport to improve and expand the runway safety areas. These improvements will enhance the safety of the general public using the airport's facilities. The state currently has a project on-going to determine the extent of obstructions at all of the State-owned airports.
- **Improved Navigational Aids.** The need to update the current navigational aids to enable the airport to meet the future demands that result from increased traffic must be addressed.
- **Runway Safety Area Improvements.** Recent FAA studies show that most on-airport aircraft accidents occur within 1,000 feet of the runway ends. FAA Advisory Circular 150/5300-13 requires 150-foot wide runway side safety areas to protect the runway environment and 300 foot long extended runway safety areas. This may not be entirely realistic with the existing ground contours at either end of the runway, but an effort must be made to enhance the safety areas to benefit the pilots at the airport. However, careful consideration must be made so that the improvements do not outweigh the financial cost.

## 7.1.7 Danielson Airport (LZD)

LZD occupies 257 acres of land in the Town of Killingly, two miles northwest of Danielson Center. It is classified in the FAA's NPIAS as a general utility, general aviation airport. It is home to one fixed base operator, New England Flight Services, and has airside access to Harvard Ellis Regional Technical School, one of two facilities in Connecticut providing training for aviation mechanics. The aviation training portion of this school was relocated to Hartford-Brainard Airport. Comprehensive information on the services, facilities, and plans for Danielson Airport is presented in the Danielson Airport Master Plan which was updated in 2008.

The airport is owned by the State of Connecticut and is managed by CAA. The airport receives funding from the state's General Fund and federal assistance from the FAA.

**Figure 7-8. Aerial Photograph of Danielson Airport**



### 7.1.7.1 Current Use

Danielson Airport is used to a great extent for local, single engine, general aviation operations. As of August 2014 Danielson Airport had a total of 34 based aircraft. The numbers of operations at the airport for the 12 months ending on August 31, 2014 are listed below:

**Table 7-11. Operations at Danielson Airport**

Operation Type	Number of Operations	Percent of Total Operations
Air Taxi	72	0.3%
General Aviation - Local	16,500	73.0%
General Aviation - Itinerate	6,000	26.5%
Military	30	0.1%
Total	22,602	

Source: FAA Airport Master Record, Form 5010. Operations for the 12 Months Ending August 31, 2014



### **7.1.7.2 Airside and Landside Facility Components**

The existing facilities at Danielson Airport consist of one runway with connecting taxiways, two apron areas, a general aviation terminal, and one t-hangar building. These facilities and their components are discussed and listed below:

#### **Pavement**

Danielson Airport has one paved runway, Runway 13-31, with the following characteristics: 2,700 feet in length and 75 feet in width. In 1997 the entire airport pavement system was reconstructed. In addition, a new transient parking apron was constructed along with a new stub taxiway in 2009.

#### **Pavement Markings**

The entire airport was repainted in 1998 under a reconstruction project. The markings are visually inspected annually and repainted as needed.

#### **Airport Signing**

Danielson Airport installed new signs in 1998. As of February 2010, all the signs were in good condition, functioned very well, and met current FAA regulations.

#### **Landing Aids**

During periods of inclement weather, when the vertical visibility (ceiling) is less than 1,000 feet or forward visibility - Runway Visual Range (RVR) is less than three miles, an airport is operating under IMC. Danielson Airport has only visual approaches. An AWOS weather reporting system was installed in 2007.

#### **General Aviation (GA) Facilities**

Danielson Airport plays an important role in GA in eastern Connecticut, primarily in Windham County. The airport has one fixed base operator, New England Flight Services, which provides storage and maintenance facilities, apron areas for based and transient aircraft, flight instruction, and GA terminal facilities. The present GA facilities also include a privately owned, ten-unit t-hangar facility. The current GA facilities are adequate for the level of activity at the airport. Improvements to these facilities may need to be addressed in the future as needs arise.

### **7.1.7.3 Ability to Meet Current and Future Demands**

The ability to meet the future aviation demands at Danielson Airport will be affected by increases in general aviation activity at the airport. Some of the key factors that will affect the ability of the airport to meet these demands are discussed below:

- **Environmental Concerns and Regulations.** The impact of new environmental regulations and mandates on the continued operation of the airport will need to be addressed. These factors include tree penetrations into the airport's approach and transitional flight surfaces, regulated wetlands and the Quinebaug River within close proximity to the runway environment. Removal of the trees and any construction in or near the regulated wetlands and floodplains of the Quinebaug River will require permitting and careful coordination with ConnDEEP, U.S. Army Corps of Engineers (ACOE) and the public. The State of Connecticut has hired a consultant to complete vegetation management plans for all State-owned airports.
- **Improved Navigational Aids.** To better accommodate operations during inclement/IFR conditions, improved navigational aids will be needed.

## 7.2 Municipal Airports

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The State of Connecticut distributes funding through state grants-in-aid to the municipal airports for improvements and studies. The airport enters into an agreement with the state for every project requiring a Federal Aviation Administration (FAA) grant. The agreement states that the State of Connecticut will participate in 75 percent of the Non-Federal share of approved costs for the proposed project. The airport's governing body selects the consultants for the design and inspection of the projects following all applicable FAA guidelines. The municipal airport projects are carried in the FAA's five-year capital improvement plan for the State of Connecticut. This section includes information on and pictures of the following five municipal airports: Sikorsky Memorial Airport, Danbury Municipal Airport, Tweed-New Haven Airport, and Meriden-Markham Municipal Airport and Robertson Airport in Plainville.

### 7.2.1 Sikorsky Memorial Airport (BDR)

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Sikorsky Memorial Airport (BDR) is situated three and a half miles east/southeast of the City of Bridgeport and adjacent to Long Island Sound in the Town of Stratford in Fairfield County. The airport is owned by the City of Bridgeport. BDR has an airport commission made up of individuals from Bridgeport and Stratford, which acts as its governing body.

BDR is a primary regional service and general aviation airport. As of November 2014 it had 187 based aircraft. The National Plan of Integrated Airport Systems identifies BDR as a general aviation airport. The numbers of operations at the airport for calendar year 2010, the latest year data are available, are listed in the table below.

**Figure 7-9. Aerial Photograph of Sikorsky Memorial Airport**



**Table 7-12. Operations at Sikorsky Memorial Airport**

Operation Type	Number of Operations	Percent of Total Operations
Air Carrier	0	0
Air Taxi	2,309	3.3%
General Aviation - Local	33,829	49.8%
General Aviation - Itinerate	31,189	45.9%
Military	624	.91%
<b>Total</b>	<b>67,951</b>	

Source: FAA Airport IQ 5010 form. Operations for 12 Months Ending 06/30/2010

The airfield consists of two runways: Runway 6-24, which measures 4,677 feet long, and Runway 11-29, which measures 4,761 feet long. The airport is serviced by an air traffic control tower.

Landside facilities include a terminal building and three full service fixed base operators, Bridgeport Air Center, Textron Flight Services, and Three Wing Aviation. Additional information on the airport can be found in the *Sikorsky Memorial Airport Master Plan*, on file at the Bridgeport City Hall and at the Airport Manager's Office.

## 7.2.2 Danbury Municipal Airport (DXR)

Danbury Municipal Airport (DXR) is located in the City of Danbury, on a 248-acre site that is adjacent to I-84 and State Route 7. It is 20 miles southwest of Waterbury-Oxford Airport and five miles east of the Connecticut/New York border. It is owned and operated by the City of Danbury and governed by the City of Danbury's Airport Commission. As of December 2012, the airport had 291 based aircraft. The National Plan of Integrated Airport Systems identifies the airport as a reliever, general utility airport. It is a reliever to Westchester Airport in White Plains, New York. The numbers of operations at the airport for calendar year 2012 are listed in the table below:

**Figure 7-10. Aerial Photograph of Danbury Municipal Airport**



**Table 7-13. Operations at Danbury Municipal Airport**

Operation Type	Number of Operations	Percent of Total Operations
Air Carrier	0	0
Air Taxi	3,360	0.3%
General Aviation - Local	33,796	51.0%
General Aviation - Itinerate	32,210	48.5%
Military	5,858	0.2%
Total	69,424	

Source: FAA Airport IQ 5010 Report. Operations for 12 Months Ending 12/31/12

DXR has two intersecting runways: Runway 8-26, an east to west runway and the primary visual and instrument runway which measures 4,422 feet long, and Runway 17-35, the north-south crosswind runway which measures 3,135 feet long. The airport is serviced by an air traffic control tower.

Landside facilities include six fixed base operators who provide a range of services to on-airport owners of transient aircraft using Danbury Municipal Airport. Additional information about the airport can be found in the Danbury Municipal Airport Master Plan, on file at the Danbury City Hall and at the Airport Manager's Office.

The major issue with respect to airport operations is the removal of obstructions required to keep the appropriate runway approach slopes clear, as mandated by the FAA. DXR is currently purchasing property to secure rights to the runway protection zone for Runway 8-26. The acquisition will allow the airport to maintain its existing displaced threshold at 368 feet.

### 7.2.3 Tweed-New Haven Airport (HVN)

Tweed-New Haven Airport (HVN) occupies 397 acres of land in the City of New Haven (175 acres) and the Town of East Haven (222 acres) in southern Connecticut. It has an airport authority, comprised of members from area municipalities and the South Central Regional Council of Governments, which is the airport's governing body.

HVN serves south central Connecticut as an active, vital general aviation and scheduled service airport. The airport is classified as a short haul, primary commercial service airport in the National Plan of Integrated Airport Systems. As of March 2014, the airport had 43 based aircraft. The numbers of operations at the airport for the 12 months ending March 31, 2014 are listed in the table below:

**Figure 7-11. Aerial Photograph of Tweed-New Haven Airport**



**Table 7-14. Operations at Tweed-New Haven Airport**

Operation Type	Number of Operations	Percent of Total Operations
Air Carrier	2578	7.6%
Air Taxi	1528	4.6%
General Aviation - Local	14,641	43.6%
General Aviation - Itinerant	14,349	42.8%
Military	455	1.4%
<b>Total</b>	<b>33,551</b>	

Source: FAA Airport IQ 5010 Report. Operations for 12 Months Ending 03/31/2014

The airfield consists of two runways; Runway 2-20 which measures 5,600 feet and Runway 14-32 which measures 3,626 feet. Construction of runway safety areas for Runway 2-20 was completed in the fall of 2009. The objective is to eliminate obstructions (trees and towers) that penetrate the approaches. The airport is serviced by one commuter carrier, US Airways Express.

Landside facilities include an 11,000-square-foot terminal, rental car agencies, long- and short-term parking lots, and taxi service. Additional information about the airport can be found in the *Final Tweed-New Haven Airport Master Plan Update*, on file at the New Haven City Hall and at the Airport Manager's Office.

## 7.2.4 Meriden-Markham Municipal Airport (MMK)

Meriden-Markham Municipal Airport (MMK) occupies 137 acres of land within the jurisdictions of the City of Meriden (11 acres) and the Town of Wallingford (126 acres). Airport activities are overseen by the Meriden Aviation Commission whose members are appointed by the Meriden City Council. The Commission oversees the operation, maintenance, and management of the airport. Day-to-day operations are assigned to the fixed base operator, Meriden Aviation Services. The airport currently serves small general aviation aircraft and has 50 based aircraft as of 2013.

**Figure 7-12. Aerial Photograph of Meriden-Markham Municipal Airport**



The airport consists of one main runway, Runway 18-36, that measures 3,100 feet and has a full-length taxiway 30 feet wide and in 2013 the runway was crack sealed. There is a two-story terminal building, maintenance hangar, one six-unit t-hangar, and two conventional hangars and one maintenance hangar. A new snow removal equipment building was constructed in 2012. Recently the Commission acquired a new maintenance contract with mustang maintenance. The airport also provides access to 24 hour self-service fuel pump, this was initiated in 2012.

The major issue with respect to airport operations is the need to replace aircraft hangars and parking aprons due to age and deterioration. The aircraft apron was reconstructed in 2008. Additional information about the airport can be obtained in the *Meriden-Markham Airport Master Plan*, on file at the Meriden City Hall and in the Airport Manager's Office.

## 7.2.5 Robertson Airport (4B8)

Robertson Airport (4B8) occupies 75 acres of land in the Town of Plainville and is located on the Plainville – Farmington Town Line. Airport Activities are overseen by the Town of Plainville and the Aviation Commission formed in 2008. The town Council and Commission oversees the operation, maintenance and management of the airport. Day to day operations are over seen by the town manager assigned to the fixed based operator, Interstate Aviation Inc. The airport currently serves small and medium general aviation aircraft and provides charter services, flight training and other aviation related uses. The airport has 75 based aircraft.

The airport (shown in Figure 1-20) consists of one runway, Runway 2-20 which was repaved summer 2012 that measures 3660 in length that is 75 feet wide and has a full length taxiway 35 feet wide. There are several conventional hangars, terminal building and a fuel farm.

**Figure 7-13. Aerial Photograph of Robertson Airport**



This airport was purchased by the Town of Plainville in March of 2010 and has now become Connecticut's fifth municipally owned airport. The airport is in the process of creating an Airport Layout Plan and an Airport Master Plan for the airport for FAA and CAA approval. Once this task is complete the Town can begin to request funds for improvements to the airport from both the FAA and CAA.