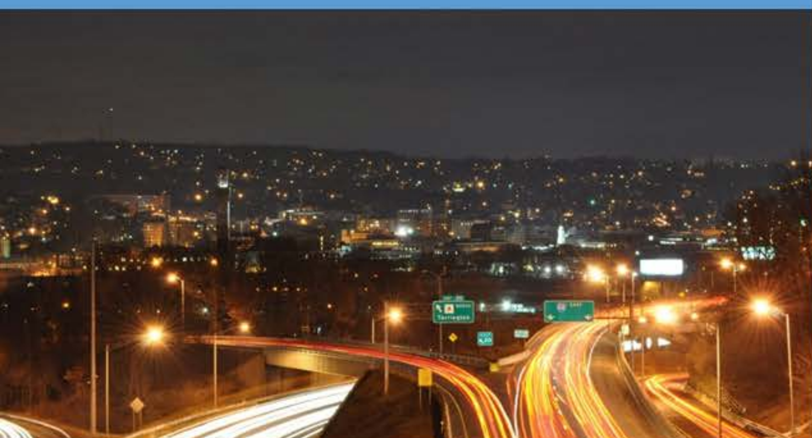

Metropolitan Transportation Plan: 2019 ~ 2045 For the Naugatuck Valley Planning Region & Central Naugatuck Valley Metropolitan Planning Area

April 2019

Prepared by:
Naugatuck Valley Council of Governments

Title:	Metropolitan Transportation Plan for the Naugatuck Valley Planning Region: 2019-2045
Author:	Naugatuck Valley Council of Governments
Date:	February 2019
Metropolitan Planning Organization:	Central Naugatuck Valley Metropolitan Planning Organization (CNVMPO)
Sources of Copies:	Naugatuck Valley Council of Governments 49 Leavenworth Street, Suite 303 Waterbury, Connecticut Phone: (203) 757-0535
Website:	www.nvcogct.org
Abstract:	Federal regulations require any urbanized area with a population greater than 50,000 to designate a metropolitan planning organization (MPO) to evaluate and assess its transportation systems, identify needed improvements to its transportation systems, and help decide how investments in the transportation systems will be made, including identifying the funding program allocations, project timing and schedule, and which projects to program. The NVCOG, as the host agency for the Central Naugatuck Valley MPO, assessed and analyzed the existing transportation system, identified deficiencies and determined future transportation needs. Based on these analyses, a program of transportation improvement projects is recommended. Future transportation investments reflect reasonably expected funding resources.
Acknowledgements:	The Metropolitan Transportation Plan for the Naugatuck Valley planning region and the Central Naugatuck Valley Metropolitan Planning Organization (CNVMPO) was prepared by the Naugatuck Valley Council of Governments (NVCOG) in cooperation with member municipalities and the Connecticut Department of Transportation (CTDOT). It was completed in accordance with federal transportation planning requirements, stipulated in 23 CFR Part 450§324, and under the NVCOG's *FY 2018/2019 Unified Planning Work Program for the Naugatuck Valley Planning Region*. Funding was provided through the UPWP by the US Department of Transportation (USDOT), Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the CTDOT and member municipalities. The findings and conclusions expressed in the report are those of the NVCOG and CNV MPO and do not necessarily

	reflect the official views or policies of the Connecticut Department of Transportation and/or the U.S. Department of Transportation.	
For more information:	For more information about the NVCOG's transportation planning process and the update of the Metropolitan Transportation Plan, please visit the NVCOG's website at: www.nvcogct.org	
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RESOLUTION ON CONFORMITY WITH THE CLEAN AIR ACT – OZONE

CENTRAL NAUGATUCK VALLEY
METROPOLITAN PLANNING ORGANIZATION
49 Leavenworth Street, 3rd Floor, Waterbury, CT 06702 · 203-757-0535 · 203-735-8688

RESOLUTION 2019-07

**RESOLUTION ON CONFORMITY WITH THE CLEAN AIR ACT
OZONE**

WHEREAS, the Central Naugatuck Valley MPO is required to submit an Air Quality Conformity Statement to the US Federal Highway Administration (FHWA) and to the US Environmental Protection Agency (EPA) in accordance with the final conformity rule promulgated by EPA (40 CFR 51 and 93) when adopting or amending the Transportation Improvement Program (TIP) or when effecting a significant revision of the Metropolitan Transportation Plan (MTP); and,

WHEREAS, Title 42, Section 7506 (3) (A) states that conformity of transportation plans and programs will be demonstrated if:

1. The plans and programs are consistent with recent estimates of mobile source emissions,
2. The plans and programs provide for the expeditious implementation of certain transportation control measures, and
3. The plans and programs contribute to annual emissions reductions consistent with the Clean Air Act of 1977, as amended; and

WHEREAS it is the opinion of the Central Naugatuck Valley MPO that the Metropolitan Transportation Plan approved today, April 12, 2019, and submitted to FHWA and EPA conform to the requirements of Title 42, Section 7506 (3) (A) as interpreted by EPA (40 CFR 51 and 93); and,

WHEREAS, The State of Connecticut has elected to assess conformity in the Connecticut portion of the New York-Northern New Jersey-Long Island, NY-NJ-CT Ozone Moderate Nonattaiment area (Fairfield, New Haven and Middlesex Counties) and in the Greater Connecticut Ozone Marginal Nonattainment area (Litchfield, Hartford, Tolland, New London and Windham Counties), and the Connecticut Department of Transportation has jointly assessed the impact of all transportation plans and programs in these Nonattainment areas (Ozone and PM2.5 Air Quality Conformity Determination February 2019); and,

WHEREAS The Connecticut Department of Transportation's assessment (above) has found that plans and programs jointly meet mobile source emission's guidelines advanced by EPA pursuant to Section 7506 (3) (A),

NOW, THEREFORE BE IT RESOLVED that Central Naugatuck Valley MPO finds that the **2019-2045 MTP** and the **FFY 2018-2021 TIP** and all Amendments conform to air quality requirements of the U.S. Environmental Protection Administration (40 CFR 51 and 93), related U.S. Department of Transportation guidelines (23 CFR 450) and with Title 42, Section 7506 (3)

BEACON FALLS · BETHLEHEM · BRISTOL · CHESHIRE · MIDDLEBURY · NAUGATUCK · OXFORD · PLYMOUTH
PROSPECT · SOUTHBURY · THOMASTON · WATERBURY · WATERTOWN · WOLCOTT · WOODBURY

(A) and hereby approves the existing Ozone and PM2.5 Air Quality Conformity Determination dated February 2019, contingent upon no major adverse comments are received during said period

This resolution shall become effective as of April 12, 2019.

I do hereby certify that the resolution adopted by the Central Naugatuck Valley MPO at a public meeting held on April 12, 2019, at which a quorum was present and that the same is a correct and true transcript from the original thereof.

Respectfully submitted,

Neil O'Leary
CNV MPO Chairman

4-12-19
Date

Resolution on Conformity with The Clean Air Act – PM 2.5

CENTRAL NAUGATUCK VALLEY
METROPOLITAN PLANNING ORGANIZATION
49 Leavenworth Street, 3rd Floor, Waterbury, CT 06702 · 203-757-0535 · 203-735-8688

RESOLUTION 2019-08

**RESOLUTION ON CONFORMITY WITH THE CLEAN AIR ACT
PM 2.5**

WHEREAS, the Central Naugatuck Valley MPO is required to submit an Air Quality Conformity Statement to the US Federal Highway Administration (FHWA) and to the US Environmental Protection Agency (EPA) in accordance with the final conformity rule promulgated by EPA (40 CFR 51 and 93) when adopting or amending the Transportation Improvement Program (TIP) or when effecting a significant revision of the Metropolitan Transportation Plan (MTP); and,

WHEREAS, Title 42, Section 7506 (3) (A) states that conformity of transportation plans and programs will be demonstrated if:

1. The plans and programs are consistent with recent estimates of mobile source emissions,
2. The plans and programs provide for the expeditious implementation of certain transportation control measures, and
3. The plans and programs contribute to annual emissions reductions consistent with the Clean Air Act of 1977, as amended; and

WHEREAS it is the opinion of the Central Naugatuck Valley MPO that the Metropolitan Transportation Plan approved today, April 12, 2019, and submitted to FHWA and EPA conform to the requirements of Title 42, Section 7506 (3) (A) as interpreted by EPA (40 CFR 51 and 93); and,

WHEREAS, The State of Connecticut has elected to jointly assess conformity in all PM 2.5 attainment/maintenance areas in Connecticut (Fairfield County and New Haven County) and,

WHEREAS The results of the required emissions analysis performed by the Connecticut Department of Transportation on the **2019-2045 MTP** and the **FFY 2018-2021 TIP** and Amendments show that the implementation of the projects contained therein will result in emissions of PM2.5 in each analysis year that are less that the emissions of the baseline year;

NOW, THEREFORE BE IT RESOLVED that Central Naugatuck Valley MPO finds that the **2019-2045 MTP** and the **FFY 2018-2021 TIP** and Amendments conform to air quality requirements of the U.S. Environmental Protection Administration (40 CFR 51 and 93), related U.S. Department of Transportation guidelines (23 CFR 450) and with Title 42, Section 7506 (3) (A) and hereby approves the existing Ozone and PM2.5 Air Quality Conformity Determination dated February 2019, contingent upon no major adverse comments are received during said period.

BEACON FALLS · BETHLEHEM · BRISTOL · CHESHIRE · MIDDLEBURY · NAUGATUCK · OXFORD · PLYMOUTH
PROSPECT · SOUTHBURY · THOMASTON · WATERBURY · WATERTOWN · WOLCOTT · WOODBURY

This resolution shall become effective as of April 12, 2019.

I do hereby certify that the resolution adopted by the Central Naugatuck Valley MPO at a public meeting held on April 12, 2019, at which a quorum was present and that the same is a correct and true transcript from the original thereof.

Respectfully submitted,

Neil O'Leary
CNV MPO Chairman

4-12-19
Date

ENDORSEMENT OF METROPOLITAN TRANSPORTATION PLAN: 2019-2045 FOR THE NAUGATUCK VALLEY PLANNING REGION

CENTRAL NAUGATUCK VALLEY
METROPOLITAN PLANNING ORGANIZATION
49 Leavenworth Street, 3rd Floor, Waterbury, CT 06702 · 203-757-0535 · 203-735-8688

RESOLUTION 2019-09

ENDORSEMENT
METROPOLITAN TRANSPORTATION PLAN: 2019- 2045
FOR THE NAUGATUCK VALLEY PLANNING REGION

WHEREAS, the he Central Naugatuck Valley MPO is designated by the US Department of Transportation as the transportation planning agency for the Central Naugatuck Valley Planning Region, and conducts the transportation planning process in accordance with Section 450 of Title 23 of the Code of Federal Regulations, as amended by the ***Fixing America's Surface Transportation Act (FAST Act)*** and related US Department of Transpo1tation planning regulations; and,

WHEREAS, the ***Central Naugatuck Valley Regional Transportation Plan: 2015 - 2040*** was prepared and endorsed by the CNV MPO on April 10, 2015:

WHEREAS the ***FAST Act***, and other related acts, requires MPOs to prepare and develop long range Metropolitan Transportation Plans every four years that reflect at least a 20-year planning horizon, are financially constrained, comply with federal planning guidelines, consider all modes of transportation, address ten planning factors, consider six livability principles, and conform to the ***Clean Air Act Amendments of 1990*** and Connecticut's ***State Implementation Plan for Air Quality***, as revised; and,

WHEREAS, the CNV MPO prepared and completed a new long range ***Metropolitan Transportation Plan*** with a timeframe of 2019 to 2040 through the transportation planning process and in conformity with ***FAST Act*** planning guidelines; and,

WHEREAS the CNV MPO conducted a proactive public involvement process that followed the procedures set forth in the MPOs ***Public Participation Program*** handbook, as revised, including soliciting input and guidance from transportation stakeholders, making the draft plan available to the public electronically (on the web), preparing a summary of the draft plan and posting it on the NVCOG website, notifying the public of the new plan, soliciting review comments and suggestions through an online survey, providing at least a 30-day review period, holding public information meeting (March 27, 2019 at the office of the NVCOG), recording comments from the public, and considering and responding to comments.

WHEREAS, the proposed program of projects recommended in the CNV MPO's Metropolitan Transportation Plan was assessed for its impact on air quality and the State's ability to attain the ***Ozone and PM2.5 National Ambient Air Quality Standards***;

WHEREAS, the regional emissions assessments demonstrate that the proposed projects will not have an adverse impact on air quality.

NOW, THEREFORE BE IT RESOLVED that Central Naugatuck Valley MPO, after reviewing the final draft ***Metropolitan Transportation Plan for the Naugatuck Valley Planning Region: 2019-2045,*** finds that the ***MTP*** conform to air quality requirements of the U.S. Environmental Protection Agency (40 CFR 21 and 93), related U.S. Department of Transportation guidelines (23 CFR 450) and with Title 42, Section 7506 (3) (A) and endorses it as the official long range ***Metropolitan Transportation Plan*** for the Central Naugatuck Valley metropolitan planning area.

This resolution shall become effective as of April 12, 2019.

I do hereby certify that the resolution adopted by the Central Naugatuck Valley MPO at a public meeting held on April 12, 2019, at which a quorum was present and that the same is a correct and true transcript from the original thereof.

Respectfully submitted,

Neil O'Leary 4-12-19
Date

Neil O'Leary
CNV MPO Chairman

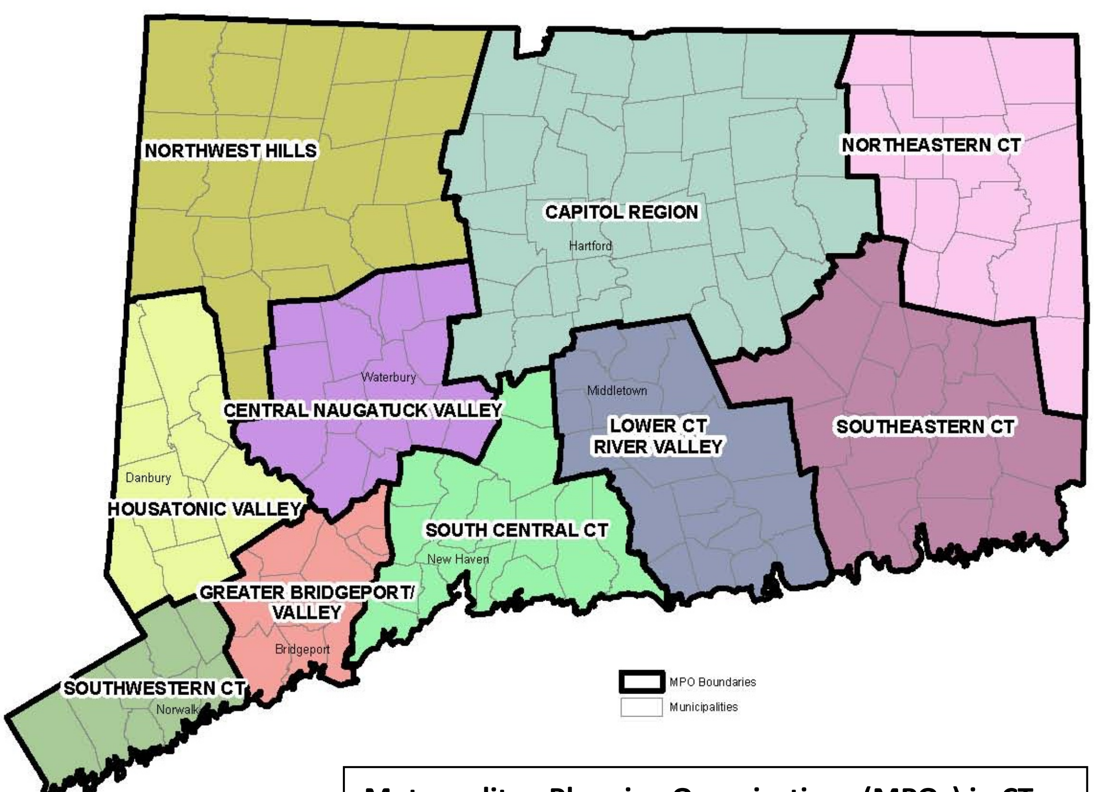
2

1.0 Metropolitan Transportation Planning Process

Federal regulations require any urbanized area with a population greater than 50,000 to designate a metropolitan planning organization (MPO) to evaluate and assess its transportation systems, identify needed improvements to its transportation systems, and help decide how investments in the transportation systems will be made. Federal regulations, as provided in Title 23 Code of Federal Regulations Part 450, Subpart C and applicable federal acts, stipulate a planning process that is continuous, cooperative and comprehensive.

The Naugatuck Valley Council of Governments (NVCOG) is a multi-discipline, regional planning organization for the Naugatuck Valley planning region and is the federally designated transportation planning agency for the Waterbury Urbanized Area. It serves as the transportation planning agency for the Central Naugatuck Valley Metropolitan Planning Organization (CNVMPO) and provides planning support to the Greater Bridgeport and Valley Metropolitan Planning Organization (GBVMPO). The NVCOG is also the designated FTA grant recipient for the Valley Transit District (VTD).

As the host agency for the CNVMPO and the co-host of GBVMPO, the NVCOG coordinates planning activities and provides technical and support services to the region’s transportation policy-making and technical groups. The metropolitan transportation planning process is conducted in accordance with federal regulations. Oversight of the metropolitan transportation planning process is jointly provided by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA).



Metropolitan Planning Organizations (MPOs) in CT

1.1 Central Naugatuck Valley MPO

The NVCOG was formed as of January 1, 2015, as a result of the state-mandated mergers and consolidations of regional planning organizations. The new organization consolidated the responsibilities of the former Council of Governments of the Central Naugatuck Valley and the Valley Council of Governments. In addition, the City of Bristol and Town of Plymouth opted to join the NVCOG after the dissolution of the former Central Connecticut Regional Planning Agency. The merger was accomplished by municipal legislative action and legal assignment of the powers, assets and functions by the respective COGs to the NVCOG. As part of the merger, the NVCOG is the legal successor to the COGCNV and VCOG and inherited all rights, roles and responsibilities of the predecessor agencies, including its designation as the federally-designated MPO.

The consolidation of regional boundaries and merger of Councils of Governments resulted in a misalignment of MPO and RPO boundaries for both the GBVMPO and the CNVMPO. The four lower Naugatuck Valley municipalities of Ansonia, Derby, Seymour and Shelton remained members of the GBVMPO. In addition, Bristol and Plymouth continued as members of the Central Connecticut MPO, which was hosted by the Capitol Regional COG.

To better conform planning functions in the region, the CNVMPO was formally re-designated to include Bristol and Plymouth as full members in July 2015. With re-designation, the CNVMPO consists of 15 of the 19 cities and towns of the Naugatuck Valley planning region. In 2017, efforts were undertaken to re-designate the GBVMPO by re-aligning the metropolitan planning area boundaries to coincide with the state-defined planning region boundaries. The process to re-designate the MPOs complied with federal regulations.

Despite efforts to re-designate the GBVMPO and CNVMPO, the resolution to separate the cities of Ansonia, Derby and Shelton and the town of Seymour from the GBVMPO failed to garner the requisite support of the GBVMPO's largest city and affirmative vote by members representing at least 75% of the population.

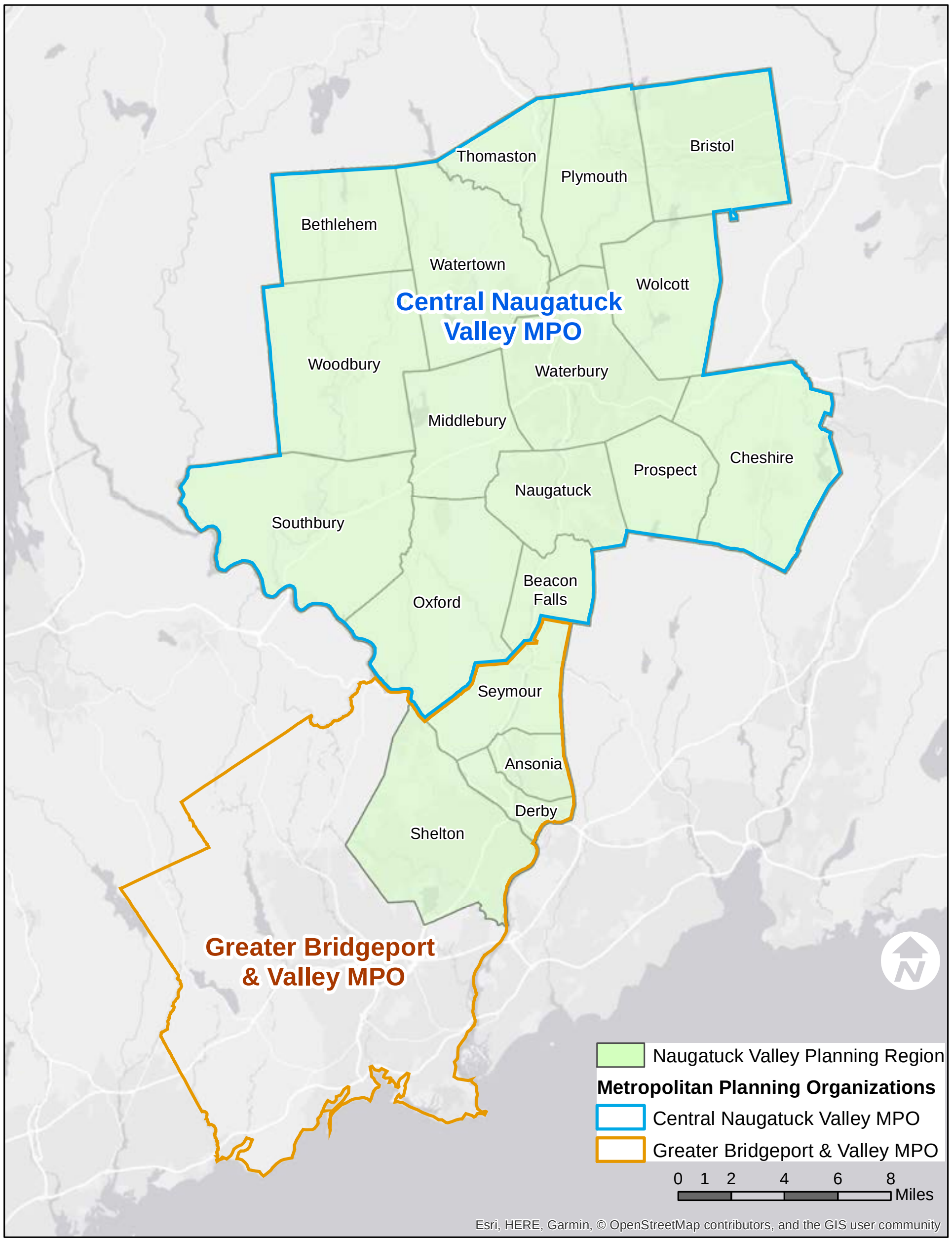
The CNVMPO comprises 15 municipalities with membership by the chief elected official of each municipality in the Metropolitan Planning Area (MPA). The members are:

Beacon Falls	Naugatuck	Thomaston
Bethlehem	Oxford	Waterbury
Bristol	Plymouth	Watertown
Cheshire	Prospect	Wolcott
Middlebury	Southbury	Woodbury

Representatives of the FHWA, FTA, Connecticut Department of Transportation (CTDOT), and the Connecticut Department of Energy and Environmental Protection (CTDEEP) are included as "Ex Officio" members. The CNVMPO policy board oversees the regional transportation planning and capital programs for the planning area, and prepares and maintains a unified planning work program (UPWP), a short range transportation improvement program (TIP), a metropolitan transportation Plan (MTP) and determines the conformity of its transportation improvement projects, plans and program to attainment of air quality goals.

The CNVMPO does not include Shelton, Derby and Ansonia and Seymour. These four municipalities are members of the Greater Bridgeport and Valley MPO (GBVMPO). MetroCOG hosts the consolidated GBVMPO.

MetroCOG contracts with the NVCOG to conduct the metropolitan planning program, as described in the UPWP, for these four municipalities. As such, throughout this MTP these four municipalities are often included in regional analysis and reporting for informational purposes only. Transportation improvement projects located in the four Naugatuck Valley planning region municipalities that are in the Greater Bridgeport and Valley metropolitan planning area are included in the MTP for the GBVMPO. The respective COG and MPO boundaries are shown in the following map.



Unified Planning Work Program

Prepared in accordance with Title 23 CFR Part 420 and Part 450 Section 308, the Unified Planning Work Program documents the planning tasks and activities to be undertaken by the NVCOG over a two-year period in support of its transportation improvement program and budgets allocated planning funds needed to complete these tasks. The multi-task planning program includes: data collection and analysis; multi-modal transportation planning; program management and administration; technical assistance; and program implementation.

The current NVCOG UPWP can be accessed here: https://nvcogct.org/content/work-program

Transportation Improvement Program

Required under 49 U.S.C. 5303(j), the Transportation Improvement Program (TIP) lists all proposed highway and transit improvement projects within the Naugatuck Valley planning region programmed to receive federal assistance over a four-year time horizon. The TIP is incorporated into the State Transportation Improvement Program (STIP), and is collectively referred to as the TIP/STIP.

The TIP/STIP is organized by federal funding program and must be "financially constrained." This means there must be a reasonable expectation of federal financial assistance to implement endorsed projects and that the funding sources must be identified for each project. Federal transportation planning regulations, as amended, also stipulate who selects projects under the various funding categories.

The TIP/STIP is periodically amended to advance priority projects and maintain a financially constrained program. It is a goal of the TIP/STIP to ensure full obligation of available federal funds in each fiscal year.

The current NVCOG TIP can be accessed here: https://nvcogct.org/content/transportation-improvement-programs

Metropolitan Transportation Plan

In accordance with 49 USC 5303(i), each MPO is required to create a Metropolitan Transportation Plan every 4 years. The MTP identifies transportation deficiencies, recommends improvements, and advances priority transportation projects in cooperation with the CTDOT, municipal officials, other state agencies, stakeholder organizations and interested residents. The MTP must consider the entire range of transportation choices and modes. As with the TIP/STIP, the MTP must be “financially constrained” and be consistent with the amount of funding that can be reasonably expected to be available over its horizon year. Priority projects from the MTP are advanced for funding and implementation through the TIP/STIP process.

Past MTPs are available for reference here: https://nvcogct.org/content/transportation-plan

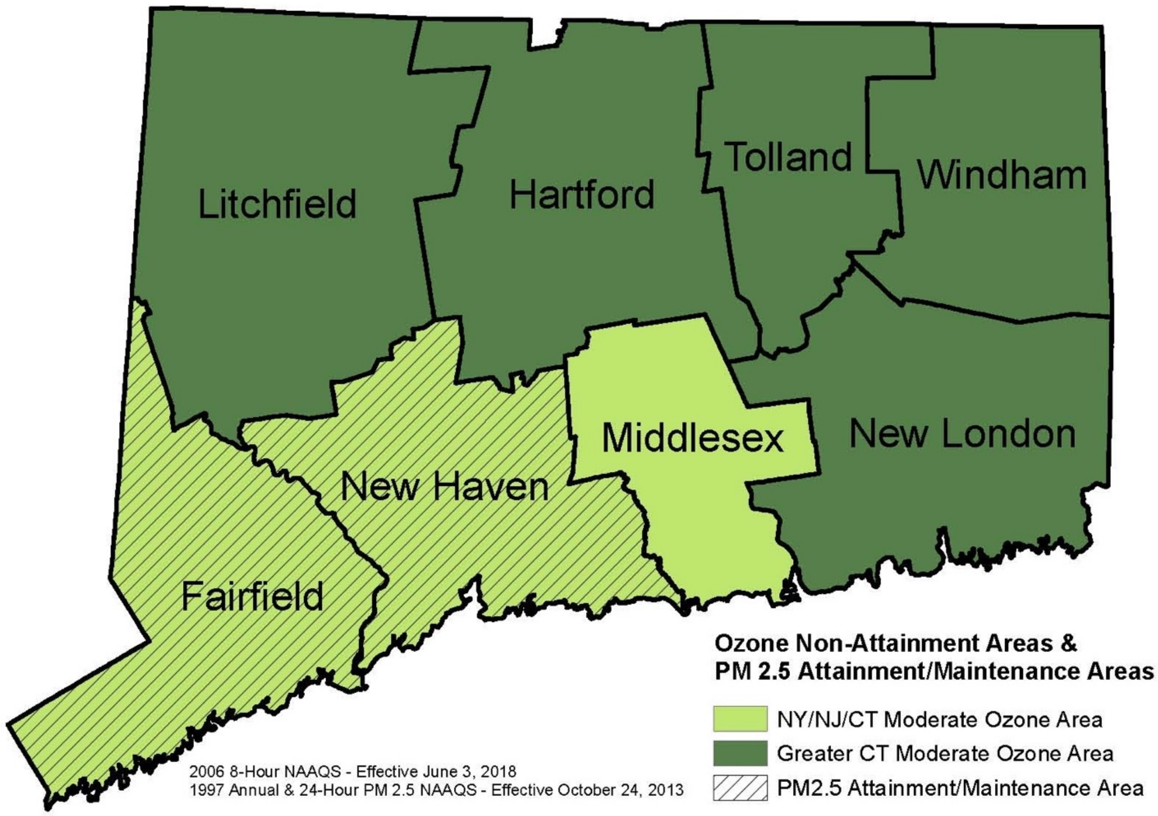
Air Quality Conformity

The Clean Air Act Amendments (CAAA) of 1990 and federal transportation regulations and legislation recognized the major contributions of transportation sources to the overall air quality problem evidenced throughout the country. To effectuate a reduction in transportation-related emissions and a corresponding improvement in air quality, areas designated as non-attainment for a criterion pollutant were required to demonstrate that their transportation plans, programs and projects contributed to the attainment of National Ambient Air Quality Standards (NAAQS) and would not cause a new violation or delay attainment of the NAAQS. This process is referred to as Air Quality Conformity.

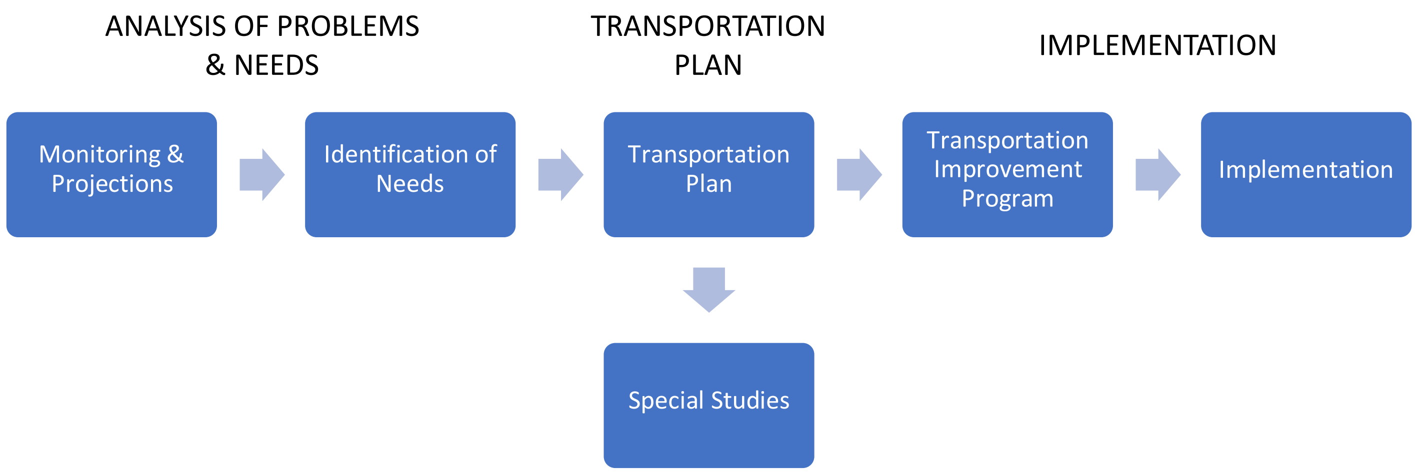
The CTDOT is responsible for conducting the detailed transportation and air quality modeling required to demonstrate conformity. Projects recommendations in the TIP/STIP and MTP are incorporated into the statewide transportation network and analyzed for their potential impact on air quality. The results of the modeling are estimates of transportation-related emissions that are expected to be generated after constructing all regionally significant transportation improvements. The MTP is required under 49 USC 5303(i) to conform to the State

Implementation Plan for Air Quality. Additionally, to be responsive to the goals of the State Implementation Plan for Air Quality, the TIP/STIP is required to contribute to annual reductions in transportation-related emissions.

The air quality conformity analysis for this plan can be found in section 3.3.



The transportation planning and project implementation process conducted by the NVCOG is outlined in the diagram below.



The Naugatuck Valley planning region is not designated as a Transportation Management Area (TMA). Despite the region's 2010 Census population of 448,708, well over the threshold needed for a TMA designation, the population of the Waterbury UZA, which defines a TMA, was 194,535, just under the 200,000 population requirement. Therefore, federal certification of its transportation planning process is not required. However, the transportation planning process is conducted in conformity with applicable metropolitan planning requirements and the CNVMPO self certifies that its planning process conforms to the Metropolitan Planning Rule, 23 CFR Part 450 Subpart C and 49 CFR Part 613. Also, the NVCOG participates in the federal certification process of adjacent MPOs, as several member municipalities are located in urbanized areas that are designated as a TMA, including the Bridgeport-Stamford UZA and Hartford UZA.

1.2 MPO Coordination

Federal regulations state that "If more than one MPO has been designated to serve an urbanized area there shall be a written agreement among the MPOs, the State(s), and the public transportation operator(s) describing how the metropolitan transportation planning processes will be coordinated to assure the development of consistent metropolitan transportation plans and TIPs across the MPA boundaries..."

In order to comply with this requirement, the NVCOG has entered into several transportation planning agreements with partner MPOs. These agreements define mutual responsibilities in carrying out the metropolitan planning process.

- Transportation Planning Process in the Greater Bridgeport and Valley Planning Regions

  This MOU consolidated the Transportation Planning Process in the Bridgeport Urbanized Area (as designated by the 1980 Census). It was executed in 1981 in response to the breakup of the Tri-State Planning Commission that had been the designated MPO for the New York metropolitan area. The MOU specifies transportation planning participants, roles, and responsibilities and designates the Greater Bridgeport Regional Council and the Valley Council of Governments as the transportation planning agencies for their respective regions. It was updated and revised in 2006.

- Transportation Planning Process in the Bridgeport-Stamford TMA

This MOU was executed in 2002 and defined the responsibilities of each MPO for carrying out its region's transportation planning program and for coordinating with the other MPOs in the Bridgeport-Stamford UZA. The MPOs in the Bridgeport-Stamford Urbanized Area consist of: the Greater Bridgeport and Valley MPO (GBVMPO); the South Western Region MPO (SWRMPO); the Housatonic Valley Council of Elected Officials (HVCEO); the South Central Regional Council of Governments (SCRCOG); and, the Council of Governments of the Central Naugatuck Valley (COGCNV). The transit operators consist of: the Greater Bridgeport Transit Authority (GBTA); the Housatonic Area Regional Transit (HART); the Norwalk Transit District (NTD); the Milford Transit District (MTD); the Valley Transit District (VTD); and, the City of Stamford.

An updated and revised MOU is being developed at the time of this MTP (February 2019) and is expected to be executed by the adoption of the plan.

- Transportation Planning Process in the Hartford TMA

  This MOU was established among the four Councils of Governments (COG) within the Hartford Urbanized Area, as well as the Connecticut Department of Transportation (CTDOT). The COGs include the Capitol Region Council of Governments (CRCOG), the Naugatuck Valley Council of Governments (NVCOG), the Lower Connecticut River Valley Council of Governments (RiverCOG), and the Northwest Hills Council of Governments (NHCOG). The purpose of the MOU is to define the method for distributing metropolitan planning funds and the responsibilities of each COG for carrying out its respective transportation planning program and coordinating with the other partner COGs.

  The MOU was executed in May 2018.

- Transportation Planning Process in the Multi-State New York-New Jersey-Connecticut-Pennsylvania Metropolitan Region

  This MOU is made and entered into by and among the New York Metropolitan Transportation Council (NYMTC) and the Orange County Transportation Council (OCTC) in the State of New York; the North Jersey Transportation Planning Authority (NJTPA) in the State of New Jersey; the Western Connecticut Council of Governments (WestCOG), Connecticut Metro Council of Governments (METROCOG), Naugatuck Valley Council of Governments (NVCOG), South Central Regional Council of Governments (SCRCOG), and Lower Connecticut River Valley Council of Governments (RiverCOG) in the State of Connecticut, and the Lehigh Valley Planning Commission (LVPC) in the State of Pennsylvania. This group of agencies is collectively referred to as the Metropolitan Area Planning (MAP) Forum. It establishes a mechanism for voluntary coordination, cooperation and consultation among the organizations. The intent is to cooperate in efforts to achieve general consistency of planning products, analyses and tools through informal communication and document exchange.

  The original MOU was updated and revised in 2017 to expand the boundaries of the MAP Forum. It was executed in September 2017.

- Air Quality Planning and Conformity

The GBVMPO and the Connecticut Department of Energy and Environmental Protection (DEEP) developed a letter of understanding to define roles and responsibilities for air quality planning, particularly as it pertains to the development of transportation control measures (TCMs) and the *State Implementation Plan for Air Quality (SIP)*.

The MOU and letter of understanding was signed in April idioms 1996.

1.3 MAP Forum

The MAP Forum is a consortium of metropolitan planning organizations (MPOs) in New York, New Jersey, Connecticut and Pennsylvania that have signed a Memorandum of Understanding (MOU) for the coordination of planning activities in the multi-state metropolitan region. The MAP Forum was established in 2008 to cooperate and coordinate transportation planning activities in the New York metropolitan area. The Valley COG, as co-host of the GBVMPO, was an original member of the MAP Forum, and NVCOG assumed the membership when the VCOG and COGCNV merged.

Members are:

- New York Metropolitan Transportation Council (NYMTC)
- Orange County Transportation Council (OCTC)
- North Jersey Transportation Planning Authority (NJTPA)
- Western Connecticut Council of Governments (WestCOG)
- Connecticut Metro Council of Governments (METROCOG)
- Naugatuck Valley Council of Governments (NVCOG)
- South Central Regional Council of Governments (SCRCOG)
- Lower Connecticut River Valley Council of Governments (RiverCOG)
- Lehigh Valley Planning Commission (LVPC)

The MAP Forum provides organizational and strategic guidance to member MPOs in planning for and understanding megaregional and boundary transportation projects. Because of the size, complexities and interdependence of the New York-New Jersey-Connecticut-Pennsylvania region, a major transportation investment in one part of the area can and will have implications throughout the region. It is imperative to be properly informed about these projects and fully understand how they will affect travel into, out of and through the component metropolitan planning areas. The networking capabilities of the MAP Forum as it relates to federally-mandated products and analyses is a critical function of the group. While the exchange of planning products is a key aspect of the MAP Forum's work program, it is the access to expertise and resources of member organizations that provides the greatest benefits.

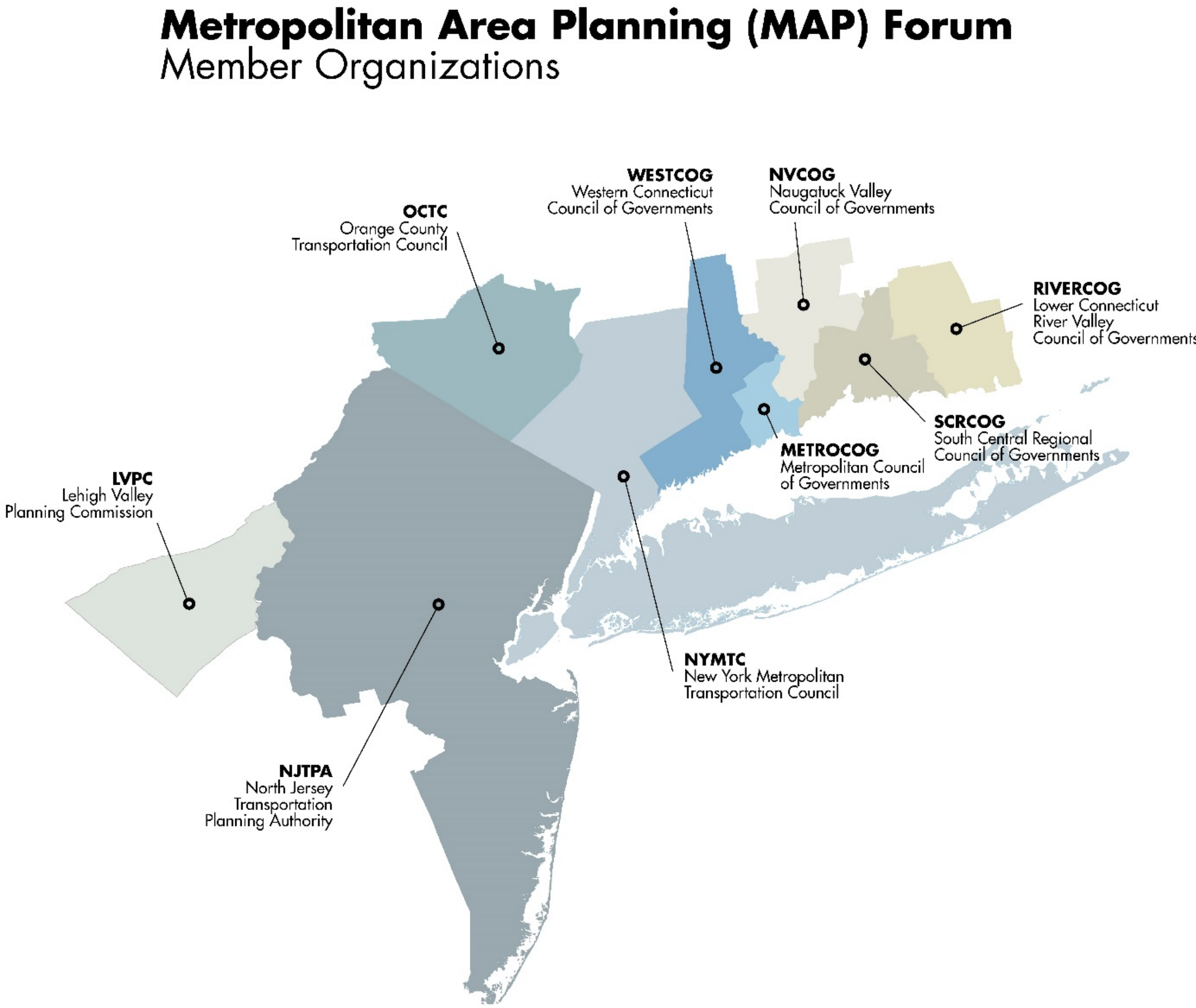
Key accomplishments of the MAP Forum are:

- Holds an annual meeting in the fall of each year and has added a spring meeting in recent years. Agendas focus on critical megaregional and boundary products.

- Developed a work program that centers on maintaining the critical networking capability of the MAP Forum.

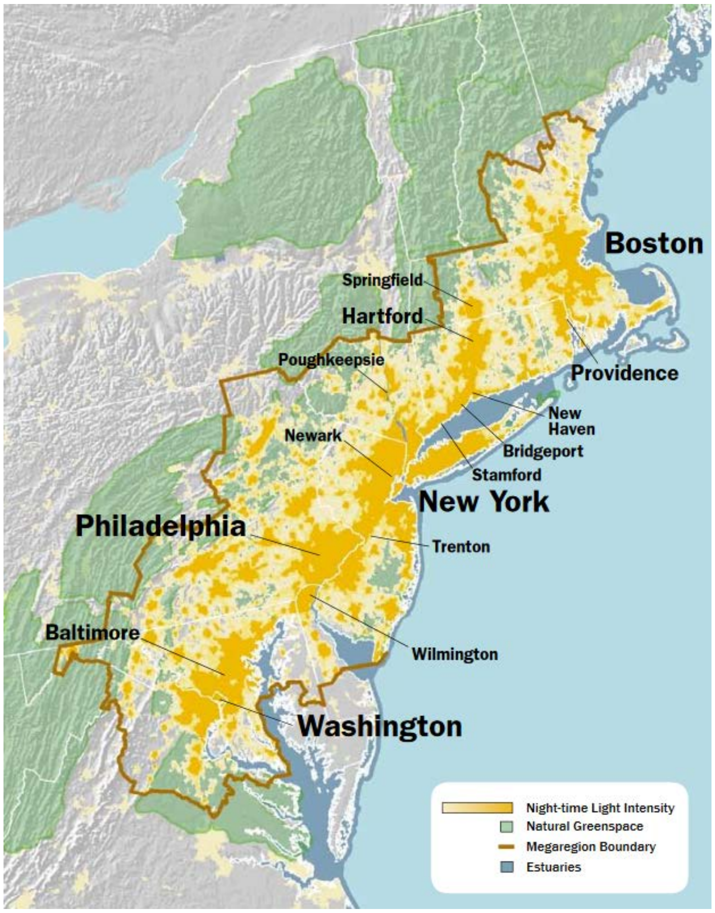
- Established a Multi-State Freight Working Group to provide a broad perspective on goods movement in the multi-state metropolitan region and advise the MAP Forum members on critical freight issues, programs and projects impacting the multi-state metropolitan region.

- Coordinated on the development of a Congestion Management Process for the NY metro area.
- Coordinated on setting transportation performance measures and targets.



1.4 Megaregional Planning Context: A Four-State Metropolitan Region

The four-state metropolitan region that composes the MAP Forum lies at the heart of the Northeast Megaregion, the most densely populated, urbanized area in the country. The Northeast Megaregion includes the metropolitan areas of Washington, D.C., Baltimore, Philadelphia, New York City and Boston and is home to 49.5 million people. This translates to nearly 18% of the nation's total population. It is also a major contributor to the United States' economy, producing one-fifth of the national GDP in 2010 (The Regional Plan Association. November 2007. *Northeast Megaregion 2050: A Common Future*. http://www.rpa.org/pdf/Northeast_Report_sm.pdf).



While the four-state region is centered on New York City, it also contains some of the largest cities in New Jersey (Newark, Jersey City, and Paterson) and Connecticut (Hartford, Stamford, Bridgeport, New Haven and Waterbury) as well as large suburban towns on Long Island (Brookhaven and Babylon) and in the lower Hudson Valley (Yonkers, Mount Vernon, Newburgh, New Rochelle, Poughkeepsie, and White Plains).

It also includes the planning areas of the MPOs and COGs that are members of the MAP Forum (refer to Section 2.3 for a list of MAP Forum organizations).

Geography and Environment

The four-state metropolitan region is geographically centered on New York City. The City possesses a well-used natural harbor and sits at the southern end of the Hudson River. East of Queens lie Nassau and Suffolk counties in suburban Long Island, known for its beach-lined coastline and barrier islands. Across the Hudson River to the west, lies northern New Jersey, an area which contains thirteen individual counties and several significant cities. North of the New Jersey-New York state border lies the Lower Hudson Valley, a hilly region comprising seven counties (Westchester, Rockland, Putnam, Orange, Ulster, Dutchess and Sullivan Counties) and dotted with suburban communities of varying size. Southwestern Connecticut is located to the east of these Hudson Valley counties and across Long Island Sound. This part of Connecticut comprises two counties (Fairfield and New Haven), and the six most populous cities in the state are located in the area (Bridgeport, Stamford, New Haven, Waterbury, Norwalk, and Danbury). It is characterized by a fairly dense, urban landscape, interspersed by a number of wealthy suburban towns.

The Pennsylvania portion of the four-state region lies at the foothills of the Poconos Mountains, and is characterized by the valleys formed by the Lehigh River and Delaware River, the latter of which creates the border between Pennsylvania and New Jersey, and the Susquehanna River. The southernmost portion of the four-state region is made up of southern New Jersey in an area to the southeast of Philadelphia. Southern New Jersey's coastline and barrier islands also are included in this metropolitan region.

Economy

The economy of the four-state metropolitan region is large, diverse, and international. In 2015, the region produced a gross metropolitan product of $1ir.6 trillion, the largest in the country among metropolitan regions. Its economic output is nearly twice that of the Los Angeles metropolitan area and second only to Tokyo globally, by a margin of only about 9% (*GDP of Tokyo Metropolitan Area (Prefecture of Tokyo, Kanagawa, Saitama, and Chiba),* http://www.esri.cao.go.jp/jp/sna/sonota/kenmin/kenmin_top.html). It is home to numerous Fortune 500 companies and foreign corporations, with one in ten private sector jobs being at a foreign company (*Wylde, Kathryn* "Keeping the Economy Growing"*. Gotham Gazette.* January 23rd, 2006).

Although significant numbers of workers who reside in the four state region commute to New York City, particularly Manhattan, suburban Long Island, the Lower Hudson Valley, northern New Jersey and southwestern Connecticut are all home to numerous industries and contribute substantially to the four state region's economy.

- Agriculture and tourism are important to the suburban Long Island and Lower Hudson Valley economies.
- Northern New Jersey is home to the busiest port on the United States' east coast, the Newark-Elizabeth Marine Terminal
- The suburban areas close to New York City, for instance Westchester County in New York and Fairfield County in Connecticut, are home to major corporations.

Areas further from the New York City core have varied demographic and economic profiles. Eastern Pennsylvania, for example, has historically been manufacturing-based, and is currently the site of a variety of industrial-related firms. In the City of Trenton, New Jersey's capital, officials are attempting to incentivize more industrial and business development, as well as, looking to encourage more retail development within city limits.

Demographics

The economy of the four-state metropolitan region is large and diverse. The 2015 population estimate (ACS) for the area was 23,723,696. While New York City is famous for its diversity, the region as a whole is also quite ethnically and racially diverse, with large communities hailing from all over the world. Nearly 27% of the region's population was born outside the United States (2015 ACS). The total work force in the region is 9,046,910, with the largest shares of jobs in the office and administrative support, sales, food, education, and financial sectors.

Transportation Systems

The transportation system of the four-state metropolitan region is large and complex, tied together by a network of highways, rail lines, bridges, tunnels, and other infrastructure. However, the system as a whole is aging and in need of renewal. As the largest metropolitan area in the nation, the four state region is traversed by numerous major limited access highways and rail lines. These include:

- Interstate Highways: I-78, I-80 and I-280 which extend from New York City west into Pennsylvania; I-87, which becomes the New York Thruway between New York City and Albany; I-95, a north-south highway that provides access to New England and of which a portion is the New Jersey Turnpike; and I-495, known as the Long Island Expressway.

- Passenger Rail Lines: New Jersey Transit, MTA Metro-North Railroad, and MTA Long Island Rail Road commuter rail networks; the Shore Line East (Connecticut) commuter rail service; MTA New York City Transit's subway network; the Port Authority of New York & New Jersey's PATH rail rapid transit service; and New Jersey Transit's Hudson-Bergen Light Rail and Newark Light Rail systems.
- Intercity Rail: Amtrak along the North East Corridor from Washington, DC to Boston.
- Maritime: freight facilities at the Port of New York & New Jersey and reliever ports in Bridgeport, New Haven and New London.
- Major Commercial Airports: John F. Kennedy International Airport (JFK) in southern Queens, Newark Liberty International Airport (EWR) in Newark, and LaGuardia Airport (LGA) in northern Queens;
- Smaller Commercial and General Aviation Airports: Lehigh Valley International Airport (ABE) in Lehigh County, Pennsylvania, Long Island MacArthur Airport (ISP) in Suffolk County, New York, Stewart International Airport (SWF) in Orange County, New York, Trenton-Mercer Airport (TTN) in Mercer County, New Jersey, and Tweed New Haven Regional Airport (HVN) in New Haven, Connecticut.
- Bridges and Tunnels: Due to the large number of islands, rivers, and other geographic features, bridges and tunnels are common throughout the four state region, carrying both roadways and rail lines across or under various topographical features.

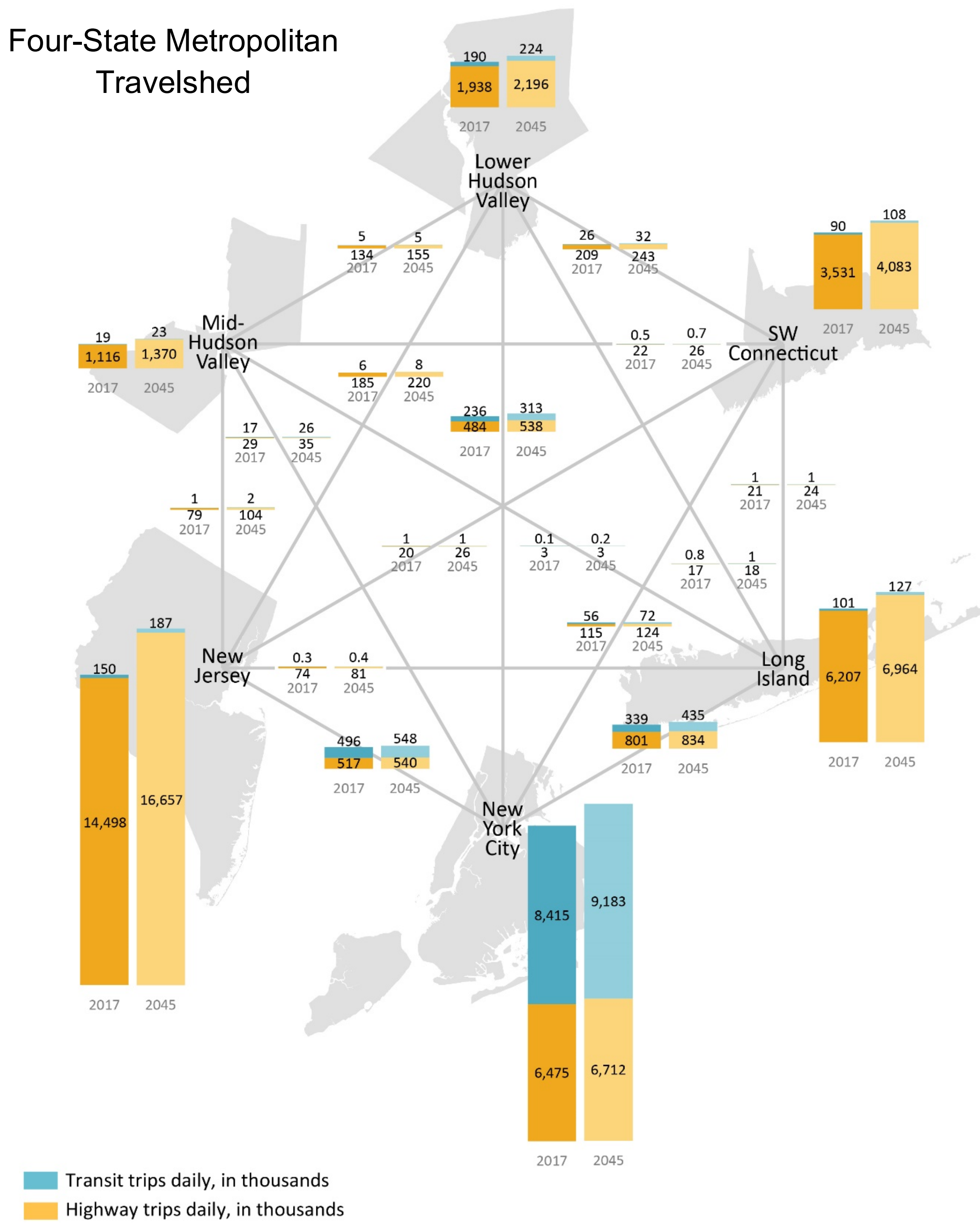
Metropolitan Travelshed

Based on a four-step transportation demand model maintained by the NYMTC, an estimated 46.2 million trips are made each day within and between the sub-regional area made up of northern and central New Jersey, New York City, suburban Long Island, southwestern Connecticut, the lower Hudson valley and the mid-Hudson Valley. (Note: Lehigh Valley in Pennsylvania was not included in the model). About 22% or 10.3 million trips are made using a form of public transit. The forecasted 2045 trip totals suggest 12% growth with total trip amounting to nearly 52 million per day.

The majority of trips are made within and are internal to the same area. The highest level of trip making occurs in the north and central New Jersey area, New York City and suburban Long Island. These three areas account for about 84% of the total trips. In terms of daily trips made between the subareas, the majority of these inter-area trips are made between New York City and northern and central New Jersey, between New York City and suburban Long Island, and between New York City and the lower Hudson Valley. These three sets of inter-area trips also feature significant proportions of transit trips.

The core of the four state region is notable for its enormous mass transit system. It is estimated that about one in every three users of mass transit, and two out of three rail riders in the United States travel using this system (Facts from Alan Pisarksi's *Commuting in America III* Study." Transportation Research Board. http://onlinepubs.trb.org/onlinepubs/nchrp/CIAIIIfacts.pdf). New York City is served by an intensively used subway and bus system, and its more immediate suburban neighbors are served by commuter rail and smaller state- and county-operated bus systems. Inter-city travel is provided by Amtrak, as well as long-haul buses and air travel facilities.

The region is the busiest airspace in the United States, serving over 100 million passengers annually (Fleming, Susan. "*FAA Airspace Redesign: An Analysis of the New York/New Jersey/Philadelphia Project, United States Government Accountability Office Report to the Congressional Requesters.*" Diane Publishing Company).



Transportation Investments

Due to the continued growth of the region and the aging state of many key pieces of infrastructure, a number of regionally-significant improvements to the transportation infrastructure are either planned or moving forward in the four-state metropolitan region. Examples of these *"boundary projects"* whose impacts cut across planning areas and state lines include:

- The Penn Station (New York) Access project that would provide direct access for the MTA Metro-North Railroad's New Haven Line to Manhattan's Penn Station, while redeveloping infill stations in the eastern Bronx.
- Interstate 95 improvement projects from Stamford to Bridgeport and Old Lyme to New London, along with New Haven Line commuter rail service improvements.
- Various improvement projects along Interstate 84 in both Connecticut and the Hudson Valley, including a complete replacement of the I-84/Route 8 interchange in Waterbury.
- A Cross Long Island Sound Connection between suburban Long Island and either the Bronx, Westchester County or Connecticut.
- The *New* New York Bridge project to replace the Tappan Zee Bridge across the Hudson River between Westchester and Rockland counties, in tandem with the development of new bus rapid transit services in the Interstate 287/Tappan Zee Bridge corridor *(under construction)*.
- West-of-Hudson transit improvements, including improvements to the Port Jervis Line in Orange County, New York.
- The replacement of the aging Goethals Bridge between Elizabeth, New Jersey and Staten Island *(under construction)*.
- The replacement of the Lincoln Tunnel Helix in Weehawken, New Jersey.
- The Hudson Tunnel Project to create an additional rail tunnel that would preserve the current functionality and strengthen the resiliency of the Northeast Corridor's Hudson River rail crossing between New Jersey and New York.
- The Amtrak Gateway Program's strategic rail infrastructure improvements designed to improve current services and create new capacity that will allow the doubling of passenger trains running under the Hudson River.
- The replacement of the Port Authority Bus Terminal, the redevelopment of Penn Station and the completion of Moynihan Station on Manhattan's west side.
- The Cross Harbor Freight Program for rail freight across New York Harbor.
- Airport access improvements, including the extension of the Port Authority Trans-Hudson rail service to Newark Liberty Airport, the extension of Air Train service to LaGuardia Airport and transit and roadway improvement for John F. Kennedy International Airport.

While passenger transport is critical, these important projects are not limited to the movement of people. In such a densely populated and economically active region, freight transportation is critical as well, and there are several major projects dedicated to freight in the region. For example, the Port Authority's Cross Harbor Freight Program is seeking to address the difficulty of moving freight from one side of New York Harbor to the other by examining a wide range of alternatives, including railcar and truck floats, container barges, and a cross-harbor rail tunnel. After review, the enhanced railcar float and double-track rail tunnel emerged as the preferred alternatives (*"Cross Harbor Freight Program."* http://www.panynj.gov/port/cross-harbor.html).

1.5 Federal Planning Factors

Federal metropolitan transportation regulations, specifically Title 23 CFR Part 450.306, requires the MTP to consider projects and strategies that will address ten specific planning factors. The planning factors and how the MTP addresses each of the factors are as follows:

1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
    - Revitalize and support the economic redevelopment of the urban core areas through the implementation of TOD projects and station area plans.
    - Reconstruct and modernize interchange areas on Route 8 to improve efficiency and safety and provide better access to the urban core areas.
    - Expand the incident management program and related ITS elements along the entire length of Route 8.
    - Construct a connector road between Route 42 in Beacon Falls and Route 67 in Seymour to spur economic development along the new corridor and provide access to potential development sites.
    - Construct a new rail spur and related infrastructure on the Waterbury branch line in Naugatuck in support of plans to develop an inland port facility.
    - Maintain I-84 and Route 8 in a state-of-good repair to support efficient movement of freight and improve truck travel time reliability.
    - Improve track conditions along the Central Connecticut Rail Line to meet FRA class 3 standards.
2. Increase the safety of the transportation system for motorized and non-motorized users.
    - The MTP supports and is consistent with the CTDOT's highway safety improvement program (HSIP) and integrates recommendations from the *State Highway Safety Plan*.
    - Construct Route 8 operational improvements and modernize interchange areas.
    - Construct intersection projects that address high hazard locations.
    - Extend the NRG Trail to provide a safe and attractive transportation corridor for bicyclists and pedestrians.
    - Expand the incident management program and related ITS elements along the entire length of Route 8.
    - Address pedestrian safety by implementing a regionwide pedestrian safety program that will close gaps in the existing sidewalk network, construct new sidewalks, maintain pedestrian signals, and implement a "Complete Streets" policy to accommodate travel of all users.

- Install advanced traffic signal systems.

3. Increase the security of the transportation system for motorized and non-motorized users.
   - Support transportation emergency management activities as part of the Regional Emergency Planning Team – REPT1, REPT2 and REPT5.
   - Identify critical transportation infrastructure in the Naugatuck Valley planning region vulnerable to natural and manmade disasters and implement resiliency and security measures.
   - Install security monitoring and response equipment at rail stations and on board transit vehicles.
4. Increase the accessibility and mobility of people and for freight.
   - Traffic signal modernization program – upgrade to include pedestrian signals, countdown signals, and accessible features (audible features).
   - Improve track conditions along the Central Connecticut Rail Line to meet FRA class 3 standards.
   - Redevelop and revitalize urban core areas, including TOD and station area projects.
   - Enhance sidewalks and crosswalks with curb ramps, curb extensions and use of textured pavement material – *"Complete Streets"* program.
   - Enhance and facilitate multi-modal connections between local bus service and commuter rail service at commuter rail stations.
   - Enhance and facilitate multi-modal connections between rail, pipeline and highway-borne freight.
   - Consolidate local bus services and implement fixed bus route connections between Bristol, Waterbury and Shelton, including points in between.
   - Expand the incident management program and related ITS elements along the entire length of Route 8.
   - Construct operational improvements Route 8 and modernize interchange areas.
   - Integrate goods movement and freight planning with the State Freight Plan.
   - Support advancements and deployment of autonomous and connected technologies and vehicles.
5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns.
   - Consult with state and local land use managers and environmental protection agencies.
   - Enhance and expand commuter rail service along the Waterbury branch line, including acquiring new locomotives and train sets to allow 30-minute peak hour service, constructing new station buildings and installing high-level platforms, and constructing a permanent transfer station at the Devon wye and instituting shuttle rail service along the WBL.
   - Complete the Naugatuck River Greenway Trail through the region.
   - Implement congestion management process and travel demand management actions.

- Implement “Complete Streets” initiatives and green infrastructure/Low Impact Development projects.
- Promote transit orient development (TOD) and station area plans to support downtown revitalization.
- Implement alternative modes of transportation projects along the Route 8 corridor, including Bus Rapid Transit and express bus service to complement commuter rail service.
- Construct pedestrian and bicycle connections and safety-related projects – Community Connectivity Program.
- Participate in the *Sustainable CT* program and encourage development of walkable and livable downtown areas.

6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.
    - Enhance rail-bus transfer connections at commuter rail stations
    - Preserve and upgrade I-84 and Route 8, as principle freight corridors, to improve the efficient movement of goods and freight.
    - Enhanced and expanded commuter rail service along the Waterbury branch line, including constructing a permanent transfer station at the Devon wye and instituting shuttle rail service along the WBL.
    - Implement Bus Rapid Transit and express bus service in the Route 8 corridor to complement WBL rail service.
7. Promote efficient system management and operation.
    - Expand the incident management program and related ITS elements along the entire length of Route 8.
    - Identify and assess intersections and corridors with recurring congestion and develop projects to reduce congestion and improve efficiency – Congestion Management System
    - Identify and assess high hazard intersections and corridors and develop a safety improvement program – Safety Management System.
    - Develop a ten-year capital plan for VTD and CTDOT to ensure rolling stock and vehicles are replaced on a life-cycle schedule – Public Transit Management System.
    - Monitor highway system operations and performance through the acquisition of *“Big Data”,* analysis of travel patterns available from the *National Performance Management Research Data Set (NPMRDS)*, and assessment of highway, bicyclist and pedestrian safety based on the analysis of crash data available from the CTDOT crash repository.
    - Implement traffic signal system modernization and interconnection projects.
8. Emphasize the preservation of the existing transportation system.
    - Rebuild and modify interchange areas on Route 8 to improve operations and efficiency and provide better access to the region’s urban core areas.
    - Upgrade commuter rail infrastructure – Positive Train Control, full signalization system and by-pass sidings.
    - Implement traffic signal system modernization and interconnection projects

    - Rehabilitate and maintain the existing highway and transit systems in a state-of-good-repair.
    - Implement low cost, intersection improvements designed to improve pedestrian safety and connections and enhance traffic flow.
    - Transportation management and operations projects.
9. Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation.
    - Implement green infrastructure and Low Impact Development projects.
    - Integrate road projects included in municipal and multi-jurisdictional *Natural Hazard Mitigation* plans into the MTP.
    - Assess the vulnerability of critical transportation infrastructure to impacts of climate change and extreme weather events.
10. Enhance travel and tourism.
    - Identified tourist attractions, including amusement parks, regional and local museums, state parks and forests, sports venues, regional performing arts theaters, and seasonal events, and developed a GIS database to define location and attributes.
    - Assess travel and traffic characteristics to key attractions to determine if operating problems exist.
    - Determine public transit access opportunities to main tourist attractions.

1.6 Transportation Performance Measures and Targets

Over the last two decades, states and MPOs, including the CNVMPO, have increasingly relied upon highway performance data to guide planning and programming, a process referred to as performance management. The 2012 federal *Moving Ahead for Progress in the 21st Century Act (MAP-21)* integrated many of these practices into statute by putting requirements on states and MPOs to include performance management in their planning documents. The *Fixing America's Surface Transportation (FAST) Act* re-emphasized the performance based approach to transportation planning. Specifically states and MPOs became required to establish performance targets and utilize a performance-based approach to transportation decision-making.

The national policy as outlined in MAP-21 and the FAST Act is as follows: "*Performance management will transform the Federal-aid highway program and provide a means to the most efficient investment of Federal transportation funds by refocusing on national transportation goals, increasing the accountability and transparency of the Federal-aid highway program, and improving project decision-making.*"

Federal targets have been or are being established in the following goal areas:

- Highway Safety
- Transit
- Infrastructure Condition – Pavement and Bridge Condition
- System Reliability
- Freight Movement
- Air Quality

The US Department of Transportation published the final rule related to implementation of performance based transportation planning in May 2016. The rule require the CTDOT, CNVMPO, and the operators of public transportation to use performance measures to document expectations for future performance. Performance management and performance-based planning and programming increases the accountability and transparency of the Federal-aid Program and offers a framework to support improved investment decision-making by focusing on performance outcomes for national transportation goals. The FHWA and FTA established national performance measures in areas of safety, infrastructure condition, congestion, system reliability, pollution emissions, freight movement, transit safety and transit state of good repair.

As part of this new performance-based approach, recipients of Federal-aid highway program funds and Federal transit funds are required to link the investment priorities contained in the TIP/STIP to achievement of performance targets.

The MAP-21 performance-related provisions also require States, MPOs, and operators of public transportation to develop other performance-based plans and processes or add new requirements on existing performance-based plans and processes. These performance-based plans and processes include the Congestion Mitigation and Air Quality Improvement (CMAQ) Program performance plan, the Strategic Highway Safety Plan, the public transportation agency safety plan, the highway and transit asset management plans, and the State Freight Plan.

A TIP/STIP shall include, to the maximum extent practicable, a discussion of the anticipated effect of the TIP/STIP toward achieving the performance targets identified by the State in the statewide transportation plan or other State performance-based plan(s), linking investment priorities to those performance targets.

The NVCOG has implemented performance measures that have been developed by CTDOT and will invest resources in projects to achieve adopted targets.

Highway Safety

Highway Safety is determined by the interaction between drivers, their behavior and the highway infrastructure. The five (5) performance measures for Highway Safety include:

1. The number of fatalities;
2. The rate of fatalities;
3. The number of serious injuries;
4. The rate of serious injuries; and,
5. The number of non-motorized fatalities and serious injuries.

The CTDOT and the CNVMPO will collaborate to program appropriate Highway Safety Improvement Program (HSIP) safety projects and the TIP/STIP will program projects to meet the targets set by the CTDOT and agreed upon by the CNVMPO. Projects will include:

- Programmatic highway safety improvements: Projects or programs that are conducted regularly throughout the state such as signing and pavement marking programs.
- Programmatic driver safety activities: Projects or programs that are conducted regularly on an ongoing basis. These include Highway Safety behavioral programs such as Impaired Driving, Occupant Protection, Distracted Driving, Speeding, Motorcycle Safety, and Teen

Driving grants for State and Municipal Police Departments using National Highway Traffic Safety Administration (NHTSA) funds.

- Location-specific highway safety projects: This includes roadway safety improvements selected to correct known safety problems at locations with a high frequency or severity of crashes.

The Safety Performance Management Measures regulation supports the Highway Safety Improvement Program (HSIP) and requires State Departments of Transportation and MPOs to set HSIP targets for the five safety performance measures that cover all public roadways regardless of ownership or functional classification.

The CTDOT, upon review of the 5-year rolling average for each measure, has determined that the targets will be to maintain the current five-year moving average.

Safety Performance Management Measure Target Summary

Target	Measures
Number of fatalities	257 fatalities/year
Rate of fatalities	0.823 fatalities/100 Million VMT
Number of serious injuries	1,571 serious injuries/year
Rate of serious injuries	5.033 serious injuries/100 Million VMT
Number of non-motorized fatalities and non-motorized serious injuries	280 fatalities and serious injuries/year

These targets were included in the CTDOT Highway Safety Plan sent to NHSTA and were approved on August 18, 2017. The targets were also incorporated in the Highway Safety Improvement Program annual report. The HSIP was approved by FHWA on September 26, 2017. The CNVMPO endorsed the state safety targets December 8, 2017.

Transit

The Transit Asset Management (TAM) rule requires that recipients and sub-recipients of FTA funds to set annual performance targets for federally established *State of Good Repair (SGR)* measures. Performance targets will be set for one or more asset classes for the following asset categories: Rolling Stock, Equipment, Facilities and Guideway Infrastructure. The CTDOT identified asset classes for its transit service providers specific to each of the four assets categories in the three public transportation modes of rail, bus and ferry.

The percentage of assets beyond the useful life benchmark is the performance measure set for both the categories of Rolling Stock and Equipment. For the facilities category, the performance measure is based on a 5-point condition rating scale derived from FTA's Transit Economic Requirement Model (TERM). The performance measure is the percentage of facilities rated below 3 on the 5-point scale, with a 3 rated as SGR. The category of facilities has two classes which are passenger and parking stations and administrative and maintenance buildings. Under FTA reporting requirements, the guideway Infrastructure category is specific only to rail. The performance measure set by FTA is the percentage of guideway with a performance restriction, which is interpreted as slow zones.

Under the FAST Act and MAP-21, "*transit providers are required to submit an annual narrative report to the National Transit Database that provides a description of any change in the condition of its transit system from the previous year and describes the progress made during the year to meet the targets previously set for that year*." Beginning in October 2018, performance targets will be reported annually to the National Transit Database by the CTDOT for the transit system. A narrative report describing strategies for setting targets and progress on the targets will accompany targets starting 2019.

To meet this requirement, the CTDOT coordinated with transit providers in Connecticut to develop *SGR* performance target in the four asset categories by the deadline of January 1, 2017, as set in the federal rules.

The four asset categories are:

- Rolling Stock – Revenue Vehicles: The goal for this asset class is to maintain vehicles in a state of good repair and replace vehicles based on a Useful Life Benchmark (ULB). The target is the percentage of vehicles that meet or exceed their ULB.
- Equipment – Service Vehicles: The goal for this asset class is to maintain vehicles in a state of good repair and replace vehicles based on a Useful Life Benchmark (ULB). The target is the percentage of vehicles that meet or exceed their ULB.
- Facilities – Revenue Vehicles: The goal for this asset class is to maintain facilities in a state of good repair. The target is the percentage of facilities that have a TERM (Transit Economic Requirements Model) condition rating of less than 3 on a 1-to-5 scale, with 1 indicating a poor condition and 5 an excellent condition.
- Infrastructure – Guideway: The goal for this asset class is to maintain transit guideway in a state of good repair. The target is the percentage of guideway operating under a speed restriction.

The following tables provides a summary of the performance targets by asset class and lists the current percentage meeting or exceeding the metric and the anticipated percentage at the end of 2017 for Tier I systems. Tier I transit systems include those under the operating jurisdiction of the CTDOT, including assets operated by Metro North Railroad on the New Haven main and branch lines and CT*transit*, including the Waterbury division operated by North East Transportation and the New Britain-Bristol Division operated by New Britain Transportation Company and DATTCO.

Transit Asset Management Performance Measure: Tier I Target Summary

Asset Class	Default SGR Metric	CT SGR Metric	Target: 2019	Percentage 2018
Bus	ULB 14 years	ULB 12 years	14%	19%
Articulated Bus	ULB 14 years	ULB 12 years	14%	0%
Over-the-road Bus	ULB 14 years	ULB 12 years	14%	3%
Cutaway	ULB 10 years	ULB 5 years	17%	0%
Rail Locomotives (MNR)	ULB 39 years	ULB 35 years	13%	54%
Rail Coaches (MNR)	ULB 39 years	ULB 35 years	13%	0%
Rail Self Propelled Cars	ULB 39 years	ULB 35 years	13%	12%
Service Vehicles-Trucks	ULB 14 years	ULB 14 years	7%	26%
Service Vehicles Automobiles	ULB 8 years	ULB 5 years	17%	46%
Service Vehicles SUVs	ULB 8 years	ULB 5 years	17%	30%
Service Vehicles Vans	ULB 8 years	ULB 5 years	17%	54%
Steel Wheel Vehicle (Rail Support)	ULB 25 years	ULB 25 years	0%	98%
Rail-Guideway	% Facilities with Performance Restrictions	n/a	2%	5%
Facilities-Passenger/Parking	TERM <3	n/a	0%	58%
Facilities-Admin/Maintenance	TERM <3	n/a	0%	0%

These targets were adopted by the CTDOT on January 1, 2017 and by the CNVMPO on June 9, 2017. The TIP/STIP will program projects to meet the targets set by the CTDOT and agreed upon by the CNVMPO by utilizing the list of capital prioritized projects, based on projected asset conditions, included in the CTDOT TAM and Transit Group Plans was completed October 1, 2018 to be shared with the MPOs. This list of projects will be updated every four years along with the Plans. These prioritized projects will be developed with the aid of CTDOT's analytical decision support tool, Transit Asset Prioritization Tool, better known as TAPT.

Within the CNVMPO planning region, there are no tier II systems. However, for informational purposes, the related tier II performance targets have been included because VTD operates in the four NVCOG communities that are part of the GBVMPO. These targets were adopted by the CTDOT on January 1, 2017 and by the GBVMPO on June 15, 2017.

Transit Asset Management Performance Measure: Tier II Target Summary

Asset Class	Default SGR Metric	CT SGR Metric	Target	Current
Bus	ULB 14 years	ULB 12 years	14%	24%
Cutaway	ULB 10 years	ULB 5 years	17%	46%
Minivan	ULB 8 years	ULB 5 years	0%	17%
Service Vehicles-Trucks	ULB 14 years	ULB 14 years	7%	32%
Service Vehicles-Automobiles	ULB 8 years	ULB 5 years	17%	100%
Service Vehicles-SUVs	ULB 8 years	ULB 5 years	17%	29%
Service Vehicles-Vans	ULB 8 years	ULB 5 years	17%	40%
Facilities-Admin/Maintenance (VTD)	TERM <3	n/a	0%	0%

Pavement and Bridge Condition

There are four performance measures for Pavement condition. These are:

1. The percentage of the pavement on the Interstate system in Good condition;
2. The percentage of the pavement on the Interstate system in Poor condition, with a maximum percentage of lane miles in poor condition at 5%;
3. The percentage of the pavement on the non-Interstate National Highway System (NHS) in Good condition; and
4. The percentage of the pavement on the non-Interstate NHS in Poor condition.

The two performance measures for Bridge deck area condition include:

1. The percentage of NHS bridges by deck area in Good condition; and
2. The percent of NHS bridges by deck area in Poor condition.

Pavement Condition Performance Measure: Target Summary

Target	Current Condition (State)	2-year targets (2020)	4-year targets (2022)
Percent interstate in good condition	66.2%	65.5%	64.4%
Percent interstate in poor condition	2.2%	2.0%	2.6%
Percent Non-Interstate NHS in good condition	37.9%	36.0%	31.9%
Percent Non-Interstate NHS in poor condition	8.6%	6.8%	7.6%

Bridge Condition Performance Measure: Target Summary

Target	Current Condition (State)	2-year targets (2020)	4-year targets (2022)
Percent in good condition	18.1%	22.1%	26.9%
Percent in poor condition	15.0%	7.9%	5.7%

These targets were adopted by the CTDOT on May 20, 2018 and by the CNVMPO on June 8, 2018. The CTDOT in collaboration with the CNVMPO will program projects to meet the targets using the Department's Pavement Management System and the Bridge Management System, which uses a systematic look at conditions to develop optimal strategies. These strategies are included in the CTDOT Transportation Asset Management Plan (TAMP).

Transportation Asset Management Plan

The TAMP acts as a focal point for information about the assets, their management strategies, long-term expenditure forecasts, and business management processes. The CTDOT is required to develop a risk-based TAMP for the NHS to improve or preserve the condition of the assets and the performance of the system (Title 23 USC 119(e) (1), MAP-21 § 1106). MAP-21 defines asset management as a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the lifecycle of the assets at minimum practicable cost (Title 23 U.S.C. 101(a) (2), MAP-21 § 1103).

Pavement and Bridge State of Good Repair needs are identified, quantified, and prioritized through the TAMP process. Projects to address SGR needs are selected from the TAMP for inclusion in the TIP/STIP.

System Reliability

Highway travel time reliability is closely related to congestion and is greatly influenced by the complex interactions of traffic demand, physical capacity, and roadway "events." Travel time reliability is a significant aspect of transportation system performance.

Operational-improvement, capacity-expansion, and to a certain degree highway road and bridge condition improvement projects, impact both congestion and system reliability. Demand-management initiatives also impact system reliability.

The level of travel time reliability (LOTTR) is expressed as a ratio of the 80th percentile travel time of a reporting segment to the "normal" (50th percentile) travel time of a reporting segment occurring throughout a full calendar year. Segments that have a ratio less than 1.5 are considered "reliable." The performance measure, as defined in Title 23 CFR 490.507, is the percent of the person-miles traveled on the Interstate section and the non-Interstate NHS that are reliable.

The following targets were adopted by the CTDOT on May 20, 2018 and by the CNVMPO on June 8, 2018.

System Reliability Performance Measure: Target Summary

Target	Current Condition (State)	2-year targets (2020)	4-year targets (2022)
Percent Interstate that is “reliable”	78.3%	75.2%	72.1%
Percent non-Interstate NHS that is “reliable”	83.0%	80.0%	76.4%

The CTDOT and the CNVMPO will program projects in the TIP/STIP to meet the targets by considering system reliability in the projects that are selected. Over time, and as quantifiable impacts begin to be observed and measured, the targets will become a formal part of the project selection process.

Freight Movement

This measure considers factors that are unique to the trucking industry. The unusual characteristics of truck freight include:

- Use of the system during all hours of the day;
- High percentage of travel in off-peak periods; and
- Need for shippers and receivers to factor in more ‘buffer’ time into their logistics planning for on-time arrivals. [23 CFR 490.607].

Freight movement will be assessed by the Truck Travel Time Reliability (TTTR) index. This index is the regional average of the highest ratios of the 95th percentile travel time for a road segment to the 50th percentile travel time for five statutorily defined time periods:

- AM peak period
- Mid-day period
- PM peak period
- Overnight
- Weekends

This is a measure of truck travel time reliability, not congestion. Segments of the highway that are regularly and predictably congested will not necessarily have a high TTTR index number. Rather, those segments of highway where delays are unpredictable and severe are scored highest. Prioritizing reliability over congestion came from stakeholder outreach with the freight industry where predictability was deemed more important for scheduling. The TTTR index only applies to roads on the National Highway System.

The CNVMPO used the FHWA *National Performance Management Research Data Set (NPMRDS)* to calculate the TTTR.

The following targets were adopted by the CTDOT on May 20, 2018 and by the CNVMPO on June 8, 2018.

Freight Movement Performance Measure: Target Summary

Target	Current Condition (State)	2-year targets (2020)	4-year targets (2022)
Truck Travel Time Reliability (TTTR) for Interstate	1.75	1.79	1.83

Air Quality

The USDOT requires that states and MPOs assess the impact of their transportation systems on air quality and specifically the impacts from vehicle exhaust emissions. The performance measure for air quality is based only on an assessment of projects selected for funding under the FHWA's Congestion Mitigation and Air Quality Improvement (CMAQ) program.

The CMAQ program's purpose is to fund transportation projects or programs that contribute to the attainment or maintenance of National Ambient Air Quality Standards (NAAQS). The TIP/STIP will program projects to meet the targets by selecting appropriate CMAQ eligible projects including: congestion reduction and traffic flow improvements; ridesharing; transit improvements; travel demand management; and, bicycle and pedestrian facilities.

The following targets were adopted by the CTDOT on May 20, 2018 and by the CNVMPO on June 8, 2018.

Air Quality Performance Measure Target: Reductions Produced by CMAQ Projects

Target	Current Measure (2017)		Targets	
Emissions Component	**2-Year**	**4-Year**	**2-Year (2020)**	**4-Year (2022)**
Volatile Organic Compounds (VOC) cumulative kg/day	10.82	263.89	19.32	30.14
Nitrogen Oxide (NOX) cumulative kg/day	34.68	462.49	67.69	102.37
Particulate Matter PM2.5 cumulative kg/day	1.04	12.95	1.632	2.674

1.7 Title VI and Environmental Justice

The NVCOG's efforts under Title VI and Environmental Justice Executive Orders aim to make the transportation planning process accessible to all NVCOG residents and neighbors, regardless of race, ethnicity, nationality, income, or ability to speak English.

NVCOG Title VI Program Plan

Title VI of the Civil Rights Act of 1964 requires that no person in the US shall be denied benefits or subjected to discrimination using Federal dollars on the basis of race, color, or national origin. The primary impact of Title VI for MPO activities is to require transportation planning and programming to proactively consider the needs of ethnic and racial minority populations through inclusion in the transportation planning process, and evaluation of the equal availability of transportation opportunities to all residents. A primary means of compliance is the provision of translated materials, on-demand interpreters, and formal discrimination complaint reviews.

The NVCOG developed and adopted a formal *Title VI Plan* in April of 2016, with a subsequent update in May to address comments from FTA. This original Title VI Plan primarily concerned the lower Valley portion of the Naugatuck Valley planning region. The NVCOG is a direct recipient of FTA funds and is FTA grant recipient for the Valley Transit District's capital program. The NVCOG is also required to follow Title VI rules with respect to its planning program for as the host agency of the CNVMPO and as a participating agency member of the GBVMPO.

Activities

Language Assistance Plan

As part of the development of the Title VI Plan, NVCOG completed a Language Assistance Plan, following the *"Four Factor Analysis"* detailed in the FTA Title VI Circular. The process requires the NVCOG to determine the number and proportion of the population with Limited English Proficiency. Based on the results of the analysis, it was determined that providing Spanish-language assistance is important to best serve the region's target populations.

The LEP analysis also determined if certain non-English speaking populations required special consideration under the Department of Justice's *Safe Harbor* provision. *Safe Harbor* provisions apply if the eligible LEP population in a given language exceeds 5% or 1,000 members of the eligible population for transit district's services. If these thresholds are attained, vital written materials will be translated to accommodate their needs. The language group that meets the *Safe Harbor* criteria is Spanish.

Since adoption of the *Title VI Program Plan*, the NVCOG has begun offering translations of all newly-published documents, and offers interpretation at all public hearings and events. The numbers of relevant social organizations, religious groups, and interpreters are kept on-hand in case of immediate need for assistance. The NVCOG has also provided notices of the rights of residents in plain sight on NVCOG-owned transit vehicles operated by the Valley Transit District and in its offices.

A small Polish-speaking population lives in the region. Through the above analysis, the NVCOG has concluded that this population group does not require the same level of language services that the Spanish-speaking population requires, primarily due to the availability of adult family members who speak English fluently. A Polish translation of the Title VI notification was added to all transit vehicles operated by the VTD, and posted in the NVCOG and VTD offices. The needs of the Polish-speaking population will continue to be monitored.

Title VI Complaint Process

The NVCOG has developed a discrimination complaint process and a standard discrimination complaint form (www.valleytransit.org/accessibility.htm)

Planned Activities

In addition to providing additional translations and notices of translation availability, NVCOG staff plan to update the *NVCOG Title VI Program Plan* to cover the entirety of the Naugatuck Valley planning region in FFY 2019.

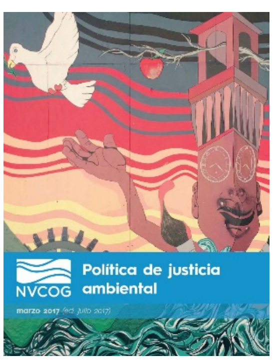
NVCOG Environmental Justice Policy

Environmental Justice (EJ) is the policy and practice that calls for an agency to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The concept also calls for identifying strategies and techniques for meaningful engagement of affected populations.

The NVCOG adopted the *NVCOG Environmental Justice Policy* in March 2017, with subsequent annual updates to incorporate updated data. This policy arose from a desire to create a comprehensive public outreach strategy for all nineteen towns in the Naugatuck Valley planning region, above and beyond the minimum requirements of state and federal regulation. The adopted Policy uses the following guiding principles:

- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations;
- Ensure the full and fair participation by all potentially affected communities in the planning decision-making process; and
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

The adopted *Environmental Justice* provisions apply to every phase of NVCOG planning decision-making processes, regardless of funding source. This policy also applies to activities of entities using NVCOG funds or facilities and to all actions of the CNVMPO as well as NVCOG activities on behalf of the Greater Bridgeport-Valley MPO.



The *Environmental Justice Policy* was the first document published by the NVCOG to be fully translated into Spanish at the time of its publication.

Environmental justice (EJ) populations are described in Executive Order 12898, and consist of minority populations, low-income populations, or both. The NVCOG also considered the impacts of transit dependence and the location of elderly residents in its analysis, though these factors are considered separately in order to supplement the primary analysis on minority and low-income factors.

The NVCOG EJ Policy uses the idea of EJ Communities to identify areas of particular concern in order to measure performance, and to identify neighborhoods where particular low-impact transportation improvements might have outsized benefit. EJ Communities also enable NVCOG staff to identify potential partners in the public outreach process who may be able to better inform and connect these communities with the transportation planning process. To identify the location of these populations, the NVCOG uses the most recent block group level survey data collected through the American Community Survey and published by the U.S. Census Bureau.

Based on minority population, the NVCOG found concentrations of racial and ethnic minority populations in the City of Waterbury with a few scattered throughout the region. Many census block groups regionwide have very high proportions of minority populations, with a mean proportion of 27.4%. Well over half of the census block groups in Waterbury are minority-majority, where the population is composed of less than fifty percent (50%) non-Hispanic whites. (RegionLinewide, racial and ethnic minorities make up 25.8% of the population.)

Of the region's population, 14.7% (66,054) identify as Hispanic or Latino, while 6.4% (28,869) identify as Black or African-American and 2.5% (11,265) identify as Asian.

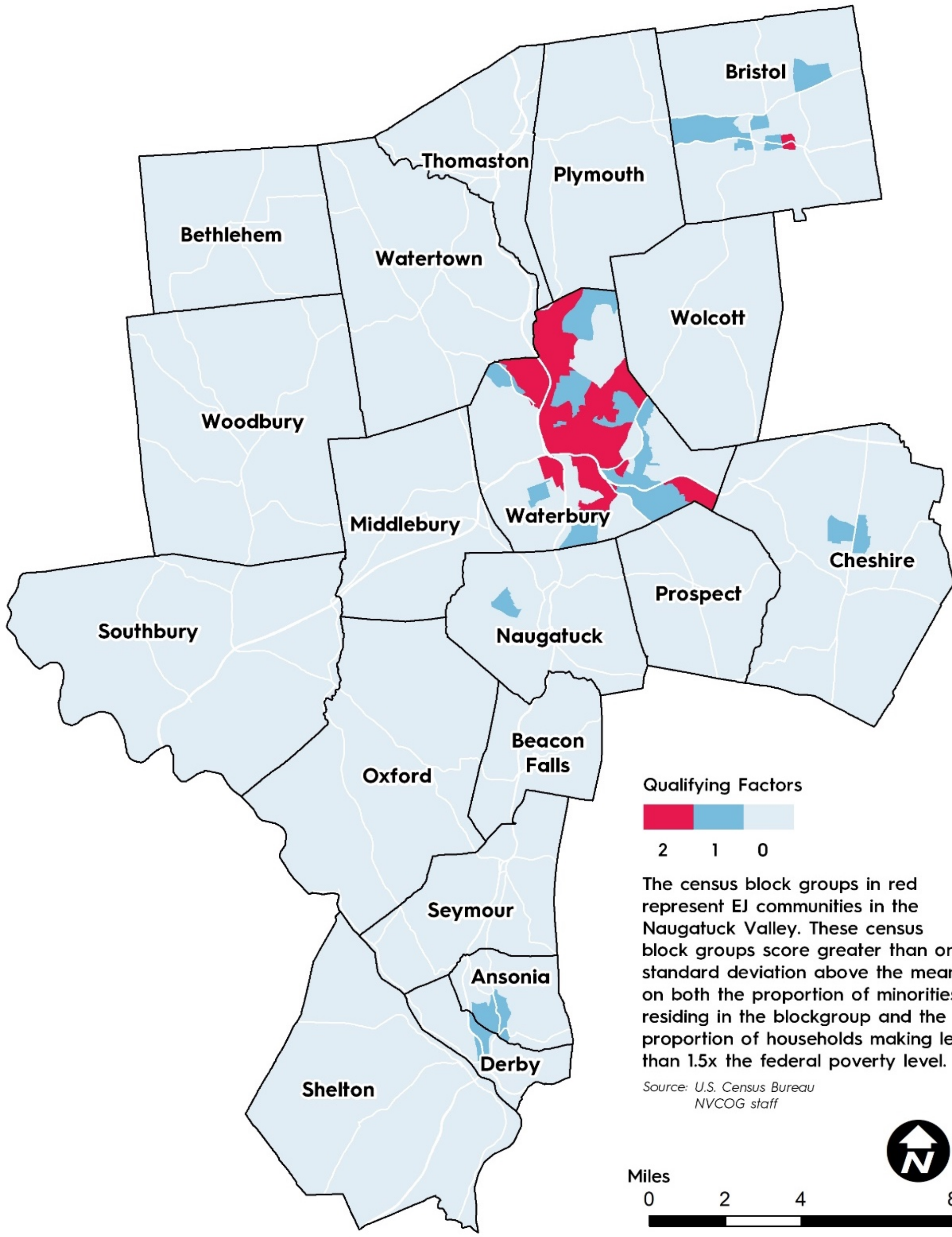
The NVCOG defines "low-income" residents for the purposes of Environmental Justice as members of households with a median household income less than 1.5 times the federally-defined poverty threshold, which is dependent upon the size of the household. For example, the most common household arrangement in the Naugatuck Valley COG is a married couple with a single child. The federal government defines this household as living at or below the poverty threshold if their annual earnings are equal to or less than $19,055. The NVCOG's low-income threshold would multiply this federal income figure by 1.5, resulting in a low-income threshold of $28,583 annual household earnings.

Low-income populations are concentrated in central Waterbury, however this concentration is not as pronounced as the concentration of the minority population. There are also several census block groups in Ansonia and Bristol with a majority of their residents below the NVCOG's low-income threshold.

Of 441,042 individuals in the region, 78,156 (17.7%) fall below the NVCOG's low-income threshold, 49,880 (11.3%) fall below the federal poverty threshold, and 24,322 (5.5%) fall below half of the federal poverty threshold. Median household income for the region is $66,989, while median family income is $88,444.

Based on the demographic analysis, EJ communities are census block groups where disproportionately large populations of minorities and low-income residents reside. The NVCOG's planning and programming should consider all EJ populations regardless of their concentration to identify and rectify adverse and disparate impacts on these populations; however, these EJ communities are areas of particular concern due to their concentrated need and have been identified for the location of beneficial projects and program activities.

NVCOG EJ Communities



The key means of implementing the *NVCOG Environmental Justice Policy* is to incorporate EJ impact analyses into the agency's projects and programs. The NVCOG has developed parallel analyses processes for physical projects (including proposed developments which fall under the NEPA process) and for NVCOG-led programs. This was done to ensure NVCOG's NEPA process was full-featured, and to measure more generalized impacts of NVCOG's programs on sensitive populations.

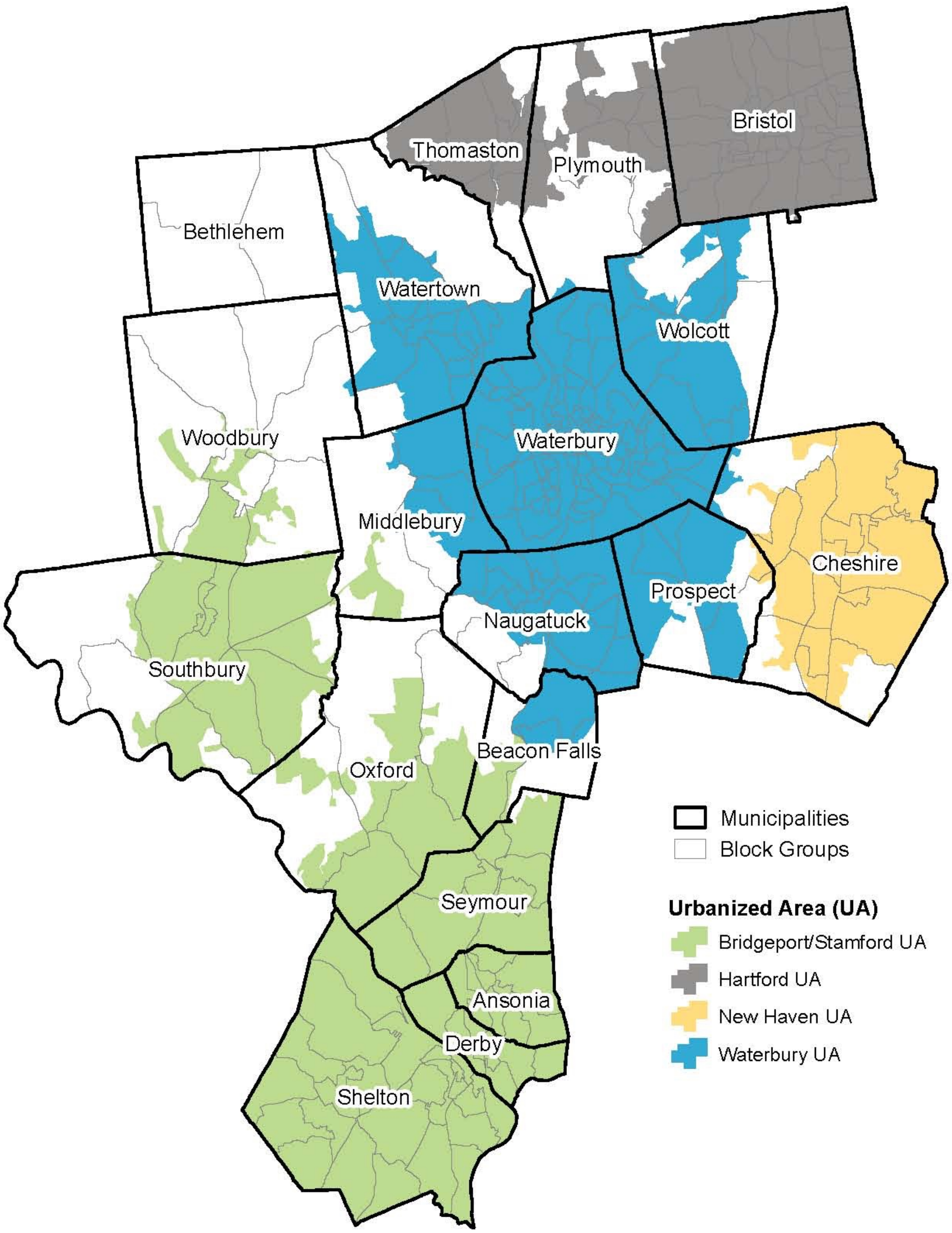
The NEPA Process is the overarching environmental analysis process required under Federal Law. Projects which may have environmental impacts must study potential impacts in great detail, and propose adjustments to the project or mitigating actions to reduce environmental impacts.

Analyses for both programs and projects attempt to identify any population negatively or positively impacted, evaluate whether those populations include EJ populations, connect directly with impacted populations to determine the scope and severity, and identify and document mitigating actions.

The *NVCOG Environmental Justice Policy* requires that the MTP conform to the principles of environmental justice by proactively considering the needs of communities and populations of concern, and negative impacts on those communities by otherwise well-intended projects and programs. As such, an environmental justice analysis of proposed transportation projects in the MTP will be completed and inserted into the final document. Additionally, a review of the Transportation Improvement Program and related amendments is performed to identify beneficial impacts of federal transportation impacts on EJ communities, and to ensure that they are proportional with the population of these communities.

2.0 Naugatuck Valley Regional Profile

The Naugatuck Valley planning region is located in west-central Connecticut, covering about 422 square miles. The City of Waterbury is the largest city in the region and serves as its central city. The region lies mid-way between Hartford to the east, New Haven to the south, Bridgeport to the southwest and Danbury to the west. The Naugatuck Valley planning region includes the whole of the Census-defined Waterbury urbanized area, and parts of the Bridgeport-Stamford urbanized area, New Haven urbanized area and Hartford urbanized area. It has a combined population (2016 ACS) of 447,390 people.



The Naugatuck Valley planning region comprises the following 19 communities:

Ansonia	Naugatuck	Southbury
Beacon Falls	Oxford	Thomaston
Bethlehem	Plymouth	Waterbury
Bristol	Prospect	Watertown
Cheshire	Seymour	Wolcott
Derby	Shelton	Woodbury
Middlebury		

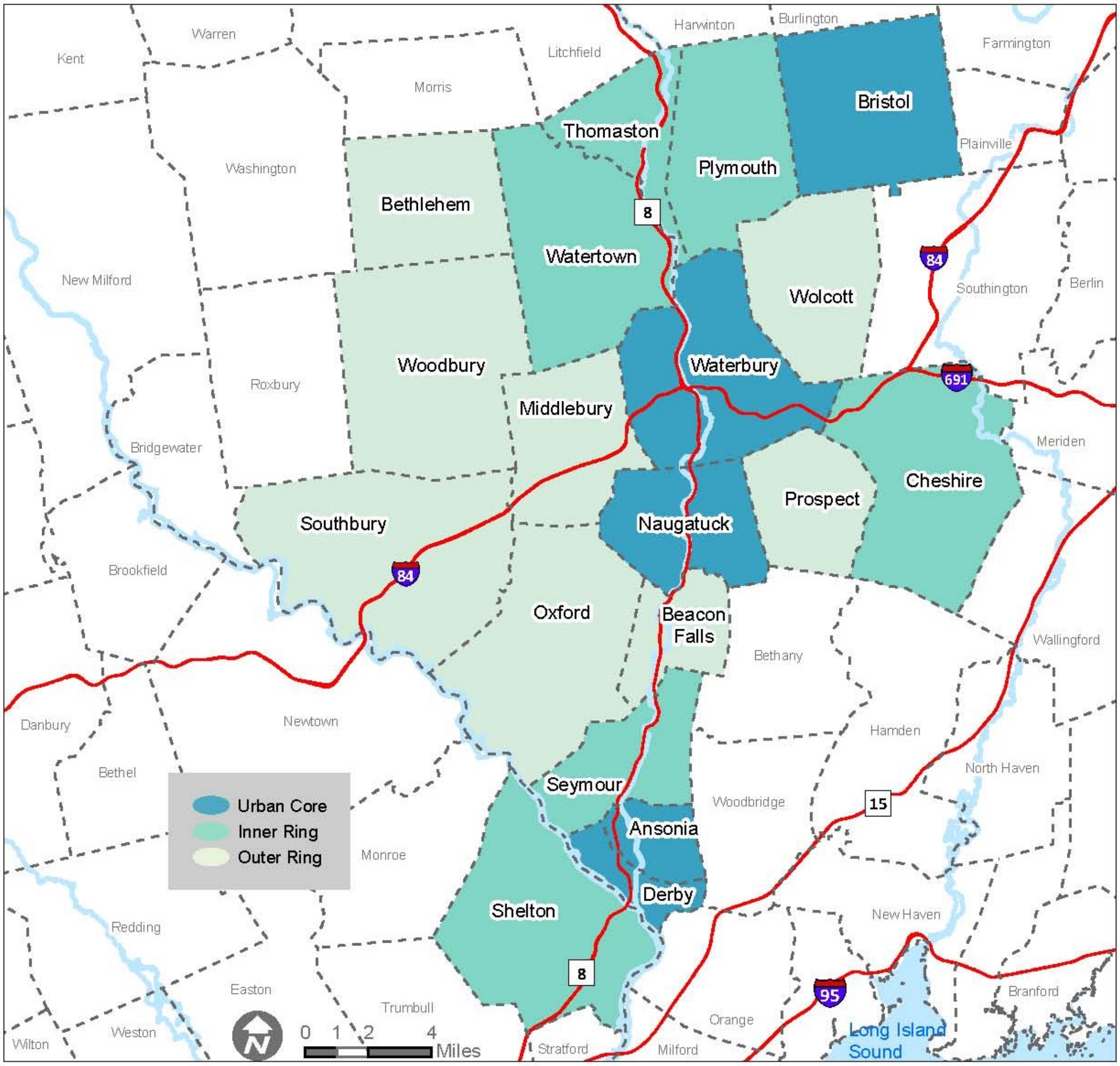
Historically, the region supported a robust manufacturing economy based on its location along the Naugatuck, Housatonic, and Pequabuck Rivers and access to water power and water borne transportation. The Naugatuck Valley was the center of American brass manufacturing, producing products such as clocks, buttons, munitions and machines. In the years following WWII, brass producers moved west, and eventually abroad, and plastics replaced brass in many products. At the economic zenith of manufacturing, communities invested in the infrastructure needed to support the sector. This infrastructure included public water and sanitary sewers. In the downtowns, dense residential developments provided work force housing in proximity of the manufacturing plants. Businesses and manufacturing plants were located in town centers and the downtown areas became the focal points for residents and met all of their essential needs.

The Naugatuck Valley economy has diversified significantly since its manufacturing heyday. While, fabricated metal production remains an important component of the economy, healthcare, educational services, retail, and professional and business services now are now dominant.

The second half of the 20th century saw extraordinary population and employment growth in the region's suburban and rural communities. Despite suburbanization, downtowns remain the social, cultural, institutional, and employment centers of the region.

The region is a mix of historic urban centers that once supported industrial activities, suburban communities and rural areas. These areas can be characterized and defined as the "urban core," "inner ring" and "outer ring."

During the 19th century, the urban core emerged as a leading manufacturing center and today has high levels of racial and income diversity, high population density, good access to public transit, and plentiful affordable housing. The character of the urban core varies significantly from neighborhood to neighborhood. Most of the region's major institutions, such as hospitals and higher education, call the urban core home. The urban core comprises the municipalities of Ansonia, Bristol, Derby, Naugatuck and Waterbury.



Inner ring communities contain a mix of urban and suburban characteristics. Smaller manufacturing centers such as Oakville, Terryville, and Shelton emerged in the 19th century, forming the historic cores of the inner ring municipalities. Following World War II, these communities became more suburban in character as urban core residents and young families moved in. Today, the population is highly educated and moderately diverse. In the last decade, the inner ring has seen job growth as companies leave the urban core to be closer to their workforce. The municipalities of Cheshire, Plymouth, Seymour, Shelton, Thomaston and Watertown make up the inner ring communities.

The traditionally rural outer ring has become more suburban in character over the last two decades. From 2000 to 2016, the outer ring population grew by 12.2%, far faster than the region, state, and nation. These towns have the lowest population densities, the highest incomes, and the highest proportion of elderly residents. With few local jobs, most outer ring residents commute to jobs in neighboring towns and cities. The outer ring includes Beacon Falls, Bethlehem, Middlebury, Oxford, Prospect, Southbury, Wolcott and Woodbury.

The Naugatuck Valley planning region has a long and rich history in transportation. As an early river port in the lower Naugatuck Valley and a major manufacturing center, the area has capitalized on multi-modal opportunities for more than 100 years. The area benefits from the confluence of the Housatonic and Naugatuck Rivers. The Housatonic River, a navigable waterway from Long Island Sound to Derby, functioned as a means of goods transport. Cargo ships would travel up and down the river and meet the trains at the East Derby Transfer Point.

Before the proliferation of the automobile and expansion of the road network following World War II, the Waterbury rail line was the dominant mode of transportation. The rail service provided intercity and inter-regional passenger, as well as freight, connections. The construction of Route 8 in the early 1960s and Interstate 84 during the mid- and late 1960s provided an efficient and convenient means to travel to other areas. As a result, manufacturing businesses began to relocate to areas with less expensive operating costs and residents also began to shift their travel to other communities for shopping and social activities. The downtowns declined; once vibrant communities became under-populated; vacant factories and industrial sites lay dormant, too polluted to be redeveloped, what are now called brownfield sites.

The core region was further devastated by severe flooding of Naugatuck River in August of 1955 from the unusual occurrence of two named hurricanes, Connie and Diane, passing within proximity of Connecticut within nine days. While neither storm directly struck Connecticut, their combined impact was immense. Hurricane Connie produced four-to-six inches of rain across southern New England. The rain saturated the ground and caused river and reservoir water levels to be well above normal. When Hurricane Diane hit the area later the same month, the ground was unable to absorb the additional rain and the rivers and lakes were already above flood stage. Over the two-day period, up to 20 inches of rain fell in parts of New England. This resulted in arguably the most devastating inland floods to ever hit the state. The heavily industrial and commercial areas bordering the Naugatuck River in Waterbury, flooding reached the first and second stories of buildings. The story was the same up and down the Naugatuck River valley from Torrington to Derby. In Bristol the Pequabuck breached its banks and inundated the downtown and Forestville neighborhood. The damage statewide was estimated to have exceeded 200 million dollars (1955 dollars) and many downtowns never fully recovered.

Subsequent to this flood event, six flood control dams were built along the Naugatuck River by the Army Corps of Engineers, including the one in the town of Thomaston at the northern edge of the region, to protect flood prone town centers. In addition, a series of flood control walls and levees were constructed to help protect Ansonia and Derby; channel improvements, a floodwall and a protective dike were built within Waterbury. The areas along the Housatonic River and other rivers in the region do not have the same level of protection and significant flooding continues to occur.

Despite the decline of manufacturing in the region and the urban exodus of the second half of the twentieth century, the region's downtowns retain well-developed infrastructure and access to both bus and rail. Steep hillsides rising from the rivers' banks define the region and have confined town centers to help create intimate, compact downtowns. These two factors make many of the region's downtowns well positioned to accommodate transit-oriented and transit-supportive development.

Today, residents of the Naugatuck Valley are more mobile than ever. The majority of residents work outside the region, many commuting to New Haven, Hartford, and Fairfield County. Similarly, over 40 percent of the workforce lives outside the region. The increasing interplay between Connecticut's regions suggests that recurring congestion on the region's main thoroughfares will also continue to worsen and alternatives to the automobile need to be implemented. Just as in the past, transportation and how residents and commuters choose to transport themselves is a key component to the region's future economic growth.

2.1 Population and Demographic Trends

From 2000 to 2016, the region's population grew by a modest 4.3%, adding 18,600 new residents, for a total population of 447,390. This was a faster growth rate than the 1990s, but much slower than the 1980s. About 60% of the population growth was due to natural increase (births minus deaths), while 40% was due to in-migration from outside the region. Demand for new single family homes in the early 2000s led to explosive growth in outer ring municipalities, which grew 12.2% between 2000 and 2016. The remainder of the region grew at a slower rate, with a 4.5% increase in the inner ring and a 1.6% increase in the urban core.

Since 2010, population growth has stagnated. From 2007 to 2015, the number of births dropped by 13.1%. A phenomenon often attributed to many families delaying having children due to economic uncertainty following the 2007-2009 recession and rising student loan debt. Additionally, the rate of new home construction has not recovered to its pre-2008 levels, particularly in the urban core.

Population Growth in the Naugatuck Valley, by Municipality: 2000-2016

	Population			Percent Change	
Geography	**2016**	**2010**	**2000**	**2010-2016**	**2000-2010**
Ansonia	18,950	19,249	18,554	-1.6%	3.7%
Beacon Falls	6,075	6,049	5,246	0.4%	15.3%
Bethlehem	3,492	3,607	3,422	-3.2%	5.4%
Bristol	60,437	60,477	60,062	-0.1%	0.7%
Cheshire	29,254	29,261	28,543	0.0%	2.5%
Derby	12,755	12,902	12,391	-1.1%	4.1%
Middlebury	7,606	7,575	6,451	0.4%	17.4%
Naugatuck	31,625	31,862	30,989	-0.7%	2.8%
Oxford	12,916	12,683	9,821	1.8%	29.1%
Plymouth	11,926	12,213	11,634	-2.3%	5.0%
Prospect	9,720	9,405	8,707	3.3%	8.0%
Seymour	16,540	16,540	15,454	0.0%	7.0%
Shelton	40,979	39,559	38,101	3.6%	3.8%
Southbury	19,727	19,904	18,567	-0.9%	7.2%
Thomaston	7,699	7,887	7,503	-2.4%	5.1%
Waterbury	109,211	110,366	107,271	-1.0%	2.9%
Watertown	22,048	22,514	21,661	-2.1%	3.9%
Wolcott	16,707	16,680	15,215	0.2%	9.6%
Woodbury	9,723	9,975	9,198	-2.5%	8.4%
Region Total	447,390	448,708	428,790	-0.3%	4.6%
Urban Core	232,978	234,856	229,267	-0.8%	2.4%
Inner Ring	128,446	127,974	122,896	0.4%	4.1%
Outer Ring	85,966	85,878	76,627	0.1%	12.1%

Source: U.S. Census Bureau, American Community Survey 5 Year Estimates: 2012-2016 (B01003), 2010 U.S. Census, 2000 U.S. Census

Population Projections

Population projections from the Connecticut State Data Center indicate that through 2025, the region's population will continue to grow, but at a much slower rate than in the past. From 2025 to 2040, the region is projected to shrink by 1.2%, losing approximately 5,355 residents.

The urban core is projected to grow at the fastest rate, adding 7,856 residents between 2015 and 2040, a 3.3% increase. Waterbury, which has a much higher birth rate than the rest of the region, is projected to grow by 7.3%. New home construction and in-migration will slow and limit population growth in the outer ring. Middlebury and Oxford are projected to be the two fastest-growing municipalities in the region. In the inner ring, shrinking household size and a decrease in the population aged 15 and under will limit growth. The population in the inner ring is expected to decline by 9.7% between 2015 and 2040. Communities such as Cheshire and Shelton are close to being "built out" and have little developable land to support new housing units.

Population Projections in the Naugatuck Valley, by Municipality: 2015-2040

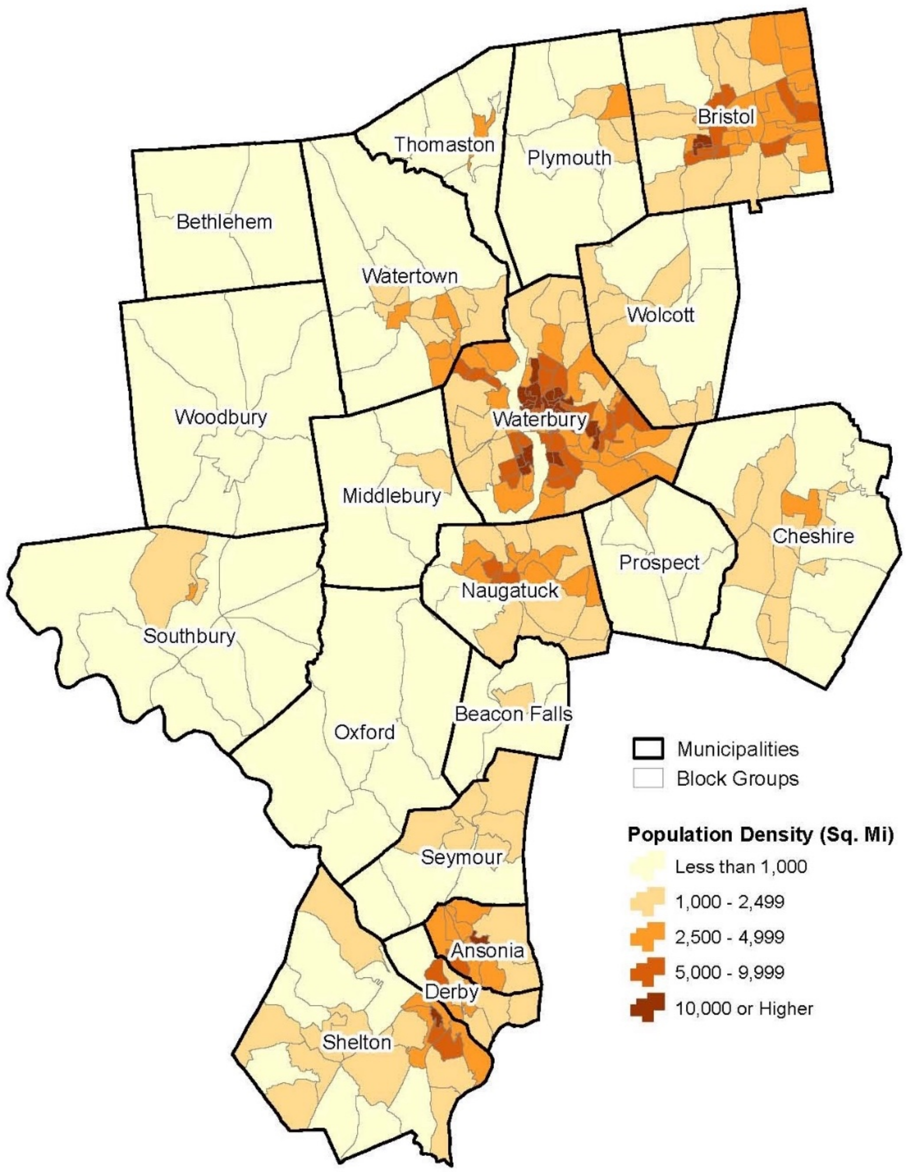
	Population Projections						% Change
Geography	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2015-2040**
Ansonia	19,480	19,839	20,265	20,651	20,889	21,067	8.1%
Beacon Falls	6,265	6,420	6,532	6,585	6,590	6,587	5.1%
Bethlehem	3,605	3,595	3,596	3,576	3,483	3,342	-7.3%
Bristol	59,918	59,535	59,359	59,006	58,205	57,129	-4.7%
Cheshire	28,889	28,257	27,087	26,127	25,288	24,860	-13.9%
Derby	13,035	13,250	13,553	13,803	13,959	14,081	8.0%
Middlebury	7,948	8,233	8,412	8,522	8,662	8,828	11.1%
Naugatuck	31,973	32,210	32,537	32,636	32,375	31,853	-0.4%
Oxford	13,841	14,924	15,695	16,353	17,061	17,855	29.0%
Plymouth	12,253	12,218	12,156	11,987	11,722	11,383	-7.1%
Prospect	9,367	9,222	8,979	8,693	8,449	8,218	-12.3%
Seymour	16,676	16,797	16,880	16,926	16,854	16,752	0.5%
Shelton	39,101	38,374	37,508	36,568	35,565	34,544	-11.7%
Southbury	19,661	19,357	19,164	18,984	18,957	18,760	-4.6%
Thomaston	7,887	7,836	7,781	7,694	7,553	7,369	-6.6%
Waterbury	111,081	112,571	114,896	117,113	118,463	119,213	7.3%
Watertown	22,345	22,011	21,640	21,219	20,616	19,869	-11.1%
Wolcott	16,906	16,921	16,885	16,770	16,629	16,511	-2.3%
Woodbury	9,999	9,835	9,703	9,499	9,281	9,052	-9.5%
Region Total	450,230	451,405	452,628	452,712	450,601	447,273	-0.7%
Urban Core	235,487	237,405	240,610	243,209	243,891	243,343	3.3%
Inner Ring	127,151	125,493	123,052	120,521	117,598	114,777	-9.7%
Outer Ring	87,592	88,507	88,966	88,982	89,112	89,153	1.8%

Source: Connecticut State Data Center, Population Projections: 2015-2040

Population Density

The Naugatuck Valley region has a higher population density than the state as a whole. In 2016, the region had an estimated 1061 persons per square mile (which includes non-residential land and roads), compared to 741 statewide. Waterbury, which is extensively developed and has the largest proportion of multi-family units, had the highest population concentration in the region with 3,774 persons per square mile. Ansonia was a close second with 3,063 persons per square mile followed by Derby at 2,360.

Population Density in the Naugatuck Valley Region: by Block Group, 2016



Source: U.S. Census Bureau, American Community Survey 5-year Estimates: 2012-2016

The towns in the eastern and central portions of the region are partially sewered, allowing greater densities. Prospect has only a limited number of properties connected to sewer systems through adjacent municipalities. In the western portion of the region, Bethlehem and Woodbury have no municipal sewer service of any kind, and service in Oxford and Southbury is limited although Oxford plans to expand its service through Naugatuck. Some new developments are using alternative treatment plants to serve increased densities in unsewered areas. This newer technology requires approval from the Department of Environmental Protection.

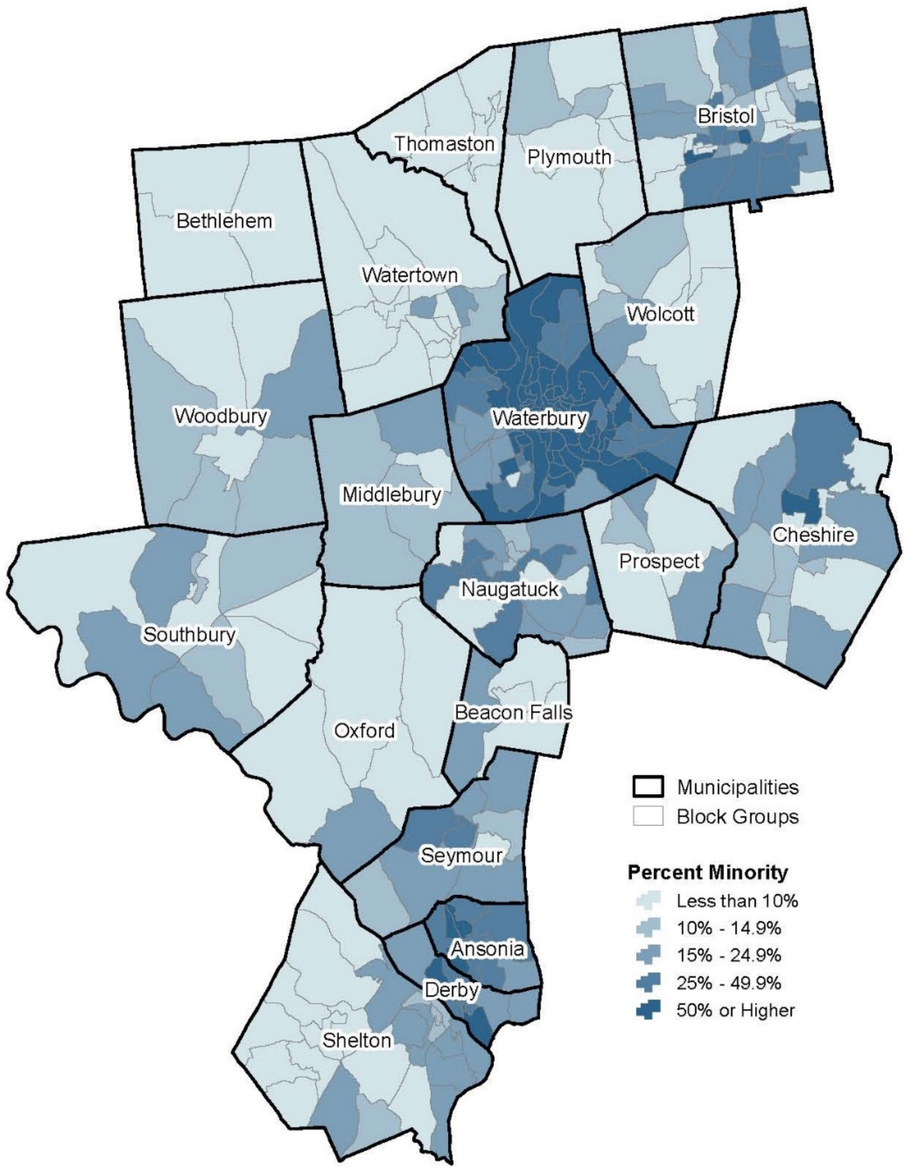
Race and Ethnicity

Immigration, migration, and higher birth rates among minority groups have made the region's population more diverse. As of 2016, 123,878 residents were of a minority race or ethnicity, making up 27.7% of the total. This is an increase from 2000, when just 16.9% of the population belonged to a minority group. From 2000 to 2016, the non-Hispanic white population of urban core communities declined by over 33,000. This coincided with rapid growth among Hispanics, African Americans, and Asians.

Waterbury is a minority-majority city, with 60.6% of its population belonging to a minority racial or ethnic group. Ansonia, Derby, Naugatuck, Seymour, and Bristol have the next highest minority populations. Outside of the urban core, less than 13% of the population belongs to a minority group, although this balance is changing. Between 2000 and 2016, inner ring and outer ring communities saw their minority populations grow by 80.9% and 165.9% respectively. This exceeded the urban core minority population increase of 64.2%. It will remain important for the NVCOG to track these trends for their impacts on Environmental Justice reviews for transportation projects.

The Hispanic minority group is the largest and fastest growing minority group in the region with a population of 71,097, a 103% increase from 2000. This minority group now makes up 15.9% of the population. A majority of the Hispanic population who live in the region are of Puerto Rican heritage, including nearly 25,000 who live in Waterbury. There was also sizable growth among African Americans, who make up 6.9% of the population. Asians, the second fastest growing minority group through 2000 to 2016 (88.4%), are more likely to live in the suburbs than the urban core.

Minority Population in the Naugatuck Valley by Block Group: 2012-2016



Source: U.S. Census Bureau Community Survey 5-year Estimates: 2012-2016

Household and Family Structure

Household arrangements have changed as the average age of marriage increases, family sizes decrease, and life expectancy increases. For the first time in history, less than half of the region's households are made up of married couples. Persons living alone, cohabitating couples, married couples without children, and single parent households are becoming more prevalent.

Less than half of married couples have children age 18 and under. "Empty nesters" are becoming more common as the millennial generation ages, and many young couples are delaying having children.

Household structure in the urban core differs significantly from the inner and outer ring communities. Just 39.2% of urban core households are married couples compared to 56.8% in the inner ring and 59.0% in the outer ring.

Income and Poverty

There is a large income gap between the urban core and remainder of the region. From the 2012 to 2016 estimates, median household income in the urban core was $49,691 compared to $85,859 in the inner ring and $89,592 in the outer ring. Over a quarter of households in the urban core are low income (making less than $25,000 per year) compared to 11.1% in the inner ring and 11.7% in the outer ring. On the opposite end of the income spectrum, over 40% of households in the inner and outer ring are high income (making $100,000 or more per year) compared to less than 21% in the urban core.

The Great Recession negatively impacted household and family income throughout the region. Since 1999, median household income declined in 16 out of 19 municipalities. The highest drops in household income occurred in the urban core towns of Ansonia, Derby, and Naugatuck.

The number of people in poverty increased by 66.8% from 2000 to 2016. In 2000, there were 31,412 persons living in poverty (7.5% of total). By 2016, it had increased to 52,396 (11.9% of total). Poverty increased at a moderate rate in the inner ring and highest in outer ring municipalities and the urban core. Waterbury, which has a poverty rate of 25.4%, is home to over half of the region's impoverished.

Child poverty is a prevalent issue in the urban core, where 27.8% of children live below the poverty line. Ansonia, Derby and Waterbury have child poverty rates exceeding 20%. Child poverty is also strongly correlated with household structure. Children in single parent households are 4.4 times more likely to live in poverty than households with both parents present.

Economic Trends

The Great Recession had lasting impacts on the economic structure of the region, impacts that are manifested in many of the following trends that are shaping the region today:

- Unemployment disproportionately affects young workers under the age of 25.
- As of 2017, the region has only gained back 71% of the jobs that were lost during the recession.
- Jobs are suburbanizing. During the last ten years the inner ring saw job growth while the urban core lost jobs.
- Over half of Naugatuck Valley residents commute to jobs outside the region.

Labor Force

The labor force is made up of Naugatuck Valley residents over the age of 16 who are either employed, or are unemployed and looking for work. As of 2017, the region's labor force was 237,050, of which 224,546 were employed and 12,504 were unemployed. From 2010 to 2013 the state and region experienced a labor force contraction which can be attributed to stagnant job growth, unemployed workers dropping out of the labor force, and a growing number of residents hitting retirement age. In 2014 the labor force grew for the first time since 2009 and has remained steady. People who had difficulty finding work following the Great Recession are reentering the labor force as the job market improves.

Employment

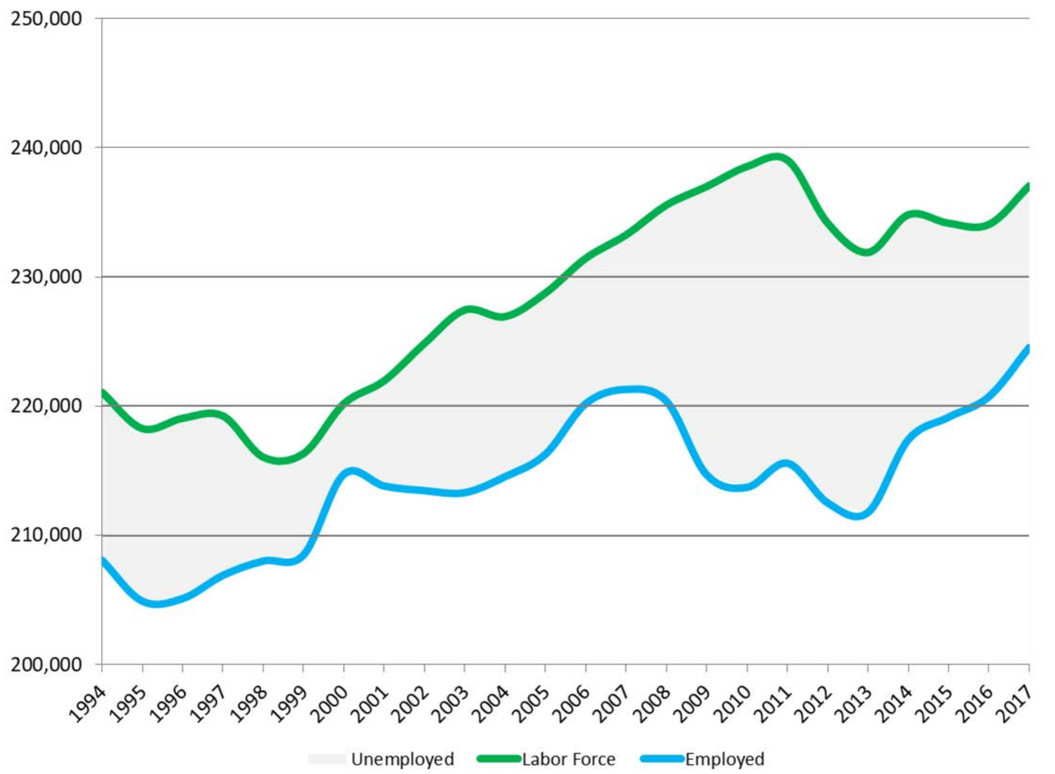
As of 2017 there were 224,546 employed residents living in the region. This is only 3,501 more than in 2007 when there were 221,045 employed residents. The number of employed residents decreased every year from 2008 to 2013 but has rebounded from 2014 to 2017. The number of working aged residents is projected to remain stable up to 2020 and decline thereafter as the last of the baby boomers retire. Attracting and retaining young workers will be necessary to replace the growing number of retirees

Unemployment

From 2007 to 2010 the region saw the number of unemployed residents more than double from 11,954 to 24,656. The jump in unemployment was caused by both job losses and labor force growth. Unemployment has decreased each year since 2010. As of 2017, it stands at 12,504, or 5.3% of the labor force. The labor force contraction (unemployed persons that have stopped looking for work) is responsible for some of the drop in unemployment. Despite improvements over the last three years, the unemployment rate remains slightly above state and national averages. Unemployment trends vary by location and age. As of 2017, unemployment is highest in the urban core communities of Waterbury (7.4%), Ansonia (6.5%), and Derby (5.8%), and lowest in the inner ring community of Cheshire (3.3%) and the outer ring communities of Woodbury (3.6%), Thomaston (4.0%), and Prospect (4.0%). Due to the collapse of the stock market from 2007 to 2009, many older workers have continued to work into retirement age. This trend, combined with the lack of new job creation, has led to a disproportionately high unemployment rate among young people. The unemployment rate for residents under the age of 25 is 17.3% compared to 8.9% for middle aged workers (age 25- 44) and 6.3% for older workers (age 45 and older)[1]

[1] Source: ACS 2012-2016, B23001

Labor Force, Employment and Unemployment in the Naugatuck Valley: 1994-2017



Jobs

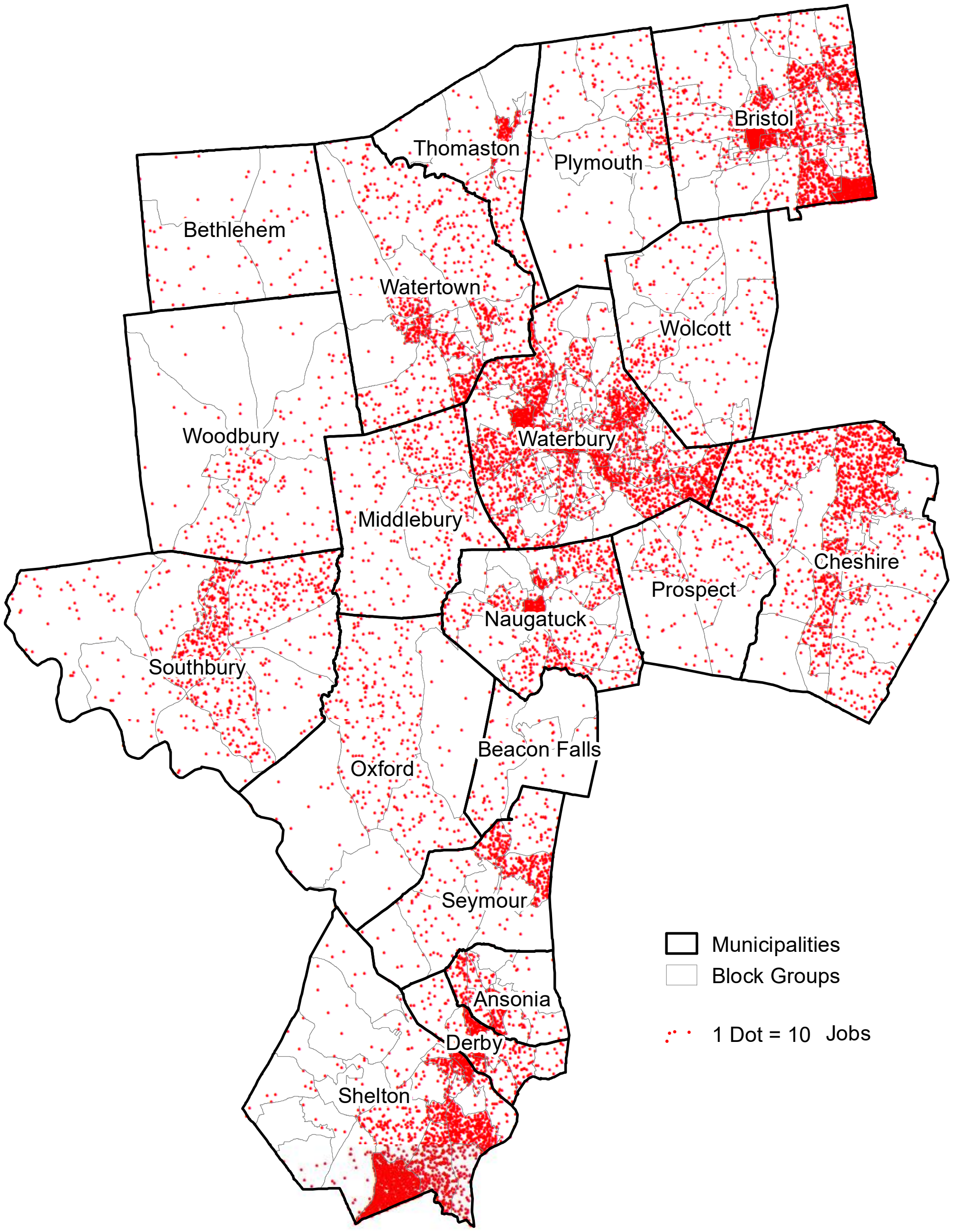
During the recession, the region experienced sharper job losses than the state and nation as a whole. From 2007 to 2011, 12,337 jobs were lost, a decline of 7.6%. The manufacturing, finance and insurance, and construction sectors experienced the sharpest job losses. Some sectors, such as health care and social assistance, and educational services, added jobs during the recession. These sectors have traditionally been "recession-proof."

Since 2011 the economy has improved, adding over 8,700 jobs. As of 2017, the region has gained back 71% of the jobs that were lost during the recession. Comparatively, the state has gained back 146% of the jobs that were lost during the recession.

As of 2017 there are 158,781 jobs in the region. Despite job losses during the last ten years, Waterbury remains the job center of the region followed by Shelton, Bristol, and Cheshire.

As the population shifts to the suburbs, many employers have followed in order to be closer to their workforce. From 2004 to 2017, the urban core lost over 3,300 jobs while the inner ring gained over 4,700 jobs, mostly in Shelton, and Cheshire. Bristol was the only urban core municipality to gain jobs (1,032). Outer ring towns with good highway access (such as Oxford and Middlebury) also saw job growth.

Jobs in the Naugatuck Valley, by Block Group: 2015



Source: U.S. Census Bureau, On the Map, LODES Dataset, 2015

Over the last half century, the region has shifted from a manufacturing-oriented economy to a service-oriented one. Health care and social assistance is now the largest job sector followed by government (which includes public school teachers). While much less prominent than in the past, manufacturing remains the third largest sector of the region's economy, with over 20,000 jobs. A majority of manufacturing jobs are now located outside of the urban core. Employment projections from the Connecticut Department of Labor indicate that the health care and social assistance sector will drive job creation up to 2020, largely due to increased demand for health care by the baby boomers. Other sectors projected to add jobs up to 2020 are professional and business services, and construction, although the latter is largely dependent on the housing market.

To access more comprehensive demographic, economic, and housing data for the Naugatuck Valley Region see the Naugatuck Valley Regional Profile which is published yearly.

3.0 Transportation Issues & Goals

The Naugatuck Valley planning region is a region in motion. Each day, about 2 million trips occur within, into and out of the region. While most of these trips are made in a private vehicle, rail, bus and walking are important ways people move about. Over the next 20 years, as population continues to grow, congestion and delays on the region's highways and roads will worsen. At the same time, the infrastructure is aging and in need of rehabilitation and replacement. However, there is expected to be insufficient funding to maintain the current and existing system in a state of good repair, let alone funds to enhance and expand infrastructure.

Data trends also indicate that the region is not only growing but aging. Over the next 20 years, the number of people over age 65 is expected to increase 77% with about one-third having a mobility impairment that will prevent them from driving independently or being able to use public transit. This suggests a need to strengthen the coordination of human and transportation services.

How we buy goods and services is already changing and the pace of that change appears to be accelerating. More and more, people are relying on online shopping to purchase items. This trend is increasing home deliveries, made primarily by smaller trucks, and reducing deliveries to retail centers.

Technology may provide some solutions to the transportation issues described above but how travel patterns will change or be affected by technological advances is less than certain. The advent and the future proliferation of autonomous and connected vehicles has the potential to drastically alter travel patterns and how trips are made. Autonomous vehicles may potentially increase road capacity and reduce recurring congestion, but they could also cause an increase in congestion as the number of shared vehicles on the road and the number of empty vehicles picking up riders increases. The benefits for residents who are older or those with a mobility disability include increased travel options, increased mobility and more access. For connected vehicles, deployment of advanced communications systems has the potential to improve safety, reduce crashes, improve driver behavior and reduce congestion.

3.1 Transportation Issues

The transportation system of the Naugatuck Valley planning region is diverse and includes a mature network of highways and roads, a commuter rail line, fixed-route, local bus services, general aviation airport, multi-use greenways and trails, and pedestrian facilities. In this section, the principal issues facing the region over the next 25 years are identified. The municipalities of Ansonia, Derby, Seymour and Shelton are included for informational and broader planning purposes.

Aging Infrastructure

The key and critical elements of the highway system are I-84, I-691, Route 8, US Route 6, and Route 34. The I-84 and Route 8 interchange is commonly referred to as the "Mixmaster" because of its closely spaced ramps that connect the two expressways with downtown Waterbury streets. The interchange was built in 1960s and needs replacement. It is one of the nation's top 100 most congested areas and a high crash location. Each day about 112,700 vehicles move between I-84, Route 8 and local streets.

The Route 8 Expressway extends from I-95 in Bridgeport to its terminus in the Town of Winsted. Built over the course of twenty-five years from the late 1950's to early 1980s, many of the older sections do not meet modern design standards, with interchange ramps closely spaced and poorly designed. Several areas have incidences of vehicle crashes.

Interstate 691 serves as an expressway connector between I-84 in Cheshire and I-91 in Meriden. Its interchange with I-84 provides an efficient, high speed connection, but operational problems occur where I-691 merges with I-91 and the Wilbur Cross Parkway (Route 15). This interchange is outside the Naugatuck planning region but back-ups and delays caused by the awkward series of ramps impacts travel on the sections of I-691 passing through the region and effects travel to/from the Naugatuck Valley planning region and adjacent regions – South Central planning region, Capitol planning region and the Lower Connecticut River planning region.

US Route 6 traverses the region from east to west along its northern tier. While it serves a main travel corridor, it lacks many of the design elements that allow traffic to move efficiently and provide sufficient capacity

Recurring Congestion and Travel Delay

Both I-84 and Route 8 experience severe peak hour congestion and excessive travel delay, especially through the interchange of the two highways. Typical travel speeds on I-84 are 36 mph and 33 mph during the morning and evening peak hours, respectively. While congestion on Route 8 is less through the "Mixmaster," it is more severe through the lower Valley, dropping to 32 mph in the morning and 25 mph in evening at the crossing of the Housatonic River between Derby and Shelton. Congestion recurs daily along several arterials throughout the region.

Highway Safety

The number and severity of vehicle crashes throughout the region is a major concern and issue. Through the transportation planning process the location of crashes has been mapped to identify high hazard points. Analysis of the crash data clearly identifies critical safety needs and actions to address these safety needs. A 4 E's approach – engineering, education, enforcement and emergency medical services – is being used.

Under Investment in the Waterbury Branch Commuter Rail Line

The Waterbury branch rail line is a tremendous asset in the Naugatuck Valley planning region, providing connections to the New Haven main rail line and service to Bridgeport and Stamford. At Bridgeport and Stamford, passengers can transfer to trains to New York City. While the WBL is a key transportation asset, it is underutilized. Currently, there are only eight inbound trains and seven outbound trains a day, with 2½ hour headways. This level of service is not convenient or attractive for commuters.

Ridership is only about 1,000 passengers a day based on a recent on-board ridership count conducted by the NVCOG, but passenger surveys suggest this level of ridership would increase with enhanced service and better connections.

The CTDOT has plans to install a Central Traffic Control (CTC) signalization system that would have the ability to permit ten trains to operate per hour. Positive Train Control (PTC) would be deployed at the same time. As part of this project, passing sidings would constructed at four locations. The project is scheduled to be fully implemented by the end of 2019.

Despite these planned enhancements, there has not been a corresponding commitment to increase service and operate additional trains. In addition, the main issues remain: the lack and age of equipment.

Fragmented Local Bus Service

The Naugatuck Valley planning region is well served by local bus operators. Four bus companies operate in the region, including three divisions of CT Transit. The region is also connected to CT*fastrak*, although by express bus routes and not the dedicated busway. However, the service is fragmented and routes do not connect urban core areas of the region. Currently, within the region, there is no direct local bus connections between Waterbury, Bristol, and the lower Valley towns. Given fiscal constraints, fares are likely to increase and many areas are unserved or underserved.

ADA Paratransit Service Gaps

The fixed-route bus operators are required by federal regulations to provide complementary services to the elderly and persons with a mobility impairment that prevents them from using a regular fixed-route bus. Planning efforts have been conducted among MPOs and transit operators to develop a *Locally Coordinated Human Services Transportation Plan (LOCHSTP)*. In the lower Valley, the LOCHSTP has identified gaps in transportation services to the elderly and disabled. The Valley Transit District provides paratransit and dial-a-ride services to the elderly and disabled. However, funding constraints prevent the VTD from expanding services to meet the identified gaps.

In the Waterbury Urbanized Area of the region, paratransit services are provided by North East Transportation (NET) under contract with the Greater Waterbury Transit District. As is the case with VTD, NET provides the required complimentary ADA services. Paratransit services are also provided to other members of the GWTD that do not have fixed, local bus routes in their communities.

The challenge facing the region is ensuring stabilized funding to maintain current ADA service levels and expand services to close the gaps in need and demand.

Expand and Maintain Multi-use Greenway and Trail Facilities

Active transportation corridors provide a valuable alternative to driving and help create livable communities by connecting them via non-motorized means. Substantial economic and health benefits are derived from the construction of multi-use greenways and trails. While residents of the region benefit greatly from the development of active transportation facilities, completion of the planned system of trails faces many challenges, including financial constraints, available rights-of-way, tight geographies, and understanding of potential benefits.

Pedestrian Safety

Walking is the most basic form of transportation. Most New England towns and cities were initially developed around walking, and many New England towns and cities retain basic elements supportive to pedestrians. Nearly all people are pedestrians of some form during most trips, be it walking to the parking lot or walking a half-hour to work. Data indicate that more people walk to work in the urban core areas of the region. However, these areas also tend to have disproportionately high numbers of pedestrian-related crashes. Despite the number of pedestrians, these urban areas often lack necessary pedestrian amenities such as clearly marked crosswalks, pedestrian signals, and functional sidewalks.

3.2 Transportation Goals

Through the transportation planning process, transportation concerns and issues facing the region have been identified. The primary goals of the metropolitan transportation plan are to enhance mobility, provide and maintain an efficient multi-modal transportation system that facilitates the movement of people and goods, and minimizes adverse social, economic and environmental impacts.

From the assessment of the existing transportation systems and trends, a vision for future travel and mobility in the Naugatuck Valley planning region emerged:

> *A New Vision…*
>
> *To invest in existing infrastructure to improve operations of existing capacity, revitalize our town centers and avoid costly highway expansion, and develop livable and sustainable downtowns with unique facilities and open space that leverage their existing infrastructure and assets. These actions will expand and increase transportation choice for all and create town centers with mixed-uses in proximity to high quality transit nodes and link the centers via efficient, convenient transit, as well as, active transportation corridors. Future investment strategies and decisions will embrace advances in technology and plan, design and build stronger, more resilient infrastructure systems that integrate climate change considerations into transportation plans and strengthen vulnerable infrastructure.*

The goals of the MTP remain consistent with past plans and provide a framework for making transportation investment decisions.

Preserve, Maintain and Enhance the Highway System

To develop and maintain an efficient transportation system that will provide the public with a high level of mobility; maintain the principal expressway and highway system in a state-of-good repair through lane continuity, minor widening, rehabilitation and reconstruction; selectively and strategically expand the capacity of key highways to reduce delay and congestion.

Objectives:

a. Making better use of existing transportation facilities.
b. Integrate Intelligent Transportation Systems and ensure ITS projects conform to the National and State ITS Architecture, standards and protocols.
c. Encourage low-cost capital, transportation system management strategies to improve capacity and level of service, by constructing missing segments of the street network, and by establishing management systems that seek to ensure the timely maintenance and rehabilitation of existing facilities.
d. Upgrade the expressway system and selectively increase roadway capacity in major travel corridors.
e. Initiate and emphasize the importance of accessibility in measuring transportation system performance.

Congestion Management

To alleviate congestion and reduce travel delay by maintaining an efficient transportation system that will provide the public with a high level of mobility, maintain the principal expressway and highway system in a state-of-good repair through lane continuity, minor widening, rehabilitation and reconstruction, and selectively and strategically expand the capacity of key highways to reduce delay and congestion.

Objectives:

a. Make better use of existing transportation facilities.
b. Construct intersection improvements and install turn lanes.
c. Implement traffic signal modernization and coordination.
d. Consider Transportation Systems Management and Operations (TSMO) strategies and Travel Demand Management (TDM) actions, such as ridesharing, telecommuting and alternate work schedules.

Improve Safety

To improve safety and efficiency of the highway network for both motorized and non-motorized users of the transportation system, with appropriate transportation improvement projects.

Objectives:

a. Reduce the number and rate of vehicle crashes, including fatalities and serious injuries.
b. Implement safety-related countermeasures that enhance visibility and awareness and reduce roadway departures.
c. Reduce the number and rate of non-motorized fatalities and serious injuries.
d. Improve and enhance pedestrian and bicyclist related infrastructure.
e. Address driver behavior.
f. Implement an Incident Management System to improve responses to an incidents and reduce the time needed to clear an incident.

Ensure Transportation System Security

To improve and expand overall security of transportation infrastructure for persons using transportation modes and services while on-board or waiting.

Objectives:

a. Install equipment on-board transit vehicles to monitor operations and activities.
b. Install equipment at transit stations to monitor waiting areas and provide access to emergency response.
c. Assess the vulnerability of critical transportation infrastructure.

Advanced Technology

To better manage transportation operations, enhance safety and mobility, ensure greater reliability in travel times and/or reduced travel delay, and provide more detailed and up-to-the-minute information to travelers and system operators through the application of various ITS actions.

Objectives:

a. Integrate Intelligent Transportation Systems and ensure ITS projects conform to the National and State ITS Architecture, standards and protocol.
b. Install Roadside Infrastructure to monitor road conditions and provide real-time traveler information to motorists.
c. Install advanced equipment to improve travel efficiency.

Preserve and Enhance Public Transportation Services

To maintain essential local bus, commuter rail and paratransit services by providing full funding for operations, replacing capital equipment on a life-cycle cost basis, renovating and rehabilitating facilities and infrastructure to a state-of-good-repair, and enhancing services by optimizing how resources are allocated and coordinating the delivery of paratransit service, and improve access to public transit for those who are dependent on public transportation services.

Objectives:

a. Improve choice of travel modes, reduce highway congestion, improve efficiency, and provide mobility for people who are transit dependent.
b. Promote rail and bus transit as the preferred modal choices in the region;
c. Rehabilitate and modernize Waterbury branch line infrastructure;
d. Replace aging and deteriorating rail equipment;
e. Expand the public transit system within the area and beyond, by improving transportation access and mobility for the elderly and disabled population, marketing those services, and by developing transit services to suburban employment areas to persons without a vehicle available for use.
f. Promote ridesharing and paratransit options including demand response transit systems that increase vehicle occupancy and manage travel demand at activity centers.
g. Improve awareness and coordination of public transportation options available in the region.

Expand Multi-Modal Opportunities

To expand and enhance opportunities for linking and connecting multiple modes and facilitating the movement between various transportation modes by constructing new multi-modal facilities and coordinating transit services.

Objectives:

a. Identify, develop and enhance multi-modal transfer and connection points.

Enhance the Efficient Movement of Freight and Goods

To expand and enhance opportunities for linking and connecting multiple modes and facilitating the movement between various freight modes by improving upon existing freight corridors, constructing new multi-modal freight transfer facilities.

Objectives:

a. Improve the safety, environmental performance and economic efficiency of freight movement and truck deliveries throughout the Naugatuck Valley planning region.
b. Identify freight movement bottlenecks and constraints to efficient freight movement.
c. Reduce truck-related congestion.

d. Identify, evaluate and invest in essential freight corridors.
e. Improve truck safety.
f. Promote development of intermodal freight centers.
g. Deploy ITS elements to enhance the efficient movement of goods into, out of and through the region.

Enhance Bicycle and Pedestrian Facilities

To encourage and promote the increased use of bicycling and walking as a mode of transportation while enhancing safety by developing a network of shared-use trails and providing pedestrian walkways and features.

Objectives:

a. Increase the number of "walkable" communities.
b. Selectively develop bicycle paths and routes to provide a viable transportation alternative and an extension of the road network.
c. Promote the construction of the Naugatuck River Greenway, extension of the Middlebury Greenway, completion of the Steel Brooke Greenway and connection to the Larkin Trail.
d. Provide adequate and safe walkways for pedestrians.
e. Enhance the aesthetic quality of existing transportation facilities.
f. Serve as the liaison to and administer the Naugatuck River Greenway Steering Committee.

Environmental Mitigation

To implement actions to mitigate and alleviate natural and cultural impacts of transportation project.

Objectives:

a. To maintain and improve the region's highway system to reduce energy consumption and motor vehicle emissions.
b. Improve the area's air quality to comply with the 1990 Clean Air Act Amendments.
c. Support the Connecticut *State Implementation Plan for Air Quality* and assist in efforts to achieve and maintain the National Ambient Air Quality Standards (NAAQS).
d. Promote and program the expeditious implementation of Transportation Control Measures.
e. Ensure no goal, objective, directive, recommendation, or transportation improvement project contradicts the attainment of the NAAQS or increases the frequency or severity of existing violations of the NAAQS.
f. To maintain and improve public transportation service to improve efficiency, and reduce energy consumption and motor vehicle emissions.
g. Encourage energy efficient transportation and minimize the adverse environmental effects of existing and future transportation programs and systems.

Sustainability

To develop a metropolitan transportation plan consistent with the Regional Plan of Conservation and Development and state Plan of Conservation and Development that links local land use management, transportation improvements, sustainability and livability initiatives and principles.

Objectives:

a. Create, promote and support strong, sustainable, and livable and walkable communities, connecting them with active transportation corridors.
b. Promote livability principles.
c. Target development to areas with existing infrastructure and coordinate the type, intensity, amount, location and timing of new development to transportation system capacity.
d. Integrate transportation planning and land use planning as part of a major regional growth management policy to reduce the potential effects of urban sprawl.
e. Promote rail and bus transit as the preferred modal choice in the region, and improve awareness and coordination of public transportation options available in the region.
f. Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods.
g. Promote transit oriented and supportive land use development plans (TOD).
h. Identify alternative transit modes that facilitate travel to and from TOD areas.
i. Develop and implement a "Complete Streets" policy and program that accommodates all travelers and modes.

Promote Economic Development and Revitalization

To improve transportation infrastructure critical to the economic vitality of the Naugatuck Valley planning region and revitalization of the region's urban core areas and expand employment opportunities, as well as, access to jobs.

Objectives:

a. Develop local transportation infrastructure that supports economic expansion while maintaining and protecting the environment.
b. Provide transportation services to employment centers and expand employment opportunities.
c. Provide transit services to jobs located in suburban areas from urban core areas.

Environmental Justice

To identify and address disproportionately high and adverse human health or environmental effects of its transportation programs, policies, and activities on minority and low-income populations, and identify strategies and techniques for meaningful engagement of populations meeting the needs for environmental justice.

Objectives:

a. Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
b. Ensure the full and fair participation by all potentially affected communities in the planning decision-making process.
c. Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Ensure Transparency and Proactive Public Involvement

To fully engage residents and stakeholders in identifying planning priorities, developing programs and projects, and publishing final products, and ensure meaningful access to participation in planning and policy decision-making processes for disadvantaged populations in the planning region.

Objectives:

a. Carry out a proactive public involvement process that promotes regionwide citizen participation, minority involvement and equal employment opportunity.
b. Provide timely public notice, effective public involvement in the development of transportation plans, programs and projects.
c. Maintain and enhance the NVCOG's website.
d. Publish reports and documents in an electronic format.

3.3 Air Quality Conformity Determination

The Clean Air Act Amendments (CAAA) of 1990 and federal transportation regulations and legislation recognized the major contributions of transportation sources to the overall air quality problem evidenced throughout the country. To effectuate a reduction in transportation-related emissions and a corresponding improvement in air quality, areas designated as nonattainment or maintenance for a criterion pollutant were required to demonstrate that their transportation plans, programs and projects contributed to the attainment of National Ambient Air Quality Standards (NAAQS) and would not cause new violations or delay attainment of the NAAQS. This process is referred to as Air Quality Conformity.

Portions of Connecticut are currently classified as nonattainment or maintenance for Ozone and fine particle mater (PM2.5).

Ozone

Connecticut is divided into two non-attainment areas for the 8-hour ozone NAAQS, both are classified as "Moderate" non-attainment areas. Fairfield, New Haven and Middlesex counties are included as part of the New York-Northern New Jersey-Long Island non-attainment area. The remainder of the state is designated as the Greater Connecticut non-attainment area.

In June, 2004, the EPA finalized the 8-hour conformity for Ozone non-attainment areas and the designated the Connecticut portion of the New York-Northern New Jersey-Long Island non-attainment area as a "moderate" non-attainment area for the 8-hour Ozone standard. Subsequent decisions by the EPA and revisions to the approach for classifying non-attainment areas re-designated both of Connecticut's non-attainment areas as a "marginal" non-attainment area with an attainment date of December 31, 2015. Based on 2012-2014 air quality data, the EPA determined that Connecticut's non-attainment areas did not attain ozone standards by July 20, 2015. Both the Greater Connecticut and the New York-New Jersey-Long Island areas were reclassified as "Moderate," effective June 3, 2016. The new attainment date for these two areas is July 20, 2018.

PM2.5

The US Environmental Protection Agency (EPA) promulgated NAAQS for fine particulate matter in 1997. Fine particulate matter is referred to as PM2.5 and is a mixture of microscopic solids and suspended liquid solids in the air. It is formed directly as a by-product of combustion, such as smoke or automobile exhaust, or indirectly from chemical reactions in the atmosphere. Fairfield and New Haven Counties are included in the New York-New Jersey-Connecticut (NY-NJ-CT) PM2.5 non-attainment area.

On April 17, 2007 the Connecticut Department of Energy and Environmental Protection (CTDEEP) submitted a revision to the State Implementation Plan to establish interim progress for achieving the NAAQS for fine particulate matter and motor vehicle emission budgets. The annual emission budgets for the Connecticut portion of the NY-NJ-CT non-attainment area were determined to be adequate and are used in future analysis years. The EPA has also determined Connecticut's PM2.5 attainment demonstration SIP to be administratively and technically complete as of January 8, 2009. Effective October 24, 2013, the Connecticut portion of the multi-state PM2.5 non-attainment area was re-designated as "attainment maintenance." EPA's guidance for maintenance plans calls for a demonstration of continued compliance by showing that future emissions during the maintenance period will not exceed the level of emission in the attainment inventory. The end of the maintenance period is 2025.

Assessment

The Connecticut Department of Transportation is responsible for conducting the air quality emissions assessments for the metropolitan planning organizations in Connecticut. The CTDOT uses the statewide travel demand model to estimate vehicle miles of travel for various classes of highways and during various time periods. The future transportation network includes all planned improvement projects and is based on the complete implementation of the transportation improvement program TIP and the current draft of this MTP.

Motor Vehicle Emissions Budgets (MVEB) are developed jointly by CTDOT and CTDEEP and have been found to be adequate by the EPA. The MOVES2014a model is used to calculate emissions from transportation travel and establish emissions budgets.

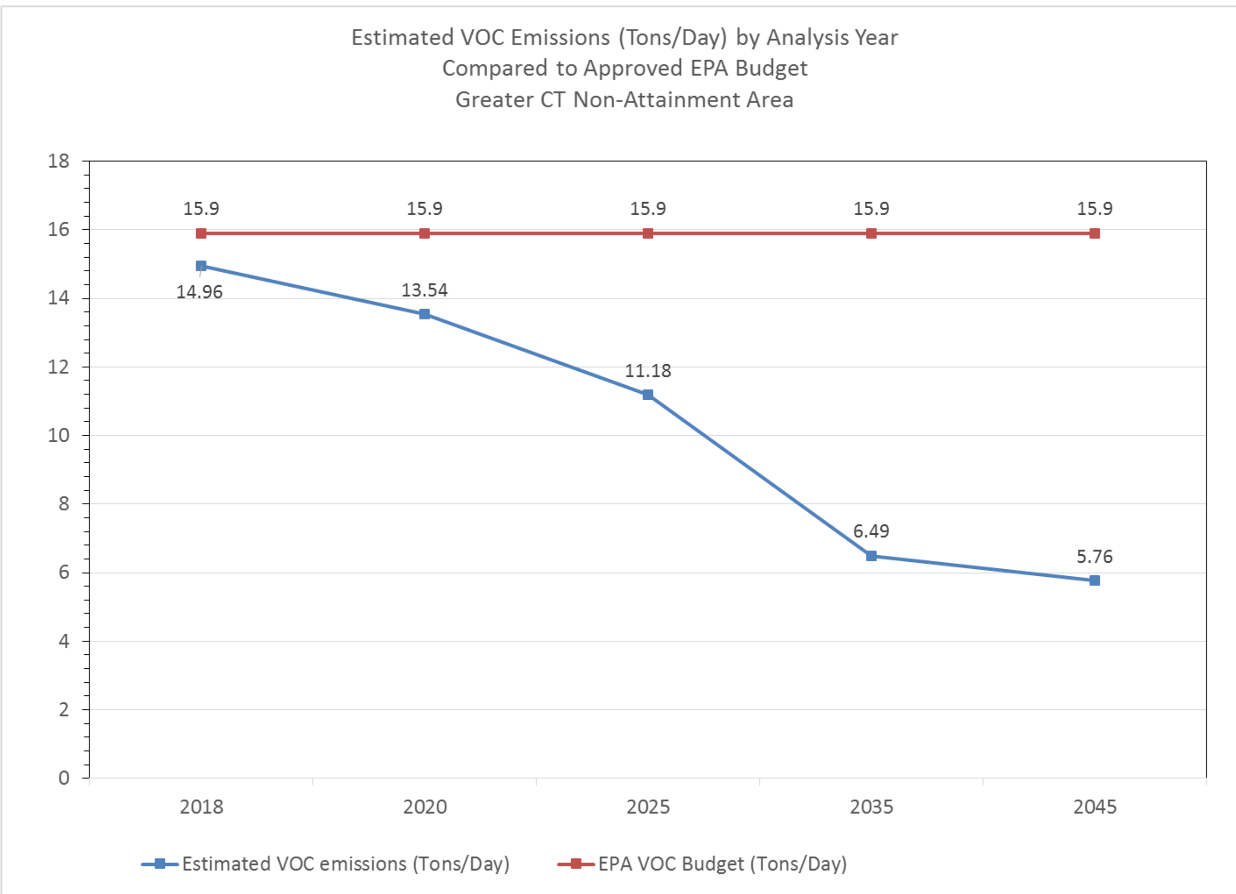
The conformity test requires the emissions from the estimated future transportation system to be less than the EPA-approved MVEBs for all analysis years. The emissions analyses were conducted for the following years:

- 2018 – New attainment year and near term analysis year: Ozone and PM2.5
- 2020 – Interim modeling year: Greater CT Ozone Non-attainment area
- 2023 – Interim modeling year: NY-NJ-CT Ozone Non-attainment area
- 2025 – Interim modeling year: Ozone and PM2.5
- 2035 – Interim modeling year: Ozone and PM2.5
- 2045 – Metropolitan transportation plan horizon year: Ozone and PM2.5

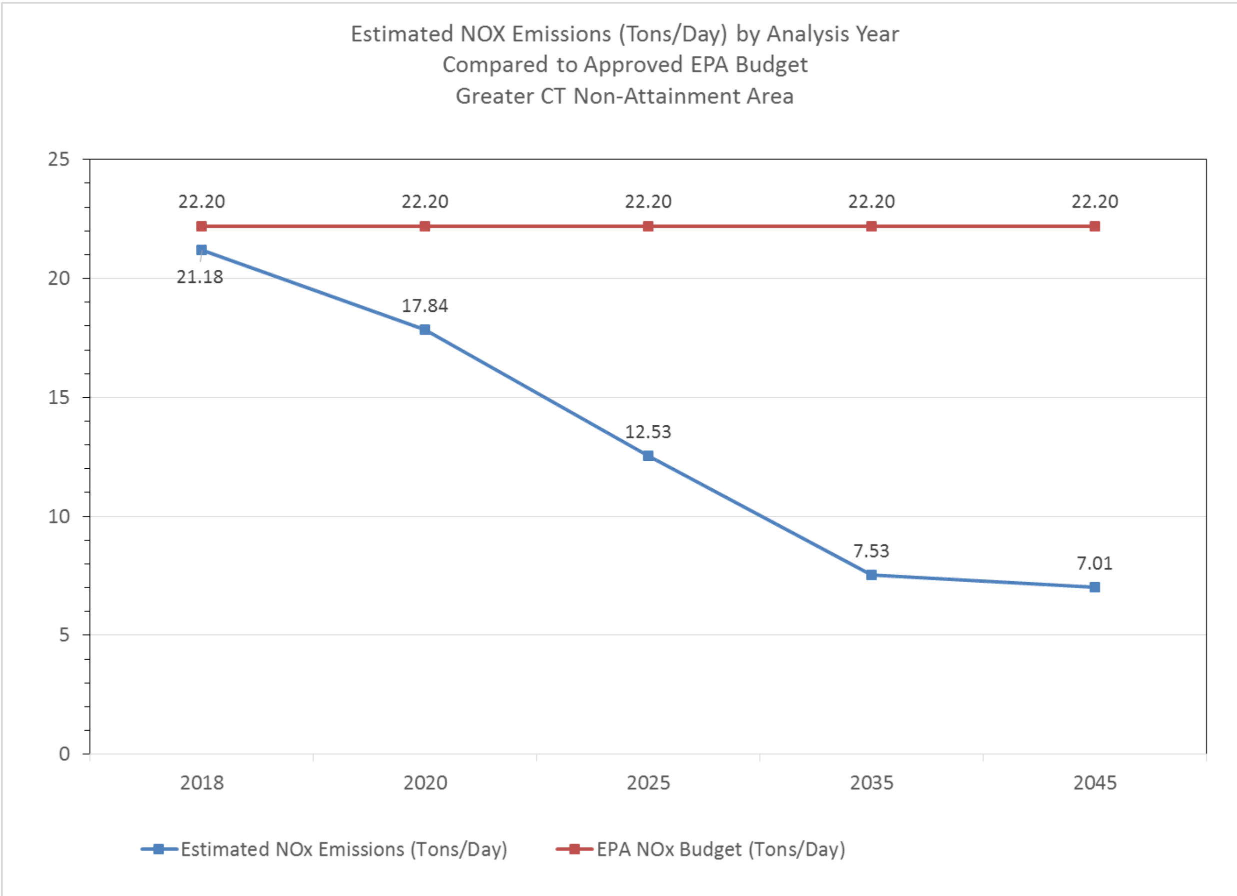
The results of the quantitative emissions analysis conducted by CTDOT are shown in the following tables and the analysis year trends are depicted in the charts following the tables.

Greater CT Ozone Moderate Nonattainment Area

VOC Emission Analysis				NO_X Emission Analysis			
Year	**Estimated VOC emissions (Tons/Day)**	**EPA VOC Budget (Tons/Day)**	**Difference**	**Year**	**Estimated NOx Emissions (Tons/Day)**	**EPA NOx Budget (Tons/Day)**	**Difference**
2018	14.96	15.9	-0.94	**2018**	21.18	22.20	-1.02
2020	13.54	15.9	-2.36	**2020**	17.84	22.20	-4.36
2025	11.18	15.9	-4.72	**2025**	12.53	22.20	-9.67
2035	6.49	15.9	-9.41	**2035**	7.53	22.20	-14.67
2045	5.76	15.9	-10.14	**2045**	7.01	22.20	-15.19

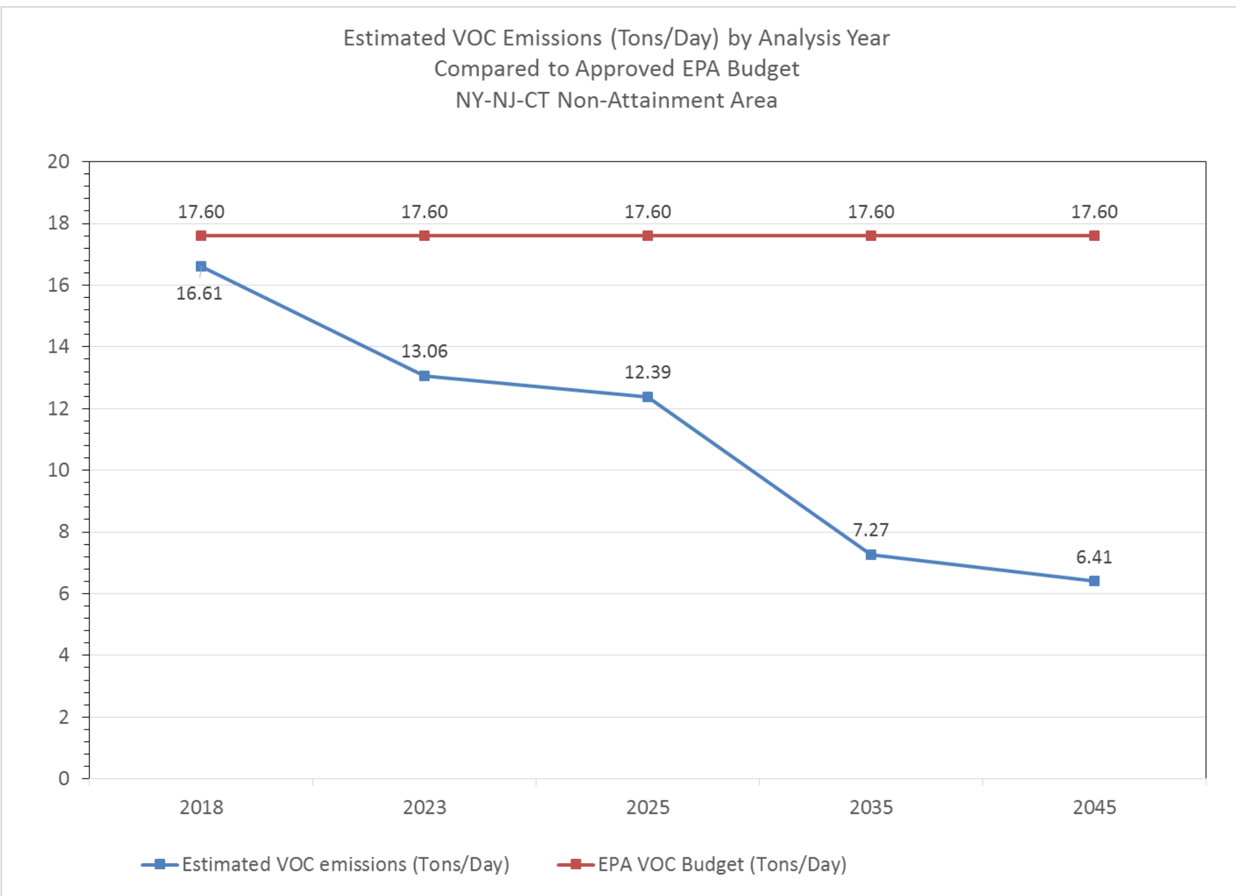


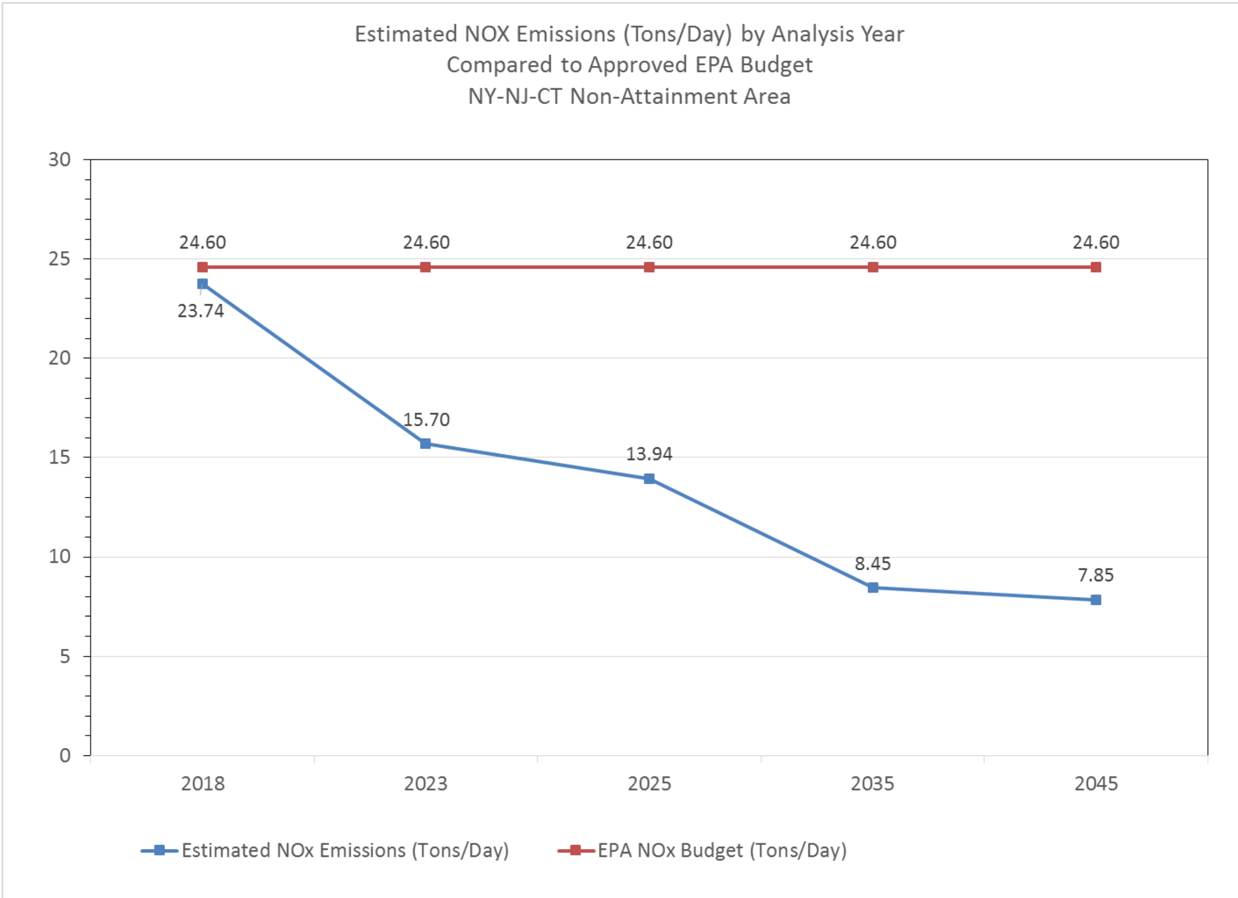
CT Portion of NY-NJ-CT Ozone Moderate Nonattainment Area



Greater CT Ozone Moderate Nonattainment Area

VOC Emission Analysis				NO_X Emission Analysis			
Year	**Estimated VOC emissions (Tons/Day)**	**EPA VOC Budget (Tons/Day)**	**Difference**	**Year**	**Estimated NOx Emissions (Tons/Day)**	**EPA NOx Budget (Tons/Day)**	**Difference**
2018	16.61	17.60	-0.99	**2018**	23.74	24.60	-0.86
2023	13.06	17.60	-4.54	**2023**	15.70	24.60	-8.90
2025	12.39	17.60	-5.21	**2025**	13.94	24.60	-10.66
2035	7.27	17.60	-10.33	**2035**	8.45	24.60	-16.15
2045	6.41	17.60	-11.19	**2045**	7.85	24.60	-16.75

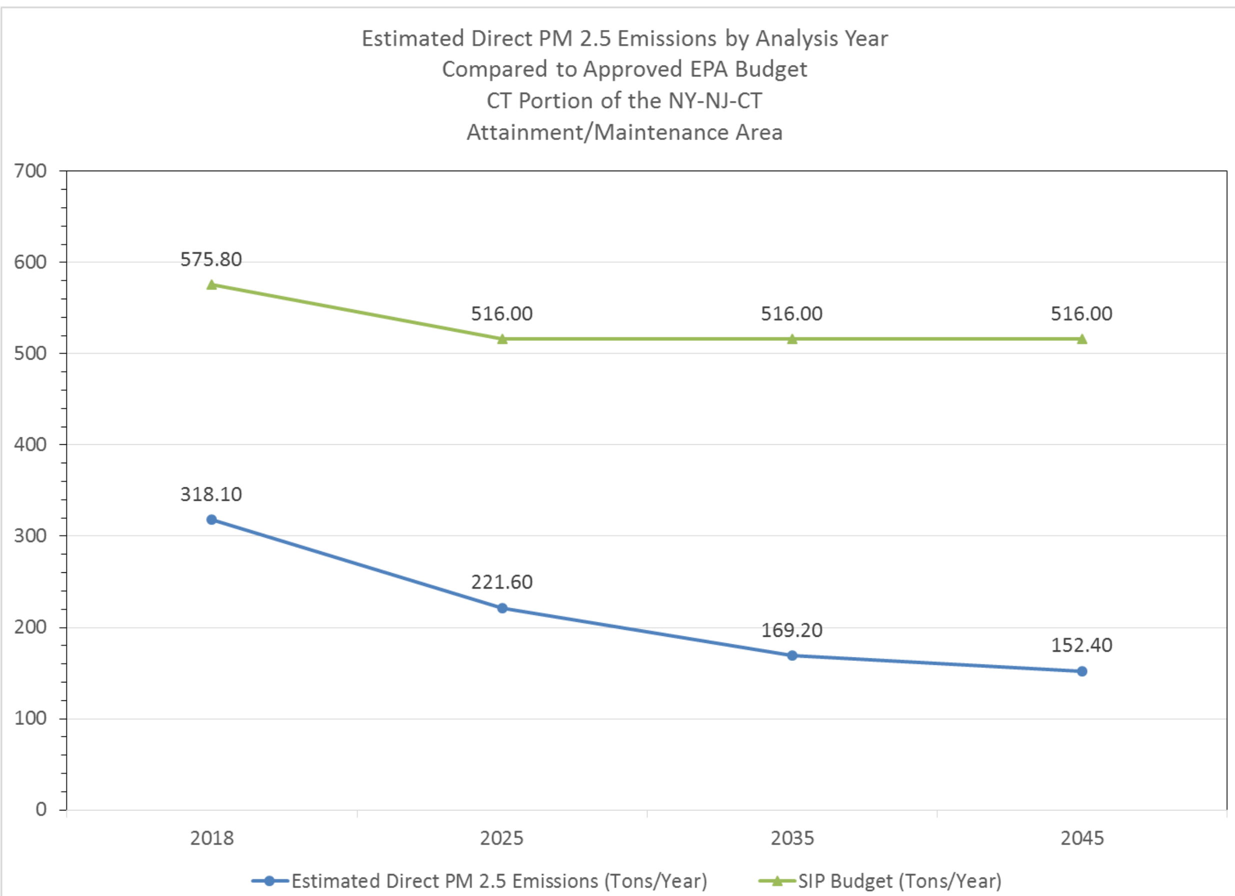


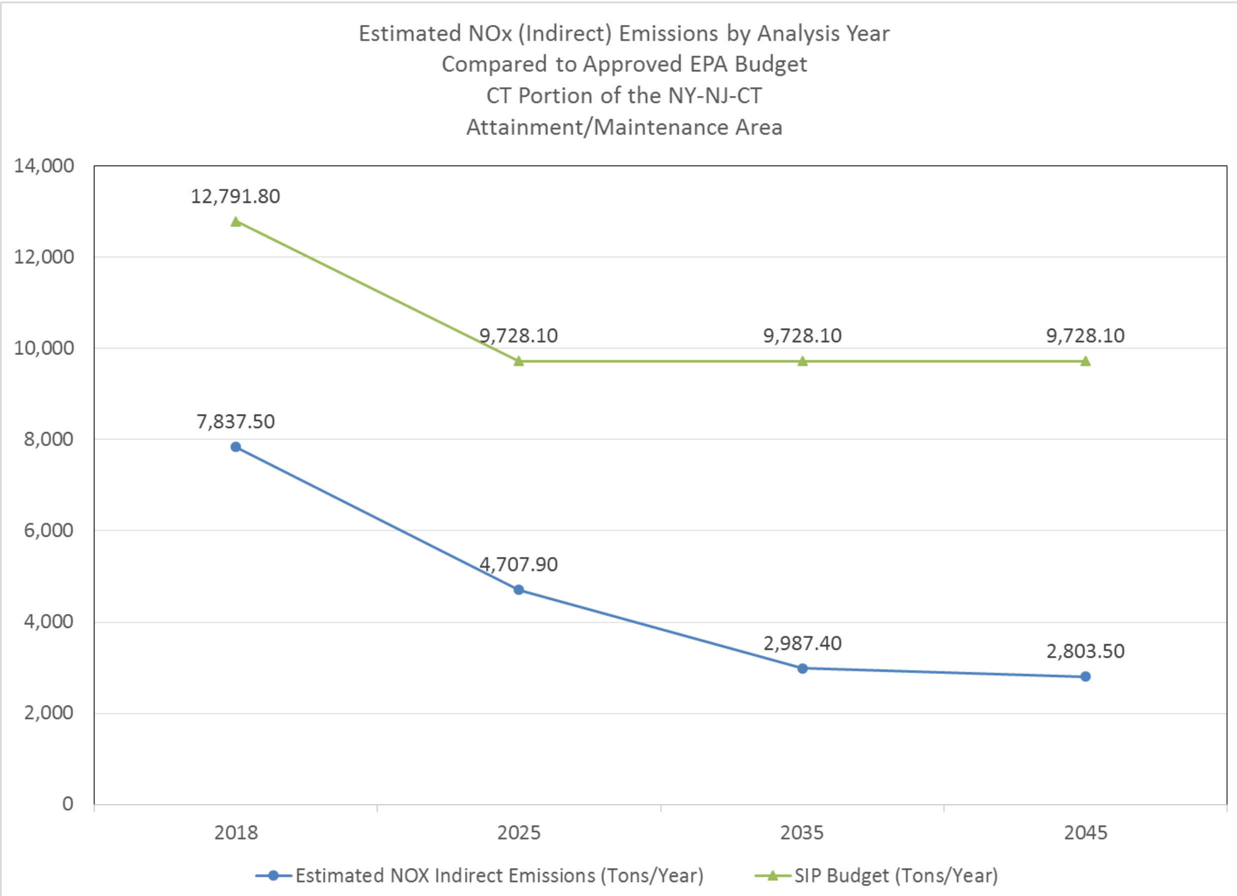


Estimated NOX Emissions (Tons/Day) by Analysis Year
Compared to Approved EPA Budget
NY-NJ-CT Non-Attainment Area
30
25
20
15
10
5
0
24.60
24.60
24.60
24.60
24.60
23.74
15.70
13.94
8.45
7.85
2018
2023
2025
2035
2045
Estimated NOx Emissions (Tons/Day)
EPA NOx Budget (Tons/Day)

CT Portion of NY-NJ-CT PM 2.5 Attainment-Maintenance Area

VOC Emission Analysis				NO_X Emission Analysis			
Year	**Estimated Direct PM 2.5 emissions (Tons/Yr)**	**EPA/SIP Budget (Tons/Yr)**	**Difference**	**Year**	**Estimated NOx Indirect Emissions (Tons/Yr)**	**EPA/SIP Budget (Tons/Day)**	**Difference**
2018	318.1	575.8	-257.7	**2018**	7,837.5	12,791.8	-4,954.3
2025	221.6	516.0	-294.4	**2025**	4,707.9	9,728.1	-5,020.2
2035	169.2	516.0	-346.8	**2035**	2,987.4	9,728.1	-6,740.7
2045	152.4	516.0	-363.6	**2045**	2,803.5	9,728.1	-6,924.6





As shown in this analysis, transportation emissions are declining and will continue to do so. This is primarily due to programs such as federal heavy-duty vehicle standards, reformulated fuels, enhanced inspection and maintenance programs, and Connecticut's low emissions vehicle program. Additionally, based on this assessment, it is concluded that all elements of the CTDOT transportation program, the CNVMPO TIP and the CNVMPO Metropolitan Transportation Plan conform to the applicable SIP, 1990 CAA and the approved transportation conformity budgets.

4.0 Highway System

The vast majority of trips throughout the region are made by automobile on the region road network, known as the highway system. This system functions as the primary means of distributing people and goods within and beyond the region. This section describes the current highway system for the 15 municipalities of the CNVMPO, as well as the four NVCOG municipalities that are part of the GBVMPO for informational and broader planning purposes. Additionally, all analyses and matrix, including commuter patterns, congestion, highway delay, and safety, are provided for the NVCOG planning region and not limited to the CNV municipalities.

4.1 Existing Conditions

Within the region, most highway traffic is accommodated by roughly 60 miles of expressways. Interstate 84 is the region's principal east-west expressway. To the west, I-84 provides access to Danbury and the New York metropolitan area. To the east, it connects to I-91 in Hartford and I-90 in Massachusetts, which links to the Boston metropolitan area. Within the planning region, traffic volumes on I-84 peak through Waterbury where average daily traffic (ADT) in 2017 reached 133,700 vehicles and trucks constituted an estimated 4.25% of that traffic[2].

Route 8 is the region's north-south arterial. As a limited access expressway, it connects Interstate 95 in Bridgeport to the Merritt Parkway in Trumbull and I-84 in Waterbury, before terminating in Winchester. North of the Town of Winchester, in the northwest corner of the state, Route 8 continues as a two-lane arterial to the Massachusetts border. It was constructed in the early 1960s but was not completed until 1982. Through the Naugatuck Valley region, the expressway features an alignment that closely follows the curves of the Naugatuck River, has elevated viaducts through the town centers and has poorly designed on and off-ramps that lack adequate acceleration and deceleration lanes, provide partial access at some locations, and often direct vehicles onto residential streets. Traffic volumes peak over the Commodore Hull Bridge, between Derby and Shelton, where ADT in 2017 reached 84,100 vehicles. Similar traffic volumes are recorded at the interchange of Route 8 and I-84. Truck volume peaks at an estimated 3.75% at the interchange of Route 8 and I-84.

Interstate 691 serves as an interstate connector between I-84 in Cheshire and Interstate 91 in Meriden. In 2017, ADT along I-691 in Cheshire was estimated to be 58,500 vehicles. Trucks constituted an estimated 3.85% of traffic on the highway in 2017.

In addition to the 60 miles of expressway, there are 360 miles of arterial roads, which facilitate the flow of traffic within and between municipalities. Some of the principal arterial routes in the planning area are State Routes 10, 34, 63, 68, 69, 70, 72, 113, 115, 188, 229, U.S. Route 6, Pershing Drive (SR 727), and South Main Street (SR 847). The following map, shows the region's major roads.

[2] HPMS 2017

Major Highways and Roadways in the Naugatuck Valley Region: 2018

Source: Connecticut Department of Transportation, 2018

Commuting Patterns

Commuting patterns in the NVCOG Region reflect national trends. The migration of the region's urban population to the suburbs and rural areas is accompanied by decentralized travel. As people move farther away from city centers, they assume longer commutes and increased reliance on the automobile. NVCOG commuting data show diverse movements across the region with strong ties between the major cities and employment areas. The length of the average work trip of NVCOG residents increased from 21 minutes in 1990 to 25 minutes in 2010, and according to the most recent American Community Survey now stands at 28 minutes.

With 52% of the region's jobs in suburban towns, some low-income residents are cut off from many jobs and services because they cannot afford a car. Public transit cannot effectively serve low and medium density areas, but employment and shopping centers continue to be placed outside of the city.

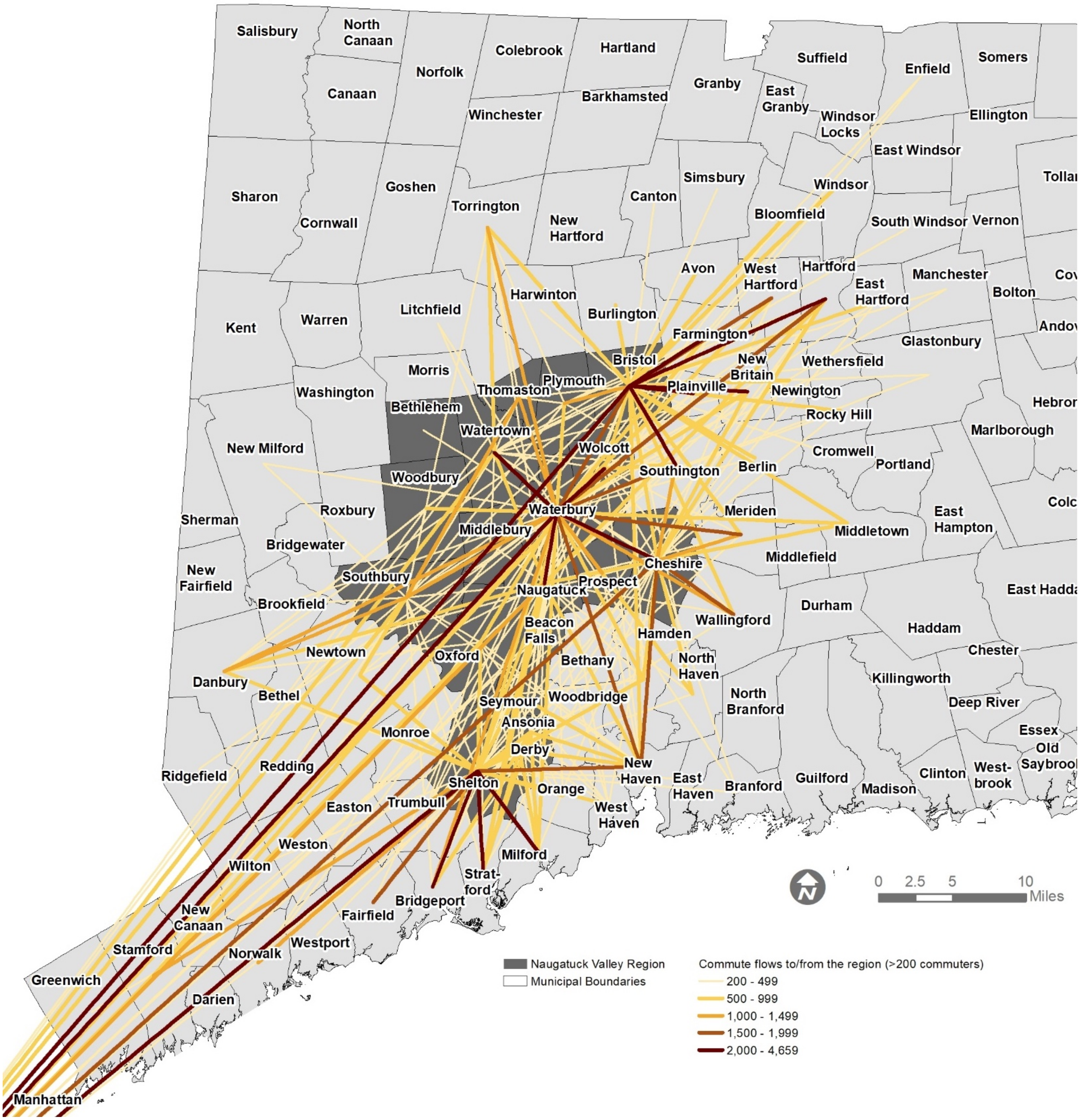
More broadly, there is a large mismatch between the number of employed residents living in the region and the number of jobs in the region. There are enough jobs to employ just 71% of employed residents. The result is a net export of over 65,000 workers each day to other regions, with many commuting to Hartford, New Haven, Bridgeport, Danbury, and lower Fairfield County.

Cheshire, Middlebury and Shelton are the only municipalities in the region that have more jobs than employed residents. The remaining municipalities have more employed residents than jobs and are net exporters of commuters.

As of 2015, just 39.8% of employed Naugatuck Valley residents worked in the region. The remaining 60.2% commute to jobs outside of the region. Waterbury is the most popular commuting destination followed by Bristol, Cheshire and Shelton. Outside of the region, the most popular destinations are Hartford, New Haven, Stratford, Bridgeport, and Danbury. Similarly, nearly half of the people who work in the Naugatuck Valley live outside of the region.

The following map illustrates those commuting patterns by linking municipality of residence with municipality of employment and vice versa. Broadly, this map demonstrates the idea that work and home are decentralized. It also outlines regional commuting patterns. Most prominent is the connection of the urbanized areas within and without the region. Bristol, Waterbury, Watertown, Shelton, and the lower valley all are strongly connected. Beyond the region, Danbury, Torrington, the New Haven area, the Hartford area, the Bridgeport area, Fairfield County, and the New York metropolitan areas all receive or send workers to and from the region. Taken as a whole, the commuter patterns visibly reflect the role of the region's major infrastructure, including expressways and commuter rail. There is clear north-south movement throughout the region, reflecting Route 8, East-West movements reflect I-84, and trips into Fairfield County and beyond reflect the highway system and Metro North service along the WBL.

Commuter flows to/from the region, by Municipality: 2015



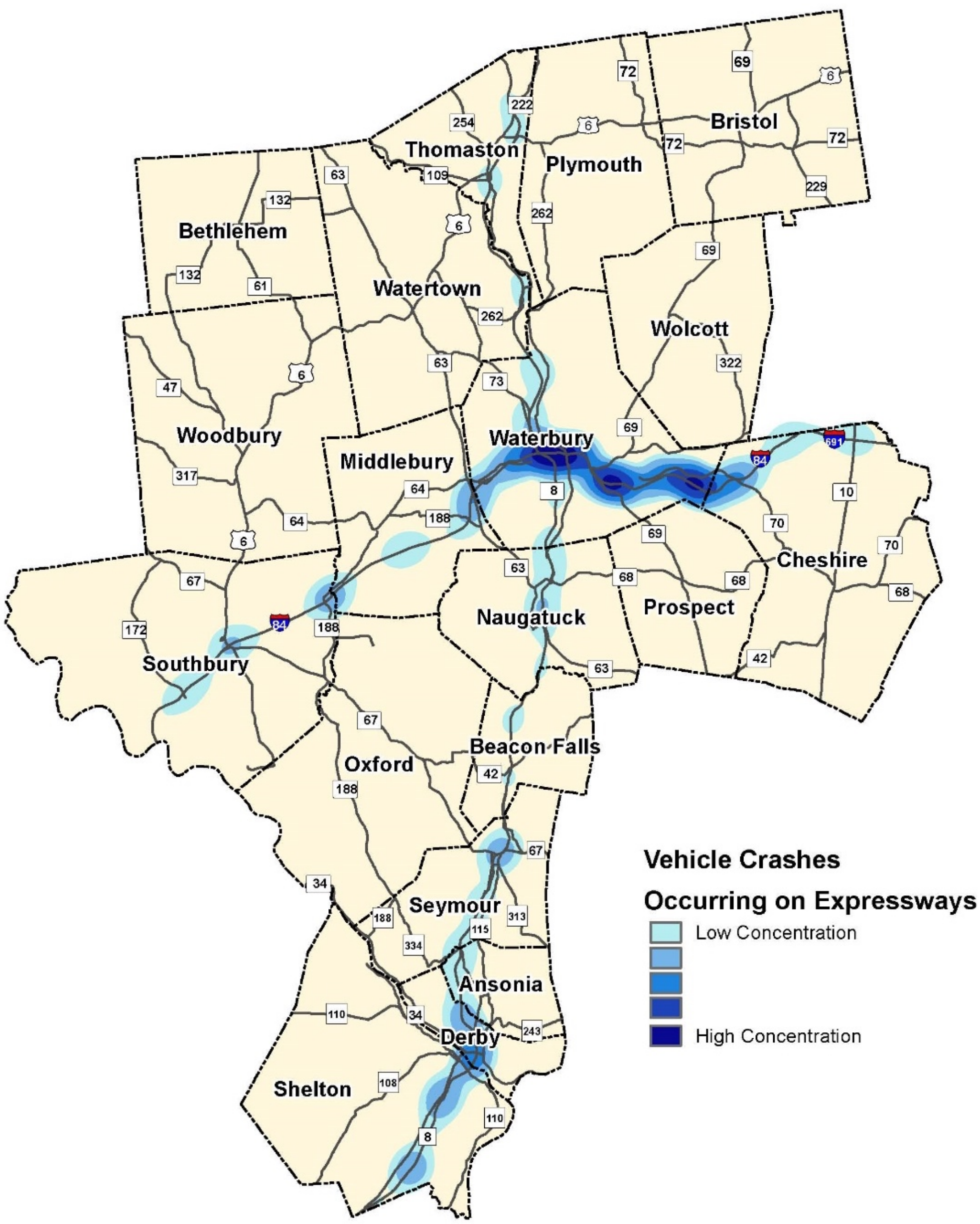
Source: U. S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (2015).

Safety

The NVCOG has adopted a regional approach to highway safety. The NVCOG follows a data driven planning process to first profile accidents throughout the region, assess risk, and prioritize location specific actions to maximize limited fiscal resources available for capital improvements. The NVCOG uses regional crash data from the UCONN Crash Repository. This is a powerful dataset that can shed light on high risk areas within the region.

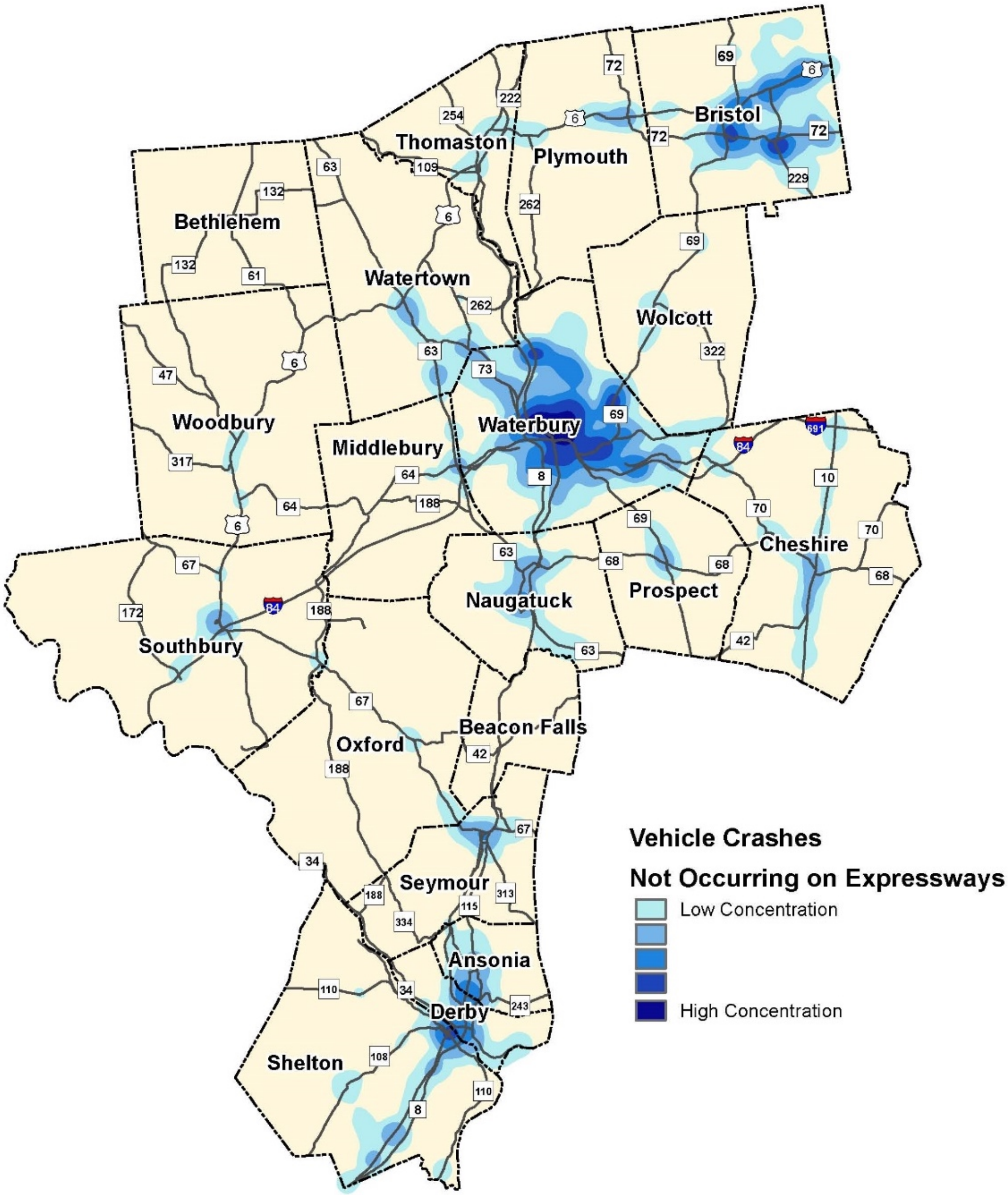
The following heat maps of crashes has been drawn to visualize and locate high hazard areas.

High Frequency Crash Areas – Expressways



Source: CT Crash Repository

High Frequency Crash Areas – Non-Expressway



Source: CT Crash Repository

FHWA has codified its goals for safety in their transportation performance measures. Highway safety is determined by the interaction between drivers, their behavior and the highway infrastructure. The five performance measures for highway safety include: (1) the number of fatalities; (2) the rate of fatalities; (3) the number of serious injuries; (4) the rate of serious injuries; and, (5) the number of non-motorized fatalities and serious injuries. The CTDOT and the CNVMPO will collaborate to program appropriate Highway Safety Improvement Program (HSIP) safety projects. Projects will include:

1. **Programmatic highway safety improvements**: Projects or programs that are conducted regularly throughout the state such as signing and pavement marking programs.

2. **Programmatic driver safety activities**: Projects or programs that are conducted regularly on an ongoing basis. These include Highway Safety behavioral programs such as Impaired Driving, Occupant Protection, Distracted Driving, Speeding, Motorcycle Safety, and Teen Driving grants for State and Municipal Police Departments using National Highway Traffic Safety Administration (NHTSA) funds.
3. **Location-specific highway safety projects**: This includes roadway safety improvements selected to correct known safety problems at locations with a high frequency or severity of crashes.

The Safety Performance Management Measures regulation supports the Highway Safety Improvement Program (HSIP) and requires State Departments of Transportation and MPOs to set HSIP targets for 5 safety performance measures that cover all public roadways regardless of ownership or functional classification.

1. Number of fatalities
2. Rate of fatalities
3. Number of serious injuries
4. Rate of serious injuries
5. Number of non-motorized fatalities and non-motorized serious injuries.

The CTDOT, upon review of the 5-year rolling average for each measure, has determined that the targets will be to maintain the current five-year moving average.

Safety Targets: CTDOT Five-Year Rolling Average

Measure	2018 Target	2019 Target
Number of fatalities	257 fatalities/year	274 fatalities/year
Rate of fatalities	.823 fatalities/100 Million VMT	.873 fatalities/100 Million VMT
Number of serious injuries	1,571 serious injuries/year	1,574 serious injuries/year
Rate of serious injuries	5.033 serious injuries/100 Million VMT	5.02 serious injuries/100 Million VMT
Number of non-motorized fatalities and non-motorized serious injuries	280 fatalities and serious injuries/year	290 fatalities and serious injuries/year

Within the NVCOG Region the numbers are as follows.

NVCOG Safety Statistics

Year	Number of fatalities	Number of serious injuries	Number of non-motorized fatalities and non-motorized serious injuries
2013	31	231	22
2014	20	175	26
2015	48	171	33
2016	40	210	37
2017	43	172	38
Total	182	959	156

Congestion

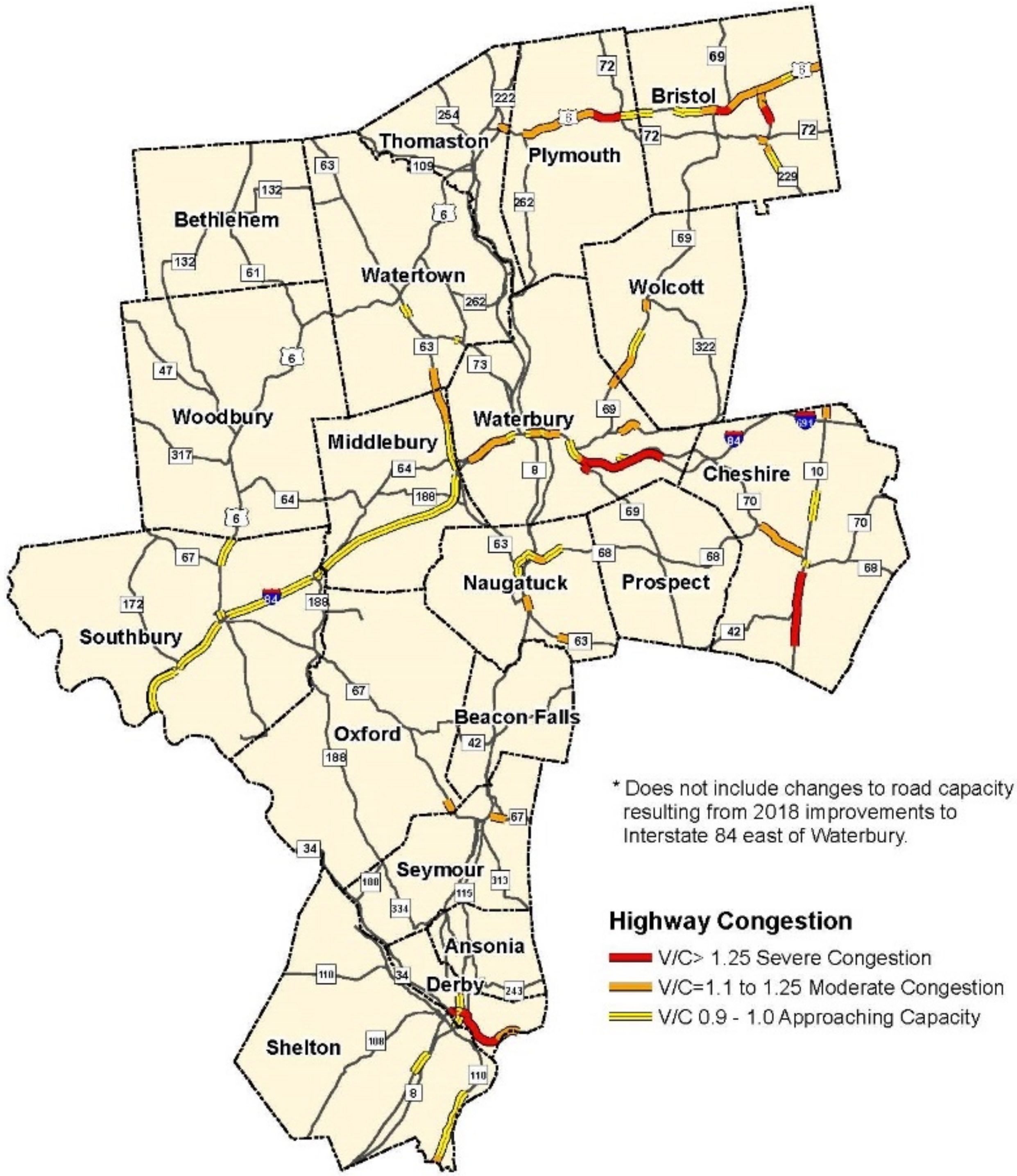
Congestion impedes vehicles, causes motorist delays, decreases safety, and increases fuel consumption and vehicle emissions. The Federal Highway Administration (FHWA) defines congestion as "the level at which transportation system performance is no longer acceptable due to excessive travel times and delays." Congestion has many causes, each of which impact how it can be alleviated. The following measures are meant to identify congestion and its causes. From these analyses, location specific projects and programs can be proposed.

A common measure of highway congestion is the volume-to-capacity (v/c) ratio. The v/c ratio is defined as the peak hour traffic volume divided by a road segment's hourly vehicle capacity. Road segments with v/c ratios over 1.00 have peak hour traffic volumes that exceed the road's hourly capacity. Factors used in determining v/c ratios include: number of lanes, lane width, truck traffic, traffic signal timing, abutting land use, and terrain. The following map shows the current ratio of vehicle volume to roadway capacity based on 2011 network capacity.

For capacity, the NVCOG used the CTDOT 2012 Congestion Management System data. Average daily traffic(ADT) data was downloaded from the Highway Performance Management System (HPMS) dataset. The NVCOG used the CTDOT methodology whereby peak hour directional traffic volumes were estimated as a percentage of the ADT for each road segment. Nine percent of the ADT was assumed during the peak hour with a 55:45 directional split. Additionally, a peak hour factor of 0.9 was used.

To project traffic growth for 2045 the NVCOG inferred a 1.5% growth rate. While this growth rate airs on the side of being high, as it was uniformly applied, it proves useful in identify areas where volume is most susceptible to exceeding capacity.

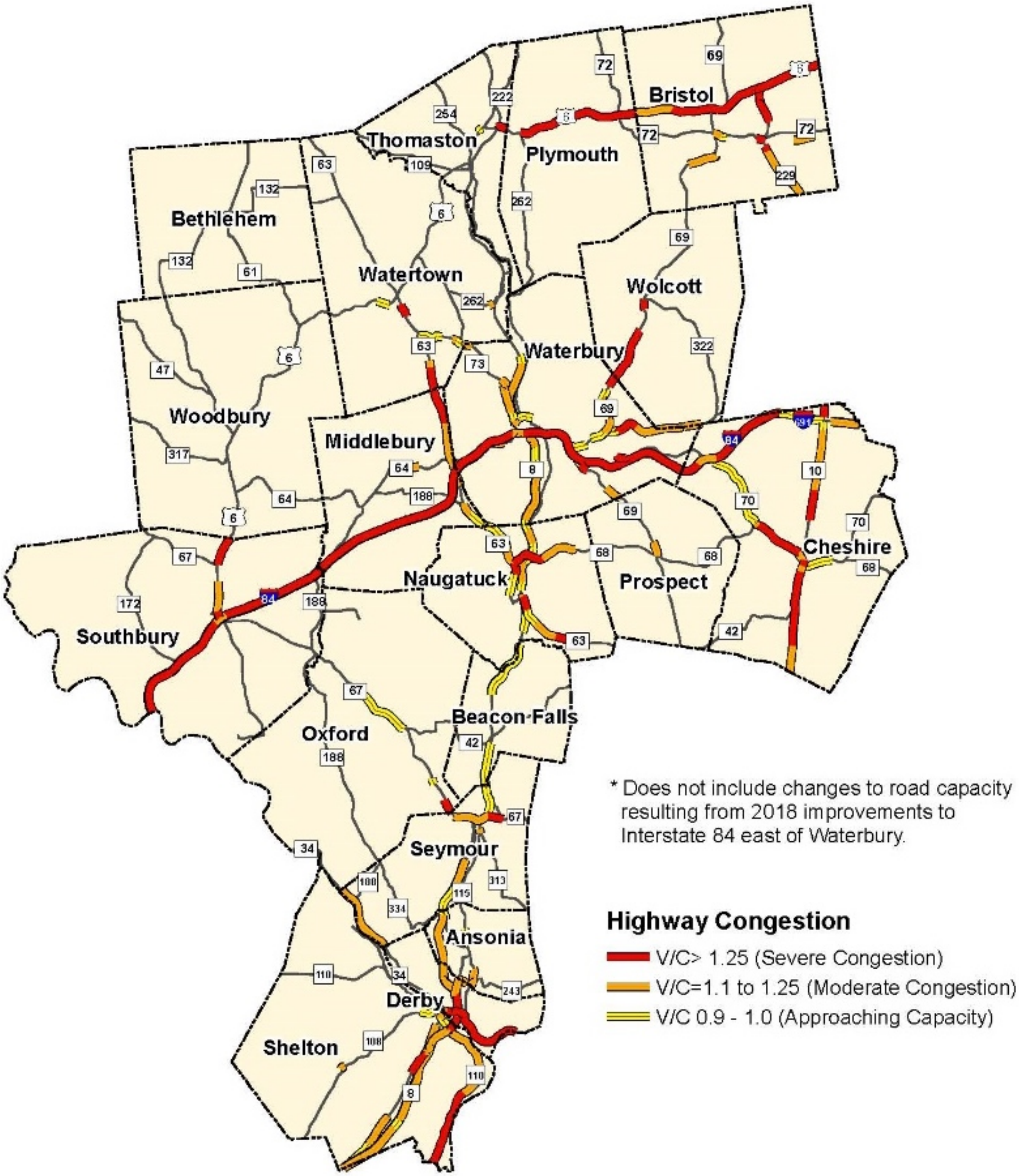
Current V/C Ratio



Source: CTDOT; NVCOG

From the regional map certain potential problem areas jump out as areas where peak hour volume exceeds roadway capacity. When traffic volume is projected out to 2045, these issues are only exacerbated.

Projected V/C Ratio 2045

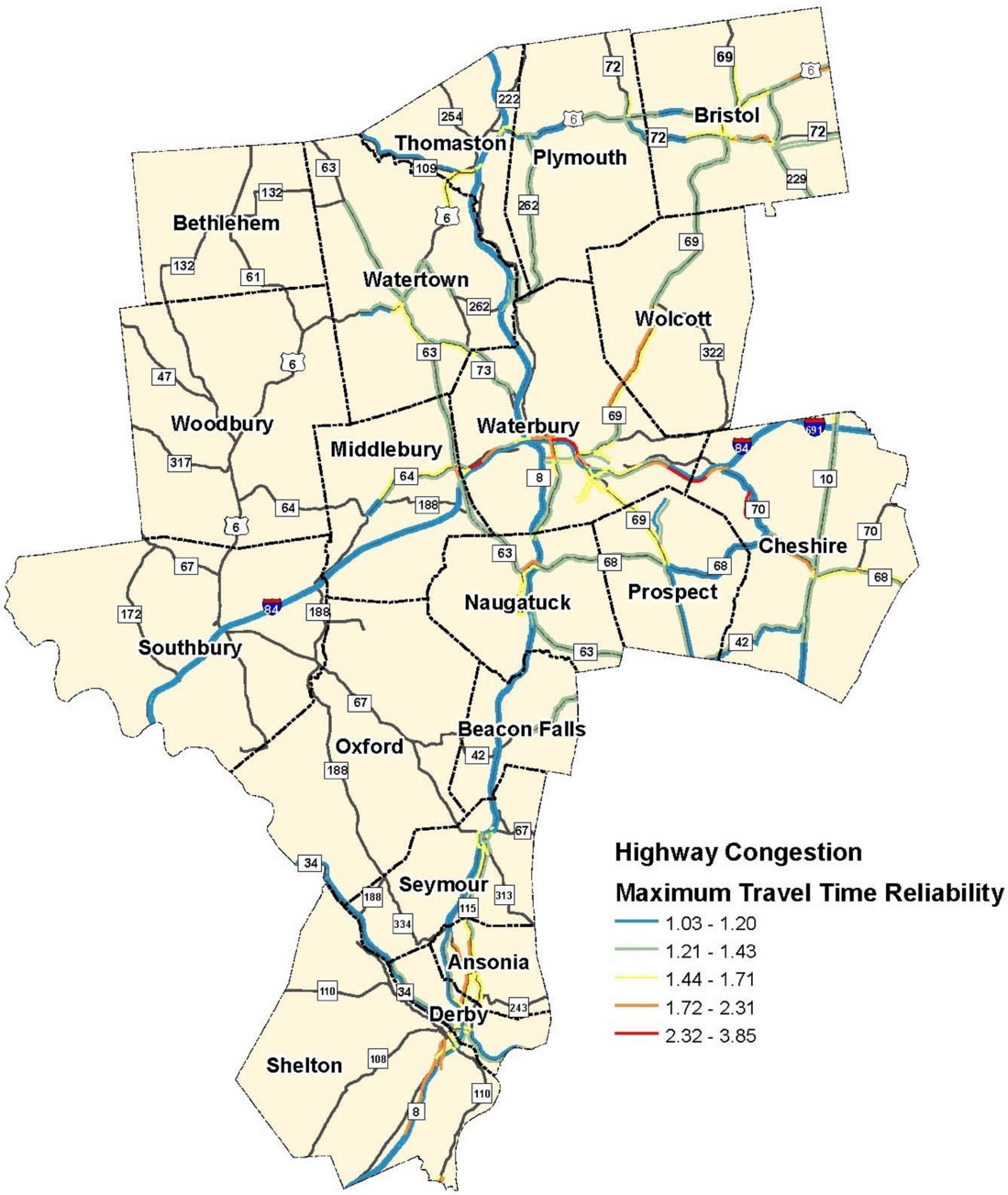


Source: CTDOT; NVCOG

The v/c ratio is a high-level test that indicates areas that may need further investigation. When combined with the following metrics, a clearer image begins to emerge; one that shows that even some areas with high V/C ratios are not experiencing high delays or reliability issues.

The next measure of congestion applied is travel time reliability (TTR). The TTR is defined as the ratio of the longer travel times (80th percentile) to a "normal" travel time (50th percentile) for a segment of roadway, using data from FHWA's National Performance Management Research Data Set (NPMRDS). NVCOG analysis was used to identify the relevant portions of the NHS that are reliable and unreliable. The reliability of a road segment is an important determinant as to how drivers assess the congestion on their commute. Regular congestion is seen as less offensive than unpredictability. This preference is especially true in the freight industry.

Travel Time Reliability 2017



Source: NPMRDS; NVCOG

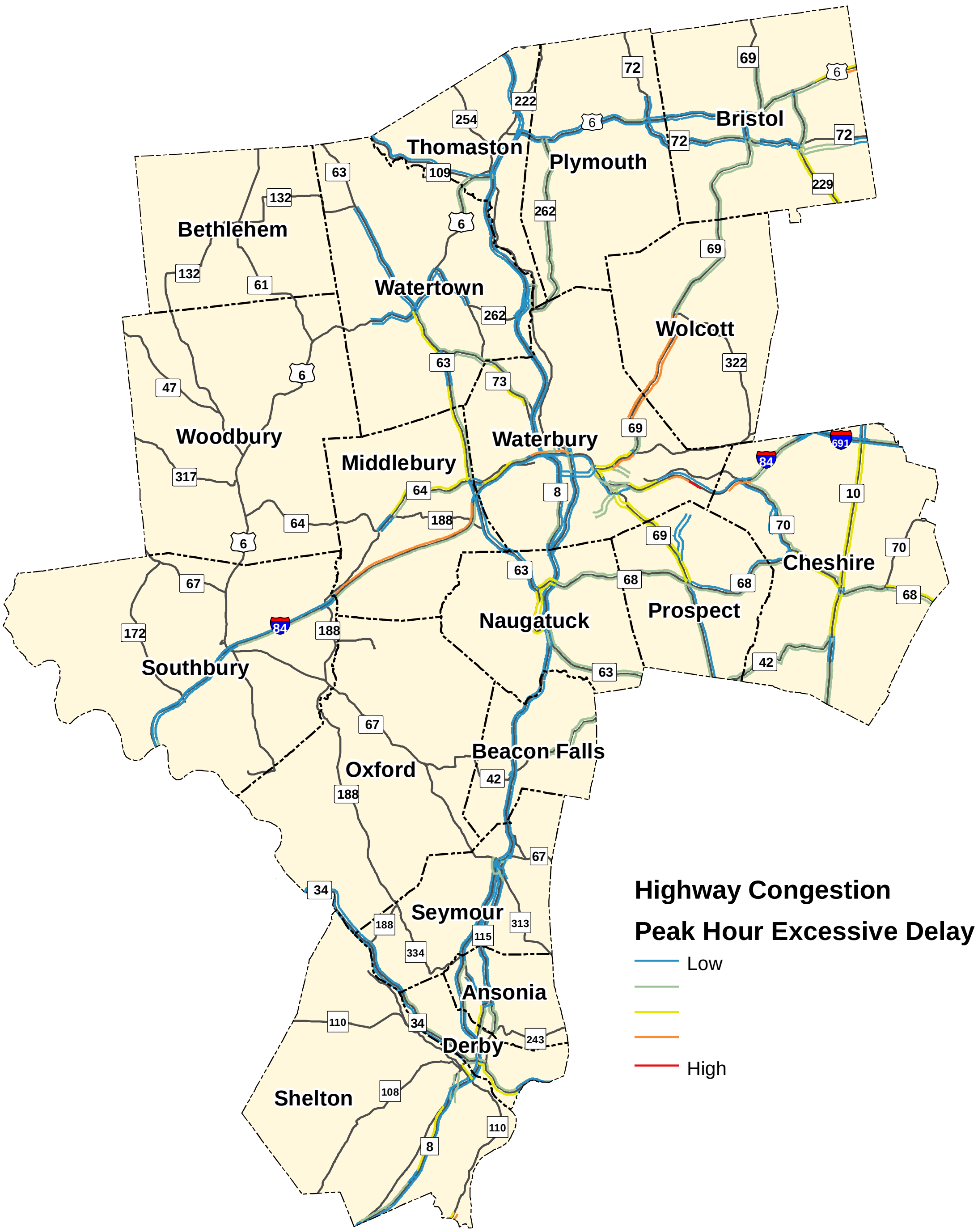
The level of travel time reliability (LOTTR) is an extension of the TTR; it is expressed as a ratio, of the 80th percentile travel time of a reporting segment to the "normal" (50th percentile) travel time of a reporting segment occurring throughout a full calendar year. Segments that have a ratio less than 1.5 are considered "reliable." The performance measure, as defined in title 23 CFR 490.507, is the percent of the person-miles traveled on the Interstate and the non-Interstate NHS that are reliable.

Level of Travel Time Reliability

	Current Condition (State)	2-year targets (2020)	4-year targets (2022)
Percent interstate that is "reliable"	78.30%	75.20%	72.10%
Percent non-interstate NHS that is "reliable"	83.60%	80%	76.40%

A final measure of congestion looked at in this report is the Peak Hour Excessive Delay (PHED). PHED is an aggregation of the time road users actually spent on a given segment of roadway above and beyond what would be expected in free flow conditions (85^{th} percentile). This additional time is then aggregated by the total number of roadway users to create a total excessive delay metric. The benefit of this measure is that it does not just look at the roadway congestion but also the number of users experiencing the congestion. For example, when calculating the excessive delay for a tractor trailer, it is assumed that only one occupant is present. However, when calculated for a car, it assumes that 1.7 occupants are present, and for a bus, 16.8 occupants are present and experiencing the delay.

Peak Hour Excessive Delay



Source: NPMRDS; NVCOG

System Preservation and Maintenance

Preservation is essential to maintaining the smooth operation and reliability of the highway network. While this work does not add capacity, it does allow the infrastructure to continue functioning as designed. To help track the state of the highway network, FHWA developed pavement and bridge condition measures. The four performance measures for pavement condition include (1) the percent of the Interstate system in good condition, (2) the percent of the Interstate system in poor condition, (3) the percent of the non-Interstate National Highway System (NHS) in good condition, and (4) the percent of the non-Interstate NHS in poor condition. The two performance measures for bridge condition include (1) the percent of NHS bridges in good condition, and (2) the percent of NHS bridges in poor condition.

FHWA Measure for Pavement Condition: Percent of the Interstate System and the non-interstate National Highway System (NHS) pavement in lane miles that are in good and poor condition.

	Current Condition (State)	2-year targets (2020)	4-year targets (2022)
Percent interstate in good condition	66.20%	65.50%	64.40%
Percent interstate in poor condition	2.20%	2%	2.60%
Percent Non-Interstate NHS in good condition	37.90%	36%	31.90%
Percent Non-Interstate NHS in poor condition	8.60%	6.80%	7.60%

FHWA Measure for Bridge Condition: Bridges (deck area) on the National Highway System (NHS) that are rated as good and poor condition.

	Current Condition (State)	2-year targets (2020)	4-year targets (2022)
Percent in good condition	18.10%	22.10%	26.90%
Percent in poor condition	15%	7.90%	5.70%

CTDOT in collaboration with the CNVMPO will program projects to meet the targets using the Department's Pavement Management System and the Bridge Management System, which uses a systematic look at conditions to develop optimal strategies. These strategies are included in the CTDOT Transportation Asset Management Plan (TAMP).

Transportation Asset Management Plan: The TAMP acts as a focal point for information about the assets, their management strategies, long-term expenditure forecasts, and business management processes. CTDOT is required to develop a risk-based TAMP for the NHS to improve or preserve the condition of the assets and the performance of the system (23 U.S.C. 119). The federal code further defines asset management as a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the lifecycle of the assets at minimum practicable cost. (23 U.S.C. 101(a) (2)).

Pavement and Bridge State of Good Repair (SGR) needs are identified, quantified, and prioritized through the TAMP process. Projects to address SGR repair needs are selected from the TAMP for inclusion in the STIP and TIPs.

4.2 Trends

Commuting

Decentralized commuting continues to define daily movements throughout the region and simultaneously, worker commutes continue to lengthen.

Safety

At both the state and regional level, fatalities and injuries for non-motorized and motorized crashes alike are on the rise.

Congestion

Steady increases in traffic volume will lead to a greater number of highway miles being congested; coincidentally reliability will decrease and delay will increase. When the above discussed indicators are looked at together, the section of Route 6 in Bristol approaching the Farmington town line, I-84 east of Waterbury, and Route 69 from south of Waterbury border to roughly Beach Road stand out across all three measures. Recent and ongoing projects along Route 6 and I-84 may ameliorate these sections of roadway; however no major work is currently underway to address the issues along Route 69.

Preservation & Maintenance

The trends for pavement and bridge condition are mixed. Throughout the state, bridge condition is improving with indications that it will continue to improve into the future. However, the state of the highway system's pavement condition is expected to deteriorate in the coming 4 years.

4.3 Actions

By looking at a variety of metrics, the NVCOG can advocate for improved reliability and safety, and reduced delay while not losing sight of system preservation and maintenance. Limited funding means that benefits must also be shared across a broad base of users. By embracing an assortment of measures NVCOG hopes to identify projects and problem areas that will benefit the greatest proportion of the community.

- Continue to support Bridge Maintenance
- Improve pavement condition across the region and state
- Promote solutions to improve incident management and the transfer of real time traffic information to improve reliability
- Where feasible and beneficial, selectively and strategically consider increasing roadway capacity
- Promote rideshare, public transit and telecommuting to reduce traffic volume and by extension delay
- Study Route 69 corridor from Waterbury to Wolcott for opportunities to improve reliability and reduce delay.

- Encourage motorists to leave their cars at home and improve safety by promoting complete street elements in the streetscape to better integrate pedestrians and cyclists in the roadway and protect their safety
- Improve safety with driver, pedestrian and cyclist safety training
- Improve roadway safety by coordinating with CTDOT to address high hazard areas

5.0 Public Transit Systems

The Naugatuck Valley planning region is well served by a range of public transportation options and choices, including local, fixed-route bus services, commuter rail, specialized paratransit services for the elderly and mobility impaired residents, and express bus services oriented to downtown Hartford that operate primarily during peak hours. In addition, CT*fastrak* routes extend to Bristol, Cheshire and Waterbury from New Britain to provide a connection to Hartford via the dedicated busway.

Local, fixed bus route services are operated by four primary operators:

- Three divisions of CT*transit* – Waterbury, Bristol-New Britain, and New Haven
- Greater Bridgeport Transit (GBT) Authority

Four express bus routes extend from the region to downtown Hartford; two beginning in downtown Waterbury, one from downtown Bristol and one from Cheshire. These routes take advantage of high speed connections afforded on regional expressways. Before the opening of the CT*fastrak* busway, these express routes would follow the expressways directly into downtown Hartford. Today, they access the busway in New Britain to complete the trip to Hartford. In addition, a limited-stop bus route was initiated in 2017 between Torrington and Waterbury with stops in Thomaston.

Paratransit services are offered to Waterbury area residents by the CT*transit* and Greater Waterbury Transit District (GWTD). The Valley Transit District (VTD) provides the complimentary ADA service to the lower Valley communities.

Commuter rail services are operated along the Waterbury branch of the New Haven main rail line by the Metro North Railroad under contract to the State of Connecticut, which owns the rail lines.

5.1 Fixed-Route Bus Systems

Within the Naugatuck Valley planning region, there are four local bus system operators:

- CT*transit*-Waterbury
- CT*transit*-New Haven
- CT*transit*-Bristol/New Britain
- Greater Bridgeport Transit (GBT)

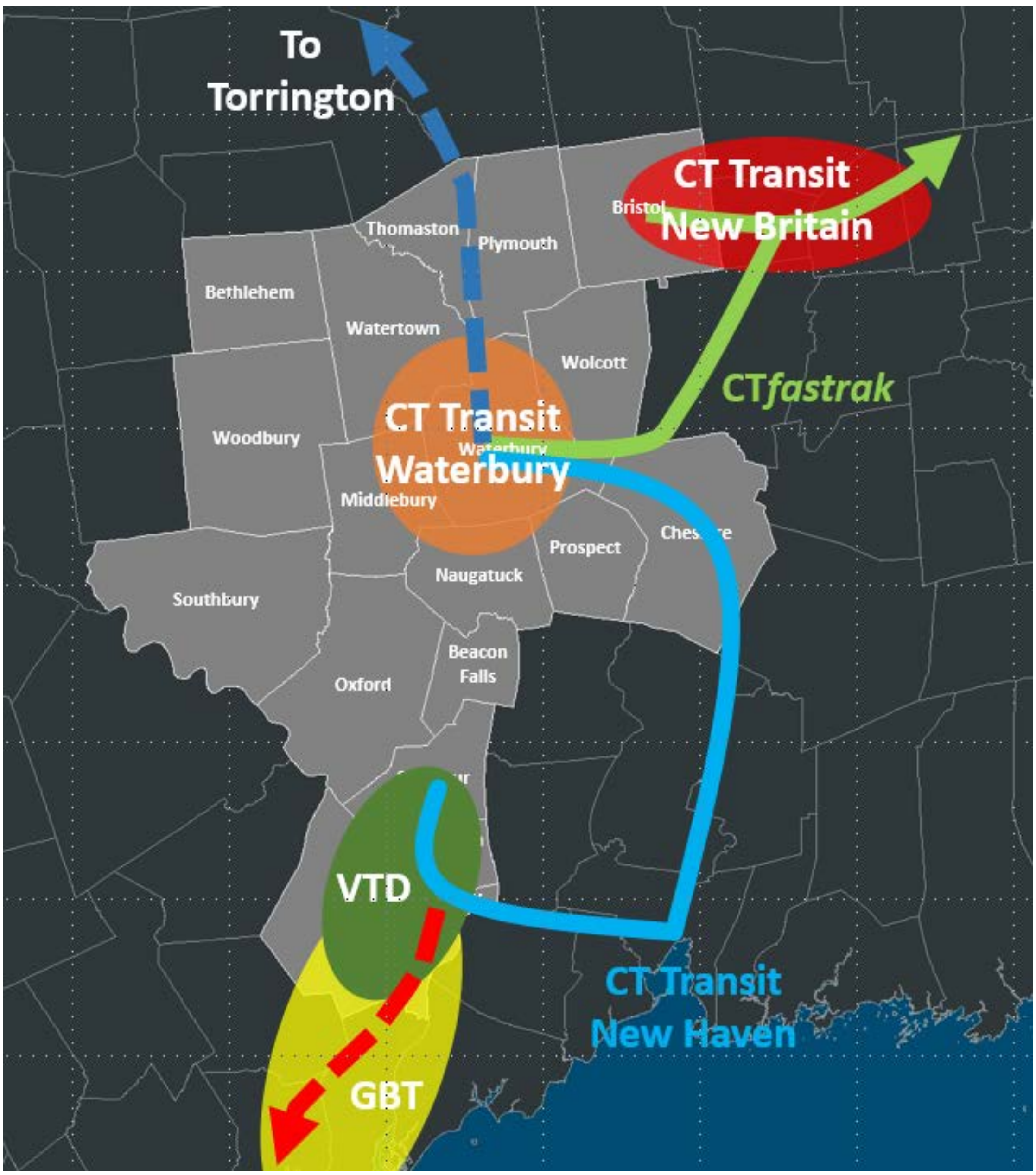
Three of these fixed-route bus systems are centered primarily outside of the region. Only the CT*transit*-Waterbury system provides coverage wholly within the region and is centered on Waterbury. CT*transit* -New Haven operates 21 local bus routes. The system operates using a radial system with most routes beginning and ending at the green in downtown New Haven, traveling outward from the city center on major roadways. Two routes extend into the region; one serving the lower Valley towns of Derby, Ansonia and Seymour and one connecting downtown New Haven to downtown Waterbury. CT*transit*-Bristol/New Britain operates 12 routes oriented toward downtown New Britain; however, three routes essentially provide local service within Bristol and one route connects downtown Bristol with downtown New Britain. The

GBT system operates primarily within greater Bridgeport area. Three routes extend in the lower Valley area, providing service to the corporate office districts in Shelton as well as the Derby-Shelton rail station. The express bus routes are operated by CT*transit*-Hartford.

Additionally, Waterbury and Southbury are served by private inter-city bus companies.

Although a substantial portion of the region is covered by local bus service, the operations are fragmented with gaps between the urban core areas. This results in extensive unserved and under-served areas. There are currently no connections between Waterbury and the lower Valley towns nor between Waterbury and Bristol.

Regional Local Bus Operations



CT*transit*-Waterbury

The CT*transit*-Waterbury Division is the third-fastest-growing fixed route bus system in the state, with a 68.7% increase in annual boardings between 2007 and 2014. The Waterbury system provides the most service in the region with 22 routes, plus three commuter-oriented “tripper” routes providing access to suburban employment opportunities. CT*transit*-Waterbury contracts with North East Transportation (NET) to operate the service. Service is provided seven days a week and generally operates from 6:00 AM to midnight on weekdays, 9:30 AM to midnight on Saturdays, and 9:30 AM to 5:00 PM on Sundays. The tripper[3] routes operate during the peak hours only in Waterbury and the surrounding communities.

In 2015 the system carried 2,721,399 passengers. During peak service 36 vehicles are in operation. Annual revenue miles are 1,102,218 and hours are 92,214. The passengers per revenue mile in 2015 was 2.5 and has been increasing since 2012 due to an overall increase in passengers. Since 2012 Waterbury has implemented several service changes including the addition of late night service and holiday service.

The system operates using a pulse (a timed transfer between multiple routes) at or near the Waterbury Green in downtown Waterbury. There are multiple bus stops located around and adjacent to the Waterbury Green on East Main Street for eastbound routes and on West Main Streets for westbound routes. Most routes pulse on the half hour or on the hour.

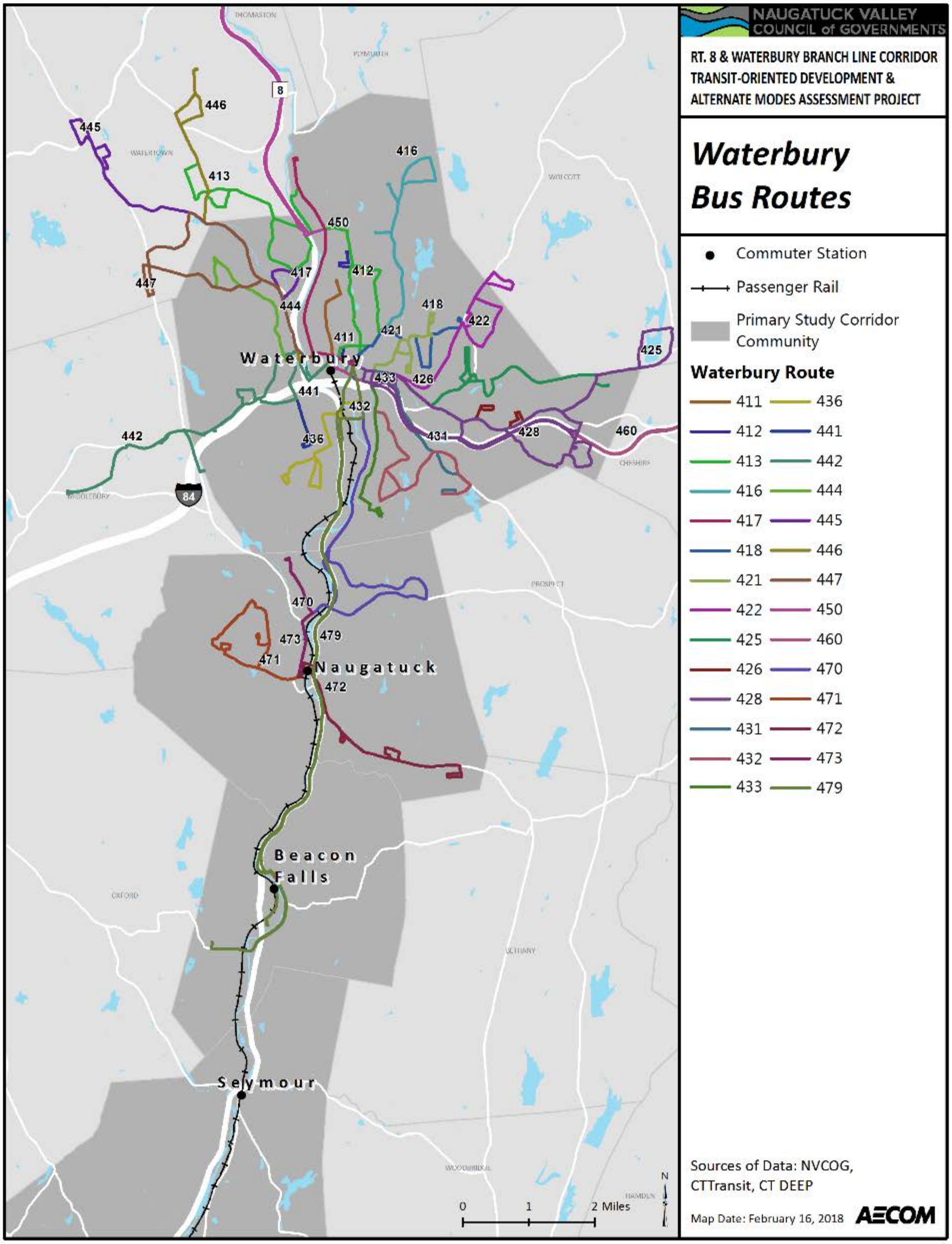
The CT*transit* -Waterbury network, despite its large coverage area, maintains excessive average headways of one hour on most non-tripper routes. The network also lacks rider amenities such as transit shelters and real-time bus tracking. The NVCOG is working closely with the City of Waterbury and NET to provide funding for improved rider amenities.

There have been several operational changes to service within the last five to six years including the addition of evening service and holiday service. In 2011 service was extended from 6:00 PM to midnight on many routes through a pilot program funded by area colleges with a UPass program. Holiday Service was implemented in 2015 with the introduction of CT*fastrak* on New Year’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas.

Recent capital improvements include a new maintenance facility and new fare system. The new maintenance facility is located at 761 Frost Bridge Road in Watertown, approximately a mile and a quarter away from the former facility. The new fareboxes include automatic vehicle location and automatic passenger counters.

In 2017, the NVCOG completed the *Waterbury Area Transit Study (WATS).* The study evaluated options for the location of the bus pulse point and opportunities for improved service within existing resources. The *WATS* also identified the costs of expanding the system to fully meet the needs of the residents of the service area, particularly with respect to providing high quality, acceptable frequency service.

[3] Tripper service means regularly scheduled mass transportation service which is open to the public, and which is designed or modified to accommodate the needs of school students and personnel, using various fare collections or subsidy systems. (49 CFR 605.3)


NAUGATUCK VALLEY
COUNCIL of GOVERNMENTS
RT. 8 & WATERBURY BRANCH LINE CORRIDOR
TRANSIT-ORIENTED DEVELOPMENT &
ALTERNATE MODES ASSESSMENT PROJECT
Waterbury
Bus Routes
Commuter Station
Passenger Rail
Primary Study Corridor Community
Waterbury Route
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Beacon Falls
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Sources of Data: NVCOG, CTTransit, CT DEEP
Map Date: February 16, 2018
AECOM

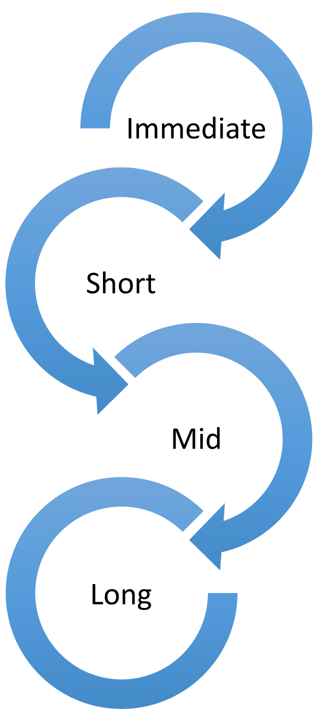
CT*transit* -Waterbury Routes

Route	Service Span (Days of the Week/Hours per Weekday)	Peak Headway (minutes)	Towns Served	End to End Travel Time (minutes)	Average Daily Ridership
411 Overlook	7/18	30	Waterbury	15	532
412 Hill St	7/18	30	Waterbury	15	282
413 Oakville	7/18	60	Waterbury, Watertown	30	601
416 Bucks Hill/North Main St	7/18	30	Waterbury	30	846
418 Long Hill Rd	7/18.5	30	Waterbury	15	284
421 Walnut St	7/18	60	Waterbury	15	268
422 Wolcott St	7/18	60	Waterbury	30	856
425 Hitchcock Lake	7/18	60	Waterbury, Wolcott	30	527
426 East Main St – Fairlawn/Meriline	5/12.5	60	Waterbury	60	592
428 East Main St – Scott Rd	7/10	50	Waterbury	20	318
431 East Mountain	5/12	60	Waterbury	15	58
432 Hopeville/Sylvan Ave	5/12	60	Waterbury	15	81
433 Hopeville/Baldwin St	7/18.5	30	Waterbury	15	649
436 Town Plot/Congress Ave	7/18.5	30	Waterbury	15	363
441 Town Plot/Highland Ave	**7/18**	**60**	**Waterbury**	**15**	**179**
442 Chase Parkway	**7/18**	**60**	**Waterbury, Middlebury**	**12-25**	**584**
444 Bunker Hill Ave	7/18	60	Waterbury	15	383
445 Watertown Ave	7/13	60	Waterbury, Watertown	30	332
450X Torrington	5/14	90	Waterbury, Torrington, Thomaston	45-70	**----**
471 Naugatuck/Millville	**5/7.5**	**80**	**Naugatuck**	**40**	**7**
472 Naugatuck/New Haven Rd	**5/7**	**80**	**Naugatuck**	**40**	**22**
473 Naugatuck/Spring St	**5/**	**80**	**Naugatuck**	**15**	----

479X Beacon Falls	**5/9.5**	**2 trips**	**Waterbury, Beacon Falls**	**25**	**127**
417 Thomaston Ave	6/12	30	Waterbury, Waterville	15-20	284
447X Watertown/Straits Turnpike	5/9.5	2 trips	Waterbury, Watertown	20	26
446X Watertown Industrial Park	5/9.5	2 trips	Waterbury, Watertown	20	42
470X Naugatuck Industrial Park	**5/9**	**3 trips**	**Waterbury, Naugatuck**	**30**	**83**
460X Cheshire Industrial Park	5/10.5	3.5 trips	Waterbury, Cheshire	25	69

It developed recommendations for immediate, short-term, mid-term and long-term modifications. Some of the actions are stand-alone and do not rely on changes made to other routes. However, many of the recommendations build upon each other and are dependent on the previous phase's actions being implemented. Short-term recommendations include restructuring the Naugatuck tripper routes, providing all-day service between Naugatuck and Waterbury, and improving on-time performances. Long-term recommendations included a potential commuter bus route from Waterbury to Shelton via Route 8. In order for the recommendations to be implemented, funding would need to be identified and CTDOT would be responsible for the implementation of service changes.

Waterbury Service Improvements for Corridor Communities



- Restructure the Naugatuck Routes to provide all day service
- Implement Lakewood Road (Waterbury) service
- Combine routes
- Reduce service on under-performing routes & eliminate low ridership deviations

- Rationalize routes
- Enhance weekend service

- Extend regular route structure
- Decrease headways
- Expand span of service

- Improve frequency in Naugatuck
- Add commuter routes
- Connect Greater Waterbury bus service with lower Valley area
- Consolidate CT*transit*-Waterbury with Valley Transit District

- New Route on Lakewood Road, Waterbury: Operate a new route along East Main Street, Wolcott Street and Lakewood Road, linking The Green to Waterbury Plaza on Chase

Avenue via Walmart and the Naugatuck Valley Shopping Center. The Wolcott Street-Lakewood Road Business Association identified this route as their highest priority service improvement in the Waterbury area. In addition to providing new access to the businesses on Lakewood Road as well as the Bergin Apartments, it would duplicate a substantial length of Route 422, solving the overcrowding problem on that route, and would help reduce strain on North Main Street routes.

- Provide Regular Service to Naugatuck: Bus service in Naugatuck consists of "Tripper" service between Waterbury and the Naugatuck Industrial Park and two local routes that remain within the town's borders. The bus service in Naugatuck would be reworked to provide full-day routes between Waterbury and Naugatuck. The existing local routes would be realigned to form the tail ends of a main trunk route that would serve and connect the Waterbury Green and Naugatuck Green.
- Improve Service on North Main Street Routes and to Town Plot Area, Waterbury: The current operations on the routes servicing these areas of Waterbury are unreliable and have difficulty meeting the timed pulse-point in downtown Waterbury. In order to improve the reliability of these routes, the cycle time needs to be lengthened to allow for round-trip running times greater than 30 minutes at certain times of day and some degree of recovery time. Without additional resources, this would result in longer headways, fewer trips, and more crowding; therefore, additional equipment would be placed in service to improve reliability, reduce overcrowding, and improve passenger convenience.
- Improve Service on Route 428 East Main Street – Scott Road, Waterbury: This route has the worst reliability of any route in CT*transit*-Waterbury system. Based on recent ride-checks, the average running time on the route was 49 minutes, compared to the schedule run time of 40 minutes. The route also offers poor level of service as much of its alignment is in a large loop, requiring passengers to ride in the opposite direction to return to their starting point. The proposed improvement would be to convert Route 428 to a bidirectional route over most of its length and complement service by changing other routes to more efficiently serve the area.
- Rationalize Various Routes, Waterbury: To improve efficiency and address underperforming routes, several routes need to be modified. Actions include combining, converting, and discontinuing routes, reducing service on some routes and eliminating little-used deviations.
- Enhance Weekend Service: Suggested enhancements include: starting Saturday operations earlier in the day, adjusting headways that better coincide with actual running times, and allocating additional equipment to improve headways.
- Improve Service Levels, System-wide: The peer analysis conducted as part of WATS determined the CT*transit*-Waterbury system operates a relatively small amount of service relative to its population and ridership. Its annual revenue hours per capita was much lower than peer systems, while its productivity was very high. The combination of poor levels of service and high productivity result in overcrowded routes and rider

inconvenience. To rectify the situation, levels of service would be addressed in several ways:

- Extend regular route structure to cover all evening hours of service, instead operating a reduced version.
- Expand the span of service to start earlier in the morning and run later in the evening. The largest impacts would occur on Saturdays and Sundays.
- Reduce headways on the more critical routes from up to 60 minutes to the range of 15-to-20 minutes.

- Expand Local Commuter Routes: Several commuter-oriented routes are operated in the CT*transit*-Waterbury district. These commuter routes run between downtown Waterbury and area industrial parks and are intended to help people get to jobs located in more suburban areas. Service is limited to morning and evening peak hours and offer limited-stops along the route. Expanding on the concept of access-to-jobs, two new commuter routes are suggested:
    - Waterbury to Bristol via Wolcott – the route would be aligned primarily along Route 69 and connect with CT*fastrak* Route 102 and an express bus route to Hartford.
    - Waterbury to Southington – the route would be aligned along Meriden Road, Route 322 and Route 10 to the center of Southington. This route could be operated as a limited stop or express route.
- Consolidate Local Fixed-Route Bus Service in the Naugatuck Valley Planning Region: The current delivery of local fixed-route bus services in Naugatuck Valley planning region is disconnected with multiple agencies and operators providing local bus services in different parts of the region. Despite the myriad transit services being provided, it is not possible to travel from one end of the region to the other by bus. To address the fragmental and disconnected bus operations in the Naugatuck Valley planning region, the CT*transit*-Waterbury district would be expanded to provide service to the entire region and consolidated with the Valley Transit District. The consolidated service would provide connections to the CT*transit*-Bristol/New Britain system.

CT*transit*-New Haven

CT*transit*-New Haven contracts with HNS Management to operate 21 local bus routes and two commuter shuttles in New Haven and the surrounding communities. Service is provided seven days a week and generally operates from 5:00 AM to 1:00 AM on weekdays and Saturdays, and 6:00 AM to midnight on Sundays. In 2014 the system carried 9,526,684 passengers. During peak service 97 vehicles are in operation. Annual revenue miles are 3,688,395 and hours are 333,660. The passenger per revenue mile statistic is 2.6.

The system operates using a radial system with most routes beginning and ending at the green in downtown New Haven and traveling outward from the city center on major roadways. Several routes are interlined at the green to provide crosstown connections and reduce running times but eliminating the need to turn around. Several of the routes operate along a main corridor and then branch out in outlying areas creating several deviations. Two of these routes continue into the Naugatuck Valley planning region.

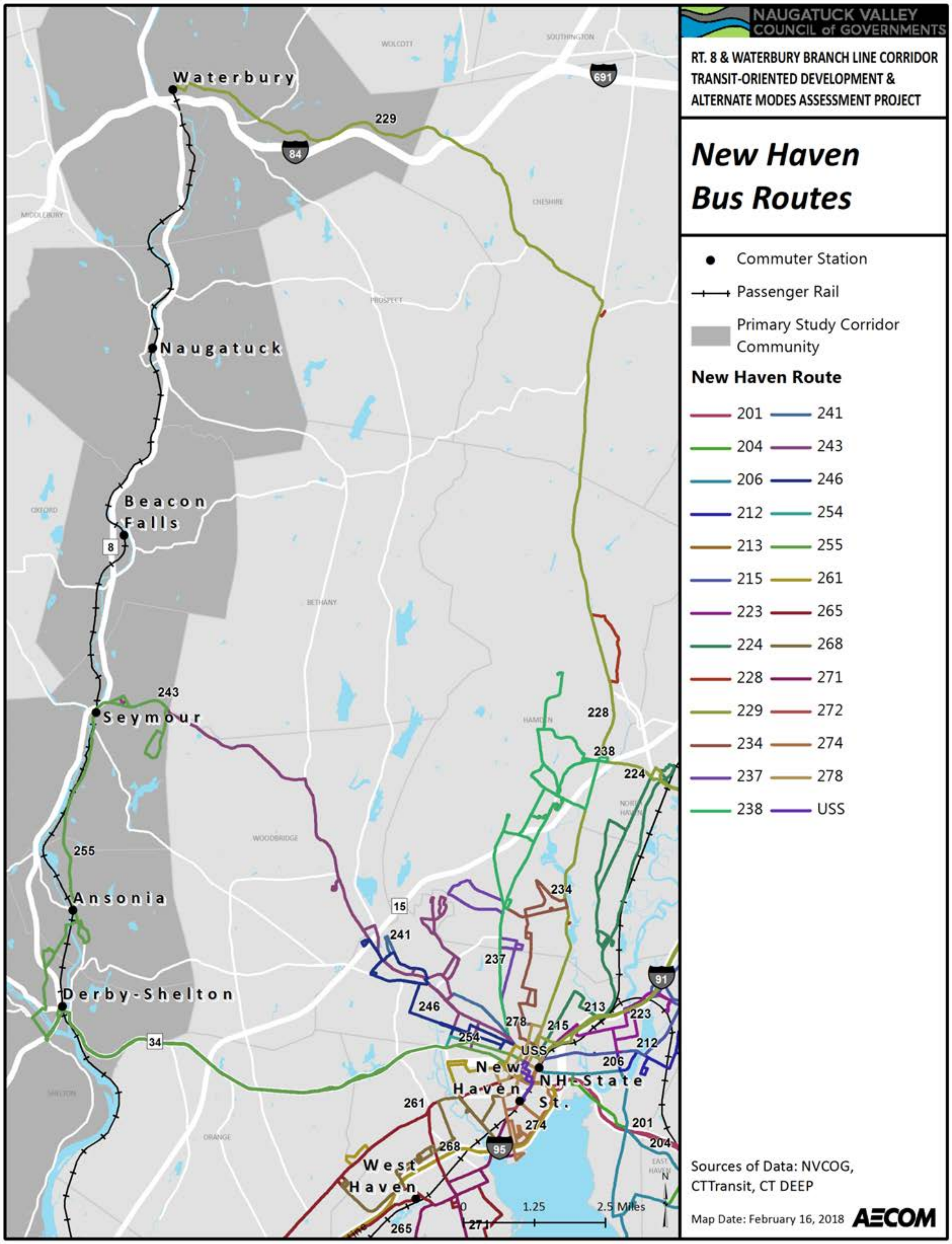
Route 229 extends from Union Station in New Haven to downtown Waterbury via Hamden and Cheshire. It travels along Whitney Avenue, Route 10, Route 68 and Route 70 to East Main Street in Waterbury before terminating at the Green. Route 229 operates Monday through Sunday, with 18 round trips daily. Peak hour headways are 30 minutes and a 60-minute headway is provided in the off-peak hours on weekdays. Saturday frequency is 60 minutes. Performance statistics show that Route 229 performs above the system average for the number of passengers per trip and the maximum load but below the system average for passengers per hour and passengers per mile. These data indicate that the bus trips carry a substantial number of passengers but they are traveling longer distances.

The first trip to Waterbury is at 5:15 AM and the last return trip is 8:05 PM. It travels through a mix of built up residential and commercial land uses as well as rural areas. For most of its length, Route 229 does not experience vehicle traffic congestion.

Route 255 extends from New Haven along Route 34 to serve downtown Shelton, Derby, Ansonia and Seymour. It has two deviations plus one express route, and connects with bus routes operated by the GBT and Waterbury branch line commuter rail service at the Derby-Shelton rail station. It travels through the downtown areas of Shelton, Ansonia and Seymour and provides connections with commuter rail stations in Ansonia and Seymour.

The route operates Monday through Saturday; there is no Sunday service. On weekdays, there are 16 round trips daily to Seymour with 30-minute headways during the peak periods and 60-minute in the off-peak timeframe. The Saturday frequency is 60 minutes. Route 255 performs above the average for the system based on the number of passengers per trip and the maximum load, but it performs below the system average for passengers per hour and passengers per mile. These measures indicate that passengers are traveling longer distances. It travels through a mix of built up residential and commercial land uses as well as more rural areas and experiences traffic congestion through downtown Shelton and along Route 34 in Derby.

In addition to the two routes described above, the CT*transit*-New Haven operates a part-time extension of Route 243 to Seymour via Whaley Avenue, Route 63 and Route 67. It passes through Woodbridge before terminating east of downtown Seymour at the terminus of Route 255. Two trips are made in the morning time period from New Haven each day Monday through Friday and one return trip is offered in the evening. At other times, connections can be made to Route 255. The extension does not operate on the weekend.


NAUGATUCK VALLEY COUNCIL of GOVERNMENTS
RT. 8 & WATERBURY BRANCH LINE CORRIDOR TRANSIT-ORIENTED DEVELOPMENT & ALTERNATE MODES ASSESSMENT PROJECT
New Haven Bus Routes
Commuter Station
Passenger Rail
Primary Study Corridor Community
New Haven Route
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213 255
215 261
223 265
224 268
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Derby-Shelton
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West Haven
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Sources of Data: NVCOG, CTTransit, CT DEEP
Map Date: February 16, 2018
AECOM

CT*transit*-New Haven conducted an alternatives analysis bus study called the "*Move New Haven Transit Mobility Study"* to develop and evaluate transit improvements for the Greater New Haven Region. The study's findings are still under review and are slated to be completed in 2019.

CT*transit*-New Haven Routes

Route	Service Span (Days of the Week/Hours per Weekday)	Peak Headway (minutes)	Towns Served	End to End Travel Time (minutes)	Average Daily Ridership
229 Waterbury/Whitney Avenue	7/16	30	New Haven, Hamden, Cheshire, Waterbury	73	2,139
255 Ansonia-Seymour	6/15.5	30	New Haven, West Haven, Orange, Shelton, Derby, Ansonia, Seymour	58	1,876

There have been very few capital improvements since the construction of the new maintenance and operations facility in 2010. The state is in the process of deploying technology upgrades to the entire CT*transit* fleet. In April 2017 real-time bus arrival information on the New Haven fleet was made available to smartphone holders. Other technologies being installed include automatic passenger counters, automatic annunciation, and centralized schedule data using Trapeze. CT*transit* is upgrading its fare system with contactless smartcard technology, fare capping, and mobile payments. New fareboxes have been installed on CT*transit*-New Haven buses. The new technology was deployed system wide and a mobile application is anticipated in the near future.

CT*transit* in New Haven is a leader in the state with equipment. In 2011 they were the first in Connecticut to begin operating hybrid diesel vehicles. That same year they became the first to operate 60-foot-articulated buses thereby increasing the capacity on core routes.

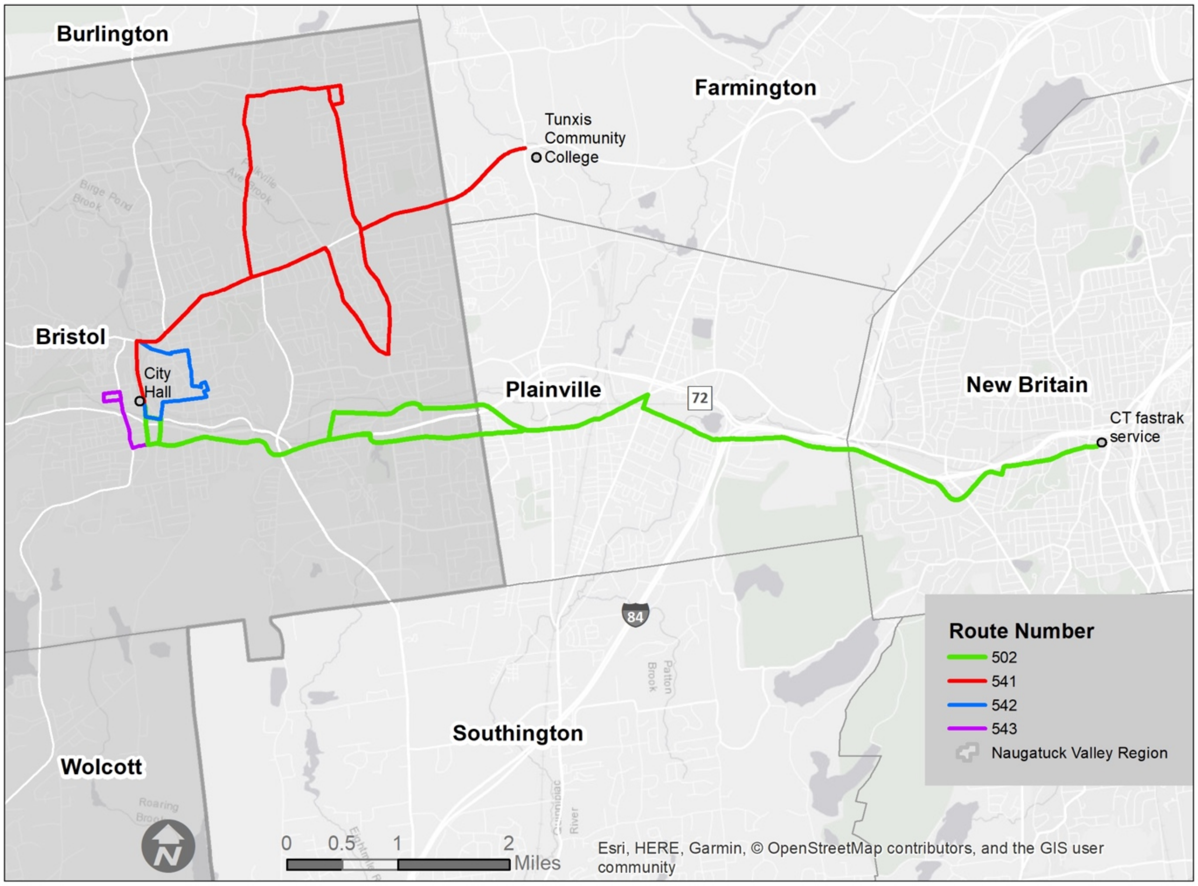
CT*transit*-Bristol/New Britain

CT*transit*-Bristol/New Britain Division provides fixed-route transit service to the towns of New Britain, Bristol, Plainville, and Berlin. Only the City of Bristol is located in the Naugatuck Valley planning region; the other three municipalities are located in Capitol planning region. The system operates 12 fixed bus routes. Some routes provide connections to CT*transit*'s Hartford and Meriden Divisions, as well as CT*fastrak* services and CT*transit* Commuter Express routes. Operations are contracted out by the CTDOT to the New Britain Transportation Company (NBT) and DATTCO.

Although the service is primarily oriented toward downtown New Britain, where riders can transfer to the CT*fastrak* service, three routes are basically local routes within Bristol. Route 541 connects downtown Bristol to the Tunxis Community College via Farmington Avenue. Transfers can be made at the college to Route 503, which continues through Plainville to downtown New

Britain. The other two local Bristol routes are relatively short loop runs wholly within the city; one serves Bristol Hospital from downtown and the other connects a residential area (Gaylord Towers) just west of downtown. All three Bristol routes begin and end at the Bristol City Hall. In addition, Route 502 connects downtown Bristol directly with downtown New Britain via Route 72 through Bristol and Plainville and Black Rock Avenue in New Britain.

CT*transit*-Bristol/New Britain System



Source: NVCOG

CT*transit*-Bristol/New Britain Routes

Route	Service Span (Days of the Week/Hours per Weekday)	Peak Headway (minutes)	Towns Served	End to End Travel Time (minutes)	Average Daily Ridership
502 Black Rock Avenue	**7/19.5**	**60**	**Bristol, Plainville, New Britain**	**38**	**221**
541 Bristol Local	**7/16.5**	**60**	**Bristol**	**27-30**	310
542 Bristol Hospital	**5/18**	**60**	**Bristol**	**16**	20
543 West Street	**7/16.5**	**60**	**Bristol**	**7**	63

The Capitol Region Council of Governments (CRCOG), in cooperation with CTDOT, conducted a comprehensive service assessment of the CT*transit* New Britain-Bristol division fixed-route bus operations ("New Britain-Bristol Division Comprehensive Service Analysis," prepared by Nelson Nygaard in association with AECOM, FHI and ASG Planning, May 2018). The assessment identified the strengths and weaknesses of existing services in the area and developed recommendations for improving transit services. It also addressed under-performing routes and service redundancies to make the system more efficient.

The key findings of the assessment related to service and fixed-routes in Bristol were:

- Circuitous Route Alignments: Several routes operate along indirect and meandering alignments, or in large one-way loops, rather than traveling along the most direct path. This increases travel time for riders and makes service inconvenient and difficult to understand. Route 541 operates primarily along Farmington Avenue with alternating service along Jerome Avenue, Stevens Street and Stafford Avenue to the north of Farmington Avenue and along Brook Street and Stafford Avenue south of Farmington Avenue.
- Inconsistent Alignments: Route 502 operates along two different roads on inbound and outbound trips for a two-mile segment of the route, resulting in a walking distance between reciprocal stops of a third of a mile or more.
- Duplicative Service: Route 502 operates along nearly the same alignment as Route 102 (part of the CT*fastrak* service), but with much lower service frequency. In addition, on many trips, Route 502 departs soon before or after Route 102, creating additional redundancy along the same corridor without effectively increasing the level of service.
- Poor Service Frequency: Route 541 operates hourly service, but serves each of the two variants (north and south of Farmington Avenue) on alternate trips, which means that riders on each variant only have two-hour service frequency.

- Inconsistent Branding: Route 542 Bristol Hospital is currently interlined with CT*fastrak* Route 102, creating a situation where the route is served by both CT*transit* vehicles and CT*fastrak* vehicles depending upon the trip. Since different equipment is used on the route, riders may become confused by the service. It also dilutes the CT*fastrak* brand by using premium vehicles on a short, low-ridership route.

To improve operations and service in Bristol, the CRCOG assessment recommended the following actions:

- Route 502 Black Rock Avenue: This route provides bi-directional service between New Britain and Bristol. However, the route has relatively low ridership and its productivity in terms of passengers per hour is below the average for the system. While the route alignment is fairly direct, it is split through the eastern side of Bristol where the route is aligned along East Main Street and Broad Street in the direction towards New Britain and along Pine Street heading toward Bristol. This pattern results in reciprocal stops to be offset a third of a mile or more.

  Actions: Relocate and realign the route along Farmington Avenue and operate between Bristol City Hall, the Tunxis Community College in Farmington and downtown New Britain. Its current service along South Street and Pine Street would be accommodated by the Ct*fastrak* Route 102.

- Route 541 Bristol Local: This route provides service between Bristol City Hall and the Tunxis Community College in Farmington. The service operates with two route variants, one breaking off to the north of Farmington Avenue and one serving areas to the south of Farmington Avenue. The route performs slightly better than the system average carrying 18.4 passengers per revenue hour. It has strong terminus points at each end of the route and serves several shopping centers along the route. However, the deviations add to the route length and travel time without generating substantial ridership.

  Actions: Simplify the route alignment and provide more direct service by eliminating the current southern deviation. To compensate for the elimination of the Brook Street deviation, the route would be extended along Stafford Avenue to the Bristol Senior Center.

- Route 542 Bristol Hospital: This route provides local circulation in Bristol between the downtown area and Bristol Hospital. It operates in one way, clockwise direction from City Hall. The route is the poorest performing route in the system, on average carrying only 3.5 passengers per revenue hour, compared to the division average of 16.8 passengers per hour.

  Actions: Reconfigure the route alignment by eliminating the short loop service and extending the route into and through eastern Bristol via West Street and West Queen Street in Southington. The route would continue along Route 10 to provide service to Plainville and ending at the Connecticut Commons retail center.

- Route 543 Bristol Local: This route provides local service in Bristol along a short alignment between City Hall and the Gaylord Towers, a subsidized senior housing complex in Bristol's west end neighborhood. The route carries about 16.6 passengers per hour, slightly lower than the system average of 16.8 passengers per revenue hour. The majority of riders board or get off the bus at either end of the route. Because of its short length, passengers need to connect and transfer to another bus in downtown Bristol to travel farther.

Actions: Discontinue the route. Service would be accommodated by extending Route 541 to serve Gaylord Towers and by providing direct service from Gaylord Towers to shopping centers along Farmington Avenue, as well as to the Bristol Senior Center.

CT*fastrak*

CT*fastrak* is the first bus rapid transit system in Connecticut. The service features a 9.4-mile dedicated guideway for buses between the downtown New Britain bus station and Hartford, a heavily congested corridor in central Connecticut. In downtown Hartford, buses circulate through downtown on city streets. Several CT*fastrak*-branded bus routes extend from New Britain station and provided limited stop service. In addition, commuter express bus route use the CT*fastrak* busway between New Britain and Hartford.

The dedicated busway has ten BRT stations that provide amenities more common with commuter rail stations. Buses are uniquely branded as CT*fastrak* service and stations are located along the busway.

One CT*fastrak*-branded bus route operates within the Naugatuck Valley planning region: Route 102. This routes extends from the New Britain CT*fastrak* station to downtown Bristol. It operates from downtown Bristol along South Street, Pine Street and Route 72. Limited stops are provided and the route operates as a non-stop, express bus along the divided section of Route 72 through East Bristol and the expressway section of Route 72 from the Connecticut Commons in Plainville to New Britain.

CT*transit* Express Bus Services

CT*transit*-Hartford Division operates 25 express bus routes to Hartford from throughout the state. These routes operate primarily along interstate and other expressways and make limited number of stops, usually at state-designated park-and-ride lots. Four express bus routes operate from cities and towns in the Naugatuck Valley planning region:

- Route 923 – Bristol Express: Operates from downtown Bristol along South Main Street and Pine Street with limited stops and then operates non-stop on Route 72 to the CT*fastrak* station in New Britain. It continues along the busway to downtown Hartford.
- Route 924 – Southington/Cheshire Express: Operates from the commuter parking lot at I-691 and Route 10 in Cheshire along Route 10 to I-84 in Southington. It continues non-stop on I-84 and Route 72 to the CT*fastrak* station in New Britain. From New Britain, the route operates on the busway to downtown Hartford.
- Route 925 – Waterbury Express: Operates from the Waterbury rail station and through downtown Waterbury with limited stops and then operates non-stop on I-84 to the park and ride lot at I-84 and Route 70 in Cheshire. It continues along I-84 and Route 72 to the CT*fastrak* station in New Britain. From New Britain, the route operates on the busway to downtown Hartford.

- <u>Route 928 – Southington/Cheshire/Waterbury Express</u>: Operates from the Waterbury rail station and through downtown Waterbury with limited stops and then operates non-stop on I-84 to the park and ride lot at I-691 and then along Route 10 to the park and ride lot at Route 10 and I-84. It continues along I-84 and Route 72 to the CT*fastrak* station in New Britain. From New Britain, the route operates on the busway to downtown Hartford.

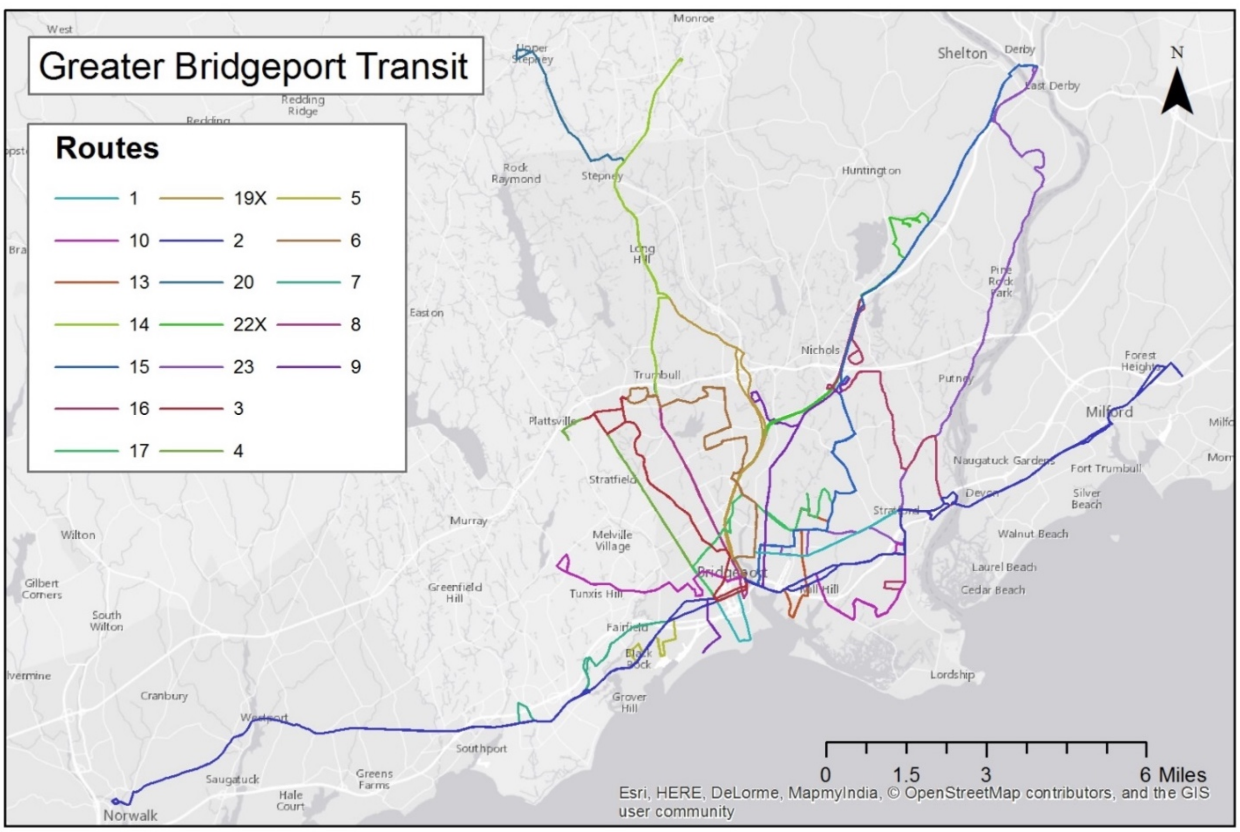
To provide additional commuter express service to Bristol, either Route 925 or 928 would be adjusted to operate along Route 229 from I-84 to provide a connection to larger employers, especially Amazon and ESPN, in Bristol. The route would make limited stops along Route 229 and continue non-stop along Route 72 to the CT*fastrak* station in New Britain.

Greater Bridgeport Transit

The Greater Bridgeport Transit Authority (GBT) operates 17 local bus routes, two express routes, and the interregional Coastal Link in Bridgeport and surrounding communities of Fairfield, Stratford and Trumbull. The system is radial with most routes beginning and ending at the Bridgeport Transit Center. A time pulse-point is operated on the hour and the half hour to allow for transfers. Service is provided seven days a week and generally operates 5:30 AM to 11:30 PM on weekdays, 5:00 AM to 11:30 PM on Saturdays, and 8:00 AM to 8:00 PM on Sundays.

The downtown Bridgeport bus terminal has 17 bus bays, a 3,000 square foot in-door waiting area, heated shelters on the platform, and real time information signs. Real-time schedule information is available online through their bus tracker.

Greater Bridgeport Transit System



While not officially members of the GBT, three routes extend into and serve the cities of Derby and Shelton. Route 15 is aligned through the East Side of Bridgeport and Stratford to the Hawley Lane Mall in Trumbull. From the mall, it runs along Route 8 for a short distance and then along Bridgeport Avenue through Shelton. It terminates at the Derby-Shelton rail station, providing a connection to commuter rail service operated on the Waterbury branch line and CT*transit*-New Haven Route 255. Route 22X is an express bus route between downtown Bridgeport and the Shelton corporate office area. It operates along Route 8 to Shelton and then along Bridgeport Avenue. A loop is made through the corporate office parks located on Trapp Falls Road, Research Drive and Commerce Drive. This route provides only three morning and three evening runs on a 60-minute headway. Travel time between downtown Bridgeport and the Shelton Corporate Park is about 28 minutes. The route is oriented towards downtown Bridgeport and does not continue to downtown Shelton, downtown Derby or the Derby-Shelton rail station. The third GBT route serving the lower Valley is Route 23. It traverses the Bridgeport South End and the length of Stratford along Route 113 and Route 110. In Shelton it provides access to the corporate office parks located along Constitution Boulevard. It continues to the Derby-Shelton rail station via Route 8.

GBT Routes Operating in the NVCOG Planning Region

Route	Service Span (Days of the Week/Hours per Weekday)	Peak Headway (minutes)	Towns Served	End to End Travel Time (minutes)	Average Daily Ridership
Route 15 - Hawley Lane/Shelton/Derby	7/15.75	60	Bridgeport, Stratford, Trumbull, Shelton, Derby	54	1071
Route 22X - Downtown Shelton via Route 8	5/11.75	3.5 Trips/day	Bridgeport, Trumbull, Shelton	37	N/A
Route 23 - Shelton via Rt. 110	5/13.5	60	Derby, Shelton, Stratford, Bridgeport	45	393

The GBT has a long range transit plan that provides a blueprint for the next 10 years, but due to reduction of funding at the state level it may take longer for recommendations to be implemented. As a result of the reduction in state investment in bus operations, the GBT has had to reduce service on several routes and may be forced to make additional scheduling and routing adjustments.

The NVCOG is working on an assessment of possible alternate transportation modes to better serve the Route 8 and Waterbury branch rail line corridors (www.rt8corridorstudy.com). A key focus area of the study is to investigate transit enhancements to the Bridgeport Avenue corporate corridor in Shelton. The corridor is home to a mix of corporate office parks, retail centers and higher density residential developments, including a recently completed high-rise complex. About 11,000 people work within the corridor, with roughly 17% traveling from the Naugatuck Valley area. Because of the limited transit options, commuters are auto-dependent.

Currently, the GBT Route 22X provides express service between the Bridgeport Transit Center (BTC) in downtown Bridgeport and the Shelton Business Park. The service currently operates only during the morning and afternoon peak periods, operating with three trips in the morning and four in the afternoon. The route is oriented toward downtown Bridgeport with service providing a connection from Bridgeport to the Shelton Corporate Park in the morning and the reverse commute in the evening. A 60-minute headway is provided with the first morning trip leaving the BTC at 6:35 am. The route runs along the Route 8 Expressway from Downtown Bridgeport to exit 11, where it continues service along Bridgeport Avenue.

To improve connections and access along Bridgeport Avenue, service and operations on GBT Route 22X would be enhanced by continuing the current routing north to the Derby/Shelton Station, thereby, providing a contiguous route between the BTC and the Derby/Shelton Station. The connection from the Shelton Corporate Park area would operate either along Bridgeport Avenue, through Downtown Shelton to the Derby/Shelton Station or on Route 8. In either option, the buses would operate in general travel lanes. To attain good travel times and institute a service similar to a BRT system, the number of total stops would be limited. This service would facilitate both southbound and northbound trips. The current GBT Route 22X service is more conducive for those traveling north in the morning and south in the evening. Additional buses would be operated to permit the same levels of service in each direction. Separate southbound service would be operated simultaneously with the northbound operations, instead of the current structure, whereby the northbound bus reverses its direction and operates as the southbound bus. Adding buses to the route will permit more frequent service and shorter headways. The major advantage to this style of system is that it would only require route definition and asset allocation to implement.

Bus Rapid Transit System

As part of the alternate transportation assessment, a longer term vision for enhanced bus service along the Route 8 corridor is being considered. This option involves the development and implementation of a Bus Rapid Transit (BRT) system between Derby/Shelton rail station to the Bridgeport station. While commuter rail service is provided on the Waterbury branch line between these stations, the line is located on the east side of the Housatonic River and trains must merge onto the main New Haven rail line. This alignment limits the number and frequency of trains that can be operated and increases travel times.

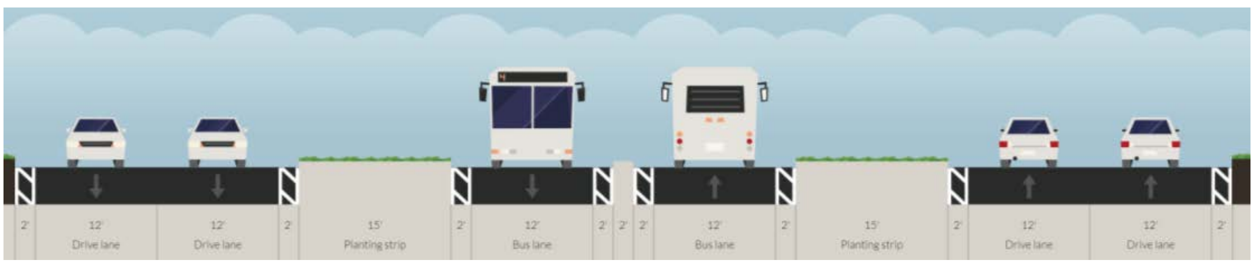
A BRT would provide a more frequent and direct connection between the Naugatuck Valley and downtown Bridgeport, as well as provide a high quality transit service to the office and industrial parks located along Route 8. The BRT system options address and focus on travel between the Derby/Shelton station and downtown Bridgeport and opportunities to provide better and more attractive public transit service along the Bridgeport Avenue corporate, commercial, retail and residential corridor. The existing bus services are limited, operating at 60-minute headways and either providing only peak period service or operating all day with long travel times. The BRT concepts would provide improved and extended service, shorter headways and shorter travel times.

Five alternate BRT systems are being considered:

- <u>Median Running BRT</u>: This type of BRT system consists of a wholly separated facility running down the center of Route 8. The proposal is to construct a busway within the center right-of-way of Route 8. Unlike the shoulder running system, no adjustments would be made to the shoulder area of the highway. Instead, a new, dedicated busway would be constructed. This system will largely eliminate conflicts with merging traffic and roadway congestion. Access to and from the busway would be via grade-separated ramps that connect to an adjacent station stop or local roads.

  The recommended width of the busway is 16 feet. The unobstructed vertical clearance over a busway is a minimum 15.5 feet with a preferred clearance of 16.5 feet. For a bi-directional, two lane busway, a raised separator should be installed. This would result in typical cross section width of 34 feet.

  Median Running-way BRT Cross Section



  Route 8 south of the Commodore Hull Bridge is a combination of an older section built in the 1960s and newer sections completed in the early 1980s. The advantage of the newer section, approximately from the underpass of Constitution Boulevard to the merge with Route 25, is that the median ranges between approximately 65 feet and over 100 feet, more than sufficient space to accommodate a two-lane, bi-directional busway. The constrained section is from the Commodore Hull Bridge to the Constitution Boulevard underpass, a distance of just under one mile (±0.91 miles). The northbound and southbound travel lanes are separated by a "Jersey" style barrier; no median is provided.

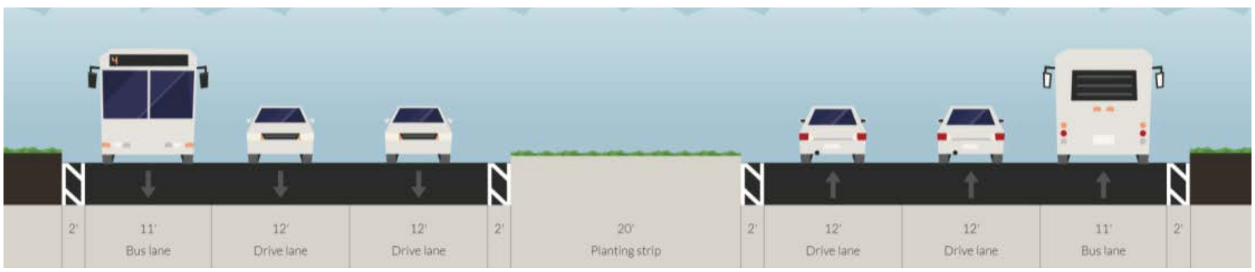
  BRT buses would travel along the separated facility for about 6.5 miles where the facility would end and merge into the overlap section of Route 8/25. At that point, BRT buses would use the general travel lanes and exit the expressway at exit 3 (Main Street) in Bridgeport. Local streets would be used to travel to the Bridgeport Transit Center, the terminus of the BRT route and transfer point to local bus service operated by the GBT and commuter rail service operated along the New Haven main line.

  The median running BRT system would function more similar to a rail system and stations would be located directly along the busway or in close proximity. Strategically located transit hubs could be built to provide a convenient station with circulator shuttles utilized to bring riders to and from their final destinations.

- <u>Shoulder Running BRT</u>: This type of BRT system would operate within and along the outside shoulder of Route 8. In this case, the right hand shoulder would be designated as a bus only lane. The BRT would operate in an express fashion with a very limited number of stops located in close proximity to the bus lane. The intent is to maximize travel speeds and minimize delays caused by station stops and off-route diversions. The BRT would function similar to the GBT Route 22X Enhanced, as described above, except it would operate on dedicated bus only lanes, as opposed to operating in the general purpose travel lanes. The bus only lane, typically referred to as a “reserved bus lane” or “bus on shoulders,” would afford the buses an opportunity to bypass congestion and maintain a free-flow speed.

The major concern with a shoulder-running BRT is the shoulder width. Along some sections, the BRT might have to travel within the general purpose travel lanes, which would expose the buses to the same level of congestion as experienced by general traffic. When it exits Route 8, it would operate along Bridgeport Avenue and merge into general traffic and use more traditional bus stops.

Shoulder Running-way BRT Cross Section



- Enhanced GBT Route 22X Express Bus Service: While the goal of the alternate transit modes assessment is to promote increased operations along the Waterbury branch line, including minimum 30-minute headways during the peak hours, and acquisition of new equipment, short term transit options within the corridor continue to be limited. A critical area that has limited transit options is the Bridgeport Avenue corridor in Shelton. GBT operates local and express service to the corridor, but existing express bus service is oriented to downtown Bridgeport and the local service operates along local roads and with run times not conducive to commuters. To address current deficiencies, the current operations of the express bus service would be extended. The service would be extended to the Derby/Shelton Train Station to provide a connection from the Waterbury Branch Line to the corporate office corridor. In addition, headways would be reduced to 30 minutes and service would be provide in both the southbound as well as the northbound directions.
- Derby to Waterbury Express Bus Service: While the goal of the alternate transit modes assessment is to promote increased operations along the Waterbury branch line, including minimum 30-minute headways during the peak hours, and acquisition of new equipment, short term transit options within the corridor continue to be limited. To address the lack of service, an express bus service, operated along Route 8, could be implemented to serve the WBL trains stations. The service would supplement existing rail service and operate at times between scheduled rail times. Currently, the WBL trains

operate at 2½-hour headways. The new express buses would operate every 30 minutes during the gaps between train departures. The service would provide greater choice for travelers and greater confidence that a public transit mode would be available to make a trip at a desired time.

- Full BRT System on Bridgeport Avenue: Service under this concept would connect the Bridgeport Transit Center and the Derby/Shelton Train Station using several paths: bus lanes along Bridgeport Avenue, operations within mixed traffic on Route 8 with the potential for shoulder or median running BRT in select locations, and on local roads with signal treatments to create mixed-use lanes. The BRT lane would be an exclusive on-street BRT lane and could either be center running or curbside. It is anticipated that service would operate with 20 minute headways during the peak and 45 minutes headways in the off peak. One-way travel time between the terminal stations is anticipated to be 30-34 minutes. There would be six stops/stations; the existing Derby/Shelton Train Station, a new transit hub in downtown Shelton, the Shelton Business Park, Trumbull Corporate Park, Lake Success and the proposed Barnum Station.

Intercity Private Buses

The privately operated intercity bus operators and routes are listed below:

- Peter Pan 2017: Boston-Hartford-New Haven-Waterbury-NYC
- Peter Pan 2018: Greenfield-Amherst-Northampton-Springfield-Hartford-New Haven-Waterbury-New York
- Peter Pan 2036: Providence-Mansfield-Storrs-Hartford-Waterbury-NYC
- Peter Pan 2042: Williamstown MA to NYC via Canaan, Winsted, Torrington, Waterbury, Southbury, Danbury

5.2 Dial-a-Ride and Paratransit Services

The Naugatuck Valley planning region benefits from several transit districts operating throughout the region. Transit districts may be formed at any time under Chapter 103a of the General Statues of Connecticut. Under state statute, a transit district is a civil division of the state for purposes of governmental administration and a legal entity. Transit districts are formed to provide public transportation for a municipality or group of municipalities. Within this framework there is a great amount of flexibility as to where and what services the district choses to provide.

In this section, this report will cover all para-transit services available throughout the planning region, including the four NVCOG municipalities that are included in the GBVMPO for informational and broader planning purposes.

Complementary ADA Paratransit Service

The federal Americans with Disabilities Act of 1990 (ADA) requires operators of regular fixed-route bus services to provide complementary paratransit services to persons that are unable to use the regular bus services. This complimentary service is available to all certified ADA eligible residents that have origins and destinations within ¾ of a mile of a local fixed route.

Within the region a number of transit services are available for individuals who, because of their disability, are unable to travel on the fixed route public transit service. This section reviews the complementary services provided for elderly and disabled rides for each of the region's fixed route transit systems and transit districts.

The Greater Waterbury Transit District (GWTD) was formed under Chapter 103a of the General Statues of Connecticut with the expressed purpose of providing service for elderly and disabled residents. The district comprises Cheshire, Middlebury, Naugatuck, Prospect, Southbury, Thomaston, Waterbury, Watertown, and Wolcott. The GWTD provides "non-ADA paratransit" services and dial-a-ride services for its member communities.

North East Transportation (NET) operates the complementary ADA paratransit program linked to the CT*transit*-Waterbury fixed-route service. Responsibilities include screening and interviewing ADA eligible clients, scheduling trips, filing complaints, and operating and maintaining the ADA fleet of vehicles. Capital stock is owned by CT*transit*. Additionally, NET provides paratransit service to Gaylord Hospital in Wallingford with FTA New Freedom funding.

The Valley Transit District (VTD) is one of the few transit districts in the state that was incorporated by special act (SA 71.71). It comprises four communities: Ansonia, Derby, Seymour and Shelton. The special act grants the VTD all the same powers afforded under Chapter 103a of the general statutes. The GBT and CT*transit*-New Haven operate fixed-route bus services in the lower Valley communities. The District operates the complementary ADA services for these routes, mirroring the fixed route services, Monday through Friday. However, the Greater New Haven Transit District (GNHTD) and the GBTA must operate the complementary ADA service on the weekends to meet ADA requirements.

The VTD responsibilities include interviewing and certifying ADA eligible clients, scheduling trips, filing complaints, and operating and maintaining the ADA fleet of vehicles. It also coordinates with GNHTD and NET to provide inter-district trips. In both cases VTD will provide the outgoing trip and the rider must coordinate with the relevant partner district to schedule the return trip.

The NVCOG is the direct recipient for funding from the Federal Transit Administration for capital and planning projects within the lower Valley area. As such, the NVCOG owns all the capital equipment and rolling stock for the VTD, while the VTD is the operator for the transit district. VTD operates fourteen handicapped accessible minivans.

The VTD also operates free shuttle buses from Derby/Shelton rail station to job centers along Bridgeport Avenue. This service is funded under the FTA's Jobs Access Reverse Commute (JARC) program.

The Greater Hartford Transit District (GHTD) is a quasi-municipal corporation operating under the authority of Chapter 103a of the Connecticut General Statutes. The District has broad powers to acquire, operate, finance, plan, develop, maintain and otherwise provide all forms of land transportation and related services including the development or renewal of transportation centers and parking facilities. While not a member of the District, the city of Bristol is provided with the complimentary ADA service by the GHTD, under contract to the CTDOT. The GHTD contracts with First Transit, a private operator, for the provision of its consolidated service. The service provides over 500,000 passenger trips annually.

The fare for complementary ADA services is $3.50 per trip for all of the transit districts operating within the region. Rides must be scheduled one day in advance and the hours of operation mirror local fixed route service in order to comply with the ADA.

Non-ADA Paratransit Service

In addition to the required complimentary ADA paratransit services, expanded paratransit services are provided within the GWTD. These services are referred to as "non-ADA paratransit dial-a-ride service" to differentiate it from the services required by the ADA.

The GWTD provides the non-ADA service to all municipalities within its district regardless of local fixed route services. The same rider eligibility requirements as ADA-paratransit apply, but the services are available for origins and destinations beyond the ¾-mile service buffer stipulated for the complimentary ADA service. While the service area is expanded, hours of operation mirror the complementary ADA service. The NET operates the non-ADA paratransit dial-a-ride program for GWTD. Operation and certification for this program is conducted jointly with the complimentary ADA service. Buses are also shared by clients of both programs.

The fare paid by non-ADA riders depends on municipal and state subsidies. Municipalities have the option to contribute $1.75 per trip, triggering a $1.75 state match. If the municipality makes the $1.75 contribution the rider will pay $3.50 a trip. However, if the municipality decides not to contribute $1.75 per trip, the cost for the passenger is $7.00 per trip. Rides must be scheduled one day in advance.

Dial-A-Ride Service

The VTD operates a dial-a-ride service Monday through Friday, 6:00 am to 5:30 pm. The program is operated independently from the complementary ADA service, because the two programs have different funding sources. This service is available for both the general public and elderly and disabled riders. However, the fare for the general public is $4.50 per trip. ADA-eligible riders and those using the service to commute to work or to travel to a medical appointment pay $3.50 per trip. Reservations must be made one day in advance.

The town of Southbury operates a dial-a-ride program that provides trips throughout the GWTD region. This service is funded through the FTA New Freedom (NFI) program.

Municipal Grant Program

The Municipal Grant Program (MGP) provides matching state funds to expand elderly and disabled transit services within a municipality. To receive funding a municipality must demonstrate that it is either already providing services or contracting to provide services of or above the value of the grant allocation.

Within the GWTD each municipality is operating a local bus for seniors and disabled residents. The municipality may or may not charge a fare to riders for this service. They use their expenditures on this local service as a match for the grant, then assign their portion to the GWTD who contracts with NET to provide a district-wide dial-a-ride service. Riders are not charged a fare for the service provided by the GWTD.

Under the MGP, NET operates two buses a day and provides service to each municipality at least one day a week. The NET takes reservations for Naugatuck, and Waterbury, and the local senior centers in Cheshire, Middlebury, Prospect, Watertown, and Wolcott take reservations for their residents and forward them onto NET for scheduling.

While service is limited, this current set-up has been favored in the past for two reason:

- Outside of the GWTD most towns limit this type of service to their municipal borders, whereas, the GWTD offers trips within an eight-town region.
- There is flexibility to move unused resources around the region. If a member town does not fully book its designated service hours, riders from other towns are able to book rides for the unused hours. Waterbury residents often get hours on days beyond their official days. Reservations are first come first serve and can be made during the week prior to the municipality's day of service.

GWTD Free Dial-a-Ride

	Monday	Tuesday	Wednesday	Thursday	Friday
Bus 1	Waterbury	Naugatuck	Thomaston[4]	Prospect	Wolcott
Bus 2	Waterbury	Watertown	Waterbury	Middlebury	Cheshire

The VTD is the local provider of most elderly and disabled transit services. As such, member municipalities generally do not operate extensive municipal bus services. Member towns have allocated their respective MGP allocations to the VTD to expand its the existing service and provide certain rides free of charge during all hours of operation. Municipal dues are used as a match for the MGP.

The remaining municipalities within the Naugatuck Valley planning region use the MGP funds to match existing local funding and expand the paratransit services they are able to offer. The following municipalities currently receive and use MGP funds directly:

- Bethlehem
- Bristol
- Oxford
- Plymouth
- Southbury
- Thomaston
- Woodbury

Locally-Funded Municipal Programs

Each municipality within the region provides a variety of services for their residents, often overseen by a local senior center. For an exhaustive list of services available, the Kennedy Center has compiled a guidebook available on their website (www.thekennedycenterinc.org/what-we-do/programs-services/mobility-services/mobility-management-project.html). Additionally, the

[4]This bus was discontinued January 1, 2019

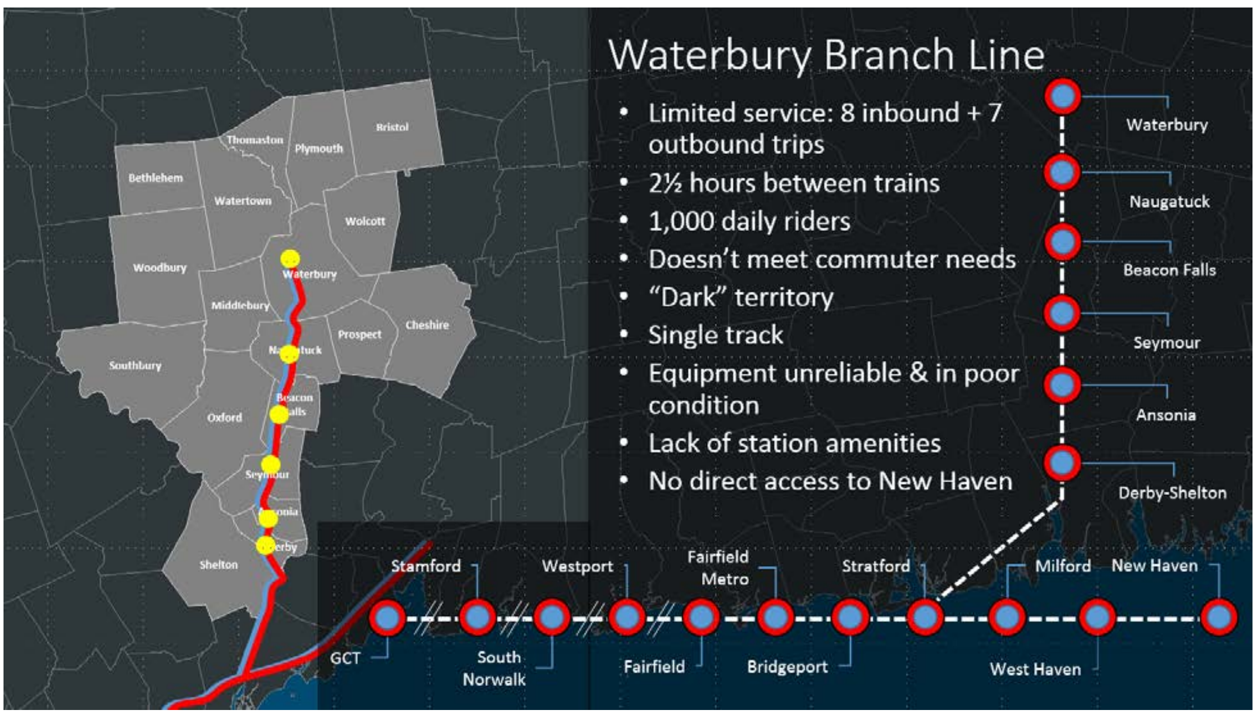
Connecticut United Way operates a 211 number that residents throughout region may call for information about how they may be able to find transportation in their community.

Actions

While the region benefits from various levels of transit services available to residents who are not able to use the fixed route system, it also proves to be complicated for riders. The United Way and Kennedy Center have helped consolidate resources, but the opportunity to consolidate services provided into fewer transit districts should be explored in a regional transit consolidation study.

5.3 Commuter Rail

Commuter rail service through the Naugatuck Valley region is operated over the Waterbury branch rail line (WBL) of the New Haven main rail line (NHML). The NHML and its branch lines are owned by the State of Connecticut. The Metro-North Railroad (MNR) operates commuter rail service along the NHML and its branch lines under a service agreement with Connecticut Department of Transportation. The agreement also requires MNR to maintain the right-of-way, maintenance facilities and equipment.



Passenger rail service on the WBL dates back to 1849. Service was originally provided by the Naugatuck Railroad later purchased by the New York, New Haven & Hartford Railroad (NYNH&H) in 1885. In 1969 the NYNH&H went bankrupt and merged into Penn Central Transportation. The new entity declared bankruptcy one year later and the New York Metropolitan Authority (MTA) and State of Connecticut began subsidizing the New Haven line and its branches. In 1976 Conrail was formed to operate the service, but by 1983 Conrail became a non-financially viable operation. With the passage of the Northeast Rail Service Act in 1981, MTA and CTDOT formed the Metro-North Commuter Railroad.

The NHML runs between New Haven and Grand Central Terminal in New York City. Three branch lines feed into the NHML:

- New Canaan branch rail line between New Canaan and Stamford – four stations along its 7.9 mile section.
- Danbury branch rail line between Danbury and the South Norwalk rail station in Norwalk – seven stations along its 24.2 mile section.
- Waterbury branch rail line (WBL) between Waterbury and Bridgeport – six stations along its 27.1 mile section.

The WBL is the longest of the three branch lines and connects with the main line at the Devon wye. Connecting service to Stamford and New York City is available at the Bridgeport station. While daily service is offered on the WBL, frequency and quality of service is constrained by the existing infrastructure.

The WBL is maintained at FRA Class 3 track standards. This classification limits speeds on the line to a maximum of 59 mph. The line consists of an unsignalized, non-electrified single track with no passing sidings. Because of the lack of signals, the WBL is considered "dark" territory. These physical characteristics limit and constrain the level of service provided on the line as northbound and southbound trains are unable to pass one another, and, since the WBL is "dark," multiple trains and cannot operate simultaneously on the line. The most frequent service that can be operated on the WBL is about every two hours in each direction.

While the Waterbury stop is the end of the passenger line, tracks extend beyond the WBL and are used by freight service. The Naugatuck Railroad Company operates sightseeing tourist trains over the Torrington Branch that extends from the end of the WBL to Torrington, as well as limited freight service. In addition, the Central Connecticut Line, the common collective name of the 24.3-mile section freight rail line that runs between Waterbury and Berlin, splits from the Torrington Branch a short distance north of the WBL. The line is owned and operated by the Pan Am Southern (PAS) Railway. The PAS also owns yard and tracks adjacent to the Waterbury commuter rail station.

The CTDOT has committed to the design and installation of a Central Traffic Control (CTC) system along the WBL (in design) and construction of by-pass sidings along four sections of track – north of the Devon wye, Derby, Beacon Falls and south of Waterbury. Full signalization, in conjunction with installing Positive Train Control, is expected to be implemented by the end of 2019 and will allow for communication to occur whereby opposing trains can safely divert and communicate with each other on the line. The signal system, which would be controlled by rail traffic controllers at the existing Grand Central Terminal (GTC) Dispatch Center, would allow two trains heading in the same direction to operate on the branch at the same time. The passing sidings would be fully integrated with the signal system to allow trains to enter and exit the sidings seamlessly. These projects will permit more frequent service and allow trains to operate on the line simultaneously in opposite directions.

Service

In 1976 there were only eight trains daily (four in each direction), this increased to twelve by 1993. Today the WBL passenger train schedule consists of 15 weekday trains between Waterbury and Bridgeport. There are eight northbound and seven southbound trains daily Monday through Friday. With the exception of one AM peak train, service to Stamford requires a transfer at the Bridgeport rail station. Travel to any other NHML stations, including east towards New Haven, also requires a transfer at Bridgeport. Three WBL trains stop at Stratford; one inbound morning train and two outbound trains. One morning peak hour train provides through service to Stamford.

The first train in the morning departs Waterbury at 5:44 am with a second trips scheduled to leave at 6:42 am. These two southbound morning peak trains arrive at Stamford at 7:14 am and 8:21 am, and at GCT at 8:08 am and 9:12 am. The remaining service throughout the day and evening operates on approximately two and a half headways. In the evening, northbound peak service consists of two WBL Bound trains: 4:42 pm and 6:53 pm departures from GCT with arrivals in Waterbury at 6:59 pm and 9:26 pm. A missed connection in the evening causes a rider a substantial travel time delay.

One fewer train in each direction is operated on Saturdays, Sundays and Holidays. The service starts later and ends earlier on the weekend.

A weekday trip between Waterbury and GCT takes an average of two hours and 31 minutes in both directions. A trip between Waterbury and Bridgeport takes an average of 55 minutes. Since 1976 the travel time has actually increased slightly as more service and stops were added to the main line. The one-way travel time between Waterbury and GCT has increased nine minutes since 1976. The transfer wait time in Bridgeport adds between three and ten minutes on weekdays and five and seven minutes on weekends. If a transfer is missed heading towards Waterbury, there is a three hour wait for the next train.

Because the WBL is currently unsignalized, the maximum speed allowed by FRA regulations is 59 mph. However, there are speed restrictions along several sections because of track condition and at-grade crossings. The lack of signals also limits the amount of service that can be provided as only one train set can be on the tracks at a time. The slowest speeds occur through the Devon wye. Trains can travel at only 10 mph. The segment with the greatest average speed is between the Devon Wye and Derby-Shelton station, because it is the longest segment, allowing the train to operate at maximum speeds over a longer length of Class 3 tracks.

Equipment

Since the WBL is not electrified, service is operated by diesel-powered locomotives. The train set also consists of three coaches. The equipment is shared with the Danbury branch line. Only three train sets are available for the two lines, with two operated on the WBL. The FRA regulations require diesel equipment to be inspected each day. The rail yards at Stamford and

New Haven are the only ones available to inspect, fuel and maintain the equipment. Currently all WBL locomotives, coaches, and cab cars are stored at the Stamford yard. This necessitates the deadheading of trainsets between Stamford and Waterbury each morning before revenue service can start. The equipment returns to Stamford after the last train arrives at Waterbury.

In the event of equipment mechanical issues, planned outages or issues on the WBL, bussing is instituted. While the MTA relies on the CT*transit*-New Haven division to provide bus service as needed, unplanned outages can strain their ability to meet service requirements. Communication issues have been reported between MTA and CT*transit*-New Haven resulting in last minute needs and/or unneeded busses. Alternate bus service is currently required on average between three and five times a month. However, there have been improvements to reduce the number of outages in rail service and the corresponding need to provide bus service.

Infrastructure

The WBL consists of a single track over its 27-mile stretch. There are numerous crossings, including 19 road over passes and 16 at grade crossings. The WBL crosses over 15 features: nine public roads and six river crossings. In addition, approximately 51 below-grade structures existing along the WBL. These include culverts, pipes and other underground structures. The at-grade crossings of public roads have signs, lights and gates to protect crossing traffic when activated. However, the private road crossings are either unprotected or only have signs installed. In either case, there are no active warning systems in place.

There are 16 interlockings along the WBL that provide connections to rail spurs, sidings or other rail lines. Six of these interlockings are active and the remaining ten are inactive. Of the six active interlocks, one provides a connection to a siding in Devon and three provide access to spurs to O&G Industries, Hubbard Hall, and Kerrite. WBL connects to two other rail lines using a wye. The Devon Wye provides access to the New Haven Main Line tracks and is operable in both the northbound and southbound directions. The Maybrook Line connects to the WBL at the Derby Wye. The line is currently inactive, but it could be reactivated at any time. The Maybrook Line is owned by the Housatonic Railroad Company with trackage rights granted to P&W. In 2010 the 12-mile segment of track between Botsford and Derby was taken out of service.

Stations

In addition to Waterbury, the WBL has stops at Naugatuck, Beacon Falls, Seymour, Ansonia, and Derby-Shelton. The condition of the stations is generally poor and passenger amenities are limited. There are no dedicated station buildings at any of the stations for ticket offices or passenger waiting areas; tickets must be purchased in advanced or on the trail. All stations feature only low-level platforms, lack canopies and have only small, three-sided, bus-style shelters to protect passengers from poor weather conditions. The exception to these features is the Waterbury rail station, which has a short (about 125 feet), high-level platform and canopy. The shelters are generally in poor condition, with evidence of attempts to remove graffiti. Platforms are in need of re-painting or re-staining, and there is evidence of rust on railings.

Waterbury

The Waterbury rail station is located near the City's downtown area on the west side of Meadow Street. It consists of a short, high level platform, canopy, two shelters and a parking lot. Ramps provide accessibility from the parking area to the platform. It is adjacent to the old Union Station, which is now owned and occupied by the Republican-American newspaper. The station is easily accessible from I-84 and Route 8, as well as main city streets. Two express bus routes and two local bus routes connect at the Waterbury rail station. The express bus routes link to the CT*fastrak* in New Britain, while one of the local bus routes provides limited stop service to Torrington. Parking is located adjacent to and south of the platform. There are no ticket vending machines installed at the station, but an information kiosk displays static bus and train information and trash and recyclable bins are in place at the station. Access and parking were improved several years ago with the demolition of the SNET building that essentially blocked the view of the platform and parking lot from Meadow Street. Despite this, passengers continue to experience frequent vehicle break-ins and express concerns about security of the parking. Plans are in design to reconstruct the parking lot that will pave the area, define parking spaces, designate pedestrian paths and enhance security and visibility. The CTDOT is also exploring the possibility of converting a portion of the old Union Station into a climate-controlled, indoor passenger waiting area.

Naugatuck

The Naugatuck rail station is located on Water Street and is two blocks from the downtown area and adjacent to the former Naugatuck station building now being used as a restaurant. Route 8 is located on the opposite side of the Naugatuck River from the station, but provides good access to the area via the Maple Street Bridge. It consists of a small, low-level platform with a single, open sided shelter. Parking is limited, not defined and sometimes in conflict with spaces designated for the restaurant. There are no defined walks or paths to the platform. Bus service is not provided to the station. The Borough of Naugatuck has been working with the CTDOT on plans to relocate the station a short distance to the south as part of a redevelopment effort. The new location would better accommodate commuter parking.

Beacon Falls

The Beacon Falls station is located on Railroad Avenue across the Naugatuck River from the downtown area, a relatively short distance (less than 1,000 feet). However, a walk over the Depot Street Bridge is required and there is a perception that the station is separate from the downtown. The station is easily accessible from Route 8. It consists of a low-level platform, a ramp, stairs and shelter. The parking lot is paved and spaces well marked. Three spaces are designated for handicapped parking. Amenities are few with only trash and recycle bins provided and bicycle racks installed; no ticket vending machines, information kiosk or benches are available. The station is not accessible by local bus service.

Seymour

The Seymour rail station is located on Main Street (Route 115) in the heart of downtown Seymour. The station consists of a low-level platform and a shelter. The shelter is unique among the WBL stations in that it is a brick structure with windows and sufficient roof overhang to protect patrons from the elements. Two-hour parking for commuters is available in front of the station, but much of the area is reserved for patrons to local businesses. Additional commuter parking can be found in nearby mixed-use parking lots. However, commuter rail parking is not readily identified and difficult to find. Access to the station is directly from Main Street, with connections to and from Route 8 nearby. However, wayfinding signage is limited and could easily be missed amid the normal sign clutter found in an urban environment. Passenger amenities are limited and no ticket vending machine is available. One local bus route serves the station; operated by the New Haven division of CT*transit*. It connects the lower Valley towns with New Haven. The Town of Seymour is working on a long term plan to relocate the station from its constrained downtown location to an area north of the downtown as part of a TOD development.

Ansonia

The Ansonia rail station is located on West Main Street in downtown Ansonia, one block from Main Street (Route 115) and along the east bank of the Naugatuck River. The station is not readily accessible from Route 8. Storefronts line the street east of the station and flood control walls line the opposite side of the tracks. Between the flood control wall and the tracks is an abandoned roadway. Weeds have overtaken the old pavement. The boarding area consists of bituminous pavement and a low-level wooden platform. A wooden canopy covers the boarding area. Three Plexiglas glass shelters line the boarding and provide some protection for passengers. Several shrubs are planted along the backside of the shelters and partially obscure them from the street. Sidewalks connect the downtown Ansonia area and the station. Commuter parking is available just south of the station. Passenger amenities are limited and no ticket vending machine is available. One local bus route passes through the Ansonia downtown area and serves the station. It is operated by the New Haven division of CTTransit and connects the lower Valley towns with New Haven.

Derby-Shelton

The Derby-Shelton rail station is located on the eastern edge of downtown Derby and is within walking distance of downtown Shelton, which is about a quarter-mile from the station. It is easily accessible from Route 8 and Route 34. The station is also referred to as the Derby-Shelton Multi-Modal Center (DSMMC) because of the local bus transfer point located at the station. Multi-modal connections are made to fixed-route bus service operated by the Greater Bridgeport Transit Authority – Route 15 and Route 23 – and CT*transit*-New Haven division – Route 255. The administrative offices and maintenance facility of the VTD are located on the same site as the station. A relatively large parking lot, with space for about 75 vehicles, is available at the station. No fee is required to park at the station. In addition, a canopy covers the low-level platform. The only passenger shelter is a small, unheated Plexiglas shelter. The station building was constructed in 1903 by the New York, New Haven & Hartford Railroad (New Haven Railroad), necessitated by the relocation of tracks of the former New Haven & Derby Line through Derby, and subsequent effort to double-track the line. It is a rectangular-plan brick building capped by an asphalt shingle-clad hipped roof. The interior floor plan featured a large central waiting room with a ticket office, restrooms, and a fireplace. Although the building no longer functions as a train station, the building retains many of its unique historical features and qualities and appears to be historically and architecturally significant as an example of an early-19th century New Haven Railroad station. The Derby Greenway section of the Naugatuck Valley River Greenway is located on the east side the WBL from the DSMMC. However, there is not a well-defined connection between the station and the greenway. Currently, travelers need to exit the station site and walk along the existing sidewalk on the north side of Route 34, cross the on-ramp to Route 8 northbound and follow a short access driveway before reaching the greenway.

While the station functions adequately, passenger amenities are minimal. The existing shelter provides only minimal protection from the elements, as it is open on one side. While a station gateway sign has been installed at the entrance to the area, signage directing users to the station and parking is minimal. No ticket-vending kiosk is available and train and bus information is limited. Although trash receptacles have been installed, there is track-level trash and litter. A standard bicycle rack has also been installed.

Ridership

The NVCOG conducted an on-board ridership count and intercept survey on all WBL trains over a three-day period in the fall of 2017. A team of two staff rode every train and counted the number of people who boarded and alighted at each station stop. Based on the count, there were 511 riders who boarded an inbound train and 503 passengers who boarded an outbound train, resulting an estimated daily ridership of 1,114 passengers.

An objective of the on-board count was to determine where passengers were boarding a WBL train and at which station they were getting off the train. There are six stations along the WBL. Not unexpectedly, the majority of passengers get on in Waterbury. About 61% of all people using the WBL board a train in Waterbury. The next most frequent boarding station is Naugatuck with 13.5% of the total, followed by Ansonia with 9.0% of the boardings and Derby-Shelton at 8.8%.

On-Board Ridership Count: Inbound Trains

Station	ON	OFF	Percent Boarding	Percent Alighting
Waterbury	311	---	60.9%	---
Naugatuck	69	16	13.5%	3.1%
Beacon Falls	17	4	3.3%	0.8%
Seymour	23	16	4.5%	3.1%
Ansonia	46	23	9.0%	4.5%
Derby-Shelton	45	21	8.8%	4.1%
Stratford	---	23	---	4.5%
Bridgeport	---	408	---	79.8%
Total	511	511	100.0%	100.0%

In terms of where riders typical alight a WBL train, the expectation is that most riders use the train to make a longer distance trip, either getting off in Bridgeport, the defined end of the WBL, or making a connection with a NHML train at Bridgeport to travel farther west. Intermediate travel between Waterbury and Bridgeport is not viewed as a major component of WBL service.

Nearly 80% of the riders travel to Bridgeport and an additional 4.5% get off in Stratford, where transfer to a main line train may be more convenient. The remaining passengers, about 15.7%, use the train to travel to points between the Waterbury and Bridgeport.

Most passengers returning to the area board the WBL train at Bridgeport and travel to Waterbury. Nearly 85% of all passengers board at Bridgeport or Stratford and over 60% travel all the way to Waterbury. Intermediate boardings are similar to inbound trends, accounting for the same 15.7% of the total.

On-Board Ridership Count: Outbound Trains

Station	ON	OFF	Percent Boarding	Percent Alighting
Bridgeport	424	---	84.3%	---
Stratford	3	1	0.6%	0.2%
Derby-Shelton	25	39	5.0%	7.8%
Ansonia	14	35	2.8%	7.0%
Seymour	15	34	3.0%	6.8%
Beacon Falls	4	10	0.8%	2.0%
Naugatuck	23	79	3.6%	15.7%
Waterbury	---	305	---	60.6%
Total	503	503	100.0%	100.0%

Passenger On-Board Survey

The NVCOG conducted an on-board passenger survey at the same time as the ridership count. The key objectives of the intercept survey were to confirm origins and destinations of riders and determine general opinions about the service of WBL trains. A good response was achieved as overall 35.5% of the riders completed the survey. The vast majority of the WBL riders live in one of the station host communities or nearby. About 69.4% of the passengers indicated they live in a municipality along the WBL and another 7.1% live in another Naugatuck Valley planning region community. The remaining riders listed a wide range of municipalities. The most frequently listed city of those from outside the area was New York City; 8.7% of the respondents indicated they live in one of the boroughs of New York City. Bridgeport was listed by 5.2% of the riders.

Unless a rider's destination is at Stratford, Bridgeport or Stamford, passengers are required to transfer to a main line train to reach their final destination. Of the total respondents, 55.2% indicated that they planned to transfer between a WBL and NHML train. Almost all of the passengers who transfer make the transfer at Bridgeport (89.7%). The two most common destination stations were Stamford and GCT. About 42.7% of inbound passengers who transfer indicated that their final destination was either Harlem 125th Street (6.8%) or GCT 35.9%. Stamford was indicated as the final stop by 18.8% of the riders. The outbound statistics were similar as 47.3% indicated New York City (GCT Harlem 125th Street) as their starting point and 23.1% listed Stamford. It is interesting to note that 16.2% of the inbound riders that made a transfer listed a station west of Stamford as the final destination. This trip requires a transfer to a local train at Stamford.

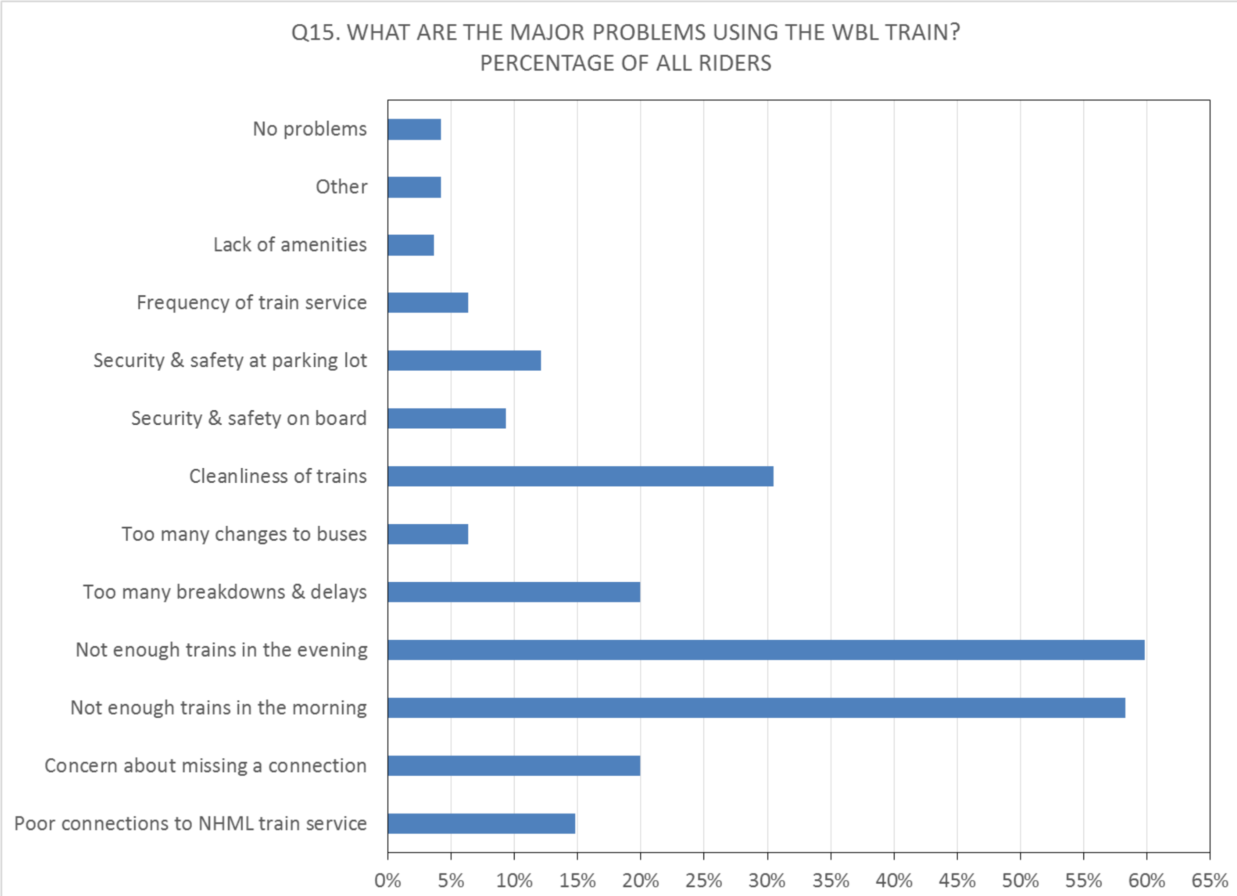
Problems and issues with the WBL service have been well documented at various public forums and news report. The on-board passenger survey intended to probe the issues and asked passengers to identify the major problems they feel affect the quality and convenience of riding the train and may influence their decision to use it more often.

Almost all respondents (91.9%) chose to the answer this question and 77.0% indicated more than one problem or issue. Only 4.2% of the passenger indicated that they were satisfied with the current service and operation and stated they had no problems.

A number of the identified problems and issues related to the frequency of service on the WBL. These included:

- Poor connection to NHML trains
- Insufficient number of trains available in either the morning or evening time periods
- Concerns with missing a connection

About 60% of the riders felt that there are not enough trains being operated in the morning and evening periods. While the lack of service is clearly an issue, concerns with making connections with NHML trains was less an issue. Only 14.8% listed poor connections to main line service as a problem and 19.9% indicated concern about missing a connection as an issue. Other concerns addressed the lack of amenities on-board the trains, on the platforms and in the parking lots, as well as the general cleanliness of the rail cars. The cleanliness on board the trains, especially the restroom facilities, was listed by 30.5% of the passengers. The lack of handicapped accessibility along the WBL was mentioned by several passengers.

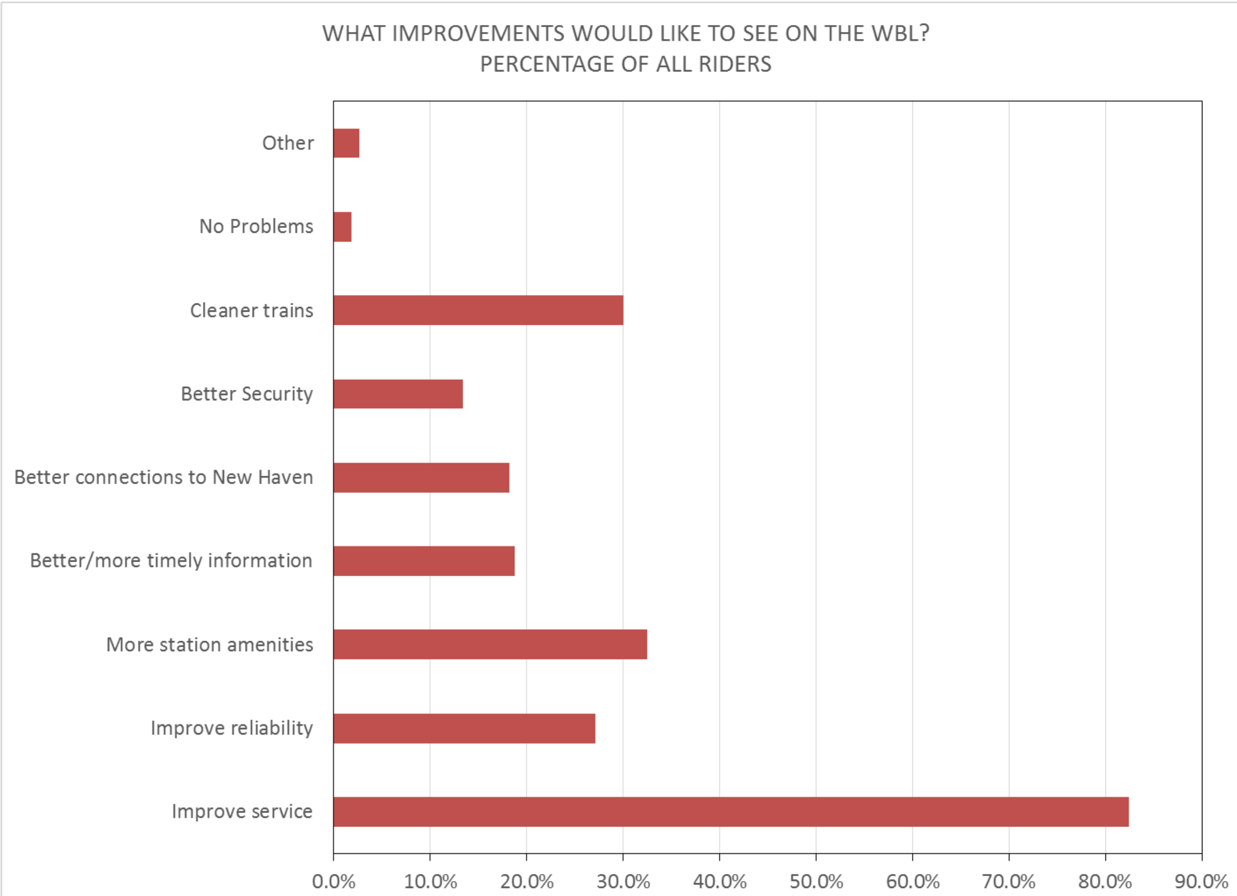


To address these problems, passengers overwhelmingly (82.4%) support *"improving service"* by adding more trains. Some suggestions include providing express service to Bridgeport, extending more trains to Stamford and making more stops at Stratford. Along with adding more trains, passengers indicated a need to improve reliability (27.1%) and make better connections to NHML trains (18.2%). Providing more and better amenities at the WBL stations was the second most listed improvement, listed by 32.4% of the riders. This category includes installing ticket machines, better shelters, benches and ADA ramps at the stations and providing Wi-fi and charging outlets on the trains. Cleaner rail cars was identified by 30.1% of the passenger and better traveler information was identified as a service improvement by 18.8% of the passengers.

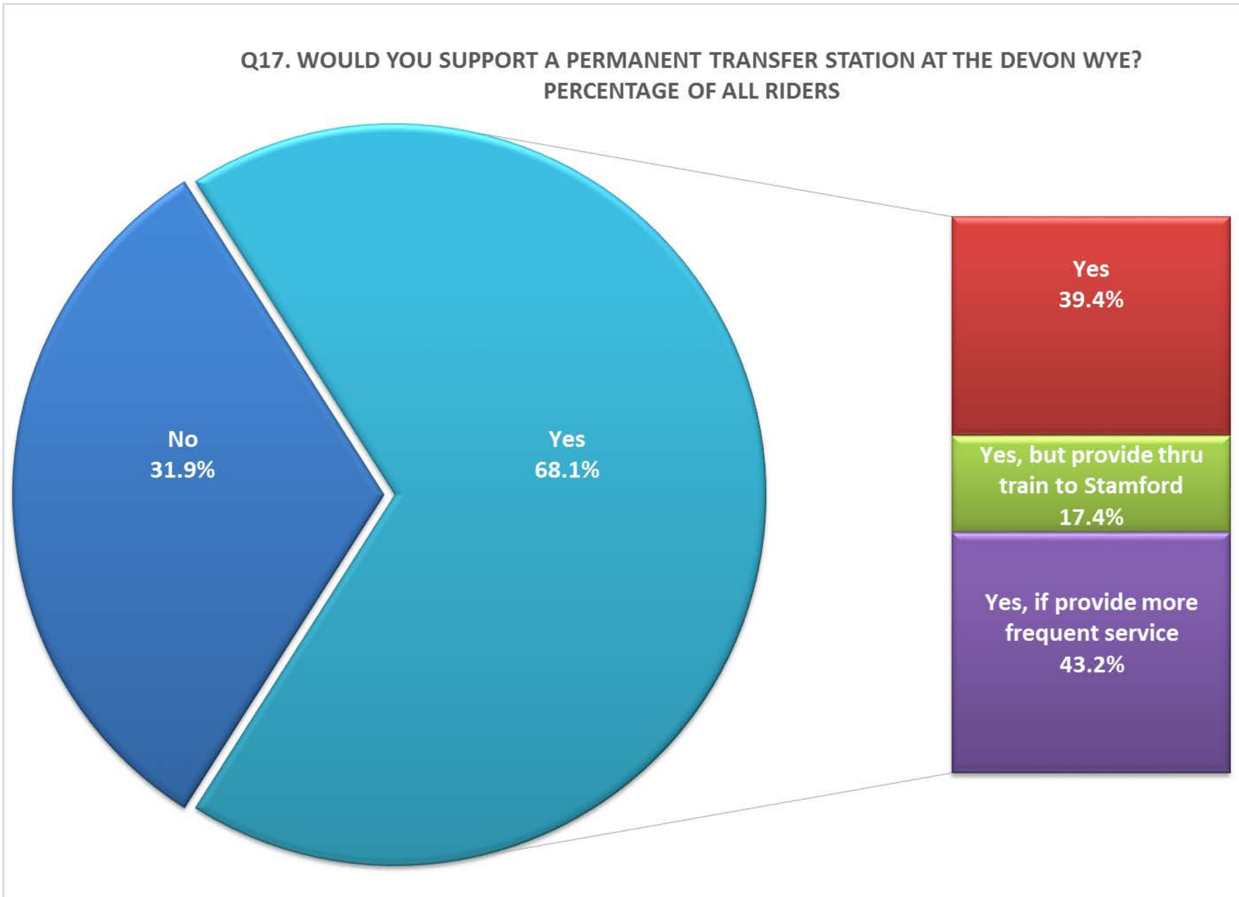
Passengers were also polled about support or opposition of a transfer station at the Devon Wye. A temporary transfer was installed during on-going track work and this question assessed riders' willingness to accept a permanent transfer station to enhance and facilitate connections to NHML trains and service.

One of the constraints limiting additional service on the WBL is the lack of capacity to accommodate additional trains on the main line. Even if additional trains were operated on the WBL, the number would be limited because of the limited number of additional slots available on the main line. As an alternative, additional service on the WBL could be in the form of a shuttle-type service with cross-platform connections to and from the WBL and NHML trains at

Devon. This approach would allow expansion of the service on the WBL without the need to address the capacity issue on the main line.



Previous rider comments have suggested there is dissatisfaction with the need to make transfers from the WBL to main line trains to complete a trip. Passengers enjoy through or "one seat" ride service to Bridgeport and Stamford and the "one seat" ride concept is attractive to commuters. Overall, 68.1% of the respondents indicated that they would support the concept of a permanent transfer station located at the Devon wye. Of this group, about 39.4% indicated general support without any conditions, whereas 60.6% of the respondents conditioned their support with the need to provide more frequent service or continue to provide through service to Stamford. Of these two groups, providing more frequent service was the more desirable condition and selected by a higher proportion of passengers than the condition to continue to provide a through train to Stamford.



Programmed Improvements

The WBL is currently undergoing several capital improvements including signalization, passing sidings and improved railroad crossings. Signalization will be installed concurrently with positive train control and will allow up to 10 trains to safely operate along the branch line at the same time. In addition to the new signal system, four passing sidings will be installed and fully integrated into the line with interlocks at both ends. The sidings are located in Devon, Derby, Beacon Falls and Waterbury. Crossings, both private and public, will either be closed or upgraded to receive full protection with active warning devices.

Design of these improvements are currently at about 60% completion with construction anticipated to begin in the fall of 2018 and completed within two years. Routine maintenance such as rail and tie replacement and crossing upgrades are ongoing. The preliminary cost estimate to construct the WBL improvements is about $73 million

Programmed improvements to the New Haven rail and the Metro North service area, which will impact the WBL, include real-time information at the stations, a new fleet, and upgraded ticket vending machines. Real-time information will be installed at all NHML stations by the end of 2020. The CTDOT has estimated that $902 million will be needed to ramp up the entire fleet and has spent $10 million on designing and procuring the new M-8 rail fleet.

Long term programmed improvements, as part of the 30 year plan for *Let's Go CT!*, include improving service on the branch lines, providing feeder bus routes to rail stations, new diesel fleet equipment, fleet expansion, and maintenance facilities and yards on the branch lines. To improve service along the main line and branch lines the fleet of diesel equipment will be replaced and expanded at a cost of $530 million over the next 30 years. CTDOT is analyzing diesel hauled equipment purchases to replace the aging fleet and is planning to phase in purchases based on need and funding availability.

Specifically for the Waterbury branch line service, the aging fleet of locomotives and coaches currently operating on the line require replacement. To take advantage of the new signalization system and passing sidings, at least three new train sets, consisting of a locomotive, a push-pull cab and two passenger coaches, are needed. Each new train set is estimated at $16 million.

Recent capital improvements include creating a new passenger entrance and off-street passenger drop zone at the Waterbury Station, improvements to the

New Haven Storage Yard, upgrading of crossings, and the deployment of a mobile ticketing platform. In 2014 the SNET Building was demolished at the Waterbury Station adding a new passenger entrance and increasing parking.

Commuter Rail Actions

The Waterbury branch rail line is a critical transportation asset of the Naugatuck Valley planning region that is currently underutilized because of the age of equipment operated on the line and limited service provided. Trainsets are old, lack amenities and are generally considered poorly cleaned and maintained. The limited service provided does not offer convenient and attractive connections to preferred destinations and requires long layovers if required transfers are missed. Station area features are meager with limited parking supply, low level platforms, basic shelters and few amenities.

To increase ridership on the WBL and divert commuters from their vehicles, the infrastructure, equipment and facilities along the WBL need to be replaced, upgraded and enhanced. While the new signal system and by-pass sidings will permit more trains to operate on the WBL, additional trainsets are required to provide the increased service. However, the critical limiting factor is the lack of equipment storage and servicing space. Currently, equipment operated on the WBL is serviced, fueled and stored at the Stamford yard, and there is no available capacity to accommodate an increase in the fleet. Yard constraints are a systemwide problem and not limited to the Stamford yard. The preferred alternative would be construct a new storage and servicing yard along WBL.

The CTDOT estimated the anticipated funds to be available from Federal Transit Administration programs to implement commuter rail projects over the next 25 years. Nearly $11.9 billion will be allocated to improve and maintain the New Haven main line and branch lines in a state-of-good-repair. Critical actions include replacement of moveable bridges, station renovations, and replacements, rail yard improvements, signal and communications systems upgrades, and track improvements. In addition, CTDOT has allocated $2.8 billion in state funds for the purchase of new coaches and locomotives on its CTRail lines. Based on these funding allocations, the following commuter rail improvement projects are recommended improvement. These projects include various system wide actions:

Town	Project Description	Project Timeframe	Program	Cost Estimate
Derby-Shelton [1]	Renovate the existing station building and waiting area; install high level platforms and passenger amenities; and reconfigure parking area to include a bus transfer point and bus bays	2020-2025	State; FTA 5309	$25,000,000
Ansonia [1]	Construct new station building and waiting area with high level platforms and passenger amenities	2020-2025	State; FTA 5309	$25,000,000

Seymour [1]	Relocate station to north of Route 67 as part of TOD project; construct new building and waiting area with high level platforms and passenger amenities	2020-2025	State; FTA 5309	$25,000,000
Beacon Falls	Construct new station building and waiting area with high level platforms and passenger amenities	2020-2025	State; FTA 5309	$25,000,000
Naugatuck	Relocate station and construct new station building and waiting area with high level platforms and passenger amenities	2020-2025	State; FTA 5309	$25,000,000
Waterbury	Renovate old Waterbury rail station to provide an indoor passenger waiting area; lengthen and improve high level platforms and install amenities. Reconstruct and reconfigure parking area	2020-2025	State; FTA 5309	$10,000,000
Waterbury	WBL Storage Yard: Waterbury branch rail line - New Rail Storage Yard	2025-2030	State; FTA 5309 & 5337	$55,000,000
WBL	Purchase three new locomotives and train sets (2 coaches + 1 push-pull cab) to operate on the WBL to expand service	2025-2030	State	$48,000,000
WBL	Purchase four new locomotives and train sets (2 coaches + 1 push-pull cab) to operate on the WBL to replace old equipment	2025-2030	State	$64,000,000
WBL	Operations: Expand service along the Waterbury branch line to provide 30-minute headways during the AM & PM peak periods	2025-2045	State	$62,826,000
WBL	Annual track modernization program – replace ties, install continuously welded rail, and maintain bed	2020-2045	State; FTA 5337	$50,000,000
NHML [2]	Rail yard improvements – system-wide	2030-2045	State; FTA 5309 & 5337	$905,000,000
NHML [2]	Maintain fixed rail bridges in a State of Good Repair (SOGR) – system-wide	2020-2045	State; FTA 5309 & 5337	$1,375,000,000
NHML [2]	Maintain communications and signal systems in a State of Good Repair (SOGR) and implement upgrades – system-wide	2020-2045	State; FTA 5309 & 5337	$1,610,500,000
NHML [2]	Annual track modernization program – State of Good repair – system-wide	2020-2045	State; FTA 5309 & 5337	$580,000,000

NHML [2]	Maintain Catenary and power systems in a State of Good Repair (SOGR) and implement upgrades – system-wide	2020-2045	State; FTA 5309 & 5337	$45,000,000
NHML [2]	System-wide technology upgrades	2020-2045	State; FTA 5309 & 5337	$83,000,000
NHML [2]	Station Improvement Program – system-wide	2020-2045	State; FTA 5309 & 5337	$80,000,000
NHML [2]	New rail maintenance facility and yard for intercity rail service	2030-2045	State; FTA 5309 & 5337	$70,000,000
NHML [2]	Full capacity for New Haven line service	2030-2045	State; FTA 5309 & 5337	$270,000,000
NHML [2]	Future station improvements for more efficient express service to NYC	2030-2045	State; FTA 5309 & 5337	$300,000,000
[1] GBVMPO project; included for information purposes only.				
[2] Statewide project; included for information purposes only. State Rail Plan				

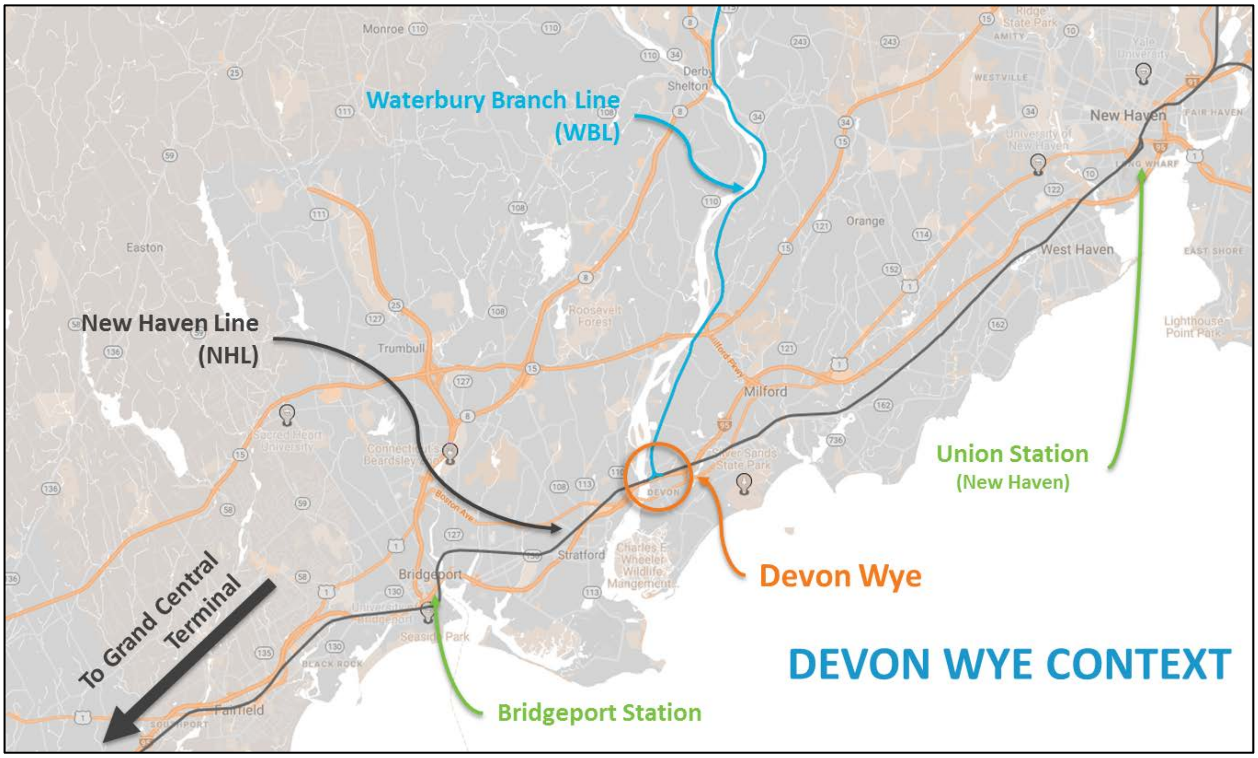
Permanent Devon Transfer Station

A critical goal of the metropolitan transportation plan is to improve operations along the Waterbury branch line and provide services and schedules that would be attractive and convenient to commuters and provide a reliable alternative to driving. Enhanced service along the WBL is also critical to realizing revitalization of the downtowns located along the branch line and incentivizing transit supportive developments within the station areas.

The planned installation of full centralized signal system and construction of four by-pass sidings will permit a substantial increase in the number of trains that could operate on the WBL. The signal system would allow ten trains per hour to operate on the line. While that level of service is not being considered, it demonstrates the opportunity to provide service at headways much better than the current 2½ hour headways.

Despite the future ability to operate more trains, a limiting issue will continue to be the number of available slots on the New Haven main line. While more trains could operate on the WBL after signals are installed, increasing the number of trains with direct service to Bridgeport or Stamford may not be possible. In addition, the existing interlocking at Devon between the NHML and the WBL does not allow service to New Haven. WBL passengers wishing to travel to New Haven must continue west to Bridgeport, and transfer to an outbound train and backtrack toward New Haven. The schedules are not setup to coordinate this inbound-to-outbound connection.

To increase the frequency of service on the WBL and expand potential transfers and connections with NHML trains, construction of a new, permanent transfer station at the Devon junction is recommended. The new station would provide the ability to increase service to mainline destinations without taking up additional schedule slots on the New Haven Line. Waterbury branch line service would be altered to operate more like a shuttle service. Operations would terminate trains at Devon and the schedule would be retooled to facilitate the transfers. Southbound WBL trains would arrive at Devon several minutes before a NHML train is due to arrive. Similarly, northbound trains would depart Devon after the arrival of a NHML train. The new Devon station would also allow WBL riders to access outbound trains and travel to New Haven without the need to travel in the opposite direction to Bridgeport.

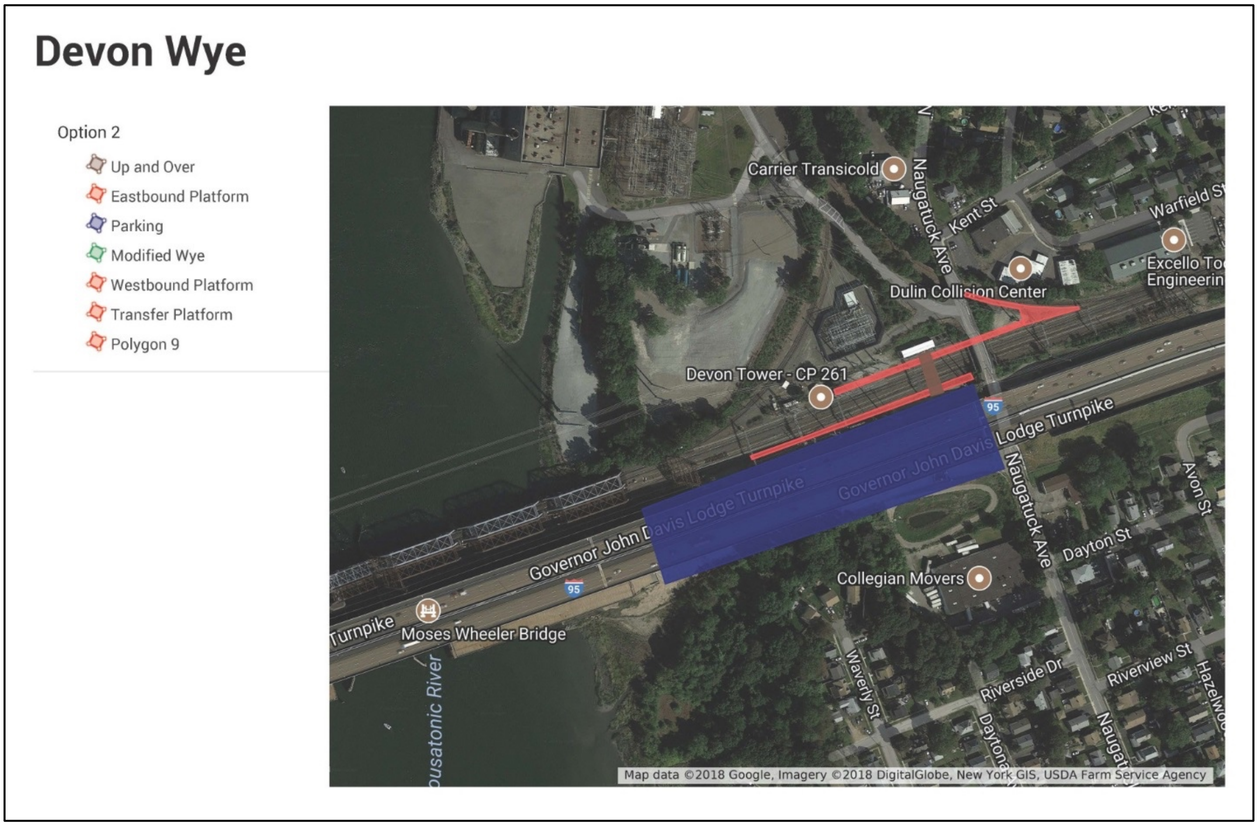


In addition to the expanded shuttle-type service, some WBL trains would continue as through trains on the main line to provide direct service to Bridgeport and Stamford.

The proposed alternative would locate a new Devon station within the Devon "wye" between the WBL track and the interlocking with Track 3 (inbound, local track) of the NHML. High level platforms would be installed along the WBL track and the inbound and outbound local tracks on the NHML. The platforms would be connected to provide seamless transfers. The NHML platforms would be connected via an elevated up-and-over walkway. The connection will require the installation of elevators on both platforms to ensure it is fully accessible. Vehicle parking would be minimal and limited. While a vehicle drop-off and pick-up drive would be provided from Naugatuck Avenue, the intent is to limited access to the station primarily to passengers transferring between the WBL and NHML trains. However, given the proximity of residential neighborhoods, pedestrian access would be accommodated.

The bridge carrying Naugatuck Avenue over the NHML is scheduled to be replaced as part of the planned Devon draw bridge project. The design of this projects has not started. This presents an opportunity to incorporate the proposed Devon transfer station concept into the Naugatuck Avenue Bridge replacement project to ensure access from Naugatuck Avenue into the site and assess the feasibility of using the bridge as the "up-and-over" between the two platforms.

The feasibility of implementing this permanent transfer station concept still needs to be more fully assessed. As part of the overall state funding plan, the CTDOT has allocated $100 million for a new station at Devon.



6.0 Active Transportation Systems

Streets are an integral part of our cities and towns, providing and facilitating the movement of people and goods. The road network in the Naugatuck Valley planning region is extensive, totaling about 2,441 miles. It serves to connect neighborhoods and provides access to businesses, jobs, schools and a wide range of public and private services. Connections to neighboring cities and towns, regions, as well as interstate travel are facilitated by an expressway system consisting of I-84, I-691 and Route 8, and a network arterial streets.

The goal of transportation improvement programs has usually been to make the highway and road networks operate more efficiently, with efficiency defined as making the flow of traffic better. Often the needs pedestrians, bicyclists and others who travel by non-traditional, motorized means have been ignored or minimally considered. Road design standards, with the emphasis on moving traffic and vehicular safety, have made the street environment an intimidating place for bicyclists and pedestrians. However, the focus of streets as the sole environment for motorized vehicles has changed over the past 10-to-15 years, as federal transportation acts have provided dedicated funding for active transportation projects and new Connecticut policies require transportation projects to consider the needs of bicyclists and pedestrians. Specific changes to state policies and how transportation projects consider the needs of pedestrians and bicyclists include:

- Connecticut Bicycle and Pedestrian Advisory Board: The Board was established in 2009 by Public Act 09-154 and codified in the General Statutes as Section 13b-13a. Its primary duties are to examine the need for pedestrian and bicycle transportation, promote pedestrian and bicycle programs and advise state agencies on policies, programs and facilities for bicyclists and pedestrians. The CTDOT is required to assist the Board in carrying out its responsibilities.
- Complete Streets Policy: In accordance with state General Statute Section 13a-153f (a)(d), the CTDOT prepared and executed a policy statement to consider all users of all abilities and ages in the planning, programming, design and construction of all road projects. The policy was signed in October, 2014.
- Bicycle and Pedestrian Travel Needs Assessment Form: To demonstrate that the needs of all users of all ages and abilities are considered in the planning, design and construction of all road projects, in accordance of the Complete Streets Policy, the CTDOT is required to complete this form.
- Share the Road CT: Effective as of October, 2008, Connecticut requires motorists to allow at least three feet of separation when overtaking and passing cyclists. Failure to do so could cause motorists to receive a fine under the motor vehicle code "failure to grant the right of way to a bicycle" (14-242). The Share the Road program strives to improve the knowledge of all roadway users and promote safe travel and minimize the likelihood of crashes.
- Bicycle Safety Bill: This law, enacted as Public Act 15-41, requires bicyclists to ride as close to the right side of the road *"as is safe, as judged by the cyclist."* This supersedes the previous law that required cyclists to ride as far right *"as practicable"*, which could have

included instances where a bicyclist is preparing to make a left turn at an intersection or onto a private road. Drivers are also allowed to cross double yellow lines to pass slower moving bicyclists when it's safe to do so. Additionally, this law allows two-way bicycle lanes, buffered bike lanes, and cycle tracks to be designed in Connecticut.

- Community Connectivity Program: The CTDOT, as part of the *Let's Go CT!* program, initiated the Community Connectivity Program. It focuses on improving pedestrian and bicyclist safety by implementing various low-cost road, sidewalk and intersection projects. The first step was the conduct of Road Safety Audits to identify problems and develop low- and high-cost actions to address safety deficiencies. Statewide, 80 RSA's were conducted, 15 in the Naugatuck Valley planning region. Subsequently, funding was provided to construct projects ranging in cost between $75,000 and $400,000. Statewide, funding was provided to 80 cities and towns, seven in the Naugatuck Valley planning region.

6.1 Regional Pedestrian Plan

Walking is the most basic form of transportation. Most New England towns and cities were initially developed around walking, and many New England towns and cities retain basic elements supportive to pedestrians. Nearly all people are pedestrians of some form during most trips, whether it is walking to and from their car in a parking lot, walking to a transit stop, or walking to and from work. Walking also tends to be the most accessible form of transportation: no special equipment is typically required, provided the built environment is supportive. Of course this does not apply to persons who are unable to walk. Special accommodations are needed to ensure people with a mobility impairment and are dependent upon wheelchairs or other means of physical assistance can travel safely. For that reason, these persons are also considered pedestrians in this plan.

In addition to transportation, walking, jogging, and running are healthy habits one can incorporate into daily routines. The US Department of Health and Human Services (HSS) recommends all adult Americans maintain thirty minutes of physical activity each day (***"Physical Activity Guidelines for Americans"***, DHHS 2008) and adding a short walk into one's day is for many the easiest way to accommodate this level of activity.

Research shows that people walking in business districts are more likely to spend more time and spend more money in local establishments, ("***Consumer Behavior and Travel Mode Choices***," Clifton et al., 2012) partly because it is easier to make impulse buys at multiple stores and partly because they would need to change travel modes to reach destinations outside of the business district. Further, the mix of uses that walkable environments usually feature often improve property values and small business profitability.

In the Naugatuck Valley planning region, only about 1.7% of commuters walk to work (*American Community Survey 5-year estimates 2010-2014,* US Bureau of the Census). This is lowest walk rate of any region in the state, including the non-urbanized regions. By comparison, about 4.5% of commuters living in the Southeast Connecticut planning region and about 4.3% living in the South Central Connecticut planning region walk to work.

Of more concern is that the region, based on a calculated *"Pedestrian Danger Index (PDI)"* is second most dangerous region for walkers in the state. With a PDI of 85.59, the region ranks just below the high PDI of 85.78 for the Northeast Connecticut planning region. (Note: The PDI is based on comparison of population, percentage of people who walk to work and the five-year average fatality rate).

The goals of the pedestrian safety program and plan area:

- To increase the safety and well-being of residents of the Naugatuck Valley planning region who walk to work or for any other purpose by improving infrastructure and transportation policies.
- To encourage more residents of the Naugatuck Valley planning region to walk to work or for any other reason by improving infrastructure and land use policies.
- To build a more resilient, equitable, and economically vibrant transportation system by providing more balanced modal choice.
- To develop consistent policies for the future development and planning of pedestrian-related projects and programs.

Pedestrian Safety

Crash data involving pedestrians in motor vehicle crashes were extracted from the CTDOT *Crash Data Repository* hosted and maintained by the University of Connecticut. The most recent crash data indicate that over the last couple of years the number of crashes involving pedestrians has increased. In 2012, a total of 141 pedestrian-involved crashes occurred in the Naugatuck Valley planning region. For 2016, that number was 163 crashes, an increase of 15.6%. Over the past five years (2012 through 2016), an average of 146.8 vehicle crashes in the region involved a pedestrian.

Not unexpectedly, the incident of pedestrian-involved crashes is correlated with urban density. Built-up areas, especially the downtowns of the region's cities, tend to experience higher numbers of pedestrians and higher traffic volumes on the streets. Because of these characteristics, pedestrians have greater exposure.

The urban core areas of Waterbury and Bristol are a concern as these two cities accounted for over 70% of the pedestrian-involved crashes. This is particularly true of Waterbury as over 60% of these crashes occurred in Waterbury and has a widely outsized concentration of pedestrian crashes in key transportation corridors. Despite having pedestrian safety features, such as pedestrian signals, crosswalks and sidewalks, a disproportionately high number of pedestrian-related crashes are occurring in these areas. This suggests that the condition of pedestrian safety features may be poor – crosswalks that are no longer clearly marked or pedestrian signals that either are not functioning properly or do meet current standards. Further, many of the streets in these core areas are in a state of disrepair that generally makes the transportation experience, regardless of mode choice, stressful.

Pedestrian Involved Crashes: Naugatuck Valley Planning Region: 2015 - 2018

Municipality	2015	2016	2017	2018	Total	Annual Average
Ansonia	3	9	3	8	23	5.75
Beacon Falls	1	0	1	1	3	0.75
Bethlehem	0	0	1	0	1	0.25
Bristol	28	26	30	26	110	27.50
Cheshire	10	8	14	13	45	11.25
Derby	12	12	7	2	33	8.25
Middlebury	2	2	3	2	9	2.25
Naugatuck	17	11	12	7	47	11.75
Oxford	0	0	2	0	2	0.50
Plymouth	1	3	1	1	6	1.50
Prospect	2	1	2	0	5	1.25
Seymour	4	1	3	2	10	2.50
Shelton	5	12	10	2	29	7.25
Southbury	2	3	2	1	8	2.00
Thomaston	1	1	2	1	5	1.25
Waterbury	114	110	133	126	483	120.75
Watertown	2	4	3	1	10	2.50
Wolcott	0	3	2	1	6	1.50
Woodbury	2	2	1	1	6	1.50
Total	206	208	232	195	841	210.25

The severity of pedestrian-involved vehicle crashes is a critical concern. Pedestrians hit by a vehicle are exposed to severe injury and death, especially when vehicle speeds are high. This exposure is illustrated by the fact that pedestrians are overrepresented in fatal crashes, not only in Connecticut but nationally. Over the five-year timeframe for which the crash data were extracted, 33 pedestrians were killed in the region out of the 734 total number of pedestrian-involved crashes. This represents 4.5% of the pedestrian-related crashes. In addition, nearly 85% of these crashes resulted in an injury. Only 10.9% of the pedestrian-involved crashes did not cause an injury. Again, the statistics indicate a critical problem in Waterbury. Eighteen of the 33 pedestrian fatalities were recorded in Waterbury.

Severity of Pedestrian Involved Crashes: Naugatuck Valley Planning Region: 2015 - 2018

Municipality	PDO	Injury	Fatality	Total
Ansonia	3	19	1	23
Beacon Falls	0	3	0	3
Bethlehem	0	1	0	1
Bristol	10	94	6	110
Cheshire	9	35	1	45
Derby	9	23	1	33
Middlebury	1	8	0	9
Naugatuck	9	37	1	47
Oxford	2	0	0	2
Plymouth	1	5	0	6
Prospect	0	5	0	5
Seymour	3	7	0	10
Shelton	3	23	3	29
Southbury	0	8	0	8
Thomaston	1	4	0	5
Waterbury	62	408	13	483
Watertown	1	6	3	10
Wolcott	1	5	0	6
Woodbury	0	6	0	6
Total	115	697	29	841
Percent	13.7%	82.9%	3.4%	100.0%

The crash records include contributing factors to the incident, as well as which vehicle was determined to be at fault. In nearly half of the cases (47.8%), the pedestrian was cited as using the roadway in an unsafe manner, indicating they were at fault. The second most often cited contributing factor was failure of the motorist to grant the right of way. Combined with other driver related citations, motorists were deemed to be at fault in 42.2% of the pedestrian-involved crashes. For the remaining pedestrian-related crashes (10.0%), the contributing factor was unknown.

Contributing Factors of Pedestrian Involved Crashes NVCOG Planning Region: 2012-2016

Contributing Factor	Percent
Unsafe Use of Highway by Pedestrian	47.8%
Failed to Grant the Right of Way	15.9%
Violated traffic control	4.6%
Under the Influence	2.4%
Driving too Fast or Lost Control	9.0%
Improper Turning Maneuver	0.7%
Unsafe Right Turn on Red	1.0%
Unsafe Backing	2.7%
Other Driver-related Factors	5.9%
Unknown	10.0%

There are two typical locations for a pedestrian crash in the region: suburban-style shopping streets and high-vehicle-traffic urban streets.

Suburban-style shopping centers, particularly ones with transit access, contribute an outsize proportion of pedestrian crashes given their pedestrian activity. These areas typically show poor access management onto primary roadways, a lack of sidewalks and safe crosswalks, and high automobile crash volumes.

High-vehicle-traffic urban streets have high absolute numbers of pedestrian accidents, but also contain the overwhelming majority of pedestrian activity in the region. Dangerous urban streets and their intersections typically have wide turning radii, confusing signalization, poorly marked transit stops, and poorly delineated road markings.

The CTDOT is presently installing curb ramps on several of their roadways with pre-existing sidewalks in the region as part of their *ADA12 Transition Plan* (A final draft of the state *ADA Transition Plan* can be found at: http://www.ct.gov/dot/lib/dot/documents/ddbe/1-18_ada_transition_plan.pdf). Implementation of the plan may be on hold due to the state budget. Several municipalities in the NVCOG region have ADA Transition Plans of their own, though implementation of these plans has been mixed with regards to pedestrian accessibility. While the NVCOG has not developed an ADA Transition Plan under federal law, the NVCOG is involved in funding capital projects that would trigger the need to ensure ADA compliance. Further, any pedestrian-related planning activity should be inclusive to all pedestrians, regardless of ability status.

Pedestrian Demand and Deficiencies in the Naugatuck Valley Planning Region

To determine pedestrian demand in the region and better understand which areas have the highest propensity for walking, the NVCOG used the methods adopted by the City or Portland, OR. Portland's approach developed *Pedestrian Potential* and *Pedestrian Deficiencies Indices* for identifying high pedestrian demand and safety-related barriers to walking. Under this framework, the NVCOG created two separate datasets: (1) a *Pedestrian Demand Index* to identify locations of high pedestrian demand or potential demand, and (2) a *Pedestrian Deficiencies Index* to identify locations with poor, incomplete, or unsafe pedestrian infrastructure or environments.

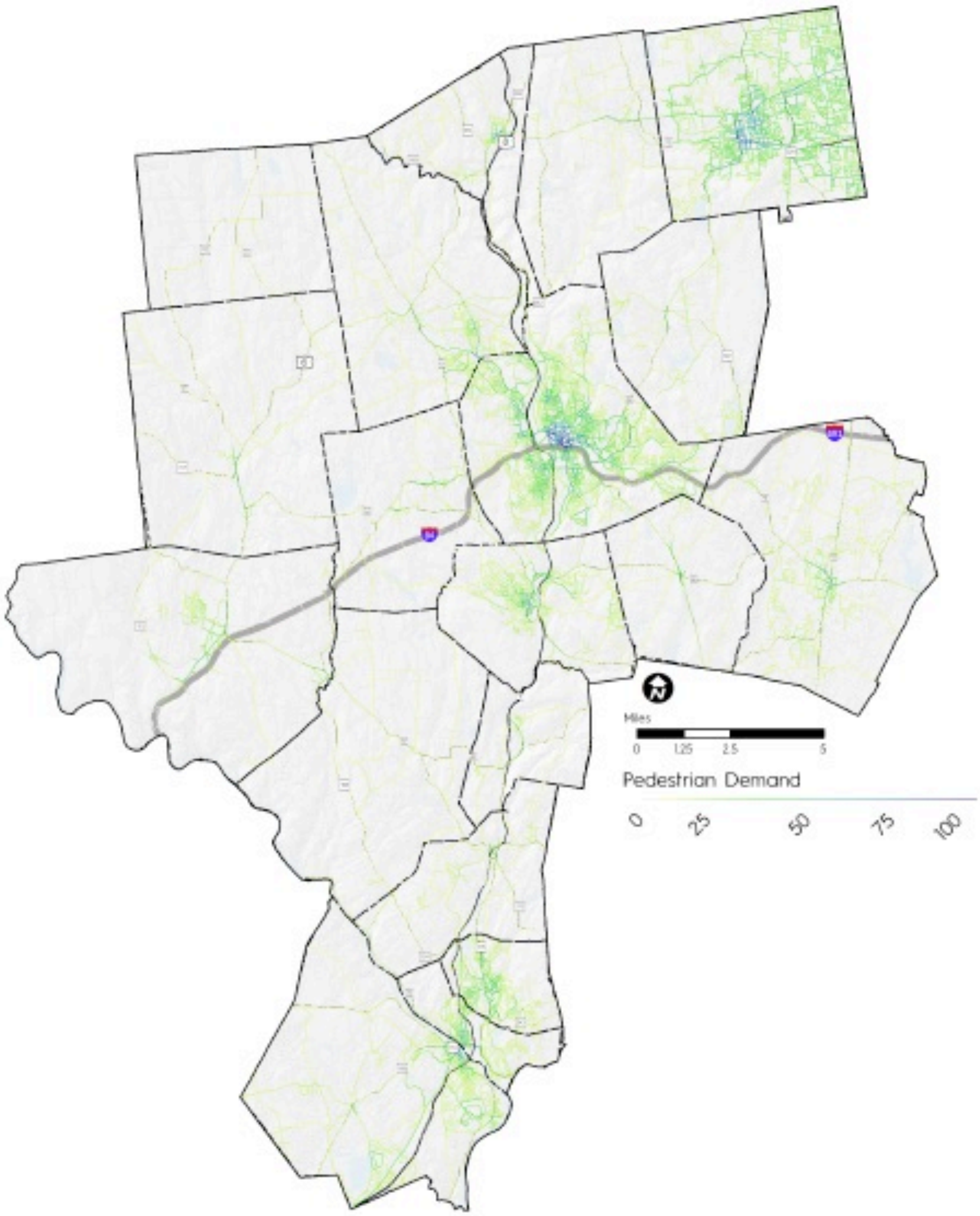
The *Pedestrian Demand Index* looks at various factors known to increase the likelihood of walking in order to identify roadways where there is a high demand for walking. The index will help NVCOG, municipal leaders, and local advocacy groups better understand where there are likely to be pedestrians currently, and where small improvements to the streetscape or the zoning code may increase the number of pedestrians.

Three factors are considered in the calculation of the *Pedestrian Demand Index*:

- <u>Policy factors</u>: These relate to current state, municipal and regional policy that emphasizes pedestrian activity, such as local Plans of Conservation and Development.
- <u>Proximity factors</u>: These relate to areas where there are walkable destinations and infrastructure to support pedestrian activity.
- <u>Environmental factors</u>: These relate to areas where existing land use densities are above a threshold to support pedestrian activity.

The NVCOG used its Geographic Information System (GIS) to map areas in the region relative to the above factors. The information was combined to create a regional map showing the *Pedestrian Demand Index*. The *Pedestrian Demand Index* indicates several high-priority pedestrian areas in the region, mostly in the historic downtown cores of NVCOG cities. Of particular note are the historic cores of Waterbury and Bristol, which score the highest and have multiple locations with a score of 100. Town-by-town maps were also created.

Pedestrian Demand Index Map

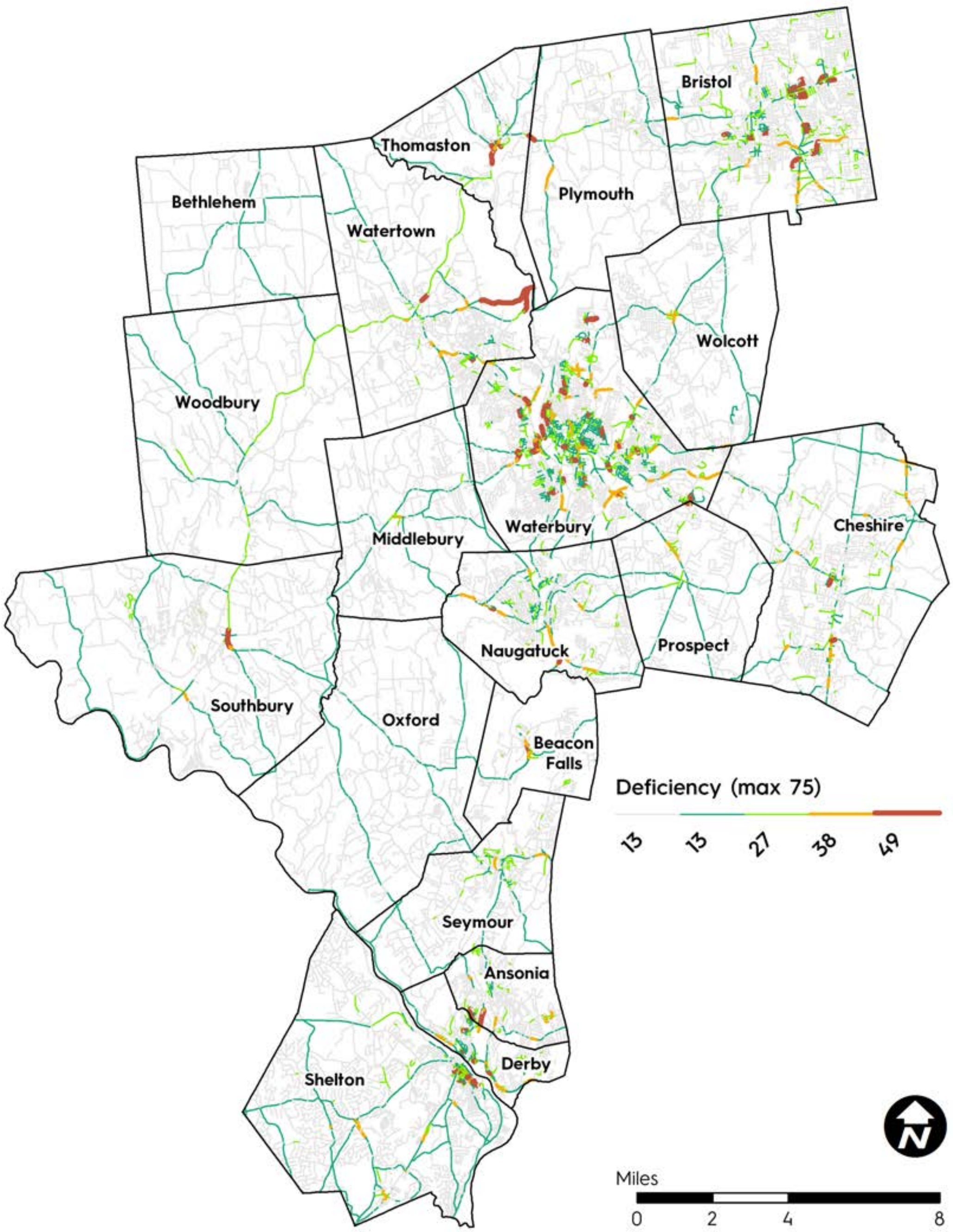


Source: NVCOG

The complement to the *Pedestrian Demand Index* is the *Pedestrian Deficiencies Index*. This latter index looks at factors known to increase the danger of serious injury or death for pedestrians and is used to locate areas where there is a demonstrated need for safety improvements. The map combines areas with a high probability of people walking and a demonstrated need for safety improvements. The Pedestrian Deficiency Index is based on three factors that are considered primary dangers to pedestrians:

- Speed factors: Travel speeds are depicted for all roads in the region, with higher travel speeds receiving higher negative scores.
- Sidewalk factors: These relate to the availability and continuity of the sidewalk network, with areas with gaps in its sidewalk network receiving a higher negative score.
- Safety factors: These factors are defined as proximity to pedestrian-related crashes.

Pedestrian Deficiencies Index Map



Source: NVCOG

Unlike the Pedestrian Demand Index, the Pedestrian Deficiencies Index is more difficult to measure because of the difficulty in measuring the quality of the pedestrian environment. For example, a 5-foot sidewalk with a grass buffer may be safe in a suburban context, but may be too small for safe pedestrian use on a downtown street. Other factors, such as signal timing, visibility, snow plowing practices, or the availability of marked crossings also contribute to pedestrian crashes but are difficult to measure. Despite some limitations, there are multiple locations with deficiencies scores that indicate a roadway of great danger to pedestrians.

Pedestrian Safety Improvements

Typical road design, with an emphasis on moving traffic, have made the street environment an intimating place for pedestrians. They feel insecure walking along a high speed, multi-lane road and are reluctant to cross arterials even when crosswalks are provided. Well-designed pedestrian facilities can change the street setting and create a more walkable environment, where pedestrians feel safe and secure and adjacent traffic is not perceived as intimidating.

Pedestrian facilities are separated areas specifically for pedestrian use and are intended to provide a safe area for people to travel between destinations. The most common pedestrian facility is a sidewalk; and the characteristics that most ensure use are continuity and interconnectedness. A well designed sidewalk network is one that provides continuous paths with no gaps that connect where walkers want to go.

While sidewalks are the main thoroughfare for walkers, there are many other pedestrian features that enhance the safety and attractiveness of the area and encourage people to walk. These include:

- Pedestrian activated signals to provide protection while crossing. Count-down indicators provide reinforcement that the signal is working and lets walkers know how much time remains to their protection.
- Well marked and visible crosswalks.
- Buffers between the street and the sidewalk.
- Curb ramps.
- Signing.
- Audible tones to aid persons with vision impairments.

Often the best approach to improving pedestrian access and safety is to expand the pedestrian network by building new sidewalks. In some areas, gaps in the sidewalk network exists forcing pedestrians to intrude into the road to complete their trip. Addressing sidewalk gaps is typically done *ad hoc*, but a methodical approach of identifying their locations and sourcing funding for construction would allow for quicker improvements.

To function properly, sidewalks must be of an adequate size, have a smooth and stable surface and provide adequate space for pedestrians to move freely and easily without impediments. Of critical importance is for the sidewalks to be well maintained. Cracks in the pavement or heaves in the surface creates trip hazards and can lead to falls and injuries.

The design of a sidewalk depends on its location and function. In less urban and commercial areas, a three-foot wide sidewalk may be sufficient. However, where high pedestrian traffic is expected, a minimum width of five feet should be provided. Wider side-walks should be installed in areas near schools, transit stops or other areas with high a concentration of pedestrians. A 4-to-6-foot buffer should be provided between the street and the sidewalk.

In downtown areas, the sidewalk area needs to consider adjacent buildings and other amenities that may be placed in the area. In addition to a five-foot pedestrian zone, an additional three feet space should be provided as a frontage zone along the building-side-walk edge. This zone provides space for the opening of doors without intruding into the pedestrian zone. On the street side, a two-to-four-foot zone should be reserved for tree plantings, street furniture, sign posts and other items. This zone provides separation between where people are walking and fixed objects.

Pedestrian signals are also a critical safety device. These signals are connected to traffic control signals and alert pedestrians to when it is appropriate to cross a street. In conjunction with the traffic control signal, the pedestrian signal provides either an exclusive crossing phase when all traffic is stopped or a concurrent phase. The latter situation allows pedestrians to cross while the opposing vehicle traffic has a green light and intersecting traffic is stopped by a red light. The pedestrian phase is timed to allow sufficient time for pedestrians to cross the street. Often the red phase is extended when the pedestrian signal is activated to ensure adequate crossing and clearance intervals. In areas where there is a heavy concentration of the elderly or children, more walk time should be provided. The installation of pedestrian signals must comply with the requirements and guidelines in the *Manual on Uniform Traffic Control Devices (MUTCD)*.

Marked crosswalks are an effective method for improving safety and reducing accidents. Crosswalks indicate the preferred locations for pedestrians to cross a street and provide warning to motorists to expect pedestrians. Typically, crosswalks are installed at intersections controlled by a traffic signal or stop sign. Mid-block locations are acceptable when warranted by high pedestrian activity. Advance stop lines, consisting of a series of white, triangular-shaped pavement markings should be installed in combination with a mid-block crosswalk. Material needs to be visible, non-slippery and not cause a tripping hazard. As part of a complete streets concept, a tactile material should be used, such as concrete pavers or stamped concrete. In either case, the markings must be well maintained to function properly. Embedding warning lighting in mid-block crosswalks can be used to enhance visibility and alert motorists of the presence of pedestrians.

To address longer term needs, the entire streetscape environment requires enhancement Road diets are projects where excessively-wide roads are reduced to accommodate sidewalks, bicycle elements, clearer lane markings, bus stops, traffic calming, or green infrastructure. Typically, road diets are developed with as part of a “Complete Streets” vision. Road diets may be included as part of a resurfacing or rehabilitation project within existing curb lines. Neckdowns are smaller-scale projects where a roadway is modestly reduced in width as the roadway approaches an intersection, in order to provide shorter pedestrian crossings. These type of treatments include bump-outs, curb extensions and median barriers. Implementing pedestrian-related traffic calming projects help to reduce traffic speed and make an area more visible as a pedestrian space. These actions include raised cross walks, raised intersections and textured pavement.

Both road diets and neckdowns can be accomplished through interim striping, paint, planters, and flexible delineators in situations where the cost of moving curbs, drains, and other street infrastructure is prohibitive. These low-cost projects may be designed and executed in-house by municipalities in anticipation for more permanent improvements.

In the Naugatuck Valley planning region, a critical area of concern is pedestrian access to transit stops. Improving the bus stop environment and ensuring good access to bus stops serves to improve safety and accessibility for all bus riders. Examples of transit accessibility improvements include ADA-accessible shelters and bus stops; clear accessible pathways from popular destinations to transit locations; curb extensions, bus bays, and bus bulbs to improve boarding times and passenger visibility; and clearly marked crosswalks to transit stops.

6.2 Regional Bicycle Plan

In Connecticut, bicycles are considered a form and type of vehicle and can be ridden on all roadways where they are legally permitted. Bicyclists must adhere to basic traffic laws as if they were a motorist. At the same time, motorists are required to share-the-road with bicyclists and provide sufficient space, minimum of three feet, when passing a bicyclist. Because of these responsibilities, the most common bicycle facility is a shared roadway. And, therefore, all roads that are open to bicyclists should incorporate design treatments that will enhance bicycle riding safety and quality.

It is not necessary to specifically designate roads as bicycle routes or provide bicycle lanes. Rather, all roadways should be maintained and upgraded to ensure bicycle travel can occur safely and conveniently. This allows bicyclists to decide on which road they want to ride.

The type of accommodation depends on the type of road and characteristics of traffic. On low volume, residential streets, bicyclists can easily become integrated with the few vehicles on the road and may not require any separation. The road is a shared-space used by vehicles, bicyclists and pedestrians. At the other end of the road system, special treatments are necessary and greater separation is required to accommodate bicyclists on higher-volume, higher-speed arterials.

Bike facilities need to accommodate a variety of users, from children to basic adult bicyclists to advanced riders.

Source: www.Pedbikeimages.org/ Dan Burden

Bicyclists can be grouped into one of three categories ranging from young children to the *advanced bicyclist*. In between are *basic bicyclists* who represent the average adult rider. Because of their abilities, *advanced bicyclists* can best be and more easily accommodated on existing roads with the proper accommodations. They are generally able to operate within the road's right-of-way and under most traffic conditions; have confidence in riding with traffic and do not feel in danger or perceive a safety hazard. This group of riders prefers the freedom of choice to decide how to complete their bicycle trip, as well as, the directness and speed advantages of using higher class roads. Route choice is much more a function of where the bicyclist is going and less dependent on road characteristics. Their trip lengths also tend to be much longer than the *basic bicyclist*.

Because only about 5% of the bicycling public is considered an *advanced bicyclist*, special attention must be given to the needs of both *basic bicyclists* and children. The design treatments needed to enhance both groups' bicycling enjoyment are similar. Bicyclists classified in these groups are generally less confident of their ability to ride in traffic and feel unsafe riding on higher volume and higher speed roads. They prefer low volume, low speed roads or designated bicycle facilities with well-defined separation from motorized vehicles. Basic bicyclists tend to have trip lengths of between two and five miles, while children typically confine their riding to their home neighborhood and do not often venture beyond familiar areas. For these reasons, these riders are best served by a network of neighborhood streets and designated bicycle facilities.

The adopted design approach reflects the "*design bicyclist*," that is, what type of rider is the facility designed for, the type of facility and actions needed to make the roads more user friendly to bicyclists. The minimum operating space of a bicyclist, based on their profile, is assumed to be about 40 inches, resulting in a minimum width for a bicycle facility of four feet. The vertical clearance from any overhead obstructions should be at least 100 inches or a little more than eight feet.

The need to implement specific design treatments depends on the traffic characteristics of the adjacent roadway. High traffic volumes and operating speeds represent greater potential risk from passing motorized vehicles and create an uncomfortable feeling. Generally, the higher the traffic volume and speed, the greater need to implement more extensive design treatments to accommodate *basic bicyclists*. Children and young bicyclists should avoid these roads all together.

There are basically four types of bicycle facilities, with each providing a greater separation between the bicyclist and motorized vehicle traffic. The four types of facilities are:

- Shared roadway;
- Dedicated bicycle lanes;
- Bi-directional cycle-tracks; and
- Shared-use paths and multi-use trails.

Shared roadway facilities and bicycle lanes are located on-the-road and either share space with motorized vehicles or provided an exclusive space along the edge of the road. Cycle-tracks are located adjacent to but separated from travel lanes and shared use paths are specialized, off-road facilities on a separate right-of-way that accommodate multiple users.

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  Shared Roadway Facilities: Provide the minimum level of route designation and separation from motorized vehicles. Bicyclists share the road with motorized traffic and are carried in the same direction of traffic. No special treatments are made at intersections or where there is on-street parking. These facilities are either unmarked or signed with a standard bicycle route sign along both sides of the road. More recently, it has become common to mark shared roadways where there is insufficient shoulder width with a “shared lane marking” or Sharrow. This marking assists bicyclists with lateral positioning and alerts motorists of the lateral location of bicyclists.

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  Bicycle Lanes: A bike lane is defined as the portion of the road specifically designated by striping and signing for preferential and/or exclusive use by bicyclists. They are always one-way facilities and carry bicycles in the same direction as adjacent traffic lanes. On two-way roads, bike lanes are installed along both sides and both directions. Because they provide a more predictable movement for bicycles and motorized vehicles, as well as, a greater degree of separation, bike lanes are more acceptable to basic bicyclists. The minimum width of a bicycle lane is four feet, but if guard rails or curbing are present, the width needs to be increased to at least five feet. Additional width is desirable in urban areas. Where on-street parking is permitted and designated, the bike lane needs to be located between the travel lane and the designated parking spaces. Parking is prohibited in a designated bicycle lane, so a clear designation for each use must be installed. At intersections, the striping and signage needs to encourage positioning bicyclists in the proper lane whether to go straight, turn left or turn right. The following diagram illustrates the typical layout of a road with a designated bike lane, with and without adjacent on-street parking.

- Cycle-Track: A cycle track is an exclusive bicycle facility located adjacent to a roadway. It is separated from the travel lanes by a buffer or bollards, and can be raised above street level or be at street level. By separating bicyclists from motor traffic, cycle-tracks provide a higher level of security than bike lanes. Two-way or bi-directional cycle-tracks allow movement in both directions on one side of the road.

- Shared-use Path / Multi-use Trails: These facilities are the highest form of facility and require special design considerations. They are referred to as shared-use or multi-use paths because they are used by more than just bicyclists and are designed to accommodate many different users. Users include bicyclists, walkers, in-line skaters, persons in wheelchairs, and strollers. A shared use path is physically separated from the road and follows an independent right-of-way. Two-way flow is provided and one-way sections are typically not allowed, although short one-way section may be acceptable as long as they are clearly designated, strictly enforced and limited to areas where it is absolutely necessary. Although these paths provide a low stress and safe area and a place where novice riders and children are separated from motorized vehicles, the mix and volume of users often creates a challenging environment with a variety of potential conflicts. Care and attention need to be given to the design and rules on how to use the path need to be established, visible and enforced. Also, speed limits may need to be set to ensure that the speed differential between users is not excessive.

Sidewalks are not considered acceptable for use by most bicyclists and designating a sidewalk as a bicycle facility is not a satisfactory policy. Sidewalks are designed for pedestrians and for their speed and maneuverability. The higher speeds of bicycles cannot be safely accommodated on sidewalks. The commingling of pedestrians and bicyclists can result in conflicts; sudden changes in direction by pedestrians leave bicyclists little time to react and pedestrians are sometimes uncertain where on-coming bicyclists are going. Also bicyclists on sidewalks are not readily visible to motorists and when they enter the road-way right-of-way, they will be approaching traffic from an unexpected direction. Fixed objects located on sidewalks such as utility poles, sign posts, and newspaper vending machines also pose a hazard. The use of sidewalks for bicycle use is acceptable for short sections and in certain exceptional situations where no alternatives are feasible.

Despite these inherent conflicts, state law does not specifically prohibit bicyclists from riding on sidewalks; instead, laws require bicyclists to yield to pedestrians on a sidewalk and emit an audible signal when overtaking them. Municipalities, however, do have the right to enact ordinances to prohibit the operation of bicycles on sidewalks. Many communities have done so, but the restriction is rarely enforced.

The regional bicycle plan for the Naugatuck Valley planning, as presented herein, represents an initial planning effort to identify actions that need to be undertaken to enhance the safety of bicyclists. The suggested actions fall into four general categories:

- <u>Planning</u>: These actions consist of endorsing and adopting regulations, ordinances and policies by member communities to enhance the opportunities for implementing bicycle and pedestrian projects. Specific actions include:
  - ➢ Update planning and zoning regulations to encourage the accommodation of bicyclists in new developments.
  - ➢ Create and adopt a vision and goals statement that supports the bicycling and amendment municipal Plans of Conservation and Development to include.
  - ➢ Adopt bicycle facility design guidelines.
- <u>Infrastructure</u>: These are actions to make improvements and enhancements to the physical infrastructure used by bicyclists, such as, designating bicycle routes, installing bicycle lanes and installing signs and pavement markings. Specific actions include:
  - ➢ Include bicycle elements, such as pavement markings, signs, widened shoulder width, and use of a smooth, compacted asphalt material for road surfaces, in all road projects.
  - ➢ Designate various roads that are less than 30-feet wide as “Shared Road” bicycle routes and marked with Sharrows and share-the-road signs.
  - ➢ Designate a network of bicycle routes to provide intra- and inter-town connections. Candidate routes are those with a minimum four-foot shoulder.
  - ➢ Install bicycle racks at strategic locations throughout the region and at the commuter rail stations.
  - ➢ Implement a Bicycle Facilities Maintenance program to provide on-going maintenance and repair of bicycle facilities.
- <u>Education</u>: These actions aim to inform everyone about the rules of the road for bicycling, as well as the laws to which motorists and bicyclists need to adhere. Specific actions include:
  - ➢ Develop an information and education campaign to communicate the rules of the road and the importance of following all traffic laws.

- Enforcement: These actions involve increased enforcement of traffic laws to encourage travelers to be aware of the street environment and attentive to the traveling characteristics of those bicycling. Enforcement of traffic laws is a critical and vital element of enhancing bicycle safety. Specific actions include:
    - ➢ Focus speed monitoring along roads and in areas that have been identified as the most severe and where critical problems occur and effectively target driver behaviors that increase the possibility of bicycle-vehicle incidents.
    - ➢ Ensure proper design and construction of bicycle facilities.
    - ➢ Develop an information and education campaign to communicate the rules of the road and the importance of following all traffic laws.

6.3 Multiuse Trail System

Multiuse trails, also referred to as shared-use paths, are paved or compacted off-road facilities separated from motor vehicle traffic designed to accommodate non-motorized users including pedestrians, bicyclists, joggers, skaters and others. They are typically designed to be accessible to users of all abilities where practicable. While multiuse trails are often viewed as “recreational” facilities, well sited and designed paths can be a viable transportation option, serving as non-motorized “expressways” for those who do not have or would rather not use a motor vehicle. Multiuse trails, in conjunction with a well-connected network of sidewalks and on-road bicycle routes, can provide safe corridors linking residential areas, commercial areas, transit and other destinations.

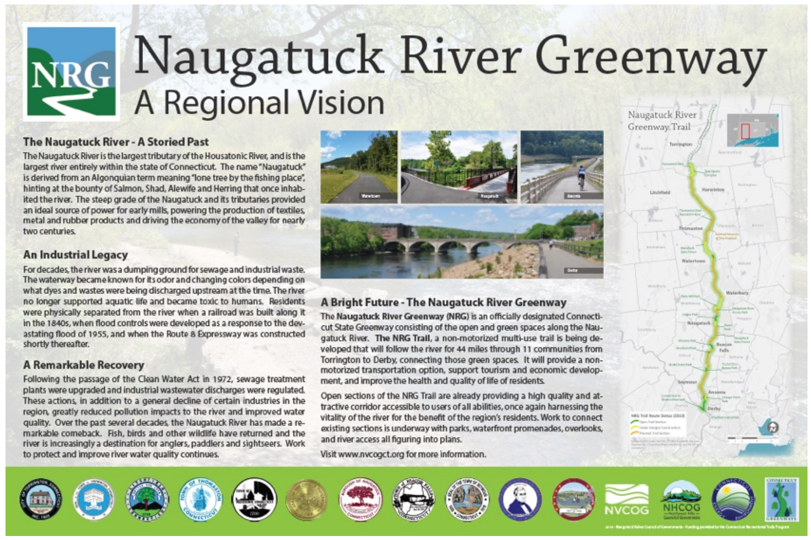
There are several existing and planned multiuse trails in the Naugatuck Valley planning region. The partially built Naugatuck River Greenway (NRG) Trail is envisioned as a main non-motorized spine running north-to-south along the Naugatuck River and Route 8 corridor. There are plans to connect several other trails to the Naugatuck River Greenway, including the Larkin State Bridle Trail, the Middlebury Greenway, the Steele Brook Greenway, the Shelton Riverwalk, and the Sue Grossman Trail to the north of the region. The Farmington Canal Heritage Trail traverses Cheshire north-to-south, and will eventually connect Northampton, Massachusetts to New Haven, Connecticut. The overall goal is to create connections between these trails and to sidewalk networks and on-road bicycle facilities, and creating a non-motorized transportation network, with the intent of safely connecting residents to destinations throughout the region.

Multi-use Trail System

Source: NVCOG

Naugatuck River Greenway Trail

When complete, the Naugatuck River Greenway (NRG) Trail will follow the Naugatuck River for approximately 44 miles, and will link 11 municipalities, help reclaim the Naugatuck River for recreation, provide an alternate mode of transportation, support tourism and economic development in the region, and improve the quality of life of valley residents. The NRG will start in Torrington and follow the river south through Litchfield, Harwinton, Thomaston, Watertown, Waterbury, Naugatuck, Beacon Falls, Seymour, Ansonia and Derby. As of 2018, there are six sections of NRG Trail open to the public in Watertown, Naugatuck, Beacon Falls, Seymour, Ansonia and Derby representing approximately 11% of the total length of planned trail with additional sections in various phases of design with plans for construction in the coming years.



Long dismissed as a polluted and dead river due to a legacy of industrial abuse, the Naugatuck River has made a remarkable comeback over the last several decades, and is increasingly a destination for anglers, paddlers and sightseers. The NRG Trail will provide access and reconnect communities to the river that they historically turned their to, with waterfront promenades, overlooks, boat launches, and fishing access points all figuring into greenway plans. The multiuse trail will provide a high quality and attractive corridor that will accommodate both walkers and cyclists safely.

The NRG Trail is envisioned as one way to help communities reclaim the river as a driver of local economies and a way to improve local quality of life. The NRG will draw sightseers, cyclists and recreationalists to the valley, and will provide opportunities for local businesses to capitalize on this increased tourist traffic. At the same time, the NRG Trail will give area residents a place closer to home to use for active transportation rather than travelling to trails elsewhere. Convenient access to the trail will encourage more use and will help improve the health and quality of life of those who use it. Since many of the communities along the planned route are in close proximity to each other, the trail will provide a viable safe and convenient non-motorized alternative for commuting in the valley for those who cannot or would rather not use a personal motor vehicle or public transit. These benefits have already been borne out on open sections of NRG, as the trail has become a popular destination and meeting place among residents and non-residents alike, and as a means for transportation. These economic and quality of life benefits will increase as more trail sections are built.

Automated trail user counts conducted by NVCOG and the CT Trail Census, a collaborative statewide volunteer data collection program (https://cttrailcensus.uconn.edu/), have indicated annual estimated trips taken at several trail locations on the greenway. There have been over 300,000 trips recorded each year since 2015 in Derby near the Division Street trailhead making it the busiest NRG section and likely the busiest multiuse trail in the state. In 2015, an estimated 58,000 trips were taken in Naugatuck near the Pulaski pedestrian bridge, and 25,000 trips in Beacon Falls.

Design and construction of the NRG Trail is being undertaken at the local level, with oversight and guidance by the NRG Steering Committee (NRGSC). The NRGSC is volunteer group consisting of members from all eleven NRG host communities, along with regional, state and federal representatives and stakeholders. It serves to promote, support and help guide the development of the NRG Trail. The NVCOG hosts and administers the NRGSC. In 2015, the NRGSC commissioned a study to investigate the economic benefits that the completion of the trail would have on the host communities. The study, conducted in partnership with UConn Extension and the UConn Center for Economic Analysis (CCEA), concluded with the publication of "*Pathway to Revitalization: Economic Impacts of the Phased Completion of the Naugatuck River Greenway*" in March of 2017. The study detailed the substantial economic, health and quality of life benefits of constructing the NRG Trail, and that the cost of constructing the trail would be outweighed by the benefit. The NRGSC and NVCOG continue to disseminate the findings, promoting the expansion of the NRG Trail by demonstrating the benefits of its development.

The NVCOG and NRGSC have also played a role in helping communities conduct routing studies. In 2010, the COGCNV, one of NVCOG's predecessor agencies, oversaw routing studies for Beacon Falls, Naugatuck, Watertown and Thomaston, and the Waterbury Development Corporation conducted one for Waterbury at the same time. These studies developed a stakeholder and publicly supported route for the greenway along with phasing recommendations and construction cost estimates. The NVCOG received a grant from Connecticut Office of Policy and Management (OPM) in 2016 to conduct a routing study for the corridor between Torrington and Thomaston. The study, which is now underway, is being conducted in partnership with the Northwest Hills Council of Governments, the City of Torrington, and the Towns of Litchfield, Harwinton and Thomaston, and will be completed in the spring of 2019.

Since much of the planning and construction will be implemented at the local level, the materials, feel and look of the trail may undoubtedly vary from town-to-town based on local needs and desires. Regardless of these differences, it is important to emphasize that the NRG is a single entity that will traverse 11 communities. The NVCOG is working with communities to implement trail standards as they design and construct new sections of trail.

Visitors to the completed trail should know that they are on a section of the NRG, and be met with a familiar and consistent system of signage and wayfinding no matter which town they are in. The NRGSC recognized that a well designed and implemented unified brand and signage program was critical to the continuity of the NRG. With support and assistance from the NRGSC, a uniform signage and wayfinding design manual was developed ("*Naugatuck River Greenway Uniform Signage and Wayfinding Design Manual,*" November 2016). The manual includes templates trail head, route designation, directional, and informational signs. The family of signs is based on and is consistent with MUTCD standards and guidelines. The NVCOG is working with host communities to institute the recommended signage and branding on established sections of trail. A project is underway to design and purchase interpretive, trailhead and wayfinding signs for installation by NRG host communities.

The goal of the MTP is to complete the construction of the entire length of the NRG. The NRGSC has endorsed priorities for construction going forward ("*Naugatuck River Greenway Project Priorities,*" October 2015). It highlights currently active design and construction projects, Tier 1 projects which include projects for which advanced planning and design have been either completed or is underway, and Tier 2 projects which include remaining trail sections for which a preliminary routing has been identified.

Active Projects

1. Waterbury: Phase 1 – Naugatuck TL at Platts Mill Road to Eagle Street. The project design is expected to be completed in June 2019 and funding for construction has been committed.
2. Ansonia: Riverwalk Segments 2a, 2b, 3 and 4. The project will extend the trail from the recently completed overpass of the Waterbury branch rail line to downtown Ansonia. Design is underway with construction anticipated in 2020.
3. Derby-Shelton: Renovation of the Derby-Shelton Bridge. The project will implement bicycle and pedestrian enhancements along the bridge and make a connection between the Shelton RiverWalk and the Derby Greenway. Design is underway and construction is expected in June 2019.

Tier 1 Projects

1. Naugatuck: Pulaski Walk to Waterbury TL. This section will construct a road-separated multi-use trail from Platts Mill Road near the town line with Waterbury to Pulaski footbridge. The planned trail will connect with the programmed trail in Waterbury.
2. Beacon Falls: South Main Street at Route 42 to Toby's Pond. The trail will be constructed as a road diet of South Main Street and will extend the existing section in downtown to Toby's Pond.
3. Waterbury: Phase 1 Extension – Eagle Street to Jackson Street. This section will extend the Phase 1 trail to just south of the downtown area.
4. Torrington: Franklin Street in downtown Torrington to Bogue Road near the city's southern border. (Note: This section is not located in the Naugatuck Valley planning region, but it is a segment of greater, interregional NRG project).

Tier 2 Projects

1. Torrington: Stillwater Pond to Franklin Street; about 3.0 miles.
2. Litchfield/ Harwinton/ Thomaston: Bogue Road to Thomaston Dam; about 7 miles. Alignment to be determined by an on-going routing study.
3. Thomaston: Thomaston Dam (Vista Picnic Area; USACE property) to Old Waterbury Road; three identified sections at a total of 3.9 miles, ±$5,529,000 – passes through downtown Thomaston and connects with the town's historic clock walk and the New England Railroad Museum.
4. Watertown: Frost Bridge Road to Waterbury town line; about 0.7 miles.
5. Waterbury: Phase 3 – West Main Street and Thomaston Avenue to Watertown TL.
6. Naugatuck: Maple Street to Beacon Falls town line; about 2.2 miles.
7. Beacon Falls: Naugatuck town line to Main Street; about 1.8 miles.
8. Beacon Falls-Seymour: Route 42 to Route 67 connector greenway; about 1.9 miles.

Larkin State Bridle Trail

The Larkin State Bridle Trail (LSBT) is a Connecticut State Park Trail that follows the historic route of the New York and New England Railroad for 10 miles from Naugatuck through Middlebury and Oxford to Southbury. It is a compact stone dust trail originally designated as a bridle path. While it remains popular with equestrians, it is a popular destination for bicyclists, walkers and joggers. The CT Trail Census estimated that over 37,000 trips were taken on the Larkin Trail near Riggs Street in 2017. As part of a LOTCIP-funded reconstruction of Hawley Road, which crosses the Larkin Trail, improved parking and trail access is being included at the request of the NVCOG and in consultation with DEEP. At its terminus in Naugatuck at Route 63, the LSBT is within ½ mile of the location of the Waterbury Phase 1 NRG Trail at Platts Mill Road. However, a route to connect the two trails has not been investigated.

Action

1. Conduct a preliminary engineering study to identify the preferred alignment for a multi-use trail to connect the LSBT to the NRG Trail.

Middlebury Greenway Trail

The Middlebury Greenway follows the historic trolley bed that once connected Waterbury to Woodbury. Generally paralleling Route 64, the trail currently runs 4.5 miles from the intersection of Route 63 and Woodside Avenue near the Waterbury city line, west to the Woodbury town line near Lake Quassapaug. The trail is paved and 10 feet wide. It is popular among bicyclists, joggers and walkers. The CT Trail Census recorded over 55,000 trips taken on the Middlebury Greenway in 2017. There are long-term plans to extend the Middlebury Greenway in both directions. To the west, the town of Woodbury recently purchased a decommissioned water supply reservoir property that will be preserved as open space. The property, now called the Woodbury Trolley Bed Preserve, contains a substantial section of the historic Trolley bed that is passable as a trail, and the town is working to improve it. Woodbury has consulted with the NVCOG regarding the potential to connect downtown Woodbury through the Trolley Bed Preserve to the Middlebury Greenway. Some preliminary routing feasibility study and high level cost estimation has been completed. A section of the corridor between the Preserve property and the terminus of Middlebury Greenway presents some challenges, because the trolley bed has been subsumed into Route 64. Despite some challenges, both towns have expressed interest in making the connection.

At the east end of the Middlebury Greenway, conceptual plans have been developed to extend the trail along Route 63 to provide access to Post University and the Hop Brook Lake Recreation

Area. The extension would be built within the state right-of-way of Route 63 and proposes a road diet on Route 63.

Actions

1. Conduct a preliminary engineering study to determine the feasibility of connecting the Woodbury Trolley Bed Preserve to the Middlebury Greenway and identify the preferred alignment.
2. Construct an extension of the Middlebury Greenway from its terminus at Woodside Avenue to the Hop Brook Lake Recreation Area, with a spur connection to Post University.

Steele Brook Greenway Trail

The Steele Brook Greenway (SBG) Trail is a planned 4.5-mile trail in Watertown, mostly following an old rail bed that once carried freight and passengers to Watertown from Waterbury. The town has constructed a short section of trail between Echo Lake Road and French Street, and recently installed a pedestrian bridge over Steele Brook connecting to the sidewalk network in the Oakville section of Watertown. The town is now working to construct the trail between the bridge and French Street following the rail bed through Unico Field recreation area. Long term plans call for the trail to continue into downtown Oakville to the south and follow the rail bed into Waterbury where it could potentially connect to the NRG Trail. To the north, the trail will follow Steele Brook north through the Heminway Pond area once an ongoing dam removal project is complete. The town is also working to connect the SBG trail to the recently completed NRG Trail section at the new CT Transit bus maintenance facility via sidewalks and on-road accommodations on Echo Lake Road.

Action

1. Complete sections of the Steele Brook Greenway Trail and connect the SBG to the NRG Trail.

Shelton River Walk

The Shelton River Walk is a paved trail along the Housatonic River with two open sections, one adjacent to Veterans Memorial Park and another behind the residential buildings on Canal Street. There are plans to connect the two sections and expand the trail to the north as new development occurs on the river side of Canal Street. The renovation of the Derby-Shelton Bridge will create a direct connection to the Shelton River Walk and connect downtown Shelton to downtown Derby.

Action

1. Complete sections of the Shelton River Walk.

Oxford Main Street

Unlike most communities in the region, Oxford does not have a traditional “walkable” downtown. Route 67, the town’s “Main Street” does not have accommodations for pedestrians, and its narrow width, high volume of traffic and high speed of traffic make it unsafe for bicyclists and pedestrians. Oxford is working to change that, and has initiated the *"Oxford Main Street"* project, aimed at improving non-motorized access in the corridor, connecting the Oxford municipal center to Seymour in the south, including the NRG Trail and Seymour train station, and the Larkin Trail to the north. The corridor would be enhanced with a series of sidewalks, multiuse trails and other non-motorized and traffic calming accommodations.

Action

1. Complete and develop an "Oxford Main Street Master Plan" to provide routing and treatment options along with phasing recommendations and construction cost estimates.

Farmington Canal Heritage Trail

The Farmington Canal Heritage Trail (FCHT) is an 84-mile multiuse trail from New Haven, Connecticut to Northampton, Massachusetts, following the route of the historic Farmington Canal, and later the Canal Railroad. The FCHT is part of the East Coast Greenway (ECG), a bicycle/ pedestrian route stretching from Maine to Florida. The completion of the trail in Connecticut has been a recent priority of the CTDOT. In 2017 and 2018, the CTDOT funded the construction of two sections in Cheshire to close gaps in the FCHT and completing the trail through the town. There is currently work underway to design and build sections of the trail from Lazy Lane in Southington north through Plainville to meet the existing trail at Northwest Drive in northern Plainville. From there the trail runs uninterrupted to the Massachusetts border in Suffield. Cheshire is working to improve pedestrian and bicycle access to the trail from residential and commercial areas, especially around the Jarvis Street trailhead. There are also plans to connect the FCHT in Cheshire to the Quinnipiac River Gorge Trail in Meriden, and potentially on to the Airline Trail via Middletown. Coordination and discussions with the Lower Connecticut River Council of Governments (RiverCOG) about these opportunities are underway.

Action

1. Implement pedestrian and bicyclist access and safety enhancements along the FCHT.
2. Investigate the feasibility of connecting the FCHT to the NRG Trail

The Sue Grossman Still River Greenway Trail

While not in the Naugatuck Valley planning region, the Sue Grossman Trail is planned to connect to the NRG trail in Torrington, and it will ultimately connect to the village of Winsted in Winchester effectively extending the NRG's reach. About three miles of the paved trail is currently complete between Harris Drive and Lanson Drive in Torrington and the City has funding to design the connections into Torrington and construct the already designed section into Winsted.

7.0 Freight and Goods Movement

The local economy depends on freight to deliver goods and materials necessary to do business. Local freight movement depends on a nationwide network of infrastructure. Therefore, the NVCOG works with the state, municipalities and regional stakeholders to identify and prioritize projects that will most effectively support the movement of freight within the region and beyond.

7.1 Truck Borne Freight

Existing Conditions

The regional highway system functions as the primary means of distributing people and goods within and throughout the region. Most of the region's freight traffic is accommodated by roughly 60 miles of expressway.

Volume

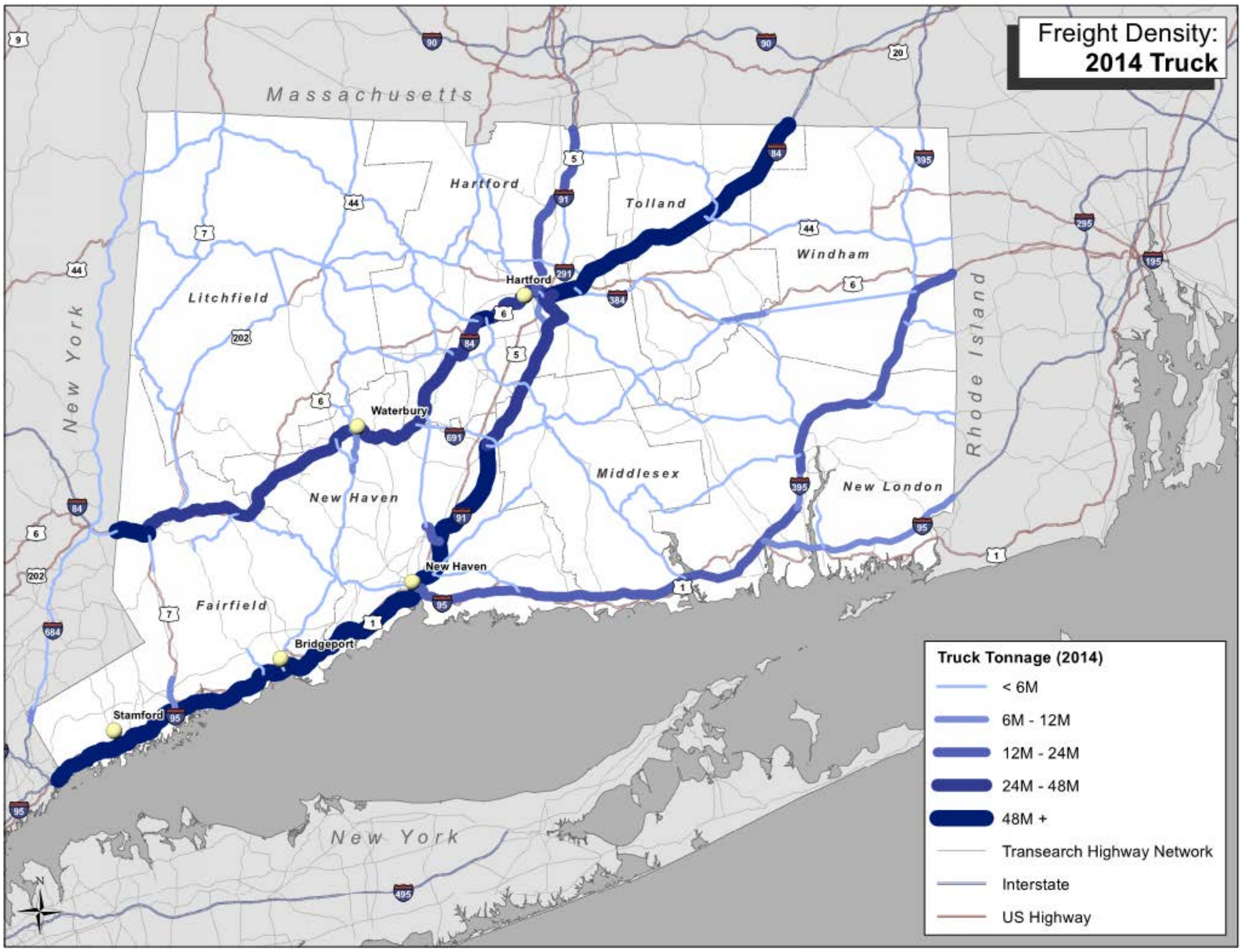
Freight enters, exits and passes through Connecticut primarily on the States' highway network. Trucks carry 93.7% of the tonnage and 92.4% of the value of freight moving throughout the state (2014).

The State of Connecticut serves as a bridge state for freight passing through the Northeast Megaregion, accommodating the movement of freight from the New York metropolitan area and Mid-Atlantic states into greater New England. As a result, only half of the States' truck freight traffic (by weight or value) originates in or is destined to Connecticut.

The principal freight corridor within the Naugatuck Valley region is I-84. I-84 is an important corridor not only to local shippers but to shippers across New England and New York. The following graphics excerpted from the Statewide Freight Plan show current highway freight density in tons. This map shows the critical importance of I-84 as an east-west alternative to the highly congested I-95.

While I-91 and I-84 service statewide north-south freight traffic, Route 8 is the regional north-south freight corridor. This following map also shows that the section of Route 8 between Naugatuck and Waterbury is the only section of non-interstate roadway in northwest Connecticut to carry over 6 million tons of freight.

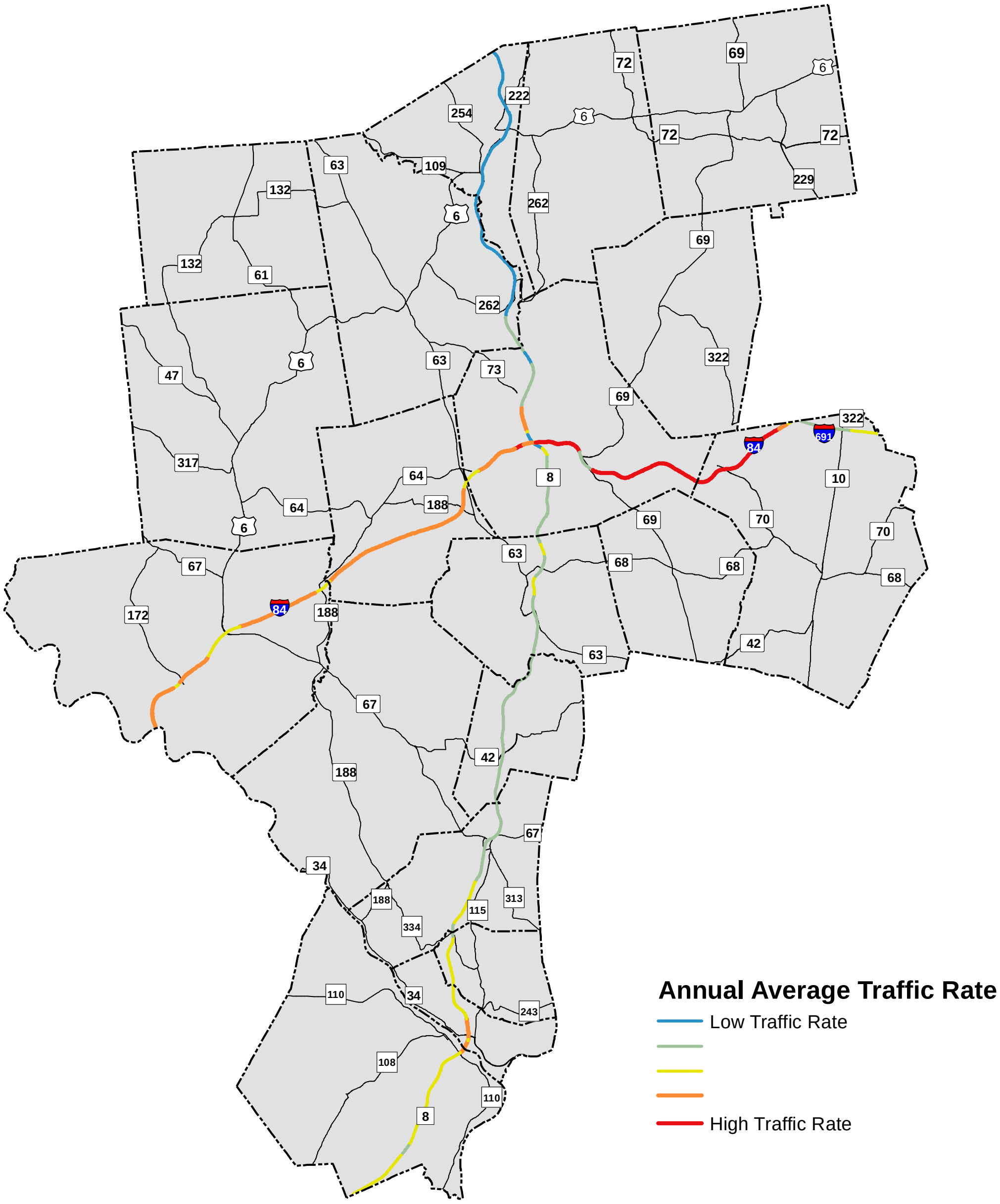
Freight Density 2014



Prepared by CDM Smith, Based on TRANSEARCH® data for 2014

Looking at the Highway Performance Monitoring System (NPMS) data, a map of the Average Annual Daily Truck Traffic for the regional highway network supports the conclusion that I-84 is the region's primary east/west freight artery.

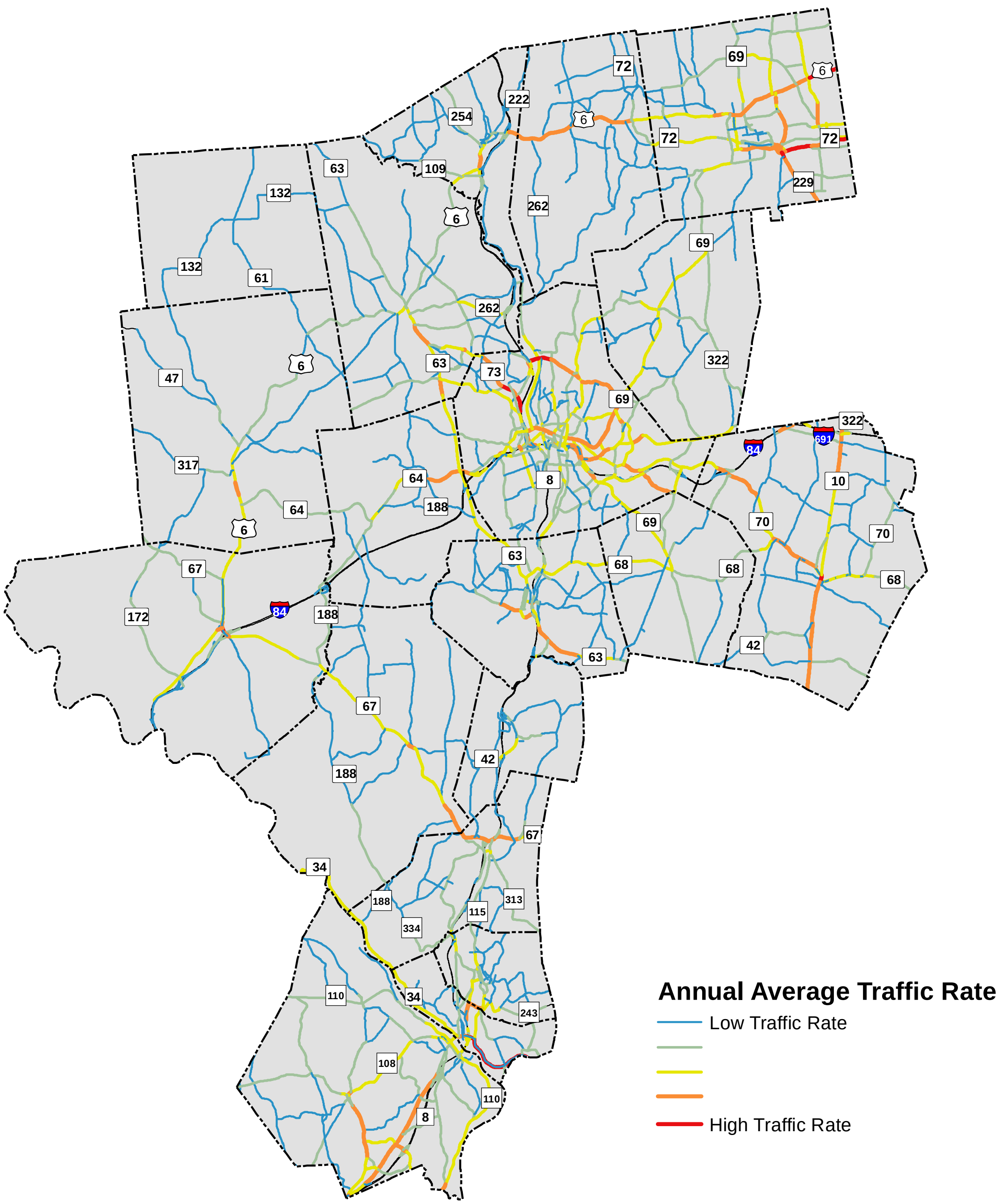
Freight Truck Volume



Source: Highway Performance Monitoring System

To illustrate local freight demand, the following map excludes the Interstate System. In this map, Route 8 stands out as the trunk for freight moving north and south throughout the Naugatuck Valley, from Derby to Thomaston. Route 34, Route 73, and Route 6 appear as important branches, collecting and dispersing local traffic. In Cheshire, Route 10 also emerges as an important freight feeder to I-691. In Bristol, Route 6, Route 72, and Route 229 can be seen as primary intermunicipal freight connectors.

Freight Volume Surface Streets

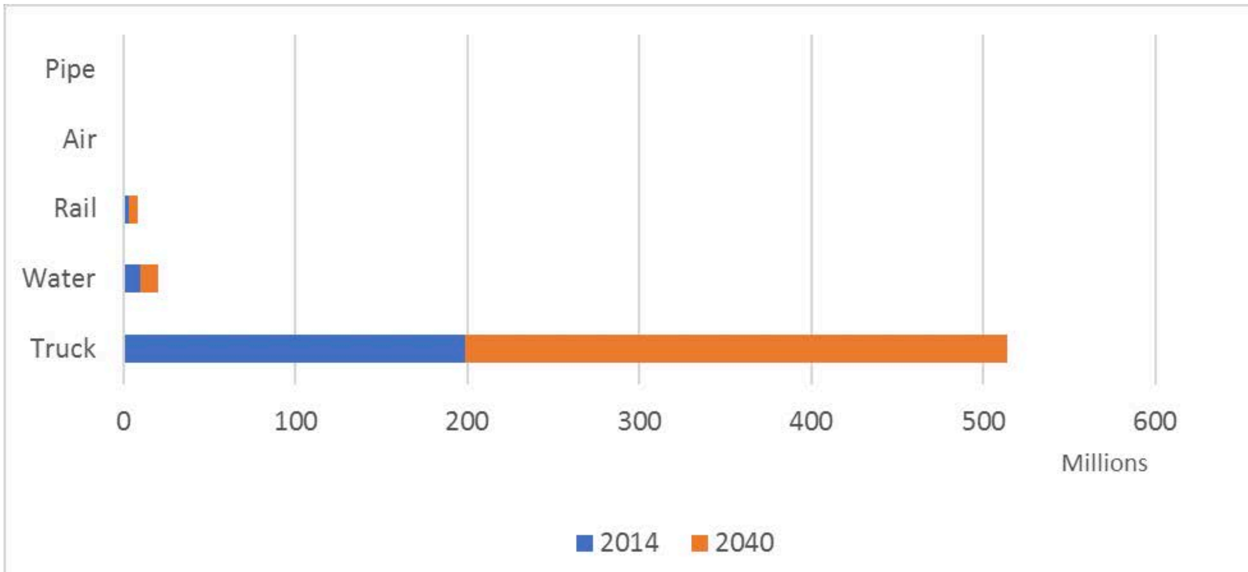


Source: Highway Performance Monitoring System

Trends and Deficiencies

Truck freight volume is forecast to grow substantially over the next 20 years. The following chart shows annual freight tonnage in Connecticut for 2014 and projected out to 2040.

Total Connecticut Freight Tonnage by Mode, 2014 and 2040 (in Millions)

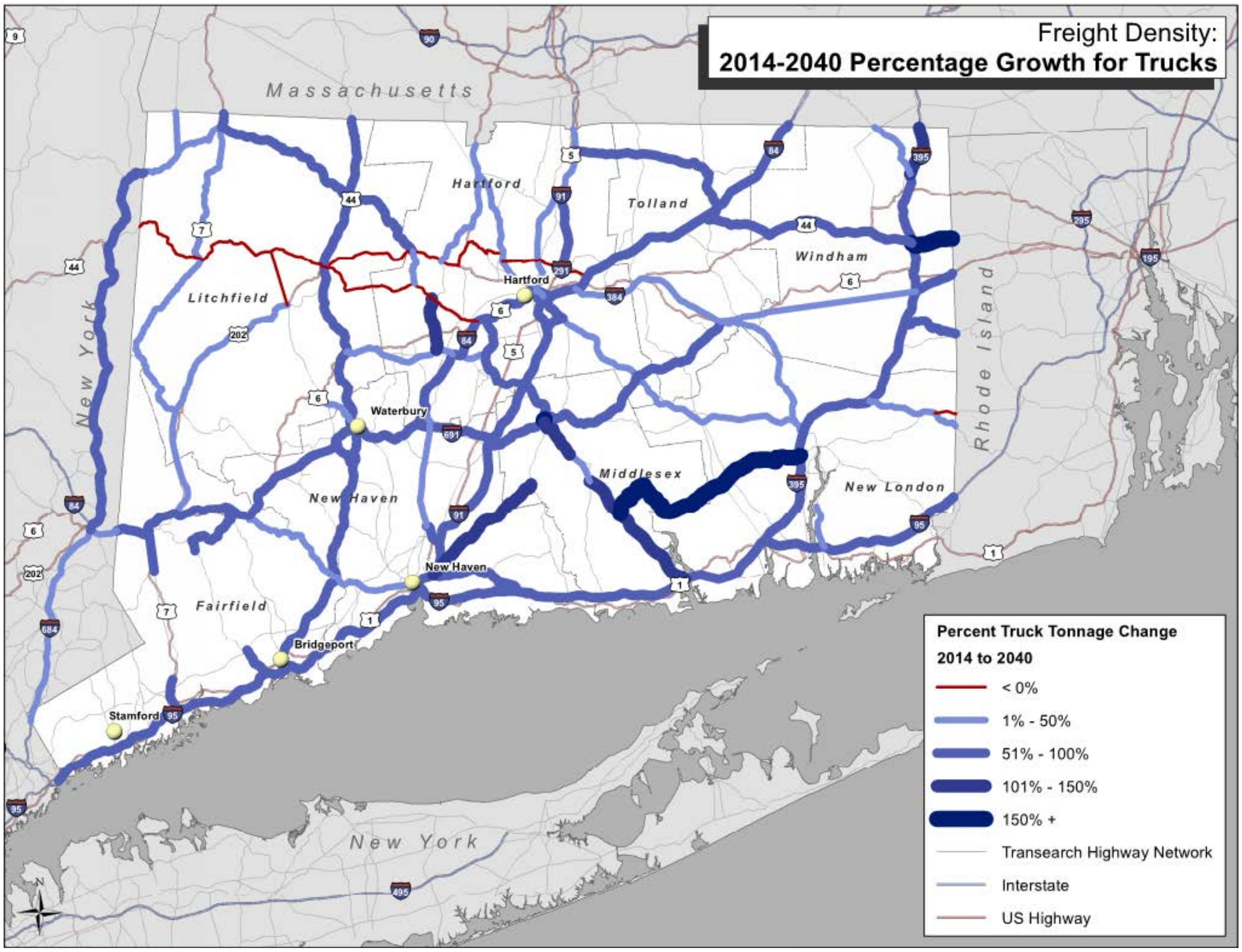


(CDM Smith and IHS-Transearch data)

Holding 2014 as the baseline, the statewide plan also projects percentage change in freight density by route by 2040. These projections are represented in the following map. Perhaps not surprisingly, I-84 and I-691 will continue to absorb significant freight traffic in coming decades. Of equal importance regionally, Route 8 will also see a similar rate of growth in freight traffic.

These datasets all point to Route 8 as western Connecticut's primary north-south non-Interstate freight corridor, connecting truck traffic from I-95 in Bridgeport, I-84 in Waterbury, and Massachusetts to the north. However, this corridor is not currently included in the Critical Urban/Rural Freight Network. Ongoing maintenance and improvements to deficient geometry and aging bridges are needed to accommodate projected growth in freight volume. Including Route 8 in the NHFN would allow access to federal freight funding for roadway improvements.

Freight Density: 2014-2040 Percentage Growth for Trucks



CT Statewide Freight Plan: Prepared by CDM Smith, based on TRANSEARCH® data for 2014 and 2040

Land use

The junction of I-84 and Route 8 at the geographic center of the Naugatuck Valley planning region provides universal expressway access to the trucking industry. Demand for new distribution centers, locations where truckloads of goods are hauled into the region and broken down into smaller loads for further distribution or delivery, is on the rise. Some areas in the region, including parts of Cheshire south of I-691, have used their geographic proximity to develop distribution centers to deliver goods by truck for local retail. Also the number of these facilities is expected to increase as demand for home delivery continues to rise. Because these facilities are major local freight generators, it is necessary for the region to work closely with municipalities to ensure economic development is supported by regional infrastructure planning.

Reliability

Regional freight reliability is a priority for freight dependent enterprises. Costs increase as shippers have to run additional or partially loaded trucks. When enterprises cannot rely on just-in-time shipping, they must carry the additional inventory needed to maintain productivity. As a result, reliability directly impacts how enterprises within the region manage their supply chain and compete in the market. For these reasons, federal rules have identified freight reliability as a national performance measure that all states and MPOs must monitor and target.

This freight specific reliability measure considers factors that are unique to the trucking industry. Some of these unique characteristics include:

- use of the system during all hours of the day;
- high percentage of travel in off-peak periods;
- need for shippers and receivers to factor in more 'buffer' time to their logistics planning for on-time arrivals. [23 CFR 490.607].

The freight specific reliability measure is the Truck Travel Time Reliability (TTTR) index. To calculate this ratio, the 95th percentile travel time is divided by the to the 50th percentile travel time for each road segment. The highest value from five statutorily defined time periods (AM, mid-day, PM, overnight, and weekends) is then averaged for all road segments on the Interstate system.

The TTTR is a measure of reliability, not congestion. Therefore, segments of the highway that are regularly and predictably congested might not have a high travel time reliability ratio. Rather, those segments of highway where delays are unpredictable and severe are scored highest. Prioritizing reliability over congestion came from stakeholder outreach with the freight industry where predictability was deemed most important for scheduling. The TTTR index only applies to roads in the Interstate System.

To fulfill the requirements of Section 23 CFR 490 the CTDOT adopted the following targets in May 20, 2018. Using the FHWA's National Performance Management Research Data Set (NPMRDS), the NVCOG reviewed and endorsed this statewide calculation for the TTTR and the accompanying targets for the metropolitan planning area June 8, 2018 for the CNVMPO.

FHWA Measure for Freight Movement: Statewide Truck Travel Time Reliability (TTTR) Index. The TTTR index is calculated by dividing the 95th percentile truck travel time by 50th percentile truck travel time.

	NVCOG Current Condition	**Statewide Current Condition**	**2-year targets (2020)**	**4-year targets (2022)**
TTTR for interstate	1.74	1.75	1.79	1.83

Source: National Performance Management Research Data Set

Trends and Deficiencies

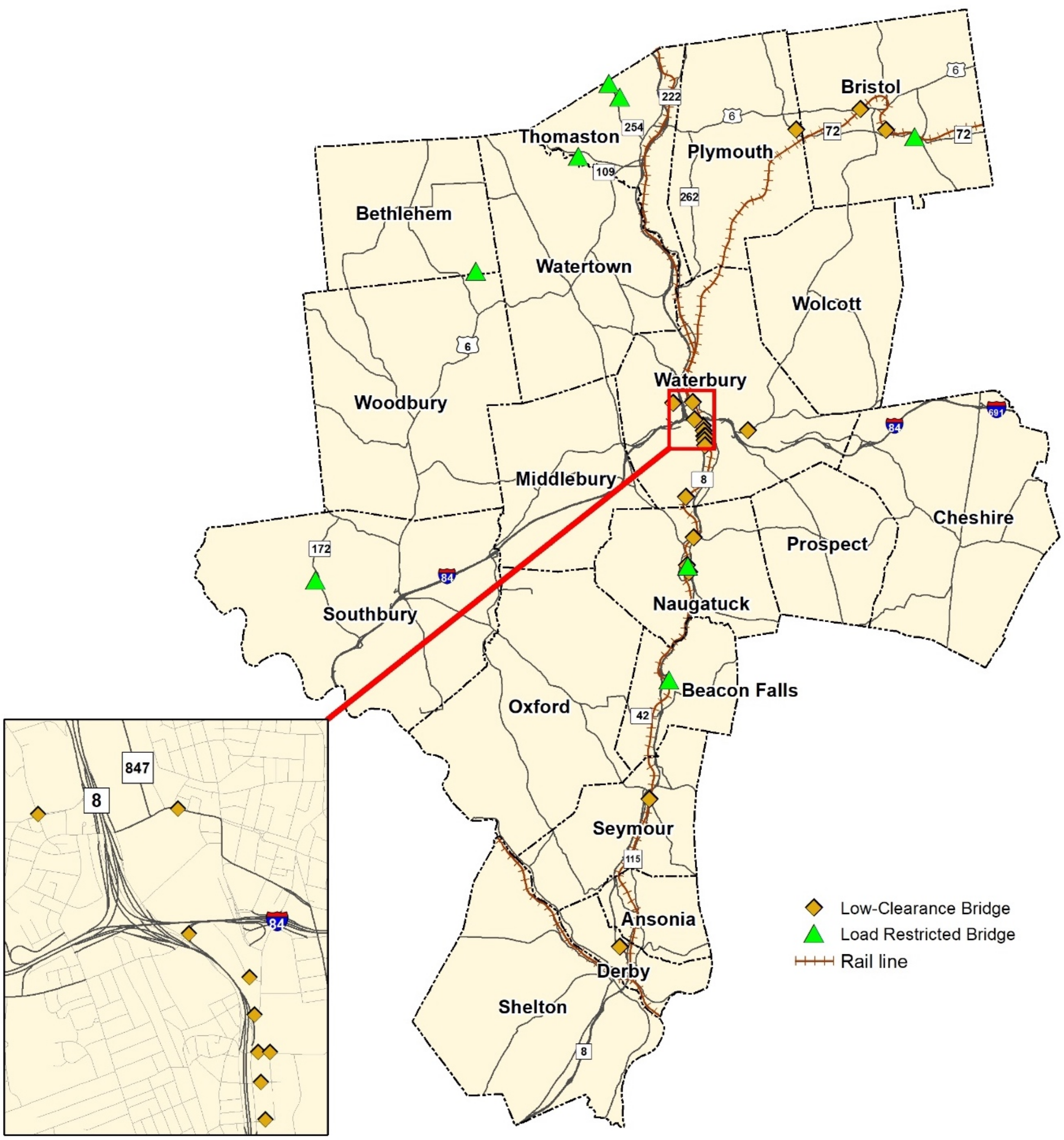
The TTTR index shows irregular truck congestion is expected to increase in the coming years. As a result, the reliability of freight movement through the state and region is expected to decrease. Reliability is best addressed by changing how roads are managed and operated, rather than by expanding the system. Increasingly, highway management involves data, communications, and technologies that help system managers optimize traffic flow, and detect and respond to situations as they arise.

Infrastructure Condition

The state of region's highways is perhaps the most visible element of the freight network. Poor highway conditions increase wear and operating costs on vehicles, increase congestion by reducing highway speeds, and reduce safety. In more extreme cases, deteriorated roadways or bridges can lead to road closures or weight restrictions. It is therefore of great importance to the freight industry that the highway network remains in a state of good repair.

Additionally, the NVCOG catalogues height and weight restricted bridges throughout the region. Improvement of these facilities should be a priority where they coincide with truck corridors or urban areas.

Low Clearance and Load Restricted Bridges



Source: NVCOG

Trends & Deficiencies

While bridge condition is expected to improve statewide in the coming years, the CTDOT foresees pavement condition deteriorating slightly over the next four years. This trend holds true for both the Interstate System and the non-Interstate NHS.

Safety

The NVCOG has adopted a regional approach to highway safety. The NVCOG follows a data driven planning process to first profile accidents throughout the region, assess risk, and prioritize location specific actions to maximize limited fiscal resources available for capital improvements. The NVCOG uses regional crash data from the UCONN Crash Repository. This powerful dataset sheds light on high risk areas within the region.

For heavy duty trucks, that is vehicles with a maximum weight limit greater than 26,000 lbs., this freight plan uses the following safety measures to monitor safety performance:

- Total number of crashes involving heavy duty trucks
- Crashes involving fatalities involving heavy duty trucks
- Crashes involving injuries involving heavy duty trucks
- Number of non-motorized fatalities and non-motorized serious injuries involving heavy duty trucks

Year	Fatalities	Serious Injuries	Bike and Ped Serious Injury/Fatality
2015	3	1	0
2016	6	5	0
2017	2	5	0

Source: Connecticut Crash Data Repository

Trends & Deficiencies

Nationally, fatal crashes involving heavy duty trucks have been on the rise since 2009. Within the state, fatalities and fatality rates are expected to hold constant or increase in the near future. Efforts by operators to fit trucks with new technologies to reduce reaction time and remove blind spots are making the roads safer.

Truck-Borne Freight Actions

- Use data driven process to prioritize improvements where demand is strongest
- Implement ITS infrastructure
- Designate Route 8 as critical urban and rural freight miles
- Explore emerging technologies
- Endorse the following FHWA operational strategies to improve reliability:
  - **Incident Management** – Identifying incidents more quickly, improving response times, and managing incident scenes more effectively;

- **Work Zone Management** – Reducing the amount of time work zones need to be used and moving traffic more effectively through work zones, particularly at peak times;
- **Road Weather Management** – Prediction of weather events (such as rain, snow, ice, and fog) in specific areas and on specific roadways, allowing for more effective road surface treatment;
- **Planned Special Events Traffic Management** – Pre-event planning and coordination and traffic control plans;
- **Freeway, Arterial, and Corridor Management** – Advanced computerized control of traffic signals, ramp meters, and lane usage (lanes that can be reversible, truck-restricted, or exclusively for high occupancy vehicles);
- **Traveler Information** – Providing travelers with real-time information on roadway conditions, where congestion has formed, how bad it is, and advice on alternative routes; and
- **Value Pricing Strategies** – Proactively managing demand and available highway capacity by dynamically adjusting the toll paid by users.

- Continue to prioritize the maintenance of the existing network at a state of good repair.
- Limit heavy duty vehicle speeds. The vulnerability of occupants in passenger vehicles involved in crashes with heavy duty vehicles is a large contributor to fatalities. Reducing the kinetic energy of the trucks with stricter limits on speeds would save lives.
- Pursue safe roadway designs on freight routes to reduce risk of front-to-front crashes.
- Enforce seatbelt regulations
- Connecticut should continue to develop and implement pilot programs to test connected and autonomous vehicles.

7.2 Rail Borne Freight

Existing Conditions

Rail is among the most efficient modes to move goods around the United States. Over the last two decades, due to improved training, technology, and an updated fleet, efficiency has improved 61 percent. Nationwide the fuel efficiency for a ton of grain moved by rail, adjusted for circuity, is on average between 3.3 and 4.4 times more fuel efficient than the movement of the same bulk materials by five-axle truck. Greater fuel efficiency translates into fewer greenhouse gas emissions. The CNVMPO is mandated to maintain a program of transportation projects that do not have adverse impacts on regional air quality. Moving additional freight from the highway to rail offers potential advantages towards achieving air quality conformity with the Clean Air Act. Because of these reasons and the advantage of reduced congestion on the federal highway system, the movement of freight by rail should be prioritized where possible.

Rail is best suited for commodities that are bulky, heavy and not time sensitive. Given this, the State’s primary imports via rail include chemicals, pulp and paper, lumber and wood, sand, and iron and steel and primary rail exports include waste, scrap, stone, gravel, and sand.

The 2013 Central Connecticut Rail Study identified the following barriers that inhibit rail-borne freight statewide.

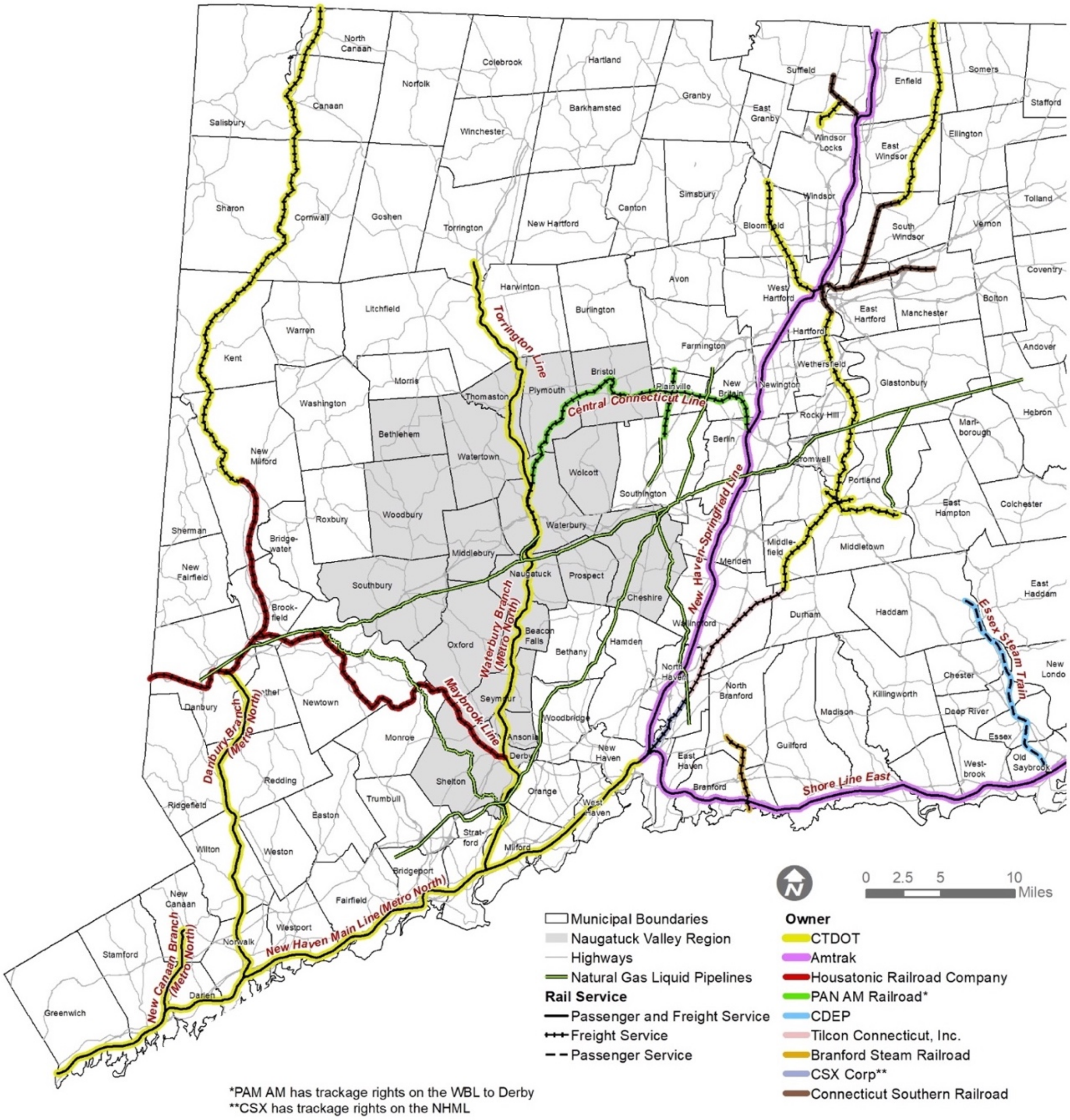
- The dearth of Hudson River rail crossings makes through shipping of freight west of Connecticut challenging;
- Overhead clearances below 22ft 8in limits the size of freight cars that can be used, including double stacked containers;
- Many freight railroads in Connecticut operate at low speeds, between 10 and 25 MPH, due to rail weight and age;
- Car weight restrictions of below 286,000-pound axle loading on many lines do not meet current industry standards. These restrictions limit the amount of commodities carried per car and hurts rail's economic advantage;
- Freight railroads are required to pay track fees for operating over Amtrak rights-of-way;
- The strong competitive position of the trucking industry due to the short distances involved in movement into and through the state; and
- The state increasingly is oriented to business and service activities, which do not generate large volumes of freight.

However, despite these limitations and disadvantages, within the Naugatuck Valley, past investment in the rail network offers a great opportunity for industry. The following map shows the rail, highway and pipeline network for the region, offering opportunities for access for most regional municipalities. While, the region has good rail connectivity, each line is maintained to a different standard and has a variety of restrictions. The following is a brief description of the current operating capacity on the major rail lines that pass through the region.

CSX, the State's sole Class I Carrier, operates on the New Haven Main Line (NHML), which intersects the Waterbury branch rail line (WBL) in Milford, giving the region access to this freight asset. The WBL is the Region's most active rail line with Metro North Railroad operating commuter services throughout the day. This 27.1-mile rail line connects the NHML in Milford to Waterbury. Work is currently underway to add four new or reconstructed sidings, signalization, and positive train control to allow multiple trains to operate on the line at one time. The track is rated to FRA Class 3 standards and has clearance for Plate F. Currently it carries heavy commuter traffic with plans to expand service. PanAm Southern has trackage rights north of the junction of the Maybrook Line in Derby.

Despite the limitations of working around heavy commuter traffic, new freight opportunities are being explored north and south along the line. In Naugatuck discussions are underway to develop a new multimodal facility. Elsewhere, freight stakeholders have pointed to the benefits of rehabilitating the yard in Waterbury and the track in Derby-Shelton to allow interchanging.

Freight Assets and Rail Network



Source: NVCOG

In Derby the WBL intersects the Maybrook Line, operated by the Housatonic Rail Road Company (HRRC). The HRRC operates freight from Derby to Danbury where trains can either continue west into New York State or go north to interchange with CSX in Pittsfield, Massachusetts, and connect to the national rail system. The Maybrook Line runs 33.5 miles from Derby to Danbury. The HRRC is not currently operating through trains between Danbury and Derby. If the Maybrook corridor were reactivated there would be opportunities for direct connections from Derby to Pittsfield, Massachusetts. Because of the opportunity to connect western Connecticut to the national network, this line should be an important piece of future rail growth within the region and State.

This potential is further supported the 2014 data that show substantial freight tonnage being moved over this line. Until the line became inactive, it was maintained to FRA class 2 standards, limiting freight speeds to a maximum of 25 mph. The line is compliant with the 286,000 pound axel loading standards and has a clearance for Plate F (up to 17ft 8in).

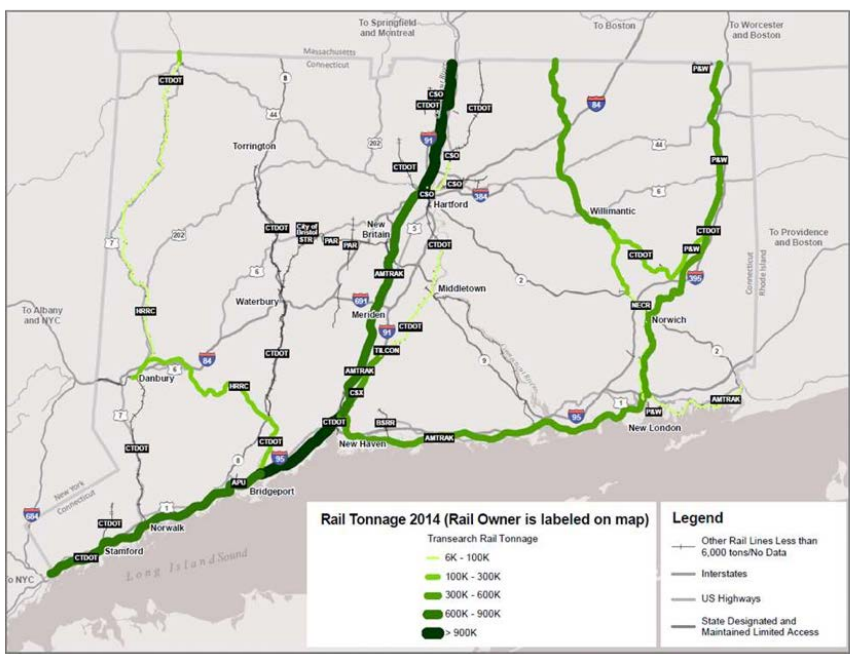
Pan Am Railroad operates on the Central CT Line (Terryville secondary, New Britain Secondary, and the Berlin Secondary), connecting Waterbury east to Plymouth, Bristol, and the Plainfield Yard before connecting to the New Haven-Hartford-Springfield line in Berlin. The Central CT line is currently operating regular freight service and growing its market. The FRA currently rates the Central CT line as a class 2 track, with speeds restricted to 25 mph. However, due to track conditions in certain locations, much of the line functions as a class 1 track with speeds limited to 10 mph. Rail axel loading is limited to 263,000 pounds. Clearance is limited to 17 ft (Plate F). In the 2016 Central CT Railroad Study, CTDOT recommends improving this rail line to meet FRA track class 3 standards, allowing freight to travel at up to 40 mph. The study estimates the cost of these upgrades to be $170 million.

From the terminus of the WBL in Waterbury, the Railroad Museum of New England operates seasonally north along the Torrington Branch. While, service along this 19.5-mile segment from Waterbury to Torrington is mainly limited to the museum's seasonal tourist train, the line can accommodate a 263,000-pound axel loading and has a clearance for Plate C. The track meets FRA track class 1 standards, limiting freight operating speeds to 10 mph. Freight currently operates regularly in the southern portion of the track from Waterbury through Watertown, but there is discussion of additional freight operations farther north.

Trends and Deficiencies

Rail tonnage is forecast to increase from 3.1 million tons in 2014 to 5.5 million tons in 2040, an increase of 78.3 percent (2.2 percent annually). Rail commodity value is forecast to increase from $2.2 billion in 2014 to $3.4 billion by 2040, or 54.7% (1.7% annually). Rail freight growth is projected to occur on the rail-equivalent corridors of the most heavily traveled truck routes, generally following I-95 and I-91. In percentage terms, the largest growth in rail traffic is projected for the southwestern portion of the state.

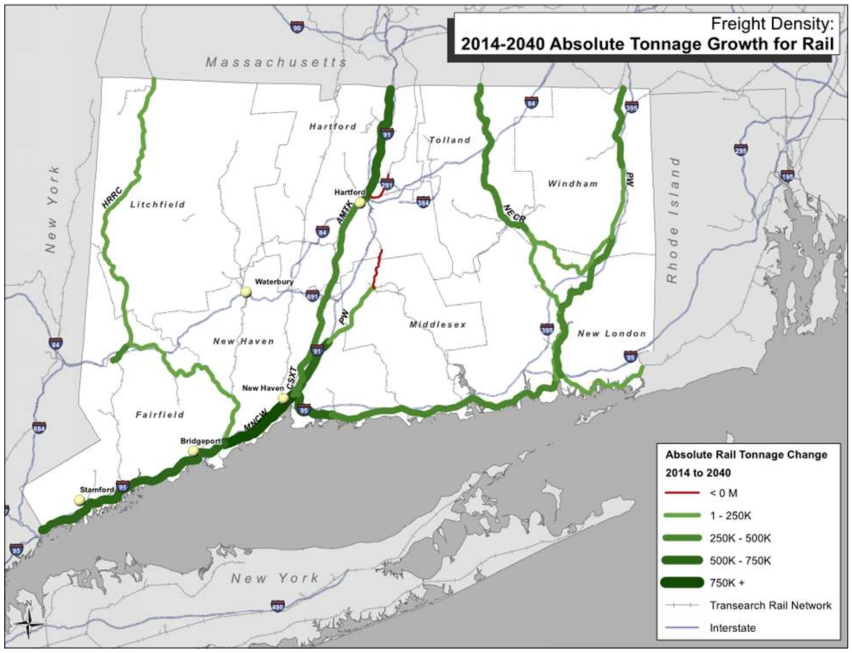
Connecticut Freight Rail Tonnage, 2014



Source: CDM Smith and IHS-Transearch data

While rail will see greater traffic in future years it still remains a less congested alternative to the highway network. The rail network will need increased attention and maintenance if it is to remain a viable freight alternative. Currently speeds are highly restricted on the Central CT Line. The Millbrook line is not active. The Thomaston Branch line is mostly inactive except for a tourist train run out of Thomaston. The prioritization of freight oriented land uses along the rail lines might serve as an effective strategy to revitalize these assets and encourage private investment in rail line maintenance. Shifting modal choice from the highway to the rail will help preserve the system as a whole and postpone expensive highway investments that will be needed to handle expected freight growth.

Forecast of Truck Freight Growth (by Tonnage), 2014-2040



Source: CDM Smith and IHS-Transearch data

Multimodal Facilities and Inland Ports

The NVCOG seeks to work effectively with its municipalities and CTDOT to maximize the efficiency and productivity of existing infrastructure. Given the uncertainty and variability of highway funding for capital improvements, the NVCOG prioritizes maintenance and works to promote projects that can improved the complementary nature of existing assets. Improving the ease of choice among the region's freight modes offers the region benefits that are not available in many parts of the country. Intermodal transfer between rail, pipeline, and truck offers opportunities to reduce highway volumes while improving reliability.

In Naugatuck, an inland port and intermodal transportation hub is being proposed for a mostly-vacant 86.5-acre parcel of land along Elm Street. The port would be used to transport consumer goods for warehousing and distribution. It would also allow international goods to go through customs in the Borough rather than when crossing the border. The proposed site of the port on the WBL connects to the Pan Am Railways network stretching from southern Connecticut to Canada.

State departments are collaborating on the project to ensure the environmental remediation to fill and cap the property to the east of the train tracks at the site of the port can be completed and fund are available to build a needed railroad spur to allow trains to pull off the main line and unload their cargo.

Indeed, the CTDOT's 2012 Connecticut State Rail Plan recognizes the importance of intermodal facilities and calls for the revitalization of intermodal facilities and inland ports to help remove long-haul trucks from the road as well as increase shipping speed.

Rail-Borne Freight Actions

- Increase capacity of Amtrak-owned rail bridge over the Connecticut River (Windsor Locks) to accommodate a 286,000 lbs standard car size
- Improve Central CT Railroad to FRA Track Class 3
- Maintain Maybrook Line to FRA Track Class 2
- Support the ongoing development of intermodal freight facilities within the region. Specifically, develop intermodal freight facility in the Borough of Naugatuck along the WBL, south of Route 63 on 86.6 acre former industrial – Uniroyal Chemical site
- Prioritize freight intensive land uses adjacent to the region's rail lines

7.3 Pipeline

Existing Conditions

Pipeline transmission is a very efficient method to ship fuels and can decrease the number of delivery trucks needed on the highway system. These large transmission pipelines for natural gas and petroleum products can be compared to the nation's interstate highway system. They move large amounts of fuel thousands of miles from the producing regions to local distribution companies. There are many interconnections with other pipelines and other utility systems, which offer system operators a great deal of flexibility in moving gas. The top priority listed in the State of CTDOT freight plan is to incentivize fuel delivery companies to utilize the pipeline infrastructure to its fullest capacity.

Almost 100 % pipeline-related movements are crude petroleum and natural gas, with natural gas accounting for 88%. According to the CTDOT Statewide Freight Plan, in 2014, pipeline transmission has moved 287.9 thousand tons of crude petroleum and natural gas products in Connecticut valued at $62 million.

Four companies operate pipelines in or near the Naugatuck Valley region. The Buckeye Pipe Line Company operates an approximately 100-mile refined petroleum fuel pipeline that transports jet fuel from the Port of New Haven through Middletown and Hartford to Bradley International Airport and Westover Air Force Base, just north of Springfield, Massachusetts. The Buckeye transmission pipeline also carries other petroleum products to a pipeline terminal in Wethersfield.

The Iroquois Gas Corp natural gas pipeline traverses the Naugatuck Valley region and interconnects with the Tennessee Gas Pipeline Company (Kinder Morgan, Inc.) in Shelton. The Tennessee Gas Pipeline Company's natural gas transmission pipeline also interconnects and pipeline owned by Algonquin Gas Transmission LLC (Spectra Energy Partners) in Cheshire. The Algonquin Gas Transmission Company has several transmission pipelines traversing the region:

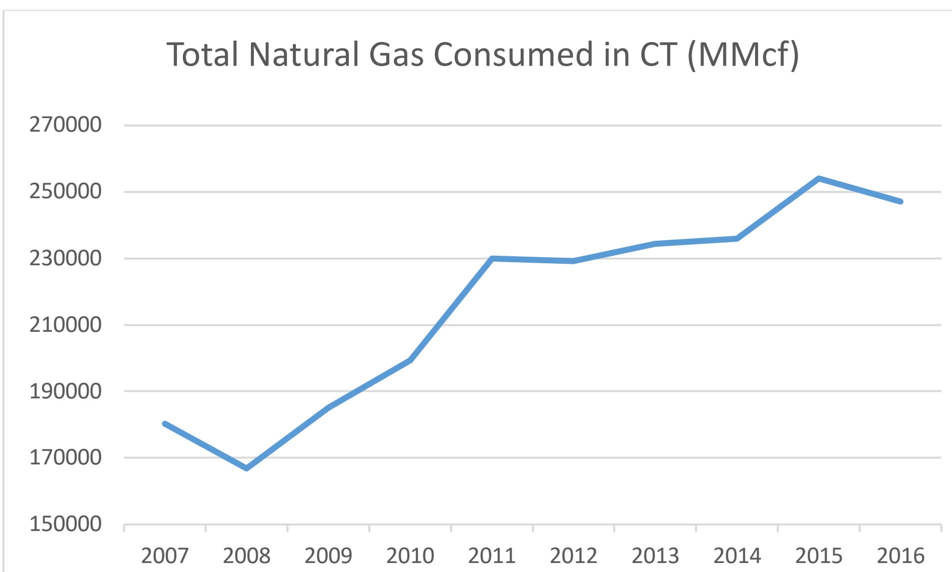
one crosses east to west through Southbury, Oxford, Middlebury, Naugatuck, Waterbury, Prospect, and connects to the another in Cheshire that runs north to south. Many of the pipelines in Connecticut are looped, that is there are two or more lines running parallel to each other in the same right of way. This provides maximum capacity during periods of peak demand.

The U.S. Energy Information Administration publishes the current capacity rates for the four major pipelines for transmitting natural gas in the state. The following table displays the entity managing the natural gas pipeline transmission, county of origin, county of destination, and the capacity of each transmission pipeline in 2017.

Pipeline	County From	County To	Capacity (MMcf/d)
Algonquin Gas Trans. Co.	Fairfield, CT	Putnam, NY	275
Algonquin Gas Trans. Co.	Windham, CT	Providence, RI	1,102
Iroquois Pipeline Corp	New Haven, CT	Suffolk, NY	620
Tennessee Gas Pipeline Co.	Hartford, CT	Hampden, MA	80
MMcf/d = Million Cubic Feet Per Day			

Trends and Deficiencies

While pipeline provides benefits for freight movement and has enjoy growing demand in the last decade, as a freight mode it has also faced resistance from communities in the Northeast.



Connecticut has approximately 590 miles of transmission pipelines currently in operation within the state. In its Statewide Freight Plan the CTDOT states that the system is limited in its capacity to meet the growing demand. Some projects to expand capacity have recently been completed or are under development in or near the region. The Algonquin Incremental Market expansion project, which added thirty-seven miles and 342 million cubic feet per day (MMcf/d) of capacity, was completed in 2016; the Connecticut Expansion Project by the Tennessee Pipeline Company, which added sixteen miles and 72 MMcf/d of capacity, was completed in 2017; Algonquin Gas Transmission LLC is constructing the Atlantic Bridge Project, currently in its second phase.

Additionally, in June 2018, Competitive Power Ventures, in conjunction with General Electric, began operations of CPV Towantic Energy Center, a natural gas-fired electric generating facility, in Oxford and is supplying power to more than 800,000 homes. This project clearly benefits from its location along the Algonquin Gas Transmission Pipeline and the Connecticut Light & Power electricity transmission lines and illustrates the importance of pipeline to the freight network.

Ongoing planning includes the Access Northeast, a project currently under review by Enbridge Inc., Eversource Energy, and National Grid. This natural gas pipeline will have a peak capacity up to 900,000 dekatherms (approximately 900 MMcf) per day.

Pipeline Actions

Leverage the existing pipeline network to reduce the vehicle miles traveled by heavy trailer trucks on the highway system

Where feasible, encourage land use to support multi-modal facilities along exiting pipeline.

7.4 Shipping and Air Freight

Shipping and air freight have important effects on the regional economy. However, no facilities currently lie within the limits of the planning region. The region is landlocked and while Waterbury-Oxford airport is an important piece of the local economy, the limited size of its run way will not accommodate the needs of bigger, heavier freight airplanes. For more information about freight planning especially how it affects the states ports and airports, please refer to the statewide freight plan.

8.0 Aviation

The NVCOG region hosts one general aviation (GA) airport, four small aircraft facilities, and six Federal Airport Administration (FAA) registered heliports. The GA Airports and Heliports are managed by the Connecticut Airport Authority (CAA). The region's publicly owned and operated GA service level airport is located in both Oxford and Middlebury and named the Waterbury-Oxford Airport (OXC). The MTP will consider only general aviation airports.

General Aviation Airports and Heliports

Source: NVCOG

8.1 Existing Conditions

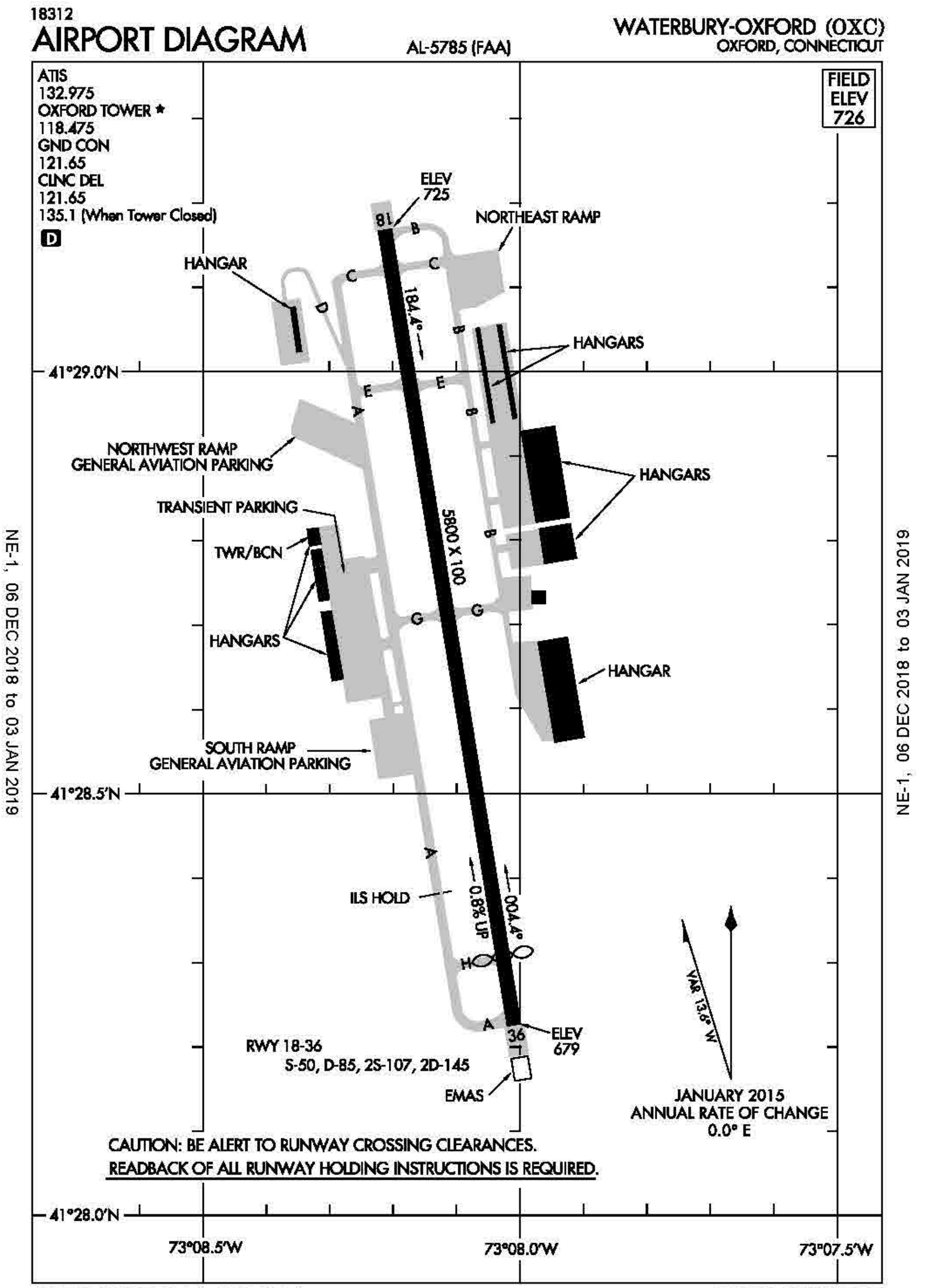
General Aviation Airports

The OXC primarily services corporate, business and recreational flight operations, and does not serve commercial airlines. The Federal Aviation Administration (FAA) has categorized OXC as a "national asset" based on existing aviation activity such as the number and types of based aircraft. The "national asset" group includes general aviation airports which serve national and global markets. In 2017, OXF handled an average of 119 flights a day, approximately 43,500 operations a year. Situated seven miles southwest of Waterbury, it is accessible from Route 188 and I-84. The airport offers facilities for corporate, freight, and recreational flights. It is owned and operated by the Connecticut Airport Authority (CAA), and has provided general aviation services since its completion in 1971. It occupies 424 acres within a 3,000 acre zone of industrial land. The airport's runway is 5,800 feet long by 100 feet wide. In 2018, there were 2 helicopters and 106 aircraft based at the Waterbury-Oxford Airport, of which 17 were medium and large corporate jets, 3 were multi-engine, and 84 were single-engine aircraft.

Atlantic Aviation offers servicing and maintenance as well as charter passenger service and air freight. Tradewind Aviation LLC, Clay Lacy and Richmor Aviation offer charter passenger service. Image Aviation Services, Clay Lacy provides medium and small jet servicing. Image Aviation Service, Oxford Flight Training, and Richmor Aviation provide flight school training. Executive Aircraft Interiors, Inc. offers complete refurbishment of single engine to large cabins.

An air traffic control tower became operational in 2001. The State of Connecticut has implemented various infrastructure improvements such as additional taxiways, gas mains, electrical service, and a sewer system. A rear access road, entrance improvements including a gateway, and additional signage are also planned for the airport.

In 2010, the airport contributed 1,670 direct and in-direct jobs to the local economy and had an economic impact of about $235 million. In 2013 the Waterbury-Oxford Development Zone was designated by the state of Connecticut. Companies that move into the Development Zone may be eligible for property tax abatements and state corporation business tax credits.



Source: Federal Aviation Administration website https://aeronav.faa.gov/d-tpp/1813/05785AD.PDF

Heliports

Heliports are managed by the Connecticut Airport Authority, however takings of property are under the jurisdiction of the Commissioner of Transportation (CGS §13b-39). There are currently six (6) operational FAA registered heliports in the NVCOG region (see table below for details). This MTP will not include or consider Heliport projects.

Heliport name	Location	Type	Operational?	# of Runways
Bristol Hospital Heliport	Bristol, Connecticut	Heliport	Operational	1
Ultimate Heliport	Bristol, Connecticut	Heliport	Operational	1
St Mary's Heliport	Waterbury, Connecticut	Heliport	Operational	1
Rondo Heliport	Naugatuck, Connecticut	Heliport	Operational	1
Miry Dam Heliport	Middlebury, Connecticut	Heliport	Operational	1
Itt Heliport	Shelton, Connecticut	Heliport	Operational	1

Source: http://www.city-data.com/airports/Connecticut.html accessed 11-7-2018.

8.2 Trends & Forecasts

As per the Connecticut Statewide Airport System Plan (CSASP) (2016), between the years 2006 and 2016, the following factors affected demand for air carriers and general aviation transportation services at airports within Connecticut:

- Economic conditions, employment/unemployment, and income/debt levels
- Changes in population
- Changes in air service patterns due to consolidation
- Aviation fuel prices
- Changes in airline and general aviation fleets
- Competing services in nearby states
- Fares and the cost of inputs
- Corporate profits

Between 2003 and 2016, a series of one-time events (terrorism, recessions, fuel spikes, and industry consolidation) have depressed the demand for aviation nationally and in CT. But since 2016, the aviation industry is generally viewed as being in a state of recovery. For general aviation operations, recovery has differed between high-end and light GA markets. High-end GA includes turbojet and turboprop aircraft (8+ seat) and fractional operations. Large corporate operators dominate the turbojet market. Turbojet operations are expected to grow at a rate greater than the general economy. Light GA operations include single or twin engine piston aircraft (6 or fewer seats) and are expected to decline. Retirement of aging aircraft is the main contributor to light GA decline. Turbojet operations have been on the increase at OXC and development plans call for greater support of high-end GA activity.

8.3 System Deficiencies, Issues & Problems

Connecticut Airport System Challenges and Recommendations

Airport infrastructure generally serves higher-end economic contributors than other transportation infrastructure, and thus infrastructure challenges may affect economic conditions at regional and state scales. Key CT airport system challenges are outlined in the table below.

Connecticut Airport System Challenges (2016)

Category	Challenges or Influences
Aviation Industry Trends	• Aircraft Size and Performance • Cargo Growth • Viability of General Aviation • Airport Traffic Control Tower Closures • Socioeconomic Conditions
In-State Dynamics	• Airport Development Restrictions and Incentives • Airport Roles & Closures • Governance Structures
Neighboring State Influences	• Commercial Airport Proximity • Destinations Served • Competition for Cargo • Vying for Business Aircraft
Capacity/Development Constraints	• System Capacity • Physical Constraints • Environmental Regulations • Varying Political/Municipal Viewpoints • Community Perception

Source: Connecticut Statewide Airport System Plan (CSASP) (2016)

Based on the airport system analysis completed as part of the 2016 CSASP, recommendations for CT GA system infrastructure include the following:

- Attract the high-end operator growth market that help to drive economic development and enhance the State's competitive position.
- Undertake long-term efforts to reduce airport development constraints: legislative, environmental, physical, and community

- Support development and expansion of economic incentive zones near airports and establish airport land use compatibility guidelines
- Pursue runway extensions to achieve more than 5,000 feet takeoff length
- Prepare hangar and service development areas at target high-end airports
- Undertake pavement and improvements to comply with FAA design standards
- Advocacy and aviation technical contribution

Waterbury-Oxford Airport Challenges and Recommendations

In December 2010, a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis workshop was conducted at the Waterbury-Oxford Airport. The SWOT results led to identification of OXC advantages, challenges and priorities which subsequently informed the 2012 OXC Business Plan.

OXC advantages included:

- Proximity to Metropolitan New York area and ability to attract corporate activity.
- Favorable tax structure
- Cooperation and support from surrounding communities
- Airport and its on-site businesses perceived as valued employers within the community.

OXC challenges and recommendations included:

- Airport maintenance at current levels.
- Overregulation and involvement by many levels of government. This has been somewhat mitigated with the 2012 transition of airport operation from the State of CT to the Connecticut Airport Authority (CAA).
- Infrastructure improvements such as installing radar in the control tower, installing a Medium Intensity Approach Lighting System (MALS) and adding a deicing facility.
- Expand the amount of developable land trough a “clean fill” program to reduce sloped terrain.
- Create a Foreign Trade Zone (FTZ) at OXC which would allow US customs processing services and facilities to be located at the airport. The development of an FTZ in the vicinity of the Airport would provide an opportunity for businesses to take advantage of both the Airport and the FTZ, and compete with other businesses on an international level.
- Develop high-end GA hangar facilities.

8.4 Projects

Development of the OXC and heliports is managed by the CAA. Documents which guide OXC development include the following:

- Waterbury-Oxford Master Plan (2007)

- Waterbury-Oxford Business Plan (2012)
- Connecticut Statewide Airport System Plan (CSASP) (2016)
- Waterbury-Oxford Airport Environmental Assessment/Environmental Impact Evaluation for Obstructions (2017)

The following OXC airport projects are underway or planned over the next few years:

Increased Hangar Space

The lack of adequate hangar space limits growth. Additional hangars and tie-down areas are recommended in CTDOT's Waterbury-Oxford Airport Master Plan, and Keystone, the fixed-base operator, is proposing the construction of a hangar and office space with a 206,000 square-foot footprint at the airport.

Safety Improvements

The Waterbury-Oxford Airport Master Plan calls for safety improvements including expanded taxiways, new lighting, and obstruction removal. Concurrent with the latest master plan update, an airport noise study was completed by the Federal Aviation Administration to understand the noise impacts of the airport and to identify the areas around the airport that are eligible for noise abatement. The study found that some residences in Middlebury experience noise levels considered incompatible with residential uses. CTDOT has initiated a voluntary buyout program for the Triangle Hills subdivision in Middlebury. The study also recommends that undeveloped, land near the airport be rezoned for non-residential uses.

Runway Reconstruction

In the Fall of 2017, the yearlong Runway Reconstruction Construction Project commenced. This project addressed non-conforming runway safety areas at each end of the runway to bring the airport into safety conformance for its general aviation designation. Additional improvements included new runway and taxiway lighting in the work areas, replacement of drainage and structures, removal of runway taxiway "A" and two connector taxiways to eliminate direct runway access.

9.0 Sustainable Transportation

Sustainable transportation looks beyond infrastructure investments in highway improvements to consider how transportation decisions made today will affect the health and wealth of communities in the future. When transportation investments take into consideration economic, environmental and social issues, opportunities to improve all travelers' quality of life or livability are created. Since 2009, the federal government has used an interdisciplinary approach to foster sustainable communities and improve peoples' livability. The US Department of Transportation (USDOT), the US Department of Housing and Urban Development (HUD) and US Environmental Protection Agency (EPA) formed the *Partnership for Sustainable Communities* to improve access to affordable housing, provide more transportation options, and lower transportation costs. The partnership established six livability principles which describe the multidisciplinary nature of sustainable development:

- Provide more transportation choices: Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.
- Promote equitable, affordable housing: Expand location- and energy-efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation.
- Enhance economic competitiveness: Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services, and other basic needs by workers, as well as expanded business access to markets.
- Support existing communities: Target Federal funding toward existing communities through strategies like transit oriented, mixed-use development, and land recycling, to increase community revitalization and the efficiency of public works investments and safeguard rural landscapes.
- Coordinate and leverage Federal policies and investment: Align federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy.
- Value communities and neighborhoods: Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods.

In response to the HUD *Sustainable Communities Regional Planning Grant Program,* a partnership of seventeen cities, counties and MPOs in Long Island, the Hudson Valley, and southern Connecticut was formed to develop a regional plan of sustainability. It was known as the New York-Connecticut Metropolitan Region Sustainable Communities Planning Consortium. The Naugatuck Valley Council of Governments, by its membership in the Greater Bridgeport and Valley MPO, participated in the project. The Consortium, over a three-year period, developed a regional plan for sustainable development to leverage the region's robust transit network to promote and achieve more sustainable growth. The primary goal of the plan is to foster sustainable development and transportation.

(http://www.sustainablenyct.org/SCIImplementationPlan20140602Final.pdf)

While the NVCOG supports sustainable transportation and the six livability principles, the region continues to experience obstacles to sustainable development through past reliance on highways and roadways and current limited commuter rail service provided on the Waterbury branch rail line. Residents, municipal leaders and officials, and other stakeholders of the Naugatuck Valley region recognize the limits on land and natural resources and the implications when reliable and efficient transportation for commuters to travel to job centers is not provided.

To adhere to the livability principles, the NVCOG has developed a metropolitan transportation plan for the Naugatuck Valley planning region and the Central Naugatuck Valley MPO that promotes a shift to an increased emphasis on mode choice, public transit opportunities, sustainable development, housing, and interconnectedness of transportation planning and transit supportive land uses. The key focus of the plan is to effectuate a fundamental change in how city centers are perceived and construct transformative improvements that will be the catalysts for economic revitalization, livable communities and sustainable transportation choices.

9.1 Sustainable CT

Sustainable CT is a voluntary municipal certification program to recognize thriving and resilient Connecticut municipalities taking local actions toward sustainability. One of the program's goals is to broaden the understanding of sustainability, looking beyond the environment to include the economy, housing, transportation, culture, equity and public services and events. This perspective on sustainability echoes the six livability principles identified by the *Partnership for Sustainable Communities*. Sustainable CT is an independently funded, grassroots, municipal effort, which has identified a broad range of sustainable best practices. Municipalities choose *Sustainable CT* actions, implement them, and earn points toward certification. Every *Sustainable CT* action can produce multiple community benefits, demonstrating how local action can have a statewide impact.

Transportation is one of the nine *Sustainable CT* action categories. More specifically, the "*Clean and Diverse Transportation Systems and Choices"* category includes many sub-categories and actions that municipalities and the NVCOG may collaborate on to improve the sustainability of the transportation system regionwide. This category includes actions taken to implement complete streets, promote effective parking management, encourage smart commuting, support zero emissions vehicle deployment, and promote public transit and other mobility strategies.

The following section discusses these transportation related sustainable actions and how the region may collaborate with municipalities to support and help them achieve *Sustainable CT* certification and realize the intended benefits.

Implement complete streets

The goal of these actions is to reward steps taken toward a municipality building more complete street facilities. From training and planning to project construction, this sub categories affords municipalities opportunities to score points wherever they are in the process of adding complete streets to their community.

The NVCOG plays a supportive role in this process by developing regional planning documents and templates which may be locally implemented. Additionally, where funding is regionally distributed, the NVCOG will continue to encourage project sponsors to take steps that would support these goals by *“allow(ing) safer access for all roadway users—including motor vehicles, pedestrians, bicyclists, and transit users—regardless of age, ability, income or ethnicity.”*

Promote effective parking management

In this action, *Sustainable CT* recognizes the importance of parking to support the vitality of a commercial district. However, effective parking management can also mitigate environmental impacts, including excessive land consumption, degraded water quality, and exacerbated heat island effects and reduce greenhouse gas emissions by encouraging alternative modes of transit.

At the regional level the NVCOG conducts commuter parking lot counts. The NVCOG can conduct parking studies for the region’s communities and disseminate information about commuter lots and adjacent facilities with differing time parking demand.

Encourage smart commuting

To meet the goals of this action, communities must show that they are making efforts and providing options to their employees to use alternative modes of transportation for their commutes.

The NVCOG continues to undertake studies aimed at promoting alternative modes of transportation for the region’s commuters and has hosted presentations on the subject. Going forward, in addition to the NVCOG attempting to implement these actions in-house as a public entity, it can also amass resources on regionwide opportunities for transit, vanpool, and other alternative modes of transportation, which may benefit the residents and workers of individual municipalities.

Support zero emissions vehicle deployment

Under this action, *Sustainable CT* is encouraging communities to transition their municipal vehicle fleet, and create infrastructure for zero emission vehicles (ZEV) that city officials, residents, businesses, and travelers may use. While the goal is increased deployment of ZEVs within the municipal fleet, there are many intermediate steps municipalities can take including inventorying existing infrastructure. For example, the municipality of Plymouth, working with the region, acquired hybrid vehicles to reduce fuel consumption. Additionally, the NVCOG is actively developing data and publishing information about existing ZEV infrastructure. The Region will continue to act in this supportive manner while promoting regional grant funding for the expansion of infrastructure.

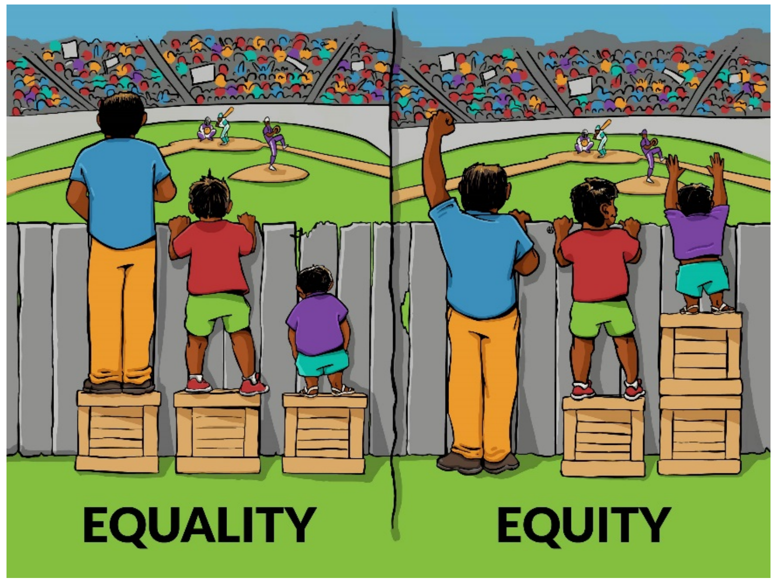
Promote public transit and other mobility strategies

For most travelers, public transportation is the best alternative to single occupancy vehicle commuting. *Sustainable CT* will reward actions taken to promote and enhance public transportation, including steps taken to better coordinate public transportation with walking and bicycling.

The NVCOG plays a significant role in the public transportation discussion regionwide. The NVCOG regularly works with CT*transit* to gather data and analyze ridership trends and advocate for new connections where there is a documented demand. Active public engagement is the crux of this work, which includes inviting regional stakeholders to take part in NVCOG Board meetings and partnering with complementary organizations to ensure information regarding existing services is widely promulgated. By continuing to participate in these public engagement events, and creating opportunities for further engagement in their communities, municipalities may earn credit for this action category.

Equity

Equity is about fairness and the ability of everyone to get what they need in order to improve their quality of life. It is a practice that underlies the six livability principles and, as such, is a component and benefit of a sustainable action. *Sustainable CT* views equity benefits as new, improved, and valued relationships between different members of the community. In the context of transportation systems and planning, the Title VI regulations prescribe equity policy for more inclusive decision-making and improved access to services and sharing of benefits with all residents, both current and future, regardless of race, income, ability, age, gender, sexual orientation, etc. *Sustainable CT* attempts to advance equity by asking municipalities to demonstrate its application in municipal decision-making processes. The NVCOG is committed to applying the practice and pursuit of equity to all transportation planning work, and partnering with its municipalities toward more inclusive and meaningful participation in the planning processes.



Source: Interaction Institute for Social Change | Artist: Angus Maguire. interactioninstitute.org and madewithangus.com

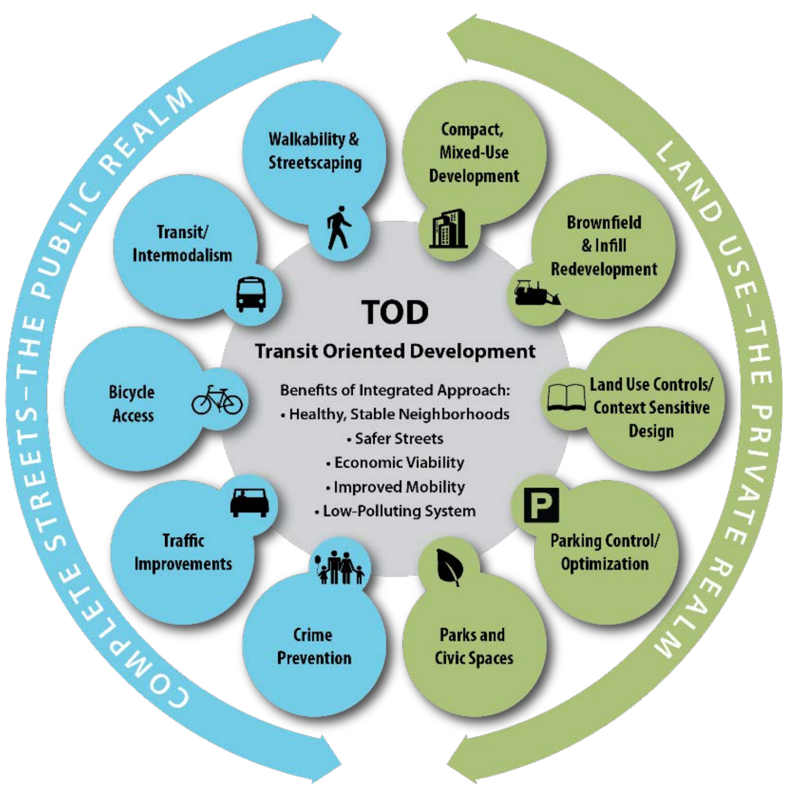
9.2 Transit Oriented Development (TOD)

The freedom and movement associated with individual automobile ownership have always come with tradeoffs. As suburban development chases low real estate prices farther and farther from our downtowns, problems like congestion, deteriorated air quality, national dependence on foreign oil, and the high costs associated with automobile ownership are only worsened. In the early and mid-1990s many residents and several municipalities began to seek out alternatives to promote increased use of public transportation. This movement has continued to grow and expand over the years. New principles have emerged aimed at reducing dependency on the automobile by encouraging land uses that are supportive of public transit.

Communities have increasingly recognized the problems with continuing to develop in the same way and are more often promoting new developments that provide more choices for reliable transportation, more socially mixed and affordable housing, and expanded business and economic opportunities. They are seeking developments that reinforce the existing character of their communities and historical downtowns and enhance the opportunities for healthy, walkable and safe neighborhoods to flourish. These are the "Livability Principles of the Partnership for Sustainable Communities" that many municipalities want to see succeed locally.

Transit oriented development (TOD) has become a prominent strategy for building communities that meet these goals. TOD is a proven economic growth strategy that integrates land use, transportation, and the environment and results in new housing, jobs, and more sustainable and walkable communities. TOD is an essential component of any transportation plan, as it is a form of infill development that encourages use of mass transit such as trains and buses, as well as non-motorized travel such as walking and bicycling. Successful TODs include:

- Compact, mixed-use development, including a range of housing choices, within a 10-minute walk of a transit station or transportation hub.
- A network of streets, ideally in a traditional street grid with short blocks, that allow for safe walking and bicycling and access to transit stations or transportation hubs.
- Intermodal improvements that facilitate travel mode shift away from single-occupancy cars to train and bus transit, shared vehicles, walking, or bicycling.



Transit-oriented development touches upon nearly all aspects of urban centers and downtowns, including zoning, architecture, infill development, parking, streets, utilities, demographics, and market conditions. Accordingly, the consideration of TOD needs to be a collaborative community process. Public involvement is critical to promoting TODs and defining the scale, density, style, architectural character and street environment unique to each community.

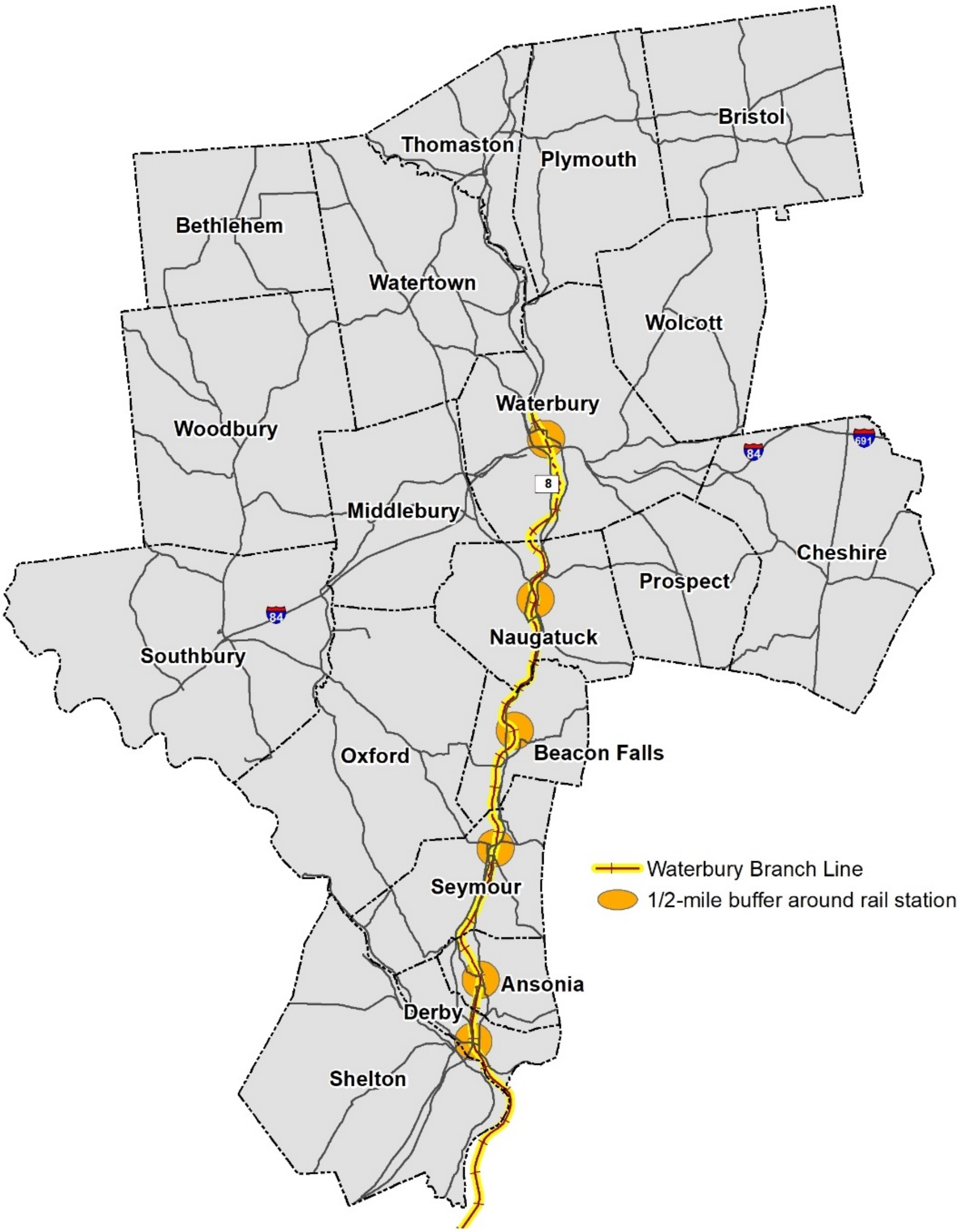
There are common building elements and design strategies for all communities to consider:

- Complementary Mixed Uses**:** New infill development should comprise a mixed of uses with retail located on the ground floor of primary streets with commercial offices or quality, market-priced residential units located on the floors above retail uses. This proximity and density of uses contribute greatly to "walkability" and allow people to visit multiple destinations without having to drive from one place to another.
- Building Height**:** Buildings in a TOD should be at least two stories. However, the optimal height and spacing of buildings varies by block and by lot depending on the width of street, rhythm and intensity of development in the downtown.
- Continuous "Street Wall:" All new buildings are situated close to the back of the sidewalk to create a direct relationship and connection between the public right-of-way and new buildings. It is also important to minimize gaps between buildings to enclose the street with active uses.
- Architecture**:** Buildings should reflect the character of the existing historical setting of downtown. Well-proportioned windows interesting and varied roof-lines, articulated cornices, ornate building entries and special details at gateway corners will result in finely detailed, contextual buildings. The architecture should complement the form and materials of existing buildings and look like it belongs in the community.
- Off-Street Parking: Any off-street surface parking for new infill development should be discretely located to the rear of lots and accessed from driveways located on secondary or side streets.

Currently, the neighborhoods best suited for a TOD are those located along the Waterbury branch rail line and in proximity to a rail station, generally considered within ½-mile of the station. While opportunities for TOD should not be limited to areas near a rail station, these areas provide direct access to employment centers in Bridgeport and Stamford, as well as, New York City. The Naugatuck Valley communities that are located along the WBL and host a commuter rail station are prime candidates for transit-supportive development. In a north-to-south orientation, the cities and towns on the WBL are:

- Waterbury
- Naugatuck
- Beacon Falls
- Seymour
- Ansonia
- Derby-Shelton

TOD Opportunity Areas



Source: NVCOG

The towns and cities in the Naugatuck Valley are prime candidates for TOD development because they already have compact historic urban centers that developed along the Naugatuck River and around access to the Waterbury rail line and have a rich historic quality to their downtowns. They have the infrastructure, such as public water and sanitary sewer lines, needed to support mixed-use and higher density developments. Also, the key component of Transit-Oriented Development, that is "transit," already exists within the corridor. The Naugatuck Valley is served by commuter rail operated on the Waterbury branch rail line commuter rail and fixed-route bus networks operated by the CT*transit* and Greater Bridgeport Transit. These transit services provide the Naugatuck Valley a significant advantage because new infrastructure and services do not need to be built.

TOD can help position these community for a revitalization and retrofit their central business districts to recapture an urban form and character that helped the Naugatuck Valley achieve national status during the industrial revolution, but in ways that position it to benefit from the digital revolution. TOD can also improve access to jobs because, in a compact, mixed-use district, people can live close to where they work, or they can walk to a transit station to access jobs or educational opportunities in other nearby cities.

While the goals of TOD, such as increasing economic development opportunities, reducing travel demand by single-occupant automobile travel, optimizing infrastructure, making cities more walkable and connected, and reducing environmental impacts, may be similar from community to community, the way TOD looks and feels should be unique to each community. It is very important that TOD respect and complement the form, density, character, and even community values of each station area and downtown. Customization of TOD projects is critical to ensure that the new development is appropriate for their urban context and accepted and supported by elected officials and the public while achieving a suitable level of building or critical mass to attract private investors.

As part of the alternate modes assessment, the NVCOG is identifying opportunity sites in proximity to the rail stations that could become TODs. In addition, *"Model Blocks"* were developed for each community based on the results of public input and visual preference surveys. The *"Model Block"* concept is not intended to impose a design on any one site, rather, it is an approach that helps towns visualize a form of mixed-use, compact development that optimizes use of valuable downtown infrastructure, complements existing downtown development, builds a customer base for downtown merchants, builds transit ridership by bringing people closer to transit stations, and enables people to live closer to where they work.

Source: NVCOG Alt Modes Study

The "*Model Block*" represents a development strategy that can be applied to underutilized parcels.

Land development is only one aspect of TOD. To realize the full potential of this type of development it is imperative to have the complementary transit services. While the Naugatuck Valley benefits by having the rail infrastructure in place, it suffers from the lack of service and poor condition of equipment. In order for TODs to capture the residents, jobs and businesses, enhancements and improvements along the WBL are essential. The alternate transit modes assessment identified several rail projects that would be catalysts for economic redevelopment and transform the corridor's urban centers.

Investments are being made in the WBL, including full signalization, passing sidings, and Positive Train Control. To leverage these planned improvements, the following projects need to be implemented:

- Purchase new rolling stock: The existing equipment operated on the WBL is old and experiences frequent breakdowns. Coaches are not clean and lack passenger amenities. This action involves the purchase of four locomotives and train sets consisting of one push-pull cab and two coaches to replace the existing equipment and the purchase of three additional locomotives and train sets to expand service.
- Expand service: Provide 30-minute headways during the morning and evening peak hours.
- Construct station improvements: The existing rail stations are not much more than a small platform and plexi-glass bus-type shelters. New station buildings need to be built at Naugatuck, Beacon Falls, Seymour, and Ansonia, and the stations at Derby-Shelton and Waterbury need to be rehabilitated. At Naugatuck, the station needs to be relocated to a vacant parcel just south of the current stop to position it on a prime TOD opportunity site. Similarly, the Seymour station would be relocated to a site north of the downtown area on site adjacent to a prime redevelopment site. As part of the new station buildings, high level platforms would be installed and various passenger amenities, such as traveler information and ticket vending machines, would be added.

An option to provide more through service from the WBL onto the New Haven main line is the construction of a transfer station at the Devon wye. Capacity on the NHML is limited and it may not be possible to add more WBL through trains. To increase the frequency on the WBL and enhance connections between WBL and NHML service, the Devon transfer station would provide the ability for Waterbury branch line riders to transfer to main line trains. New platforms would be built along the WBL and on both inbound and outbound NHML tracks to allow a cross-platform connection. An ADA-compliant access would be built to connect the platforms. Service on the WBL would be converted to operate more similar to a shuttle with schedules timed to meet most NHML trains. This service would also be set to permit WBL passengers to access outbound train service to New Haven. This would also allow connections directly to New Haven without the need to travel to Bridgeport to transfer to an eastbound train.

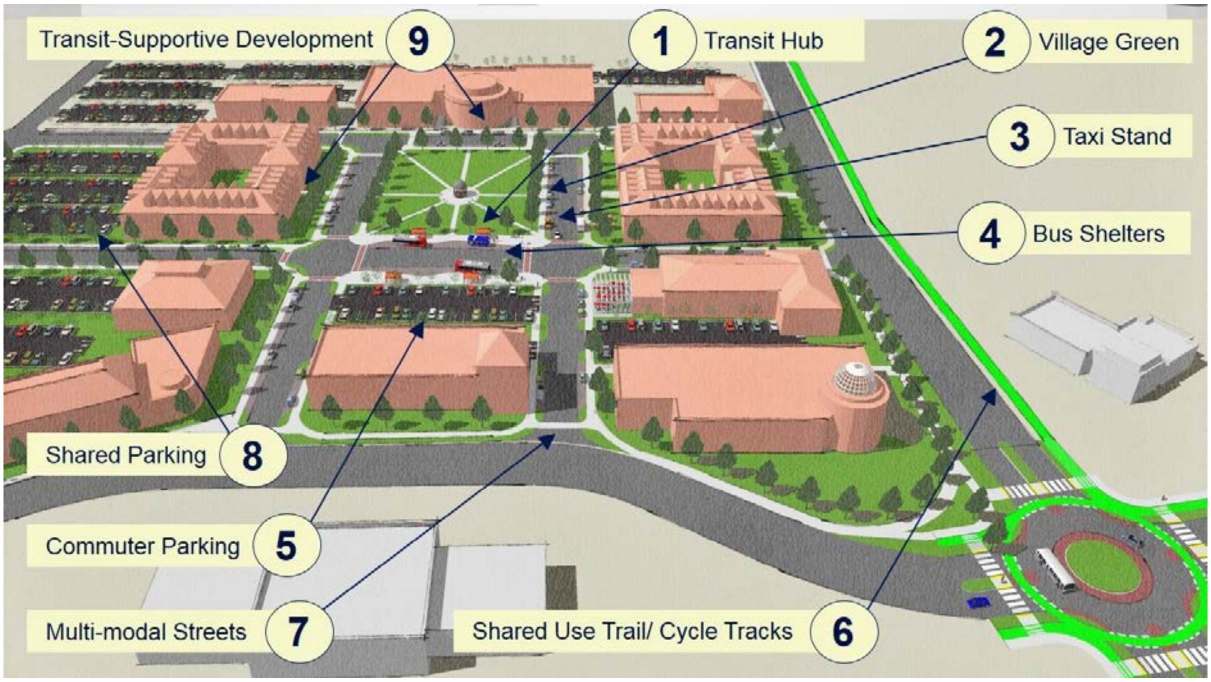
In addition to the downtown revitalization potential of TOD, the alternate transit assessment investigated opportunities to enhance transit services to the Bridgeport Avenue corridor of

Shelton. The city has enjoyed significant corporate and industrial development in several areas outside the downtown core, with the Bridgeport Avenue corridor a prime area. With ready access to the Route 8 expressway and proximity to corporate and financial markets in Fairfield County and New York City, large tracts of open land were prime and attractive for commercial and corporate development. In the past 40 years, mid-sized retail centers, condominiums, hotels and corporate office parks, including the recently constructed mixed-use development, have been constructed. There is potential for more development in the Bridgeport Avenue corridor, but residents' concerns about traffic and other growth impacts are refocusing efforts to non-automotive modes to accommodate new growth.

While a traditional TOD node may not be feasible along the corridor, the concept of a *"Neighborhood Transit Hub"* or *NTH* was explored. A *NTH* is a highly interactive transit stop with multi-modal connections, where transit vehicles (public buses, private shuttles, taxis, and shared vehicles) enable passengers to change mode of travel (from car or taxi to bus, from bus to shuttle, from bicycle to bus or shuttle, or from bus to bus). A *NTH* can also be a pulse-point where transit vehicles from different routes converge and time their stops to enable easy and immediate transfer of passengers to another route or service. A *"village green*" could be built in conjunction with a *NTH* to add place-making value. The provision of effective and predictable transit encourages surrounding development, which, in turn, supports transit. Private uses such as coffee shops, book stores, restaurants and convenience stores provide services of value to transit riders and area workers alike. The activity levels associated with transit hubs provides new customers for private development and the activity levels in shops, cafes, and service establishments provides more "eyes on the street" that improves the security of people waiting for buses.

The development of a *NTH* would require the implementation of new and expanded transit services to the area. While the proposed enhancement of GBT Route 22X might be sufficient to promote and support the development of a *NTH*, it is more likely necessary to implement high quality BRT system that uses the *NTH* as its primary stops.

Overview of Neighborhood Transit Hub concept.



Source: NVCOG Alt Modes Study

9.3 Complete Streets Policy

Streets are an integral part of our cities and towns, providing and facilitating the movement of people and goods. The road network serves to connect neighborhoods and provides access to businesses, jobs, schools and a wide range of public and private services. Connections to neighboring cities and towns, regions as well as interstate travel are facilitated by the highway system. The goal of transportation improvement programs has usually been to make the highway system as efficient as possible, with efficiency defined as making the flow of traffic better. This has resulted in overbuilt roadways, exclusive turn lanes that increase the walk distance across an intersection, additional travel lanes that reduce shoulder area available to bicyclists and traffic signal timing and phasing that favors vehicle movements. The needs of pedestrians and bicyclists have often been either ignored or only considered minimally. However, streets are an important part of a community's livability and help define it as a special place. The emphasis on vehicle movement has resulted in street environments unfriendly to bicyclists and pedestrians and land uses dependent on the automobile.

The concept of *"Complete Streets"* is to effectuate a change in how the street environment is planned, designed and built and, as a consequence, change how it is used. In essence, the street environment is altered from one where vehicles dominate to one where all users are accommodated. It also encompasses not just the area between the curbs but extends beyond the pavement to include space along the roadway as well.

Implementation of *"Complete Streets"* makes the street environment more livable, and will reduce energy consumption, greenhouse gas emissions and driving, while enhancing mobility and safety for all and encouraging walking and bicycling for transportation, recreation, exercise and quality of life. It is essentially a paradigm shift in how the street environment is perceived and used. Instead of continuous strip of hardscape to move automobiles as quickly as possible, a "complete street" employs variable paving material, street trees, rain gardens, and various traffic calming features to create a more comfortable environment for all users and one that is more visually interesting.

While a complete street embraces many common elements, each application is unique and the features selected reflect the land use, needs and characteristics of the area.

Key elements of "*Complete Streets"* include:

- Bicycle facilities – bicycle routes and lanes, signage, bicycle racks, appropriate pavement markings and symbols.
- Bus features and amenities – bus pull-outs, shelters, clear and accessible paths.
- Pedestrian enhancements – crosswalks, pedestrian signal enhancements, curb ramps, and sidewalks.
- Traffic calming actions – using textured material, intersection bump-outs, curb extensions, center refuge islands, and raised intersection tables.
- Streetscape environment and Green Infrastructure – appropriate urban trees, landscaping, bio-swales and rain gardens, permeable paving material, and buffers between the street and sidewalk to dramatically alter the "atmosphere" of the street environment.
- ADA compliant features – curb ramps, detectable tactile cues and warnings, accessible pedestrian signals, and longer walk intervals.
- On-street parking treatments – delineated parking spaces and curb/sidewalk bump-outs.
- Access management actions – driveway consolidations, modifications and closures.

The image at the left illustrates an open street design that does not consider the needs of any other traveler than a motor vehicle. On-street parking and access is uncontrolled, and there is no safe place for pedestrian to cross.

The following photo shows how the same street environment can look by converting it to a complete street. Variable pavement materials, designated crosswalks, defined on-street parking, street trees and striped bicycle lane are used to make the street inviting to all users and creates a much more visually interesting place.

9.4 Green Infrastructure/ Low Impact Development

Hard surfaces in urban and suburban environments are a major source of surface water pollution. As rainwater falls on these impervious surfaces, it runs off, usually to a system of gutters, ditches, storm drains and conveyances to be discharged directly into streams, rivers and wetlands. With it, the rainwater carries pollutants including dust, lubricants, tire rubber, animal waste, traction sand, salt, and anything else that may have built up the surface since the last rainfall, depositing it directly into the receiving water. This typical method of dealing with storm water also causes much heavier than natural peak flows during and shortly after rain events, causes drastic water temperature spikes, and may cause erosion of streambanks and washouts or damage to culverts and bridges, impacting the reliability of the transportation network.

Green infrastructure (GI) and Low Impact Development (LID) are alternative planning, design and construction best management practices (BMPs) that aim to more closely mimic the pre-construction hydrology of a site. The goal of their implementation is to slow, filter, store, evaporate and/or infiltrate stormwater close to its source. These methods include non-structural planning and design techniques as well as structural features designed to minimize stormwater impacts.

Non-structural techniques begin with good land use planning and design aimed at minimizing the amount of impervious surface associated with a development, and properly siting development with surface water impacts in mind. This can be accomplished through a number of techniques including:

- Clustering development – by minimizing the amount of area that is disturbed by development, natural stormwater infiltration functions can be preserved. Clustered development also minimizes the amount of roadway and other infrastructure needed to serve a development.
- Prioritizing infill development and redevelopment of vacant or under-utilized previously developed properties over development of forest or farmland.
- Minimizing lawn areas in favor of more natural vegetation cover.
- Avoidance of steep grades.
- Designing roads that are not excessively wide and better relate to the service and function they provide. This would allow narrower street widths and less impervious pavement.
- Smart design of appropriately sized parking lots, promoting shared parking, and incorporating covered garages in order to reduce the amount of impervious parking lot cover.
- Designing with proper materials in mind including natural materials and native plants.

On-site structural green stormwater infrastructure can also greatly reduce the amount of runoff entering traditional stormwater systems and runoff receiving bodies of waters. These GI features are typically built to treat a specific amount of runoff, with overflows built in to default to traditional stormwater systems when overloaded during more extreme events. In some cases, the need for traditional stormwater infrastructure can be eliminated. Some structural GI BMPs include:

- Bioswales/Bioretention – shallow vegetated depressions that infiltrate or temporarily store runoff.
- Rain Gardens – landscaped areas designed to receive and infiltrate stormwater, typically include native plants and are designed to infiltrate water quickly.
- Permeable Pavement – By eliminating fines in asphalt or concrete, or using pavers with spaces in between, water can flow through the pavement and a properly prepared sub-base and into the ground below.
- Tree boxes – similar in appearance to traditional street tree planters, but designed to retain, filter and infiltrate stormwater. These are often connected to a stormwater system to handle excess flows.
- Storm water planter – a small, contained vegetated area that collects and treats storm water using bioretention. They typically contain native, hydrophilic flowers, grasses, shrubs and trees. Treated storm water is either infiltrated into the ground or discharged into a traditional storm water drainage system. The planters are relatively small and do not require a large amount of space. However, they need periodic maintenance, including weeding, plant replacement, cleaning inflow and outflow pipes, watering during dry periods and removing litter.

- Rainwater storage and repurposing – Cisterns and rain barrels can be used to collect and store runoff so that it can be used at a later date, typically for irrigation. Using rainwater for irrigation has the added benefit of reducing demands on drinking water supplies, and reducing the energy used to treat and deliver drinking water.
- Vegetated roof – lightweight planter systems can be integrated into rooftops to slow rainwater which is taken up by low maintenance plants. These roofs help insulate buildings and help mitigate the heat-island effect in urban areas.

The new Connecticut "*Municipal Separate Storm Sewer System (MS4) General Permit"* that went into effect in 2017 applies to all NVCOG municipalities with the exception of Bethlehem. An MS4 is the municipally owned system of drains, conveyances, pipes, outfalls, etc. that transmits runoff to surface waters. As a condition of the permit, municipalities are required to "disconnect" directly connected impervious area (DClA). Impervious surfaces are considered disconnected if runoff from the impervious surface does not enter the MS4, or if the volume of runoff generated from one inch of rainfall on a site is infiltrated or treated. Since municipalities do not have direct control of privately owned parking lots, driveways, rooftops and other impervious surfaces, they are left with town owned facilities and roads from which they can directly disconnect DCIA. Retrofitting existing facilities or designing new facilities with GI BMPs is one way in which towns can reach compliance with the permit. Implementing GI BMPs during roadway reconstruction wherever possible will help towns meet the requirements of the MS4 permit, and will help restore and preserve surface water quality.

The MS4 permit also requires that municipalities eliminate all obstacles to the implementation of LID in local regulations. In 2017, NVCOG produced municipal MS4 and LID Local Regulations Assessments for all 19 towns in the planning region. The assessments identified local regulation that might need to be altered in response to the new MS4 requirements, and suggested ways to make LID principles easier to implement. The assessments looked at procedural barriers to LID implementation, including those related to transportation infrastructure. Regulations relating to street width, cul-de-sac design, road drainage, parking sizing and runoff, sidewalks and driveways were looked at and the ability to implement LID and GI BMPs under those regulations was assessed. By changing local regulations to meet the MS4 permit requirements, municipalities will be in a better position to encourage private developers to implement LID BMPs during new development and re-development, helping towns reach their DCIA disconnection goals. UConn's Center for Land Use Education and Outreach (CLEAR) provides tools, information and assistance to help municipalities with MS4 compliance and GI implementation. Additionally, as noted in the subsequent section 10.3, changes in climate have also resulted in increasing number of flood events, and as such, implementation of GI LID measures would also serve to mitigate the increased surface runoff contributing to these floods.

GI and LID techniques are a proven way to protect surface water quality when implemented in new construction, and to improve water quality when traditional stormwater systems are retrofitted. As such, they are promoted by watershed groups and environmentalists. Several watershed protection groups in the Naugatuck Valley planning region have recently completed Watershed Based Plans in the region. The Mill River Watershed Plan was completed in 2018 and includes parts of Cheshire and Prospect. The Pomperaug River Watershed Plan was also completed in 2018 covering parts of Woodbury, Southbury, Bethlehem and Watertown. The Pequabuck River Watershed Plan is currently in development, and includes parts of Bristol and Plymouth. These plans include examples of GI retrofits that can be implemented to help improve water quality. Many of the examples are within public ROW along roadways and public parking lots, and were intended to give municipalities options to retrofit portions of the storm water system under their control. These examples are a good place for municipalities to start minimizing the impacts of stormwater from the transportation network.

Actions:

- For projects under purview of NVCOG, encourage the use of LID and GI BMPs wherever practical.
- Promote LID and GI practices during planning or corridor studies.
- Assist municipalities in MS4 compliance.
- Provide training to municipal staff regarding BMP implementation and maintenance.
- Endorse implementation of GI and LID projects identified in CT-DEEP/EPA approved watershed based plans.

9.5 Tourism Travel

Tourism and its related travel are an economic engine for many areas and how well visitors can access destinations is an important factor in influencing the extent of the economic impact. Generally, tourism encompasses a wide range of industrial sectors, such as hotels, restaurants, recreation, orchards, wineries/breweries and entertainment, and it is difficult to separate local visitors from tourists who may travel longer distances. Surveys by the Connecticut Department of Economic and Community Development (DECD) indicate that the majority of visitors to tourist destinations in Connecticut are from Connecticut. Only about 35% of groups surveyed included someone from out-of-state. And, about 46% of those came from New York or New Jersey. Because of these trends, transportation to the region's tourist attractions needs to focus on local access and accommodations.

Tourism in the Naugatuck Valley planning region is often overshadowed by tourism opportunities in nearby regions and communities. Litchfield County is a popular tourist destination for New York and Boston residents looking to get away from their home cities, and Hartford and New Haven offer a breadth of cultural institutions for locals and for tourists to enjoy. The Naugatuck River, a primary recreational attraction in the region, is often overshadowed by its parent the Housatonic River, which also partially flows through the region, and its neighbor the Connecticut River. In fact, the official state tourism resources list much of the Naugatuck Valley region as "Litchfield Hills," despite this moniker applying more accurately to an area farther north and west of the region.[5]

Despite this, the Naugatuck Valley region has a wealth of opportunities for out-of-town tourists and local residents to explore the beauty and history of the region, offering a blend of outdoor

[5] http://www.ctvisit.com/litchfield

options, cultural experiences and urban amenities, and often at lower cost and with more freedom for visitors. There are eleven state parks, forests and scenic preserves that allow residents to stretch their legs and numerous museums and culture sites to allow them to expand their minds. A unique characteristic of the Naugatuck Valley is its small, compact town centers and walkable urban neighborhoods that offer a plethora of ethnic restaurants and foods.

Another advantage is that much of the Naugatuck Valley is easily accessible via I-84, Route 8, a network of state routes, local and inter-city buses, and the Waterbury branch rail line, which connects the region by rail to the larger New York metropolitan area. Accessibility via bicycle is also increasing and becoming a more viable mode of transportation, most notably in Cheshire and in the lower Valley communities.

Current Tourism Opportunities

The Naugatuck Valley's current tourism opportunities are heavily concentrated in hiking and outdoor activities, and in its collection of unique, regional museums and cultural festivals. There are also a wealth of heritage attractions, spread across the region.

The Connecticut Department of Energy and Environmental Protection (CTDEEP) operates and maintains ten state parks, forests and scenic reserves in the region. The areas offer a wide range of activities throughout the year, such as hiking, mountain biking, swimming areas, and cross country skiing. Most state forests and many state parks allow seasonal hunting for specific game, ranging from small game and birds to deer. Restrictions apply and hunters must obtain a permit.

In response to the devastating floods of 1955, the US Army Corps of Engineer constructed and operates flood risk management reservoirs throughout New England. Five such projects are located in the Naugatuck Valley planning region. A multitude of outdoor recreational activities are offered within these areas, including fishing, hiking, canoeing, picnic areas, cross country skiing, snowshoeing, and hunting. The Thomaston Dam Recreational Area allows the use of two wheeled motorized trail bikes (OHVs), the only public area that these bikes can be legally ridden. The ACoE estimate that the dam area sees roughly 34,500 annual OHV users annually from across Connecticut and neighboring States. Snowmobiles are permitted during the winter. Campgrounds have been created in several of these areas. Annual visitation reaches 150,000 people, 75,000 of which are visitors to the Thomaston Dam area alone.

The region is also the home to several multi-use trails and greenways. The Naugatuck River Greenway Trail runs along the Naugatuck River from Torrington to Derby. It is a planned 44-mile trail. Currently about five miles are open to the public with about another five miles expected to be opened in the next couple of years. The Larkin State Park Trail stretches 10 miles through four towns. It was originally designated for horse trail riding but is now open to bikers and hikers. The Middlebury Greenway was built on an old trolley bed that once connected the residential towns of Woodbury and Middlebury and the Lake Quassapaug Amusement Park to the city of Waterbury. Also, a section of the 84-mile Farmington Canal Heritage Trail runs through the town of Cheshire. These trails are important tourist attractions in the region. User counts indicate that they are well utilized, with over 450,000 visits annually. As the NRG Trail is extended and completed, it is likely to become a more attractive destination for out-of-state travelers. It will be critical to ensure convenient access to trailheads and provide wayfinding.

Visitors can also enjoy the outdoors at a number of “pick your own” fruits and vegetable farms and explore the quaint shops and restaurants in the downtowns of the region. Downtown Seymour has become an antique district and Woodbury has an established antiques trail.

Two amusement parks are located in the region: the 322-acre Lake Compounce and the smaller, 20-acre Quassay Amusement Park and Waterpark. Both feature various rides and attractions for all ages, and a beach and a water park along a lake. Lake Compounce, located in Bristol, is the oldest, continuously operated amusement park in the US. Quassay Amusement park is located in Middlebury and is one of only a small number of parks built along a trolley line still operating.

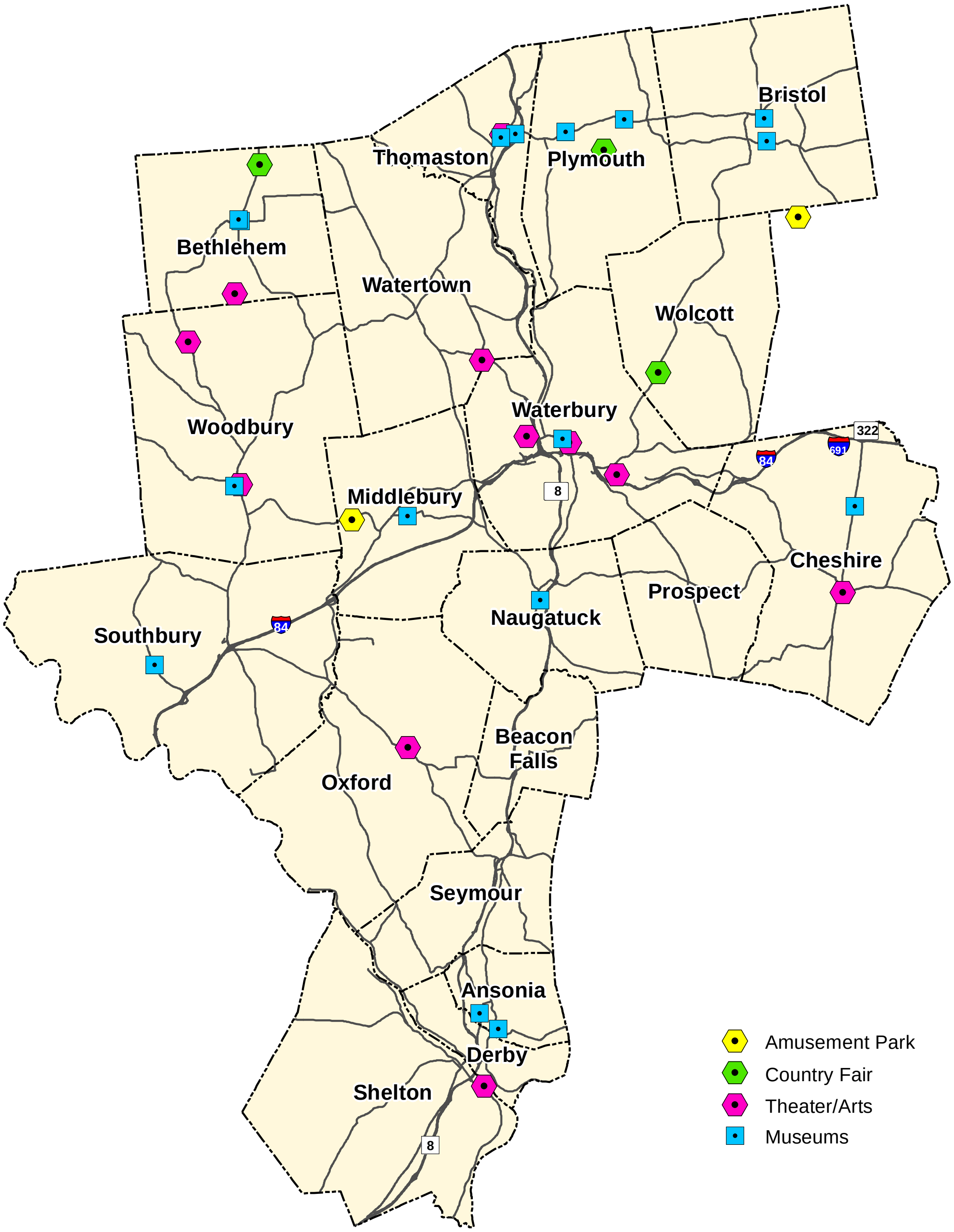
Cultural and historical museums abound throughout the region, ranging from fine art exhibits to museums focused on the region’s industrial past. The Mattatuck Museum in Waterbury is the region’s flagship, displaying American art and cultural history with a focus on the Naugatuck Valley. Visitors to the region can also learn about the art and history of the carousel, clocks, watches and locks, as well as, ride in a vintage railroad car.

Sports venues are also located in the region. At one time, minor league baseball teams played at stadiums in Bristol (Muzzy Field) and Waterbury (Municipal Stadium). While neither stadium hosts professional baseball, amateur sporting events are held in both stadiums throughout the year. Downhill skiing, snowboarding and snow tubing can be done at Woodbury Ski Area during the winter months and tubing and zip lining are offered during the summer.

Vibrant nightlife is also available throughout the region ranging from several craft breweries to Broadway shows at the Palace Theater in Waterbury.

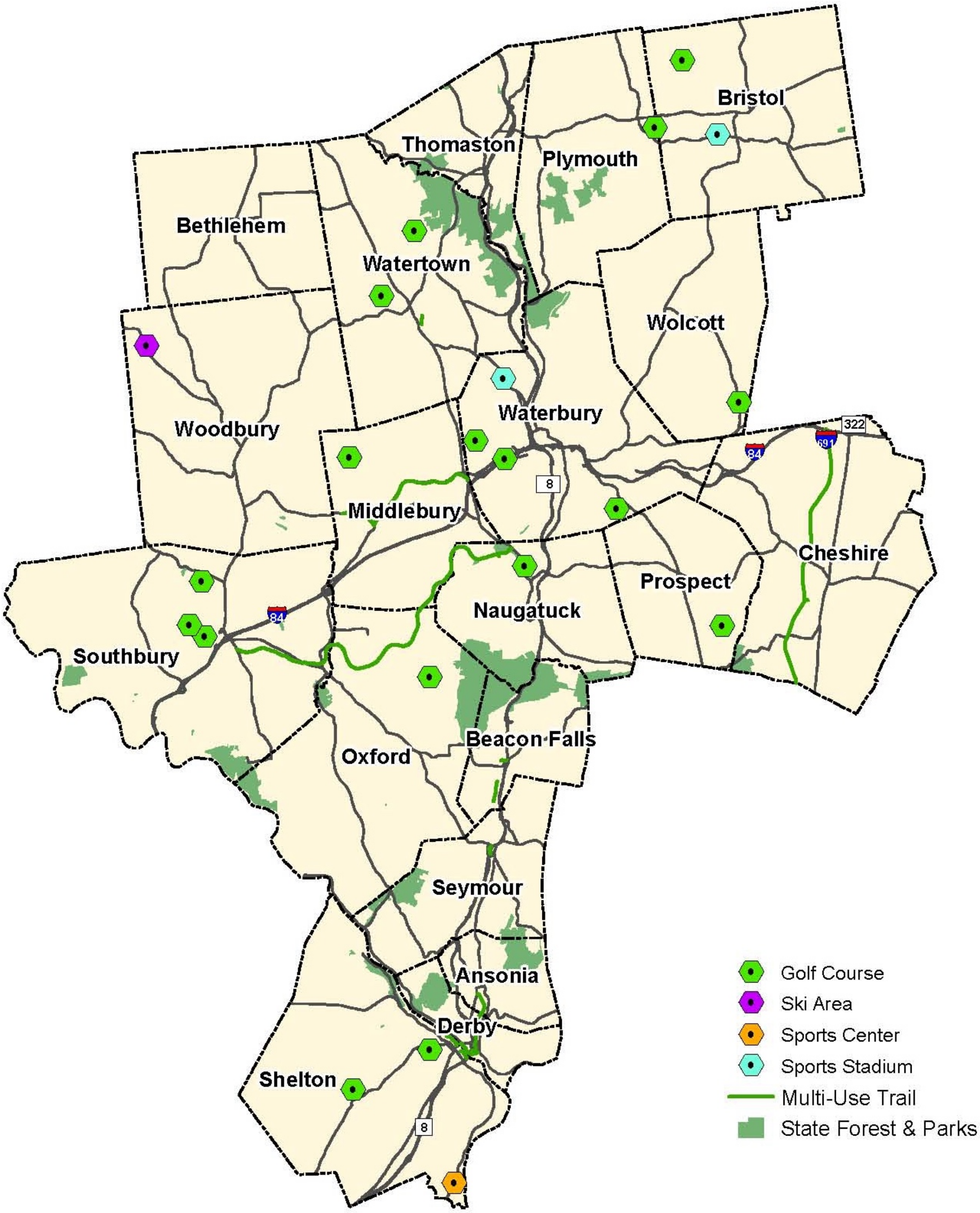
Standout concentrations of tourism activities also include ballooning opportunities in Woodbury and Southbury, history and house museums up-and-down the Naugatuck Valley, cultural amenities and festivals in Waterbury, and agri-tourism throughout the area.

Amusements Parks, Fairs and Arts



Source: NVCOG

Recreation and sports



Source: NVCOG

Improving Transportation Access for NVCOG Residents

Despite this wealth of opportunities, the region lags behind its neighbors in tourism as a means of economic growth. The region's tourism opportunities often are overshadowed by better known neighboring destinations with greater institutional support or easier transportation access, based on data on tourism as a proportion of employment, average tourism wages, etc.

In most instances, access and travel to the region's tourist attractions are via private automobile. Except for the venues in or nearby downtown Waterbury or downtown Bristol, local bus service is not generally a viable option. Access to the region's wealth of outdoor activities is almost exclusively by car. While the system of multi-use trails encourages non-motorized options, visitors tend to travel to the trails by car. A survey conducted by the NVCOG on usage of the open sections of the NRG Trail found that 71% of visitors traveled to the trail by car, either alone or as a passenger.

While the regional tourism destinations are relatively easy to access from out of the region, they remain just as difficult to reach by Naugatuck Valley region residents as out-of-region destinations. This incentivizes residents of the region to choose more distant, more well-known tourism destinations over local options. By providing easier transportation access to local destinations, the NVCOG region can develop more sustainable tourism habits, and keep more tourism dollars within the regional economy. This can be done through:

- Improved wayfinding
- Completion of long-distance trails
- Improving parking
- Enhancing access by public transit
- Reducing conflicts between tourism trips and daily commuter transportation
- Improving walkability in tourism hot spots

Wayfinding

Source: Pannier Graphics

With a few exceptions, the major transit hubs in the region, consisting of the Waterbury branch rail line stations, the downtown Waterbury bus pulse point, and the Bristol bus hub, are more than a quarter-mile walk from population centers and tourism destinations. Highlighting available tourism destinations within walking distance of major transit hubs through directional signage, 45-degree wayside informational displays, and public event posting boards is an easy and inexpensive way to encourage existing riders to visit nearby destinations.

The Seymour and Ansonia train stations are in the center of busier neighborhoods within their respective towns, and provide easier opportunities for immediate rail-based tourism. The Waterbury bus pulse point is conveniently located near several of the larger tourism destinations downtown.

More broadly, improving the visibility of the region's tourism assets is an economic development priority. The NVCOG region lags behind the state in tourism-related employment, with 7% of the state's Leisure & Hospitality jobs, or just under 12,500 positions.[6] Roughly 500 of those jobs are municipally-funded positions. State-funded tourism resources tend to overlook tourism destinations in the region. Developing a standalone website and campaign highlighting tourism opportunities in the region could improve the visibility of our industry, and expand it to create additional jobs for residents.

Source: Walk [Your City] Press Kit

The key to improving access to the region's tourism attractions is installing a coordinated system of wayfinding signs that clearly direct travelers to destinations, especially from the region's interstate and expressway systems. Wayfinding signage will help visitors find their intended attractions and guide them to the preferred and appropriate parking facilities. Wayfinding signage will also help raise the visibility of tourist attractions throughout the region.

Long-Distance Trails

The NVCOG is assisting with the development of several, long-distance multi-use trails, including the Naugatuck River Greenway Trail which spans the region. A recent analysis by the NVCOG has shown that long-distance trails generate substantial economic benefits, including increased tourism spending.[7] To realize benefits, these trails need to be promoted and wayfinding signs need to be installed to enhance access. The NVCOG is working with the CTDOT to install wayfinding signs on state highways and at the ends of exit ramps from Route 8 to direct travelers to NRG Trail trailheads.

The NVCOG will continue to support the development of trails regionally, particularly trails that connect current and potential tourist destinations and services with population centers. Additionally, future phases of NVCOG trail development efforts will incorporate additional services at trailheads, including adequate bicycle parking and repair stations, zoning and development that expands services and destinations, and pedestrian and bicycle connections to off-trail amenities.

Improved Access

Many current and potential tourism opportunities in the region are lacking in transportation access, especially with respect to adequate parking and alternative travel mode access. Because there is a wide variety of tourist attractions throughout the region, it may not be practical to provide public transit options to all. However, many are located in the urban core areas,

[6] CT DOL QCEW 2017, retr. July 12th, 2018
[7] Naugatuck River Greenway Economic Benefits Study

especially downtown Waterbury and Bristol, and both areas are well served by fixed route bus service. Attractions easily accessible by public transit need to be better marketed.

The Naugatuck Valley region benefits from the many small, compact downtown areas that offer a wide range of cultural activities and ethnic restaurants. To leverage these attractions, actions are needed to ensure and enhance walkability in these areas. Complete streets and sustainability initiatives will help make these downtowns more attractive and desirable as destinations. The goal will be to reduce conflicts between pedestrians and motorized vehicles

9.6 Electric Vehicles and Infrastructure

According to the EPA, transportation was responsible for 28.5% of U.S. greenhouse gas emissions in 2016, representing the largest share of greenhouse gas emissions in the nation. Over 90 % of the fuels used in transportation are petroleum based, mainly gasoline and diesel being burned in internal combustion engines (ICEs). ICEs emit carbon dioxide (CO_2), a major greenhouse gas, along with particulate matter (PM), nitrogen oxides (NO_x) and volatile organic compounds (VOCs) that serve to impair air quality and can have negative health impacts to humans. Electric Vehicles (EVs) are widely seen as a way to curb these impacts by shifting away from the use of fossil fuels in motor vehicles to those that will be less impactful.[8]

EVs represent several different technologies. Hybrid electric vehicles (HEVs) have both ICEs and electric motors that provide power for locomotion. These vehicles use energy produced by the ICE and/or through regenerative braking systems to charge batteries that drive the electric motor. Plug-in hybrid electric vehicles (PHEVs) have larger batteries that can be charged by plugging into the electric grid to extend range or to reduce ICE use. Battery electric vehicles (BEVs) only have electric motors powered by a battery that must be charged by plugging into the electric grid. Less established than other types of EVs are fuel cell electric vehicles (FCEVs) which produce electricity using a chemical process that combines hydrogen and oxygen in the air in a fuel cell stack. FCEVs do not rely on combustion and produce no harmful emissions; however, they require hydrogen fuel to operate.[9]

HEVs require no special infrastructure to operate and return much better fuel efficiency compared to similar IC vehicles. PHEVs do not necessarily need special infrastructure since they have IC engines to rely on if its battery is depleted, and they can fuel up at any gas station. BEVs and FCEVs, however, do need a network of special fueling stations to operate. While BEVs can be charged at a home charging station for routine trips or commuting, publicly available electric charging stations are necessary for longer trips. There are three general types of EV chargers.

[8]US Environmental Protection Agency. “Sources of Greenhouse Gas Emissions”, accessed 12/4/2018 at https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions
[9]CT Department of Energy and Environmental Protection, “EVConnecticut: Electric Vehicles 101”accessed 11/14/2018 at https://www.ct.gov/deep/cwp/view.asp?a=2684&q=562482&deepNav_GID=2183

Level 1 chargers use a standard 120 volt AC outlet and 3-prong plug to deliver approximately 2-5 miles of range per hour of charging. Level 1 is good for overnight home charging and requires no special equipment or investment. Level 2 chargers deliver a charge to batteries more quickly, about 10-to-20 miles of range per hour of charging, but require special 240 volt equipment and a dedicated circuit. Level 3 or DC fast charging stations can add 60-to-80 miles of range in 20 minutes of charging; however, these charging units are expensive and require substantial investment.[10]

In order to avoid "range anxiety" or the worry that a BEV driver will be stranded with a depleted battery and no recharging option, there needs to be a robust network of publicly available charging stations. There has been substantial work done to encourage the development and deployment of this network in Connecticut. *EVConnecticut*, a Department of Energy and Environmental Protection (CTDEEP) program focusing on the expansion of EV technology in the state, has provided funding to expand the network of charging stations. The *Electric Vehicle Charging Station Incentive Program* has provided several rounds of funding to businesses and municipalities for the installation of publically accessible charging stations. The program offered full reimbursement of charging equipment and installation, as long as the charger was made available to the public and was available free of charge for a period of time. The NVCOG promoted these programs to its members, and offered assistance with grant application and installation. Despite these efforts, there were barriers to implementation. The main issue was that while the program would in most cases cover installation and equipment fees, there is substantial work involved in grant application, siting, procurement, and oversight that many municipalities simply do not have the capacity to handle. There were also questions about ongoing electric and maintenance costs associated with the chargers, and many municipalities were uneasy with the uncertainty. The NVCOG pursued the potential for the NVCOG to request funds from DEEP for the installation of charging stations at Waterbury branch line train stations. However, the proposal failed to advance because of questions about whether the host community or CTDOT would supply the electricity. The CTDOT voiced reluctance to be responsible for supplying electricity to the charging stations even though electrical service is currently being supplied to state-owned rail station platforms.

A review of EV charger location lists compiled by CTDEEP and EPA, as well as those included on EV charger crowdsource web application *SharePoint,* indicate that there are currently 25 EV charging stations located in the Naugatuck Valley planning region, although not all may be accessible to all EV users because some stations are reserved for use by specific vehicle type owners.

With respect to FCEVs, there are no known public hydrogen fueling stations in the region or in Connecticut. FCEVs are an emerging technology with some limited adoption in southern California, where a network of hydrogen fueling stations is developing. In 2018, CTDEEP solicited applications for funding to develop a retail hydrogen refueling station in the greater New Haven area with the goal of beginning to establish supportive infrastructure for FCEVs. Additional hydrogen fueling stations will be needed for FCEV adoption in the region.

[10]National Renewable Energy Laboratory, US Department of Energy (2015) "Plug In Electric Vehicle Handbook for Consumers" accessed 11/30/2018 at https://afdc.energy.gov/files/u/publication/pev_consumer_handbook.pdf

There are additional incentives encouraging consumers to purchase EVs. The *Connecticut Hydrogen and Electric Automobile Purchase Rebate (CHEAPR)* offers a rebate to help offset additional costs associated with EV purchase, and there are also federal rebates available for hydrogen and EV consumers. The CTDEEP provided funding to offset the additional cost of EVs purchased for municipal fleet vehicles as well.

Improving technology, extended ranges, and an expanding charging network and purchase incentives are all driving the increased popularity of EVs in general and BEVs more specifically. Electric vehicles are increasing as a percentage of the American motor vehicle market. As battery capacity increases and longer range BEV vehicles become available and affordable, a larger portion of these vehicles will be predominantly charged at home since consumers will likely "right-size" their vehicle to confidently accommodate their daily driving needs. As more PHEVs and BEVs enter the market, however, there will be more long distance trips taken using these vehicles. There will be increased demand for additional charging infrastructure, and for that infrastructure to be located in convenient locations and have adequate capacity. More Level 3 or DC fast charge infrastructure will be needed along interstate and long-distance highway corridors, and more Level 2 or Level 3 infrastructure will be needed at destinations of long distance travel.[11]

As more EVs replace IC vehicles, there will also be a shift in demand away from fossil fuels toward the electricity grid to fuel transportation. The state of the electricity generation and delivery system in Connecticut and the Northeast has serious implications for the "cleanliness" of EVs, since EVs are only as "clean" as the electricity used to produce the electricity in the grid. It also raises questions about the overall ability to meet the increased electricity demand. The Independent System Operator (ISO) New England, Inc. operates the region's electric power system, reporting that in 2017, natural gas provided 48% of New England's electric power, followed by nuclear (31%), renewables (10%), hydro (7%) and coal (<2%).[12] In the past decade, natural gas has replaced coal and oil as major contributors to electric generation and renewable energy production has increased, making electric generation cleaner from an emissions and greenhouse gas perspective, and EVs cleaner than ICEs. States across New England have set goals for greenhouse gas reduction by 75-90% by 2050, including a Connecticut legislative mandate for 80% reduction from 2001 levels by 2050. These goals and Connecticut's participation in the Regional Greenhouse Gas Initiative (RGGI) carbon dioxide cap and trade program, suggest that this trend toward cleaner generation will continue, especially as renewable energy costs decline.[13]

Large scale EV adoption will increase demand on the electric grid which may lead to supply problems or the need for increased generation capacity. "Smart charging" or "vehicle grid integration" (VGI) refers to a range of technologies intended to optimize charging to help minimize negative impacts that increased demand from EV charging could have on the grid.

[11]Wood, E., C. Rames, M. Muratori, S. Raghavan, M. Melania (2017) "National Plug-in Electric Vehicle Analysis", National Renewable Energy Laboratory, US Department of Energy. Accessed at: https://www.nrel.gov/docs/fy17osti/69031.pdf

[12]ISO New England "Resource Mix" accessed 12/27/2018 at https://www.iso-ne.com/about/key-stats/resource-mix/

[13]CT Department of Energy and Environmental Protection "Connecticut 2018 Comprehensive Energy Strategy – Electric Power Sector" accessed 12/27 at https://www.ct.gov/deep/lib/deep/energy/ces/electric_power_sector.pdf

These technologies are aimed at avoidance of charging at peak demand times, and shifting to low demand, off-peak times. By "talking" to one another, the grid can indicate when there is more or less demand, and the EV can pause charging when it is likely to create a supply problem. Charging at off-peak times can be further encouraged by pricing incentives, with higher charges for peak charging. The overall effect will be a leveling of the electricity demand profile and a reduction in the need for more peak supply. Vehicle-to-grid (V2G) services takes this a step further by making stored energy in EV batteries available to be tapped by the grid to assist with demand spikes. V2G could be especially helpful when paired with renewable generation, since power stored in batteries is more predictably available than some forms of renewables, and renewable energy could be stored in EV batteries when it is available. Technology and smart planning has the potential to mitigate many of the demand issues that large scale EV adoption presents, and could actually serve to strengthen the grid.[14]

Following a recommendation in Connecticut's Comprehensive Energy Strategy that was issued in 2018, the CTDEEP is working to develop an "Electric Vehicle Roadmap for Connecticut". This planning document will identify policies, programs and strategies that the state can use to guide future EV infrastructure development. It will also investigate the added demand that EV adoption will place on the electric grid and potential mitigation factors. DEEP will be developing the roadmap in early 2019 with an expected rollout in May of 2019. NVCOG staff will be involved by attending meetings, reviewing drafts and providing comments.

The trend toward the greater use of EVs and the increased deployment and demand for charging stations will continue to be monitored as part the NVCOG's transportation planning process. Specifically:

- Monitor the need for EV charging stations along I-84, I-691, and Route 8.
- Work with municipalities to fully utilize funding opportunities for the installation of EV Charging infrastructure and purchase of EV fleet vehicles.
- Work with CTDEEP to improve grant funding delivery to better reach communities with less capacity to site and install chargers needed.
- Work with CTDEEP and municipalities to properly site EV charging infrastructure.
- On projects under the purview of NVCOG, consider the inclusion of EV charging infrastructure to any roadside or lot parking as appropriate.
- Encourage the installation of EV chargers at train stations and commuter parking lots. CTDEEP recommends that 3% of all new commuter parking spaces should be EV-ready.

[14] Pamela MacDougall (2018) "EVs Can Do More Than Just Drive, They Can Help the Grid Too", National Resources Defense Council. Accessed 12/27/2018 at https://www.nrdc.org/experts/pamela-macdougall/evs-can-do-more-just-drive-they-can-help-grid-too

10.0 Transportation Security

10.1 Transit safety and security

A major concern for users and would-be-users of public transportation is their security and safety. When approached from the perspective of available data (FHWA, BTS, FBI) for both the risk of crashes (injury and fatality) and crime, transit is the safer choice.

Crashes

Looking nationwide, transit is a significantly safer mode of transportation than passenger vehicles. If only considering passengers, rail is roughly 20 times safer than passenger vehicles and a bus is nearly 60 times safer. However, buses are also responsible for a significant number of pedestrian fatalities, even so, transit as a transportation mode remains nearly twice as safe as passenger cars. Additionally, empirical evidence shows that these safety statistics improve (for users and non-users alike) the higher the proportion of the population that uses transit. As has been noted elsewhere in this plan, the rate of transportation related fatalities is on the rise nationwide. But, in cities where public transit has been on the rise, the trend has been mitigated or reversed.

Crime Risk and Security

The security of passengers waiting at a rail station or walking between the station and parking area is an important issue. Broadly, transit has lower overall associated crime risk than the use of passenger vehicles. While it is true that transit serves low income communities, which are correlated with increased risk of certain crimes, crime statistics indicate that overall, transit users have lower exposure to risk. At transit stations, regardless of neighborhood, the large number of people circulating in the vicinity leads to better security for the individual. The risk of crime when using transit comes from the solitary journey to and from the station or while waiting at a deserted location. However, these risks are outweighed by risks of vandalism or assault operators of passenger vehicles experience in parking facilities.

Studies suggest that better access to quality transit can also lower crime rates. Because public transportation improves access to economic activities and jobs, especially for low-income residents who are unable to drive, it therefore lowers the chance of offending for individuals who may be at risk of criminal activity.

To ensure the security of their riders, each transit operator within the region is taking steps to prevent or mitigate risk on their vehicles and at stations.

CT*transit* promotes the *See Something, Say Something* campaign, a program meant to benefit from many daily users being able to recognize something that is suspicious. The slogan was created by an advertising agency hired by the Metropolitan Transportation Authority, in the wake of the 9/11 terror attacks.

CT*transit*

On their web site, CT*transit* urges riders:

> *Stay alert around buses, trains, bridges and roadways. If something doesn't look right, tell the nearest authority or transit employee.*

Bags, boxes or other packages left unattended on buses and trains, in stations or on train tracks.

- *People entering unauthorized areas at train or bus stations.*
- *Exposed wiring, leaks, strange smells or other signs of potential tampering on buses and trains.*
- *People videotaping, sketching or taking notes on transit equipment or facilities.*
- *Placing a package or luggage in a different compartment than the one being occupied.*
- *People who stay at bus or train stations for long periods without getting on.*

For security on the buses, the CT*transit* has video recording devises onboard all of its full sized buses and para-transit vans in case of an incident.

Greater Bridgeport Transit Authority

The Greater Bridgeport Transit Authority provides security information on their web site, including an entire section on *Safety and Security*. Like CT*transit*, the site includes information about *See Something, Say Something*, but also includes safety information for riders regarding safe behavior traveling to and from a bus stop.

For security on the buses, the GBT has video recording devises onboard in case of an incident.

Valley Transit District

The Valley Transit District is currently in the process of upgrading its fleets of paratransit vehicles. The new vehicles will all be equipped with security cameras.

Metro North

On their web site, the MTA provides information regarding on-board train emergencies, including emergency and evacuation instructions and safety information regarding at grade crossings.

To ensure rider security, there are currently many monitoring and security features employed along the passenger rail line. Security officers are present at the major stations. Video cameras are installed along the platforms and parking lot at the Waterbury station to monitor activity.

While ongoing work to improve security includes the installation of cameras at stations and bridges along the New Haven Line, these systems need to be installed at the rail stations along the branch lines in the region.

Looking to the future, additional steps can be taken to ensure the security of transit users.

Transportation Emergency and Personal Security (TEPS) System

The proposed TEPS system supports development of enhanced emergency and law enforcement response activities to provide increased safety for transit patrons, both while on-board vehicles and at waiting areas. The system involves installation of security surveillance and monitoring equipment (CCTV video cameras) and emergency phones and aid call boxes on rail station platforms, at commuter parking facilities, and along pedestrian walkways. On-board vehicle systems include video surveillance and silent alarms. It would integrate various security and surveillance equipment into a seamless emergency detection and response system for transit travelers. The proposed TEPS system would be integrated with other emergency management and homeland security projects. TEPS elements include:

- Security offices – On-site offices in the bus terminal and rail station for enhanced incident and emergency detection and response;
- Institutional agreements – Agreements to establish the roles and responsibilities of each participating transit operator and law enforcement agency;
- Closed-circuit television, video cameras – Video cameras at critical areas;
- Emergency phones and aid call-boxes – Call boxes located at critical areas and along primary walkways;
- On-board transit vehicle surveillance – Silent alarms and video monitoring to allow transit security personnel to assess the incident, determine appropriate response and acknowledge the incident.

Facility security

Facility security addresses surveillance and sensor monitoring of transit stations, stops, facilities, infrastructure, and vehicles. The surveillance includes both video and audio surveillance. The sensor monitoring includes threat sensors, such as chemical agent, toxic industrial chemical, biological, explosives, thermal, acoustic and radiological sensors, object detection sensors, motion or intrusion detection sensors, and infrastructure integrity sensors. It also includes analysis of sensor or surveillance outputs for possible threats and need for response. Interfaces with the appropriate security agency, either in-house or public safety agency, are specified. These ITS systems support traveler or transit vehicle operator initiated alarms and allow the transit agency to respond to an on-board incident. The systems are also capable of providing emergency information to travelers using the transit system by visual (signs) or audio messages on-board the transit vehicle, at transit stops, or in transit facilities.

Safety and security actions

- Continue to promote public transit and dense transit supported development to improve safety and security.
- Continue to fund the installation and upgrading of current infrastructure to meet safety and security needs.

10.2 Emergency Response Planning

Emergency Response Planning in the NVCOG region

In the scope of this plan, a discussion of transportation security extends to minimizing and responding to disruptions of the regional transportation system, and more specifically the quick, safe and efficient response to emergency situations (i.e. traffic incidents) on major expressways. The NVCOG role in the State of Connecticut emergency management is to foster collaborative planning by providing resource information between local communities and State agencies.

The State of Connecticut Department of Emergency Management and Homeland Security (DEMHS) partners with State agencies and Non-Governmental organizations to coordinate emergency preparedness and response activities. The purpose of this collaboration is to support local governments and their residents in responding to disasters and emergencies. The NVCOG is one such DEMHS regional emergency management partner.

Documents which guide emergency response coordination in the State of Connecticut include:

- State of Connecticut State Response Framework Version 4.1
- Traffic Diversion Plan for I-84 and Parts of US Route 7 and CT Route 8 (2011)
- Unified Response Manual (2008)
- REPT Regional Emergency Support Plan (RESP) for regions 2, 3 and 5

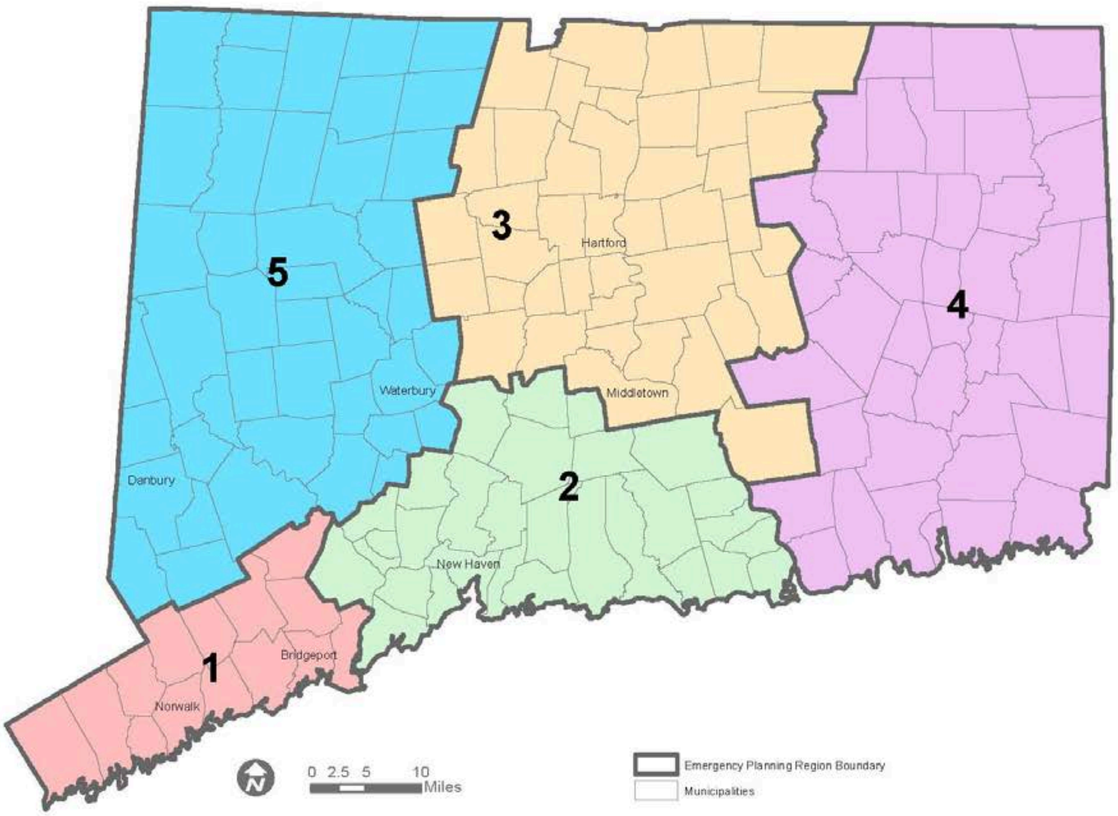
As a partner of both CTDOT and DEMHS, the NVCOG has contributed to traffic incident management in the following ways:

- Collaborated with regional agencies to develop emergency diversion plans for major expressways in DEMHS Region 5 and portions of Regions 2 and 3 (link to NVCOG website) to equip and guide state and local emergency responders before, during and after emergency situations.
- Trained on the Regional Evacuation and Shelter Plan activation and implementation.
- Trained on National Incident Management system (NIMS)/Incident Command System (ICS) protocols.
- Participated, as determined, in disaster exercise drills.
- Trained on the Regional Response Coordination Center (RCC) setup, on the regional emergency communications system setup, and on the coordination function of Transportation, RESF 1 procedures.

Regional Emergency Planning Teams and Emergency Support Functions

Regional emergency partners are organized into Regional Emergency Planning Teams (REPT). There are five REPT emergency planning regions in the State of Connecticut, which are overseen by The State of Connecticut Division of Emergency Management and Homeland Security (DEMHS) of the Department of Emergency Services and Public Protection (DESPP). Within each REPT regional resource coordination is developed through regional emergency support functions. Emergency support functions (ESF) are discipline oriented working groups standardized across the CT emergency management community. Each REPT has ESFs and a Regional Emergency Support Plan (RESP) which assist all levels of government to work in a coordinated and standardized manner.

REPT Regions



The NVCOG members are located across three regions of DEMHS' Regional Emergency Planning Teams (REPT), namely regions 2, 3 and 5. The NVCOG participates in these REPT regions and the ESF 1 working group which addresses transportation issues. The purpose of ESF 1 is to develop and implement a system of resources and response capabilities that facilitates communication and coordination among regional jurisdictions and agencies concerning transportation issues and activities during a major disaster, including natural and human-made, in the Region 5 area. Traffic incident management is one such transportation issue.

Traffic Incident Management Infrastructure and Diversion Routes

The State of CT DEMHS and CTDOT collaborate on traffic incident management. Traffic Incident Management Infrastructure is maintained by CTDOT and includes traffic cameras, Variable Message Signs (VMS), and a Highway Advisory Radio (HAR) system that can be employed during emergency situations. In addition, the Connecticut Highway Assistance Monitoring Patrol (CHAMP), which is a road service patrol operated by the CTDOT, offers emergency service to motorists along major highways in the state. Within the NVCOG region, there are four (4) VMS located on I-84, and another four (4) located along Route 8.

The DEMHS has provided a framework for agencies to respond to traffic incidents, which is described in the Unified Response Manual (URM) last published in 2008. As per the URM, the NVCOG's role in incident management is the dissemination of information regarding diversion routes and lessons learned from past traffic incidents.

Through the ESF 1 Transportation group, NVCOG has overseen the development of diversion and evacuation routes. The most recent diversion routes for REPT 5 were devised in 2011 by the Council of Governments of the Central Naugatuck Valley (COGCNV). The NVCOG will collaborate with REPT regions 2, 3 and 5 and their associated COG's to review and revise the 2011 diversion routes.

Actions

- Expand state Incident Management Systems to include entire length of Route 8; includes 24-hour monitoring, video surveillance, variable message signs & incident detection, Source: NHPP, Amount: $7,200,000 in Years 1 to 4

10.3 Natural Hazards, Transportation Resiliency and Climate Change

The FHWA defines resilience or resiliency as "the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."[15] Following passage of the FAST Act, the FHWA and FTA updated the metropolitan and statewide transportation planning regulations to reflect new requirements regarding resilience planning. The transportation planning rule includes:

- A new planning factor for states and MPOs to consider and implement as part of the transportation planning process. The new planning factor reads: *"improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation"* (23 CFR 450.206(a)(9) and 23 CFR 450.306(b)(9)).
- A recommendation for MPOs to consult with agencies and officials responsible for natural disaster risk reduction when developing a metropolitan transportation plan and the transportation improvement program (23 CFR 450.316(b)).
- A requirement that the metropolitan transportation plan assess capital investment and other strategies that reduce the vulnerability of the existing transportation infrastructure to natural disasters (23 CFR 450.324(g)(7)).[16]

To address these requirements, the metropolitan transportation plan for the NVCOG planning region and the Central Naugatuck Valley metropolitan planning area includes an assessment of the vulnerability of the region's transportation facilities and systems to the impacts of climate change and extreme weather. The MTP recommend ways to improve transportation system resiliency in the future.

Natural hazard mitigation plans have been prepared for all of municipalities in the region and the CT DEEP has developed the Connecticut Natural Hazard Mitigation Plan. These plans explain that the region may potentially be impacted by flooding, hurricanes and tropical storms, summer storms and tornadoes, winter storms and nor'easters, earthquakes, dam failures, wildfires, and landslides. All of these natural hazards have the potential to adversely impact transportation networks, transit reliability, and safety. The largest and most frequently occurring threats to the transportation system are likely from flooding due to heavy rainfall and/or snowmelt, heavy

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[15] Federal Highway Administration. January 2017. "Resilience and Transportation Planning". Available at: https://www.fhwa.dot.gov/environment/.

[16] Federal Highway Administration. December 2014. "FHWA Order 5520." Available at: https://www.fhwa.dot.gov/legsregs/directives/orders/5520.cfm#par6.

snowfall or icing conditions associated with winter storms, fallen trees from high winds, and long term power outages.

The Naugatuck Valley planning region is most vulnerable to the impacts from inland flooding. Flooding impacts transportation networks in the short term, by disrupting traffic flow in inundated areas, and in the long term when flooding causes damage to infrastructure through erosion or washouts. The area was devastated by severe flooding of the Naugatuck River in August of 1955 from the unusual occurrence of two named hurricanes, Connie and Diane, passing within proximity of Connecticut within nine days. While neither storm directly struck Connecticut, their combined impact was immense. Hurricane Connie produced four-to-six inches of rain across southern New England. The rain saturated the ground and caused river and reservoir water levels to be well above normal. When Hurricane Diane hit the area later the same month, the ground was unable to absorb the additional rain and the rivers and lakes were already above flood stage. Over the two-day period, up to 20 inches of rain fell in parts of New England. This resulted in arguably the most devastating inland floods to ever hit the state. The heavily industrial and commercial areas bordering the Naugatuck River in Waterbury experienced flooding to first and second story levels. The damage was estimated to have exceeded 1.5 billion dollars (1955 dollars).

Subsequent to this flood event, six flood control dams were built in the region along the Naugatuck River and tributaries by the Army Corps of Engineers. These dams include Northfield Brook, Black Rock and Thomaston Dams in the town of Thomaston, Hop Brook Lake Dam in Middlebury and Hancock Brook Lake Dam in Plymouth, to protect flood prone town centers. In addition, a series of flood control walls and levees were constructed to help protect Ansonia and Derby, and channel improvements, floodwalls and a protective dike were built within Waterbury.

The areas along the Housatonic River do not have the same level of protection and significant flooding has not occurred in recent years.

There are two major types of flooding that can impact the region:

- Coastal flooding as a result of a storm surge,
- Inland flooding as a result of heavy precipitation or snowmelt.

The Naugatuck Valley region is located in west-central Connecticut with its southern most point about 7.5 miles from Long Island Sound. This location makes the region less vulnerable to a damaging storm surge and coastal flooding. There is only one area in the region where coastal flooding could potentially be an issue. Parts of the Housatonic and Naugatuck Rivers in Shelton and Derby are tidal and could be impacted by storm surge from coastal storms. During a Category 1 Hurricane, the storm surge could impact the southern tip of Derby along the Naugatuck River. O'Sullivan's Island is located in this area and would be inundated by three-to-nine feet of water. Two transportation facilities pass through the area impacted by a potential Category 1 storm surge:

- The Waterbury branch rail line, including a rail bridge over the Naugatuck River.
- Route 34 Bridge over the Naugatuck River.

In both instances, the facilities are elevated above the maximum flood stage.

During a Category 2 Hurricane, the storm surge would spread to inundate the area south of Downtown Derby and low lying areas between the Naugatuck River and Route 8 and west of Route 8. In this scenario, narrow strips of land along the west bank of the Housatonic River in Shelton would be affected. While Route 8 passes through the storm surge area, it is elevated above the peak surge height. However, it is likely that a short section of Route 34 would be flooded by this event. In addition, it is likely that the WBL would be flooded along its stretch from Route 34 and Division Street. The Derby-Shelton rail station and the Valley Transit District administrative offices, garage and maintenance facility are located in the area.

Under the Category 3 and 4 Hurricane conditions, the impacted areas spread farther inland and have the potential for more extensive flooding. Either strength storm would cause greater impact to the WBL and various state and local roads. The Ansonia rail station could potentially be flooded by these events.

While the storm surge maps indicate that the transportation facilities mentioned above could be vulnerable to flooding from intense hurricanes, flood control walls have been installed to protect low lying areas. The surge produced by these events would not be high enough to over-top the walls that are in place.

Inland flooding is more widespread and has a greater potential to impact transportation facilities in the region. A review of the municipal hazard mitigation plans found several instances in the region where state routes or regional transportation infrastructure would be impacted in the case of a natural disaster, see the following table. Most of the areas of repeated local flooding are a result of low lying roadways or undersized storm drainage systems or culverts.

List of Natural Hazard Locations

Town	Road/ Route	Location	Hazard	Comments	Recommendations
Beacon Falls	Route 42	At Blackberry Hill Road	Flooding	Closed due to flooding twice since 2007	Increase the conveyance capacity of the culvert for Hockanum Brook near Route 42 & Blackberry Hill Road
Beacon Falls	Route 42	Near Oxford and Bethany Town Lines	Wind	Trees down and blocking traffic during wind events	Develop a plan to address potential wind damage due to excessive pine trees located along Route 42
Beacon Falls	Beacon Valley Road	Bridges	Flooding	Town considering armoring	Evaluate the feasibility of armoring the bridge on Beacon Valley Road to limit structural damage during storm events.

Bethlehem	Route 132	Near Long Horizon Road and Sky Meadow Road	Flooding	Occasional Flooding from Fire Pond	Encourage the State DOT to elevate Route 132 between Lakes Road and Sky Meadow Lane, or to widen the stream and install a box culvert
Cheshire	Blacks Road	Bridge over Honeypot Brook	Flooding	Undersized Culvert	Increase the conveyance capacity of the bridge over Honeypot Brook at Blacks Road
Naugatuck	Route 68	Multiple	Flooding	Fulling Mill Brook has flooded Route 68 during heavy rain	
Naugatuck	Route 68	Bridge over Hop Brook	Flooding	"Crown Spring Bridge" has recurring problems with flooding	If necessary, increase conveyance of Crown Spring Bridge over Hop Brook at Bridge Street
Naugatuck	Beacon Valley Road	Beacon Falls Town Line	Flooding	Becomes flooded during major rainfall events	
Oxford	Route 67	Various	Flooding	Flooding has occurred at various places along Route 67 from Little River and tributaries	Pursue funding to complete flood mitigation projects along the Little River
Oxford	Route 34	Vicinity of "under the Rocks Park"	Flooding	Housatonic River	
Prospect	Clark Hill Road	Rt 68 at Clark Hill Road	Flooding	Raudis Pond overtopped, causing stormwater back-up downstream along Rt 68	

Prospect	Route 68	Rt 68 at Plank Road	Flooding	Flooding occurs 2-3 times per year due to undersized culvert	
Prospect	Plank Road	Plank Road at Mountain Brook	Flooding	Culvert for Mountain Brook is undersized	
Prospect	Salem Road	Salem Road at Pondview Drive	Flooding	Flooding reachese four septic fields near CT Water Company Lands	
Prospect	Route 68	Rt 68 at Chatfield Road	Dam Failure	Cheshire Reservoir dam a high hazard dam, failure would inundate Rt 68 to Plank Rd, could cause additional failure at Mixville Pond Dam, with possible damage to critical facilities	
Prospect	Route 69	Rt. 69 at Turkey Hill Brook	Dam Failure	Waterbury Reservoir Dam #2 a high hazard dam, failure would inundate Rt. 69 to depth of 8 feet, could impact Reidville Drive in Waterbury downstream	

Southbury	Route 172	Route 172 at Horse Fence Hill Rd	Flooding	Extensive flooding has occured causing road closure along Pomperaug River	
Southbury	Flood Bridge Road	Flood Bridge Road at Pomperaug River	Flooding	Extensive flooding has occured causing road closure along Pomperaug River	
Southbury	East Flat Hill Road	East Flat Hill Road at Pomperaug River	Flooding	Extensive flooding has occured causing road closure along Pomperaug River	
Southbury	River Road	River Road along Housatonic River	Dam Failure	Shepaug Dam would inundate River Road, Manor Drive, and Pomperaug Trail	
Thomaston	Hickory Hill Road	Hickory Hill Road at Peck Hollow	Flooding	Flooding has occured at west end of Peck Hollow due to poor drainage	Implement road reconstruction through LOTCIP program
Thomaston	Route 6	Branch Brook	Flooding	Water backs up at an undersized culvert toward Stumpf Avenue	Continue working with DOT to install appropriate culvert
Waterbury	Bank Street	Near Fifth Ave and Congress St	Flooding	High slopes, one-way streets, and multiple	

				flooding occurrences per year	
Waterbury	East Main Street	Near Fairlawn Ave	Flooding	Catch basins insufficient to handle parking lot runoff	
Waterbury	Grandview Ave	Throughout	Flooding	Insufficient drainage causes overflows and erosion	
Waterbury	Grove Street	at Little River culvert	Flooding	washed out due to clogging of Little River Culvert	
Waterbury	West Main Street	near Douglas Ave and Park Road	Flooding	Insufficient drainage cuasing repeptitive flooding at St. Mary's Medicine	
Watertown	Route 6	Intersection at Route 63	Flooding	Poor drainage	
Watertown	Sylvan Lake Road	Steele Brook Corridor	Flooding	Water overtops dam, causing road closure and inundation of private properties	
Wolcott	Mad River Road	at Route 69	Flooding	Bridge is undersized, multiple flooding events documented	Still needed, lack of funding
Woodbury	Transylvania Road	length of Transylvania Road from Rt 317 to Rt 67	Flooding	Road is low in elevation and may be sinking	Identified as high priority, not carried out due to lack of funding

Much of the existing infrastructure in the region was built during the post-war era. Stormwater systems and waterway conveyances were in most cases designed using now outdated rainfall data. Until 2015, the US Weather Bureau's Technical Paper Number 40, published in 1961, was cited in the CTDOT Drainage Manual as the required rainfall event figures to use in the design of drainage systems and conveyances. Technical Paper 40 used rainfall data collected between 1938 and 1958, and assumed that rainfall amounts and the rate of extreme rainfall events, in particular, do not change over time. It is now understood that rainfall amounts and rates have increased and will continue to change as a result of climate change. In the future, the northeast region is likely to witness more frequent heat waves, coastal flooding, and river and stream flooding that will pose a growing challenge to the region's infrastructure.

Between 1958 and 2010, the amount of precipitation delivered in very heavy events (the heaviest 1% of all daily events) rose by 70%. This trend is expected to continue, with precipitation delivered in more frequent intense precipitation events[17]. Rainfall amounts overall are also changing, with annual rainfall increasing nearly one inch per decade since the turn of the 20th century[18]. In response to these trends, the Hydrometeorological Design Studies Center of the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) released updated precipitation frequency estimates for the Northeastern States including Connecticut, the NOAA Atlas 14 precipitation frequency estimates. CTDOT adopted these new estimates into the Drainage Design Manual in November of 2015.

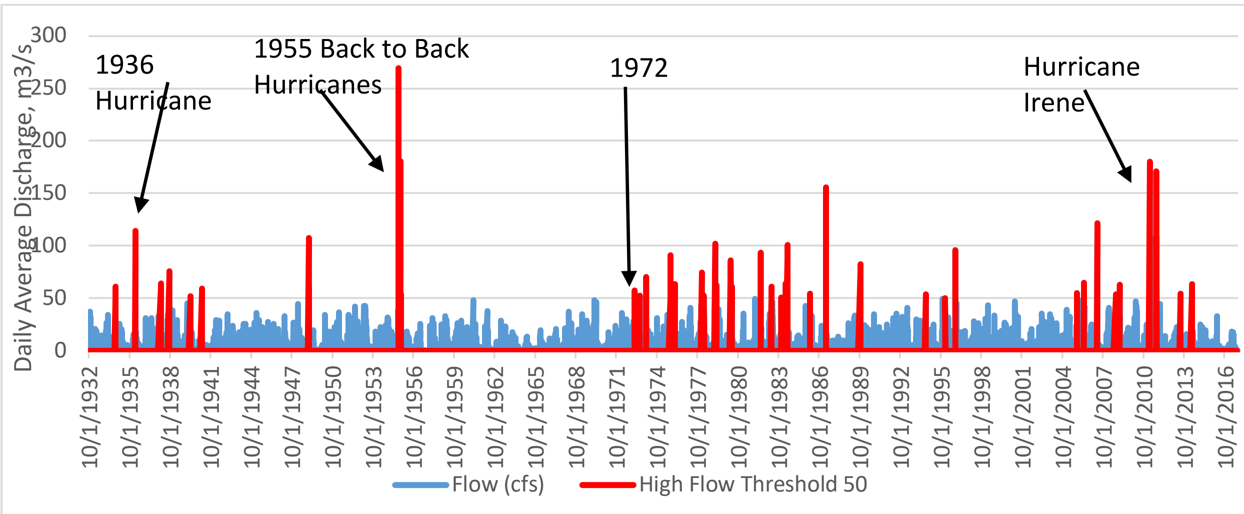
The increase in precipitation noted above has had a demonstrable response in the flood flow regime in rivers within the NVCOG serviced area. Analysis of USGS streamflow data for the Pompreaug River, and other rivers in Connecticut, show that there is a marked increase in low level flood flows after 1972 (see figure xxx below). Various indicators have shown that after 1972, climatic conditions in New England began to change (Hodgkins and Dudley, 2006; Hodgkins et al., 2003; Hodgkins et al., 2002; Bjerklie et al., 2010). Flows above a threshold at which bank and channel erosion would be expected to occur, indicate that there is more energy in the stream system, and that the river channel will be in flux as a new equilibrium is established (or no equilibrium at all). The channel will need to enlarge to accommodate the more frequent flooding, and thus the expectation is that culverts designed to older standards may now be inadequate, and will wash out, and the channel will experience more bank erosion, thus impacting riparian land owners. Additionally, eroded material will be deposited within the channel system at locations where the flow slows down. This would include wide channel sections, inside bends, deep pools, and behind impoundments – natural and man-made. Deposited sediment, in addition to scour and erosion, is a major factor in channel shifting due to increased flow resistance and changes to bed elevations.

This same pattern of increased high flows is evident in other rivers with long term (more than 80 years) records within or near the NVCOG service area, even in rivers that have flood control large

[17] Horton, R., G. Yohe, W. Easterling, R. Kates, M. Ruth, E. Sussman, A. Whelchel, D. Wolfe, and F. Lipschultz, 2014: Ch. 16: Northeast. *Climate Change Impacts in the United States: The Third National Climate Assessment,* J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 16-1-nn.

[18] Miller, D. R., Warner, G. S., Ogden, F. L., & DeGaetano, A. T. (2002). Precipitation in Connecticut. Storrs, CT: University of Connecticut College of Agriculture and Natural Resources.

dams within the river system upstream of the streamgage (e.g. the Naugatuck and the Housatonic). Table xxx shows the number of days above the expected flow threshold before and after 1972, in absolute numbers and as a percent of the number of days in each time period. Table xxx also shows the ratio of the days post-and the days pre- 1972 for the rivers looked at. It is supposed that this phenomenon is due to climate shifts and may be occurring throughout Connecticut. The increased number of floods indicates that there is more energy within the flow regime of these rivers. Although we have not conducted interviews with DOT maintenance and Town maintenance departments, it is likely that higher costs incurred as a result of erosion and deposition including road and culvert washouts has not been systematically understood to be part of regional trend.



Daily mean flow *record for the Pomperaug River at Southbury, beginning in 1932 to the present (blue), highlighting those flows (red) that exceed an expected flood threshold (50 m^3/s = 1,700 ft^3/s) above which the peak flow for the day would be near or more than bank-full capable of causing channel and bank erosion. In this analysis, the peak flow for the day is considered to be 1.7 times the daily mean flow (see USGS streamflow for Connecticut, Pomperaug River station 01204000).*

Number of flows exceeding a presumed erosive threshold for some rivers in western Connecticut

Pomperaug Southbury 1931 – 2019			No. of days	Ratio
High before 10/1/1972	13	percent	0.09	
High after 9/30/1972	42	percent	0.25	2.79

Salmon East Hampton 1928 -2019			No. of days	Ratio
High before 10/1/1972	19	percent	0.12	
High after 9/30/1972	58	percent	0.34	2.90

Housatonic Falls Village 1912 - 2019			No. of days	Ratio
High before 10/1/1972	44	percent	0.20	
High after 9/30/1972	47	percent	0.28	1.39

Naugatuck Beacon Falls 1928 - 2019			No. of days	Ratio
High before 10/1/1972	46	percent	0.29	
High after 9/30/1972	68	percent	0.40	1.41

Increased rainfall and rainfall intensity, and subsequent increased frequency of erosive and over-bank flood events likely represent the greatest climate threat to the region's transportation infrastructure. Although an increasing frequency of floods is occurring in many rivers since 1972 relative to before 1972, this does not imply an increase in extreme floods, which by nature are rare and unpredictable. The increasing frequency of erosive and over-bank flood events will by necessity be attended by changes in the river channel systems including more erosion and deposition within the channel, channel banks, and along riparian lands. Thousands of culverts in the region carry waterways under roads and rails. Since many of them were designed to handle lesser historic flows, they may be undersized to handle current and future flows. Overwhelmed culverts and bridges can cause flooding, erosion, and roadway and rail washouts, directly impacting the transportation network. Ideally, as infrastructure is improved or replaced, replacement infrastructure will be properly sized to handle additional expected flows. Properly sized and designed culverts provide the added benefit of allowing fish and animal passage, and may reduce road casualties of amphibians and other small animals.

Common recommendations in many of the region's municipal Natural Hazard Mitigation Plans are to assess the adequacy of stormwater infrastructure and culverts in context of new rainfall figures to determine locations of potential hazards and to prioritize future replacement and upgrades. Some towns have begun doing so. For example, the Housatonic Valley Association (HVA) has been assessing culverts in several towns across the Housatonic River watershed, including two, Seymour and Oxford, within the Region. The HVA is a nonprofit organization working on natural resources issues and conservation in the Housatonic River Watershed including much of the NVCOG region. Initial results from their study indicate that of the structures studied to date, over a quarter (27%) of non-bridge structures would fail (water would flow over roadway) in a 25-year recurrence interval flood. These assessments will be used to help communities identify their highest priority culvert replacement projects based on flood risk and conservation value and encourage adoption of culvert design best management practices.

Actions

- Assess existing infrastructure for risk using the new rainfall NOAA Atlas 14 precipitation frequency estimates.
- Continually assess impact from changing flood risk areas.
- Encourage municipalities to prioritize replacement of deficient structures.

- Ensure that projects under purview of NVCOG use the most up to date rainfall frequency figures when designing structures (NOAA Atlas 14 precipitation frequency estimates).
- Ensure that new transportation investment is not made in areas that may be at risk of flooding or other natural hazards.

11.0 Advanced Technologies

Advanced technologies have the potential to make the region's transportation system operate more efficiently and safely and provide more information to travelers. In the previous MTP, the consideration of advanced systems focus exclusively on *Intelligent Transportation Systems (ITS).* There was no mention of the advent of connected and autonomous vehicle technologies and what effect their introduction would have on how people and goods are moved.

In recent years, most automobile manufacturers offer a range of driver assistance devices that help drivers avoid collisions. The key feature of these systems is the driver remains in control. The evolution of technology to operate a vehicle and take control from the driver is accelerating. Fully automated cars and trucks that drive themselves is likely to be a reality over the timeframe of this transportation plan. At the same time, wireless communication is increasing the ability to exchange information between vehicles and to and from road side devices. As inter-vehicle communication advances, drivers will become better informed about their surroundings and the position of nearby vehicles.

The goals of these advanced technologies are to make travel safer and reduce the number of crashes. They also have the potential of reducing congestion.

11.1 Intelligent Transportation Systems (ITS)

ITS refers to using advanced technologies to better manage and operate transportation systems. It is defined as: "the application of advanced sensor, computer, electronics, and communication technologies and management strategies – in an integrated manner – to improve the safety and efficiency of the surface transportation system". These advanced systems include computer hardware or software, traffic control devices, communications links, and remote detectors. The intent is to realize a more seamless transportation system with reduced delays and conflicts and increased systems integration, interoperability and communication. ITS projects need to be consistent with the National ITS Architecture and must satisfy a defined set of user services defined by FHWA.

The National ITS Architecture defines eight broad service areas:

- <u>Advanced Traffic Management Systems (ATMS):</u>

  These systems include: CCTV cameras, computerized traffic signal systems, dynamic message signs, highway advisory radio, and traffic incident management systems.

- <u>Advanced Public Transportation Systems (APTS):</u>

  These systems include: Computer aided dispatch (CAD), automatic vehicle location (AVL), automated payment systems, transit signal priority, and fare technology.

- <u>Advanced Traveler Information Systems (ATIS):</u>

  These systems include: Traveler information websites, 511 travel information call centers.

- <u>Emergency Management (EM):</u>

  These systems include: Service patrols, infrastructure protection, and disaster response and recovery.

- Maintenance and Construction Management (CM):

  These systems include: Vehicle and equipment GPS, route deployment, road weather information systems (RWIS), work zone management and safety management.

- Archived Data Management (ADM):

  These systems include: Data warehouses and *ITS* databases.

- Commercial Vehicle Operations (CVO):

  These systems include: Roadside enforcement, automated roadside safety inspection, weigh-in-motion technology, vehicle electronic clearance, and on-board safety and security monitoring.

- Advanced Vehicle Safety Systems (AVSS):

  These systems include: Intersection, longitudinal and lateral collision avoidance, vehicle safety monitoring, automated vehicle operations, and vision enhancement systems.

Through the application of *ITS*, travel conditions can be determined more quickly, traffic controls can automatically respond to changing traffic conditions, and real-time information can be disseminated. In order to realize these benefits, ITS must be fully incorporated into the surface transportation network and work together to deliver transportation services. In other words, *ITS* must be "mainstreamed" into the overall transportation planning and project development processes that exist in the state and region.

To accomplish this "mainstreaming" the development and deployment of *ITS* actions must be advanced through the existing transportation planning process in the region. The transportation planning process is an ongoing, iterative process, with the goal to make quality, informed decisions pertaining to the investment of public funds for regional transportation systems and services.

The *National ITS Architecture* provides a common structure for the design of intelligent transportation systems and a framework around which multiple design approaches can be developed, each one specifically tailored to meet the individual needs of the user, while maintaining the benefits of a common architecture. It is a mature product that reflects the contributions of a broad cross-section of the *ITS* community (transportation practitioners, systems engineers, system developers, technology specialists, consultants, etc.). The architecture is functionally oriented not technology specific. It defines what needs to done (functions) as opposed to how it will be done (technology). In this way, the architecture can remain valid and current even as technology changes

The architecture defines the following elements:

- The functions – gather traffic information or request a route – that are required for *ITS*.
- The physical entities or subsystems where these functions reside – the field, roadside or vehicle.
- The information flows and data flows that connect these functions and physical subsystems together into an integrated system.

The intent of developing and deploying intelligent transportation systems is to realize a more "seamless" transportation system with reduced traveler delays, quicker response to highway incidents, better traveler information, enhanced and more efficient transit operations, and improved safety and reduced number of crashes. Integration of these services and seamless communication among operators offers the opportunity of increased traveler efficiency and better management of transportation resources.

In the Naugatuck Valley planning region, *ITS* projects conform to the state architecture and focus on three broad areas:

- Freeway Incident Management:

  The CTDOT operates 24-hour incident management centers in Bridgeport and Newington. The program includes monitoring of traffic and detection of incidents along I-95, I-91 and I-84. The program needs to be expanded to include coverage along Route 8 through the region. The project would include the installation of video cameras along the highway and speed detectors to monitoring operations and identify incidents. Including Route 8 in the state's incident management system will reduce response time when an incident occur and reduce congestion and delay caused by an incident.

- Enhanced Highway Corridor Operations:

  The proposed program would integrate existing and planned traffic control devices to enhance and coordinate arterial traffic control systems. The intent will be to monitor traffic operations and institute timing changes in response to traffic conditions in real time. The system may also provide transit signal priority.

- Real Time Traveler Information System:

  The proposed system would provide information to transit travelers on vehicle location, schedule adherence, and delays. The project would install and interactive information kiosks dynamic message signs at the region's commuter rail stations. Through the transportation planning process, transportation concerns and issues facing the region have been identified. The primary goals of the metropolitan transportation plan are to enhance mobility, provide and maintain an efficient multi-modal transportation system that facilitates the movement of people and goods, and minimizing adverse social, economic and environmental impacts. The goals of the MTP remain consistent with past

11.2 Autonomous Vehicles

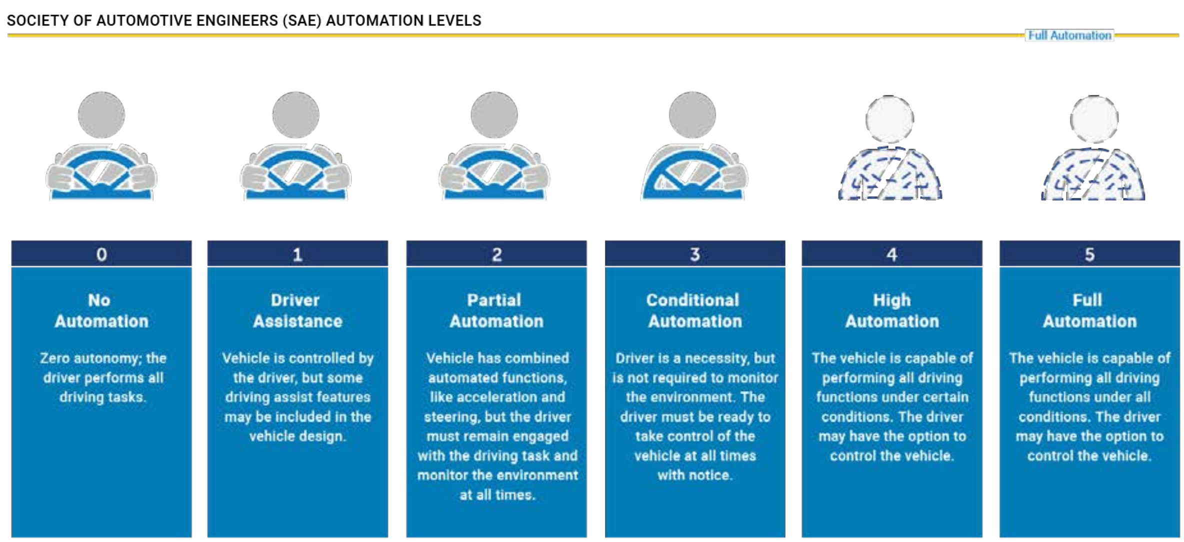
Autonomous vehicles or AVs refer to vehicles that have been mounted with a variety of sensors, cameras and other sensing devices to allow the vehicle operate with varying degrees of autonomy and driver control. The deployment of AVs is increasing in popularity and many communities are looking at operating AVs. However, since they rely on the ability of sensors and cameras to detect and recognize the road environment, weather, poor road condition and lines of sight have impacted AVs capabilities to move safely and correctly.

The transition from driver control to vehicle control has been defined by six levels of automation by the Society of Automotive Engineers (SAE), ranging from no automation (Level 0) to full automation (Level 5):

SAE Levels of Automation

Level 0	**The human driver does all the driving**
Level 1	An advanced driver assistance system (ADAS) on the vehicle can sometimes assist the human driver with either steering or braking/accelerating, but not both simultaneously.
Level 2	An advanced driver assistance system (ADAS) on the vehicle can itself actually control both steering and braking/accelerating simultaneously under some circumstances. The human driver must continue to pay full attention ("monitor the driving environment") at all times and perform the rest of the driving task.
Level 3	An Automated Driving System (ADS) on the vehicle can itself perform all aspects of the driving task under some circumstances. In those circumstances, the human driver must be ready to take back control at any time when the ADS requests the human driver to do so. In all other circumstances, the human driver performs the driving task.
Level 4	An Automated Driving System (ADS) on the vehicle can itself perform all driving tasks and monitor the driving environment – essentially, do all the driving – in certain circumstances. The human need not pay attention in those circumstances.
Level 5	An Automated Driving System (ADS) on the vehicle can do all the driving in all circumstances. The human occupants are just passengers and need never be involved in driving.

Source: National Highway Safety Traffic Safety Administration, https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety#issue-road-self-driving



While the AV technology is advancing, acceptance of US drivers will be critical to deployment. A recent survey by the American Automobile Association (December 2017) indicated 63% of US drivers would be afraid to ride in a fully automated vehicle. This is down from the 78% mark for the same question from an earlier survey, but it suggests acceptance has a ways to go. The AAA survey also determined that safety and reliability are the greatest concern about AVs. Education will be critical to increasing AV acceptance. Motorists, passengers and those sharing the road with an autonomous vehicle must be confident that the technology works and is not prone to errors. In order to achieve the level of trustworthiness needed to ensure acceptance, there must be truth in advertising – the sensors must work according to manufacturer claims, transparency and standardization of terminology.

Currently, AV technology is being developed along two, somewhat, separate paths:

- Private ownership
- Shared mobility

The approach based on private vehicle ownership is being driven by the auto industry. These companies are developing and offering driver assistance equipment as options on generally higher end vehicles. Examples include:

- Crossing traffic warning rear and front
- Night vision
- Lateral parking aid
- Distance information
- Land departure warning
- Wrong way assist
- Lane changing warning
- Approach control warning with braking function
- Speed limit and No Pass information
- Parking assistant – Active park distance control and remote control parking
- Steering and lane control assistant
- Active cruise control with Stop&Go function
- Rear collision prevention

These features are intended to aid the driver and are based on the assumption that the driver remains in control.

The other AV development and deployment path involves technology companies and "ride hailing companies" (also referred to as Transportation Network Companies or TNCs). Technology companies, such as Google, and TNCs, such as Uber and Lyft, are working towards developing driverless vehicles that enhance their businesses. Instead of a private person owning the AV, a company owns a fleet of autonomous vehicles that are shared by many. They would provide on-demand service.

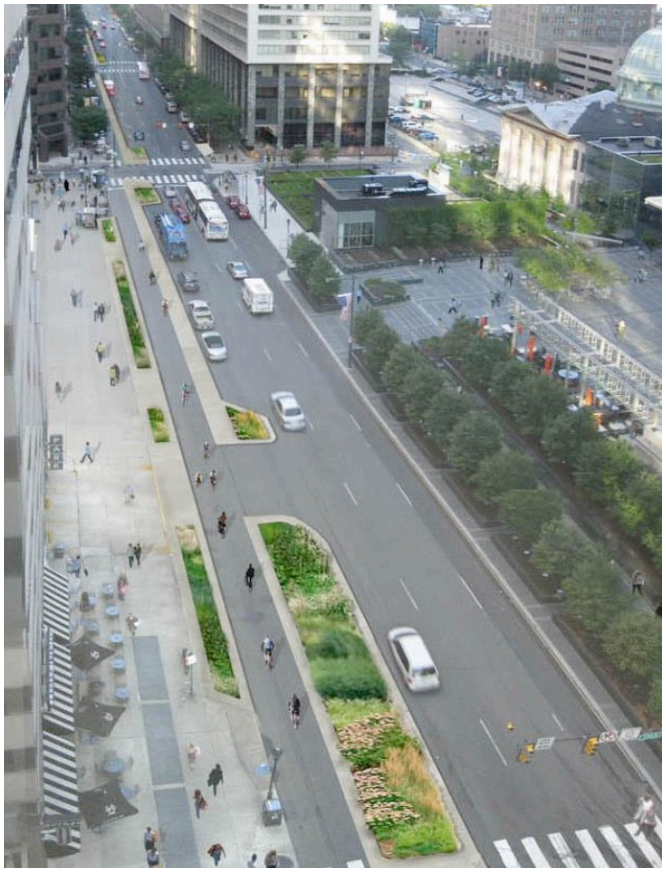
Regardless of which path AV advancement and deployment follows, there are likely to be impacts to the transportation system and how transportation improvement plans are developed. There are numerous benefits to AV technology. Improving road safety is the paramount expected benefit from AV technology. Roughly 94% of serious crashes (NHTSA) are due to human error. Driver assistance features that warn drivers about the vehicles position relative to other vehicles have the potential to greatly reduce human error from the crash equation and, thereby, greatly reducing the number and severity of vehicle collisions.

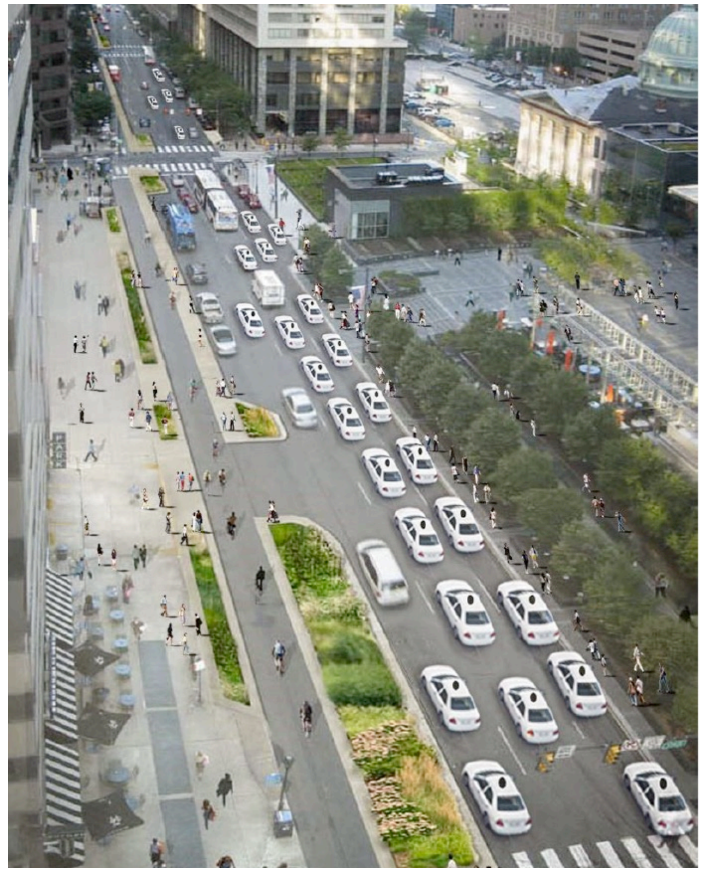
Other often cited benefits are:

- Enhanced mobility – increased deployment of fully automated vehicles will provide new mobility options to persons that are unable to drive, either due to age or disability.
- Economic – vehicle crashes cost billions of dollars in economic activity, productivity, loss of life and decreased quality of life due to injuries.
- Congestion – vehicles equipped with AV features will result in smoother traffic flows, thereby, reducing impedance and congestion.

Conversely, the potential exists for consequences from the proliferation of AVs. While reduced congestion is perceived as a possible benefit, deployment of AV fleets could potentially clog streets travelling while waiting for a call for a ride, especially in urban/downtown areas. A concern of AVs is the potential impact on transit services. As AVs deployed by TNCs increases, bus ridership may decline. The TNC AV fleet would provide on-demand, point-to-point service, as opposed to fixed-route service offered by public transit. Riders would no longer be captive to a bus schedule, long headway and set route. In this scenario, one bus would be replaced by multiple vehicles with disperse boarding and alighting stops.

As shown in the illustrations below, the photo on the left depicts a typical urban street served by a bus route, whereas the one on the right illustrates the AV fleet deployment





However, in the future public transit and TNCs may be able to partner for mutual benefit. The AV fleets could help solve the "first mile/last mile" problem and fill gaps in regular bus service, especially on weekends and late night hours. In addition, advancements in autonomous technology could result in driverless buses that could help reduce costs to operate services or encourage smaller transit vehicles, operated more frequently.

The potential impact on land use decisions is also uncertain at this time. The deployment of fully automated vehicles may spur interest in denser, mixed use urban centers where a substantial portion of the fleet will be shared. Or, because of the ease of driving and ability to perform other activities instead of driving, interest in development in auto-dependent suburban areas may increase.

To help determine which outcome is more likely, many cities and states, including Connecticut, are developing and implementing pilot programs to test AVs. Some of these pilots are testing multi-passenger vehicles or shuttles, while others are requesting vendor proposals to demonstrate the capabilities of individual vehicles. These pilot projects are demonstrating that AV technology can perform as expected, even under more adverse weather conditions. However, these systems rely on sensors, radar and cameras to keep the AV in the correct alignment and path. A key factor to success is the maintenance of pavement markings (line striping), signage, road surface and signals.

11.3 Connected Vehicles

Connected vehicles or CVs rely on wireless communications between vehicles or to and from a vehicle and roadside infrastructure. The communication links provide valuable and timely information to the vehicle regarding the position of other vehicles as well as the status of road devices, such as traffic signals, or roadway conditions. Whereas an AV operates in isolation from other vehicles using its internal sensors, CVs communicate with nearby vehicles and infrastructure. For AVs, it is what the vehicle can see, for CVs, it is what the vehicle can hear.

When discussing connected vehicle technologies, how the vehicles communicate with the world around them is fundamental. Vehicle communications fall under five categories:

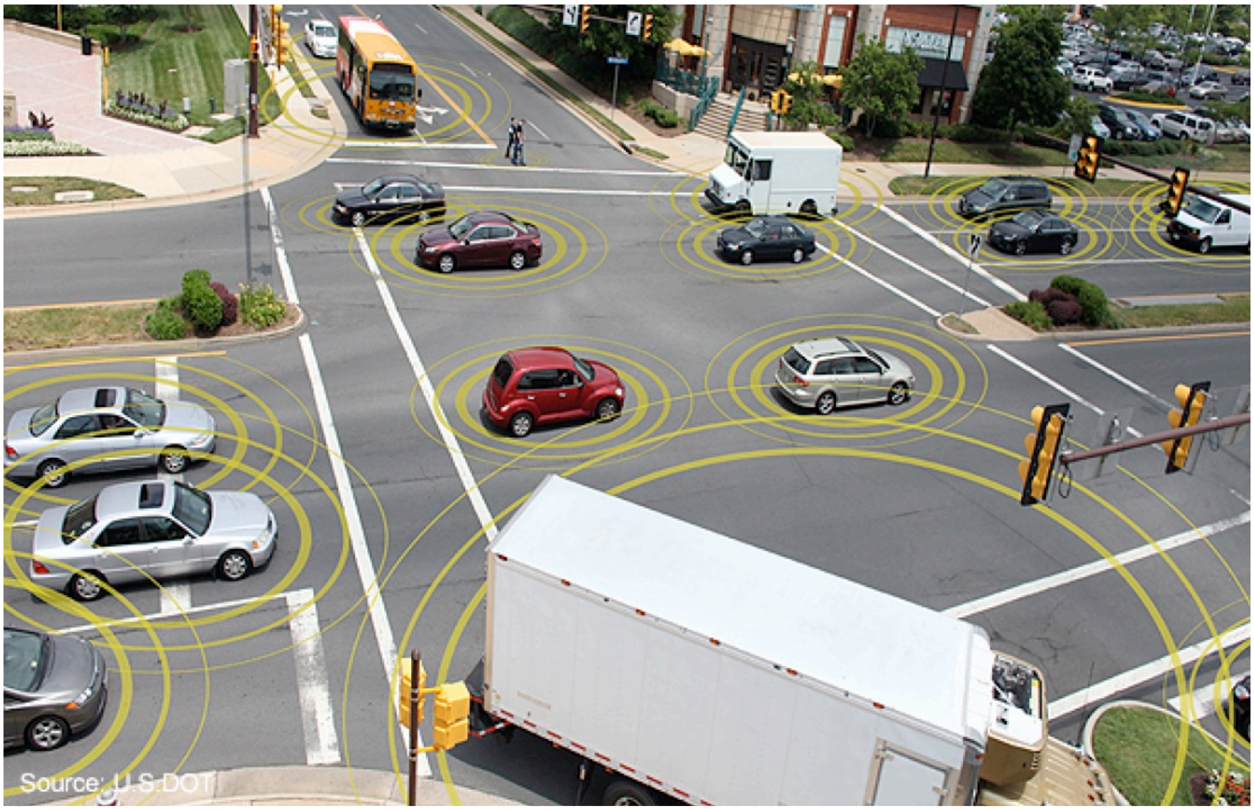
- Vehicle-to-Vehicle – V2V
- Vehicle-to-Cloud – V2C
- Vehicle-to-Infrastructure – V2I
- Vehicle-to-Anything – V2X
- Vehicle-to-Pedestrian – V2P

When connected to other vehicles, the communications is referred to as *Vehicle-to-Vehicle* or V2V. This type of connectivity works whenever similarly equipped vehicles encounter one another and is currently being experimented on highways throughout the nation. An advantage of V2V technologies is that they can be implemented with no change to the current roadway.

Vehicle-to-Cloud or V2C involves the transmission of information from a vehicle to a cloud-based server that then communicates the information to another vehicle. *Coordinated Adaptive Cruise Control* (CACC) offers a good example of a V2C technology. Currently, this technology is only being tested in good weather on expressways with minimal vertical and horizontal curves. This systems involves two or more vehicles connected to a cloud-based server and allows the vehicles to find each other on the highway and connect in route. The CACC technologies then help the vehicles synchronize their speeds to create a platoon. The lead vehicle broadcasts its actions to all trailing vehicles using V2V communications. Similarly, trailing vehicles broadcast their information to the other vehicles in the platoon.

Communications with roadside devices is referred to as *Vehicle-to-Infrastructure* or V2I. These systems work where roadside units have been installed. The flow of information is bi-directional and is typically handled by *Dedicated Short Range Communication* (DSRC) frequency. DSRC is a broadcast mode on a dedicated frequency or channel. The range is short, typically about 900 feet, but provides fast and reliable communications with minimal delay. DSRC can be deployed relatively easily; it is a mature, proven and stable technology. However, the installation of devices to receive and transmit information to and from the vehicle is the responsibility of auto manufacturers and state and local agencies are responsible for installing the road side infrastructure. An example of V2I systems that is being deployed and tested involves communications between vehicles and traffic signal systems. The status of the signal is transmitted to vehicles and allows the vehicle to adjust speed as it approaches the intersection. The intent is to reduce the number of complete stops and improve the traffic flow along the interconnected corridor. Road side infrastructure can also be installed that provide weather and road condition reports. This permits the vehicle to adjust its movement accordingly.

Wireless communications, currently via 4G, are also being developed that rely on smartphone apps to connect roadside units and on board units to pedestrians; *Vehicle-to-Pedestrian* or V2P communication. It is a non-broadcast mode with unlimited range, with communications processed through a server. These systems can inform vehicles of the pedestrian's presence and location, as well as, transmit a request to activate the pedestrian phase and signal as the pedestrian approaches the intersection.



As with AVs, the primary goal of CV deployment is improved road safety and driver behavior:

- V2V Safety Applications:
- Communicating Radar Cruise Control
- Forward Collision Warning
- Emergency Electronic Brake Light
- Blind Spot Warning
- Lane Change Warning/Assist
- Intersection Movement Assist
- Vehicle Turning Right in Front of Bus Warning
- V2I Safety Applications:
- Traffic Signal Change Advisory
- Right Turn Collision Caution
- Red Light Violation Warning
- Speed Compliance
- Curve Speed Compliance
- Speed Compliance in Work Zone

- Oversize Vehicle Compliance – Prohibited Facilities (Parkways); Over Height warning
- Pedestrian in Crosswalk
- Pedestrian Signal
- Emergency Communications and Evacuation Information

As more and more vehicles will become connected to each other and with road side units, congestion relief is expected through the smoothing of the traffic flow. Inter-vehicle communication will help fill gaps in the road and allow cars to seamlessly merge and maintain relative speeds and spacing.

The principle challenges facing CV deployment are:

- Market penetration – need to get devices installed in vehicles.
- Security – need to encrypt systems to prevent cyber vulnerabilities
- Privacy – need to scrub data to eliminate identity and personal information.
- Mainstream acceptance
- Budget for implementing roadside infrastructure.

The integration of AV and CV systems and technologies has the potential to enhance the performance of both. Communication of data from roadside infrastructure to an AV would permit the vehicle to operate more efficiently and it would not have to rely solely on on-board sensors. The use of CV technology would transmit information about surrounding vehicles, location and road environment and has the potential to ameliorate weather, poor road maintenance and lines of sight problems that impede the operation of AVs.

11.4 Connected and Autonomous Trucks

While the prospects for widespread acceptance of connected and autonomous vehicle technologies and systems loom large on the horizon of transportation planning, the potential implication these systems could have on motor carrier freight transportation is enormous. The trucking industry is a $700 billion industry and truck borne freight has the potential to be revolutionized by the introduction of connected and autonomous trucks.

High fuel costs (about 34% of operating expenses), vehicle crashes (represent about a $90 billion loss annually), and vehicle emissions (accounting for about 6% of greenhouse gas (GHG) emissions in the United States) contribute to the trucking industry’s low profit margin (about 3%). In addition, federal regulations limit the number of hours that drivers can operate a heavy truck, and with truck borne shipping expected to grow at a high rate, there will be demand to hire and train more and more drivers.

These market forces and environmental concerns make the industry a prime candidate for any advanced technology that can improve operations and performance and reduce costs. Demonstrated benefits include:

- Safety – reduce the frequency and severity of commercial vehicle crashes.

- Fuel savings – reduced air drag and wind resistance from platooned vehicles improves fuel efficiencies about 10.0% for the rear vehicle and 4.5% for the front vehicle.

- Air quality – reduced fuel consumptions reduces the diesel emissions.

- Mobility – improved information for drivers and fleet managers will increase freight throughput and efficiency.

As an intermediate step to fully automated commercial vehicles, many companies are working to deploy level 1 automation in the freight industry. These technologies rely on the driver remaining in control of the vehicle with cameras (video optics), sensors (RADAR and LIDAR) and communications (DSRC and wireless 4G or 5G) equipment to allow information to be broadcast to and from the vehicles. These technologies generally provide for the vehicles to be connected but also afford a certain level of automation.

Active Safety Systems

Currently, many commercial vehicles and fleets are being install with a wide range of active monitoring systems to improve safety and reduce the frequency and severity of crashes. Examples of systems:

- Electronic stability control to control speed and traction over curves and poor weather conditions
- Forward collision avoidance and warning, with automated braking system – RADAR systems can sense and identify obstacles farther in front of a vehicle than the driver and can automated braking systems can respond and react faster than the driver
- Adaptive cruise control – automatically adjusts speed to adjust speed and maintain distance from a vehicle in front of the truck
- Lane change assist – sensors identify the presence of vehicles in the adjacent lane and warn the driver
- Lane keeping system – sensors help maintain the vehicle within the travel lane

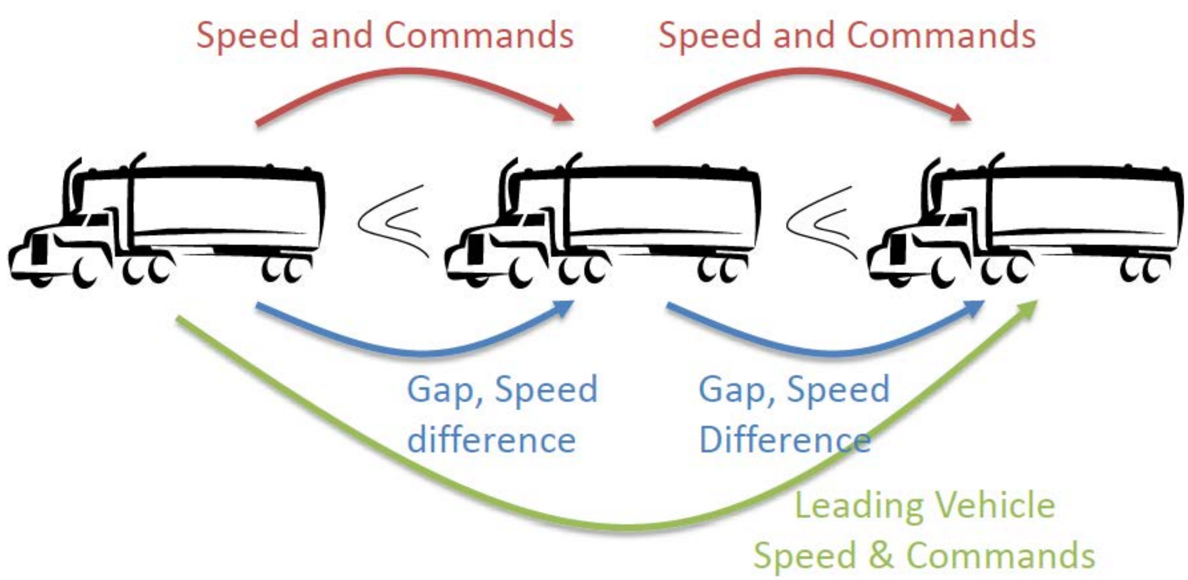
Automated Driving Systems (ADS)

Over the next 20 years, full automation of both heavy duty and light weight vehicles may become a reality. Proponents claim that self-driving trucks will be safer and less costly to operate. While currently private companies are working on ADS units, standardization of communications, backed by new regulations or regulatory buy-in, will likely be required to realize widespread deployment.

In 2016, Otto, a company purchased by Uber, and Volvo teamed up to haul a delivery over 120 miles along I-25 in Colorado. Because the ADS units do not operate in cities and along small rural roads, a driver operated the vehicle from the origin to the interstate and from the interstate to the destination. However, while the truck was traveling along I-25, the ADS was activated and the driver stepped away from the driver's seat to observe from the back of the truck. This was just one trial and the technology is not currently deployed for commercial use. In fact, during the test, escort vehicles travelled in front of and with the truck, and the truck did not attain highway speeds. However, to all watching the industry, it is only a matter of time, perhaps ten years, before this level of automation is broadly deployed, if only in carefully designated regions of the country and only under ideal weather conditions.

Truck Platoons

Connected and autonomous trucks can closely coordinate their movements to platoon over long stretches of highway. Currently available systems control truck platoons via DSRC communications. With the driver manually steering the truck, the lead vehicle controls longitudinal movement of the platoon via the throttle and brakes. The systems can be disengaged from the trailing vehicles at any time and video is provided to the trailing trucks to allow drivers to see what the lead driver sees. Truck platoons operate almost exclusively on multi-lane, divided limited access highways and interstates and when traffic and weather conditions are acceptable.



Truck platoons cut wind resistance and air drag by setting and maintained a constant gap between trucks. This reduces fuel consumption for all vehicles by roughly 10.0% and 4.5% for the trailing trucks and lead truck respectively. Traffic flow also improves as the truck platoon maintains spacing and pace. These systems can also detect a vehicle crossing in between platooned vehicles and automatically adjusts speeds to maintain a safe following distance.

Front mounted radar can "see" farther than the driver and can react faster and apply brakes quicker to obstacles in front of the truck. These systems improve safety and help prevent crashes.

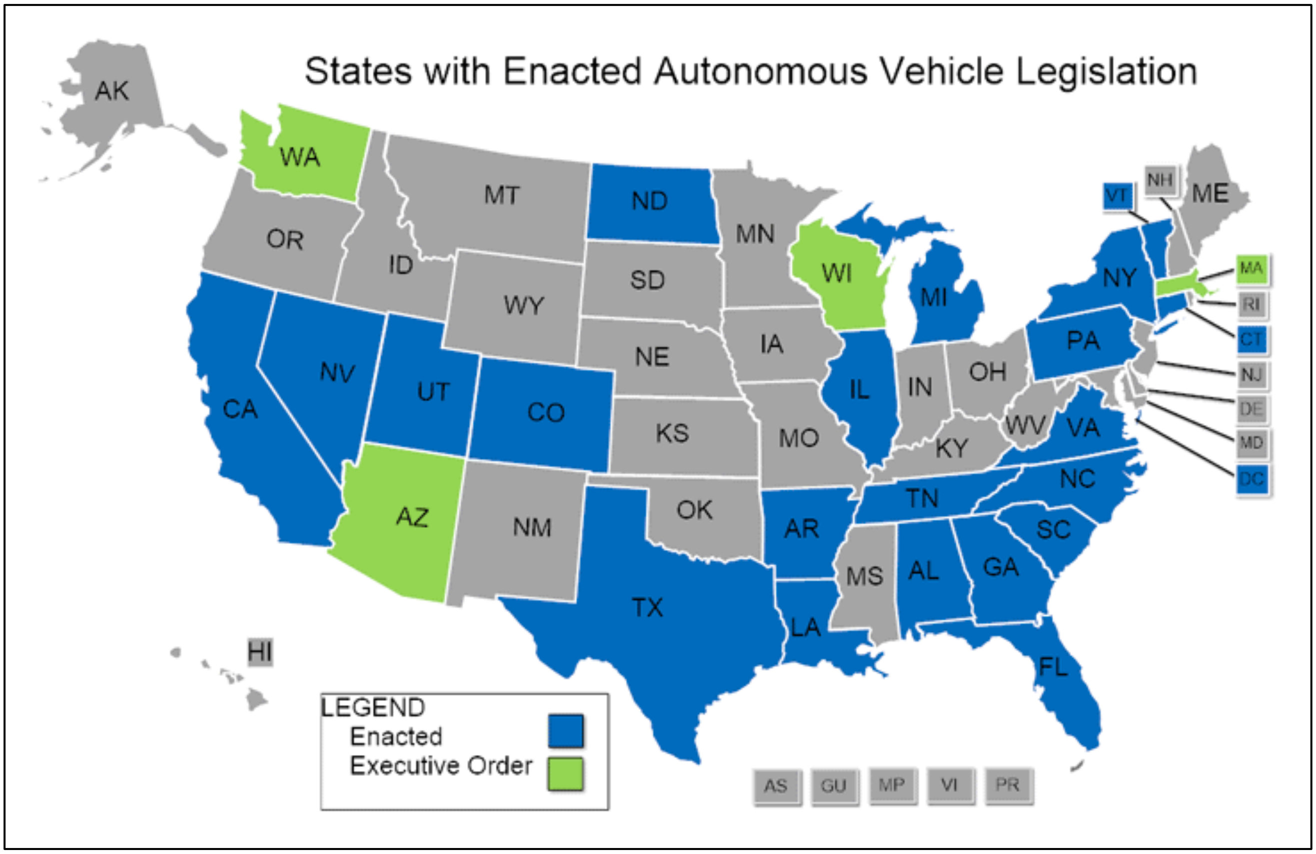
Once these technologies have been thoroughly vetted, in order to employ them on the state highway network, laws pertaining to following distance will need to be set to ensure safety and the driving experience for other road users is not eroded. These regulatory adjustments can be made with no new costs.

To coordinate the connected technologies outlined above, the industry is currently working diligently to standardize the frequencies for the DSRC on which they broadcast V2V. A federal recommendation from FHWA to states might help this process. V2I technologies will benefit from the planned 2020 launch of a 5G cellular network and the setting of standards for V2I broadcasting is of equal importance and seems necessary for projects that may, realistically, start receiving federal funding for design and construction in the coming three-to-five years.

11.5 State and Federal CAV Programs and Pilot Projects

A number of TNCs, such as Uber and Lyft, auto manufacturers, such as Toyota, GM and Ford, and technology companies, such as Google and Panasonic, are investing in the design and development of CAV systems and technologies, as well as, purchasing vehicle fleets to deploy their ADS. The commonality of these efforts is that they are being made by the private sector with low public involvement. However, a successful path to safe testing and deployment of ADS requires government oversight, engagement of key stakeholders, and development of uniform, consistent and reciprocal polices, regulations and standards. In addition the deployment of V2I road side units will require the investment of public funds.

Nevada was the first state to authorize the operation of autonomous vehicles in 2011. Since then, 20 other states and the District of Columbia have passed legislation related to autonomous vehicles. Governors in five other states have issued executive orders authorizing the safe development, testing and operation of AVs.



These state actions typically establish committees, commissions or work groups to develop guidelines for the testing of AVs on public roads and support deployment of AVs. Some legislation requires the presence of an operator while other states allow fully automated vehicles. Despite differences the goal of the legislation is to encourage partnerships with the private sector to ensure safe testing and ultimate deployment of AVs.

Several cities and states have initiated efforts to test connected and autonomous vehicle systems and technologies, as have a number of transportation coalitions. The following are brief overviews of some these efforts:

Connecticut

In 2017, the State of Connecticut enacted legislation (Public Act 17-69) that authorized the state to establish and implement a pilot program for testing fully autonomous vehicles, as defined as either Level 4 or Level 5 on the SAE classification scale. Under the program, the Office of Policy and Management will solicit AV proposals and select up to four municipalities to participate in the program. Two of the selected participants need to meet set population thresholds and targets. The program is being initiated in consultation with the Department of Motor Vehicles

(DMV), Department of Transportation (DOT), Department of Emergency Services and Public Protection (DESPP) and the Connecticut Insurance Department (CID).

The pilot program aims to encourage and allow for the testing of fully autonomous vehicles on local highways in Connecticut. The municipalities must outline the location and routes where AVs may operate, hours of operation for vehicle testing, as well as record the make, year, and model of the test vehicles. Partnerships with an automated vehicle manufacturer, university and service provider (Lyft, Uber, etc.) are encouraged for purposes of providing shuttle services and other programs. The legislation requires a tester to be seat in the driver's seat and be capable of taking immediate control of the AV, and prohibits testing on limited access highways.

The legislation also established a task force to study fully autonomous vehicles, evaluate the pilot program, and develop recommendations on how Connecticut should promote and regulate AVs in the state.

OPM expects to approve its first application by late 2018.

Rhode Island

The State of Rhode Island convened a Policy and Innovation Team within the Rhode Island Department of Transportation (RIDOT). The goal of the Team is to implement a pilot program to test multi-passenger AVs on Providence streets. A Transportation Innovation Partnership was established in July 2017 to guide and oversee the pilot program. The focus is on integration of AV technologies into public transit. The initial phase will test vehicles within the Quonset Business Park, a relatively controlled environment. Tests will be conducted during daytime and nighttime, as well as under adverse weather conditions.

Boston, Massachusetts

The City of Boston initiated a pilot project to test AVs with the goal of deploying fleets of autonomous vehicles that are electric and shared. The testing area is within the 1,000-acres Innovation District located in South Boston waterfront. The intent of the project is to reduce crashes, especially ones resulting in severe injuries, improve access and enhance mobility for those who most need it. The focus is on autonomous shared taxis and autonomous minibuses.

Minnesota

The State of Minnesota initiated a pilot project to test the performance of AVs under more adverse weather conditions. Prior to this effort, testing of AVs was conducted under almost ideal weather condition. To determine how well AVs operate under various weather conditions, multi-passenger shuttles (capacity of 12 passengers) were operated at the Minnesota road test facility, owned and operated by the Minnesota Department of Transportation. The shuttle vehicles were operated at the Level 4 level of autonomy (highly automated). The closed-loop circuit allowed testing at various speeds (15-to-25 mph) and permitted testers to create varying test conditions. The AVs were also placed in operation and open to the public during Super Bowl in 2018.

The AVs performed well under bare pavement and clear weather conditions and were able to navigate stops, starts, turns, curves and had good obstruction interaction. With one inch snow on the road, performance was similar to bare pavement test, but some wheel wander was noted. Slippage and localization issues occurred and loose and blowing snow became obstructions as the weather and road conditions worsened.

Automated trucks and truck platooning are other concepts being considered for testing at the road test facility. Minnesota is also considering testing connected vehicle corridors by implementing a “Smart” corridor with road side units that can transmit information to vehicles.

Maryland

The State of Maryland initiated a project within its Department of Transportation to design and deploy road side devices to provide information to connected vehicles. The first application will be installed along an eight-mile section of US Route 1. It will include closed-circuit TV to support incident and traffic management and DSRC at intersections to communicate traffic signal timing and phasing information. DSRC is also being considered for installation at tunnels. Other activities include testing self-parking vehicles at Baltimore Washington International Airport parking lots and examining autonomous vessels by the Maryland Port Authority.

I-95 Corridor Coalition

The I-95 Corridor Coalition is a 16-state plus the District of Columbia association tasked with monitoring travel along I-95. Evolving autonomous and connected vehicle technologies have become a focus of the Coalition. Although the Coalition is not sponsoring or testing CAV technology, it has determined that there is a strong need for a dialogue among partners regarding interoperability of these systems across state borders.   within the corridor. A workshop was to allow members to share CAV related activities, identify challenges and potential solutions, and define implementation steps for member agencies.

New England Transportation Consortium

The New England Transportation Consortium is comprised of state Departments of Transportation from the six New England states. Its mission is to conduct shared transportation research initiatives. In the area of CAV systems, the Consortium is working to identify multi-state issues related to the testing and deployment of CAVs in New England, document opportunities and challenges and prepare an action plan to minimize challenges and pursues opportunities. A key focus is developing a roadmap to address and overcome cross-border issues and challenges.

New York City

The New York City is participating in a connected vehicle pilot deployment project to improve safety and mobility of travelers, install V2V technology in up 10,000 vehicles in Mid-town Manhattan, and put in place V2I devices along targeted high accident arterials in Manhattan and Brooklyn. The V2V applications include forward collision warning, blind spot warning, lane change warning, and intersection movement assist. The V2I applications provide red light violation warning, speed compliance, oversize vehicle compliance on prohibited facilities, over height warning, and pedestrian in crosswalk warning. Effectiveness of this project is dependent on mainstream acceptance and ability to ensure security and privacy of data exchanged between vehicles and between vehicles and road side units.

Colorado

The State of Colorado initiated a project within its Department of Transportation to design and deploy a platform for connected vehicles. It is a V2X concept to provide communications between vehicles (V2V), between vehicles and road side devices (V2I and I2V), and between infrastructure (I2I). The project is targeted at a 90-mile section I-70 from Golden to Vail.

12.0 Capital Improvement Program

The Metropolitan Transportation Plan for the Naugatuck Valley planning and the Central Naugatuck Valley MPO is intended to address the issues and deficiencies of the area's transportation systems. The critical transportation problems facing the region are:

- Aging Infrastructure
- Roadway Congestion
- Highway and Pedestrian Safety
- Under Investment in Public Transit
- Incomplete and Gaps in Active Transportation Facilities

Capital improvement program will effectively meet the goals and objectives discussed throughout this MTP over its timeframe. These goals involve:

- Maintaining and preserving critical systems in a State-of-Good-Repair
- Promote better and more efficient operation and management of the transportation system
- Enhance transportation systems to meet the traveling needs of all residents and travelers
- Support economic revitalization
- Support sustainable communities initiatives that link land development with investments in transportation infrastructure and support the development of transit oriented districts

12.1 Implementing the MTP

Implementation of the capital improvement program presented in the MTP will require a substantial investment in federal, state and local funds. Federal regulations require the MTP to be "*financially constrained*" (Title 23 CFR 450.324) and develop a financial plan based on reasonably expected available and projected sources of federal, State, and local revenues and the costs of implementing proposed transportation system improvements.

The principal sources of funds are the various federal-aid transportation programs administered by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). The federal aid programs are authorized by federal act and typically provide 80% of the project costs, with state and local funds covering the remaining 20% non-federal share. The current federal transportation act, known as the *FAST Act,* was signed into law on December 4, 2015. It is five-year legislation. While many of the programs and provisions included in the previous federal act (*MAP-21*), the *FAST Act* reformed and strengthened the transportation programs and refocused federal-aid on national priorities. Key elements of the new act were providing long-term certainty and more flexibility for states and local governments.

Most federal transportation programs apportion funds by formula using program-specific factors. Some transportation funding is provided through discretionary programs, with states required to compete on a project-by-project basis.

In Connecticut, the Special Transportation Fund (STF) finances transportation improvement projects and is accessed to provide the non-federal match of funds under the *FAST Act*. The primary use of the STF is to pay debt service on Special Tax Obligation Bonds issued for transportation infrastructure purposes. A small portion of the STF is used for *“pay-as-you-go”* projects, including on-going maintenance. The major sources of STF dollars are the motor fuels tax and motor vehicle receipts, which combined account for about 80% of the total STF revenues.

The core federal aid transportation programs administered by FHWA and FTA are as follows:

- <u>Better Utilizing Investments to Leverage Development (BUILD) Program:</u>

  In addition to the federal programs provided in the *FAST Act*, Congress has continued to provide discretionary grant funds to stimulate the nation’s economy. These discretionary grant funds were first provided in 2009 by the *American Recovery and Reinvestment Act* under the Transportation Investment Generating Economic Recovery (TIGER) grant program. Since its inception, nine rounds of TIGER grants have been offered, totaling nearly $5.6 billion. In FFY 2018, the TIGER program was renamed the BUILD program: Better Utilizing Investments to Leverage Development. The purpose and intent of the BUILD grants remain the same as the TIGER program: *to invest in road, rail, transit and port projects that promise to achieve economic recovery and growth*.

  Grants are awarded on a competitive basis for capital investments in surface transportation projects that have a significant national, regional, and local impact. Project selection criteria includes safety, economic competitiveness, quality of life, environmental protection, state of good repair, innovation, partnership, and additional non-Federal revenue for infrastructure investments.

- <u>National Highway Performance Program – NHPP (FHWA):</u>

  The NHHP “*provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a State's asset management plan for the NHS.*” Under MAP-21, the NHS was expanded to include all principle arterials, not just those designated as an NHS facility. The NHS includes:

  - Interstates: I-84 and I-691
  - Other limited access expressways: Route 8
  - Other Principle Arterials: about 95 miles of the roads in the Naugatuck Valley planning region are classified as principle arterials

  The NHPP consolidated funding from previously separate programs:

  - National Highway System (NHS)
  - Interstate Maintenance (IM)
  - Highway Bridge Replacement and Rehabilitation Program (HBRR)

- National Highway Freight Program – NHFP (FHWA):

  The *FAST Act* established a new program to improve the efficient movement of freight on the National Highway Freight Network (NHFN) and invest in projects that strengthen economic competitiveness, reduce congestion, improve safety, improve freight reliability and reduce the cost of freight transportation. Funds are distributed to States by formula for eligible activities, such as construction, operational improvements, freight planning, and performance measurement. Although the program is highway-focused, each State may use up to 10 percent of its NFRP funds for each fiscal year for public or private freight rail, water facilities (including ports), and intermodal facilities. To be eligible for receiving NHFP, a USDOT-compliant State freight plan needs to have been approved.

  In the Naugatuck Valley planning region, I-84 and I-691 are the only facilities on the Primary Highway Freight System (PHFS).

- Highway Safety Improvement Program – HSIP (FHWA):

  The HSIP program provides funds to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. The SIPH requires a data-drive, strategic approach to improving highway safety on all public roads that focuses on performance. Projects funded under this program need to improve highway safety and be consistent with the State's strategic highway safety plan (SHSP).

- Surface Transportation Block Grant Program (FHWA):

  The STBG program provides the most flexibility in allocating funds to transportation improvement projects. It essentially replaced and renamed the long-standing Surface Transportation Program included in previous federal transportation legislation. The State's STBG apportionment is sub-allocated to three sub-programs:

  - Urbanized areas with a population greater than 200,000 – STBG: Urban. These funds are divided among the large urban areas based on their relative share of population.
  - Areas with a population greater than 5,000 but less than 200,000 – STBG: Anywhere.
  - Areas with a population less than 5,000 – STBG: Rural.

STBG funds can be used to implement a wide variety of transportation improvement projects located on the federal highway system.

- Surface Transportation Block Grant Program – Transportation Alternatives Set-Aside (FHWA):

  Under *MAP-21*, a separate program was established to implement various small scale projects, such as pedestrian and bicycle facilities, recreational trails, safe-routes-to-schools and community improvements. The *FAST Act* eliminated the Transportation Alternatives Program (TAP) and replaced it with a set-aside of STBG funds. The Transportation Alternative set-aside program maintains the eligibility criteria previously included in *MAP-21*. A portion of the funding is sub-allocated based on population and states are allowed to transfer up to 50% of the TA funds not sub-allocated by population to another federal aid program. The TA apportionment includes funds that had been previously allocated under the federal Recreational Trails Program, unless the state had decided to opt out of the program.

The CNVMPO area is not designated as a TMA; therefore, it does not receive a dedicated allocation of TA set-aside funds and must compete with other small urban areas in Connecticut.

- Congestion Mitigation and Air Quality Program – CMAQ (FHWA):

  The CMAQ program is a flexible funding source to state and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality in areas designated as non-attainment for the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter. CMAQ funds can also be used in areas designated as a "maintenance area." To be eligible under the CMAQ program, a project must demonstrate a reduction in air pollution and contribute to attainment of the NAAQS. An air quality assessment needs to be performed for all CMAQ-funded projects and programs.

- Off-System Bridges (FHWA):

  The FAST Act continues the MAP-21 set-aside of a percentage of a State's STBG apportionment for the replacement and rehabilitation of bridges not on the federal aid highway system, referred to as "off-system bridges." The allocation must not be less than 15% of the State's federal Highway Bridge Program apportionment in FFY 2009. Since almost all bridges on the state highway system are on the federal aid system, the majority of projects funded under this program are owned by municipalities.

- National Highway Traffic Safety (NHTS) / Section 154 Penalty Funds (FHWA):

  Connecticut is currently assessed a 2.5% annual penalty from its NHPP and STBG programs because it does not meet Federal Open Container Legislation Requirements under 23 USC 154. These funds are transferred to the State's Section 402 Safety Program and are used for Impaired Driving and Hazard Elimination Programs. Through education, research, and roadway safety improvements, these programs are intended to change behaviors, save lives, prevent injuries and reduce economic costs due to road traffic crashes.

- Urbanized Area Formula Grant Program – Section 5307 (FTA):

  This program provides grants to Urbanized Areas (population over 50,000) for public transportation capital, planning, job access and reverse commute projects, as well as operating expenses in certain circumstances. These funds constitute a core investment in the enhancement and revitalization of public transportation systems in the nation's urbanized areas, which depend on public transportation to improve mobility and reduce congestion. The NVCOG is designated as a direct recipient of FTA grant funds for the Valley Transit District and its four member communities of Ansonia, Derby, Seymour and Shelton. Funding is apportioned on the basis of legislative formulas.

- Capital Investment Grants – Section 5309 Discretionary Capital Program (FTA):

  The Capital Investment Grant program is FTA's primary program for funding major transit capital investments, including heavy rail, commuter rail, light rail, streetcars, and bus rapid transit. While it is a discretionary grant program, it is different from other federal discretionary programs in that instead of an annual call for applications and selection of awardees, the law requires that projects seeking CIG funding complete a series of steps over several years to be eligible for funding. Program funds can be used for major fixed guideway capital projects, including new starts and extensions, bus rapid transit (BRT) projects, and projects that improve capacity on an existing fixed-guideway system. There are four categories of eligible projects:

  - New Starts
  - Small Starts
  - Core Capacity
  - Programs of Interrelated Projects

- Enhanced Mobility of Seniors and Individuals with Disabilities – Section 5310 (FTA):

  This program provides formula funding to states for the purpose of assisting public and private nonprofit groups in meeting the transportation needs of older adults and people with disabilities beyond traditional public transportation services and ADA complementary paratransit services. Funds are apportioned to states based on their share of the population for these two groups. The program aims to improve mobility for seniors and individuals with disabilities by removing barriers to transportation service and expanding transportation mobility options. Eligible projects include both "traditional" capital investment and "nontraditional" investment beyond the Americans with Disabilities Act (ADA) complementary paratransit services.

  Under *MAP-21* and forward in the FAST Act, the Section 5310 program was consolidated with the New Freedom Program (Section 5317), described as capital and operating expenses for new public transportation services and alternatives beyond those required by the ADA.

- Emergency Relief Program – Section 5324 (FTA):

  This program helps states and public transportation systems pay for protecting, repairing, and/or replacing equipment and facilities that may suffer or have suffered serious damage as a result of an emergency, including natural disasters such as floods, hurricanes, and tornadoes. The program also improves coordination between USDOT and the Department of Homeland Security (DHS) to expedite assistance to public transit providers in times of disasters and emergencies.

- State of Good Repair Grant Program – Section 5337 (FTA):

  The State of Good Repair program provides capital assistance for maintenance, replacement and rehabilitation projects of high-intensity fixed guideway and bus system. The program is dedicated to repairing and upgrading the nation's high-intensity rail and bus systems to ensure that public transit operates safely, efficiently, reliably, and sustainably so that communities can offer balanced transportation choices that help to improve mobility, reduce congestion, and encourage economic development. Funds are apportioned by statutory formula.

- Bus and Bus Facilities Infrastructure Investment Program – Section 5339 (FTA):

  This program provides funding through formula allocation and competitive grants to replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities. The competitive allocation provides funding for major improvements to bus transit systems that would not be achievable through formula allocations. A sub-program provides competitive grants for bus and bus facility projects that support low and zero-emission vehicles.

In recent years, several 100% state-funded programs have been established. The most transformative program has been the Local Transportation Capital Improvement Program, referred to as LOTCIP. This program is intended to address regional transportation priorities through capital improvement projects selected, prioritized and endorsed by the Councils of Governments. The program essentially mirrors the federal STBG: Urban program and preserves the eligibility requirements and purposes and needs criteria of the federal program. The COGs and its municipal members do have more flexibility in advancing and designing LOTCIP programs, but the main goals of improving safety, preserving the road system and ensuring long useful life times of the road improvement projects are retained. Project sponsors are responsible for 100% of all design costs and the state provides for 100% of the construction costs. The LOTCIP program allows the COGs to streamline the implementation process and advance projects more quickly from design to construction.

Annually, the Naugatuck Valley planning region is allocated about $8.5 million. The NVCOG maintains a financial plan that tracks available funds and expenditures. The intent of the financial plan is to ensure optimal allocation of funds and attempts to minimize the unprogrammed balance. This approach endeavors to allocate 100% of available LOTCIP funds each year.

Since its inception in 2014, the NVCOG has been allocated about $49.0 million and received applications for 33 projects from 16 of its 19 municipalities. Eight projects have been completed at a construction cost of $16.0 million and two additional projects have received qualified bids to construct that will increase the construction expenditures to $19.9 million. Design activities are underway on seven projects with an estimated construction value of $24.8 million. The remaining projects are still in the pre-application/approval process.

The Community Connectivity Program was developed to provide funding for targeted infrastructure improvements that are commonly identified through Road Safety Audits (RSAs) or other transportation planning initiatives. The purpose of the program is to provide funding directly to municipalities to implement smaller scale infrastructure improvements that will improve safety and connections for pedestrians. Municipalities are responsible for all design costs and the state provides 100% of construction costs. Unlike the LOTCIP program, the Community Connectivity Program is not administered through the COGs and regional priorities are not established.

Connecticut established the Local Bridge Program to provide grant funds to municipalities to rehabilitate or replace locally-owned bridges under 20 feet in length. Bridges that carry a certified local road and are structurally deficient, based on FHWA criteria, are eligible under the program.

Connecticut decided to opt out of the federal Recreational Trails Program. The federal program was replaced, and enhanced, by a state-funded recreational trails program administered through the CTDEEP. This program provides funds to a variety of entities for the following activities:

- Planning, design and construction of new trails (motorized and non-motorized).
- Maintenance and restoration of existing trails (motorized and non-motorized).
- Access to trails by persons with disabilities.
- Purchase and lease of trail construction and maintenance equipment.
- Acquisition of land or easements for a trail, or for trail corridors.
- Operation of educational programs to promote safety and environmental protection as related to recreational trails.

While the state program mirrors much of the activities and eligibility criteria of the federal program, it provides greater flexibility in the use of grant funds and expanded the types of actions that could be funded, including the maintenance and restoration of existing trails. The state Recreational Trails Program also has appropriated more funds than would have been available under the federal program. Despite these benefits, the appropriations to fund the program need to be authorized by the state legislature and approved the state Bond Commission, making the funding of the program less consistent year-to-year.

12.2 Financing the MTP

The CTDOT, as part of its financial planning responsibilities, calculated the total estimated funds reasonably anticipated to be available from the FHWA and FTA over the timeframe of the MTP. In addition, the CTDOT provided an estimate of the 100% state-funded transit projects.

For the highway program, state and federal aid funds apportioned to Connecticut for highway projects in FFY 2018 was used as a base, and compounded at 3% per year over the life of the MTP. This total was then sub-allocated to each metropolitan and rural planning area based on a formula that considered vehicle miles of travel, volume-to-capacity ratios and lane miles. Funds needed to construct major projects of statewide significance were extracted from the total before apportioning funds to the metropolitan and rural areas. Each area was allocated minimum funding level. The sub-allocated totals was divided into two categories:

- System Improvements – 40% of the total
- System Preservation – 60% of the total

The CTDOT estimates that, over the next 27 years, about $2.5 billion will be available to implement the highway improvements in the metropolitan planning area under the jurisdiction of the CNVMPO (Note: transportation improvement projects located in the four Naugatuck Valley planning region municipalities that are in the Greater Bridgeport and Valley metropolitan planning area are included in the MTP for the GBVMPO). Included in this total are funds allocated to major state projects in the region, estimated at $64.4 million. Resources for the highway system are further broken-down by funds to preserve and maintain the system in a state of good repair (Highway System Preservation) and those available for system enhancements (Highway System Improvements). About $790.67 million are earmarked for system improvements (enhance safety, improve mobility, increase system productivity or promote economic growth) and about $1.5 billion for system preservation (resurfacing, bridge rehabilitation and replacement, and reconstruction).

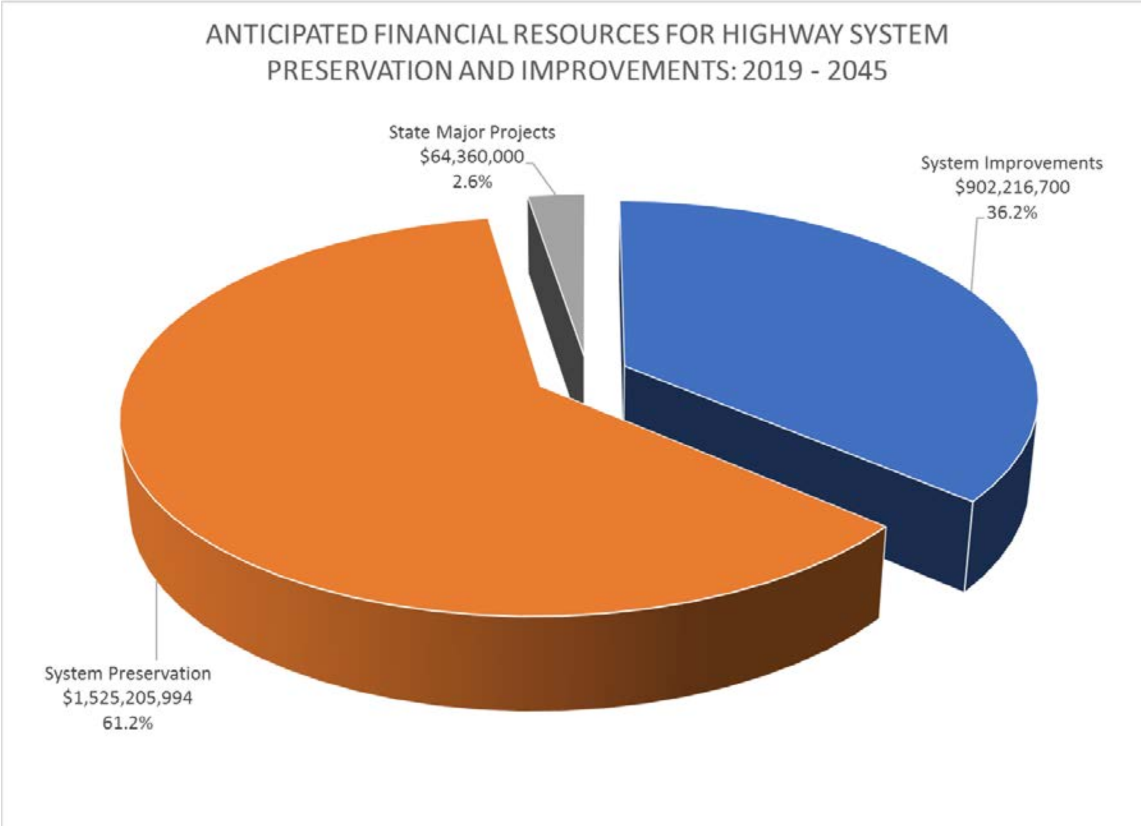
For the public transit funding sources, the CTDOT provided an FTA funding chart that indicated expected revenues for transit projects by MPO and for multi-regional actions. The FTA funding allocation for multi-regional projects represent revenues expected to be available to implement system-wide improvements along the New Haven rail line, including the branch lines, Connecticut rail lines, including the Hartford Line and Shoreline East, and CT*transit* bus systems. In total, about $14.6 billion is expected to be available for transit projects, with $12.0 billion provided for commuter rail improvements and $2.6 billion for bus transit projects.

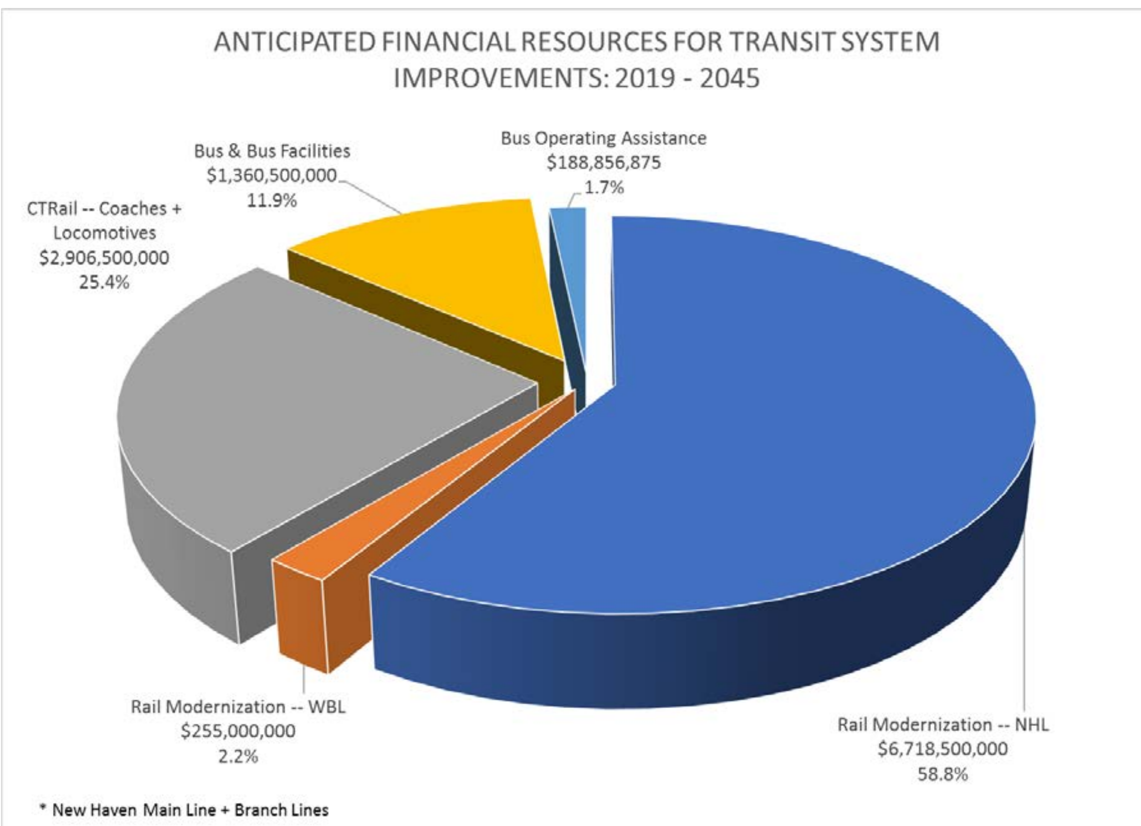
To estimate the amount of funds expected to be available to support the transit improvements included in the MTP for the Central Naugatuck Valley planning area, the current FTA apportionments to the Waterbury urbanized area were extrapolated over the life of the MTP inflated by 3% per year. The state has committed to providing funds to cover 100% of the operating subsidies for local bus services. Funds to operate complementary ADA para-transit services were expected to be continued over the life of the MTP. Based on current trends about $188.9 million will be needed to support bus operations of the CT*transit* Waterbury and Bristol divisions. While the total allocation for bus operating assistance is expected to meet existing needs and demand, it does not factor in or allow for any new services or route enhancements and expansions. The MTP recommends new bus service along Lakewood Road in Waterbury and revised service in Bristol to rationalize routes and provide service to large employment areas in the southeast part of the city. These new service will require a commitment additional state operating assistance.

Rail capital projects proposed and planned for the Naugatuck Valley planning region represent major statewide investments and integrated with the capital program for the state-owned New Haven rail line and its related branch lines. The funding for these projects was assumed to be included in the CTDOT’s rail plan.

Based on the FTA revenue chart provided by the CTDOT, it is expected that about $250 million will be available through FTA programs for rail modernization projects specifically on the Waterbury branch rail line. Additional, non-designated funds allocated to the New Haven rail line would also be available for improvements on the WBL. Funds projected to be available for the entire CT*transit* regional bus and bus facilities projects are estimated at about $813 million, with an additional $792.5 million available for all transit districts statewide.

The breakdowns by the funding sources for highway and transit improvement projects expected to be available to implement the recommended program of projects are shown in the following charts.

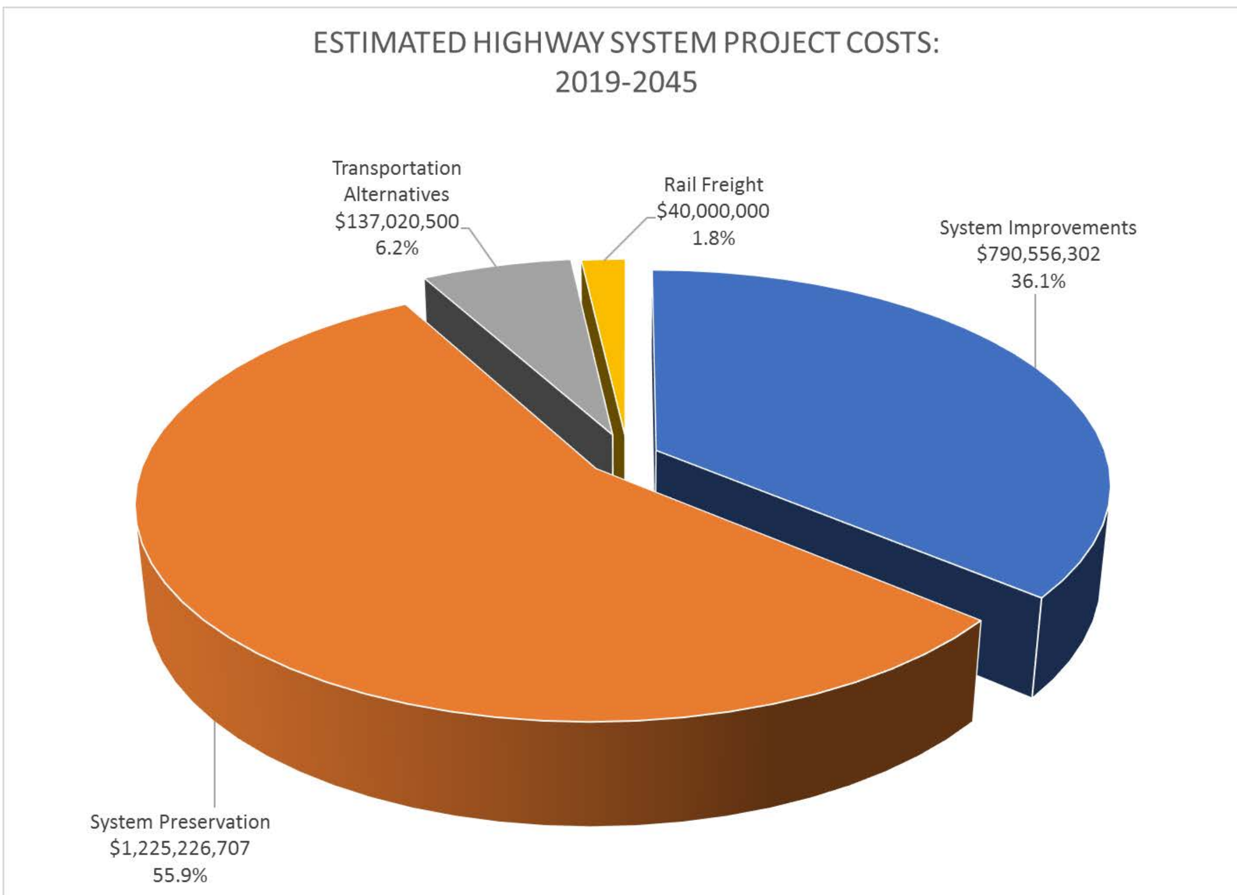

ANTICIPATED FINANCIAL RESOURCES FOR HIGHWAY SYSTEM PRESERVATION AND IMPROVEMENTS: 2019 - 2045
State Major Projects
$64,360,000
2.6%
System Improvements
$902,216,700
36.2%
System Preservation
$1,525,205,994
61.2%

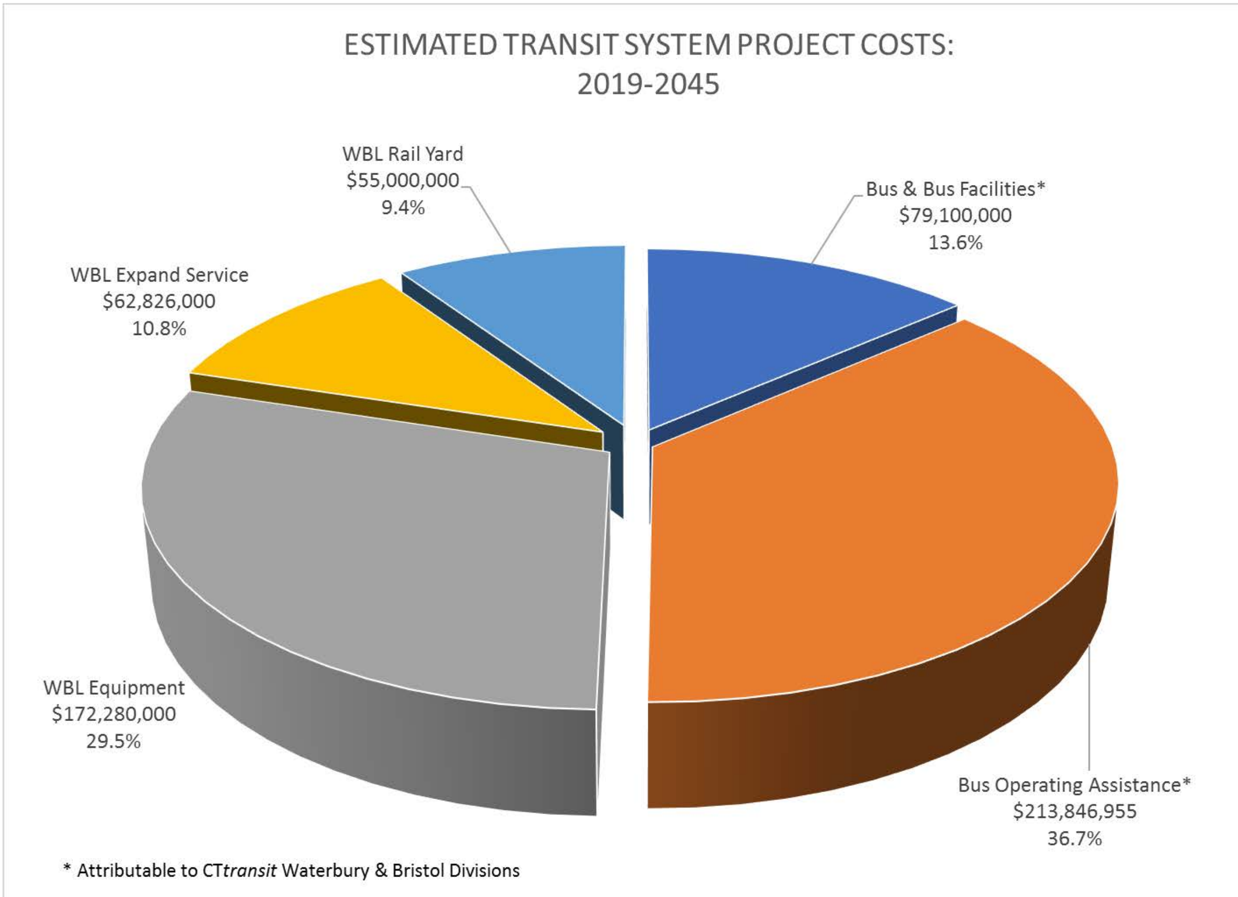

ANTICIPATED FINANCIAL RESOURCES FOR TRANSIT SYSTEM IMPROVEMENTS: 2019 - 2045
Bus & Bus Facilities
$1,360,500,000
11.9%
Bus Operating Assistance
$188,856,875
1.7%
CTRail -- Coaches + Locomotives
$2,906,500,000
25.4%
Rail Modernization -- WBL
$255,000,000
2.2%
Rail Modernization -- NHL
$6,718,500,000
58.8%
* New Haven Main Line + Branch Lines

The program of projects included in the MTP will require a substantial investment. Based on high level estimates, nearly $2.8 billion will be needed to implement the transportation improvements recommended in the MTP. This cost includes a substantial investment in modernizing the infrastructure of the Waterbury branch rail line and purchasing new, modern rail rolling stock, preserving and maintaining I-84 and Route 8 in states-of-good-repair, providing dedicated bicycle and pedestrian facilities to ensure safe travel, including completing the Naugatuck River Greenway Trail, and supporting and enhancing public transit operation, especially ensuring the capital needs of the Waterbury and Bristol divisions of CT*transit* are met. The MTP has also identified opportunities to provide new, alternate modes of transportation, such as Bus Rapid Transit, and create transit-supportive land development in the vicinity of WBL rail station.

Project and program estimates represent order of magnitude costs based on unit prices supplied by CTDOT and illustrative project concepts. Projects with known schedules were inflated to the expected year of implementation.

The breakdown of estimated projects for highway and transit system improvements are depicted in the following charts.





About 79% of the total investment in the CNV's transportation systems is targeted at highway preservation and enhancement projects. This amounts to a nearly $2.2 billion allocation of expected funding levels. Based on the funds expected to be available over the timeframe of the MTP, the highway system program is fiscally constrained as 87.6% of the funds available for *"Highway System Improvements"* is allocated to MTP project recommendations and 88.2% of the *"Highway System Enhancement"* funds have been designated. The "*Highway System Preservation"* category includes active transportation projects and improvements to support and expand transportation of freight by rail. This provides a 12% residual for contingencies and inflation.

The recommended investment in transit represents only about 21% of the total funds expected to be available to the Central Naugatuck Valley metropolitan planning area. While on a percentage basis this appears unbalanced, it still represents an investment of $583 million over the span of the MTP. In addition, the program of projects reflects specific actions located in the CNV area and does not take into account state investments targeted at the commuter rail lines as a system – New Haven line, Hartford line, and Shoreline East – that will have a beneficial impact on travelers to, from and within the metropolitan area. Similarly, the state has allocated substantially more funds for all divisions of CT*transit*, and it is reasonable to expect a portion of these funds would be allocated to Waterbury and Bristol divisions.

Estimated Funding and Project Implementation Costs: 2019 - 2045

Funding Category	**Estimated Funding**	**Estimated Costs**	**Percent of Funding**
System Improvements	$902,216,700	$790,556,302	87.6%
System Preservation [1]	$1,589,565,994	$1,225,226,707	80.3%
Transportation Alternatives		$137,020,500	9.0%
Rail Freight		$40,000,000	2.6%
Bus & Bus Facilities[2]	$1,360,500,000	$79,100,000	5.8%
Bus Operating Assistance	$188,856,875	$213,846,955	113.2%
WBL Equipment/Rolling Stock	$2,906,500,000	$172,280,000	5.9%
WBL Rail Yard	$55,000,000	$55,000,000	100%
WBL Expanded Service	N/A	$62,826,000	N/A
Total:	$7,002,639,569	$2,775,856,464	
[1] Estimated costs for Transportation Alternatives and Rail Freight are included in funding for System Preservation projects.			
[2] Estimated funding is for all CT*transit* Divisions; estimated costs are for only the Waterbury and Bristol divisions.			

12.3 MTP Program of Projects

The Program of Projects included in the MTP is grouped by the following categories:

- Highway System Preservation Projects
- Highway System Improvement Projects
- Transportation Alternative Projects
- Rail Capital Improvement Projects
- Bus Transit Capital Improvement & Operating Projects

There is a total of 126 specifically defined regional projects, listed by municipality and expected implementation timeframe. For illustrative purposes, generic projects have been included as place holders to account for system improvements and enhancements that have not been identified. These types of projects are generally in the later years of the MTP. Examples include:

- Regional bridge program
- Regional pavement program
- Regional road reconstruction program
- Regional bicycle program

- Regional pedestrian safety program
- Regional community connectivity program

In addition, the MTP includes various state-wide and system-wide projects that the CTDOT plans to implement over the timeframe of the MTP to extend beyond the region's jurisdiction. These projects are listed for information purposes and the costs of these improvements are not reflected in the financial plan for the CNVMPO. Examples include:

- Widening of I-84 to three lanes west of Waterbury
- Traffic signal modernization program
- Expand truck parking
- New Haven main line infrastructure improvements
- CT*rail* infrastructure and rolling stock improvements
- State-wide bus and bus facilities projects

The list of projects is included as Appendix A.

13.0 Public Outreach

The MTP is the product of collaboration between NVCOG, CTDOT, its member communities, and the public and has been informed by consultation with stakeholders throughout the region. To develop the MTP, the NVCOG gathered input from the diverse groups that make up the region using a variety of methods and means.

- Mobility Project Reporter: This is an online application developed on a GIS platform that allows the public to submit problems or observations related to local mobility and transportation for consideration in future planning projects. Users can submit new suggestions or review and vote on existing suggestions submitted by other users.
- Online Survey: A survey was developed and posted online to solicit information and comments from the public regarding their opinions on the transportation systems of the Naugatuck Valley planning region. A Spanish-language version of the survey was developed and posted on the NVCOG website. Post cards in English and Spanish were distributed to town halls, libraries and through the TTAC, RPC, NVCOG Board, and various community groups with information about the MTP and links to the online survey. For a report of the survey results see Appendix D.
- MTP Update Webpage: A separate webpage was created on the NVCOG website to inform visitors to the site that the long range transportation plan for the region was being updated. The webpage provides links to the transportation survey, the Mobility Project Reporter, a public draft of the MTP for review and comment, and a summary of the MTP.
- Social Media: The NVCOG posts notices on the progress of updating the MTP on its Facebook page.
- NVCOG Board, CNVMPO, Transportation Technical Advisory Committee (TTAC) and Regional Planning Commission (RPC) Meetings: Progress on updating the MTP was presented at monthly meetings of the NVCOG Board and the CNVMPO, as well as at the bi-monthly meetings of the RPC and TTAC. The chief elected officials of the NVCOG member municipalities comprise the Board and CNVMPO. The RPC is made up of planners and/or planning officials of NVCOG member cities and towns and the TTAC members are the local municipal engineers and/or public works officials. All meetings are open to the public. Members of these boards and committees collaborated with NVCOG staff to finalize the proposed program of projects. Both the TTAC and the RPC endorsed a recommendation to the CNVMPO to adopt the MTP.

In addition to the above listed methods, beginning February 22, 2019 and ending April 12, 2019, the NVCOG conducted posted the report for public review and comment. During that period, the NVCOG website included access to the draft MTP and a summary of the draft MTP, an online story map describing the MTP, and updates about the MTP planning process. Public notice was posted in the Republican-American, a major regional newspaper, on February 22, 2019, and translated into Spanish and posted in La Voz, a major regional Spanish language newspaper, on 2/22/2019. A public information meeting was held on March 27, 2019 during the comment period to present the transportation vision for the region, review recommended actions to realize the vision, and solicit comments. The CNVMPO adopted the MTP at its April 12, 2019 meeting. The public was afforded an opportunity to address the MPO before a vote on the MTP was taken.

A review of all public comments submitted to the NVCOG during the comment period and staff responses is available in Appendix C.

Appendix A: Metropolitan Transportation Plan Capital Plan

A-1: Highway System Preservation Project

A-2: Highway System Improvement Projects

A-3: Transportation Alternative Projects

A-4: Bus Transit Capital Improvement & Operating Projects

A-5: Rail Capital Improvement Projects

Highway System Preservation Projects

Route Number or Street	Project Description	Funding Source*	Years 1 to 4	Years 5 to 10	Years 11 to 27
Beacon Falls					
Beacon Valley Road	Reconstruct Beacon Valley Bridge #05364 on new alignment over the Beacon Hill Brook	LOTCIP	$1,500,000		
Burton Road & Maple Avenue	Realign intersection into a "T" intersection & clear sight line issues	STBG	$1,500,000		
Route 42	Intersection safety improvements at Lopus Road & Pines Bridge Road; straighten & widen Intersection	STBG	$1,500,000		
Bethlehem					
Nonnewaug Road	Replace Bridge 06121 over East Spring Brook	BRZ	$2,700,000		
Flanders Road	Reconstruct 1.5 mile section of Flanders Road	STP-R	$3,500,000		
Route 61	Intersection and geometric improvements at various locations along Route 61, including at Flanders Road & Green Hill Road	STBG	$1,500,000		
Route 132	Intersection improvements at various locations Route 132: Improve sight lines, grade, and vertical and horizonal geometry.	STBG	$6,000,000		
Route 61	Realign intersection at Town Green to address skew and align stop sign and stop bar	STBG	$350,000		
Maddox Road	Reconstruction of Bridge #05172 on Maddox Road	Local Bridge	$1,500,000		
Bristol					
Route 72	Intersection Improvements along Route 72 to Memorial Avenue, including improving 5-way intersection of Downs St, Blakeslee St, Riverside Ave & Memorial Blvd and replacing bridge 04205 and realigning Riverside Ave to create a four-way intersection	NHPP	$3,000,000		
Louisiana Avenue	Replace Bridge 04480 over Coppermine Brook	BRZ	$4,110,000		

Various	Bristol Roundabout Study: Evaluate feasibility of installing roundabouts at various locations	STBG	$200,000	
US 6 & Route 229	Intersection improvements to eliminate triangle	NHPP	$3,000,000	
Route 229	Route 229 Corridor Study : Develop strategies to address pedestrian, bike & driver safety along corridor and opportunities to improve access control	STBG	$200,000	
Woodland & King Street	Realign intersection to improve geometry & sight lines.	STBG; LOTCIP		$3,500,000

Cheshire

Various	Traffic Signal Replacements to Accommodate Pedestrians	Ramp Up	$966,000	
Route 10	Intersection improvements at Cook Hill Rd and at South Brooksvale Rd & Harrison Rd	STBG	$3,750,000	
Jarvis Street	Intersection realignment at Lancaster Way & Guinevere Ridge	STBG; LOTCIP	$600,000	
Route 70	Intersection improvements at Maple St and lengthen dedicated left turn signal on to Route 70	STBG	$150,000	
Route 10	Coordinate signals on Route 10 and install Adaptive Traffic Control Systems	STBG	$2,000,000	

Middlebury

Benson Road	Rehabilitate bridge 01160 over I-84	BRZ	$5,500,000	
Tucker Hill Road	Improve geometry at Tucker Hill Road & Regan Road	STBG; LOTCIP		$2,500,000

Naugatuck

Rubber Avenue	Intersection Improvement at Hoadley St & Melbourne St	SIPH	$800,000	
Route 63	Replace Traffic Control Signal at Rubber Avenue	SIPH	$335,000	
North Main Street	Reconstruction & roadway improvements from Calvin St to Union St	LOTCIP	$3,000,000	
Cross Street	Roadway improvements along 3300 LF of Cross Street	STBG; LOTCIP	$3,000,000	
Field Street & Jones Road	Intersection Improvements to Improve sight lines and geometry	STBG; LOTCIP	$1,000,000	

Route 63	Intersection improvements at Rubber Ave and Meadow St to improve pedestrian safety	NHPP		$2,500,000
Mulberry Street	Realign and traighten curves on Mulberry St	LRARP; LOTCIP		$3,250,000
Rubber Ave	Reconstruct Rubber Avenue, including roadway, sidewalk, drainage, from Old Fire House Rd to Melbourne St	LOTCIP	$4,000,000	
Route 63	Construct roundabout at Route 63, Church St & Millville Ave to improve function and safety	STBG		$3,000,000
Oxford				
Dutton Road	: Replace Bridge 04913 over Little River	BRZ	$2,160,000	
Route 42	Geometry improvements to soften major curve at Old Litchfield Turnpike	STBG	$2,000,000	
Route 67	Intersection safety improvements along Route 67 to improve geometry and sght lines at 8 skewed intersections from Chestnut Tree Hill Rd to Hawley Rd	STBG		$6,000,000
Plymouth				
US Route 6	Intersection improvements at North Main St to realign intersection and widen US Route 6 to provide left-turn lanes	NHPP	$3,770,000	
Greystone Road	Reconstruct to mprove vertical and horizontal geometry, clear sight lines, and add shoulder	STBG		$9,000,000
Harwinton Avenue	Reconstruct from Schroback Rd to Armbruster Rd and improve drainage and deficient geometry	STBG; LOTCIP	$2,700,000	
Harwinton Avenue	Reconstruct from US Route 6 to Schroback Rd and improve drainage and deficient geometry	STBG; LOTCIP	$4,000,000	
US Route 6	Intersection improvements at Harwinton Ave to realign intersection into a "T"	NHPP		$1,500,000
South Main Street	Improve geometry at South Main St, add sidewalk barrier (curb), clear sight lines and add advanced warning signs of curve	STBG		$3,000,000
Tory Crossing	Reconstruct and realign at East Plymouth Road and Matthews St to improve geometry	LOTCIP	$2,000,000	

Prospect

Route 69; Route 68	Corridor Improvements: Reassess signal timing and implement access management along Route 69 and Route 68	NHPP	$750,000
Scott Road	Reconstruct from Maria Hotchkiss Road to the intersection with Route 69	LOTCIP	$4,000,000
Route 68	Site Line Improvements at Talmadge Rd & Matthew St	STBG	$750,000

Southbury

Buck Hill Road	Rehabilitate bridge 01157 over I-84	BRZ	$5,900,000
Various	Signal Coordination Study: Study and coordinate signals throughout town to reduce congestion	STBG	$250,000

Thomaston

Route 8 SB	Rehabilitate bridge 01729 over Reynolds Bridge	FIF-Bridge	$800,000
Carter Road	Repair bridge 140003 over Nibbling Brook		$750,000
Route 109	Realign Intersection at Watertown Rd and implement geometry improvements	STBG	$1,500,000
US Route 6	Implement Main Street Safety Improvements along US Route at Route 8 NB exit 39 on- and off-ramps and at Prospect St & Pleasant St	NHPP	$1,250,000

Waterbury

I-84 EB	Rehabilitate bridge 03191A over I-84 WB, Route 8 & Naugatuck River	NHBR	$52,627,966
I-84 WB	Rehabilitate bridge 03191B over I-84 WB, Route 8 & Naugatuck River	NHBR	$39,025,587
Various	Downtown Signal Improvements: Traffic signal upgrade at 15 location in downtown Waterbury	CMAQ	$2,780,000
I-84 & Route 8	Rehabilitate 8 bridges at the I-84 & Route 8 interchange; bridges 03190 A, B, C, D, E, F & 03191 D, E	NHBR	$124,183,766
I-84	Rehabilitate bridge 03191F (ramp 197) over ramp 202 (Meadow Street)	NHBR	$5,000,000
Route 8	Rehabilitate bridges 03176 & 03177 over Naugatuck River & local roads	NHBR	$10,200,000

Route 8	Rehabilitate bridges 03178 & 03179 over WBL	NHBR	$10,200,000	
Aurora Street	Widen to provide 28-foot cross section from Bunker Hill Road to Watertown Ave	NHPP		$5,940,000
Cooke Street & Rosebud St	Install new traffic signal	STBG	$500,000	
Eagle Street	Reconstruct bridge over Naugatuck River	Local Bridge		$8,000,000
East Main Street	Reconstruct from North Main Street to Elm St and provide additional on street parking and dedicated bus lane	LOTCIP	$3,000,000	
SR 801	Construct spot improvements and lane configurations to provide a uniform road width and number of lanes	STBG	$6,000,000	
Route 69	Improve traffic operations at the signalized intersection with Edgewood Avenue	NHPP	$500,000	
Route 69	Intersection improvements at Southmayd Rd & Meriden Rd and realign to make "T" Intersection	NHPP	$3,000,000	
North Main Street	Install new traffic signals at Tudor St and Griggs St	LOTCIP	$1,500,000	
North Main Street	Construct traffic calming & intersection improvements	STBG	$1,500,000	
SR 801	Construct safety improvments and remove 1 through lane in EB direction between Cherry Street and Brass Mill Dr	LRARP	$380,656	
Walnut Street	Construct safety improvments to mprove geometry	LRARP	$224,332	
Washington Street	Reconstruct bridge over Mad River	Local Bridge		$8,000,000

Watertown

Guernseytown Road	Reconstructfrom Eastwood Hall Rd to Crest View Rd to soften horizontal and vertical geometry and improve intersection with West Road by improving sightlines	LOTCIP	$3,416,400	
Route 73	Improve signal timing at Buckingham St, Hillside Ave and Riverside St/Davies St	NHPP	$1,000,000	
Middlebury Road	Construct safety Improvements to improve geometry and sight lines	STBG	$1,500,000	
Route 63	Add left turn lane to mitigate congestion from Middlebury TL to Bunker Hill Rd	STBG	$1,500,000	

Lake Winnemaug Rd	Construct safety improvements and adjust curvature to align Sperry Rd at a 90 degree angle	STBG	$750,000		
Wolcott					
Route 69	Replace bridge 03240 over Mad River	FIF-Bridge	$3,000,000		
	Wolcott Tank Replacements	ENV Comp	$1,300,000		
SR 844	Improve sight lines at various intersections through tree trimming and minor widening	STBG	$650,000		
Woodbury					
Hazel Plain Road	: Replace bridge 05849 over Sprain Brook	BRZ	$2,700,000		
US Route 6, Route 317	Construct intersection Improvements at Main St & Sycamore Ave and upgrade ADA compliance and traffic signals	STBG	$1,500,000		
US Route 6	Construct intersection improvements by reducing turning radius at Old Sherman Hill Road	STBG	$1,000,000		
	Total:		$367,179,707	$56,190,000	$0
Various					
NVCOG	Regional Bridge Program: Rehabilitate, widen and repair various bridges in the metropolitan planning area to achieve Bridge Condition performance measures targets. Locations to be determined	Various		$30,000,000	$50,000,000
NVCOG	Regional Pavement Program: Resurface various state and local roads and highways in the metropolitan planning area to achieve Pavement Condition performance measures targets. Locations to be determined	Various		$30,000,000	$50,000,000
NVCOG	Regional Reconstruction Program: Reconsturct various state and local roads and highways in the metropolitan planning area to maintain State of Good Repair. Locations to be determined	Various		$25,000,000	$45,000,000
Route 8	Route 8 Incident Reporting: Expand state Incident Management Systems to include entire length of Route 8; includes 24-hour monitoring, video surveillance, variable message signs & incident detection	NHPP	$7,200,000		
I-84	Wide I-84 west of Waterbury from two lanes to three in both the east and westbound directions	NHPP			$475,200,000

WBL	Develop in-land port in Naugatuck along the WBL; construct a new rail spur from the WBL to service areas; and construct warehouse facilities. Located on the former Chemtura site	5309; State		$40,000,000	
Interstate	Construct/Create additional truck parking along I-84 and I-691	NHPP		$75,000,000	
Various	Install, replace and upgrade traffic control signals in District 1, 3 and 4. Locations to be determined based on condition and need	STPA	$3,657,000	$5,000,000	$5,000,000
Various	Replace Salt Shed Roofs, Cornwall, Bethlehem & Danbury	ENV Comp	$800,000		
		Total:	$11,657,000	$205,000,000	$625,200,000

Highway System Improvement Projects

Route Number or Street	Project Description	Funding Source*	Years 1 to 4	Years 5 to 10	Years 11 to 27
Beacon Falls					
Route 8	Interchange 23 NB Deceleration Lane: Minor widening of shoulder area at Interchange 23 to extend NB off-ramp deceleration lane	NHPP		$8,500,000	
Bristol					
Route 72	Intersection improvements at Route 72 and Route 69: Construct intersection improvements at Route 72, Route 69 and Divinity St. Includes realignment of the intersection.	NHPP; STBG	$8,100,000		
Middlebury					
I-84, Route 63 & Route 64	Improvements on Route 63, Route 64 & I-84 WB Interchange 17: Build new connector road and realign existing state routes	NHPP	$22,400,000	$6,600,000	
Naugatuck					
Route 8	Interchange 26 improvements: Minor widening of shoulder area at Interchange 26 to extend NB off-ramp deceleration lane; relocate NB off-ramp south along Route 63 to form a T-intersection to eliminate awkward intersection; and install new traffic signal and modify existing signal at Route 63	NHPP		$11,117,000	
Route 8	Interchange 27 Improvements: Widening SB off-ramp on structure at Interchange 27 to provide right turn lane and construct section of Naugatuck River Greenway; close NB off-ramp to North Main St to eliminate the short weave section with NB on-ramp from South Main St and extend the on-ramp; close SB on-ramp from North Main St; and construct segment of the NGR on west side of Route 8 to Linden Park	NHPP		$51,000,000	
Route 8	Interchange 28 Improvements: Minor widening of shoulder area at Interchange 28 to extend NB off-ramp deceleration lane and realign and minor widening of several roads and intersections at Route 68 and NB off-ramp.	NHPP		$9,464,000	

Route 8	Interchange 28/29 Improvements: Close SB on-ramp from Platts Mill Road (Exit 29) and SB off-ramp to North Main St to eliminate short weave section; install barrier to provide local access between Platts Mill Road and North Main St; and construct new SB on-ramp from local connector	NHPP		$26,942,000
Route 63	Realign NB Route 8 off-ramp and perform geometric improvements at Roue 63	NHPP		$5,500,000
Route 68	Construct intersection improvements and realignment at Golden Court & at Church Street (Route 63)	STBG	$4,000,000	
Scott Road	Widen from Route 63 to Elm Street and construct radius improvements at Elm Street to accommodate large heavy-duty vehicles as part of the Borough's plan to develop an In-land Port	BUILD	$20,000,000	

Oxford

Route 34	Relocate bridge 01843 on the Stevenson Dam and rebuild crossing over the Housatonic River on new alignment downstream from Stevenson Dam	NHPP	$10,500,000	$124,000,000

Prospect

Route 69	Minor widening near Orchard Dr to allow motorists to bypass left-turning vehicles in NB direction	NHPP	$750,000	

Southbury

I-84	I-84 Improvements at Exit 14	FIF-Roadway	$3,500,000	

Waterbury

I-84	Upgrade Expressway - Phase 3 (80%)	NFRP	$342,883,302	
I-84/Route 8	Placeholder - I-84/Rt 8 Interchange (PE)	Ramp Up	$31,000,000	
I-84/Route 8	Placeholder - Phase 1 of I-84/Rt 8 Interchange (CN)	FIF-Roadway		$50,000,000
RTE 69	Realign intersection at East Main St	NHPP	$3,000,000	
Huntingdon Avenue	Reconstruct and widen bridge 03729 over the Naugatuck River and add EB left turn lane and WB right turn lane, widen NB Route 8 off-ramp by adding additional right turn lane, and widen Colonial Avenue by adding additional left turn lane	STBG	$18,000,000	

Route 69	Increase capacity at Wolcott Road & Lakewood Road by adding dual left turn lanes on NB Route 69 at Lakewood Road and widen Lakewood Road to accommodate double lefts	NHPP	$6,500,000		
Lakeside Boulevard East	Reconstruct to meet FHWA standards & installat storm drainage	STBG		$5,000,000	
SR 844	Construct intersection improvements at Route 69, Frost Road and Alexander Avenue in Waterbury and at Route 322 in Wolcott, including signal timing adjustments	STBG	$6,500,000		
Route 8	Add second right turn lane on Route 8 NB off-ramp at Exit 36 and add a dedicated left-turn lane over Huntington Ave and over the Naugatuck River	NHPP		$15,300,000	
	Total:		$477,133,302	$313,423,000	$0

Transportation Alternative Projects

Route Number or Street	Project Description	Funding Source*	Years 1 to 4	Years 5 to 10	Years 11 to 27
Beacon Falls					
NRG	Phase II: Extend the road diet along South Main Street and install a multi-use trail from about Route 42 to Riverbend Park and provide a connection from Riverbend Park to the access to Toby's Pond	TAP	$3,300,000		
NRG	Phase III: Extend the road diet along North Main Street and install a multi-use trail from about Depot Street to Church Street	TAP	$1,700,000		
NRG	Phase IV: Construct a multi-use trail from about Church Street to the Naugatuck town line at Cross Streetalong the old Route 8 road bed	TAP			$2,744,000
Bethlehem					
Route 61	Construct 2,700 LF of sidewalk from Town Hall to Jackson Ln to serve town center and commercial corridor	TAP	$300,000		
Bristol					
RTE 229	Connect pedestrian facilities around recreation area and 760 LF of sidewalk along Route 229 to close gap in existing sidewalk near Lake Ave Intersection	TAP	$3,000,000		
Trail	Develop and construct Forestville multi-use trail to connect Bristol to existing regional and statewide network in Plainville	TAP		$3,500,000	
Memorial Avenue	Insatll striped bike lanes on two roads and provide bike facilities and accommodations along Route 72 and West St	TAP	$200,000		
Cheshire					
Route 10	FCHT Connector: Construct a multi-use trail link to Airline Trail creating bike and pedestrian access to the FCHT and replace aging sidewalks along Route 10 in front of state correctional facility	TAP/LOTCIP	$1,500,000		
FCHT	FCHT Crossing Realignment: Realign the Jarvis St Trail crossing near the trail head parking lot	TAP	$300,000		

Jarvis Street	Jarvis Street Sidewalks: Relocate utility poles and catch basins and construct 2,350 LF of sidewalk on Jarvis St	STBG; LOTCIP;TAP	$540,500	
Peck Lane	Install traffic calming measures along Peck Lane	STBG; LOTCIP	$150,000	

Middlebury

Middlebury Greenway	Extend Middlebury Greenway south, from Woodside Ave to Country Club Road, install visual and protective barrier between Route 63 and Greenway, and install lighting	TAP	$5,500,000	

Naugatuck

Route 63	Implement various improvements along Route 63 to accommodate bicyclists, including re-striping Route 63 north of Water St with 11 ft travel lanes to provide a wider shoulder for bikes	STBG	$200,000	
Various	Implement various ADA accessibility and pedestrian Improvements in the downtown and construct additional sidewalks, crosswalks, ADA compliant ramps, and detectable warning strips	Community Connectivity	$400,000	
Maple Street	Reconfigure the Maple St Bridge to include bike lane	LOTCIP		$2,000,000
NRG	Construct 2 miles of NRG south from Breen Field's near Maple Street to Beacon Falls town line; requires crossing the Naugatuck River	TAP		$7,600,000
NRG	Build section of NRG connecting Maple Street and downtown with Breen Fields	LOTCIP	$2,000,000	
NRG	Build 0.9 miles of NRG from Pulaski Walk to Waterbury town line	TAP		$3,000,000
Route 63	Install various pedestrian Improvements along Route 63, including audible pushbuttons, detectable warning strips, ADA compliant ramps, retro-reflective signage, countdown type pedestrian signals at signalized intersections	Community Connectivity	$800,000	

Oxford

Larkey Road	Construct connecter trail to close gaps along Larkey Road to connect Larkin Bridle Trail to Main St	TAP; LOTCIP		$1,500,000
Trail	Construct greenway trail to connect Naugatuck State Forest with the Larkin State Bridle Trail in Oxford	Community Connectivity	$1,400,000	

Plymouth				
Various	Construct sidewalks in downtown areas of Plymouth & Terryville	Community Connectivity	$1,000,000	
US Route 6	Implement streetscape enhancement/beautification on Main St (US Route 6)	STBG	$500,000	
Prospect				
Route 69	Implement various pedestrian improvements, including handicap ramps and detectable warning strips at crosswalks on Route 69, and optimize signal timing and phasing with an exclusive pedestrian buttons	Community Connectivity	$750,000	
Southbury				
Old Field Road	Construct 4,500 LF of sidewalk from Main St to Heritage Road along Old Field Road	TAP	$1,000,000	
Thomaston				
High Street	Extend existing sidewalk onto High St and repair sidewalks in adjacent neighborhood	TAP	$375,000	
SR 807	Construct a sidewalk on west side of Main St; complete the missing sections on the east side including crosswalks, ramps; and replace sidewalks throughout downtown area where needed	STBG	$375,000	
NRG	Construct section of NRG trail from Old Waterbury Road to Branch Brook at Watertown TL; includes new bridge over Branch Brook	TAP	$500,000	
NRG	Construct sections of trail through downtown Thomaston to Old Waterbury Road; connects with the town's historic clock walk, the New England Railroad Museum and Vista Park at the Thomaston Dam	TAP		$5,529,000
Waterbury				
NRG	Waterbury Phase 1: Construct multi-use trail within the existing right of way of South Main Street by reducing the number of travel lanes from Naugatuck TL to Eagle St	HPPS; REP;TAPO	$7,860,000	
Lakewood Road	Construct new sidewalks along north side of road	LOTCIP	$1,900,000	
NRG	Waterbury Phase 2: Construct multi-use trail within the existing right of way of South Main Street to Glen Street and then with a separate corridor to Jackson Street	TAP		$8,600,000

NRG	Waterbury Phase 3: Extend multi-use trail from West Main St along Thomaston Ave, Chase River Rd and through the Waterbury Industrial Commons to Watertown TL	TAP			$11,900,000
Watertown					
Route 63	Implement various capital projects to improve geometry and pedestrian safety of Main Street as recommended in RSA	Community Connectivity	$1,500,000		
NRG	Watertown Phase 1: Construct section of multi-use trail along the alignment of the Waterbury water main line from Frost Bridge Road to Branch Brook and build facilities for bicyclists and pedestrians to safely use road creating connection to Thomaston	TAP	$1,847,000		
NRG	Watertown Phase 2: Construct section of multi-use trail from the Waterbury TL to Frost Bridge Road	TAP			$1,500,000
Steele Brook Trail	Steele Brook Trail: Construct 4.6 mile stone-dust trail along Steele Brook and link to the NRG Trail	TAP	$2,000,000	$1,500,000	
Route 73	Implement streetscape improvements along Route 73 between Waterbury TL and Route 63, and provide streetscape improvements along this commercial corridor to improve pedestrian experience	STBG	$300,000		
Bunker Hill Road/Avenue	Implement various capital projects, including closing gaps in the sidewalk network and creating new pedestrian crosswalks, to improve geometry and pedestrian safety of Main Street as recommended in RSA	Community Connectivity	$500,000		
Woodbury					
US Route 6	Implement various pedestrian friendly enhancements along Main Street by providing crosswalks, benches, and tourist conveniences.	Community Connectivity	$300,000		
US Route 6	Implement various traffic calming measures along Main St to reduce traffic speeds and conduct an access management study	STBG		$650,000	
	Total:		$41,997,500	$33,879,000	$16,144,000

Various					
NVCOG	Regional Bicycle Program: Implement regional bicycle route netwrok. Locations to be determined	Various		$5,000,000	$10,000,000
NVCOG	Regional Pedestrian Safety Program: Implement regional pedestrian safety program, including new sidewalks, pedestrian actuated signals, crosswalks, and curb extensions. Locations to be determined	Various		$5,000,000	$10,000,000
NVCOG	Regional Community Connectivity Program: Implement various bicycle and pedestrian safety projects and connections as recommended in Road Safety Audits. Locations to be determined	Various		$5,000,000	$10,000,000
		Total:	$0	$15,000,000	$30,000,000

Bus Transit Capital Improvement & Operating Projects

Route Number or Street	Project Description	Funding Source*	Years 1 to 4	Years 5 to 10	Years 11 to 27
CT*transit* -Waterbury					
NETCO	NETCO - Facility Improvements - Fuel Tanks	State	$100,000		
CT*transit* - Waterbury	Develop and implement Real Time Bus Tracking to track vehicle location and transmit bus arrival times to riders	5307; 5339	$5,000,000		
CT*transit* - Waterbury	CTtransit Waterbury Capital	5307; 5339	$8,000,000	$12,000,000	$54,000,000
CT*transit* - Waterbury	CTtransit Waterbury Operating Subsidy	State	$19,408,348	$33,773,964	$135,674,563
CT*transit* - Waterbury	Implement new fixed-route bus service along Lakewood Road and provide 60-minute headway with stagger service with Route 422	State	$472,000	$708,000	$2,006,000
		Total:	$32,980,348	$46,481,964	$191,680,563
CT*transit* -Bristol					
CT*transit* -Bristol	Realign fixed-route bus service to serve employment centers in southeast Bristol and provide 60-minute headway	State	$2,240,751	$3,899,303	$15,664,026
		Total:	$2,240,751	$3,899,303	$15,664,026
CTtransi*t* Projects					
Statewide	Bus Fleet Expansion in Urban Areas, Including Real-Time Scheduling and Smart Card Fare Boxes	State	$0	$16,500,000	$66,000,000
Statewide	Administrative Capital & Miscellaneous Support - Cttransit	5307; 5339; State	$18,500,000	$166,500,000	$434,000,000
Statewide	Bus Fleet Overhauls & Replacements - Cttransit	5307; 5339; State	$19,000,000	$42,000,000	$133,000,000
Statewide	Bus Maintenance Facility Improvements - All Other Bus Facilities SOGR	5307; 5339; State	$35,000,000	$45,000,000	$100,000,000

Statewide	Multimodal Fare Technology Improvements	State	$0	$45,000,000	$150,000,000
Statewide	Systemwide Technology Upgrades for Buses	State	$0	$30,000,000	$60,000,000
		Total:	$72,500,000	$345,000,000	$943,000,000

Rail Capital Improvement Projects

Route Number or Street	Project Description	Funding Source*	Years 1 to 4	Years 5 to 10	Years 11 to 27
Beacon Falls					
WBL	Construct new station building and waiting area with high level platforms and passenger amenities	5309		$25,000,000	
Naugatuck					
WBL	Relocate station to southern side of Maple Streetand, about 950 feet south of its current location, and construct new station building and waiting area with high level platforms	5309		$25,000,000	
Waterbury					
WBL	Renovate old Waterbury rail station to provide an indoor passenger waiting area; lengthen and improve high level platforms and install amenities. Reconstruct and reconfigure parking area	5309; State	$10,000,000		
WBL	WBL Storage Yard: Construct new Waterbury Branch Line rail storage yard. Location to be determined	5309; State		$55,000,000	
Watertown					
Route 262	Upgrade Active Railroad Devices at Frost Bridge Road (FRA #503937W)	STPX	$280,000		
Waterbury Branch Line Projects					
WBL	Expand service along the Waterbury branch line to provide 30-minute headways during the AM & PM peak periods	State		$10,500,000	$52,326,000
WBL	Purchase four new locomotives and train sets (2 coaches + 1 push-pull) to operate on the WBL to replace old equipment	5309; State		$64,000,000	
WBL	Purchase three new locomotives and train sets (2 coaches + 1 push-pull) to operate on the WBL to expand service	5309; State		$48,000,000	
		Total:	$10,280,000	$227,500,000	$52,326,000

New Haven Line Projects

NHL	NHL - Rail Yard Improvements Statewide	FTA	$0	$0	$905,000,000
NHL	NHL - Catenary SOGR / Power Upgrades	FTA	$15,000,000	$0	$30,000,000
NHL	NHL - Communications / Signal Upgrades SOGR	FTA	$130,000,000	$280,500,000	$1,200,000,000
NHL	NHL - Electric Fleet Mid-Life Overhauls & Replacements	State	$0	$0	$1,400,000,000
NHL	NHL - Fixed Bridge SOGR	FTA	$0	$650,000,000	$725,000,000
NHL	NHL - Full Capacity New Haven Line Service	FTA	$0	$0	$270,000,000
NHL	NHL - Future Station Improvements for More Efficient Express Service to NYC	FTA	$0	$0	$300,000,000
NHL	NHL - New Rail Maintenance Facility and Yard for Intercity Rail Service	FTA	$0	$50,000,000	$20,000,000
NHL	NHL - Stations/Parking - Station Improvement Program	FTA	$10,000,000	$20,000,000	$50,000,000
NHL	NHL - Stations/Parking - Systemwide Technology Upgrades for Rail at Stations	FTA	$73,000,000	$0	$10,000,000
NHL	NHL - Track Improvements SOGR	FTA	$70,000,000	$145,000,000	$365,000,000
NHL	Waterbury Branch Line - High Level Platforms	FTA		$150,000,000	$50,000,000
NHL	Waterbury Branch Line - New Rail Storage Yard Location TBD	FTA		$5,000,000	$50,000,000
		Total:	$308,280,000	$1,755,500,000	$5,479,652,000

Freight Rail Projects

Statewide	Rail Freight Network Annual Funding Program (SOGR)	State	$20,000,000	$20,000,000	
		Total:	$20,000,000	$20,000,000	$0

CT*Rail* Projects

CTRAIL	Rail Fleet - Coaches	State	$0	$300,000,000	$135,000,000
CTRAIL	Rail Fleet - Locomotives	State	$150,000,000	$1,350,000,000	$884,000,000
CTRAIL	Systemwide - New Rail Shop for Diesel / Dual Power Locomotives & Coach Repairs	State	$0	$0	$87,500,000
		Total:	$150,000,000	$1,650,000,000	$1,106,500,000

Appendix B: Summary Environmental Justice Analysis

To better incorporate the principles of environmental justice in the NVCOG Metropolitan Transportation Plan, a cursory analysis of the proposed program of projects for the 26-year planning horizon was completed to identify any projects that would have a disproportionate impact on minority and low income populations. This review comprised two phases, (1) identifying projects falling within EJ communities to identify where impacts are being borne, and (2) aggregating spending by EJ area and the region as a whole to ensure the EJ communities are not being disproportionately excluded from the planning process in terms of programed transportation funding. The following analysis is not meant to replace a full Title VI Assessment, but should give some indication of the greater equity of the plan.

The following is a summary of the findings.

Project Impacts

No project was found to have a disproportionately negative affect to the local population. The majority of the proposed roadway improvements are oriented toward improving local access for the community. Several maintenance and rehabilitation projects designed to bring a facility up to the state of good repair were found to have neutral impacts on the local community. These projects were not deemed to be changing the function of the existing structures. See the table below for more details.

Town	Project Description	Impact
Bristol	Memorial Avenue: Provide striped bike lanes on two roads and provide bike facilities/ accommodations on local roads along Route 72 and West St	Positive
CT*transit*-Bristol	Realign fixed-route bus service to serve employment centers in southeast Bristol and provide 60-minute headways	Positive
Waterbury	NHS - Rehabilitate Bridge 03191A over I-84 WB, Route 8 & Naugatuck River (90/10)	Neutral
Waterbury	NHS - Rehabilitate Bridge 03191B over I-84 WB, Route 8 & Naugatuck River (90/10)	Neutral
Waterbury	Aurora Street Widening: Widen Aurora St to provide 28-foot cross section from Bunker Hill Road to Watertown Ave.	Positive
Waterbury	Cooke Street & Rosebud St Traffic Signal: Install new traffic signal	Neutral
Waterbury	East Main St & Route 69 Intersection Realignment: No new lanes. Improve skewed intersection geometry.	Positive
Waterbury	East Main Street reconstruction: Reconstruct East Main Street and provide additional on street parking and dedicated bus loading and unloading lane	Positive
Waterbury	East Main Street Spot Improvements and Lane configurations: Provide only two approach lanes along East Main Street, narrow where three are provided.	Positive
Waterbury	Hamilton Avenue Signal Improvements: Improve traffic operations at the signalized intersection with Edgewood Avenue to address SB PM Peak.	Positive

Waterbury	Huntingdon Avenue Reconstruction: Widen bridge number 03729 over the Naugatuck River by adding eastbound left turn lane and westbound right turn lane.	Positive
Waterbury	Increased Capacity at Wolcott Road & Lakewood Road: Provide dual left turn lanes on NB Route 69 at Lakewood Road; widen Lakewood Road to accommodate and except double lefts.	Positive
Waterbury	Lakewood Road Sidewalks: New sidewalks along north side of roadway	Positive
Waterbury	North Main Street Traffic Signals: New traffic signals at Tudor St and Griggs St	Positive
Waterbury	North Main Street: Construct Product of City Traffic Calming Design including roadway calming & intersection improvements	Positive
Waterbury	NRG: Waterbury Phase 3: NRG: Extend multi-use trail from West Main Street along Thomaston Avenue, Chase River Road and through the Waterbury Industrial Commons	Positive
Waterbury	Renovate old Waterbury rail station to provide an indoor passenger waiting area; lengthen and improve high level platforms and install amenities. Reconstruct and reconfigure parking area	Positive
Waterbury	Route 8 NB Exit 36 Improvements: Addition of second right turn lane on off ramp. Addition of dedicated left-turn lane over on Huntington Ave over the Naugatuck River.	Positive
Waterbury	Safety improvements East Main Street: Remove 1 through lane in eastbound direction between Cherry Street and Brass Mill Dr. Shorten pedestrian crossing distances	Positive
Waterbury	Walnut Street Safety improvements: Improve geometry, create all way stop, align stop bar with signs.	Positive
Watertown	NRG: Watertown Phase 2: NRG: Construct section of multi-use trail from the Waterbury TL to Frost Bridge Road	Positive
Waterbury	Waterbury Branch Line Maintenance and Storage Yard: acquire parcels in Waterbury for storage yard for equipment; construct maintenance & refueling facility	Neutral
CT*transit*-Waterbury	Develop and implement Real Time Bus Tracking to track vehicle location and transmit bus arrival times to riders	Positive
CT*transit*-Waterbury	CT*transit* Waterbury Capital	Positive
CT*transit*-Waterbury	CT*transit* Waterbury Operating Subsidy	Positive
CT*transit*-Waterbury	Implement new fixed-route bus service along Lakewood Road and provide 60-minute headway with stagger service with Route 422	Positive
Various	Central Connecticut Freight Rail Line: Upgrade line to Class III (40 mph speed)	Neutral

Geographic Distribution of Projects

Generally, the program of projects financially favors the identified EJ communities. That is, in terms of geographic area and population, EJ communities will benefit from a disproportionately high share of the total transportation spending. Beyond the capital projects outlined here, continued and expanded spending on the local bus and train services, which are of greatest benefit to the Region's urban cores, will ensure mobility and access for EJ communities. Please see the table below for more details on the proposed spending.

Matric	Total Region	EJ Census Blocks	Percentage
Spending ($)	2,297,709,441	693,495,496	24.98%
Geography/Area (Sqmi)	422	9	2.14%
Population	447,390	48,064	10.74%

Appendix C: Public Comments and Responses

The NVCOG held a public comment period from February 22, 2019 to April 12, 2019. During this time comments were received through various representatives of the government, non-profit and public. The following documents the comments received by the NVCOG and the staff responses.

CTDOT, FHWA & FTA

NVCOG Submitted a draft MTP to CTDOT FHWA and FTA on January 4, 2019. The three organizations met and submitted the following comments to the NVCOG. Below, these comments are provided with responses highlighted in red.

- Qualifying Statement to be added to the MTP: *"The opinions, findings, and conclusions expressed in this publication are those of the [insert MPO name] and do not necessarily reflect the official views or policies of the Connecticut Department of Transportation and/ or the U.S. Department of Transportation."*
    - *This text was added to the Abstract page of the document*
- Need stronger statement or map graphics to identify the four towns in GBVMPO, differentiating them from the NVMPO. The plan should be clear throughout that the 4 valley towns are part of the GBVMPO and discussed in this plan for information only.
    - *Additional maps and clarifying language were added throughout the document*
- The discussion of transit performance measures in Section 2.6 only includes Tier 1 providers but should also address relevant Tier 2 targets. Additionally, on page 40 the plan says a TAM plan will be completed by October 1, 2018- this should have been done and the TAM plan should be incorporated into the planning process for this document.
    - *Additional language was added to identify the tier 1 systems active within the MPA. Additional discussion was added for VTD, a tier 2 system. While VTD is out of the planning region, the information was provided for information purposes.*
- A significant amount of 5309 funding is shown for commuter rail projects in the Section 5.4. Is that funding included in the fiscal constraint? 5309 is a discretionary program and if the region wants to consider it as a constrained revenue source, an explanation of why those funds can be reasonably expected to be available needs to be provided.
    - *Clarified the section to indicate that the expected funds to implement rail modernization projects was provided by the CTDOT and reflects the Department's rail plan and expected rail investment over the time frame of the MTP. Specific recommended actions for the Waterbury branch line and stations are identified and the estimated cost of these actions is consistent with and in line with the rail capital plan for the entire New Haven line system.*
- The revenue v. cost table on page 215 shows $588M of revenue for bus and bus facilities but only $82M of costs. Why is there such a discrepancy in projected needs/revenues? A discussion of that would be appropriate.
    - *The estimated funding level for bus and bus facilities reflect the allocation to all CTtransit Divisions; whereas the recommended projects are the capital needs for the Waterbury and Bristol divisions only. The estimated cost of these actions is*

consistent with and in line with the bus capital plan for the entire CTtransit system.

- Under the "federal Requirement's" and "MPO" section of the checklist, they mention that there will be more clarifying language. This needs to be added.
  - *Completed*
- Under the "Public Outreach and Consultation" section it says "Overseen by the CTDOT". This needs to be addressed in the plan.
  - *An explanation of the CTDOT's role the interagency consultation has been added to the public outreach section.*

CTRC&D

The CTRD&D provided comments on behalf of their constituent agricultural working groups. The recommendations included:

- Encourage expansion of agriculture planning in your UPWP and your Regional Transportation Plan updates that are currently underway
  - *Certain segments of agriculture are discussed under Tourism. However, with regard to the wider industry, the MTP addresses improved and expanded freight movement for the region.*
- Incorporate agriculture land use and planning review as part of your intermunicipal review of new land use regulations or amendments
  - *While this comment is beyond the proposed scope of the MTP, the NVCOG Regional Planning Commission, a committee comprising land use representatives from throughout the 19-town region, take this land use into account in their work.*
- Encourage more mapping to better understand food – farm worker access via transit as well as freight planning.
  - *Transit and job centers are both mapped in the plan. Specific industries have not been mapped relative to transit.*
- Consider the formation of a Regional Agriculture Council to support existing municipal Ag Commissions and towns without Ag Commissions
  - *This would be a positive step in highlighting the agricultural issues in the region. NVCOG RPC acts as the de facto regional voice for issues relating to the nexus of agricultural land use and transportation issues.*

The Pomperaug River Watershed Coalition

The PRWC submitted comments on the low impact development and resiliency. The comments were integrated into the text of the document under sections 9.4 and 10.3.

NVCOG Online Survey

Over 74 responses were received for the regional online survey. The full report of the survey's findings is available in Appendix C.

Public Information Meeting – March 27, 2019 at the NVCOG Offices, 49 Leavenworth street, Waterbury, CT.

The meeting was noticed and advertised on the NVCOG Website and Facebook page. Public notice was posted in the Republican-American, a major regional newspaper, on February 22, 2019, and *translated into Spanish and posted in La Voz, a major regional Spanish language newspaper, on 2/22/2019.*

NVCOG Staff and CTDOT Staff were present to discuss the draft MTP, answer questions and take comments. No members of the public were present.

Regional Planning Commission: A local representative made the following suggested edits:

Add to the "Jones Family Farm" in Shelton to the tourism section.
The plan does not mention any orchards by name. However, this farm is among those included in NVCOG's online tourism map.

Add "Center Stage Theatre" to the tourism section
A "theater and arts" point was added to the map on Amusement Parks, Fairs and Arts under Tourism.

Appendix D: Metropolitan Transportation Plan Public Survey

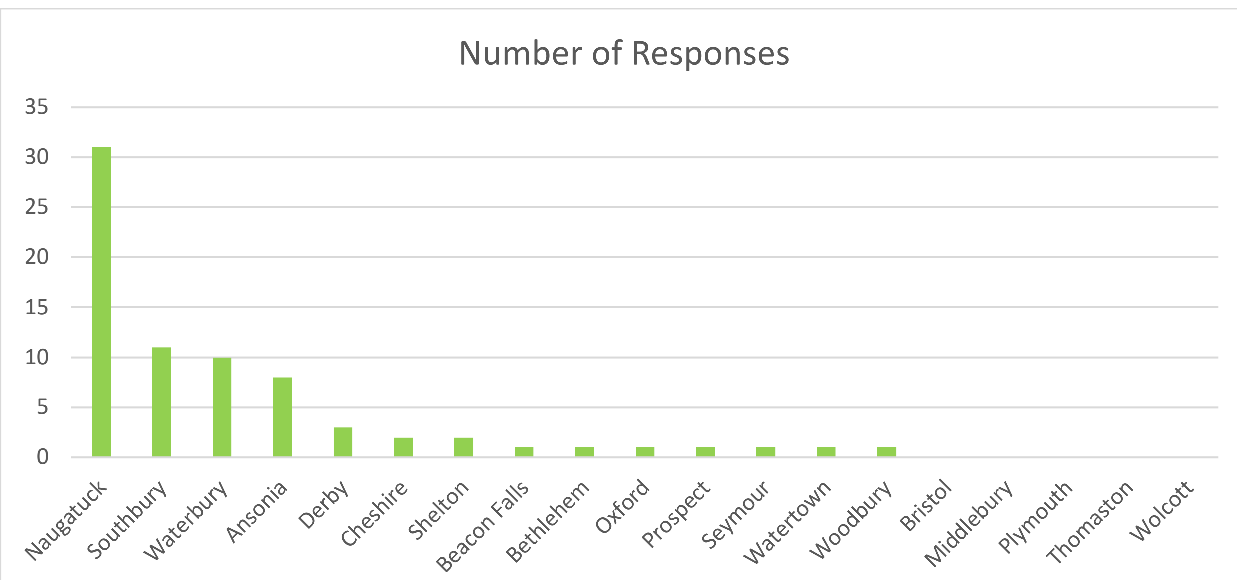
In support of the *Metropolitan Transportation Plan: 2019 – 2045,* the Naugatuck Valley Council of Governments conducted public outreach between February 22, 2019 and March April 12, 2019. The public was surveyed on their transportation related needs and demands via an online platform. The survey was advertised on the NVCOG website, at-public meetings, and through post cards mailed to community libraries and town halls. The survey was intended to collect opinions and concerns of residents and commuters within the region on the state of the local transportation system, as well as provide an opportunity for suggestions to improve transportation in the region. The survey was administered in both English and Spanish.

A total of 74 surveys were completed. While an effort was made to consider riders with limited English proficiency, none of the completed surveys were filled in using the Spanish language version.

The following is a report on the results gathered in the survey. Each survey question is presented and with accompanying results and dialogue.

1) In which city/town do you live in?

While, all communities in the region were included in the outreach process, participation in the survey was uneven. The table below shows the number of completed surveys by municipality. While residents from across the region took part, the Borough of Naugatuck was exceptionally active in the survey.

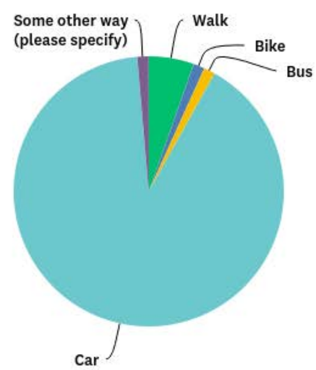


2) In a few words what do you most like about where you live?

Generally speaking, and summarized in the word cloud below, residents like the feel of their communities, neighborhoods and commercial districts. Given the phasing of the question, there were few negative responses; however Connecticut State taxes were identified as burdensome.

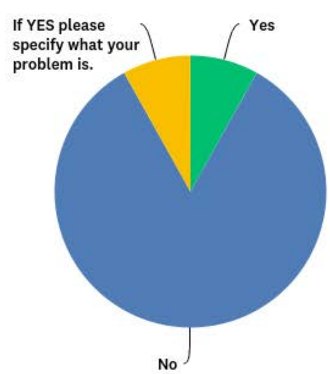
3) How do you usually get around your community?

People overwhelming use their cars to get around. Walking is also an important transportation mode but for the majority of residents is limited to the dense urban cores.



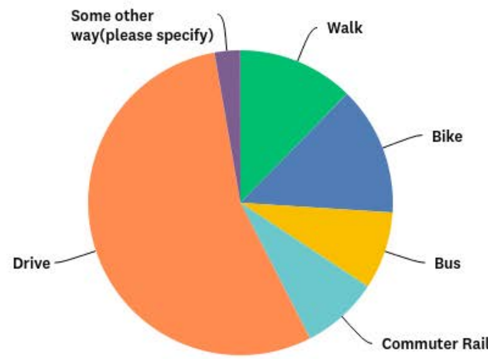
4) Do you usually have difficulty traveling around your community?

A majority of residents did not have any problems getting around the neighborhood. Of those who had difficulty, the primary causes were lack of alternative modes of transportation, including public transportation, unsafe walking conditions and bus stops, rough road surface, and difficulty finding parking.



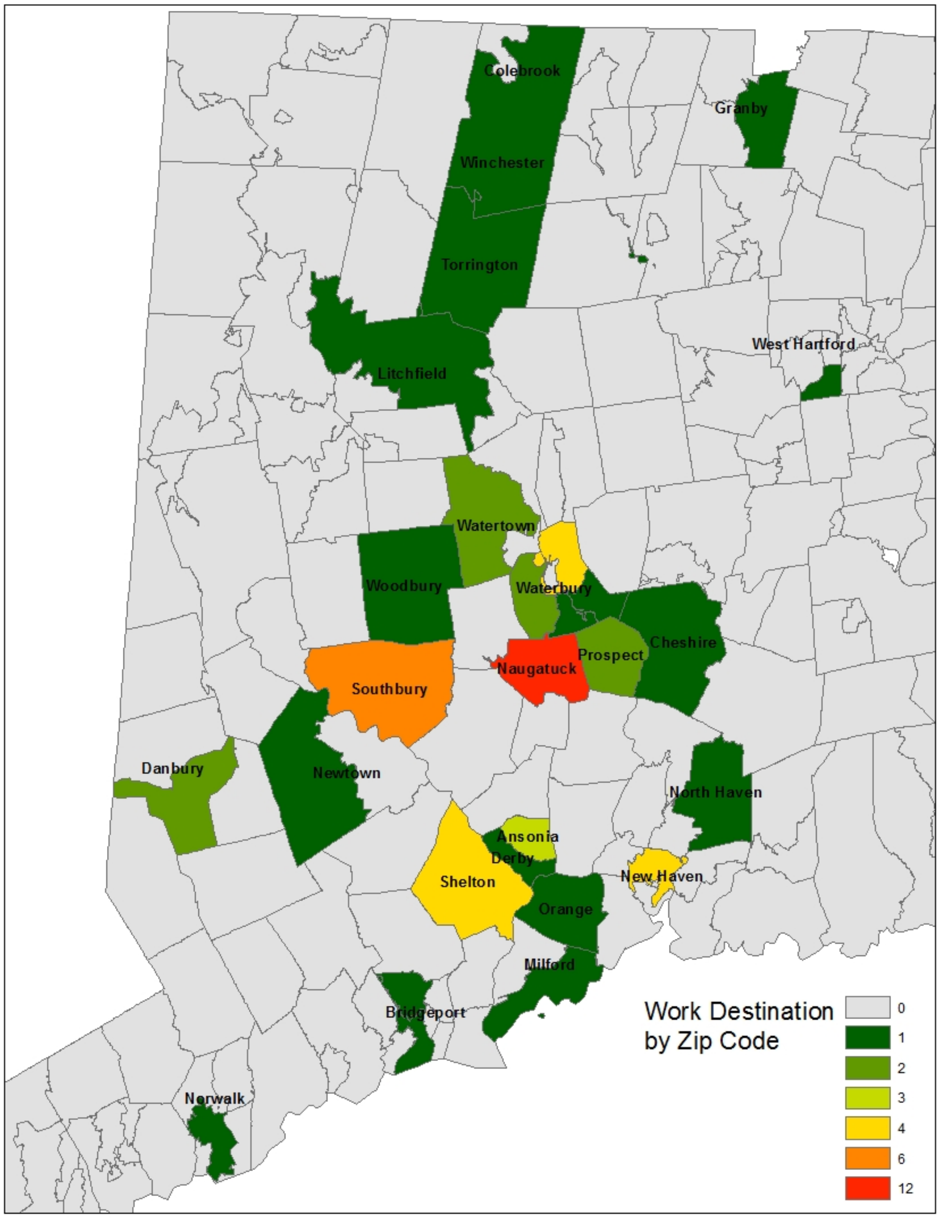
5) How would you like to get around your community today?

This question asked respondents to think about their preferences. While, driving maintained supremacy, all other mode choices showed significant demand.



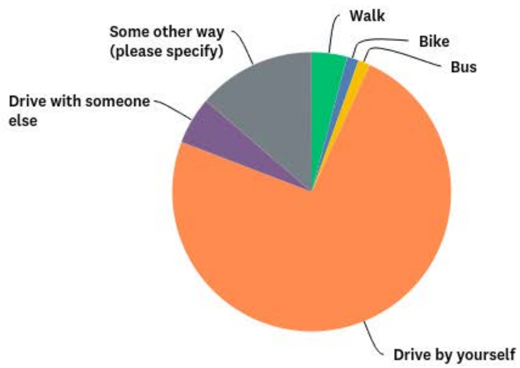
6) Please indicate the ZIP Code where you most often commute to work?

The findings from this question confirm what has been shown from other data sources, commuting patterns in the region are decentralized and tend to be supported by the existing Interstate and expressway highway network.

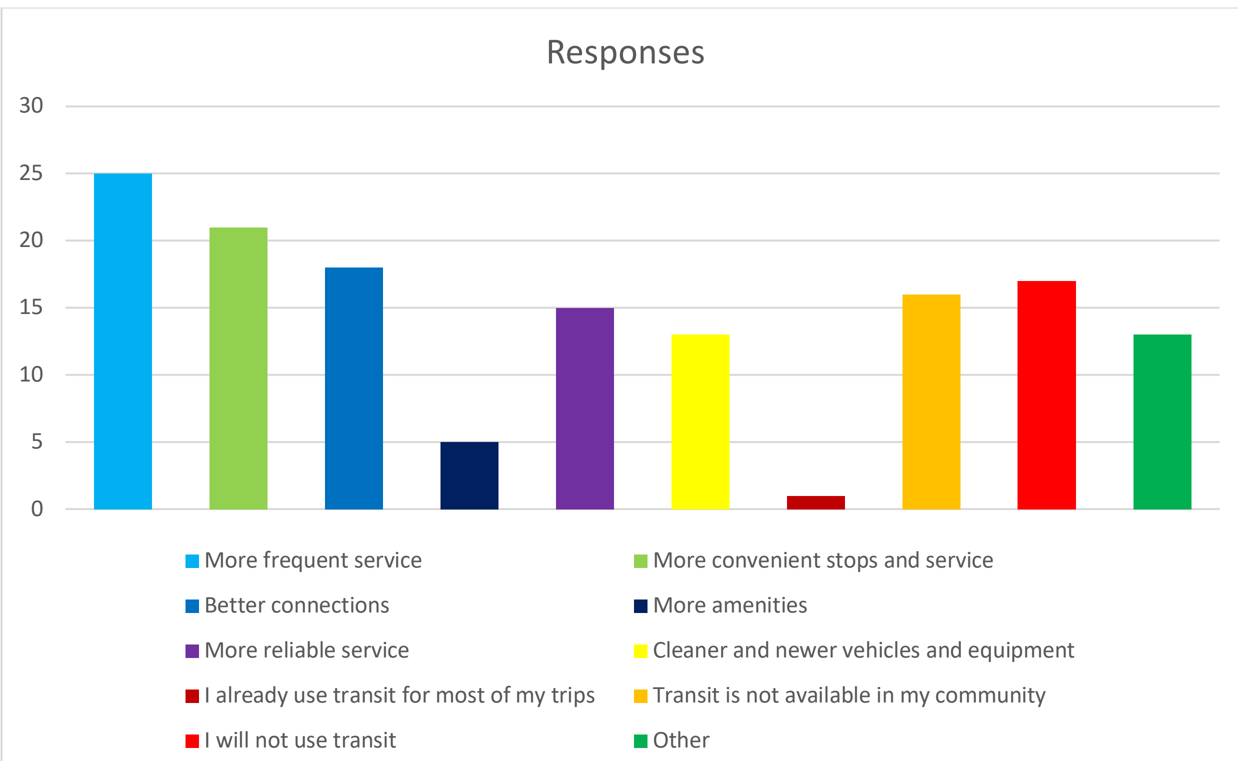


7) How do you usually travel from home to work each day?

Similar to Question 4, residents use their cars to go to and from work. Those who chose “Some other way,” all retired and were no longer commuting.



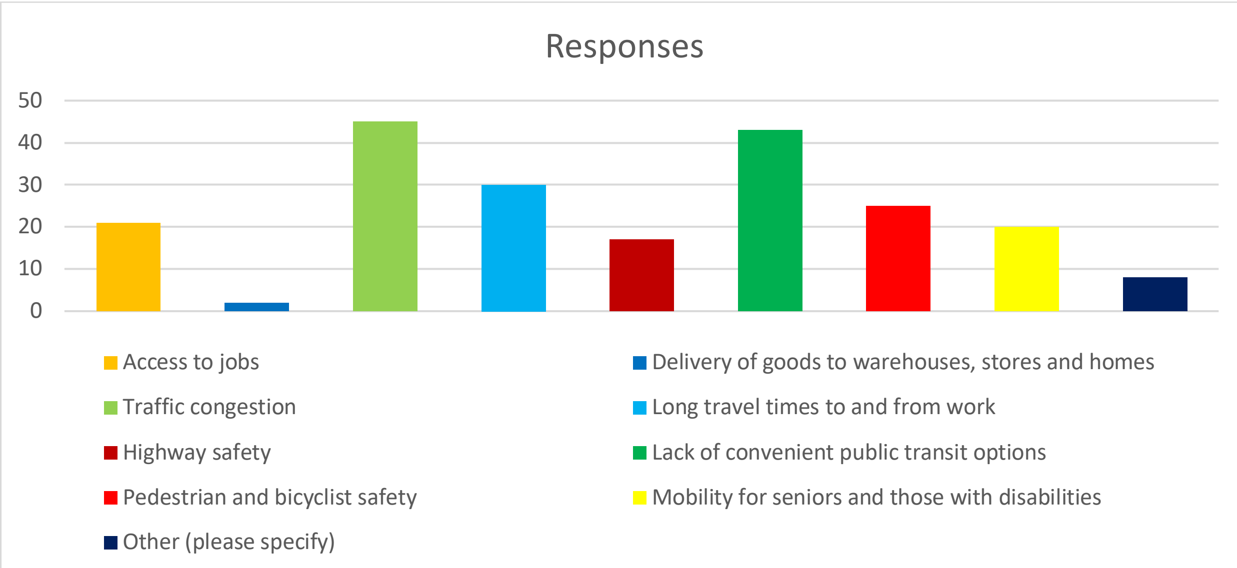
8) If transit is an option but you choose not to use it, is there anything that would help you use transit more often? Choose all that apply.



Of residents who chose “Other,” many specified that transit was not available or that the service was not convenient. However, others provided new suggestions, including improve safety, decrease the cost of and improve wayfinding and other train/train station facilities.

9) What are the key challenges facing our transportation system today? Choose all that apply.

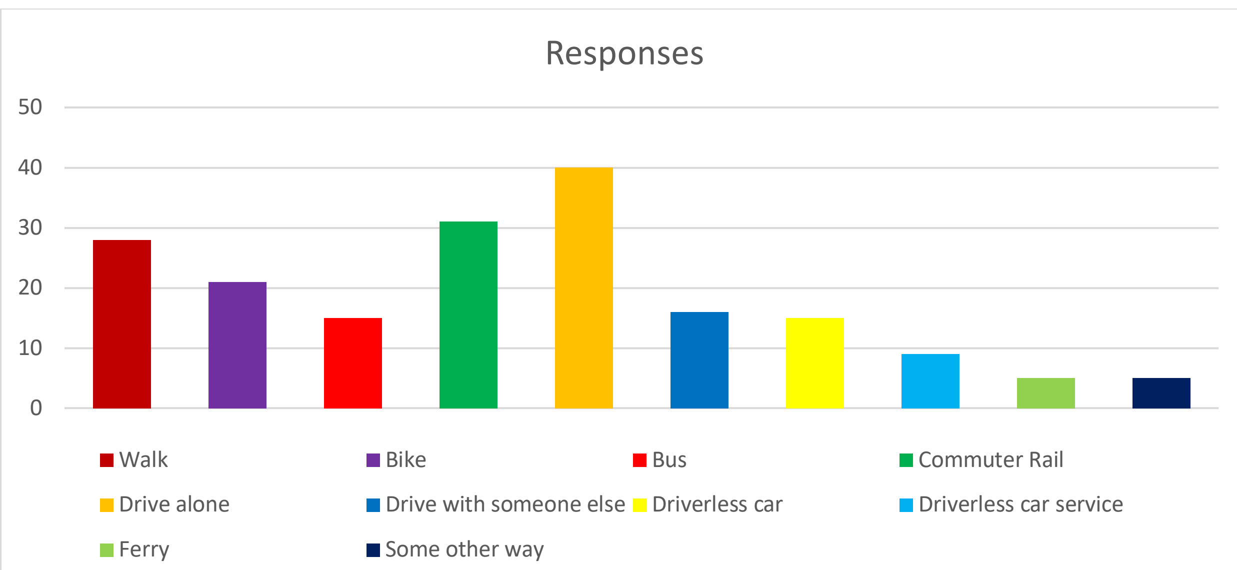
For respondents in the region congestion and lack of public transit rose to the top of the list as key challenges.



Among the "Other" issues specified were poor roadway maintenance, a lack of fast trains, and transit options (bus, intermunicipal buses, and trains) that don't connect.

10) How would you like to get around in the future? Choose all that apply.

While from this question, it is clear that the residents of the NVCOG planning region intend to use their cars for the for foreseeable future, there is clear interest other modes of transportation.



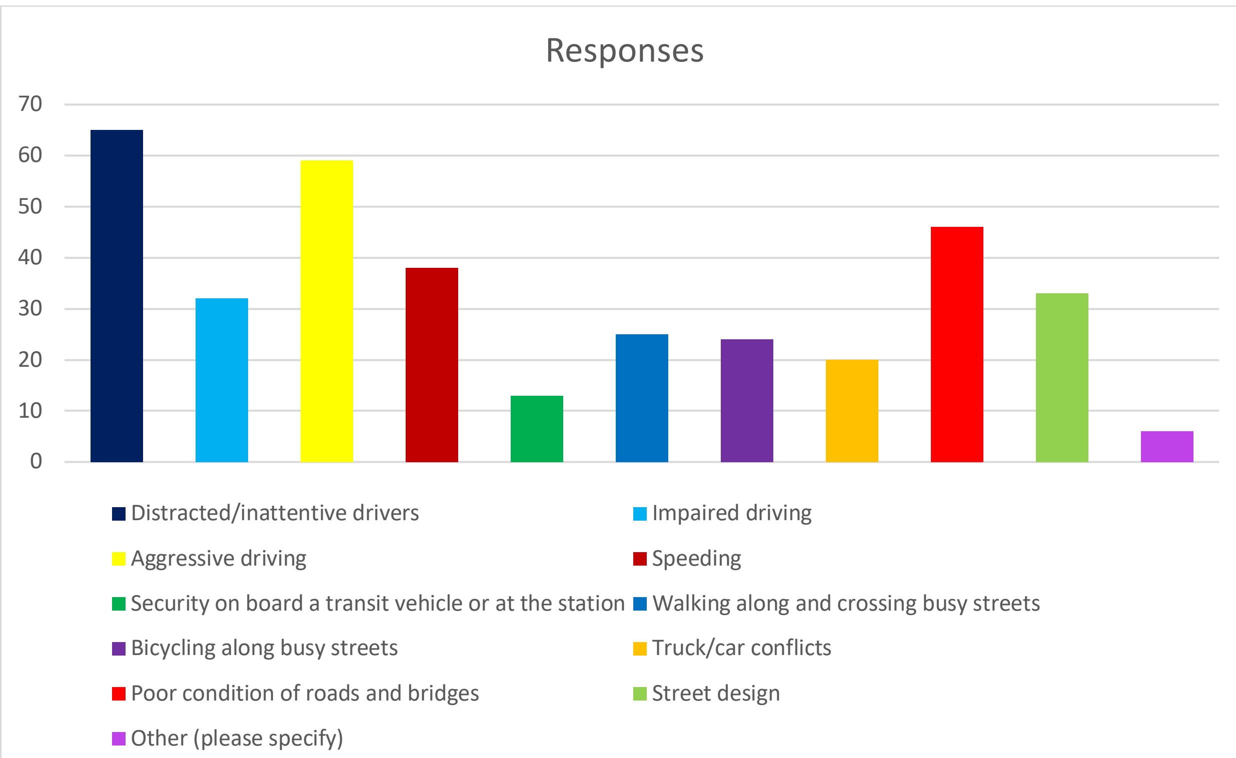
Among the "Some other ways" specified, were TNCs and flight.

11) Thinking about the future and the possibility of driverless cars and car services, how afraid would you be to ride in a driverless vehicle?

There is still a lot of apprehension about using and sharing the road with driverless vehicles. This is consistent with national surveys on the subject.

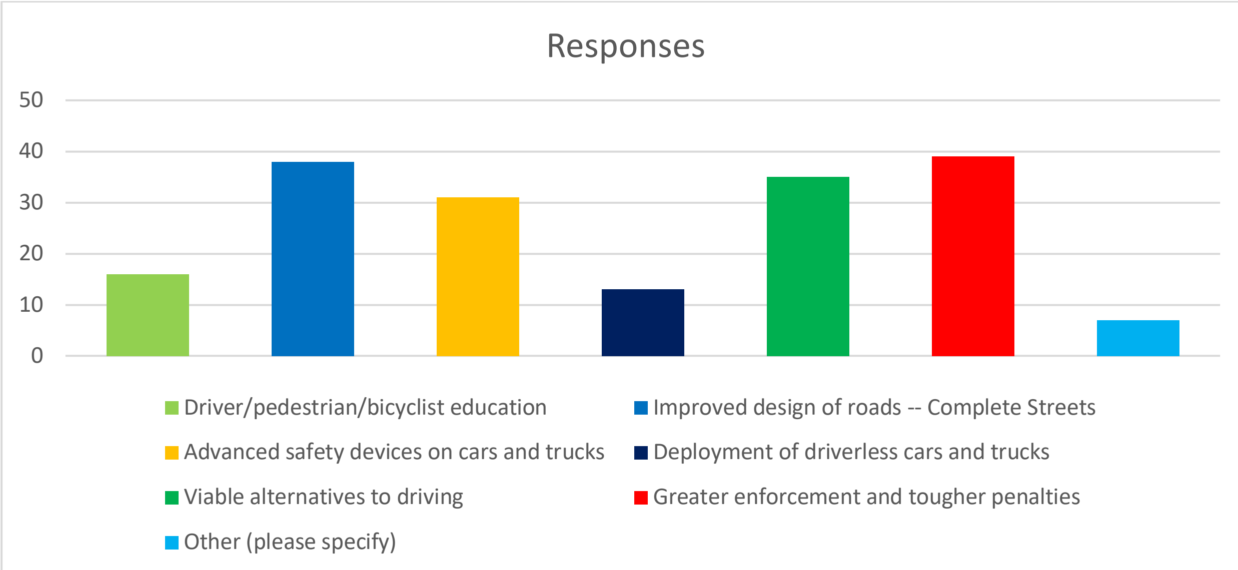
I would be afraid to ride in a driverless vehicle	31.08%
I would feel less safe sharing the road with driverless vehicles	13.51%
I would be concerned about the reliability and safety of driverless vehicles	22.97%
I would be unafraid to ride in a driverless vehicle	17.57%
Driverless vehicles would improve road safety	13.51%
Other (please specify)	1.35%

12) What are your biggest transportation safety concerns today? Choose apply that apply.



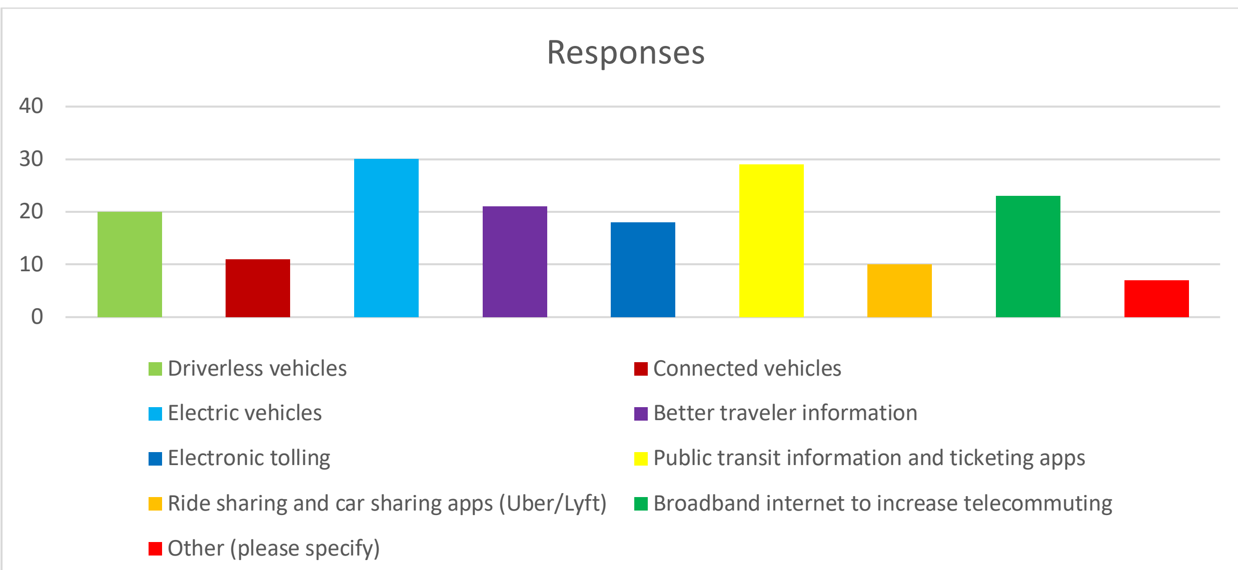
Among the responses indicated under “Other” were maintenance (faded and obscured traffic markings and signage) and safety of non-automotive roadway users (pedestrians and equestrians).

13) What's the best way to make your travels safer in the future? Choose all that apply.



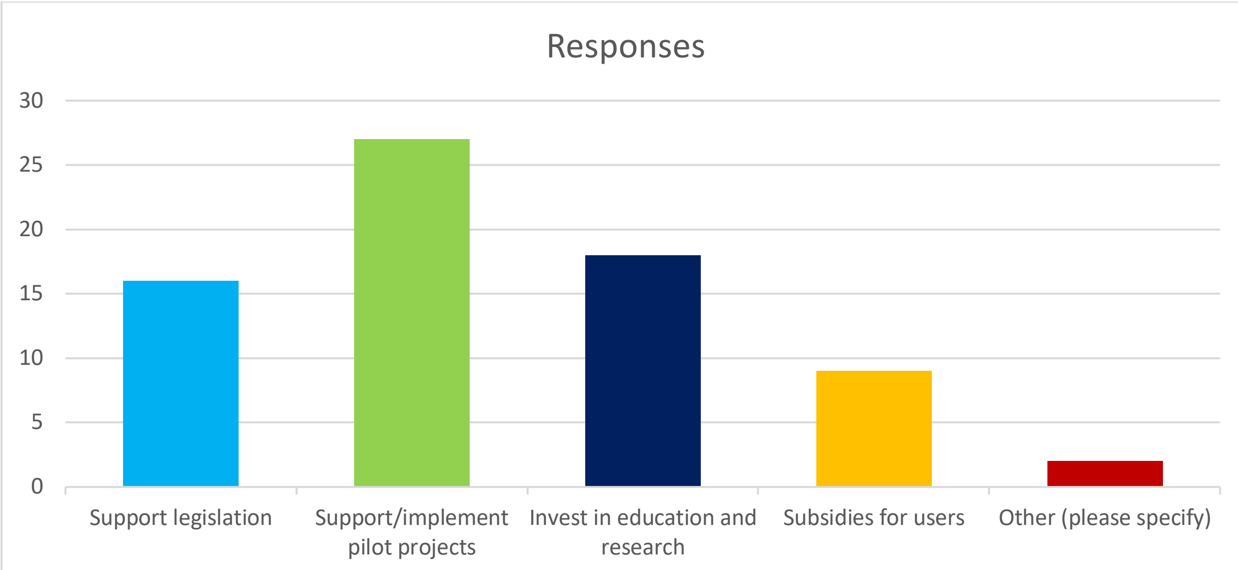
Other proposals suggested include improved roadway maintenance, pedestrian improvements, restrictions on the accessorizing of personal vehicles, improved public transportation.

14) What new transportation technologies are most interested in seeing implemented today? Choose all that apply.

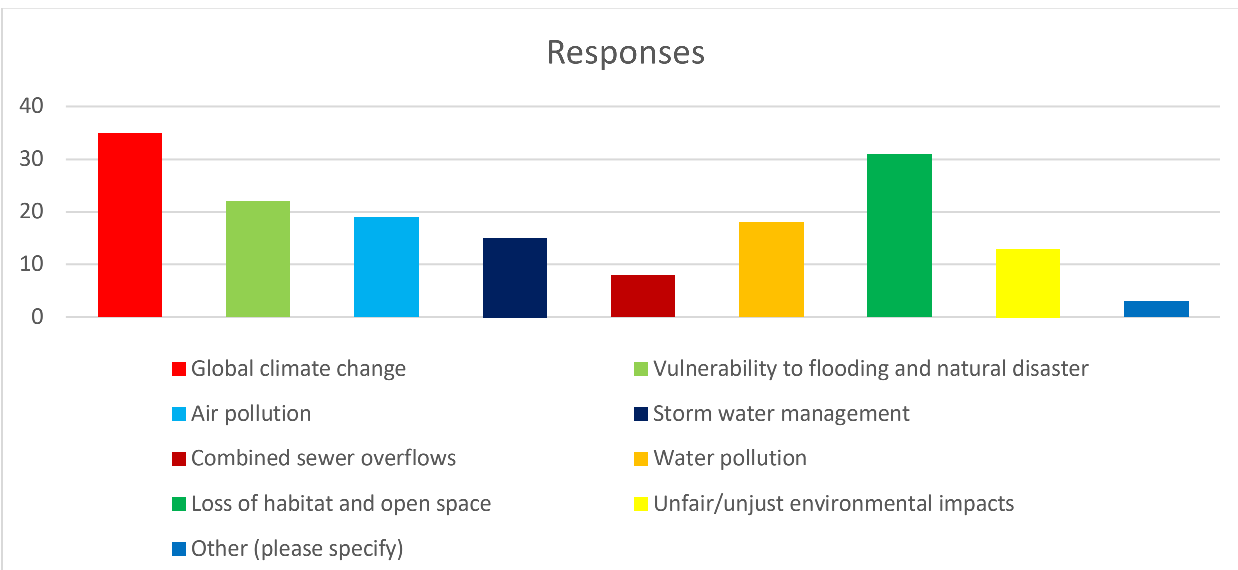


Responses contributed under "Other" included going back to the basics with maintained and enhanced public transportation, roadways and law enforcement. One respondent brought up hydrogen and natural gas powered vehicles.

15) What is the best way for the region to support and shape technological innovation and implementation?

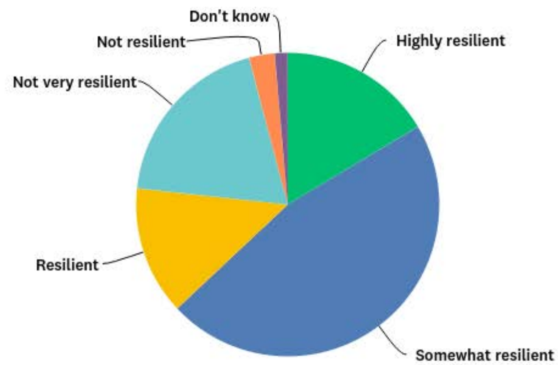


16) What is the most pressing/critical environmental issue facing your community today? Choose all that apply.

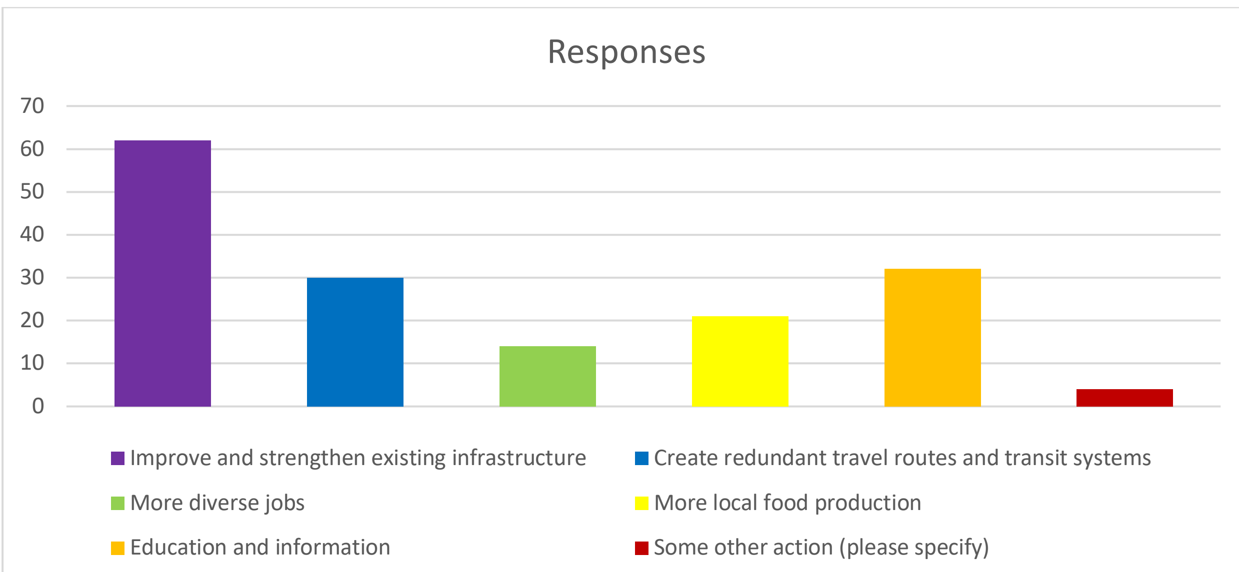


Additionally, respondents pointed out depleted natural resources and brownfields.

17) How resilient do you feel your community is to a major storm event today?

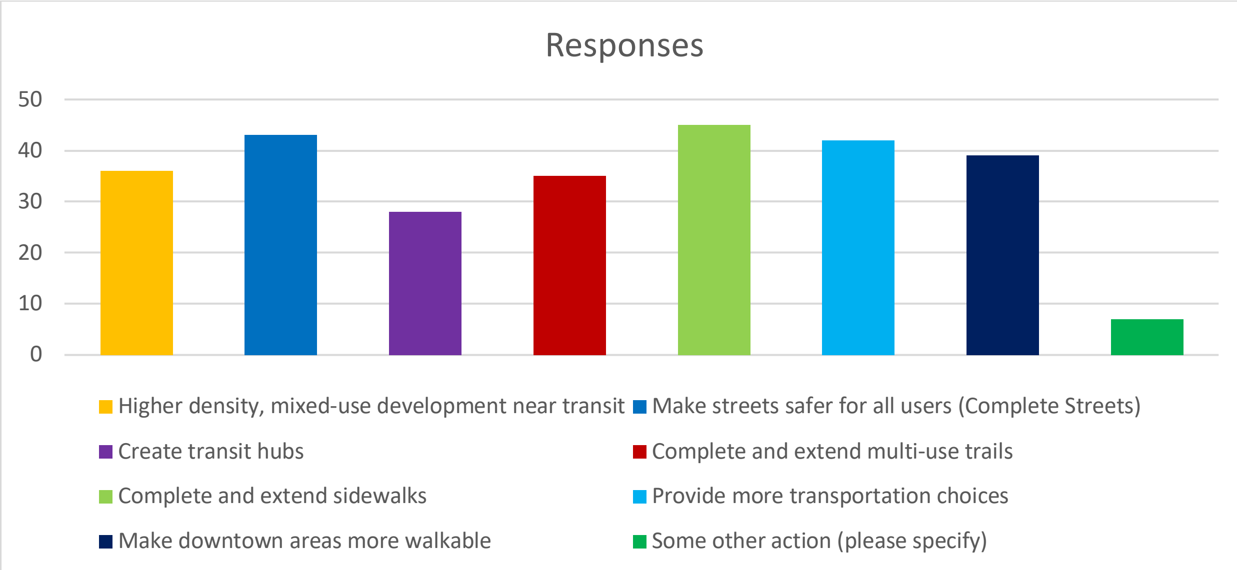


18) Looking forward, what is needed to make our region more resilient? Choose all that apply.



Additional comments under "Some other action" included empowering the students, clear trees and bury powerlines, and informed leaders who embrace innovation and change.

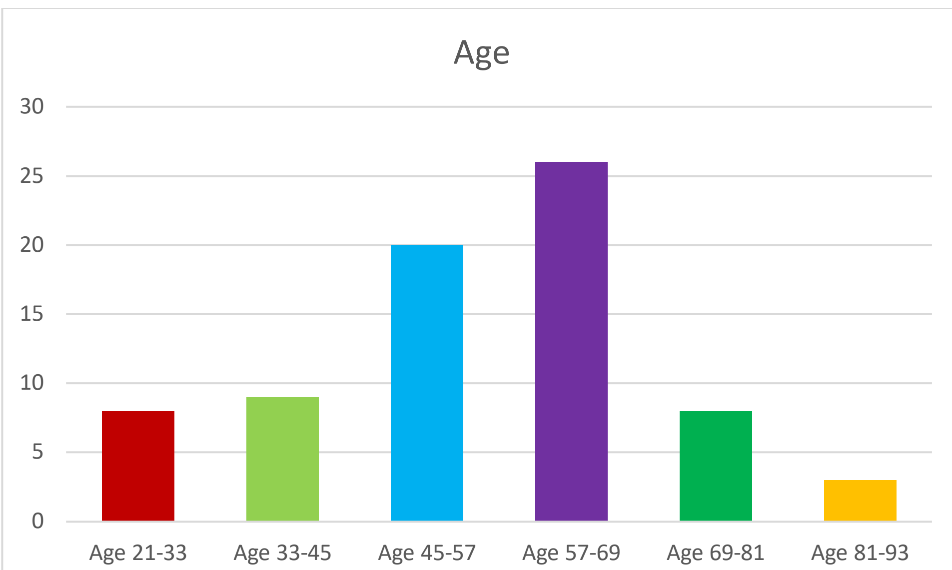
19) What actions would you support to enhance quality of life in your community and the region in the future? Choose all that apply.



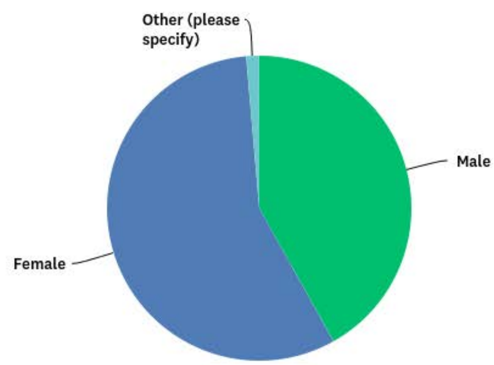
Some other actions put forward included protected bike lanes, improved public transportation, improved integration of ride sharing in roadway design, more pedestrian signals, community activities, improved business development, and a focus on safety, security and the enforcement of existing laws.

20) Please indicate your age.

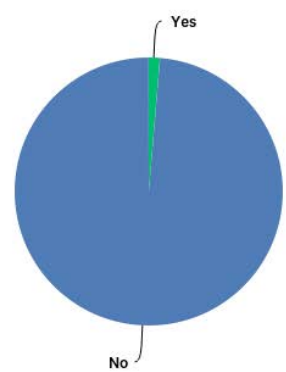
The median age of respondents for the survey was 57.



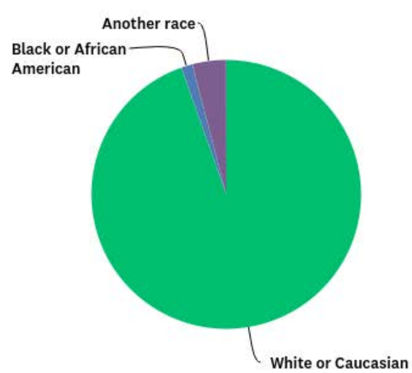
21) What gender do you identify as?



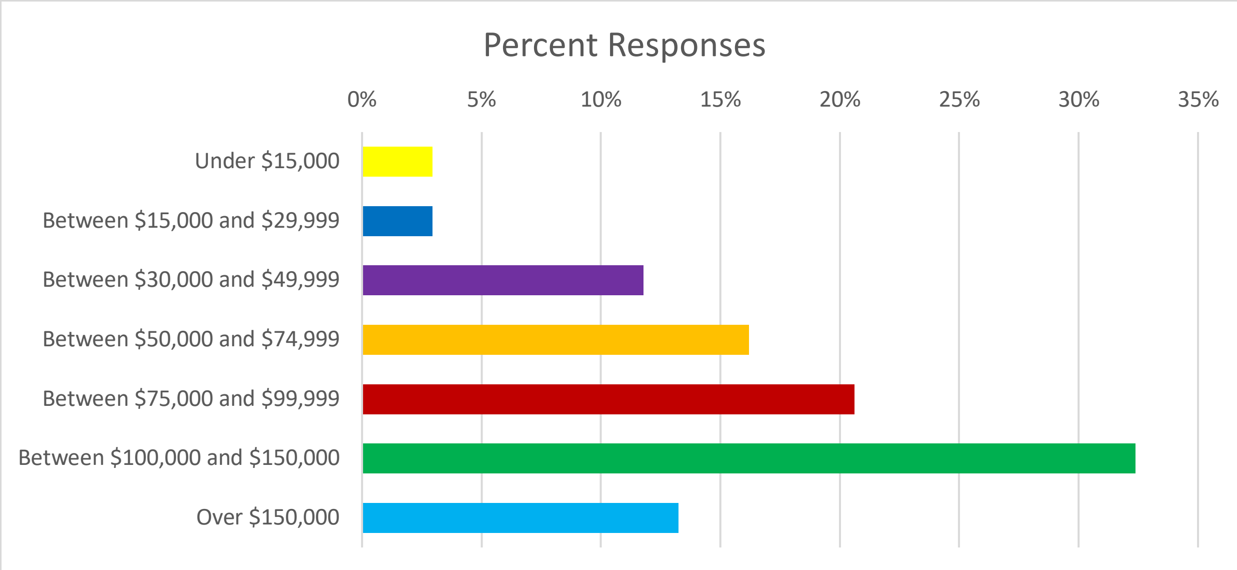
22) Do you identify as Hispanic or Latinx?



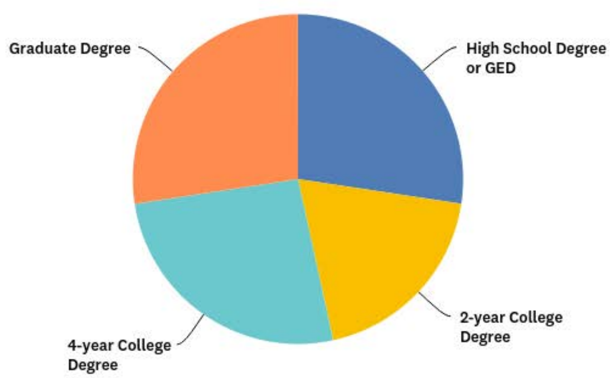
23) How would you describe yourself?



24) What is your annual household income?



25) What is your level of education?



26) Additional comments:

All responses have been included as they were submitted with no edits:

I do think that Southbury, or any other small town in our part of Connecticut needs public transportation if it is going to keep people moving in who are still working, are younger and would love to live here. This is a beautiful place to live, but think we need more housing for younger people combined with available transit. Our downtown area could be more people friendly. Similar towns in NJ where I came from do have transportation, either bus, train or both. Rt. 84 in rush hour is a nightmare. Every time I have to drive to Danbury, or further on 84, I envision a high speed rail right in the middle of the highway, like one I used to see in Atlanta, Ga. from Buckhead, a close suburb of Atlanta. Other towns around the country have used this method, but obviously requires planning, and lots of funds. However without plans and looking into the future nothing can happen. Some of our town fathers are against anything that will *upset the "rural" feeling of our town, but we cannot support a town without younger families and we can't let the town just "rust".*

We should create "luxury lanes" that wealthy people will pay to use as opposed to tolling everyone all the time. It's a small state. A Disney monorail would work GREAT here. Run it right down the middle of I-84.

I think mass transit will work only when service is frequent; nearby at both ends; economic to use and operate and safe.

No Tolls ever!

Research William Malone who passed away in 2017. Believe he was onto something with natural gas

There would be so much more bike commuting if the roads were safe to do so. This is the cleanest & healthiest form of transportation

I think the city of Waterbury should do a better job enforcing parking rules on Highland Ave near Damilios Restaurant. That area can be hazardous when pulling out on to Highland Ave. I also think that parking should be red downtown.

I do not support tolling in Connecticut. I think the Governor is making a huge mistake tolling people to use roads they've already paid through the nose for. Find another solution.

There should be a public bus route and new sidewalks over the Lakewood Road connections in Waterbury. Safety and commerce reasons.

Pershing Drive is a merchant hub yet I terminated my planet fitness membership because traffic volume and lack of effective and safe crosswalks jeopardize my life.

Valley should be more important than party. Region has very little legislative clout, and really never has.

Please fix the road surfaces in Naugatuck they are hazardous to cars, but especially walking or biking

Need more access for seniors and disabled. Limited buses and transit services don't allow these individuals to get to appointments independently. Valley transit does not do a good job at being on time or caring how long someone has to wait to go home. It shouldn't take an entire persons day, who is already disabled, to be out for one appointment. Zero care or compassion.

Seymour needs to start getting into the press for positive actions, development, and progress. Bad press doesn't encourage people to move into town. School system is not in good shape and needs an overhaul. Kurt has done a good job with finances.

Extend Metro North to connect to Torrington and beyond, and have it connect to New Haven, Hartford and Springfield. Extend the Riverwalk from Shelton to Torrington for bicycles and walking.

Absolutely need to push for more complete streets.

Appendix E: Legal Notices and Meeting Records

Wtby Republican
Legal Notice
MTP
2-22-19
publication date

LEGAL NOTICE

Central Naugatuck Valley
Metropolitan Planning
Organization

Metropolitan Transportation Plan
2019-2045

The draft Metropolitan Transportation Plan which includes the Air Quality Conformity Determinations for ozone and fine particulate matter for the Central Naugatuck Valley Metropolitan Planning Organization (CNVMPO) is available for public review and comment between February 22, 2019 and April 12, 2019. A public meeting will be held on March 27, 2019 at 5:00 PM at the CNVMPO/Naugatuck Valley Council of Governments offices, 49 Leavenworth Street, Third Floor, Waterbury, CT. The public meeting snow date is 5:00 PM on April 1, 2019. The MTP will be reviewed and considered for adoption by the CNVMPO at its meeting to be held on April 12th at 10:00 AM at the above noted location. The Public is invited to attend and offer comment at the MPO meeting.

The Metropolitan Transportation Plan analyzes the existing transportation system in the Central Naugatuck Valley planning area, as well as future transportation needs, and recommends improvements to the system. Comments may be made orally at the public information meeting and at the CNVMPO meeting. Written comments may be mailed to CNVMPO at 49 Leavenworth Street, Third Floor, Waterbury, CT 06702, or e-mailed to cmeyer@nvcogct.org. Written comments must be received by 4:00 PM on Wednesday, April 10, 2019.

The draft MTP is available for viewing at the offices of the Naugatuck Valley Council of Governments, 49 Leavenworth Street, Third Floor, Waterbury, CT. The draft MTP may also be viewed or downloaded online at http://www.nvcogct.org/content/mtp-update. For more information, please call NVCOG at (203) 757-0535. Language assistance may be requested within a reasonable timeframe and is provided at no cost to the public.

04-05-2019

HOWARD WILLIAMS
R-A February 22 &
March 1, 2019

LEGAL NOTICE
TOWN OF CORNWALL
NOTICE OF DECISION
PLANNING AND ZONING
COMMISSION

Pursuant to the provisions of Section 8-28 of the General Statutes, as amended, notice is hereby given that at a regular meeting, February 19, 2019 held in the Cornwall Library, the Cornwall Planning and Zoning Commission made the following decision: To approve SP#248 - Carroll Dunham and Laurie Simons owners/George Johannsen Allied Engineering/Special Permit(s) for a detached accessory as per Section 3.11.3 Special Uses Permitting in the CP Zone and Section 8.10 - "Apartment uses in Residential Zones - 48 Jewel Street/with proposed driveway entrance from Pine Street - Assessors Map H04-04-1 as presented,
Dated this 21st day of February 2019.
Karen Griswold Nelson, Land Use Administrator
R-A February 22, 2019

NAUGATUCK
ZONING BOARD OF APPEALS
NOTICE OF PUBLIC HEARING

The Zoning Board of Appeals hereby gives NOTICE that on Tuesday, February 26, 2019 at the Naugatuck Town Hall the following will transpire: 6:00 P.M. PUBLIC HEARING APPEAL #2007- Applicant: Jason Morales will seek a variance of Section 25.4.3 for the reduction of the side yard setback of the Naugatuck Zoning Regulations for the property located at 39 Celentano Dr. 6:05 P.M. PUBLIC HEARING APPEAL #2008- Applicant: Rosa Home Improvement, LLC will seek a variance of Section 24.1 Sched. B Sec. 5.3 for the reduction of the side yard setback of the Naugatuck Zoning Regulations for the property located at 47 Homestead Ave. Maps and Plans are available for review at the Land Use Office, 229 Church St., Naugatuck, CT, M-F 8:30 A.M. to 4:00 P.M.

ATTEST: Charles Marino, Chair
R-A February 15 & 22, 2019

these courageous individuals and deeply regret that opportunities were missed to adequately address Mr. Phillip's abuse five decades ago and to respond more empathetically to the survivors of these horrific experiences."

There was no mention in the letter of the nature of the alleged sexual abuse, how many students may have been involved or what evidence Cowdery discovered that the parties involved claim confirms the allegations.

Neither the school nor Cowdery would comment further when contacted by phone. A school spokesman would not say whether the school knows of Phillips' whereabouts.

Contact Mike Patrick at mpatrick@rep-am.com, on Twitter @RA_MikePatrick or on Facebook at RA. Mike. Patrick.

as they tried to escape officers, including members of the Vice and Intelligence Division who joined the chase.

After brief pursuits on foot, police arrested Booker, Keven O. Santos, 21, Judson Albert Watts, 25, and 21-year-old Douglas Lara. The men are all Waterbury residents.

Police identified Santos as the shooter and charged him with illegal discharge of a firearm, among other crimes.

Police found two loaded handguns and ammo in the car, which was stolen from Plain-

ed of carrying a pistol without a permit in 2017 in Bridgeport, but was spared prison time. Lara also has felony larceny convictions on his record that stem from stolen cars, according to court records.

Lara was wanted by state police in Litchfield, according to city police. Santos and Booker were held on $250,000 bonds. Lara was held on a $150,000 bond, while Watts was held on a $75,000 bond.

The men are due in Waterbury Superior Court next month.

Your Input is Requested
DRAFT
Metropolitan Transportation Plan 2019-2045
for the
CENTRAL NAUGATUCK VALLEY
METROPOLITAN PLANNING ORGANIZATION

Available Online: **nvcogct.org**

The Public Outreach Process Is Open From
2/22/2019 Through 4/12/2019

Residents, commuters, business owners, and other interested individuals are encouraged to take advantage of this opportunity to learn about the transportation planning process and provide valuable input on transportation needs in the Greater Waterbury Area

SHARE YOUR INPUT ONLINE
nvcogct.org/content/mtp-update

PUBLIC INFORMATION MEETING
5:00 p.m. Wednesday, March 27, 2019

at the

NVCOG
49 Leavenworth Street, Third Floor
Waterbury, CT

*The MTP will be considered for adoption by the CNVMPO at its meeting to be held on **April 12th at 10:00 a.m.** at the above noted location.*

Language assistance may be requested within a reasonable timeframe and is provided at no cost to the public.

NAUGATUCK VALLEY COUNCIL OF GOVERNMENTS

Wtby Republican
Local Section Display Ad
2-22-19

AVISO LEGAL

Central Naugatuck Valley Metropolitan Planning Organization
Plan de Transporte Metropolitano 2019-2045

El borrador del Plan de Transporte Metropolitano (MTP) que incluye las Determinaciones de Conformidad de la Calidad del Aire para el ozono y partículas finas para la Central Naugatuck Valley Metropolitan Planning Organization (CNVMPO) está disponible para revisión y comentarios públicos entre el 22 de febrero de 2019 y el 12 de abril de 2019. Habrá una reunión pública el 27 de marzo de 2019 a las 5:00 PM, en las oficinas del CNVMPO/Naugatuck Valley Council of Governments, 49 Leavenworth Street, tercer piso, Waterbury, CT. En caso de nevada, la reunión pública será a las 5:00 PM del 1 de abril de 2019. El MTP será revisado y considerado para su adopción por el CNVMPO en su reunión que tendrá lugar el 12 de abril, a las 10:00 AM en el lugar mencionado anteriormente. El público está invitado a asistir y ofrecer comentarios en la reunión de la MPO.

El Plan de Transporte Metropolitano analiza el sistema de transporte existente en el área de planificación del Central Naugatuck Valley (Valle Central), así como las necesidades de transporte futuras, y recomienda mejoras al sistema. Los comentarios se pueden hacer oralmente en la reunión de información pública y en la reunión de la CNVMPO. Los comentarios escritos pueden ser dirigidos a: CNVMPO, 49 Leavenworth Street, tercer piso, Waterbury, CT 06702, o enviados por email a: **cmeyer@nvcogct.org.** Los comentarios escritos deben de recibirse a no mas tardar de las 4:00 p.m. el miércoles, 10 de abril, 2019

El borrador del MPT está disponible para revisión en las oficinas del CNVMPO/Naugatuck Valley Council of Governments, 49 Leavenworth Street, tercer piso, Waterbury, CT. También puede ser consultado o descargado en línea en: **http://www.nvcogct.org/content/mtp-update.** Para mayor información, puede llamar al NVCOG: (203) 757-0535. Se puede solicitar asistencia de interpretación dentro de un plazo de tiempo razonable y se proporciona sin costo para el público.

NAUGATUCK VALLEY COUNCIL of GOVERNMENTS

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About | Planning & Services | Projects/Studies | Publications | Calendar | Maps | News | **MTP Update** | For Vendors

MTP Update

The public outreach period for the Metropolitan Transportation Plan (MTP) is open from 2/22/2019 through 4/12/2019. Residents, commuters, business owners, and other interested individuals are encouraged to take advantage of this opportunity to learn about the transportation planning process and provide valuable input on transportation needs in the Greater Waterbury Area.

About the MTP

You may read through the Metropolitan Transportation Plan (pdf), read a shortened Metropolitan Transportation Plan Summary (pdf), or view the Metropolitan Transportation Plan as an interactive story.

You may also read through the supporting documents on the Capital Improvement Plan (pdf) and Air Quality Conformity Determination (pdf) and addendum (pdf)or a shortened Air Quality Conformity Determination Summary (pdf).

Public Involvement

By sharing your ideas and opinions about how to improve the safety and efficiency of your community's transportation system, you will help guide elected officials when they make decisions about where and how to invest in the transportation system in the future. Please take a few moments to complete the following surveys. Your responses are important and we appreciate your time in answering it. Thank you!

Thank you to all who participated in the MTP Survey. You may view the results from the MTP survey, but you can still suggest a transportation project idea with the Mobility Project Reporter.

A public information meeting was held on **Wednesday, March 27, 2019, at 5:00 p.m**. at NVCOG.

The MTP will be considered for adoption by the CNVMPO at its meeting to be held on **Friday, April 12th, 2019 at 10:00 a.m.**, also at NVCOG. The Public is invited to attend and offer comment at the MPO meeting.

Written comments were excepted until **4:00 PM on Wednesday, April 10, 2019,** mailed to CNVMPO at 49 Leavenworth Street, Third Floor, Waterbury, CT 06702, or e-mailed to cmeyer@nvcogct.org.

Language assistance may be requested within a reasonable timeframe and is provided at no cost to the public.

NAUGATUCK VALLEY COUNCIL of GOVERNMENTS
49 Leavenworth Street, 3rd Floor, Waterbury, Connecticut 06702
203-757-0535 or 203-735-8688 | nvcogct@nvcogct.org | Directions

NAUGATUCK VALLEY
COUNCIL of GOVERNMENTS
49 Leavenworth Street, 3rd Floor, Waterbury, CT 06702 · 203-757-0535 · 203-735-8688 · nvcogct.org

Participant Sign-in Sheet
NVCOG Metropolitan Transportation Plan 2019-2045
Public Information Meeting
March 27, 2019

Name	Organization	E-Mail	City/Town/Borough of Residence
Christian Meyer	NVCOG	—	—
SARA RADACSI	CT DOT-COG UNIT		
Richard Crowther Jr	NVCOG		
Gabriel Filg	NVCOG		

ANSONIA · BEACON FALLS · BETHLEHEM · BRISTOL · CHESHIRE · DERBY · MIDDLEBURY · NAUGATUCK · OXFORD · PLYMOUTH
PROSPECT · SEYMOUR · SHELTON · SOUTHBURY · THOMASTON · WATERBURY · WATERTOWN · WOLCOTT · WOODBURY

NAUGATUCK VALLEY
COUNCIL of GOVERNMENTS
49 Leavenworth Street, 3rd Floor, Waterbury, CT 06702 · 203-757-0535 · 203-735-8688 · nvcogct.org

2019-2045 Naugatuck Valley Council of Governments Metropolitan Transportation Plan Public Information Meeting – March 27, 2019 Public Comment Sheet	
Name:	Town of Residence:
Comments:	

Page _______ of _______