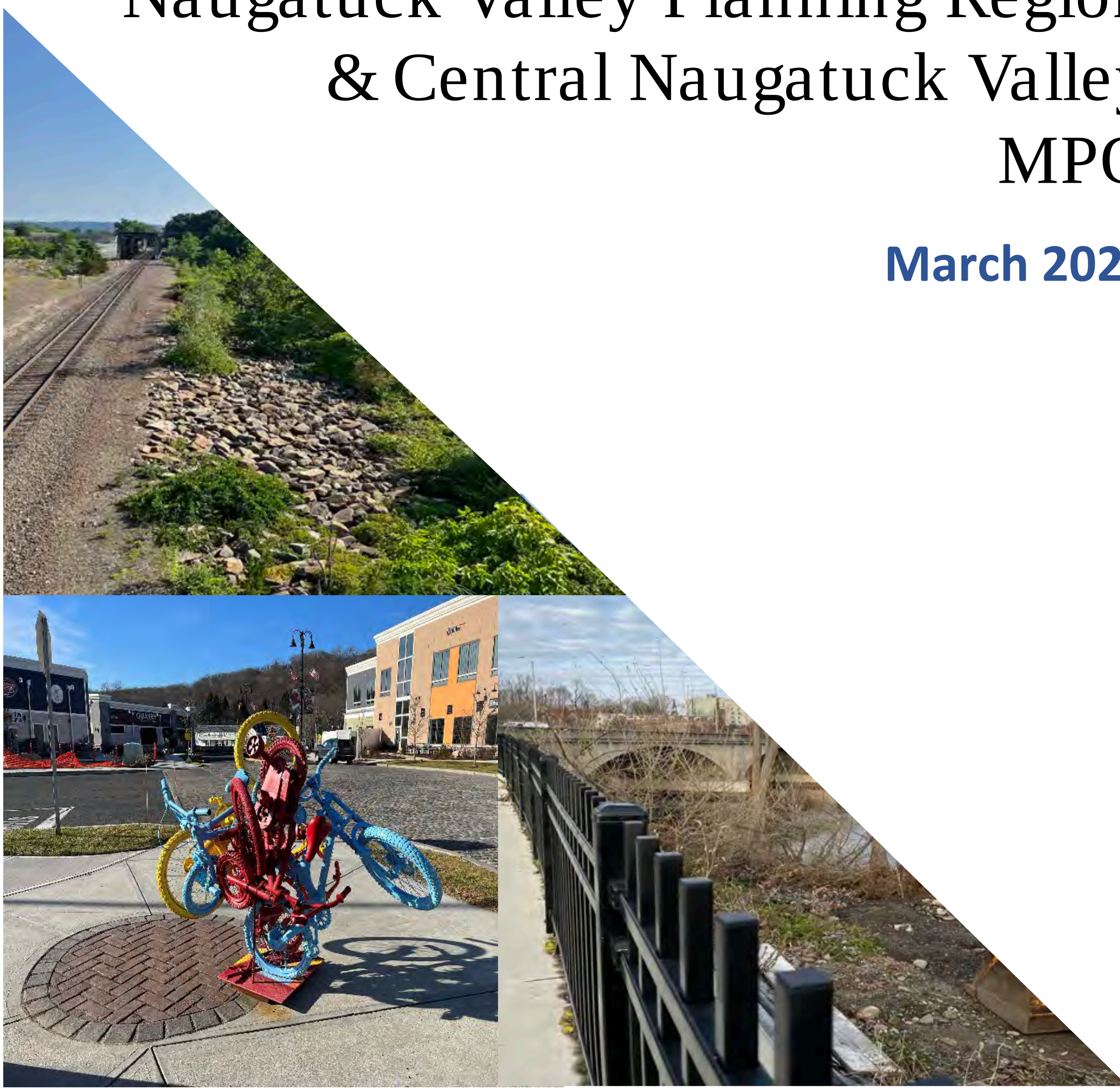
NVision50: The Metropolitan Transportation Plan for the Naugatuck Valley Planning Region & Central Naugatuck Valley MPO

March 2023



Title:	NVision50: Metropolitan Transportation Plan for the Naugatuck Valley Planning Region & Central Naugatuck Valley MPO: 2023-2050
Author:	Naugatuck Valley Council of Governments
Date:	March 17, 2023
Metropolitan Planning Organization:	Central Naugatuck Valley Metropolitan Planning Organization (CNVMPO)
Sources of Copies:	Naugatuck Valley Council of Governments 49 Leavenworth Street, 3rd Floor Waterbury, Connecticut Phone: (203) 757-0535
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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. This plan is an update to *MTP 2019-2045*, which was completed and adopted by the CNVMPO on April 12, 2019 and can be accessed by following this link: https://nvcogct.gov/wp-content/uploads/2019/03/NVCOG-MTP-DRAFT1-w-Appendices-20190222.pdf. An updated MTP is required every four years with at least a 20 year horizon, but the MPO may revise the plan at any time using the procedures in 23 CFR Part 450§324 without a requirement to extend the horizon year.
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 2022/2023 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. This plan has been adopted by the CNVMPO and provided to CTDOT, Connecticut Office of Policy and Management, FHWA, and FTA, and submitted for information purposes to the Governor. Any future revisions will similarly be distributed.

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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CENTRAL NAUGATUCK VALLEY
METROPOLITAN PLANNING ORGANIZATION
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RESOLUTION 2023-10
ENDORSEMENT OF THE BRIDGEPORT-STAMFORD URBAN AREA CONGESTION MANAGEMENT PROCESS

WHEREAS, The 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), authorized by the Infrastructure Investment and Jobs Act (IIJA), and related US Department of Transportation planning regulations; and,

WHEREAS, Transportation Management Areas (TMA) are designated urban areas with populations of greater than 200,000 residents; and,

WHEREAS, TMAs are required to develop and maintain a Congestion Management Process that identifies a CMP network, utilizes data to identify problem areas, and includes a listing of strategies to improve key performance measures; and,

WHEREAS, The CNVMPO includes several towns within the Bridgeport-Stamford TMA, including Beacon Falls, Oxford, Southbury, and Woodbury as of the 2020 US Census Bureau designation of Urban Areas; and,

WHEREAS, NVCOG staff worked in partnership with the Connecticut Metropolitan Council of Governments (MetroCOG) and the Western Connecticut Council of Governments (WestCOG) to develop a TMA-wide CMP;

NOW THEREFORE BE IT RESOLVED, that the Central Naugatuck Valley MPO, after reviewing the final draft of the Bridgeport-Stamford Transportation Management Area Congestion Management Process, included as Appendix B on NVision50: The Metropolitan Transportation Plan for the Naugatuck Valley COG & Central Naugatuck Valley MPO, endorses the CMP as the congestion management strategy for the part of the MPO covered by the urban area.

This resolution shall become effective as of March 17, 2023.

I do hereby certify that the resolution adopted by the Central Naugatuck Valley MPO at a public meeting held on March 17, 2023, at which a quorum was present and that the same is a correct and true transcript from the original thereof.

Ed Mone, Treasurer

March 17, 2023
Date

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RESOLUTION 2023-11

URBAN TRANSPORTATION PLANNING CERTIFICATION
CENTRAL NAUGATUCK VALLEY MPO

WHEREAS, the Central Naugatuck Valley MPO (CVNMPO) is required by the ***Fixing America's Surface Transportation Act (FAST Act), Infrastructure Investment and Jobs Act (IIJA)*** and related US Department of Transportation regulations to certify that the metropolitan transportation planning process is being carried out in accordance with all US Department of Transportation requirements and regulations and must submit such certification to the Federal Highway Administration and Federal Transit Administration as part of the STIP and MTP approval.

WHEREAS, the Naugatuck Valley Council of Governments is the designated host agency for the Central Naugatuck Valley MPO and conducts the transportation planning process in accordance with the regulations promulgated by the US Department of Transportation and specified in the ***FAST Act and authorized by IIJA***, by preparing a Unified Planning Work Program, conducting and performing the transportation planning activities contained in the UPWP, preparing, maintaining and amending the endorsed short-range Transportation Improvement Program (TIP), preparing and updating the metropolitan transportation plan (MTP), assessing the air quality impacts of the proposed transportation improvement projects included in the TIP and MTP, and proactively involving the public in the metropolitan transportation planning process.

WHEREAS, the ***CNVMPO*** adheres to the principles of non-discrimination on the basis of race, color, creed, national origin, sex, or age in employment or business opportunity, as specified in Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990 and the Older Americans Act, and regarding the involvement of disadvantaged business enterprises in USDOT funded projects and the implementation of an equal opportunity program on Federal and Federal-aid highway construction contracts.

NOW, THEREFORE BE IT RESOLVED that the Central Naugatuck Valley MPO, the metropolitan planning organization for the Central Naugatuck Valley metropolitan planning area and the Waterbury urban area hereby certifies that the urban transportation planning process has been and is being conducted in accordance with the terms and provisions of the rules and regulations promulgated by the US Department of Transportation under the ***FAST Act and IIJA*** and all applicable provisions relative to public and private providers of mass transportation, civil rights, involvement of minority business enterprises, special efforts for elderly and disabled persons, the Clean Air Act and amendments, 23 USC and 49 USC have been satisfied.

This resolution shall become effective as of March 17, 2023.

I do hereby certify that the resolution adopted by the CNVMPO at a public meeting held on March 17, 2023, at which a quorum was present and that the same is a correct and true transcript from the original thereof.

Respectfully submitted,

Ed Mone, Treasurer	March 17, 2023 Date

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RESOLUTION 2023-12

RESOLUTION ON CONFORMITY WITH THE CLEAN AIR ACT GREATER CONNECTICUT OZONE NONATTAINMENT ZONE CENTRAL NAUGATUCK VALLEY MPO

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 an annual 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;
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 plans and programs approved today, March 17, 2023, 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 Greater Connecticut Ozone 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 this Ozone Nonattainment area (Ozone and PM2.5 Air Quality Conformity Determination February 2023); 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 2023-2050 MTP and the FFY 2021-2024 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 if 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 2023.

This resolution shall become effective as of March 17, 2023.

I do hereby certify that the resolution adopted by the Central Naugatuck Valley MPO at a public meeting held on March 17, 2023, at which a quorum was present and that the same is a correct and true transcript from the original thereof.

Ed Mone, Treasurer	March 17, 2023 Date

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RESOLUTION 2023-13

RESOLUTION ON CONFORMITY WITH THE CLEAN AIR ACT CONNECTICUT PORTION OF THE NY-NJ-CT OZONE NONATTAINMENT ZONE CENTRAL NAUGATUCK VALLEY MPO

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 an annual 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;
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 plans and programs approved today, March 17, 2023, 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 Nonattainment area (Fairfield, New Haven, and Middlesex Counties) and the Connecticut Department of Transportation has jointly assessed the impact of all transportation plans and programs in this Nonattainment area (Ozone and PM2.5 Air Quality Conformity Determination February 2023); 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 2023-2050 MTP and the FFY 2021-2024 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) (A) and hereby approves the existing Ozone and PM2.5 Air Quality Conformity Determination dated February 2023.

This resolution shall become effective as of March 17, 2023

I do hereby certify that the resolution adopted by the Central Naugatuck Valley MPO at a public meeting held on March 17, 2023, at which a quorum was present and that the same is a correct and true transcript from the original thereof.

	March 17, 2023
Ed Mone, Treasurer	Date

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RESOLUTION 2023-14

RESOLUTION ON CONFORMITY WITH THE CLEAN AIR ACT CONNECTICUT PM2.5 NONATTAINMENT ZONE CENTRAL NAUGATUCK VALLEY MPO

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 an annual 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;
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 plans and programs approved today, March 17, 2023, 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 Connecticut portion of the New York – Northern New Jersey – Long Island, NY-NJ-CT area is designated a PM 2.5 attainment/maintenance area; 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 2023-2050 MTP and the FFY 2021-2024 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; and

NOW, THEREFORE BE IT RESOLVED that Central Naugatuck Valley MPO finds that the 2023-2050 MTP and the FFY 2021-2024 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 if 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 2023.

This resolution shall become effective as of March 17, 2023.

I do hereby certify that the resolution adopted by the Central Naugatuck Valley MPO at a public meeting held on March 17, 2023, at which a quorum was present and that the same is a correct and true transcript from the original thereof.

Ed Mone, Treasurer	March 17, 2023 Date

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RESOLUTION 2023-15
ENDORSEMENT OF NVision50: THE METROPOLITAN TRANSPORTATION PLAN FOR THE NAUGATUCK VALLEY COG & CENTRAL NAUGATUCK VALLEY MPO

WHEREAS, The 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), authorized by the Infrastructure Investment and Jobs Act (IIJA), and related US Department of Transportation planning regulations; and,

WHEREAS, The Metropolitan Transportation Plan: 2019-2045 for the Naugatuck Valley Planning Region & Central Naugatuck Valley Metropolitan Planning Area was prepared and endorsed by the CNVMPO on April 12, 2019; and

WHEREAS, The IIJA 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 partially 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 CNVMPO prepared and completed a new long range Metropolitan Transportation Plan with the timeframe of 2023 to 2050 through the transportation planning process and in conformity with FAST Act and IIJA planning guidelines; and,

WHEREAS, The CNVMPO 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, an online survey to gather feedback from the public, making the draft plan available to the public electronically for a period exceeding 30 days, preparing a summary of the draft plan and posting it on the NVCOG website, notifying the public of the new plan, soliciting review comments on the posted draft from stakeholders and pertinent organizations, holding a hybrid public information meeting on February 16, 2023, both virtually and at the NVCOG office, hosting a virtual listening session on March 9, 2023, inviting public comment to the March 1, 2023 meeting of the NVCOG Transportation Technical Advisory Committee, recording comments from the public, and considering and responding to comments; and,

WHEREAS, the proposed program of projects recommended in the CNVMPO'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; and,

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 the Central Naugatuck Valley MPO, after reviewing the final draft NVision50: The Metropolitan Transportation Plan for the Naugatuck Valley COG & Central Naugatuck Valley MPO, finds the MTP to 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 March 17, 2023.

I do hereby certify that the resolution adopted by the Central Naugatuck Valley MPO at a public meeting held on March 17, 2023, at which a quorum was present and that the same is a correct and true transcript from the original thereof.

Ed Mone, Treasurer

March 17, 2023
Date

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Glossary of Acronyms

ACS – American Community Survey

ADA – Americans with Disabilities Act

BIL – Bipartisan Infrastructure Law (common reference to the Infrastructure Investment and Jobs Act)

BRT – Bus Rapid Transit

CAA – Connecticut Airport Authority

CCP – Community Connectivity Program (State)

CERT – Community Emergency Response Team

CFR – Code of Federal Regulations

CMAQ – Congestion Management and Air Quality Improvement

CMP – Congestion Management Process

CNVVMPO – Central Naugatuck Valley Metropolitan Planning Organization

CRCOG – Capital Region Council of Governments

CT DEEP – Connecticut Department of Energy and Environmental Protection

CTDOT – Connecticut Department of Transportation

DAR – Dial-A-Ride

EJ – Environmental Justice

EPA – US Environmental Protection Agency

EV – Electric Vehicle

FAA – Federal Aviation Administration

FAST Act – Fixing America's Surface Transportation Act

FCHT – Farmington Canal Heritage Trail

FHWA – Federal Highway Administration

FTA – Federal Transit Administration

FRA – Federal Railroad Administration

GBT – Greater Bridgeport Transit Authority

GBVMPO – Greater Bridgeport and Valley Metropolitan Planning Organization

GCT – Grand Central Terminal

GHTD – Greater Hartford Transit District

GI – Green infrastructure

GIS – Geographic Information Systems

GWTD – Greater Waterbury Transit District

HSIP – Highway Safety Improvement Program

HUD – US Department of Housing and Urban Development

IIJA - Infrastructure Improvement and Jobs Act (also known as Bipartisan Infrastructure Law)

ITS – Intelligent Transportation System

LAP – Language Assistance Plan

LEP – Limited English Proficiency

LID – Low impact development

LOCHSTP – Locally Coordinated Human Services Transportation Plan

LOTCIP – Local Transportation Capital Improvement Program

LRTP – Long Range Transportation Plan

LSBT – Larkin State Bridle Trail

LVPC – Lehigh Valley Planning Commission (Pennsylvania)

MAP-21 – Moving Ahead for Progress in the 21st Century Act

MAP Forum – Metropolitan Area Planning Forum

MetroCOG – Connecticut Metropolitan Council of Governments

MGP – Municipal Grant Program or Matching Grant Program for Demand Responsive Transportation for Elderly and People with Disabilities

MNR – Metro North Railroad

MOU – Memorandum of Understanding

MPO – Metropolitan Planning Organization

MTA – Metropolitan Transportation Authority (New York City)

MTP – Metropolitan Transportation Plan – Federally required for urban areas larger than 50,000 residents, the Metropolitan Transportation Plan identifies issues, goals, and a long-term vision for a minimum of a 20-year period. The MTP must be updated every four years, including new data, a new financial plan, and updated air quality analysis.

MUTCD – Manual on Uniform Traffic Control Devices

NAAQS – National Ambient Air Quality Standards

NEPA – National Environmental Policy Act

NET – North East Transportation

NEVI – National Electric Vehicle Infrastructure Program

NHCOG – Northwest Hills Council of Governments

NHML – New Haven main line

NHS – National Highway System

NHTSA – National Highway Traffic Safety Administration

NJTPA – North Jersey Transportation Planning Authority

NPMRDS – National Performance Management Research Dataset

NHPP – National Highway Performance Program

NRG – Naugatuck River Greenway

NRGSC – Naugatuck River Greenway Steering Committee

NVCOG – Naugatuck Valley Council of Governments

NYMTC – New York Metropolitan Transportation Council

OCTC – Orange County Transportation Council (New York)

PEL – Planning and Environmental Linkage

PHED – Peak Hour Excessive Delay

PMT – Person-miles traveled

PROWAG – Public Rights of Way Accessibility Guidelines

PTC – Positive Train Control

RAISE – Rebuilding American Infrastructure with Sustainability and Equity

RCPP – Reconnecting Communities Pilot Program

REPT – Regional Emergency Planning Team

RiverCOG – Lower Connecticut River Valley Council of Governments

RPOCD – Regional Plan of Conservation and Development

SCRCOG – South Central Regional Council of Governments

SGR – State of Good Repair

SIP – State Implementation Plan for Air Quality

SS4A – Safe Streets for All

STBG – Surface Transportation Block Grant

STIP – State Transportation Improvement Program

TAM – Transit Asset Management

TAP – Transportation Alternatives Set-Aside Program

TAPT – Transit Asset Prioritization Tool

TCM – Transportation Control Measure

TDM – Travel Demand Management

TIM – Traffic Incident Management

TIP – Transportation Improvement Program (metropolitan)

TMA – Transportation Management Area – USDOT designation for large urban areas with 200,000 or more in population

TOD – Transit Oriented Development

TSMO – Transportation Systems Management and Operations

TTAC – Transportation Technical Advisory Committee

TTR – Travel Time Reliability

TTTR – Truck Travel Time Reliability

ULB – Useful Life Benchmark

UPWP – Unified Planning Work Program

USDOT – United States Department of Transportation

UA – Census-defined Urban Area

VCOG – Valley Council of Governments

VHT – Vehicle Hours of Travel

VMT – Vehicle Miles Traveled

VTD – Valley Transit District

WATER – Waterbury Active Transportation and Economic Resurgence

WATS – Waterbury Area Transit Study

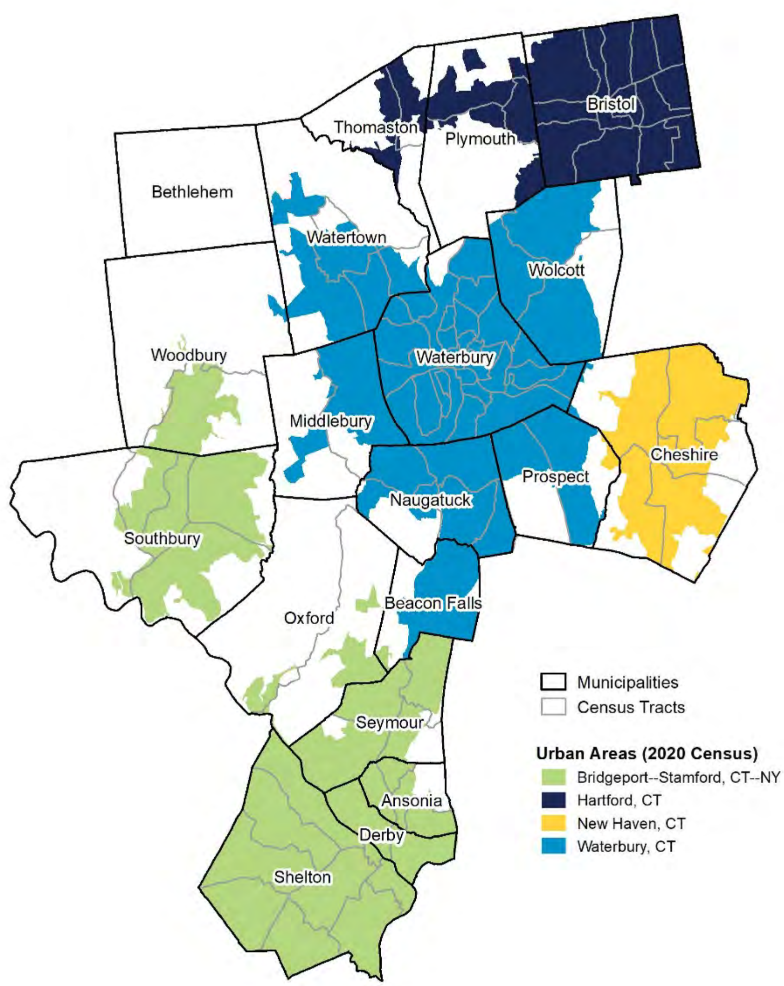
WBL – Waterbury Branch Line

WestCOG – Western Connecticut Council of Governments

ZEV – Zero emission vehicle

1.0 NAUGATUCK VALLEY REGIONAL PROFILE

The Naugatuck Valley Council of Governments (NVCOG), identified in Map 1 below, is an urban, suburban and rural region covering nineteen towns and cities in west-central Connecticut with the City of Waterbury as its largest municipal member and geographic center. The Naugatuck Valley Planning Region is home to 450,376 residents across 422 square miles (2020 census population data). It includes the whole of the census-defined Waterbury Urban Area, as well as parts of the Hartford, New Haven, and Stamford-Bridgeport Urban areas. The NVCOG also includes two Metropolitan Planning Organizations (MPOs), including the entirety of the Central Naugatuck Valley MPO and four out of 10 municipalities within the Greater Bridgeport and Valley MPO.



Map 1.1 Urban Areas within the NVCOG Planning Area, US Census Bureau, 2020

The Naugatuck Valley planning region comprises the following communities:

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

DEVELOPMENT

Historically, the region grew around a robust manufacturing economy, supported by its location along the Naugatuck and Housatonic rivers that provided power and transportation to early factories. It was the center of American brass manufacturing, renowned for products such as clocks, buttons, munitions, and machines. Over the course of the late 19^{th} and early 20^{th} centuries, the much of the region's development took the form of dense urban clusters centered around individual large factories and industry concentrations, as well as housing, businesses and institutions serving these communities. The New York, New Haven and Hartford Railroad's Naugatuck Valley branch and connecting services allowed easy travel between these cities, as well as the opportunity to ship a wide range of manufactured products to national and international markets.

Beginning in the 1960's and 1970's, many of the region's largest manufacturing companies relocated their production to other parts of the country and overseas, leaving behind physical and environmental challenges that the region still faces today. Many of the region's communities faced an economic downturn that has taken years to overcome.

In response to these challenges, the Naugatuck Valley economy has diversified significantly in the 21^{st} century. Healthcare, educational services, retail, and professional and business services now dominate the economy. High precision and advanced manufacturing also remain notable contributors to the region's economy. The second half of the 20th century also saw a shift of population and employment growth from traditional urban centers to the suburban and rural parts of the region. Despite suburbanization, the region's cities continue to play a vital role as the social, cultural, and institutional centers while also retaining their position as critical employment centers. Beginning in the early 2000s, following national trends, traditional urban centers are seeing returning populations and increased investment, and newer developments include more walkable, mixed-use patterns reminiscent of traditional downtowns.

Today, the NVCOG region has a mix of growing, vibrant city centers, considered to be the urban core of the region, older “inner ring” suburban style development with aging but still popular residential styles and commercial activity in strip mall style buildings, and “outer ring” communities including large residential homes on large lots and the region’s remaining agricultural assets.

TRANSPORTATION

The Naugatuck Valley region was able to develop and thrive due to an extensive transportation network that supported the movement of goods and people. The swift-flowing Naugatuck and Housatonic rivers were dammed to provide power for the region’s mills. Navigable up to the confluence with the Naugatuck in Derby, the Housatonic provided access for manufacturers to markets around the world.

Neither river could ever match the access and mobility that the proliferation of railroads in the region provided. Through the 1910’s, the Naugatuck, Waterbury-Meriden-Connecticut River, New Haven and Derby, and the Hartford, Willimantic, Providence, and Fishkill railroads were consolidated under the ownership of the New York, New Haven, and Hartford Railroad. This rail giant eventually controlled most passenger and freight services throughout southern New England, as well as much of the region’s streetcar and bus public transportation system through its subsidiary, the Connecticut Company.

After World War 2, the region’s freight rail service deteriorated as the New Haven experienced multiple bankruptcies and merged with the two other major northeast railroads to form the Penn Central in 1968. The service further declined with Conrail operation following the Penn Central’s bankruptcy in 1976. Passenger rail service, which has been federally subsidized since the 1960’s, remained more or less intact during these transitions with the only significant reduction being the elimination the last east-west passenger service between Hartford and Waterbury and the end of passenger service north of Waterbury on the Naugatuck Valley route in the late 1950’s.

The system today, belonging in part to the CTDOT and in part to private freight operators, has seen renewed investment, increased service, and continues to play a vital role in the mobility of the region. The condition of, as well as goals for, the rail system in the region are further covered in Chapters 5 and 7.

Through the middle of the 20th century, the construction of state and federal highways, including CT Route 8 and Interstate 84, provided a means for further expansion of automobile and truck traffic in the region. As was true in most cities, the construction of the highways forced the relocation of urban residents, disconnected downtown areas from their surrounding cities, and encouraged the decline in downtown population in favor of suburban and rural development.

These changes in development, along with underinvestment in maintenance and growing traffic volumes, have resulted in a highway system today that faces delays, congestion, and state of good repair challenges, all addressed further in this document in chapter 4.

Also impactful to the region's urban and industrial core was the severe flooding of the Naugatuck River caused by Hurricanes Connie and Diane in the summer of 1955. In addition to the estimated $1.5 billion (1955 dollars) worth of damage to the communities along its length, the response to this flood involved a series of flood walls and control dams that impacted ecosystems and access in each Naugatuck River community. These flood control systems are largely still in place today. Naugatuck Valley communities are increasingly finding innovative ways to use these assets for more than just flood control, as best exemplified by the Derby and Ansonia Greenways built on top of the existing flood walls.

Figure 1.1 Flood of 1955

Despite the challenges faced in the region over the years, the urban cores of the Naugatuck Valley planning region are well poised to continue their revival in the coming years. Changes in the way people work and live, long-coming and sped up by the COVID-19 pandemic, all position the

NVCOG region to attract new investment and residents in the coming years. Easy access to major metropolitan areas including Lower Fairfield County, New York, New Haven, Hartford, and Boston, along with a lower cost of living, easy access to nature, and strong municipal services are all key components to the region's increasing attractiveness to new residents. Additional improvements to the transportation system will be necessary to meet the demand and expectations of new residents, especially those that arrive from denser urban areas.

Similarly, as companies begin, move to, or grow within the region, the transportation system will need to serve the needs of those living in the surrounding communities who travel to employment centers within the region. Though there are several cities with significant inbound commuting, Shelton's growing business community and location at the crossroads of several regions will put increasing demand on the already overburdened highway system if alternatives are not developed.

1.1 POPULATION AND DEMOGRAPHIC TRENDS

Between 2000 and 2020, the region saw limited growth, adding 21,600 new residents, bringing the population of the region to 450,374. Within the CNVMPO portion of the region, the total population is now 361,516. Trends within the region show a continued interest in urban dwelling, with Waterbury, Bristol, and Shelton (a member of the GBVMPO) representing the most rapid growth in the region while many suburban and rural towns remained stagnant or lost population in the 2020 census. However, despite strong public engagement campaigns, a combination of concern about data privacy and COVID-19 likely resulted in undercounts within the 2020 census.

	Population			Percent Change	
Geography	2020	2010	2000	2010-2020	2000-2010
Ansonia	18,916	19,249	18,554	-2%	4%
Beacon Falls	6,000	6,049	5,246	-1%	15%
Bethlehem	3,385	3,607	3,422	-6%	5%
Bristol	60,833	60,477	60,062	1%	1%
Cheshire	28,733	29,261	28,543	-2%	3%
Derby	12,325	12,902	12,391	-4%	4%
Middlebury	7,574	7,575	6,451	0%	17%
Naugatuck	31,519	31,862	30,989	-1%	3%
Oxford	12,706	12,683	9,821	0%	29%
Plymouth	11,671	12,213	11,634	-4%	5%
Prospect	9,401	9,405	8,707	0%	8%
Seymour	16,748	16,540	15,454	1%	7%
Shelton	40,869	39,559	38,101	3%	4%
Southbury	19,879	19,904	18,567	0%	7%
Thomaston	7,442	7,887	7,503	-6%	5%
Waterbury	114,403	110,366	107,271	4%	3%
Watertown	22,105	22,514	21,661	-2%	4%
Wolcott	16,142	16,680	15,215	-3%	10%
Woodbury	9,723	9,975	9,198	-3%	8%
Region Total	**450,374**	**448,708**	**428,790**	**0.4%**	**4.6%**

Figure 1.2 Waterbury Line train at the Waterbury Train Station

Table 1.1 Population Growth in the NVCOG Region, Decennial Census 2000-2020, US Census Bureau

POPULATION GROWTH ESTIMATES

Because of the interconnectedness of MPOs within Connecticut, the CTDOT models air quality conformity for the full state. These models take into consideration expected population change over time, which similarly must represent data from across the state, and all MPOs within Connecticut are using the below population growth estimates for planning within the MTP timeframe. Though estimates, these numbers forecast future changes based on using town level trend lines taken from the decade prior to ACS 2019 estimates. This continues the modeling methodology of the CNVMPO's last air quality conformity adoption in February of 2022.

MPO	2019	2023	2025	2035	2045	2050
SWRMPO	380,336	385,393	387,947	400,437	412,691	418,736
HVMPO	229,379	234,824	237,567	251,014	264,214	270,736
CNVRMPO	354,309	358,823	361,109	372,225	383,151	388,517
GBVMPO	409,480	412,475	414,006	421,400	428,657	432,216
SCRCOG	566,583	571,398	573,843	585,742	597,411	603,122
CRCOG	969,836	982,812	989,352	1,021,014	1,051,611	1,066,567
RiverCOG	172,060	175,296	176,928	184,920	192,761	196,620
SCCOG	277,633	280,877	282,533	290,454	298,091	301,812
NHCOG	110,102	111,514	112,237	115,683	119,034	120,661
NECCOG	95,567	97,614	98,649	103,692	108,651	111,080
Statewide	3,565,285	3,611,026	3,634,171	3,746,581	3,856,272	3,910,067

Table 1.2 Population Growth Estimate by Region, CTDOT

These estimates show moderate growth across the state, following the trend of the last several decades of slow growth or stagnation at the town level. The CNVMPO portion of the region is projected to grow from 354,309 as of the 2019 ACS to an estimated 388,517 in 2050, or a growth of 9.6%. On a town-by-town basis, these projections show steady growth in almost every town within the region. Though this chart shows all the NVCOG towns, the GBVMPO communities are highlighted in gray.

Town	MPO	2019	2023	2025	2035	2045	2050
Beacon Falls	CNVMPO	6,222	6,426	6,530	7,038	7,535	7,782
Bethlehem	CNVMPO	3,402	3,479	3,518	3,706	3,892	3,983
Bristol	CNVMPO	59,947	60,187	60,313	60,897	61,472	61,751
Cheshire	CNVMPO	28,937	29,601	29,931	31,559	33,156	33,945
Middlebury	CNVMPO	7,798	7,966	8,050	8,460	8,863	9,063
Naugatuck	CNVMPO	31,109	31,537	31,752	32,812	33,855	34,368
Oxford	CNVMPO	13,255	13,864	14,171	15,680	17,164	17,896
Plymouth	CNVMPO	11,597	11,678	11,721	11,918	12,111	12,203
Prospect	CNVMPO	9,703	9,968	10,103	10,763	11,411	11,731
Southbury	CNVMPO	19,571	20,071	20,321	21,557	22,768	23,366
Thomaston	CNVMPO	7,536	7,650	7,710	7,998	8,280	8,417
Waterbury	CNVMPO	107,569	107,969	108,176	109,151	110,120	110,582
Watertown	CNVMPO	21,575	21,771	21,870	22,346	22,811	23,041
Wolcott	CNVMPO	16,586	16,918	17,085	17,899	18,700	19,094
Woodbury	CNVMPO	9,502	9,738	9,858	10,441	11,013	11,295
Ansonia	GBVMPO	18,653	18,617	18,602	18,516	18,429	18,384
Derby	GBVMPO	12,340	12,340	12,340	12,336	12,335	12,332
Seymour	GBVMPO	16,437	16,714	16,854	17,538	18,209	18,540
Shelton	GBVMPO	41,129	42,036	42,491	44,728	46,921	48,005

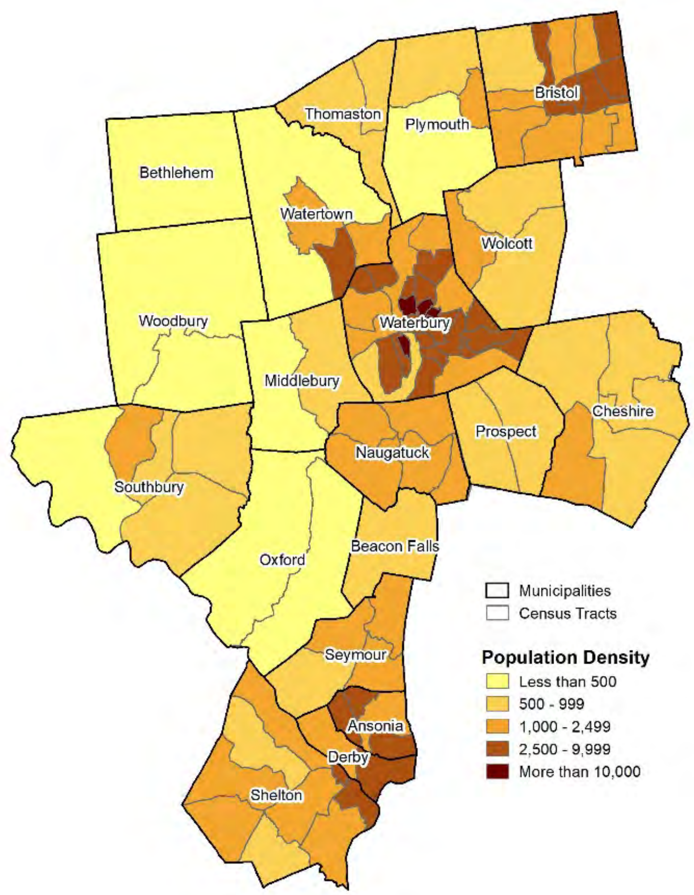
Table 1.3 Population Growth Estimate by Municipality, CTDOT

POPULATION DENSITY

Owing in part to its historic growth pattern and industrial past, the Naugatuck Valley maintains a population density higher than the Connecticut statewide average. Using data from the 2020 ACS, the region had an estimated 1056.5 residents per square mile (which includes non-residential land and roads), compared to 743.5 statewide. Waterbury, which is extensively developed and has the largest proportion of multi-family units, had the highest population concentration in the region with 3770.7 persons per square mile.

Towns along the Naugatuck River and in the eastern portion of the region are partially or fully sewered, allowing greater densities. In the eastern portion of the region, Prospect does not have municipal sewage, but does have several properties connected to neighboring municipalities. In the west portion, Bethlehem and Woodbury have no municipal sewage capability, and service through Oxford and Southbury is limited. Though limiting, the lack of wastewater service has not prevented development in these towns, and a combination of novel treatment facilities and shared services have allowed the growth of higher densities in these towns.

Population Density in the Naugatuck Valley Region



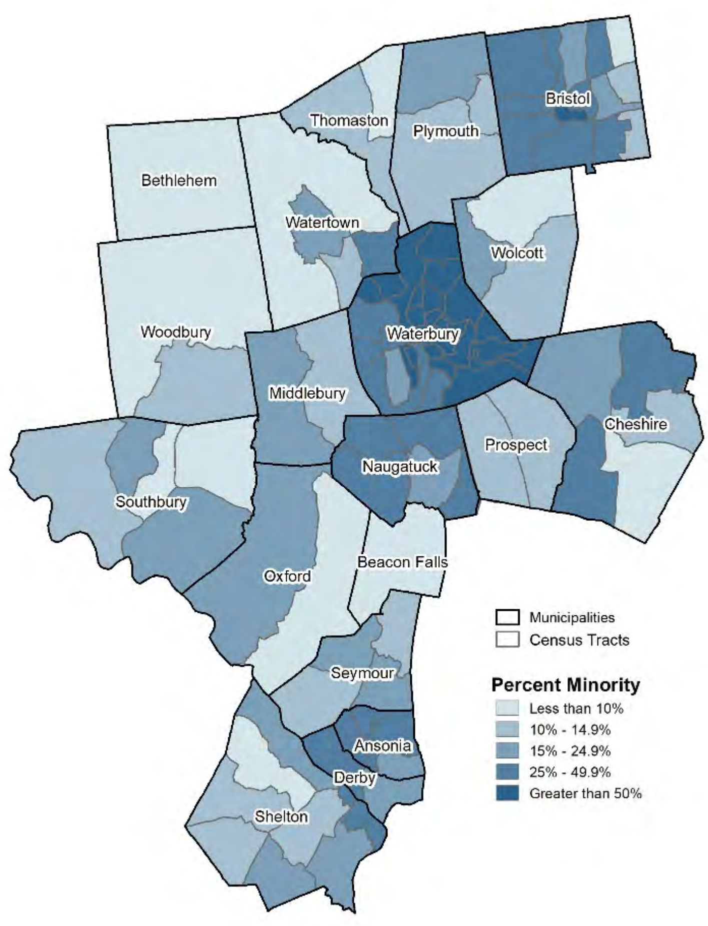
Map 1.2 Population Density by Block Group, ACS 2020 5-Year Estimates, US Census Bureau

RACE AND ETHNICITY

Immigration, migration, and higher birth rates among minority groups have made the region's population more diverse than ever before. As of 2020, 29.2 percent of the region reported being of one or more non-white races. The population across the region is growing more diverse, with Waterbury as a majority-minority city, having nearly 59% of its total population belonging to a minority racial or ethnic group.

Hispanics are the largest and fastest growing minority group in the region with a population of 81,600, a 42% increase since the 2010 census. Hispanics now make up 18.1% of the population. The growing population of non-white residents was not restricted to the traditional urban cores, with every town across the region growing more diverse over the 10-year period. Though a trend seen throughout the state, with towns across the board diversifying, this does break from other points in history where minority populations were increasingly concentrated in urban centers.

Minority Population in the Naugatuck Valley



Map 1.3 Minority Population Percentages by Block Group, ACS 2020 5-Year Estimates, US Census Bureau

HOUSEHOLD AND FAMILY STRUCTURE

Household arrangements have changed as the average age of marriage increases, family sizes decrease, and life expectancy increases. Less than half of the region's households are made up of married couples with 17.6% of households being single parents. Persons living alone, cohabitating couples, married couples without children, and other non-traditional households are becoming more prevalent.

Less than half of married couples have children aged 18 and under. Empty nesters are becoming less common as the younger generations reside at home longer, and many young couples have delayed having children in the last few years due to economic uncertainty.

INCOME AND POVERTY

There is a large income gap between the urban centers and the remainder of the region. 2020 estimates have the median household income in the region at $83,841 compared to $68,485 in urban cities. Over a quarter of households in the urban core are low income (making less than $25,000 per year). On the opposite end of the income spectrum, the rural municipalities in the region are high income (making $100,000 or more per year).

The increasing inflation caused by the COVID-19 pandemic impacted household and family income throughout the region. Since 2015, median household income increased in 17 out of 19 municipalities. This reflects the nationwide trend of increasing wages. The drop in household income occurred in Watertown, while Beacon Falls stayed relatively flat.

The number of people in poverty increased by 71.7% from 2000 to 2020. In 2000, there were 31,412 people living in poverty (7.5% of the total). By 2020, it had increased to 43,807 (10% of total). Poverty increased dramatically during the COVID-19 pandemic. Waterbury, which has a poverty rate of 21.3%, is home to over half of the region's impoverished.

Child poverty is a prevalent issue in the urban core, where 14.7% of children live below the poverty line. Ansonia, Derby, and Waterbury have child poverty rates at or over 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.

1.2 REGIONAL ECONOMIC TRENDS

The economy of the Naugatuck Valley, recovering slowly from the recessions of the early 21st century, was hit hard by the COVID-19 pandemic. The major economic trends shaping the region are:

- Unemployment disproportionately affects young workers under the age of 25.
- Jobs are suburbanizing. During the last ten years, the suburban areas 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 2021, the region's labor force was 228,920, of which 212,840 were employed and 16,080 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 until 2020. People who had difficulty finding work during the pandemic are reentering the labor force as the job market improves.

EMPLOYMENT

As of 2021 there were 212,840 employed residents living in the region. This is 13,247 less than the pre-COVID number in 2019 when there were 226,087 employed residents. The number of employed residents decreased every year from 2008 to 2013 but has continued to rebound from 2014 to 2019. The number of working aged residents is projected to grow after the low employment levels of 2020. Attracting and retaining young workers will be necessary to replace the growing number of retirees.

UNEMPLOYMENT

From 2019 to 2020 the region saw the number of unemployed residents more than double from 9,938 to 19,610. The jump in unemployment was caused by both job losses during the COVID-19 pandemic. Unemployment has decreased in 2021 to 16,080, or 7% of the labor force. The labor force contraction (unemployed people that have stopped looking for work) is responsible for some of the drop in unemployment, and a strong employment market in 2022 has continued the declining trend. Improvements over the last three years, the unemployment rate remains above state and national averages.

Labor Force, Employment and Unemployment in the Naugatuck Valley: 1997-2021

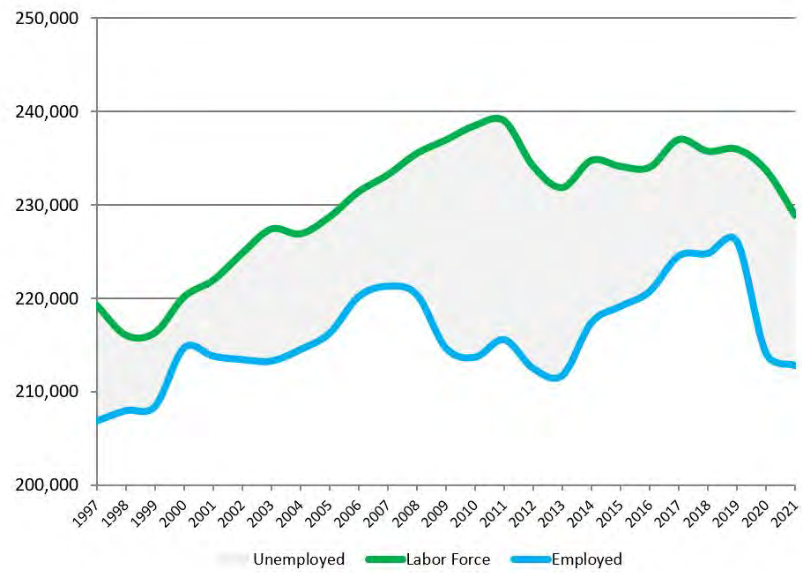


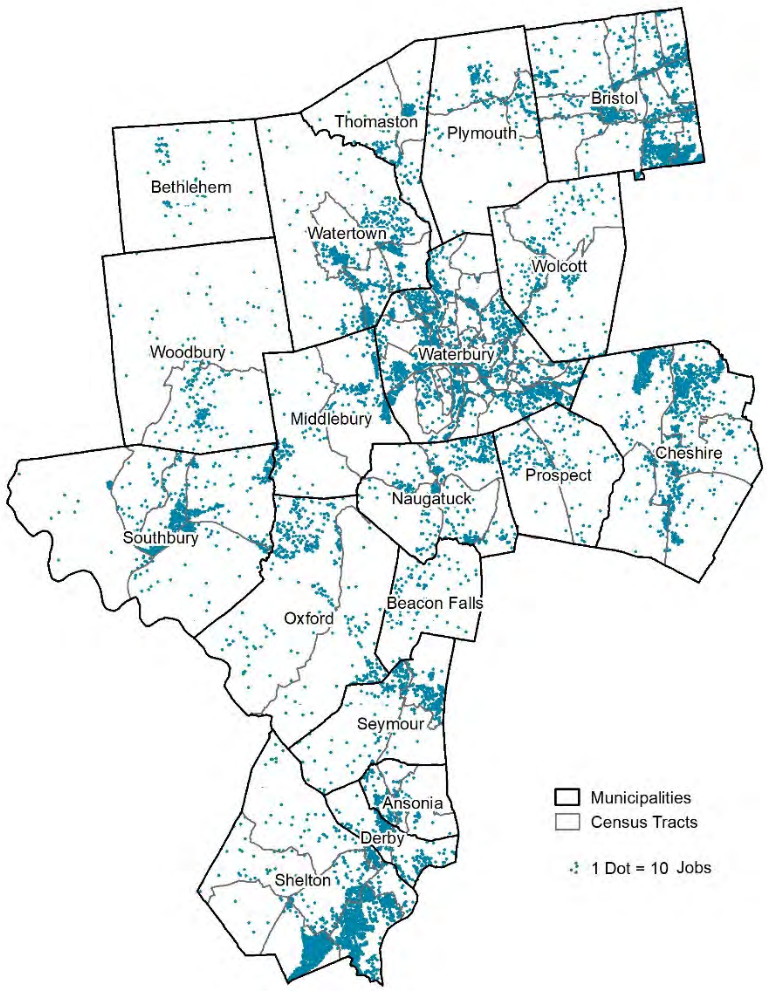
Figure 1.3 Labor Force vs Unemployment, CT Department of Labor, Local Area Unemployment Statistics

JOB MARKET

As of 2023, it is estimated that there are 165,642 jobs within the NVCOG region. Waterbury remains the center of employment for the region, with 39,940, followed by Shelton, Bristol, and Cheshire. Estimates provided by the CT Department of Labor suggest that employment in all towns within the region will grow between 15 and 18%, with Waterbury remaining the largest job market.

As has occurred throughout Connecticut, the region has shifted from a manufacturing-oriented economy to a service-oriented one. Health care and social assistance has become 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. Across industries jobs have become increasingly spread away from the traditional urban core. While Downtown Waterbury still serves as an employment hot spot, suburban office parks and remote distribution sites have spread employment throughout the region. Additionally, following the COVID-19 Pandemic, more and more employees are allowed to work remotely, meaning an increasing number of jobs cannot be pinned to a location in the traditional way. As this trend continues, employment and housing not only come closer together but converge into one location for many.

Jobs in the Naugatuck Valley, by Block Group: 2020



Map 1.4 Density of Jobs within the NVCOG Region, LEHD Origin-Destination Employment Statistics 2019, US Census Bureau

1.3 COVID 19 IMPACT

Since the World Health Organization declared COVID-19 a pandemic on March 10, 2020, the country's transportation dynamics shifted dramatically. People were urged to stay home and practice social distancing to prevent the spread of COVID-19. This left roads empty, transit ridership down, and work travel patterns dramatically altered. Three years after its initial onset, the pandemic has had significant and lasting impacts on mode choice, traffic volumes, and safety. Many industries have returned to pre-pandemic work arrangements, but others have implemented some degree of additional telework and some companies offer fully remote positions that previously would have been in an office.

COVID-19 also impacted the global supply chain. Factories closed when they experienced outbreaks and could not produce their product line. Strict international COVID restrictions aimed at curbing the spread of the virus worsened this trend. Factories trying to produce goods had to wait for components that were delayed. With the "just in time" production methodology implemented for the past several decades, this created ripples across the supply chain as companies and consumers could not get products they needed. These closures caused by outbreaks applied to ports as well, which impacted the global trade network as ships had to wait days up to several weeks to unload goods they were carrying. This had profound impacts on the freight industry and has caused many to reevaluate how the country can prevent it from happening again.

In addition to the supply chain, the pandemic impacted regional population trends. Because the 2020 census occurred so early in the pandemic it is likely that there was an undercount of residents in the region, especially in the denser and more immigrant heavy city centers. Additionally, in the years since the census, movement into the region has continued as home and rental prices have increased quickly across the state. The NVCOG region offers relatively lower costs of living than the state as a whole, which appealed people who looked for more accessible housing during the height of COVID-19. The growth in population, not yet fully captured in Census or American Community Survey data, has impacted the region's roads, housing stock, and density, and will continue to effect transportation planning in the foreseeable future.

TRAVEL PATTERN IMPACTS

For the reasons noted, the pandemic caused a significant shift in regional traffic patterns. Reports of traffic volumes dropping created headlines at the beginning of the pandemic, but little reporting has been done since then. Using Streetlight, NVCOG obtained traffic data within the region for 2019, 2020, and 2021. Zones were drawn along interstates and other major routes within the state to obtain traffic data passing through them.

PEAK HOUR

A significant way travel has shifted during the pandemic is when the peak hour occurs during the day. The peak hour for a roadway is when the roadway sees the largest volume of traffic traveling across it during the day. In 2019, during a 7-day period, the peak time for most of the analyzed zones was between 3 PM and 7 PM, and many of the zones had a peak time between 10 AM and 3 PM. A small number of zones had a morning peak time. The total number of vehicles that traveled during their respective peak times was around 1,200,000 vehicles.

STREET LIGHT DATA

THE NVCOG USES STREET LIGHT DATA, A BIG DATA PLATFORM THAT UTILIZES ANONYMIZED AND AGGREGATED LOCATION DATA FROM CELL PHONES TO ESTIMATE VOLUMES, ROUTES, AND TRIP CHARACTERISTICS. THIS PLATFORM PROVIDES GREATER VISIBILITY INTO TRAVEL IN THE REGION WITH LOWER MARGINS OF ERROR THAN TRADITIONAL DATA COLLECTION METHODS

In 2020, most of analyzed zones had a peak time between 10 AM and 3 PM, and for many the peak time was 3 PM and 7 PM. There are no zones that had a morning peak time. The total number of vehicles that traveled during the respective peak time was around 1,100,000 vehicles.

In 2021, most of the peak hours were between 10 AM and 3 PM, much like 2020. However, the amount of midday peak hours has decreased by around 6 percent while the 3 PM and 7 PM peak hours grew 8%. One zone had a morning peak time instead of none in 2020. The total number of vehicles that traveled during the respective peak time was around 1,140,000 vehicles.

From the data gathered, traffic peak hours shifted from the evening and the morning to the middle of the day This shift logically follows the decrease in traditional on-site employment during standard work hours and is likely to remain going forward as remote work and telework become standard. The change in peak hour traffic will undoubtably impact the future needs of the region. People’s travel destinations are changing, and travel may be spread throughout the day, reducing the need to accommodate spikes during the peak hours.

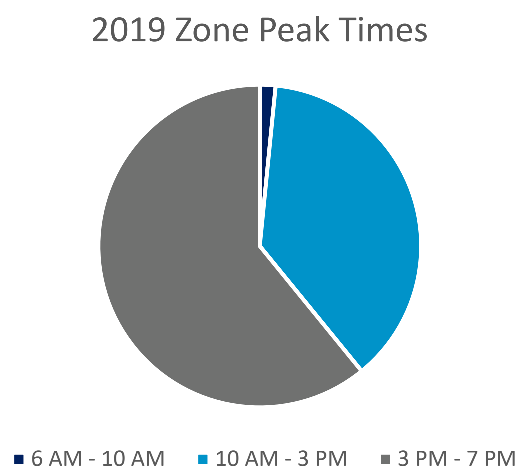


Figure 1.6 2019 Peak travel times in the NVCOG region, Street Light Data

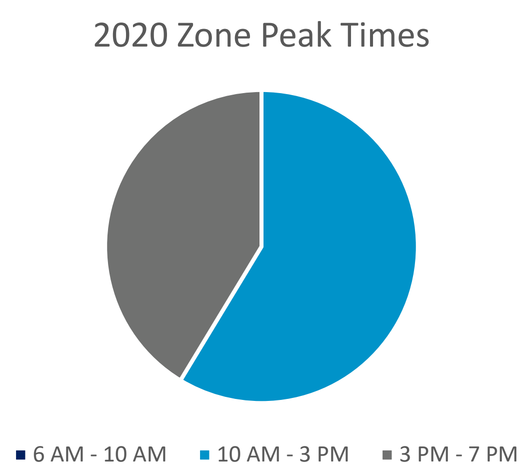


Figure 1.5 2020 peak travel times within the NVCOG region, Street Light Data

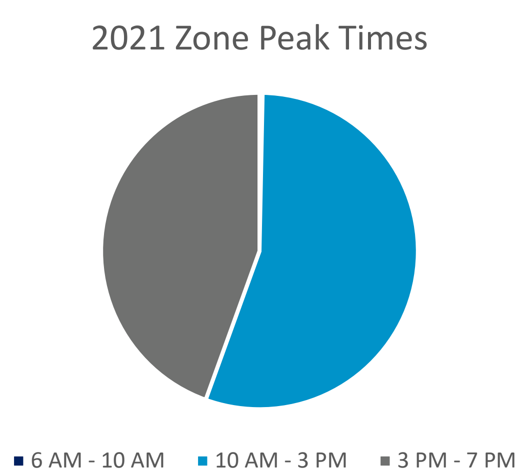


Figure 1.4 2021 peak travel times within the NVCOG region, Street Light Data

PROJECTING FUTURE TRAFFIC NEEDS

Projecting future travel patterns is difficult and becomes even more challenging with a variable such as COVID. As of the preparation of this plan, the pandemic is still causing travel disruptions. But patterns are starting to emerge. Public transit ridership levels are slowly returning to pre-pandemic levels, aided in part by the suspension of fares on buses throughout the state. Companies that intend to return to offices have mostly done so, which is having an impact on urban commercial centers, most notably on Downtown Hartford. This change in work location will impact commuting, likely continuing the shifted peak hour, less predictable origin-destination pairings, and less use of commuter transit services. Demographic changes, yet to be quantified through the US Census Bureau, may also have lasting impacts on travel as the region's core cities increasingly repopulate, increasing the ability for walking/rolling and micro mobility solutions for short trips.

For planning purposes, the region has considered travel changes throughout the period of the pandemic, as well as trends prior to its onset, and programmed projects that will improve the system in the short term while attempting to meet the long-term demands. This includes forecasting low VMT growth into the future and focusing on safety because technology and behavior changes may result in increasing speeds that put drivers and other users at risk.

Farmington Canal Heritage Trail in Cheshire

1.4 TOURISM TRAVEL

The Naugatuck Valley Planning Region offers a variety of reasons for tourists to visit, including access to nature and outdoor recreation, cultural institutions, and a thriving agritourism business. The Connecticut Department of Energy and Environmental Protection (CT DEEP) operates and maintains eleven state parks, forests, and scenic reserves in the region. These areas offer a wide range of activities throughout the year, such as hiking, mountain biking, swimming, cross country skiing, camping, and hunting. As further detailed in chapter 6.3, the region also has several multi-use trails and greenways, which are important tourist attractions. One of them is the Naugatuck River Greenway, a planned 44-mile trail, running along the Naugatuck River from Torrington to Derby. Currently, more than eight miles are open to the public with more expected to be opened in the next few years. Other trails include the Larkin State Park Trail, Middlebury Greenway, and the Farmington Canal Heritage Trail, which passes through Cheshire as it connects New Haven to Northampton, MA. Data from the University of Connecticut's Trail Census shows more than five hundred thousand visitors to the region's trails each year. This number is expected to grow as new trails are opened and existing trails are connected.

Museums throughout the region offer residents and visitors the opportunity to view fine art exhibits, learn about the industrial past of the Naugatuck Valley, and connect with the cultural history of the region's towns. The region has many registered historic buildings and districts. These assets improve the quality of life for the residents of the NVCOG region and attract thousands of visitors each year primarily from the adjacent tri-state New York/New Jersey/Connecticut area.

Cultural institutions beyond those focused on history are also abundant. Agritourism is a growing but vital piece of the economy of the region, with a variety of pick-your-own farms, seasonal attractions, and a growing craft beer, local wine, and spirits industry. Especially in autumn, but throughout the year, the region's agricultural roots are on display through the many fairs, festivals, and farmer's markets. Additionally, the region is home to two active theme parks, including Quassy, located along Lake Quassapaug in Middlebury, and Lake Compounce, the oldest continuously operated theme park in the country.

IMPACTS TO THE TRANSPORTATION SYSTEM

Tourism fluctuates seasonally, and so do the effects on the region's transportation network. During the summer, many tourists use Interstate-84 as they pass through the region on their way to prominent weekend destinations in New England like Cape Cod and the Maine Coast. The region's two amusement parks, Lake Compounce and Quassy Amusement Park, also bring an influx of roadway traffic to I-84, Route 6, and Route 229. In the fall, leaf viewing is a common activity, and national and state highways in the region experience increased congestion, most notably Route 6, Route 8, and I-84

Did you Know?

The NVCOG maintains a series of maps highlighting the region's cultural and historic assets. Check it out here:

https://storymaps.arcgis.com/stories/fdee600a5028455abffb8c5e5d86329c

Interstate 84 and Route 8 experience the most significant impacts of tourist travel in the region, largely because of people traveling from New York City, through the region, and into New England. Beyond the major expressways, visitors regularly interact with the region's network of state numbered routes, which provide direct access to city centers and many of these attractions. Though limited, the impact of this traffic on some of the region's roads is notable, especially during key events. These delays are a piece of the region's ongoing efforts to mitigate congestion, as well as to improve safety for all users of the roadway network.

Bicycles and micro-mobility devices are part of the solution to the region's congestion and an attraction of their own. In addition to the region's paved multi-use trails, off-road biking and, increasingly, biking through city centers, is an attractive pastime that has continued to grow in popularity since the onset of the COVID-19 pandemic. With the increasing popularity of outdoor activities, the region aims to take advantage of the momentum and further provide safe and efficient means for cyclists to travel.

The region's public transit assets also provide an opportunity for continued expansion of tourism to the region. Currently, commuters and residents use the Waterbury Line of the Metro-North Railroad, but it does little to attract visitors to the region. However, there is an opportunity to greatly expand rail access to visitors from New York and Boston. In addition, the CT Fastrak BRT service continues beyond the dedicated busway into Bristol, providing another means for tourists to travel into the region from Hartford and CTRail's Hartford Line.

IMPROVING TRANSPORTATION ACCESS FOR NVCOG RESIDENTS

Despite a growing wealth of opportunities, the NVCOG region's tourist attractions are often overshadowed by neighboring, better-known destinations with greater institutional support or easier access to transportation. Improving public transit service and making non-motorized transportation more viable will increase access to local tourist attractions and mitigate the congestion that seasonal tourism causes.

Currently, most visitors drive to the region's tourist attractions in a car. Aside from venues in or near downtown Waterbury or downtown Bristol, local bus service is not generally a viable option. Moreover, most people who access the region's wealth of outdoor activities do so by motor vehicle. The system of multi-use trails encourages cycling and walking/rolling, but an NVCOG survey on usage of the open sections of the NRG found that 71% of visitors traveled to the trail by car, either alone or as a passenger.

Providing easier transportation access to local destinations can foster more sustainable tourism habits and keep more tourism dollars within the regional economy. Potential improvements include enhancing access by public transit and non-motorized modes, improved wayfinding, and completion of long-distance trails:

- **Enhancing Transit Access**: Many current and potential tourism opportunities in the region are not accessible by mass transit or difficult to get to by walking/rolling or riding a bike. Improving access to transit options, service quality, and station amenities will help make public transportation a more viable and attractive option for tourist travel. Transit routes should serve major tourist destinations where possible and have robust options for transfers at major transit hubs. Additionally, improved access to and quality of active transportation options will both further enhance mobility and boost the attractiveness of tourist destinations.
- **Wayfinding:** With a few exceptions, the major transit hubs in the region (e.g., Waterbury Branch Line stations, the Waterbury bus pulse, and the Bristol bus hub) are more than a quarter-mile walk/roll from population centers and tourism destinations. Highlighting available tourism destinations within walking/rolling distance of major transit hubs through directional signage, 45-degree wayside maps, and public event

WHY DID WE SAY THAT?

THROUGHOUT THIS DOCUMENT, WE USE WALK/ROLL INSTEAD OF JUST WALK. THIS PHRASE BETTER REPRESENTS THE DIVERSITY OF WAYS PEDESTRIANS CAN MOVE, WHETHER IT BE WALKING ALONE, WALKING WITH A MOBILITY AID, OR USING A WHEELCHAIR FOR ASSISTANCE. ALL RESIDENTS AND VISITORS TO THE NVCOG REGION DESERVE HIGH QUALITY SIDEWALKS AND TRAILS THAT ARE ACCESSIBLE FOR ALL.

posting boards is an easy and inexpensive way to encourage existing riders to visit nearby destinations.

- **Long Distance Trails**: The NVCOG is helping its member communities develop long-distance trails, including the Naugatuck River Greenway, which spans the region. NVCOG analysis has shown that long-distance trails have positive economic benefits, including increased tourism spending.[1] NVCOG should 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 should incorporate additional services at trailheads, including adequate bicycle parking and repair stations, zoning and development that expands services and destinations near the trails, and connections that help walkers/rollers and cyclists access off-trail amenities.

[1] Naugatuck River Greenway Economic Benefits Study

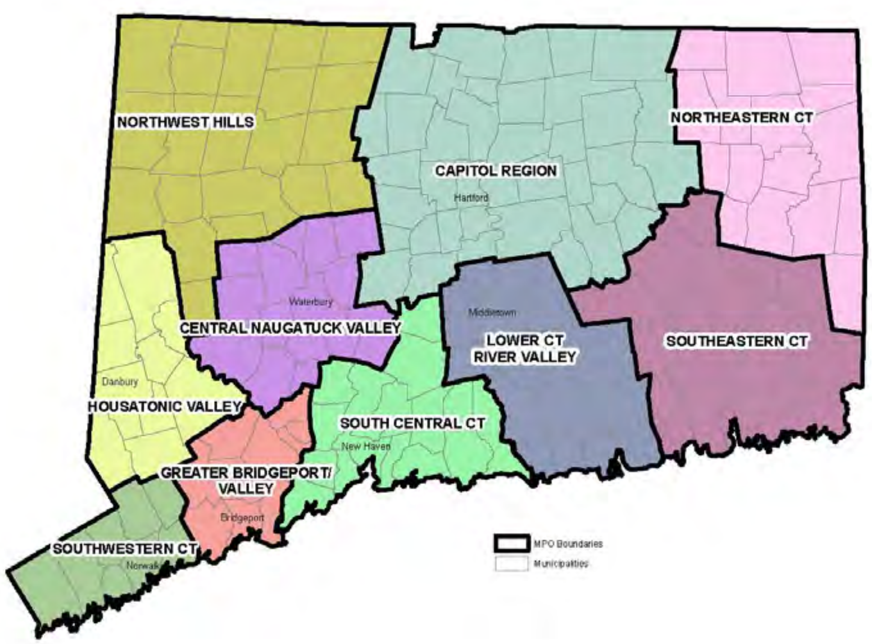

CT Route 132 crosses
Wood Creek,
Bethlehem

2.0 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, 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 Urban 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 portion of the Bridgeport-Stamford urban area that is within the Naugatuck Valley planning region. This designation includes the capital program for the Valley Transit District (VTD).

As the host agency for the CNVMPO and 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).

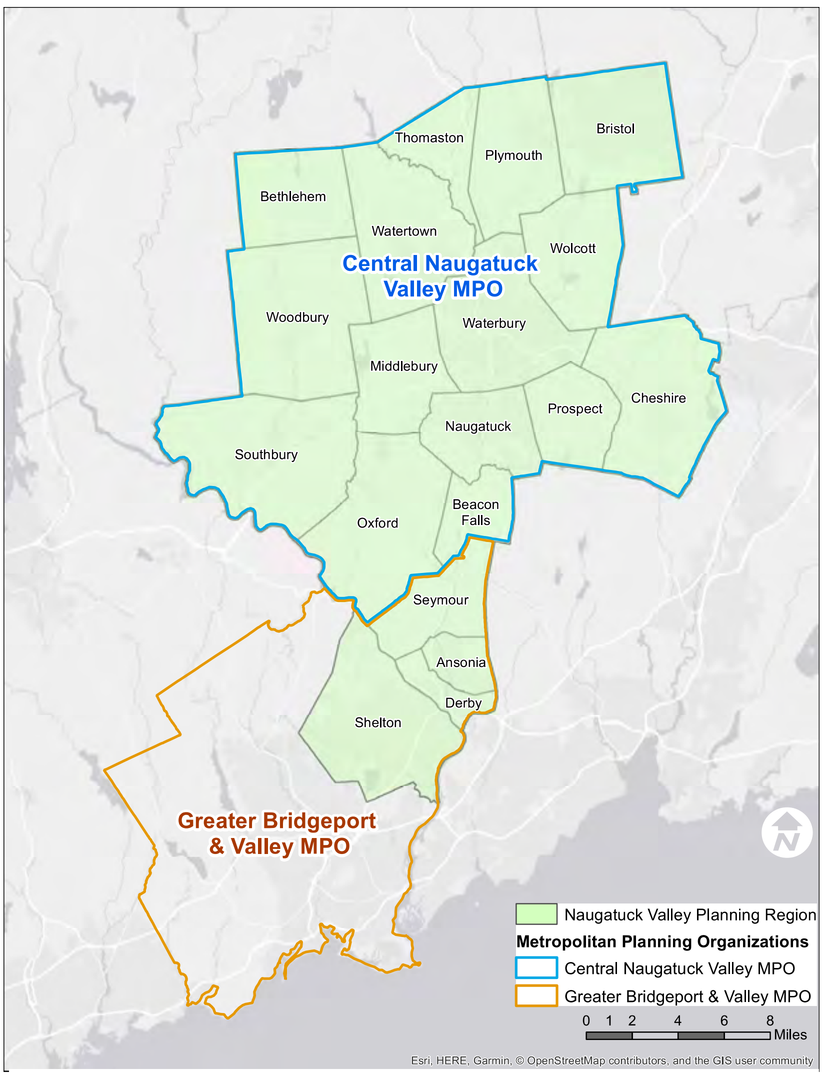


Map 2.1 Map of all MPOs in CT

2.1 CENTRAL NAUGATUCK VALLEY MPO

The Central Naugatuck Valley MPO (CNVMPO) comprises 15 municipalities with membership by the chief elected official of each municipality in the MPA. The member municipalities are:

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



Map 2.2 Map of NVCOG Municipalities within CNVMPO and GBVMPO

The metropolitan planning area covered by the CNVMPO is shown in the map at left.

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 of the CNVMPO. The CTDOT Bureau Chief of Policy and Planning has been designated as a non-voting member.

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 long-range metropolitan transportation plan (MTP) and determines the conformity of its transportation improvement projects, plans and program to attainment of air quality goals.

UNIFIED PLANNING WORK PROGRAM

The Unified Planning Work Program documents the planning tasks and activities to be undertaken by the NVCOG in support of its transportation improvement program. The multi-task planning program includes: data collection and analysis; multi-modal transportation planning; program management and administration; technical assistance; and program implementation

TRANSPORTATION IMPROVEMENT PROGRAM

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 period of four federal fiscal years. 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.

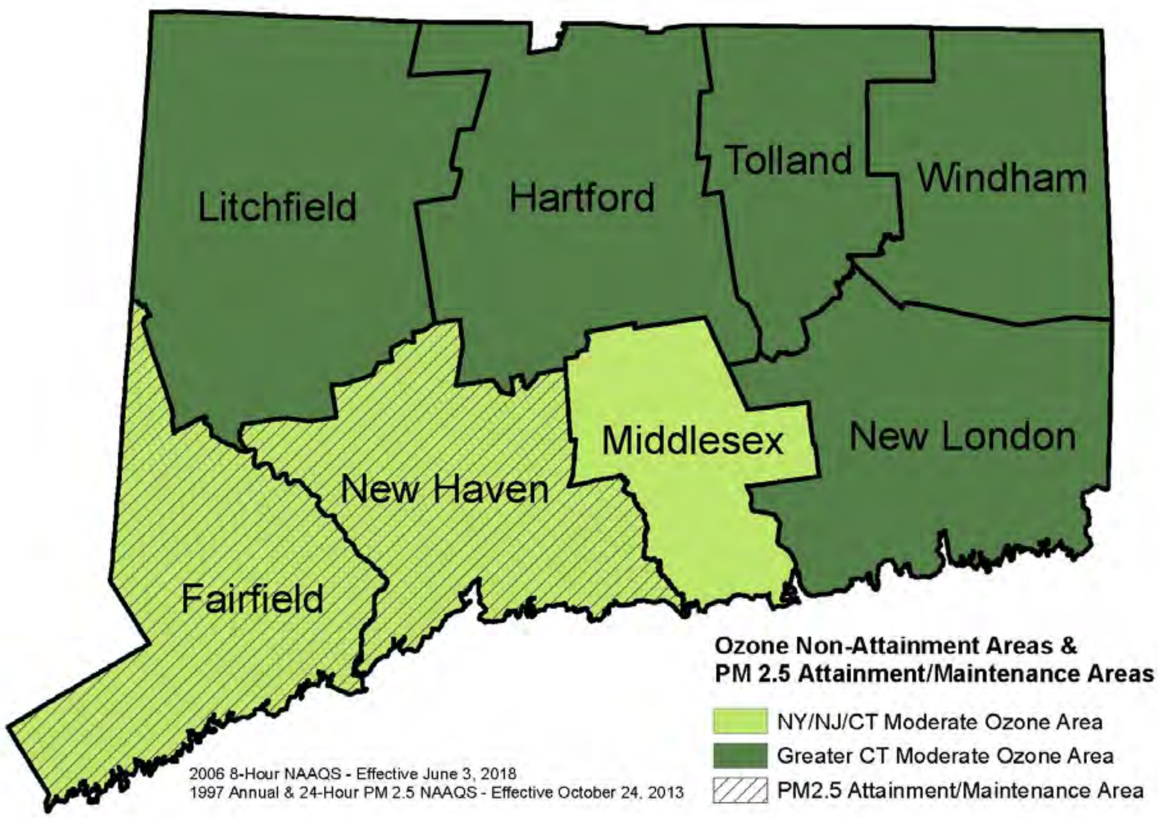
The TIP/STIP is periodically amended to advance priority projects and maintain a financially constrained program. It is a goal of the TIP/STIP to ensure full obligation of available federal funds in each fiscal year.

LONG-RANGE METROPOLITAN TRANSPORTATION PLAN

The Metropolitan Transportation Plan (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. The first four years of 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. Programs of projects in future years beyond year four are more illustrative and do not to be financially constrained. Priority projects from the MTP are advanced for funding and implementation through the TIP/STIP process.

AIR QUALITY CONFORMITY

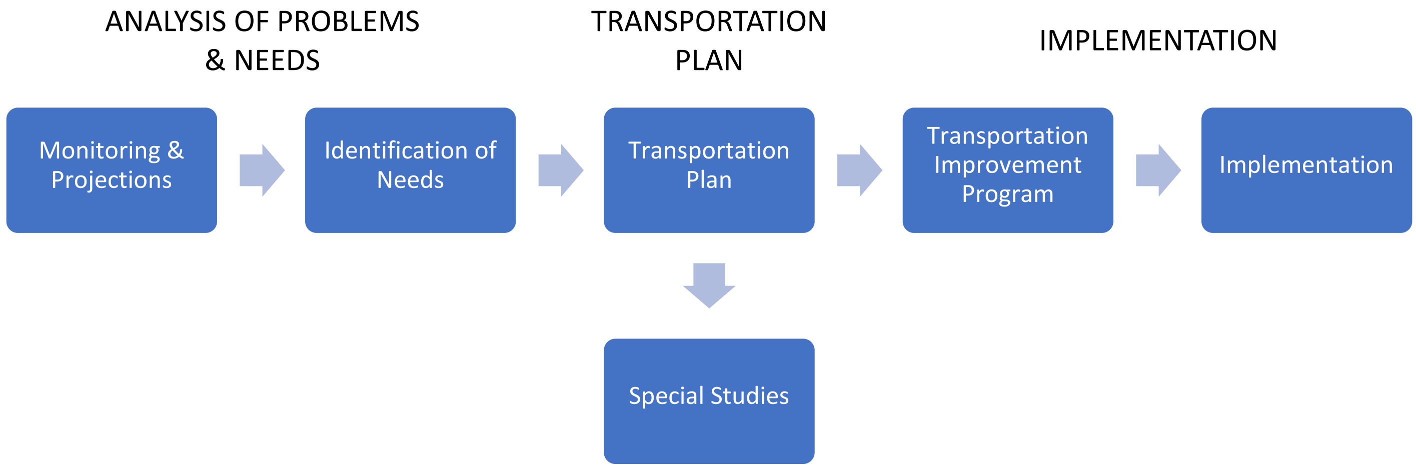
The *Clean Air Act Amendments (CAAA) of 1990* and federal transportation regulations and legislation recognized the major contributions of transportation sources to the overall air quality problem evidenced throughout the country. To effectuate a reduction in transportation-related emissions and a corresponding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



Map 2.3 Air Quality Non-Attainment Areas in CT

The CTDOT is responsible for conducting the detailed transportation and air quality modeling required to demonstrate conformity. Project 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. 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. In addition, the total emissions generated by the transportation system need to be lower than emission budgets that have been approved for the non-attainment or maintenance area.

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



The Waterbury urban area is not designated as a Transportation Management Area (TMA). A TMA is designated for urban areas that have a population over 200,000. Despite the region's 2020 Census population of 450,367, which is well over the threshold needed for a TMA designation, the population of the Waterbury urban area, released in late 2022 as 199,317, remains just under the 200,000-resident threshold.

Federal metropolitan planning regulations require an enhanced transportation planning process for a TMA and the US Department of Transportation (USDOT) conducts a review of a TMA's planning process every three years. In addition, USDOT funding programs authorize MPOs in TMAs to select and program projects directly, whereas non-TMA MPOs must coordinate with the state DOT on project selection, with the state DOT having the final ability to select projects.

While the federal certification of the CNVMPO's transportation planning process is not required, it 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 in urban areas that are designated as a TMA, including Bridgeport-Stamford and Hartford.

2.2 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*..." (23 CFR § 450.314)

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 BRIDGEPORT-STAMFORD TMA

This MOU was initially executed in 2002 and updated and revised 2021. The MOU defines the responsibilities of each MPO for carrying out the transportation planning program in the Bridgeport-Stamford TMA and describes how the MPOs with jurisdiction in the TMA will coordinate transportation planning. The MPOs in the Bridgeport-Stamford Urban Area are: the Greater Bridgeport and Valley MPO (GBVMPO); the South Western Region MPO (SWRMPO); the Housatonic Valley MPO (HVMPO); the South Central Regional Council of Governments (SCRCOG); and, the Central Naugatuck Valley MPO (CNVMPO). The transit operators include: 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); CTtransit New Haven Division, and the City of Stamford.

TRANSPORTATION PLANNING PROCESS IN THE HARTFORD TMA

This MOU was established among the four MPOs within the Hartford TMA, 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 perform 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 were signed in April, 1996.

2.3 MAP FORUM

The Metropolitan Area Planning (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 coordinate transportation planning activities in the New York City 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:

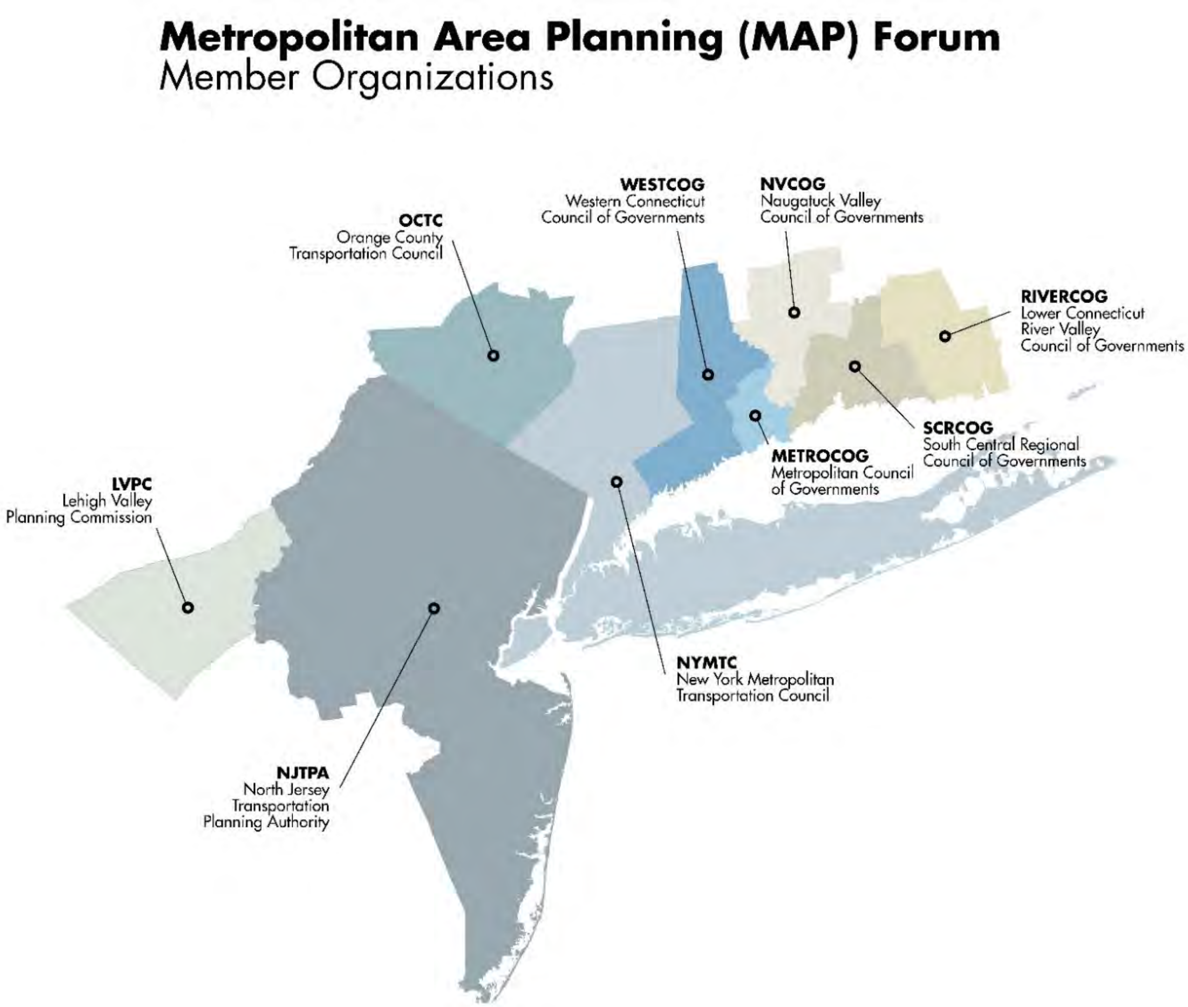
- New York Metropolitan Transportation Council (NYMTC)
- Orange County Transportation Council (OCTC)
- North Jersey Transportation Planning Authority (NJTPA)
- Western Connecticut Council of Governments (WestCOG)
- Connecticut Metro Council of Governments (MetroCOG)
- Naugatuck Valley Council of Governments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

The MAP Forum provides organizational and strategic guidance to member MPOs in planning for and understanding mega-regional 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 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 two annual meetings, one in the Spring and one in late Autumn. Agendas focus on critical mega-regional and boundary challenges and products.
- Developed a work program that centers on maintaining the critical networking capability of the MAP Forum.

- Established a Freight Working Group to handle issues related to goods movement within the multi-state metropolitan region, such as the increase in home delivery, supply chain changes resulting from COVID-19 impacts, and dramatic expansion of warehouse space in northeastern Pennsylvania and Central New Jersey.
- Established a Multi-State Resilience Working Group to discuss issues related to climate change and se level rise. The group's mission is to build on the Federal Highway Administration's Post Hurricane Sandy Transportation Resilience Study of New York, New Jersey and Connecticut that was completed in 2017. It also looks to expand its purview to include vehicle electrification, greenhouse gas mitigation, and transportation impacts from health-related events.
- Coordinated on the development of a Congestion Management Process for the metro area.
- Coordinated on establishing transportation performance measures and targets.



Map 2.4 Map of the MAP Forum member organizations

GEOGRAPHY AND ENVIRONMENT

The MAP Forum 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 comprised of seven counties (Westchester, Rockland, Putnam, Orange, Ulster, Dutchess, and Sullivan Counties) and dotted with suburban communities of varying size.

Southwest-central Connecticut is located to the east of these Hudson Valley counties and across Long Island Sound. The area of Connecticut included in the MAP Forum region encompasses almost the entire state, with only the far southeastern portion and the rural areas of northwest and northeast of Connecticut not represented by a member. About 86% of the state's population is represented in the MAP Forum region, including the seven most populous cities in the state: Bridgeport, Stamford, New Haven, Hartford, Waterbury, Norwalk, and Danbury. It is an area characterized by small but interconnected cities, with many wealthy suburban towns along the coast.

The Pennsylvania portion of the four-state region lies at the foothills of the Pocono 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.

ECONOMY

The MAP Forum Region's economy is large, diverse, and international. In 2018, the region produced a gross metropolitan product of $1.7[1] trillion, the largest in the country among metropolitan regions. The multi-state gross metropolitan product would rank 11th among the nations of the world, ahead of Canada, Russia, South Korea, and Spain. The region's economic output is nearly twice that of the Los Angeles Metropolitan area[2]. In 2018, a report by Oxford Economics projected that it will be the top urban economy in the world in 2035, having a GDP of

[1] U.S. Bureau of Economic Analysis. 2018. CAGDP2 Gross domestic product (GDP) by county and metropolitan area. https://apps.bea.gov.

[2] American Enterprise Institute. Perry, J. Mark. February 28, 2019. Putting America's huge $20.5T economy into perspective by comparing US state GDPs to entire countries. https://www.aei.org/carpe-diem/putting-americas-enormous-20-5t-economy-into-perspective-by-comparing-us-state-gdps-to-entire-countries-2/

$2.5 trillion, with the largest financial and business sector, while Tokyo will come in second with a GDP of $1.9 trillion and Los Angeles third with a GDP of $1.5 trillion[3].

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 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.
- Fairfield County, Connecticut, is home to many large hedge funds and financial services.

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 and is becoming a major warehousing and distribution center.

DEMOGRAPHICS

ACS 2019 data shows the multi-state region's population, based on the 2020 census, at 24,004,477 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. The same data source shows that the four-state region has become a majority-minority region, with 52.4% of the population identifying as a minority race or ethnicity. 11,0600,334 employees work for 914,309 businesses within the area.

TRANSPORTATION SYSTEMS

The transportation system of the MAP Forum 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, it is

[3] Oxford Economics. 2018. Which cities will be leading the global economy in 2035? https://resources.oxfordeconomics.com/global-cities-2035

critical that key infrastructure is maintained and upgraded to accommodate future growth, allowing the region to continue serving as a major economic driver for the nation.

- Interstate Highways:
  - I-78 connects Harrisburg and points west to New York City through the Holland Tunnel, terminating in lower Manhattan.
  - I-80 crosses the United States between New York City in the east, over the George Washington Bridge, and continues through Northern New Jersey, through Scranton, Pennsylvania, eventually terminating in San Francisco, California.
  - I-84 extends from Connecticut along the north tier of the MAP Forum, passing through Orange County, New York. It connects Hartford, Waterbury, and Danbury to the northern Pennsylvania region.
  - I-87 travels between I-278 in the Bronx, up through New York State and across the Mario Cuomo Bridge (Tappan Zee Bridge), connecting to Albany as the New York Thruway, and continuing north to the Canadian border.
  - I-95 connects the east coast states, from Miami, Florida, in the south to the Canadian border in Maine. It overlaps with the New Jersey Turnpike through north New Jersey, crosses into New York City over the George Washington Bridge, continues as the Cross Bronx Expressway, to and through Connecticut as the Connecticut Turnpike before continuing to Boston along the coast.
  - Several interstate spurs and beltways connect the interstate network and provide access to major points throughout the MAP Forum region. I-280 extends from lower Manhattan west to I-80 in central New Jersey;I-287 functions as a beltway around the core New York City area extending from I-95 near the New York-Connecticut state line to I-95 south of Newark, New Jersey; I-495, also referred as the Long Island Expressway, extends from mid-town Manhattan through the length of Long Island; I-684 connects southern Westchester County and the I-287 loop to I-84; and I-678 serves to connect main interstate routes with JFK International Airport.
- Passenger Rail Lines: The region is home to the busiest passenger rail network in the country, including: New Jersey Transit, MTA Metro-North Railroad, and MTA Long Island Railroad commuter rail networks; the CT*rail* Hartford Line and Shore Line East commuter rail services; 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 runs a variety of services through the region, with New York's Penn Station serving as a major hub. Throughout the region, the Northeast Regional and high-speed Acela service utilize the Northeast Corridor, traveling 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, and Bradley International Airport (BDL) in Windsor Locks, Connecticut.

- 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, Westchester County Airport (HPN) 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. Major Hudson River bridge crossings include: Governor Mario Cuomo Bridge (Tappan Zee Bridge), George Washington Bridge, and Verrazzano-Narrows Bridge. The Lincoln Tunnel, Holland Tunnel, and several major rail tunnels cross between New York and New Jersey under the Hudson River.

METROPOLITAN TRAVEL SHED

Based on a four-step transportation demand model maintained by the NYMTC, an estimated 53.4 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. NYMTC's current model predicts to 2045, showing an estimated growth to more than 60.5 million trips per day, a growth of approximately 13%.

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).

Four State Metropolitan Travel Shed

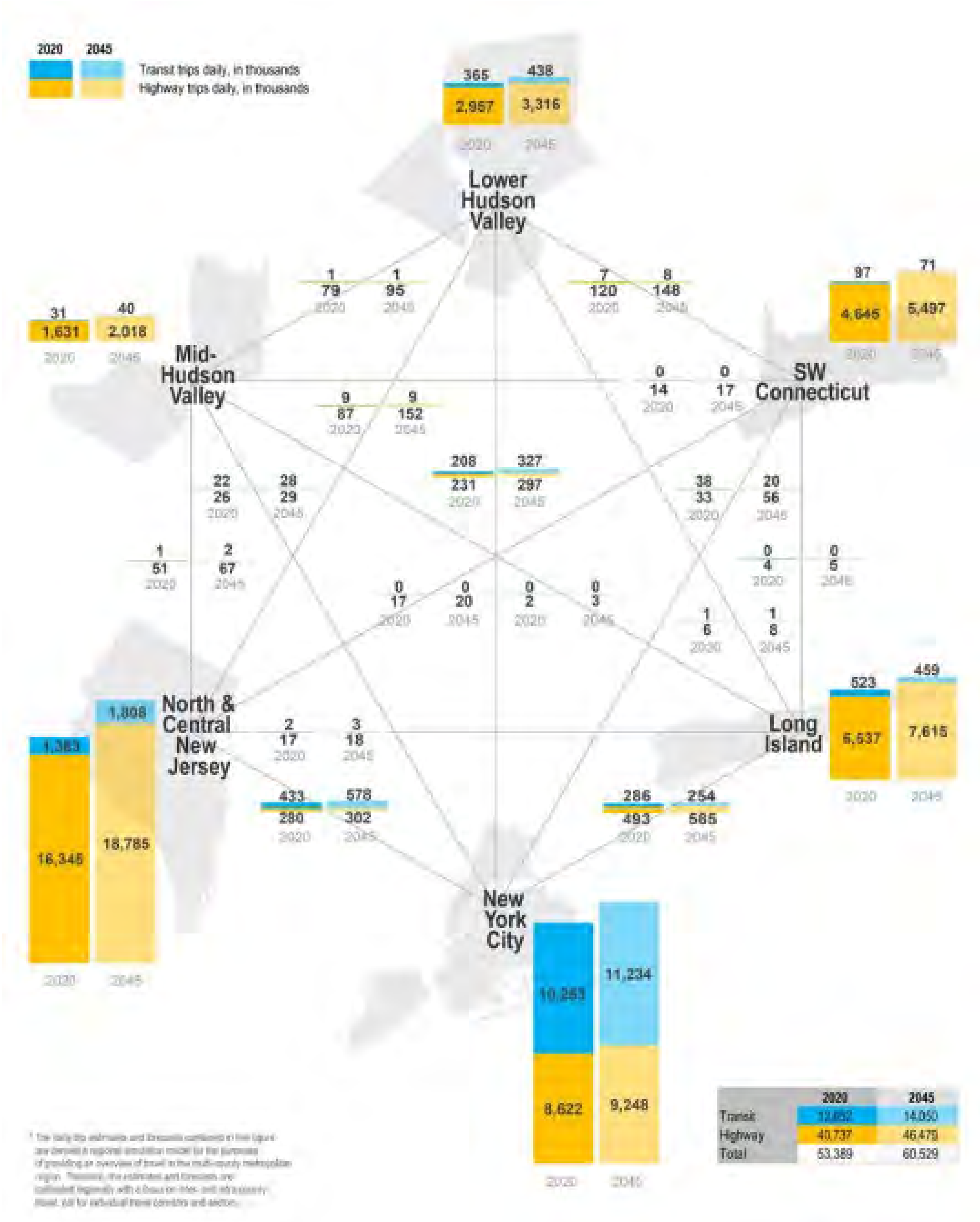


Figure 2.1 Four State Metropolitan Travel Shed

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 MAP Forum 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 rehabilitation and reconstruction of the I-84/Route 8 interchange in Waterbury.
- A Cross Long Island Sound Connection between suburban Long Island and either the Bronx, Westchester or Connecticut.
- West-of-Hudson transit improvements, including improvements to the Port Jervis Line in Orange County, New York.
- 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 and the redevelopment of Penn 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).

2.4 MEGA-REGIONAL PLANNING CONTEXT: THE FOUR STATE METROPOLITAN REGION

The Four State Metropolitan Region that comprises the MAP Forum lies at the heart of the Northeast Mega-region, the most densely populated, urbanized land in the country. The Mega-region 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).

Figure 2.2 Light intensity map within the Northeast Mega-Region

The MAP Forum region includes the metropolitan planning areas under the jurisdiction of each of its member MPO and COG. While it 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, in the lower Hudson Valley, Fairfield and New Haven County and north New Jersey. The Lehigh Valley area in Pennsylvania includes the cities of Allentown, third largest city in Pennsylvania, and Bethlehem. The region is experiencing a change to a major warehousing and distribution hub.

2.5 FEDERAL PLANNING FACTORS

Federal metropolitan transportation regulations, specifically Title 23 CFR Part 450.306, require the MTP to consider projects and strategies that will address ten specific planning factors. The planning factors and how the MTP addresses each factor 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.

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).
    - 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.
    - 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 principal 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 bypass 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.

2.6 IIJA

The *Infrastructure Investment and Jobs Act (IIJA)*, also known as the *Bipartisan Infrastructure Law (BIL)*, was signed into law on November 15, 2021. *IIJA* provides a total of $1.2 trillion over five years to support new and existing programs. Funds are allocated to states, MPOs and cities and towns depending on the eligibility criterion of the particular program. It is comprehensive in that it addresses all the country's infrastructure needs. However, approximately half of the funding will be allocated to the US Department of Transportation (USDOT), reauthorizing the nation's surface transportation program, as provided by the FAST Act. Of the approximate $567.5 billion authorization for surface transportation improvements, $293.4 billion represents baseline spending from FAST Act and $274.1 billion is new funding authority.

The key goals of *IIJA* are:

- Repair and rebuild roads and bridges with a focus on climate change mitigation, resilience, equity, and safety for all users.
- Improve transportation options for millions of Americans and reduce greenhouse emissions through the largest investment in public transit in U.S. history.
- Address growing safety concerns on the nation's roads through a multi-modal safe systems approach.

To achieve these goals, the core transportation programs remain the same as authorized under the FAST Act, but funding allocations to these programs have been increased by anywhere from 10% to 34%. The increase in funding availability is intended to permit states and MPOs to address outstanding infrastructure deficiencies and issues.

The act also made significant changes to the metropolitan transportation planning process that MPOs need to follow. Key among the changes is that funding for metropolitan planning was increased 32% for highway-related planning activities and 42% for transit planning. It also requires MPOs that are designated as a Transportation Management Area to add a housing coordination process to better connect housing and employment as an area of interest. Affordable housing organizations are added as an "interested party" and need to be consulted in development of the MTP. Federal regulations will also be revised to designate outer years in MTP program of projects as beyond the first four years and would no longer need to be fiscally constrained. Only the first four years of the MTP, which corresponds to the short-range Transportation Improvement Program (TIP), would need to be fiscally constrained and the reasonably expected funding needed to implement the projects identified.

2.7 TRANSPORTATION PERFORMANCE MEASURES AND TARGETS

As part of a performance-based approach to transportation planning, states and MPOs set a strategic direction (goals and objectives). Using performance measures and targets helps agencies support these objectives and allows them to compare alternative improvement strategies and track results over time. A performance measure is a metric used to assess progress toward meeting a goal. A performance target is a specific performance level that is desired to be achieved within a certain timeframe.

Federal targets have been established in the following goal areas:

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

The NVCOG has implemented CTDOT's selected performance measures in each goal area 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:

- <u>Programmatic highway safety improvements</u>: 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.

- Systemic highway safety improvement projects: This includes roadway safety improvements that are widely implemented based on high-risk roadway features that are correlated with particular severe crash types.

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	
Measures	Target
Number of fatalities	270 fatalities/year
Rate of fatalities	0.850 fatalities/100 Million VMT
Number of serious injuries	1,300 serious injuries/year
Rate of serious injuries	4.300 serious injuries/100 Million VMT
Number of non-motorized fatalities and non-motorized serious injuries	280 fatalities and serious injuries/year

Table 2.1 Safety Performance Management Measure Target Summary

These targets were included in the CTDOT's 2022 Highway Safety Plan. The targets were also incorporated in the state's Highway Safety Improvement Program annual report. The CNVMPO endorsed the state safety targets November 4, 2022.

TRANSIT

The Transit Asset Management (TAM) rule requires 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 – Revenue Vehicles: The goal for this asset category 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 category 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 category 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 category is to maintain transit guideway in a state of good repair. The target is the percentage of guideway operating under a speed restriction.

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 following table provides a summary of the performance targets by asset class and lists the current percentage meeting or exceeding the metric 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.

These targets were adopted by the CTDOT on September 30, 2022. The TIP/STIP will program projects to meet the targets set by the CTDOT by utilizing the list of capital prioritized projects, based on projected asset conditions, included in the CTDOT TAM and Transit Group 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.

Transit Asset Management Performance Measure Target Summary			
Asset Class	Performance Metric	Target	Current Percentage (FY21)
Transit Bus	ULB 12 years	14%	22%
Articulated Bus	ULB 12 years	14%	49%
Over-the-Road Bus	ULB 12 years	14%	49%
Cutaway Bus	ULB 5 years	17%	100%
Rail Locomotives	ULB 35 years	13%	37%
Rail Coaches (Push/Pull)	ULB 35 years	13%	38%
Rail Self Propelled Cars	ULB 35 years	13%	0%
Service Vehicles-Trucks	ULB 14 years	7%	37%
Service Vehicles-Automobiles	ULB 5 years	17%	100%
Service Vehicles-SUV	ULB 5 years	17%	72%
Service Vehicles-Van	ULB 5 years	17%	100%
Rail-Guideway	Slow Zone Miles	4%	3%
Facilities-Passenger/Parking	TERM >3	0%	0%
Facilities-Admin/Maintenance	TERM >3	0%	58%

Table 2.2 Transit Asset Management Performance Measure Target Summary

PAVEMENT AND BRIDGE CONDITION

There are four performance measures for Pavement condition:

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 percentage of NHS bridges by deck area in Poor condition.

Pavement Condition Performance Measure Target Summary			
Target	Current Condition (State)	2-year targets (2024)	4-year targets (2026)
Percent interstate in good condition	68.6%	72.0%	70.0%
Percent interstate in poor condition	0.2%	1.0%	1.3%
Percent Non-Interstate NHS in good condition	37.9%	37.0%	35.0%
Percent Non-Interstate NHS in poor condition	1.8%	2.7%	3.5%

Table 2.3 Pavement Condition Performance Measure Target Summary

Bridge Condition Performance Measure Target Summary			
Target	Current Condition (State)	2-year targets (2024)	4-year targets (2026)
Percent in good condition	14.1%	14.2%	14.5%
Percent in poor condition	7.7%	6.2%	6.0%

Table 2.4 Bridge Condition Performance Measure Target Summary

These targets were adopted by the CTDOT on December 16, 2022. 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 repair 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 (PMT) on Interstate and non-Interstate NHS that are reliable.

The CTDOT adopted the following targets on December 16, 2022:

System Reliability Performance Measure Target Summary			
Target	Current Condition (State)	2-year targets (2024)	4-year targets (2026)
Percent PMT on Interstate that are reliable	86.2%	78.6%	78.6%
Percent PMT non-Interstate NHS that are reliable	90.0%	84.9%	84.9%

Table 2.5 System Reliability Performance Measure Target Summary

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 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 has access to the data needed to calculate the TTTR. Truck travel times for the Interstate System are included in the FHWA's *National Performance Management Research Data Set (NPMRDS)*.

The CTDOT adopted the following targets on December 16, 2022:

Freight Movement Performance Measure Target Summary			
Target	Current Condition (State)	2-year targets (2024)	4-year targets (2026)
Truck Travel Time Reliability (TTTR) for Interstate	1.56	1.95	2.02

Table 2.6 Freight Movement Performance Measure Target Summary

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 CTDOT adopted the following targets on December 16, 2022:

Air Quality Performance Measure Target Reductions Produced by CMAQ Projects		
Emissions Component	2-Year (2024)	4-Year (2026)
Volatile Organic Compounds (VOC) Emissions Reduction (kg/day)	87.346	87.346
Nitrogen Oxide (NOX) Emissions Reduction (kg/day)	81.978	81.978
Particulate Matter PM2.5 Emissions Reduction (kg/day)	6.290	6.290

Table 2.7 Air Quality Performance Measure Target Reductions Produced by CMAQ Projects

2.8 AIR QUALITY CONFORMITY DETERMINATION

Due to the interconnectedness of MPOs within Connecticut and the misalignment of boundaries for non-attainment areas and MPOs, air quality modeling is completed on a statewide basis by the CTDOT. In February of 2023, the CTDOT released their updated modeling outcomes based on the proposed projects and priorities of the CTDOT and the eight MPOs within the state. The result of this analysis shows notable declines in all three of Connecticut's non-attainment emissions and confirms that projects identified within NVision50 and its counterparts from the Connecticut MPOs further advance the goals of improving air quality within the region.

The full air quality conformity determination, including detailed process and modeling information, can be found as Appendix D to this document.

2.9 TITLE VI AND ENVIRONMENTAL JUSTICE

The NVCOG's efforts under Title VI and the Environmental Justice Executive Order 12898 aim to make transportation planning accessible to all NVCOG residents and neighbors, regardless of race, ethnicity, nationality, income, or English proficiency. Since the publication of the previous MTP, the NVCOG has created a separate community engagement office to strengthen public outreach efforts. The objectives of this office are to provide greater opportunities to the public to participate in the transportation planning process and enhance dissemination of information regarding transportations projects, plans and programs.

TITLE VI PROGRAM

Title VI of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color, or national origin in programs and activities receiving federal funds. As a direct recipient of FTA funds and FTA grant recipient for the Valley Transit District's capital program, the NVCOG is required to follow Title VI rules with respect to its transit capital and planning program as well as the host agency of the CNVMPO and as the co-host and participating agency member of the Greater Bridgeport and Valley MPO. 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. Submission of Title VI documentation reports, provision of translated materials, on-demand interpreters, and formal discrimination complaint reviews are all primary means of compliance.

The following are specific activities carried out by the NVCOG to comply with Title VI requirements.

- NVCOG updates its Title VI and Environmental Justice analysis triennially. The most recent update was published and endorsed by the NVCOG Board in June 2022.

- Language Assistance Plan: NVCOG completed a Language Assistance Plan as part of the Title VI Plan development, using 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 (LEP). 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. According to the findings of the analysis, the most prevalent LEP and Safe Harbor population in the service area speak Spanish.

- The Language Assistance Plan will be continuously monitored, evaluated, and updated. NVCOG offers translations of all newly published documents and offers interpretation at all public hearings and events, upon request. 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.

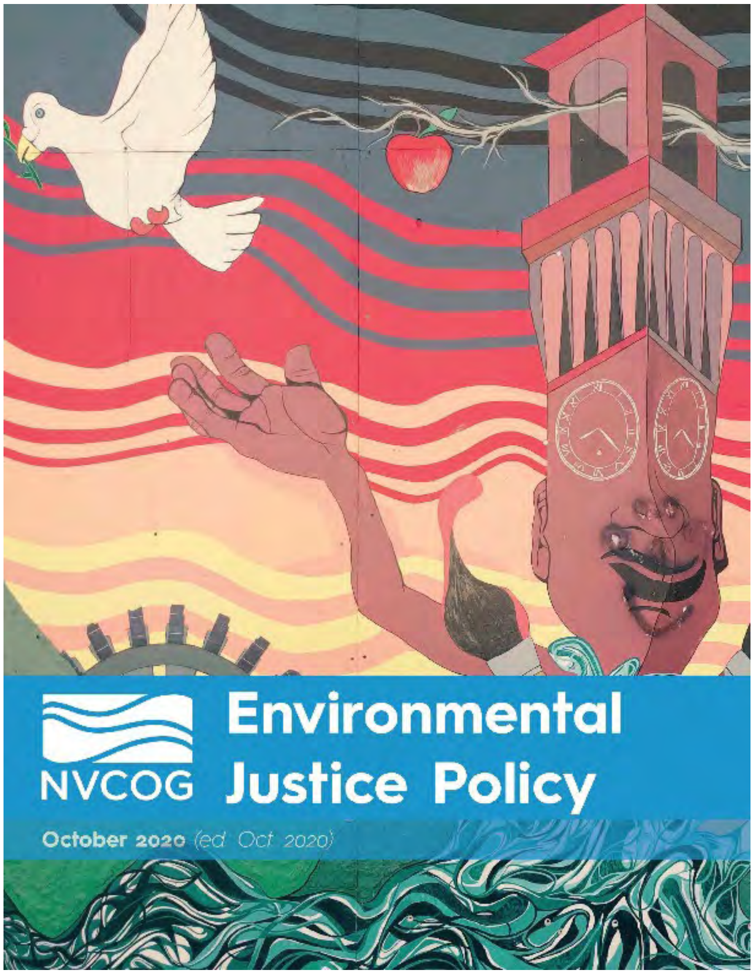
- Title VI Complaint Process: The NVCOG has developed a discrimination complaint process and a standard discrimination complaint form https://nvcogct.gov/wp-content/uploads/2019/06/TitleVI-ComplaintProcess.pdf

ENVIRONMENTAL JUSTICE

Environmental Justice amplifies the provisions found in Title VI of the Civil Rights Act of 1964. Executive Order 12898 directed each federally funded agency to identify any disproportionately high and adverse health or environmental effects of its programs on minority and low-income populations. In turn, MPOs, as part of the United States Department of Transportation's certification requirements, are charged with evaluating their plans and programs for environmental justice sensitivity, including expanding their outreach efforts to low-income, minority, and other disadvantaged populations. The intent is to ensure that the MPO's transportation projects, plans and/or programs do not adversely or disproportionately impact EJ-defined communities, that the residents of these communities are not overburdened by investments in the transportation network and that fair and equitable investments in the transportation system located in these communities are made.

Executive Order 12898: *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, established the following Environmental Justice (EJ) principles for all federal agencies and agencies receiving federal funds, such as MPOs:

- To 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
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.



- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

The NVCOG updated and adopted the *Environmental Justice Policy for the Naugatuck Planning Region* in October 2020. The policy embodies the Environmental Justice provisions as set forth by E.O 12898. A key aspect of the policy to create and implement 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 regulations. The adopted EJ provisions apply to all NVCOG activities regardless of funding source, to the activities of entities using NVCOG funds or facilities and to all actions of the CNVMPO, as well as NVCOG activities conducted on behalf of the Greater Bridgeport and Valley MPO.

The NVCOG EJ Policy uses the concept of *Equity Emphasis Area (EEA)* to identify areas of particular concern to measure performance and identify neighborhoods where particular low-impact transportation improvements might have outsized benefit. The *EEAs* also enable NVCOG 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.

The NVCOG EJ Policy is considered a vital transportation document and has been translated into Spanish and is available on the NVCOG website.

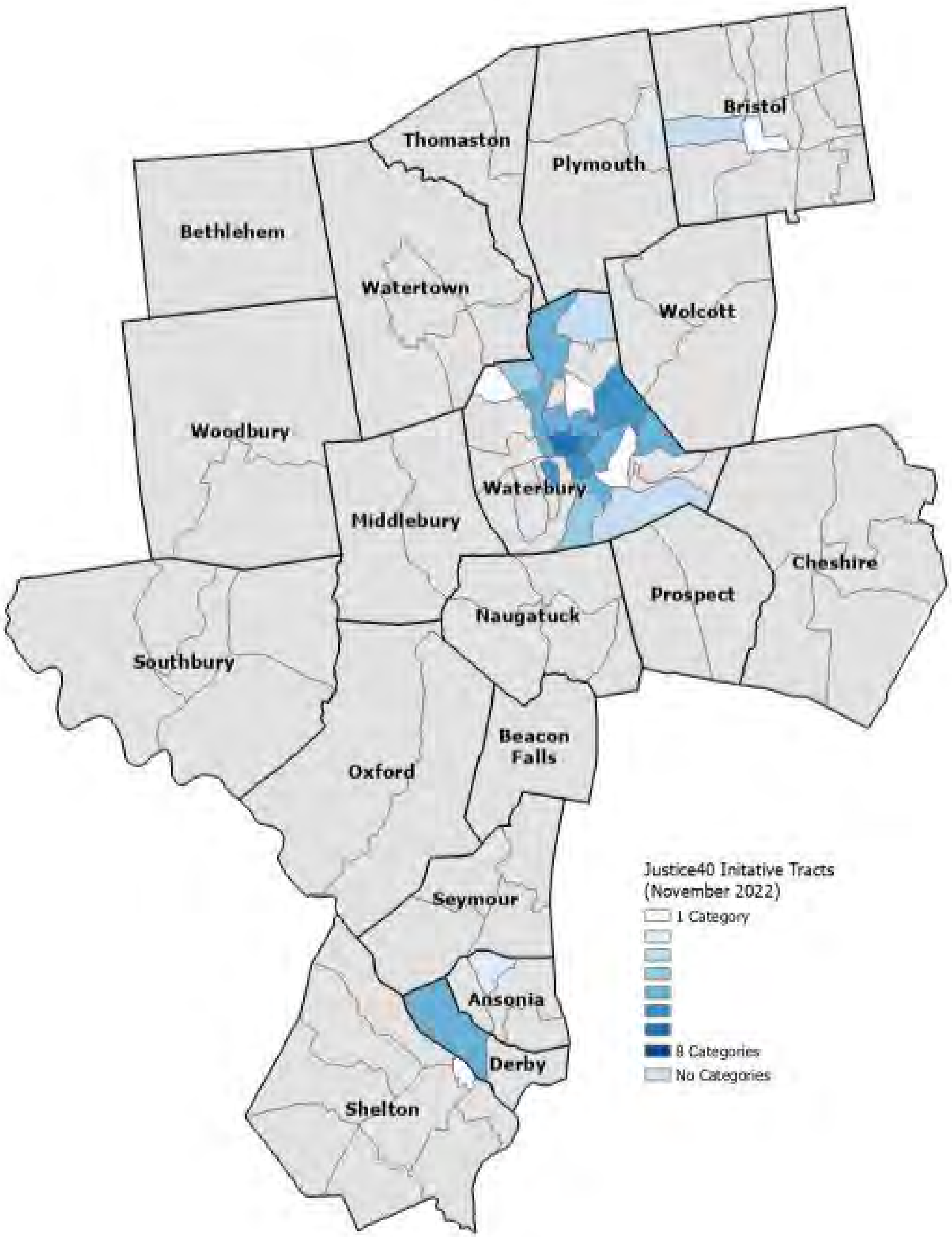
JUSTICE40

President Biden's January 2021 Executive Order 14008: *Tackling Climate Change at Home and Abroad* created the government wide *Justice40 Initiative*, establishing the goal of directing at least 40% of the benefits of federal investments to flow to disadvantaged communities. The initiative aims to bring resources to communities most impacted by climate change, pollution, and environmental hazards.

The *Justice40 Initiative* provides an opportunity to address transportation infrastructure and public service gaps to better serve communities. Through this initiative NVCOG will work to identify and prioritize projects that benefit our communities facing barriers to affordable, equitable, reliable, and safe transportation. When developing projects and making selections, consideration will be given to the positive and negative impacts projects will have on disadvantaged populations, as well as the inclusion of these communities in a meaningful public participation process.

The White House Council on Environmental Quality (CEQ) released the Climate and Economic Justice Screening Tool (CEJST). The tool defines and maps disadvantaged communities for the purpose of informing how Federal agencies guide the benefits of certain programs, including through the *Justice40 Initiative*. A *Historically Disadvantaged Community* is a group of individuals living in geographic proximity to one another or sharing common conditions or group experiences that experience cumulative burden across economic, social, and environmental factors. The tool uses a methodology and datasets that identify census tracts that are economically disadvantaged and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and health care. A census tract qualifies as *Historically Disadvantaged Community* if it is above the threshold for one or more environmental or climate indicators and the tract is above the threshold for the socioeconomic indicators.[4] NVCOG has begun to incorporate the identified disadvantaged tracts into our EJ analysis and mapping as well. The following map shows the (see Map 2).

[4] https://screeningtool.geoplatform.gov/en/about

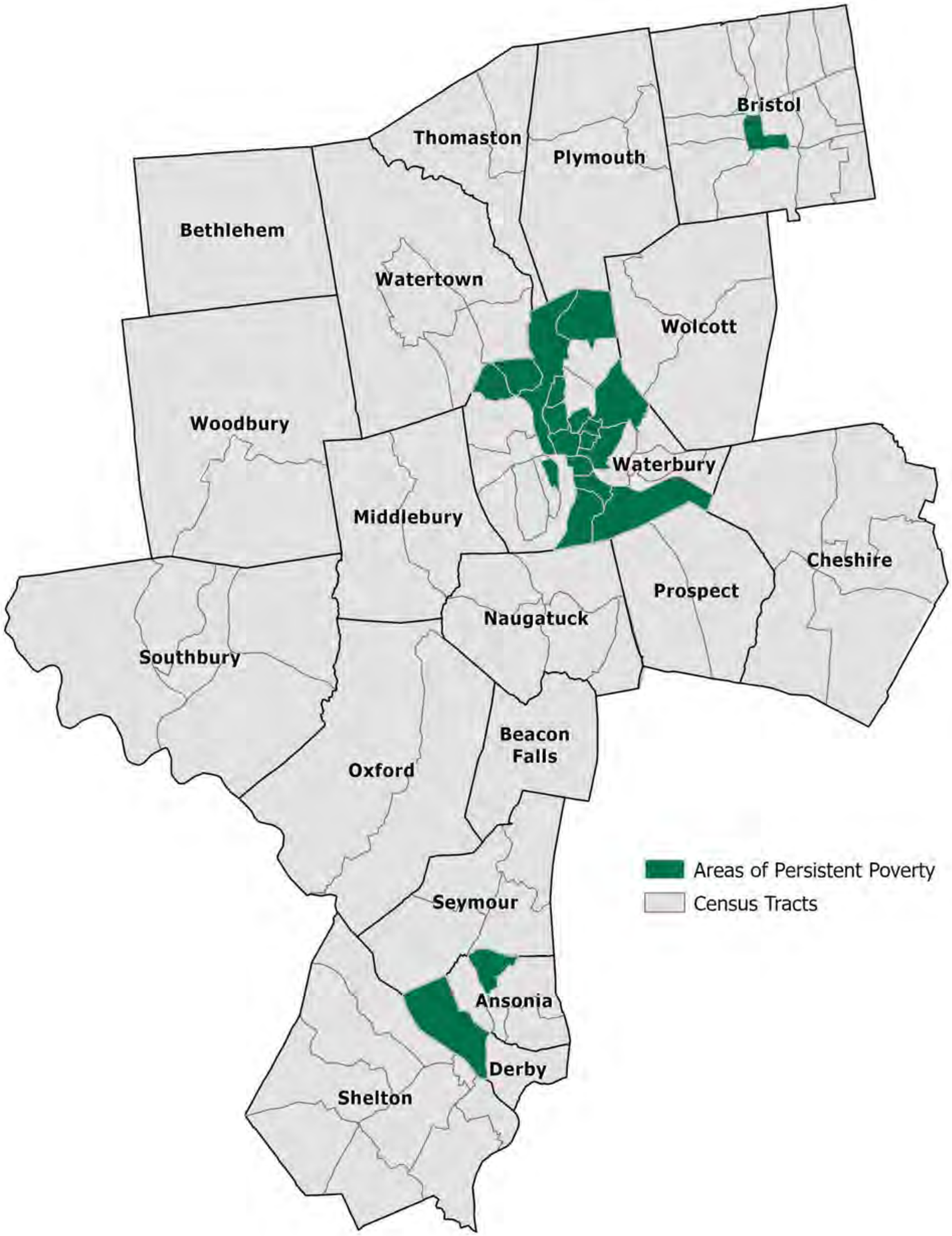


Map 2.5 Historically disadvantaged communities within the NVCOG region Source: Climate and Economic Justice Screening Tool

AREAS OF PERSISTENT POVERTY

The US Department of Transportation created a mapping tool to identify *Areas of Persistent Poverty*. These areas are defined as those in which more than 20% of the residents live at or below the poverty line. Persons and/or households that earn less than the income needed to meet basic costs of living are disadvantaged communities that are marginalized, underserved, and overburdened. Mobility is critical to the health, welfare, and well-being of a community. Today, car ownership and having a vehicle available is almost a requirement for residents to travel around the region. Those earning less than the poverty line typically lack access to a private vehicle and rely on public forms of transportation. The lack of access poses a significant transportation barrier that causes disparities in access to employment opportunities, services, health care, food, and other basic services. Those without mobility choices are at a great disadvantage economically, socially, and in terms of health and welfare.

The NVCOG uses the USDOT mapping to target transportation improvements in areas most in need of alternative transportation options and enhanced mobility choices. The Areas of Persistent Poverty in the region are depicted in the following map, Map 3.



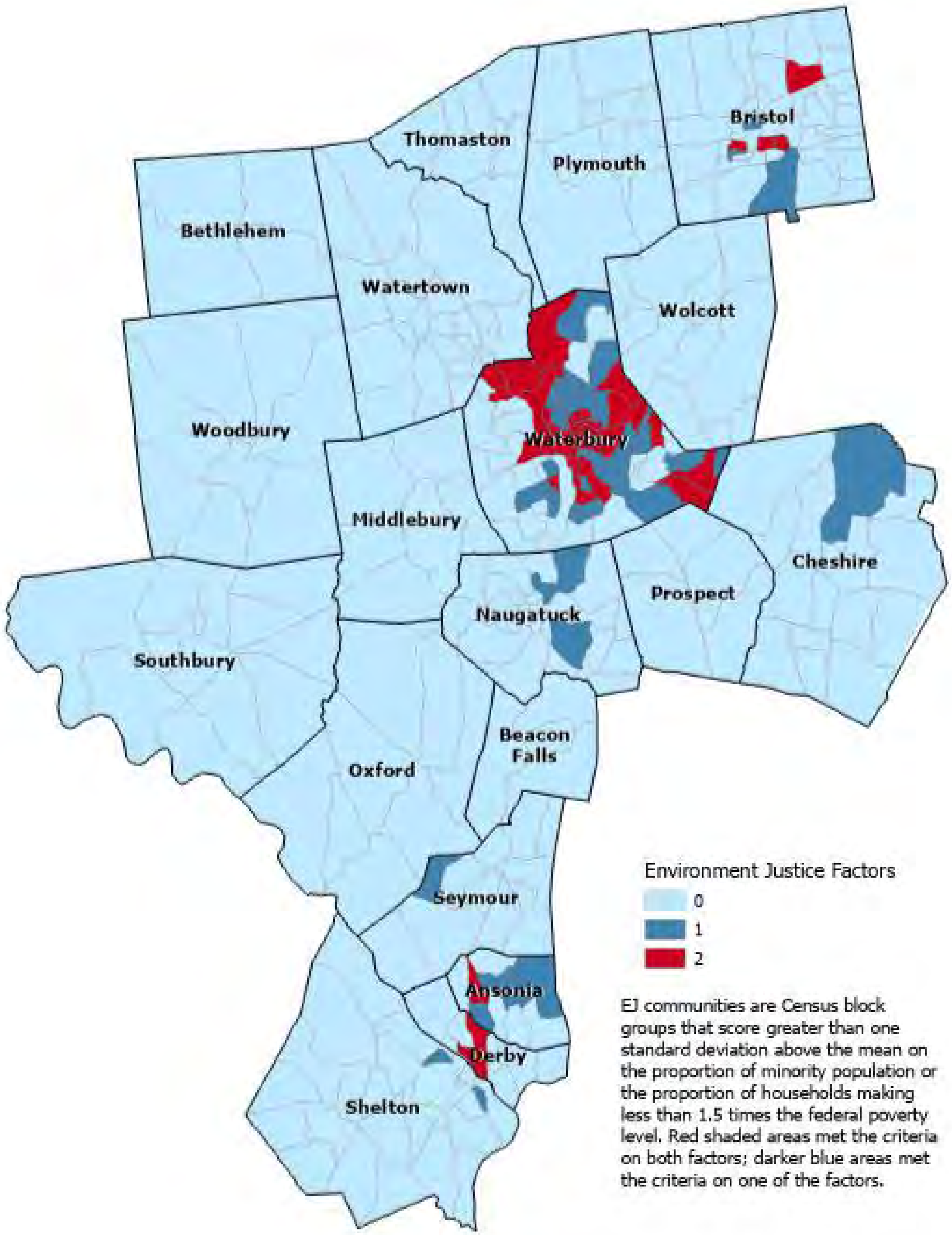
Map 2.6 Areas of persistent poverty Source: USDOT Areas of Persistent Poverty Mapping Tool

ENVIRONMENTAL JUSTICE ANALYSIS

Metropolitan Planning Organizations (MPOs) are responsible for developing and maintaining a short-term Transportation Improvement Program (TIP) for the metropolitan planning area and a long-range program of future improvements, referred to as the Metropolitan Transportation Plan (MTP). The TIP lists all highway and transit improvement projects in the metropolitan planning area programmed to receive federal assistance from the Federal Highway Administration and the Federal Transit Administration over a four-year time horizon. The program of projects in the metropolitan TIP represents the first five years of the MTP and are, by regulation, financially constrained. The MTP is the MPOs vision for future transportation improvements beyond the horizon of the TIP. As such, the actions are more illustrative and less financially constrained. However, the program is intended to identify improvements to address deficiencies and issues, provide mobility options and choice, and ensure access to jobs, healthcare, education, and all other services to all residents of the region.

NVCOG seeks and considers the needs and interests of individuals, groups, and communities traditionally underserved by transportation system policies and investments. The NVCOG has established an Environmental Justice Analysis process that evaluates the programmed and planned transportation improvement projects for the potential impact on areas with racial minorities at a proportion higher than the average for the region and populations with incomes below the federal poverty level. The first step is to define small geographic areas, referred to as *Equity Emphasis Areas,* on which the analysis is conducted. Unlike the *Justice40* screening tool and the USDOT mapping tool used to identify areas of persistent poverty, both of which are based on census tract level, the *Equity Emphasis Areas* are based on census block group level. Data collected through the most recent American Community Survey and published by the U.S. Census Bureau are used for the analysis. The smaller geographic area was used to better define areas of concern and properly identify the areas that are most vulnerable. The metrics used to determine *Equity Emphasis Areas* are where the proportion of the racial or ethnic minority population and or the proportion of low-income individuals/or the percentage of households below the poverty level is one standard deviation from the mean of the region as a whole. Figure 3 shows the *Equity Emphasis Areas* in the Naugatuck Valley planning area.

The second step in the analysis examines transportation performance in these areas and compares it with performance in all other areas of the planning area. This process helps determine accessibility and mobility in these areas and assess whether persons living or working the areas are being underserved by the transportation system. As projects identified in the metropolitan TIP or MTP are planned and programmed changes in accessibility and mobility are evaluated, and determinations are made regarding whether the changes constitute a benefit or burden to the area. Comparing benefits and burdens within *EEAs* relative to the rest of the Region determines if a disproportionately high and adverse impact on low-income and minority populations exists.



Map 2.7 Equity Emphasis Areas Source: ACS 2020 5-Year Estimates, US Census Bureau

The *Emphasis Equity Areas* were used to analyze the FFY 2021-2024 metropolitan TIP for the NVCOG planning area for disproportionately high and adverse impacts on low-income and minority populations by comparing the location of projects in these areas compared to the rest of the Region. As of June 2022, the metropolitan TIP has a total of $499,203,451 programmed for the FFY 2021 through 2024 timeframe. The projects were mapped and overlaid on the Environmental Justice map for the region (Map 4). The total population within *EEAs* of the region is 110,521, representing 24.5% of the total population of the NVCOG municipalities 450,376. The goal is to ensure than the allocation of transportation investments is commensurate with the proportion of population living in an *EEA*.

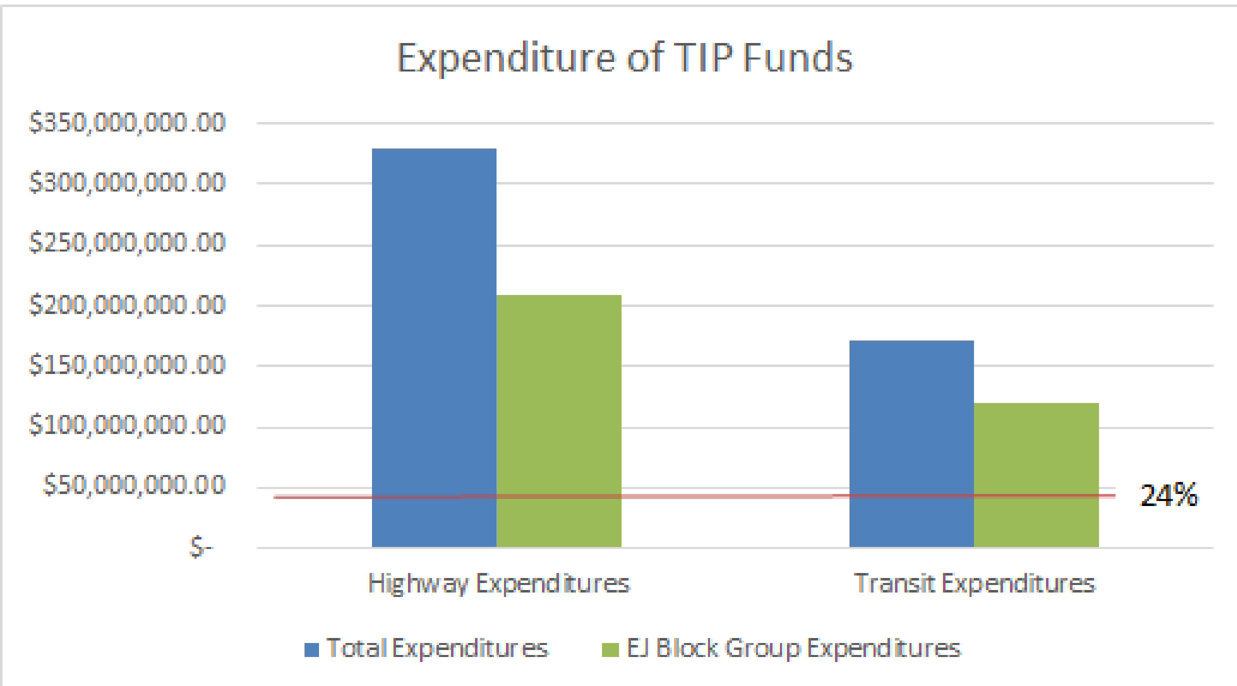


Figure 2.3 Expenditure of TIP funds within NVCOG

Equity Emphasis Areas in the Naugatuck Valley region are frequently concentrated in and around older, industrial town centers. Because of the age of these communities, significantly more funding is required to maintain the highway infrastructure in a state of good repair than in the areas of more recent development. Importantly, most of the highway projects currently underway within the region are designed more for preservation of the existing system with minor improvements than for significant expansion of capacity.

A total of $328,706,089 is programmed in the current TIP for highway improvements. Of this total amount, $229,409,059 is programmed within areas identified as an *Equity Emphasis Area*. While this suggests a substantially higher percentage of highway-related investments are target in an area of concern, the majority of this spending is influenced by two projects: the rehabilitation and future reconstruction of the I-84 and Route 8 Interchange in Waterbury and the approximate

$25 million reconstruction of Route 34 in Derby. Furthermore, the I-84/Route 8 interchange project is intended to improve traffic flow through the area and may not provide a direct benefit to those living in vicinity of the interchange. However, residents will experience improved air quality from the reduced congestion on the highways and less frequent use of local streets to by-pass problems through the interchange. The Route 34 project will directly improve travel and conditions in an *EEA*. Although Route 34 will be expanded to include an extra travel lane in either direction, significant improvements are being made to calm traffic through the downtown area, support pedestrian and cyclist activity and safety, and install various streetscape elements to enhance aesthetic qualities along the street and make Route 34 more of a complete street.

Investment in public transit services is critical to ensuring access and mode choice to vulnerable populations that do not have a private vehicle available for use. Without a viable and effective public transit system, many residents in an Equity Emphasis Area would not have access to jobs and basic services. Because of the number varying transit operators in the region, investments in transit services may not be perfectly aligned within the region alone. The TIP has about $170,497,361 programmed for bus and rail capital and operating projects within the region. Of this, nearly $119,348,153 is targeted at services within *EEA* communities, yielding a similar result of 70.0% being programmed in areas of concern. This allocation in *EEAs* is also much higher than the population in these areas. However, the result is not unexpected as the bus systems operating in the region serve the core downtown areas of the region, including Bristol and Waterbury. These bus services are also designed to connect to regionally significant services, including hospitals and institutions of higher education, which are also clustered around downtown Bristol and Waterbury as well as points in the lower Valley area.

Beyond the timeframe of the TIP, the goal of the MTP is to ensure the delivery of transportation investments are equitably distributed across the region and that residents of *Equity Emphasis Areas* receive a proportional level of investment in improvements and are not over- or disproportionately burdened by a transportation improvement. The assessment of equity in transportation investments is not solely based on location but more on who receives the benefits from the investment. A transportation improvement project may be located in an *EEA*, but the project may cause residential displacements or major disruptions during construction disparate to the likely benefits.

PUBLIC PARTICIPATION

Public participation is integral to good transportation policies, programs, and projects. To prevent disproportionately high and adverse effects on minority or low-income populations early in the planning process, NVCOG makes efforts to encourage high community and stakeholder engagement in the design phase of projects. This is especially important for projects that are located in areas with a disproportionately high minority and/or low-income population.

The following are representative of public involvement NVCOG uses:

- Provide ample opportunity through effective public notices and outreach activities to engage this segment of the population and their respective representation in the early planning phases of a project.
- Identify concentrations of protected classes of people by mapping demographic data.
- Utilize geographical information systems (GIS) to map transportation investments in relation to low income and minority areas with an intent to identify, highlight and analyze projects within these areas; respective to the Metropolitan Transportation Plan (MTP or Transportation Improvement Program (TIP).
- Incorporate Environmental Justice considerations into MTP and TIP criteria to ensure these issues are addressed in the early phases of the planning process.

Furthermore, NVCOG's Public Outreach Policy, which was updated in February 2020, provides a framework for engaging the public in the regional transportation planning and programming process. It is the official policy for how the NVOG will disseminate information to the public and stakeholders, ensuring adequate time for them to provide input.

2.10 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. This tool is continuously available on the NVCOG website and will continue to be maintained and monitored past the publishing of this report.

- Online Survey: In conjunction with the CT MetroCOG, NVCOG staff developed and collected feedback via an online survey within the ESRI Survey123 platform. This survey, focused on mobility and safety within the region, was published in both English and Spanish for residents and visitors to both the CNVMPO and GBVMPO regions. A total of 687 responses were received during the collection period, and a summary of these responses can be found in Appendix B. To publicize this survey, post cards in English and Spanish were distributed in libraries, town halls, and public facilities throughout the region, and NVCOG staff actively promoted it during appearances at local festivals and civic meetings. Members of the NVCOG Board, the Transportation Technical Advisory Committee(TTAC), Regional Planning Commission (RPC), and community groups were also asked to share survey details.

- 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 transportation within the region and how it will be impacted by this document.

- Social Media: NVCOG Communications Staff actively share information related to the MTP and transportation within the region on Facebook and LinkedIn. Feedback received through these platforms is included as comments received in writing.

- Public Events: To further share the online survey and gather feedback in real time, NVCOG staff attended Waterbury’s Harry Potter Day event, Bristol’s Mum Festival, and Shelton’s Shelton Day during the fall of 2022. During these events, in addition to distributing survey post cards, staff engaged with residents and noted their transportation priorities and major concerns.

- NVCOG Board, CNVMPO, TTAC, and 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.

- Public Information Material: To ensure that information about the MTP could be easily accessed by residents and interested stakeholders, in addition to a public posting of the draft document, a presentation was consistently posted and made available during the public review period for viewing. This included graphic representations of the most important aspects of NVision50, a self-paced guided tour of the plan's major components, and clear information about how to share feedback.

In addition to the above listed methods, beginning January 17, 2023 and ending February 7, 2023, the NVCOG posted sections of this report for public review and comment outside of the standard 30 day comment period. Ending of February 7th with the posting of the complete document, a 38-day public comment period officially opened. During that period, the NVCOG website included access to the draft MTP and a summary of the draft MTP, a short visual executive summary, and updates about the MTP planning process. Public notice was posted in the Republican-American, the major regional newspaper, on February 8, 2023, and translated into Spanish and posted in La Voz, a major regional Spanish language newspaper, on February 13, 2023. A public information meeting was held February 16, 2023, during the comment period to present the transportation vision for the region, review recommended actions to realize the vision, and solicit comments, and an additional virtual listening session was held on March 9, 2023, to solicit feedback from the community. During the entirety of the public comment period, instructions for providing comment via email, telephone, written mail, and online were maintained on the NVCOG website. The CNVMPO adopted the MTP at its March 17, 2023, meeting, along with formally adopting the Air Quality Conformity Determination attached to this document as Appendix D. 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.

3.0 TRANSPORTATION ISSUES & GOALS

Each day, there are more than 2 million trips into, out of, and within the Naugatuck Valley region. Most of those trips are made in private vehicles. Rail, bus, and walking are also important ways for people to move about in the region, but there are challenges to making those options viable for most travelers. As the region's population grows during the next 25 years, congestion and delays on roadways will worsen if patterns don't change. At the same time, the region's aging infrastructure will need to be repaired or replaced. Though additional federal funding provided by the Infrastructure Investment and Jobs Act (IIJA), also known as Bipartisan Infrastructure Law (BIL), provide an increase in funding to projects throughout the region and country, the law does not cover all aspects of the transportation system and falls short of the full cost of maintaining our aging infrastructure.

Data indicate that the region's population is growing and getting older. Between 2010 and 2020, the percentage of people 18 and older in the NVCOG region increased from 76.9% to 79.4%. This trend is expected to continue over the next 25 years. As the region's population ages, travel patterns and needs will change, requiring the region's infrastructure to adapt.

Trends further suggest that many people are moving back to cities, where transit options are more plentiful. The populations of Bristol and Waterbury, which are the major urban centers in the region, increased during the decade from 2010 to 2020. The same happened in Shelton, Seymour, and Oxford. All other municipalities in the region saw a decrease in their population. More and more, young adults want to live where there are more transportation options and daily activities like work, retail shopping, entertainment, and services are within walking/rolling distance. A possible consequence of this trend is that disadvantaged groups, who often rely on public transit, could be displaced from urban cores to areas with fewer transit options. However, with well-coordinated policy between land-use and transportation, it is possible this trend will revitalize once vibrant city centers, provide additional transit options to many residents, and create communities where walking/rolling or biking are attractive mobility options.

How individuals buy goods and services is also changing fast. Because of the COVID-19 pandemic, consumers rely more than ever on online shopping. This trend is increasing home deliveries, which are made primarily by smaller trucks, and reducing deliveries to retail centers. The resulting change in traffic pattern is bringing more large vehicles to roads less designed to handle them, increasing congestion and risk to vulnerable users.

Technology may help to ease or exacerbate the issues identified above. Although autonomous vehicles are likely years away from widespread adoption, they could change travel patterns, traffic volumes, and parking requirements. These changes are hard to predict, but our infrastructure decisions today may impact the way these vehicles interact with our road network in the future. Connected vehicles, with their advanced communications systems, could improve safety by reducing crashes, improving driver behavior, and reducing congestion. Location-based vehicle regulation is widely available on micro-mobility devices, and its potential risks and safety benefits may be hard to judge for many years. The region needs to remain abreast of changing technology in transportation and take advantage of it when possible.

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 passenger rail line, multiple freight rail operators, fixed-route, local bus services, multi-use greenways and trails, a general aviation airport, and pedestrian facilities.

To identify issues within the region's transportation system, NVCOG staff used a combination of data-based research, public engagement, and stakeholder meetings. With these data sources, the following were repeatedly identified as the most pressing and concerning issues for the region:

- Aging Infrastructure

  Many elements of the region's transportation infrastructure, along with those that deliver essential utilities and services throughout the region, have reached or passed their intended lifespans. Highways in the region, including Interstate 84, Interstate 691, and Route 8, increasingly do not meet modern standards for safety and operation. The age of these highways means that critical pieces of their infrastructure, particularly bridges, will need rehabilitation or replacement.

  While the CT Department of Transportation, individual municipalities, and the region have all worked to bring the region's infrastructure to a state of good repair, additional funding is necessary to ensure that this work can be continued and maintained.

- Lacking Mobility Alternatives

  As is true across the country, the NVCOG region depends heavily on automobiles for mobility. For many, however, preference, differing abilities, or cost prevent them from having consistent access to a car, requiring them to rely on the region's public transit system, sidewalks, and cycling facilities. Though mobility alternatives have expanded in recent years, it is still difficult for many without a car to accomplish their necessary daily tasks. To address this issue, NVCOG needs to use a multi-modal approach, improving rail, bus, bicycle, sidewalk, and micro-mobility options.

- Recurring Congestion and Travel Delay

  Because of the region's automobile dependence, one of the most commonly reported issues from all forms of engagement is roadway congestion and resulting delays. No road in the region is immune, although congestion is most clear on Route 8 and Interstate 84. As the region pursues Transportation Management Area (TMA) status, additional details on major road congestion, Peak Hour Excessive Delay, Travel Time Reliability, and Truck Travel Time Reliability will be gathered in the region's Congestion Management Process (CMP). In this report, projects were selected for congestion mitigation based on feedback from residents, municipal staff, and publicly available sources such as Google Maps' average congestion feature.

- Roadway Safety

  Using a data-based approach, the NVCOG regularly monitors traffic safety and develops strategies and projects aimed to address noted concerns. Roadway safety is a pressing issue across the country, and the NVCOG region is no exception. Traffic fatalities and serious injuries happen far too often on the region's roads, which has prompted strong response from the NVCOG's Policy Board. In September of 2022, the region adopted a Vision Zero Goal, establishing a list of priorities for the region aimed at reducing and eventually eliminating fatalities. More information on this goal and resulting implementation plan can be found in Section 3 of this chapter.

- Pedestrian and Cyclist Safety

  Walking/rolling is the most basic form of transportation, and nearly everyone is a pedestrian of some form during most trips. Although most New England towns and cities initially developed around walking, and many retain basic pedestrian-supportive infrastructure elements, pedestrian safety remains a challenge. Data indicate that more people walk/roll to work in urban areas like Waterbury and Bristol. But these areas also tend to have disproportionately high numbers of pedestrian-related crashes, mostly because the pedestrian infrastructure is inadequate. NVCOG has committed to prioritizing investment in amenities that will make sure people can safely walk/roll and ride a bicycle in the region. This includes clearly marked crosswalks, pedestrian signals, functional sidewalks, and separated bike lanes.

- Waterbury Rail Line

  The Waterbury Line is a tremendous asset in the Naugatuck Valley planning region. It connects Waterbury to the New Haven main rail line in Bridgeport, where passengers can transfer to New York City and New Haven. Despite the inter-regional connections it provides, the Waterbury Line is underused because of infrequent service and lack of basic amenities. In June 2022, service increased to twelve inbound (toward Manhattan/away from Waterbury) trains and ten outbound trains on weekdays, as well as two substitute express buses. Despite additional weekday service, headways can be as long as 2 ½ hours, with average headways of more than 1 ½ hours. Weekend service is even less frequent. The current level and quality of service is not convenient or attractive for most riders.

  Additional information about the current state of the Waterbury Line and its operations is in chapter 5 of this document.

- Fragmented Bus Service

  CTtransit's Waterbury and New Britain & Bristol divisions provide fixed route bus service in the Central Naugatuck Valley MPO region, with Greater Bridgeport Transit extending into the larger Naugatuck Valley region. Express bus routes connect the region to CT*fastrak.* Bus service in the region is often fragmented with unreliable arrival times and connection opportunities, which is a challenge to presenting bus transit as a viable option. Bus routing improvements occur infrequently, and many areas remain underserved or have no bus service at all. Respondents to the MTP mobility survey have said that the region's bus service is slow, too infrequent to be reliable, and the lack of real time arrival information makes it difficult to plan trips. In addition, many stops lack amenities such as shelters or benches. Currently, there are no direct local bus connections between Waterbury, Bristol, the lower Valley, and other central Connecticut municipalities. As of the preparation of this report, bus fares have been suspended statewide by legislative action, and options for retaining fare-free service or re-instating fares are under review in Hartford.

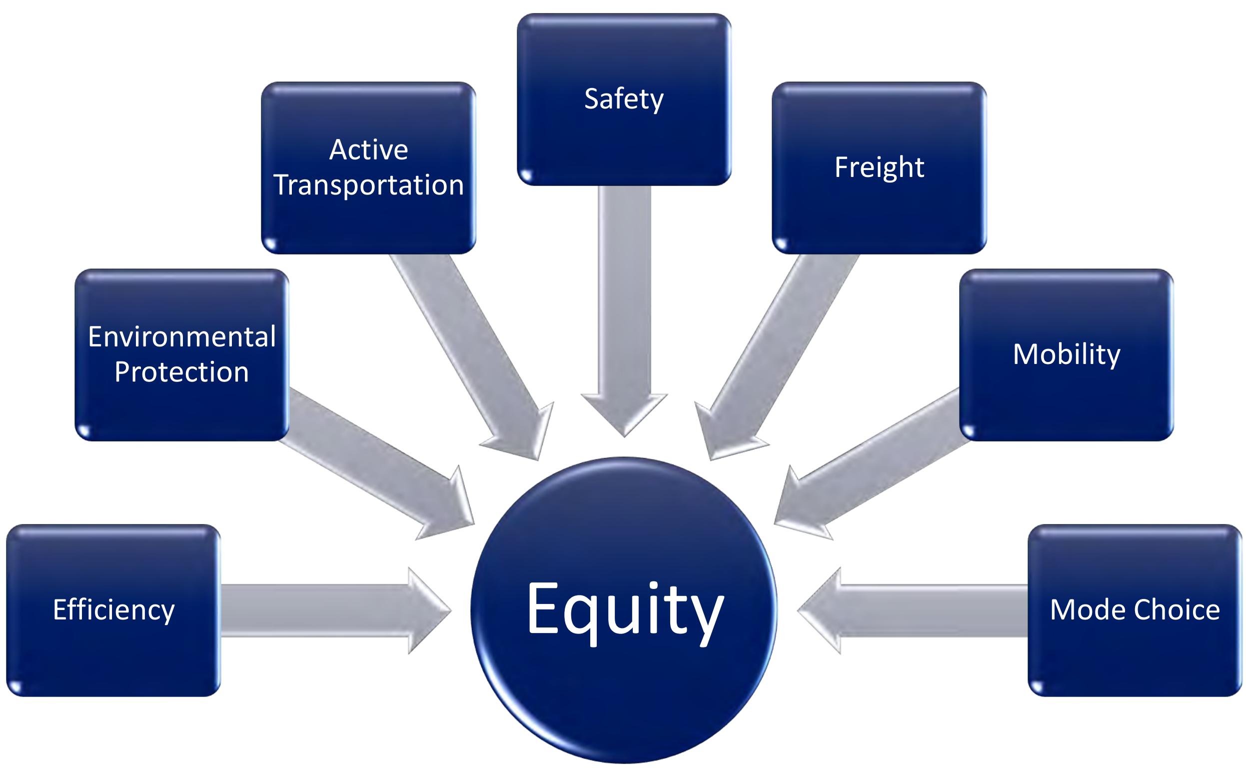
- ADA Paratransit Service Gaps

  Federal regulations require fixed-route bus operators to provide complementary services to the elderly and individuals with mobility impairments that prevent them from using a regular fixed-route bus. MPOs and transit operators have conducted planning efforts to develop a *Locally Coordinated Human Services Transportation Plan (LOCHSTP)*. Throughout the region, limited fixed-route service and funding constraints prevent ADA and DAR services from reaching all who may need these services, and the NVCOG will be continuing studies to expand service throughout the region.

In addition to physical service gaps, the presence of multiple operators makes it difficult to coordinate services and ensure meaningful coverage. Similar to fixed-route operations, consolidation, or at least rationalization, of service governance will provide benefits to system operating costs and to users.

- Expand and Maintain Multi-use Greenway and Trail Facilities

Paths for walking/rolling and cycling, or active transportation corridors, are a valuable alternative to driving and help create livable communities by connecting them via non-motorized means. Building multi-use greenways and trails has substantial economic, health, and environmental benefits. Trails provide outdoor recreation and tourism opportunities, promote physical fitness and healthy living, preserve open spaces, and improve air and water quality. While residents of the region benefit greatly from the development of active transportation facilities, completing the planned system of trails faces many challenges. Those include financial constraints, available rights-of-way, tight geographies, and lack of available data for use by planning and zoning commissions, economic development coordinators, and voters.



NVision50 puts equity at the center of all planning activities, utilizing seven major categories to define progress toward addressing inequities of the past.

3.2 TRANSPORTATION GOALS

Utilizing a data-first methodology, including a heavily publicized survey designed to gain insights and priorities from the public, NVCOG has identified transportation concerns and issues facing the region. The next step is to lay out the goals and long-term vision for transportation in the region, identifying priorities for investments and projects, and ensuring that the existing system is utilized effectively.

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

> *The NVCOG Planning Region Vision…*
>
> *To advance the goal of Vision Zero, acknowledging that even one fatality or serious injury on our transportation system is too many. The commitment to Vision Zero is a commitment to the value of those traveling within the region, and by utilizing a multi-disciplinary approach crashes resulting in fatalities and serious injuries can be avoided.*
>
> *To invest in and maximize the utilization of existing infrastructure, ensuring that facilities of all kinds, including roads, highways, sidewalks, and rail, are maintained in a state of good repair, and used in the most effective way.*
>
> *To ensure accessible and safe mobility for all, regardless of mode choice. The NVCOG defines mobility equity as "mobility for all ages, mobility for all abilities, mobility for all incomes, and mobility from anywhere to everywhere."*
>
> *To facilitate economic growth and revitalization through the efficient movement of freight into and throughout the region.*

The goals of the MTP remain consistent with work the NVCOG has undertaken in recent years and with the current investment of state and federal dollars. These goals are expanded upon below:

- Progress the goal of Vision Zero

  To work toward the goal of zero fatalities and serious injuries within the transportation system.

  Objectives:

  a) Utilize a data-based approach to identify locations with the highest number of fatal or serious injury crashes, then focus investments and improvements to these areas.
  b) In coordination with CTDOT, USDOT, and private partners, expand education to drivers and non-motorized users.
  c) Work with all appropriate departments to ensure effective enforcement of traffic laws throughout the region.
  d) Maintain a focus on equity and accessibility, ensuring that mobility is safe and guaranteed for all.
  e) Continue collaboration with the Connecticut Vision Zero Committee, along with municipalities and CTDOT, to ensure that appropriate actions can be taken at every level of government to achieve this goal.

- Preserve and Maximize Value of the Existing Highway System

  To maintain an efficient highway 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, address common locations of collisions, and focus on projects designed to the latest standards of safety and efficiency.

  Objectives:

  a) Focus federal investments into achieving and maintaining a state of good repair on existing infrastructure.
  b) Integrate Intelligent Transportation Systems (ITS) and ensure ITS projects conform to the National and State ITS Architecture, standards, and protocols.
     Ensure that projects and programs all receive a thorough review for their impact on accessibility and equity.
  c) Where necessary, utilize improved traffic incident management (TIM) strategies

- Congestion Management

To develop and maintain a congestion management plan as the CNVMPO pursues TMA status and ensure programming of projects for areas of highest concern along the roadway network.

Objectives:

a) Use existing transportation facilities to maximize efficiency, safety, and positive local community impact.
b) Construct intersection improvements with a focus on vulnerable user safety and efficient operations. Where appropriate, consider alternatives such as roundabouts that reduce wait times and improve safety.
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 and promoting telecommuting and alternate work schedules.

- Ensure Transportation System Security

To ensure that users of the transformation feel secure, using a combination of new technologies and traditional approaches.

Objectives:

a) Install monitoring equipment on-board transit vehicles to monitor operations and activities.
b) Install equipment at transit stations such as monitored cameras and blue-light call stations to monitor waiting areas and provide easy access to all forms of emergency response.
c) Assess the vulnerability of critical transportation infrastructure.
d) Where appropriate, implement additional roadway security features, such as truck inspection stations and hazardous material response equipment.

- Evaluate and Utilize Advanced Technology

  To better manage transportation operations, enhance safety and mobility, ensure greater travel time reliability, and provide more detailed and up-to-the-minute information to travelers and system operators through the application of various Intelligent Transportation Systems (ITS) actions.

  Objectives:

  a) Integrate ITS features into future projects, ensuring ITS projects conform to the National and State ITS Architecture, standards, and protocol.
  b) Expand roadside infrastructure that monitors road conditions and provides real-time traveler information to motorists. Particularly, expand the CTDOT's monitoring and variable message system to Route 8.
  c) Continue upgrades to the rail system to ensure that all aspects comply with modern standards for the type of traffic they carry.
  d) Continue to monitor advances to vehicles, ensuring that pilot studies and rollout of advanced features occurs in a manner that prioritizes the safety of operators and vulnerable users.

- Preserve and Enhance Public Transportation Services

  To maintain essential local bus, passenger 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 improving service through rationalized and better coordinated routes and reduced headways.

  Objectives:

  a) Improve choice of travel modes by increasing service options and decreasing service headways. This will reduce highway congestion and provide greater mobility for those who cannot or prefer not to drive.
  b) Promote rail and bus transit as easy, safe, and convenient modes within the region, encouraging users to switch some trips to transit when possible.
  c) Replace passenger rail equipment with modern, clean vehicles and coaches with enhanced passenger amenities.

d) Encourage the CTDOT to continue investigating the electrification of the passenger service portion of the Waterbury Line to improve speeds and reduce noise and air pollution along the route.
e) Expand the public transit system within its service area and beyond, by improving transportation access and mobility, marketing those services, and developing transit services to suburban employment centers and service-heavy areas.
f) Promote ridesharing and increased vehicle occupancy through public campaigns, enablement technology, and incentives like those currently provided by CTrides.
g) Improve awareness and coordination of public transportation options available in the region.

- Expand Multi-Modal Opportunities

To expand opportunities for travelers to easily switch between modes, providing first/last mile options and high-quality transit services in between.

Objectives:

a) Identify, develop, and enhance multi-modal transfer and connection points.
b) Work with transit providers to better coordinate transfer times, focusing on realistic and well-timed pulses at critical locations between services.

- Enhance the Efficient Movement of Freight and Goods

To expand and enhance opportunities for expediting movement of freight.

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. Utilize the Congestion Management Process to regularly evaluate performance and program improvements to these areas.
c) Reduce truck-related congestion by improving infrastructure for alternative modes of freight transport, including rail, air, and sea.
d) Improve safety for truckers and other drivers by providing adequate facilities for rest breaks.
e) Promote development of intermodal freight centers.
f) Deploy ITS elements to enhance the efficient movement of goods into, out of and through the region.
g) Monitor efficacy of the state’s recently enacted heavy vehicle user fee.

- Enhance Bicycle and Pedestrian Facilities

To encourage and promote the increased use of bicycling and walking/rolling as a mode of transportation.

Objectives:

a) Increase the number of walkable communities through infrastructure improvements, transit-oriented development, and updated village/city center zoning codes.
b) Develop and expand bicycle paths and routes to provide a viable transportation alternative as an extension of the road network.
c) Promote the construction of the Naugatuck River Greenway, extension of the Middlebury Greenway, and completion of the Steele Brook Greenway connection to the Larkin Trail.
d) Provide comfortable, connected, and safe walkways for pedestrians.
e) Provide adequate and safe paths and routes for cyclists.
f) Enhance the aesthetic quality of existing transportation facilities.
g) Serve as the liaison to and administer the Naugatuck River Greenway Steering Committee.

- Environmental Protection

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

Objectives:

a) Promote clean modes of transportation including walking/rolling, cycling, and micro-mobility devices such as e-scooters and e-bikes, and connections between these modes and the region's transit network.
b) Monitor and maintain the region's highway network to address congestion and minimize motor vehicle emissions.
c) Continue to program transportation projects designed to achieve the region's air quality targets as identified in the 1990 Clean Air Act amendments.
d) Support the Connecticut *State Implementation Plan for Air Quality* and assist in efforts to achieve and maintain the National Ambient Air Quality Standards (NAAQS).

e) Promote and program the expeditious implementation of Transportation Control Measures.
f) Support the adoption of lower emission vehicles across the transportation network, including personal vehicles, trucks utilized for moving freight, and the transit network.
g) 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.
h) To maintain, improve, and expand public transportation service to improve efficiency, reduce energy consumption, and motor vehicle emissions.

- Sustainability

To develop a long-range 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 communities, connecting them with active transportation corridors.
b) Target development to areas with existing infrastructure and coordinate the type, intensity, amount, location, and timing of new development to transportation system capacity.
c) Integrate transportation planning and land use planning as part of a major regional growth management policy to reduce the potential effects of urban sprawl.
d) Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods.
e) Promote transit oriented and supportive land use development plans.
f) Develop and implement a Complete Streets policy and program that accommodates all travelers and modes.
g) Undertake a regional guidebook for streetscape elements, improving the comfort and safety of the sidewalk network and assisting in economic development of municipal centers.

Civil War Monument, Naugatuck Green

- Promote Economic Development and Revitalization

  To improve transportation infrastructure critical to the economic vitality of the Naugatuck Valley planning region.

  Objectives:

  a) Develop local transportation infrastructure that supports economic expansion, such as complete streets, cycle paths, and road safety improvements through downtown areas.
  b) Provide transportation services to employment centers and expand employment opportunities.
  c) Ensure that employment throughout the region, regardless of surrounding development patterns, can be reached through multiple modes.

- Environmental Justice

  To identify and address disproportionately high and adverse human health or environmental effects of the 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 and ensure that populations negatively impacted by transportation infrastructure receive commensurate benefit in return from its presence.
  d) Provide additional public outreach to minority and low-income populations for projects within the region including providing meetings and/or pamphlets in other languages. The NVCOG Limited English Proficiency (LEP) plan provides additional details on this effort and will be maintained as part of the broader public outreach and Title VI efforts.

- 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 our planning region.

Objectives:

a) Carry out a proactive public involvement process that promotes region-wide citizen participation, minority involvement and equal employment opportunity.
b) Provide timely public notice and effective public involvement in the development of transportation plans, programs, and projects.
c) Maintain and enhance the NVCOG's website, ensuring it provides clear and detailed information about projects in the region.
d) Publish reports and documents in an electronic format, with paper copies available to those who want them.

- Project specific goals over the next 5 years

The following is an excerpt list of projects that can be constructed within the next 5 years. The projects all can be completed within these 5 years, have sources of funding readily available for them, and are fiscally constrained. The full list of projects can be viewed in Appendix A.

a) Pavement Rehabilitation along I-84 (Waterbury)
This project will reconstruct and rehabilitate pavement along I-84 between South Elm Street and Washington Street to bring that section of roadway into a state of good repair. The estimated cost is $70,000,000 and is identified as a major project of statewide importance by the CTDOT.

b) Corridor Improvements near Memorial Boulevard (Bristol)
This project will bring improvements to traffic flow, safety, and multi-modal users along Memorial Boulevard and Route 72 through downtown Bristol. This project is identified as a major project of statewide importance by the CTDOT and is estimated to cost $10,000,000. This project will build off of the currently under-construction improvements to the Route 72 and Route 69 interchange to the west of this project's limits.

c) Roundabout Construction along Route 6 at Route 61 and Quassapaug Road (Woodbury)
This project will construct a new roundabout at the intersection of Route 6, Route 61 and Quassapaug Road. The current intersection is a safety concern with several crashes within the past couple of years. The estimated cost is $4,000,000, and is identified as a major project of statewide importance by the CTDOT.

d) Relocation of Naugatuck Train Station (Naugatuck)
This project will construct a new train station in Naugatuck south of Maple Street along Old Firehouse Road. This will allow for a more suitable station for the WBL and the potential to facilitate development downtown. The estimated cost is $25,000,000 and currently identified funding sources included the FTA 5307 and 5337 programs.

e) Waterbury Station Improvements (Waterbury)
This project will renovate an indoor waiting area at the former Waterbury Union Station. This will provide passengers waiting for the next train a place to wait away from the elements in a safe location. The estimated cost is $12,597,000 and will be paid for through state funding sources.

f) Exchange Place Improvements (Waterbury)
This project is the second phase of a downtown reconstruction project in Waterbury, the first phase being constructed along East Main Street. This project will include a section of North Main Street, South Main Street, and Bank Street, and will include sidewalk improvements, streetscape elements to improve the pedestrian and cyclist experience, and roadway reconstruction as necessary to achieve these goals. The estimated cost is $10,000,000 and is approved through the LOTCIP program.

g) West Main Street/NRG Phase II (Waterbury)
This project will construct the second phase of the Naugatuck River Greenway in Waterbury, connecting Eagle Street north to West Main Street. Additionally, it will support the implementation of the West Main Street Study’s recommendations, improving pedestrian safety, adding bicycle facilities, and addressing traffic flow and safety issues. This project will cost $25,000,000 and is being funded 100% under a recently awarded RAISE grant.

- Project specific goals beyond the next 5 years

The following is a list of projects that can be constructed after the next 5 years. These projects are not fiscally constrained and are all meaningful projects to accomplish in the future. Several of these projects can be viewed in Appendix A.

a) New Mix (Waterbury)
The NewMix is an ongoing study which will lead to a complete reconstruction of the I-84 interchange with Route 8. The study will determine how the MixMaster will be replaced at the end of its useful life following the recent improvements. The current estimated cost is $3,000,000,000.

b) Relocation of bridge crossing Housatonic River from Stevenson Dam (Oxford)
This project will relocate Route 34 off the Stevenson Dam and onto a new bridge across the Housatonic River. The estimated cost is $70,250,000.

c) Additional Waterbury Branch Line Equipment (Various)
This project will obtain additional locomotives and rolling stock for the Waterbury Branch Line. This will facilitate additional trains during the day which will decrease the headways between trips along the WBL. This project is a priority for the region if funding can be found or made available. The estimated cost is $97,983,000.

d) Central Connecticut Line Passenger Service (Various)
This project will upgrade the Central Connecticut Line to passenger service. The Central Connecticut Line runs between Waterbury and Berlin passing though Plymouth, Bristol, Plainville, and New Britain. The estimated cost is $985,000,000.

e) Torrington Passenger Service (Various)
This project will upgrade the section of rail line north of Waterbury up to Torrington for expanded commuter service to Torrington. This section of rail line only sees freight operations and tourism exertion service by the Railroad Museum of New England.

f) Electrification of Passenger Rail Service (Various)
Per the 2022 update of the CTDOT rail plan, it is a priority for the NVCOG region to see the electrification of all passenger rail service throughout the state, including the Waterbury Line and potential future service within the region. This will reduce noise and air pollution, increase speeds, and address reliability issues along the Waterbury Line.

g) Completion of Naugatuck River Greenway (Various)
   These series of projects will connect existing pieces of the NRG to create a continues recreational trail along the Naugatuck River. This will create an active transportation corridor for all the municipalities the trail passes though and provides a safe place for various forms of active transportation. The estimated cost is approximately $76,634,000.

h) Track upgrades to WBL (Various)
   This project will upgrade the tracks along the WBL between Milford and Waterbury to Class 4 standards, which will permit passenger train speeds of 80 miles per hour. Currently, the WBL has Class 3 standards which only permits passenger train speeds of 60 miles per hour. There is no cost estimate for this project at this time.

3.3 VISION ZERO

Each year, thousands of people are seriously injured or killed in preventable traffic accidents on American roads. Based on data from the University of Connecticut's Crash Data Repository, 102 people died in crashes on NVCOG roadways from the beginning of 2020 to the end of 2022, and 552 people were seriously injured during the same period. Each one of these losses impacted families and communities, and the NVCOG region is committed to ensuring these losses do not occur in the future.

Traditionally, decision-makers considered traffic deaths inevitable, and traffic safety focused on preventing collisions and perfecting human behavior, emphasizing the individual responsibility of roadway users. In recent years, however, a rapidly growing number of states, cities, and regions have embraced Vision Zero, a fundamentally different approach to traffic safety that utilizes a multi-disciplinary approach to eliminate fatalities and serious injuries. It uses a Safe Systems approach, which is a holistic strategy that focuses on safer people, safer roads, safer vehicles, safer speeds, and post-crash care. Vision Zero recognizes that people make mistakes and emphasizes policy and design to ensure these mistakes do not result in crashes in which people die or are seriously injured. Vision Zero encourages cross-disciplinary collaboration among planners, engineers, policymakers, and public health officials. It also seeks to minimize vehicle miles traveled (VMT) to reduce the potential for roadway crashes.

Within the NVCOG region, and the country, fatalities are concentrated in areas with larger minority populations and lower average incomes. This disparity is one of the significant equity issues within the region. The NVCOG must address this disparity to ensure that the burdens of the transportation system do not fall unfairly on specific communities.

The NVCOG Board adopted a resolution committing to a goal of zero traffic deaths, following the principles of Vision Zero, in September 2022. All projects and priorities in this document must consider safety/Vision Zero as a priority during concept development and design. NVCOG staff also regularly participate in the State's Vision Zero Council (VZC), an interagency working group that develops statewide policy to further the goals of Vision Zero. VZC subcommittees focus on engineering, enforcement, education, and equity.

Core elements of Vision Zero include:

- Public, high-level, ongoing commitment – Key elected officials and leaders of public agencies commit to eliminating traffic fatalities and serious injuries within a specific timeframe. Agency leaders prioritize safety through a collaborative working group and other resource sharing efforts.
- Authentic engagement – Employ meaningful, accessible, and equitable community engagement toward implementing Vision Zero strategies.
- Strategic planning – Develop, approve, and use a Vision Zero Action Plan to guide work. The Plan should identify specific goals, measurable strategies, and responsible stakeholders with clear timelines.
- Project delivery – Decision makers, planners, and designers secure funding and advance projects and policies that emphasize safe and equitable multimodal travel. Prioritize roads with the most pressing safety issues.
- Complete Streets for all – Complete Streets is a holistic approach to planning, designing, and building a street environment that enables safe, well-connected access for all users. For additional information, see Chapter 9 Section 3 of this document.
- Context-appropriate speeds – Set and manage traffic speeds to achieve safe roadway conditions and protect all users.
- Equity-focused analysis and programs – Prioritize engagement and investment in traditionally underserved communities and adopt equitable traffic enforcement policies.
- Proactive, systemic planning – Use a systems-level approach to identify and address risk factors, avoid crashes, and mitigate crash severity.
- Responsive, hot spot planning – Create and regularly update a map of the region's fatal and serious injury crash locations to guide priority actions and funding. In the past, NVCOG has identified and mapped crash locations in the RTSP.
- Comprehensive evaluation and adjustments – Regularly evaluate and share project performance to inform priorities, budgets, and updates to the Action Plan.

This plan aims to address some of the engineering steps in the region's Vision Zero goal, with all programmed projects focusing on improving safety, especially for vulnerable users. The programmed projects also aim to provide additional options for mode-choice, which will both expand mobility for residents and help reduce the total number of miles driven, especially by those who would prefer not to drive. A few key pieces of the NVCOG's plan are detailed below:

- NVision Zero – The region's public campaign aims to educate residents about the Vision Zero goal, the strategies planned to improve safety, and to provide essential data about safety within the region.
- TTAC Safety Sub-Committee – The Transportation Technical Advisory Committee will establish a sub-committee focused on safety. This group will review key projects for their impact, help to establish a quick-build improvement guidebook, and serve as the technical advisors to the NVCOG Board.
- Enforcement Sub-Committee – The enforcement sub-committee will comprise members of municipal law enforcement agencies. This group will focus on sharing best practices around speed and driving safety enforcement, as well as provide additional input on quick-build safety improvements.
- Updated Reporting – Because Vision Zero depends on a data-driven approach, the NVCOG will provide bi-annual data with a breakdown of crashes by user type, location, and severity.
- Education – The region will work in conjunction with school districts, Departments of Parks and Recreation, and advocacy groups to encourage an elementary school curriculum for safe habits as pedestrians and a middle school bicycle safety education course.

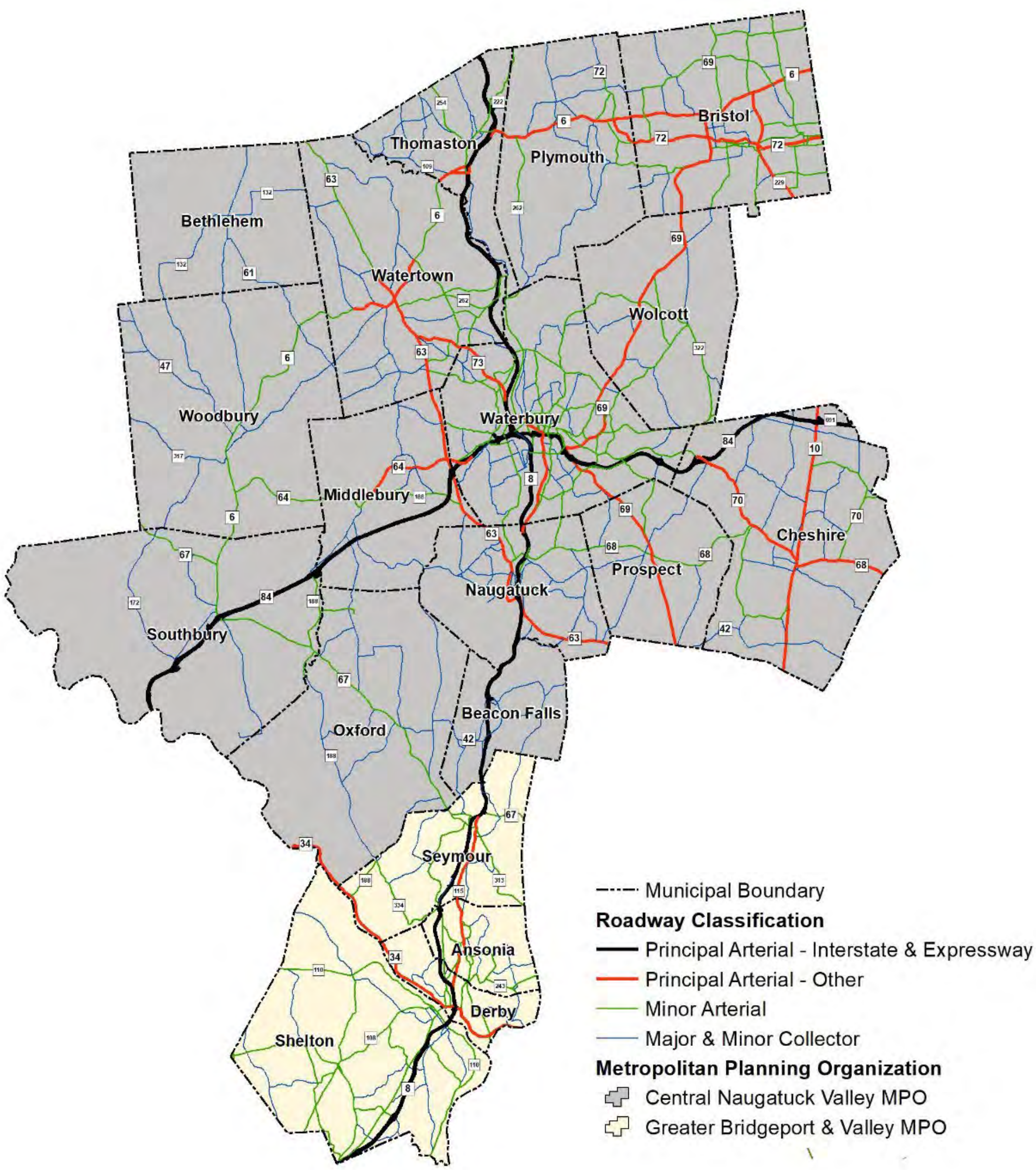
Wolcott Town Hall

4.0 HIGHWAY PLANNING

The core of the region's transportation system, and by far the most heavily used piece, is the network of expressways, arterials, and supporting roadways that provide access to, though, and within the region.

4.1 EXISTING CONDITIONS

The Naugatuck Valley Planning region, like many in the United States, is crossed by and reliant on an aging and increasingly congested road network. 60 miles of expressway make up the spine



Map 4.1 Classification of major roadways within the NVCOG region

of this system, with Interstate 84 providing the primary East/West route through the region, Interstate 691 providing an alternate route east and connection to Interstate 91, and CT Route 8 serving as the primary north/south route. In conjunction with 360 miles of arterial roads, this network serves as the primary means of transportation for most residents and visitors to the NVCOG area, as well as the main route for freight traffic through the region. These highways are a vital connection between the NVCOG planning region and surrounding communities.

Interstate 84, to the west, connects the region to Danbury and the New York City Metropolitan area, ultimately terminating near Scranton, Pennsylvania. To the east, I-84 provides access to Hartford, where it intersects with Interstate 91, before terminating at the Massachusetts Turnpike, which ultimately connects to Boston and the remainder of Southern New England. I-84 is the most heavily trafficked road in the region, with 2018 volume of nearly 194,000 vehicles per day according to CTDOT traffic monitoring stations.

Through downtown Waterbury, I-84 carries both east and west traffic over a stacked viaduct called the Mixmaster because of the significant amount of mixing traffic. Though innovative at its time, this design has been detrimental to the City of Waterbury. The highway disconnected downtown and the northern half of the city from the formerly industrial south side. Finally, the roadway is inadequate for modern highway safety. Tight entrance and exit ramp proximity, a lack of shoulders, and limited sightlines plague the highway and are compounded by the aging and deteriorating conditions of the structure. CTDOT is currently performing a major rehabilitation on this structure and anticipates a full replacement and modernization program in the next 30 years.

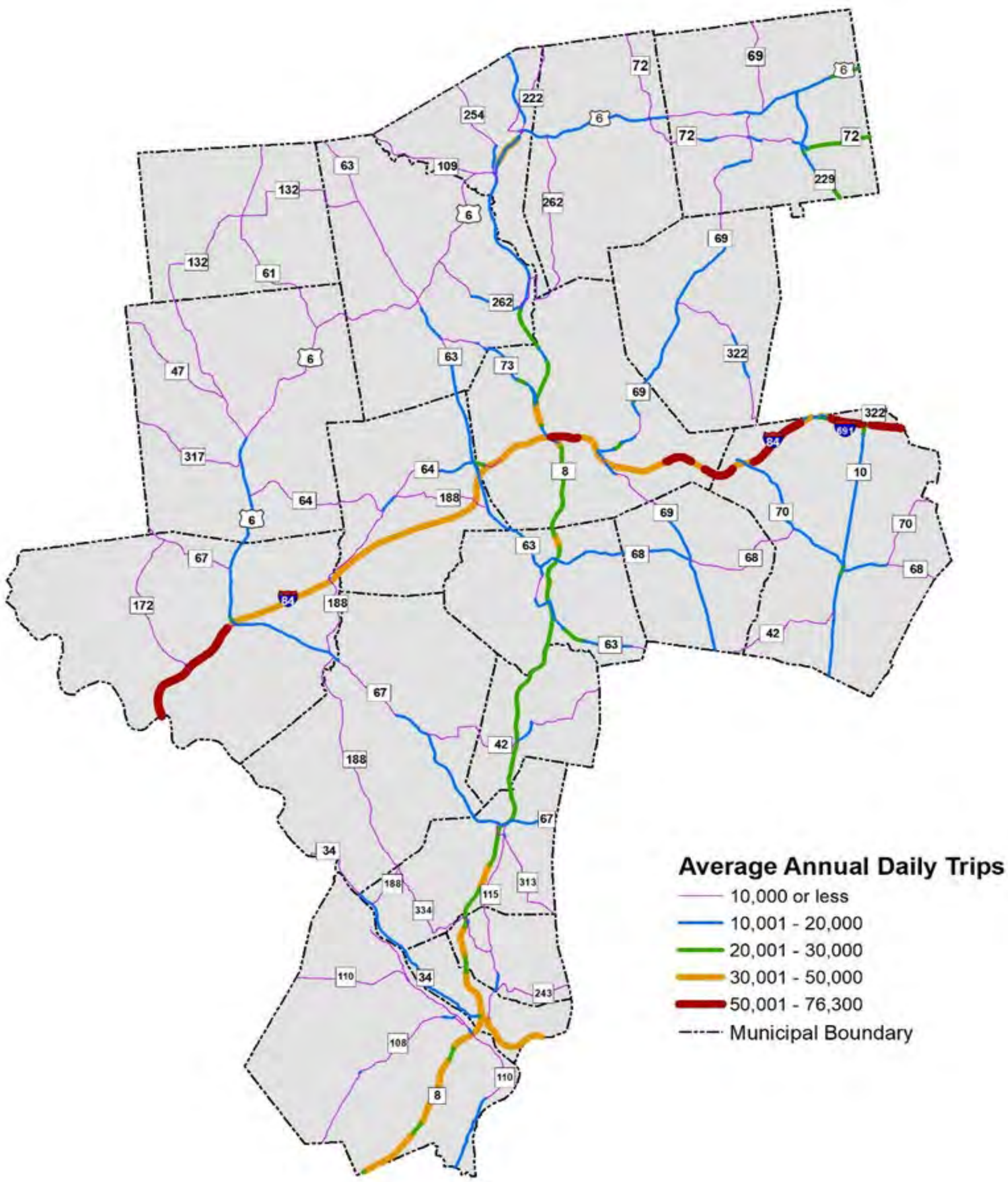
Connecticut Route 8 is the primary north/south route through the region and is the only limited access highway in the majority of NVCOG towns. To the south, Route 8 terminates at Interstate 95 in Bridgeport. North of the NVCOG region, the Route 8 Expressway ends in Winstead, where it continues into Massachusetts as a two-lane arterial road. Traffic along Route 8 peaks in Waterbury at an estimated 80,000 vehicles per day in 2018. Within the NVCOG region, but outside of the CNVMPO, Route 8 traffic also spikes at the Commodore Hull Bridge over the Housatonic River. This location, with an estimated 77,000 vehicles per day, is frequently congested.

Much like Interstate 84, Route 8’s construction has proven extremely detrimental to many of the communities it serves. Throughout the Valley, towns and cities were cut off from their riverfronts, downtowns separated from neighborhoods, and communities subjected to excess noise and pollution. These problems are particularly prominent in Derby, Seymour, Naugatuck, and Waterbury.

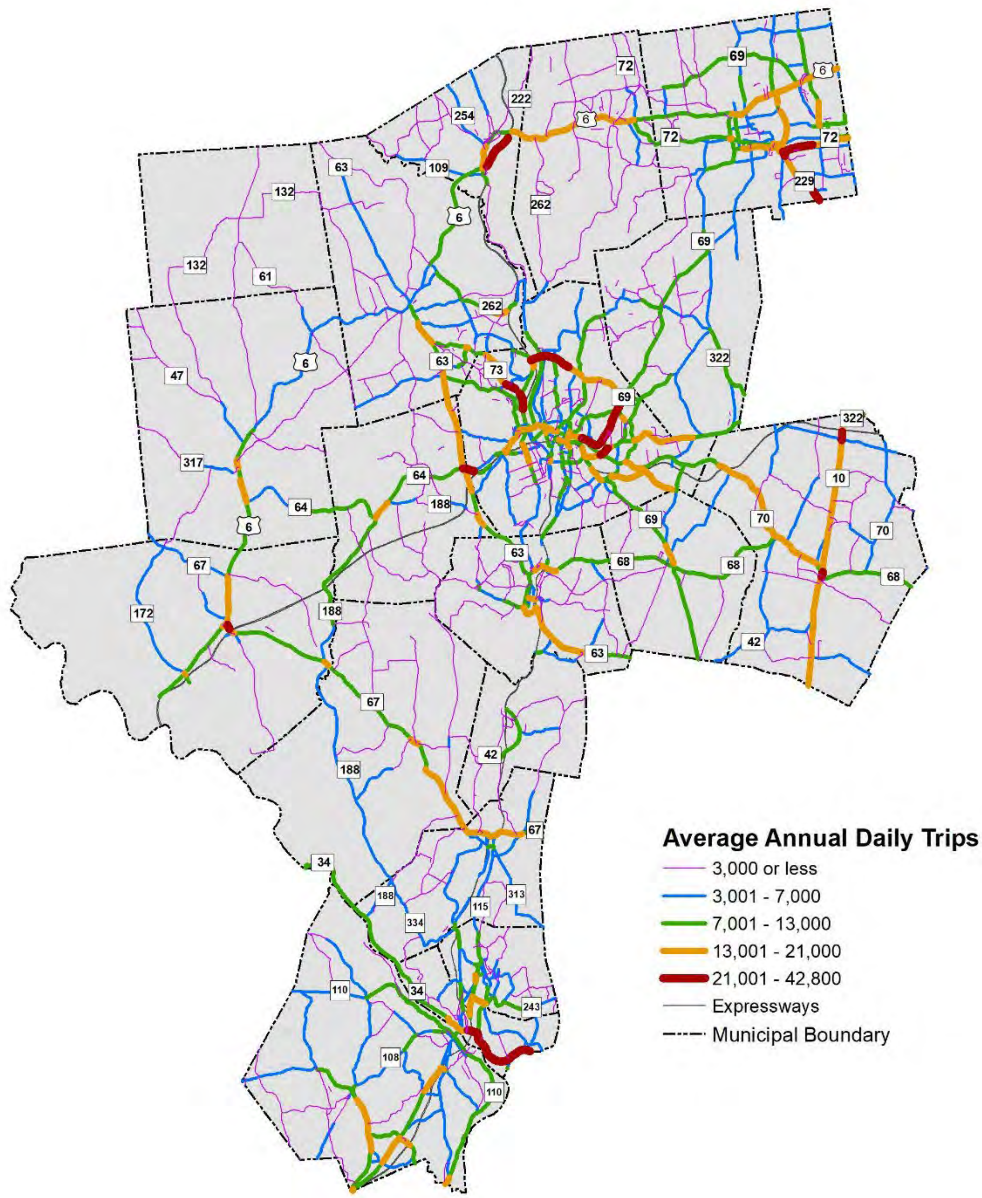
Interstate 691 is a spur route that connects Interstate 84 in Cheshire to Interstate 91 in Meriden, then continues as Connecticut Route 66 to an interchange with Connecticut Route 9 in

Middletown. This is an important truck route from the industrial and warehouse zones in northern Cheshire and a vital connection for freight from the rest of the region. Within the NVCOG region, traffic volumes peaked at 61,500 just east of the Route 10 interchange in Cheshire. The full peak, however, occurs near the interchange with Interstate 91 east of the region with a total of 82,000 vehicles per day.

The full highway network includes 120 miles of Expressway and 360 miles of arterial roads which facilitate the flow of traffic within and between municipalities. Some of the principal arterial routes within NVCOG are State Routes 10, 34, 63, 68, 69, 70, 72, 113, 115, 188, 229, U.S. Route 6, Pershing Drive (SR 727), and Waterbury South Main Street (SR 847). The following map shows the region's major roads.



Map 4.2 Average annual daily traffic on the region's expressway network



Map 4.3 Average Annual Daily Trips on the non-expressway network

COMMUTING PATTERNS

As a result of COVID-19, commuting patterns are much more difficult to identify than in previous years. Though many residents work outside of the region and many of the region's jobs are filled by workers who live outside of the region, an increase in remote work, telework, and gig work has modified many of the traditional commuting expectations.

The Naugatuck Valley Planning Region, however, does have a high percentage of workers that must be in person, including healthcare, manufacturing, and higher education. These positions, however, often do not align with traditional work hours, which contributes to how difficult it is to pin down peak hour commuting. As a result, the NVCOG has reduced its focus on commuting as a generator of traffic volume and relied more on real world traffic counts. Additionally, the traditional planning ethos of focusing on the commuting peak hour has left many people underserved by the transportation system. By focusing on full-day system reliability and safety it can be better assured that low-income and non-employed residents benefit equally from long-term projects.

The one metric considered in this area is the in/out movements of employees through the region. Because this number focuses on all employees and not just those in traditional office settings, conclusions drawn from it will not unfairly burden those traveling outside of the peak hour, and providing access for all employees is critical to the metropolitan transportation planning goal of supporting an economically vibrant region. Based on 2020 ACS data, there are 166,382 total employees that work within the NVCOG area. Of these, 51.6% live and work within one of the 19 towns that make up the region, while the remaining 48.4% travel into the region for work. These 80,493 individuals are essential to the companies that call the NVCOG region home and maintaining easy access into the region for them is a priority for this plan, especially using public transit modes.

Similarly, of the 220,757 employed individuals that live within the NVCOG region, 61.1% work outside of the 19 towns that make up the NVCOG. For the 134,868 individuals commuting to an employment site in Hartford, New Haven, Bridgeport-Stamford, or the New York Metro area, safe and quick connections to these regions is equally important. Addressing unemployment and underemployment within the region require this access to be improved further. The goal for the region is to improve public transit connections to these job sites.

TRENDS

The COVID-19 pandemic increased the pace of disruptive trends in commuting patterns that had already begun. These changes, tied with broader patterns in the types of jobs held by NVCOG residents, have dramatically and permanently impacted travel patterns in the region. Demand is now spread over a much larger portion of the day, with significant morning and evening peaks seeing slight reductions as volumes throughout the rest of the day increased.

For those who are still commuting, rising housing costs and limited availability of both rental and owned housing stock have been leading to increasingly long commutes. As a relatively affordable region in a very expensive state, this has meant that commuters have sought homes in the Naugatuck Valley despite their commutes to Hartford, New Haven, Bridgeport, Stamford, and New York City.

Reckless and aggressive driving has become a significant problem since the onset of the COVID-19 pandemic. In 2020, significantly reduced traffic volumes allowed for higher speeds and more dangerous driving in areas that typically were congested, and these habits have carried through the return of pre-pandemic volumes.

SAFETY

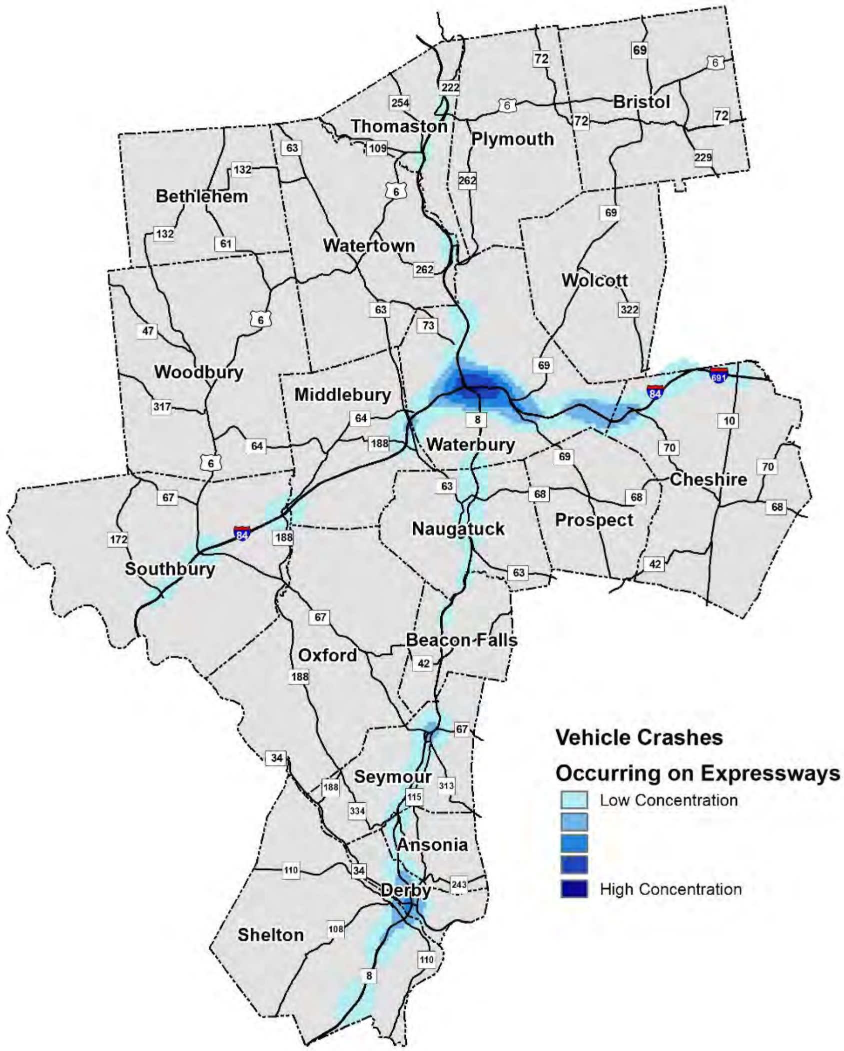
The NVCOG has adopted a regional approach to highway safety and will continue to work with CTDOT and our municipal members to best ensure that our transportation system is safe. The region's Vision Zero goal dictates that fatalities and serious injuries are avoidable, and it is the policy of the NVCOG and member municipalities to work toward eliminating these events. A full Vision Zero implementation plan is in development and will establish collaborative and ongoing steps that can be taken to avoid fatalities.

Vision Zero dictates a data-driven approach to safety. This includes regular reporting on crash data in the region, identification of serious injury and fatality hot spots, and development of implementation plans to address dangerous areas both in a quick-build and long-term fashion.

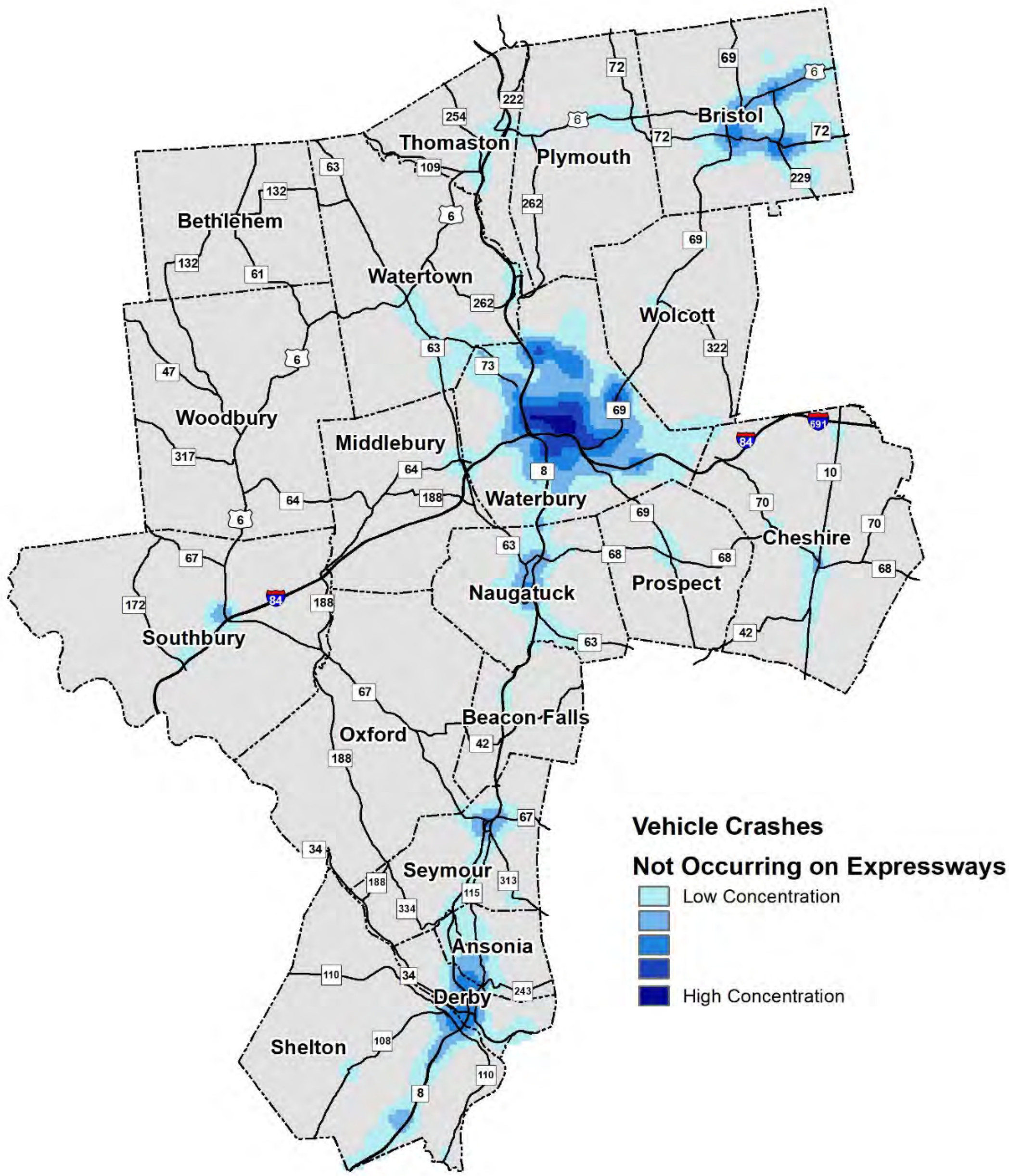
Figure 4.1 The Vision Zero approach to traffic safety. Resources such as this are available from the Vision Zero Network, visionzeronetwork.org

NVCOG additionally participates in regional and statewide initiatives to improve enforcement, education, and emergency response.

For Vision Zero planning purposes, the region looks separately at the three major limited access roadways and the rest of the transportation system. Because of their limited access nature, the region's freeways do not have as direct a negative impact on vulnerable users, but still represent significant barriers to the goal of zero fatalities.

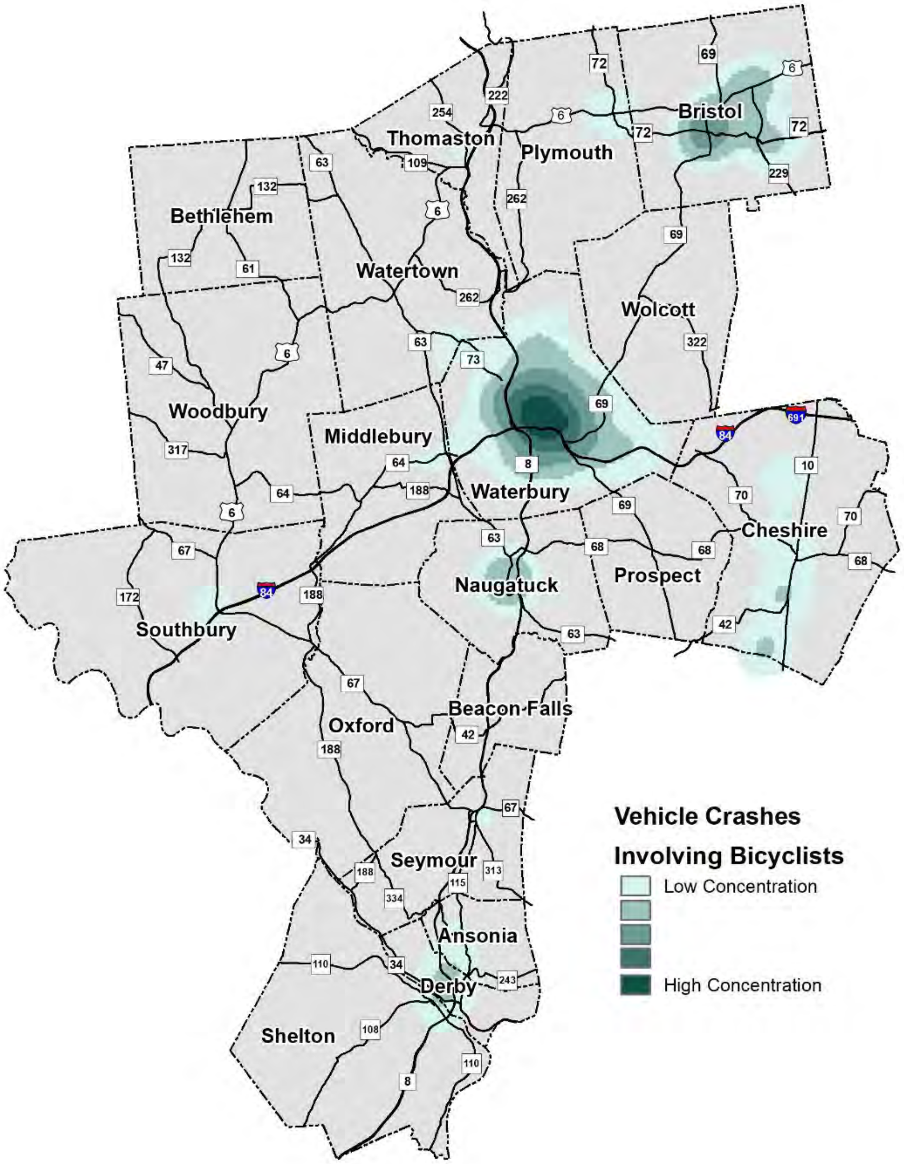


Map 4.4 Crash frequency on the limited access expressway network, UConn Crash Data Repository



Map 4.5 Crash frequencies on the non-expressway network

As demonstrated by the above maps, crashes in the region are in urban centers, providing a need for additional protection for vulnerable users. Cyclists and pedestrians are uniquely at risk in a crash involving a car as they do not have the protection of the vehicle.



Map 4.6 Crash frequencies for cyclists

Because cyclists are considered vehicles, they are often expected to ride within travel lanes. While this can be safe and comfortable for cyclists on slow speed, low volume roads, most of the region's popular cycling routes have a higher volume of cars and travel speeds are faster, which means that cyclists should be separated from car traffic. Information provided by the Institute for Transportation Engineers suggests that separated bike lanes or shared use paths are desirable on roads with more than ~7,000 vehicles per day or where the speed limits exceed 25 mph. Further information on this topic is included in Chapter 6 – Active Transportation within this document.

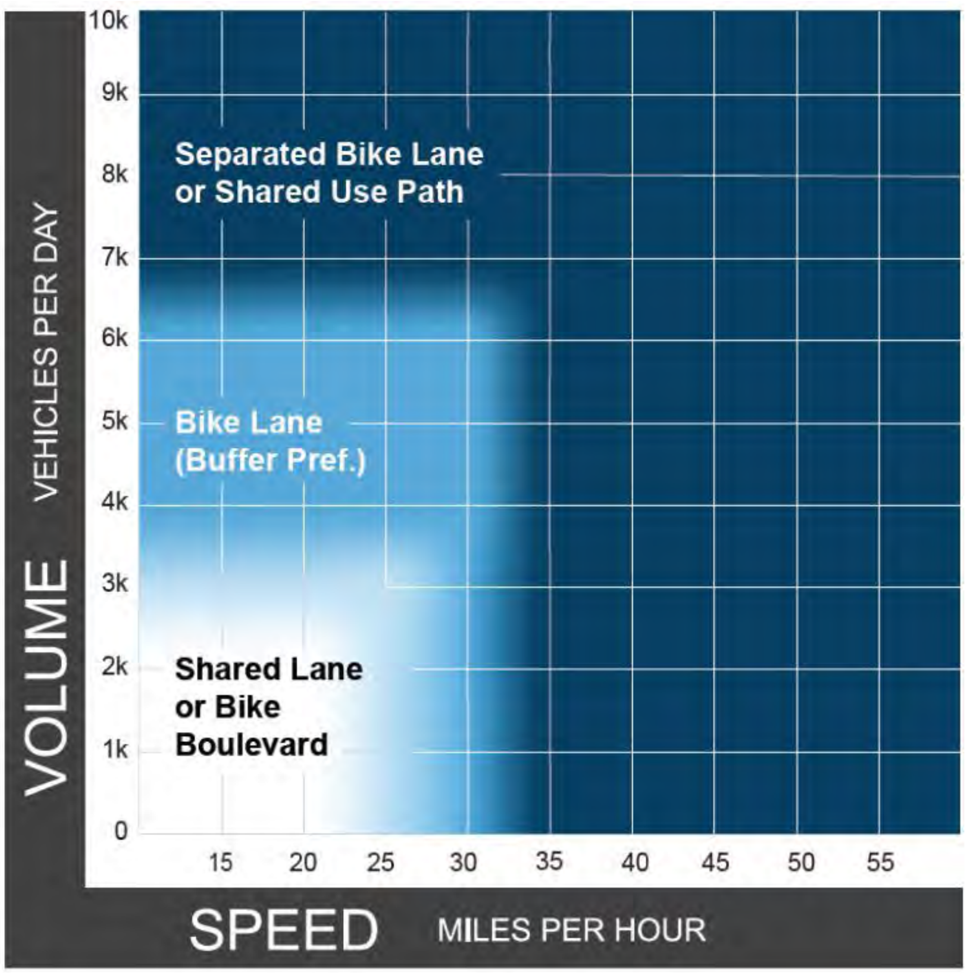
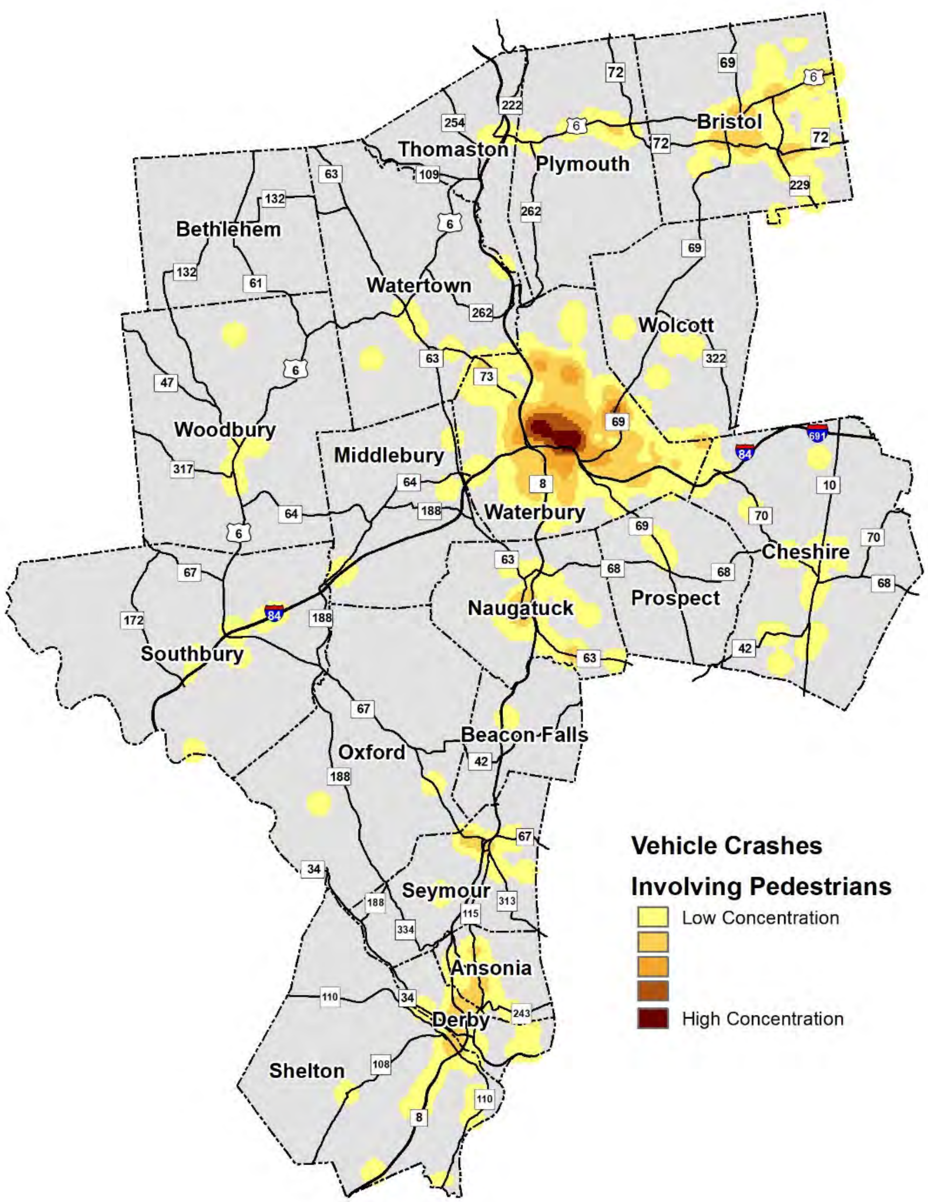


Figure 4.2 Guidance from the Institute of Transportation Engineers regarding bicycle facilities

Similarly, those walking/rolling throughout the region are both especially vulnerable and often do not have safe space along the region's roads. Sidewalks can be incomplete or poorly maintained, and many are disrupted by utilities and roadway signs that provide small or interrupted space. Crosswalks pose a unique threat to pedestrians as well, with vehicles attempting to turn right-on-red, long wait periods before pedestrian crossing, and crossings that are often too short for many individuals.



Map 4.7 Pedestrian crash frequency within the NVCOG region

4.2 PERFORMANCE-BASED PLANNING

In the last two decades, states and MPOs, including the CNVMPO, have come to rely on performance data to guide planning, programming, and strategic decision-making. This approach is called performance management, and the 2012 federal Moving Ahead for Progress in the 21st Century Act (MAP-21) required states and MPOs to include it in transportation planning documents. The Fixing America's Surface Transportation Act (FAST Act) of 2015 re-emphasized the performance management requirements of MAP-21. In addition, the USDOT published the Final Rule on implementing performance-based transportation planning in May 2016. The rule requires the CTDOT, CNVMPO, and transit operators to use specific measures to document expectations for future performance.

Performance-based planning and programming refers to the application of performance management within the transportation planning and programming process to achieve desired performance outcomes for the multimodal transportation system. Performance-based planning uses goals, objectives, and trends analysis to develop strategies and priorities in the Metropolitan Transportation Plan (MTP), Congestion Mitigation and Air Quality Improvement Program (CMAQ), and other performance-based plans. Recipients of Federal-aid highway program funds and Federal transit funds must link the investment priorities contained in their TIP to achieving performance targets that are in the statewide transportation plan. Throughout the performance-based planning process, public involvement and data are critical.

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.

Figure 4.3 Flowchart of the planning process

The following stages are core elements of the performance-based planning and programming process:

- Strategic direction – Where do we want to go?
- Planning analysis – How are we going to get there?
- Programming – What will it take?
- Implementation and Evaluation – How did we do?

STRATEGIC DIRECTION

In transportation planning, stakeholders and the public set a strategic direction based on a vision for the future.

- Goals and objectives – Goals address key desired outcomes. Objectives are specific, measurable statements that support achieving those goals and shape planning priorities.

  NVCOG's goals for the 2023-2050 MTP are: to progress the goal of Vision Zero, manage congestion, improve safety, ensure transportation system security, advance technology, preserve and enhance public transportation services, expand multi-modal opportunities, enhance the efficient movement of freight and goods, enhance pedestrian and bicycle facilities, mitigate environmental impacts, promote sustainability, promote economic development and revitalization, practice environmental justice, and ensure transparent and active public engagement.

Specific objectives for these goals are listed in Chapter 3.2 of this document.

- Performance measures – Performance measures support objectives and allow agencies to compare alternative improvement strategies and track results over time. NVCOG adopts CTDOT's performance measures in the areas of highway safety, transit, pavement and bridge condition, system reliability, freight movement, and air quality.

PLANNING ANALYSIS

Based on performance data, public involvement, and policy considerations, agencies conduct analysis to develop investment and policy priorities.

- Identify trends and targets – The agency sets preferred trends and/or specific targets for each performance measure. These are based on past trends, forecasting tools, and information on possible strategies, available funding, and other constraints. NVCOG adopts CTDOT's performance targets, which are identified in Chapter 2.6 of this document.
- Identify strategies and analyze alternatives – Performance measures help the agency assess strategies and prioritize options. This may include scenario analysis.
- Develop investment priorities – The MTP and other long-range plans guide strategies that will help reach performance targets.

PROGRAMMING

Programming involves selecting investment priorities to include in the TIP/STIP and/or Capital Plan that will reach the performance targets and desired outcomes.

- Investment plan – This connects long-range plans, like the MTP, to projects selected in the TIP/STIP. CTDOT publishes an Investment Plan as part of the Transportation Asset Management Plan.
- Resource allocation and program of projects – Prioritizing projects helps to identify specific investments for the TIP/STIP or Capital Plan. Projects should show how they can meet performance objectives.

IMPLEMENTATION AND EVALUATION

These steps should be ongoing.

- Monitoring – Gathering data on actual conditions.
- Evaluation – Analyzing data to determine if strategies are meeting goals.
- Reporting – Agencies should tell stakeholders, policymakers, and the public how well transportation systems and plans are doing.

4.3 HIGHWAY PERFORMANCE MEASURES

The Federal Highway Administration has established a series of performance measures designed to ensure the nation's highways and roads are maintained in a safe and usable condition. These performance measures are identified below in three categories; safety, congestion, and system condition.

SAFETY

The Federal Highway Administration has codified highway safety into a series of five performance measures, which in Connecticut are monitored at the state and MPO level. The five performance measures are: 1. Number of fatalities, 2. The rate of fatalities, 3. Number of serious injuries, 4. The rate of serious injuries, and 5. Non-motorized fatalities and 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 set ambitious targets despite a recent rise in roadway injuries and fatalities. The penalty for missing those targets is a lack of ability to flex dedicated safety money to other transportation projects, something the CTDOT has already decided against. This gives the state more power to set and meet aggressive targets. The NVCOG and CNVMPO endorse the aggressive stance and will continue advocating for a Vision Zero setting a date when the targets for fatalities and serious injuries are zero. Within the NVCOG region, this target is currently set at 2060.

Measure	2022 Target	2023 Target
Number of fatalities	270 fatalities/year	270 fatalities/year
Rate of fatalities	.850 fatalities/100 Million VMT	.850 fatalities/100 Million VMT
Number of serious injuries	1,300 serious injuries/year	1,300 serious injuries/year
Rate of serious injuries	4.30 serious injuries/100 Million VMT	4.30 serious injuries/100 Million VMT
Number of non-motorized fatalities and non-motorized serious injuries	280 fatalities and serious injuries/year	280 fatalities and serious injuries/year

Table 4.1 Safety Performance Measures and Targets

An analysis of crash data within the region during the period of the previous MTP yields the following results:

Year	Number of fatalities	Number of serious injuries	Number of non-motorized fatalities and non-motorized serious injuries
2019	32	174	43
2020	38	171	34
2021	30	207	30
2022	31	175	29
Total	131	727	136

Table 4.2 Crash data analysis during previous MTP period within NVCOG

For comparison, the data table presented in the 2019 CNVMPO MTP is below:

Year	Number of fatalities	Number of serious injuries	Number of non-motorized fatalities and non-motorized serious injuries
2014	20	175	26
2015	48	171	33
2016	40	210	37
2017	43	172	38
Total	151	728	134

Table 4.3 Crash data analysis during previous MTP period within CNVMPO

TRENDS

At the regional, state, and national level, traffic injuries and fatalities have increased during the past several years. At all levels of government and academia, research has been done to identify the cause of this increase, especially since traffic volumes decreased during the COVID-19 pandemic. While it is impossible to know the exact reasons, it is commonly believed that a reduction in congestion has allowed motorists to drive faster, and that frustration and stress from life impacts caused by the pandemic have caused drivers to calculate the risk of driving differently.

In addition to higher speeds and reckless driving, the movement of residents back to urban areas, plus pandemic related need for outdoor activities have resulted in larger numbers of pedestrians and cyclists in the transportation system. While this is a positive that should be encouraged to continue, the current system is not designed for the safety of these users and must be updated to ensure cyclists and pedestrians are safe.

SYSTEM CONGESTION

Congestion occurs when more people are driving, cycling or walking than a road, bike path or sidewalk can accommodate. In our region, congestion is a significant challenge for moving people and goods, especially on our limited access freeways and interstates. According to the FHWA, 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, locations specific projects and programs can be proposed.

Metropolitan Planning Organizations representing urban areas with populations greater than 200,000, also known as Transportation Management Areas (TMAs), must maintain an ongoing Congestion Management Process (CMP) to ensure that future programming of projects can address issues of system reliability and delay. As the CNVMPO pursues TMA status for the Waterbury Urban Area, the region will develop a comprehensive CMP that addresses the region's expressways, major arterial roadways, and considers the impacts of transit on congestion. For the purposes of this plan, however, a more limited focus will be placed on congestion along the region's expressways, with additional data collected and presented on travel time reliability on the national highway system network.

Data in this section is pulled from the National Performance Measure Research Data Set (NPMRDS), a key tool used by MPOs to measure critical data.

Figure 4.4 Photo Source: CTDOT MixMaster Rehab Project

Interstate 84

Interstate 84 provides the region's primary east-west route and is a primary connector between New York and the rest of New England. This highway is vital for travelers and freight.

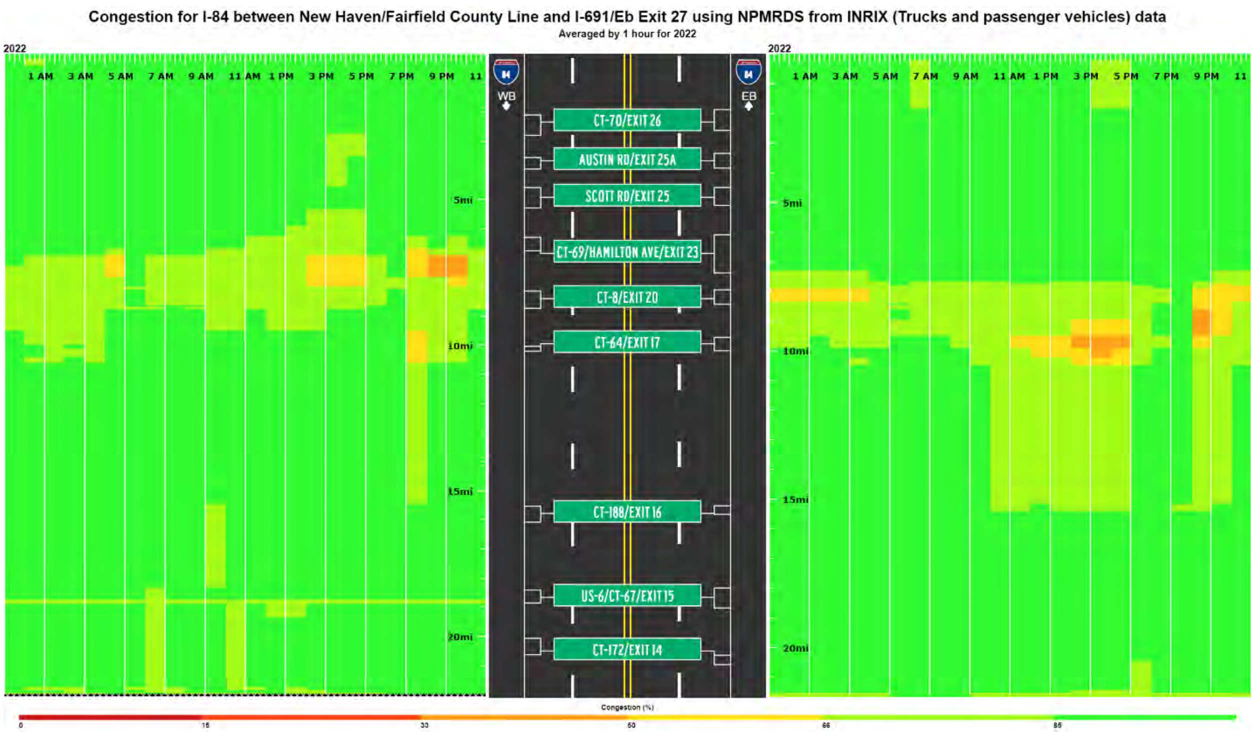


Figure 4.5 I-84 Congestion within NVCOG

Utilizing full year data for 2022, the congestion scan provided by the NPMRDS for Interstate 84 within their region shows minimal delays in most locations, with congestion mostly focused around the MixMaster in Waterbury, between exits 23 and 17.

Interstate 691

Only a short section of this spur route is in the NVCOG region, but this segment passes through the heavily shipping and warehousing focused northern end of Cheshire and is vital to the economy of the region.

Though not available through the NPMRDS, congestion is common during morning and evening peaks at the interchange between Interstate 84 and Interstate 691. A a proposal to improve ramp geometry and capacity is included in the project listing.

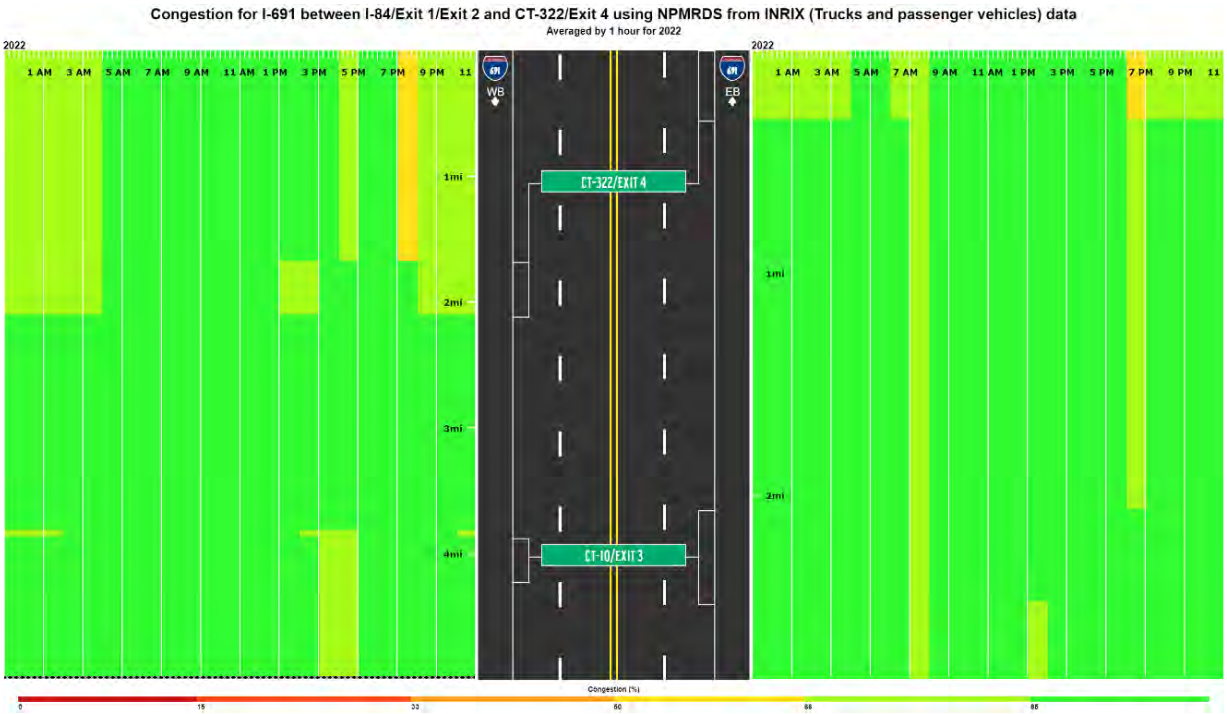


Figure 4.6 I-691 Congestion within NVCOG

CT Route 8

As the primary north-south route in the region, Route 8 is also vital to the area and suffers from regular congestion at key spots, notably at the Route 8/Interstate 84 interchange and at the Commodore Hull Bridge over the Housatonic River between Shelton and Derby.

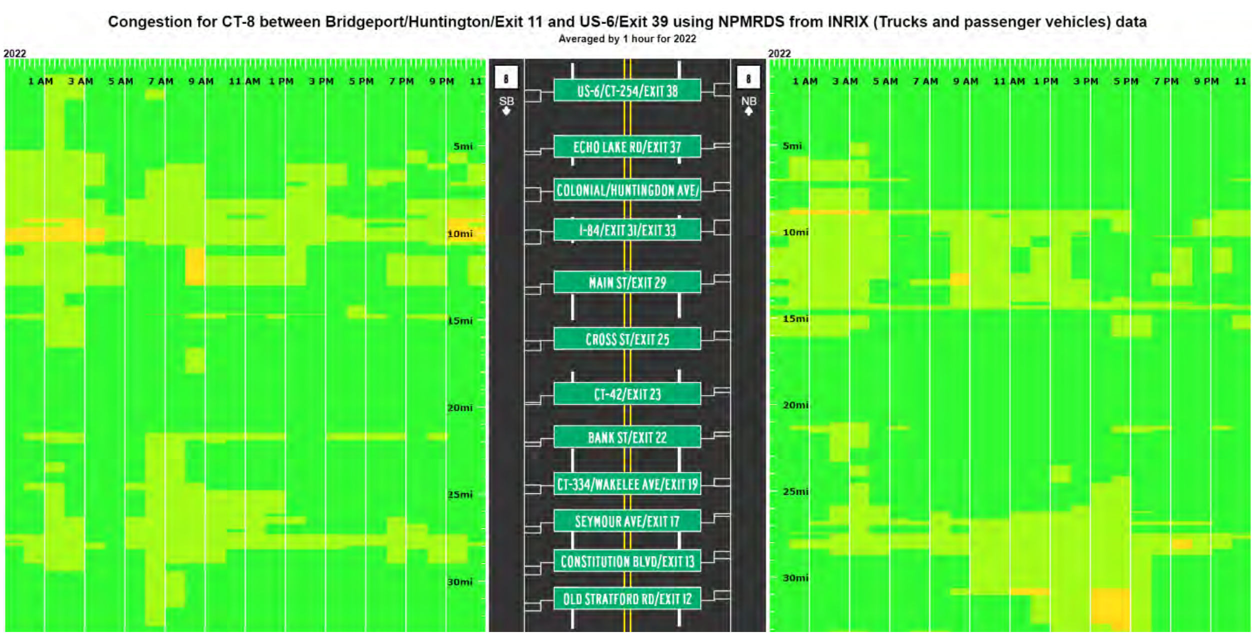


Figure 4.7 Route 8 Congestion within NVCOG

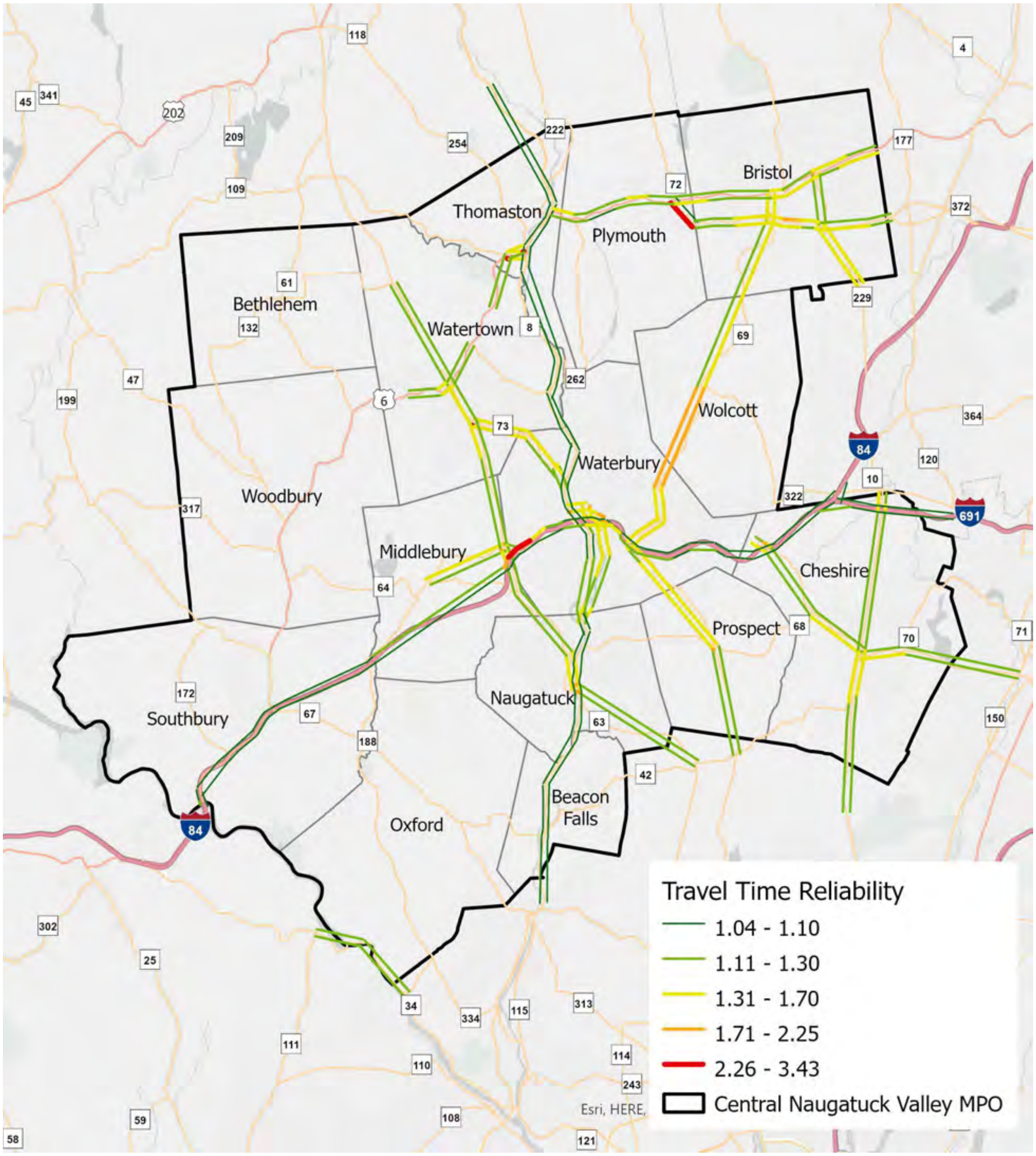
Two additional measures used to track highway functionality are the Level of Travel Time Reliability (LOTTR), which looks at how consistent travel times are along the system, even if that consistency includes recurring delays, and Truck Travel Time Reliability (TTTR), a similar measure for the movement of freight. These measures will both be examined further in the region's forthcoming CMP.

LOTTR

The second measure of congestion 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), using data from FHWA's National Performance Management Research Data Set (NPMRDS). NVCOG analysis identified the relevant portions of the NHS that are reliable and unreliable. The reliability of a road segment is an important factor in how drivers assess the congestion on their commute. Regular congestion is seen as less offensive than unpredictability. Nowhere is this truer than in the freight industry.

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 percentage of the person-miles traveled on the Interstate section and the non-Interstate NHS that are reliable.

FHWA has identified 90% reliability as the target for travel time reliability. Within the NVCOG region, for the year 2022, both the interstate and non-interstate NHS met this measure, with interstate LOTTR at 97.2% and non-interstate NHS LOTTR 95.6% reliable. As can be seen on Map 8, reliability issues within the region are located mostly along non-interstate arterials. These roads are vital connections between cities in west-central Connecticut, and efforts to improve connection between these cities via public transit and non-motorized facilities to better accommodate all travelers on these roads.



Map 4.8 Level of Travel Time Reliability on the CNVMPO's major road network

TRUCK TRAVEL TIME RELIABILITY (TTTR)

Reliability for truck travel is a critical measure for the trucking industry, and reliability on the region's highways can contribute to growth or stagnation of the region's economy. Truck travel time reliability uses a similar process to travel time reliability, not penalizing a region for congestion but instead for sporadic congestion. The Federal Highway Administration identifies a truck travel time reliability target of 1.5 as preferred. Within the CNVMPO the TTTR is 1.65, slightly above the national target.

Projects identified within this plan work to address locations of sporadic congestion to improve travel time reliability for all users, especially for the freight industry that does not necessarily use the expressway system during peak hours. As can be seen in the below image from the CMPRDS, the least reliable sections of the network are on the approach to Waterbury on Interstate 84. Additional information about truck travel time reliability will be presented in the forthcoming Waterbury Urban Area CMP.

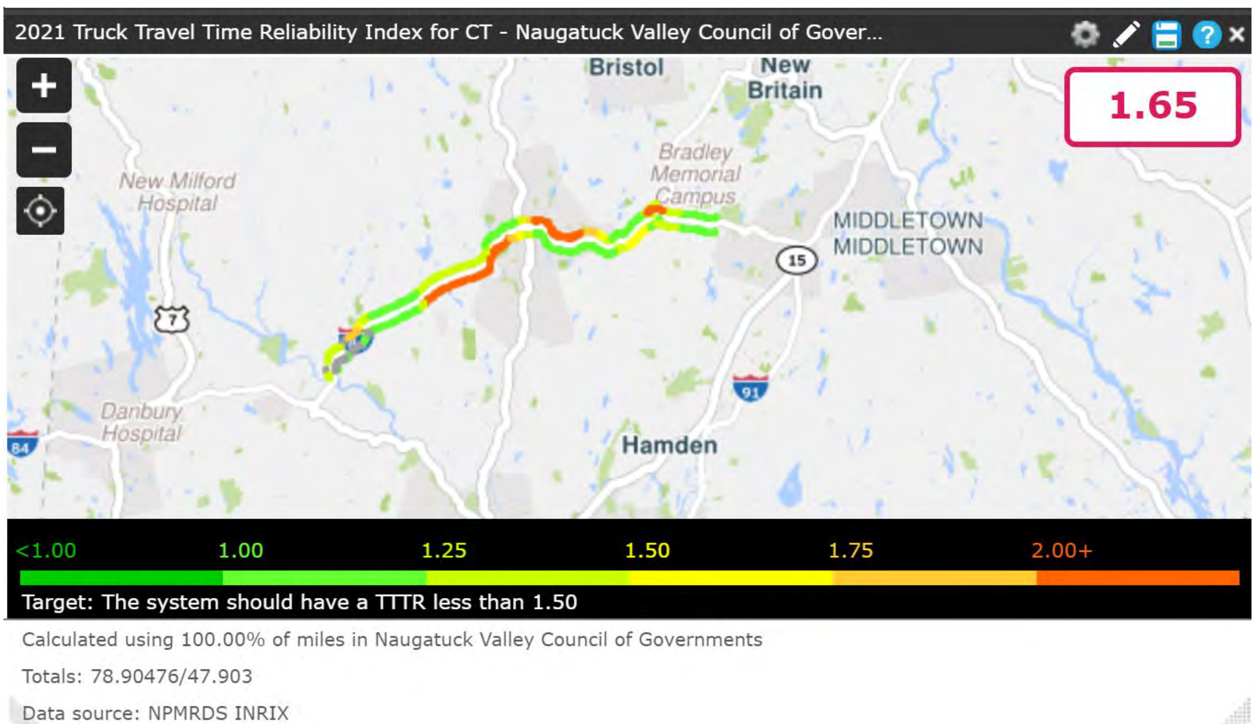


Figure 4.8 Truck Travel Time Reliability within NVCOG

BRIDGEPORT-STAMFORD CMP

In addition to data across the CNVMPO, portions of the region are part of the Bridgeport-Stamford TMA, and therefore are covered under the TMA wide Congestion Management Process. NVCOG staff, along with staff from the CT MetroCOG and WestCOG, prepared the 2023 Bridgeport-Stamford CMP in conjunction with NVision50 and their respective MTPs. This process identifies the most significant issues within the TMA and the strategies proposed by the MTPs of the three MPOs to address these issues. The full CMP was adopted by the CNVMPO Board at the February 17, 2023, meeting and is included as Appendix E of this document.

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 allows the infrastructure to function 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, (2) the percent of the Interstate system in Poor condition, (3) the percent of the non-Interstate National Highway System (NHS) in Good, 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, 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	4-year targets (2025)
Percent interstate in **good** condition	68.6%	72.0%	70.0%
Percent interstate in **poor** condition	0.2%	1.0%	1.3%
Percent Non-Interstate NHS in **good** condition	37.9%	37.0%	35.0%
Percent Non-Interstate NHS in **poor** condition	1.8%	2.7%	3.5%

Table 4.4 Pavement Condition within NVCOG

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	4-year targets (2025)
Percent in **good** condition	14.1%	14.2%	14.5%
Percent in **poor** condition	7.7%	6.2%	6.0%

Table 4.5 Bridge Condition within NVCOG

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:

Transportation Asset Management Plan (TAMP) acts as a focal point for information about the assets, their management, 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(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. (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 repair needs are selected from the TAMP for inclusion in the STIP and TIPs.

Between the DOT's commitment to improving current pavement conditions and the passage of major federal infrastructure spending, it is expected that the state of good repair for pavement and bridges will improve in the coming decades. However, this trend could be offset by the shift to electric vehicles with their increased weight, along with more on-road freight movements, which will lead to additional wear on the region's roads. The NVCOG will continue advocating for a state of good repair and fix-it-first spending within the region. Over the four year period of current goals both the percentage of pavement in good condition and pavement in poor condition increase. Utilizing preservation funding available through NVision50, however, the region believes that it is possible to reduce the percentage in poor condition by 2050.

NETWORK ACTIONS

The NVCOG is committed to improving the region's roads and highways in a way that supports freight and passenger movements without doubling down on mistakes of the past. This includes advocating for maintenance over roadway expansion, very limited and targeted expansions only in the places where they will have the greatest impact, and addressing the lasting impacts of highway construction on our municipalities and the health of our residents. Even with the influx of federal money, it is expected that transportation dollars will be insufficient to accomplish all the state's goals, so prioritizing those projects that improve mobility and quality of life is essential. The following action items are some of the NVCOG's priorities for the highway system.

- Utilizing well studied engineering solutions, implement safety improvements that reduce the severity of crashes when they happen, building off a safe-systems approach that prioritizes safety.
- The region will seek to maximize efforts as part of the Federal Local Bridge program, the State Local Bridge Program, and On-System Bridge Maintenance with the goal of getting all the region's bridges to a state of good repair.
- Improve pavement conditions across the region, with an extra focus on local roads in municipalities with the least resources to maintain their infrastructure.
- Promote solutions that improve incident management and the transfer of real time traffic information to improve reliability.
- Endorse small, targeted capacity increases in locations where these enhancements are likely to have the biggest impact on travel time and not negatively impact vulnerable communities.
- Encourage road diets and safety improvements on urban streets, integrating the tenets of a complete streets program to better serve all users and encourage non-motorized travel.
- Promote enhancements to public transportation, including shorter headways on the region's buses and more frequent and reliable service on the Waterbury Rail Line. Expanding services and improving station and stop amenities is included as a critical component of this goal.

- Encourage municipalities to welcome and push for transit-oriented development around the region's existing public transit assets, helping to remove vehicles from the road and therefore better utilizing the highway capacity that exists today.
- Encourage the adoption of cyclist training for all students at a young age, focused on both safety and technical skill to make cycling a more viable alternative for more of the population.
- Develop and encourage a curriculum for pedestrian safety within schools to ensure those walking/rolling are doing so safely from a young age.
- Coordinate with CTDOT to address high hazard areas, particularly on the many downtown streets located along state routes.

5.0 PUBLIC TRANSIT SYSTEMS

The Naugatuck Valley region is served by a range of public transportation options, including local, fixed-route bus services, commuter rail, paratransit services for the elderly and mobility impaired, and express bus services.

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

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

Paratransit services in the majority of the NVCOG region are provided by the Greater Waterbury Transit District (GWTD). The Valley Transit District (VTD) offers this service to the lower Valley communities of Ansonia, Derby, Seymour and Shelton.

Commuter rail services are operated along the Waterbury branch of Metro North Railroad under contract to the State of Connecticut, which owns the railroad right-of-way and funds the capital and operating costs of the service.

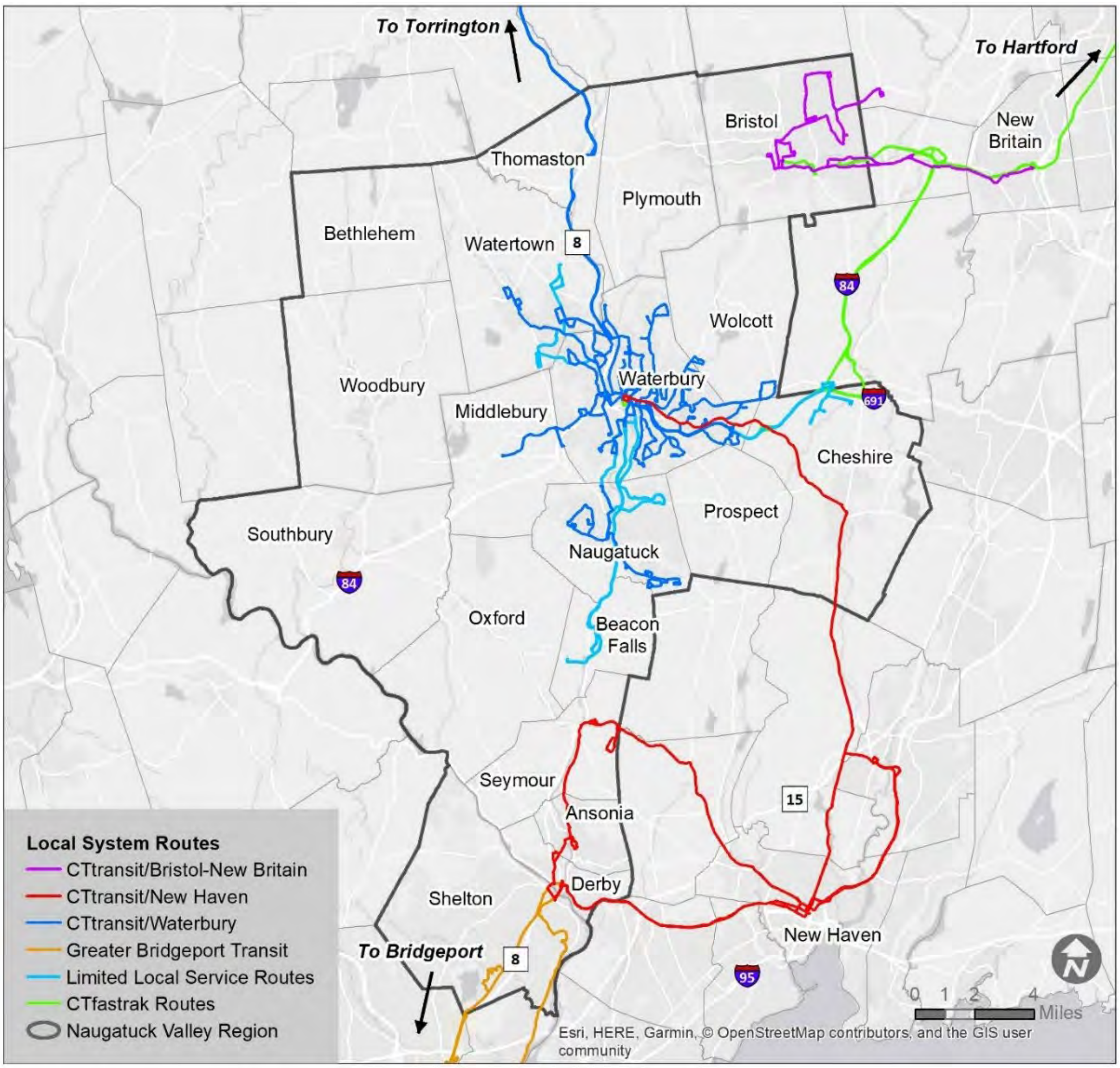
5.1 FIXED-ROUTE BUS SYSTEMS

CT*transit*'s Waterbury division provides most of its services within the NVCOG region and is centered on a pulse point at the Waterbury Green. This pulse point is served every 30 minutes by all the routes in the system allowing a relatively convenient transfer between the division's 28 local routes. In addition to the City of Waterbury, Waterbury division routes provide access to some portions of Cheshire, Watertown, Naugatuck, Wolcott, and Middlebury.

Two local routes operated by CT*transit*'s New Haven division extend into the NVCOG region: New Haven division Route 229 provides a connection between downtown New Haven and downtown Waterbury primarily via Route 10 through Hamden and Cheshire, while Route 255 provides service to downtown New Haven from Derby, Ansonia, and Seymour. Three routes of the CT*transit*-Bristol/New Britain division provide local service within Bristol and one route connects downtown Bristol with downtown New Britain. Four routes of the GBT system extend into the lower Valley area, providing service to the major corporate office and retail areas in Shelton as well as the Derby-Shelton rail station.

Although a substantial portion of the region is covered by local bus service, significant gaps remain between the urban core areas, such as the absence of a connection between Waterbury and the lower Valley towns, as well as between downtown Waterbury and downtown Bristol. Additionally, Oxford, Woodbury, and Southbury do not have any bus transit services within their borders. NVCOG will investigate the addition of micro and flex transit within these municipalities.

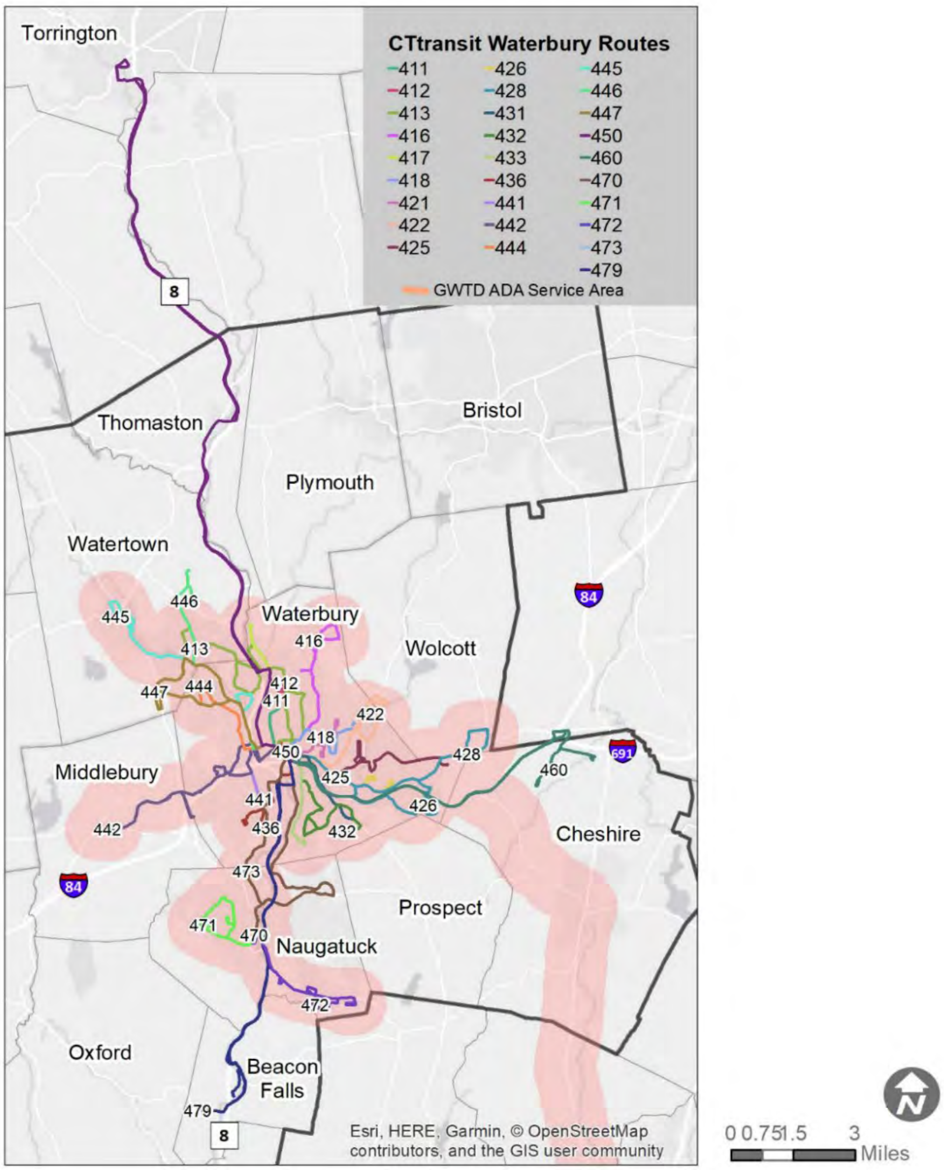
Four express bus routes operated by CT*transit*'s – Hartford division offer service within the region primarily oriented to Hartford-bound commuters. Two express routes originate in downtown Waterbury, one in downtown Bristol and one in Cheshire. The CT*fastrak* bus rapid transit (BRT) provides these routes a high-speed connection to downtown Hartford via the dedicated busway between New Britain and Hartford. In addition, a limited-stop bus route was initiated in 2017 between Torrington and Waterbury with stops in Thomaston. Another express route runs between Waterbury and Meriden. This route creates a connection between the Waterbury Branch Line (WBL) and the Hartford Line, as well as connecting to other local bus routes in Meriden and Waterbury. Local and express bus operations in the Naugatuck Valley region are shown in the map below.



Map 5.1 Fixed route buses within the NVCOG Region

CT*TRANSIT*-WATERBURY

The CT*transit*-Waterbury Division system provides the most service in the region with 28 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, 6:00 AM to midnight on Saturdays, and 9:30 AM to 5:00 PM on Sundays.



Map 5.2 CTtransit Waterbury Routes

The tripper[1] routes operate during the peak hours only in Waterbury and the surrounding communities.

CTtransit-Waterbury routes are presented in the following table.

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	157
412 Hill St	7/18	30	Waterbury	15	72
413 Oakville	7/18	60	Waterbury, Watertown	30	254
416 Bucks Hill/North Main St	7/18	30	Waterbury	30	352
417 Thomaston Ave	6/10.5	30	Waterbury	20	114
418 Long Hill Rd	7/18.5	30	Waterbury	15	179
421 Walnut St	7/18	60	Waterbury	15	94
422 Wolcott St	7/18	60	Waterbury	30	419
425 Hitchcock Lake	7/18	60	Waterbury, Wolcott	30	196
426 East Main St – Fairlawn/Meriline	5/12.5	60	Waterbury	60	277
428 East Main St – Scott Rd	7/10	50	Waterbury	20	148
431 East Mountain	5/12	60	Waterbury	15	20
432 Hopeville/Sylvan Ave	5/12	60	Waterbury	15	51
433 Hopeville/Baldwin St	7/18.5	30	Waterbury	15	323
436 Town Plot/Congress Ave	7/18.5	30	Waterbury	15	345
441 Town Plot/Highland Ave	7/18	60	Waterbury	15	85
442 Chase Parkway	7/18	60	Waterbury, Middlebury	12-25	112
444 Bunker Hill Ave	7/18	60	Waterbury	15	187
445 Watertown Ave	7/13	60	Waterbury, Watertown	30	208

[1] 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)

446 Watertown Industrial Park	5/9.5	2 trips	Waterbury, Watertown	20	51
447 Watertown/Straits Turnpike	5/9.5	2 trips	Waterbury, Watertown	20	35
450 Torrington	5/14	90	Waterbury, Torrington, Thomaston	45-70	108
460 Cheshire Industrial Park	5/10.5	3.5 trips	Waterbury, Cheshire	25	39
470 Naugatuck Industrial Park	5/9	3 trips	Waterbury, Naugatuck	30	69
471 Naugatuck/Millville	5/7.5	80	Naugatuck	40	30
472 Naugatuck/New Haven Rd	5/7	80	Naugatuck	40	9
473 Naugatuck/Spring St	5/5.5	80	Naugatuck	15	10
479 Beacon Falls	5/9.5	2 trips	Waterbury, Beacon Falls	25	106

Table 5.1 CTtransit Waterbury ridership data

The CT*transit* Waterbury network on average has longer headways compared to other bus networks within the state. A sampling of CT*transit* New Haven routes has an average headway of 26 minutes. CT*transit* Hartford has an average headway of 29 minutes when comparing routes of similar size and scope to New Haven's. Doing the same for CT*transit* Waterbury, the average headway is 35 minutes. CT*transit* Waterbury has the largest headway out of nearby transit operators with their routes. The network also lacks rider amenities such as transit shelters at many locations and real-time bus tracking. The NVCOG is working closely with the City of Waterbury and NET to provide funding for improved rider amenities. The current system provides lots of service area but the long headways between buses deter riders form using the system. An update to the 2023 WATS study will explore alternatives to the system to decrease headways, increase service, and rationalize routes and route planning. Routes with less than 50 daily riders should be investigated to increase their ridership with improvements decreased headways or improved route planning. These improvements will be invested in the 2023 WATS study.

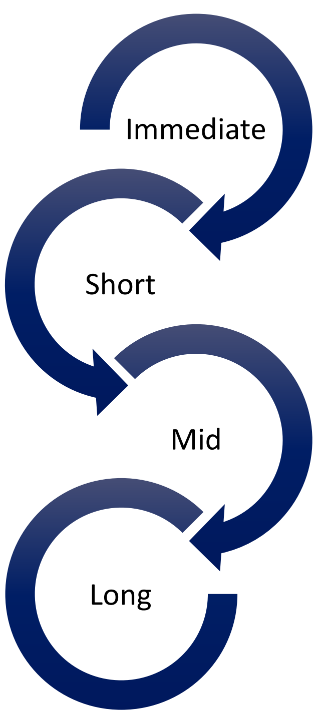
Recent capital improvements include a new maintenance facility and new fare system. The new maintenance facility is located at 761 Frost Bridge Road in Watertown. The new fareboxes include automatic vehicle location and automatic passenger counters.

CT*transit* Waterbury will be deploying 10 battery electric buses replacing 10 diesel buses in kind. This will allow CT*transit* to test the new 35-foot battery electric buses within the hilly terrain that is found within the Waterbury division. The bus facility in Watertown will be upgraded to accommodate these new buses and their technology. The goal is to prepare the entire transit network into a 100% battery electrification. CTDOT has committed funds for this project, but a temporary moratorium has been placed for battery electric bus acquisition. As mandated by the Connecticut Legislature, non-alternative fuel buses cannot be purchased starting in 2024.

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.

WATS 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 previous phase actions being implemented. Short-term recommendations include restructuring the Naugatuck tripper routes, providing all-day service between Naugatuck and Waterbury, 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.

NVCOG would like to perform another transit study within Waterbury to update and expand WATS. The goal of the next study will be the implementation of the findings within the WATS study.



- 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

Figure 5.1 Waterbury Service Improvements for Corridor Communities; NVCOG WATS

CT*TRANSIT*-NEW HAVEN

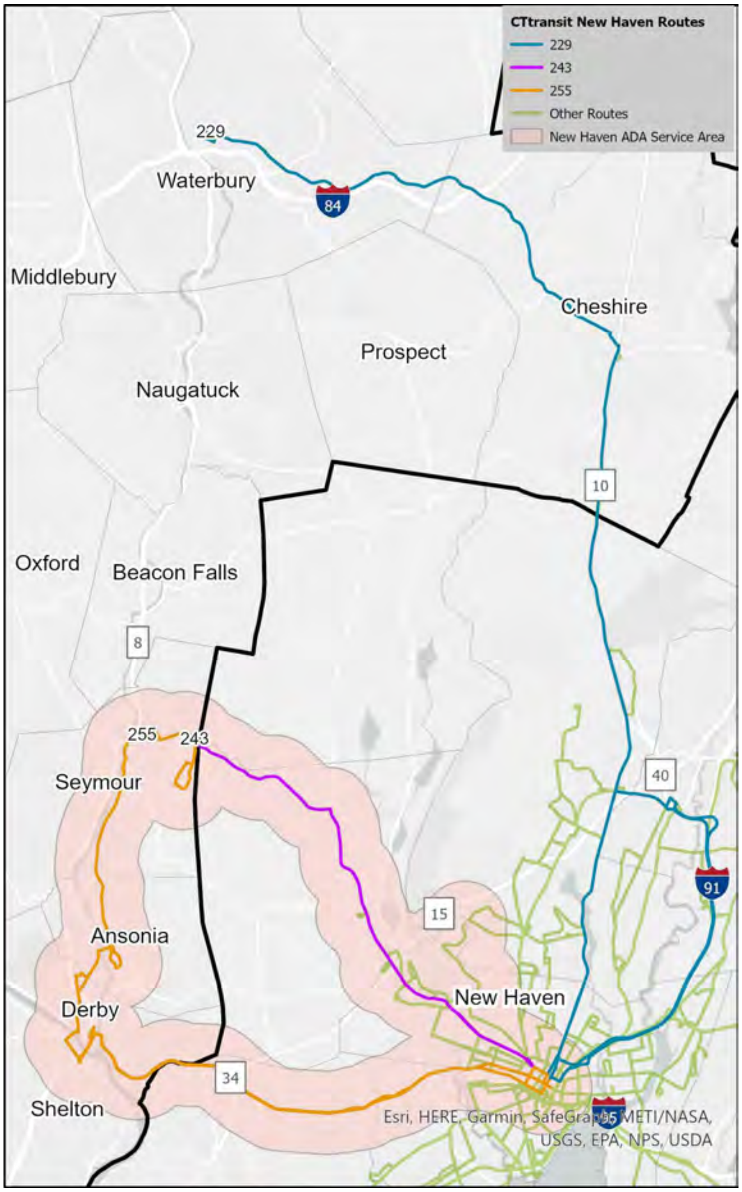
CT*transit*-New Haven contracts with HNS Management to operate 24 local bus routes and two commuter shuttles in New Haven and the surrounding communities. Service is provided seven days a week and generally operates from 5:00 AM to 1:00 AM on weekdays and Saturdays, and 6:00 AM to midnight on Sundays. 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. 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. 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 residential and commercial areas.

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 Greater Bridgeport Transit (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 first bus departs at 6:00 AM and the last bus starts its route from the valley towns at 7:42 PM.

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.

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 from New Haven, 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 Saturdays or Sundays.



Map 5.3 CTtransit New Haven Routes within the NVCOG Region

CTtransit-New Haven routes are presented in the following table.

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	551
255 Ansonia-Seymour	6/15.5	30	New Haven, West Haven, Orange, Shelton, Derby, Ansonia, Seymour	58	467

Table 5.2 CTtransit New Haven ridership data

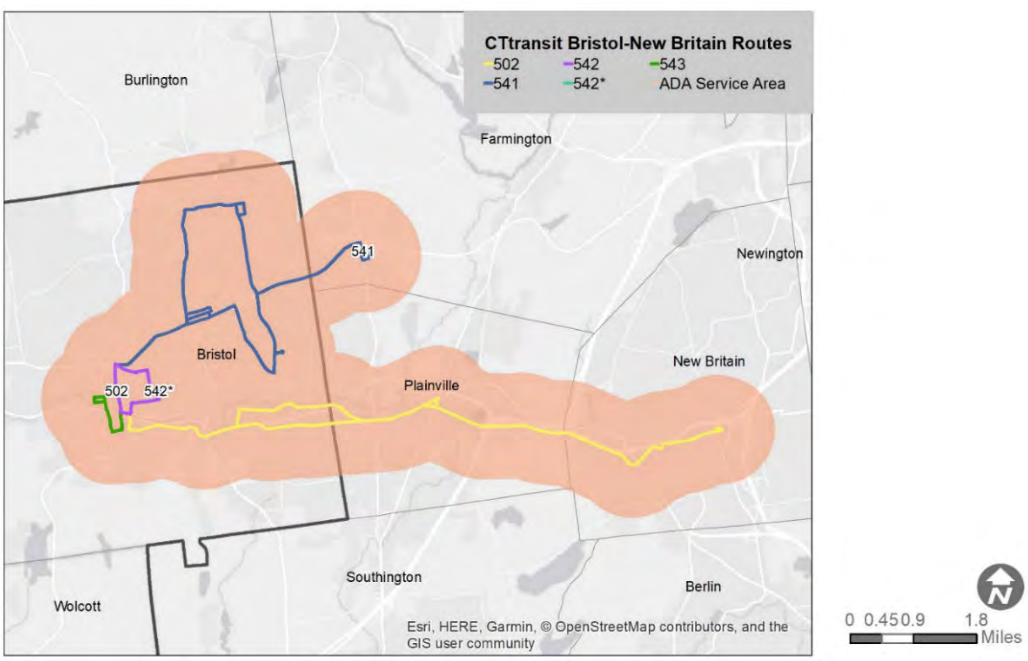
CT*transit*-New Haven conducted an alternatives analysis bus study called the "*Move New Haven Transit Mobility Study"* to develop and evaluate transit improvements for the Greater New Haven Region. The study was completed in 2019 and recommended converting the most utilized routes, 212, 238, 243, and 265 to BRT. Additionally, it recommended creating cross-town routes and improved bus stops throughout the region. 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 installed include automatic passenger counters, automatic annunciation. CT*transit* has recently upgraded 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 with a mobile application.

In 2021, CT*transit* in New Haven acquired 12 battery electric buses. The delivery and facility upgrade for the buses were completed in Fall of 2021.

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 within the Naugatuck Valley planning region; the other three municipalities are located in the 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). 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.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.

Figure 5.2 The former Forestville Train Station, Bristol



Map 5.4 CTtransit Bristol-New Britain Routes within the NVCOG Region

CTtransit-Bristol-New Britain routes are presented in the following table.

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	92
541 Bristol Local	7/16.5	60	Bristol	27-30	90
542 Bristol Hospital	5/18	60	Bristol	16	3
543 West Street	7/16.5	60	Bristol	7	14

Table 5.3 CTtransit Bristol-New Britain ridership data

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 route 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* operates 23 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. Three 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.

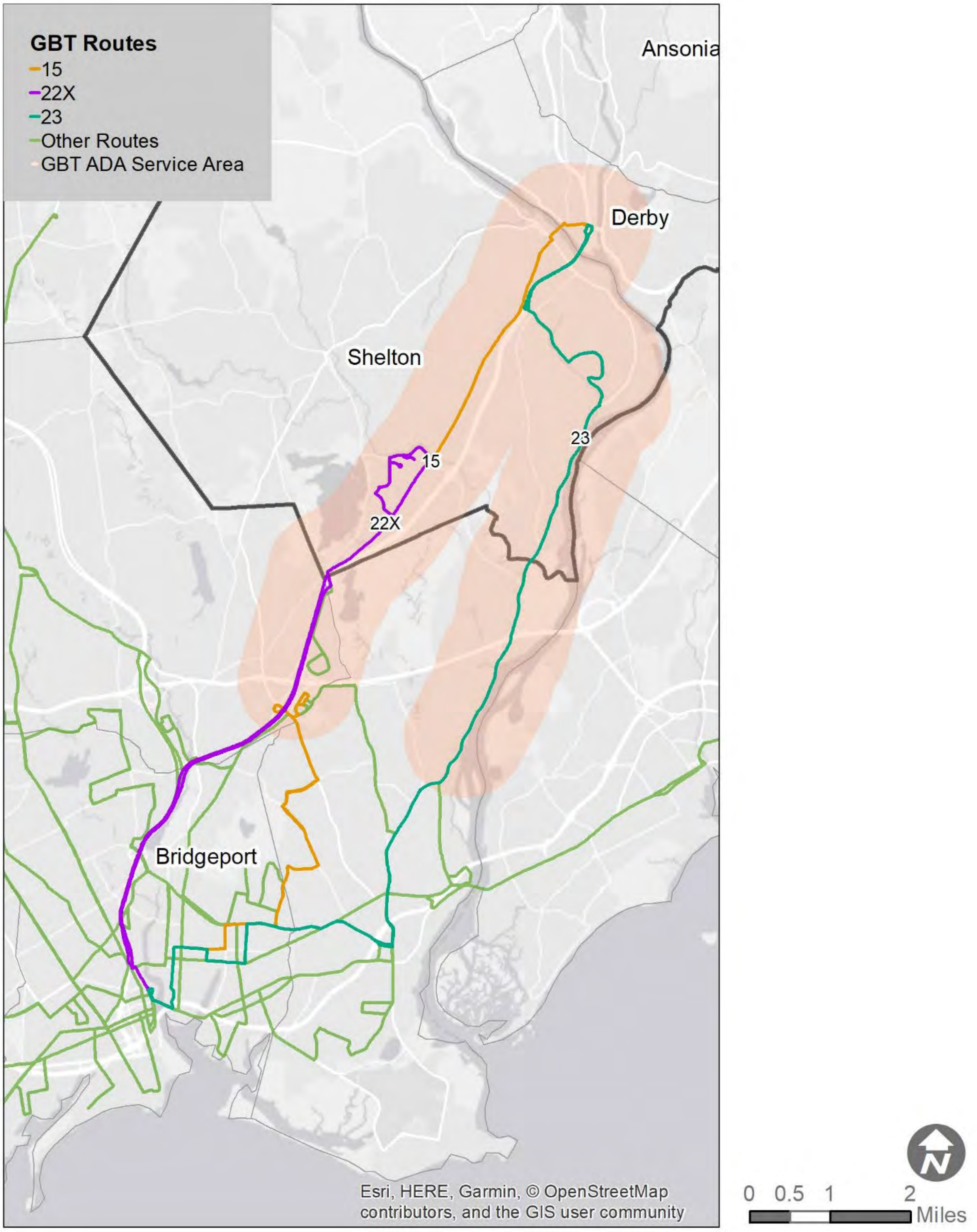
- Route 928 – Southington/Cheshire/Waterbury Express: Operates from the Waterbury rail station and through downtown Waterbury with limited stops and then operates non-stop on I-84 to the parking and ride lot at I-691 and then along Route 10 to the park and ride lot at Route 10 and I-84. It continues 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.
- Route 940 – Waterbury/Meriden: Operates a direct route from downtown Waterbury to the Meriden Transit Center. This route starts at the Waterbury train station and uses I-84 and I-691 to travel to Downtown Meriden. The route is notable for only having less than 5 stops local stops between the Waterbury train station and Meriden.

To provide additional commuter express service to Bristol, Route 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 29 and continue non-stop along Route 72 to the CT*fastrak* station in New Britain.

GREATER BRIDGEPORT TRANSIT (GBT)

The Greater Bridgeport Transit Authority (GBT) operates a total of 17 bus routes, two of these routes are express routes, and one route is 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 on-line through their bus tracker.



Map 5.5 Greater Bridgeport Transit Routes

CTtransit-Bristol-New Britain routes are presented in the following table.

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	87
Route 22X - Downtown Shelton via Route 8	5/11.75	3.5 Trips/day	Bridgeport, Trumbull, Shelton	37	13
Route 23 - Shelton via Rt. 110	5/13.5	60	Derby, Shelton, Stratford, Bridgeport	45	43

Table 5.4 GBT ridership data

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 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.

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 run is aligned 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.

GBT has recently purchased two battery electric buses in 2020 and are in regular service today. The purchase included two bus charging stations for these vehicles. The second phase of the project will include three more battery electric buses as well as three more charging stations for these buses. The end goal of the project will include infrastructure for up to 11 electric battery buses for the fleet.

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 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.

Two BRT systems are being considered:

- Shoulder Running BRT: 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 by-pass 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.

- Median Running BRT: This type of BRT system is comprised 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.

  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.

CT transit Bus

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 chooses to provide.

COMPLEMENTARY ADA PARATRANSIT SERVICE

The federal Americans with Disabilities Act of 1990 (ADA) requires transit districts that operate 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 operated. 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.

The 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 a special act (SA 71.71). It is comprised of 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 that comprise the VTD. 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 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. Fourteen handicapped accessible minivans are operated by the VTD.

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 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 region. 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 eligibility requirements as ADA-paratransit apply, but the services are available to riders who have 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, Waterbury, Thomaston, 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 the municipality’s day of service.

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 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[2]. Additionally, the 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.

FARE-FREE BUS SERVICE

Due to rising fuel prices in March of 2022, the State of Connecticut suspended the gas tax and implemented fare free bus service. The program was originally spanning from April 1st to June 30th, but it was first extended to November 30th, and then extended further to March 31st, 2023. Because of this, bus ridership began to climb, with bus ridership numbers exceeding pre COVID pandemic levels, which saw a reduced number of riders when the COVID-19 pandemic began.

The removal of fares on all bus services within the state allows many more people to utilize the service by allowing financially unstable individuals use the system for free. Additionally, free fares can get riders to try the bus system who may not normally do so. If these riders decide to continue using buses, there is a beneficial impact by taking a car that would normally be driving off the roadway.

[2] www.thekennedycenterinc.org/what-we-do/programs-services/mobility-services/mobility-management-project.html

The removal of fares has some other challenges associated with it. With the loss of ridership income, there is a reduction in funding for bus transit agencies. This can lead to reduced service or less capital improvement over time, which would dampen new ridership. Another issue is related to equity. While the free bus fares are beneficial, the impact it has on equity is less known. The free fares may assist those who are financially stable disproportionally to those who are financially unstable. If this is the case, this is further increasing the wealth gap, not closing it.

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, 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 Line between New Canaan and Stamford – four stations along its 7.9 mile section.
- Danbury Branch between Danbury and the South Norwalk rail station in Norwalk – seven stations along its 24.2 mile section.
- Waterbury Branch 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. The CTDOT completed infrastructure improvements along the WBL in 2020. The improvements consisted of installing a centralized traffic control signal system and Positive Train Control (PTC). By-pass sidings were constructed along four sections of track to permit bi-directional movement. The total investment amounted to about $115 million. Before these improvements were implemented the WBL was considered “dark” territory and only one train could operate on the line at any given time.

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 Terryville Secondary, 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 from the end 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.

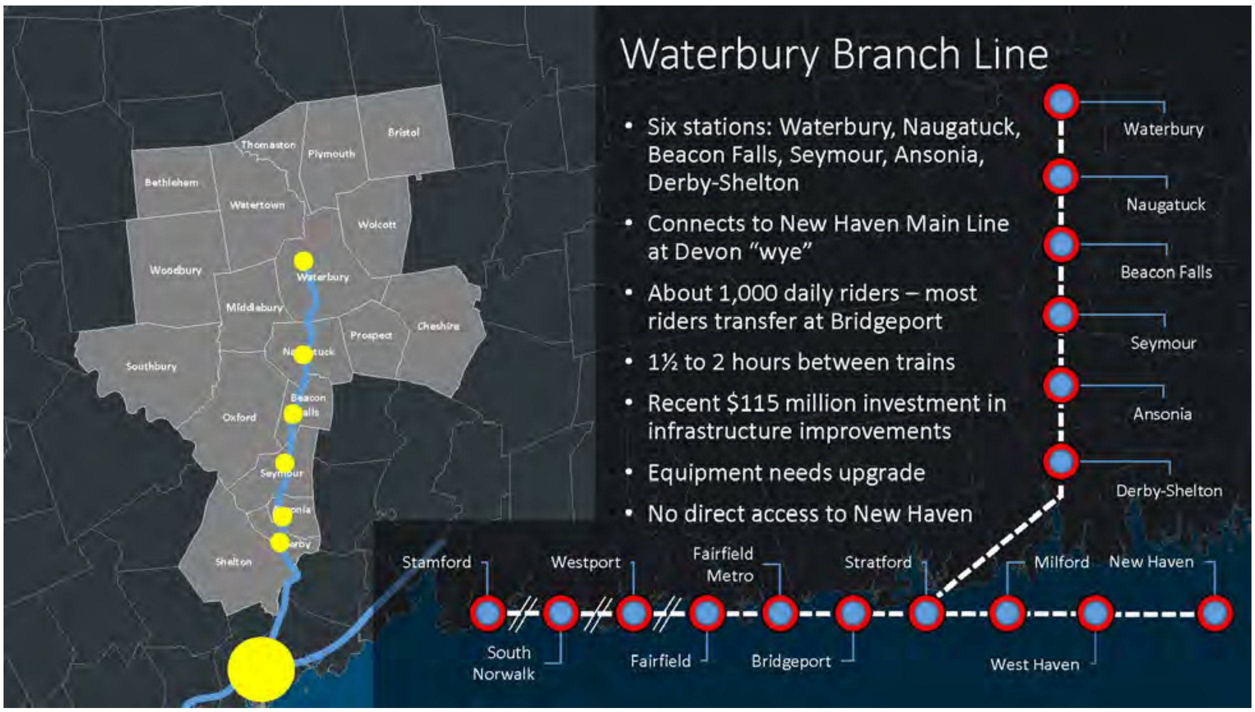


Figure 5.3 Waterbury Branch Line Stations; NVCOG Alternative Modes Assessment

SERVICE

In 1976 there were only eight trains daily (four in each direction), this increased to twelve by 1993. Seven new train trips were added in 2022, increasing the total daily service to 22 trips. Two additional Waterbury bound trips are provided by buses and serve all stations along the line. Waterbury Line service terminates at Bridgeport, requiring riders continuing their trip to transfer to a mainline train. Six WBL trains stop at Stratford; two inbound morning train and four outbound trains. Service to and from Stratford is primarily to discharge passengers in the inbound direction and receive passengers in the outbound direction.

Weekend service consists of only 12 trips: six in each direction.

Following the installation of the signal system, the maximum speed allowed by FRA regulations is 59 mph. This speed restriction may be modified to require slower speeds along several sections because of track condition and at-grade crossings. 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

Figure 5.4 Metro North Waterbury Line Train

Since the WBL is not electrified, service is operated by diesel-powered locomotives. Most train sets consist of three coaches plus the locomotive. The equipment is shared with the Danbury branch line and sets have recently been shifted from use on the Shoreline East which permitted the increase in service 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 capable 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. With the infrastructure improvements that have been completed in the past few years, the frequency of outages and problems that require alternate bus service has been greatly reduced.

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.

Figure 5.5 View southbound from the Waterbury Train Station

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 (freight) connects to the WBL at the Derby Wye, but it appears the interlocking is currently disconnected, and repairs are needed to make it operational.

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 train. All stations, except Waterbury, feature only low-level platforms, lack canopies and have only small, three-sided, bus-style shelters to protect passengers from poor weather conditions. At the Waterbury rail station, the high-level platform is shorter than optimal, about 125 feet, but a canopy provides some protection from the weather. The existing 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.

Figure 5.6 Platform at the Waterbury Train Station

- 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. The parking lot was recently reconstructed and access and egress from the lot better defined. Parking spaces are defined, and pedestrian paths and bus stop locations are clearly designated. The new parking lot has enhanced 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 CTDOT is developing 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.

Figure 5.7 The current Naugatuck Rail Station

- 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.

Figure 5.8 Waterbury Line train arrives at the Beacon Falls Station

- 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. Parking for commuters is available in front of the station, but patrons to local businesses can also park in the area. Additional commuter parking can be found in nearby mixed-use parking lots. However, commuter rail parking is not readily identified and difficult to find. A two-hour time limit is posted at the lot and the mixed use of spaces restricts parking supply. 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. There continues to be interest in the long-term vision of relocating the station from its constrained downtown location to an area north of the downtown as part of a TOD development.

Figure 5.9 The small structure at the Seymour Train Station

- 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. An old wooden canopy overs 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

Figure 5.10 The current Ansonia Train Station

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 CT*transit* 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 on site. 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 Valley Transit District (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 Trail 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.

Figure 5.11 Platform of the Derby-Shelton Train Station looking south

> 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.

The CTDOT has initiated efforts to improve and rehabilitate several of the WBL stations. In 2021, the CTDOT was awarded a grant under the USDOT RAISE program to install high-level platforms and rehabilitate the grounds and building at the Derby-Shelton station. The total amount allocated to the project is about $24 million. The CTDOT was also awarded funds under the All Station Accessibility Program (ASAP) to install high-level platforms and other passenger amenities at the Beacon Falls, Seymour and Ansonia stations. The project will rehabilitate the station areas to bring them into compliance with American Disabilities Act requirements.

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 a WBL train and 503 passengers who got off, resulting an estimated daily ridership of 1,114 passengers. Since that survey, ridership on all commuter rail lines in Connecticut decline as a result of the COVID-19 pandemic. Based on ridership available from the Connecticut Commuter Rail Council website, monthly ridership on the WBL totaled 24,195 passengers for February 2020 and decreased to 14,608 in March 2020, as the effects of the pandemic began to take hold. It fell to less than 3,000 passengers for the month in May 2020 before rebounding the during the second half 2020, totaling 11,503 passengers for December. While this ridership level represented a 58.6% decrease from the ridership level for the same time the previous year, it was the lowest decrease for any rail line in Connecticut. By comparison, ridership on the New Haven main line decreased 81.6% and ridership on the other branch lines (Danbury and New Canaan) experienced drops of 86.2% and 84.1%, respectively. As the region continues to recover from the pandemic and adjust to the changes in travel patterns precipitated by the pandemic, WBL ridership is approaching pre-pandemic levels. The most recent available data show that ridership for August 2022 was 24,189 passengers, a 72.1% gain over the amount from the same the previous year, but still 23.5% less than the levels recorded in August 2019.

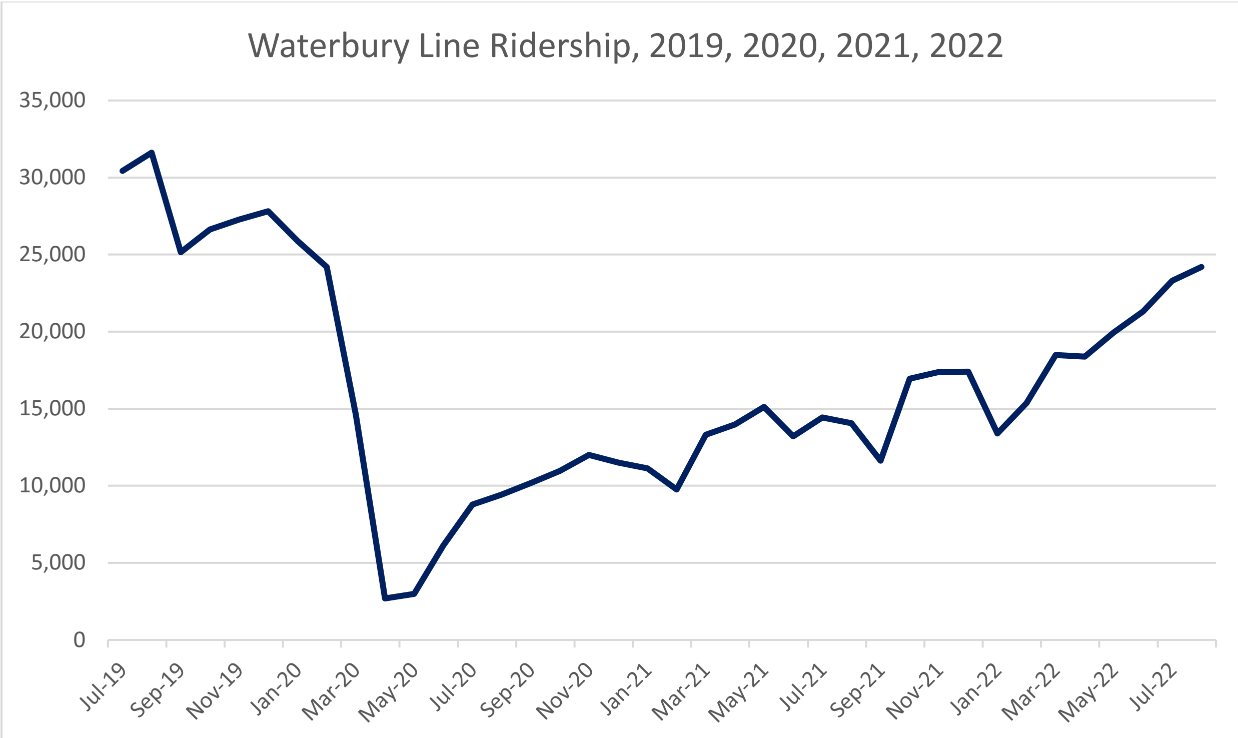


Figure 5.12 Ridership on the Waterbury Line from July 2019 through July 2022; data source: CT Commuter Rail Council

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. The majority of riders (60.9%) board at Waterbury with about 79.8% getting off at Bridgeport, the defined terminus of the WBL. Unless a rider's destination is at Bridgeport or Stamford, passengers are required to transfer to a main line train to reach their final destination. About 55.2% of respondents indicated that they transfer between a WBL and NHML train, with almost all transferring at Bridgeport (89.7%). The two most common destination stations were Stamford and GCT.

Problems and issues with the WBL service have been well documented at various public forums and news report and continue to be issues. The primary issue voiced by riders relates to the frequency of service on the WBL and concerns with making connections. The CTDOT has started addressing this issue by instituting additional service in 2022. The new service reduced headways and improved PM peak hour connections, but there remain concerns with frequency of service and ability to make connections.

The NVCOG has been researching the feasibility and opportunity of developing a permanent transfer station between WBL and New Haven main line services. Often passengers are reluctant make a transfer between services and prefer "one" seat rides. Because the majority of riders using the WBL already need to transfer to a main line train, establishing a transfer station is not seen as a deleterious problem. Passengers were polled about support or opposition of a transfer station at the point where the Waterbury branch line tracks connect to the main line, known as the Devon wye. 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 CTDOT completed several capital improvements along the WBL in 2021. These actions included installation of a Central Traffic Control Signal system, passing sidings, and improved railroad crossings. Positive Train Control (PTC) was installed concurrently with the signalization system. The signal system and passing sidings provide the opportunity to permit up to 10 trains per hour to safely operate along the branch line at the same time.

On-going, system-wide improvements to the Metro North service area will affect and improve operations along the WBL. These programmed improvements include real-time information at the stations, a new fleet, and upgraded ticket vending machines. Real-time information is operational at all NHML stations and CTDOT is programming $902 million to ramp up the entire rail fleet. In 2022, the CTDOT started operating M-8 trainsets on the Shore Line East system. This permitted the equipment that had been used on SLE to be shifted to the WBL and accommodate the increase in service implemented in 2022.

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. Even with the reassignment of equipment from SLE to WBL, the locomotives and coaches operating on the WBL are the oldest on any Connecticut's rail lines. To fully take advantage of the new signalization system and passing sidings, additional service is needed, and new train sets are needed.

5.4 PASSENGER RAIL IMPROVEMENT PROJECTS

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. Service provided on the line remains insufficient to meet the needs of commuters and other travelers and does not offer convenient and attractive connections to preferred destinations. The potential for long layovers if required transfers are missed remains a concern. Station area features are meager with poor station access, low level platforms, basic shelters, and few amenities.

Many of these deficiencies will be addressed within the next five years because of recent awards of USDOT discretionary program funds. The CTDOT applied for and received an award through the RAISE program to rehabilitate the Derby-Shelton station and construct ADA-accessible high-level platforms. Similarly, an award from the US DOT from the All Stations Accessibility Program (ASAP) will fund ADA-accessible platforms and amenities at the Beacon Falls, Seymour and Ansonia stations. These actions area critical first step in transforming the WBL into a modern, state-of-the-art rail system.

To further increase ridership and reduce inefficiencies along the line, modern equipment must be better utilized. While electrification continues to remain the preferred option for new equipment purchases, a small Waterbury yard and maintenance facility should be constructed to allow Waterbury Line equipment to be based along the line. This would further support expansion of the service onto parts of the rail network not currently served by passenger trains.

Outside of the Waterbury Line, there are two critical passenger rail expansions considered priorities within the region. Most importantly, the line that exists between Waterbury and Berlin, passing through Bristol and New Britain, should receive the upgrades outlined in the Central CT Rail Study. Given the expected cost of this project, it is not funded in this plan, but is listed as an unfunded regional priority within Chapter 3. Additionally, extension of Waterbury Line service north to Torrington would provide access for residents of the Valley and Waterbury to the natural resources of northwest Connecticut while also improving access to the vital services and employment opportunities in Waterbury to residents of Torrington and the surrounding communities. This enhancement, under study as part of the ongoing Waterbury Line Needs Assessment, does not yet have a cost estimate and therefore is similarly not included with a funding source in this plan.

A detailed list of recommended improvements and identified funding sources are included in Appendix A.

5.5 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 installation of full centralized signal system and construction of four by-pass sidings permits a substantial increase in the number of trains that can operate on the WBL and the CTDOT implemented seven new train trips on the WBL in 2022 to take advantage of the ability to operate trains in both directions. The signal system has the potential to allow ten trains per hour to operate on the line. While that level of service is not being considered, it demonstrates the opportunity to operate service at headways substantially better than currently.

Despite the ability to increase service, a limiting issue continues to be the capacity on the New Haven main line; that is, the number slots available on NHML is limited and the opportunity to add more trains to NHML from the Waterbury line is constrained. While the signal system allows more trains to operate on the WBL, increasing the number of trains with direct service to Bridgeport or Stamford may not be possible to the capacity issues on the main line. In addition, the existing interlocking at Devon between the NHML and the WBL does not allow direct 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. Furthermore, the schedules are not setup to coordinate this inbound-to-outbound connection, therefore longer than desirable layovers are required.

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 NHML. 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.

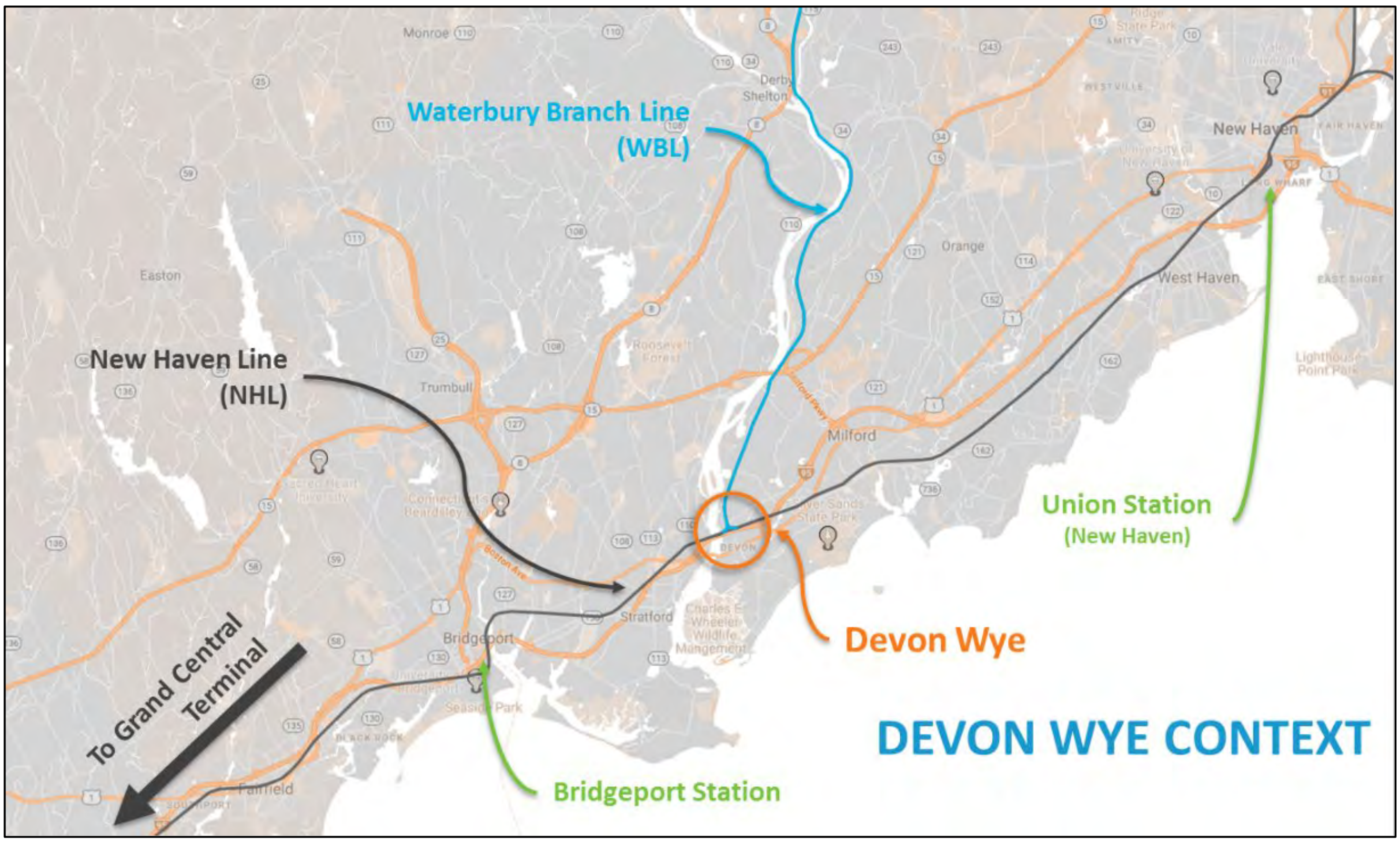


Figure 5.13 Context of the Devon Wye within the greater Metro North System

Figure 5.14 Rendering of the proposed Devon Transfer Station in Milford

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.

5.6 MICRO-TRANSIT

Micro-transit is a form of demand-responsive transit service that offers highly flexible routing and scheduling of minibus or van style vehicles that are shared with other passengers, unlike a conventional taxi or ride-hailing service. Unlike Dial-a-Ride or paratransit service, riders do not have to call an operator and request a ride in advance. Micro-transit typically utilizes an application-based service, allowing riders to request a ride in real-time. Most micro-transit services allow users without a smartphone to request a ride by phone. The vehicle picks up riders and delivers them to their destination, with the ability to carry multiple passengers in the same vehicle to different locations. Like standard fixed route service, riders are typically picked up at common pre-determined locations such as conventional bus stops. Due to the demand-response system, however, there is no fixed schedule, and buses do not drive around empty for periods of time like a fixed route, improving system efficiency.

Micro-transit can assist with the "first and last mile problem," or the issue of how people will get between a transit hub and their origin or destination. In many cases, people can walk to and from transit if it is close enough. However, there are cases where a transit hub may be difficult to access from a passenger's origin or their destination may be difficult to access from a transit hub. This gap is called the "first and last mile connection". Micro-transit can take passengers to major transit hubs, such as train stations and bus stops, filling the first and last mile gap and making existing public transit accessible to more members of the community. Micro-transit can also replace fixed-route service in time frames with less demand, such as late nights and weekends. Aside from filling service gaps, micro-transit can reduce the need for additional parking spaces and help achieve climate goals as part of a broader package of solutions.

The potential of micro-transit is particularly significant for rural and lower density suburban communities, which often struggle to have a cost-effective method of transportation that meets the needs of the community. In these circumstances, micro-transit is cheaper to operate than conventional fixed route service, and it can provide better operational coverage in lower density areas. Micro-transit is not a replacement for fixed-route service in areas with sufficient demand.

Currently, no municipalities in the region provide micro-transit service. NVCOG is interested in gauging demand and determining suitability for micro-transit through a pilot program or study but will need to conduct further research to determine where potential locations are the communities in the Valley Transit District and the neighboring communities of Southbury and Oxford.

5.7 TRANSIT PERFORMANCE MEASURES

Transit agencies and MPOs have increasingly used data for transit as well as highway performance. Utilizing a data-based approach to improving service and safety allows for establishing realistic, achievable goals and measuring progress toward those goals. To meet federal requirements for performance-based planning in transit, the various transit agencies, in partnership with the NVCOG, have developed and adopted plans for both safety and asset management.

As of 2021, each agency that utilizes federal transit funds, except for those that exclusively use 5309 or 5310 funds, must develop and share with their primary MPO a Public Transit Agency Safety Plan (PTASP). While there are several operators with PTASPs within the NVCOG, NorthEast Transit, operator of the CTtransit Waterbury Division and the Greater Waterbury Transit District, is the only agency for whom the CNVMPO is their primary operating area. PTASPs are regularly monitored and updated by both the agency and NVCOG, with regular updates coinciding with MTP updates.

Transportation Asset Management (TAM) Plans are similarly required for all agencies utilizing federal funds. These plans include an inventory of existing equipment, the strategies to maintain and replace equipment, and long-term maintenance for facilities. These plans are also shared with the MPO and, similar to PTASPs, regularly monitored and updated in line with new MTP and TIP adoption.

PUBLIC TRANSIT AGENCY SAFETY PLAN

Each agency that operates public transit is required by USC 49 § 673 to develop and maintain an agency wide safety plan. These plans must address critical safety criteria, setting targets for future performance. These criteria are:

- Fatalities per Hundred Thousand (or per one Million) Vehicle Revenue Miles
- Injuries per Hundred Thousand (or per one Million) Vehicle Revenue Miles
- Safety Events per Hundred Thousand (or per one Million) Vehicle Revenue Miles
- Vehicle Revenue Miles per Mechanical Failure

In addition to developing measures for each of these categories, agencies must identify strategies to achieve and improve the measures included for each. Utilizing this data based approach, agencies across the country will yield better results for riders and staff. To advance these goals, not only must the targets be developed but a strategy for monitoring and reporting this data must also be identified.

TO ENSURE EASY ACCESS FOR MEMBERS OF THE PUBLIC, THE NVCOG MAINTAINS LINKS TO ALL OF THE REGION'S PTASPS ON ITS TRANSIT PLANNING PAGE

https://nvcogct.gov/what-we-do/transportation-planning-2/transit/

Adjustments should be made to operations and targets over time to advance safety across the full system.

Because of the number of operators within the NVCOG, there are several separate PTASPs that all must be monitored by the region's staff. Within the CNVMPO, operators include CTtransit Hartford, both for fixed route and BRT, CTtransit New Haven, CTtransit Waterbury, The Greater Waterbury Transit District, and the Greater Hartford Transit District. Additionally, within the GBVMPO portion of the NVCOG, CTtransit New Haven, Greater Bridgeport Transit, and the Valley Transit District all have operations. CTtransit Hartford, New Haven, CT Fastrak, and The Greater Hartford Transit District are all covered under a single PTASP, CTtransit Waterbury and the Waterbury Transit District under one, and GBT and VTD each maintain separate plans.

Table 5 includes a summary of all of the PTASP targets for transit operators within the NVCOG region.

NVCOG Agency Safety Plan Targets								
Service Entity	Service Offering	Fatalities		Injuries		Safety Events		System Reliability
		Total	Per 100,000 VRM	Total	Per 100,000 VRM	Total	Per 100,000 VRM	VRM/ Mechanical issues
CTtransit Waterbury	Fixed Route	0	0	12	10.50	8.00	6.70	26608
CTtransit New Britain/Bristol	Fixed Route	0	0	2.0	2.20	1.00	1.90	22069
CTtransit Hartford (CT Fastrak)	BRT	0	0	26.0	3.80	82.00	12.00	22092
CTtransit New Haven	Fixed Route	0	0	30.0	0.78	255.00	6.60	64516
Greater Bridgeport Transit	Fixed Route	0	0	35.0	1.95	80.00	4.46	7000
Valley Transit District	Demand Response	0	0	7.0	3.30	8.00	3.80	32837
Greater Waterbury Transit District	Demand Response	0	0	3.0	4.20	3.00	3.70	177445
Greater Hartford Transit District	Demand Response	0	0	26.0	6.30	23.00	5.70	50000

Table 5.5 Regional PTASP Safety Targets

Table 6 details performance in key safety categories for 2021. Aside from a fatality designated as a suicide for the CTtransit New Haven division, all operators in the region had no fatalities and were in line with their safety targets.

NVCOG Agency Safety Plan 2021 Baseline					
Service Entity	Service Offering	Fatalities	Injuries	Injuries	Safety Events
		Total	Total	Total	Total
CTtransit Waterbury	Fixed Route	0	1.00	1.00	4.00
Cttransit New Britain/Bristol	Fixed Route	0	0.0	0.0	1.00
Cttransit Hartford (CT Fastrak)	BRT	0	5.0	5.0	1.00
Cttransit New Haven	Fixed Route	1	3.0	3.0	10.00
Greater Bridgeport Transit	Fixed Route	0	0.0	0.0	1.00
Valley Transit District	Demand Response	0	0.0	0.0	0.00
Greater Waterbury Transit District	Demand Response	0	0.0	0.0	0.00
Greater Hartford Transit District	Demand Response	0	0.0	0.0	0.00

Table 5.6 Regional PTASP Baseline

TRANSPORTATION ASSET MANAGEMENT PLAN

Functional, safe, and efficient equipment are vital to the operations of the many transit agencies within the NVCOG region. 49 CFR 625 requires that agencies develop and maintain Transit Asset Management (TAM) Plans to collect data, set targets, and track progress toward the economical management of assets, mobile and station, required to operate a successful and efficient agency. Within the region, the CTDOT maintains TAM plans for Tier 1 and Tier 2 operators, which includes all the eligible federal aid recipients. These plans were each updated in 2022 and cover the period between 2022 and 2025. Both plans are linked from the NVCOG's transit planning web page to ensure easy access for the public.

Figure 5.15 The cover of the 2022 update to the Tier I TAM Plan

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 2,580 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 street.

Figure 6.1 Different forms of micromobility

The goal of transportation improvement programs has usually been to make the highway and road networks operate more efficiently, with efficiency defined as improving the flow of traffic. Often, the needs of pedestrians, bicyclists, those rolling, and others who travel by non-traditional, motorized means have been ignored or minimally considered. In combination, these non-traditional ways of traveling are generally referred to as micromobility. Micromobility is defined as *any small, low-speed, human- or electric-powered transportation device, including bicycles, scooters, electric-assist bicycles (e-bikes), electric scooters (e-scooters), and other small, lightweight, wheeled conveyances*. In recent years, the popularity and use of electric-assisted devices has increased dramatically, expanding not only the type of device but also the number of people using them.

Road design standards, with the emphasis on moving traffic and vehicular safety, have made the street environment an intimidating place for anyone not in a car or other motorized vehicle. The focus of streets as the sole environment for motorized vehicles has changed with greater emphasis on travel needs of all users regardless of mode, age, and abilities, supported by and well connected to a strong public transportation system. Federal transportation acts have provided dedicated funding for active transportation projects and have required planners to consider all travelers. Connecticut state laws and policies also require transportation projects to consider the needs of bicyclists and pedestrians and promote bicyclist and pedestrian safety. In 2021, the state established the Vision Zero Council, an interagency work group tasked with developing statewide policy to eliminate transportation-related fatalities and severe injuries involving pedestrians, bicyclists, transit users, motorists, and passengers. In addition, the state has implemented a *"complete streets"* policy and promote *"Share the Road"* campaigns. The goal of these federal and state actions is to create an interconnected, hierarchical network of safe, accessible, convenient, and protected transportation facilities that accommodate all users.

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 all 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 those who 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) because it is easier to make purchases at multiple stores and because users would otherwise need to change travel modes to reach destinations outside of the business district. Further, mixed use development often creates walkable environments that often leads to improved property values and increased small business profitability.

In the Naugatuck Valley planning region, only about 1.7% of commuters walk to work (*American Community Survey 5-year estimates 2016-2020,* US Bureau of the Census). This is lowest walk rate of any region in the state, including the non-urbanized regions.

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, creating aesthetically pleasing and safe

street environments, and revise land use policies that promote mixed-use developments and pedestrian facilities and amenities.

- To build a more resilient, equitable, and economically vibrant transportation system by providing more balanced and accessible 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 available (2019 through 2021) indicate that over the last couple of years the number of crashes involving pedestrians has decreased. In 2019, a total of 195 pedestrians were involved in crashes with a motorized vehicle in the Naugatuck Valley planning region. By 2021, that number had declined to 140 crashes, a decrease of 28.2%. The annual average number of pedestrian crashes in the region is 163.7 per year.

Pedestrian-Vehicle Crashes in Naugatuck Valley Region 2019 through 2021					
Municipality	2019	2020	2021	Total	Annual Average
Ansonia	6	4	3	13	4.3
Beacon Falls	0	0	0	0	0.0
Bethlehem	0	0	0	0	0.0
Bristol	19	20	16	55	18.3
Cheshire	1	2	4	7	2.3
Derby	3	3	3	9	3.0
Middlebury	0	2	0	2	0.7
Naugatuck	13	5	6	24	8.0
Oxford	1	0	1	2	0.7
Plymouth	2	4	1	7	2.3
Prospect	3	0	0	3	1.0
Seymour	6	5	3	14	4.7
Shelton	7	4	1	12	4.0
Southbury	1	1	2	4	1.3
Thomaston	0	0	0	0	0.0
Waterbury	131	101	96	328	109.3
Watertown	1	3	0	4	1.3
Wolcott	0	0	3	3	1.0
Woodbury	1	2	1	4	1.3
Total	**195**	**156**	**140**	**491**	**163.7**

Table 6.1 Pedestrian Vehicle Crashes within NVCOG region Source: CTDOT Crash Data Repository

The most critical concern with the incidence and frequency of crashes involving pedestrians is that a crash involving a pedestrian typically results in injury, and more likely a serious injury. 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 three-year analysis period, about 20% of the pedestrian-involved crashes resulted in a fatality or serious injury, with 20 crashes resulting in a fatality. These statistics are unacceptable, and efforts need to focus not only on reducing these number but eliminating all fatal and serious injury pedestrian crashes. As the total number of pedestrian crashes decline, the incidence of these crashes causing death or serious injury also decline. Over the past three years, the number of pedestrians who died from injuries sustained in the crash or were seriously injured went from 38 in 2019 to 28 in 2021, a decrease of 26.3%. 2020 was an especially dangerous year as 10 pedestrians were killed in a crash with a vehicle. In 2021, four people died in a pedestrian-vehicle crash. A positive trend but that remains unacceptable.

Fatal and Serious Injury Pedestrian-Vehicle Crashes in Naugatuck Valley Region 2019 through 2021

	2019		2020		2021		Total	
Municipality	Fatal	Serious Injury	Fatal	Serious Injury	Fatal	Serious Injury	Fatal	Serious Injury
Ansonia	0	2	0	0	0	1	0	3
Beacon Falls	0	0	0	0	0	0	0	0
Bethlehem	0	0	0	0	0	0	0	0
Bristol	1	4	1	5	1	3	3	12
Cheshire	0	0	1	1	0	0	0	1
Derby	1	1	0	1	0	1	1	3
Middlebury	0	0	1	0	0	0	1	0
Naugatuck	0	3	0	0	0	1	0	4
Oxford	0	0	0	0	0	0	0	0
Plymouth	0	1	0	1	0	0	0	2
Prospect	0	0	0	0	0	0	0	0
Seymour	0	1	0	1	1	1	1	3
Shelton	0	2	0	1	0	1	0	4
Southbury	0	0	0	0	1	0	1	0
Thomaston	0	0	0	0	0	0	0	0
Waterbury	4	18	6	10	1	14	11	42
Watertown	0	0	0	1	0	0	0	1
Wolcott	0	0	0	0	0	1	0	1
Woodbury	0	0	1	0	0	1	1	1
Total	**6**	**32**	**10**	**21**	**4**	**24**	**20**	**77**

Table 6.2 Fatal and Serious Injury Pedestrian Vehicle Crashes within NVCOG region Source: CTDOT Crash Data Repository

Not unexpectedly, the incident of pedestrian-involved crashes is highly 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 streets. Urban centers also have various pedestrian safety elements, such as sidewalks, crosswalks, and pedestrian signals, that are designed to protect pedestrians and make the areas safer for people walking. Despite these features, pedestrians have greater exposure in downtown areas than more suburban locations.

The urban core area of Waterbury is a major concern. Over the three-year analysis period, 66.8% of the pedestrian-vehicle crashes occurred in Waterbury and over half of the pedestrian fatalities and serious injuries occurred in the city. Despite having pedestrian safety features, such as pedestrian signals, crosswalks and sidewalks, a disproportionately high number of pedestrian-related crashes are occurring in Waterbury. 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.

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, are overrepresented in the proportion of pedestrian crashes given their higher pedestrian activity. These areas typically have poor access management (high number of driveways, wider driveways) onto primary roadways, a lack of sidewalks and safe crosswalks, and high automobile crash volumes. Poor access management increases the exposure of pedestrians to conflicts with vehicles.

High-vehicle-traffic urban streets have high absolute numbers of pedestrian accidents, as well as 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: https://portal.ct.gov/-/media/DOT/documents/ddbe/CTDOT-ADA-Transition-Plan-092019.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 develop 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

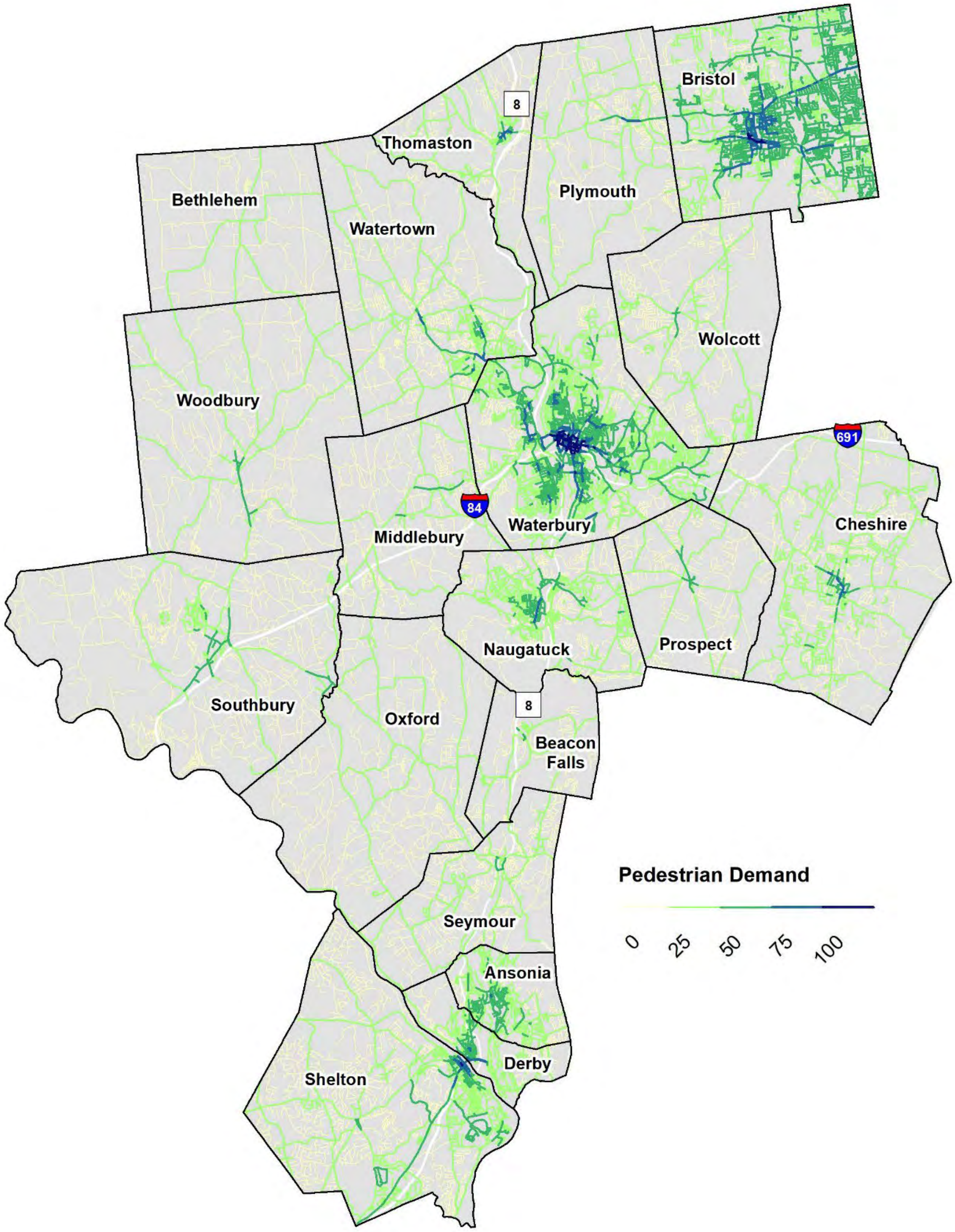
To determine pedestrian demand in the region and better understand which areas have the highest propensity for walking, the NVCOG used the methods adopted by the City or Portland, OR. Portland's approach developed *Pedestrian Potential* and *Pedestrian Deficiencies Indices* for identifying high pedestrian 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.



Map 6.1 Pedestrian Demand within NVCOG region

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.

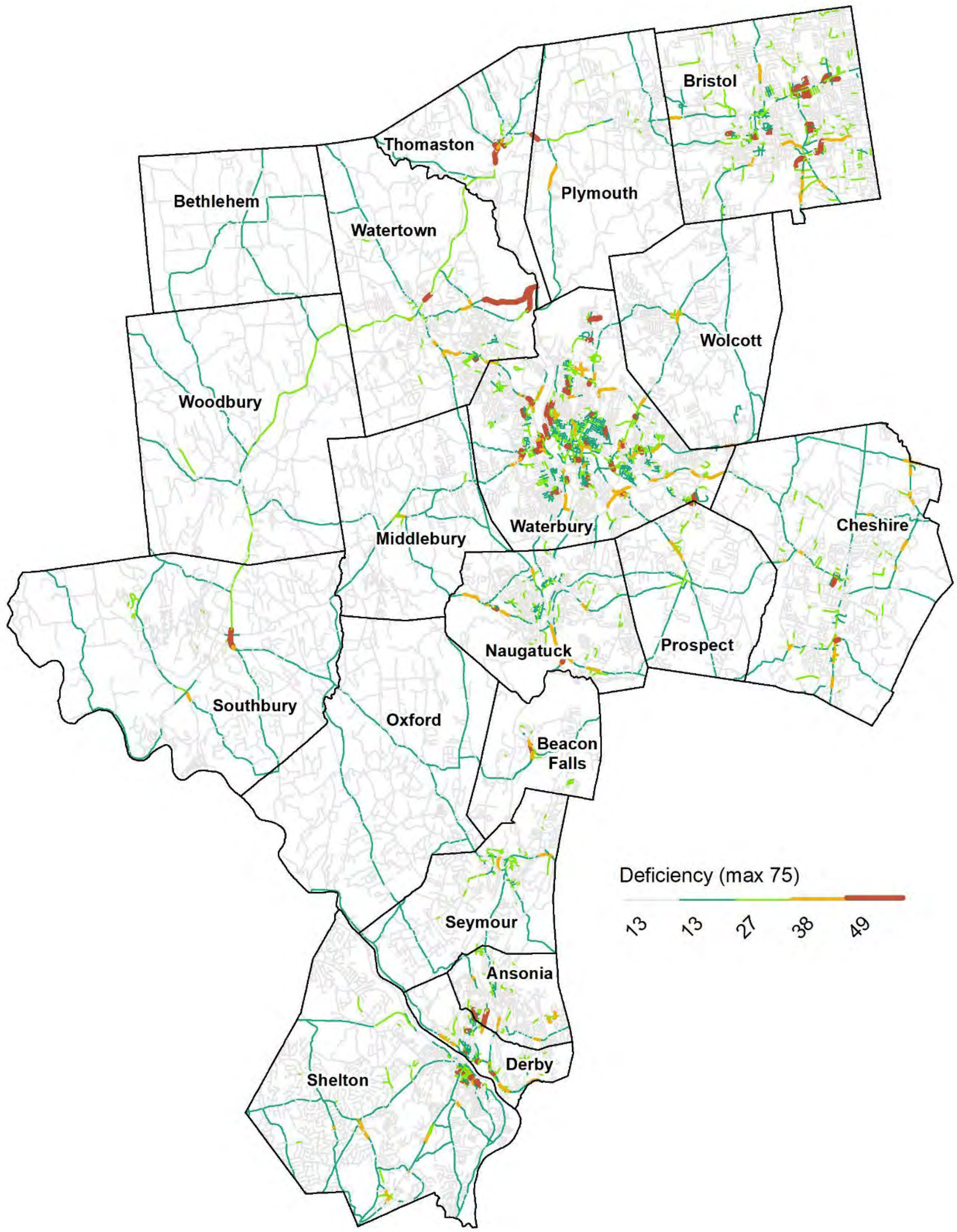
Unlike the *Pedestrian Demand Index*, the *Pedestrian Deficiencies Index* is more difficult to measure because of the difficulty in measuring the quality of the pedestrian environment. For example, a 5-foot sidewalk with a grass buffer may be safe in a suburban context but may be too small for safe pedestrian 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 its usage are continuity and interconnectedness. A well designed sidewalk network is one that provides continuous paths with no gaps within the system 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:



Map 6.2 Pedestrian Deficiency within NVCOG region, 2016

- 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. Pedestrian signals need to be equipped with audible tones to aid persons with vision impairments.
- Well-marked and visible crosswalks.
- Buffers between the street and the sidewalk.
- ADA compliant curb ramps.
- Signing.
- Curb extensions at intersections to reduce the walk distance across a street.
- Refuge islands.

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 force pedestrians to intrude onto 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 width, 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. Ideally, sidewalks must meet ADA requirements and conform to PROWAG guidelines.

The design of a sidewalk depends on its location and function. In less urban and commercial areas, a four-foot wide sidewalk may be sufficient. However, where high pedestrian traffic is expected, a minimum width of five feet should be provided. Wider sidewalks should be installed in areas near schools, transit stops or other areas with high a concentration of pedestrians and mixed-use activities. 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, signposts, and other items. This zone provides separation between where people are walking and fixed objects.

Pedestrian signals are 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. To better alert drivers of the presence of a pedestrian in a crosswalk or waiting to cross, the installation of Rectangular Rapid Flashing Beacons (RRFB) is warranted. These devices consist of high-intensity beacons located on top of pedestrian crossing warning signs. The flashing beacons are activated by pedestrians waiting to cross. Embedding warning lighting in mid-block crosswalks can also be used to enhance visibility and alert motorists of the presence of pedestrians, but RRFBs are a less complicated action to implement.

To address longer term needs, the entire streetscape environment may require enhancement. The concept consists of assessing the road environment to accommodate all users regardless of mode, age, and mobility ability. This concept is referred to as “Complete Streets” and is intended to transform a street environment from one designed only for motor vehicles to one that will accommodate a wide range of travelers. Typically, the conversion of a road into a “complete” street includes a number of actions. Often, where a road is excessively-wide, the width is reduced to provide fewer travel lanes, accommodate sidewalks, and add bicycle elements. Clearer lane markings, bus stops, traffic calming, or green infrastructure are also common elements. This road narrowing or “Road Diet” may be included as part of a resurfacing or rehabilitation project within existing curb lines. Other possible actions include neckdowns, which 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 types 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 type of vehicle and can be ridden on all roads where they are legally permitted. Someone riding a bicycle must adhere to traffic laws as if they were a driving a motor vehicle. At the same time, motorists are required to share the road with bicyclists and provide at least three feet of space when passing a cyclist. The most common bicycle facility is a shared road and because of these responsibilities, all roads that are open to bicyclists should incorporate features that enhance safety and ride quality for bicyclists.

It is not necessary to specifically designate roads as bicycle routes or provide bicycle lanes. But roadways should be maintained and upgraded to ensure riding a bicycle on them is safe and convenient. This lets bicyclists decide which road they want to use.

What accommodations should be made for bicyclists depends on the type of road and traffic characteristics. Bicyclists can easily use low-volume residential streets because there are few motor vehicles and may not require any separation. This type of road is a shared space used by vehicles, bicyclists, and pedestrians. But for roads that are busy with higher volume and fast-moving traffic, special features are necessary and greater separation is required to accommodate bicyclists.

Figure 6.2 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 fall 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*** are more easily accommodated on existing roads with few special features. Advanced cyclists generally can ride within the road's right-of-way and under most traffic conditions. They are confident riding in traffic and do not feel in danger or perceive a safety hazard. This group of riders prefers the freedom to decide how to complete their bicycle trip, as well as the convenience and speed of using higher class roads. Picking a route is more a function of where the cyclist is going and less dependent on road characteristics. Their trips also tend to be much longer than the ***basic bicyclist***.

Because only about 5% of the bicycling public is considered advanced, special attention must be given to the needs of ***basic bicyclists*** and children. The design treatments that enhance both groups' experience is similar. Bicyclists 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 that are separated from motor vehicles. A trip for a ***basic bicyclist*** tends to be between two and five miles. Children typically only ride in their neighborhood and tend not to venture beyond familiar areas. These riders are best served by neighborhood streets and designated bicycle facilities.

BICYCLIST SAFETY

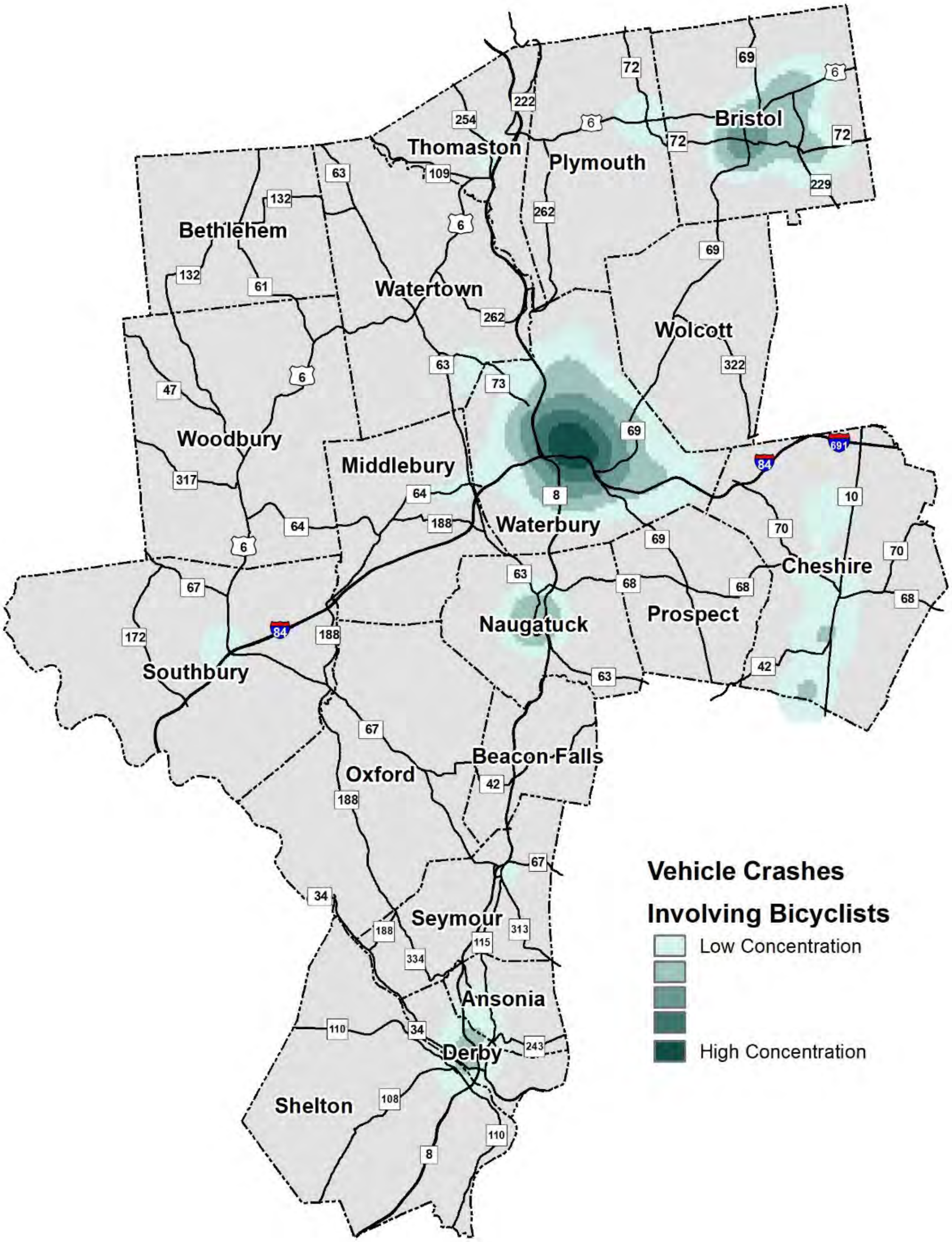
Absent designated facilities for their use, bicyclists are required to ride on-street and intermingled with motorized traffic. Since bicycles are considered a vehicle, bicyclists are required to adhere to traffic laws and ride in the same direction as traffic. This intermixing of bicyclists with motorized traffic results in the potential for conflicts and vehicle and bicycle crashes.

Crash data involving bicyclists 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 available (2019 through 2021) indicate that over the last couple of years the number of crashes involving bicycle has remained constant year-over-year at about 37 crashes per year. Over the three-year period, a total of 112 crashes involving bicyclists were recorded, with 38 crashes occurring in 2019 and 37 in both 2020 and 2021.

Crashes involving bicyclists correlate to a number of factors, such as, traffic volumes, number and frequency of intersections and driveways, the physical characteristics of the road (width, number of lanes, grade, curvature) and other features that may impede sight lines and visibility. More bicycle-motorized vehicle crashes occur in more densely populated, urban areas. The bicycle crash data illustrates this relationship. Nearly 60% of the bicycle-motorized vehicle crashes occurred in the two most populous cities of the region: Waterbury (42.0%) and Bristol (17.9%). On per capita basis, about 8.3 bicyclist crashes occur per 100,000 in population per year in the region, with the highest incidence rate recorded for Waterbury at 13.7 crashes per 100,000 population. In general, higher crash rates are recorded in the more urban areas of the region and the lower rates occur in the towns with more rural characteristics.

Bicyclist-Vehicle Crashes in Naugatuck Valley Region 2019 through 2021							
Municipality	2019	2020	2021	Total	Annual Average	2020 Population	Crashes / 100,000 Population
Ansonia	2	2	0	4	3.6%	18,916	7.0
Beacon Falls	0	0	0	0	0.0%	6,000	0.0
Bethlehem	0	0	0	0	0.0%	3,385	0.0
Bristol	5	6	9	20	17.9%	60,833	11.0
Cheshire	3	5	5	13	11.6%	28,733	15.1
Derby	1	2	1	4	3.6%	12,325	10.8
Middlebury	1	0	0	1	0.9%	7,574	4.4
Naugatuck	1	4	0	5	4.5%	31,519	5.3
Oxford	0	1	1	2	1.8%	12,706	5.2
Plymouth	0	2	1	3	2.7%	11,671	8.6
Prospect	0	0	0	0	0.0%	9,401	0.0
Seymour	0	0	1	1	0.9%	16,748	2.0
Shelton	2	1	2	5	4.5%	40,869	4.1
Southbury	2	0	0	2	1.8%	19,879	3.4
Thomaston	1	1	0	2	1.8%	7,442	9.0
Waterbury	19	12	16	47	42.0%	114,403	13.7
Watertown	1	1	1	3	2.7%	22,105	4.5
Wolcott	0	0	0	0	0.0%	16,142	0.0
Woodbury	0	0	0	0	0.0%	9,723	0.0
Total	**38**	**37**	**37**	**112**	**37.3**	**450,374**	**8.3**

Table 6.3 Bicyclist Vehicle Crashes in the NVCOG Region, 2019 to 2021



Map 6.3 Bicyclist-Motor Vehicle Crash Locations within NVCOG region

A critical concern with the incidence and frequency of crashes involving bicyclists is the severity of any injuries that result from the crash. While bicyclists are vulnerable to severe injury, the data indicate that injuries are generally minor. About 82% of bicycle crashes resulted in either a possible minor injury or suspected injury. Only seven crashes resulted in a serious injury and no fatalities occurred. By contrast, however, only 13 of the bicycle-involved crashes did not cause any injury. This suggests bicyclists are highly susceptible to injury when they are involved in a collision with a motor vehicle; when a crash occurs, the bicyclist tends to be injured.

Injury Severity of Bicycle Crashes Naugatuck Valley Planning Region		
Severity	Number	Percent
Fatality	0	0.0%
Suspected Serious Injury (A)	7	6.3%
Suspected Minor Injury (B)	63	56.3%
Possible Injury (C)	29	25.9%
No Apparent Injury (O)	13	11.6%
Total	**112**	

Table 6.4 Injury severity of bicycle crashes in the NVCOG region

Another cause for concern is the age of riders involved in a bicycle-motor vehicle crash. Over one-quarter (26.8%) of the crashes involved riders who were 13 years old or younger and for another 23.2% of the crashes the age of the bicyclist was between 14 and 18 years old. This suggest inexperience may be a contributing factor to bicyclist-related crashes.

Age of Bicyclist Involved in Bicycle Crashes Naugatuck Valley Planning Region		
Age of Bicyclist	Number	Percent
13 years old & younger	30	26.8%
14 to 18 years old	26	23.2%
19 to 40 years old	21	18.8%
41 to 65 years old	24	21.4%
>65 years old	6	5.4%
Unknown	5	4.5%
Total	**112**	

Table 6.5 Age of bicyclist involved in bicycle crashes in the NVCOG region

A number of factors can contribute to a crash between bicyclists and motorists. Often a crash is caused by the failure of either the rider or motorists to follow traffic laws. The adherence to traffic is critical when bicyclists and motor vehicles comingle and need to share the road. The data extracted from the repository indicate that in about one-third (31.3%) of the crashes, the bicyclist was riding properly at the time of the crash. However, this suggests it was more typical that the rider something wrong that contributed to the crash. The most common actions were failure to obey a traffic sign or signal and failure to yield the right of way.

Actions or Circumstances of Bicyclist at Time of Crash Naugatuck Valley Planning Region		
Action	Number	Percent
Dart/Dash	6	5.4%
Failure to Obey Traffic Signs	20	17.9%
Failure to Yield ROW	18	16.1%
Improper Passing	2	1.8%
Improper Turn/Merge	4	3.6%
In Roadway Improperly	5	4.5%
Wrong Way Riding	4	3.6%
No Improper Action	35	31.3%
Not Visible	5	4.5%
Other	8	7.1%
Unknown	5	4.5%
Total	**112**	

Table 6.6 Actions or circumstances of bicyclist at time of crash in the NVCOG region

The crash data clearly demonstrate the need to focus efforts on enhancing and expanding bicycle facilities that provide better separation and protection for bicyclists. Despite the fact that bicycle-motor vehicle crashes typically do not result in a serious injury or fatality, bicyclists are susceptible to injury whenever a crash occurs and it is important to reduce crash incidence as much as possible. This is also especially important because younger children or adolescents are over-represented in the crash data. There is also an evident need to enhance education of both bicyclists and motorists regarding proper riding technical and better understanding of the rules of the road for both.

BICYCLE FACILITY DESIGN APPROACH

The design approach for bicycle facilities needs to reflect what type of rider the facility is designed for. Absent designated facilities for their use, bicyclists are required to ride on-street and intermingle with motorized traffic, and since bicycles are allowed to ride on almost all streets, except on limited access highways, it is critical to make roads more friendly to bicyclists and safer for all levels of riders.

The minimum operating space of a bicyclist is assumed to be about 40 inches and the minimum width for a bicycle facility is four feet. The vertical clearance from any overhead obstructions should be at least 100 inches. which is a little more than eight feet. The need for separation or a buffer between the bicycle facility and motorized travel lanes is dependent on the volume and speed of traffic.

The need to implement specific design treatments depends on the characteristics of the adjacent roadway. A high volume of traffic and fast operating speeds mean cyclists face greater potential risk from passing motorists and create an uncomfortable feeling. Generally, the higher the traffic volume and speed, the greater need there is to implement more extensive design treatments to accommodate ***basic bicyclists***. Children and young bicyclists should avoid these roads.

There are four types of bicycle facilities: shared roadway; bicycle lanes; cycle-track and shared-use paths. Shared roadway facilities and bicycle lanes are located on-the-road, and share space with motorized vehicles or are provided an exclusive space along the edge of the road. Cycle-tracks are typically street adjacent and separated from travel lanes by a buffer or are vertical curbing. Shared use paths are specialized, off-road facilities on a separate right-of-way that accommodate multiple users.

- Shared Roadway Facilities: These provide the minimum level of route designation and separation from motorized vehicles. Bicyclists share the road with motorists and go 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. Recently, it has become common to mark shared roadways where there is insufficient shoulder width with a shared lane marking known as a Sharrow. This marking helps bicyclists know where they should ride on the road and alerts motorists that cyclists may be using and sharing the road.

- Bicycle Lanes**:** A bike lane is a portion of the road specifically designated for cyclists that is marked with painted stripes on the roadway and signs. They are always one-way facilities and carry bicycles in the same direction as adjacent traffic lanes. On two-way roads, there are often bike lanes on both sides of the street. Bike lanes are more acceptable to less experienced riders because they provide a more predictable movement for bicycles and motorized vehicles and a greater degree of separation between the two. The minimum width of a bicycle lane is four feet, but if guard rails or curbing are present, the width needs to be at least five feet. Additional width is desirable in urban areas. Where on-street parking is designated, the bike lane should be located between the travel lane and the 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 need to encourage positioning bicyclists in the proper lane whether to go straight, turn left or turn right.

- Cycle Track: A cycle-track is an on-street facility for the exclusive use by bicyclists. The facility is physically separated from motor vehicle travel lanes by on-street parking, raised median or buffer, or bollards. Cycle tracks can be one-way or bi-directional and may be at street level, at sidewalk level or in between. By separating bicyclists from motorized traffic, cycle tracks offer a high degree of safety than bike lanes and are better suited to wider spectrum of user and would more attractive to basic riders who may be uncomfortable rider close to traffic. The minimum desired width for a one-way cycle track is five feet. For two-way cycle tracks, the desired with is 12 feet but a minimum width of eight feet is acceptable in constrained locations.

- Shared-use Path**:** These facilities provide the most service for bicyclists and require special design considerations. They are called shared-use paths because other users are allowed to use the path, including walkers, joggers, rollers, people in wheelchairs, and people with small children in strollers. In recent years, shared-use paths are seeing a proliferation of electric-assisted devices, such as e-bikes and e-scooters. A shared use path is physically separated from the road and follows an independent right-of-way. Two-way flow of people using the paths is provided and one-way sections are typically not allowed, unless unavoidable. Short one-way sections may be acceptable if they are clearly designated, strictly enforced, and limited to areas where it is necessary. These paths provide a safe place where novice riders and children are separated from motorized vehicles. However, the mix and volume of different types of users often creates a challenging environment with the potential for conflict. Because of this, the design of a shared-use path needs special attention regarding width, shoulders, clear zones, sightlines, and curves. User rules also need to be established and enforced. Additionally, speed limits for cyclists may need to be set to ensure that the speed differential between bicyclists and walkers is reasonable and to avoid or minimize conflicts.

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 cannot safely accommodate the higher speeds of bicycles. Mingling pedestrians and bicyclists can result in conflicts. For example, a sudden change in direction by a pedestrian could leave a cyclist with little time to react and pedestrians are sometimes uncertain where on-coming bicyclists are going. Additionally, 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 within or nearby sidewalks like utility poles, signposts, and newspaper vending machine are hazardous for bicyclists. Designating bicycle use is acceptable only for short sections and in 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 that bicyclists yield to pedestrians on a sidewalk and emit an audible signal when overtaking them; however, municipalities 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.

Bicycling in the Naugatuck Valley planning region is challenging because of the older, urban character of the region with narrower roads, higher traffic volumes and higher incidence of on-street parking. Topography is also a constraining factor. The region is hilly with many rivers and streams creating valleys. The factors have contributed to the lack of an extensive and integrated network of facilities to attract and accommodate bicyclist travel. There are few designated bicycle routes in the region and no established bike lanes. In recent years, shared-road sections have been identified with Sharrows and signs, and a cycle-track was built in Waterbury along Freight Street and new cycle-track is being install over the Derby-Shelton bridge. Despite these recent actions, the primary bicycle network in the region consists of multi-use trails and paths (see Section 6.3).

The MTP recognizes the need to develop an interconnected bicycle route network throughout the region to provide an alternative access to the region's prime attractions, facilities and services, including but not limited to the region's downtown centers, employment centers, train stations, parks and recreation complexes, schools and multi-use trails. The first step in the process is the preparation of a regional bicycle plan for the Naugatuck Valley planning region. This plan will be developed as part of and incorporated into a comprehensive plan for active transportation. The plan will formulate a shared, regional vision for accommodating bicycle travel throughout the region, assess the opportunities and constraints for making cycling more attractive in the region, identify actions that will make cycling safer for riders of all levels of ability and designate an on-route bicycle network that will connect all corners of the region.

The bicycle network action plan will include recommendations in the following areas:

- <u>Institutional</u>: This area includes changes with respect to how bicycle travel is accommodated and perceived in the region, including adopting and supporting policies that enhance bicycling, such as a "Complete Streets" policy, ongoing public engagement regarding bicycling needs and continual maintenance and repair of the roads to ensure they are free of hazards. This includes street sweeping, removal of debris and litter, vegetation control and tree trimming.

- Planning: 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, such as bicycle parking and clearly defined access points and paths.
    - Create and adopt a vision and goals statement that supports bicycling and include in municipal Plans of Conservation and Development.
    - Adopt bicycle facility design guidelines. The application of design guidelines will follow a context sensitive approach, in that adherence to a guideline will be based on the context of the neighborhood or facility on which is planned.

- Infrastructure: Improve and enhance the physical infrastructure that cyclists use. This includes designated bicycle routes, bicycle lanes and cycle-tracks, as well as installing signs and pavement markings (in accordance with the Manual on Uniform Traffic Control Devices0 that warn motorists to the presence of cyclists. Specific actions include:
    - Include bicycle elements, such as bicycle pavement markings, signs, wider shoulder width, and use of a smooth, compacted asphalt material for road surfaces in all road projects.
    - Designate roads that are less than 30-feet wide and with a low traffic volume and speed as "Shared Road" bicycle routes and mark them with Sharrows and share-the-road signs.
    - Designate and develop a network of bicycle routes to provide intra-town and inter-town connections. Preferred routes will be identified through an engineering assessment and user feedback. Designated routes will be upgraded to meet established guidelines. A minimum shoulder width of four feet wide is recommended for roads designated as a bike route.
    - Install bicycle racks at strategic locations in the region, including commuter rail stations.
    - Construct cycle-tracks along higher volume and speed arterials to provide protection and by-pass around constrained areas.

- Education: Better education of both cyclists and motorists is necessary to reduce the incidence and severity of crashes between bicycles and motorized vehicles. These actions will help inform everyone about the rules of the road for bicycling and the laws that motorists and bicyclists need to follow. Specific actions include:
    - Develop an information and education campaign to communicate the rules of the road and the importance of following all traffic laws.

    - Develop promotional campaigns and events that encourage cycling and teach other users how they can safely share roads with cyclists.
    - Educate residents about the CTDOT and *Watch for Me CT* Share the Road Program.
    - Engage municipal Police Departments and other community organizations to hold and sponsor bicycle riding clinics.
    - Develop social media to highlight designate bicycle facilities and proper riding techniques.

- Enforcement: Increased enforcement of traffic laws can encourage motorists to be aware of the street environment and pay attention to people traveling by bicycle. Enforcing traffic laws is a critical element of enhancing bicycle safety. Specific actions include:
    - Monitor speeds in areas that have been identified as the most severe and where critical problems occur. Effectively target driver behaviors that lead to collisions with cyclists.
    - 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.
    - Consider adding officers on bikes, especially in downtown areas to enforce safe bicycling rules and educate cyclists about the dangers of improper riding.

6.3 MULTIUSE TRAIL SYSTEM

The Naugatuck Valley's network of multi-use trails has become an important part of the area's transportation network. Multiuse trails, also known as shared-use paths, are off-road facilities that are separated from motor vehicle traffic and designed to accommodate pedestrians, bicyclists, joggers, rollers, and others. These trails are generally paved but can also be surfaced with a soft compacted material. The goal is to build these trails be meet ADA accessibility to the greatest extent practicable. While multiuse trails are often viewed as recreational facilities, they are intended to serve as non-motorized transportation alternative for people who do not have a

Map 6.4 Multiuse Trails in the NVCOG Region

motor vehicle available or would rather not use one. Multiuse trails, in conjunction with a well-connected network of sidewalks and on-road bicycle routes, can provide safe corridors that link residential areas, commercial areas, employment centers, public transit services and other destinations.

In the Naugatuck Valley planning region, a comprehensive plan for multi-use trails is being implemented. The regional network of trails will create a continuous, connected route that lets non-motorized users travel between city and town centers and other destinations. In the center of the region, the Naugatuck River Greenway Trail serves as the north-south spine, with east-west connections to the Larkin State Bridle Trail, the Middlebury Greenway, the Steele Brook Greenway, the Shelton Riverwalk, and the Sue Grossman Trail, in Torrington. On the east side of the region, the Farmington Canal Heritage Trail, which begins in New Haven, traverses Cheshire north-to-south, and is close to completing a connection to Northampton, Massachusetts. The goal is to connect trails, sidewalk networks, and on-road bicycle facilities so that pedestrians and bicyclists have full access to the region using safe, off-road paths.

Naugatuck River Greenway Trail

The Naugatuck River Greenway (NRG) Trail will follow the Naugatuck River for approximately 44 miles and link 11 municipalities. The trail will start in Torrington and follow the river south through Litchfield, Harwinton, Thomaston, Watertown, Waterbury, Naugatuck, Beacon Falls, Seymour, Ansonia, and Derby. In Torrington, it will eventually connect to the Sue Grossman Trail and in the south it connects to the Shelton Riverwalk. The NRG Trail will help reclaim the Naugatuck River for recreation, afford greater access and connection to the River, provide an alternate mode of transportation through the region, support tourism and economic development, and improve Naugatuck Valley residents' health and quality of life. As of 2022, there are nine sections of NRG Trail open, extending about 7.3 miles. Open sections are in Torrington, Waterbury, Naugatuck, Beacon Falls, Seymour, Ansonia (three sections), and Derby. Currently, approximately 16.6% of the total planned length of the trail is open. In the coming years, significant progress in completing additional sections is expected. Three sections have completed the design phase or the design is nearly completed and design funds under the Connecticut Recreational Trails Program have been applied for another three sections. In addition, a 2.1-mile extension of the NRG Trail through Waterbury will be designed and built under a FFY 2022 RAISE grant from the USDOT. Once these sections have been constructed, the length of open sections will total 17.2 miles and represent 39.2% of the planned trail.

The NRG Trail will help communities to reconnect to the river and become a driver of the local economy by drawing tourists to the Naugatuck Valley. Sightseers, cyclists, people using micro-mobility devices, and other recreationalists will provide opportunities for local businesses. At the same time, the NRG Trail will offer area residents active transportation options close to home.

Convenient access to the trail will encourage residents to be more physically active and keep them connected with nature. Since many of the communities along the route are close to each other, the trail will provide a safe and convenient non-motorized alternative to a personal motor vehicle or public transit. These benefits are already evident on the open sections of the NRG Trail. These sections have become a popular destination and meeting place as well as a popular means of transportation. These benefits will increase as more trail sections are built.

The CT Trail Census (https://cttrailcensus.uconn.edu/), a collaborative statewide volunteer data collection program that NVCOG is supporting, conducts counts of how many people use the NRG Trail. In 2021, the Census counted more than 200,000 trips in Derby near the Division Street trailhead, making it the busiest NRG section and the second busiest multiuse trail in the state.

Naugatuck River Greenway, Naugatuck

Design and construction of the NRG Trail happens at the local level, but with oversight and guidance from the NRG Steering Committee (NRGSC). The NRGSC is a volunteer group with members from the eleven NRG host communities, along with regional, state, and federal representatives and stakeholders. The NVCOG hosts and administers the NRGSC.

Since much of the planning and construction is at the local level, the materials, feel and look of the trail may 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, and NVCOG is working with communities to implement trail standards during design and construction.

The completed trail will have a familiar and consistent system of signage and wayfinding, so visitors will know that they are on a section of the NRG no matter which town they are in. The NRGSC recognized that a well designed and implemented brand and signage program was critical to the NRG. With support and assistance from the NRGSC, NVCOG developed the "*Naugatuck River Greenway Uniform Signage and Wayfinding Design Manual*", which includes templates for trail head, route designation, directional, and informational signs consistent with MUTCD standards and guidelines.

Active Construction Projects:

- Derby-Shelton Bridge Improvements (DERB-4): The project includes bicycle and pedestrian improvements and connects the NRG to the Shelton Riverwalk. Construction is underway and expected to continue through the 2023 construction season.
- Thomaston (THOM-4): This section of trail will connect Old Waterbury Road around the WPCA facility to a new pedestrian bridge over Branch Brook. The design is complete, but construction is being delayed because of the need to design the connecting section in Watertown. Construction of the project will be funded by the Local Transportation Capital Improvement Program (LOTCIP), a state funding program available to towns and cities.
- Torrington (Portion of TORR-3): The City will connect two open sections of trail along Scoville Street using local funds.
- Waterbury (WTBY-3): Phase II of the Waterbury Active Transportation and Economic Resurgence (WATER) Project includes a 2.3-mile extension of the NRG Trail from the intersection of Eagle Street and South Main Street to West Main Street. This project is funded by a USDOT FY 2022 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant.

In 2021, the NRGSC endorsed priorities for future construction. Regional NRG priorities are trail sections that have demonstrable local support, and

- connect two complete or soon to be complete sections of trail, or
- connect a complete or soon to be complete section of trail with an important destination or population center, or
- require little investment or effort to complete.

Regional Priorities:

- Torrington: TORR-2 (East Main Street/ Franklin to East Albert Street)
- Harwinton: LITC/HARW-3 (Campville Hill Road to Wildcat Hill Road)
- Watertown: WTTN-1 (Branch Brook Road to Frost Bridge Road)
- Naugatuck: NAUG-1 (Naugatuck River Access Park to Pulaski Bridge)
- Beacon Falls: BEAC-3 (Route 42 to Toby's Pond)
- Seymour/ Beacon Falls: SEYM-1/BEAC-5 (Toby's Pond to Bank Street)

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 compacted stone dust trail originally designated as a bridle path. While it remains popular with equestrians, many bicyclists, walkers, and joggers use it too. The CT Trail Census estimated annual (2021) trips on the Larkin Trail in Oxford at 33,359. As part of a LOTCIP-funded reconstruction of Hawley Road, which crosses the Larkin Trail in Oxford, improved parking and trail access was construction, providing more efficient access to the trail for residents and visitors. At its terminus at Route 63 in Naugatuck, the LSBT is within a half-mile of Waterbury's Phase 1 NRG Trail at Platts Mill Road. Connecting these two points is a regional priority.

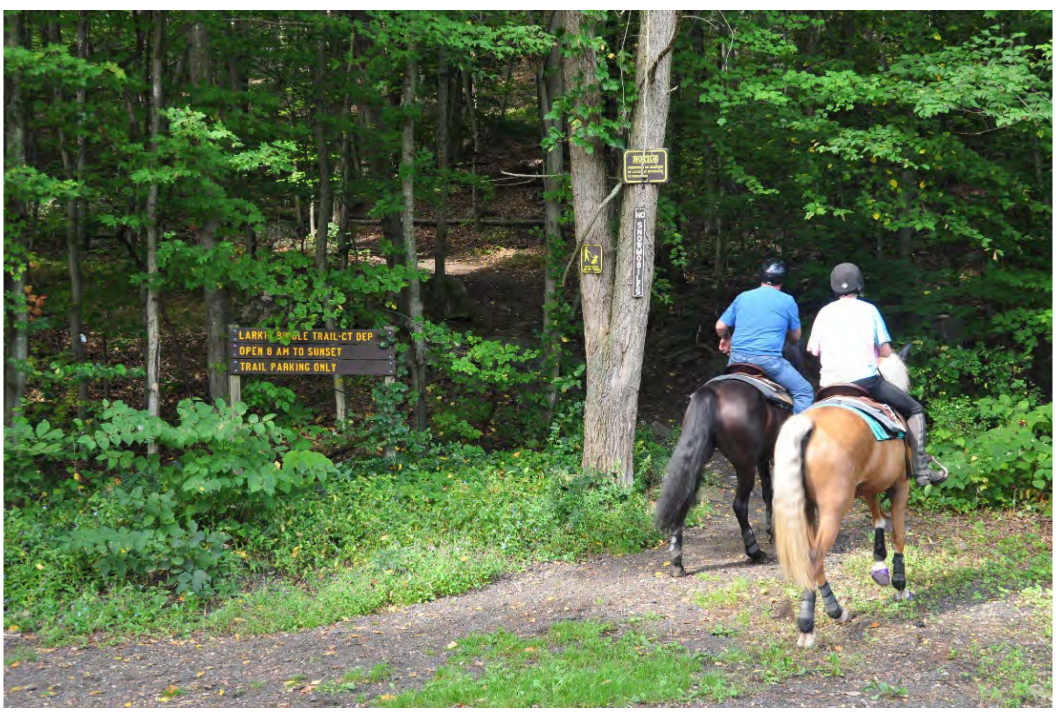


Figure 6.3 Larkin State Bridle Trail

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 with bicyclists, joggers, and walkers. The CT Trail Census recorded 72,066 trips on the Middlebury Greenway in 2021.

There are long-term plans to extend the Middlebury Greenway in both directions. To the west, the town of Woodbury recently purchased a decommissioned reservoir and land surrounding it that will be preserved as open space. The property is called the Woodbury Trolley Bed Preserve and has a substantial section of the old trolley bed that is passable as a trail. Woodbury and the NVCOG have discussed connecting downtown Woodbury through the Trolley Bed Preserve to the Middlebury Greenway. A preliminary routing feasibility study and high-level cost estimation have been completed. Completing a section of the corridor between the Preserve and the terminus of the Middlebury Greenway would be challenging because Route 64 has subsumed the trolley bed. Despite the challenges, both towns have expressed interest in making the connection.

At the east end of the Middlebury Greenway, there are conceptual plans to extend the trail along Route 63, providing access to Post University and the Hop Brook Lake Recreation Area. The extension would be 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.

Oxford Route 67

Oxford does not have a traditional walkable downtown and its Main Street is State Route 67, a relatively high-speed, high-volume arterial that connects the town with I-84 to the west and Route 8 to the east. While Route 67 serves as the Town’s “Main Street,” it does not have any accommodations for pedestrians and bicyclists. , and it has a high volume of fast-moving traffic. Because of the lack of pedestrian and bicycle features plus the high speed of traffic along the road, Route 67 is considered unsafe for bicyclists and pedestrians.

To improve non-motorized access in the corridor, the town and NVCOG initiated the Route 67 Alternative Transportation Study. The goal of project was to develop a preferred plan for improving pedestrian and bicyclist safety along the corridor and connecting the Oxford municipal center to Seymour in the south, including the NRG Trail and Seymour train station, and to the Larkin Trail to the north. The Oxford Board of Selectmen approved the master plan in 2022. It recommends constructing a series of sidewalks, multiuse trails, and other non-motorized and traffic calming accommodations along Route 67. The plan divided the corridor into several segments and subsections. This will help the Town plan, prioritize, and fund future improvements. The final study report, including recommended routing and facility types, can be found on the NVCOG website at https://nvcogct.gov/project/current-projects/transportation-planning-studies/oxfordroute67/.

Bristol Trail Study

In 2022, the NVCOG, along with the Capitol Region Council of Governments (CRCOG), the City of Bristol, and the Town of Southington, completed a study of the Route 229 corridor. The corridor is aligned in a north-south orientation and extends avels between US Route 6 in Bristol and I-84 in Southington. The study recommended traffic calming and safety enhancements, as well as the construction of a complete and continuous cycle track along the route. These recommendations will provide non-motorized access options to the schools, parks, shopping, and services along the corridor, and to ESPN, one of the region’s largest employers.

Aiming to build off the Route 229 Corridor Study, the City of Bristol and NVCOG have begun a study of routing options for a multi-use trail in Bristol. The goal is to propose a route that provides a safe, continuous connection between Rockwell Park in the west to downtown Bristol, continuing east to Route 229. In the future, NVCOG will seek additional funding to design a route from Route 229 to the Farmington Canal Heritage Trail in Plainville.

Actions:

1. Identify funding for final design and construction of the Route 229 project, focused on pedestrian improvements and a multi-use side path.
2. Finalize routing and preliminary concepts for a downtown multi-use trail to connect Rockwell Park, the downtown, and the Route 229 path.
3. Initiate study for an alignment from Route 229 east to the Farmington Canal Heritage Trail in Plainville.

Steele Brook Greenway Trail

The Steele Brook Greenway (SBG) Trail is a 4.5-mile multi-use trail in Watertown, mostly following an old rail bed that once carried freight and passengers to Watertown from Waterbury. In 2021, Watertown received federal funding under the Transportation Alternatives Set Aside Program to connect two existing sections of trail and construct a new pedestrian bridge over Steele Brook near French Street. 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 connect to the NRG Trail. 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. It has 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 from the Derby Greenway, a component of the NRG Trail. The bicycle and pedestrian features being added on the Derby-Shelton Bridge will also connect downtown Shelton to downtown Derby. Additional efforts by the City are underway to convert the deteriorated, historic canal lock into a park. The refurbished park will provide a terminus to the trail. To ensure and promote access to all facilities in the area, gaps in the Shelton River Walk need to be closed. In addition, as growth continues in downtown Shelton, connections need to be enhanced to the Derby/Shelton multi-modal transportation center.

Actions:

1. Complete connection between Shelton River Walk and Derby Greenway, providing access to the Derby/Shelton Train Station.
2. Complete improvements to Canal Street and park around the remaining lock at the end of the canal system.

Farmington Canal Heritage Trail

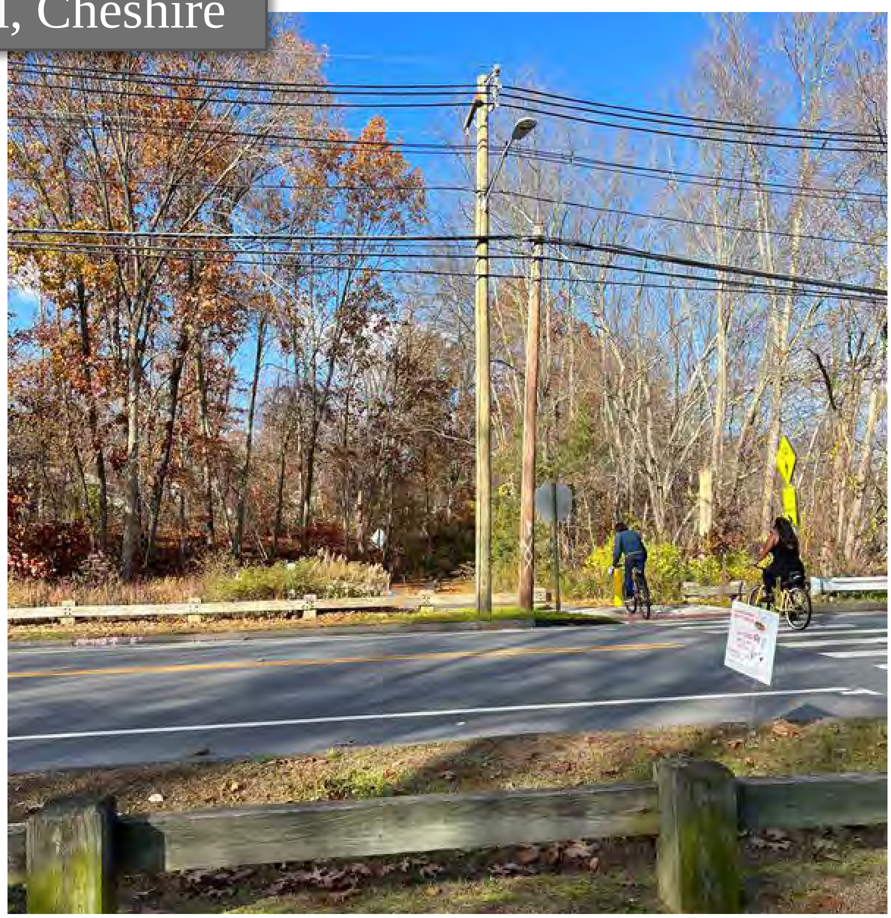
The Farmington Canal Heritage Trail (FCHT) is an 84-mile multiuse trail from New Haven, Connecticut, to Northampton, Massachusetts. It follows the route of the historic Farmington

Canal and the Canal Railroad. The FCHT is also a part of the East Coast Greenway (ECG), a bicycle and pedestrian route that stretches from Maine to Florida. The 7.1-mile section of trail in Cheshire was completed in 2019. 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 plans to connect the FCHT in Cheshire to the Quinnipiac River Gorge Trail in Meriden and potentially to the Airline State Park Trail via Middletown. Coordination and discussions are underway about these opportunities with the other MPOs located in the possible corridor: Lower Connecticut River Council of Governments (RiverCOG) and South Central Connecticut Regional COG.

Action:

1. Implement pedestrian and bicyclist access and safety enhancements along the FCHT.
2. Identify preferred routes to connect the FCHT to the NRG Trail and Airline State Park Trail.

Farmington Canal Heritage Trail, Cheshire



The Sue Grossman Still River Greenway Trail

The Sue Grossman Trail is located in the City of Torrington, which is not located on the Central Naugatuck Valley MPO planning area. Plans envision the trail eventually connecting to the village of Winsted in the town of Winchester. About three miles of the paved trail are complete between Harris Drive and Lanson Drive in Torrington. The City has funding to design the connections into Torrington and construct the already designed section into Winsted.

The NVCOG has been coordinating with the City through the NRGSC to identify a connection from the NRG Trail to the Sue Grossman Trail. The construction of the Sue Grossman Trail and connection to the NRG Trail would extend the reach of the NRG Trail and enhance the trail network in both regions. The extension will also provide additional natural resource and recreation connections to places like Highland Lake in Winchester, which is a popular destination in the summer, for residents of the Naugatuck Valley planning region.

7.0 FREIGHT AND GOODS MOVEMENT

In an increasingly interconnected world, the movement of freight into, out of, and through the region is a critical component for economic vitality. Historically a region developed around the strength of freight rail, the shift in the region's economy and physical development have followed national patterns and now a large majority of freight is shipped via truck over limited access expressways. To support this movement and ensure economic growth is not hindered by freight movements, NVision50 identifies and aims to address issues with capacity, reliability, and ensure that a variety of modes is available for shippers. This includes the region's highway network, rail network, pipelines, and air and seaports.

7.1 TRUCK BORNE FREIGHT

EXISTING CONDITIONS

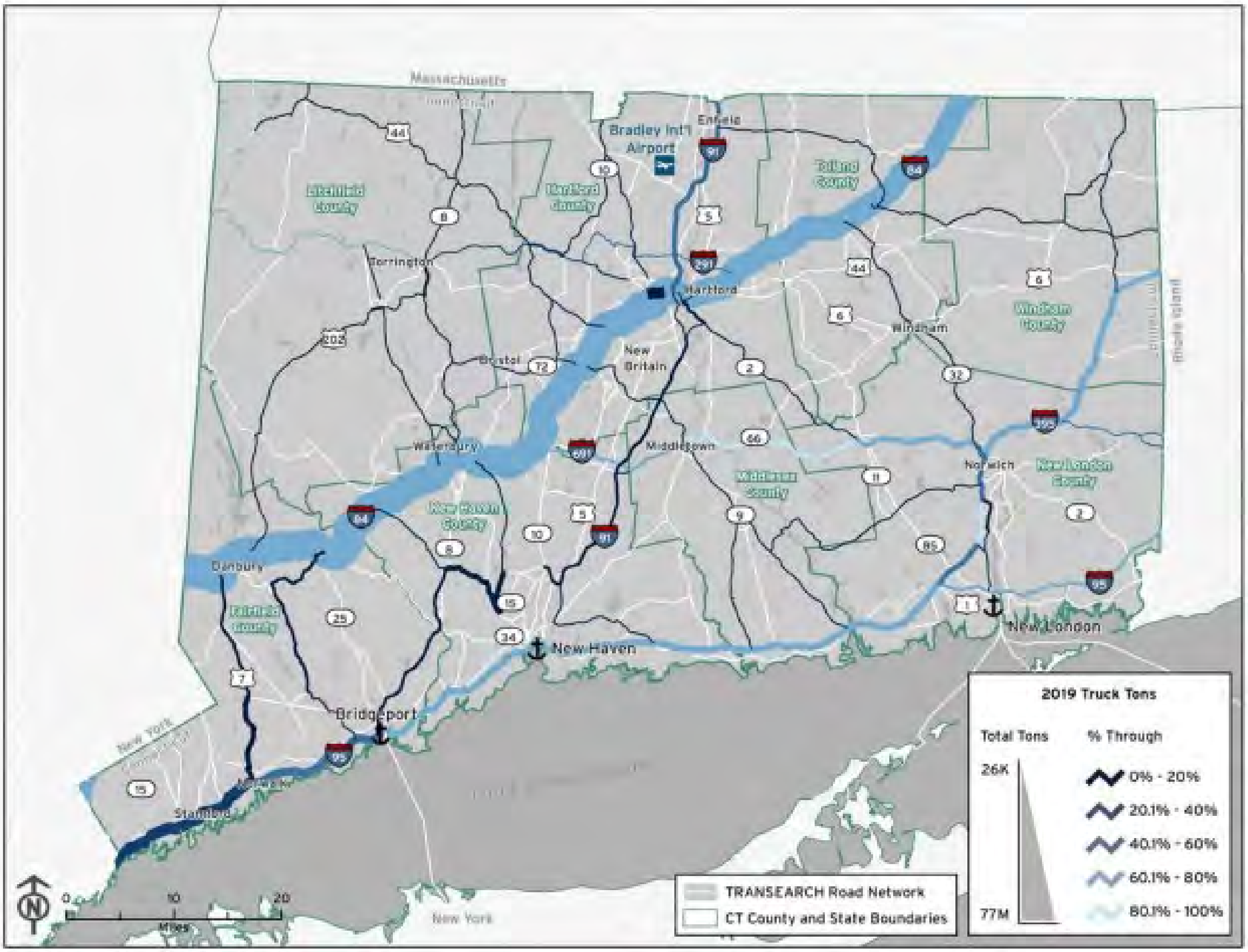
The vast majority of freight in Connecticut moves via trucks, with much of that traffic happening on the state's limited access expressway network. The rise of trucking to move freight since the early 20th century has brought with it both benefits, like the great expansion of markets beyond the traditional rail network, as well as consequences like environmental impacts and safety concerns on the region's roads. NVision50 takes into consideration the importance of trucking to the region's economy, aiming to improve parking and rest facilities for drivers while also ensuring that travel times are reliable.

FREIGHT VOLUME

Freight enters, exits, and passes through Connecticut primarily on the state's highway network. According to the CTDOT's 2022 Freight Plan, trucks carry 91% of the tonnage and 89% of the value of freight moving throughout the state (2019).

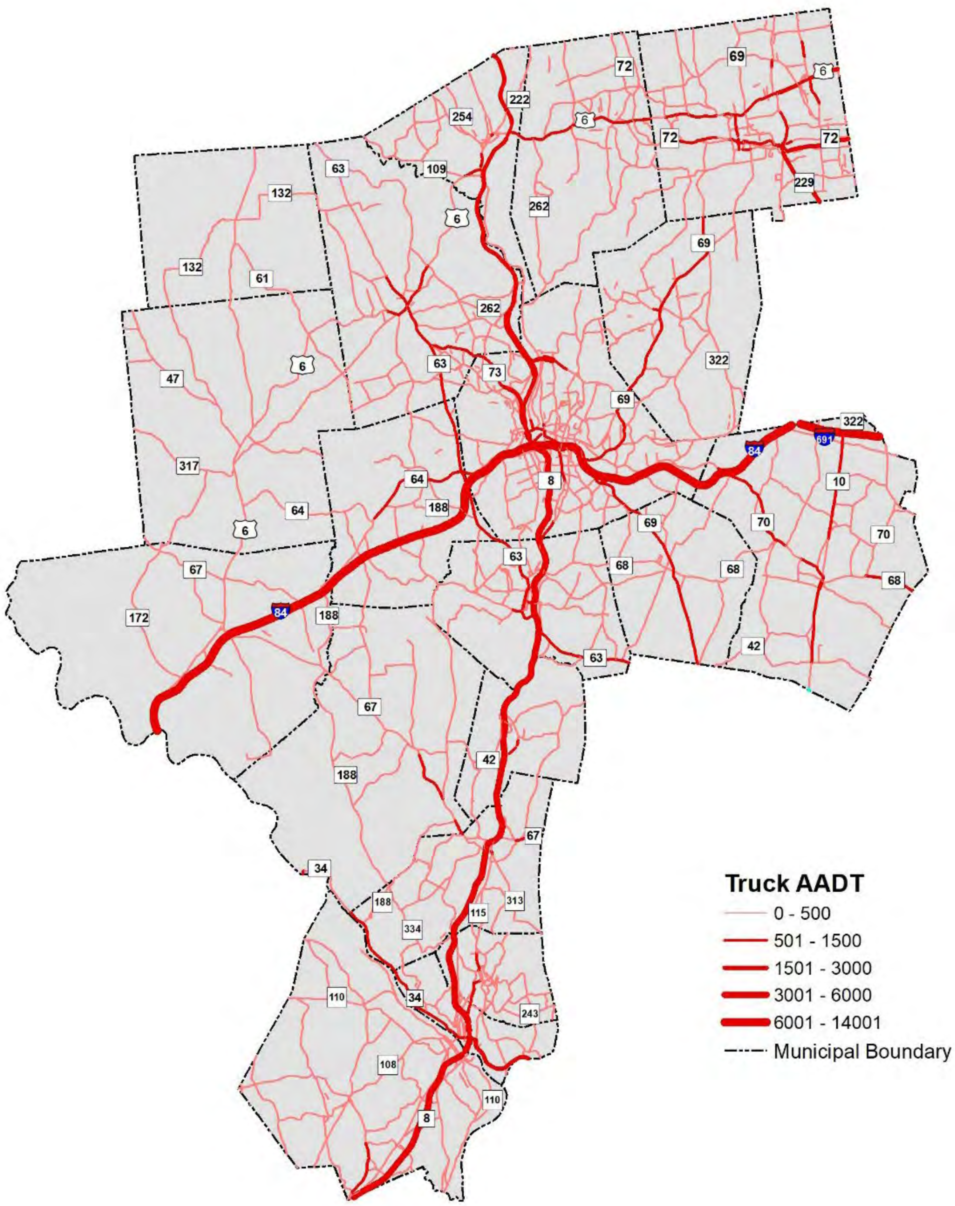
Connecticut serves as a bridge state for freight passing through the Northeast Mega-Region, accommodating the movement of freight from the New York metropolitan area and Mid-Atlantic states into greater New England. As a result, less than half of the State's truck freight traffic, by weight and value, 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.



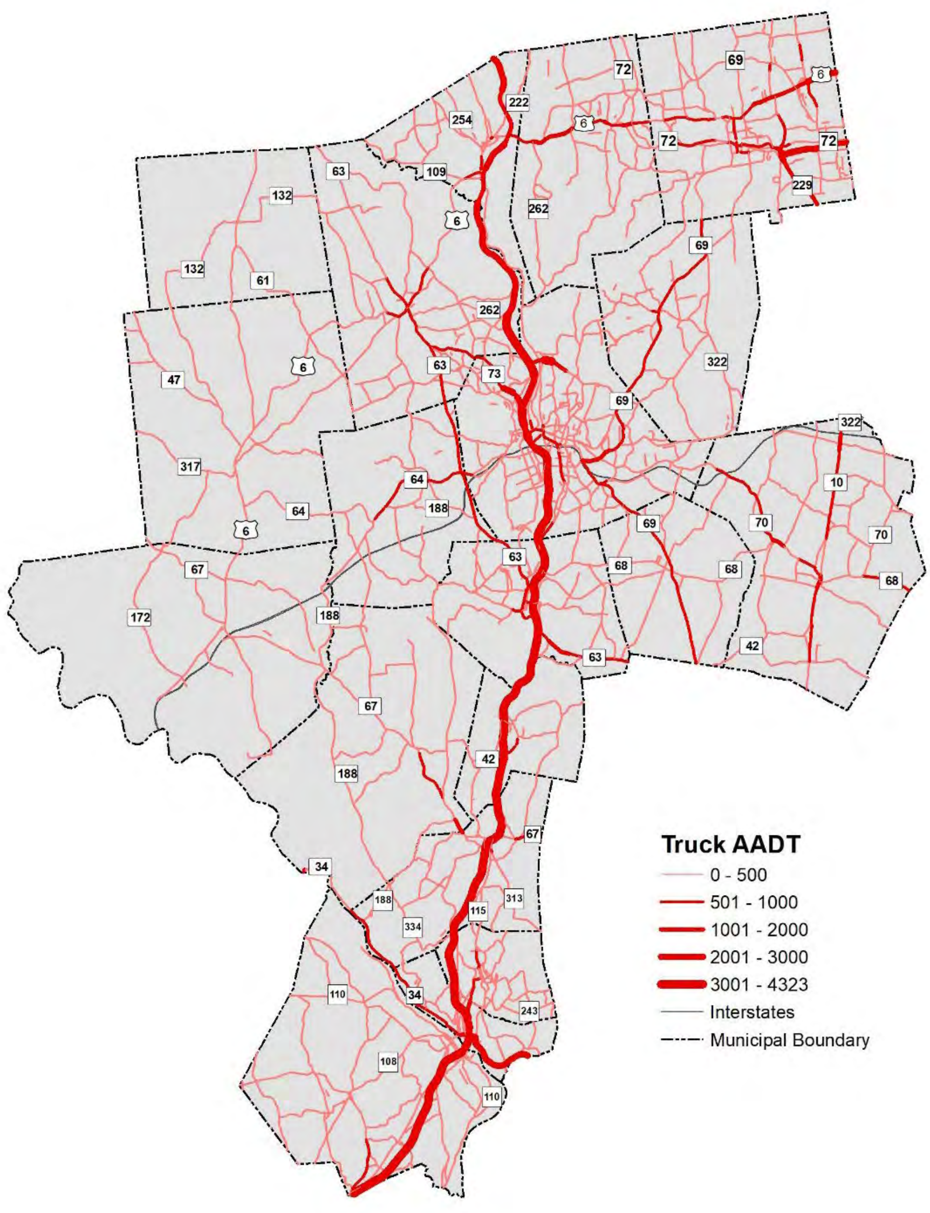
Map 7.1 Highway freight density (Tons, prepared by CDM Smith, Based on TRANSEARCH® data for 2019)

Mapping truck routes utilizing CTDOT truck average daily traffic data it becomes clear that Interstate 84 is the primary route for the majority of freight within the region, with Route 8 serving as the secondary route and the network of Arterials and state numbered roads carrying additional traffic.



Map 7.2 Truck AADT within NVCOG region (CTDOT Traffic Counts)

To illustrate regional 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 72, and US Route 6 appear as important branches, collecting and dispersing local traffic. In Cheshire, Route 10, Route 68, and Route 70 also emerge as important freight feeders, with Route 10 feeding to I-691. In Bristol, US Route 6, Route 72, and Route 229 can be seen as primary intermunicipal freight connectors. Route 63 and Route 69 both provide important local freight connections within the region.



Map 7.3 Truck AADT within NVCOG region, excluding interstates (CTDOT Traffic Counts)

TRENDS AND DEFICIENCIES

Truck freight volume is forecast to grow substantially over the next 20 years. The following charts show annual freight tonnage in Connecticut for 2019 and projected out to 2040.

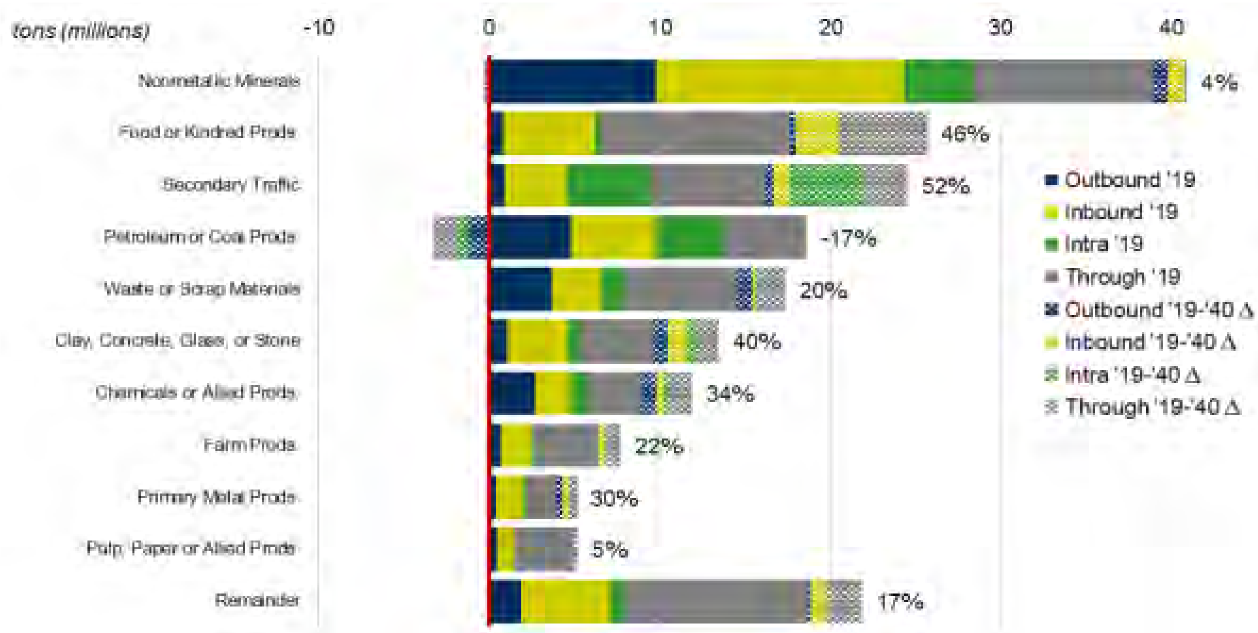


Figure 7.1 Total Connecticut Freight Tonnage, 2019 (in Millions, prepared by CDM Smith, Based on TRANSEARCH® data for 2019)

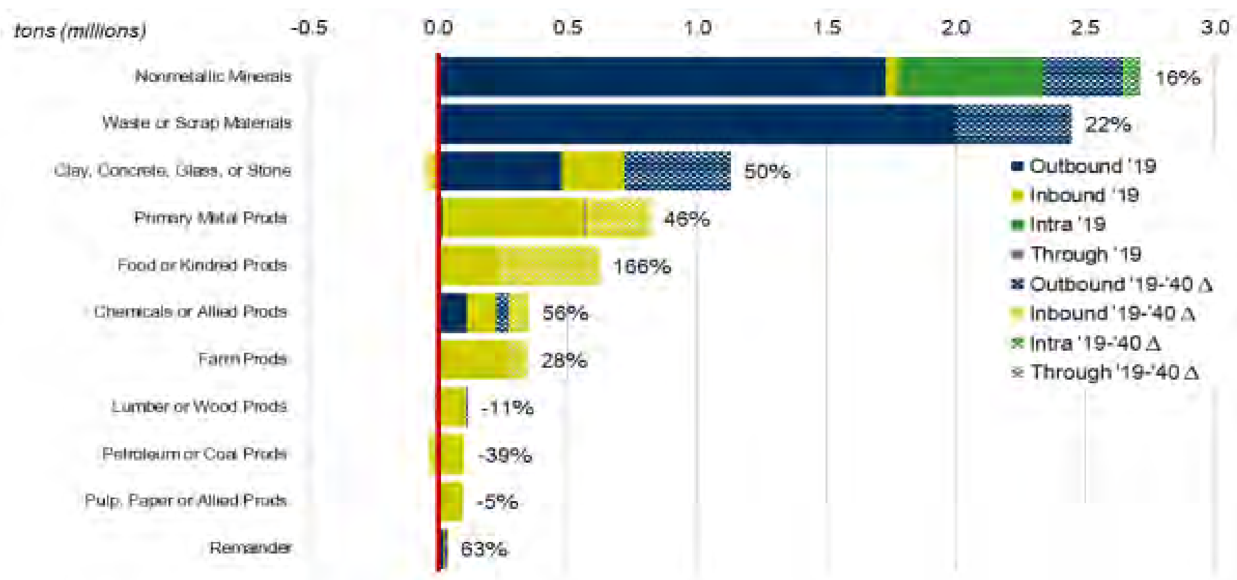


Figure 7.2 Total Connecticut Freight Tonnage, 2040 (in Millions, prepared by CDM Smith, Based on TRANSEARCH® data for 2019)

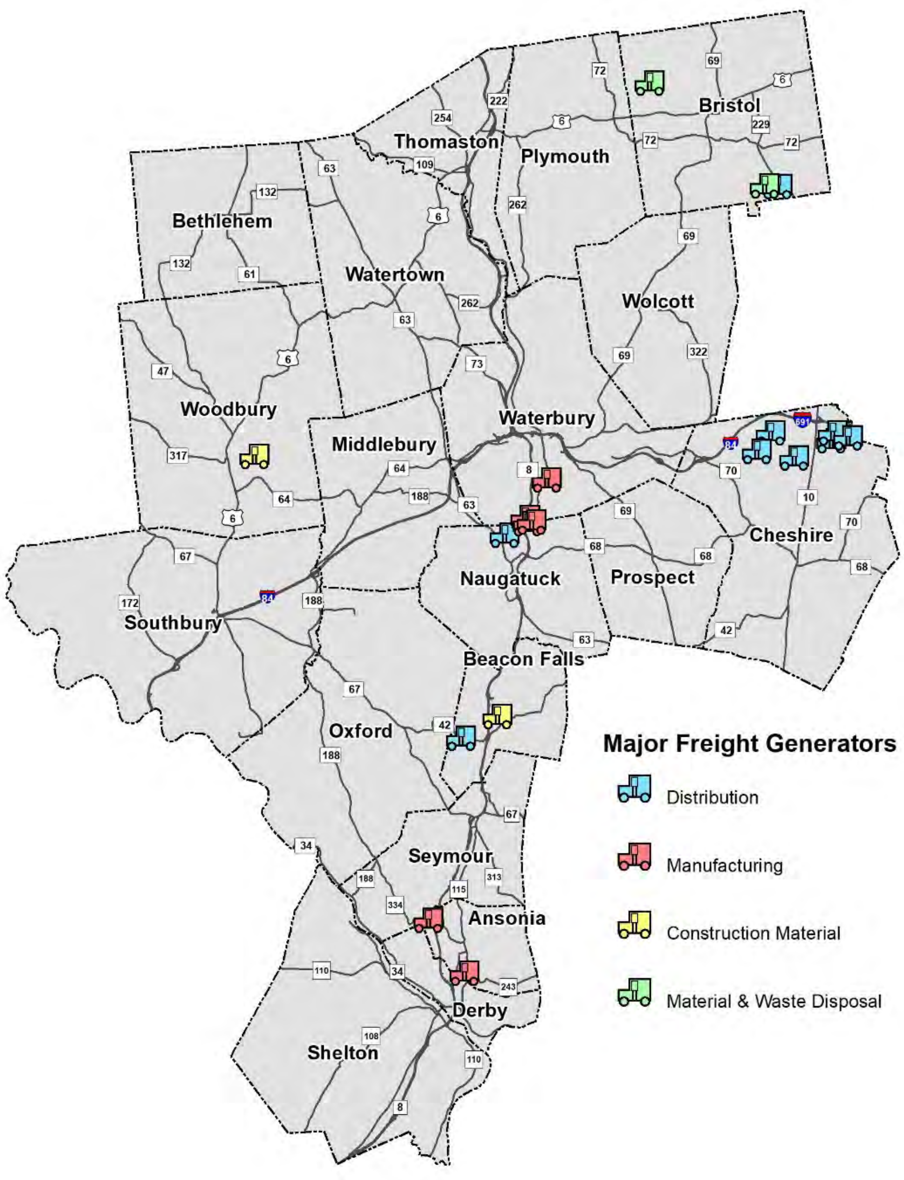
The state freight plan estimated the change in freight density by route by 2040, using 2019 as a baseline. These projections are illustrated in the following map. The analysis indicates that I-84, and to a lesser extent, I-691 will continue to absorb significant freight traffic in the coming decades.

Map 7.4 Change in Freight Density, 2019 to 2040 (Tons, prepared by CDM Smith, based on TRANSEARCH® data for 2019 and 2040)

Route 8 is not currently included in the Critical Urban/Rural Freight Network. However, ongoing maintenance and improvements to deficient geometry and aging bridges are needed to accommodate projected growth in freight volume along Route 8. Including Route 8 in the NHFN would allow access to federal freight funding for roadway improvements.

LAND USE

Additionally, the junction of I-84 and Route 8 is at the geographic center of the Naugatuck Valley planning region. The interchange between the two expressways provides access for the trucking industry to points through the region, state and larger region of New England and the entire northeastern United States. 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. The following map shows the locations of these major freight generators within the region.



Map 7.5 Major Freight generators within NVCOG

RELIABILITY

Regional freight reliability is a priority for freight dependent enterprises. Costs increase as shippers are required 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. With recent supply chain issues underscored during the COVID-19 pandemic, freight reliability is more important than ever.

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 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 index only applies to roads in the Interstate System.

The TTTR is a measure of reliability, not congestion. Therefore, segments of the highway that are regularly and predictably congested will not have a high travel time reliability ratio. Rather, those segments of the highway where delays are unpredictable and severe are scored highest. This performance measure prioritizes reliability over congestion and was developed in response to stakeholder outreach with the freight industry which deemed predictability most important factor for scheduling. For the next two and four years, the TTTR targets for the region are 1.95 and 2.02 respectively. These targets are matching the targets that CTDOT has.

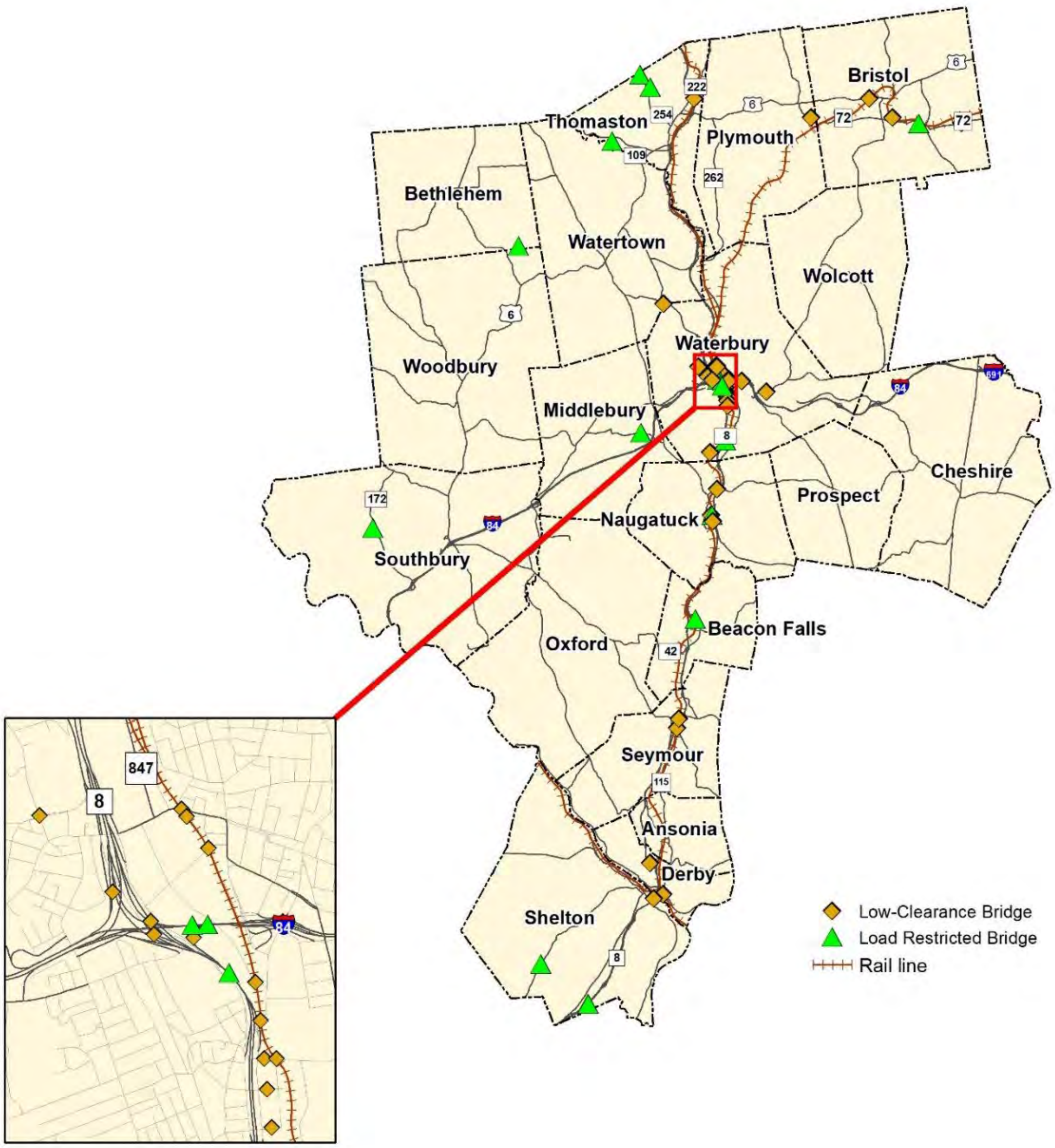
TRENDS AND DEFICIENCIES

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 the 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.



Map 7.6 Freight restrictive bridges within the NVCOG region, Data source: CTDOT

TRENDS & DEFICIENCIES

The indices for both bridge condition and pavement condition are expected to improve statewide during the next four years with performance targets to improve the State of Good Repair of Connecticut's roadways. 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 crashes 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 be used to highlight high risk areas within the region.

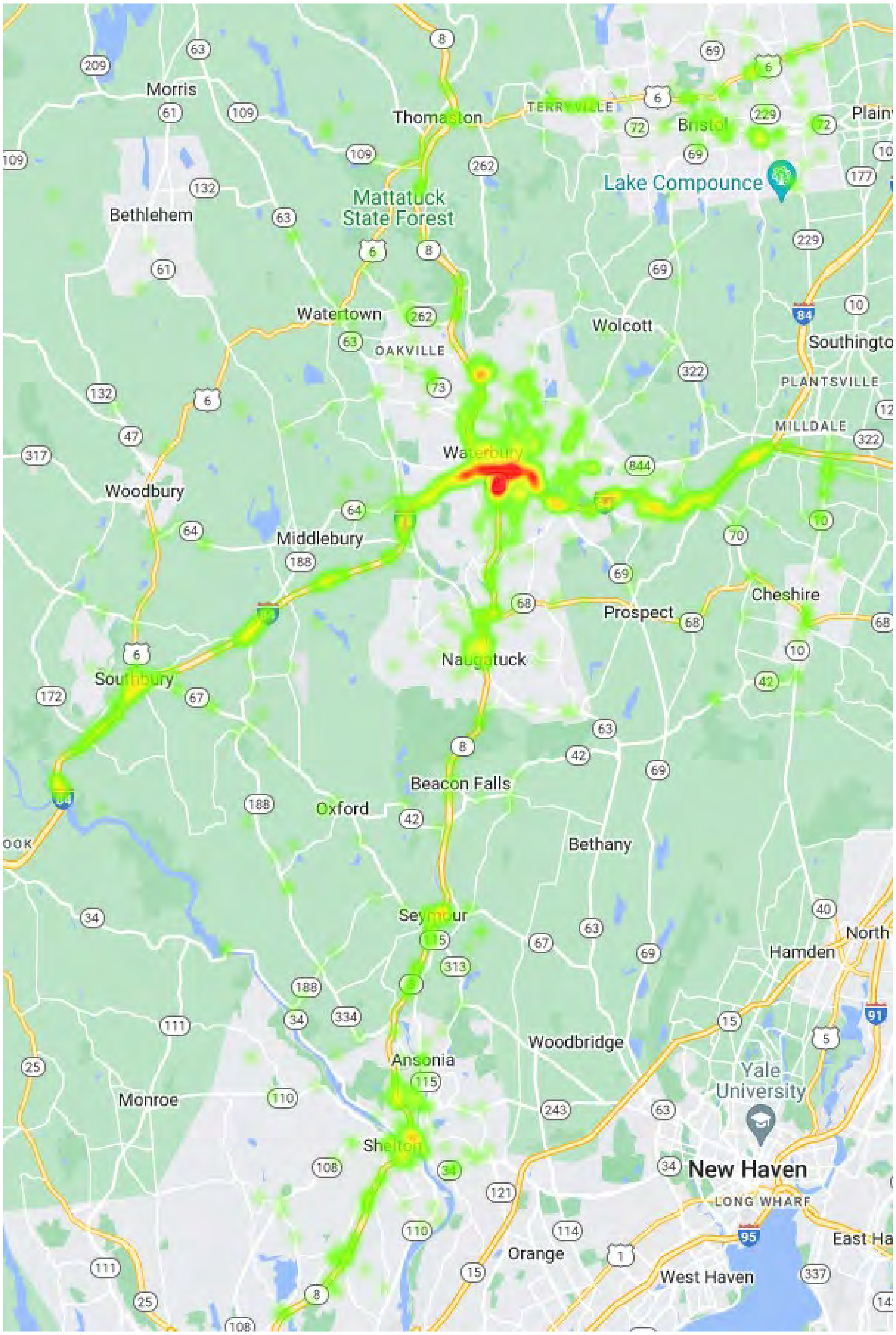
For heavy duty trucks, that is vehicles with a maximum weight limit greater than 26,000 pounds, the following safety measures are used to monitor safety performance:

- 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	Fatal Injury	No Apparent Injury	Possible Injury	Minor Injury	Serious Injuries	Bike and Ped Serious Injury/Fatality	Total
2019	1	452	55	40	1	1	549
2020	0	367	37	29	7	0	440
2021	1	497	27	30	4	0	559

Table 7.1 Crashes involving heavy duty trucks. Source: Connecticut Crash Data Repository

The following heat map shows freight related crashes and visualizes high hazard areas.



Map 7.7 Heatmap of Crashes within the NVCOG region, Data Source: UConn Crash Data Repository

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 within the near future. Trucks are increasingly being fitted with new technologies to reduce reaction time and remove blind spots.

TRUCK-BORNE FREIGHT ACTIONS

- Use data driven process to prioritize improvements where demand is strongest.
- Implement ITS infrastructure.
- Designate Route 8 as a critical urban and rural freight corridor.
- 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

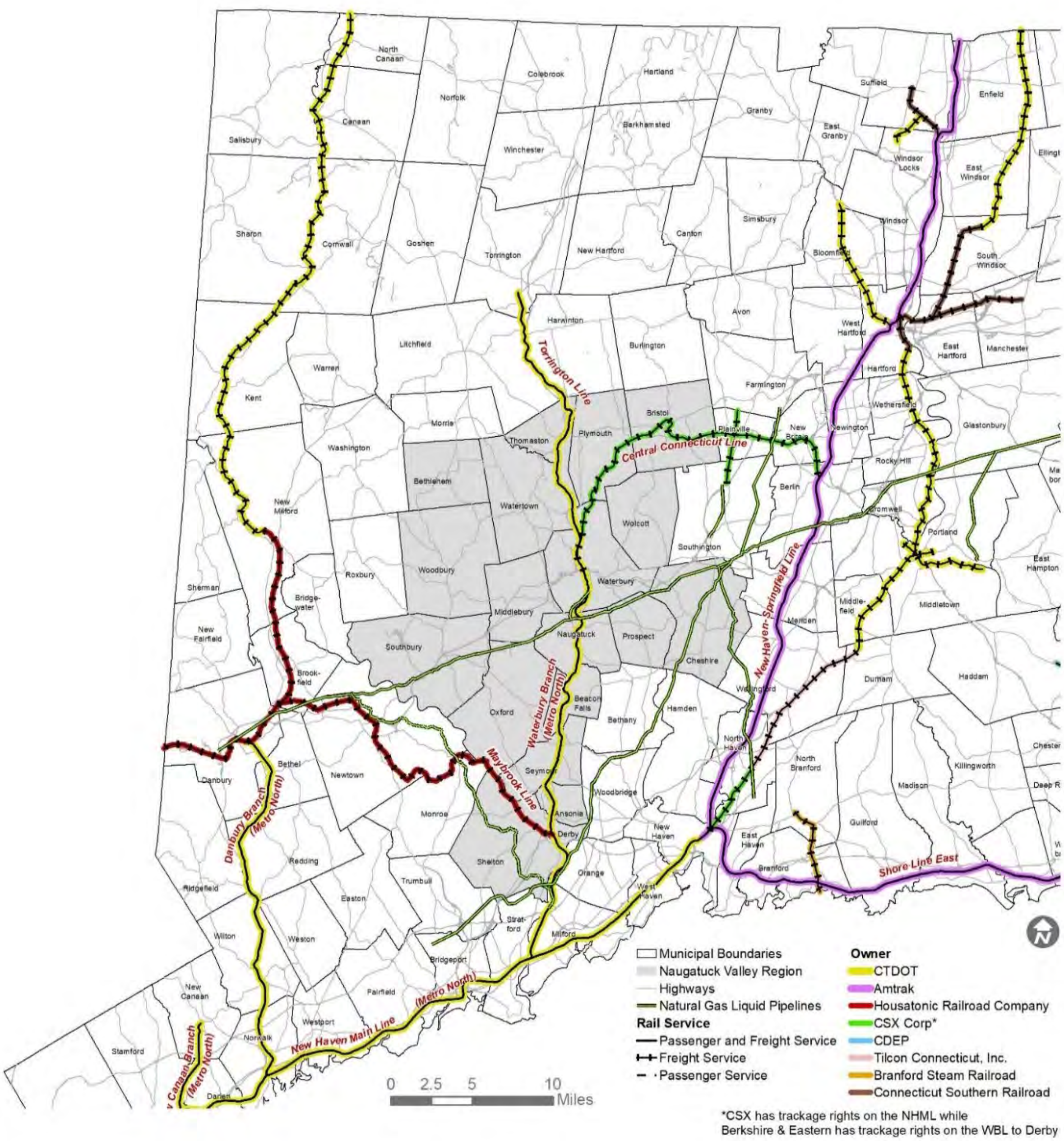
EXISTING CONDITIONS

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%. 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 required to demonstrate that its plans, program, and projects contribute to the attainment of national air quality standards and do not have adverse impacts on regional air quality. Shifting freight movement from heavy trucks to rail offers potential advantages towards reducing regulated and greenhouse gas emissions and contributing to achieving air quality goals. 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 benefits related to increased rail freight indicate the increased movement of freight by rail should be prioritized where possible. However, there are some basic pragmatic issues to be considered, such as rail access, that limit a more widespread shift. The 2013 Central Connecticut Rail Study identified the following barriers that inhibit rail-borne freight statewide.

- *Constrained Hudson River rail crossings make 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 low rail weight restrictions 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 suitable for movement by rail.*

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.



Map 7.8 Railroad ownership map around NVCOG region

As stated, CSX, the State's sole Class I Carrier, does not operate within the planning area, but it remains locally important as the New Haven Main Line (NHML) intersects the Waterbury Branch Line (WBL) in Milford, giving the region access to this freight asset. In 2022, CSX finalized the acquisition of PanAm Southern, who operated on the Central Connecticut Line. A new shortline was chartered to operate on this territory, Berkshire and Eastern, with CSX as one of the stakeholders.

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 has been completed which added four passing sidings, signalization, and positive train control, which allows 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. Berkshire and Eastern has trackage rights from the junction of the Maybrook Line north to the split between the Central CT line and the Torrington Line in Waterbury.

Naugatuck Railroad Freight Operations in Waterbury

North of the Waterbury Line, the Naugatuck Railroad operates freight services as well as passenger excursion service. As one of the largest originators of freight cars within the region, the Naugatuck Railroad serves as a key stakeholder within the NVCOG region for freight related topics and several of the projects within NVision50 were developed based on feedback from their staff. The line between Waterbury and Torrington, sometimes referred to as the

Torrington Line, is a 19.5-mile segment that can accommodate 263,000-pound axle loading and has a clearance for Plate C. Currently rated as FRA Class 2, freight movements along the line are limited to 25 mph. Currently, the Naugatuck Railroad is hauling over 100,000 tons of freight a year and they are actively pursuing additional customers within the Torrington area.

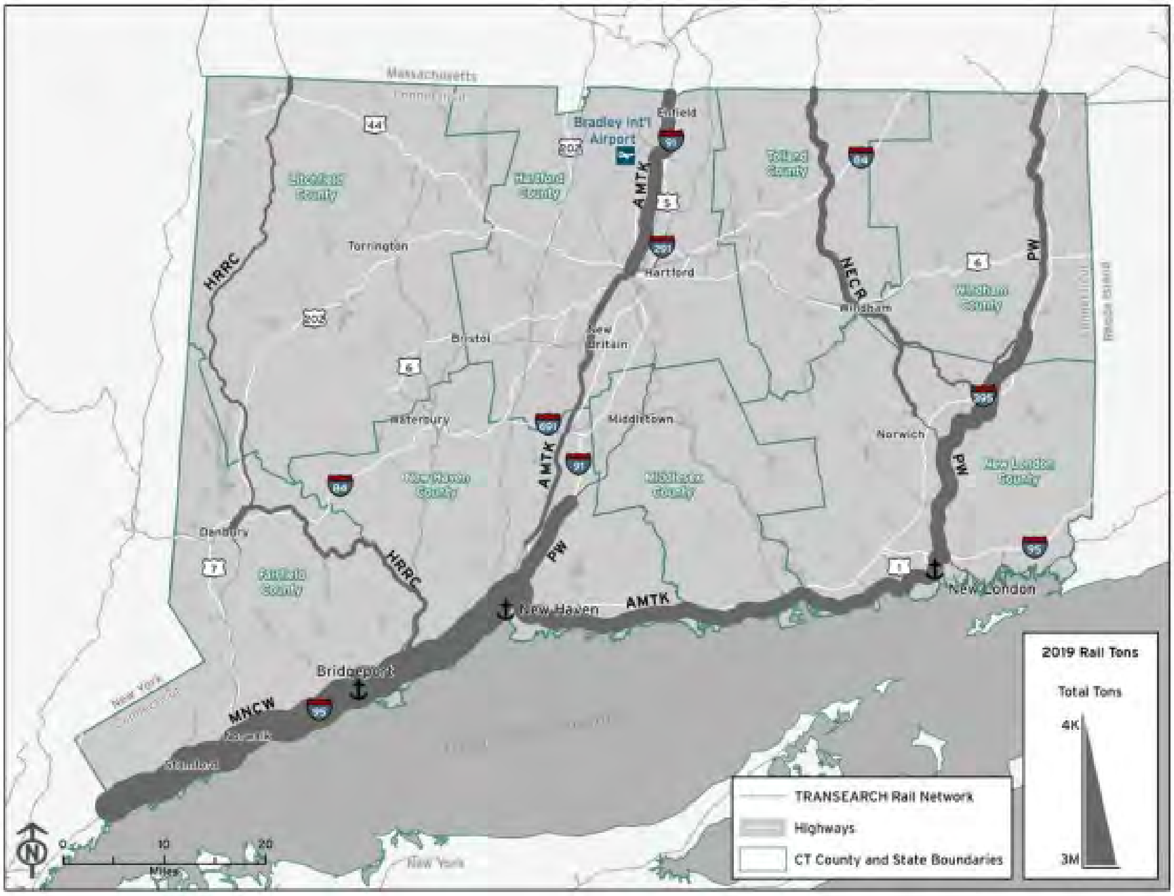
In Derby, the WBL intersects the Maybrook Line, operated by the Housatonic Railroad Company (HRRC). The Maybrook Line, formerly a critical connection between the New Haven Railroad's Cedar Hill Yard in New Haven and Maybrook Yard in Maybrook, New York, currently connects from Derby west to Danbury, where the rail line turns north to Pittsfield, MA. 2014 data shows heavy utilization of this line, though today no customers exist within the NVCOG region. An ongoing concern about a Downtown Shelton development within the railroad's right of way, potentially obstructing the movement of freight cars, has temporarily stopped the movement of freight over the Housatonic river to the wye with the WBL. Reactivation of the 33.5 mile Maybrook line is identified as a priority within the CTDOT's 2022 freight plan.

Berkshire and Eastern 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 axle 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.

TRENDS AND DEFICIENCIES

Rail tonnage is forecast to increase from 5.6 million tons in 2019 to 8.6 million tons in 2040, an increase of 30 percent (1.3 percent 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 northeastern portion of the state.

While rail is projected to see greater traffic in future years, it 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, particularly focused on meeting national weight and height standards, increasing travel speeds, and maintain a state of good repair. The prioritization of freight reliant 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.



Map 7.9 Connecticut Freight Rail Tonnage, 2019 (Source: CDM Smith and IHS-Transearch data)

MULTIMODAL FACILITIES AND INLAND PORTS

The NVCOG seeks to work effectively with regional 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 regions 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 the mostly vacant 86.5-acre parcel of land along Elm Street, a brownfield site located between the Waterbury Line and Route 8. The port would consist of warehousing and transloading facilities, allowing consumer goods to be shipped via rail into Naugatuck, stored until ready for distribution, then loaded on to trucks for last-mile delivery. This project is envisioned to reduce costs for shippers while reducing the burden on the regional highway network, benefiting consumers and shippers alike. Serving as a critical site within the Northeast Mega-Region with easy distribution to the New York Metro area, this project would bring economic benefits to the region as well as support NVision50's goals of mode shift and environmental protection.

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 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. There is potential to improve the maritime to rail connections in Connecticut's three major ports, reducing the need for trucks to move freight.

A similarly critical project suggested by the Naugatuck Railroad is a Waterbury freight yard to facilitate interchanges of cars with the Berkshire & Eastern. The current process is inefficient and hampers the railroad's ability to expand their customer base. Existing space at the Waterbury Train Station, formerly used as a railyard, could serve this purpose, as could land north of the current station. Although not funded within this plan, this project remains a regional priority and funding opportunities will be sought for this improvement in conjunction with the railroads and CTDOT as the owner of the rail.

ACTIONS

NVision50 aims to support the continued growth of rail freight throughout the region through a series of funded and unfunded priority projects.

- 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
- Improve Maybrook Line to FRA Track Class 2
- Support the ongoing development of intermodal freight facilities within the region
- Incentivize placing freight intensive land uses adjacent to the region's rail lines
- Construct freight yard at Waterbury to facilitate safer and easier transfer between railroads

7.3 PIPELINE

EXISTING CONDITIONS

Pipeline transmission is an 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.

Four companies operate pipelines in or near the Naugatuck Valley region. The Buckeye Pipeline 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 connects in Shelton, and pipeline owned by Algonquin Gas Transmission LLC (Spectra Energy Partners) connects 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 2020.

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	1,142
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

Table 7.2 Natural gas pipelines in Connecticut

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.

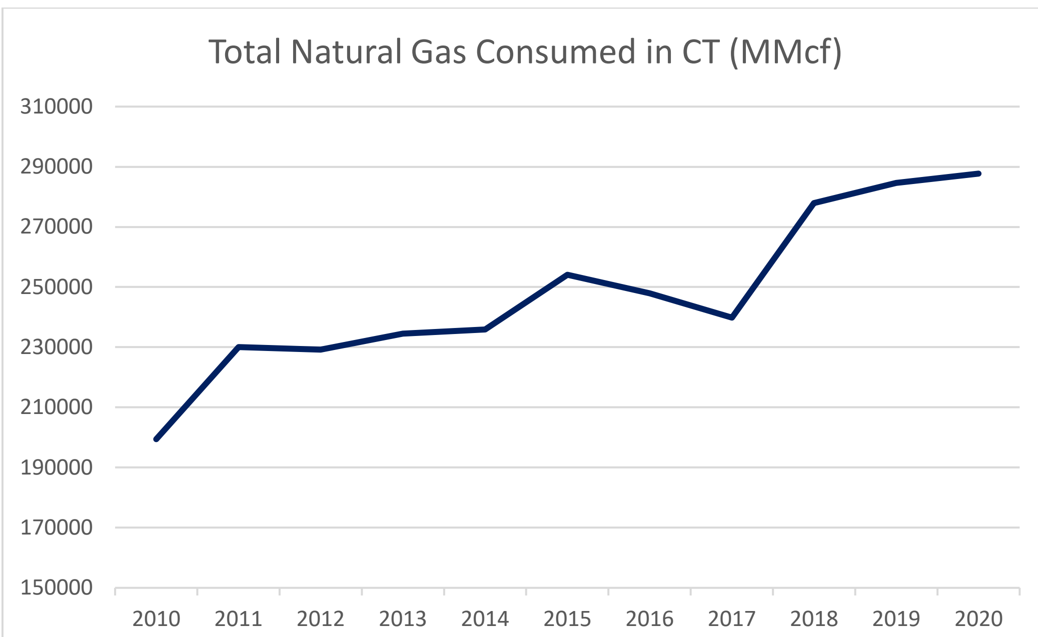


Figure 7.3 Natural Gas consumption within CT

Connecticut has approximately 590 miles of transmission pipelines currently in operation within the state. 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. The second phase was completed in January 2021.

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 Eversource electricity transmission lines and illustrates the importance of pipeline to the freight network.

Ongoing planning includes the Access Northeast, with the project stakeholders 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. This project was put on indefinite hold in 2017 after significant public opposition.

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 runway 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, five small aircraft facilities, and six Federal Airport Administration (FAA) registered heliports The GA Airport and Heliports are managed by the Connecticut Airport Authority (CAA). The region's publicly owned and operated GA service level airport is the Waterbury-Oxford Airport (OXC) located at the border of Oxford and Middlebury. The MTP will consider only general aviation airports.

Map 8.1 Locations of Airports and Heliports within the NVCOG Region

8.1 EXISTING CONDITIONS

General Aviation Airports

OXC primarily services corporate, business, and recreational flight operations, and has no scheduled commercial airline service. 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 2019, OXC handled an average of 43 flights a day, approximately 15,700 operations a year, while in 2020, OXC handled an average of 44 flights a day, approximately 16,200 operations a year. Compared to the previous transportation plan, the number of operations has dropped significantly from 43,000 operations in 2017, a 63% decrease. Situated seven miles southwest of downtown 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 opening 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 2021, there were 3 helicopters and 154 fixed-wing aircraft based at the Waterbury-Oxford Airport, of which 32 are medium and large corporate jets, 11 are multi-engine, and 111 are single-engine aircraft.

> An airport is considered a "national asset" if is a part of the FAA's National Plan of Integrated Airport Systems (NPIAS)

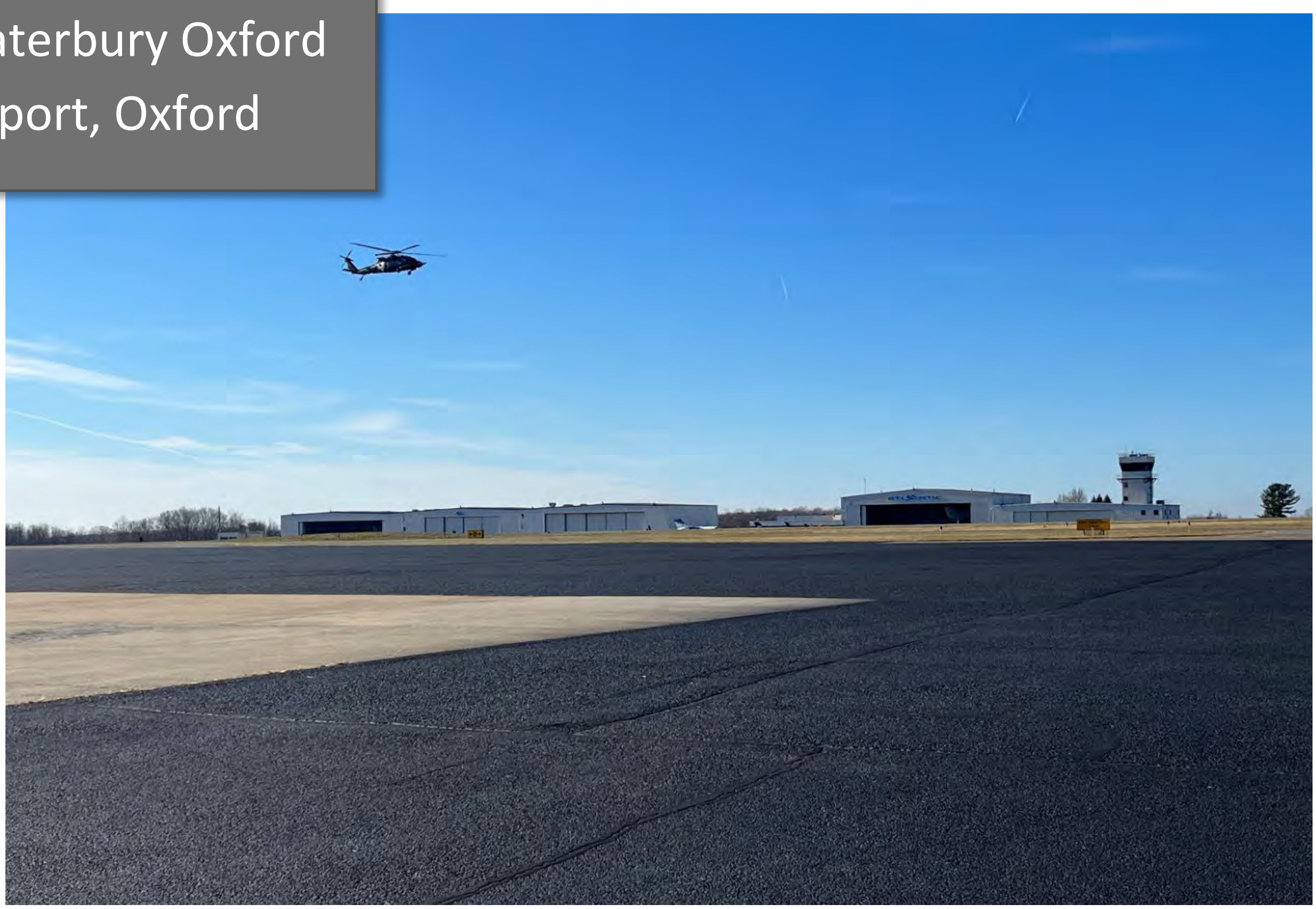
As the Fixed Base Operator (FBO), Atlantic Aviation offers servicing and maintenance as well as charter passenger service and air freight. Tradewind Aviation LLC, Clay Lacy Aviation, and Richmor Aviation offer charter passenger service. Atlantic Aviation and Clay Lacy provides medium and small jet servicing. Atlantic Aviation, Interstate Aviation, and Richmor Aviation provide flight school training. Executive Aircraft Interiors, Inc., offers complete refurbishment of single engine to large aircraft cabins.

An air traffic control tower was put into operation 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 were completed in 2018. The updated airport master plan includes several improvements over the next 20 years. These improvements include extending taxiways, constructing a heliport, and installation of new runway lights. Additional improvements if funding allows include additional hangars, a new administration building, a service road around the airport’s perimeter, and additional jet fuel storage facilities.

According to the CAA, the airport contributes 1000 jobs to the local economy, as well as $182.4 million in economic contributions and $10.05 million in state tax revenue. 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. In 2014, Autonomy Technology Inc. (ATI) moved in within the development zone, contributing 20 full time jobs to the region within the first couple of years of operation. In July of 2022, a U.S. Customs and Border Protection office opened at the airport. This allows the airport to accept charter flights from outside the country. Hangers for charter flights are in short supply with other nearby airport at capacity. This new asset will continue to foster new growth for the Waterbury Oxford Airport.

Currently, Clay Lacy Aviation is expanding the Airport’s capabilities in two construction phases. The first phase is a $40 million expansion project adding 40,000 square foot hangar space and 5,000 square feet of office space in three phases. The first phase is expected to be open before the winter of 2023, the second phase in middle of 2024, and the third phase will be ready by the end of 2024. This project will create over 200 jobs for the airport.

Waterbury Oxford Airport, Oxford



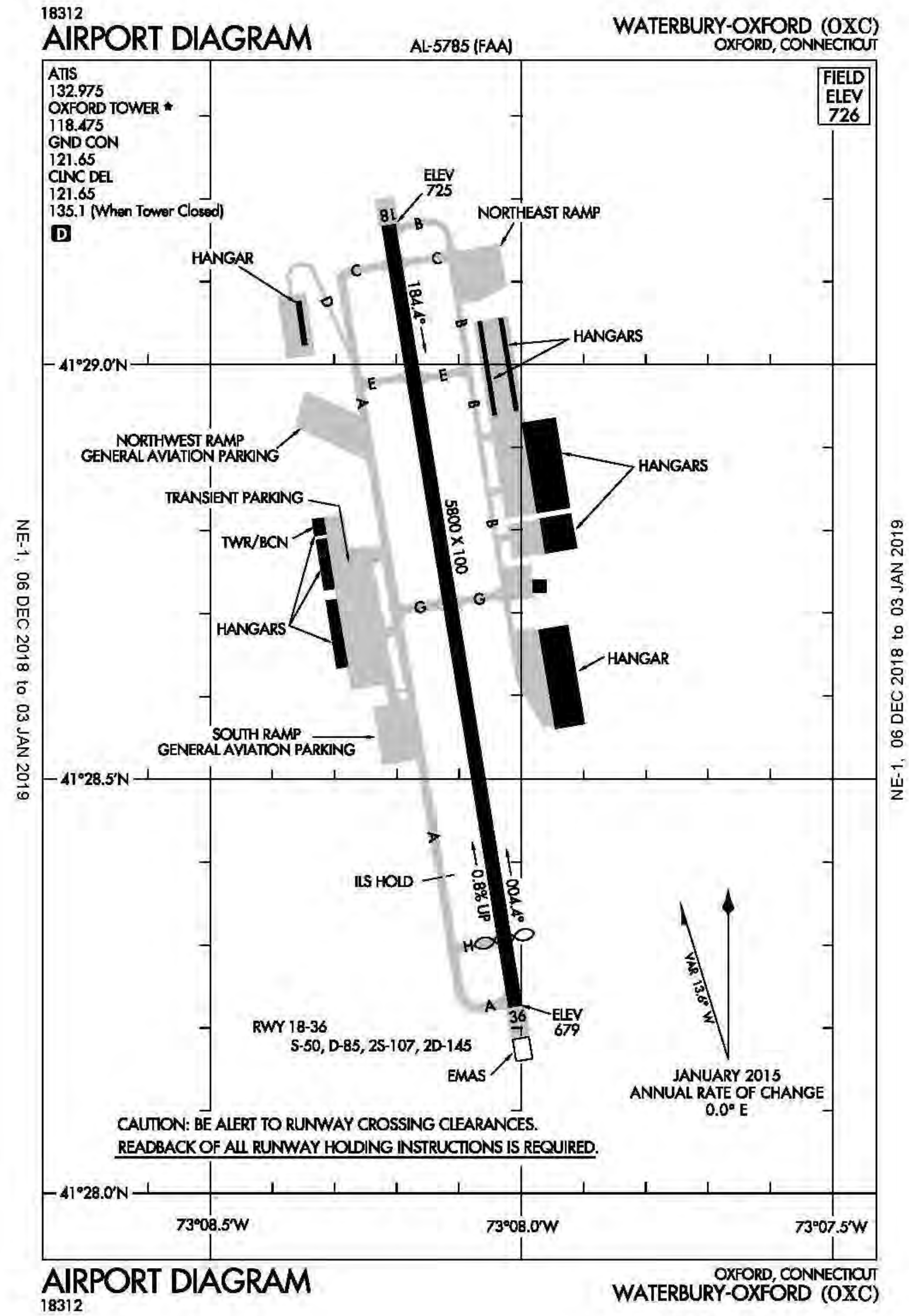


Figure 8.1 Airport Diagram, Source: Federal Aviation Administration website https://aeronav.faa.gov/d-tpp/1813/05785AD.PDF

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

Table 8.1 Heliports within NVCOG Source: http://www.airnav.com/airports/us/ct?type=H&use=R

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 2018, a series of one-time events (terrorism, recessions, fuel spikes, and industry consolidation) have depressed the demand for aviation nationally and in CT. Despite predictions of growth, the actual number of aircraft and operations out of the airport were significantly lower. Predictions for 2018 anticipated 280 based aircraft and 81,707 operations. However, there were only 163 based aircraft and 34,437 operations. Despite this, the airport is anticipating growth over the next 10 years, with an average of 2 new operations per day until 2032.

Other nearby airports and their long term decisions also impact OXC. Tweed Airport located in New Haven is expected to get significant upgrades within the next couple of years. The upgrades include a new four-gate 74,000 square-foot terminal and daily service from a new airline.

Bradley Airport, located in Windsor Locks, is Connecticut's primary commercial airport within the state mainly servicing domestic destinations and nearby international destinations with non-stop flights. Westchester Airport serves a similar role serving some domestic non-stop flights. A $230 million investment is being made in the terminal at the airport. The improvements will focus on making room for more airlines, passengers, and amenities within the terminal.

Sikorsky Memorial Airport, which is currently owned by the City of Bridgeport, will possibly change hands soon. The City of Bridgeport is looking to sell the airport to CAA. The implication of the sale is not clear yet, but if the ownership does change, there is a possibility that CAA will expand service at this location and complete $60 million worth in upgrades.

Additional non-stop destinations include LaGuardia Airport and John F. Kennedy International Airport. LaGuardia Airport serves several domestic destinations across the country while John F. Kennedy International Airport serves several domestic and international destinations around the world.

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

Table 8.2 Connecticut Airport System Challenges. Source: Connecticut Statewide Airport System Plan (CSASP) (2016)

A challenge faced by OXC and other airports in Connecticut is the lack of a new CSASP update since the 2016-2021 plan. NVCOG and other stakeholders must encourage the CAA to undertake an update to this important planning document and to maintain current, realistic plans moving forward to ensure that continuous projects and maintenance are occurring.

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

- Undertake long-term efforts to reduce airport development constraints: legislative, environmental, and physical
- Support development and expansion of economic incentive zones near airports and establish airport land use compatibility guidelines

- 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

OXC created a 20 year plan for the airport in 2018. The plan outlines the goals for the next 20 years, inventory of existing airports, activity forecasts, facility requirements, and proposed alternatives for the site. Their plan outlines several short-term, medium-term, and long-term goals for the airport.

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

Based on their plan, NVCOG's recommendations for OXC airport includes:

- Ensure airport maintenance continues at current levels
- Pursue infrastructure improvements such as taxiway construction, heliport construction, additional lighting, a deicing facility, and additional service buildings.
- Develop high-end GA hangar facilities
- Support local development around the airport that will foster economic development for both the community and the airport
- Create a bus shuttle between the airport and Downtown Waterbury or expand CTtransit route 442 to OXC to provide a transit connection to the airport and to the local jobs surrounding the airport.

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 (2018)
- 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. OXC wants to construct another 668,750 square feet of hanger space by the year 2038.

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. This project was completed in 2018.

9.0 SUSTAINABLE TRANSPORTATION

When transportation investments consider economic, environmental, and social issues, it creates opportunities to improve all travelers' quality of life. The concept of sustainable transportation looks beyond traditional transportation improvements to consider the ways that the transportation system will impact the health, wealth, and overall well-being of communities in the future.

In 2009, 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, lower transportation costs, and foster sustainable communities. 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 that lower 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 economic mobility and lower the combined cost of housing and transportation.
- Enhance economic competitiveness**:** Improve economic competitiveness by giving workers reliable and timely access to employment centers, educational opportunities, services, and other basic needs, as well as expanded business access to markets.
- Support existing communities**:** Target federal funding toward transit-oriented, mixed-use development, and land recycling. This enhances community revitalization, improves the efficiency of public works investments, and safeguards rural landscapes.
- Coordinate and leverage federal policies and investment**:** Align federal policies and funding to remove barriers to collaboration and increase the effectiveness of governments to plan for future growth. This includes smart energy choices like 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 formed the New York-Connecticut Metropolitan Region Sustainable Communities Planning Consortium to develop a regional plan of sustainability. The Naugatuck Valley Council of Governments, because of its membership in the Greater Bridgeport and Valley

MPO, participated in the project. The Consortium developed a regional plan for sustainable development that leverages the region's robust transit network to achieve more sustainable growth. The primary goal of the plan is to foster sustainable development and transportation. More information about the plan is available here: https://www.nymtc.org/Regional-Planning-Activities/Sustainability-Planning/NY-CT-SCI.

By taking a multi-disciplinary approach to planning, coordinating land use, transportation, and environmental planning professionals, the NVCOG actively promotes the principles of livability and sustainable transportation in ongoing planning work. Regional projects and programs work to actively address obstacles to sustainable development, such as reliance on highways and roadways, limited and fragmented bus and rail service, and gaps in the active transportation network. Residents, municipal leaders and officials, and other stakeholders of the Naugatuck Valley region recognize the finite limit on land and natural resources and the implications of insufficient access to reliable and efficient transportation for travelers.

To adhere to the livability principles, there should be more emphasis on mode choice, public transit opportunities, low impact development/green infrastructure, equity, sustainable development, housing, and the interconnectedness of transportation planning and transit supportive land uses. The key focus of the plan is to fundamentally change the perception of city centers from car-dominated to multimodal 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 that are taking 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, public services, and events. This perspective on sustainability echoes the six livability principles identified by the *Partnership for Sustainable Communities*. *Sustainable CT* is a nonprofit that has identified a broad range of sustainable best practices. Municipalities choose from a menu of *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. Currently, Cheshire, Southbury, Waterbury, and Woodbury have achieved Bronze status, and Bristol has achieved Silver status. More information about NVCOG's involvement with Sustainable CT is available here: https://nvcogct.gov/what-we-do/environment/sustainable-ct/.

Transportation is one of the thirteen *Sustainable CT* action categories. The "*Clean and Diverse Transportation Systems and Choices"* category contains many sub-categories and actions on which municipalities and the NVCOG may collaborate to improve sustainability of the region's transportation system. Examples include implementing complete streets, promoting effective parking management, encouraging smart commuting, supporting zero emissions vehicle deployment, and promoting public transit and other mobility strategies.

The following sections discuss these transportation-related sustainable actions and how the region may collaborate with municipalities to help them achieve *Sustainable CT* certification.

IMPLEMENT COMPLETE STREETS

The goal of these actions is to reward steps toward building more complete street facilities. Complete streets is a holistic approach to planning, designing, and building a street environment that prioritizes safe access and connectivity for all users. From training and planning to project construction, this subcategory affords municipalities opportunities to score points at any stage of adding completes streets to their community.

NVCOG supports this process by developing regional planning documents and templates which may be locally implemented. Additionally, where funding is regionally distributed, such as LOTCIP, the NVCOG encourages 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."*

At the September 9, 2022, meeting of the NVCOG Policy Board, the chief elected officials of the nineteen NVCOG municipal members, including the fifteen members of the CNVMPO, voted to adopt the CTDOT's Complete Streets Policy, ensuring that all roadway projects examine the impact to all users. At that meeting, the policy board adopted a Vision Zero goal, which aims to eliminate fatalities and serious injuries, through a series of actions that include broader adoption of complete streets principles. The NVCOG aims to develop a region-wide Complete Streets plan to identify high-priority improvements, as well as a series of best practices that can be implemented across the nineteen-municipality region.

PROMOTE EFFECTIVE PARKING MANAGEMENT

Sustainable CT recognizes the importance of making existing parking more efficient, reducing parking demand and encouraging mode shift, as well as fostering walkability. Effective parking management mitigates environmental impacts like excessive land consumption, degraded water quality, exacerbated heat island effects, and reduces greenhouse gas emissions by encouraging alternative modes of transit.

Within the region, the NVCOG is preparing to undertake a parking utilization study that will examine the average occupancy rates of public parking within the region's downtown or village center areas. This study aims to provide zoning officials with real world data as they make decisions regarding minimum/maximum parking requirements for development within these districts, as well as to inform decisions about future development potential. Additionally, NVCOG regularly monitors use of the CTDOT maintained commuter lots along major arterial roads and at Waterbury Line rail stations. There is potential for additional regional actions on parking, and NVCOG staff across the transportation, land use, and environmental planning units will ensure that future projects and studies provide municipal officials with data that can help to address this challenging issue.

ENCOURAGE SMART COMMUTING

To meet the goals of this action, communities must show that they are providing options for their employees to use alternative modes of transportation when commuting to work.

The NVCOG has actively worked with CTDOT and municipalities to identify opportunities for alternative means of travel. This includes expanding the existing bus system, additional service and better facilities along the Waterbury Branch Line, and new options like Bus Rapid Transit (BRT). The Route 8 & Waterbury Branch Line Transit Oriented Development and Alternative Modes Assessment Project, expected to be completed in 2023, is a prime example of providing additional modes of travel that are as or more appealing than a single occupant vehicle. In the coming years, new studies in the region will include a look into micro/flex transit options, improved active transportation, building out infrastructure for micro-mobility options like e-scooters and e-bikes, and additional fixed route bus service enhancements.

The CTDOT's CTRIDES program provides valuable assistance in promoting smart commuting. It serves as the Department's public facing entity to share information about public transit, vanpool, carpool, and other demand management strategies. Future advertising and sharing of this program will be a vital strategy toward advancing this goal.

SUPPORT ZERO EMISSIONS VEHICLE DEPLOYMENT/MANAGE MUNICIPAL FLEETS

Sustainable CT encourages 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, like inventorying existing infrastructure. For example, the municipality of Plymouth worked with the region to acquire hybrid vehicles that reduce fuel consumption. Additionally, the NVCOG is actively developing data and publishing information about existing ZEV infrastructure.

A map of existing electric vehicle charging stations in the NVCOG region is available here: https://arcg.is/0yuH0u.

COG staff also monitors grant opportunities related to installing electric vehicle charging stations and provides the information to member municipalities. The Region will continue supporting its member cities and towns while also promoting regional grant funding for the expansion of infrastructure. The National Electric Vehicle Infrastructure (NEVI) Program is part of the Infrastructure Investment and Jobs Act, allocating $5 billion to create a nationwide, interconnected network of DC fast charging stations. The CTDOT will manage the state's share of NEVI funding. The FHWA approved CTDOT's NEVI plan in September 2022, which is available here: https://portal.ct.gov/-/media/DOT/documents/dsustainabilityandresiliencyunit/CTDOT-Approved-NEVI-Plan-2022-2023.pdf.

In December 2021, Governor Ned Lamont signed Executive Order No. 21-3, which prevents CTDOT from using state funds to purchase diesel buses after 2023 and mandates a plan for electrifying the state's bus fleet by 2035.

PROMOTE PUBLIC TRANSIT AND OTHER MOBILITY STRATEGIES

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

NVCOG regularly works with CT*transit* to gather data, analyze ridership trends, improve existing transit options, and advocate for new connections where there is a documented demand. Active public engagement is at the heart of this work, which includes inviting regional stakeholders to NVCOG Board meetings and partnering with complementary organizations to communicate information about existing services. By participating in 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 which underlies the six livability principles and, as such, is a component and benefit of sustainable action. the Title VI regulations prescribe equity policy for more inclusive decision-making, improved access to services, and sharing of benefits with all current and future residents, regardless of race, income, ability, age, gender, sexual orientation, etc. *Sustainable CT* advances equity by asking municipalities to demonstrate its application in municipal decision-making processes. 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 planning.

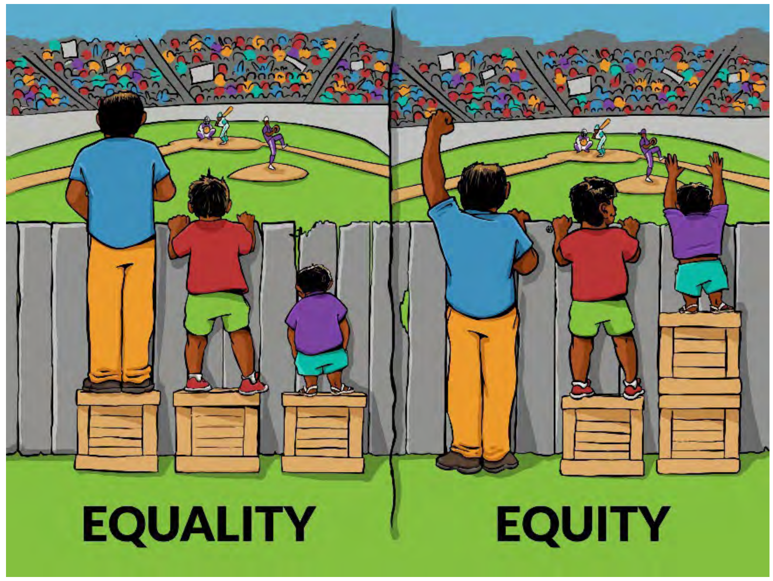


Figure 9.1 Picture showing difference between equality and equity. Source: Interaction Institute for Social Change | Artist: Angus Maguire. interactioninstitute.org and madewithangus.com

9.2 TRANSIT ORIENTED DEVELOPMENT (TOD)

The freedom of movement associated with individual automobile ownership comes with tradeoffs. Suburban sprawl has chased development farther and farther from our downtowns, leading to lower density development and increased reliance on private vehicles. The result of this is congestion, pollution, and other costs associated with automobile ownership and inefficient land use. Based on 2021 ACS estimates, and excluding those that work from home, approximately 87.2% of people in the NVCOG region drive alone to work, largely because of the region’s auto-centric infrastructure and the lack of viable alternative modes. Communities in the region are seeking ways to increase the use and accessibility of public transportation, cycling, and walking. Promoting these alternatives will better support the area’s aging population, ease congestion, address environmental concerns, and enhance town centers.

Many communities recognize the problems associated with low-density development and current zoning practices that separate land uses by type (e.g., residential, commercial, industrial). In response, they are promoting new developments that provide more reliable transportation options, provide mixed-income and affordable housing, and expand opportunities for economic development. The goal is to create nodes within a community that reinforce the existing character of communities, preserve historic downtowns, and enhance opportunities for healthy, walkable, and safe neighborhoods to flourish.

New principles have emerged that are aimed at reducing dependency on the automobile by encouraging land uses that support public transit. Transit oriented development (TOD) is a strategy to encourage pedestrian-friendly, mixed-use development projects near transit facilities, resulting in more livable and sustainable communities. TOD is a proven economic growth strategy that integrates land use, transportation, and the environment to generate new housing, jobs, more inclusive public spaces, and more sustainable and walkable communities. Transit-oriented development is an important part of any transportation plan, as it is a form of development that encourages people to use trains and buses, walk, or ride their bike.

Successful TODs include:

- Compact, mixed-use development, including a range of housing choices, within a quarter of a mile of a transit station or transportation hub. The goal is to be able to walk from where you live to a train or bus station in 10 minutes.
- 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.
- High-quality intermodal improvements that help people use trains, buses, bicycles, carpools, and walk rather than use a single-occupancy vehicle.

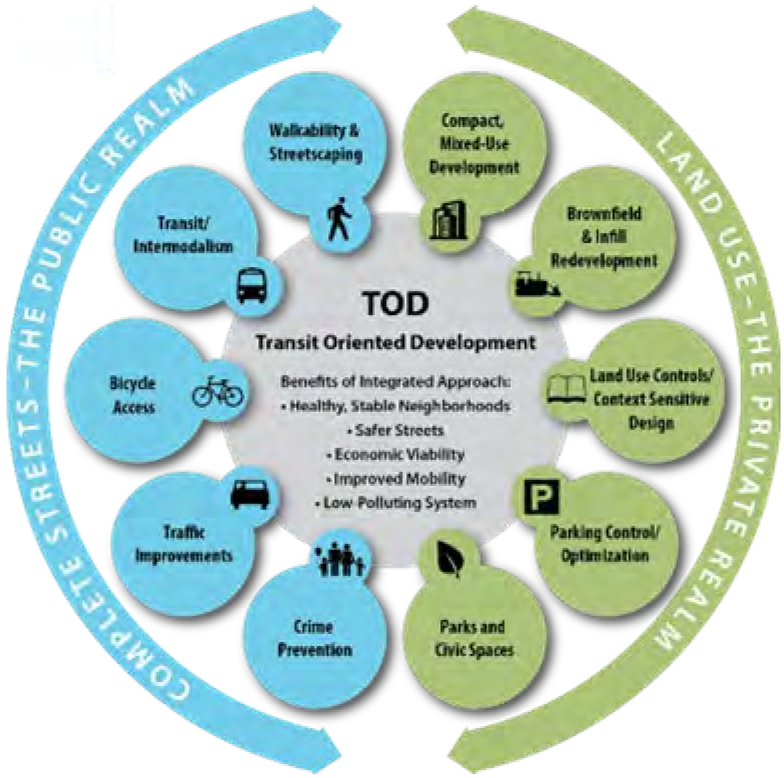


Figure 9.2 Elements of transit oriented development

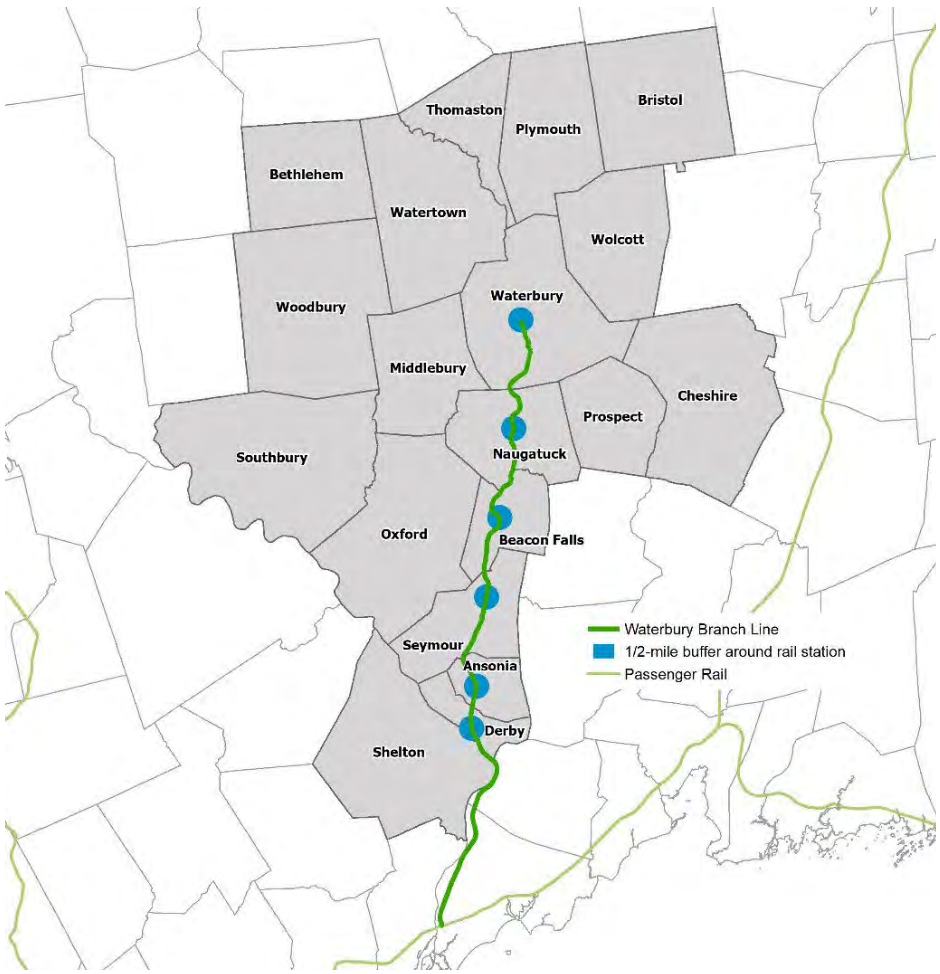
Transit oriented development involves nearly all aspects of community development, including land use planning, site development, and market analyses. TOD requires careful review of a variety of considerations, including land use regulations and zoning, contextual site design, infrastructure capacity, and market and demographic conditions. Accordingly, planning for TOD should 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 elements and design strategies for all communities to consider:

- <u>Complementary Mixed Uses</u>**:** New infill developments mix retail on the ground floor with commercial offices or apartments on the floors above. The proximity and density of these uses make developments more walkable and mean that people can visit multiple destinations without having to drive.
- <u>Building Height</u>**:** Buildings that implement TOD principles are typically at least two stories. However, the optimal height and spacing of buildings can vary depending on land and infrastructure constraints, market conditions, width of the street, and the rhythm and intensity of surrounding development.

- Continuous Street Wall: All new buildings abut the sidewalk to create a direct 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 incorporate TOD principles of flexible area and bulk requirements that allow for reduced setbacks and flexible height and lot coverage regulations. The architecture should complement the appearance and materials of existing buildings. Well-proportioned windows, interesting and varied rooflines, articulated cornices, ornate building entries, and special details at gateway corners can make a TOD development successful.
- Off-Street Shared Parking: There should be little surface parking for new infill development near station areas in order to directly integrate the station into the city, emphasize transit and non-motorized modes, as well as enhance safety of pedestrians and bicyclists. Shared parking between complementary uses is encouraged.

The neighborhoods best suited for transit-oriented development are those located within a half-mile of a transit station. The Naugatuck Valley communities that host a Waterbury Line rail station are prime candidates for TOD. In a north-to-south orientation, these are Waterbury, Naugatuck, Beacon Falls, Seymour, Ansonia, Derby, and Shelton. While opportunities for TOD should not be limited to areas near a rail station, they provide direct access to employment centers in Bridgeport and Stamford, as well as New York City.



Map 9.1 Map of WBL and other nearby passenger rail networks

Most towns and cities in the Naugatuck Valley are prime candidates for TOD. They have compact historic urban centers, public water and sanitary sewer lines needed to support mixed-use and higher density developments, and access to the Waterbury Line and fixed-route bus service. TOD can help position these communities for a revitalization and retrofit their central business districts to recapture a dense, vibrant urban character. 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 may be similar from one community to another, each development will be unique. It is very important that TOD respect and complement the form, density, character, and community values of each station area and downtown. Customizing TOD projects is critical to ensure they are appropriate for their urban context, accepted by the public, and attractive to private investors.

As part of the alternate modes assessment, the NVCOG has identified 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 but to help towns visualize a form of mixed-use, compact development that optimizes use of valuable downtown infrastructure, complements existing development, builds a customer base for merchants, builds transit ridership by bringing people closer to train and bus stations, and lets people live closer to where they work. The "*Model Block"* represents a development strategy for underused parcels.

Figure 9.3 Model block concept in Beacon Falls

Land development is only one aspect of TOD. It is imperative to have complementary transit service. While the Naugatuck Valley has rail infrastructure, it suffers from poor service and a state of poor repair. If TOD is going to capture residents, jobs, and businesses, improvements to the WBL are essential.

There are also opportunities to bring bus rapid transit (BRT) to the Bridgeport Avenue corridor in Shelton, which would connect the Derby-Shelton train station and downtown Bridgeport. Shelton has experienced significant corporate and industrial development in several areas outside the downtown core, the Bridgeport Avenue corridor being a prime example. With ready access to Route 8 and proximity to corporate and financial markets in both Fairfield County and New York City, large tracts of open land are attractive for commercial and corporate development. Over the last 45 years, mid-sized retail centers, condominiums, hotels, corporate office parks, and mixed-use developments have been constructed. There is potential for more development in the Bridgeport Avenue corridor, but residents' concerns about traffic and other impacts from growth have put the focus on how non-automobile modes of transportation can accommodate new growth.

One option for TOD is the development of a *"Neighborhood Transit Hub",* or *NTH*, which is a transit stop with robust multi-modal connections, including but not limited to buses, taxis, private vehicles, and non-motorized transportation. An *NTH* can also be a pulse-point where transit vehicles from different routes converge, timing their stops so that transferring from one route or service is easy. Providing effective and predictable transit encourages surrounding residential and commercial development, which, in turn, support transit. Coffee shops, bookstores, restaurants and convenience stores provide services to transit riders and area workers, new customers for private development, and more "eyes on the street" to improve safety and security. Other possible elements of an NTH include a village green that adds place-making value to nearby developments, a taxi and/or shared vehicle stand, bus shelters and other transit conveniences, commuter parking, and multi-use paths and bike lanes.

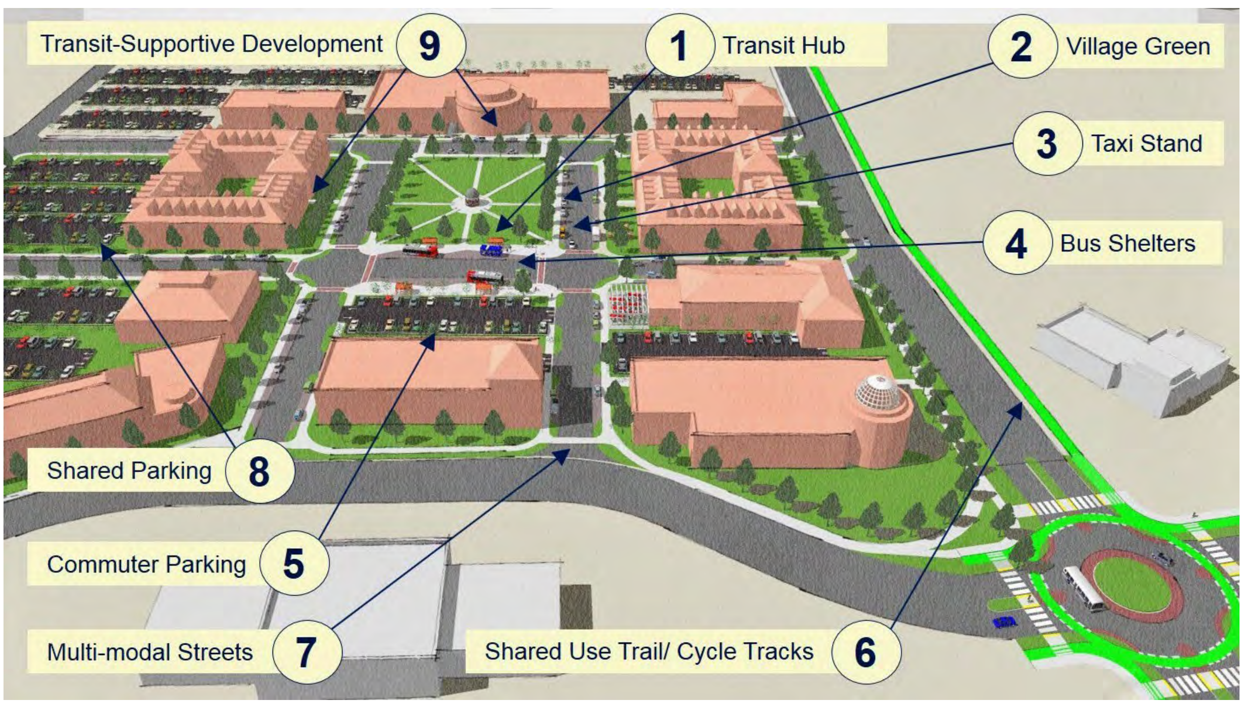


Figure 9.4 Overview of Neighborhood Transit Hub Concept

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 has direct impacts on a community's quality of life, connecting neighborhoods and providing access to businesses, jobs, schools, and a wide range of public and private services. In addition, the highway system facilitates connections to neighboring cities and towns, regions, and states. Historically, the goal of transportation improvement programs has usually been to make roadways as efficient as possible, prioritizing the flow of vehicular traffic while minimally considering the needs of pedestrians, bicyclists, and other non-motorized users. This has resulted in overbuilt roadways, long pedestrian crossing distances at intersections, limited bicycle infrastructure, and traffic signal timing and phasing that favors vehicle movements over other users. Streets are integral to the development of a high-quality sense of place, but the emphasis on vehicle movement has resulted in street environments that are unpleasant, and often to dangerous, to non-motorized users.

Complete Streets is a holistic approach to planning, designing, and building a street environment that accommodates and enables safe access for all users, emphasizing the needs of individuals that traditional transportation planning has ignored, such as the elderly, people with disabilities, BIPOC communities, and people without access to a vehicle. More than just a safety strategy, a Complete Streets approach reduces vehicle miles traveled, energy consumption, and greenhouse gas emissions, enhances mobility and safety for all, and encourages walking and bicycling for transportation, recreation, and exercise. Instead of focusing on moving automobiles as quickly as possible, a complete street emphasizes multimodality, traffic calming, and employs variable paving material, street trees, rain gardens, and other streetscaping elements to create a visually interesting environment that is more comfortable for all users. While a complete street embraces many common elements, each application is unique and its features reflect the land use, needs, and characteristics of the area.

Key elements of Complete Streets include:

- Bicycle facilities: protected bicycle lanes or sidepaths, signage and appropriate pavement markings, and bicycle racks or parking.
- Bus features and amenities: bus pull-outs, demarcated bus areas, dedicated bus lanes (where appropriate), shelters, and clear and accessible paths.
- Pedestrian enhancements: accessible sidewalks, perpendicular crosswalks with striping, pedestrian signal enhancements, curb ramps, and short crossing paths and curb bump outs.
- Traffic calming actions: reduced lane width, textured paving material, intersection bump-outs, crosswalk bump outs, curb extensions, center refuge islands, and raised intersection tables.

- Streetscaping and green infrastructure: pedestrian-scale street lighting, street furniture, wayfinding signage, decorative paving, and buffers between the street and sidewalk to create a sense of place.
- Green infrastructure: appropriate urban trees, landscaping, bioswales and rain gardens, and pervious paving materials.
- ADA compliant features: sidewalk ramps, detectable warning strips and warnings, accessible pedestrian signals, short crossing lengths, and longer walk intervals.
- On-street parking treatments: delineated parking spaces and curb/sidewalk bump-outs.
- Access management actions: driveway consolidations, modifications, and closures.

Figure 9.5 Comparison of Street and a Complete Street

The image at the left illustrates a street design that does not consider the needs of non-motorized travelers. On-street parking and access is uncontrolled, and there is no safe place for pedestrians to cross.

The following photo shows how the same street environment would look as a complete street. Variable paving materials, designated crosswalks, striped bicycle lanes, defined on-street parking, and streetscaping elements make the street inviting to all users and create a much more visually interesting place.

Complete Streets has been general practice in the region for several years, and NVCOG aims to include complete streets elements and integrate non-motorized needs into all projects, plans, and programs. In 2022, the NVCOG Board endorsed CTDOT's Complete Streets Policy, formally recognizing Complete Streets as a design and policy priority for all projects in the region. NVCOG plans to develop a regional Complete Streets Plan, which will include a more specific regional policy. Implementing Complete Streets at a regional level will be crucial in helping NVCOG achieve our Vision Zero goal of eliminating all roadway related fatalities and serious injuries by 2050.

Although NVCOG has not yet formally adopted a regional Complete Streets Policy or Plan, various projects and studies in our region have already incorporated complete streets elements:

- Derby Route 34 Reconstruction: new sidewalks with curb bump-outs, upgraded storm drainage, lighting and streetscape features
- Derby-Shelton Bridge Enhancements: protected bi-directional cycle track, textured pavement, buffers with planters, larger pedestrian space, connection with Derby Greenway and Shelton Riverwalk
- Bristol Route 229 Corridor Study: recommended improvements include narrower travel lanes, sidewalk construction, new crosswalks, multi-use path, bicycle parking, bus shelters and passenger facilities, and wayfinding signage
- Waterbury West Main Street Study: recommended improvements include a road diet, curb bump-outs, pedestrian actuated crossing devices, bus pull-outs, protected bi-directional cycle track, bicycle parking, textured pavement, and other streetscaping elements

Rendering of the Derby-Shelton Bridge

9.4 GREEN INFRASTRUCTURE/LOW IMPACT DEVELOPMENT

Much of the transportation network comprises paved or hard surfaces in urban and suburban environments, greatly contributing to surface water pollution. As rainwater falls on impervious surfaces, it runs off, usually to a system of gutters, ditches, storm drains, and conveyances, and discharges 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 since the last rainfall and deposits it directly into the receiving water. Typical methods of dealing with storm water cause unnaturally heavy peak flows during and shortly after rain events, drastic water temperature spikes, and sometimes erosion of streambanks, washouts, and 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 that aim to mitigate some of the environmental impacts of the transportation network by mimicking the pre-construction hydrology of a site. The principal goal of GI and LID is to slow, filter, store, evaporate and/or infiltrate stormwater close to its source, through both structural and non-structural planning and design techniques 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. Some non-structural GI best management practices include:

- Cluster development: Minimizing the amount of area that is disturbed by development to preserve natural stormwater infiltration functions and minimize the amount of roadway and other infrastructure needed to serve a development.
- Infill development and redevelopment: Prioritizing infill development and redevelopment of vacant or under-utilized parcels over development of forest or farmland.
- Lawn reduction: Minimizing lawn areas in favor of more natural vegetation cover, integrating native species where possible.
- Green streets: Designing roads that are not excessively wide, better relate to the service and function they provide, avoid steep grades, and incorporate vegetation such as bioswales and planter boxes.
- Green parking: Smart parking design and management including appropriately sized parking lots, shared parking, utilizing permeable pavement where possible, and incorporating covered garages to reduce the amount of impervious parking lot cover.

- Green materials: 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 storm water systems and surface receiving waters. Typically, these features treat a specific amount of runoff, with overflows built-in to default to traditional stormwater systems during more extreme events. In some cases, traditional stormwater infrastructure is not necessary. Some structural GI best management practices include:

- Bioswales – shallow vegetated depressions that infiltrate or temporarily store runoff.
- Rain gardens – landscaped areas designed to receive and infiltrate stormwater quickly, typically including native plants.
- Permeable pavement – by eliminating fines in asphalt or concrete, or using pavers with spaces in between, water can flow through the pavement and sub-base 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 planters – a small, contained vegetated area that collects and treats storm water using bioretention. They typically contain native, hydrophilic flowers, grasses, shrubs, and trees. The planters require periodic maintenance to ensure the system functions properly; insufficient maintenance can lead to poor drainage and potential flooding.
- Rainwater storage and repurposing – Cisterns and rain barrels collect and store runoff for later use, typically irrigation, reducing scarcity of drinking water supplies and energy needed 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.

Connecticut's "*Municipal Separate Storm Sewer System (MS4) General Permit"* went into effect in 2017 and 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 (DCIA). 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. Towns can comply with the permit through retrofitting existing facilities and designing new facilities with green infrastructure.

Watershed groups and environmentalists promote GI and LID techniques as a proven way to protect surface water quality during new construction and improve water quality for existing stormwater systems. Several watershed protection groups in the NVCOG region have recently completed Watershed Plans: The Mill River Watershed Plan (2018) includes parts of Cheshire and Prospect; the Pomperaug River Watershed Plan (2018) covers parts of Woodbury, Southbury, Bethlehem, and Watertown; and the Pequabuck River Watershed Plan (2019) includes parts of Bristol and Plymouth. These plans include examples of GI retrofits that can help improve water quality, many of which are in public rights-of-way along roadways and public parking lots. These examples are a good place for municipalities to start minimizing impacts of the transportation network on stormwater.

Currently, there is a limited number of green infrastructure and low-impact developments in the NVCOG region. Examples of completed projects include bioswales with educational signage on Freight Street in Waterbury and the Byam Road Fire Station Rain Garden in Cheshire.

For future projects, planning, and corridor studies, NVCOG recommends the use of GI and LID best management practices wherever practical. When necessary, NVCOG will assist municipalities in MS4 compliance and provide training to municipal staff regarding implementations and maintenance.

9.5 SOLAR ENERGY

In 2021, in partnership with SolSmart, a U.S. Department of Energy program, NVCOG is working to streamline and promote the installation of solar energy within the region. The main goals of the program are to remove unnecessary barriers for development in solar installation, promote best practices throughout the region, educate and train staff, provide resources to municipalities, residents, and developers, reduce soft costs or indirect costs for solar implementation, and for NVCOG to gain recognition as a renewable friendly region.

Expanding the low-carbon electric grid will lead to a more sustainable transportation system that is not as dependent on fossil fuel powered vehicles and increase the environmental benefits of electric vehicles (EVs). Vehicle-to-grid technology is a smart charging technology that allows car batteries in EVs to give back to the power grid. For solar power, this is most critical at night, when solar panels cannot generate any additional energy. Vehicle-to-grid can improve efficiency of power distribution, expand capacity for renewable energy storage, and reduce energy costs.

Solar energy and other renewable projects can also be installed in highway rights-of-way, which are typically underutilized or empty spaces. Both the USDOT and FHWA have published guidance on using the highway right-of-way for renewable energy generation, and there are examples of installations in states such as Massachusetts, Maryland, and Oregon. The NVCOG, in partnership with the CTDOT, will prioritize solar installations in highway rights-of-way wherever feasible.

The expansion of NVCOG's solar grid could have also have benefits for transportation-related infrastructure and amenities. Solar-powered bus stations and/or shelters could provide digital timetables, route information, and promotional panels, as well as heat in the winter months. In the more distant future, solar energy could have implications for electric-powered buses and rail.

10 TRANSIT SAFETY AND SECURITY

A major concern for users and would-be-users of public transportation is their security and safety. However, available data shows that transit riders face a much lower risk of crash related injury. While there is no significant increase in crime due to transit, a lack of ridership and social stigma create the perception that utilizing transit is unsafe. Increased safety measures will improve this perceived safety and increase ridership.

10.1 TRANSIT RIDER SAFETY

CRASHES

Nationwide, transit users are significantly safer on a per-mile-traveled basis than drivers and passengers in private vehicles. According to the National Safety Council, in 2019, per 100,000,000 miles, there were 0.45 passenger vehicle deaths, compared to 0.05 bus deaths, and 0.005 railroad passenger deaths. 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. A recent analysis performed by the American Public Transit Association, *Public Transit Is Key Strategy in Advancing Vision Zero, Eliminating Traffic Fatalities*, shows that metro areas with more than 40 annual trips per capita, have half the traffic fatality rates compared to metro areas with fewer than 20 trips per capita. This data underscores the need for increased frequency and reliability of transit services within the NVCOG region as defined in section.

TRANSIT RELATED CRASHES

Within the region, there were 414 crashes involving buses from the years of 2019 to 2021. Of these crashes, none were fatal. Additionally, two crashes were recorded involving buses and pedestrians which is less than 1% of total bus-involved crashes. There were no fatalities from these crashes as well. For passenger vehicles and other motorized traffic, including light trucks, commercial vehicles and full-sized trucks, there were 36,889 vehicle crashes within the region including 94 fatalities. Of the vehicle crashes, 403 involved pedestrians which is around 1.1% of total vehicle crashes. The pedestrian-vehicle crashes resulted in 18 fatalities. This data shows that buses are a significantly safer way to travel.

Additionally, there were no crashes involving Metro North Railroad from 2019 to 2021 within the NVCOG region. This can be attributed to a lack of grade crossings along the Waterbury Branch Line (WBL). The only public grade crossing is located at Division Street in Ansonia. This grade crossing should be investigated for removal to further improve safety along the WBL.

10.2 CRIME RISK AND SECURITY

The perception of unsafe transit systems within the region is a significant barrier for high transit ridership. Transit systems that are perceived to be unsafe will experience less ridership even if they are statistically safe to ride. A lack of riders will then cause the public to think the system is unsafe, creating a negative feedback loop. The best way to address this issue is to create a transit system that strives to be as safe as possible at its boarding locations and on its equipment. To ensure the security of their riders, each transit operator within the region is taking steps to prevent or mitigate risk on their facilities.

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.

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, CT*transit* has video recording devices onboard all of its full sized buses and para-transit vans in case of an incident.

Safety perception for CT*transit* bus stops is an important aspect to increase ridership. All bus stops should have proper lighting, so additional lighting should also be installed at all the bus stops. Places that are well lit improve perceived safety for users waiting at bus stops encouraging greater usage of CT*transit* services. Bus stops with 150 or more riders each day should also have emergency blue light boxes installed. Even if these call boxes are not used for emergency calls, the presence of these boxes deter potential incidents with the ability for people to access them easily in emergency situations. Bus shelters should also be installed at these locations as the presence of a well-maintained bus shelter will help increase rider comfort and safety at these highly utilized locations. CT*transit* can create a facility security network that links their safety features together by creating a cohesive network. Additionally, the Waterbury Green, which acts as the pulse point for the system, should have regular police patrolling within the area.

Facility security addresses surveillance and sensor monitoring of bus stops, facilities, infrastructure, and vehicles. Surveillance includes both video and audio surveillance. The sensor monitoring system can include 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. This connected system supports traveler or transit vehicle operator-initiated alarms and allows CT*transit* to respond to an on-board incident. The system is also capable of providing emergency information to travelers using CT*transit* by utilizing electronic signage or audio messages on-board the transit vehicle, at transit stops, or in transit facilities. This information can also be sent to users who have the CT*transit* application installed on their phones or emailed to them directory whenever an incident occurs. With the installation of the facility security system, CT*transit* can create a cohesive security system across its system to install on their vehicles, bus stops, and equipment. A comprehensive system that contains monitoring equipment that can talk to a central network increases safety across the entire system and can increase ridership.

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 devices onboard in case of an incident.

Like with CT*transit*, GBT should seek installation of lighting for their bus stops though coordination between GBT and the local municipalities, install emergency blue light boxes with 150 or more riders each day, ensure that there are bus shelters at these locations, and create a cohesive facility security network for its system. These features should be incorporated into the GBT system. Parts of the facility security network have already been deployed in the Greater Bridgeport planning region, primarily at the downtown Bridgeport bus terminal and rail station. These devices include emergency aid call boxes, security video cameras, voice annunciating systems and variable message signs.

The Valley Transit District has purchased 5 new paratransit vehicles in 2018. These new vehicles are all equipped with security cameras.

On Metro North's website, 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 Metro North lines, but there are none installed along the WBL. Security officers are present at the major Metro North stations, but oftentimes, there are no security officers at any of the WBL stations. In order to increase security and safety, part-time police presence should be provided at all of the stations and full-time police presence should be provided at Waterbury Station, which is the busiest station within the region. Video cameras should be installed along the platforms and parking lots at all stations, in particular, at the Waterbury station to monitor activity. Additional infrastructure that should be installed at the WBL stations are emergency blue light boxes and additional lighting should also be installed at all the stations. This will increase perceived safety for users waiting at stations encouraging greater usage of the WBL. Facility security should be incorporated into the Metro North system to create a cohesive safety network for the entire Metro North system.

The replacement and upgrades of stations in Naugatuck and Derby/Shelton, as well as the potential relocation of the Seymour and Beacon Falls Station and an indoor waiting area at the Waterbury station present opportunities for CTDOT and Metro North to implement these critical security improvements. Funding has been approved for both a new Derby/Shelton station as well as funding for relocating the Naugatuck Station. Previously mentioned blue light boxes and other safety features should be included for both station projects.

Looking to the future, additional steps should be taken to ensure the security of transit users.

SAFETY AND SECURITY ACTIONS:

- Continue to promote public transit and dense transit supported development. As we know, increased activity at bus stops, stations, and on-board transit vehicles helps to deter crime, increased transit utilization is a critical component to transit safety. The eyes on the street effect offered by dense housing and commercial uses, particularly located near public transit stops, adds an additional passive safety tool.
- Improve safety and security on all transit options. Every transit rider, regardless of their entry or exit point from the system, deserves to feel safe and comfortable while traveling, and the NVCOG will advocate for CT*transit*, Metro North, GBT, and CTDOT to implement all available tools to improve safety along our transit systems.
- Continue to fund the installation and upgrading of current infrastructure to meet safety and security needs.

10.3 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's emergency management organizational structure is to foster collaborative planning by providing resources and information between local communities and State agencies.

The State of Connecticut Division of Emergency Management and Homeland Security (DEMHS) partners with other 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.

The Community Emergency Response Team (CERT) is an education program for the public. The program provides education about disaster preparedness and trains the public on basic disaster preparedness. Additionally, CERT members can assist others within their community after a disaster using their training. CERT members are also encouraged to support local emergency response agencies within their communities.

Transportation Incident Management (TIM) is the method to manage traffic around incident locations such as a vehicle crash. First responders are being trained so they can perform a safe and quick clearance for all traffic incidents. The goal is to reduce secondary crashes such as a vehicle colliding with a first responder vehicle while they are on scene responding to an incident. TIM training for first responders has taken place at the bed of 2022 into the beginning of 2023 at the CTDOT headquarters.

Documents which guide emergency response coordination in the State of Connecticut include:

- State of Connecticut State Response Framework Version 4.2
- Traffic Diversion Plan for I-84 and Parts of US Route 7 and CT Route 8 (2011)
- Unified Response Manual (2008)
- Regional Emergency Support Plan (RESP) for regions 2, 3 and 5

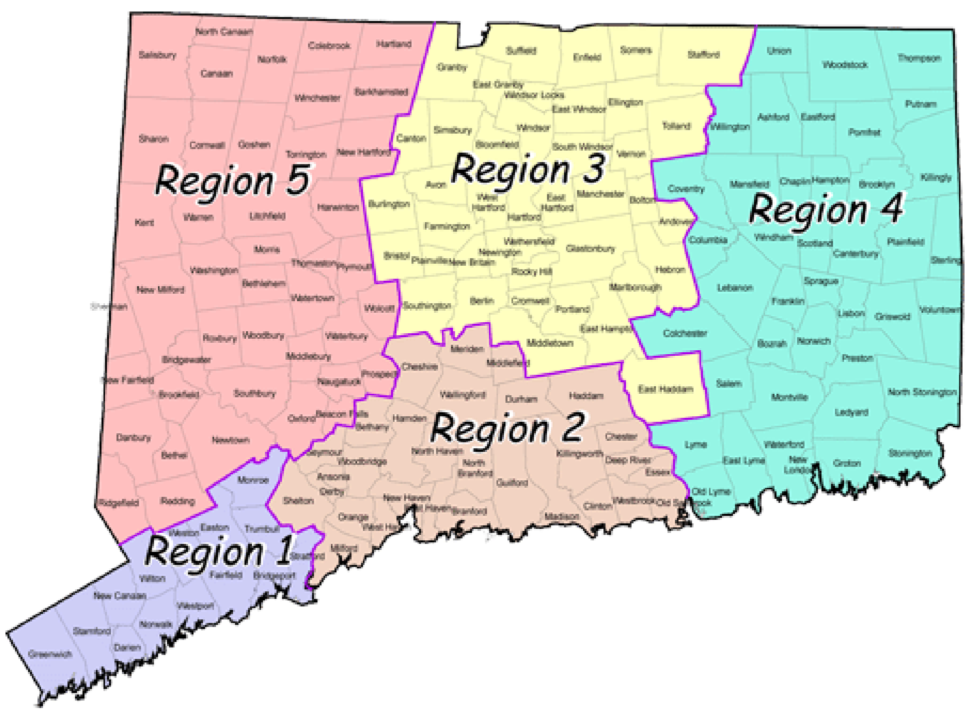
As a partner of both CTDOT and DEMHS, the NVCOG has contributed to traffic incident management in the following ways:

- 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.
- 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.
- Partnered with the CRCOG Transportation Incident Management Coalition, working with first responders and transportation planners from within and outside of the region
- Developed an inventory of ADA capable vehicles and qualified drivers within the region for access by FEMA in an emergency scenario

REGIONAL EMERGENCY PLANNING TEAMS (REPT) AND EMERGENCY SUPPORT FUNCTIONS (ESF)

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 ESF's and a Regional Emergency Support Plan (RESP) which assist all levels of government to work in a coordinated and standardized manner.



Map 10.1 Regional Emergency Planning Teams, Source: CTDOT

NVCOG municipalities 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 is to develop and implement a system of resources and response capabilities that facilitates communication and coordination among regional jurisdictions and agencies. These issues can range from transportation issues to activities during a major disaster, including natural and human-made. Traffic incident management is a critical transportation issue that is required during emergency events.

TRAFFIC INCIDENT MANAGEMENT INFRASTRUCTURE AND DIVERSION ROUTES

The State of CT DEMHS and CT DOT collaborate on traffic incident management. Traffic Incident Management Infrastructure is maintained by CT DOT 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 CT DOT, 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 Central Naugatuck Valley Council of Governments (COGCNV). Currently, a consultant is updating diversion routes throughout the state. This information will be released within the coming years.

WHY DID WE SAY THAT?

In line with national standard practices, the NVCOG no longer refers to traffic incidents as accidents. This phrase conveys that no one is at fault and these events are unavoidable. The Vision Zero model of transportation safety acknowledges that mistakes will happen but that the transportation system should be designed to prevent these mistakes from becoming serious.

11.0 EMERGING TECHNOLOGIES

New and emerging technologies have the potential to drastically reshape the region's transportation system. Alternative fuel and autonomous vehicles have the potential to reduce greenhouse gas emissions and health threats, improve traffic flow on our highways, and increase safety for drivers and vulnerable road users. However, if deployed prematurely or utilized incorrectly, they also present new hazards that we need to be prepared to address. Additionally, advancements in technologies for large vehicles, including buses and trucks, and increasing access to assisted or powered micro-mobility all will have an impact on the region. Though these technologies may not be ready for mass adoption as of the publishing of this report, it is possible that any or all of them may dramatically reshape getting around the Greater Naugatuck Valley.

In recent years, many automobile manufacturers began to 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 are currently in widescale testing around the country and are likely to be widespread between now and 2045. Several of these technologies allow for autonomous driving on highways today, and current beta testing software can attempt to navigate complex urban streets as well. At the same time, wireless communication is increasing the ability to exchange information between vehicles and with roadside devices. As inter-vehicle communication advances, drivers will become better informed about their surroundings and the position of nearby vehicles.

The goals of these technologies are to make travel safer and reduce the number of crashes. They also have the potential of reducing congestion by at least 35%, according to research from the University of Cambridge[1]. There will likely also be impacts to the amount of parking needed, the total number of vehicles on the road, and, potentially, the amount of energy used by those vehicles.

[1] https://www.sciencedaily.com/releases/2019/05/190519191641.htm

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:

- Advanced Traffic Management Systems (ATMS): These systems include CCTV cameras, computerized traffic signal systems, dynamic message signs, highway advisory radio, and traffic incident management systems.
- Advanced Public Transportation Systems (APTS): These systems include computer aided dispatch (CAD), automatic vehicle location (AVL), automated payment systems, transit signal priority, and fare technology.
- Advanced Traveler Information Systems (ATIS): These systems include traveler information websites, 511 travel information call centers.
- Emergency Management (EM): 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 *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 be 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:

- <u>Freeway Incident Management</u>: 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, I-691 and I-84. The program should 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 occurs 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 interactive information kiosks and dynamic message signs at the region's commuter rail stations. Advancements in vehicle location tracking have allowed similar systems to be implemented on bus systems throughout the country. In many cases, this information can be delivered directly to a user's smartphone through transit agency apps.

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 to operate with varying combinations of autonomy and driver control. The deployment of AVs is increasing in popularity and many communities are considering or are 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 consistent with driver expectations.

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.

Table 11.1 SAE Levels of Automation Source: National Highway Safety Traffic Safety Administration, https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety#issue-road-self-driving

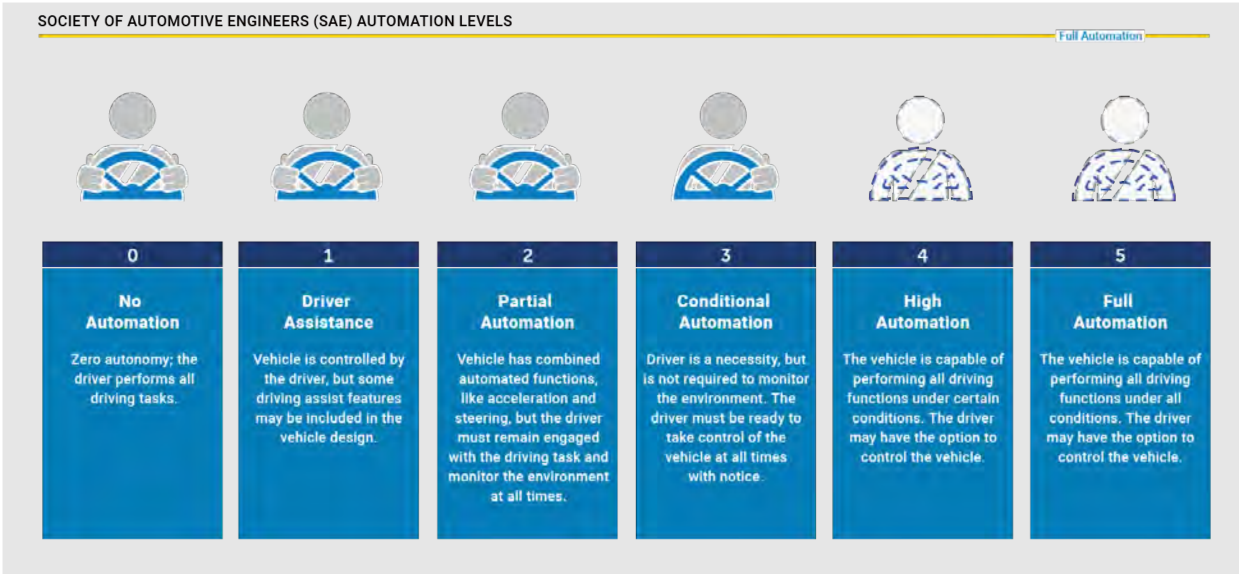


Figure 11.1 SAE Levels of Automation Source: https://www.mdpi.com/1424-8220/21/16/5397/html

While AV technology is advancing, acceptance of US drivers will be critical to deployment. A recent survey by the American Automobile Association (AAA, December 2017) indicated 54% of US drivers would be afraid to ride in a fully automated vehicle. This is down from the 63% and 78% marks for the same question from earlier surveys. Acceptance has come a long way, but there is still significant increases public support needed. The AAA survey also determined that safety and reliability are the greatest concern about AVs. Education will be critical to increasing AV acceptance. Notably, Covid-19 did not alter the acceptance of AVs significantly. Motorists, passengers, and those sharing the road with an autonomous vehicle must be confident that the technology works and is not prone to errors. To achieve the level of trustworthiness required for acceptance, there must be truth in advertising – the sensors must work according to manufacturer claims and manufacturers must be transparent with shortcomings or failures of their systems.

Currently, AV technology is being developed along two 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 – Sensors to detect front and rear collisions while parking 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 assume that the driver remains in control.

Figure 11.2 AV owned and used by Uber® Source: https://www.nbcnews.com/business/autos/brave-new-world-why-when-we-ll-go-drivers-passengers-n785876

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 AVs that are shared by many. They would provide on-demand service. Several companies are striving to achieve levels 4 and 5 automation for their services which would decrease the need for many individuals to own personal vehicles as AVs become more widespread within ride service businesses.

Regardless of which path AV advancement and deployment follows there will be significant changes within the on-street transportation system. There are numerous benefits to AV technology, most importantly when it comes to traffic safety. Roughly 95% 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 cited benefits include Enhanced mobility where 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 benefits are significant because vehicle crashes cost billions of dollars in economic activity, productivity, loss of life and decreased quality of life due to injuries. Decreased congestion due to vehicles with high levels of autonomy operating in closer proximity at higher speeds, which helps reduce impedance and congestion.

Conversely, the potential exists for negative consequences from the proliferation of AVs. While reduced congestion is perceived as a possible benefit, deployment of large AV fleets can add more vehicles to our roads, increasing vehicle miles traveled (VMT) and, as a result, increasing traffic congestion, especially in urban/downtown areas. An additional concern of AVs is the potential impact on transit services. As AVs deployed by Transit Network Companies (TNCs, i.e. Uber, Lyft, etc.) become common, 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, potentially having a significant impact on urban congestion.

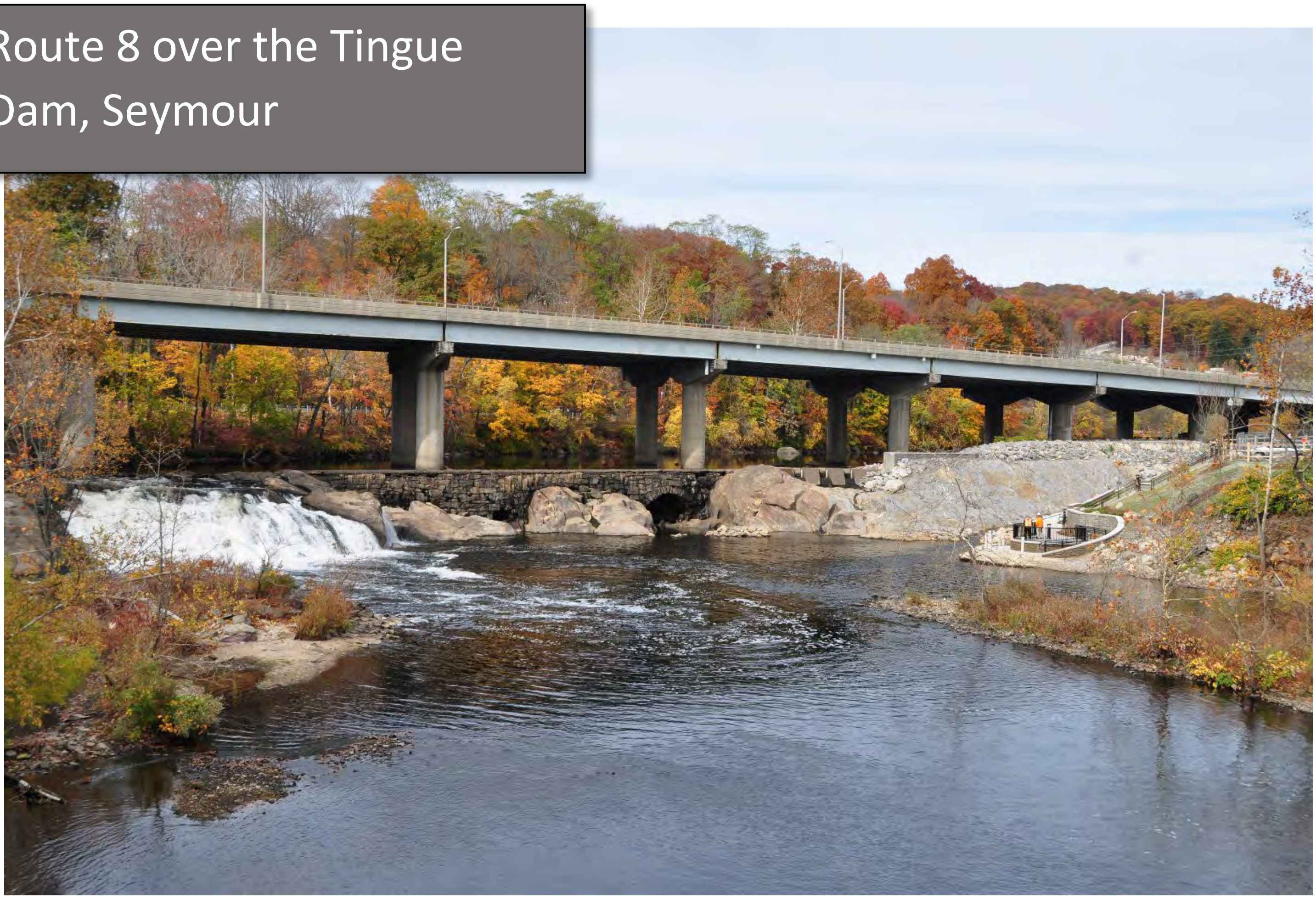
However, in the future public transit and TNCs may be able to partner for mutual benefit. The AV fleets could help solve the “first mile/last mile” problem and fill gaps in regular bus service, especially on weekends and late-night hours. The applicability also extends to trucks and home deliveries as goods get distributed throughout a network as they head towards their destination.

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. In addition to more frequent service, autonomous buses can have their schedules modified to account for shifts in passenger demand dynamically changing their routes and frequency. This technology can be applied to both local bus routes and bus rapid transit systems between urban areas on dedicated bus lanes. Both forms of transit will lead to increased capacity and efficiency due to autonomous vehicles.

The potential impact on land use decisions is also uncertain currently. 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 increase in mobility and ability to perform other activities instead of driving, interest in development in auto-dependent suburban areas may increase.

Many cities and states, including Connecticut, have begun testing autonomous technologies on their roadways. 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 projects are aiming to prove that the technology can reliably work while also identifying potential threats to successful implementation. One such threat, identified in several studies around the country, is the need for streets to remain in a state of good repair, most importantly ensuring that pavement markings, signage, and traffic signals are all clearly readable and working correctly.

Route 8 over the Tingue Dam, Seymour



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.

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 are 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. A majority of AV testing around the world utilize V2C to ensure the data transferred to and from the AV is secure. This system 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 require roadside units be installed to work. 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 roadside 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. Roadside 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 5G, 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.

Figure 11.3 Demonstration of connected vehicle technology Source: https://www.itsinternational.com/feature/frequency-changes-threaten-vehicle-safety-applications

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

In the coming decades, the increase in vehicles connected to each other and roadside units should help contribute to improved efficiency on existing highways, allowing vehicles to better take advantage of the available space. Inter-vehicle communication will help fill gaps in the road and allow cars to seamlessly merge and maintain relative speeds and spacing.

The principal 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 and public perception.
- Budget for implementing and maintaining 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 as 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.

Currently, there is a shortage of both truck drivers and truck parking. Trucks going to pick up shipments and driving them to their destination require breaks for drivers for 30 minutes as well as rest stops after their shift so the driver can sleep. This required activity is currently creating truck parking shortages across the country. Autonomous trucks can provide a long term solution to this problem. Additionally, High fuel costs (about 24% of operating expenses), vehicle repair and maintenance (about 9% of operating expenses), in addition to wages and benefits (about 43% of operating expenses) contribute to the trucking industry's low profit margin in research performed in 2018 by American Transportation Research Institute.

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 reduced diesel emissions. The potential for electric or alternative fuel trucks can have an even greater impact on air quality while also reducing pollution from fossil fuel extraction and refining.
- 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 and 2 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, active monitoring systems are being installed in many commercial vehicles to improve safety and reduce the 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 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 will be 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, is required to realize widespread deployment.

  Several companies such as Daimler Trucks, Watch Plus, Waymo, and TuSimple are performing level 4 autonomous vehicle testing with trucks. Some of these tests occurred on highways with no actual driver behind the wheel to intervene. Testing is occurring in more predictable environments, often at locations with clearer skies and no ice and snow. These tests have been occurring for several years and widespread commercial deployment is inevitable.

- 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.

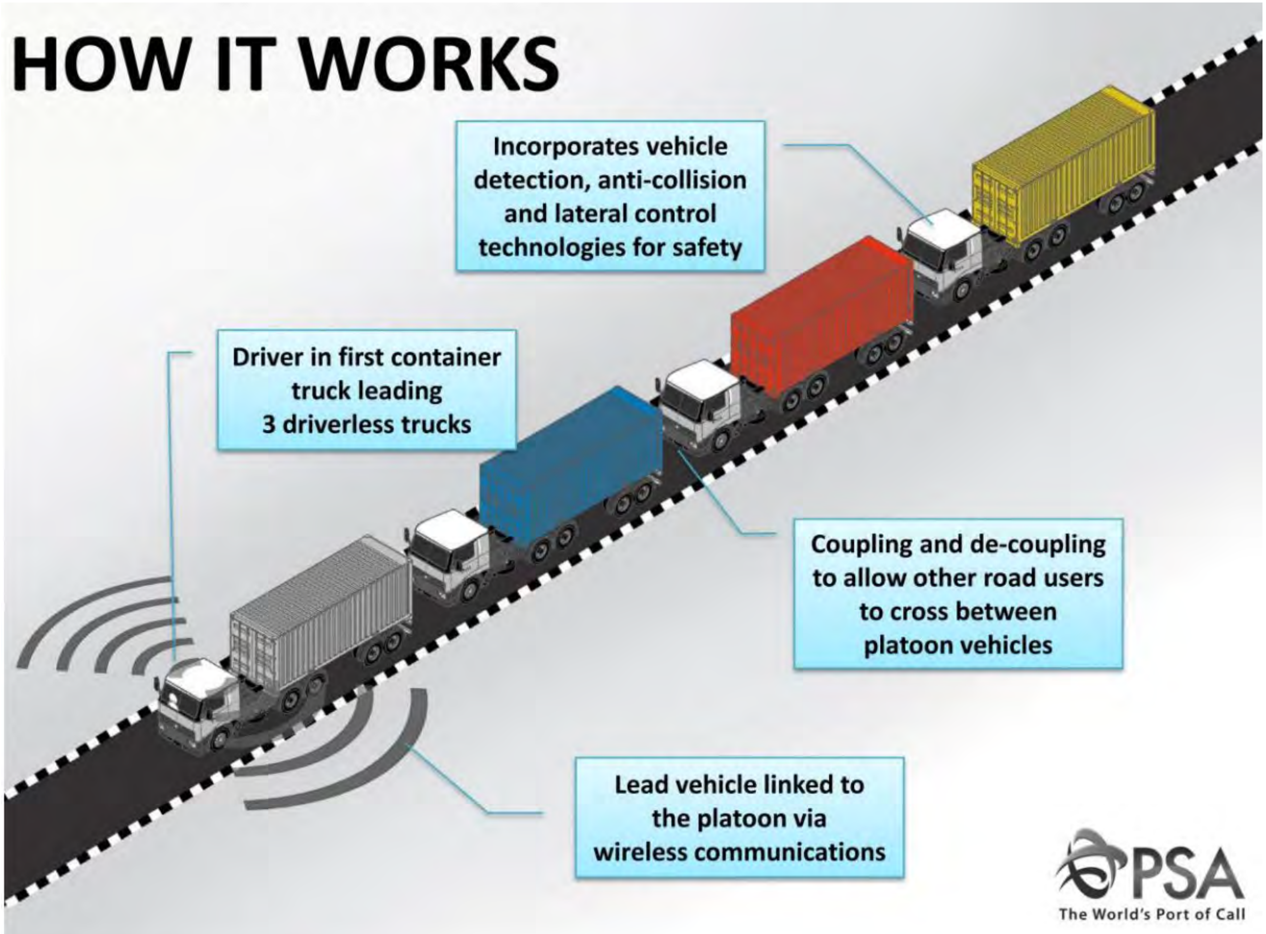


Figure 11.4 Diagram on how truck platoons works Source: https://newatlas.com/self-driving-trucks-singapore-ports/47360/

Truck platoons cut wind resistance and air drag by setting and maintaining a constant gap between trucks. This reduces fuel consumption 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.

- AV Vehicle Standardization

  Standardization has been pursued by the 3rd Generation Partnership Project (3GPP), where there are two competing standards for AV communication, C-V2X and DSRC. C-V2X, deployed in 2021, uses Long Term Evolution, 5G technology, and LTE technology when 5G data is not available. This system uses cellular data that is not tied to a specific network and the coverage range exceeds one mile. Additional improvements are being investigated such as changing the utilization spectrum from 3.4 GHz to 5.9 GHz. Major steps recently have started to make the 5.9 GHz the new standard with direction from USDOT. With this, most AV deployments in recent years have used the 5.9 GHz frequency as the main method of communication between other AVs and related infrastructure.

  DSRC has been used in AVs since 2017 and was adopted in 2019. It is based on Wi-Fi technology that allows for V2V, V2I, and V2X communications. This is a short-range form of communication that allows the AV to communicate with several nearby vehicles, infrastructure, and other forms of transportation.

  There is ongoing debate between the C-V2X system and DSRC system. However, many automotive industry companies are supporting C-V2X 5.9 GHz, so it is likely it becomes the main method of AV communication. Despite this, many predict AV's using both forms of communication as the complement each other for effective short-range and long-range communication.

11.5 STATE AND FEDERAL CAV PROGRAMS AND PILOT PROJECTS

TNC companies such as Uber and Lyft, auto manufacturers such as Toyota, GM, and Ford, and technology companies such as Good and Panasonic are investing into the design and development of CAV systems and technologies, as well as purchase 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 roadside units will require the investment of public funds.

Nevada was the first state to authorize the operation of autonomous vehicles in 2011. Since then, 21 other states—**Alabama, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Louisiana, Michigan, New York, North Carolina, North Dakota, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, and Vermont**—and **Washington D.C**. have passed legislation related to autonomous vehicles. Governors in **Arizona, Delaware, Hawaii, Idaho, Maine, Massachusetts, Minnesota, Ohio, Washington,** and **Wisconsin** have issued executive orders related to autonomous vehicles.

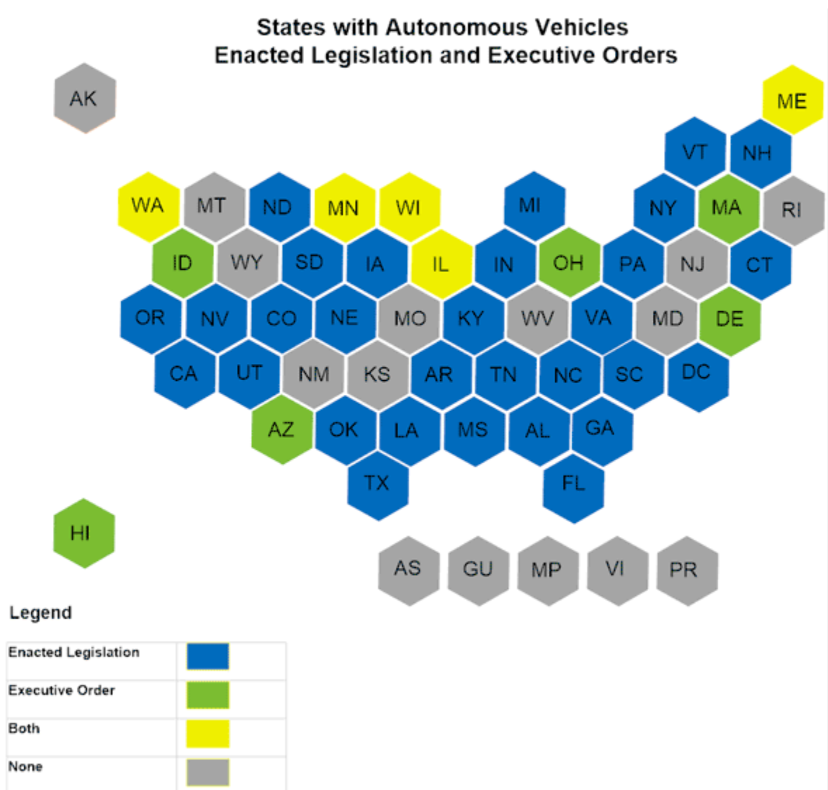


Figure 11.5 States that have executive orders related to AVs Source: https://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx (National Conference of State Legislatures)

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 AVs to operate on their own. Despite differences in language, the goal of the legislation is to encourage partnerships with the private sector to ensure safe testing and ultimate deployment of AVs.

Connecticut has initiated efforts to test connected and autonomous vehicle systems and technologies. 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 roadways 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 received its first applications in 2018.

  In 2021 CTDOT published a strategic plan specifically for AVs. CTDOT refers to this technology as Connected and Autonomous Vehicles (CAV). The strategic plan can be found on their website[2]. The vision of the plan is to ensure CAV transportation is safe and to determine ways that CAV technology can be used as a powerful tool to improve safety. Near-term, CTDOT will focus on policy development, infrastructure preparation, and

[2] https://portal.ct.gov/-/media/DOT/PLNG_STUDIES/CT-CAV-Report-Final.pdf

developing pilot test programs. Long-term, CTDOT will establish a feedback loop to engage with the public to continue to advance, policies, technology, larger deployments, and upgrade infrastructure to support CAV.

CTDOT plans to launch full-sized autonomous buses to run on CT Fastrak between New Britain and Hartford. Beginning testing in 2023, the potential benefits of automated transit buses, particularly on BRT routes such as CT Fastrak, could be significant. By reducing operating costs and necessary downtime, automated buses may allow for more frequent service without requiring additional personnel or equipment. Additionally, automated buses have the potential to reduce dwell time by more closely aligning boarding doors with platforms, making it easier for passengers using mobility assistance equipment to enter and exit the bus.

A second pilot, focused on testing V2I and ITS technology, will take place on the Berlin Turnpike. 28 signalized intersections will be upgraded to include communications equipment allowing for real time signal timing changes and traffic signal priority for transit buses and emergency vehicles.

Both projects will require a public investment but will demonstrate the transformative potential of these technologies in the NVCOG planning region and all of Connecticut. As these technologies advance toward widespread deployment, NVCOG and our member municipalities will closely follow developments to ensure that our transportation systems remain current and competitive.

- New England Transportation Consortium

  The New England Transportation Consortium is a joint research organization sponsored by the Departments of Transportation of the six New England States. Its mission is to conduct shared transportation research initiatives. Currently, they are assessing existing and future legal issues, regulatory concerns, and policy management. To do this, they are collaborating with other organizations interested in AV technology and researching laws and regulations that may impede testing of this new technology throughout the region. They will then provide recommendations to all the New England states.

- American Association of State Highway Transportation Officials

  The American Association of State Highway Transportation Officials (AASHTO) drafted a letter on April 1st, 2021, regarding the use and testing of AVs. They encourage the importance of adhering to federal, state, and local regulations when it comes to the enforcement of the new technology. They go on to encourage the Federal Agencies to encourage collaboration between government agencies and automotive and technical experts as standards for the technology are determined. AASHTO envisions AVs within the near future and has supported and will continue to support research within this field.

12.0 CAPITAL IMPROVEMENT PROGRAM

The Metropolitan Transportation Plan for the Naugatuck Valley planning region (NVCOG) and the Central Naugatuck Valley MPO (CNVMPO) addresses the issues and deficiencies of the area's transportation systems. The critical transportation problems facing the region, described in detail in chapter 3 of this document, are:

- Aging Infrastructure
- Roadway Congestion
- Highway and Pedestrian Safety
- Under Investment in Public Transit
- Gaps in Active Transportation Facilities

The capital improvement program will meet the goals and objectives discussed throughout this MTP over its 28-year timeframe. These goals, also identified in greater detail in Chapter 3, involve:

- Achieve the goal of zero fatalities or serious injuries on the road network
- Maintain and preserve 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
- Improve resilience of transportation infrastructure to enable it to withstand weather and natural events and provide flood protection
- Address equity and traditionally underserved communities
- 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 FUNDING PROGRAMS IN 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 *Infrastructure Investment and Jobs Act (IIJA)* requires the USDOT to revise federal regulations to designate outer years of the MTP as beyond the first four years and no longer require the projects to be financially constrained.

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 *IIJA* reauthorized the core transportation funding programs contained in the FAST Act for both highway and transit improvements. In general, however, funding allocations were increased between 10% and 34%, greatly increasing resources available to address outstanding transportation deficiencies. The *IIJA* added several new formula and discretionary programs, as well as new pilot programs to address specific issues. Key elements of the new act are:

- It provides long-term certainty and more flexibility for states and local governments.
- It advances the goals of safety and sustainability within the system.

About 72% of the Federal Highway Administration funds authorized in the IIJA will be distributed to states by statutory based, program-specific factors. The remaining 28% of the funding is provided through discretionary programs, with states, MPOs and cities and towns required to compete on a project-by-project basis.

In Connecticut, the Special Transportation Fund (STF) finances transportation improvement projects and provide the non-federal match of funds under federal transportation acts. The primary purpose 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.

FEDERAL HIGHWAY ADMINISTRATION (FHWA) FORMULA FUNDING PROGRAMS

The core formula programs overseen by the Federal Highway Administration (FHWA) include the following:

National Highway Performance Program (NHPP): The NHPP provides funds to states to maintain and support the condition and performance of the National Highway System (NHS), construct new facilities on the NHS, and ensure that investments of Federal-aid funds in highway construction support progress toward achieving performance targets in the state asset management plan. NHPP projects must be on an eligible facility: interstate highways, non-interstate expressways and other non-expressway principal arterials. Projects need to support progress toward achieving national performance goals and improving infrastructure condition, safety, mobility, or freight movement on the NHS. Projects must be consistent with Metropolitan and Statewide planning requirements. Under IIJA, the NHPP may now fund undergrounding public utility infrastructure, in conjunction with an eligible project, resiliency improvements and activities to protect NHS segments from cybersecurity threats. IIJA authorized $148.0 billion from the Highway Trust Fund, which represents a 27% increase over the funding provided in the FAST Act.

Surface Transportation Block Grant Program (STBG): The STBG program is the most flexible federal aid transportation program. It provides funding to states via a set formula to address state and local transportation needs. STBG funds may be used for improving roads classified as a rural major collector or above. Funds can be used for a wide range of projects, such as road reconstruction, rehabilitation, and widening, bicycle and pedestrian facilities, transit projects and ridesharing projects. STBG funds are suballocated to several categories: large urban areas (greater than 200,000 population), other urban areas (less than 200,000 population), transportation alternative projects and off system bridges. Funds not suballocated to one of these categories are available to be spent anywhere in the state.

The IIJA authorized $72.0 billion under the STBG program, a 24% increase over the amount provided under the FAST Act.

The urban set-aside is the largest of all the STBG programs and funds are suballocated to specific large (over 200,000 population) urban areas of the State according to the area's relative share of the State's population. The Waterbury Urban Area is classified as a small urban area and not directly allocated funds under the STBG program at this time.

The Transportation Alternatives Set-aside Program (TAP) is funded under a 10% drawdown of the STBG allocation. The Transportation Alternative program funds a wide range of non-traditional transportation projects. This includes on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvements like historic preservation, environmental mitigation related to storm water and habitat connectivity; recreational trails, and safe routes to school projects. IIJA substantially increased funding available under the TA program, increasing the authorization by 71% over the FAST Act. In addition, it increased the amount of funds suballocated to urban areas to 59% of the total, an increase of more than 50% suballocated under the FAST Act. Under the FAST Act, states were permitted to flex TA funds not suballocated to urban areas. This provision was revised in *IIJA* to allow this transfer only if no eligible TA project is available. States are not eligible recipients of TA funds, with projects being led by regional or local governments or non-profit organizations.

The IIJA also increased set-aside funding provided for off-system bridge projects to 20% and added project types to include electric vehicle (EV) charging infrastructure, protective features to enhance resilience and wildlife crossings.

Congestion Mitigation and Air Quality Improvement Program (CMAQ): The CMAQ program funds transportation projects and programs that reduce emissions from mobile transportation sources and are intended to help States meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality in areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas). All CMAQ funded projects and programs require an assessment and documentation of air quality benefits by the State. Under the IIJA, CMAQ may now fund shared micro mobility projects and buying medium- and heavy-duty zero emission vehicles and charging equipment.

Highway Safety Improvement Program (HSIP): This program funds projects that will significantly reduce traffic fatalities and serious injuries on public roads. The program requires a data-driven, strategic, performance-based approach to improving highway safety on public roads. *IIJA* added eligibility for non-infrastructure safety projects related to education, research, enforcement, emergency services, and safe routes to school. New provisions under IIJA require States to complete vulnerable road user (VRU) safety assessments and consider a *"Safe System"* approach.

National Highway Freight Program (NHFP): This program focuses on improving the efficient movement of freight on the National Highway Freight Network. Eligible activities include construction, operational improvements, planning, and performance measurement. Although the program is highway-focused, up to 10% of funds may be used for public or private freight rail, water facilities, including ports, and intermodal facilities. States must have a State Freight Plan to receive funds. IIJA authorizes $7.15 billion for the program.

Bridge Formula Program (BFP): This program provides funds to replace, rehabilitate, preserve, protect, and construct highway bridges. 15% of the funds are set-aside to replace or rehabilitate "off-system" deficient bridges. Off-system refers to bridges that are not on the Federal-Aid Road system, defined as bridges located on local roads or rural minor collectors. Bridges need to be at least 20 feet long to be eligible. IIJA authorizes $27.5 billion for the program.

Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT): This program was created in IIJA and provides both competitive and formula funds for planning, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure related to highway projects, public transportation facilities, commuter and intercity rail facilities or service, and port facilities. MPOs are eligible recipients for resilience planning grants including scenario development and vulnerability assessments. *IIJA* authorizes $7.3 billion for the program by formula and $1.4 billion for competitive grants.

Carbon Pollution Reduction Program (CPRP): This is a new formula program to provide funds for projects designed to reduce transportation emissions (defined as CO2) from on-road highway sources. Eligible projects include public transportation, bicycle and pedestrian facilities, efficient street lighting and traffic control devices, congestion pricing, transportation demand management (TDM) actions that effectuate a mode shift and supporting alternative fuel vehicle deployment. The program requires the state to develop a carbon reduction strategy, in consultation and collaboration with the MPOs, within two years of passage of IIJA.

National Electric Vehicle Investment Program (NEVI): This new program will provide formula funding to States to strategically deploy EV charging infrastructure and establish an interconnected network that facilitates data collection, access, and reliability. States must prepare and submit an *Electric Vehicle Infrastructure Deployment Plan* before receiving funds. The initial focus of this program is directed at highways designated as "Alternative Fuel Corridors" for electric vehicles. The intent is to build out this national network, particularly along the Interstate Highway System. Once this national network is fully built out, funding may be used on any public road or in other publicly accessible locations. *IIJA* authorizes $5.0 billion for the program.

FEDERAL HIGHWAY ADMINISTRATION (FHWA) DISCRETIONARY PROGRAMS

While formula funding programs provide states financial assistance to implement core highway improvements, *IIJA* allocates about two-thirds of its funding authorization on a competitive basis for projects that would have a significant national, regional, and local impact. While IIJA specifies that a percentage of discretionary funds are allocated to all states and geographic areas, the ultimate decisions on the award of competitive grants lies with the USDOT. The IIJA continues funding for various discretionary programs included in the FAST Act but also created several new programs.

Rebuilding American Infrastructure with Sustainability and Equity (RAISE): Previously known as the BUILD and TIGER grant programs, the RAISE program awards funds on a competitive basis for major capital investments in surface transportation projects that will stimulate the nation's economy and invests in road, rail, transit and port projects that promise to achieve economic recovery and growth. 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. Some planning grants are provided. This program provides at most 80% federal funding, although in recent years this has been modified to cover 100% of eligible project costs in historically disadvantaged areas. Under *IIJA*, the RAISE program was authorized for five years at a minimum total allocation of $15.0 billion.

Nationally Significant Multimodal Freight & Highway Projects (INFRA): This program provides funds for multimodal freight and highway projects of national or regional significance. The purpose is to improve the safety, efficiency, and reliability of the movement of freight and people. Eligible projects need to be located on the National Multimodal Freight Network. Under *IIJA*, flexibility to use INFRA funds for non-highway freight projects was increased and the set-aside for small projects was increased. A total of $8 billion will be provided under *IIJA*.

Safe Streets and Roads for All (SS4A): The SS4A program was created to support efforts to advance "vision zero" plans and implement other capital improvements that reduce the number of fatal and serious injury crashes, especially for bicyclists and pedestrians. Recipients of SS4A funds are MPOs and local governments; state DOTs are not eligible recipients. *IIJA* authorizes $5.0 billion for the program.

National Infrastructure Project Assistance (MEGA): This program was established under *IIJA* and supports large, complex, multi-modal, multi-jurisdictional freight-related projects that are difficult to fund by other means and are likely to generate national or regional economic, mobility, or safety benefits. The program allocates 50% of the funds for projects costing between $100 million and $500 million and 50% of the funds for projects costing more than $500 million. The federal share directly from the program is 60%. Federal funds from other programs can supplement the project, but the total federal support cannot exceed 80%. Total funding available over the life of the *IIJA* is $10 billion.

Bridge Investment Program (BIP): This is a new program that supports rehabilitating or replacing bridges, including culverts. The focus of the program is to encourage bridge repairs, including culverts, that will improve safety, efficiency, and reliability of people and freight movement, as well as to improve flood control and habitat connectivity for aquatic species. Eligible bridges need to be listed on the National Bridge Inventory. A total of $12.5 billion is authorized for the program under *IIJA*.

Congestion Relief Program (CRP): The Congestion Relief program was created to advance innovative solutions to congestion in the most congested metropolitan areas. The goals are to reduce highway congestion, optimize highway capacity and reduce economic and environmental costs incurred by travelers due to excessive congestion. Eligible activities include integrated congestion management systems, congestion pricing, including interstate tolling and actions that encourage ridesharing and mobility services. *IIJA* authorizes $250 million for the program.

National Culvert Removal, Replacement, and Restoration Grant program (also known as the Culvert Aquatic Organism Passage Program (AOP)): *IIJA* established this program to address barriers to anadromous fish passage by replacing, restoring, or removing culverts and other structures that prevent or inhibit movement of these fish species. These species, such as salmon, are born in freshwater, spend most of their lives in the marine environment, and migrate back to freshwater to spawn.

Strengthening Mobility and Revolutionizing Transportation (SMART): This program was established under *IIJA* to fund advanced smart city or community technology demonstration projects that improve transportation safety and efficiency. Total funding available over the life of the *IIJA* is $10 billion.

Charging and Fueling Infrastructure Grants: This program was established under *IIJA* to strategically deploy publicly accessible electric vehicle charging infrastructure and other alternative fueling infrastructure along designated alternative fuel corridors. Operating assistance may be funded for up to five years. At least 50% of funds must be used for community grants that prioritize projects in rural areas and low- and moderate-income neighborhoods. Total funding available over the life of the *IIJA* is $2.5 billion.

Active Transportation Infrastructure Investment Program: This program was established under *IIJA* to build connected active transportation systems. The intent is to expand opportunities for people to walk, bicycle and roll safely to where they want to go. The focus is on larger, regional active transportation networks that will connect communities and destinations. Total funding available over the life of the *IIJA* is $1 billion.

FEDERAL TRANSIT ADMINISTRATION (FTA) PROGRAMS

As is the case for highway improvement projects overseen by the FHWA, the core formula and discretionary programs administered by the Federal Transit Administration are retained and continued under *IIJA*. The FTA will receive $91.2 billion over the five years of the act. Most of these funds will be allocated to capital programs and projects.

Urbanized Area Program (§5307): This program provides formula funds to designated recipients in urban areas for transit capital and operating assistance. These funds are intended primarily for capital projects, including buying new buses, building maintenance and passenger facilities, acquiring support vehicles, and purchasing administrative capital items. Funds are allocated to individual urban areas based on its share of the population. In Connecticut, split agreements are executed among FTA recipients within an urban area that allocate funds to priority projects. Unallocated funds from the urban area are pooled and assigned for use anywhere in the state. The CTDOT provides the non-federal share of FTA capital grants.

Capital Investment Grants (CIG/§5309): This discretionary program funds major transit capital investments, including heavy rail, commuter rail, light rail, streetcars, and bus rapid transit. Program funds are used for constructing new, fixed-guideway transit systems or extending existing systems (New Starts), enhancing or improving the capacity of existing systems (Core Capacity), and constructing bus rapid transit projects operating in mixed traffic that represent a substantial investment in the corridor and emulate the features of rail.

Enhanced Mobility of Seniors and Individuals with Disabilities Program (§5310): This program provides funds to private nonprofit organizations help meet the transportation needs of older adults and persons with disabilities when transportation services are unavailable. Funds are apportioned to states based on a formula and can be used for capital, operating and planning assistance to nonprofit organizations and public agencies that provide specialized transportation services to elderly persons and persons with disabilities. Eligible projects include both traditional capital and nontraditional investments that go beyond ADA services.

State of Good Repair (§5337): This formula program allocates funding to states and local governments that own, maintain, and operate fixed-guideway and high-intensity bus systems. The goal of the program is to support capital projects that maintain public transportation systems in a state of good repair and ensure that public transit operates safely, efficiently, reliably, and sustainably.

Bus and Bus Facilities Formula Grants (§5339): This discretionary program provides grants to help modernize bus fleets and facilities. A priority purpose is to help transit agencies acquire or lease low- or no-emission vehicles to improve air quality and reduce the effects of climate change. Funding is also available to acquire and construct supporting facilities required for operating low- and zero-emission vehicles.

All Station Accessibility Program (ASAP): The ASAP was established under *IIJA* to provide funding to repair, rehabilitate, modify, and improve the infrastructure at existing stations or facilities to ensure accessibility for all users. The intent is to upgrade "legacy" transit and commuter rail stations to fully comply with the requirements of the Americans with Disabilities Act.

NEW PILOT PROGRAMS ESTABLISHED UNDER IIJA

The IIJA created several pilot programs to address critical concerns, but Congress wanted states and MPOs to demonstrate efficacy of the federal participation before making the program permanent. The following pilot programs may be pertinent to the NVCOG MTP.

Reconnecting Communities Pilot Program (RCP): The construction of the interstate system, as well as other limited access highways, often divided neighborhoods and created barriers to community activity. *IIJA* created this pilot program to study the feasibility and impacts of removing an existing facility to reconnect communities. Eligible activities include planning, design, demolition, and reconstruction of street grids, parks, or other infrastructure. The goals of the program include improving mobility, access, and economic development. The program will provide $50 million for planning activities and $70 million for construction over five years.

Wildlife Crossings Pilot Program: The purpose of this new program is to reduce the number of wildlife-vehicle collisions and improve habitat connectivity. A total of $350 million will be provided under *IIJA* for projects implemented under the program.

National Motor Vehicle Per-Mile User Fee Pilot Program: The purpose of this pilot program is to test design and implement a per-mile user fee as alternate method for generating revenue to finance transportation investments. The program will develop recommendations related to adoption and implementation of a per-mile user fee. A total of $50 million will be provided under *IIJA*.

FEDERAL RAILROAD ADMINISTRATION PROGRAMS

In Connecticut, CTDOT is responsible for funding rail operations and equipment. Metro North Railroad, a division of the Metropolitan Transportation Authority (MTA) in New York City, operates rail service along the Connecticut-owned the New Haven Main Line (NHML) and branch lines, including the Waterbury Branch Line (WBL). CT Rail is responsible for operating rail service along the Shoreline East (from New Haven to New London) and the Hartford Rail Line (from New Haven to Springfield, Massachusetts). The New Haven Main Line (NHML) is part of the Northeast Corridor (NEC), extending from Washington, DC to Boston. Service on the NEC is operated by Amtrak. The NEC does not include the New Haven line branches. Additionally, a series of freight operators utilize the state's rail network, some on privately owned trackage and others over Connecticut-owned track. The Federal Rail Administration (FRA) oversees several grant programs to improve and modernize the existing rail system and maintain the equipment, track and way in a state-of-good-repair. Improvements to rail infrastructure are also eligible under several programs administered by the FTA. Recipients and project eligibility vary by program, as well as the cost share.

Consolidated Rail Infrastructure and Safety Improvements (CRISI): The CRISI program provides funding opportunities for capital projects that improve the safety, efficiency and reliability of passenger and freight rail transportation systems.

Federal-State Partnership for Intercity Passenger Rail Grants: This program provides funding for intercity passenger rail systems to reduce the backlog of projects needed to maintain systems in a state of good repair and improve performance. Under *IIJA*, the program was broadened to include projects that would expand or establish new intercity passenger rail services. Two subcategories are designated: system on the Northeast Corridor and other intercity rail systems not located on the NEC.

Railroad Crossing Elimination: This is a new, competitive grant program established under *IIJA* to fund highway-rail or pathway-rail grade crossing improvements. The purpose of the program is to eliminate highway-rail crossings that are frequently blocked by trains and generally improve the safety and mobility of people and goods.

FEDERAL AVIATION ADMINISTRATION

Airport Improvement Grant and Passenger Facility: The *IIJA* provides $15 billion in grants to airports throughout the country. Under this program, grants are used to implement various improvements to airport infrastructure. Funds can be used on runways, taxiways, terminals, airport-transit connections, and roadway projects. Projects related to safety and sustainability are also eligible.

Airport Terminals Program: The *IIJA* provides $5 billion in competitive grants under this program to fund airport terminal development projects that address the aging infrastructure of the nation's airports. These grants will fund safe, sustainable, and accessible airport terminals, on-airport rail access projects and airport-owned airport traffic control towers. Projects may also include multimodal development.

Air Traffic Facilities: The *IIJA* provides $5 billion to FAA for grants to upgrade and maintain the nation's air traffic control systems. Funds will be used to upgrade, replace, and maintain critical buildings and equipment to operate the nation's air space. This also includes upgrading the power systems, navigation and weather equipment, and radar and surveillance systems that the air traffic systems rely and depend on.

FAA Contract Tower Competitive Grant Program: The FAA provides $20 million annually through FY 2026 to modernize air traffic control towers at small town and municipal airports.

STATE FUNDING PROGRAMS

Local Transportation Capital Improvement Program (LOTCIP): The LOTCIP program was created to provide state funds to municipalities through the Councils of Governments for road, bridge, multi-use trail, and pedestrian improvements. The intent of the program is to address regional transportation needs through a dedicated capital improvement program overseen by the COGs. The responsibility of the program is vested at the regional level, and it is expected that projects will advance more expeditiously and at a lower cost. Project eligibility is the same as under the USDOT STBG Program. Municipalities are responsible for preparing design plans and paying 100% of the design-related costs; the designs must meet minimum state roadway design standards and ensure a 15-to-20-year useful life. LOTCIP funds are allocated at the low bid amount at the time of construction plus 20% for contingencies and incidentals.

Community Connectivity Grant Program (CCGP): The CCGP was developed to provide funding for targeted, low-cost infrastructure improvements commonly identified through a Road Safety Audit (RSA) or other planning initiatives. The purpose of the CCGP is to provide funding directly to municipalities to implement small-scale infrastructure improvements that enhance pedestrian and bicyclist safety and provide better connections for pedestrians and bicyclists. Municipalities are responsible for preparing design plans and paying 100% of the design-related costs. State funds are allocated for the construction of improvements but are constrained to the cost estimate at the time of grant award.

Recreational Trails Program Grant: Connecticut provides funds through the Department of Energy and Environmental Protection (DEEP) for a variety of recreational trails actions and projects. The program provides 80% of the project's cost with a 20% sponsor-provided match required. Eligible sponsors include private organizations, municipalities, federal, state, and regional agencies, and other government entities such as tribal nations. Funds can be used for planning, such as trail routing studies, project design, acquisition of property for trail projects, construction, maintenance equipment, trail amenities, and publications and outreach material related to bikeways, multi-use trails (including motorized) and water trails (blueways).

State Local Bridge Program: Municipally owned bridges can be funded by state and federal Local Bridge Programs. To qualify for the state Local Bridge Program, a bridge must carry a certified local road, be at least 20 feet long, and be functionally obsolete according to FHWA criteria. The program was revised to extend eligibility to include bridges that are not currently structurally deficient but have other issues and could benefit from minor repairs to extend their useful life. State grants provide 50% of the cost of improvements with the municipality responsible for the other 50% cost share.

State Matching Grant Program for Demand Responsive Transportation for Elderly and People with Disabilities: This program provides funds to municipalities for new or expanded transportation services to seniors and people with disabilities, such as weekend, evening or out of town services, additional days of service or special trips. These funds are available to all municipalities, but they must submit an application that describes the service enhancements to be funded by the grant. Municipalities may also choose to assign their grant to a transit district.

Transportation Rural Improvement Grant Program (TRIP): This program provides funds to municipal governments for infrastructure improvements in small towns designated as rural by the US Census. Activities may include transportation capital projects such as construction, modernization, or major repair of infrastructure. Funds may only be used for construction activities.

Transit-Oriented Development Grant Program: This program provides grants through the Office of Policy and Management (OPM) to fund shovel-ready capital projects and related activities located within one-half mile of existing public transportation facilities. Currently, a minimum 20% match is preferred.

Quarry Walk, Oxford

12.2 IMPLEMENTING THE MTP

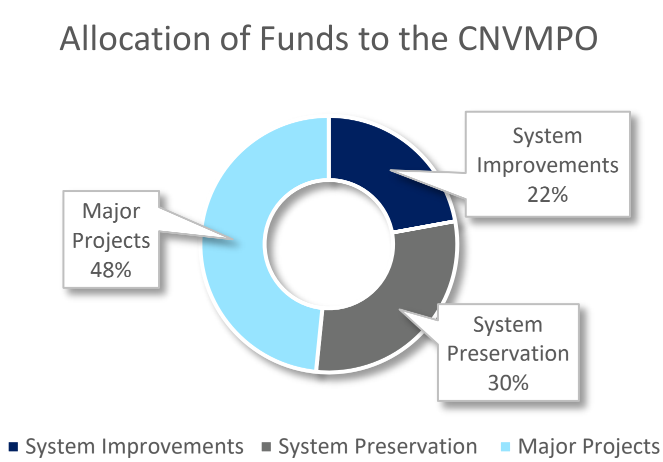
To accomplish the goals of the MTP, the region has developed a list of priority projects that maintain fiscal constraint over the span of this plan, meaning that total programmed projects remain below the reasonably expected funding levels. There are projects, however, that the region considers priority that could not be accomplished with the funding expected within the region, and these are identified in the Goals section of Chapter 3 as Vision Projects, those that would be transformational but do not fit into current funding levels.

The full list of projects programmed in the region can be found in Appendix A of this document.

CTDOT calculated the total estimated FHWA funds for Connecticut ($53,570,365,877) for the period 2023-2050 by compounding the estimated federal funds for federal fiscal year 2023 ($1,600,000,000) at 1.5% for 28 years. $17,632,713,000 was deducted from this total for "major projects of statewide significance".

Of the balance of the total estimated funds ($35,937,652,877), CTDOT's Office of Statewide Coordination and Modeling, STIP Unit allocated 60% for System Preservation ($21,562,591,726), and 40% for System Improvement ($14,375,061,151). System Preservation projects include repaving roadways, bridge repair or replacement, and any other form of reconstruction in place. System improvement projects are projects that enhance safety, improve mobility, increase system productivity, or promote economic growth.

Five percent of the System Preservation funds and 3.8% of the System Improvement funds were distributed equally to each of the MPOs and the RPOs. This provided each of the 10 planning organizations with a minimum allocation of funds. Weighted variables were used to distribute the remainder of the funds. The variables used were Vehicle Miles of Travel (VMT), Average Travel Time Index (AVR TTI), and Lane Miles (LM).



For System Improvement funds: .25 weight for VMT and .75 weight for AVT TTI.

For System Preservation funds: .25 weight for VMT and .75 for LM.

The amounts allocated to these variables for each category were then distributed to each MPO/RPO in proportion to its respective percentage to the total of the variables.

The CTDOT has estimated that, over the period of the MTP, approximately $3.362 billion will be available for improvements and preservation of the system within the CNVMPO region. An additional $3.154 billion will be provided to fund Major Projects of Statewide Significance, projects that will occur on roads within the region but will be controlled by the CTDOT because of their significance to the statewide transportation system. Most notably in this category is the NewMix project, which is the long-term replacement of the Interstate 84/Route 8 interchange in Waterbury. This project, estimated to occur in the mid-2040s, is programmed for $3 Billion.

Of the $3.6 billion not allocated to major projects, funding comes from a variety of sources, both federal and state, which will allow the region to program a variety of improvement and preservation project types. While FTA funds will not be able to cover programmed transit enhancements, state funds will pay for annual operating costs for service and asset improvements will be paid for by a combination of state funds and the federally awarded All Stations Accessibility Program, awarded in late 2022, which will cover rail platform construction at 3 of the six stations along the Waterbury Line, along with the RAISE grant awarded for improvements to the Derby-Shelton station.

Tables in Appendix A break down funding estimates for years 1-5, years 6-10, and years 11-28 to ensure that projects can be built on the timeline proposed. Funds not utilized within a period are carried forward into the next, but funds are not transferred between preservation, improvement, and major projects. Table 1, below, includes an estimated breakdown of funding for each period based on increased allocations for later years in line with CTDOT's allocation inflation schedule.

	Years 1-5	Years 6-10	Years 11-28	Total
Improvement	$231,834,213.96	$257,593,571.07	$953,096,212.96	$1,442,523,998.00
Preservation	$308,465,943.27	$342,739,936.96	$1,268,137,766.77	$1,919,343,647.00
Total	$540,300,157.23	$600,333,508.04	$2,221,233,979.73	$3,361,867,645.00

Table 12.1 Funding estimates by project time period

In addition to the above outlined FHWA funding, direct maintenance and operation funding from the FTA is included in the long-range outlook for the region. Within the CNVMPO, FTA funding is expected to be utilized 100% for operations and state of good repair projects, so none of this funding is programmed into the project listing in Appendix A or included in the income or expenditure tables. Funding to the region includes:

- $87,376,250 for the CTtransit Waterbury Division
- $1,805,000 for the CTtransit New Britain Division, which provides service for Bristol
- $387,380,000 for the CTtransit New Haven Division, which operates one route into Cheshire and Waterbury

These funds represent the operating and basic capital costs associated with ongoing operations of these districts. Additional FTA and state funds will be provided for operations and state of good repair projects on the Waterbury Line which, in addition to projects programmed into appendix 1 of this document, will ensure that the line remains a safe and convenient option for riders. Funds for this come from several items in the CTDOT's FTA and State Transit Budget tables:

- $35,000,000 for rail projects specifically within the CNVMPO, all from state funds
- $80,000,000 for Waterbury Line projects along the entire line, including within the GBVMPO, all from state funds
- $1,150,000,000 for systemwide New Haven Line projects, which includes branch lines, that includes a combination of federal funds, $920,000,000 of FTA funds and $230,000,000 of CT funds

Projects along the Waterbury Line represent a critical series of improvements to the region, and additional state of good repair work following the significant investment in the line over the past several years will all serve to advance the region's economic development targets as well as encourage additional discretionary riders for the line, helping reach the ongoing safety and VMT reduction targets.

Because of the region's commitment to Vision Zero, the list of improvement projects is larger than the list of preservation. While maintaining the system in a state of good repair is essential, the region is committed to improving roadway safety as quickly as possible on as much of the network as possible. The result is that most projects, even those designed to improve the condition of existing roads, will likely include improvements to pedestrian and cyclist infrastructure, as well as lighting, safety devices such as bollards, and design speed reductions.

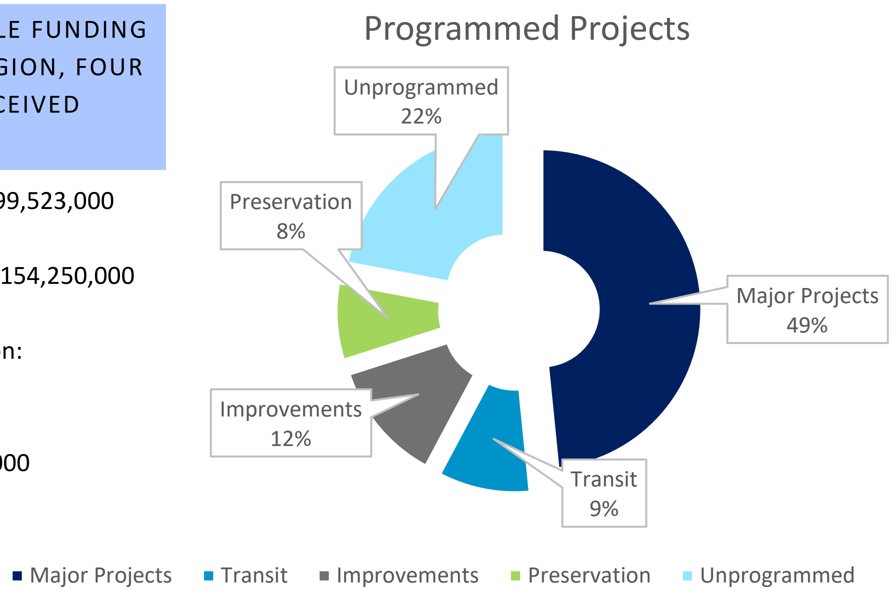
Table 2 shows a breakdown of expected improvement revenue as well as programmed projects. Projects programmed into this category include roadway projects that will be funded through state and federal funds as well as improvements to transit that will be paid for primarily through state funding sources.

	Years 1-5	Years 6-10	Years 11-28
Programmed	$ 223,936,000.00	$ 225,813,000.00	$ 960,606,000.00
Budgeted	$ 231,834,213.96	$ 265,491,785.04	$ 992,774,998.00
Unspent Balance	$ 7,898,213.96	$ 39,678,785.04	$ 32,168,998.00

Table 12.2 Programmed projects vs funding for Improvements to the highway and transit network.

WITHIN THE REASONABLE FUNDING ESTIMATES FOR THE REGION, FOUR MAJOR CATEGORIES RECEIVED FUNDING:

- Improvements: $799,523,000
- Major Projects: $3,154,250,000
- System Preservation: $516,389,000
- Transit: $610,832,000

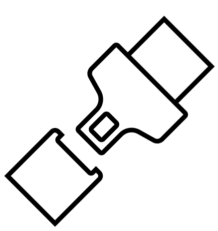


This plan yields a surplus of expected funds which can either be programmed into future projects, particularly those focused on vulnerable user safety, or made available for CTDOT projects within the region. Funds remaining in the system preservation bucket will be programmed into regular pavement and structure maintenance activities, including pavement replacement, drainage basin cleaning and top setting, pipe replacements, and similar activities required to maintain the system in a state of good repair. This program does not, however, cover all the regional priority projects, and in combination with unanticipated funding amounts or discretionary awards may be utilized to implement these projects.

EXPECTED OUTCOMES

Implementation of the MTP will address the region's most critical problems while allowing for growth and revitalization throughout the 19 NVCOG towns. Based on the critical planning factors identified in Chapter 2 of this document, with an intensive focus on equity, the following out comes are expected from the projects and programs identified in this plan.

Safety



Improvements identified in this plan focus heavily on safety, providing for the region's NVision Zero program, addressing the locations that prove most dangerous for users, especially vulnerable users, and utilizing a full safe-system approach to address traffic fatalities and injuries. Of the 25% of funds programmed into improvements, the majority focus on intersection and corridor safety upgrades, utilizing proven countermeasures to reduce speeds and reduce the severity of crashes when they happen. Importantly, these improvements include additional pedestrian facilities, improved and expanded bicycle facilities, and intersection improvements.

NVCOG will continue regular updates to the region's NVision Zero action plan, prioritizing enhancement projects based on periodic review of crash data, speed data, and volumes. These updates will ensure that, as much as possible, traffic fatalities can be eliminated within the time frame of the Vision Zero goal.

A critical step to reduce roadway fatalities and serious injuries is providing alternatives for those who need to travel but should not be driving, including those who have consumed alcohol, individuals who are too tired to drive, or those who are unable to drive. The expansion of transit and active transportation options will provide an alternative, further benefiting those traveling on the region's roads.

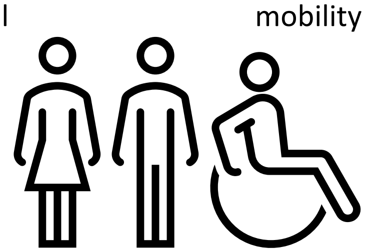
Active Transportation

Projects within NVision50 provide not only for the completion of the 44-mile Naugatuck River Greenway but connector trails that reach all parts of the region. This network of multi-use trails will serve as the core of a broader active transportation network, allowing users of bicycles, micromobility devices, mobility assistive devices, and pedestrians to travel between town centers and transit stops.

To supplement the network of trails, multi-use side paths and on-road mobility lanes will provide access to local destinations. These facilities, implemented as part of a broader complete streets plan, will add an additional option to users.

Mobility Equity

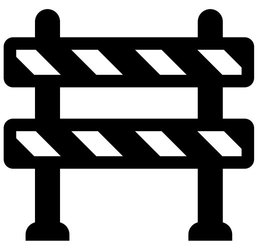
For too many residents and visitors to the NVCOG region, mobility is limited based on the lack of options in the current transportation system. This plan aims to address this equity issue by addressing the four parts of the NVCOG's definition of mobility equity; mobility for all ages, mobility for all abilities, mobility for all incomes, and mobility from anywhere to everywhere. This plan addresses mobility equity in two ways; adding additional mobility options for all users and reducing the impact of the roadway network.



Projects identified in NVision50 complete the region's trail network, put a renewed focus on complete streets throughout the region's cities and towns, and expand the transit network. Outcomes related to this primary planning goal are further discussed under the Mode Choice target.

Several of the region's major projects, including the largest and most significant, all work to mitigate the impacts of the region's transportation network on the surrounding residents. By reconnecting local streets that were bisected by highway construction, residents can benefit from the services and jobs located throughout their city. Additionally, based on air quality conformity modeling, pollution emitted from the transportation system decreases drastically by 2050, having the greatest impact on those with health issues who live and work near major highways.

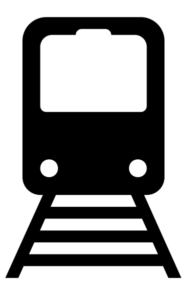
Efficiency



Minor roadway expansions, improved transit options, and greater active transportation access will all work to address congestion on the region's roads. While there is no one simple answer, the many actions included in this plan, including the major projects of statewide importance being lead by the CTDOT, will all contribute to addressing the least predictable and most congested locations within the CNVMPO. The 9% of funding committed to preservation of the system will improve the quality of our infrastructure, across the transportation system, to better serve existing users more efficiently.

Mode Choice

A key contributing factor to mobility equity is providing mode choice for all users; ensuring that no matter how an individual wants to travel they can do so safety and conveniently. Improvement projects within the MTP add significant extension to the region's bicycle network, as well as upgrade and complete facilities for those walking/rolling. Not only does this open traditional active transportation options to more residents but it provides for additional micromobility options including e-bikes and scooters.

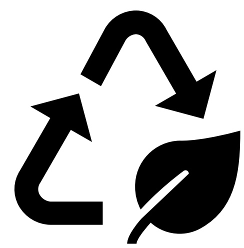


The $610 million programmed into transit improvements and service, along with the several significant but unfunded priorities, will provide intercity connections for passengers across the region, ensuring that the two largest NVCOG cities, Bristol and Waterbury, are connected via transit, and providing access to Hartford and points north, New Haven and points east, and expanding the number of people with access to New York and points west and south.

The inclusion of Bus Rapid Transit along the Route 8 corridor, and decreased headways along rail and bus systems, provides new and better options for residents throughout the region, ensuring that everyone has the ability to choose how they would like to travel.

Environmental Protection

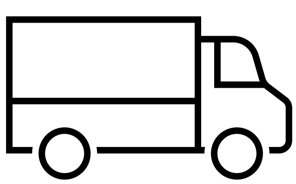
Projects identified in NVision50 will work to reduce the impact of the transportation network on the environment. As identified in the air quality conformity determination included as Appendix B to this document, all the region's non-attainment categories are improved by implementation of projects within and surrounding this region. By 2050, all three non-attainment categories within Connecticut are well below their emission budgets. Electrification of the passenger rail system and buses, along with the switch from internal combustion to alternative power sources in personal vehicles will all benefit the region's air and water quality.



Additionally, the increase in options for travelers to those with less environmental impact, particularly active transportation, will further yield benefits in this category. Bridge and culvert improvements, along with non-transportation related habitat restoration projects, will bring native species back to the region's waterways.

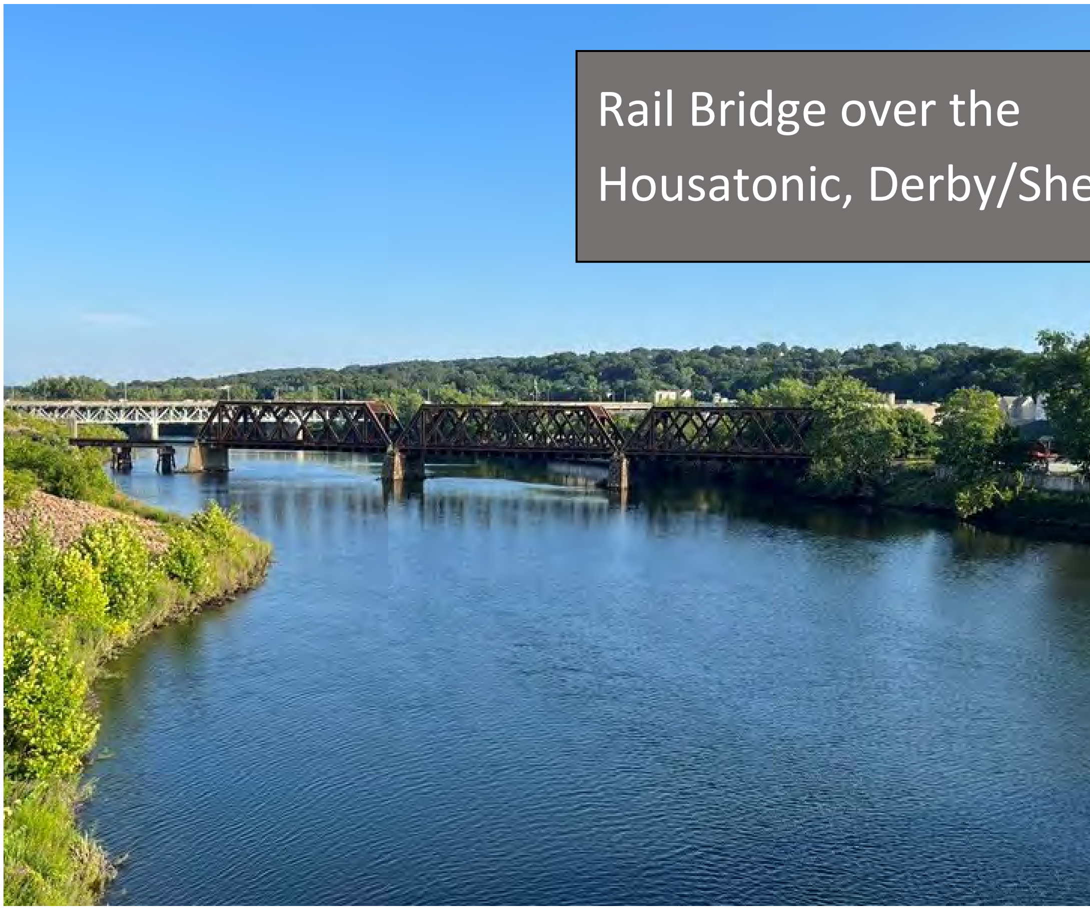
Freight

Movement of materials and goods throughout the region are essential to the economy and well-being of residents. Reliability of the roadway network is one of the most important aspects of planning for the freight industry, and NVision50 utilizes a series of preservation and improvement projects to reduce unpredictability within the highway system. Ensuring consistency in cross-section across Interstate 84, addressing the challenge of grades and curves at the interchange between Interstates 84 and 691, and addressing the short weaves and dangerous ramp spacing along Route 8 will improve safety and reduce congestion, improving consistency for freight companies.



Improvements to the freight rail network will also provide an alternative for shippers and receivers, help to reduce truck miles on the region's highways, and support economic growth in former industrial zones. Improvements to capacity throughout the region, the construction of an inland port in Naugatuck to transfer freight from rail to truck, and improved transfer sites between railroads will all work to ensure the freight network is a driver of economic growth and wellbeing.

Rail Bridge over the Housatonic, Derby/Shelton



NVision50: The Metropolitan Transportation Plan for the Naugatuck Valley Planning Region & Central Naugatuck Valley MPO

Appendices

March 2023

Naugatuck Railroad number 859 crosses the Thomaston Dam. Photo Credit: Howard Pincus/Naugatuck Railroad Co.

Appendices:

Appendix A – Project Tables and Funding

Appendix B – Public Survey and Responses

Appendix C – Public Comments with Responses

Appendix D – Air Quality Conformity Determination Report

Appendix E – Bridgeport-Stamford TMA Congestion Management Process

2023

Appendix A

CAPITAL PLAN

NVISION50

The tables on the following pages reflect the four major categories of projects within the MTP. Though the passage of the Infrastructure Investment and Jobs Act modified requirements for fiscal constraint within long-range transportation plans, this capital plan maintains project listings within reasonably expected funding levels. These levels, provided by the CTDOT, provide for significant investments into the region's infrastructure. The CNVMPO shall not be required to select any project from the illustrative list of projects included in the financial plan under federal regulation 23 CFR Part 450§322(f)(10).

For a detailed breakdown of funding sources, refer to Chapter 2 of this document. Within these tables, funding is simplified to either state or federal as the primary source of funding.

Appendix A-1 System Preservation

Appendix A-2 System Improvements

Appendix A-3 Major Projects of Statewide Importance

Appendix A-4 Transit Projects

PRESERVATION

ROUTE	LOCATION	PROJECT	YEARS AND FUNDING 1-5	6-10	11-27	TOTAL	SOURCE	AQ
Route 8	NVCOG	Route 8 Incident Reporting	$ 9,644,400			$ 9,644,400	NHPP	X6
Route 8	Thomaston	Bridge No. 01729 Rehabilitation	$ 1,071,600			$ 1,071,600	FIF-Bridge	X6
Route 10	Cheshire	Signal Improvements	$ 2,679,000			$ 2,679,000	STBG	X8
Route 69	Wolcott	Bridge replacemet of bridge No. 03240	$ 4,018,500			$ 4,018,500	FIF-Bridge	X6
Beacon Valley Road	Beacon Falls	Reconstruct Bridge No. 05364	$ 2,009,250			$ 2,009,250	LOTCIP	X6
Flanders Road	Bethlehem	Raodway Construction between Woodbury Townline and Thomas Road		$ 5,400,000		$ 5,400,000	STP-R	X6
Maddox Road	Bethlehem	Bridge replacement of Bridge No. 05172	$ 2,009,250			$ 2,009,250	Local Bridge	X6
Nonnewag Road	Bethlehem	Bridge replacement of Bridge No. 06121		$ 4,155,300		$ 4,155,300	BRZ	X6
Lousiana Avenue	Bristol	Bridge Replacement of Bridge No. 04480	$ 5,505,345			$ 5,505,345	BRZ	X6
Farmington Canal Heritage Trail	Cheshire	Facilitate connection to the Airline Trail			$ 2,607,750	$ 2,607,750	TAP	X6
Various	Cheshire	Traffic Signal Replacements and Upgrades		$ 1,485,000		$ 1,485,000	Ramp Up	X7
Benson Road	Middlebury	Bridge Rehabilition of Bridge No. 01160	$ 7,367,250			$ 7,367,250	STBG	X6
Various	NVCOG	Regional Bridge Program	$ 33,592,000	$ 52,531,200	$ 49,552,000	$ 135,675,200	Various	X6
Various	NVCOG	Regional Pavement Program	$ 33,592,000	$ 52,531,200	$ 49,552,000	$ 135,675,200	Various	X6
Various	NVCOG	Regional Reconstruction Program	$ 29,393,000	$ 45,964,800	$ 43,358,000	$ 118,715,800	Various	X6
Various	NVCOG	Signal Replacements	$ 5,734,574	$ 8,967,732	$ 8,459,146	$ 23,161,453	STPA	X7
Various	NVCOG	Replace Salt Shed Roofs in Cornwall, Bethlehem, and Danbury	$ 1,071,600			$ 1,071,600	ENV Compo	X6
Harwington Avenue	Plymouth	Reconstruction between Schroback Road to Ambruster Road		$ 4,155,300		$ 4,155,300	STBG, LOTCIP	X7
Route 254	Thomaston	Improve and expand median island at Goodwin Court to Union Street	$ 587,500			$ 587,500	CC	X6

PRESERVATION CONT.

ROUTE	LOCATION	PROJECT	YEARS AND FUNDING 1-5	6-10	11-27	TOTAL	SOURCE	AQ
Harwington Avenue	Plymouth	Reconstruction between Schroback Road to Route 6		$ 4,155,300		$ 4,155,300	STBG, LOTCIP	X7
Scott Road	Prospect	Roadway Reconstruction between Maria Hotchkiss Road to Route 69		$ 4,560,000		$ 4,560,000	LOTCIP	X7
Poverty Road	Southbury	Intersection with Old Field Road		$ 675,000		$ 675,000	CC	X7
Buck Hill Road	Southbury	Rehabilitation of Bridge No. 01157	$ 7,903,050			$ 7,903,050	BRZ	X6
Various	Southbury	Signal Coordination Study	$ 334,875			$ 334,875	STBG	X8
Main Street	Southbury	Signal Replacement between Route 6 and Route 172		$ 5,400,000		$ 5,400,000	LOTCIP	X7
Carter Road	Thomaston	Rehabilitation of Bridge No. 14003	$ 1,004,625			$ 1,004,625	Local Bridge	X6
Various	Waterbury	Upgrade 10 traffic signals within downtown	$ 3,723,810			$ 3,723,810	CMAQ	X7
Eagle Street	Waterbury	Bridge Reconstruction over Naugatuck River			$ 13,908,000	$ 13,908,000	Local Bridge	X6
Gurnseytown Road	Watertown	Roadway reconstruction between Eastwood Hall Road and Crest View Road	$ 1,762,500			$ 1,762,500	LOTCIP	X7
Hazel Plain Road	Woodbury	Bridge Replacement of Bridge No. 05849	$ 3,616,650			$ 3,616,650	BRZ	X6
		TOTAL PROGRAMMING	**$ 156,621,000**	**$ 189,981,000**	**$ 167,437,000**	**$ 514,039,000**		

IMPROVEMENTS

ROUTE	LOCATION	PROJECT	YEARS AND FUNDING 1-5	6-10	11-27	TOTAL	SOURCE	AQ
I-84	Southbury	Interchange 14 Improvements		$ 5,400,000		$ 5,400,000	FIF-Roadway	X7
I-84, I-691	Cheshire	Ramp Improvements			$ 40,500,000	$ 40,500,000	NHPP	X7
I-84, I-691	NVCOG	Truck Parking			$ 136,372,500	$ 136,372,500	NHPP	NRS
Route 8	Beacon Falls	Minor widening			$ 11,385,750	$ 11,385,750	NHPP	X6
Route 8	Naugatuck	Interchange 26 Improvements			$ 17,109,063	$ 17,109,063	NHPP	X7
Route 8	Naugatuck	Interchange 27 Improvements		$ 7,848,900		$ 7,848,900	NHPP	CC
Route 8	Naugatuck	Interchange 28 Improvements			$ 14,565,096	$ 14,565,096	NHPP	X7
Route 8	Naugatuck	Interchange 28/29 Improvements			$ 41,463,738	$ 41,463,738	NHPP	CC
Route 42	Beacon Falls	Lopus Rd and Pines Bridge Rd Intersection Improvements	$ 2,009,250			$ 2,009,250	STBG	X7
Route 61	Bethlehem	Sidewalk between Town Hall to Jackson Lane	$ 401,850			$ 401,850	TAP	X6
Route 61	Bethlehem	Intersection Improvements at Flanders Road & Green Hill Road	$ 2,009,250			$ 2,009,250	STBG	X7
Route 61	Bethlehem	Intersection Improvements around Town Green	$ 470,000			$ 470,000	STBG	X7
Route 132	Bethlehem	Intersection Improvements	$ 8,037,000			$ 8,037,000	STBG	X7
Route 229	Bristol	Trail/Sidewalk		$ 16,200,000		$ 16,200,000	TAP	X6
Route 229	Bristol	Spot Improvements		$ 4,904,415		$ 4,904,415	STBG; SS4A	X7
Route 70	Cheshire	Intersection Improvements at Maple Street		$ 230,850		$ 230,850	STBG	X7
Route 10	Cheshire	Intersection Improvements at Cook Hill Rd, South Brooksvale Rd and Harrison Rd		$ 5,023,125		$ 5,023,125	STBG	X7
Route 64	Middlebury	Pedestrian enhancements bewteen Interchange 17 to Chase Road	$ 1,175,000			$ 1,175,000	TAP	X6
Route 63	Middlebury	Extend Greenway between Woodside Avenue to Country Club Road	$ 7,367,250			$ 7,367,250	TAP	X6
Route 63	Naugatuck	Route 8 and Route 68 Improvements			$ 8,464,500	$ 8,464,500	NHPP	X7
Route 63	Naugatuck	Roundabout Construction at Church Street and Millville Avenue			$ 5,814,000	$ 5,814,000	STBG	X7
Route 67	Oxford	Sidepath from Seymour Town Line to Bridle Trail		$ 19,387,500		$ 19,387,500	CC, LOTCIP, TAP	X6

IMPROVEMENTS CONT.

ROUTE	LOCATION	PROJECT	YEARS AND FUNDING 1-5	6-10	11-27	TOTAL	SOURCE	AQ
Route 42	Oxford	Geometric Improvements at Old Litchfield Turnpike	$ 2,679,000			$ 2,679,000	STBG	X7
Route 67	Oxford	Intersection Improvements between Chestnut Tree Hill Road and Hawley Road			$ 9,234,000	$ 9,234,000	STBG	X7
Route 6	Plymouth	Sidewalk Improvements		$ 1,539,000		$ 1,539,000	CC	X6
Route 6	Plymouth	Intersection Improvements at North Main Street	$ 5,052,500			$ 5,052,500	NHPP	X7
Route 6	Plymouth	Intersection Improvements at Harwinton Avenue			$ 2,607,750	$ 2,607,750	NHPP	X7
Route 68	Prospect	Sidewalk and Intersection Improvements at Old Schoolhouse Rd and Straitsville Rd	$ 940,000			$ 940,000	STBG	X7
Route 69	Prospect	Intersection Improvements at Orchard Drive		$ 1,154,250		$ 1,154,250	NHPP	X7
Route 68, Route 69	Prospect	Corridor Improvements near Scott Road, Morris Road		$ 1,154,250		$ 1,154,250	NHPP	X7
Route 68	Prospect	Sight Line Improvements at Talmadge Road and Matthew Street	$ 1,004,625			$ 1,004,625	STBG	X7
Route 67, Route 6	Southbury	Construction of Roundabout			$ 12,200,000	$ 12,200,000	STBG	X7
Route 807	Thomaston	Pedestrian Enhancements within downtown		$ 5,771,250		$ 5,771,250	STBG	X6
Route 109	Thomaston	Intersection Improvements at Watertown Road		$ 2,308,500		$ 2,308,500	STBG	X7
Route 6	Thomaston	Safety Improvements at Route 8, Prospect Street, and Pleasant Street		$ 1,923,750		$ 1,923,750	NHPP	X6
Route 69	Waterbury	Intersection Improvements at East Main Street		$ 4,617,000		$ 4,617,000	NHPP	X7
Route 69	Waterbury	Roadway Improvements at Lakewood Avenue	$ 8,706,750			$ 8,706,750	NHPP	NM
Route 844	Waterbury	Intesection Improvements at Route 69, Frost Road, and Alexander Avenue			$ 11,300,250	$ 11,300,250	STBG	X7
Route 801	Waterbury	Spot Improvements	$ 8,001,750			$ 8,001,750	STBG	X6
Route 69	Waterbury	Intersection Improvements at Edgewood Avenue		$ 769,500		$ 769,500	NHPP	X7
Route 63	Watertown	Main Street Pedestrain Improvements within Downtown	$ 2,009,250			$ 2,009,250	CC	X6
Route 73	Watertown	Streetscape Improvements from Waterbury Townline to Route 63	$ 401,850			$ 401,850	STBG	X6
Route 63	Watertown	Main Street Pedestrain Improvements within Downtown	$ 2,009,250			$ 2,009,250	CC	X6
Route 73	Watertown	Streetscape Improvements from Waterbury Townline to Route 63	$ 401,850			$ 401,850	STBG	X6

IMPROVEMENTS CONT.

ROUTE	LOCATION	PROJECT	YEARS AND FUNDING			TOTAL	SOURCE	AQ
			1-5	6-10	11-27			
Route 73	Watertown	Signal Improvements at Buckingham Street, Hillside Avenue, Riverside Street, Davies Street	$ 1,339,500			$ 1,339,500	NHPP	X7
Route 63	Watertown	Intersection Improvements from Middlebury Townline to Bunker Hill Road		$ 2,308,500		$ 2,308,500	STBG	X7
Route 844	Wolcott	Intersection Improvements	$ 870,675			$ 870,675	STBG	X6
Route 6	Woodbury	Pedestrian Enchancements from Southbury Townline to Flanders Road		$ 2,700,000		$ 2,700,000	STBG	X6
Route 6	Woodbury	Intersection Improvements at Route 317		$ 2,308,500		$ 2,308,500	STBG	X7
Route 6	Woodbury	Intersection Improvements at Old Sherman Hill Road	$ 1,339,500			$ 1,339,500	STBG	X7
Naugatuck River Greenway	Beacon Falls	Trail Extension between Route 42 and Riverbend Park	$ 4,420,350			$ 4,420,350	TAP	X6
Naugatuck River Greenway	Beacon Falls	Trail Extension along North Main Street between Depot Street and Chruch Street	$ 2,330,025			$ 2,330,025	TAP	X6
Naugatuck River Greenway	Beacon Falls	Trail Extension Chruch Street and Nuagatuck Town Line		$ 4,223,016		$ 4,223,016	TAP	X6
Trail	Bristol	Construct New Trail			$ 8,500,000	$ 8,500,000	TAP	X6
Trail	Bristol	Trail Routing Study	$ 587,500			$ 587,500	State	X6
Memorial Boulevard	Bristol	Install Bicycle Facilities	$ 267,900			$ 267,900	TAP	X6
Various	Bristol	Roundabout Study	$ 243,960			$ 243,960	STBG	X7
Center Street	Bristol	Grade Crossing Evaluation	$ 17,625,000			$ 17,625,000	STBG	X7
Farmington Canal Heritage Trail	Cheshire	Improve Trail Crossing Jarvis Street	$ 401,850			$ 401,850	TAP	X6
Jarvis Street	Cheshire	Sidewalk Installation	$ 724,000			$ 724,000	STBG, LOTCIP, TAP	X6
Peck Lane	Cheshire	Traffic Calming		$ 230,850		$ 230,850	STBG, LOTCIP	X6
Jarvis Street	Cheshire	Intersection Realignment at Lancaster Way and Guinevere Ridge	$ 803,700			$ 803,700	STBG, LOTCIP	X7
Tucker Hill Road	Middlebury	Geometry Improvements at Regan Hill Road			$ 4,346,250	$ 4,346,250	STBG, LOTCIP	X7
Scott Street	Naugatuck	Roadway Improvements at between Route 63 and Elm Street		$ 3,078,000		$ 3,078,000	BUILD	X7
Various	Naugatuck	ADA Improvements within Downtown	$ 535,800			$ 535,800	CC	X6
Maple Street	Naugatuck	Cyclist Improvements	$ 2,679,000			$ 2,679,000	LOTCIP	X6

IMPROVEMENTS CONT.

ROUTE	LOCATION	PROJECT	YEARS AND FUNDING 1-5	6-10	11-27	TOTAL	SOURCE	AQ
Naugatuck River Greenway	Naugatuck	Trail Extension at Breen Fields near Maple Street to Beacon Falls Town Line	$ 10,180,200			$ 10,180,200	TAP	X6
Naugatuck River Greenway	Naugatuck	Trail Extension between Maple Street and Breen Fields	$ 2,679,000			$ 2,679,000	LOTCIP	X6
Naugatuck River Greenway	Naugatuck	Trail Extension from Pulaski Walk to Waterbury Town Line		$ 4,617,000		$ 4,617,000	TAP	X6
Rubber Avenue	Naugatuck	Intersection Improvements at Hoadley Street and Melbourne Street	$ 1,071,600			$ 1,071,600	SIPH	X7
Rubber Avenue	Naugatuck	Install Roundabout at intersection of Route 63 and Cherry Street	$ 5,875,000			$ 5,875,000	LOTCIP	X7
Field Street	Naugatuck	Intersection Improvements at Field Street and Jones Road		$ 1,539,000		$ 1,539,000	STBG	X7
Mulberry Street	Naugatuck	Geometric Improvements			$ 7,625,000	$ 7,625,000	LRARP	X7
Various	NVCOG	Regional Bike Program			$ 30,267,000	$ 30,267,000	Various	X6
Various	NVCOG	Regional Pedestrian Safety Program			$ 30,267,000	$ 30,267,000	Various	X6
Trail	Oxford	Trail Construction between Larkin Bridle Trail to Main Street	$ 2,009,250			$ 2,009,250	TAP	X6
Dutton Road	Oxford	Replacement of Bridge No. 04913		$ 3,324,240		$ 3,324,240	BRZ	X6
Graystone Road	Plymouth	Geometry Improvements			$ 15,646,500	$ 15,646,500	STBG	X7
South Main Street	Plymouth	Safety Improvements between Main Street and East Washington Road			$ 5,814,000	$ 5,814,000	STBG	X7
Tory Crossing	Plymouth	Improve Geometry between East Plymouth Road and Matthews Street		$ 3,078,000		$ 3,078,000	LOTCIP	X7
Old Field Road	Southbury	Sidewalk Contruction from Main Street to Heritage Road	$ 1,339,500			$ 1,339,500	TAP	X6
Naugatuck River Greenway	Thomaston	Construct NRG between Old Waterbury to Branch Brook	$ 669,750			$ 669,750	TAP	X6
Naugatuck River Greenway	Thomaston	Construct NRG between Old Waterbury to Vista Park		$ 8,509,131		$ 8,509,131	TAP	X6
North Main Street	Waterbury	Intersection with Cherry Street and Grove Street			$ 18,300,000	$ 18,300,000	STBG	X7
Riverside Street	Waterbury	Improve Intersection with Bank Street			$ 38,125,000	$ 38,125,000	STBG	X7
Huntungdon Avenue	Waterbury	Improve Intersection with Route 8			$ 27,702,000	$ 27,702,000	STBG	NM
Lakeside Boulevard East	Waterbury	Roadway Improvements		$ 7,695,000		$ 7,695,000	STBG	X6
South Main Street	Waterbury	Intersection Improvements at South Main Street and Washington Street	$ 5,875,000			$ 5,875,000	STBG	X7

IMPROVEMENTS CONT.

ROUTE	LOCATION	PROJECT	YEARS AND FUNDING 1-5	6-10	11-27	TOTAL	SOURCE	AQ
Lakewood Road	Waterbury	Sidewalk Construction between North Main Street to Route 69	$ 2,889,000			$ 2,889,000	LOTCIP	X6
Naugatuck River Greenway	Waterbury	Construct NRG between Washington Street and West Main Street		$ 13,235,400		$ 13,235,400	TAP	X6
Naugatuck River Greenway	Waterbury	Construct NRG between West Main Street and the Waterbury Industrial Commons			$ 20,688,150	$ 20,688,150	TAP	X6
Aurora Street	Waterbury	Geometry Improvements between Bunker Hill Road to Watertown Avenue			$ 10,326,690	$ 10,326,690	NHPP	X6
Cooke Street	Waterbury	Intersection Improvements with Rosebud Street	$ 669,750			$ 669,750	STBG	X7
North Main Street	Waterbury	Traffic calming and pedestrian improvements between West Main Street and Hill Street	$ 2,009,250			$ 2,009,250	STBG	X7
Walnut Street	Waterbury	Safety Improvements	$ 300,800			$ 300,800	LRARP	X7
Naugatuck River Greenway	Watertown	Construct NRG between Frost Bridge Road and Branch Brook	$ 2,474,057			$ 2,474,057	TAP	X6
Naugatuck River Greenway	Watertown	Construct NRG between Frost Bridge Road to Waterbury Town Line			$ 2,607,750	$ 2,607,750	TAP	X6
Steele Brook Trail	Watertown	Construct trail along Steele Brook to NRG			$ 6,100,000	$ 6,100,000	TAP	X6
Bunker Hill Road	Watertown	Pedestrian Safety Improvements between Route 63 and Route 73	$ 669,750			$ 669,750	CC	X6
Middlebury Road	Watertown	Safety Improvements		$ 2,308,500		$ 2,308,500	STBG	X6
Lake Winnemaug Road	Watertown	Safety Improvements at intersection with Sperry Road		$ 1,154,250		$ 1,154,250	STBG	X7
		TOTAL PROGRAMMING	**$ 125,558,000**	**$ 138,542,000**	**$ 537,332,000**	**$ 801,431,000**		

MAJOR PROJECTS OF STATEWIDE IMPORTANCE

ROUTE	LOCATION	PROJECT	YEARS AND FUNDING 1-5	6-10	11-27	TOTAL	SOURCE	AQ
I-84	Waterbury	Pavement Rehab	$ 70,000,000			$ 70,000,000	NHPP	X6
I-84, Route 8	Waterbury	NewMix			$ 3,000,000,000	$ 3,000,000,000	*	PD
Route 72	Bristol	Corridor Improvements near Memorial Blvd	$ 10,000,000			$ 10,000,000	TAP	X7
Route 34	Oxford	Relocation of Bridge Crossing Housatonic River from Stevenson Dam		$ 70,250,000		$ 70,250,000	NHPP	NM
Route 6	Woodbury	Roundabout Construction at Route 61 and Quassipog Road	$ 4,000,000			$ 4,000,000	STBA	X7
		TOTAL PROGRAMMING	**$ 84,000,000**	**$ 70,250,000**	**$ 3,000,000,000**	**$ 3,154,250,000**		

*Due to the size and scope as well as the statewide significance of this project, CTDOT may utilize multiple funding sources to execute this project

TRANSIT PROJECTS

ROUTE/SYSTEM	LOCATION	PROJECT	YEARS AND FUNDING 1-5	6-10	11-28	TOTAL	SOURCE	AQ
CTtransit Bristol/New Britian	Bristol	Additional CTtransit route	$ 360,000			$ 360,000	State	NM
CTtransit Bristol	Various	Realign Service	$ 2,555,000	$ 4,445,000	$ 17,860,000	$ 24,860,000	State	NM
CTtransit Waterbury	NETCO Facility	Facility Improvements	$ 125,970			$ 125,970	State	X6
CTtransit Waterbury	Various	Real time information signs	$ 6,298,500			$ 6,298,500	5307; 5339	X6
CTtransit Waterbury	Various	Cttransit Waterbury operating capital	$ 9,782,000	$ 13,680,000	$ 63,037,000	$ 86,499,000	5307; 5339	X6
CTtransit Waterbury	Various	Cttransit Waterbury operating subsidy	$ 23,735,000	$ 28,189,000	$ 152,960,000	$ 204,884,000	State	X6
Waterbury Branch Line	Naugatuck	Station relocation	$ 25,000,000			$ 25,000,000	5309	PD
Waterbury Branch Line	Naugatuck	Inland Port		$ 24,900,000	$ 24,900,000	$ 49,800,000	5309; State	NRS
Waterbury Branch Line	Various	Expand service to provide 30 minute headways		$ 15,248,000	$ 82,735,000	$ 97,983,000	State, Federal	NM
Waterbury Branch Line	Waterbury	Rennovate station to provide indoor area	$ 12,597,000			$ 12,597,000	5309; State	X6
Waterbury Branch Line	Waterbury	Storage yard in Waterbury for WBL			$ 78,061,500	$ 78,061,500	5309; State	NRS
CTtransit Waterbury	Waterbury	Additional route along Lakewood Road	$ 578,000	$ 809,000	$ 3,720,000	$ 5,107,000	State	CC
Central Connecticut Line	Waterbury	Rehabilitation of four CSX bridges north of the Waterbury Train Station	$ 10,000,000			$ 10,000,000	State	X6
CTtransit Waterbury	Waterbury	Infratructure improvements for electric vehicles	$ 9,255,000			$ 9,255,000	State, Federal	X6
		TOTAL PROGRAMMING	**$ 100,287,000**	**$ 87,271,000**	**$ 423,274,000**	**$ 610,831,000**		

PUBLIC INVOLVEMENT SURVEY

Central Naugatuck Valley Metropolitan Planning Organization

2023 Metropolitan Transportation Plan

THANK YOU TO EVERYONE WHO PARTICIPATED

METROCOG
Connecticut Metropolitan Council of Governments

NAUGATUCK VALLEY COUNCIL of GOVERNMENTS

INTRODUCTION

Plan Purpose, Survey, & Goals

This document summarizes the responses to a survey jointly developed by the Connecticut Metropolitan Council of Governments (MetroCOG) and the Naugatuck Valley Council of Governments (NVCOG) for the update of the Central Naugatuck Valley Metropolitan Planning Organization (CNVMPO). The survey served as a means for people to share their thoughts on transportation in their communities and throughout the region. The survey also raised public awareness and interest in the plan.

GOAL DEVELOPMENT

Responses to the survey were utilized to develop regional transportation goals and will inform the update of the Metropolitan Transportation Plan (MTP). These goals will guide decision makers about where and how to invest in the transportation system in the future. Survey responses were analyzed through response theme coding (staff), natural language processing techniques, and staff review. Each task helped to develop recurring themes seen in survey responses, which were refined into seven regional goals and supporting actions. The goals were compared with the USDOT's National Transportation Performance Measures and CTDOT's State of Connecticut Transportation Performance Measures and evaluated for alignment with national and state priorities.

The goals and corresponding actions developed through this process are listed on the next page.

PLAN PURPOSE

The MTP is a federally required document that identifies potential opportunities to improve mobility for people throughout the region, from 2023 to 2050. A critical component of the MTP development process is to provide opportunities for community members to inform the plan. The GBVMPO's MTP will take a comprehensive, system-wide approach to improving all modes of transportation, as well as potential impacts to and from the system for residents, commuters, and travelers to the Greater Bridgeport Region. Federal regulations require an update on certain content and on the development process every four years.

Survey Development & Distribution

DEVELOPMENT

The survey was developed as a coordinated effort between MetroCOG and NVCOG. Organization staff utilized Esri's ArcGIS Survey 123 to develop a survey of 32 questions, available in English and Spanish versions. Survey 123 is a web and mobile application for survey design, distribution and response management. The application allows for logic-based design and manages responses through automated record keeping in a secured XLSForm. Paper versions of the survey in English and Spanish were also created (the English version can be found at the end of this document). For consistency, both COGs used a single joint survey, resulting in a combined dataset that contained all responses.

The 32 questions include a variety of required and optional open-ended/fill-ins, yes/no, multiple choice and ranking. Logic was also utilized. For example, only participants that replied

Goals for the CNVMPO Region

1. Progress the goal of Vision Zero.

To work toward the goal of zero fatalities and serious injuries within the transportation system.

2. Preserve and Maximize Value of the Existing Highway System.

To maintain an efficient highway 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, address common locations of collisions, and focus on projects designed to the latest standards of safety and efficiency

3. Congestion Management

To develop and maintain a congestion management plan as the CNVMPO pursues TMA status and ensure programming of projects for areas of highest concern along the roadway network

4. Ensure Transportation System Security.

To ensure that users of the transformation feel secure, using a combination of new technologies and traditional approaches.

5. Evaluate and Utilize Advanced Technology

To better manage transportation operations, enhance safety and mobility, ensure greater travel time reliability, and provide more detailed and up-to-the-minute information to travelers and system operators through the application of various Intelligent Transportation Systems (ITS) actions.

6. Preserve and Enhance Public Transportation Services

To maintain essential local bus, passenger 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 improving service through rationalized and better coordinated routes and reduced headways.

7. Expand Multi-Modal Opportunities

To expand opportunities for travelers to easily switch between modes, providing first/last mile options and high-quality transit services in between.

8. Enhance the Efficient Movement of Freight and Goods

To expand and enhance opportunities for expediting movement of freight.

Goals for the CNVMPO Region

9. Enhance Bicycle and Pedestrian Facilities

To encourage and promote the increased use of bicycling and walking/rolling as a mode of transportation.

10. Environmental Protection

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

11. Sustainability

To develop a long-range 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.

12. Promote Economic Development and Revitalization

To improve transportation infrastructure critical to the economic vitality of the Naugatuck Valley planning region.

13. Environmental Justice

To identify and address disproportionately high and adverse human health or environmental effects of the 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.

14. 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 our planning region.

“Yes” to “Do you ride a bike within your community?” were prompted to answer further questions about bicycling.

SURVEY DISTRIBUTION

The survey was available from August 24th, 2022 to November 30th, 2022. The CNVMPO and GBVMPO’s Public Participation Plans were utilized to inform this distribution, which includes a comprehensive list of local, regional and statewide stakeholders with an interest in the transportation planning process. Stakeholders include municipal departments (such as planning, engineering, and health), non-profits, local service organizations and individuals who have requested inclusion in the MPOs' email distribution lists. Many of the individuals and organizations engaged with were asked to suggest additional contacts and stakeholders. While this method encouraged participation from people who are interested in transportation and planning, the survey was not distributed through any random or scientific sampling process.

Staff attended several in-person events to raise community awareness of the plan and to distribute links to the survey (or provide paper versions upon request). Events included:

- The Bristol Mum Festival
- Shelton Day
- Waterbury Harry Potter Day
- Neighborhood Housing Services of Waterbury Housing Expo

Postcards with survey links and paper versions were distributed to:

- Libraries
- Community centers
- Senior centers
- The Kennedy Collective

Press releases were provided to the weekly newspapers, and member municipalities (for websites and newsletters). A link to the survey was also posted to NVCOG’s and MetroCOG’s website, facebook,twitter, and LinkedIn accounts.

The survey was intended to be available to people throughout the region, regardless of their age, sex, income level, ability, or ethnicity. As stated earlier, the survey was not distributed to a random sample of people. Thus, the demographics of the survey participants do not mirror the demographic composition of the region. For example:

- 18.5% of the population is over the age of 65. Of the respondents who indicated their age, 19% are 65 or older.
- The median household income in the region is $83,841.
- The region has a large population of persons whose first language is Spanish and have limited proficiency in English. 5 people participated in the Spanish language survey.

Future outreach efforts for all CNVMPO projects and initiatives must work to engage people and organizations not reached as part of the MTP survey distribution process. Making the region aware of the public comment period for the plan is one opportunity. Additionally, abbreviated surveys with fewer questions that take less time may garner more responses, as well as offering small incentives for completion.

Filtering CNVMPO Responses for Analysis

During the roughly 3-month period that the survey was available (August 24th-November 30th), 687 online English, 5 online Spanish, and 16 paper surveys were received. To house all survey responses in a single dataset, MetroCOG staff entered paper survey responses into Survey123. NVCOG did not recieve paper survey responses.

Survey distribution included NVCOG member municipalities outside of the CNVMPO region (by MetroCOG staff). Thus, respondents whose primary residence was not in the region and/or did not spend significant time in the region were removed from the CNVMPO dataset and any further analysis. Staff used the following process and criteria:

- "In what town/city is your primary residence:" response criteria included the 15 CNVMPO municipalities. Obvious misspellings were included.
- "In what town/city do you spend most of your time outside the home (work, school, etc.)?" response criteria included the GBVMPO municipalities above. Thus, participants who do not live in the region but spend a significant amount of time in the region were incorporated into the dataset. For example, if a respondent has a primary residence in Woodbury but works or spends most of their time in Fairfield, their responses were included in the GBVMPO dataset.

The resulting dataset includes CNVMPO responses.

Spanish responses to the dataset were reviewed separately and are available in an anonymized version of the dataset. Due to the low number of participants in this survey, potential identifying information was removed to ensure confidentiality and are not available separately.

ENSURING ANONYMITY

This document was created, in part, as a result of many respondents asking if the results of the survey would be publicly available. The full dataset is in excel format, and to protect the identities of participants, responses to each question were separated into an individual worksheet and sorted randomly or alphabetized.

Analyzing Open-Ended Responses

Open-ended survey responses were analyzed by staff and via digital analysis. MetroCOG staff organized responses into categories using a coding method, which involved reviewing each response and tagging the categories, or "codes," that the response included. For example, the response "enforcement to make roads safer for pedestrians and cyclists," would be categorized as "enforcement," "safety," "pedestrian," and "biking." The most common categories helped to determine recurring themes across all survey respondents.

WORD CLOUDS

Word clouds were generated for most of the open-ended questions via the free version of the software Alteryx. These Alteryx Designer settings were used:

- Text Pre-Processing tool: removed digits, punctuation, SpaCy default stop words (Link below) and converted words to their roots (for example, "running," "ran," and "runs," all become "run" after this step).
- RegEx tool: parsed shortform text responses by "entire word," and created a new dataset for NLP (natural language processing) with one word per one row.
- Data Cleansing tool: removed whitespaces and blank responses and modified all text to lower case.
- Word Cloud tool: created visualizations of the 200 most frequently occurring words.

Future Participation

The survey responses continue to be utilized in developing the MTP. The CNVMPO is committed to a continuous public involvement process that provides complete information, timely public notice, and full public access to the organization's activities at all key stages in the decision making process. Thus, the public is encouraged to comment on the MPO's ongoing activities, including throughout the development of the MTP. Additionally, the opportunity to sign up for future MTP updates was made available to survey respondents. Those requesting updates will be informed on the ongoing progress.

The CNVMPO's Public Participation Plan requires a formal, 30-day public comment period prior to endorsement of the plan. Endorsement of the MTP is anticipated for the March 17th, 2023 meeting of the CNVMPO. Therefore, the MTP will be made available for public review on or before February 6th, 2023. During this period, the public will be made aware of the opportunity to comment on the plan via the following methods:

- Legal notice published in the Republican American
- Email notice to CNVMPO stakeholder list
- Social media posts
- Website notice

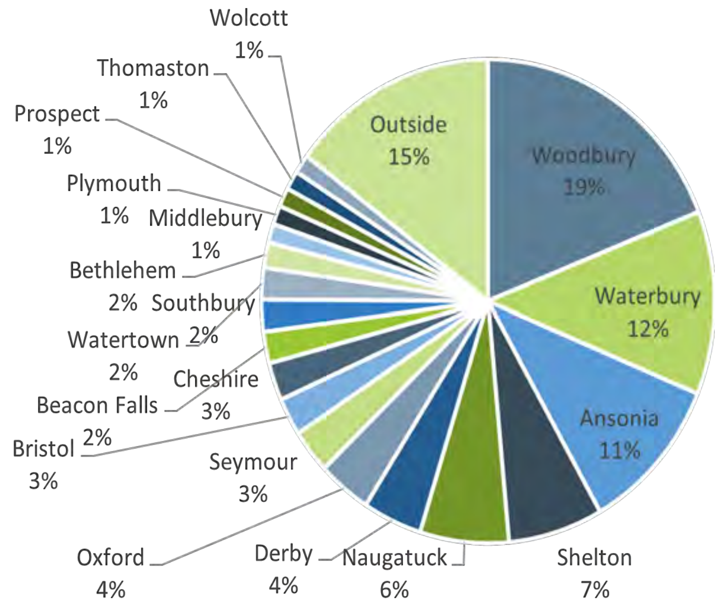
All notices will include a description of where to send written and/or email comments and the location, date, and time of a public meeting. The public meeting is anticipated for mid-February and will likely be held in NVCOG's offices at 49 Leavenworth Street, 3rd Floor, Waterbury CT, 06702. An option to join virtually will also be provided.

OUR SURVEY PARTICIPANTS...

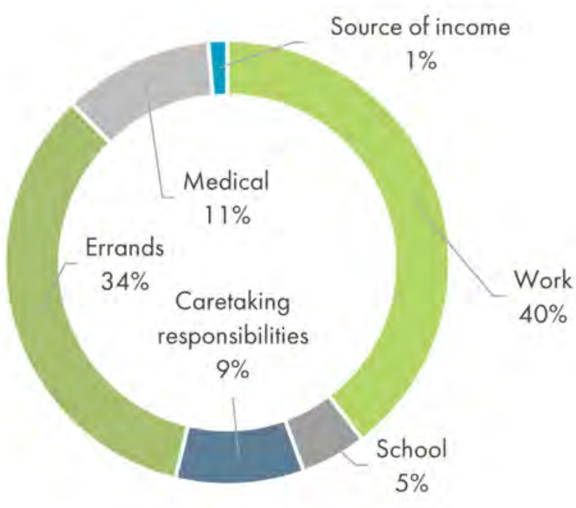
Primary Residence

This pie chart is made up of the 202 respondents who live in the region. **Woodbury residents (45 people), followed by residents of Waterbury (29),Ansonia (25), Shelton (16) and Naugatuck (15)** made up the majority of responses.

Q: In what town/city is your primary residence?

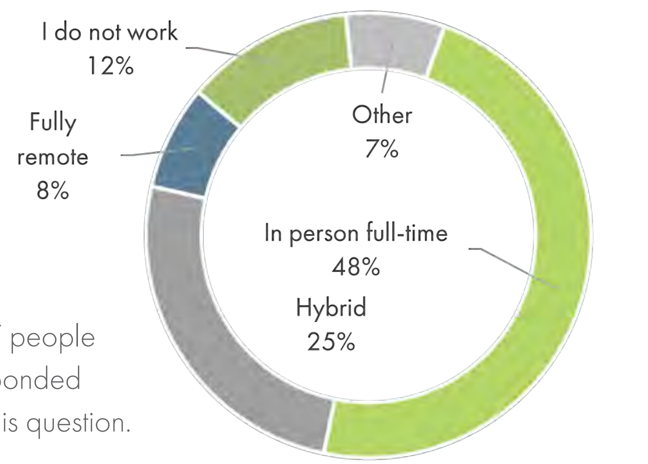


Q: To where do you travel most frequently?



463 of the 524 people who answered this question indicated more than one frequent travel location. **Work (341 people) and errands (340)** were chosen the most.

Q: How would you describe your work environment?



527 people responded to this question.

41% indicated that they work in an **in-person full-time** environment (215 people).

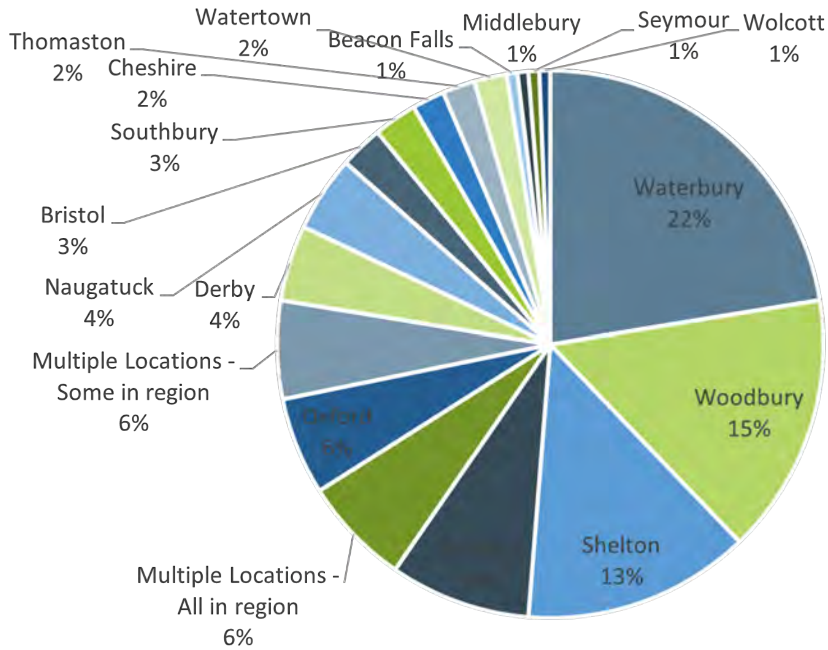
24% are **hybrid** (125)

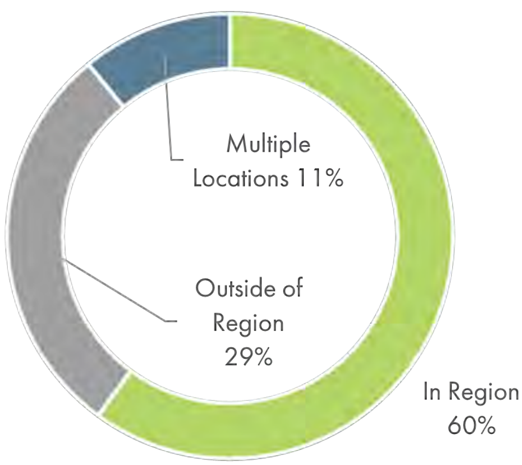
10% are **fully remote** (55)

16% indicated that **they do not work** (87). Many of the 45 people who indicated **"other" are retirees or work part-time.**

Q: In what town/city do you spend most of your time outside the home (work, school, etc.)?

156 people indicated that they spend most or all their time outside of the home in the region. **Waterbury (35), Woodbury (24) and Shelton (21) were the locations with the most responses.**



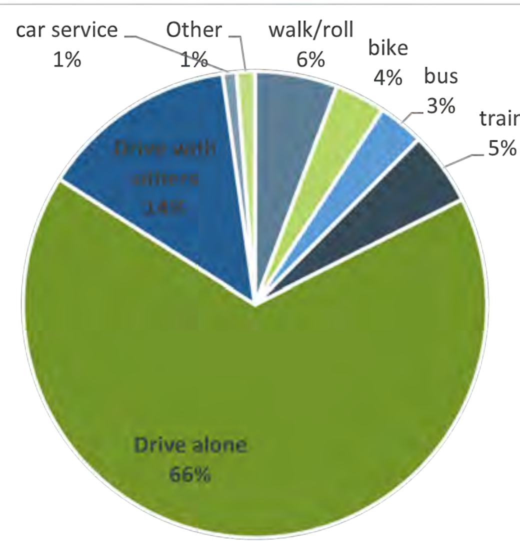


Travel Outside the Region

29% Of responders reported that when they aren't home it is typically outside of the region.

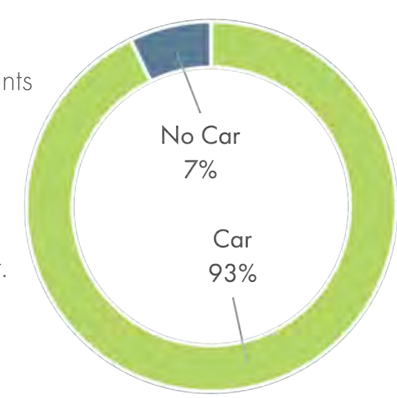
11% of all respondents reported that their travel is made up of multiple locations.

Q: How do you travel most often?



55% of respondents drive alone.

90% have consistent access to a car; 10% do not.



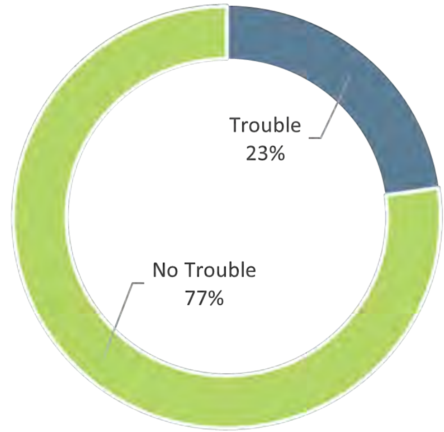
TRANSPORTATION CHALLENGES

Q: Do you ever have trouble getting where you need to go?

527 people provided a response to this question.

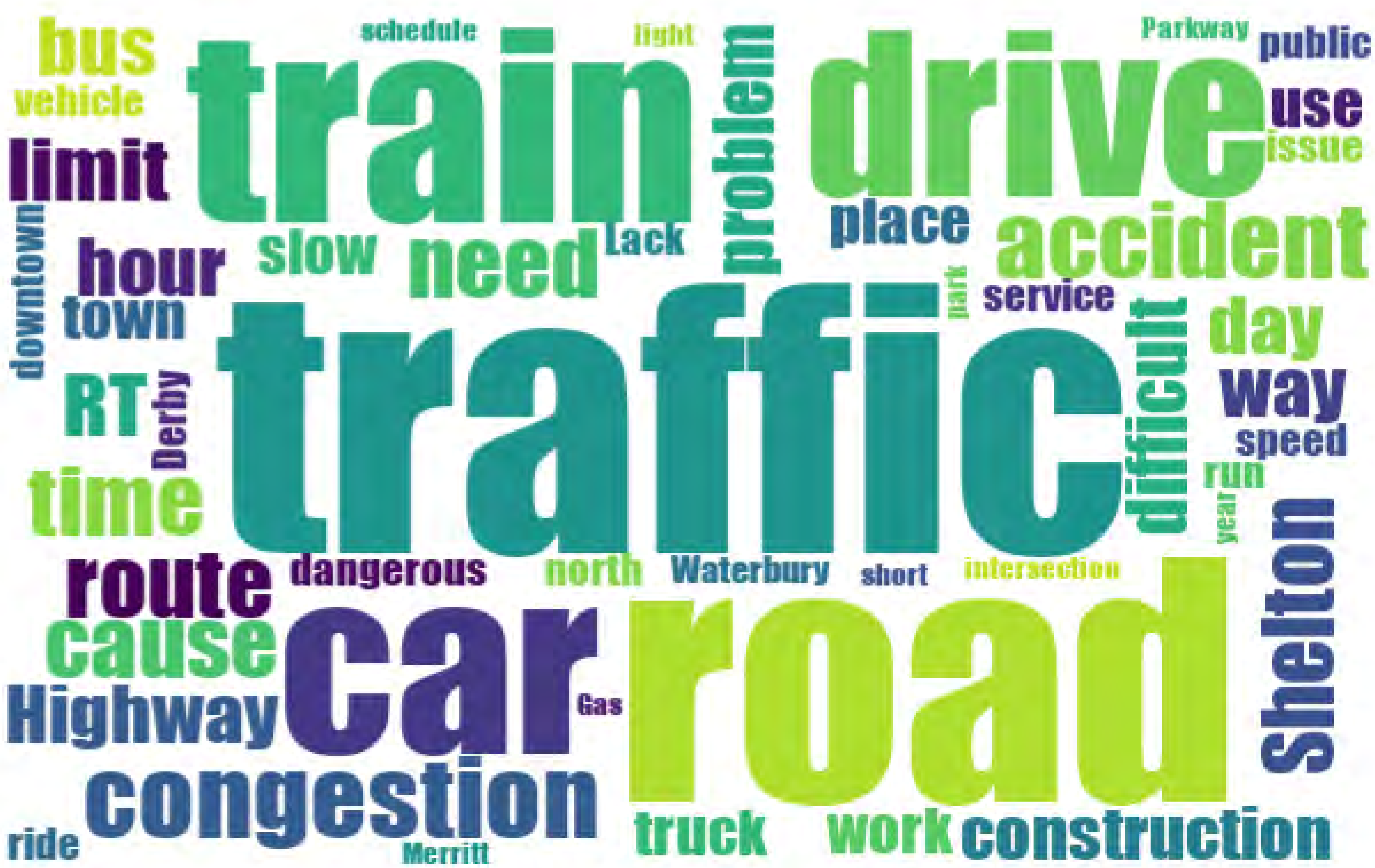
77% of respondents indicated that they **do not have trouble.**

23% of respondents indicated that they **have trouble** getting to their destination.



Q: Please tell us more about what prevents you from getting around easily.

The word cloud below indicates the most common words used in the responses received from participants. A few responses are highlighted on the next page.



Attribute: Alteryx

"Car and truck accidetns on I-84; slow lights at intersections on RT 70 in Cheshire and RT 10 during the school year and during sports events at Bartlem park. More and more landscaping trucks town roads while work, blocking off lanes of travel."

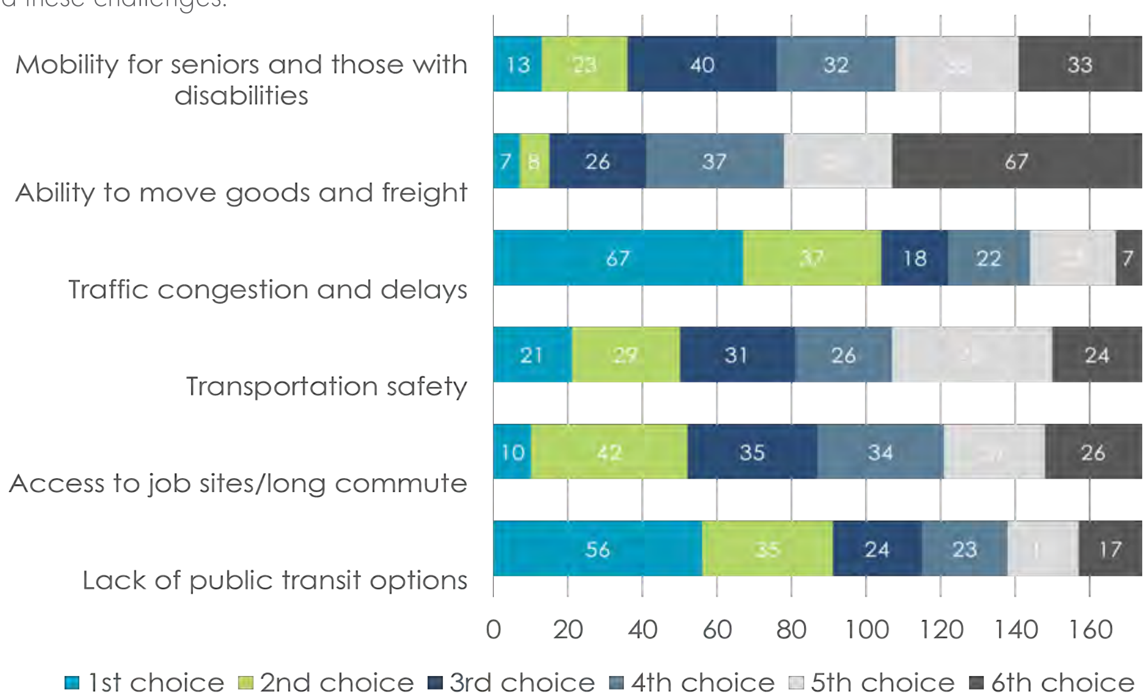
"I wish more places were walkable. I would prefer to walk a mile or two than to drive such short distances. Secondly, when I commute by car and train to NYC, I have to come home at night. Visibility is poor."

"There are limited Trasportation services In Wolcott"

"Limited train service to and from Shelton/Derby station Traffic problems and accidents on Route 8 in Shelton"

Q: What do you think are the biggest transportation challenges faced by our communities?

This question asked respondents to choose or rank the region's biggest transportation challenges. 356 people ranked these challenges.



39% of respondents identified **traffic congestion and delays** as the greatest challenges (67 people).

32% identified the **lack of public transit** options as the greates challenge (56 people).

Q: Please tell us more about the challenges faced by our transportation system.

This was an open-ended question that 173 people answered. Below, a few comments are highlighted. The word cloud indicates the words used most often in comments.

"Lack of options/steady reliable public transit. Seems like there's an accident on rt 8 almost every other day in one direction or another.."

"Congestion and lack of safety frustrate and discourage commuters. Public transportation crippled by longer travel time and limited schedules..."

"Even for very short trips it is difficult to walk or bike because of the lack of good, connected sidewalks and bike lanes. There is too much traffic moving too fast to feel comfortable riding or walking in the street."

"Route 6, especially in Woodbury, is a traffic nightmare. Cars travel too quickly, there isn't safe access to cross the street - at any point - including the walk light by the town offices.."

"No bus routes in Woodbury."

"Train schedule is limited times. More times needed. Also ansonia train station un secured. From weather and feeling safe."

Attribute: Alteryx

Q: What suggestions may you have for the transportation system across the region?

This was an open-ended question that 238 people answered. The word cloud indicates the words used most often in the comments.

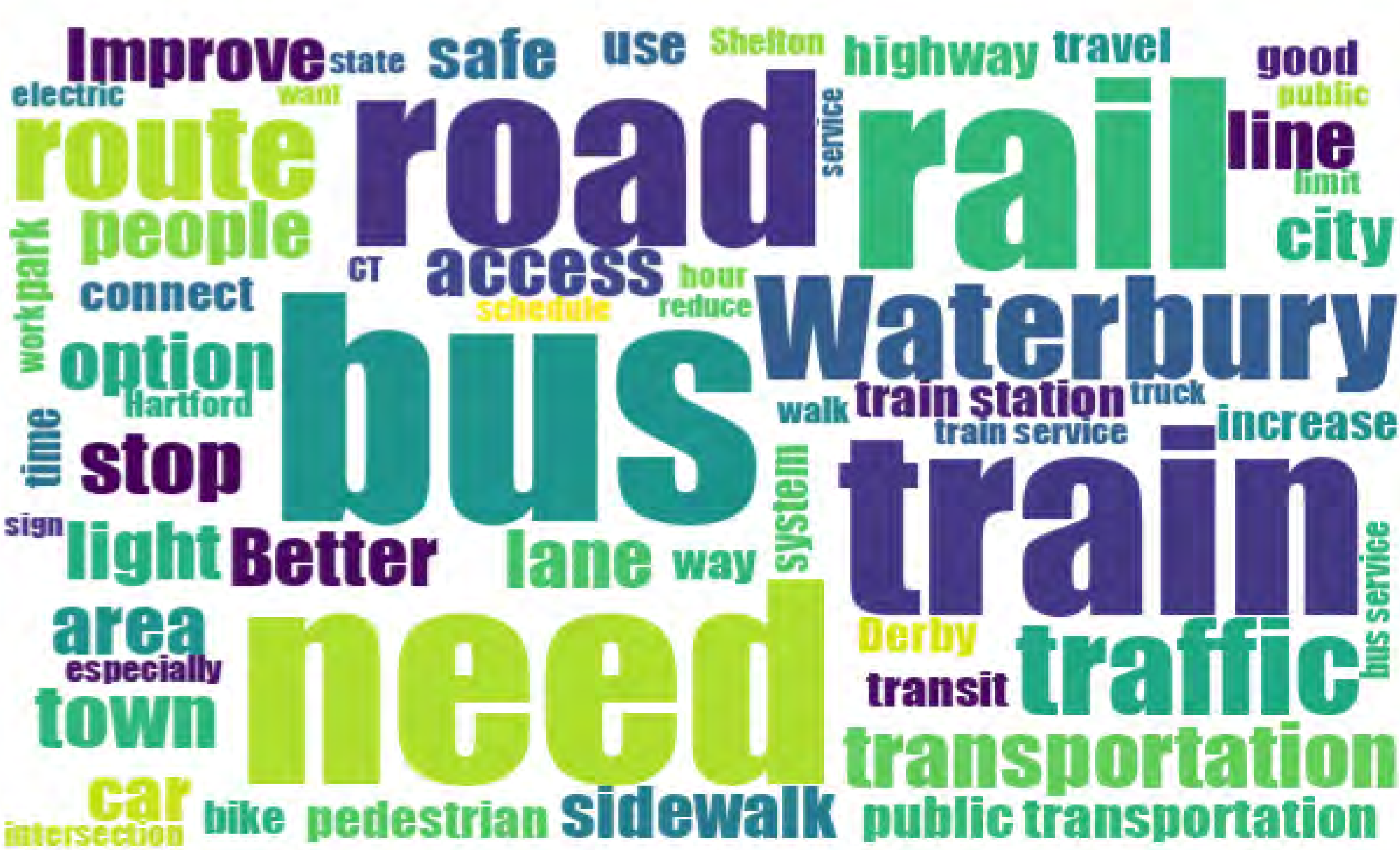
"Continued improvements to the Waterbury Branch Line of Metro North and the completion of the Route 34 reconstruction projects through downtown Derby are the most pressing"

"A more complete, interconnected set of bike lanes would help those who don't want to drive to not have to do so. Expanded public transit options, especially between urban centers, would further reduce car traffic."

"Create/rehabilitate roadways that will enhance communities."

"Need to invest more federal funds in a multimodal future for the region."

"Public Transportation available for the more rural /sub-urban areas."

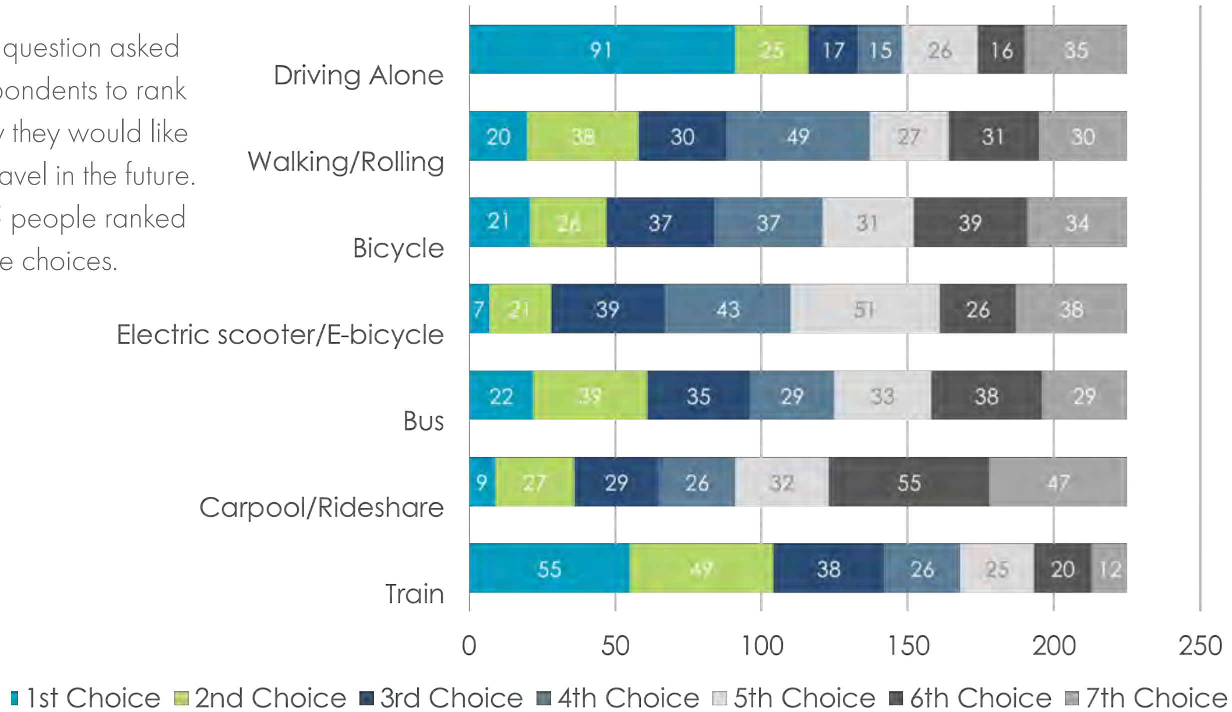


Attribute: Alteryx

FUTURE PREFERENCES

Q: Which of the following options are ways you'd like to get around in the future?

This question asked respondents to rank how they would like to travel in the future. 225 people ranked these choices.



40% of respondent's first choice was **driving alone** (91 people).

24% of respondent's first choice was **the train** (55).

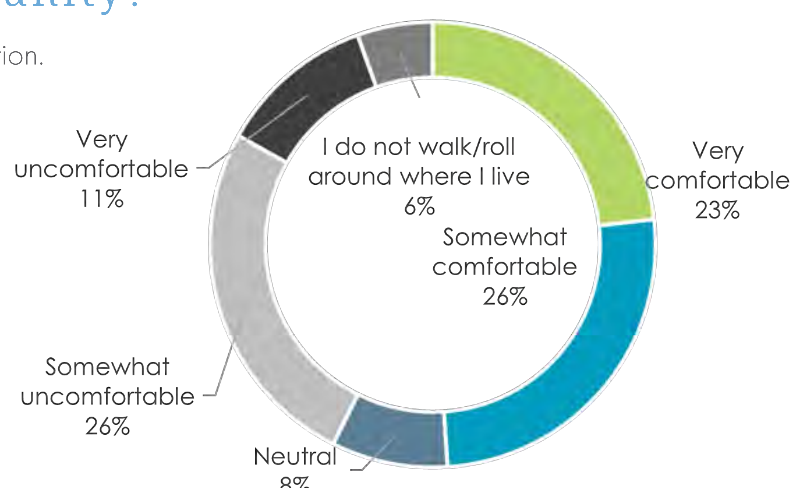
WALKING & ROLLING

Q: How comfortable do you feel walking/rolling throughout your community?

527 people provided a response to this question.

49% of respondents (116 people) **feel somewhat or very comfortable** walking or rolling in their communities.

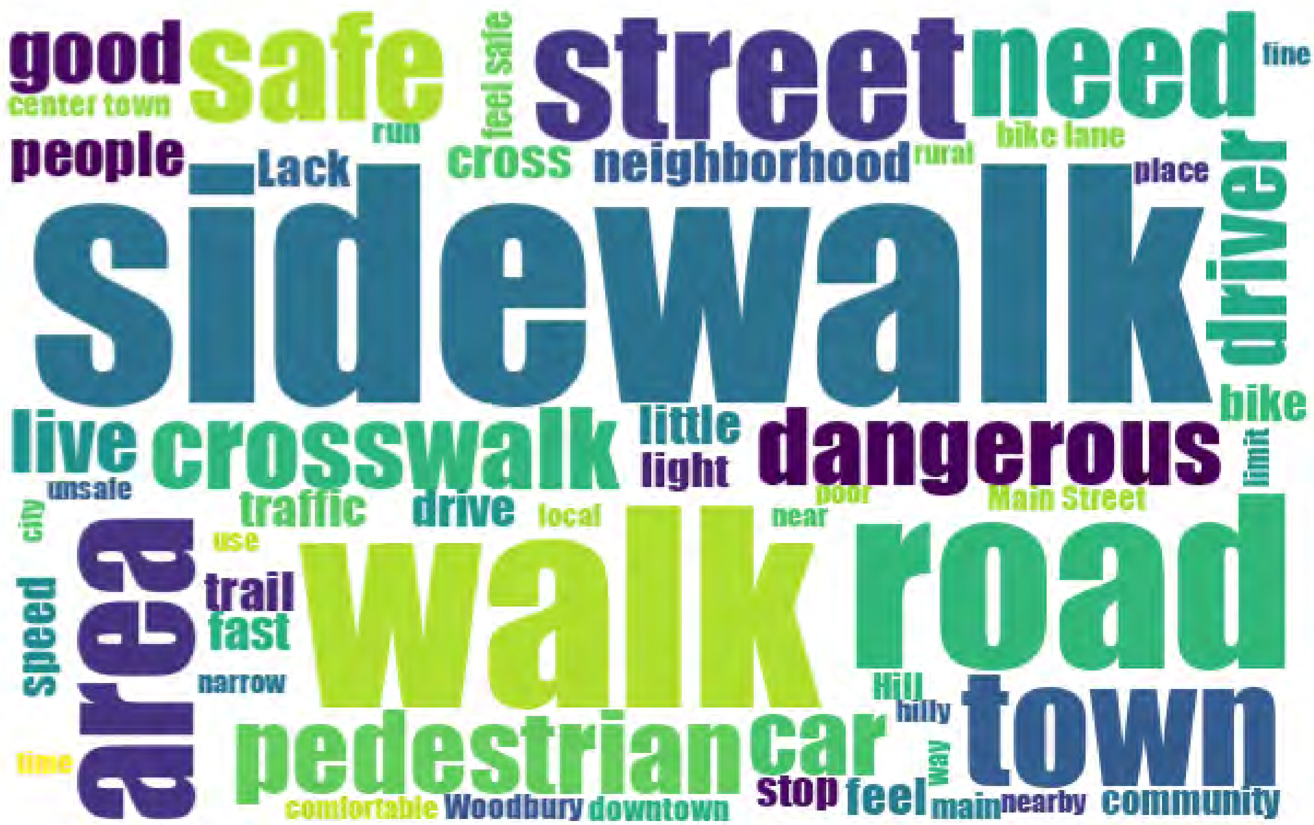
37% (88) indicated that they **feel somewhat or very uncomfortable.** 5% (13) do not walk or roll in their communities.



Q: Please tell us more about the walking/rolling environment within your community.

This was an open-ended question that 186 people answered. The word cloud indicates the words used most often in comments., with a few comments highlighted underneath the word cloud.

Attribute: Alteryx



"It is a hilly environment and there are no sidewalks if I walk beyond my neighborhood.."

"There are no sidewalks on the rural roads, so walking/biking can be hazardous. There are areas to walk/hike/bike but you have to drive to get there safely. The town is starting to build a sidewalk and multi-use trail along the main road."

"There are no sidewalks and the streets in my neighborhood are hilly. Drivers seem to be much less courteous now than prior to the pandemic.."

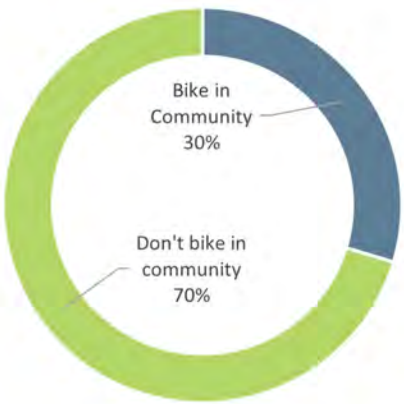
BICYCLING

Q: Do you ride a bike within your community?

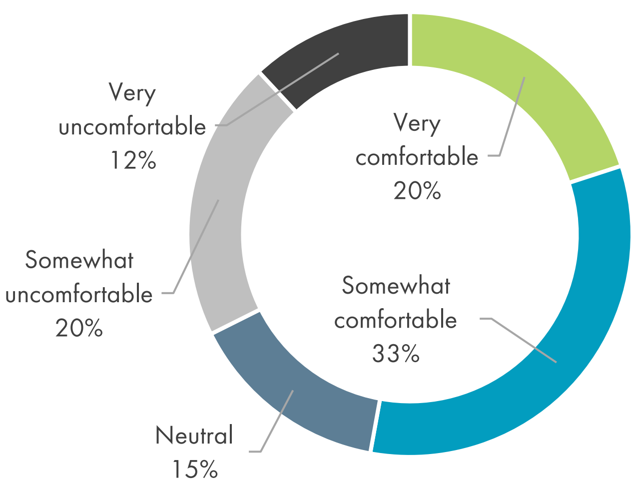
27 people provided a response to this question.

30%

of respondents (8 people) **bike in their community.**



Q: How comfortable do you feel biking throughout your community?



53% (36 people) are **somewhat or very comfortable bicycling.**

32% (24) are **somewhat or very uncomfortable bicycling.**

Q: Please tell us more about the cycling environment within your community.

This was an open-ended question. A few comments are highlighted below. and at the bottom of the next page The word cloud on the next page indicates the words used most often in comments.

"I only bike on the rail trail. Riding on our public roads is not safe. it isn't even safe on my cul-de-sac with cars parked on the road and speeders."

"We need bike lanes in NW CT. In towns like Woodbury there is too much priority given to cars. We need to safely share the road with pedestrian and cyclists."

"I really don't feel that safe on the roads - I would ride a lot more if there were dedicated bike lanes."

"I have access to trails for walking and biking purposes which are not available or known to outside communities."

Attribute: Alteryx

"Mostly the same as walking. Very easy in the suburbs, not as easy out on main street and larger roads. Usually am more comfortable riding on the sidewalk as not every road gives enough bike clearance and drivers tend to be aggressive in passing."

"More bike lanes or wider shoulders would be excellent."

SAFETY

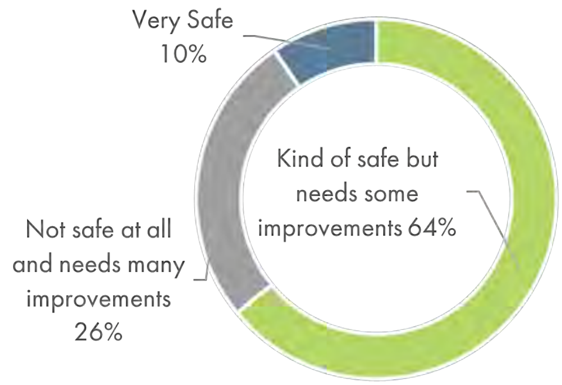
Q: How safe do you feel traveling throughout our communities is today?
(including for yourself & people you know)

317 people responded to this question.

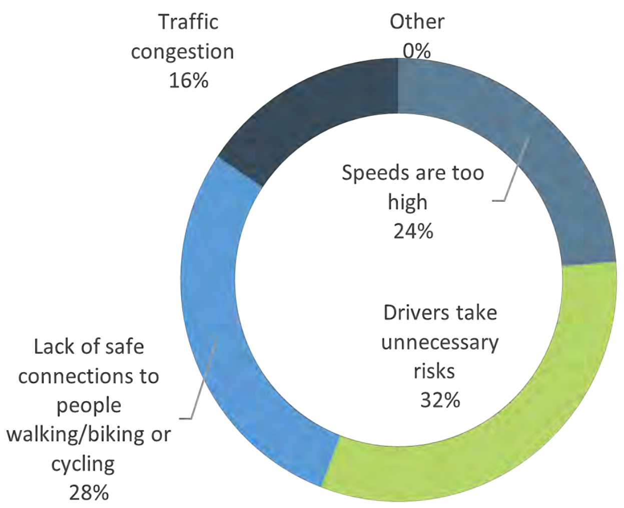
64% of respondents (107 people) **felt kind of safe traveling in their communities, and that some improvements are necessary.**

26% (44 people) **did not feel safe at all.**

10% (16) **felt very safe.**



Q: What makes you feel that way?



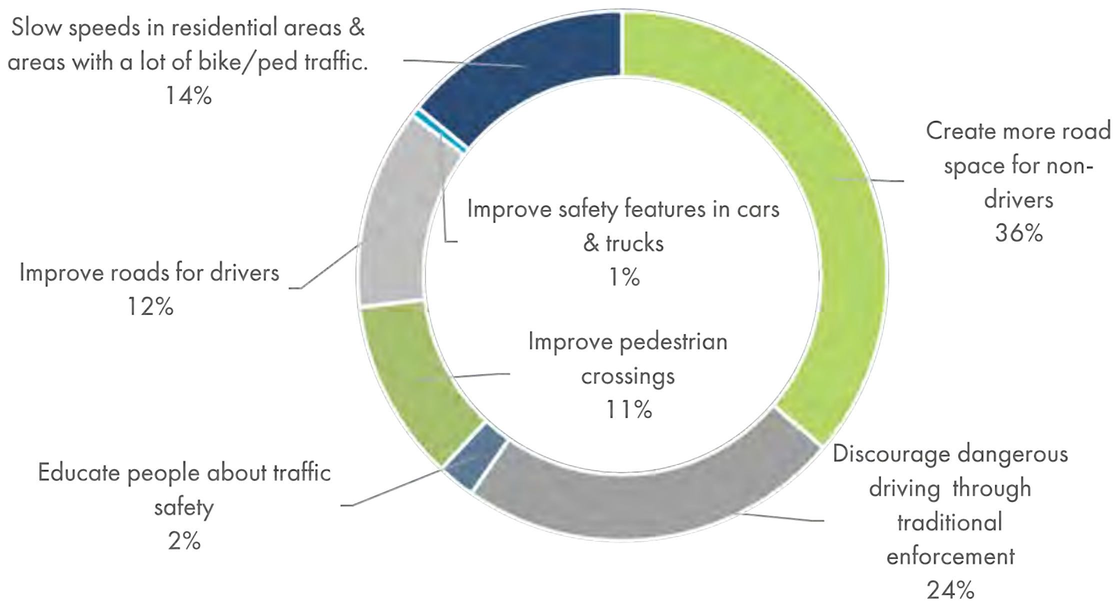
This question allowed for multiple responses. **Many of the 171 people who responded thought that multiple factors impacted safe travels in their communities.**

32% of respondents identified **unnecessary risks by drivers.**

28% of people indicated a **lack of safe bicycle/pedestrian connections.**

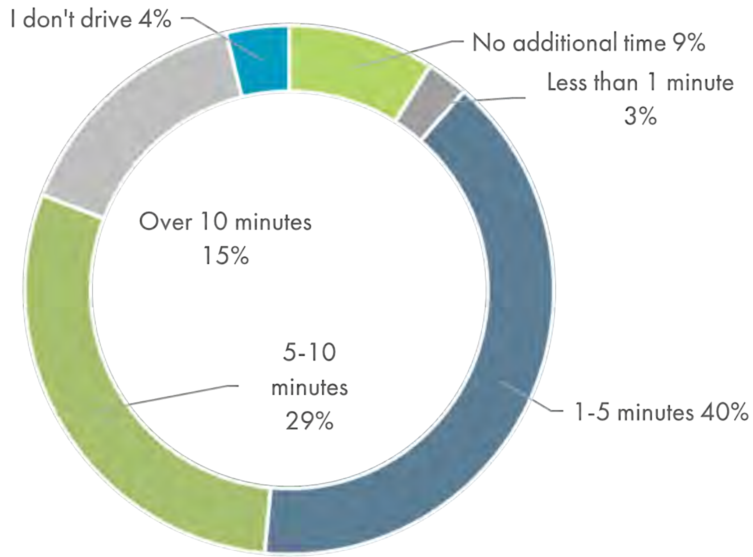
24% of respondents idenentified **high speeds.**

Q: What can be done to make your travel feel safer?



36% of respondents(62 people) thought that **more road space for non-drivers could improve safety,** with enforcement at the next highest choice, at 23% (40).

Q: Some safety improvements may involve trade-offs for people driving, including having some trips take longer. How many additional minutes would you be willing, on average, to add to your drive to improve the safety of our streets?



All respondents made a selection. **A 1-5-minute increase was selected by 40% of respondents (94 people). 29% of respondents (69) selected 5-10 minutes.**

Q: Anything else you'd like to add to the previous question?

This was an open-ended question. A few comments are highlighted. The word cloud below indicates the words used most often in comments.

"I'd need to know more about the improvements and how it may affect the time it takes to travel. And I don't drive because I can't afford a car anymore.."

"speed limit zones should be revisited"

"If trips become longer in a car because of safety, then more people will take alternative modes of transportation to avoid a longer drive. The safety improvements will promote alternative modes of transportation. Win-win."

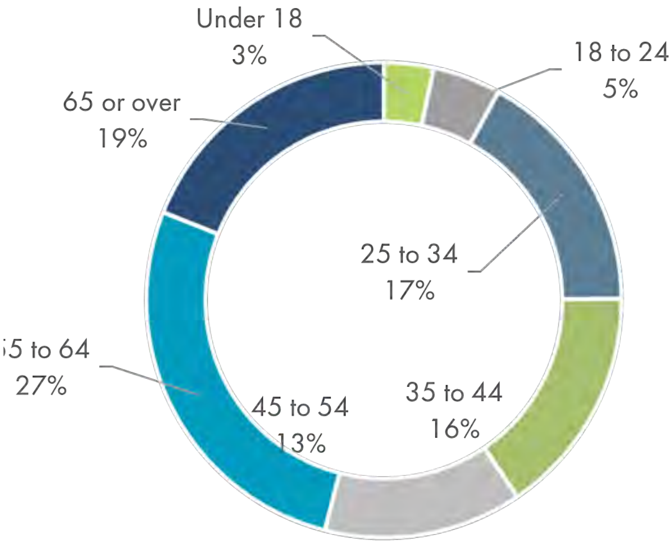
"We need better signs like adding more stop signs."

"I'm more concerned with safety than time savings"

"The main safety improvement needed is road condition. I believe that improving the condition and quality of our roads would actually improve safety and save travel time. trips would actually be shorter."

Attribute: Alteryx

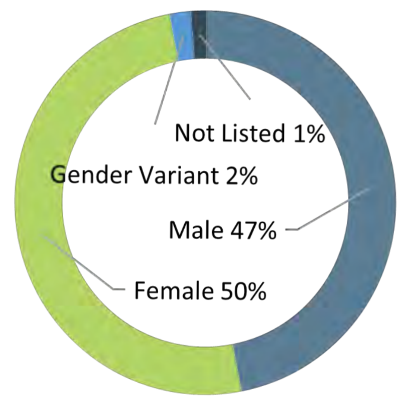
Q: Please indicate your age.



237 people indicated their age. 27% of respondents are between 55 and 64 (64), with 23% 66 or older (45). Respondents 24 and under made up only 5% of respondents (23).

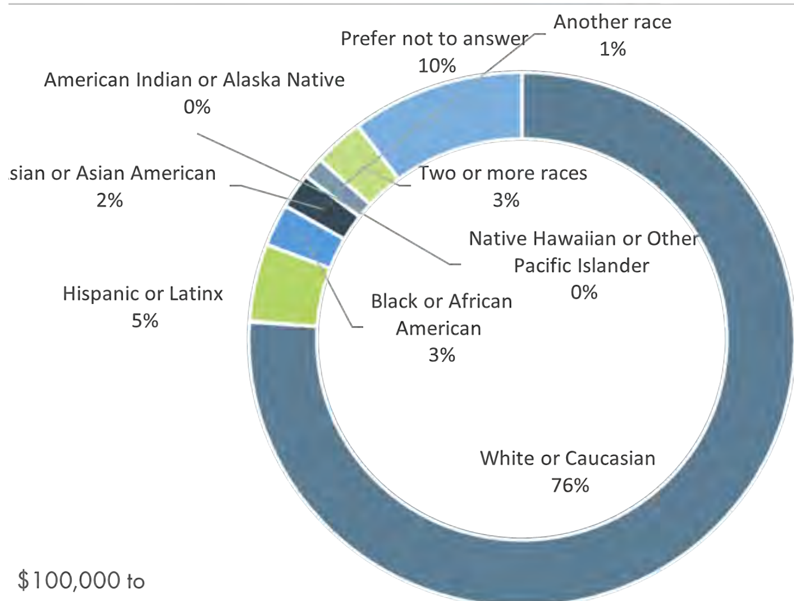
Q: What gender do you identify as?

222 people indicated their gender: 50% of respondents are female (111) and 47% are male (104) 2% indicated their gender as non-conforming (4).

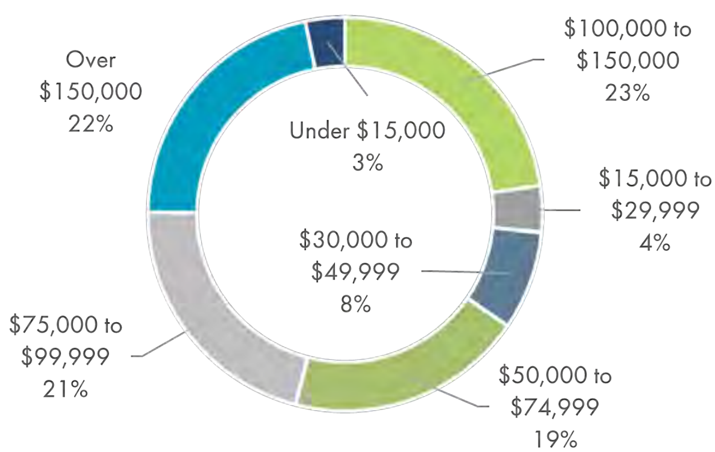


Q: How would you describe yourself?

210 people indicated their race or ethnicity. 76% of respondents reported that they are white/Caucasian (178 people). 5% of respondents are Hispanic/Latinx (11) and 3% are Black/African American (6).



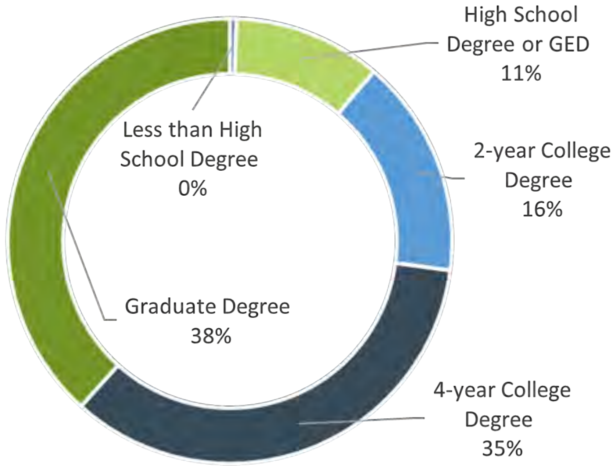
Q: What is your annual household income?



185 people indicated their annual household income. 46% of respondents (82 people) reported incomes of $100,000 or over. 4% of respondents (7) reported incomes of less than $30,000.

Q: What is your level of education?

214 people indicated their education: 38% of respondents (82) have a graduate degree. 35% (74) have a four-year degree 11% (23) have a high school degree/GED.



Q: Anything else you'd like to tell us?

We received a variety of responses to this question - some were "thank you", while others offered constructive feedback about the survey itself, including the need for some of the questions. Many comments drew attention to the need for location-specific amenities and improvements, and notes about transportation references, examples, and resources. A few comments are highlighted.

"I have children. Walking safety is very important to me. Some drivers exceed speed limits and wont slow down when they see children/people walking"

"Bicycle lane on Main Street Woodbury would not only increase safety, but it would attract people to live and shop in Woodbury.."

"Metro north waterbury to bridgeport needs to be better promoted with easier access to travel times posted at stations and online. constantly hear from people that it is very difficult to navigate train scheduled!"

"Fewer cars, more trains, less dependency on highways, like Rt 8, which almost destroyed the livability of the Housatonic and Naugatuck River valleys."

"Much potential for extra room on streets to bike. Many already walk sidewalks. Traffic speeds too fast. If I could take a bus to work, or bike, I would."

"Drivers seem to be more impatient, speed more, and less observant of other traffic, pedestrians, and bikers since Covid. I have asked others, and they are of the same opinion.."

"When my husband and I lived in Bridgeport we did take the bus more often. Now in Shelton we don't have convenient access to public transportation, we have to drive to get to the bus stop, which of course we don't do.."

"CT needs high speed rail and the return of trolleys.."

We want to hear what you think!

METROPOLITAN TRANSPORTATION PLAN 2050 TRAVEL SURVEY

Thank you for taking the time to complete this survey about how you travel. Your responses will help shape our region's Metropolitan Transportation Plan (MTP).

This survey is being conducted to help MetroCOG and NVCOG better understand the issues and opportunities for all those who live in and travel to our regions, including motorists, bicyclists, pedestrians, and transit users.

More information about the study can be found at http://bit.ly/link.

1. In what town/city is your primary residence?

2. To where do you travel most frequently?

- ☐ Work
- ☐ School
- ☐ Caretaker responsibilities – assisting family and friends
- ☐ Errands
- ☐ Medical
- ☐ A source of my income is made up of driving

3. How would you describe your work environment?

- ☐ In person full time
- ☐ Hybrid – some in person and some remote
- ☐ Fully remote
- ☐ Other ________

4. In what town/city do you spend most of your time outside the home (work, school, etc.) (optional)?

5. How do you travel most often?

- ☐ I walk/roll
- ☐ I bike
- ☐ I ride a bus
- ☐ I take a car service
- ☐ I ride the train
- ☐ I drive alone
- ☐ I drive with others
- ☐ Other ________

6. Do you have consistent access to a car?

☐ yes ☐ No

7. Do you have trouble getting where you need to go?

☐ No ☐ Yes.

8. (if yes to previous question) Please tell us more about what prevents you from getting around easily. (optional)

METROCOG Connecticut Metropolitan Council of Governments NVCOG

9 What do you think are the biggest transportation challenges faced by our communities? Please use on star for those issues you do not thing apply, and five for the ones that are the biggest problems.?	*Smallest challenge*			*Biggest Challenge*	
	1	2	3	4	5
Bicycle					
Walking					
Driving alone					
Carpooling/ ride sharing					
Electric scooter/ electric bicycle					
Bus					
Rail					

10 . Please tell us more about the challenges faced by our transportation system? (optional)

11. What suggestions may you have for the transportation system across the region?

12. Which of the following options are ways you'd like to get around in the future? *Please rank the following options according to how well they match your preference.*	*least favorable*			*most favorable*	
	1	2	3	4	5
Bicycle					
Walking					
Driving alone					
Carpooling/ ride sharing					
Electric scooter/ electric bicycle					
Bus					
Rail					

13. How comfortable do you feel walking/rolling throughout your community?

- ☐ Very comfortable
- ☐ Neutral
- ☐ Very uncomfortable
- ☐ Somewhat comfortable
- ☐ Somewhat uncomfortable
- ☐ I do not walk/roll around where I live

14. Please tell us more about the walking/rolling environment within your community? (optional)

15. Do you ride a bike in your community?

- ☐ Yes
- ☐ No

16. If you answered yes to question 15. how comfortable do you feel walking/rolling throughout your community?

- ☐ Very comfortable
- ☐ Somewhat comfortable
- ☐ Neutral
- ☐ Somewhat uncomfortable
- ☐ Very uncomfortable

17. (only if 14 is yes) Please tell us more about the cycling environment within your community? (optional)

18. How safe do you feel travel throughout our communities is today (including for yourself and people you know)?

- ☐ Not safe at all and needs many improvements
- ☐ Kind of safe but needs many improvements
- ☐ Very safe

19. What makes you feel that way? (select all that apply)

- ☐ Speeds are too high
- ☐ Drivers take unnecessary risks
- ☐ Lack of safe connections to people walking/biking or cycling
- ☐ Traffic congestion
- ☐ Other ________

20. What can be done to make ravel feel safer ?

- ☐ Discourage dangerous driving behaviors through traditional enforcement
- ☐ Improve safety features within cars and trucks
- ☐ Create more road space for people who are not driving
- ☐ Educate people about traffic safety
- ☐ Slow speeds in areas with a lot of pedestrian/bicycle traffic and within residential areas
- ☐ Improve roads for drivers (striping, signs, traffic signals, etc.)
- ☐ Other (please specify) _______________

21. Some safety improvements may involve trade-offs for people driving, including having some trips take longer. How many additional minutes would you be willing, on average, to add to your drive to improve the safety of our streets?

- ☐ No additional time
- ☐ Under a minute
- ☐ 1-5 minutes
- ☐ 5-10 minutes Improve roads for drivers
- ☐ 10+ minutes
- ☐ I don't drive

22. What is your age?

- ☐ 18 - 24
- ☐ 25 -34
- ☐ 35-44
- ☐ 45-54
- ☐ 55-64
- ☐ 65+

23. What gender do you identify as?

- ☐ Male
- ☐ Female
- ☐ Gender variant/Non-conforming
- ☐ Not listed _________
- ☐ Prefer not to answer

24. How would you describe yourself?

- ☐ White or Caucasian
- ☐ Black or African American
- ☐ Hispanic or Latinx
- ☐ Asian or Asian American
- ☐ American Indian or Alaska Native
- ☐ Two or more races
- ☐ Another race _____________

25. What is your annual household income?

- ☐ Under $15,000
- ☐ Between $15,000 and $29,999
- ☐ Between $30,000 and $49,999
- ☐ Between $50,000 and $74,999
- ☐ Between $75,000 and $99,999
- ☐ Between $100,000 and $150,000
- ☐ Over $150,000
- ☐ Prefer not to answer

26. What is your level of education?

- ☐ Less than High School Degree
- ☐ High School Degree or GED
- ☐ 2-year College Degree
- ☐ 4-year College Degree
- ☐ Graduate Degree
- ☐ Prefer not to answer

27. Are there any other comments you'd like to make?

THANK YOU!

This document was prepared by the CNVMPO, NVCOG and MetroCOG, in cooperation with the Connecticut Department of Transportation and the U.S. Department of Transportation's Federal Highway Administration and Federal Transit Administration.

Staff are entirely responsible for the design and format of this report.

The opinions, findings and conclusions expressed in this publication are those of the CNVMPO and do not necessarily reflect the official views or policies of the Connecticut Department of Transportation and/ or the U.S. Department of Transportation.

Appendix C: Public and Stakeholder Comments

CTDOT & FHWA/FTA Comments:
General Comments:

- Confirm MPOs consulted with State and local agencies for land use management, natural resources, environmental protection, conservation and historic preservation in developing the MTPs.
  Additional text to clarify was added into chapter 1 further detailing the CNVMPOs coordination with relevant agencies and organizations to ensure that NVision50 considers the impacts of programmed projects to land use management, natural resources, environmental protection, conservation and historic preservation.
- Confirm that TMA Certification Review findings, especially corrective actions, were incorporated into the plans.
  As the CNVMPO is not a TMA at the time of plan adoption, no corrective actions are directly assigned to the region. However, as participants in the TMA Certification Reviews for the Hartford, New Haven, and Bridgeport-Stamford Urban Areas comments received from each are addressed. Particularly, increased efforts to gather public opinion and share information are both included in the plan and were implemented in plan development.
- Confirm that MPOs are revisiting and updating regional TAM and PTASP performance targets as appropriate with each TIP/MTP update.
  An additional section in Chapter 5 was added to detail PTASP and TAM targets and update schedules.
- Confirm what the transit financial estimates include and how that compares to typical revenues and expenditures; plans should be explaining what the numbers they provide represent.
  Additional detail was added to both Chapter 12 and to Appendix A to further explain funding sources and fiscal constraint.
- We encourage MPOs to review the Environmental Justice Resources summary document provided to CTDOT in December 2022 to continue to enhance benefits and burdens analyses and equity in transportation planning documents.
  In addition to the NVCOG's Environmental Justice planning, plans and policies were reviewed in accordance with resources provided by the CTDOT.

Comments that need to be addressed to gain Federal approval:

- The MTP must include PTASP targets and baseline performance.
  An additional section in Chapter 6 was added to include information on the PTASPs for all agencies operating within the NVCOG region. Chapter 5 Section 7 includes details of PTASP requirements, a summary of targets for each agency, and baseline performance for NET, the operator of CTtransit Waterbury Division and the Greater Waterbury Transit District.
- Fiscal constraint is not clearly demonstrated, and clarity should be provided showing sufficient revenues are anticipated to be available to meet the anticipated costs of proposed projects. The COG may wish to illustrate this in tabular form.

  Additional data was added to Chapter 12 to better explain the available funding sources and annually expected revenue, and project tables in Appendix A were updated to ensure fiscal constraint and demonstrate that projects are programmed at or below reasonably expected revenues in each period of the plan.

Additional Comments to address in the coming months/next update:

- In the beginning of MTP it says Appendix A is "Project Tables and Funding" but Appendix A is really "Acronyms".
  Acronyms were moved to the beginning of the plan to ensure no confusion occurs with Appendix numbers. Appendix A remains Project Tables and Funding.

Comments from the Naugatuck Railroad

- Page 7-15, Naugatuck Railroad is operated by itself. The Railroad Museum has no role in the operations of NAUG, please correct that.

- Numerous uses of "axel" when "axle" is meant.

- NAUG track between Waterbury and Torrington is FRA Class II or better. NAUG is currently handling over 100,000 tons of freight per year, and is actively pursuing additional customers in the Torrington area.

- There is no more operation west of Danbury on the Maybrook Freight Line. NY State has severed the line and is actively pursuing its removal between Beacon and the Connecticut border. At least one major bridge (In Brewster) is out of service for structural reasons.
  All the above corrections were made to Chapter 7 based on data provided by the Naugatuck Railroad.

Public Comments

- Comment from Christine O'Neill, attached
  Additional text added to Chapter 9 to suggest solar within the transportation right away and further explain the importance of low impact development. These items align with the NVCOG's development strategies and goals, and the agency will encourage these items be included in projects moving forward.

Ozone and $PM_{2.5}$ Air Quality Conformity Determination

of the 2023-2050 Metropolitan Transportation Plans

and the 2021-2024 Transportation Improvement Programs, As Amended

Connecticut Department of Transportation

February 2023

Table of Contents

1. Executive Summary

This report documents the air quality conformity analysis of the 2023-2050 Metropolitan Transportation Plans (MTPs) and the 2021-2024 Transportation Improvement Programs (TIPs), as amended carried out under the regulations contained in the United States Environmental Protection Agency's (EPA) final rule, published in the November 24, 1993 Federal Register, with subsequent amendments and additional federal guidance published by EPA, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). The process involved consultation with affected agencies such as EPA, FHWA, FTA, the Connecticut Department of Energy and Environmental Protection (CTDEEP) and the Metropolitan Planning Organizations (MPOs) within the State of Connecticut. The air quality emissions analysis is a responsibility of the Connecticut Department of Transportation (CTDOT), acting as the MPO for this task.

"Conformity" is a requirement of the Federal Clean Air Act Amendments (CAAA) Section 176(c) (42 U.S.C.7506(c)) and EPA conformity regulations (40 CFR 93 Subpart A). These regulations require that each new MTP and TIP be demonstrated to conform to the State Implementation Plan (SIP) before the MTP and TIPs are approved by the MPO or accepted by the United States Department of Transportation (USDOT). This ensures that the MTP and TIPs are consistent with air quality goals and that progress is being made towards achieving and maintaining Federal air quality standards. A conformity determination is undertaken to estimate emissions that will result from an area's transportation system. The analysis must demonstrate that those emissions are within limits outlined in state air quality implementation plans.

Under the transportation conformity regulation, the principal criteria for a determination of conformity for transportation plans and programs are:

- The TIP and MTP must pass an emissions budget test using a motor vehicle emissions budget (MVEB) that has been found to be adequate by EPA for transportation conformity purposes, or an interim emission test;
- The latest planning assumptions and emission models specified for use in conformity determinations must be employed;
- The TIP and MTP must provide for the timely implementation of transportation control measures (TCMs) specified in the applicable air quality implementation plans; and
- Interagency and public consultation.

As the federal air quality districts for ozone and PM2.5 include several counties and various planning regions, the emission analysis must be coordinated to include the TIPs and MTPs of several regions.

The CTDOT performs this coordination role. Each region submits its draft TIP and MTP to the CTDOT and the CTDOT in turn combines the TIPs and MTPs for all appropriate regions and conducts the analysis on each pollutant's impact for each air quality district in relation to the established MVEBs.

For the 2023-2050 MTP and the 2021-2024 TIPs, as amended, summer day emission estimates for ozone precursors, volatile organic compounds (VOC) and nitrogen oxides (NOx), and annual emission estimates for particulate matter 2.5 microns or smaller (PM2.5) and NOx as a precursor were developed for years 2023, 2025, 2035, 2045, and 2050 forecast years. These emission estimates were calculated using EPA's Motor Vehicle Emission Simulator (MOVES3).

The results of this analysis, in Tables 1 and 2 below show that the 2023-2050 MTP and the 2021-2024 TIPs, as amended, mobile emissions are within the MVEBs for all forecast years per pollutant. This analysis provides a basis for a determination of conformity for the 2023-2050 MTP and the 2021-2024 TIP, as amended.

Table 1: Ozone Conformity - NOx and VOC Emissions Budget Test Results for Both 2008 and 2015 Ozone NAAQS

Year	Ozone Area	Tons per day					
		Cube Series 2		Budgets		Difference	
		VOC	NOx	VOC	NOx	VOC	NOx
2023	CT Portion of NY-NJ-LI Area	15.28	18.56	17.6	24.6	-2.32	-6.04
	Greater CT Area	13.58	16.30	15.9	22.2	-2.32	-5.90
2025	CT Portion of NY-NJ-LI Area	13.89	15.54	17.6	24.6	-3.71	-9.06
	Greater CT Area	12.42	13.67	15.9	22.2	-3.48	-8.53
2035	CT Portion of NY-NJ-LI Area	8.66	8.36	17.6	24.6	-8.94	-16.24
	Greater CT Area	7.78	7.47	15.9	22.2	-8.12	-14.73
2045	CT Portion of NY-NJ-LI Area	7.47	7.65	17.6	24.6	-10.13	-16.95
	Greater CT Area	6.74	6.82	15.9	22.2	-9.16	-15.38
2050	CT Portion of NY-NJ-LI Area	7.03	7.61	17.6	24.6	-10.57	-16.99
	Greater CT Area	6.35	6.80	15.9	22.2	-9.55	-15.40

Table 2: PM2.5 Conformity - Direct PM2.5 and NOx Emission Budget Test Results

Year	PM2.5 Area	Tons per year					
		Cube Series 2		Budgets		Difference	
		Direct $PM_{2.5}$	NOx	Direct $PM_{2.5}$	NOx	Direct $PM_{2.5}$	NOx
2023	CT Portion of NY-NJ-LI Area	205.36	5954.80	575.80	12,791.80	-370.44	-6837.00
2025	CT Portion of NY-NJ-LI Area	192.15	5003.72	516.0	9,728.10	-323.85	-4724.38
2035	CT Portion of NY-NJ-LI Area	143.73	2792.78	516.0	9,728.10	-372.27	-6935.32
2045	CT Portion of NY-NJ-LI Area	125.72	2530.02	516.0	9,728.10	-390.28	-7198.08
2050	CT Portion of NY-NJ-LI Area	127.35	2531.04	516.0	9,728.10	-388.65	-7197.06

2. What is Transportation Conformity?

Transportation conformity is a planning process required by the CAA Section 176(c), which establishes the framework for improving air quality to protect public health and the environment. The goal of transportation conformity is to ensure that FHWA and FTA funding and approvals are given to highway and public transportation activities that are consistent with air quality goals.

The CAA requires that metropolitan transportation plans, TIPs, and Federal projects conform to the purpose of the SIP. Conformity to a SIP means that such activities will not cause or contribute to any new violations of the National Ambient Air Quality Standards (NAAQS); increase the frequency or severity of NAAQS violations; or delay timely attainment of the NAAQS or any required interim milestone. Conformity requirements apply in areas that either do not meet or previously have not met air quality standards for ozone, carbon monoxide, particulate matter, or nitrogen dioxide. These areas are known as “nonattainment areas” or “maintenance areas”, respectively.

Connecticut contains nonattainment areas for ozone (O3) and maintenance areas for carbon monoxide (CO) and PM2.5.

For MTP and TIP conformity, the determination shows that the total emissions from on-road travel on an area’s transportation system are consistent with the MVEBs and goals for air quality found in the state’s SIP. A conformity determination demonstrates that implementation of the MTP or TIP will not cause any new violations of the air quality standard, increase the frequency or severity of violations of the standard, or delay timely attainment of the standard or any interim milestone.

This document was developed by the CTDOT to demonstrate that the MTP comply with the MVEBs for the nonattainment and maintenance areas that fall within the state’s planning boundary. In accordance with EPA regulation 40 CFR 93 Subpart A, this conformity determination is being issued in response to the adoption of new MTPs.

In addition, the conformity determination demonstrates compliance with the congestion management process in transportation management areas (23 CFR §450.322), development and content of the MTP (23 CFR §450.324), and fiscal constraints for MTPs and TIPs (40 CFR §93.108-119).

3. Nonattainment and Maintenance Areas in Connecticut

a. Ozone Nonattainment Areas

Ozone is an extremely reactive, colorless gas comprised of three atoms of oxygen. Ozone exists naturally in a layer of the earth's upper atmosphere known as the stratosphere, where it shields the earth from the sun's harmful ultraviolet rays. However, ozone found close to the earth's surface, called ground-level ozone, is a component of smog and a harmful pollutant. Ground-level ozone is produced by a complex chemical reaction between VOCs and NOx in the presence of sunlight.

Mobile source NOx emissions form when nitrogen and oxygen atoms chemically react inside the high pressure and temperature conditions in an engine. VOC emissions are a product of partial fuel combustion, fuel evaporation and refueling losses caused by spillage and vapor leakage.

Exposure to ozone has been linked to a number of respiratory health effects, including significant decreases in lung function, inflammation of airways, and increased symptoms such as cough and pain when breathing deeply. High concentrations of ozone can also contribute to reductions in agricultural crop production and forest yields, as well as increased susceptibility of plants to disease, pests and other environmental stresses such as harsh weather. This pollutant alone contributes to the majority of unhealthy air quality days in Connecticut, as measured by the Air Quality Index (AQI).

EPA revised the ozone NAAQS in 2008 and again in 2015. The 2008 ozone NAAQS was established at 75 ppb and the 2015 ozone NAAQS revised the standard to 70 ppb. States and portions of states are then subsequently classified as attainment (meeting the standard) or one of the following classifications of nonattainment: marginal, moderate, serious, severe and extreme. The classifications indicate the severity of the exceedance are defined in rules that proceed a newly promulgated NAAQS. Connecticut is nonattainment for both standards and as such must contend with the subsequent nonattainment requirements for both standards. Under the 2008 standard the southwest portion of the state, known as the New York-Northern New Jersey-Long Island (NY-NJ-CT) ozone nonattainment area, is designated as Severe and the rest of the state, known as the Greater Connecticut ozone non-attainment area, is designated as Serious. Under the 2015 standard Connecticut's two nonattainment areas are designated as Moderate.[1]

Under the 2008 standard, the Connecticut ozone nonattainment areas were subsequently reclassified to moderate. EPA determined that 11 of the original marginal areas did not attain the 2008 ozone standards by the July 20, 2015 attainment date and that they must be reclassified as moderate. Both the Greater Connecticut and the Connecticut portion of the NY-NJ-LI nonattainment areas were two of the eleven areas.[2] The "bump- up" designation to moderate was effective on June 3, 2016.

In this action, the EPA also established a due date of January 1, 2017, by which states with newly reclassified moderate areas must submit SIP revisions to address moderate nonattainment area requirements for those areas. The reclassified areas must attain the 2008 ozone standards by the July 20, 2018 moderate attainment deadline. Neither of Connecticut's nonattainment areas measured compliance by the deadline. As such, on September 23, 2019, EPA reclassified both areas as serious under the 2008 standard.

On March 20, 2017, EPA notified CTDEEP that EPA had determined the 2017 MVEBs for the Greater Connecticut ozone nonattainment area, submitted as a SIP revision by CTDEEP to EPA on January 17, 2017, to be adequate for transportation conformity purposes. On May 31, 2017, EPA published its adequacy finding in the Federal Register (82 FR 24859) and the MVEBs became effective on June 15, 2017 for transportation conformity purposes.

On June 4, 2018, EPA published a final rule that designated new nonattainment areas for the 2015 Ozone NAAQS (83 FR 25776). These designations were effective on August 3, 2018. The Greater Connecticut non-attainment area is designated as marginal for the 2015 NAAQS while the Connecticut portion of the NY-NJ-LI nonattainment areas is designated as moderate. This analysis demonstrates conformity to the new 2015 Ozone NAAQS for both Connecticut non-attainment areas.

On October 1, 2018, EPA published a final rule approving certain SIP revisions relating to the 2008 8-hour Ozone NAAQS (83 FR 49297), including approval of the MVEB as shown in Table 3.

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[1] 83 FR 25776

[2] 81 FR 26697

Table 3: Approved Motor Vehicle Emissions Budgets - Ozone

Year	Area	**VOC** (tons/summer day)	**NOx** (tons/summer day)
2017	Connecticut portion of the New York-Northern New Jersey-Long Island, NY-NJ-LI Ozone Area	17.6	24.6
2017	Greater Connecticut Ozone Area	15.9	22.2

b. PM2.5 Maintenance Area

Fine particulate matter, also called PM2.5, is a mixture of microscopic solids and liquid droplets suspended in air, where the size of the particles is equal to or less than 2.5 micrometers (about one-thirtieth the diameter of a human hair). Fine particles can be emitted directly (such as smoke from a fire, or as a component of automobile exhaust) or be formed indirectly in the air from power plant, industrial and mobile source emissions of gases such as sulfur dioxide and nitrogen oxides.

The health effects associated with exposure to fine particles are serious. Scientific studies have shown significant associations between elevated fine particle levels and premature death. Effects associated with fine particle exposure include aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days), lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems such as heart attacks and cardiac arrhythmia. While fine particles are unhealthy for anyone to breathe, people with heart or lung disease, asthmatics, older adults, and children are especially at risk.

In December of 2004, EPA signed the final rulemaking notice to designate attainment and nonattainment areas with respect to the PM2.5 NAAQS, becoming effective April 5, 2005. In Connecticut, Fairfield and New Haven Counties were included in the New York-Northern New Jersey-Long Island, NY-NJ-CT PM2.5 nonattainment area. On June 20, 2007, PM2.5 budgets were found to be adequate for the early progress SIP. CTDEEP submitted a re-designation request and maintenance plan for the Connecticut portion of the NY-NJ-CT area on June 22, 2012. The plan demonstrated that Connecticut's air quality met both the 1997 annual and the 2006 24-hour PM2.5 NAAQS due to a combination of national, regional and local control measures implemented to reduce emissions and presented a maintenance plan that ensures continued attainment through the year 2025. The end of the maintenance period was established as 2025, consistent with the CAA section 175A (a) requirement that the plan provide for maintenance of the NAAQS for at least 10 years after EPA formally approves the re-designation request.

EPA subsequently determined that the 2017 and 2025 MVEBs in the maintenance plan were adequate for transportation conformity purposes and effective as of February 20, 2013. On September 24, 2013, EPA published its approval of the PM2.5 re-designation request, establishing October 24, 2013 as the effective date of re-designation to attainment/maintenance for Connecticut's portion of the NY-NJ-CT area for both the 1997 annual and 24-hours PM2.5 NAAQS. Table 4 summarizes Connecticut's current PM2.5 MVEBs.

Table 4: Approved Motor Vehicle Emissions Budgets – PM2.5

Year	Area	Direct $PM_{2.5}$ (tons/year)	NOx (tons/year)
2017	Connecticut portion of the New York-Northern New Jersey-Long Island, NY-NJ-LI $PM_{2.5}$ Area	575.8	12,791.8
2025	Connecticut portion of the New York-Northern New Jersey-Long Island, NY-NJ-LI $PM_{2.5}$ Area	516.0	9,728.1

c. Carbon Monoxide Attainment Areas

Carbon monoxide is produced by the incomplete burning of carbon in fuels, including gasoline. High concentrations of CO occur along roadsides in heavy traffic, particularly at major intersections and in enclosed areas such as garages and poorly ventilated tunnels. Peak concentrations occur during the colder months of the year when CO vehicular emissions are greater and meteorological inversion conditions occur more frequently, trapping pollutants near the ground.

There were formerly three CO nonattainment areas in the state. These were the Southwestern portion of the state, the New Haven-Meriden-Waterbury area, and the Hartford-New Britain-Middletown area. The remainder of the state was in attainment for CO. Attainment was demonstrated in each of the nonattainment areas and, subsequently, they were designated as full maintenance areas. On September 13, 2004, EPA approved a CTDEEP submittal for a SIP revision for re-designation of these areas to limited maintenance plan status, thus eliminating the need for budget testing. Effective January 2, 2016, the Hartford-New Britain-Middletown area was in full attainment status. The New Haven-Meriden-Waterbury area completed the maintenance period effective December 4, 2018 while the Southwestern Connecticut area was effective May 10, 2019. In the future, “hot-spot” carbon monoxide analyses will not be performed to satisfy “project level” conformity determinations as the whole State of Connecticut is in attainment for CO.

d. PM10 Attainment Area – Limited Maintenance

EPA previously designated the City of New Haven as nonattainment with respect to the NAAQS for particulate matter with a nominal diameter of ten microns or less (PM10). The PM10 nonattainment status in New Haven was a local problem stemming from activities of several businesses located in the Stiles Street section of the city. Numerous violations in the late 1980’s and early 1990’s of Section 22a-174-18 (Fugitive Dust) of CTDEEP regulations in that section of the city led to a nonattainment designation (CTDEEP, 1994: Narrative Connecticut Department of Energy and Environmental Protection, State Implementation Plan Revision, For PM10, March 1994). Corrective actions were subsequently identified in the SIP and implemented, with no violations of the PM10 NAAQS since the mid-1990s.

On October 13, 2005, EPA published in the Federal Register (70 FR 59690), approval of a request by CTDEEP for a limited maintenance plan and re-designation of the New Haven nonattainment area to attainment for the PM10 NAAQS. This direct final rule became effective on December 12, 2005.

All construction activities undertaken in the City of New Haven are required to be performed in compliance with Section 22a-174-18 (Control of Particulate "Emissions") of the CTDEEP regulations. All reasonable available control measures must be implemented during construction to mitigate particulate matter emissions, including wind-blown fugitive dust, mud and dirt carry out, and re-entrained fugitive emission from mobile equipment.

As with limited maintenance plans for other pollutants, emissions budgets are considered to satisfy transportation conformity's "budget test". However, future "project level" conformity determination may require "hot spot" PM10 analyses for new transportation projects with significant diesel traffic in accordance with EPA's Final Rule for "PM2.5 and PM10 Hot-Spot Analyses in Project-level Transportation Conformity Rule PM2.5 and PM10 Amendments; Final Rule (75 FR 4260, March 24, 2010) which became effective on April 23, 2010.

e. State of Connecticut Nonattainment/Attainment Maps

Figure 1: Connecticut Ozone Nonattainment Areas

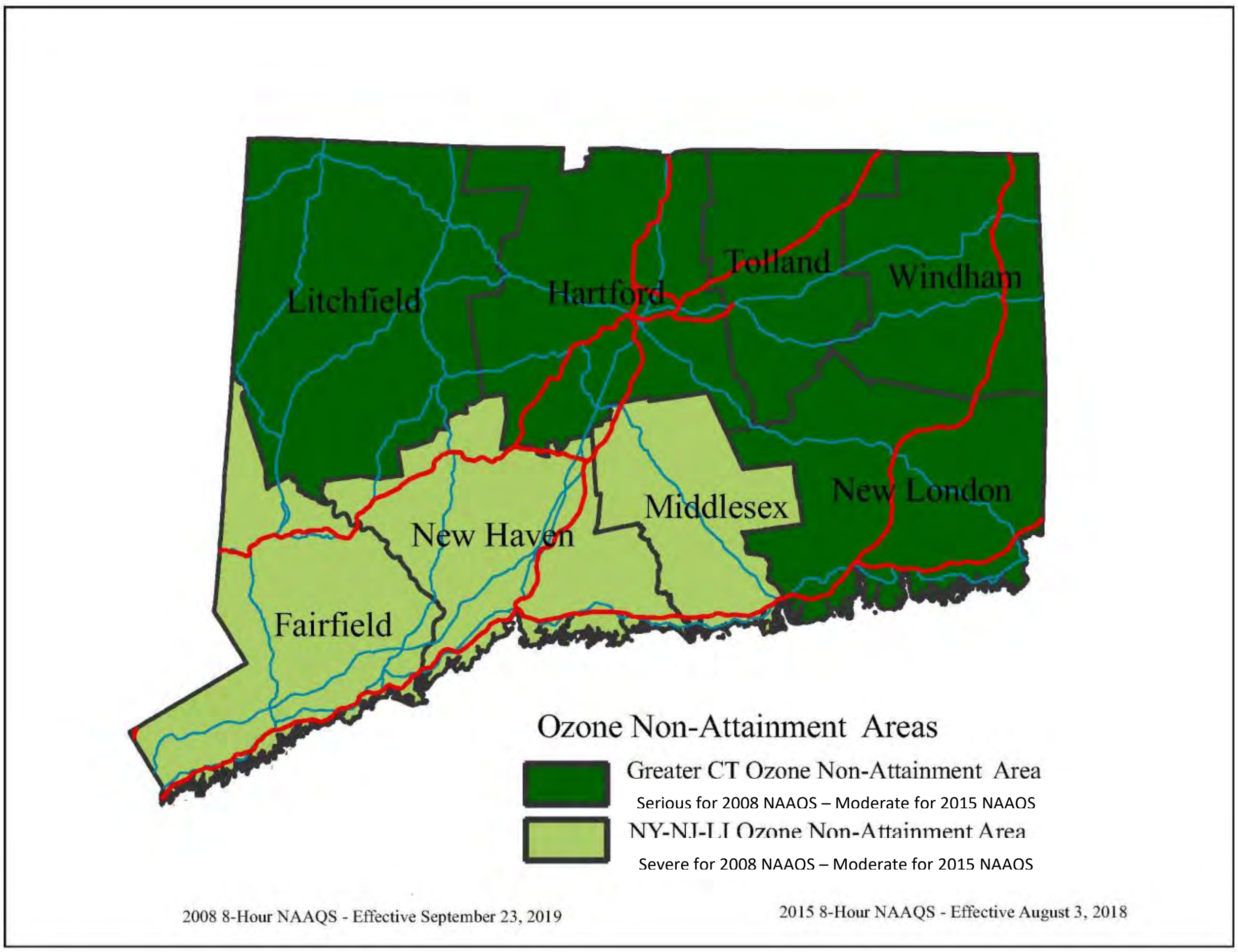


Figure 2: Connecticut PM2.5 Attainment/Maintenance Area

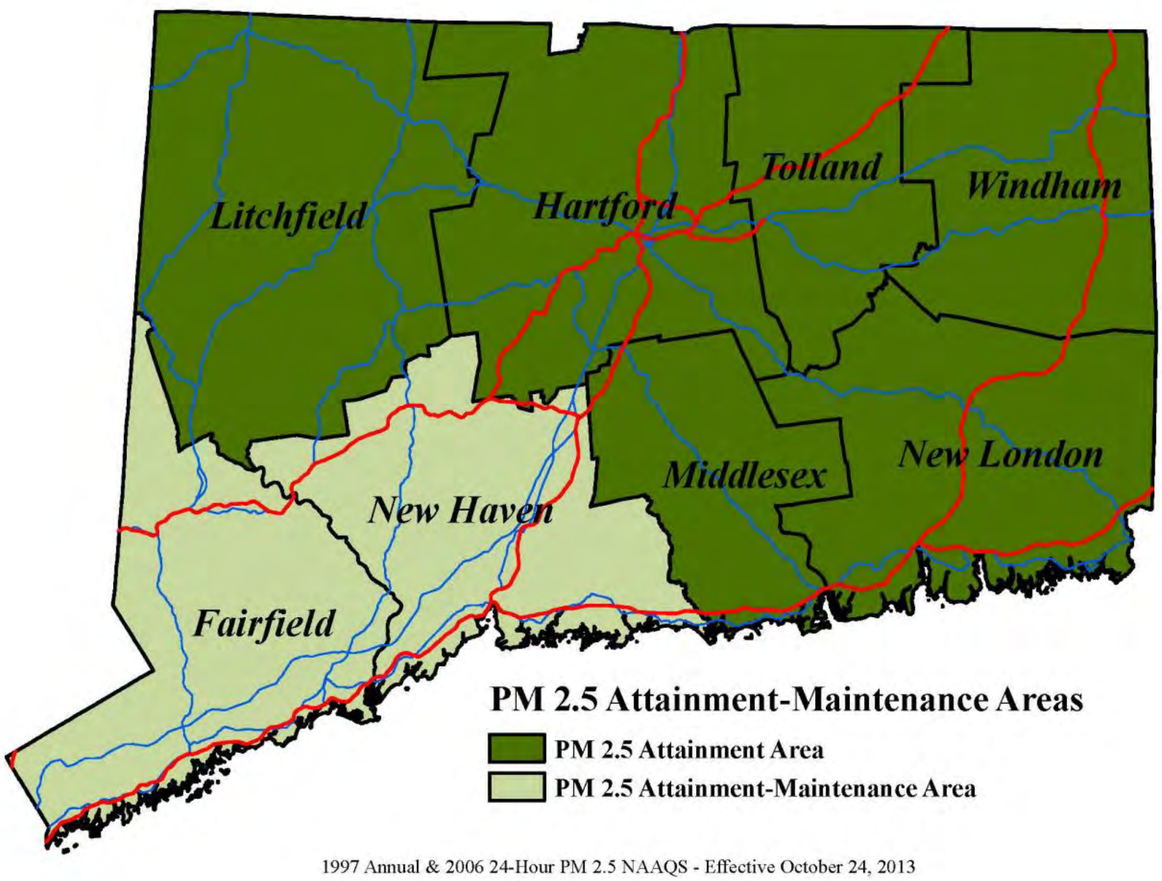
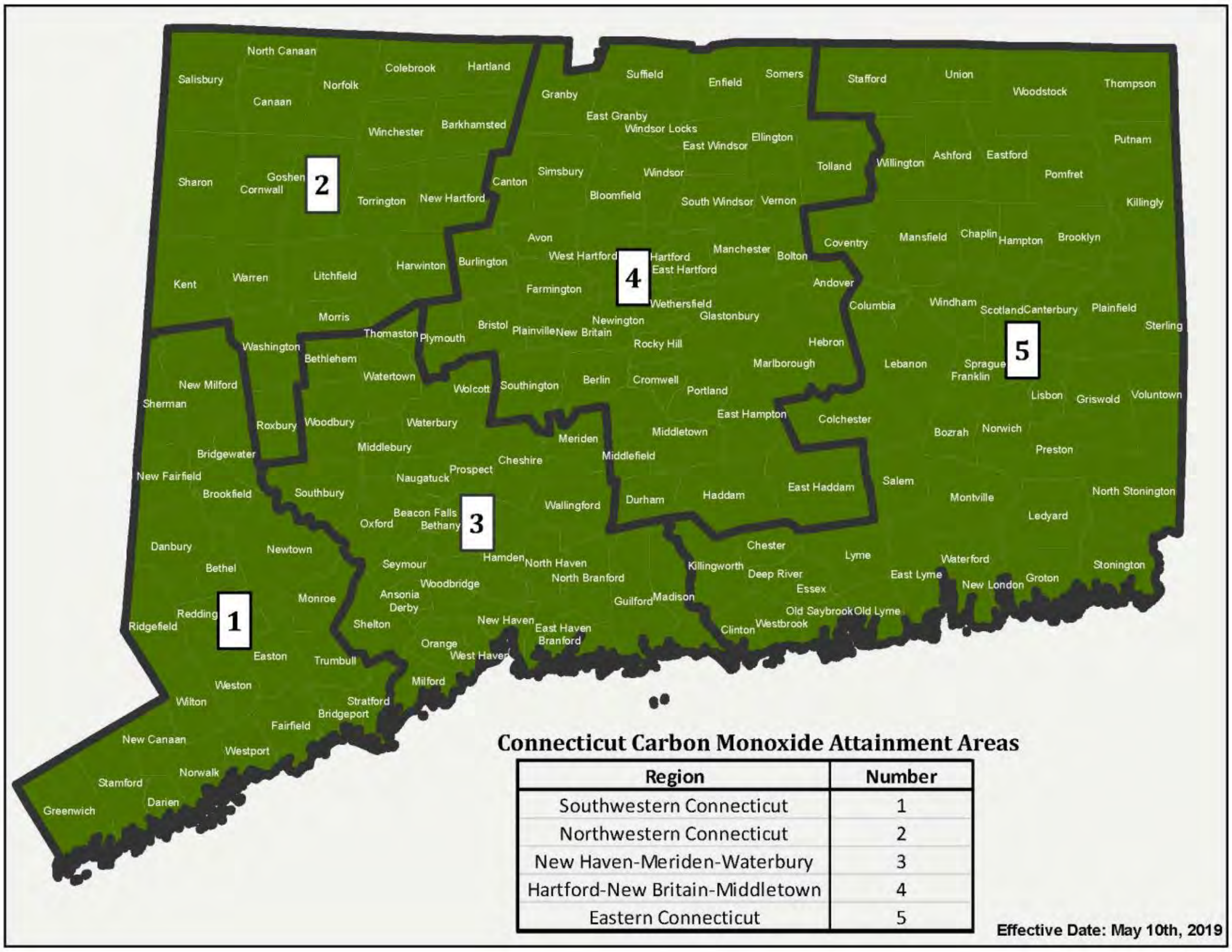


Figure 3: Connecticut Carbon Monoxide Attainment Areas



4. How Does Connecticut Demonstrate Conformity?

a. Transportation Planning Work Program

CTDOT's FY 2023-2024 Transportation Planning Work Program contains a description of all planning efforts, including those related to air quality, to be sponsored or undertaken with federal assistance during FY 2023 and 2024. Included with this program are several tasks directly related to CTDOT's responsibilities under Connecticut's air quality SIP. Additional functions, such as those supporting the preparation of project level conformity analysis, are funded under project related tasks. This work program is available at CTDOT for review.

b. Interagency Consultation

The conformity rule requires that Federal, State, and local transportation and air quality agencies establish formal procedures to ensure interagency coordination on critical issues. Interagency consultation is a collaborative process between organizations on key elements of the transportation and air quality planning and provides a forum for effective state and local planning and decision-making.

Key organizations included in the interagency consultation are FHWA, FTA, EPA, CTDOT, CTDEEP and the MPOs.

Some goals of interagency consultation are to:

- Ensure all agencies meet regularly and share information;
- Identify key issues early in the process;
- Enable well-coordinated schedules for TIP/MTP conformity determinations and SIP development; and
- Allow collaborative decision on methodologies, assumptions, and conformity test selections.

A list of attendees and call-in participants of the Interagency Consultation Meeting is included in Appendix C along with a copy of the minutes from the meeting.

c. Public Consultation

The transportation conformity process must also include public consultation on the emissions analysis and conformity determination. This includes posting of relevant documentation and analysis on a "clearinghouse" webpage maintained through the interagency consultation process. All MPOs in the affected nonattainment or maintenance areas must provide thirty-day public comment periods and address any comments received. For this transportation conformity determination, all Connecticut MPOs will hold a thirty-day public comment period. If any public comments were received, they will be attached and can be found in Appendix E.

d. Scenario Years

The "Action Scenario" is the future transportation system that will result from full implementation of the MTP.

VOC/NOx emission analysis was conducted for ozone season summer day conditions for the following years:

- 2023 (Attainment year and near-term analysis year for both the Greater CT and CT portion of NY-NJ-LI Serious nonattainment areas under the 2008 and 2015 Ozone NAAQS)
- 2025 (Interim modeling year)
- 2035 (Interim modeling year)
- 2045 (Interim modeling year)
- 2050 (Metropolitan Transportation Plan horizon year)

PM2.5 emission analysis was conducted for the following years but for annual average conditions:

- 2023 (Attainment year and near-term analysis year)
- 2025 (Interim modeling year)
- 2035 (Interim modeling year)
- 2045 (interim modeling year)
- 2050 (Metropolitan Transportation Plan horizon year)

e. Other Planning Documents

The enacting of Section 81 of Connecticut Public Act 13-277 repealed Section 13b-15 of the Connecticut General Statutes, no longer mandating a biennial Master Transportation Plan effective July 1, 2013. The Department's Capital Plan has been expanded to include much of the project information that was formerly included in the Master Transportation Plan.

5. Latest Planning Assumptions and Emissions Model

a. VMT

Vehicle miles of travel (VMT) estimates were developed from CTDOT's statewide network-based travel demand model, Cube Series 2. The 2019 travel model network, to the extent practical, represents all state highways and major connecting non-state streets and roads, as well as the rail, local bus, and express bus systems that currently exist. Future highway networks for 2023, 2025, 2026, 2028, 2030, 2035, and 2045 and transit networks for 2023, 2025, 2028, 2030, and 2040 were built by adding MPOs TIP projects (programmed for opening after 2019) to the 2019 network year. These networks were used to run travel demand models and conduct emissions analyses for the years 2023, 2025, 2035, 2045 and 2050. Projects for each model analysis year for which network changes were required are listed in Appendix B.

It should be noted that the MPOs TIP projects, which have negligible impact on trip distribution and/or highway capacity, have not been incorporated into the network. These include, but are not limited to, geometric improvements of existing interchanges, short sections of climbing lanes, intersection improvements, transit projects dealing with equipment for existing facilities and vehicles, and transit operating assistance. Other projects that reduce the number of vehicle trips, VMT or both may not be included. Such projects include ridesharing and telecommuting programs, bicycling facilities, clean fuel vehicle programs or other possible actions. These types of considerations, while not explicitly accounted for in the travel demand model, will continue to reduce the emissions levels in the regions. Essentially, those projects that do not impact the travel demand forecasts are not included in the networks and/or analysis.

The network-based travel model used for this analysis is the model that CTDOT utilizes for transportation planning, programming and design requirements. This travel demand model uses demographic and land use assumptions based on the 2019 Connecticut Department of Public Health Annual Population Estimates and Connecticut Department of Labor 2019 employment estimates. Population and employment projections for the years 2020, 2030, 2040 and 2050 were developed by the Connecticut Department of Transportation, Travel Demand and Air Quality Modeling Unit.

The model uses a capacity constrained multi-class equilibrium approach to allocate trips among links. The model was calibrated using 2019 ground counts and 2019 Highway Performance Monitoring System (HPMS) Vehicle Miles of Travel data.

In addition, the Employer Commute Options (ECO) Program has been made available to all employers and is incorporated in the travel demand model. It is felt that this process is an effective means of achieving Connecticut's clean air targets. Funding of this effort under the Congestion Mitigation and Air Quality Improvement (CMAQ) program is included in the TIP for FY 2021-2024. It is estimated that this program, if fully successful, could reduce VMT and mobile source emissions by 2% in Southwest Connecticut.

Peak hour directional traffic volumes were estimated as a percentage of the Average Daily Traffic (ADT) on a link-by-link basis. Based on automatic traffic recorder data, 9.0 percent, 8.5 percent, 8.0 percent and 7.5

percent of the ADT occurs during the four highest hours of the day. A 55:45 directional split was assumed. Hourly volumes were then converted to Service Flow Levels (SFL) and Volume to Capacity (V/C) ratios calculated as follows:

$$SFL = DHV / PHF * N$$

$$VC = SFL / C$$

where: DHV = Directional Hourly Volume
PHF = Peak Hour Factor = 0.9
N = Number of lanes
C = Capacity of lane

Peak period speeds were estimated from the 2000 Highway Capacity Manual based on the design speed, facility class, area type and calculated V/C ratio. On the expressway system, Connecticut- based free flow speed data was available. This data was deemed more appropriate and superseded the capacity manual speed values. The expressway free flow speeds were updated in 2005.

For the off-peak hours, traffic volume is not the controlling factor for vehicle speed. Off-peak link speeds were based on the Highway Capacity Manual free flow speeds as a function of facility class and area type. As before, Connecticut-based speed data was substituted for expressway travel, where available, and was updated in 2005.

ShoreLine East, Hartford Rail Line, New Haven Rail Line, and its branch line schedules were updated in 2019 to reflect new headways and routes. Rail station boardings were then calibrated to a mixture of 2018 and 2019 actual counts for A.M. peak period, Midday off-peak, and Daily boardings along all Connecticut rail lines.

Two special cases exist in the travel demand modeling process. These are centroid connectors and intrazonal trips:

- Centroid connectors represent the local roads used to gain access to the model network from centers of activity in each traffic analysis zone (TAZ). A speed of 25 mph is utilized for these links; and
- Intrazonal trips are trips that are too short to get on to the model network. VMT for intrazonal trips is calculated based on the size of each individual TAZ. A speed of 20 to 24 mph is utilized for peak period and 25 to 29 mph for off-peak.

The Daily Vehicle Miles of Travel (DVMT) is calculated using a methodology based on disaggregate speed and summarized by inventory area, functional classification, and speed. The annual VMT and speed profiles developed by this process are then combined with the emission factors from the MOVES3 model to produce emission estimates for each scenario and time frame.

b. Emissions Model

For this transportation conformity analysis, the MOVES model, specifically MOVES3, was used to estimate on-road vehicle emissions for the action scenarios. MOVES is a state-of-the-science emission modeling system, developed by EPA, that estimates emissions for mobile sources at the national, county, and project level for criteria air pollutants, greenhouse gases, and air toxics.

MOVES estimates exhaust and evaporative emissions as well as brake and tire wear emissions from all types of on-road vehicles. It also uses a vehicle classification system based on the way vehicles are classified in the FHWA's Highway Performance Monitoring System (HPMS). Other parameters include VMT by vehicle and road type, vehicle hours traveled (VHT) by vehicle and road type, the number of each type of vehicle in the fleet, vehicle age distribution, model year, travel speed, roadway type, fuel information, meteorological data, such as ambient temperature and humidity, and applicable control measures such as reformulated gasoline (RFG) and inspection and maintenance (I/M) programs. Local inputs were cooperatively developed by CTDEEP and CTDOT, where applicable, using EPA recommended methods.

The HPMS Vehicle Mix file was updated to reflect the average vehicle mix for the 2015-2017 timeframe. A Three-year average was determined to be a more accurate representation of actual vehicle mix than the previous one-year counts as the CTDOT rotates traffic and vehicle counts on a three-year basis.

CTDEEP used local data from 2020 Connecticut registration data for 11 Motorcycle, 43 School Bus, and 54 Motor Home source types. Data from an EPA sponsored decode of 2017 state vehicle registration data was used for 21 Passenger Car, 31 Passenger Truck, 32 Light Commercial Truck, 51 Refuse Truck, 52 Single Unit Short-haul Truck, 53 Single Unit Long-haul truck source types. Local data from analyses of 2011 Connecticut registration data was used for 41 Intercity bus, 42 Transit Bus, 61 Combination Short-haul Truck and 62-Combination Long-haul Truck source types. These data sets were scaled to the project base year using the growth in MOVES Default VMT for the relevant time periods.

In November 2012, EPA confirmed by telephone to CTDEEP that future conformity determinations utilizing newer versions of MOVES can be made by comparing emission results to the existing budgets based on older versions of MOVES. As new MVEBs are determined by EPA to be adequate for each area, they will be used to make conformity determinations.

For the ozone analysis, MOVES was only run to obtain VOC and NOx emissions on a typical summer weekday to compare to the ton per summer day ozone MVEBs. For the PM2.5 analyses, an annual emissions run was conducted for PM2.5 and NOx to compare to the ton per year PM2.5 MVEBs. All runs also included the National Low Emission Vehicle (NLEV) program in 2020 and all future years.

6. Conformity Tests and Air Quality Emissions Results

For the NY-NJ-LI ozone nonattainment area, VOC and NOx transportation emissions from the Action Scenarios must be less than the 2017 transportation emission budgets if analysis year is 2017 or later.

For the Greater Connecticut ozone nonattainment area, VOC and NOx transportation emissions from the Action Scenarios must be less than the 2017 transportation emission budgets if analysis year is 2017 or later.

For the NY-NJ-LI PM2.5 maintenance area, PM2.5 and NOx transportation emissions from the Action Scenarios must be less than the 2017 transportation emission budgets if analysis year is between 2017 and 2024.

For the NY-NJ-LI PM2.5 maintenance area, PM2.5 and NOx transportation emissions from the Action Scenarios must be less than the 2025 transportation emission budgets if analysis year is 2025 or later.

No tests for CO are required because the CO areas have completed their Limited Maintenance Plans.

The following tables show the MOVES3 modeled emissions for both ozone and PM2.5 areas compared to the applicable MVEBs for each pollutant. In all cases, the MPOs TIPs meets the required conformity tests.

Table 5: Ozone Conformity - NOx and VOC Emissions Budget Test Results for Both 2008 and 2015 Ozone NAAQS

Year	Ozone Area	Tons per day					
		Cube Series 2		Budgets		Difference	
		VOC	NOx	VOC	NOx	VOC	NOx
2023	CT Portion of NY-NJ-LI Area	15.28	18.56	17.6	24.6	-2.32	-6.04
	Greater CT Area	13.58	16.30	15.9	22.2	-2.32	-5.90
2025	CT Portion of NY-NJ-LI Area	13.89	15.54	17.6	24.6	-3.71	-9.06
	Greater CT Area	12.42	13.67	15.9	22.2	-3.48	-8.53
2035	CT Portion of NY-NJ-LI Area	8.66	8.36	17.6	24.6	-8.94	-16.24
	Greater CT Area	7.78	7.47	15.9	22.2	-8.12	-14.73
2045	CT Portion of NY-NJ-LI Area	7.47	7.65	17.6	24.6	-10.13	-16.95
	Greater CT Area	6.74	6.82	15.9	22.2	-9.16	-15.38
2050	CT Portion of NY-NJ-LI Area	7.03	7.61	17.6	24.6	-10.57	-16.99
	Greater CT Area	6.35	6.80	15.9	22.2	-9.55	-15.40

Table 6: PM2.5 Conformity - Direct PM2.5 and NOx Emission Budget Test Results

Year	PM2.5 Area	Tons per year					
		Cube Series 2		Budgets		Difference	
		Direct $PM_{2.5}$	NOx	Direct $PM_{2.5}$	NOx	Direct $PM_{2.5}$	NOx
2023	CT Portion of NY-NJ-LI Area	205.36	5954.80	575.80	12,791.80	-370.44	-6837.00
2025	CT Portion of NY-NJ-LI Area	192.15	5003.72	516.0	9,728.10	-323.85	-4724.38
2035	CT Portion of NY-NJ-LI Area	143.73	2792.78	516.0	9,728.10	-372.27	-6935.32
2045	CT Portion of NY-NJ-LI Area	125.72	2530.02	516.0	9,728.10	-390.28	-7198.08
2050	CT Portion of NY-NJ-LI Area	127.35	2531.04	516.0	9,728.10	-388.65	-7197.06

Emission Summary Tables are posted in Appendix D.

This analysis in no way reflects the full benefit in air quality from the MPOs TIPs. The network-based modeling process is capable of assessing the impact of major new highway or transit service. It does not reflect the impact from the many projects, which are categorically excluded from the requirement of conformity. These projects include numerous improvements to intersections, which will allow traffic to flow more efficiently, thus reducing delay, fuel usage and emissions. Included in the MPOs TIPs, but not reflected in this analysis, are many projects to maintain existing rail and bus systems. Without these projects, those systems could not offer the high level of service they do. With them, the mass transit systems function more efficiently, improve safety, and provide a more dependable and aesthetically appealing service. These advantages will retain existing patrons and attract additional riders to the system. The technology to quantify the air quality benefits from these programs is not currently available.

Changes in the transportation system will not produce significant emissions reductions because of the massive existing rail, bus, highway systems, and land development already in place. Change in these aspects is always at the margin, producing very small impacts.

As shown in this analysis, transportation emissions are declining dramatically 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 (LEV) program.

7. Conclusions

CTDOT has assessed its compliance with the applicable conformity criteria requirements of the 1990 CAAA. Based upon this analysis, it is concluded that all elements of Metropolitan Transportation Plans conform to applicable SIP and 1990 CAAA Conformity Guidance criteria and the approved transportation conformity budgets.

8. Contact Information

Please direct any questions you may have on the air quality emission analysis to:

Connecticut Department of Transportation
Bureau of Policy and Planning
Division of Program Development and Forecasting
Travel Demand / Air Quality Modeling Unit
2800 Berlin Turnpike
Newington, CT. 06111
Email: DOT.AQUnit@ct.gov

All MOVES modeling files and run streams are available for review upon request. The files will remain available during the 30-day public review period.

9. Appendices

In addition to the information required for a conformity determination, the following is attached:

Appendix A: Acronyms
Appendix B: List of Projects Included in Conformity Analysis by Network Year
Appendix C: Interagency Consultation Meeting
Appendix D: Emissions Summary Tables
Appendix E: Comments Received During Public Review Period

Appendix A

Acronyms

Acronym	Meaning
ADT	Average Daily Traffic
AQI	Air Quality Index
CAAA	Clean Air Act Amendments (1990)
CO	Carbon Monoxide
CFR	Code of Federal Regulations
CTDEEP	Connecticut Department of Energy and Environmental Protection
CTDOT	Connecticut Department of Transportation
CMAQ	Congestion Mitigation and Air Quality Improvement Program
DHV	Design Hourly Volume
DVMT	Daily Vehicle Miles of Travel
ECO	Employee Commute Option
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FTP	File Transfer Protocol
FR	Federal Register
HPMS	Highway Performance Monitoring System
I/M	Inspection Maintenance Program
MTP	Metropolitan Transportation Plan
MOVES	Mobile Vehicle Emission Simulator
MPO	Metropolitan Planning Organization
MVEB	Motor Vehicle Emission Budget
NAAQS	National Ambient Air Quality Standards
NLEV	National Low Emission Vehicle
NOx	Nitrogen Oxides
PHF	Peak Hour Factor
$PM_{2.5}$	Fine Particulate Matter less than 2.5 micrometers
PM_{10}	Fine Particulate Matter less than 10 micrometers
SFL	Service Flow Levels
SIP	State Implementation Plan
STIP	Statewide Transportation Improvement Program
TAZ	Traffic Analysis Zone
TCM	Transportation Control Measure
TIP	Transportation Improvement Program
U.S.C.	United States Code
U.S. DOT	U.S. Department of Transportation
V/C	Volume to Capacity
VHT	Vehicle Hours Traveled
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound

Appendix B

List of Projects Included in Conformity Analysis by Network Year

2023-2050 Metropolitan Transportation Plan & 2021-2024 Transportation Improvement Programs

MPO	Project Number	Town(s)	Route/Street/Sys	Brief Project Description	Network Year
GBVMPO	0036-0179	Derby	RTE 8	Reconstruct interchanges 16 & 17; extend Pershing Drive & construct local roads. Preliminary design completed	2023
GBVMPO	0036-0184	Derby	RTE 34	Reconstruct and widen Main Street from Bridge St. to Ausonio Dr. to 4 travel lanes	2023
	0304-XXXX	Various	NHL	WATERBURY BRANCH SERVICE EXPANSION - OPERATING - FUNDS TRANSFER TO FTA	2023
CNVMPO	TBD	Waterbury	Cttransit Waterbury	Add Route	2025
CNVMPO	TBD	Various	WBL	Expand Service	2025
CNVMPO	TBD	CT Transit-Bristol	Various	Realign Service	2025
CRCOG	320-0005PE (Station) / 320-0008PE (Track)	Newington (HL)		320-0013CN - The Hartford Line Newington Station	2025
CRCOG	320-0005PE (Station) / 320-0008PE (Track)	West Hartford (HL)		320-0014CN - The Hartford Line West Hartford Station	2025
CRCOG	320-0005PE (Station) / 320-0008PE (Track)	Windsor (HL)		320-0015CN - The Hartford Line Windsor Station	2025
CRCOG	320-0005PE (Station) / 320-0008PE (Track)	Enfield (HL)		320-0017CN - The Hartford Line Enfield Station	2025
CRCOG	320-0005PE (Station) / 320-0008PE (Track)	Enfield (HL)		320-0024CN - The Hartford Line Enfield Station - Short High Level	2025
CRCOG	TBD	Hartford	Albany Ave/Blue Hills Ave	Transit Priority Treatments	2025
CRCOG	TBD	Hartford/West Hartford	Farmington Ave	Transit Priority Treatments	2025
CRCOG	TBD	Hartford	Franklin Ave	Transit Priority Treatments	2025
CRCOG	TBD	Hartford	Main Street	Transit Priority Treatments	2025
CRCOG	TBD	Hartford	Park Street	Transit Priority Treatments	2025
CRCOG	TBD	East Hartford	Burnside Ave/Main Street	Transit Priority Treatments	2025
GBVMPO	0015-0368	Bridgeport	Route 700	Improvement	2025
GBVMPO		Various	WBL	Operation Expansions	2025
GBVMPO		Seymour	WBL	Seymour Station Relocation	2025

MPO	Project Number	Town(s)	Route/Street/Sys	Brief Project Description	Network Year
GBVMPO		Fairfield	Route 58 - Black Rock Turnpike, Moritz Place and Whitewood Drive	Improvement	2025
GBVMPO		Monroe	Route 25 at Pond View Plaza/Judd Road/Purdy Hill Road	Improvement at Pond View Plaza/Judd Road/Purdy Hill Road intersection	2025
GBVMPO		Fairfield	Route 58 - Fairfield Woods Road to Brookside Drive	Improvement	2025
GBVMPO		Fairfield	Route 58	Improvement	2025
GBVMPO		Seymour	New Road	Route 42 & Route 67 Connector	2025
RiverCOG	0082-0316	MIDDLETOWN	RT 9 / RT 17	Rt. 9 / Rt. 17 Operational & Safety Improvements at Ramp (Reconfigure Rt 17 On-ramp to Rt 9 NB)	2025
RiverCOG		RiverCOG		581 alignment	2025
RiverCOG		RiverCOG		582 alignment	2025
RiverCOG		RiverCOG		583 alignment	2025
RiverCOG		RiverCOG		584 alignment	2025
RiverCOG		RiverCOG		585 alignment	2025
RiverCOG		RiverCOG		586 alignment	2025
RiverCOG		RiverCOG		587 new	2025
RiverCOG		RiverCOG		590 alignment	2025
RiverCOG		RiverCOG		640 new	2025
RiverCOG		RiverCOG		641 algnment	2025
RiverCOG		RiverCOG		642 alignment	2025
RiverCOG		RiverCOG		643 alignment	2025
RiverCOG		RiverCOG		644 alignment	2025
RiverCOG		RiverCOG		645 alignment	2025
RiverCOG		MTD		Add a second Meriden to Middletown run to provide 30 minute service vs. 60 minute	2025
RiverCOG		ETD		Bradley Airport Service – Semi-express service to Bradley from Old Saybrook with stops at park and ride lots and the Middletown bus terminal	2025
RiverCOG		MTD		Express bus service from Middletown to CT Fastrack in New Britain	2025
RiverCOG		ETD		RT 80 Service – Old Saybrook to North Branford service through Ivoryton, Winthrop, Killingworth, Madison, and Guilford with CT transit New Haven connection	2025
RiverCOG		RiverCOG		Service frequency changes	2025

MPO	Project Number	Town(s)	Route/Street/Sys	Brief Project Description	Network Year
RiverCOG		RiverCOG		Service frequency changes	2025
RiverCOG		RiverCOG		Service frequency changes	2025
RiverCOG		RiverCOG		Service span changes	2025
RiverCOG		RiverCOG		Shuttles new	2025
RiverCOG		RiverCOG		Systemwide changes	2025
RiverCOG		RiverCOG		Systemwide changes	2025
RiverCOG		RiverCOG		Systemwide changes	2025
RiverCOG		RiverCOG		Xtra mile new	2025
RiverCOG		RiverCOG		Xtra mile new	2025
RiverCOG		RiverCOG		Xtra mile new	2025
SCCOG	0085-0146/0120-0094	VARIOUS	RT 85	Rt. 85 Improvements	2025
SCCOG		COLCHESTER	Route 2	Interchange improvements at Exit 17, add eastbound on-ramp, westbound off-ramp	2025
SCRCOG	0079-0240	MERIDEN	I-91 / I-691 / RT 15	WAS: I-91 / I-691 / Rt. 15 Operational Improvements NOW: Added lines for 2 other projects and corrected cost	2025
SCRCOG	0079-0245	MERIDEN	I-91 / I-691 / RT 15	I-91 / I-691 / Rt. 15 - Interchange Improvs - EB to NB (B/O from 79-240) - (Design-Build)	2025
SCRCOG	0079-0246	MERIDEN	I-91 / I-691 / RT 15	I-91 / I-691 / Rt. 15 - Interchange Improvements - NB & NB to WB (B/O from 79-240)	2025
SCRCOG	0106-0108	ORANGE	RT 1	Operational Lane from Milford to CT 114	2025
SCRCOG	320-0005PE (Station) / 320-0008PE (Track)	North Haven (HL)		320-0012CN - The Hartford Line North Haven Station	2025
	0053-0189	GLASTONBURY	CT 17		2025
CNVMPO	PP0151-014	Waterbury	I-84	Elimination of I-84 Eastbound Exit 21?	2028
CNVMPO	TBD	Bristol	Cttransit Bristol/New Britain	Add Route	2028
CRCOG	TBD	Manchester	I-84	Auxiliary lanes between Exits 62 and 63	2028
CRCOG	TBD	Manchester	I-84	Auxiliary lanes between Exits 63 and 64/65	2028
CRCOG	TBD	Windsor Locks	Northern Bradley Connector	Bradley Airport-Northern Bradley Connector	2028
CRCOG	TBD	Bolton	Route 6	Route 6 Corridor Study-Bolton Crossroads – Phase 1: Route 6-Route 44 Connector	2028
MULTIPLE	0084-0114	Oxford/Monroe	Rte 34	Bridge Replacement	2028
RiverCOG	0082-0318	MIDDLETOWN	RT 9	Rt. 9 Removal of Lights in Middletown	2028
SWRMPO	0102-0358	NORWALK	RT 7	Rt. 7 / Rt. 15 Interchange Reconstruction and Reconfiguration	2028

MPO	Project Number	Town(s)	Route/Street/Sys	Brief Project Description	Network Year
	0096-0208	Newtown	I-84	Climbing lane extension & Exit 9 on-ramp reconfiguration	2028
CNVMPO		Naugatuck	Route 8	Interchange 27 Improvements	2030
CNVMPO		Naugatuck	Route 8	Interchange 28/29 Improvements	2030
CNVMPO		Oxford	Route 34	Bridge Relocation	2030
CNVMPO		Waterbury	Huntingdon Avenue	Roadway Improvements	2030
CNVMPO		Waterbury	Route 69	Roadway Improvements	2030
GBVMPO		Bridgeport	Railroad Station	Improvement	2030
GBVMPO		Fairfield	Route 58 - Black Rock Turnpike and Burroughs Drive	Improvement	2030
GBVMPO		Fairfield	Route 58 - Burroughs Drive and Katona Drive	Improvement	2030
GBVMPO		Fairfield	Route 58 - Shoprite to Stillson Road	Improvement	2030
GBVMPO		Fairfield	Route 58 - Old Navy to Fairfield Woods Road	Improvement	2030
GBVMPO		Shelton	Constitution Blvd	Extend Constitution Blvd	2030
GBVMPO		Bridgeport	I-95	Improvement	2030
GBVMPO		Bridgeport	Route 8 and Route 25	Improvement	2030
GBVMPO		Shelton	SR 714	Widening of Bridgeport Avenue to provide a consistent 4-lane cross section with turn lanes from Trumbull town line to Constitution Boulevard; includes advance traffic signal system & access management	2030
HVMPO	TBD	Danbury	Sandpit Rd Corridor Improvements	Sandpit Rd Corridor Improvements	2030
HVMPO	TBD	Danbury	West St Corridor Improvements	West St Corridor Improvements	2030
SCCOG		PRESTON	Route 2A	New Parallel 2-lane Route 2A Bridge (Add Second Span to Mohegan Pequot Bridge, alternative F of the 2005 EIS, estimated at 119M(cost escalated 2%/25 years)	2030
SWRMPO	TBD	Norwalk	Various	Transit Service Connecting Wall Street and SONO	2030
SWRMPO		Stamford	1	Route 1 BRT Implementation	2030
SWRMPO		Sta		Stamford Trolley Bus and Network Upgrades	2030
CRCOG	TBD	Windsor Locks	Bradley Park Road	Bradley Airport-East Granby - Bradley Park Road Improvements	2035

MPO	Project Number	Town(s)	Route/Street/Sys	Brief Project Description	Network Year
CRCOG	TBD	Buckland	Buckland: Redstone Rd Extension	Buckland: Redstone Rd Extension	2035
CRCOG	TBD	Rocky Hill	Elm Street	Elm Street Connector Roadway	2035
GBVMPO		Monroe	Route 25	Improvement	2035
GBVMPO		Stratford	I-95	Improvement	2035
GBVMPO		Trumbull	Route 25; From Route 111 (Trumbull) to the Monroe-Newtown town line.	Improvement	2035
HVMPO	TBD	Danbury, Bethel, Newtown	84	I-84 Strategic Congestion Relief Projects	2035
SWRMPO	TBD	Norwalk	US 1 (Cross Street)	Widening last remaining section of US Route 1 from two lane to four lane cross-section.	2035
SWRMPO	TBD	Stamford		Canal Street MNRR Bridge Replacement and Complete Street Enhancements	2035
SWRMPO	TBD	Stamford		Elm Street MNRR Bridge Replacement and Complete Street Enhancements	2035
SWRMPO	TBD	Stamford		Greenwich Avenue MNRR Bridge Replacement and Complete Street Enhancements	2035
HVMPO	TBD	Danbury	HARTransit	Intermodal Hub	2040
HVMPO	TBD	Various	Danbury Branch Line	Track improvements and extension	2040
SWRMPO	TBD	Norwalk	NTD	Intermodal Hub	2040
CRCOG	TBD	FARMINGTON	Monteith Drive	New Bridge Crossing of the Farmington River	2045
GBVMPO		Trumbull	Route 25	Improvement	2045
GBVMPO		Bridgeport	Route 130	Improvement	2045
GBVMPO		Fairfield	Route 130 from Kings Highway to Shoreham Village Drive	Improvement	2045
GBVMPO		Bridgeport, Fairfield	I-95	Major	2045
GBVMPO		Bridgeport, Fairfield	I-95	Major	2045
GBVMPO		Ansonia	RTE 334	Relocate Route 334 to a new alignment	2045
HVMPO	0034-0349	DANBURY	I-84	WAS: I-84 Widening from Danbury Exit 3 to Exit 8 Ramp Improvements NOW: I-84/Rt 7 Improvements (PEL Recommendations)	2045

MPO	Project Number	Town(s)	Route/Street/Sys	Brief Project Description	Network Year
RiverCOG		RiverCOG/Old Lyme	I 95	Widening from the Baldwin Bridge to the Rocky Neck Connector	2045
RiverCOG		RiverCOG/Cromwell	RT 9 Exit 19 Southbound and RT 372	Roadway improvements	2045
SCCOG		New London	I-95	Close exit 84E to Williams Street	2045
SCRCOG	TBD	Wallingford	Route 5	ADDITIONAL LANE	2045
SCRCOG	TBD	Branford	I95 Exit 53	Interchange reconstruction	2045
SWRMPO	TBD	NORWALK	RT 7	Was: Rt. 7 Reconstruction from Grist Mill Road to Rt. 33 Now: Rt. 7 Improvements from Grist Mill Road to Rt. 33	2045

2021-2024 Transportation Improvement Programs, As Amended

MPO	Project #	Town	Route/Street Number	Project Description	Network Year
SECCOG		Groton	Chicago/Poquonnock/Mitchell/Benham Intersection	Reconfigure the existing 5-way intersection to 4-way by closing Chicago access	2020
CNVCOG	0080-0128	Middlebury	RT63,64 & I-84	Route 63, 64, and I-84 WB Exit 17 Improvements	2023
CNVCOG	DOT0302XXX1	Various	NHL- Waterbury Branch	Waterbury Branch Expanded Service	2023
SECCOG	0044-0156	EAST LYME	I-95	I-95 Interchange 74 @ Rte 161	2025
CRCOG	0053-0189	GLASTONBURY	CT 17	NHS - Remove Brs. 00388 & 00389 & Revise CT 17 SB @ New London Tpk	2025
SECCOG	0057-0121	GRISWOLD	Carroll Road	Bridge Removal #04671	2025
SCRCOG/RiverCOG	0079-0245	MERIDEN/MIDDLETOWN	I-91/I-691/Route 15	Improve I-691 EB/I-91 NB	2025
SCRCOG	0079-0245	Meriden	I-91/I-691/RT15	I-91/I-691/Route 15 Interchange Improvement (Design-Build)	2025
RiverCOG	0082-0316	MIDDLETOWN	Rt 17 & Rt 9	Rt 17 Ramp to Rt 9 North Improvements	2025
RiverCOG	0082-0318	MIDDLETOWN	Rt 9	Traffic Signals Removal Rte 9	2025
RiverCOG	0082-0318	Middletown	RT9	Route 9 Signal Removal and Route 17 On-Ramp	2025
SECCOG	0085-0146	MONTVILLE/SALEM	Rt 85	CT85 Corridor Improvements	2025
WESTCOG	0102-0358	NORWALK	Rt 15 & Rt 7	Norwalk Rt 15/Rt 7 Interchange	2025
SCRCOG	0106-0108	ORANGE/MILFORD	US1	US 1 OPERATIONAL LANE	2025
SCROCG	PP_083_011	MILFORD	I95 exit 38 -SR 796	Lane re-striping & dropping lanes for exits	2025
WESTCOG	PP_096_007/0096-0208	NEWTOWN	I84E exit 9	lane addition before and after exit	2025
SCRCOG		New Haven		New Haven Downtown Crossing Phase 4 – Temple Street Crossing	2025
SECCOG		Norwich	I-395/RT 97	Int Ramp Improvements Exit18 & new arterial road connecting Lawler Lane/Canterbury Tpke/Rt 97	2025
SCRCOG/RiverCOG	0079-0240	MERIDEN	I-91/I-691/Rt15	Reconfig I-91/I-691/Rt15 Inter	2035
SCRCOG	0079-0246	MERIDEN	I-91/I-691/Route 15	Improve I-91 NB/I-691 WB/15 NB	2035
SCRCOG	0092-0689	NEW HAVEN	RT 69	CT-15 INT 59 Improvements	2035
SCRCOG		New Haven		New Haven, Bus Rapid Transit	2035

Appendix C

Interagency Consultation Meeting

Interagency Consultation Meeting
2023 -2050 Metropolitan Transportation Plans
2021-2024 Transportation Improvement Programs, as amended
Connecticut Department of Transportation
October 11, 2022 Virtual Meeting

Attendees:

Name	Organization		Name	Organization
Rob Aloise	CRCOG		Kevin Tedesco	CTDOT
Pete Babich	CTDEEP		Maribeth Wojenski	CTDOT
Paul Farrell	CTDEEP		Grayson Wright	CTDOT
Paul Kritzler	CTDEEP		Ariel Garcia	EPA
Brent McDaniel	CTDEEP		Eric Rackauskas	EPA
Allison Burch	CTDOT		Kurt Salmoiraghi	FHWA
Matthew Cegielski	CTDOT		Eril Shortell	FHWA
Andrew Correia	CTDOT		Meghan Sloan	METROCOG
Graham Curtis	CTDOT		Richard Donovan	NVCOG
Steven Giannitti	CTDOT		Robert Haramut	RIVERCOG
Caroline Kieltyka	CTDOT		Sam Gold	RIVERCOG
Kimberly Lesay	CTDOT		James Rode	SCRCOG
Jennifer Pacacha	CTDOT		Laura Francis	SCRCOG
Marissa Pfaffinger	CTDOT		Rebecca Andreucci	SCRCOG
Sara Radacsi	CTDOT		Kate Rattan	SECCOG
Taylor Reed	CTDOT		Kristin Floberg	WESTCOG
Pamela Sucato	CTDOT		Todd Fontanella	WESTCOG
Zachary Taylor	CTDOT			

The Interagency Consultation Meeting was held to review projects submitted for the MPOs MTPs.

The Conformity Documents will be electronically distributed to the MPOs, FHWA, FTA, EPA and CTDEEP. The MPOs will need to hold a 30-day public review and comment period. At the end of this review period, the MPO will hold a Policy Board meeting to endorse the Air Quality Conformity determination.

There was also a brief discussion on the travel demand model and emissions software planning assumptions employed in the conformity analysis.

The schedule for the Transportation Improvement Programs Conformity Determination Analysis is as follows:

- MPOs transmit signed and dated Concurrence Form to mailto:DOT.AQUnit@ct.gov
- CTDOT Travel Demand Model Unit performs the air quality analysis and sends the Air Quality Conformity Determination Report electronically to all MPOs
- MPOs advertise and hold a 30-day public review and comment period for the Air Quality Conformity
- MPOs hold a Policy Board meeting approving and endorsing the Air Quality Conformity and transmit resolutions to DOT.AQUnit@ct.gov after Policy Board meeting.

It is important that all MPOs follow this schedule to ensure that the MPO TIPs Conformity Determinations can go forward on schedule.

PLANNING ASSUMPTIONS

Ozone and $PM_{2.5}$
2023 -2050 Metropolitan Transportation Plans
2021-2024 Transportation Improvement Programs
October 11, 2022

Planning Assumptions for Review	Frequency of Review*	Responsible Agency	Date of Last Review
Socioeconomic Data	At least every 5 years	CTDOT	2019 ACS Data
DMV Vehicle Registration Data	At least every 5 years	CTDEEP	2020
State Vehicle Inspection and Maintenance Program	Each conformity round	CTDEEP	Same as currently approved I&M SIP
State Low Emission Vehicle Program	Each conformity round following approval into the SIP	CTDEEP	Same as SIP
VMT Mix Data	At least every 5 years	CTDEEP	2018**
Analysis Years – Ozone	Each conformity round	CTDOT/CTDEEP	2023, 2025, 2035, 2045, and 2050
Analysis Years – PM2.5	Each conformity round	CTDOT/CTDEEP	2023, 2025, 2035, 2045, and 2050
Emission Budget – PM2.5	As SIP revised/updated	CTDEEP	2018: PM2.5 575.8 NOx 12,791.8 2025: PM2.5 516.0 NOx 9,728.1
Emission Budget – Ozone	As SIP revised/updated	CTDEEP	NY Area: VOC 17.6 NOx 24.6 Gr. CT: VOC 15.9 NOx 22.2
Temperatures and Humidity	As SIP revised/updated	CTDEEP	X
Control Strategies	Each conformity round	CTDEEP	X
HPMS VMT	Each conformity round	CTDOT	2019

* Review of Planning Assumptions does not necessarily prelude an update or calibration of the travel demand model.

** Local data was developed from an analysis of Connecticut's 2020 motor vehicle registration data and an EPA sponsored analysis of 2017 state registration data for the 2017 NEI.

*** Data available 2018 based on an average of 2015-2017

Appendix D

Emission Summary Tables

Pollutants		2023 Emission Quantities (Tons/Day)										
		NY/NJ/CT Non-Attainment Area				Greater CT Non-Attainment Area						**Statewide**
ID	Name	Fairfield	Middlesex	New Haven	***Subtotal***	Hartford	Litchfield	New London	Tolland	Windham	***Subtotal***	
1	Hydrocarbons	7.49761	1.58752	6.86757	**15.95269**	7.45335	1.79726	2.42111	1.40483	1.06468	**14.14122**	**30.09392**
3	Nox	8.31101	1.94505	8.30699	**18.56304**	8.59803	1.72408	2.93624	1.86321	1.17385	**16.29541**	**34.85845**
79	NM Hydrocarbons	6.82696	1.43883	6.21601	**14.48180**	6.77893	1.64724	2.20183	1.27069	0.97088	**12.86959**	**27.35139**
87	VOC	7.20293	1.51737	6.55660	**15.27690**	7.15180	1.73919	2.32360	1.34022	1.02563	**13.58044**	**28.85733**

Pollutants		2025 Emission Quantities (Tons/Day)										
		NY/NJ/CT Non-Attainment Area				Greater CT Non-Attainment Area						**Statewide**
ID	Name	Fairfield	Middlesex	New Haven	***Subtotal***	Hartford	Litchfield	New London	Tolland	Windham	***Subtotal***	
1	Hydrocarbons	6.85249	1.44348	6.27376	**14.56973**	6.86114	1.65164	2.20994	1.28430	0.97609	**12.98311**	**27.55283**
3	Nox	6.96814	1.62375	6.94906	**15.54095**	7.20910	1.45914	2.44405	1.56762	0.99021	**13.67010**	**29.21105**
79	NM Hydrocarbons	6.21431	1.30179	5.64942	**13.16553**	6.21527	1.50889	2.00156	1.15618	0.88627	**11.76818**	**24.93371**
87	VOC	6.55682	1.37299	5.95969	**13.88950**	6.55781	1.59320	2.11234	1.21967	0.93630	**12.41933**	**26.30882**

Pollutants		2035 Emission Quantities (Tons/Day)										
		NY/NJ/CT Non-Attainment Area				Greater CT Non-Attainment Area						**Statewide**
ID	Name	Fairfield	Middlesex	New Haven	***Subtotal***	Hartford	Litchfield	New London	Tolland	Windham	***Subtotal***	
1	Hydrocarbons	4.31574	0.91653	4.06115	**9.29342**	4.37394	1.06271	1.40833	0.82987	0.63875	**8.31360**	**17.60702**
3	Nox	3.71770	0.85835	3.78811	**8.36416**	3.90376	0.81447	1.31609	0.87087	0.56340	**7.46859**	**15.83275**
79	NM Hydrocarbons	3.83650	0.80709	3.56808	**8.21168**	3.87383	0.95419	1.24911	0.72918	0.56780	**7.37411**	**15.58579**
87	VOC	4.04757	0.85116	3.76359	**8.66231**	4.08528	1.00697	1.31765	0.76901	0.59945	**7.77835**	**16.44067**

Pollutants		2045 Emission Quantities (Tons/Day)										
		NY/NJ/CT Non-Attainment Area				Greater CT Non-Attainment Area						**Statewide**
ID	Name	Fairfield	Middlesex	New Haven	***Subtotal***	Hartford	Litchfield	New London	Tolland	Windham	***Subtotal***	
1	Hydrocarbons	3.75481	0.80811	3.55420	**8.11712**	3.83215	0.92828	1.22659	0.73588	0.56156	**7.28444**	**15.40156**
3	Nox	3.38181	0.78317	3.48293	**7.64792**	3.56989	0.75050	1.18853	0.80255	0.51192	**6.82339**	**14.47130**
79	NM Hydrocarbons	3.30113	0.70324	3.08079	**7.08515**	3.35468	0.82500	1.07657	0.63899	0.49473	**6.38996**	**13.47511**
87	VOC	3.48315	0.74170	3.24974	**7.47459**	3.53759	0.87053	1.13566	0.67386	0.52228	**6.73992**	**14.21451**

Pollutants		2050 Emission Quantities (Tons/Day)										
		NY/NJ/CT Non-Attainment Area				Greater CT Non-Attainment Area						**Statewide**
ID	Name	Fairfield	Middlesex	New Haven	***Subtotal***	Hartford	Litchfield	New London	Tolland	Windham	***Subtotal***	
1	Hydrocarbons	3.54954	0.76720	3.37479	**7.69153**	3.64248	0.87579	1.16062	0.69925	0.53603	**6.91417**	**14.60570**
3	Nox	3.36407	0.78128	3.46194	**7.60729**	3.55550	0.74675	1.17904	0.79852	0.51985	**6.79966**	**14.40695**
79	NM Hydrocarbons	3.09742	0.66213	2.90225	**6.66179**	3.16576	0.77296	1.01150	0.60252	0.46782	**6.02056**	**12.68235**
87	VOC	3.26787	0.69825	3.06101	**7.02713**	3.33781	0.81544	1.06687	0.63528	0.49377	**6.34917**	**13.37630**

County	Total Energy Consumption 91 (Joules/Year)	2023 Pollutant Emission Quantities (Tons/Year)				
		NOx	PM 2.5			
		3 Oxides of Nitrogen	110 Engine Exhaust	116 Brakewear	117 Tirewear	**County Total**
Fairfield	4.10E+16	2978.00095	69.95757	23.26821	11.75533	**104.98112**
New Haven	4.18E+16	2976.79827	67.55929	20.89200	11.93136	**100.38265**
Totals	**8.28E+16**	**5954.79922**	**137.51686**	**44.16021**	**23.68670**	**205.36377**

County	Total Energy Consumption 91 (Joules/Year)	2025 Pollutant Emission Quantities (Tons/Year)				
		NOx	PM 2.5			
		3 Oxides of Nitrogen	110 Engine Exhaust	116 Brakewear	117 Tirewear	**County Total**
Fairfield	3.96E+16	2505.49710	62.84222	23.67016	11.87296	**98.38534**
New Haven	4.05E+16	2498.21842	60.37604	21.31198	12.07314	**93.76116**
Totals	**8.01E+16**	**5003.71552**	**123.21826**	**44.98214**	**23.94610**	**192.14650**

County	Total Energy Consumption 91 (Joules/Year)	2035 Pollutant Emission Quantities (Tons/Year)				
		NOx	PM 2.5			
		3 Oxides of Nitrogen	110 Engine Exhaust	116 Brakewear	117 Tirewear	**County Total**
Fairfield	3.53E+16	1384.70658	35.61356	25.05515	12.41077	**73.07947**
New Haven	3.61E+16	1408.07716	34.74381	23.21220	12.69190	**70.64792**
Totals	**7.14E+16**	**2792.78375**	**70.35737**	**48.26735**	**25.10267**	**143.72739**

County	Total Energy Consumption 91 (Joules/Year)	2045 Pollutant Emission Quantities (Tons/Year)				
		NOx	PM 2.5			
		3 Oxides of Nitrogen	110 Engine Exhaust	116 Brakewear	117 Tirewear	**County Total**
Fairfield	3.47E+16	1219.70728	25.28174	23.75982	12.44799	**61.48956**
New Haven	3.59E+16	1310.30994	25.51365	25.35450	13.36136	**64.22951**
Totals	**7.06E+16**	**2530.01722**	**50.79539**	**49.11432**	**25.80936**	**125.71907**

County	Total Energy Consumption 91 (Joules/Year)	2050 Pollutant Emission Quantities (Tons/Year)				
		NOx	PM 2.5			
		3 Oxides of Nitrogen	110 Engine Exhaust	116 Brakewear	117 Tirewear	**County Total**
Fairfield	3.55E+16	1251.89360	22.83946	28.28492	13.35578	**64.48016**
New Haven	3.63E+16	1279.14334	22.81905	26.34851	13.70328	**62.87084**
Totals	**7.18E+16**	**2531.03694**	**45.65850**	**54.63344**	**27.05906**	**127.35100**

Appendix E

Comments Received During Public Review Period

Congestion Management Process

2023

Bridgeport-Stamford, CT-NY Urbanized Area Transportation Management Area

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1.0 Introduction:

A Congestion Management Process (CMP) is required for any Metropolitan Planning Organization (MPO) that includes an urbanized area exceeding 200,000 known as a Transportation Management Area (TMAs). This plan covers the Bridgeport-Stamford TMA and was developed cooperatively by the MPOs within the TMA. The Congestion Management Process (CMP) is a data driven approach for managing congestion that utilizes current data, including performance measures, to assess alternative strategies for congestion management. The CMP provides strategies to be included in the Metropolitan Transportation Plan (MTP) to secure future funding. This update is being developed concurrently to and will inform each MPO’s 2023 – 2050 MTP. This CMP relies heavily on data made available to the MPOs through the RITIS platform using the National Performance Management Research Data Set (NPMRDS). The data and methodology for analyzing congestion is consistent with guidance from FHWA regarding Transportation Performance Management.

This TMA-wide CMP will focus on the National Highway System (NHS) roadways located in within the urbanized area based on the 2010 Census data; this includes all or partial coverage of the following municipalities: Ansonia, Beacon Falls, Bridgeport, Darien, Derby, Easton, Fairfield, Greenwich, Milford, Monroe, New Canaan, Newtown, Norwalk, Oxford, Redding, Ridgefield, Seymour, Shelton, Southbury, Stamford, Stratford, Trumbull, Weston, Westport, Wilton, Woodbridge, and Woodbury. A map depicting the extent of the Bridgeport-Stamford Urbanized Area may be found in Figure 3.1.

The elements of the CMP are as follows:

- Develop regional objectives for congestions management
- Define CMP network
- Develop multimodal performance measures
    - Collect data/calculate performance measures
    - Analyze congestion problems and needs
- Develop Strategies
- Program and Implement Strategies
- Evaluate Strategy Effectiveness

2.0 Objectives:

This CMP will provide an analytical process for understanding congestion and developing mitigating strategies in the Bridgeport-Stamford TMA.

The primary objectives will be:

- Determine the highway & transit CMP network
- Calculate current congestion through performance measures
- Develop strategies to reduce congestion

- Increase Non-Single Occupancy Vehicle usage
- Increase Level of Travel Time Reliability
- Increase Truck Travel Time Reliability
- Decrease Peak Hour Excessive Delay

3.0 CMP Network:

This Bridgeport-Stamford TMA encompasses five MPOs in southwestern Connecticut; Housatonic Valley, South Western, Greater Bridgeport and Valley, Central Naugatuck Valley and South Central. The MPOs do not share boundaries with the Council of Governments in CT so the same TMA encompasses four COGs; Western CT, Naugatuck Valley, CT Metropolitan, and South Central CT.

As of the 2020 census, there are 860,964 people that live in the Bridgeport-Stamford TMA. The TMA is also a major employment center, attracting commuters from across Connecticut and southern New York. Many of these employees work in industries that provide critical services, attracting an equally significant number of non-commuting travelers to the region's core cities of Stamford and Bridgeport, as well as the many suburban office and retail locations spread throughout the 27 municipalities across the TMA, resulting in a high volume of vehicular traffic that is served by multiple expressways and state-maintained arterials

The region's two interstate highways, I-84 and I-95, both travel east/west within the region, though Interstate 95 is a north/south route. Aside from interstate highways, Connecticut Route 8, 15, and portions of US Route 7 also serve as limited access expressways within the region, with 7 and 8 providing north/south travel and 15 mainly serving east/west traffic. Additionally, the remaining portion of Route 7, along with US Route 1, and CT Routes 25, 34, 35, 58, 104, 106, 110, 113, 115, 123, and 147 all carry large volumes through diverse development patterns, passing through low density, suburban commercial, and urban center corridors. Finally, the CMP network within the region includes three unsigned CT State Routes, which are 727, 731, and 732, located in Ansonia, Bridgeport-Trumbull, and Fairfield respectively.

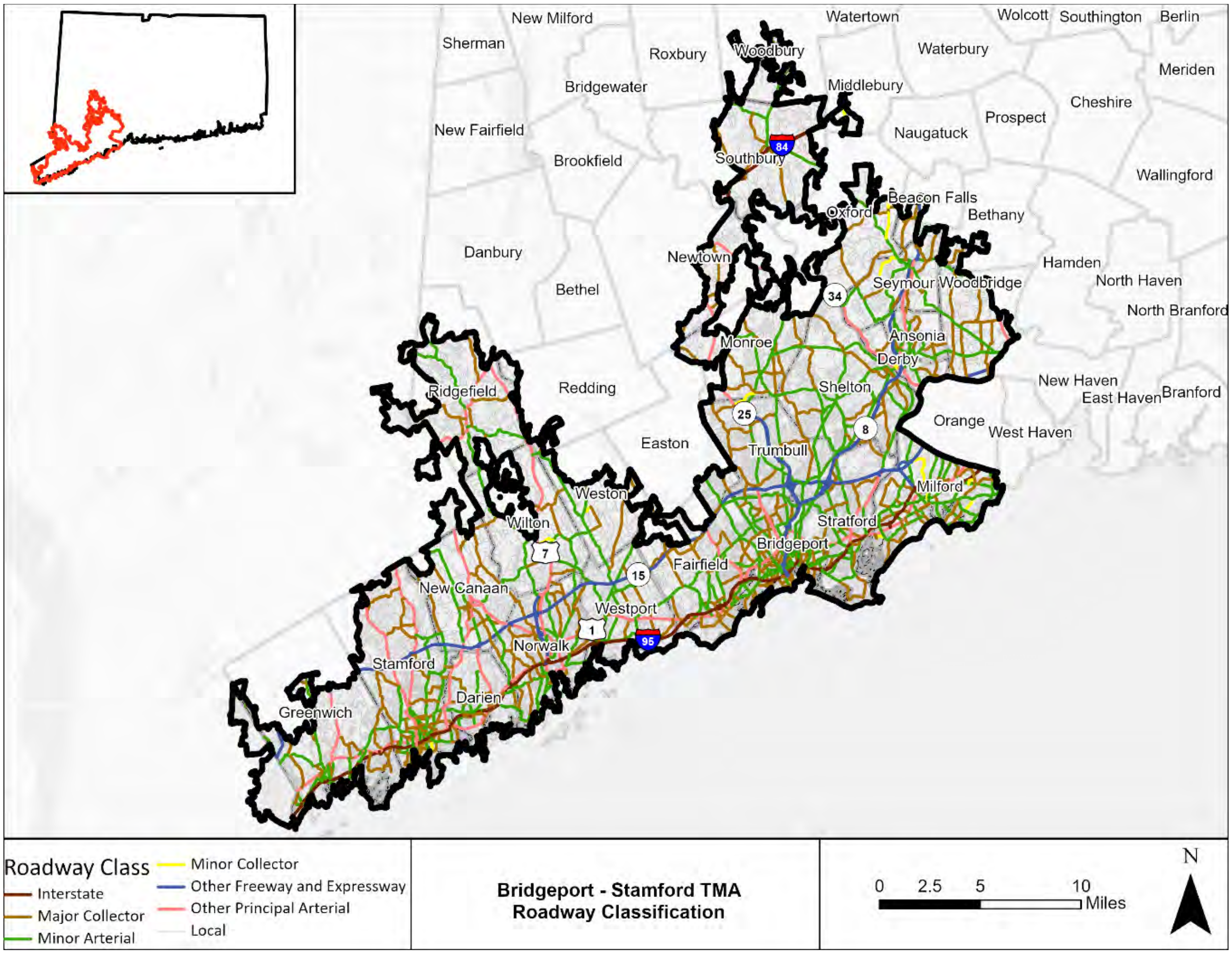


Figure 3. 1 Bridgeport-Stamford TMA Road Network

Transit is available throughout the Bridgeport-Stamford TMA. While this CMP will not focus on transit directly, improvements made to transit could increase the number of non-single occupancy vehicles potentially mitigating congestion. CT Transit- New Haven provides services to the eastern TMA towns of Seymour, Ansonia, Derby, Woodbridge, and Milford. Greater Bridgeport Transit provides bus service throughout Bridgeport, Stratford, Fairfield, Trumbull, Monroe and Shelton. Norwalk Transit provides service in Norwalk, Westport and Wilton and connections to Greater Bridgeport Transit through the Coastal Link which also goes to Milford. Stamford Transit District provides service to Greenwich, Stamford, and Darien and connects to Norwalk as well. HART transit is out of Danbury and provides service through Ridgefield, Wilton, to Norwalk.

Rail travels east-west and provides travel to NYC and New Haven on Metro-North as well as Amtrak service to other parts of the country (Figure 3.2). Metro-North also provides inland branches to New Canaan, Danbury, and Waterbury.

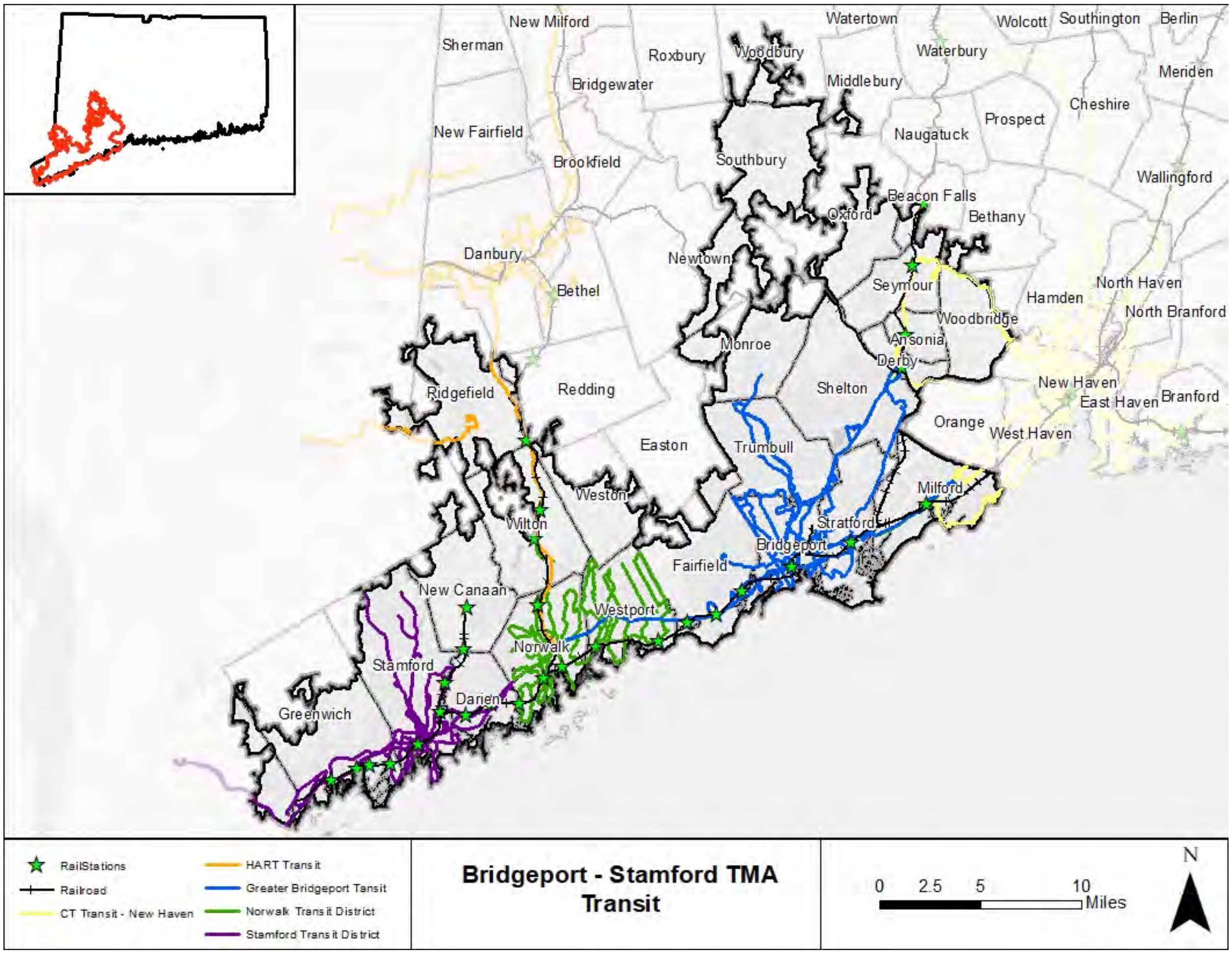


Figure 3. 2: Transit in the Bridgeport-Stamford TMA

This CMP will focus on road segments that are included in the FHWA National Performance Management Research Data Set (NPMRDS). This dataset encompasses all segments in the enhanced National Highway System along with some additional intersecting road segments. The analysis of this study will focus on the large continuous segments that had reliable data in the NPMRDS for 2017-2021 (Figure 3.3).

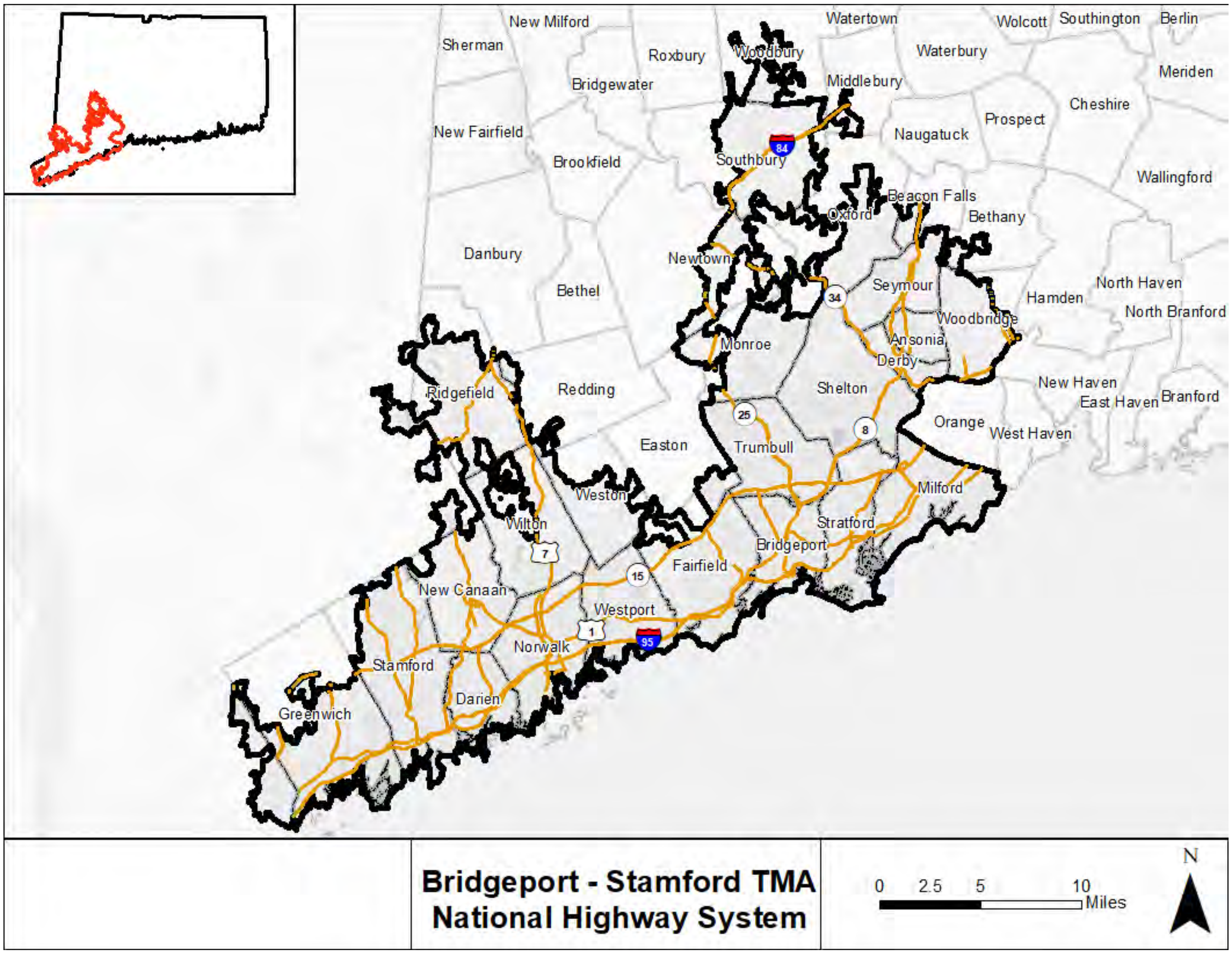


Figure 3. 3: National Highway System in the Bridgeport-Stamford TMA

3.1 Principal Arterials: Interstate

Interstate 95

I-95 runs east-west, though it is a north-south route, through nine municipalities in the Bridgeport-Stamford TMA: Milford, Stratford, Bridgeport, Fairfield, Westport, Norwalk, Darien, Stamford and Greenwich. Travelling east, I-95 provides access to New Haven and major cities throughout New England, such as Boston and Providence. Most critical to the economy of the Region is the connection that I-95 provides to the New York Metropolitan area.

Along most of the 41+ miles that run through the TMA, I-95 is made up of three lanes running in each direction. I-95 widens to four travel lanes in one or both directions between exits 25 and 29 which include the Fairfield-Bridgeport line, Downtown Bridgeport, and the Exit 27A interchange to Route 8/25. In Darien, southbound I-95 expands to four lanes from exit 10 through exit 8 in Stamford.

The congestion scan shows reduced speeds southbound and northbound throughout the TMA. Southbound congestion begins in Fairfield between 6:00am and 7:00am. Congestion continues south through the TMA and peaks in Stamford between 7:00am and 8:00am. There is also some notable congestion later in the afternoon especially when approaching the CT/NY border.

Northbound congestion is more concentrated between 1:00pm and 6:00pm. There is persistent speed reduction from the CT/NY border through Bridgeport, with the most congestion occurring between exit 17 and exit 23 in Westport and Fairfield.

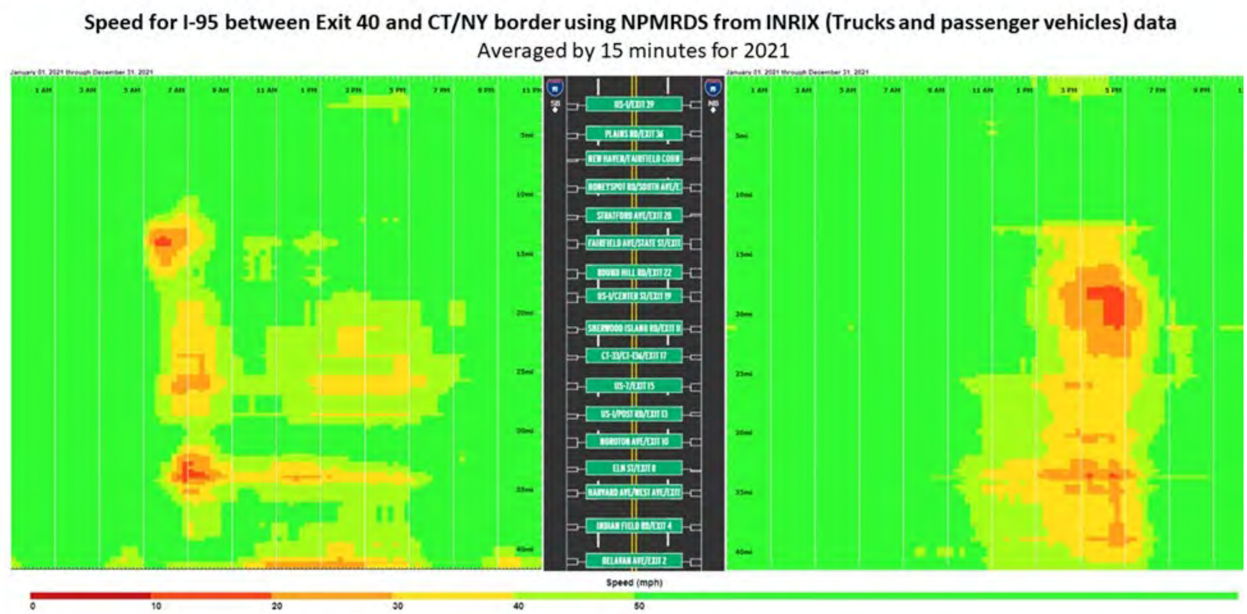


Figure 3. 4: I-95 Congestion Graph

Interstate 84

I-84 runs east-west through 2 municipalities within the TMA, Newtown and Southbury. At only 8.44 miles, the TMA represents only a short portion of the highways distance through Connecticut, connecting New York State and Danbury to the west to Waterbury, Hartford, and ultimately eastern Massachusetts to the east. Interstate 84 provides a critical route for travelers and freight to eastern and northern New England from points west.

At two through lanes in each direction throughout the region, Interstate 84 regularly experiences congestion at points east and west of the TMA, but within the boundaries tends to perform better than the system average. It meets in a major interchange with Routes 25 and 34 in Newtown, and projects underway currently aim to address congestion created at this location.

Though delay along Interstate 84 is limited within the TMA, delays both east and west of the TMA are notable. The NPMRDS congestion scan for I-84 contains too many missing data points to be useful for analysis, and therefore was not included within this CMP.

3.2 Principal Arterials: Other freeways and expressways

CT Route 15/Merritt Parkway:

CT Route 15, or the Merritt Parkway is a limited access, principal expressway that runs 52 miles east-west through Milford, Stratford, Trumbull, Fairfield, Westport, Norwalk, New Canaan, Stamford and Greenwich, with two lanes in each direction. Like I-95, the Merritt provides a critical link to western Fairfield County and New York. East of the Housatonic River (in Milford), Route 15 continues as the Wilbur Cross Parkway and the Berlin Turnpike, which provides access to central Connecticut, Hartford, and I-91.

As a transportation facility designed in the 1930s, a number of the Parkway's historic features limit its utility in the 21st century. Commercial and oversized vehicles are prohibited from the Parkway due to the low clearances of the historic Art Deco bridges. Tight curves and limited sight lines supports a maximum speed of 55 miles per hour. Two travel lanes in each direction is often insufficient to address the volume of traffic. Recent projects have utilized a context sensitive approach that balances historic preservation and enhancement with improving safety and mitigating congestion.

The congestion scan shows that speed reduction occurs southbound during the morning commute and northbound during afternoon travel. Southbound speed is reduced between 6AM and 8AM, especially between exit 42 and exit 37 between Westport and New Cannan.(Figure 3.5). Northbound travel is congested between 2PM and 6PM with the slowest travel occurring between exit 40 and exit 42 in Westport.

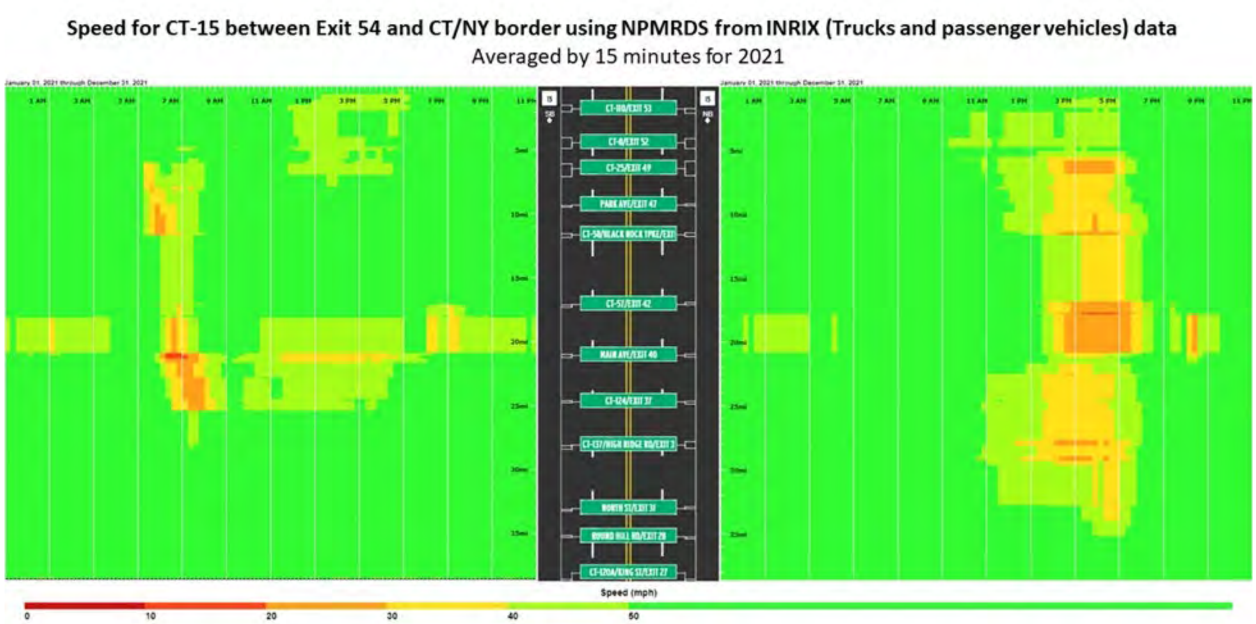


Figure 3. 5: CT Route 15 Congestion Graph

US Route 7

In the TMA, US Route 7 runs in the north-south direction from the intersection with Interstate 95 in Norwalk to Bennetts Farm Road in Danbury. The route further extends up through Northern Connecticut, Massachusetts, and Vermont to the Canadian border. The first 3.6 miles of the route is a limited-access, 4-lane principal arterial expressway that intersects with US Route 15, an east-west principal arterial in the region, before turning to a principal arterial with direct access to properties at the intersection with Grist Mill Road in northern Norwalk. The remaining 13.9 miles of road in the TMA pass through the towns of Wilton, Ridgefield, Redding to just over the border with Danbury. It has two lanes in each direction until just north of the Cannondale Train Station in Wilton where it reduces to one lane in each direction for the rest of the corridor. Vehicular traffic is controlled with traffic signals throughout the corridor.

US Route 7 parallels the Danbury Branch Line of the Metro North Railroad and when complete, the Norwalk River Valley Trail. The route is also serviced by bus via the HART 7 Link route. The properties along the route vary widely in the type and intensity- from large scale industrial and office buildings to open-space to smaller scale businesses to educational facilities.

The congestion scan for the limited access freeway segment of Route 7 shows northbound and southbound speeds averaging over 50mph. During the afternoon rush hour, between 3PM and 5PM, there is typically a slow-down at the northbound Grist Mill Road exit where the road is no longer an expressway.

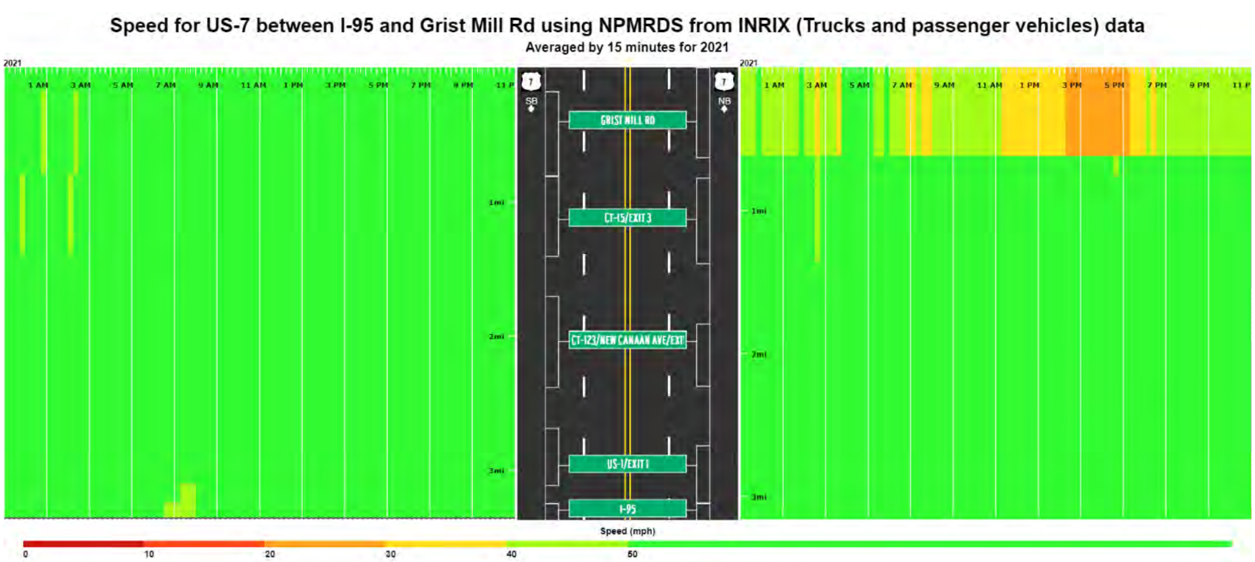


Figure 3. 6: US Route 7 Congestion Graph

CT Route 8

CT Route 8 is a north-south limited access expressway and runs north through Bridgeport (as 8-25), Trumbull, Stratford, Shelton, Derby, Ansonia and Seymour, a total of approximately 20 miles. At its southern termination in Bridgeport, Route 8-25 connects to I-95. In northern Bridgeport, Route 8-25 splits into Route 8 (northeast toward Trumbull, Stratford, Shelton, Derby, Ansonia and Seymour) with access to Route 15 north and Route 25 (northeast to Trumbull and Monroe) with access to Route 15 south. Farther north, Route 8 links to Route 34 in Shelton. Outside of the Region, Route 8 intersects I-84 in Waterbury and continues north with access to Torrington, Greater Litchfield County, and southwest Massachusetts.

As Route 8-25, primarily three or four travel lanes are provided in each direction. After the Route 25/Route 15 split, Route 8 is composed of two travel lanes in each direction.

On Route 8, speed is reduced as drivers approach the I-95 interchange throughout the day but is exacerbated during morning and afternoon peaks.

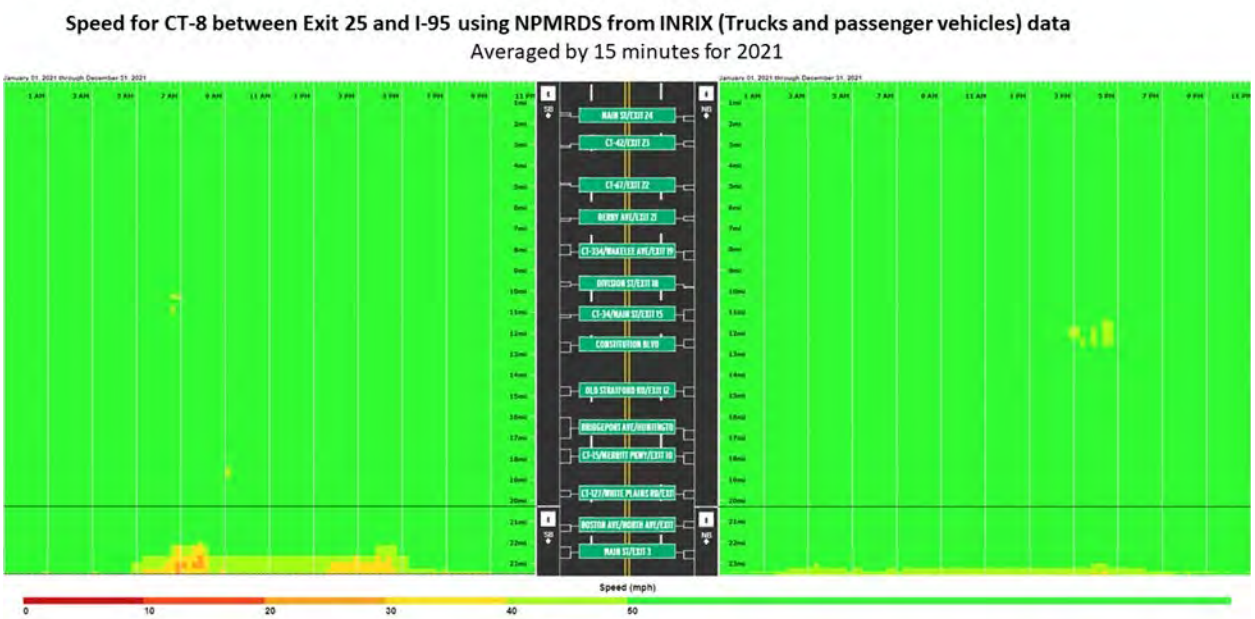


Figure 3. 7: CT Route 8 Congestion Graph

CT Route 25

After splitting with Route 8, Route 25 continues northbound as a limited-access expressway through Trumbull for 6.7 miles. North of the Route 111 intersection, Route 25 functions as a principal arterial that provides access to commercial, office and industrial developments in Monroe (4.5 miles). Route 25 also serves as a connection to I-84 in Newtown.

The limited access portion of Route 25 provides three travel lanes in each direction. North of Route 111, the road narrows to a single lane of travel in each direction. Although turn lanes are provided at several signalized intersections, the two travel lanes often do not provide sufficient capacity for the volume of traffic on Route 25.

Below is the congestion scan for the limited access portion of Route 25. The scan shows that speed is reduced as cars approach or leave the Route 111 intersection.

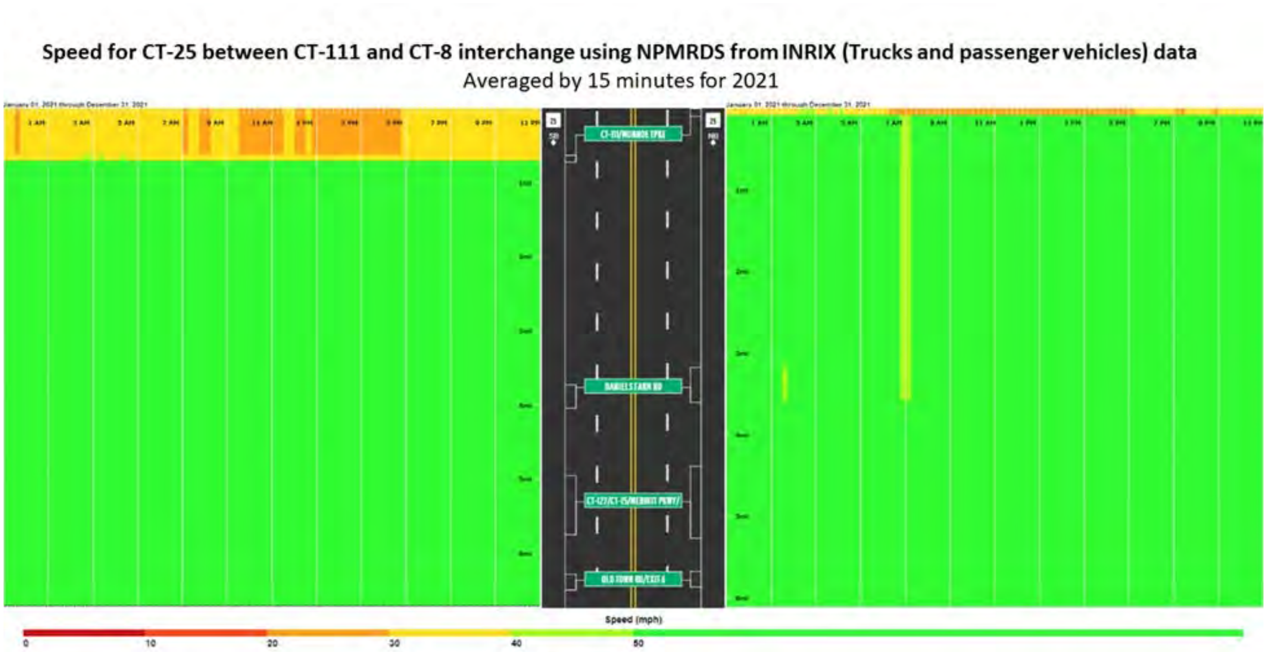


Figure 3. 8: CT Route 25 Congestion Graph

3.3 Principal Arterials: Other/NHS

US Route 1

US Route 1 is a principal arterial that runs about 41 miles east-west through the region's coastal municipalities: Milford, Stratford, Bridgeport, Fairfield, Westport, Norwalk, Darien, Stamford, and Greenwich. Route 1 runs roughly parallel to much of I-95 and like I-95, it is a critical link along the eastern seaboard from Maine to Florida. In Connecticut, Route 1 functions as an east-west commercial corridor that links the shoreline communities of Long Island Sound.

In the Bridgeport-Stamford TMA, Route 1 alternates between one or two travel lanes for each direction of traffic. Turn lanes are not consistently provided at signalized intersections. In addition, unsignalized intersections and numerous driveways cause further congestion.

On Route 1, speeds are reduced during daytime hours in both the northbound and southbound directions due to increased traffic and frequent traffic lights and stops.

CT Route 34

CT Route 34 a principal arterial that runs west from I-84 in Newtown to New Haven in the east. In the Bridgeport – Stamford TMA, Route 34 connects to I-84 in Newtown , then transects Monroe and crosses the Housatonic River via the Stevenson Dam Bridge (to Oxford). Route 34 follows the Housatonic south-east into Seymour and continues into downtown Derby. In Derby, Route 34 intersects Route 8. West of Route 8, 34 is made up of a total of two travel lanes. East of 8, Route 34 is made up of two travel lanes in each direction.

On Route 34 speed is reduced during the morning and afternoon peaks in both the eastbound and westbound direction. There is also a general slowdown through the commercial area in downtown Derby.

CT Route 35

CT Route 35 runs in the north-south direction from the New York State border in southwestern Ridgefield through downtown Ridgefield before intersecting with US Route 7 near the border with Danbury. The 2-lane principal arterial is 5.7 miles and is routed through medium density single family housing before reaching the denser, downtown Ridgefield which has frequent pedestrian and on-street parking activity. Except for the 1.2-mile segment through downtown, the corridor does not have traffic signals.

CT Route 58

CT Route 58 Functions as a minor arterial for a mile east-west between Route 1 (at the Bridgeport border) and State Route 732 in Fairfield. Between its intersection with State Route 732 and Route 15, Route 58 (Black Rock Turnpike) functions as a principal arterial that connects multiple shopping centers in a busy commercial corridor and runs approximately 2.4 miles east to northwest. After its intersection with Route 15, Route 58 becomes a minor arterial for 1.75 miles into Easton. In Easton, Route 58 is a designated scenic road and functions as a major rural collector that runs between 5 and 6 miles south-north to the Redding border. This CMP will focus on the 3.4 mile stretch in Fairfield from Route 1 to Route 15 as this is the section included in the NHS and NPMRDS dataset. This section is 2 lanes for the majority but expands to 2 lanes in each direction in the commercialized area between Burroughs Rd and Samp Mortar Dr.

CT Route 104

CT Route 104, more commonly known as Long Ridge Road, runs in the north-south direction in Stamford and is classified as a principal arterial. The route's southern terminus is in the Ridgeway-Bulls Head Neighborhood at the intersection with CT Route 137. It stretches 6.2 miles, passes under US Route 15 to the northern TMA limit at the intersection of Erskine Road. The northern half of the route is 2-lanes wide with medium density single-family housing and no traffic control. The southern half of the route, from just .15 miles north of US Route 15, widens to 4 through lanes with auxiliary turning lanes throughout. Major intersections are controlled with traffic signals as it passes by higher density single family housing neighborhoods and driveways to large scale office buildings and healthcare facilities. The route is serviced by CT Transit Stamford Division Bus Route 336 and there are no sidewalks or bicycle facilities.

CT Route 106

CT Route 106 runs in the north-south direction from the intersection of US Route 1 in Stamford, just west of Exit 9 off Interstate 95, to the intersection with CT Route 124 where it coincides with Route 124 through downtown New Canaan until turning on to East Avenue and intersecting with CT Route 123. It is a 2-lane,7.5-mile-long principal arterial that passes through Stamford with medium-density multi-family housing, high-density single-family housing, and a few industrial properties then through medium and high-density single-family housing in Darien and New Canaan before reaching the New Canaan downtown. Vehicular traffic is controlled with traffic signals at major intersections throughout the corridor. It parallels the New Canaan Branch Line of the Metro North Railroad and there are sidewalks on one or both sides of the road for the entire corridor except for the 3.8-mile segment between Lynn Court in Darien to Park Street in New Canaan.

CT Route 110

CT Route 110 runs south to north through Stratford and Shelton then east to west through Shelton and Monroe as a minor and principal arterial. The south-north portion of Route 110 roughly follows the Housatonic River. Route 110 begins at Route 1 in Stratford as a minor arterial. Between its intersection with Route 113 and Route 15, the road functions as a principal arterial and provides access to offices, retailers, and a major regional employer (Sikorsky). Route 110 continues north into Shelton as a minor arterial and intersects Route 8. Near Indian Wells State Park, the road begins to run east-west toward Monroe. Route 110 ends at its intersection with Route 111 in Monroe. This CMP will focus on a 3.3 mile stretch that has NPMRDS data which is north of the intersection with 113 to the intersection of Soundridge Rd.

CT Route 113

A small portion of Route 113 begins in Bridgeport as a minor arterial with access to I-95 southbound. Continuing south and east into Stratford, Route 113 functions as a major collector and runs adjacent to the Sikorsky Memorial Airport in Stratford's Lordship Neighborhood. Route 113 continues as a minor arterial and heads north through several commercial and industrial areas into Downtown Stratford. In Downtown Stratford, Route 113/Main Street is classified as a principal arterial and provides access to the Metro-North rail station, Route 1 and several neighborhood and commercial centers. Route 113 terminates at Route 110. Route 113 is 8.3 miles long, but this CMP will focus on the 2.6-mile principal arterial other segment which is Main St in downtown Stratford. Speed is reduced during the day south of I-95 past US 1 north to Paradise Green. This is a highly developed area with multiple commercial properties along with town facilities such as town hall/ Stratford High School/ Stratford Fire & EMS .

CT Route 115

Beginning in Derby and terminating roughly 5.5 miles north in downtown Seymour, Route 115 runs parallel to Route 8 on the eastern side of the Naugatuck River. From opposite the Derby-Shelton Train Station, Route 115 runs north as a minor arterial. In Ansonia, at the intersection with SR 727 at Bridge Street, Route 115 becomes a Principal Arterial. Route 115 continues north, coinciding with Main Street, Ansonia and Seymour. In this sense, Route 115 links the lower Naugatuck Valley downtowns and commercial districts. The terminus of Route 115 at Route 67 in Seymour lies in between the Route 8 Interchange 22 northbound and southbound ramps.

This CMP will focus on the 4-mile principal arterial other segment that connects State Route 727 to Route 8. This segment is part of the NHS and has NPMRDS data.

CT Route 123

CT Route 123 runs in the north-south direction from the intersection with US Route 1 in the center of Norwalk to the New York State border in New Canaan. The 2-lane road is 8.4 miles long. It is classified as a minor arterial in Norwalk up to Felix Lane then switches to a major arterial for the remainder of the route through New Canaan. Major intersections are controlled with traffic signals as the road passes through a variety of uses in Norwalk from single- and multi-family houses, small scale commercial before transitioning to mainly medium-density single family housing after crossing under US Route 15. There are sidewalks on both sides of the road for the first 1.4 miles through Norwalk and no bicycle facilities or transit.

CT Route 137

CT Route 137, more commonly known for most of the length as High Ridge Road, is a north-south route from the intersection of US Route 1/Tresser Boulevard in downtown Stamford to the New York State border in northeast Stamford. The 9.3-mile principal arterial is four lanes wide with axillary turning lanes from the southern terminus to just north of US Route 15 when the road reduces to two lanes wide. Major intersections are controlled with traffic signals for much of the route except for the northern sections. The built environment is very dense with a mix of uses downtown while slowly decreasing in intensity going north along the route. The middle of the route is characterized by high-density single-family housing and strip mall development. North of US Route 15 the land is characterized by medium density single family housing with sections of open space. The route is serviced by CT Transit Stamford Division Bus Route 331 and 336. There are sidewalks on both sides of the road south of the intersection with Scofieldtown Road, albeit there are many sections that are under built and/or damaged.

Route 727 (Pershing Dr)

SR 727 is a principal arterial that runs from Route 8 Interchange 16 north along Pershing Drive. At Bridge Street, in Ansonia, SR 727 turns east before terminating at the intersection with Route 115 (Main Street). Pershing Drive is a major commercial corridor, connecting downtown Ansonia with Route 8.

Route 731

Route 731 is a principal arterial that runs south-north from Downtown Bridgeport to the Trumbull interchange with Route 15 (as Main Street in both municipalities). Route 731 provides access to Route 8/25 in Bridgeport and Route 15 in Trumbull (where it becomes Route 111). Route 731 connects numerous commercial centers in Bridgeport. A regional shopping center (the Trumbull mall) is also located along Route 731 in Trumbull, in close proximity to the Bridgeport line.

Route 732

Route 732 is a 1-mile principal arterial located in Fairfield that runs south-north from Route 1/King's Highway to Route 58/Black Rock Turnpike. The road provides connections to I-95 and commercial areas in the eastern half of the town. A congestion graph was not suitable for this small section of roadway, but it will be part of the regional analysis.

4.0 Performance Measures:

Four performance measures were calculated for this Congestion Management Process. Non-SOV travel, Level of Travel Time Reliability, Truck Travel Time Reliability, and Peak Hour Excessive Delay.

4.1 Datasets:

Two datasets were used for these four performance measures. The Non-SOV travel was calculated by using Census Means of Transportation to Work information. For this analysis, the information from the American Community Survey 5-year estimates form 2017-2021 was used.

The other three performance measures were calculated using the National Performance Management Research Data Set (NPMRDS). This dataset was procured and sponsored by the Federal Highway Administration and made available through the Regional Integrated Transportation Information System (RITIS). The NPMRDS dataset includes speeds and travel times at 5-minute intervals for passenger vehicles and trucks on over 400,000 road segments. Speed and time travel data were collected using millions of connected vehicles, trucks and mobile devices.

To calculate the performance measures, we utilized the new Moving Ahead for Progress in the 21st Century Act (MAP-21) tool through the RITIS analytics dashboard. This widget was developed to easily calculate performance measures based on standardized geographic areas, including UZAs, that conform with Map-21 specifications. This tool reduced the amount of processing time and technical expertise needed to calculate the final performance measures.

4.2 Non-SOV

The Non-SOV measure was calculated to assess the use of other modes of transportation besides single occupancy vehicle travel in the Bridgeport--Stamford, CT--NY TMA. These other modes include transit, bicycle, or pedestrian travel.

Methodology:

The Non-Single Occupancy Vehicle (Non-SOV) measure is the percentage of the population that does not drive to work alone, including individuals who carpool or use mass transit. This metric was calculated using the 2017, 2018, 2019, 2020 and 2021 ACS 5-year estimate. Using the census information, the Non-SOV measure was calculated using the formula below.

((Total Number of Drivers – Number of Drivers that Drive Alone) / Total # Drivers)* 100 = % Non SOV

Results:

In the Bridgeport--Stamford, CT--NY TMA the Non-SOV measure was 32.93% in 2021. There was a 4.58% increase since 2017 (Table 4.1; Figure 4.1).

Table 4. 1: Percent Non-Single Occupancy Vehicle in the Bridgeport-Stamford TMA

	Total Workforce	Drove Alone	Non-SOV	% NON-SOV
2017 ACS 5 yr	462,878	331,627	131,251	28.36%
2018 ACS 5 yr	464,586	335,351	129,235	27.82%
2019 ACS 5 yr	466,800	336,220	130,580	27.97%
2020 ACS 5 yr	467,159	325,013	142,146	30.43%
2021 ACS 5 yr	473,213	317,363	155,850	32.93%

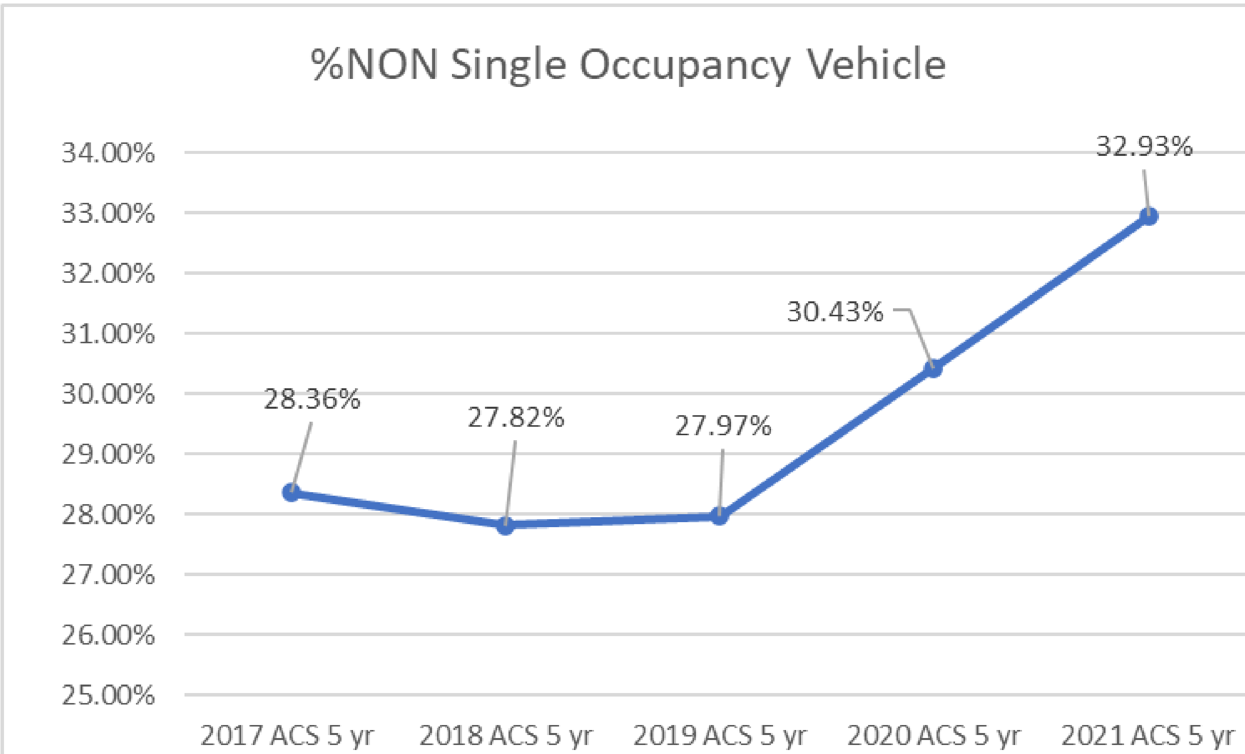


Figure 4. 1: Non-SOV Travel

4.3 Level of Travel Time Reliability (LOTTR):

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. The FHWA explains the importance of this metric:

> *"Travel time reliability is significant to many transportation system users, whether they are vehicle drivers, transit riders, freight shippers, or even air travelers. Personal and business travelers value reliability because it allows them to make better use of their own time. Shippers and freight carriers require predictable travel times to remain competitive."*[1]

[1] See the FHWA's "Travel Time Reliability: Making It There on Time, All the Time" at https://ops.fhwa.dot.gov/publications/tt_reliability/TTR_Report.htm#WhatisTTR

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.

Methodology:

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.

- "Normal" travel time (50th percentile): 50% of the times are shorter in duration and 50% are longer.
- 80th percentile travel time: Longer travel times. 80% of the travel times are shorter in duration and 20% are longer.
- The longest travel times are in the 100th percentile.

Travel time reliability data were downloaded using the RITIS platform using the National Performance Management Research Data Set (NPMRDS) app MAP-21 tool. Data were available as an annual average of travel time and for each time period below.

For each TMC segment, LOTTR was calculated for four time periods:

- AM Peak (Monday-Friday 6 am to 10 am)
- Midday (Monday-Friday 10 am to 4 pm)
- PM Peak (Monday-Friday 4 pm to 8 pm)
- Weekends (Saturday – Sunday 6 am to 8 pm)

LOTTR is calculated as:

$$\text{TMC LOTTR}_i = (80^{th}\text{ percentile travel time}_i) / (50^{th}\text{ percentile travel time}_i)$$

Values for each time period are compared to a threshold of 1.50. If LOTTR was over 1.5 during any of the four time periods, the segment was considered unreliable. The person miles traveled for each segment was then calculated by multiplying the segment length by the annual traffic (AADT * 365) and the occupancy factor (1.7):

(Length * Annual Traffic * Occupancy Factor) = Person Miles Traveled

The sum of all the person miles traveled on reliable segments was then divided by the person miles traveled on all roadways to provide the percentage of reliability for the Region (Figure 4.2).

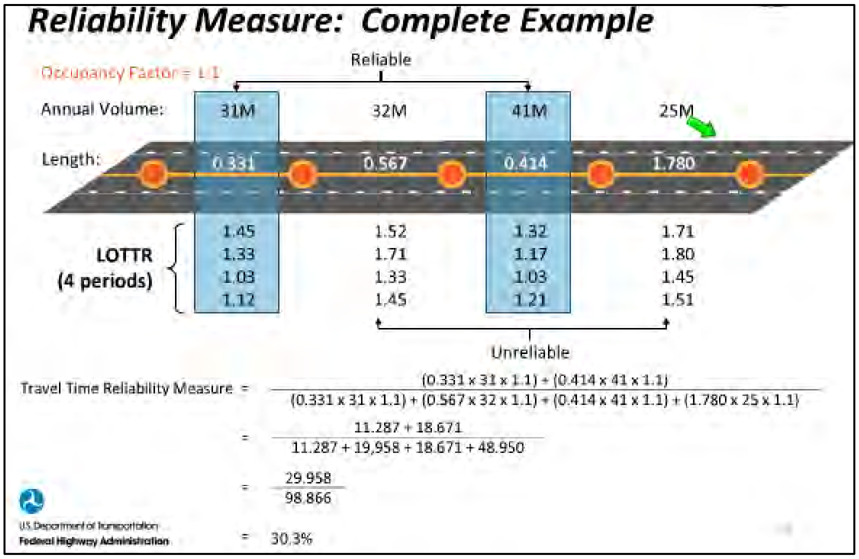


Figure 4. 2: Federal Highway Administration LOTTR Example

Results:

The LOTTR (Level of Travel Time Reliability) measure for the region was 79.25%. That is, 79.25% of the NHS person miles traveled were reliable. The map below shows the NHS segments that were calculated as reliable or unreliable (Figure 4.3).

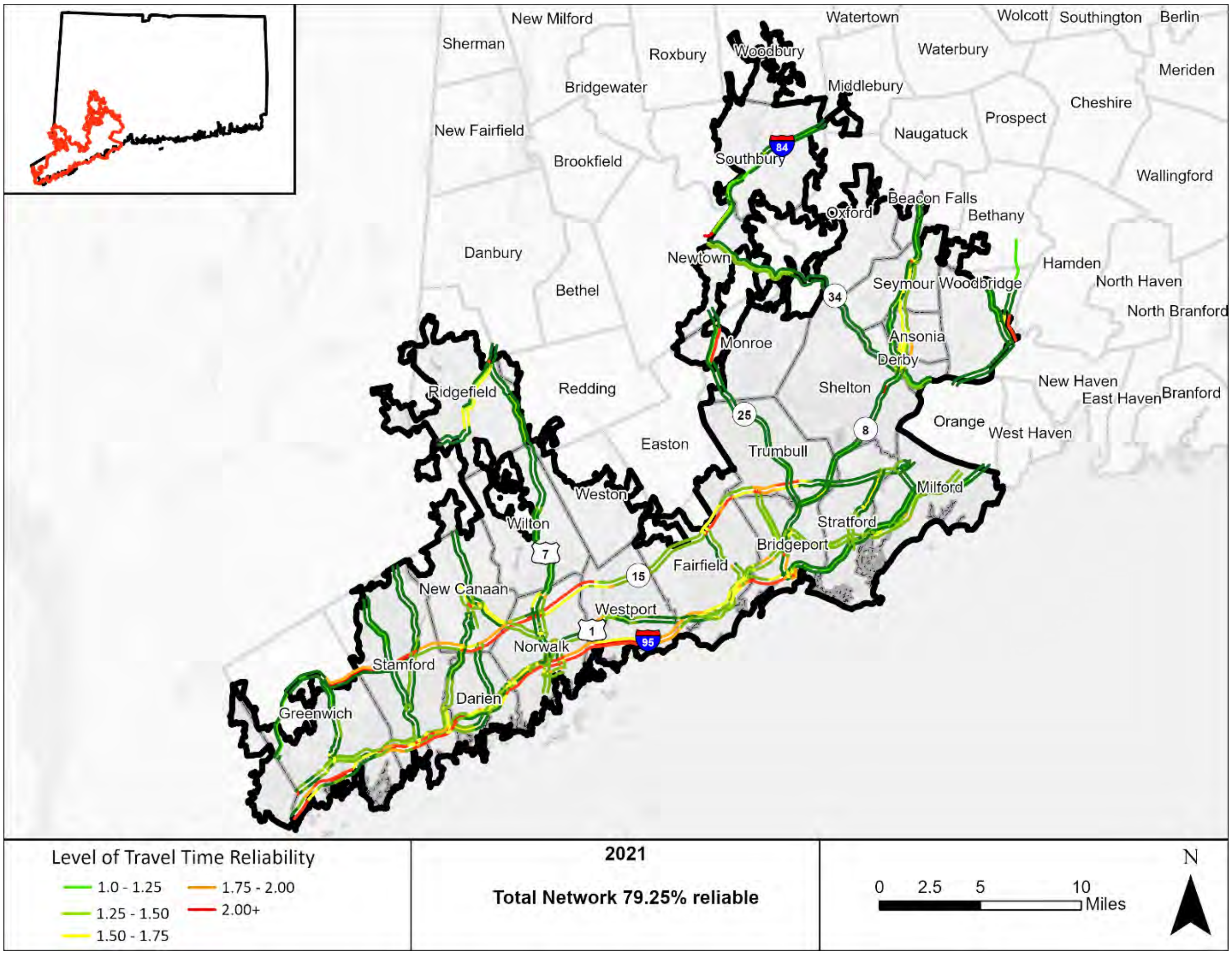


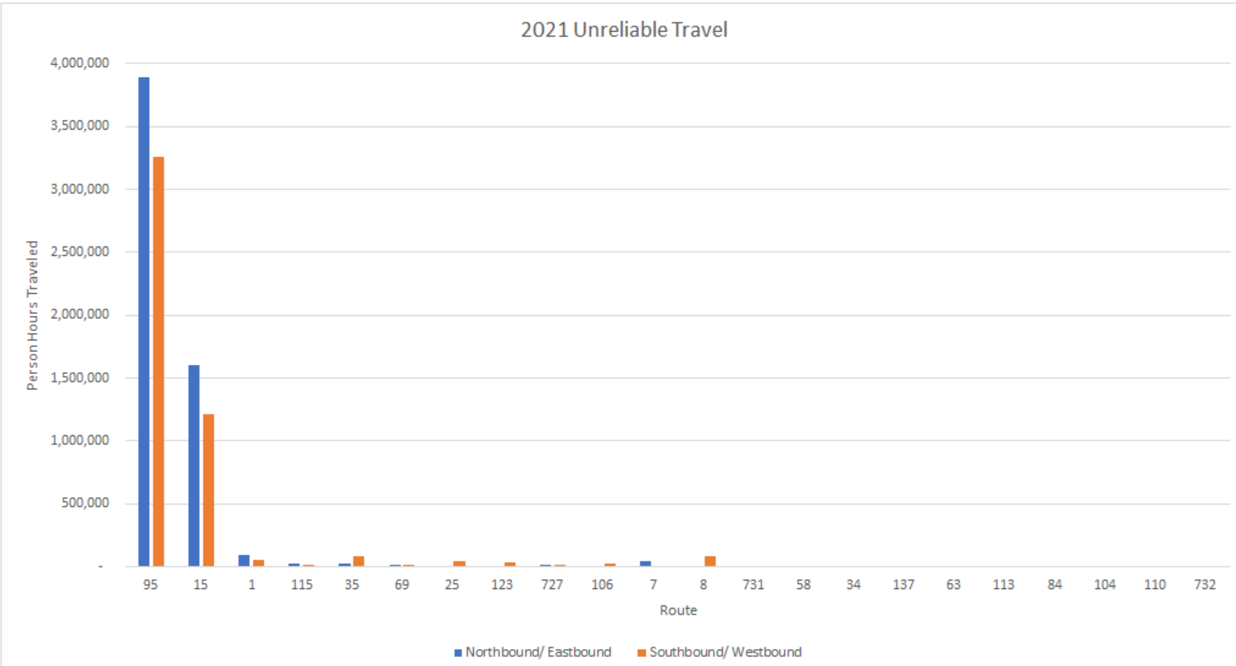
Figure 4. 3: Travel Time Reliability for 2021

By comparison the following targets were adopted by the CTDOT on May 20, 2018. (Table 4.2):

Table 4. 2: CTDOT System Reliability Targets

FHWA Measure for System Reliability:	Baseline Condition (State)	2-year targets (2020)	4-year targets (2022)	Current Condition Bridgeport Stamford UZA
% person-miles of Interstate NHS that are "reliable"	86.2%	78.6%	78.6%	79.25%

Most of the unreliable person miles in the region are confined to I-95 and Route 15. This can be attributed to the high volume of traffic on these two roadways. These coastal routes consist of the highest count of roadway miles. The unreliable segments for I-95 appear south of the intersection with Route 8 in Bridgeport both on the northbound and southbound route. Southbound on I-95 has more unreliable person miles during the AM peak of 6am-10am. The northbound side has higher unreliable miles during the PM peak 4pm-8pm.Route 15 shows unreliable segments in Fairfield, south of the route 8 and route 25 interchange through Stamford where route 15 crosses route 104 .



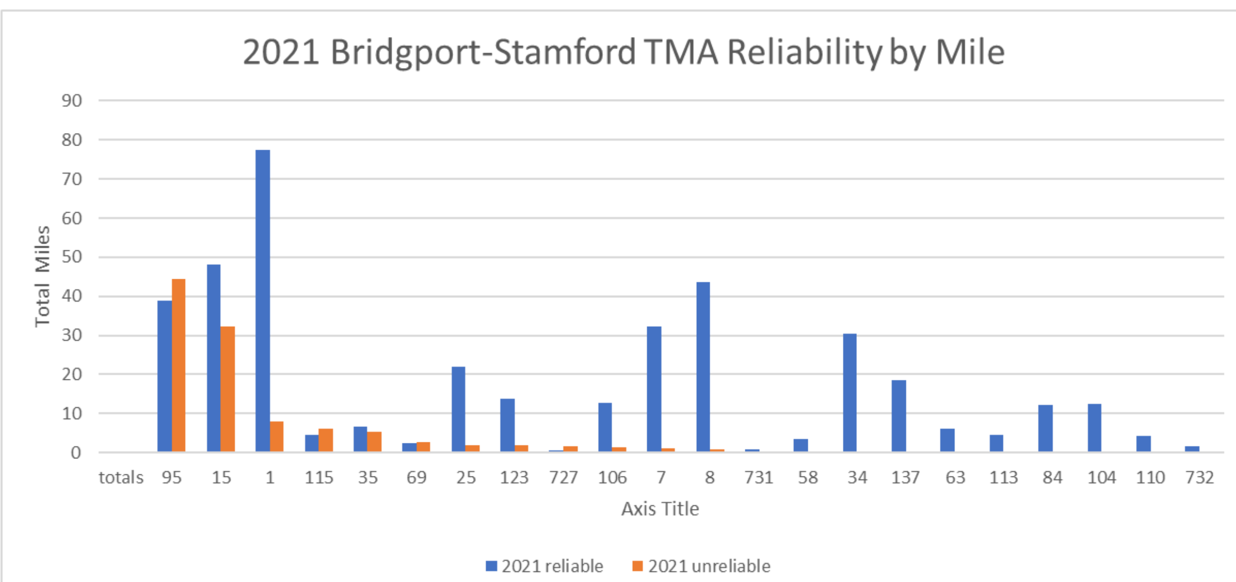


Figure 4. 4: Unreliable Travel by Route

I-95 and Route 15 have the largest amount of unreliable road mileage in both northbound and southbound directions. This compliments the previous chart which also indicates that I-95 and Route 15 have the most unreliable person miles. Both roadways are unreliable southbound during the AM peak and unreliable northbound during midday and PM peaks. Route 25 has 10 times the amount of unreliable person miles traveling southbound than north. All of the unreliable person miles on route 8 are when commuters are traveling southbound. . The other routes, which are not interstates or expressways, all had some unreliability during the weekend hours. Route 95, 115, 69, and 727 all were more than 50% unreliable. Route 7, 8, and 34 performed better than similar length routes In the region with a few unreliable miles on 7 north and 8 south. PHED was calculated annually from 2017 – 2021. Maps and graphs for each year can be found in the appendix. Like the other performance measures, the pandemic had a significant impact on peak hours of delay. However, this performance measure had the greatest decrease in 2020, declining over 55% from 2019. In 2021, PHED increased but not to pre-pandemic levels (Figure 4.8).

LOTTR was calculated annually from 2017 – 2021. Maps and graphs for each year can be found in the appendix. Like the other performance measures, the pandemic had a significant impact on travel time reliability. However, this performance measure had the greatest increase in 2020, increasing about 13% from 2019. In 2021, LOTTR decreased but not to pre-pandemic levels (Figure 4.4).

4.4 Truck Travel Time Reliability (TTTR):

Freight movement is assessed by the Truck Travel Time Reliability (TTTR) index. The Truck Travel Time Reliability metric is the ratio of long travel times (95th percentile) to a normal travel time (50th percentile). 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.

Methodology:

FHWA defines the reliable TTTR as less than 1.5; the comparison between the 50th and 95th percentiles is reliable if it is less than 1.5.

- “Normal” travel time (50th percentile): 50% of the times are shorter in duration and 50% are longer.
- 95th percentile travel time: Longer travel times. 95% of the travel times are shorter in duration and 5% are longer.
- The longest travel times are in the 100th percentile.

The TTTR is a measure of truck travel time reliability, not congestion. Segments of the highway that are regularly and predictably congested will not 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 time-period with the highest TTTR is used to determine the overall segment's TTTR, which is weighted by the segment length. The TTTR five statutorily defined time periods are:

- AM peak period (Monday – Friday 6 am – 10 am)
- Mid-day period (Monday – Friday 10am – 4pm)
- PM peak period (Monday – Friday 4pm – 8pm)
- Overnight (All Days 8pm – 6am)
- Weekends (Saturday – Sunday 6am – 8pm)

TTTR was calculated using the truck data from the NPRMDS. For segments that had no truck travel the travel time from all available vehicles was used. Route 15 was removed from the analysis as trucks are not permitted.

For each segment the maximum TTTR value over the five time periods was then used to calculate the overall TTTR for the region. For each segment the max TTTR was multiplied by the segment length to calculate a weighted average. Then the sum of the weighted averages was divided by the total length of the NHS segments to give a final TTTR score.

$$\frac{\text{Sum (Max TTTR * Segment Length)}}{\text{Total Length}} = \text{TTTR}$$

Results

The Truck Travel Time Reliability for 2021 was calculated to be 2.50 for the region. Similarly to LOTTR, a score of 1.5 represents reliable travel. (Figure 4.5).

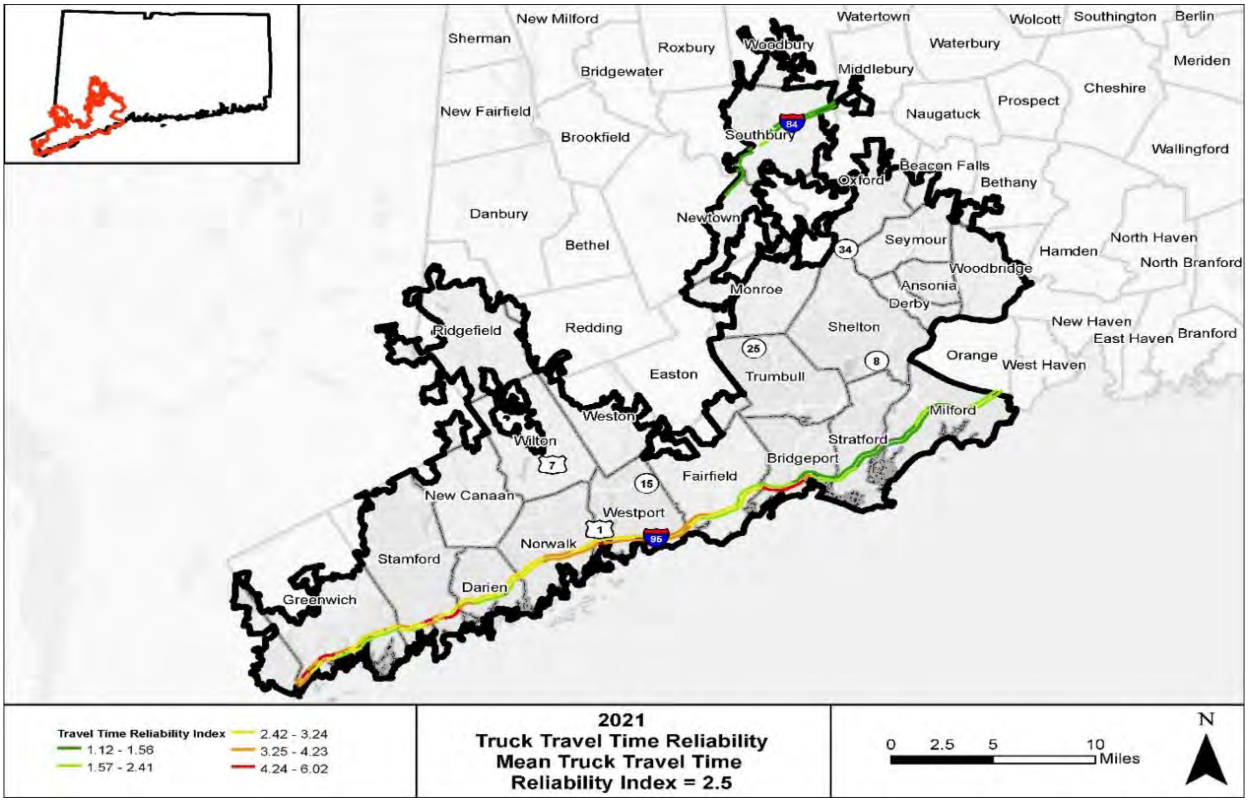


Figure 4. 5: Truck Travel Time Reliability for 2021

By comparison, the following targets were adopted by the CTDOT on May 20, 2018, and the state's MPOs within the following months:

Table 4. 3: CTDOT Freight Reliability Targets

FHWA Measure for Freight Reliability: Interstate NHS	**Baseline Condition (State)**	**2-year targets**	**4-year targets**	**Current Condition for UZA**
Truck Travel Time Reliability (TTTR) Index	1.56	1.95	2.02	2.50

Over the five-year period reviewed for this report, global events and the COVID-19 pandemic have had a significant impact on TTTR. Despite these changes, the 2021 TTTR remains lower than the pre-pandemic trend, with the 2021 index coming in at 2.5 and the 2018 and 2019 TTTR index at 2.7. The below chart reflects the full UZA's TTTR index over the defined period.

Between the two interstate highways, there is great variation in the Truck Travel Time Reliability Index. Interstate 84, through less reliable both east and west of the UZA, scores below the target of 1.5 for 2021 with a score of 1.3. Within that year, only two of the 26 segments in the region had an index above 1.5, with the area of 84 westbound at exit 14 having a reliability of 1.89 and the area of 84 westbound at the entrance ramp from Bullet Hill Road having an index of 1.65. The below chart shows the full, bi-directional indices for Interstate 84 across the study period.

4.5 Peak Hour Excessive Delay (PHED):

The Peak Hour Excessive Delay measure was calculated to assess recurring congestion during commuting hours in the Bridgeport-Stamford TMA.

Methodology:

PHED was calculated using all vehicles available in the NPMRDS between 6 am – 10 am and 3 pm – 7 pm weekdays from 2017 -2021. The PHED measure calculates the amount of person time spent in excessive delay. The calculation compares actual travel speed to the official speed limit of each TMC segment. Excessive delay is defined as when the travel speed was below 60% of the speed limit or 20 mph.

The number of hours of excessive delay were multiplied by the average yearly traffic (AADT * 365) to calculate the annual hours of delay per each segment. These were then summed to calculate the annual hours of excessive delay for the Region. Dividing the annual hours of excessive delay for the TMA by the TMA's population provided the annual hours of peak excessive delay per capita.

Results :

Th annual hours of peak hour excessive delay per capita for the region for 2021 was 12.1. This calculation was generated by the RITIS MAP-21 tool by dividing the delay by the total population of the MPO. There was a total of 11,871,079 hours of excessive delay in the TMA. By comparison, the following targets were adopted by the CTDOT on May 20, 2018, and the state's MPOs within the following months:

Table 4. 4: CTDOT PHED Targets

FHWA Measure for Freight Reliability: Interstate NHS	**Baseline Condition (State)**	**2-year targets**	**4-year targets**	**Current Condition for UZA**
Truck Travel Time Reliability (TTTR) Index	**	20.0	21.9	12.6

High excessive delay occurred in some of the same areas that had high LOTTR and TTTR values such as I-95 and Route 15 south of Bridgeport. This indicates that these roadways experience both recurring and non-recurring events that delay travel over time (Figure 4.6).

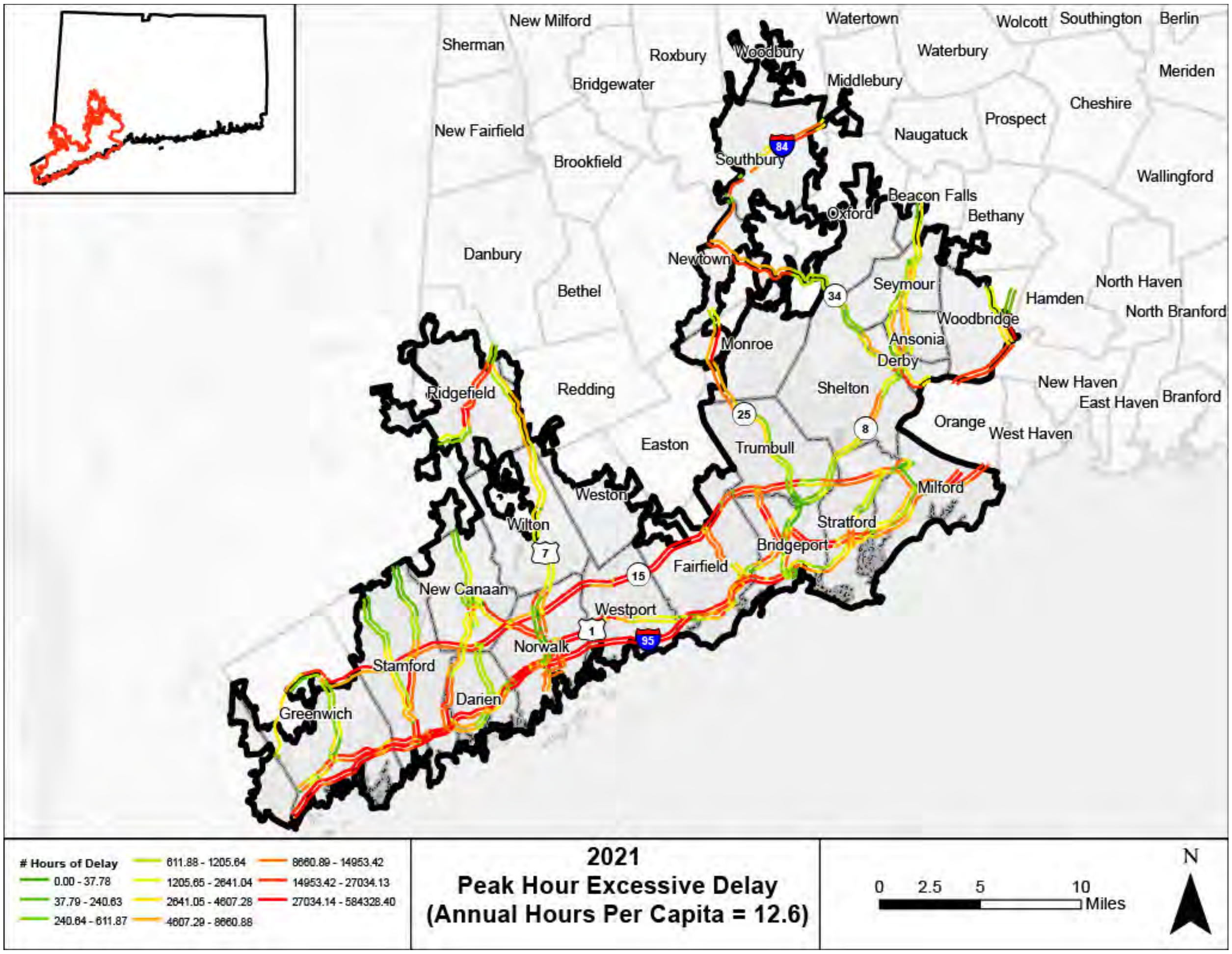


Figure 4. 6: Peak Hour Excessive Delay for 2021

I-95 accounted for 5,843,151 hours of delay in 2021, 52.5% of delay in the TMA. Route 1 was next highest, with 2,213,007 hours of delay (19.9%) followed by Route 15, 1,545,007 (13.9%) The other 13.7% of delay in the TMA were spread out over the remaining NHS segments (Figure 4.7)

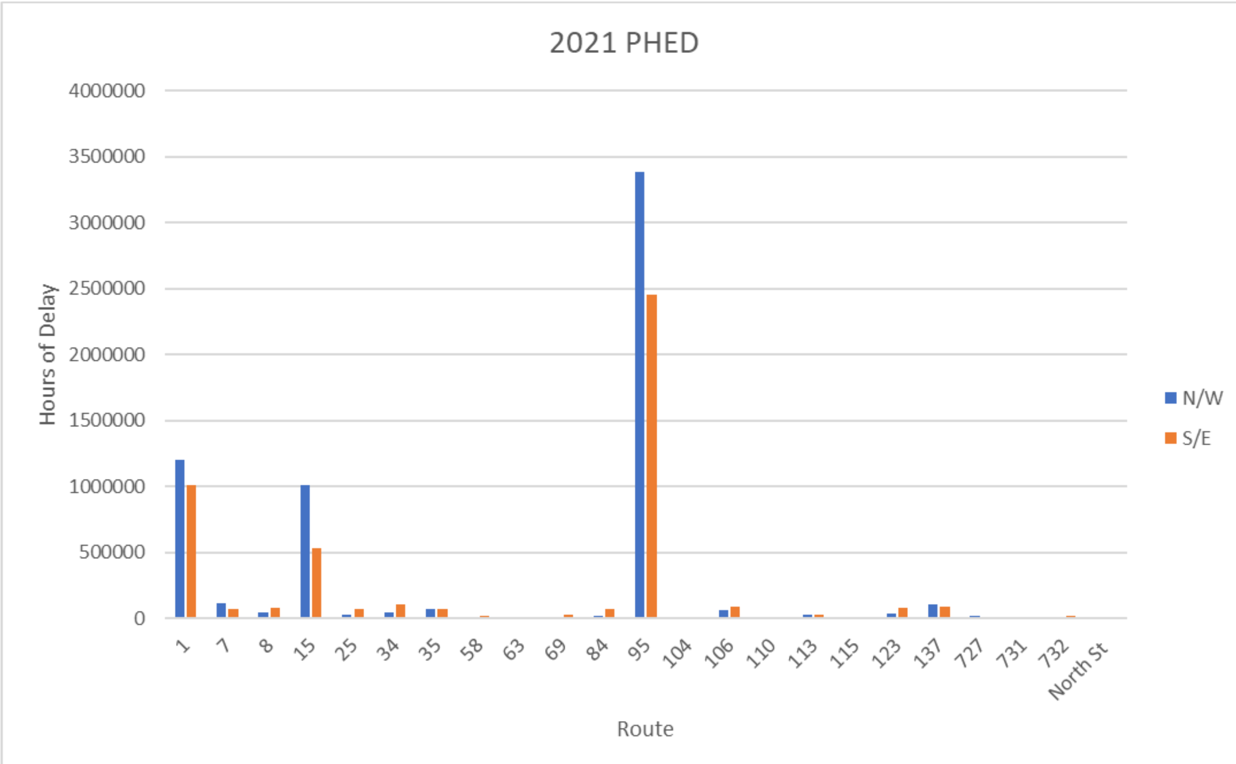


Figure 4. 7: Peak Hour Excessive Delay by Route

PHED was calculated annually from 2017 – 2021. Maps and graphs for each year can be found in the appendix. Like the other performance measures, the pandemic had a significant impact on peak hours of delay. However, this performance measure had the greatest decrease in 2020, declining over 55% from 2019. In 2021, PHED increased but not to pre-pandemic levels (Figure 4.8).

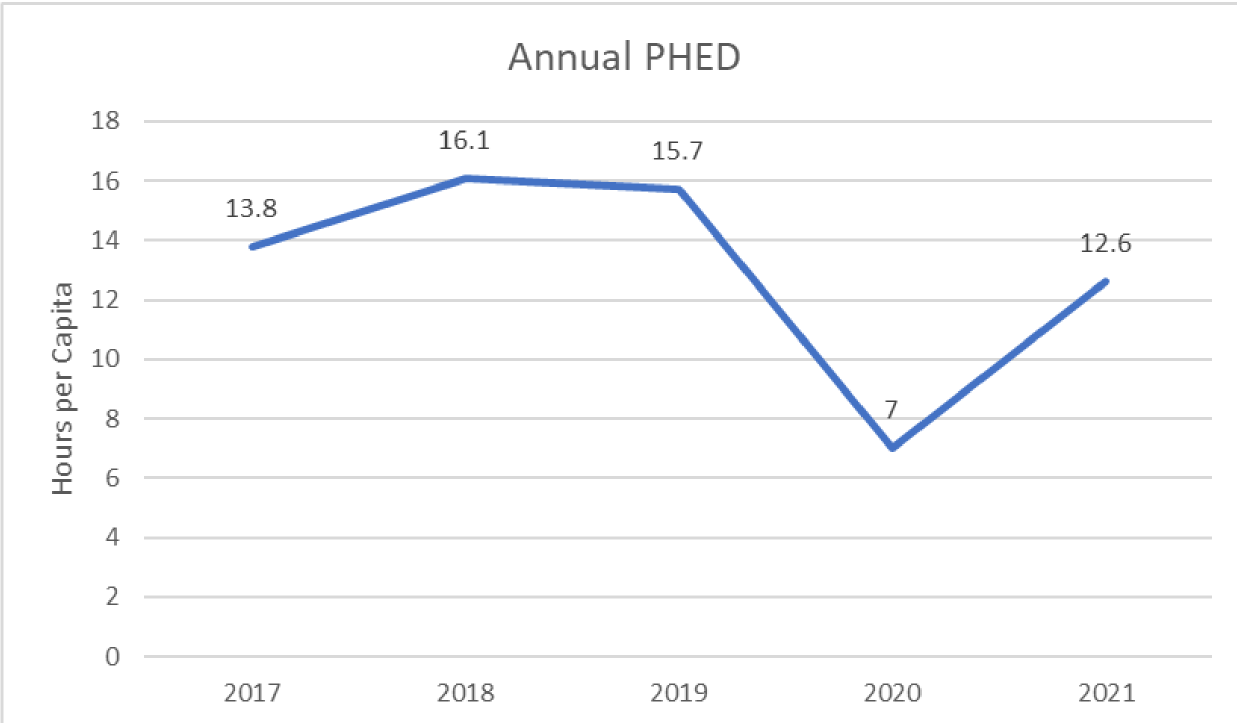


Figure 4. 8: Peak Hour Excessive Delay from 2017-2021

5.0 Strategies:

The Congestion Management Process is a data driven approach to develop strategies to mitigate congestion. The performance measures indicate that recurring and non-recurring congestion heavily impact the Region, especially in the western half. The following mitigation strategies are designed to improve travel in the Region, and will improve the performance of the transportation system in the next CMP by:

- Increasing Non-Single Occupancy Vehicle usage
- Increasing Level of Travel Time Reliability
- Increasing Truck Travel Time Reliability
- Decreasing Peak Hour Excessive Delay

The following strategies are broken down into the four following categories. Often, these strategies fall into more than one category, or integrates components from another category.

- Demand Management Strategies
- Public Transportation Strategies
- Traffic Operations Strategies
- Road Capacity

The 2023 CNVMPO, GBVMPO and SWRMPO Metropolitan Transportation Plans provides further project details. Corridor studies, charettes, Road Safety Audits (RSAs) and numerous community planning efforts have identified a range of projects that align with these strategies. Recommendations from these studies continue to be integrated into the CMP. Corridor studies include:

In Process:

- Fairfield Avenue/CT-130: Black Rock neighborhood, Bridgeport
- East End Streets: CT-130 in Bridgeport
- Norwalk Route 1 Corridor Study

Completed:

- Sport Hill Road Active Transportation Workshop: CT-59, Easton
- Black Rock Turnpike Safety Study: CT-58, Fairfield
- Post Road Circle Study: US-1 and CT-130, Fairfield
- CT-25 and CT-111 Engineering Planning Study, Monroe and Trumbull
- CT-110 Engineering Planning Study, Stratford (CT-15/Sikorsky bridge)
- Stratford Center Complete Streets Plan: US-1, CT-113 and CT-108
- Westport Main To Train Study (Route 1 and Route 33)
- Stamford Bus and Shuttle Study
- Stamford Bicycle and Pedestrian Master Plan
- Noroton Heights Station Area Study

5.1 Demand Management Strategies

These strategies help to promote alternatives to SOV travel and reduce the number of vehicles on the roadway, especially during peak travel periods. Actions may not pertain to a specific section of roadway in the CMP analysis but are more general practices that can be applied throughout the Region. Actions include:

- Encourage Access to Transit, Including the First- and Last-Mile
- Multi-Use Trail Improvements
- Complete Streets and other Pedestrian Improvements

Encourage access to transit:

- Bridgeport, Ash Creek Pedestrian Bridge: pedestrian access from Bridgeport's Black Rock Neighborhood to the Fairfield Metro Rail Station. This project was developed through a planning study (2014) and is in final design (LOTCIP).
- Stratford: Shuttle service from train station to localized businesses and popular destinations (MTP recommendation).
- Micromobility projects, such as the introduction of scooter-share service in Bridgeport and Fairfield.
- Park & Ride lot repairs, improvements, and shelter replacement (statewide CTDOT project in MTP).

Trail Improvements:

- **Housatonic River Greenway**: Stratford continues to plan for a facility that runs through Stratford in a north-south alignment. Connections will include Stratford Center (and the rail station), Roosevelt Forest, the Housatonic River, the East Coast Greenway, and other local points of interest.

- **Naugatuck River Greenway**
  - Ansonia:
    - The Ansonia Riverwalk Greenway will provide connections throughout Ansonia (along the Naugatuck River), to the downtown and to adjacent towns. Pedestrian & streetscape enhancements in downtown Ansonia will further improve connectivity within the Downtown and to the rail station.
    - East Main Street pedestrian improvement project to formalize on-street parking, and improve pedestrian access and mobility throughout the East Main Street corridor.
    - South Cliff / State Street Safety Improvement Project to improve pedestrian access and mobility in the State Street and South Cliff Street neighborhood.
  - Seymour:
    - Construct pedestrian & streetscape enhancements in downtown Seymour; construct pedestrian bridge over the Naugatuck River at Tingue Dam.
    - Connect sidewalks along Church Street from the Seymour Library to Route 67.
- **Pequonnock River Trail**: Improved linkages to the PRT in Bridgeport, Monroe and Trumbull will provide non-motorized access between commercial, recreational and residential areas. Projects that have secured funding include:
  - Trumbull: trail connection from commuter parking lot on White Plains Road to Twin Brooks park (funded through TA).
  - Monroe: the extension from Purdy Hill to Wolfe Park will move most of the trail to an off-road, protected facility (LOTCIP-funded, in final design).
- **Shelton River Walk**
  - Widen Canal Street & install various pedestrian & bicycle facilities & amenities.
  - Extend river walk along Canal Street West; construct pedestrian improvements on Wooster Street & provide connections into Riverview Park.
- **Newtown:**
  - Extension of the Poqounnock Valley Greenway – extend the trail to Fairfield Hills in Newtown.
- **East Coast Greenway (ECG)**: Implement route and wayfinding between Greenwich and Westport.
- **Norwalk River Valley Trail:** Complete remaining 15 miles of trail between Norwalk and Danbury.
- **Georgetown-Branchville Trail:** Construct a multi-use trail to connect the villages of Branchville and Georgetown as well as the Ridgefield Rail Trail.

Complete Streets and Pedestrian Improvements

Continue to identify locations for complete streets improvements and bicycle facilities. Several projects underway were identified through Road Safety Audits, charettes and corridor/planning studies. This collaborative, community-lead planning should continue throughout the TMA. Examples of projects underway include (but are not limited to):

- Fairfield/Southport US-1: based on a 2017 Road Safety Audit, the Town was awarded a Community Connectivity grant to jump-start this long-term project. Improvements will occur on- and off-road and will reduce congestion and improve safety for nonmotorized users.
- Seymour:
  - Pedestrian Improvements at Main Street and Deforest Street to normalize grades between sidewalk and roadway.
  - Pedestrian and sidewalk Improvements on 67 and 313, including completing gaps in the section along Route 67 from the Oxford TL to about North Street.
- Shelton:
  - Construct downtown pedestrian & streetscape enhancements along Route 110 & Bridge Street
- Stratford's Complete Streets Plan for the Stratford Center Area: The first phase of the project (train station vicinity) will begin construction in mid-2023. The second phase of the project (CT-113, north of Barnum Avenue) is in design. Since 2019, funding has been secured for
- Trumbull: The Town was awarded a Community Connectivity grant to install traffic light at the intersection of CT- 111 and Whitney Ave (Long Hill Green area), construct sidewalks and install pedestrian amenities. These improvements will connect a commercial development to residential neighborhoods. This project is a good example of how operations-related projects can integrate a complete streets approach.
- Split Route 115 into a one-way pair through Downtown Ansonia, with NB traffic utilizing East Main Street and WB traffic continuing along current alignment. Use newly available space to provide protected bike lanes, improved sidewalks, and pedestrian plazas.
- Darien-New Canaan Bicycle Loop: Implement recommendations from the Bike Loop Action Plan to construct 25.5 mile loop to connect the two downtowns. Improvements include painted bike lanes, buffered bike lanes, sidewalk curb extensions, pedestrian refuge islands, and signage.
- Stamford: Incorporate Complete Streets, safety improvements, sidewalks and protected bicycle facilities during the following projects:
  - Elm Street Metro-North Railroad Bridge Replacement and Complete Streets Enhancements: North State Street to Cherry Street
  - East Main Street Metro-North Railroad Bridge Replacement and Complete Streets Enhancements: Myrtle Avenue to North State Street
  - Greenwich Avenue Metro-North Railroad Bridge Replacement and Complete Streets Enhancements: South State Street to Pulaski Street
  - Canal Street Metro-North Railroad Bridge Replacement and Complete Streets Enhancements: North State Street to Dock Street
  - Grove Street/Strawberry Hil Avenue/Newfield Avenue Safe Streets for All Reconstruction
  - Cove Road East Coast Greenway Construction: Weed Avenue to Elm Street
  - Route 137 HRR Commercial Area Safety Improvements: Buxton Farms to Maplewood Place
- Norwalk:
  - Corridor Wide Bicycle and Pedestrian Improvements: State Route 53 from intersection of Westport Avenue/North Avenue to intersection of Newtown Avenue
  - Main Street Complete Streets Improvements: State Route 123 from the intersection of Cross Street/North Avenue to New Canaan Avenue

  - Corridor Pedestrian Improvements: State Route 123 from the intersection of Ells to Nursery Street
- Westport:
  - Pedestrian Crossing and Sidewalk Improvements: Route 1 and Parker Harding Plaza intersection
  - Route 1 Sidewalks: Weston Road to North Avenue
- Weston – Implement pedestrian improvements in town center to connect schools, municipal buildings, parks, and local businesses.

5.2 Traffic Operations Strategies:

These strategies focus on improving functionality of the existing roadway. The corridor studies listed above include operations strategies and improvements that should be evaluated as projects are implemented. Example strategies include but are not limited to:

- Access management: strategically consolidate, close, or relocate driveways on congested roads.
- Traffic signals: both state-owned and locally-owned signals should continue to be modernized, upgraded and optimized. For example, Bridgeport continues to upgrade and modernize their traffic signals. Signals on Park Avenue are currently being upgraded and the MTP includes additional locations in need of upgrades.
- Regional ITS improvements (highway and transit)
- Route 1 (Greenwich to Westport) Signal Upgrades, Adaptive Signal Control and Coordination: Upgrade outdated equipment, coordinate signal timings, implement transit signal priority, and implement adaptive signal technology.
- Stamford:
  - Bulls Head Traffic and Safety Improvements: Upgrade the intersection of Long Ridge Road, Cold Spring Road, High Ridge Road, Summer Street and Bedford Street to improve traffic and safety.
  - Citywide Signal Upgrades: Complete Phase I, Phase J, and Phase K

5.3 Public Transportation Strategies:

Improving public transportation will ideally increase non-SOV travelers and reduce demand on the road network. Many of these strategies strengthen the demand management projects above.

Regional:

- Seamless, statewide bus transit system: includes integrated fares and real-time information systems.
- Evaluate Bus Rapid Transit.
- Improve marketing of transit, branch line improvements and connections between transit modes.
- Fixed bus replacements – battery electric buses.
- Install new bus shelters or upgrade existing shelters.

Metro North New Haven Main Line (rail):

- Regional:

    - Continue state of good repair and improvements to the New Haven Main and branch lines, bridges, stations, and supporting facilities and technologies.
    - Improve efficiency of service and reduce trip lengths to NYC.
- Bridgeport:
    - New train station on Barnum Avenue/Crescent Avenue.
    - Study to assess possible tunnel for portion of New Haven Line, east of train station.
- Stratford: Extend RR platforms to accommodate full train length access/egress (Main Street/CT-113 RR).
- Norwalk: Complete Project 301-0524 WALK Bridge Program
- Track Improvement Mobility Enhancement (TIME) -
    - Project #2, Norwalk - WALK Small Bridges, Station, Retaining wall and East Avenue Roadway.
    - Project #4, Westport – SAGA Fixed Bridge, Saugatuck Ave Bridge, Compo Rd Bridge, Rebuild Westport Station.
    - Project #5, Greenwich – New CP227/228, Arch St Bridge Deck Repair, Steamboat Rd Bridge.
- Greenwich – Cos Cob Bridge Replacement

Waterbury Branch Line

- Construct high level platform with modern station amenities in Ansonia.
- Construct station area renovations, including rehabilitation of building, new commuter parking lot, bus bays & intermodal transfer point, information kiosk, high level platforms, accessible walkways and heated shelter in Derby-Shelton rail station.
- Relocate the Seymour Rail Station to north of Route 67 as part of TOD redevelopment project.
- Purchase three new locomotives and train sets (2 coaches + 1 push-pull) to operate on the WBL to expand service.
- Purchase four new locomotives and train sets (2 coaches + 1 push-pull) to operate on the WBL to replace old equipment.
- Operations: Expand service along the Waterbury branch line to provide 30-minute headways

New Canaan Branch Line:

- Implement at-grade crossing improvements
- Sidings
- Capacity improvements

Danbury Branch Line:

- Wilton and Bethel – complete slope and track stabilization project
- Implement recommendations from the Danbury Branch Study including extending passenger rail service north to New Milford, track improvements between Norwalk and Danbury, and electrify the entire line from Norwalk to New Milford.

Greater Bridgeport Transit (bus)

- Continue to optimize fixed-route services. This includes late night service, increased frequency and reducing mid-day service gaps.
- Evaluate innovative service delivery models, such as micro-transit and rideshare.
- Continue to replace fixed route buses (hybrid/electric/alternative fuel buses) and paratransit vehicles.
- Capital and facility improvements, including bus stop amenities.
- Stratford: Conduct feasibility study of BRT along Barnum Avenue. Plan for implementation of program.

Other Transit

- New BRT-Like Service for Stratford and Bridgeport
- Real-Time Scheduling and Smart Card Fare Boxes
- Multimodal Fare Technology Improvements
- New BRT/Express Bus service between Derby-Shelton Train Station and Bridgeport Train Station, following alignment of Bridgeport Avenue and median running along Route 8
- Implement recommendations from CTDOT's Route 1 BRT Study
- Stamford Trolley Bus and Newtork Upgrades: purchase new electric trolley buses and expand city's network through the South End, Downtown, West Side, and East Side neighborhoods.
- Norwalk – implement high frequency transit service to connect Wall Street and SONO along East Avenue, Van Zant Street, Fort Point Street, Washington Street and MLK Boulevard.
- Stamford:
    - Implementation of the Stamford Transportation Center Master Plan Recommendations
- Norwalk – new intermodal facility

5.4 Road Capacity Strategies:

These strategies alter the roadway to increase capacity. Such strategies are often expensive and include changes to road realignment, intersection improvements, and road widening. Further, significant analysis, modeling and design is often necessary before a project can be implemented. Examples from corridor studies include:

- Black Rock Turnpike Safety Study, CT-58, Fairfield: limited widening/realignment at specific cross streets and intersections. Installation of roundabouts at several key intersections.
- Post Road Circle Study, US-1 and CT-130, Fairfield: Installation of a roundabout at the traffic circle.
- CT-25 and CT-111 Engineering Planning Study, Monroe and Trumbull: Identified various realignment alternatives for CT-25 and CT-111 intersection. Recommended widening CT-25 to four lanes and realignment of some cross streets/intersections:
- CT-110 Engineering Planning Study, Stratford (CT-15/Sikorsky bridge): realignment of lanes for entrance to CT-15 ramps.

MTP projects include:

- I-95 Capacity and Safety Improvements: Exits 19-27A PD, Northbound Widening. Phase 1 of the projects will improve the CT-8 Connector at 27A. Phase 2 of the project will implement recommendations from the Planning and Environmental Linkages study for exits 19 to 25. This is a major, long-term project.

- I-84 : Construct an additional travel lane in either direction between Waterbury (east of the TMA) and the Route 7 Interchange (west of the TMA)
- CT Route 8:
  Shelton:
  - Construct new SB on-ramp at Interchange 11; minor widening of Bridgeport Avenue to accommodate additional turning movements.
  - Reconstruct and realign ramps at interchange 14 (RTE 110 and Kneen St.) and construct new SB on-ramp at interchange 14 from RTE 110; convert interchange to single-point urban interchange. Preliminary design completed.

  Derby:

  - Reconstruct interchanges 16 & 17; extend Pershing Drive & construct local roads. Preliminary design completed.

  Seymour:

  - Realign SB lanes between Interchange 19 & 21; modify interchange. Preliminary design completed.
  - Construct new SB on-ramp at Interchange 22. Preliminary design completed.
- CT Route 34: Stevenson Dam Bridge**:** Currently, this project is in development to replace the Stevenson Dam Bridge, which was built in 1919. Because of the sharp curves along the approaches and the need to remove the bridge from the dam, the project would construct a new bridge upstream of the dam. This will eliminate the sharp curves in advance of the bridge and provide a straighter alignment.
- Reconstruct and widen Main Street from Bridge St. to Ausonio Dr. to 4 travel lanes, including additional turn lanes and enhancements to the interchange with Bridge Street/the Derby-Shelton Bridge.
- Stamford, Metro-North Railroad Bridge Replacements: Widening of the railroad bridges will allow for additional travel lanes at the following project locations:
  - Elm Street Metro-North Bridge Replacement and Complete Streets Enhancements: North State Street to Cherry Street
  - East Main Street Metro-North Bridge Replacement and Complete Streets Enhancements: Myrtle Avenue to North State Street
  - Greenwich Avenue Metro-North Bridge Replacement and Complete Streets Enhancements: South State Street to Pulaski Street
  - Canal Street Metro-North Bridge Replacement and Complete Streets Enhancements: North State Street to Dock Street
- Stamford:
  - Long Ridge Road, Stillwater, Roxbury intersection reconstruction
  - Stillwater Road and Bridge Street intersection reconstruction
- Norwalk:
  - Route 1 – widen to a four lane cross section from the intersection of Hoyt Street to the intersection of East Avenue

- Westport:
  - Route 1 intersection redesign: Wilton Road and Riverside Avenue intersection
- Interstate 95:
  - Exit 16 – Implement Diverging Diamond Interchange

6.0 Program and Implement CMP Strategies:

Each MPO will incorporate this CMP into their respective Metropolitan Transportation Plans (MTPs) and will use it to prioritize projects. Future corridor planning studies will emphasize congestion mitigation strategies. Currently, many of the CMP proposals have been derived through planning studies; we will continue to program short, medium and long term projects, as well as spot improvements.

7.0 Evaluate Strategy Effectiveness:

To assess strategy effectiveness, annual performance from 2017-2021 was monitored. System-level performance and strategy effectiveness were evaluated for each year from 2017 to 2021, based on the process created in the 2018 CMP for Greater Bridgeport and Valley MPO.

7.1 System-Level Performance

Performance measures were calculated annually from 2017-2021.

The strategies in this CMP are designed to reduce congestion by:

- Increasing Non-Single Occupancy Vehicle Usage
- Increasing Level of Travel Time Reliability
- Increasing Truck Travel Time Reliability
- Decreasing Peak Hour Excessive Delay

Non-Single Occupancy Vehicle Usage

Non-SOV travel increased from 28.36% in 2017 to 32.93% in 2021, meeting the objective.

Level of Travel Time Reliability

LOTTR increased from 70.6% in 2017 to 79.25% in 2021, meeting the objective.

Truck Travel Time Reliability

The TTTR index increased from 2.4 in 2017 to 2.5 in 2021, meeting the objective.

Peak Hour Excessive Delay

PHED decreased from 13.8 hours in 2017 to 12.6 hours in 2021, meeting the objective.

While the performance measures have all improved since 2017, the pandemic clearly impacted travel in the TMA. All the performance measures improved in 2020. Non-SOV usage was the only performance measure that continued to improve in 2021. LOTTR, TTTR, and PHED all regressed but not to 2017 levels. The next CMP will be critical to assess if these were sustainable trends or just a blip due to reduced travel during the pandemic.

7.2 Strategy Effectiveness

The following projects from the 2018 GBVMPO CMP have been completed. While it is difficult to assess if any of these specific strategies had a direct impact on the performance measures, due to the pandemic, it is still important to note the projects completed to improve congestion.

Demand Management:

- The Bridgeport Intermodal Center project has improved access to rail, bus and ferry service.
- Bridgeport's bicycle path between Beardsley Park and Seaside Park has improved access throughout the City and has strengthened access to the bus station, rail station and ferry terminal.

Traffic Operations:

- CT-8: Expanded state Incident Management Systems to CT-8, includes 24-hour monitoring, video surveillance, variable message signs & incident detection.
- CT-110, Stratford: The CT-110 Planning Study recommended the realignment of Sikorsky Gate #1 intersection to directly opposite of Oronoque Lane. Previously, the three closely spaced intersections (CT-15 southbound ramps and Navajo Lane) caused congestion throughout the weekday peak hours. By realigning the driveway, the traffic light at the driveway was removed, since traffic at the intersection can now be controlled by the Oronoque Lane traffic light.

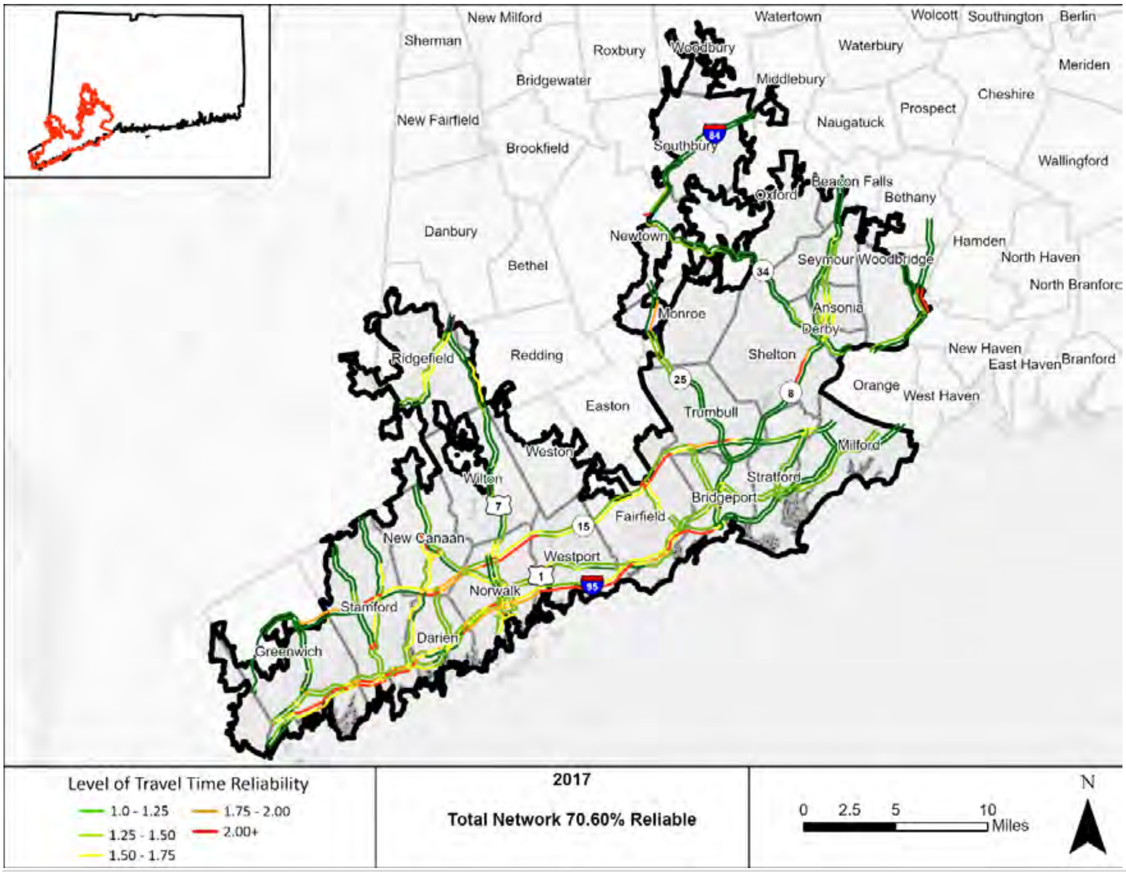
Road Capacity:

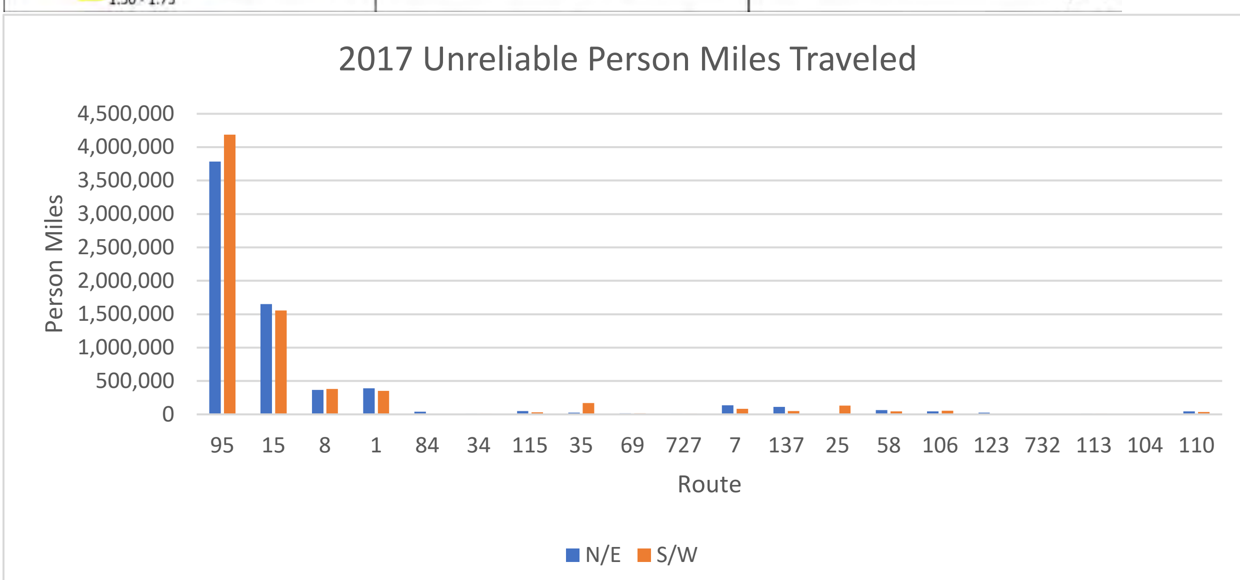
- I-95, Stratford Interchange 33: reconstructed from a partial interchange to a fully directional, diamond interchange. The project has provided better access to I-95 from adjacent commercial centers and included improvements to local roads.

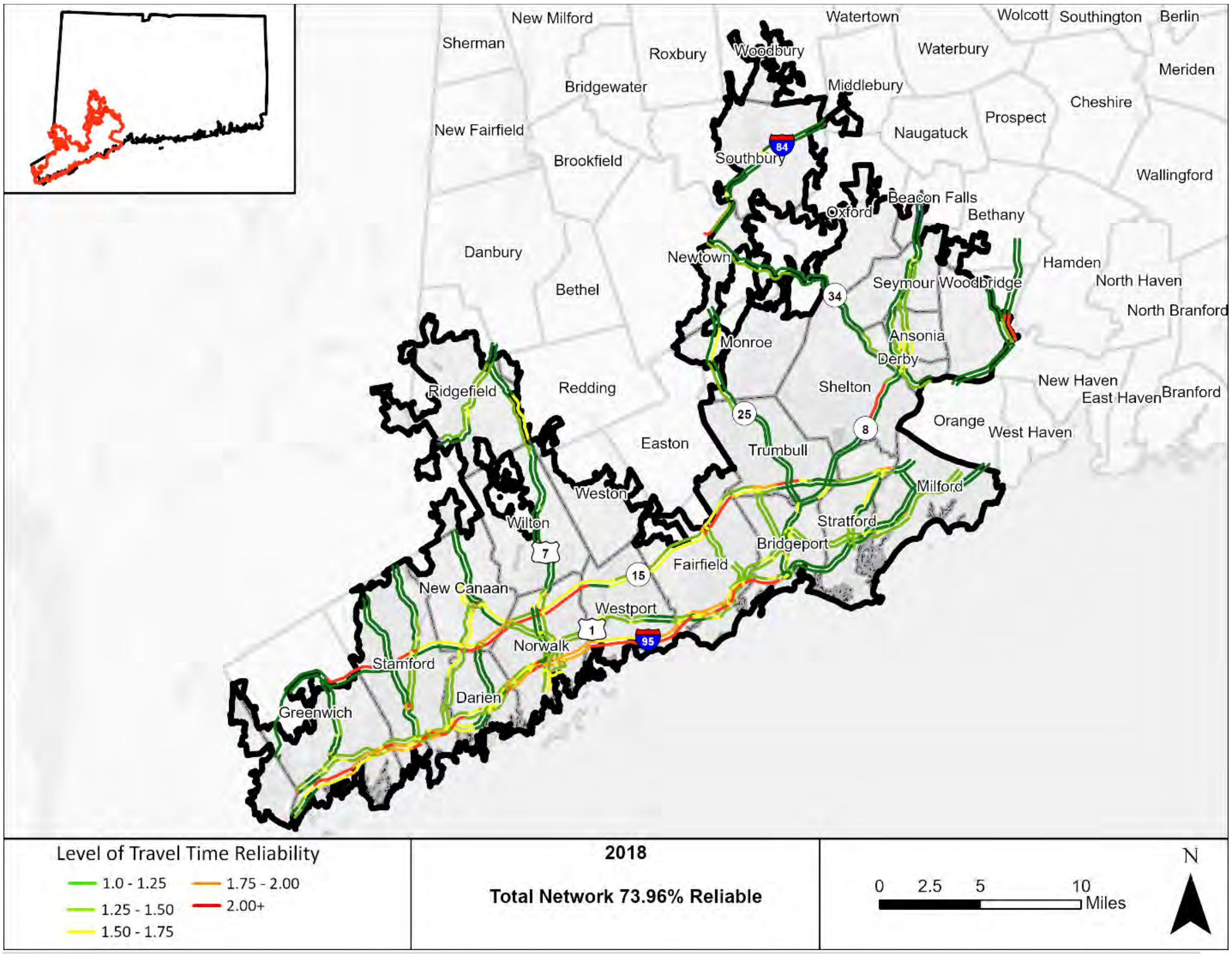
7.3 Monitoring

This is the first CMP for the entire Bridgeport-Stamford TMA and thus establishes a baseline to monitor performance measures moving forward. As projects are completed, the measures can be compared in the project area to gauge their effectiveness. The MAP-21 widget provides a quick and effective way to calculate LOTTR, TTTR, and PHED on demand. In addition, as the 5-year ACS is updated, Non-SOV travel in the TMA can be calculated.

Appendix A: Level of Travel Time Reliability Index







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Newtown
Hamden
Bethel
Seymour
Woodbridge
North Haven
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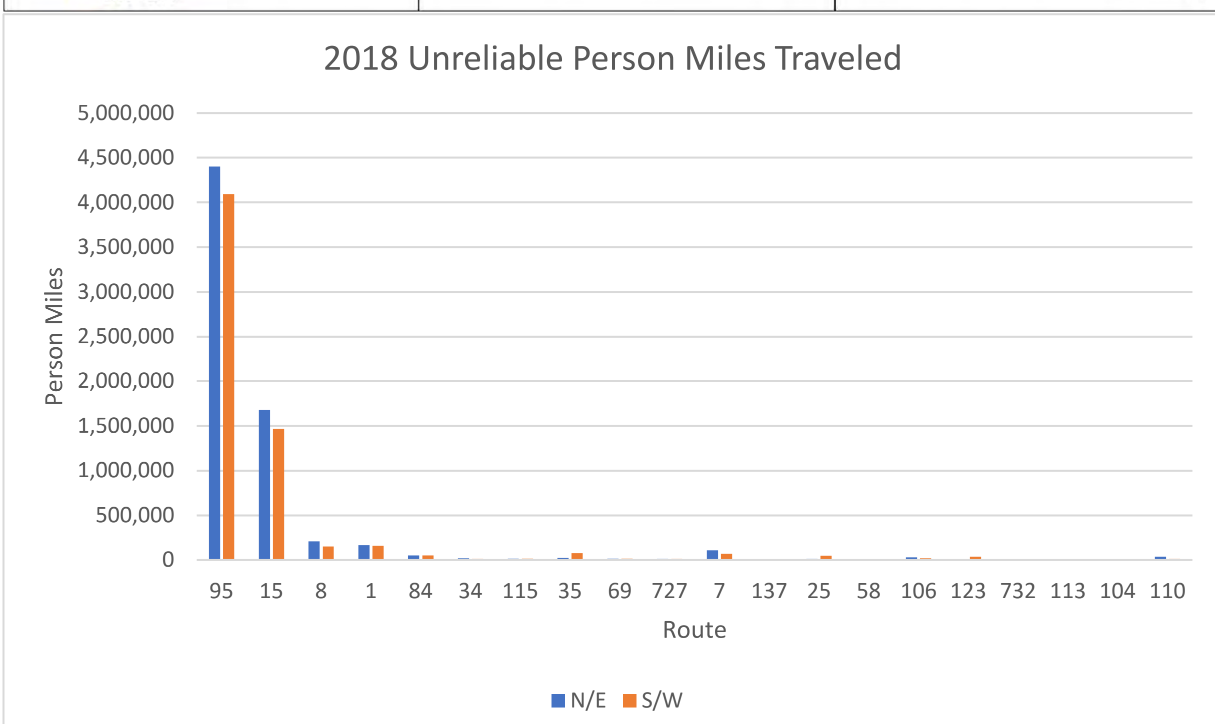
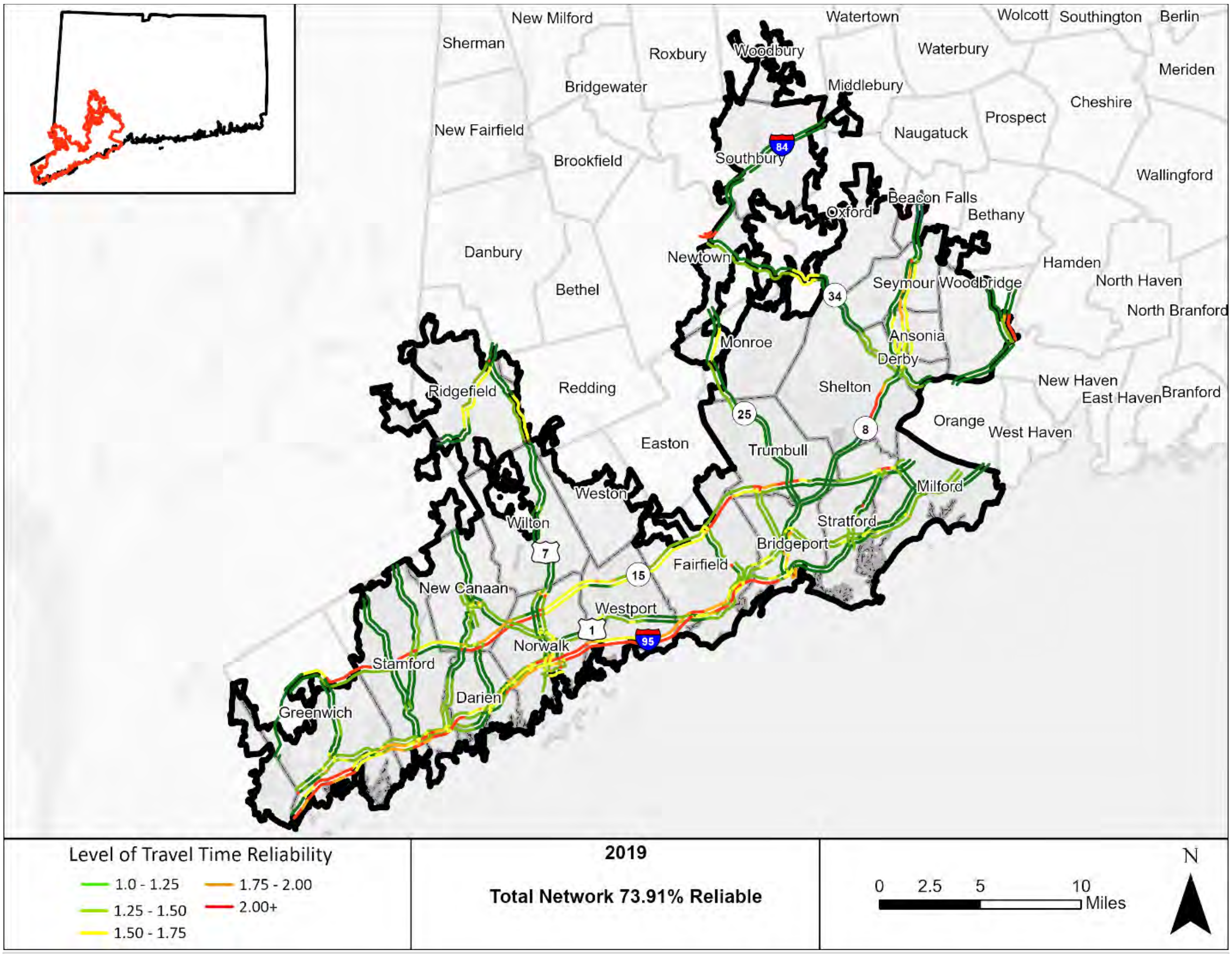
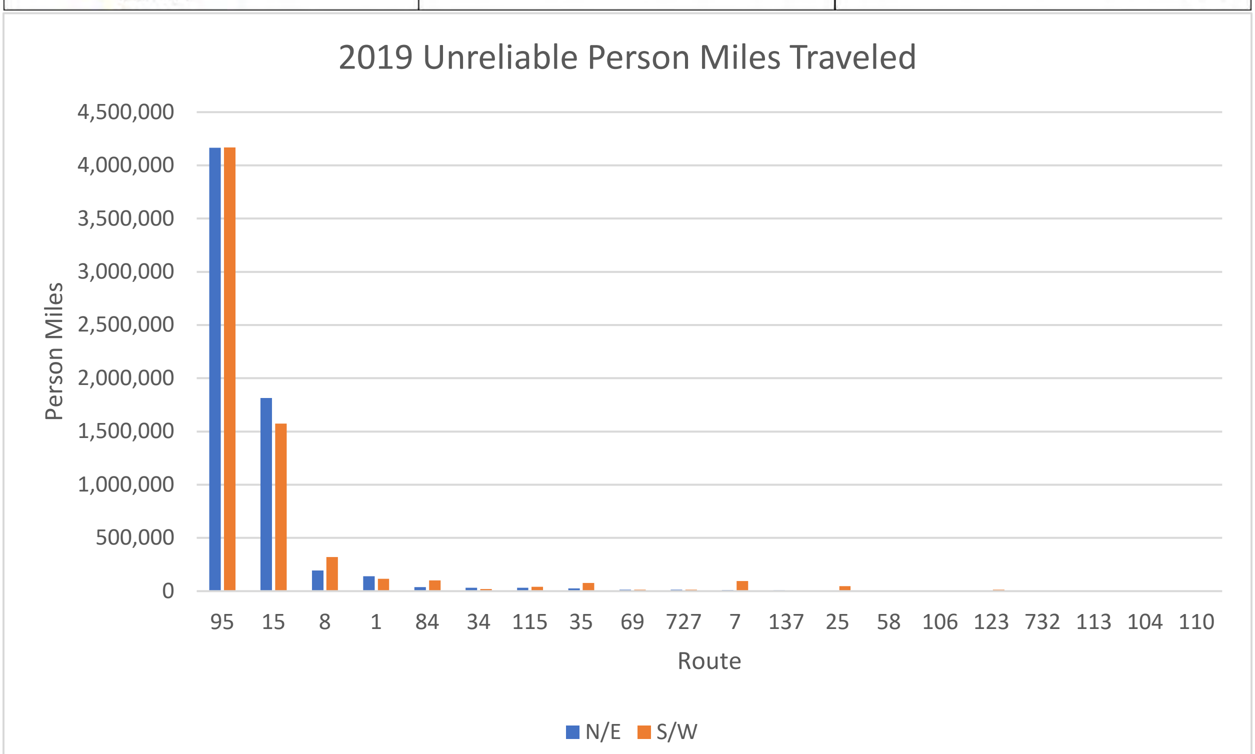
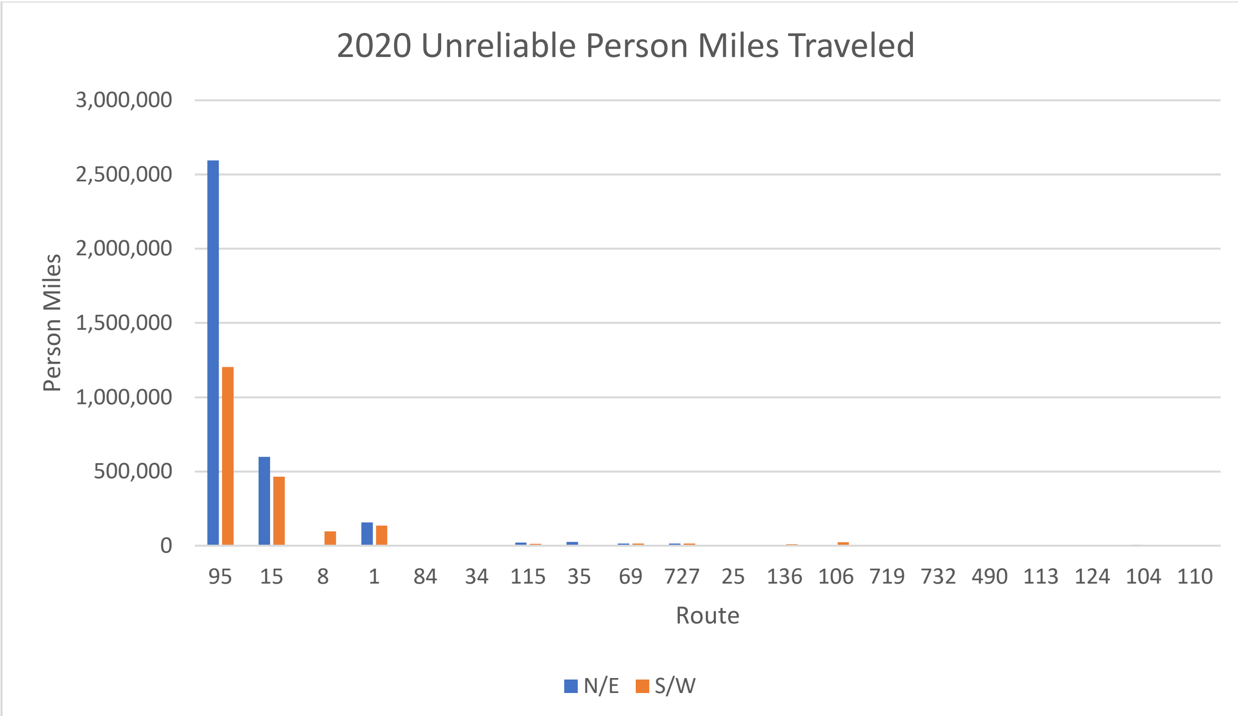
North Branford
Ansonia
Monroe
Derby
Ridgefield
Redding
Shelton
New Haven
East Haven
Branford
25
Orange
8
West Haven
Easton
Trumbull
Weston
Milford
Wilton
Stratford
7
Bridgeport
Fairfield
15
New Canaan
Westport
1
95
Norwalk
Stamford
Darien
Greenwich
Level of Travel Time Reliability
1.0 - 1.25
1.25 - 1.50
1.50 - 1.75
1.75 - 2.00
2.00+
2018
Total Network 73.96% Reliable
0 2.5 5 10 Miles
N



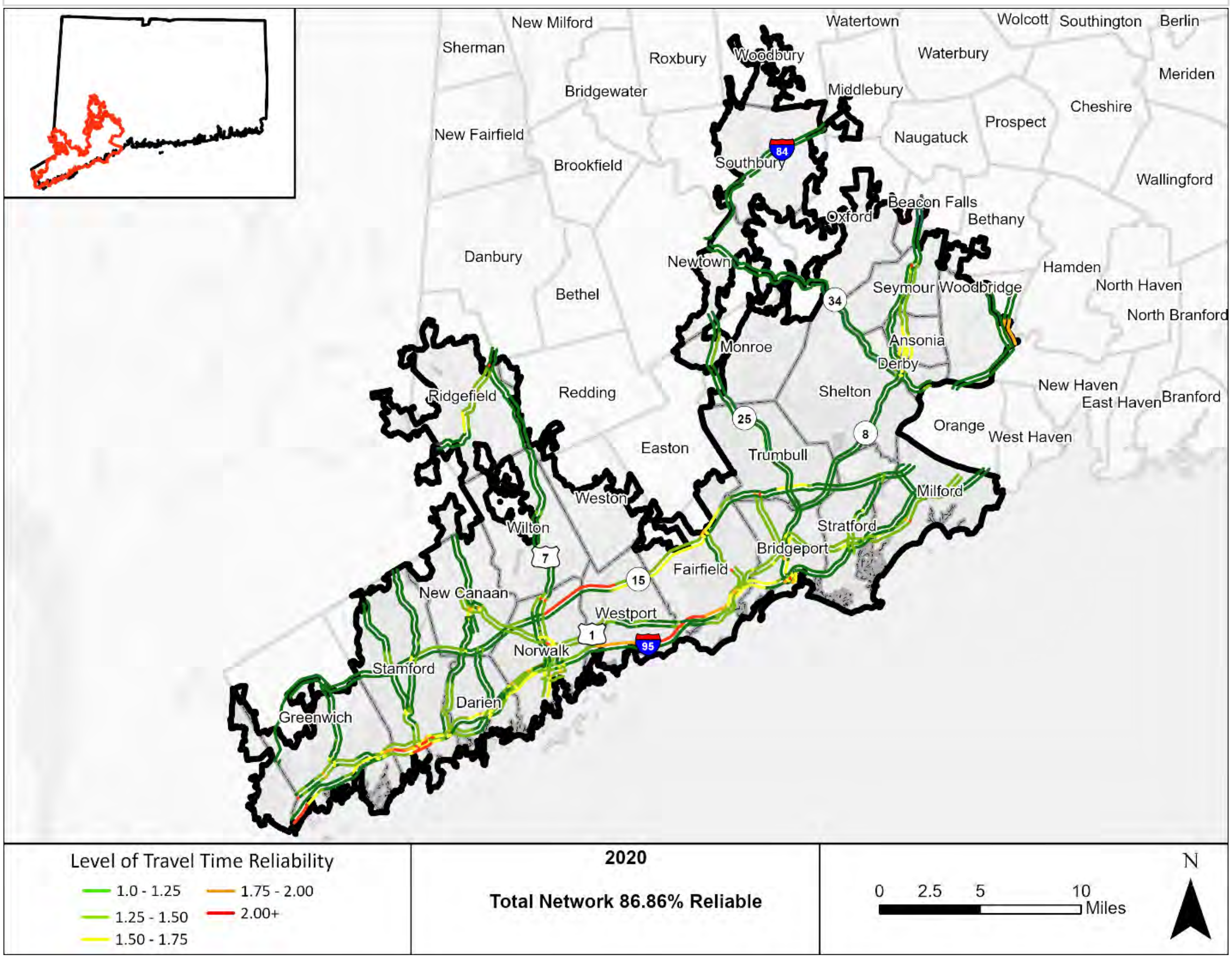
2018 Unreliable Person Miles Traveled
5,000,000
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Person Miles
95 15 8 1 84 34 115 35 69 727 7 137 25 58 106 123 732 113 104 110
Route
N/E
S/W


Level of Travel Time Reliability
1.0 - 1.25
1.25 - 1.50
1.50 - 1.75
1.75 - 2.00
2.00+
2019
Total Network 73.91% Reliable
0 2.5 5 10 Miles
N


2019 Unreliable Person Miles Traveled
Person Miles
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
95 15 8 1 84 34 115 35 69 727 7 137 25 58 106 123 732 113 104 110
Route
N/E
S/W



2020 Unreliable Person Miles Traveled
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Person Miles
95 15 8 1 84 34 115 35 69 727 25 136 106 719 732 490 113 124 104 110
Route
N/E
S/W



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Woodbridge
North Haven
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Monroe
Ansonia
Derby
Ridgefield
Redding
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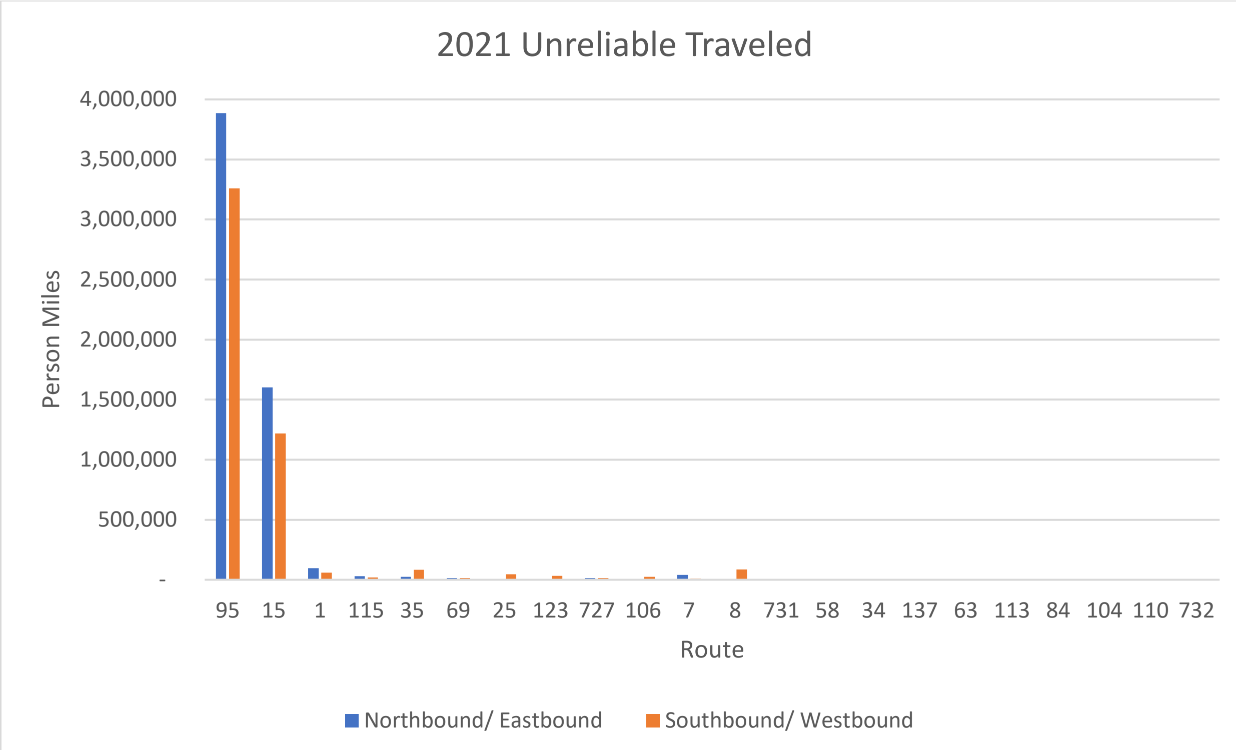
Easton
Trumbull
Weston
Milford
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
Level of Travel Time Reliability
1.0 - 1.25
1.25 - 1.50
1.50 - 1.75
1.75 - 2.00
2.00+
2020
Total Network 86.86% Reliable
0 2.5 5 10
Miles
N


2021 Unreliable Traveled
4,000,000
3,500,000
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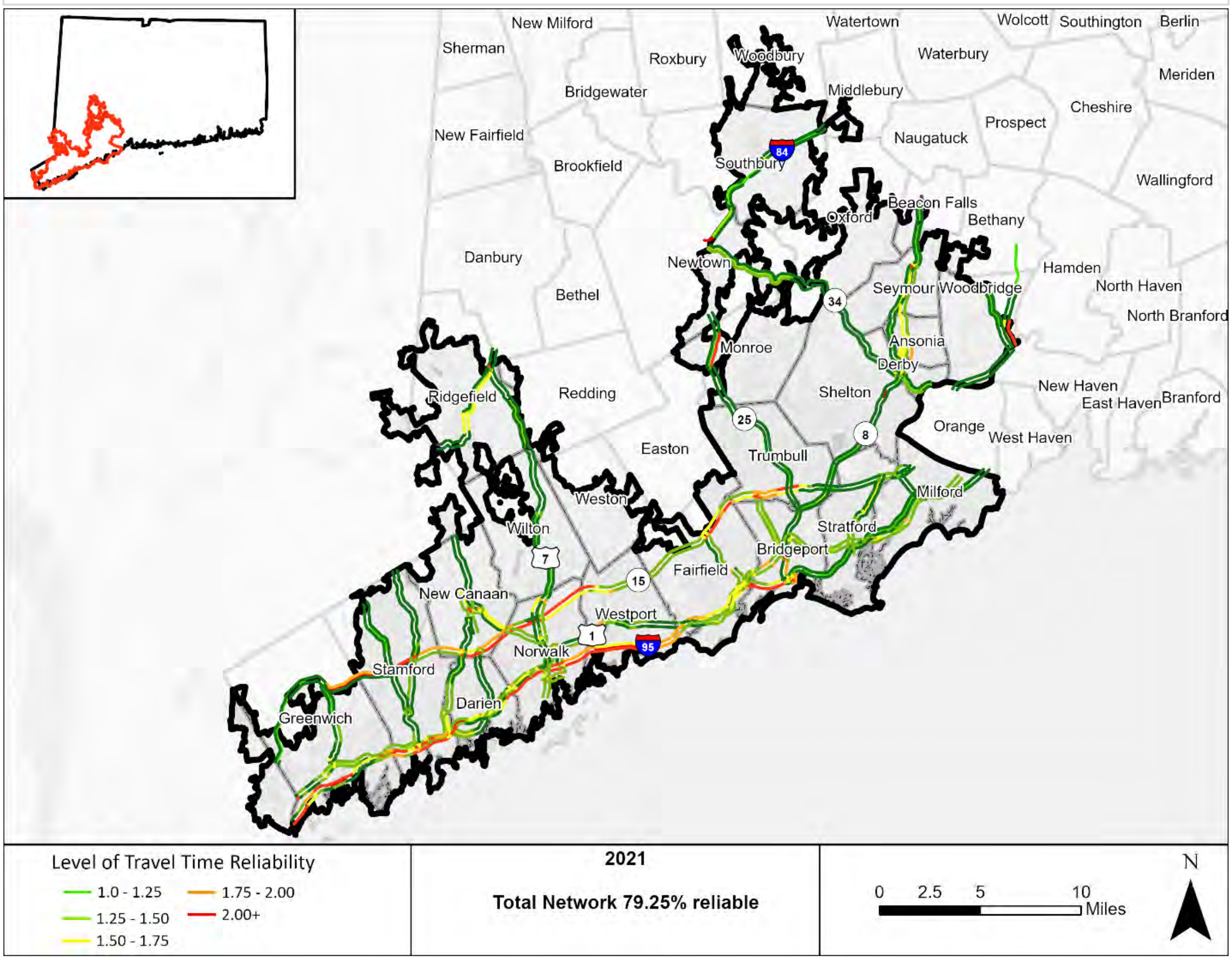
2,500,000
2,000,000
1,500,000
1,000,000
500,000
-
Person Miles
95 15 1 115 35 69 25 123 727 106 7 8 731 58 34 137 63 113 84 104 110 732
Route
Northbound/ Eastbound
Southbound/ Westbound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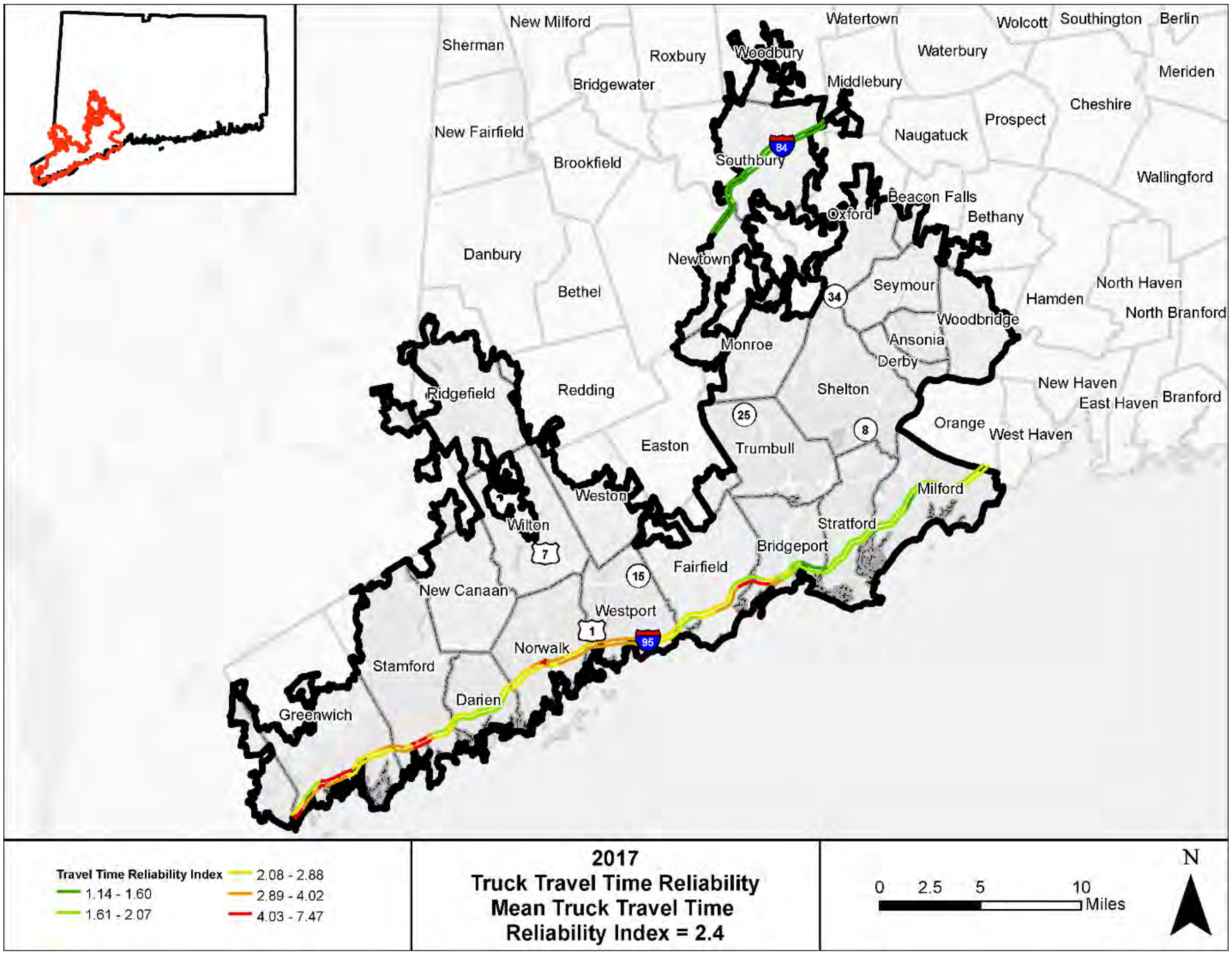
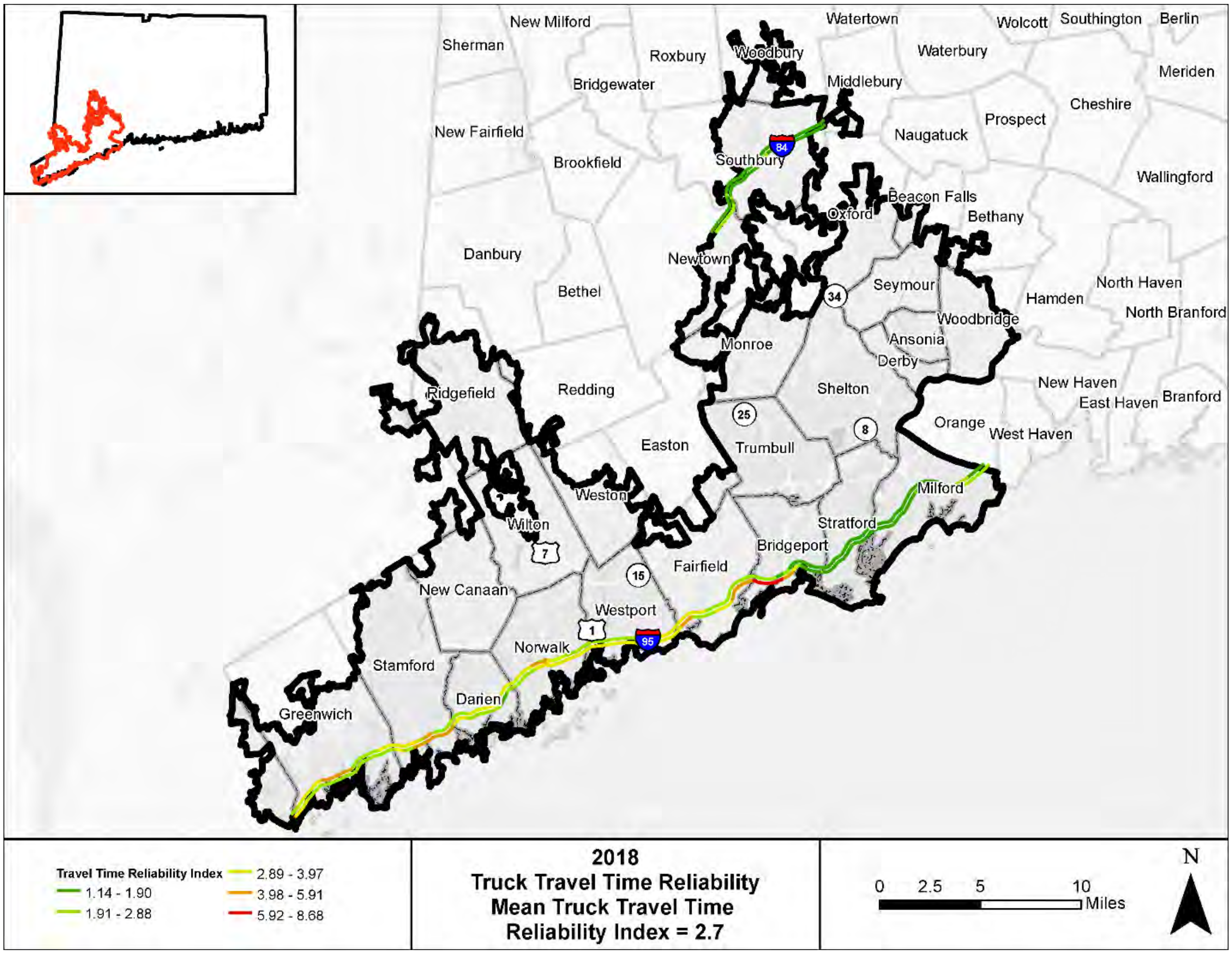
Orange
Easton
West Haven
Trumbull
Milford
Weston
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
Level of Travel Time Reliability
1.0 - 1.25
1.25 - 1.50
1.50 - 1.75
1.75 - 2.00
2.00+
2021
Total Network 79.25% reliable
0 2.5 5 10
Miles
N

Appendix B: Truck Travel Time Reliability Index

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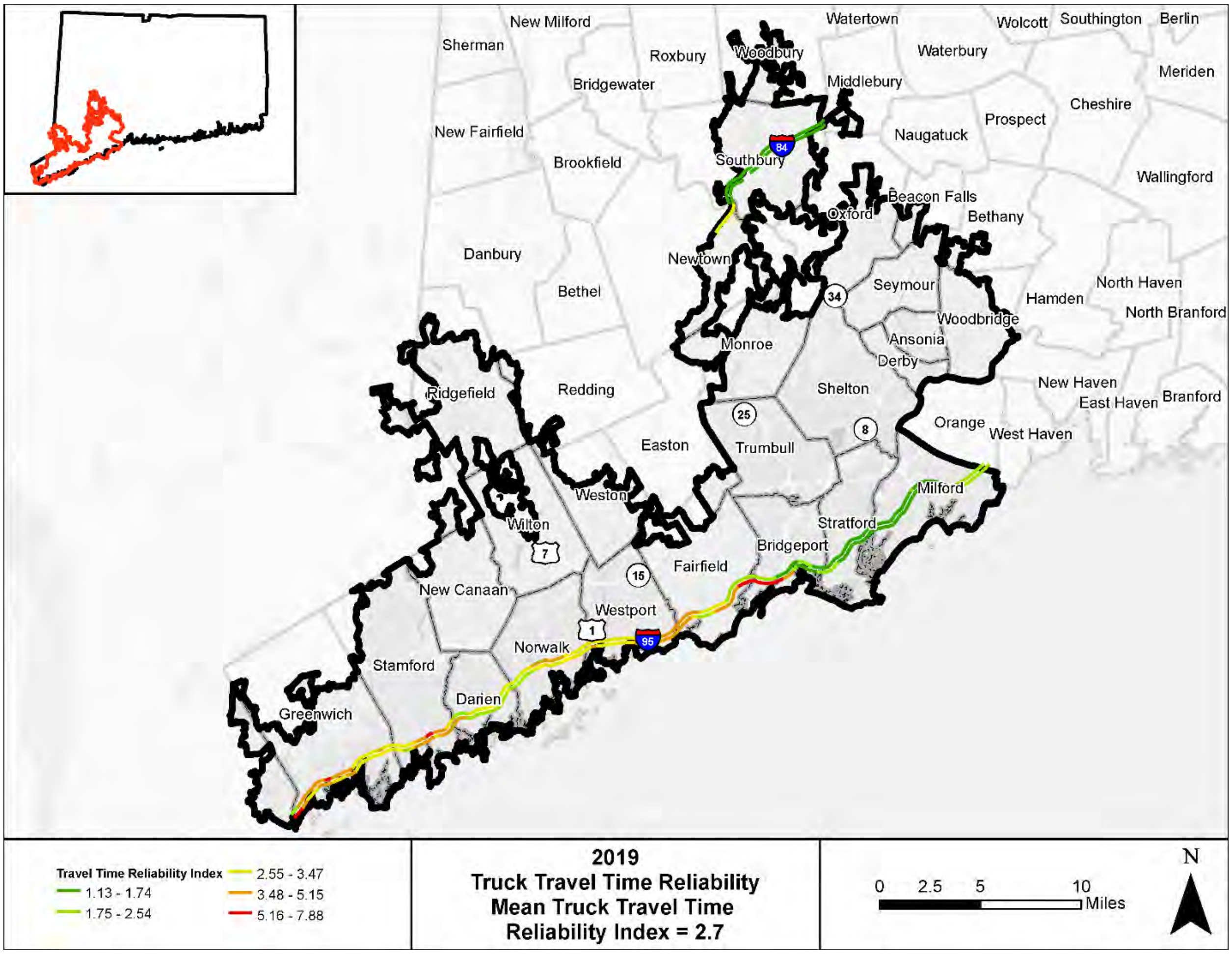
Woodbridge
Monroe
Ansonia
Derby
Ridgefield
Redding
Shelton
New Haven
East Haven
Branford
Orange
West Haven
Easton
Trumbull
Milford
Weston
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
Travel Time Reliability Index
1.14 - 1.90
1.91 - 2.88
2.89 - 3.97
3.98 - 5.91
5.92 - 8.68
2018
Truck Travel Time Reliability
Mean Truck Travel Time
Reliability Index = 2.7
0 2.5 5 10
Miles
N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Naugatuck
Southbury
84
Brookfield
Wallingford
Beacon Falls
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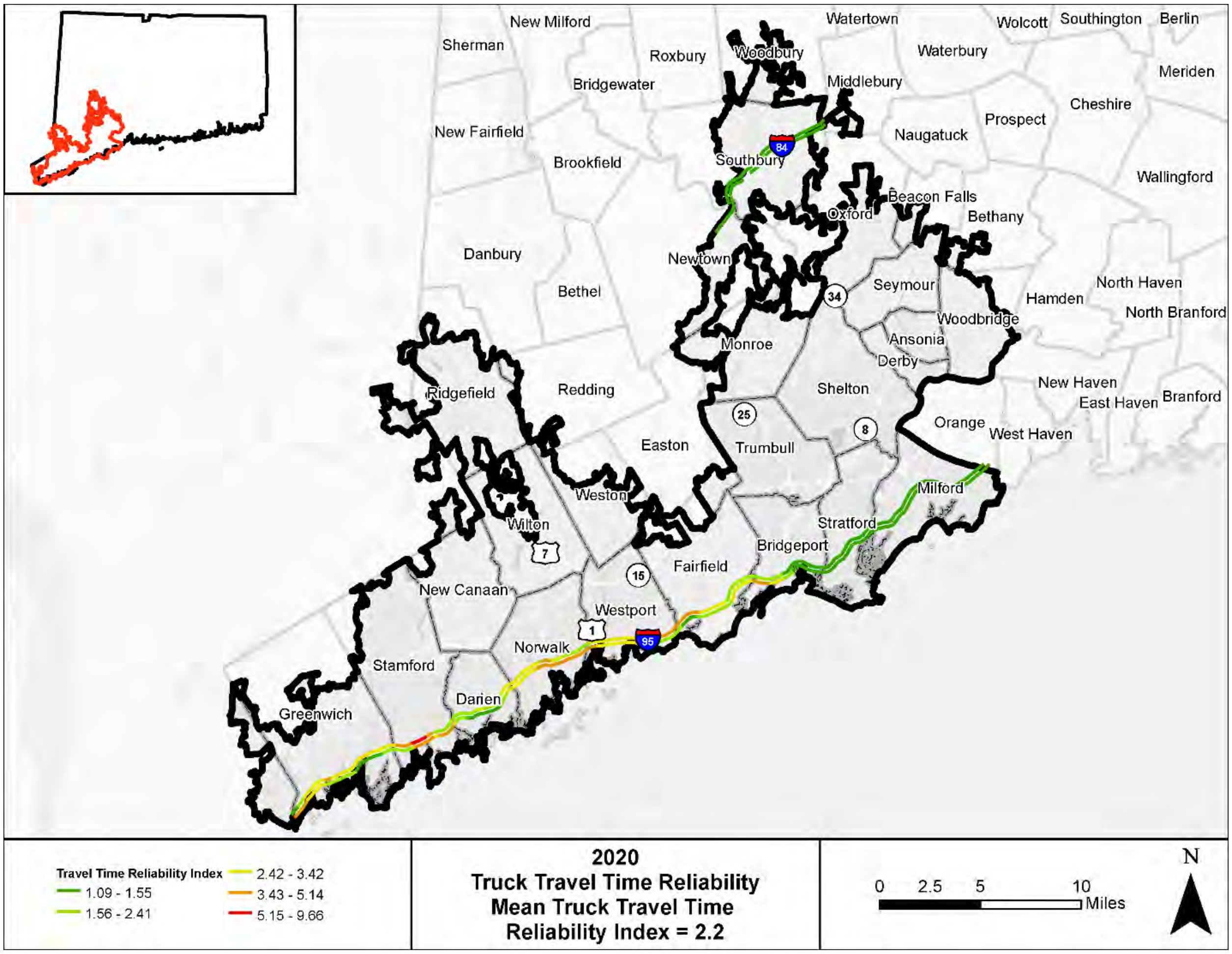
Milford
Weston
Wilton
Stratford
7
Bridgeport
15
Fairfield
New Canaan
Westport
1
95
Norwalk
Stamford
Darien
Greenwich
Travel Time Reliability Index
1.13 - 1.74
1.75 - 2.54
2.55 - 3.47
3.48 - 5.15
5.16 - 7.88
2019
Truck Travel Time Reliability
Mean Truck Travel Time
Reliability Index = 2.7
0
2.5
5
10
Miles
N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Naugatuck
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Brookfield
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Bridgeport
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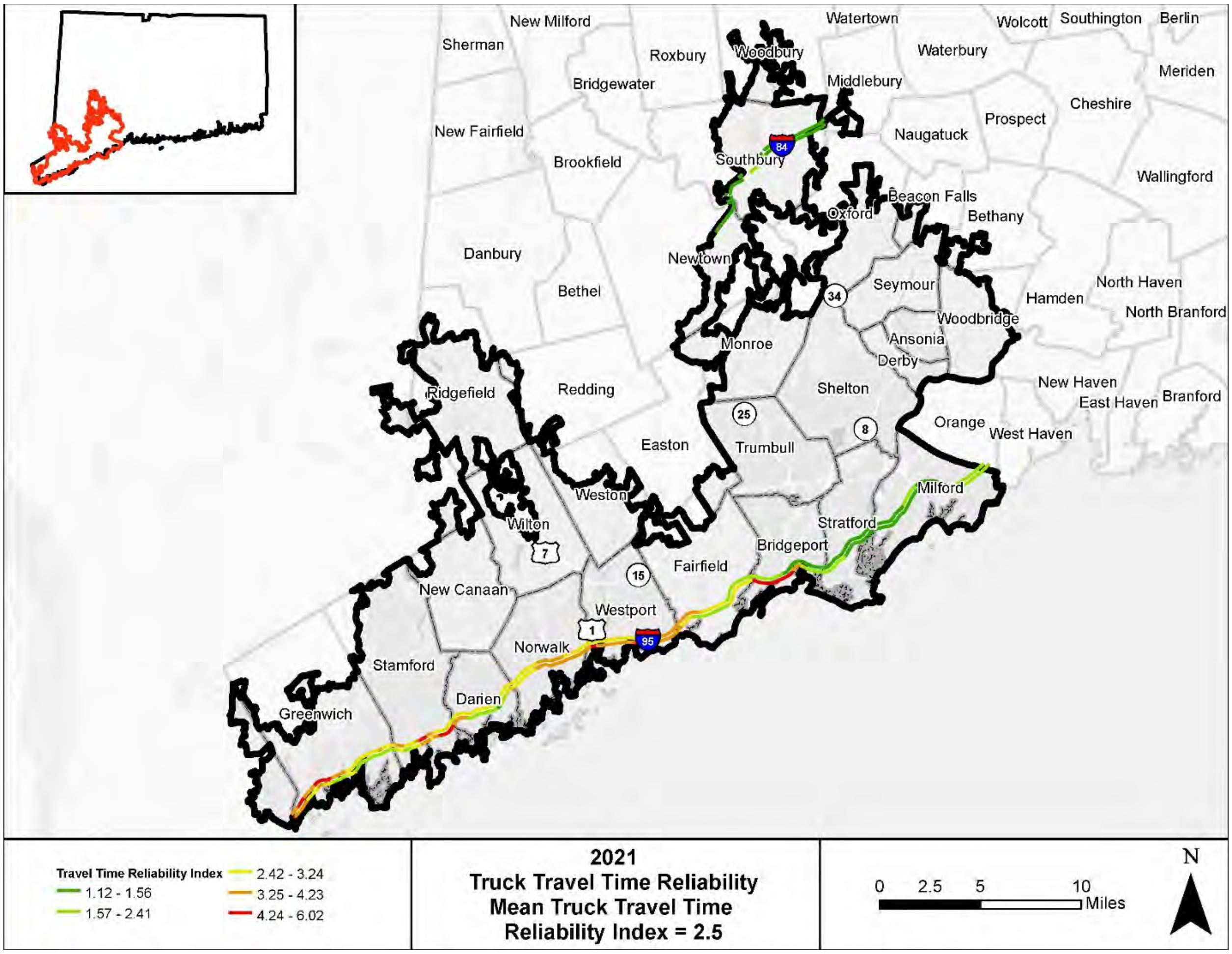
Fairfield
New Canaan
Westport
1
95
Norwalk
Stamford
Darien
Greenwich
Travel Time Reliability Index
1.09 - 1.55
1.56 - 2.41
2.42 - 3.42
3.43 - 5.14
5.15 - 9.66
2020
Truck Travel Time Reliability
Mean Truck Travel Time
Reliability Index = 2.2
0 2.5 5 10
Miles
N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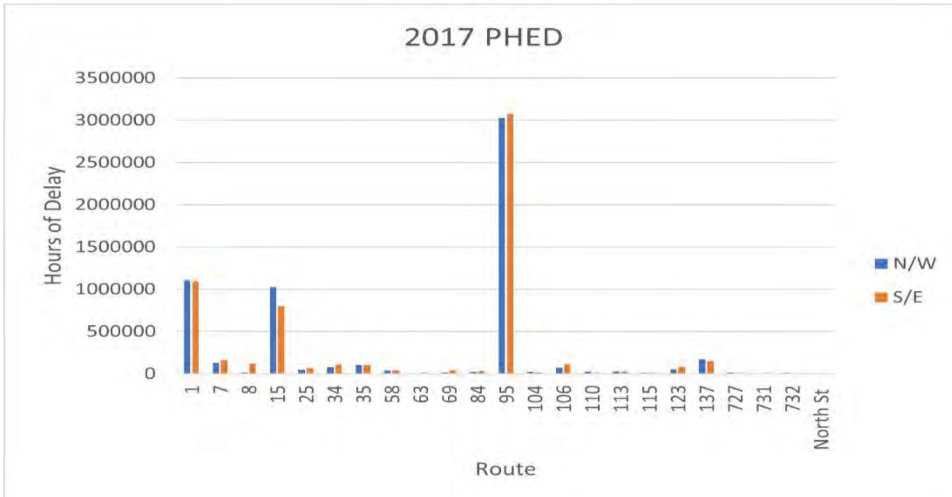
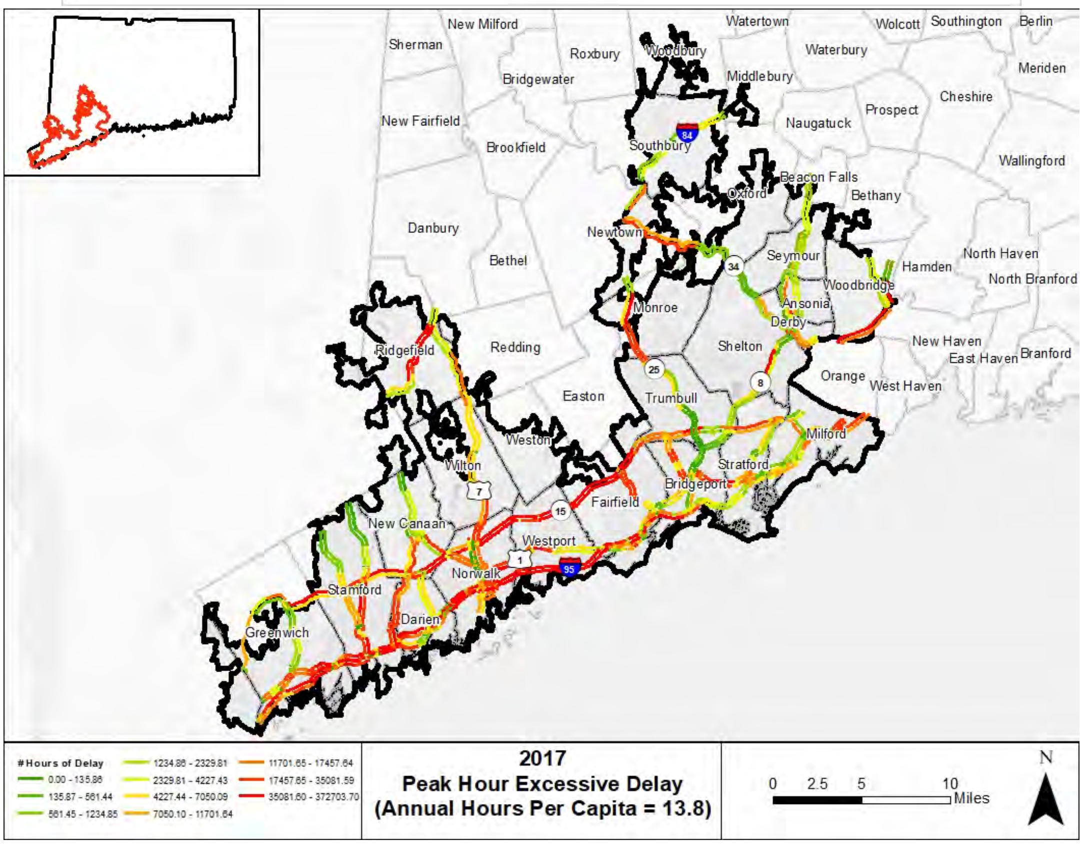
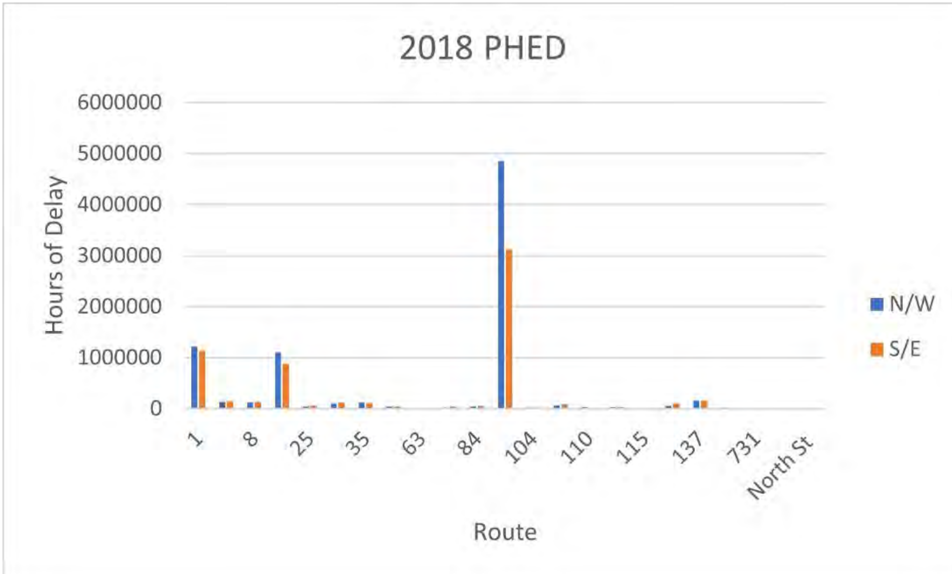
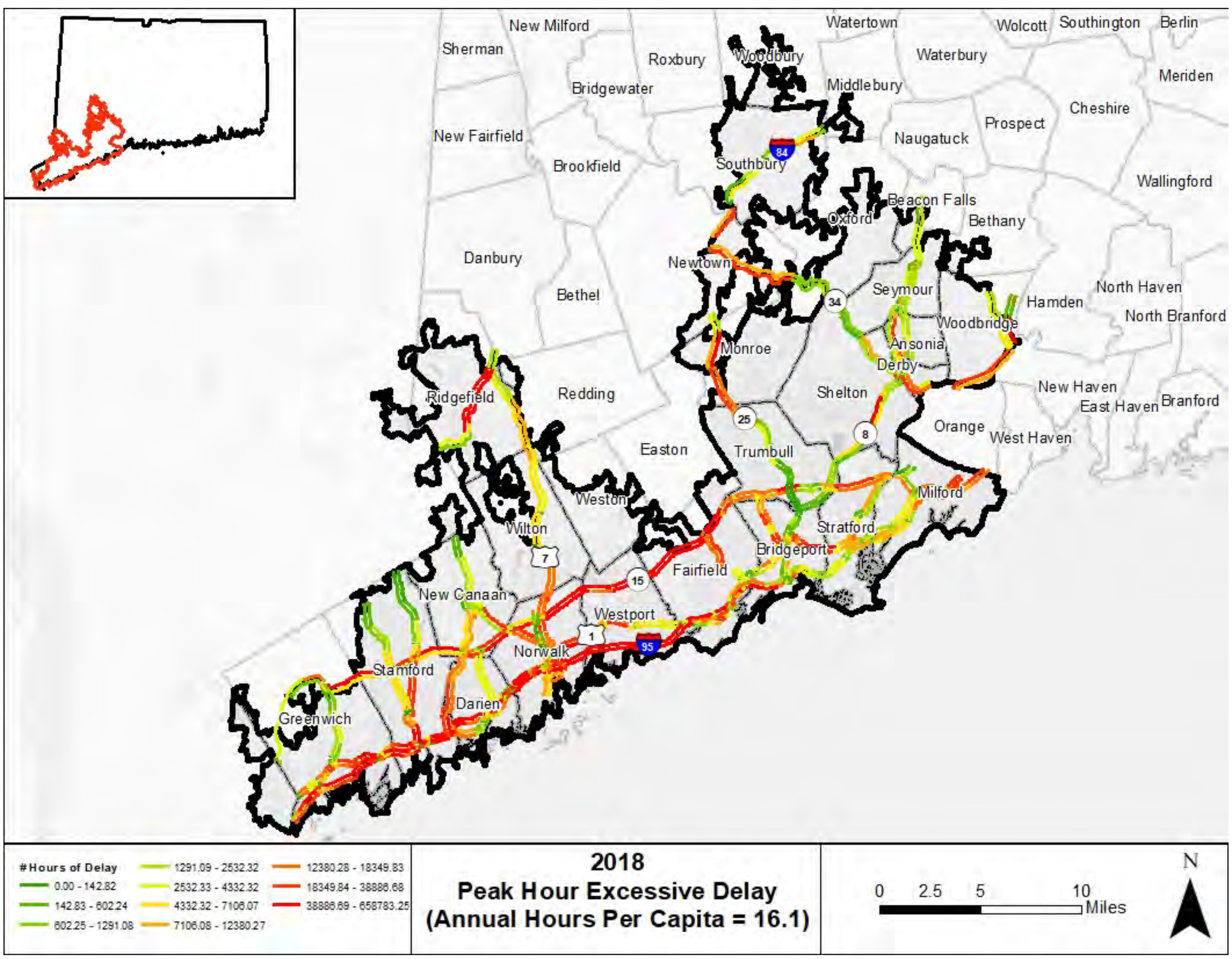
Trumbull
Milford
Weston
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
Travel Time Reliability Index
1.12 - 1.56
1.57 - 2.41
2.42 - 3.24
3.25 - 4.23
4.24 - 6.02
2021
Truck Travel Time Reliability
Mean Truck Travel Time
Reliability Index = 2.5
0 2.5 5 10
Miles
N

Appendix C: Peak Hour Excessive Delay






2018 PHED
Hours of Delay
6000000
5000000
4000000
3000000
2000000
1000000
0
1
8
25
35
63
84
104
110
115
137
731
North St
Route
N/W
S/E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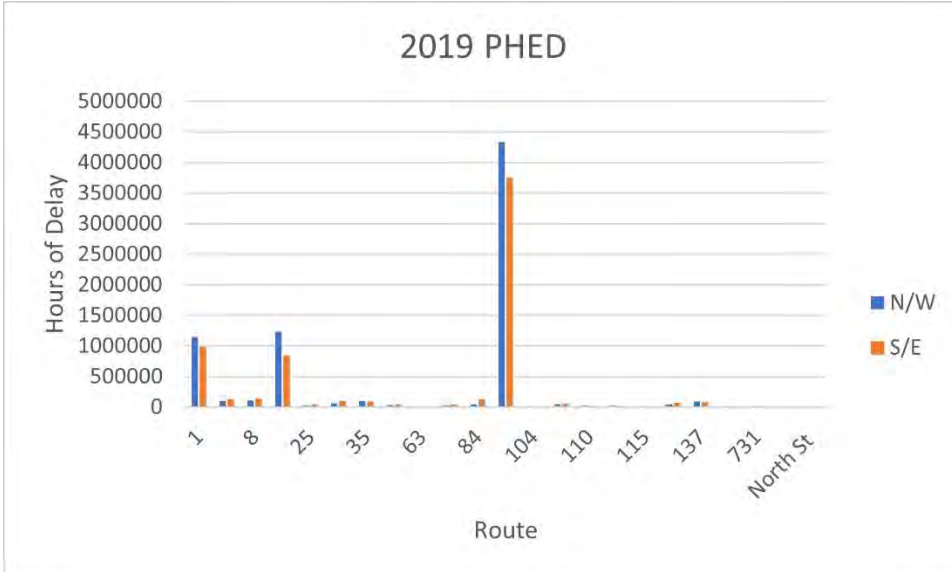
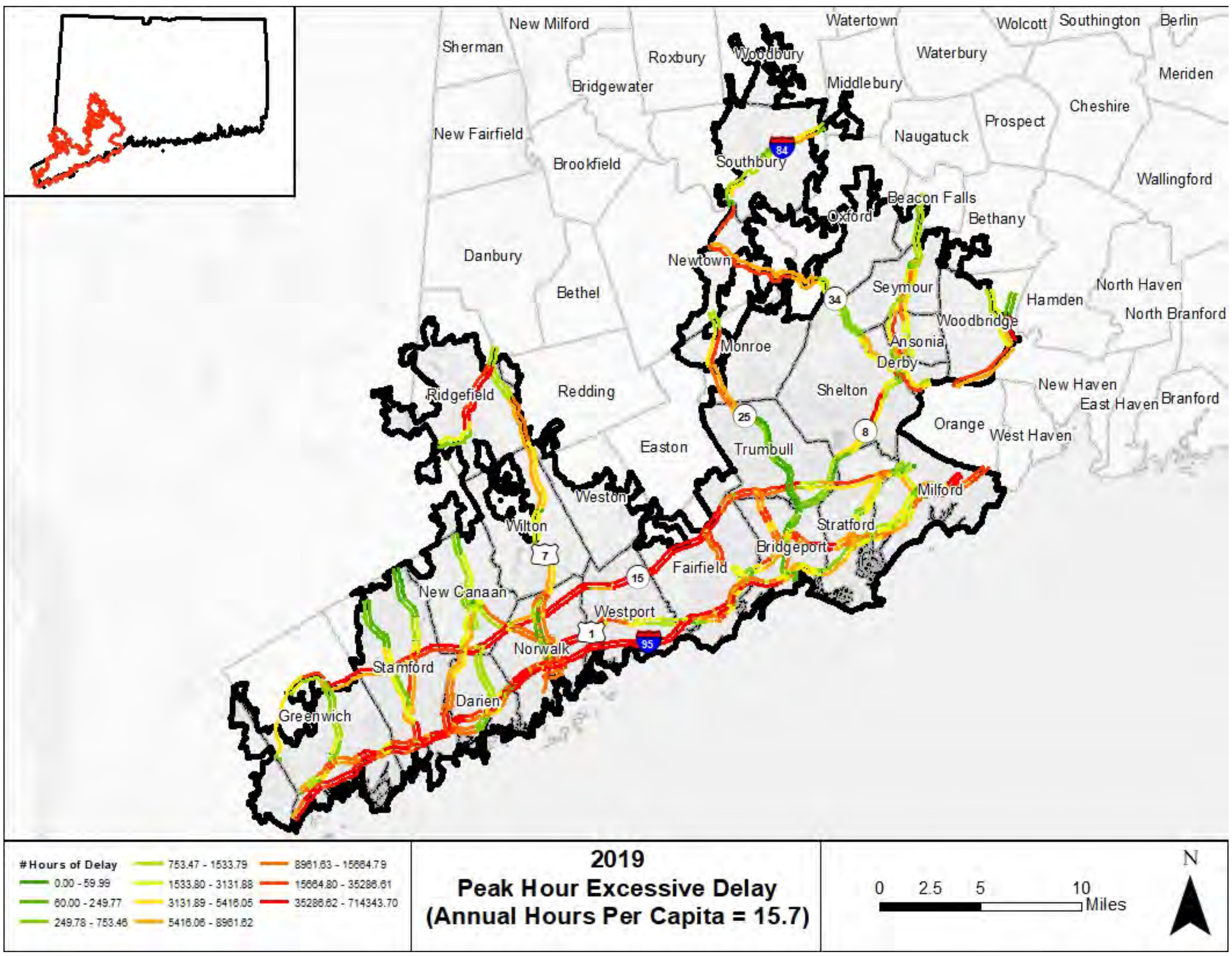
Easton
Trumbull
Weston
Milford
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
Hours of Delay
0.00 - 142.82
142.83 - 602.24
602.25 - 1291.08
1291.09 - 2532.32
2532.33 - 4332.32
4332.32 - 7106.07
7106.08 - 12380.27
12380.28 - 18349.83
18349.84 - 38886.68
38886.69 - 658783.25
2018
Peak Hour Excessive Delay
(Annual Hours Per Capita = 16.1)
0 2.5 5 10
Miles
N


2019 PHED
Hours of Delay
5000000
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
1
8
25
35
63
84
104
110
115
137
731
North St
Route
N/W
S/E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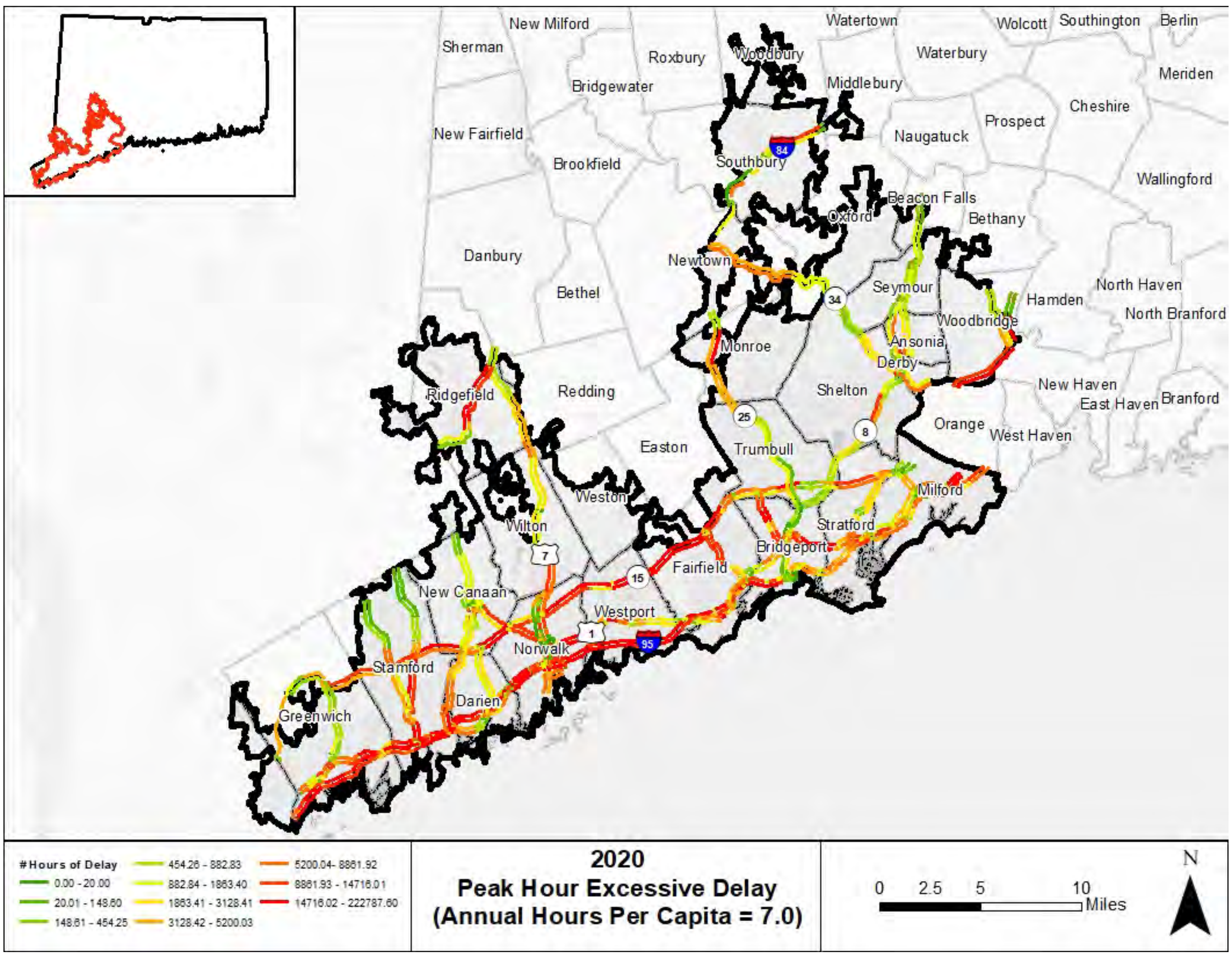
Easton
Trumbull
Weston
Milford
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
Hours of Delay
0.00 - 59.99
60.00 - 249.77
249.78 - 753.46
753.47 - 1533.79
1533.80 - 3131.88
3131.89 - 5416.05
5416.06 - 8961.62
8961.63 - 15664.79
15664.80 - 35286.61
35286.62 - 714343.70
2019
Peak Hour Excessive Delay
(Annual Hours Per Capita = 15.7)
0
2.5
5
10
Miles
N


2020 PHED
Hours of Delay
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
1
8
25
35
63
84
104
110
115
137
731
North St
Route
N/W
S/E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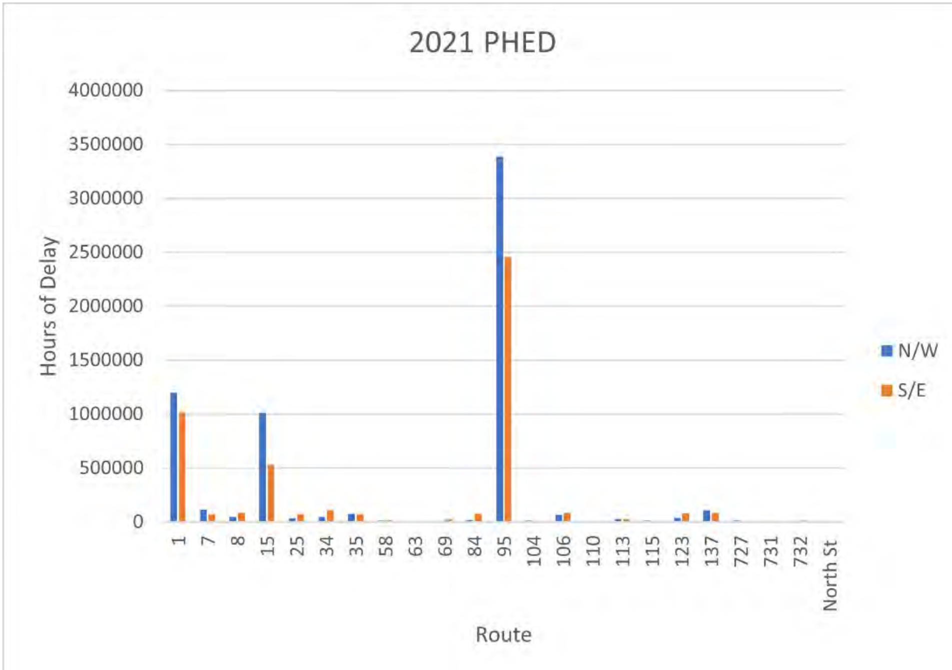
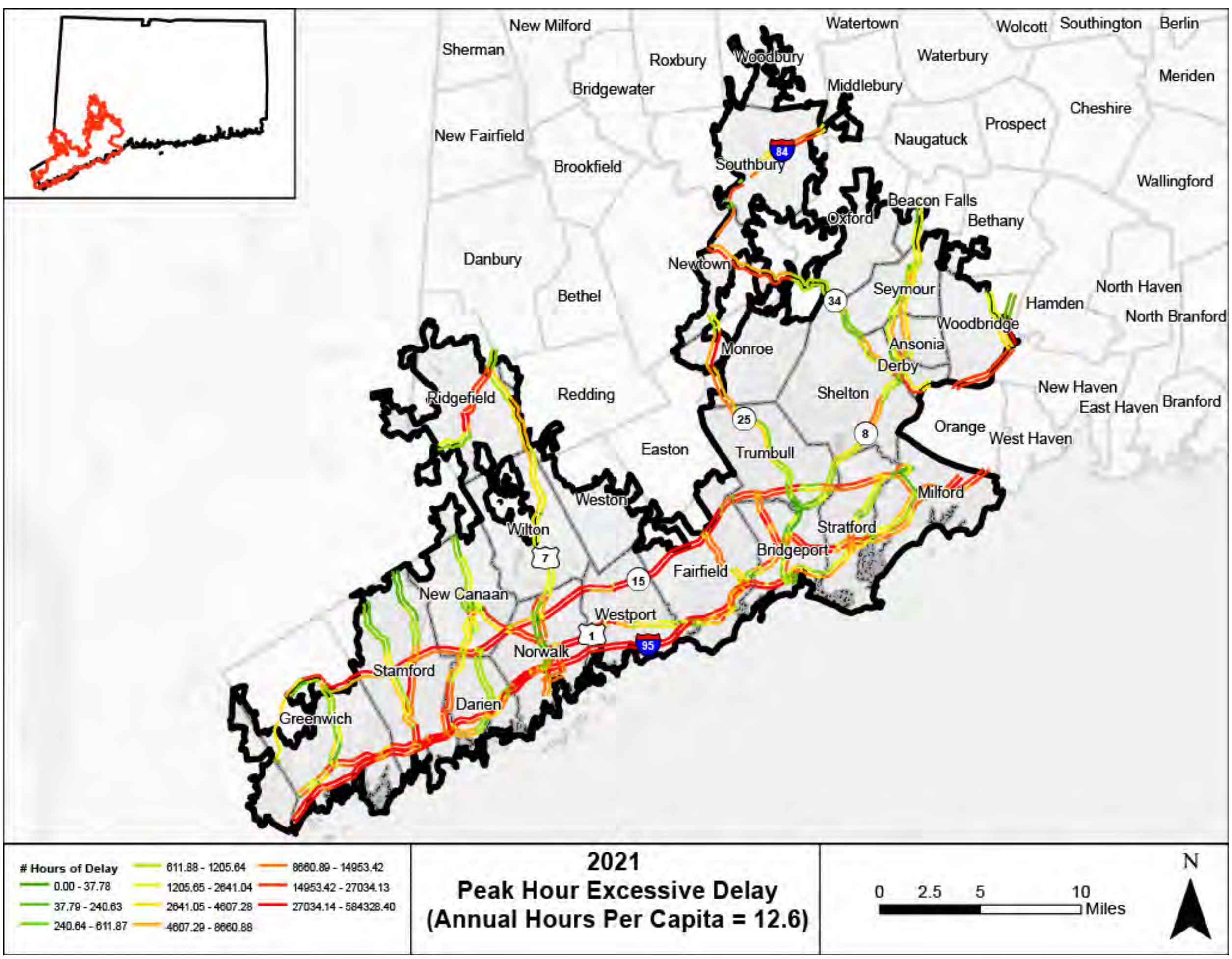
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
Hours of Delay
0.00 - 20.00
20.01 - 148.60
148.61 - 454.25
454.26 - 882.83
882.84 - 1863.40
1863.41 - 3128.41
3128.42 - 5200.03
5200.04- 8861.92
8861.93 - 14716.01
14716.02 - 222787.60
2020
Peak Hour Excessive Delay
(Annual Hours Per Capita = 7.0)
0
2.5
5
10
Miles
N


2021 PHED
Hours of Delay
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
1
7
8
15
25
34
35
58
63
69
84
95
104
106
110
113
115
123
137
727
731
732
North St
Route
N/W
S/E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Milford
Weston
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
84
34
25
8
7
15
1
95
Hours of Delay
0.00 - 37.78
37.79 - 240.63
240.64 - 611.87
611.88 - 1205.64
1205.65 - 2641.04
2641.05 - 4607.28
4607.29 - 8660.88
8660.89 - 14953.42
14953.42 - 27034.13
27034.14 - 584328.40
2021
Peak Hour Excessive Delay
(Annual Hours Per Capita = 12.6)
0
2.5
5
10
Miles
N