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.

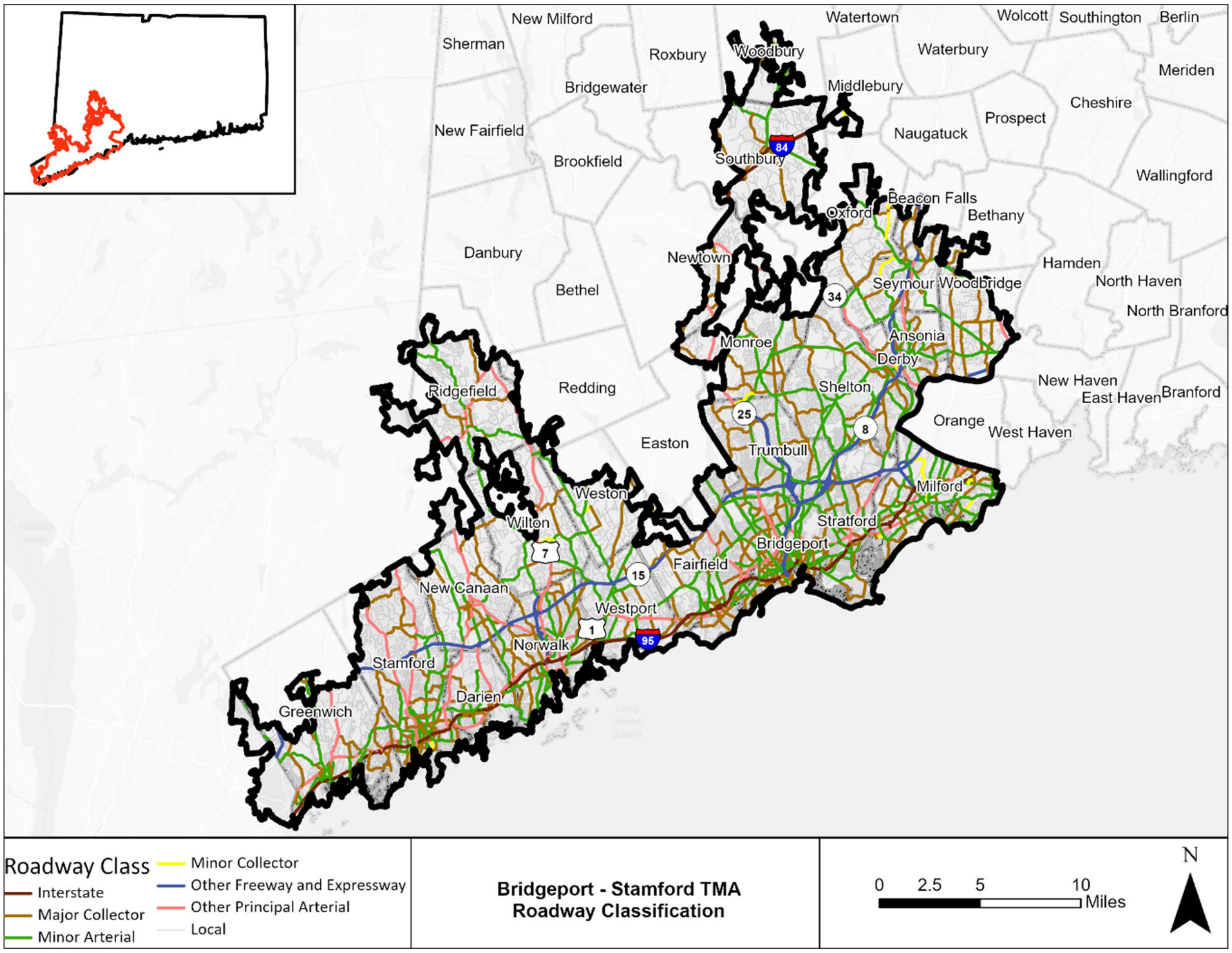


Figure 3. 1 Bridgeport-Stamford TMA Road Network

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.

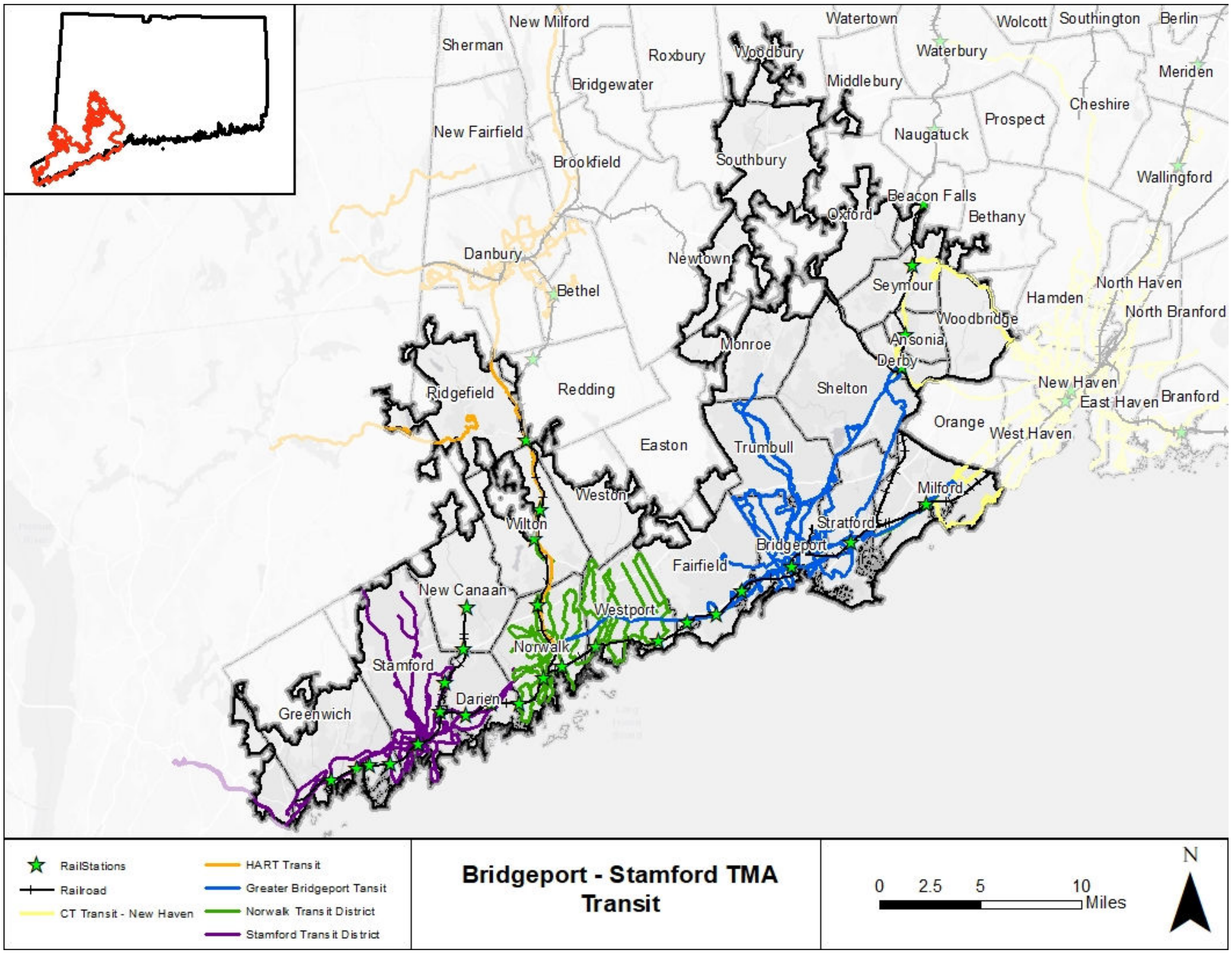


Figure 3. 2: Transit in the Bridgeport-Stamford TMA

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).

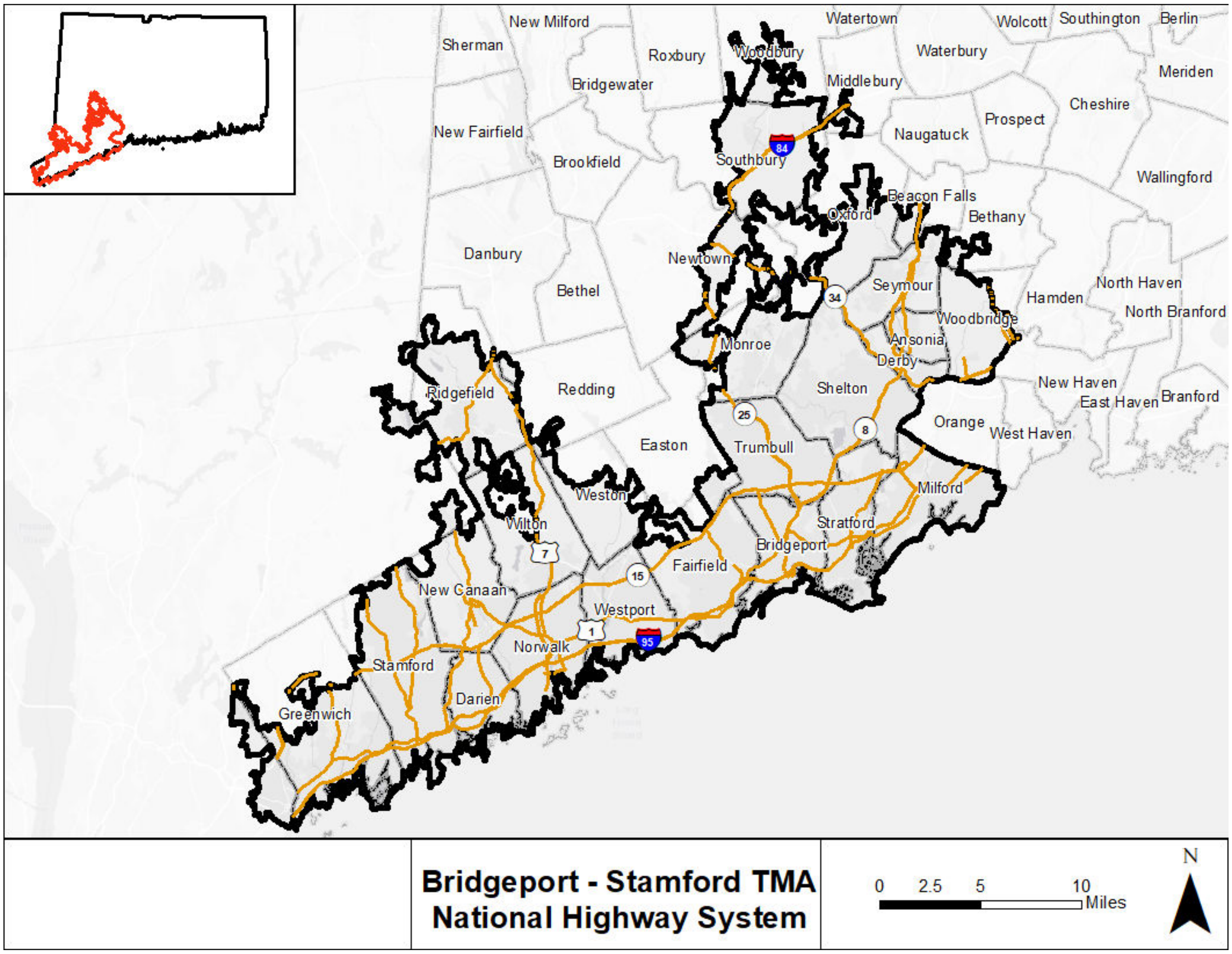


Figure 3. 3: National Highway System in the Bridgeport-Stamford TMA

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.

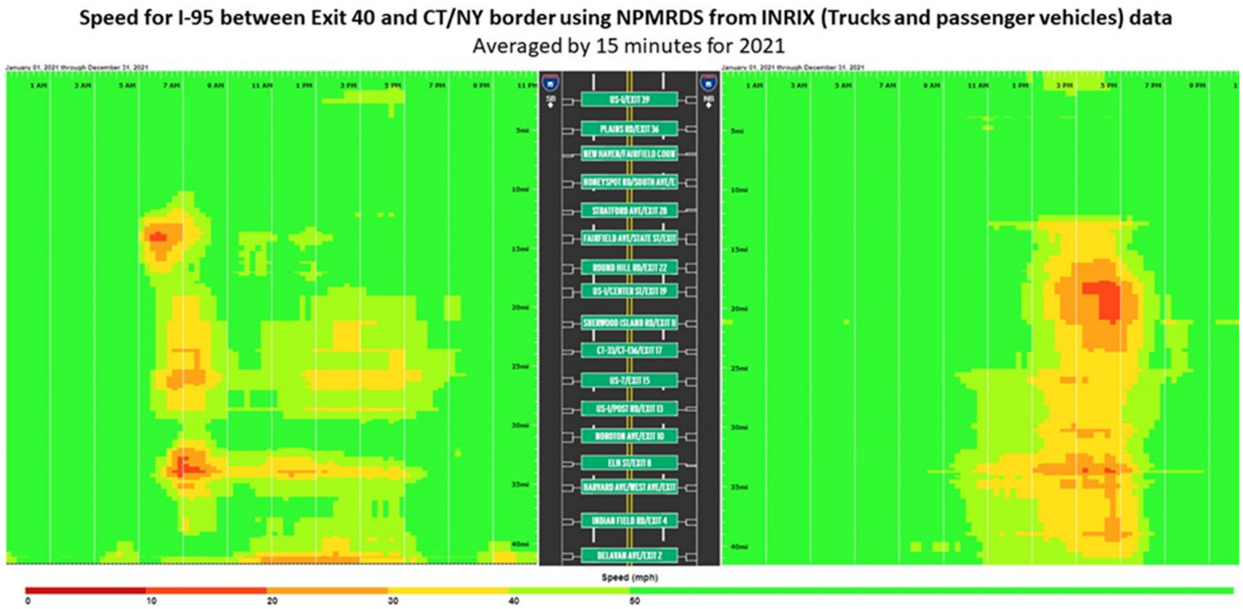


Figure 3. 4: I-95 Congestion Graph

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.

Speed for CT-15 between Exit 54 and CT/NY border using NPMRDS from INRIX (Trucks and passenger vehicles) data
Averaged by 15 minutes for 2021

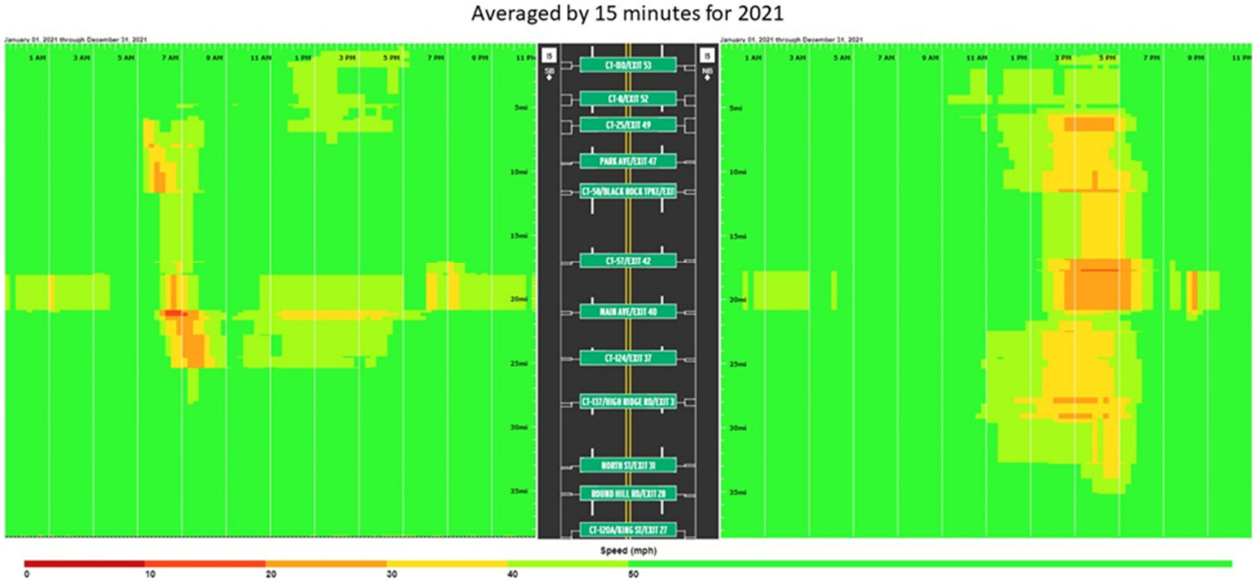


Figure 3. 5: CT Route 15 Congestion Graph

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.

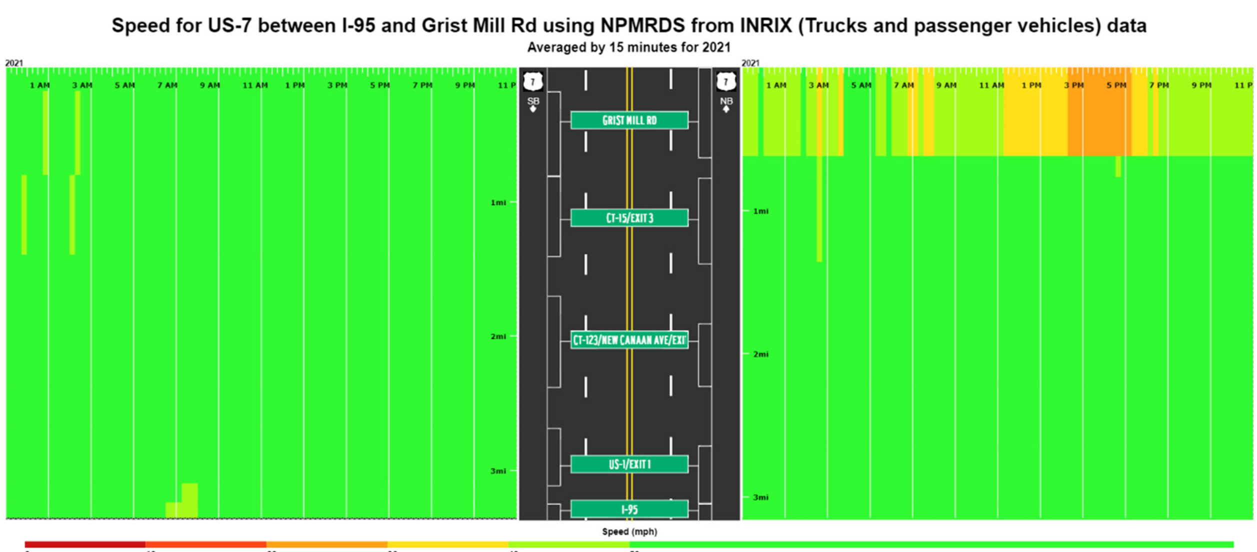


Figure 3. 6: US Route 7 Congestion Graph

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.

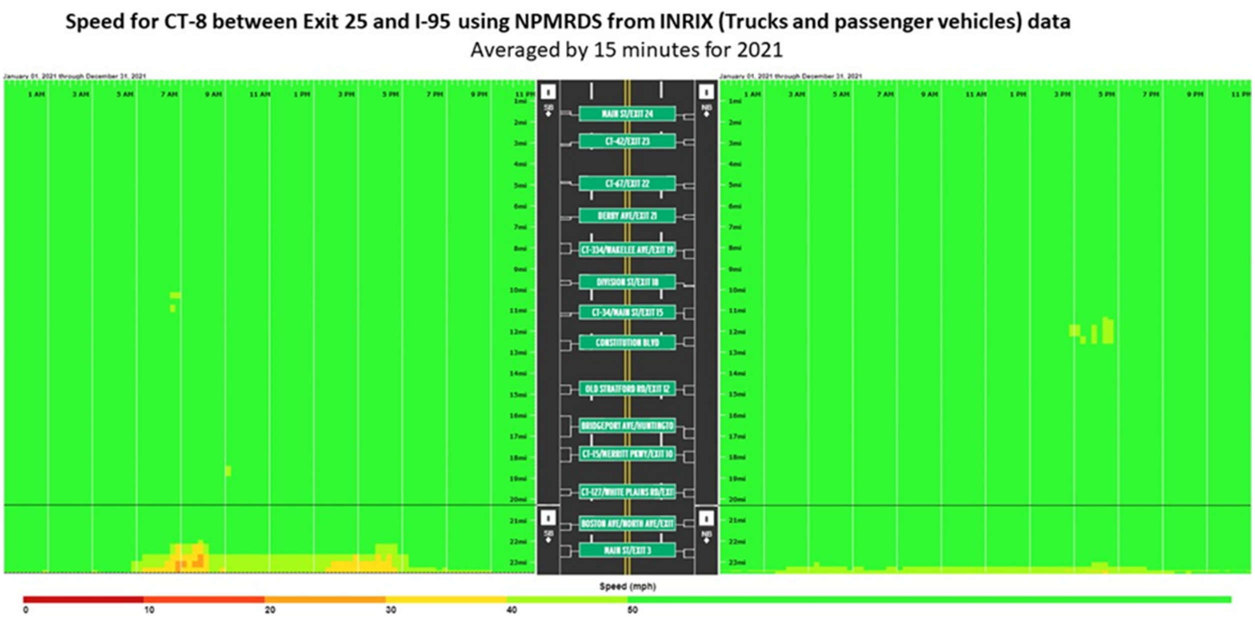


Figure 3. 7: CT Route 8 Congestion Graph

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.

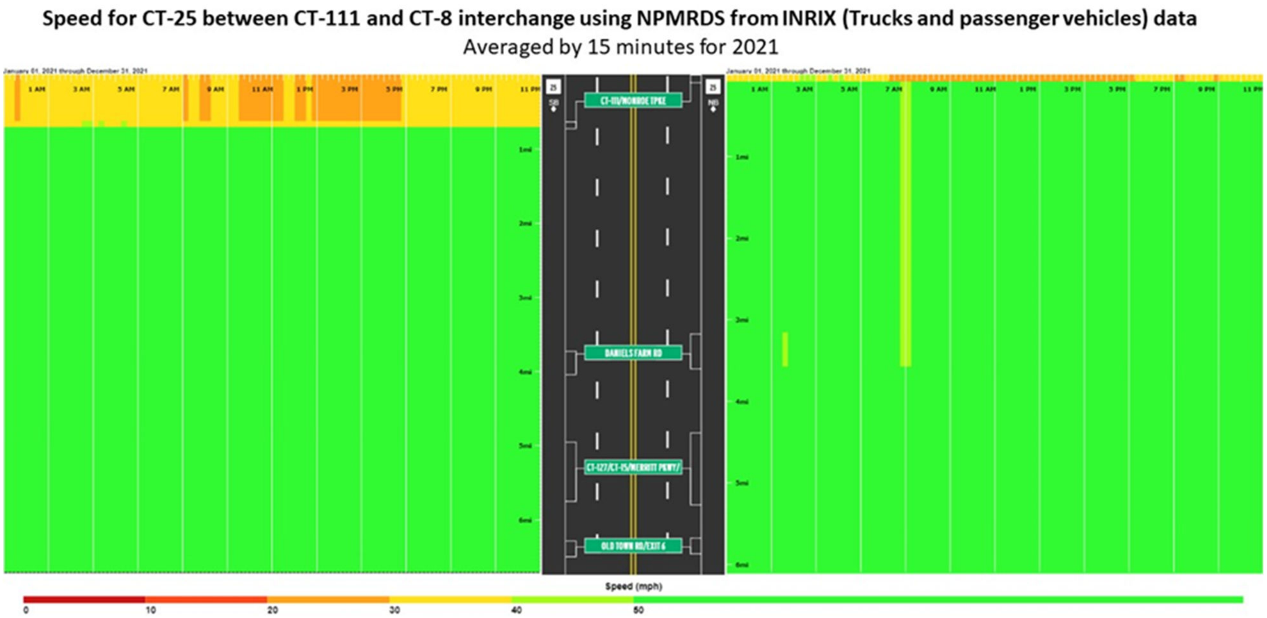


Figure 3. 8: CT Route 25 Congestion Graph

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. Since 2017, Non-SOV travel has increased 4.57 percentage points. (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%

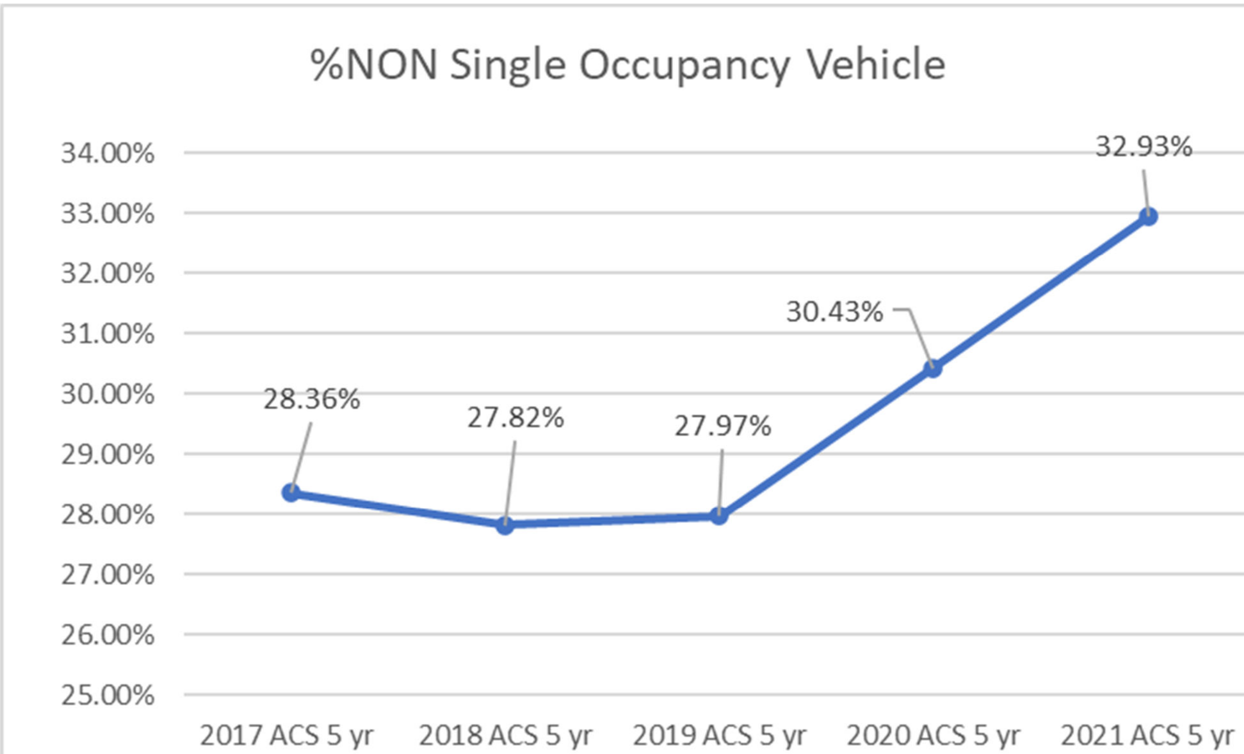


Figure 4. 1: Non-SOV Travel

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).

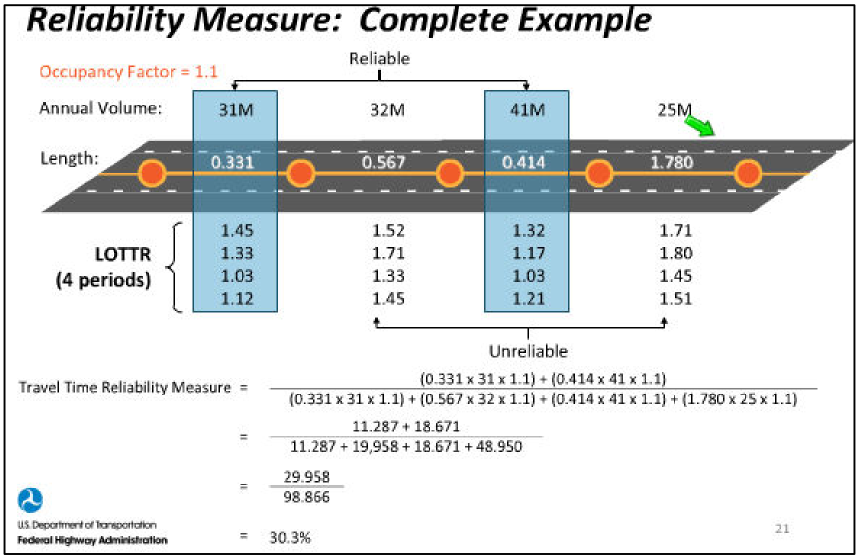


Figure 4. 2: Federal Highway Administration LOTTR Example

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).

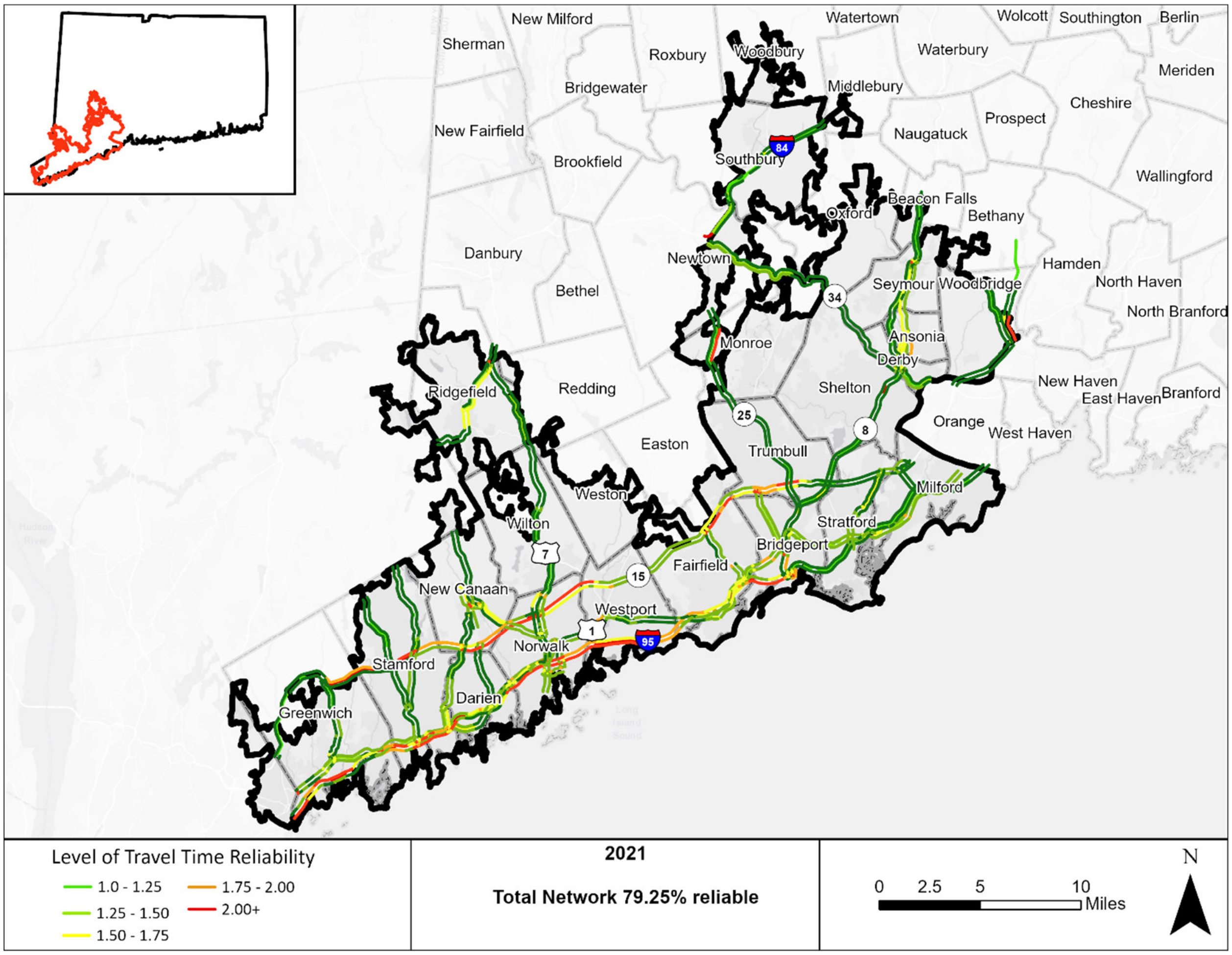


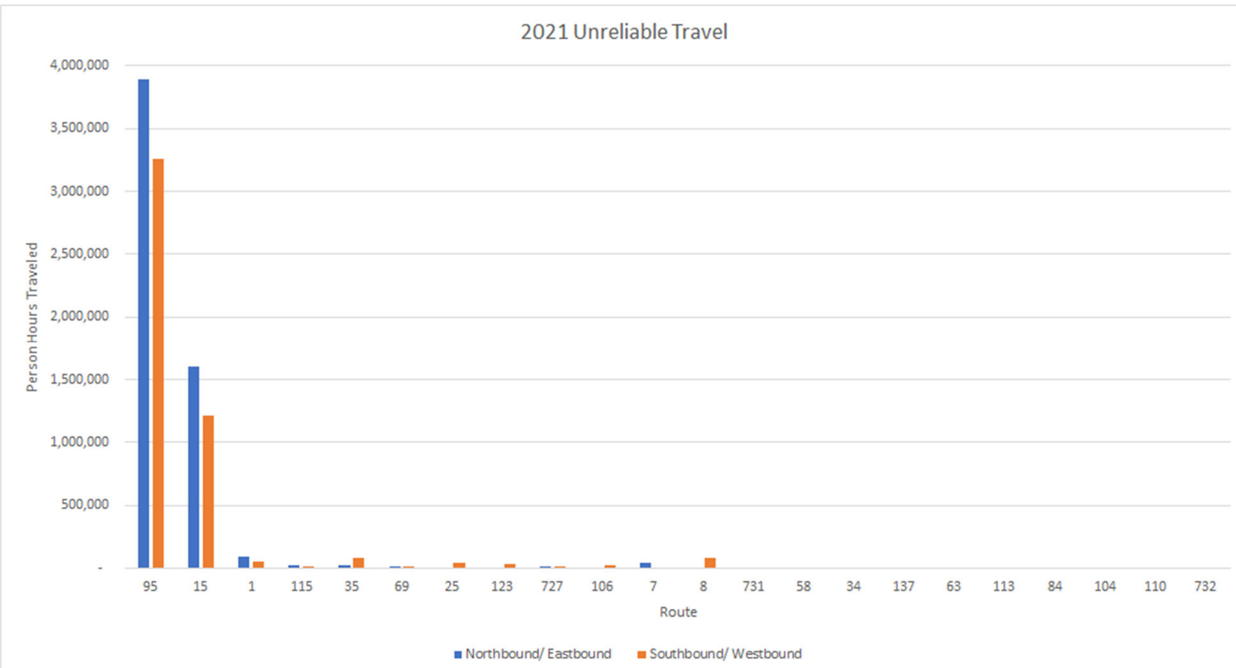
Figure 4. 3: Travel Time Reliability for 2021

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.



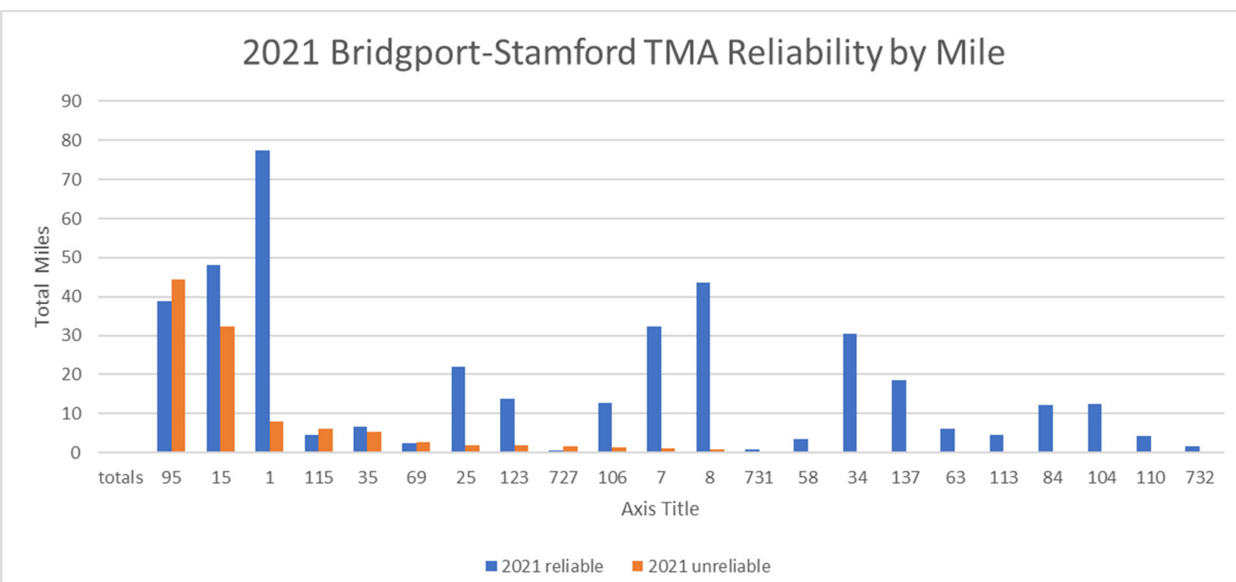


Figure 4. 4: Unreliable Travel by Route

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).

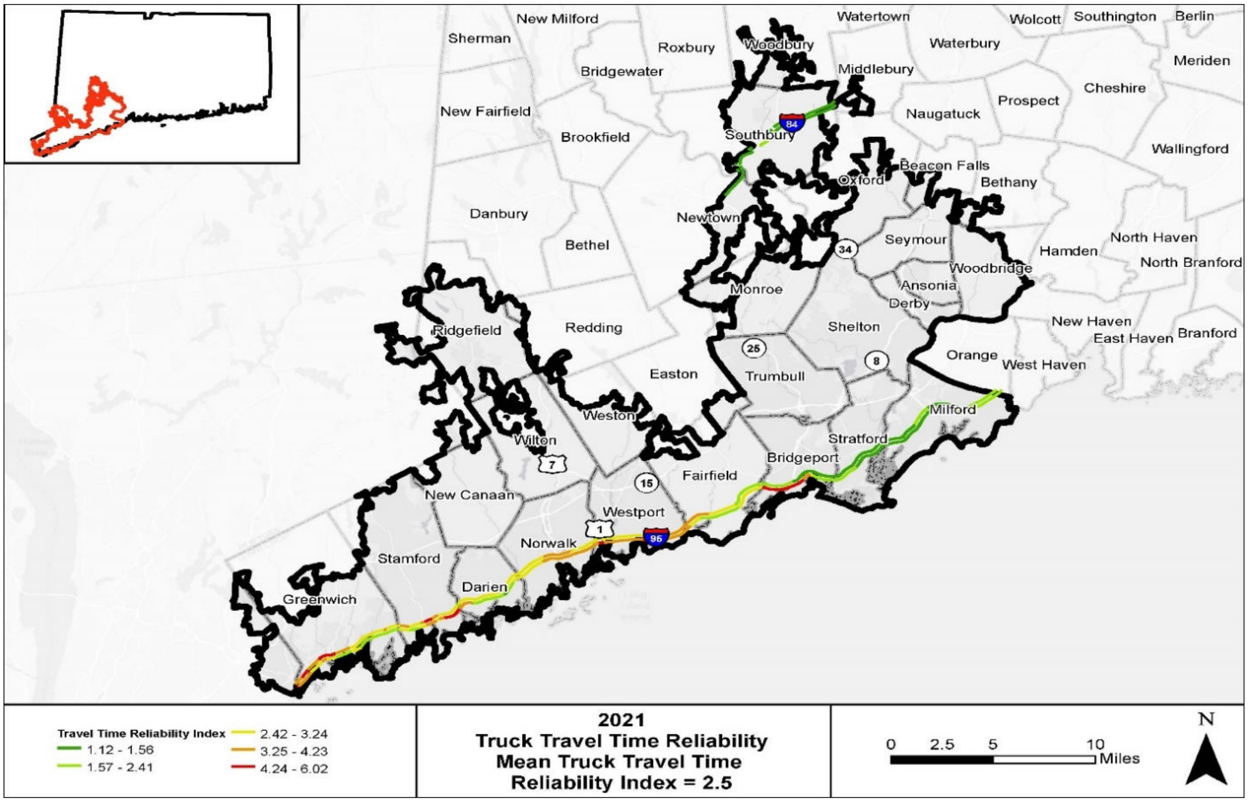


Figure 4. 5: Truck Travel Time Reliability for 2021

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**
Peak Hour Excessive Delay (Annual Hours Per Capita)	**	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).

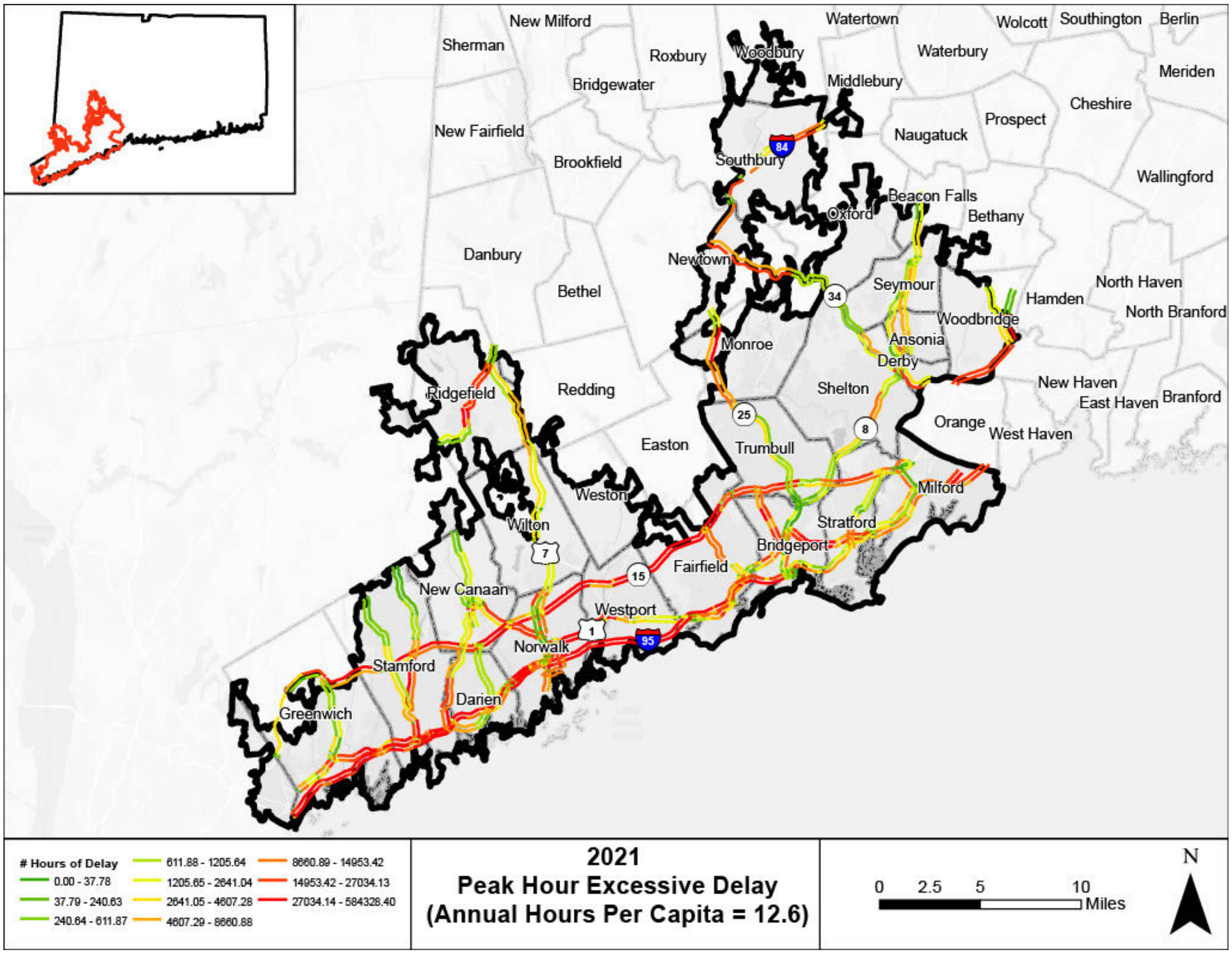


Figure 4. 6: Peak Hour Excessive Delay for 2021

I-95 accounted for 5,843,151 hours of delay in 2021, 49.2% of delay in the TMA. Route 1 was next highest, with 2,213,007 hours of delay (18.6%) followed by Route 15, 1,545,007 (13.0%) The other 19.2% of delay in the TMA were spread out over the remaining NHS segments (Figure 4.7)

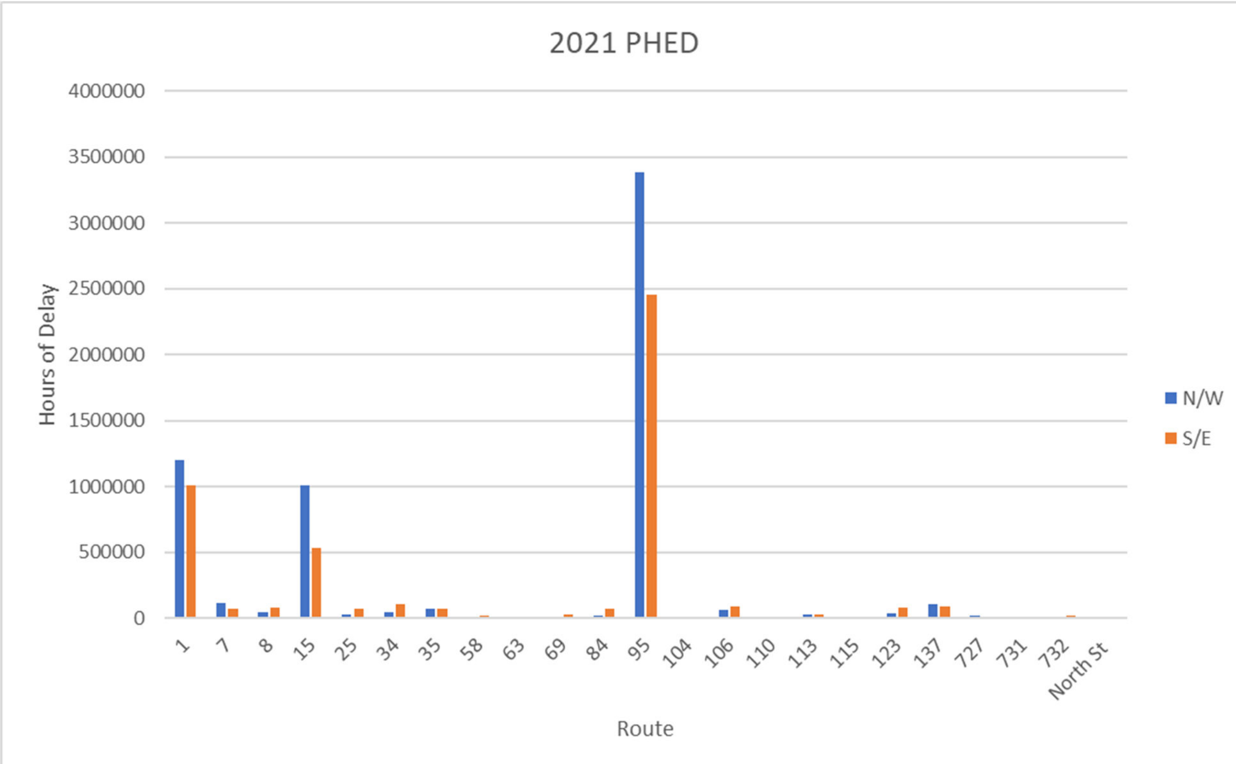


Figure 4. 7: Peak Hour Excessive Delay by Route

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).

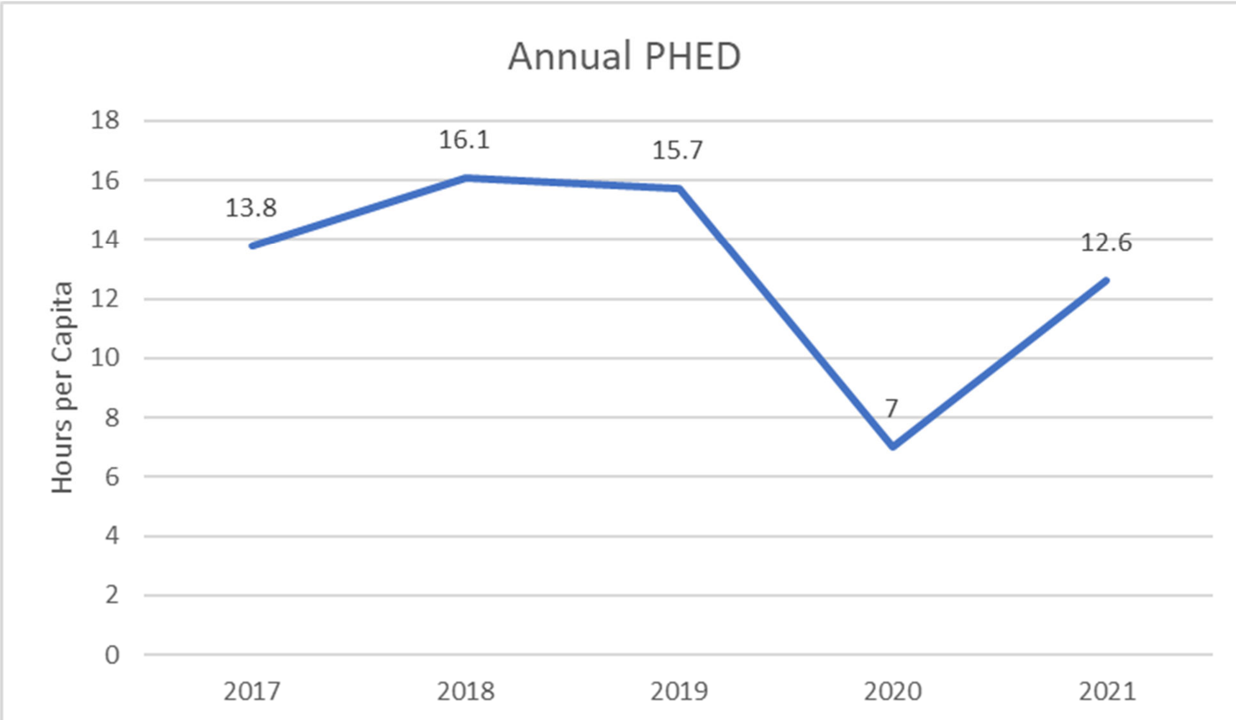


Figure 4. 8: Peak Hour Excessive Delay from 2017-2021

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 Peqounnock River Trail – 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 Hill 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 Network 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 Programming & Implementation of 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.

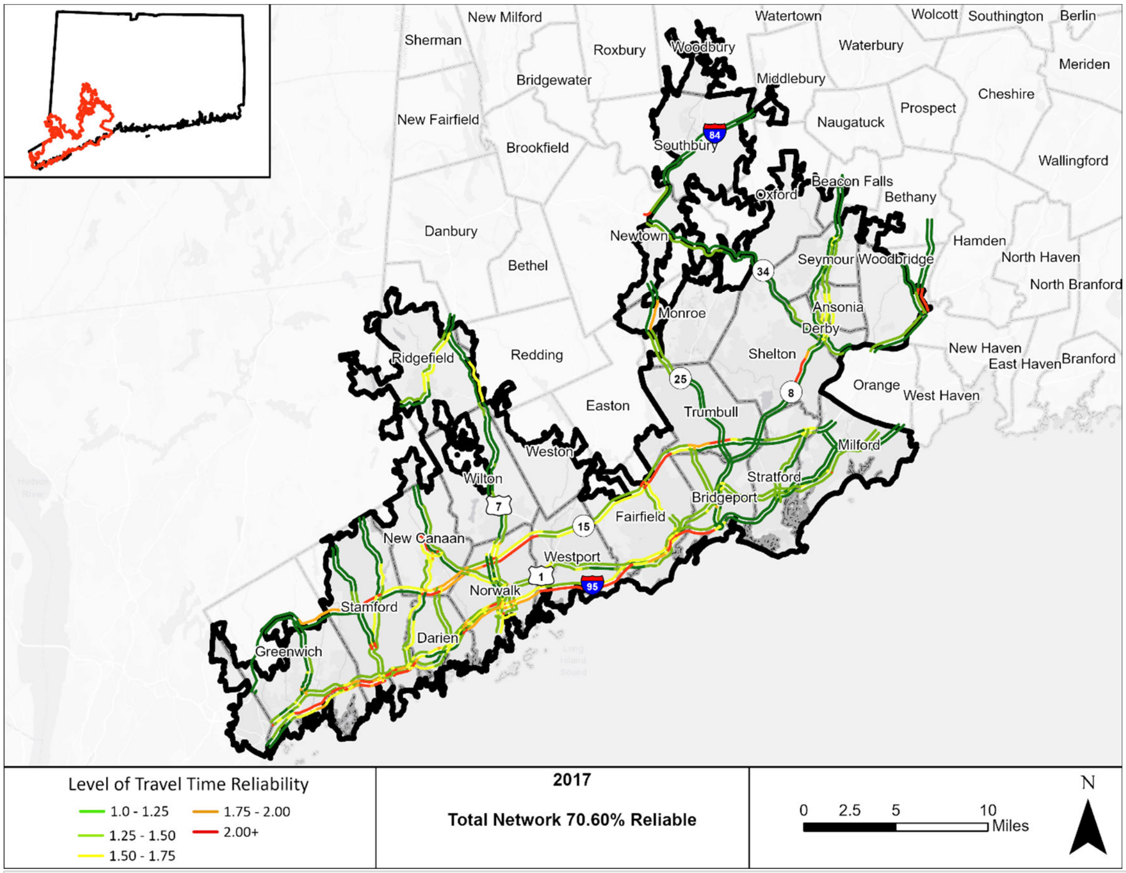
Road Capacity:

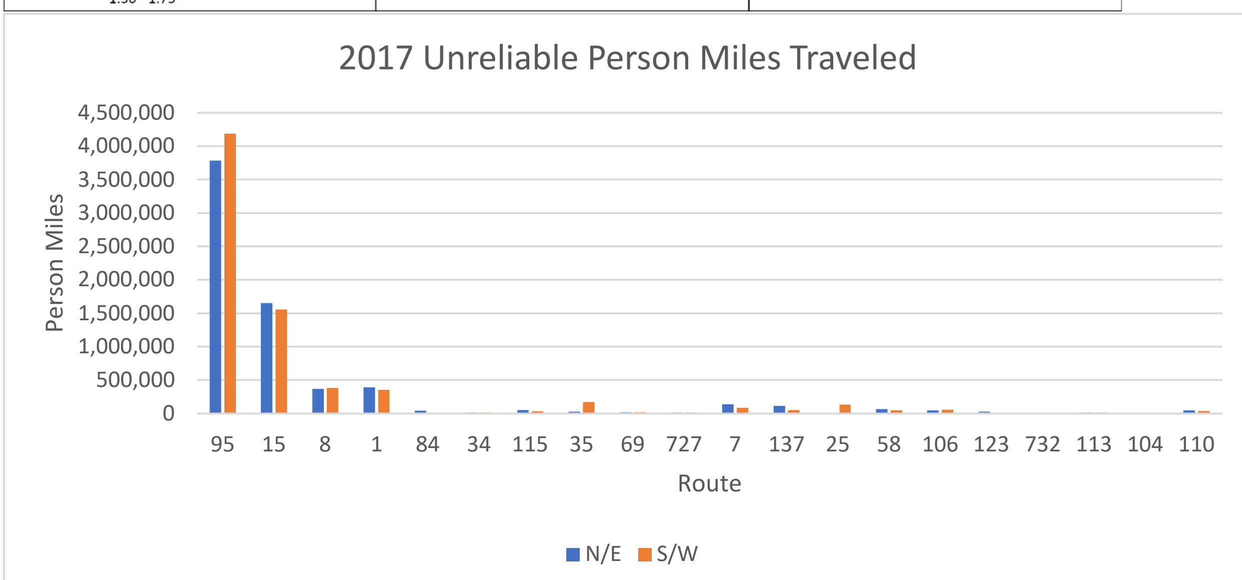
- I-95, Stratford Interchange 33: reconstructed from a partial interchange to a fully directional, diamond interchange. The project has provided better access to I-95 from adjacent commercial centers and included improvements to local roads.

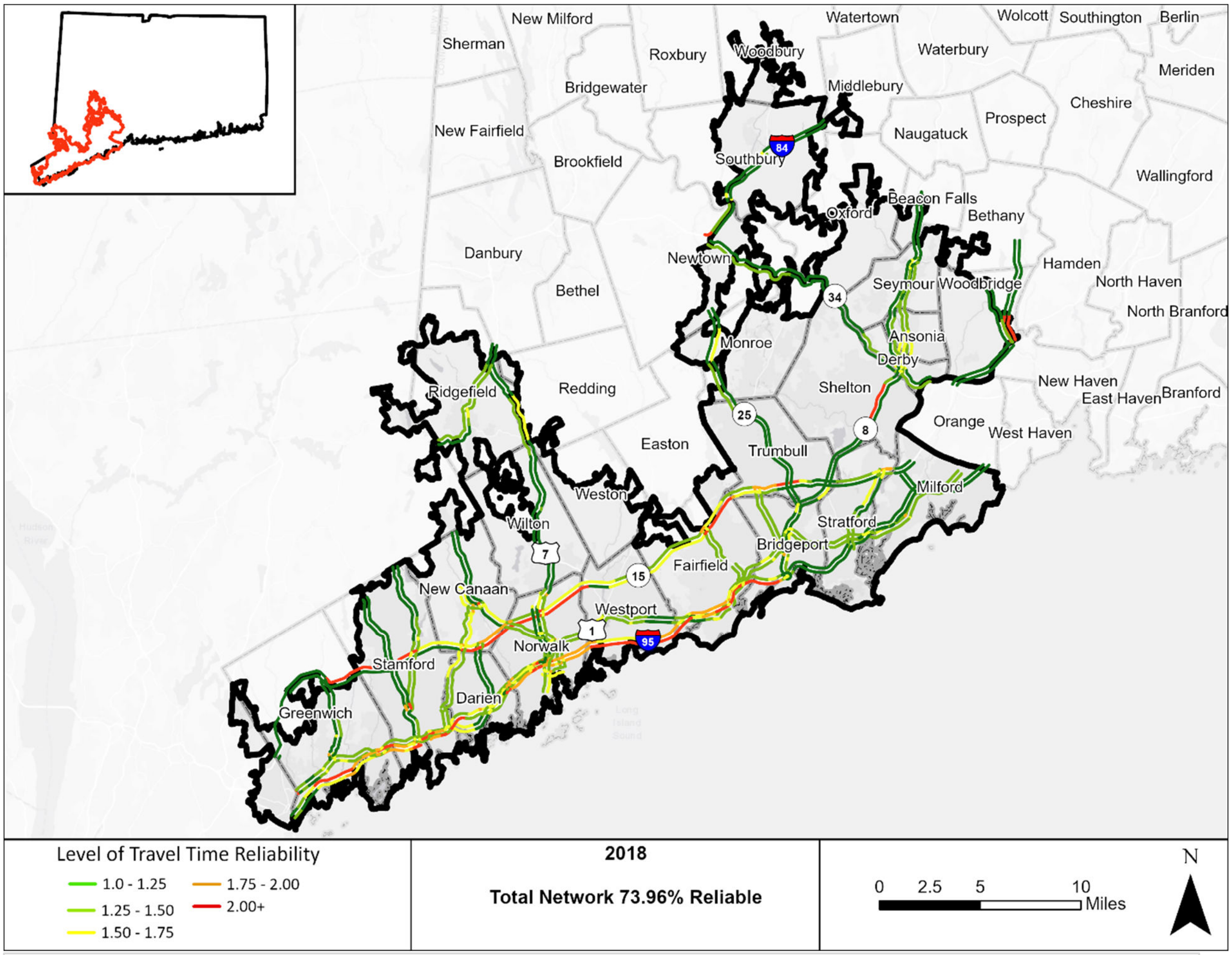
7.3 Monitoring

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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Middlebury
Cheshire
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Prospect
Brookfield
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Wallingford
Beacon Falls
Oxford
Bethany
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Hamden
Bethel
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North Haven
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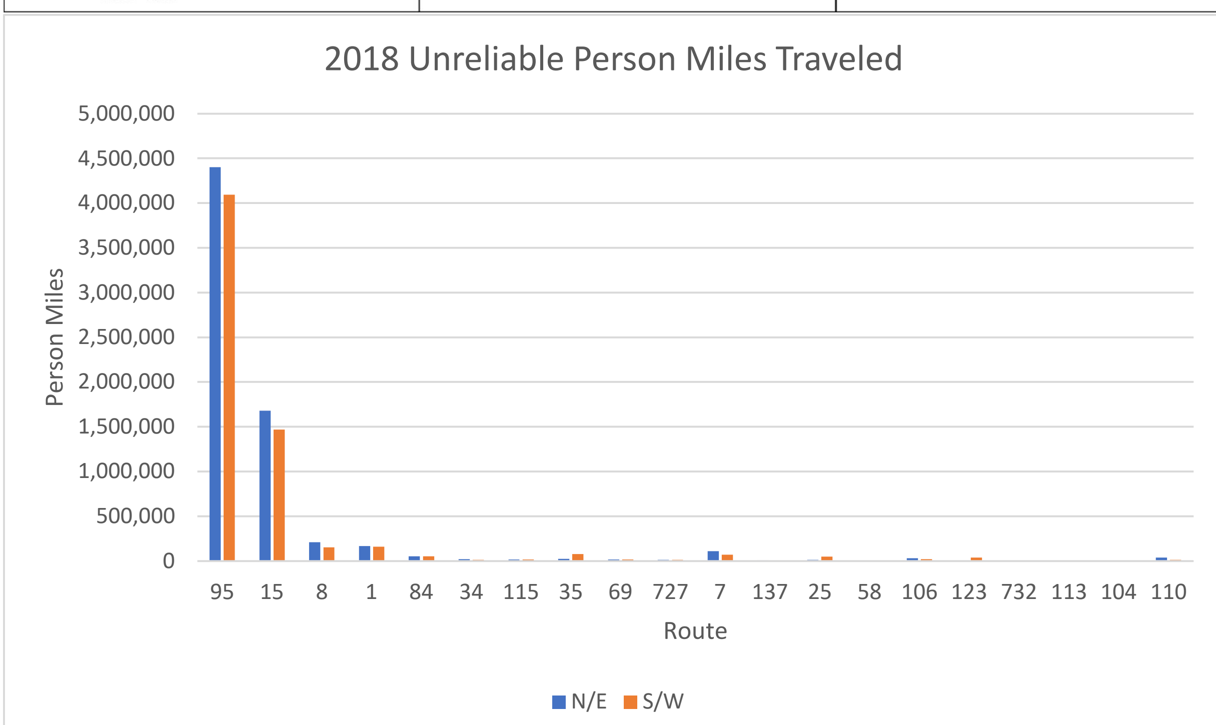
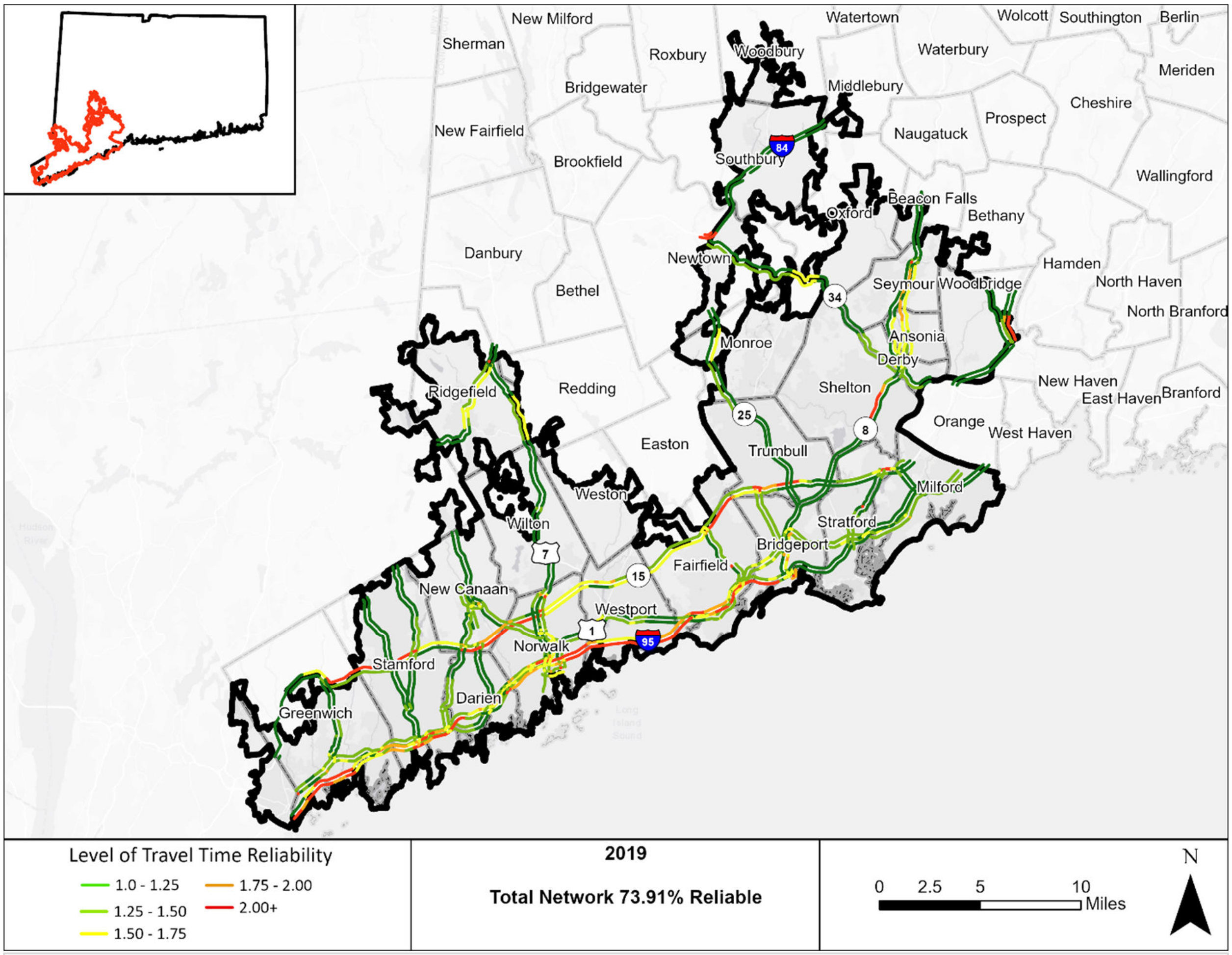
Derby
Ridgefield
Redding
Shelton
New Haven
East Haven
Branford
Orange
West Haven
Easton
Trumbull
Weston
Milford
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
84
34
25
8
7
15
1
95
Level of Travel Time Reliability
1.0 - 1.25
1.25 - 1.50
1.50 - 1.75
1.75 - 2.00
2.00+
2018
Total Network 73.96% Reliable
0
2.5
5
10
Miles
N


2018 Unreliable Person Miles Traveled
Person Miles
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
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
New Milford
Sherman
Roxbury
Woodbury
Watertown
Wolcott
Southington
Berlin
Waterbury
Meriden
Bridgewater
Middlebury
Cheshire
New Fairfield
Naugatuck
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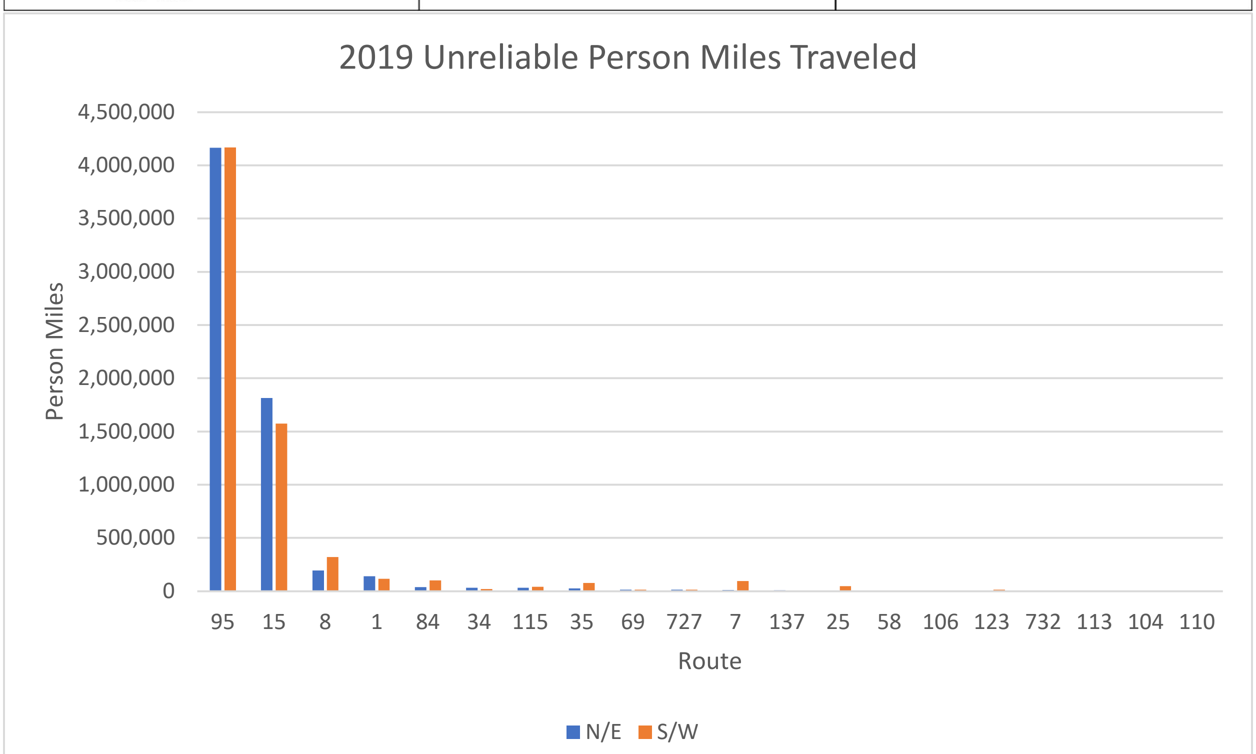
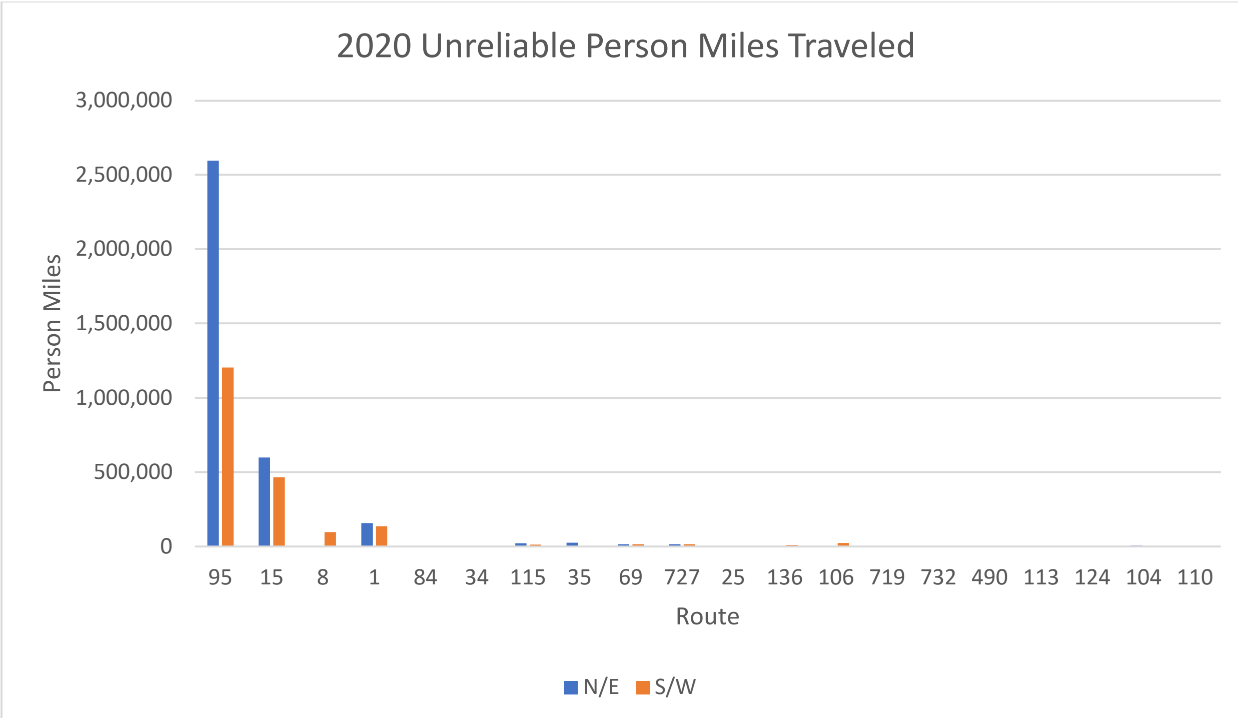
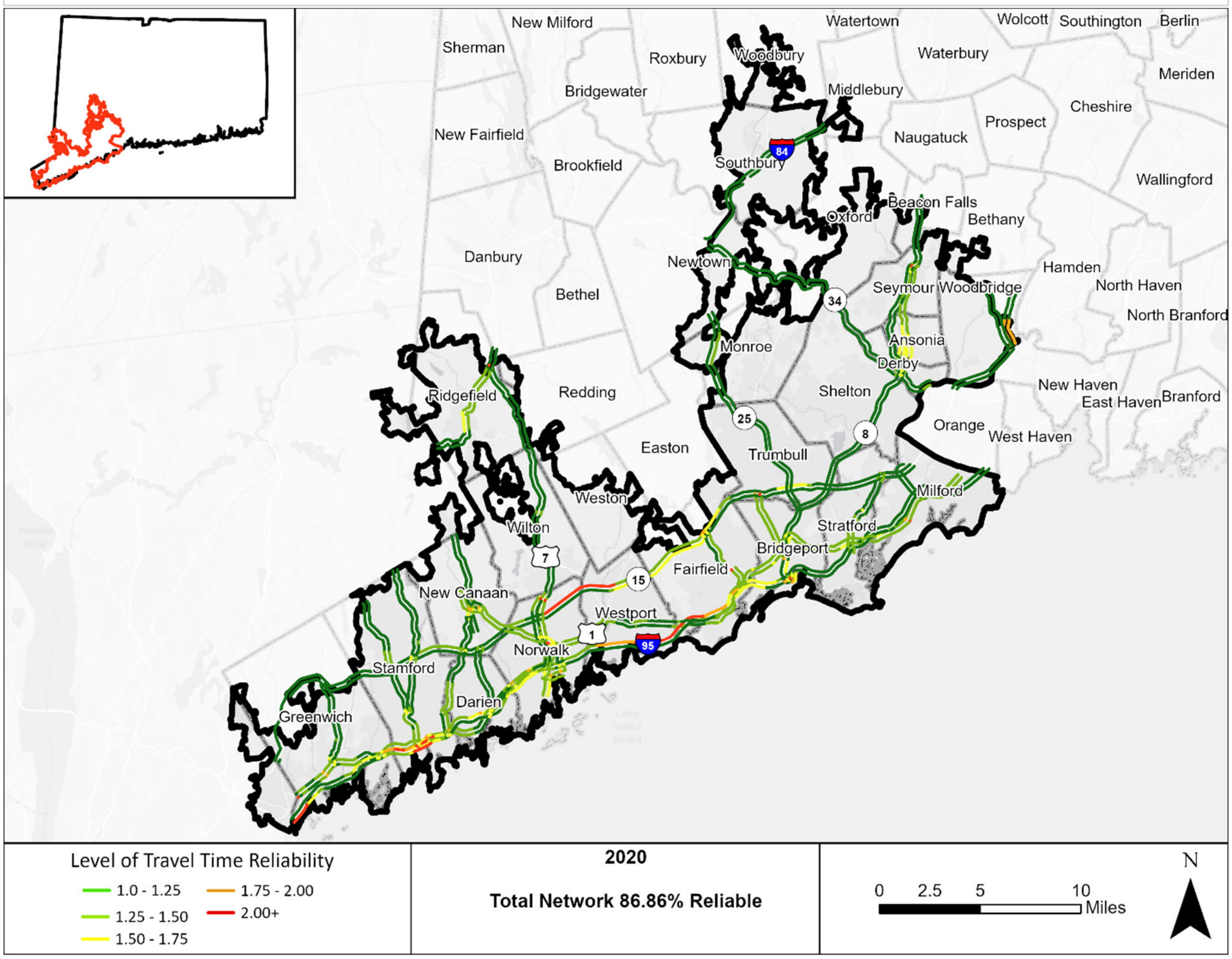
Norwalk
Stamford
Darien
Greenwich


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
Person Miles
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 25 136 106 719 732 490 113 124 104 110
Route
N/E
S/W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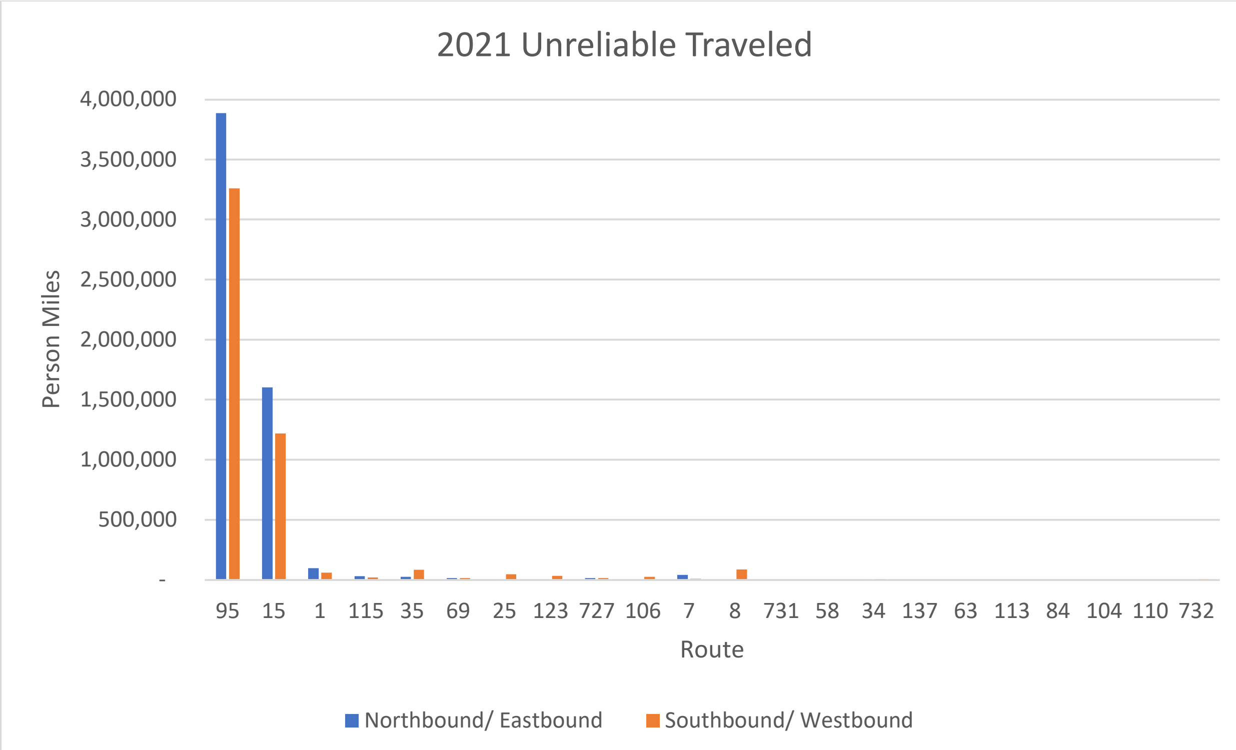
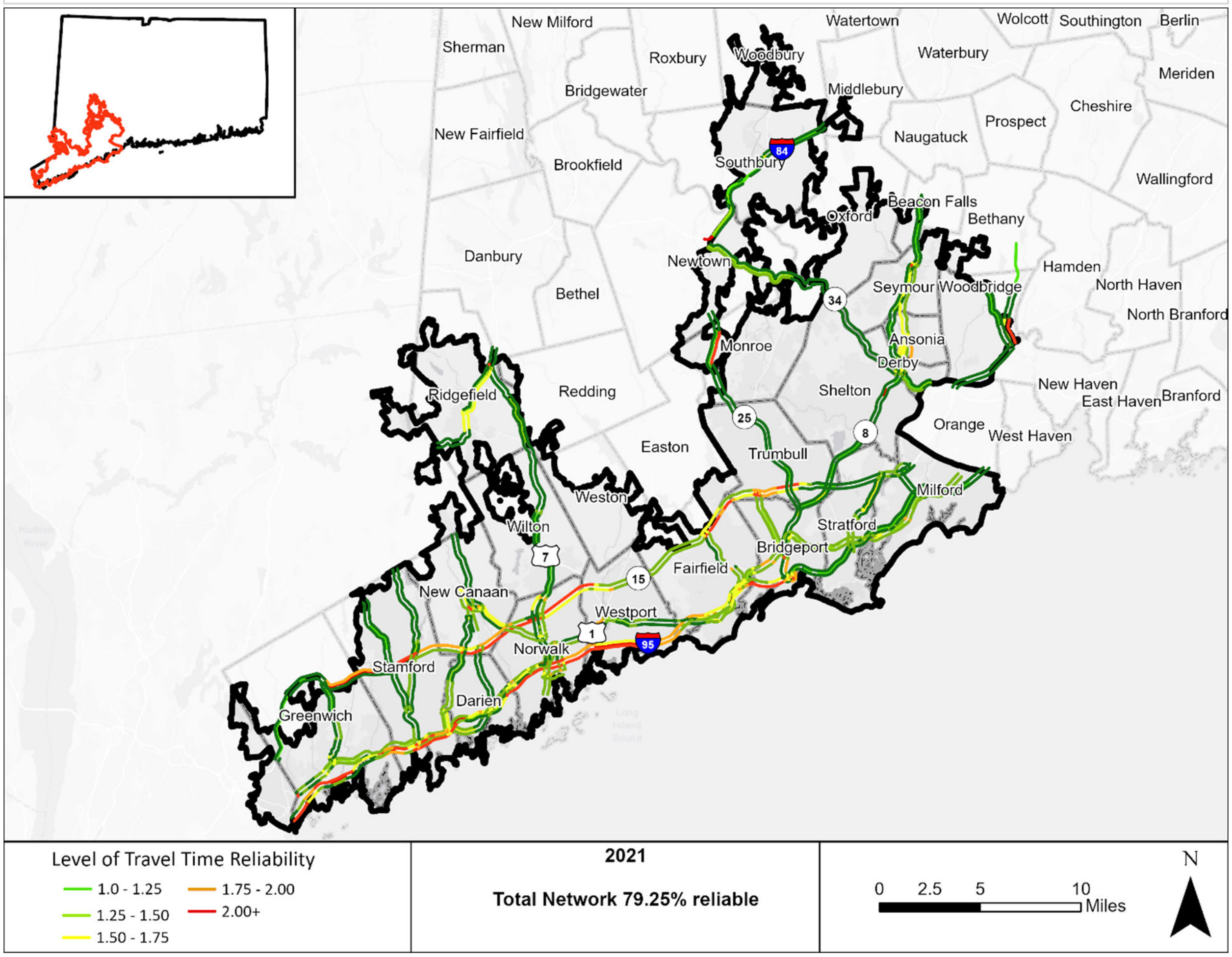
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
84
34
25
8
7
15
1
95
Level of Travel Time Reliability
1.0 - 1.25
1.25 - 1.50
1.50 - 1.75
1.75 - 2.00
2.00+
2020
Total Network 86.86% Reliable
0 2.5 5 10
Miles
N


2021 Unreliable Traveled
4,000,000
3,500,000
3,000,000
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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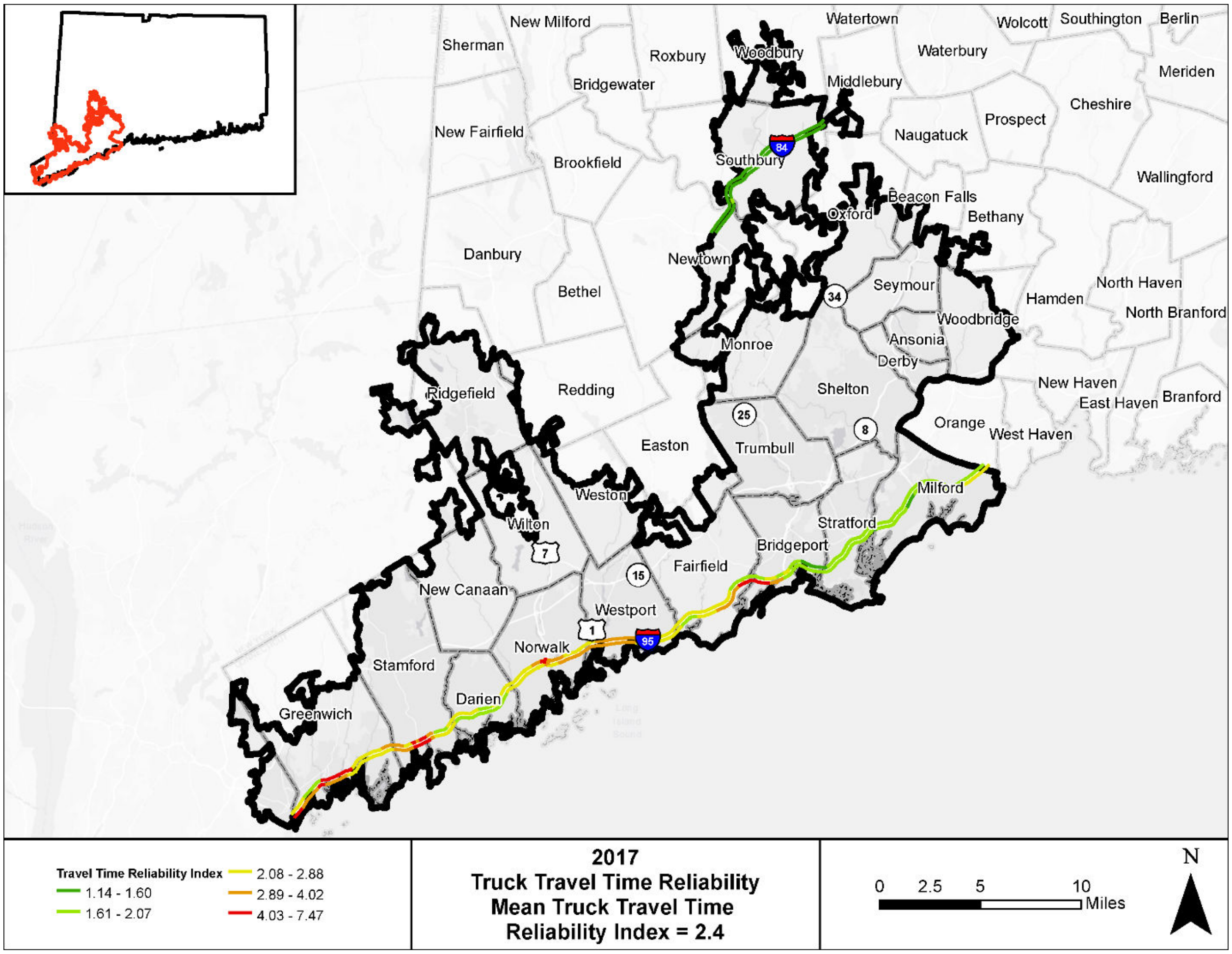
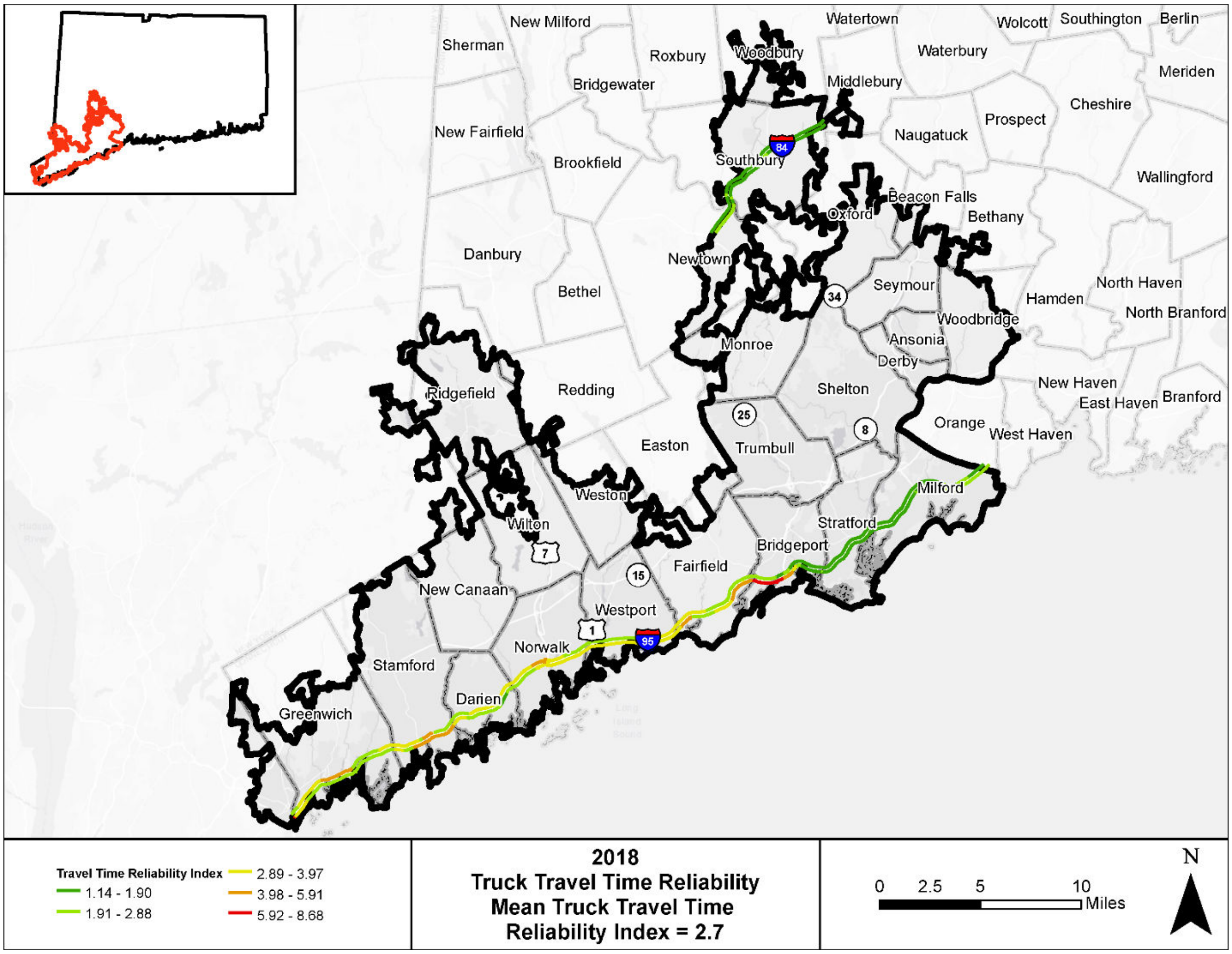
West Haven
Easton
Trumbull
Milford
Weston
Stratford
Wilton
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
Level of Travel Time Reliability
1.0 - 1.25
1.25 - 1.50
1.50 - 1.75
1.75 - 2.00
2.00+
2021
Total Network 79.25% reliable
0 2.5 5 10
Miles
N

Appendix B: Truck Travel Time Reliability Index

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Naugatuck
New Fairfield
Brookfield
Southbury
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Beacon Falls
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Bethany
Danbury
Newtown
Bethel
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Woodbridge
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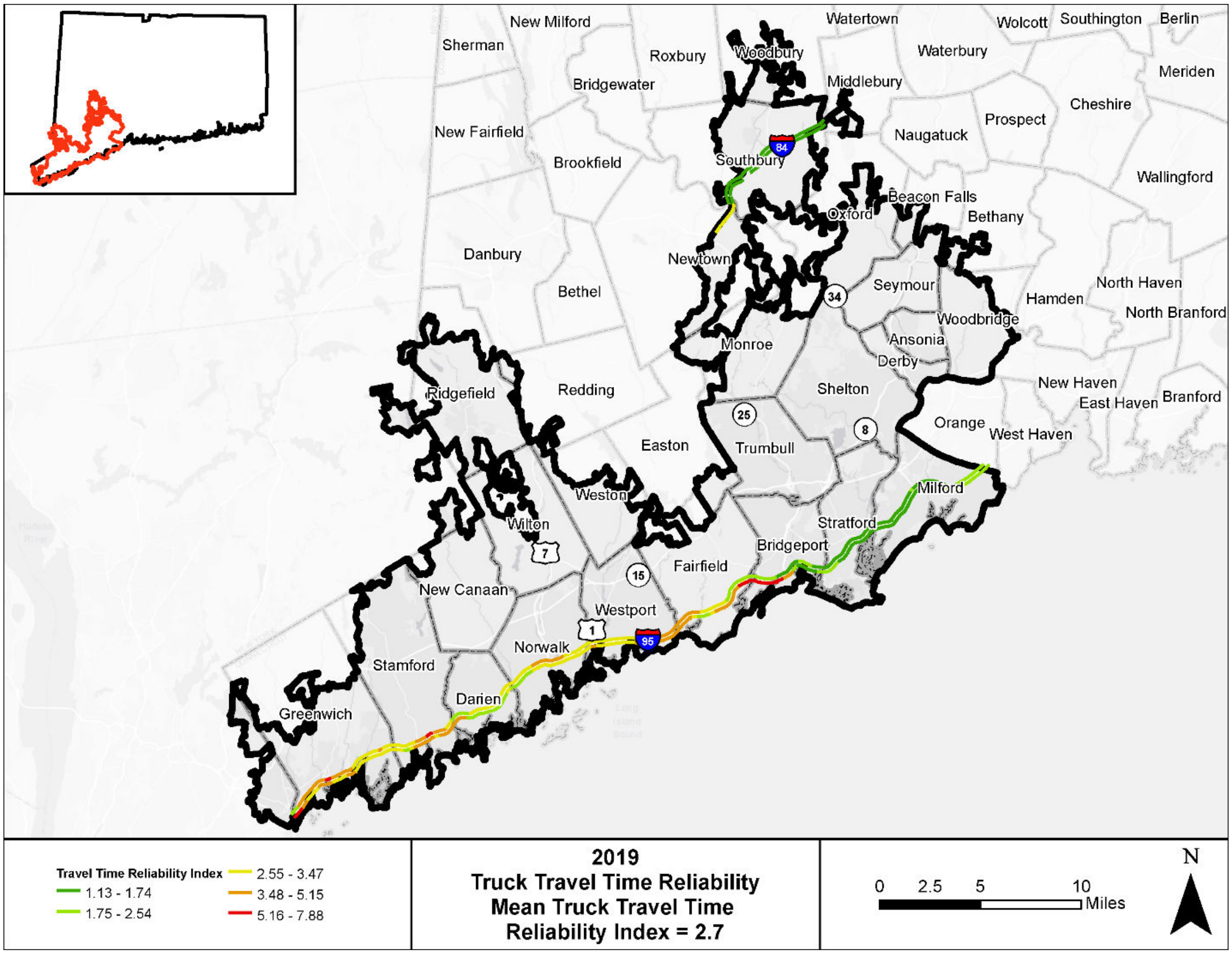
Ridgefield
Redding
Shelton
New Haven
East Haven
Branford
Orange
West Haven
25
8
Easton
Trumbull
Weston
Milford
Wilton
7
Stratford
Bridgeport
Fairfield
15
New Canaan
Westport
1
95
Norwalk
Stamford
Darien
Greenwich
Travel Time Reliability Index
1.14 - 1.90
1.91 - 2.88
2.89 - 3.97
3.98 - 5.91
5.92 - 8.68
2018
Truck Travel Time Reliability
Mean Truck Travel Time
Reliability Index = 2.7
0 2.5 5 10
Miles
N



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Bridgewater
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New Fairfield
Brookfield
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Beacon Falls
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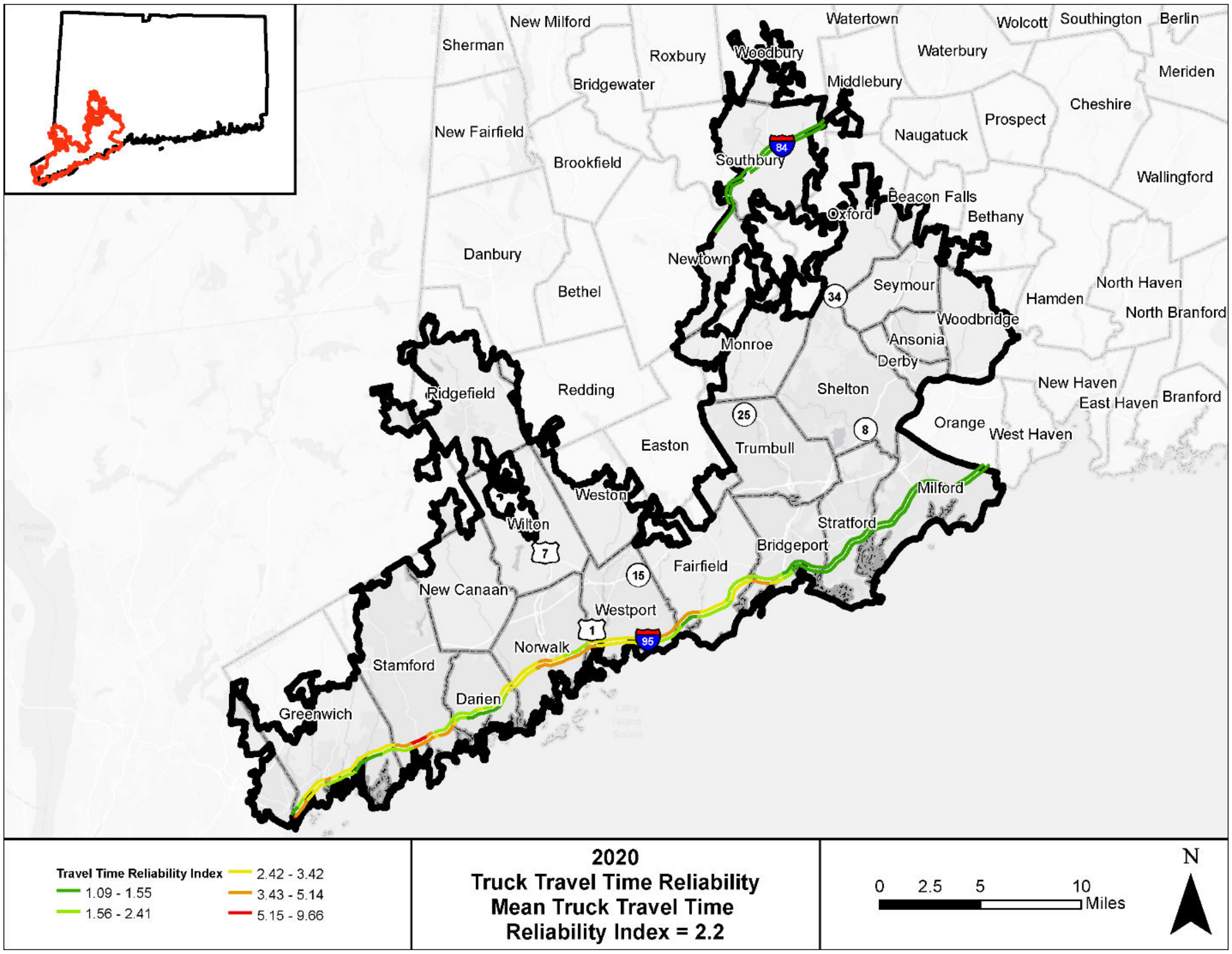
Monroe
Derby
Ridgefield
Redding
Shelton
New Haven
East Haven
Branford
25
Orange
8
West Haven
Easton
Trumbull
Weston
Milford
Wilton
Stratford
7
Bridgeport
15
Fairfield
New Canaan
Westport
1
95
Norwalk
Stamford
Darien
Greenwich
Travel Time Reliability Index
1.13 - 1.74
1.75 - 2.54
2.55 - 3.47
3.48 - 5.15
5.16 - 7.88
2019
Truck Travel Time Reliability
Mean Truck Travel Time
Reliability Index = 2.7
0 2.5 5 10
Miles
N


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
New Milford
Sherman
Roxbury
Woodbury
Watertown
Wolcott
Southington
Berlin
Waterbury
Meriden
Middlebury
Bridgewater
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Prospect
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Greenwich
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34
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8
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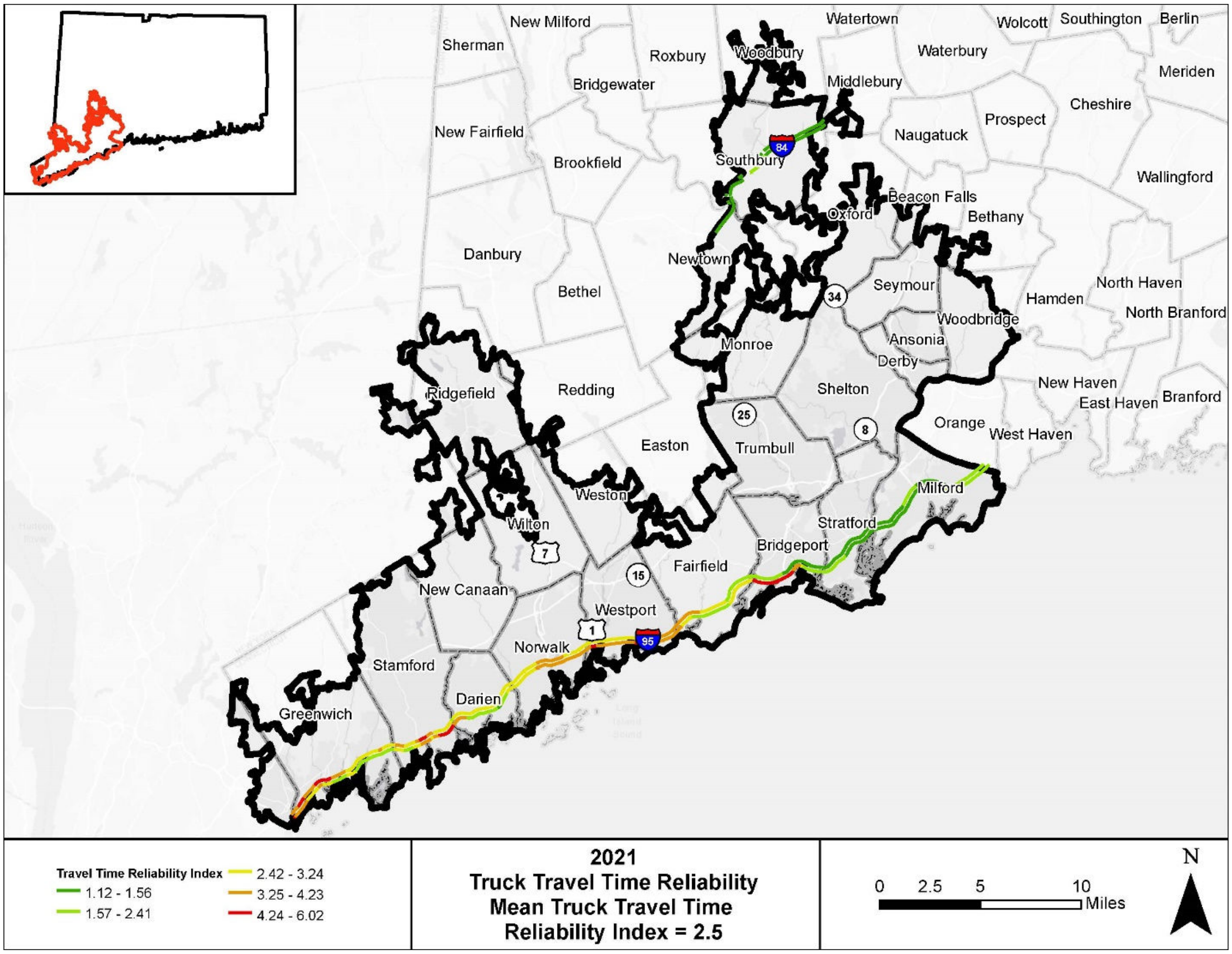
15
1
95


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
New Milford
Sherman
Roxbury
Woodbury
Watertown
Waterbury
Wolcott
Southington
Berlin
Meriden
Middlebury
Bridgewater
Naugatuck
Prospect
Cheshire
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Bridgeport
Fairfield
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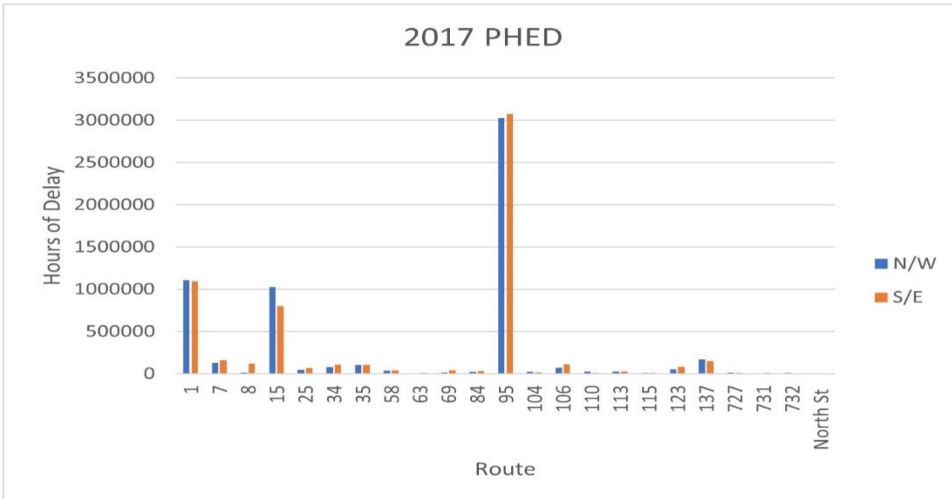
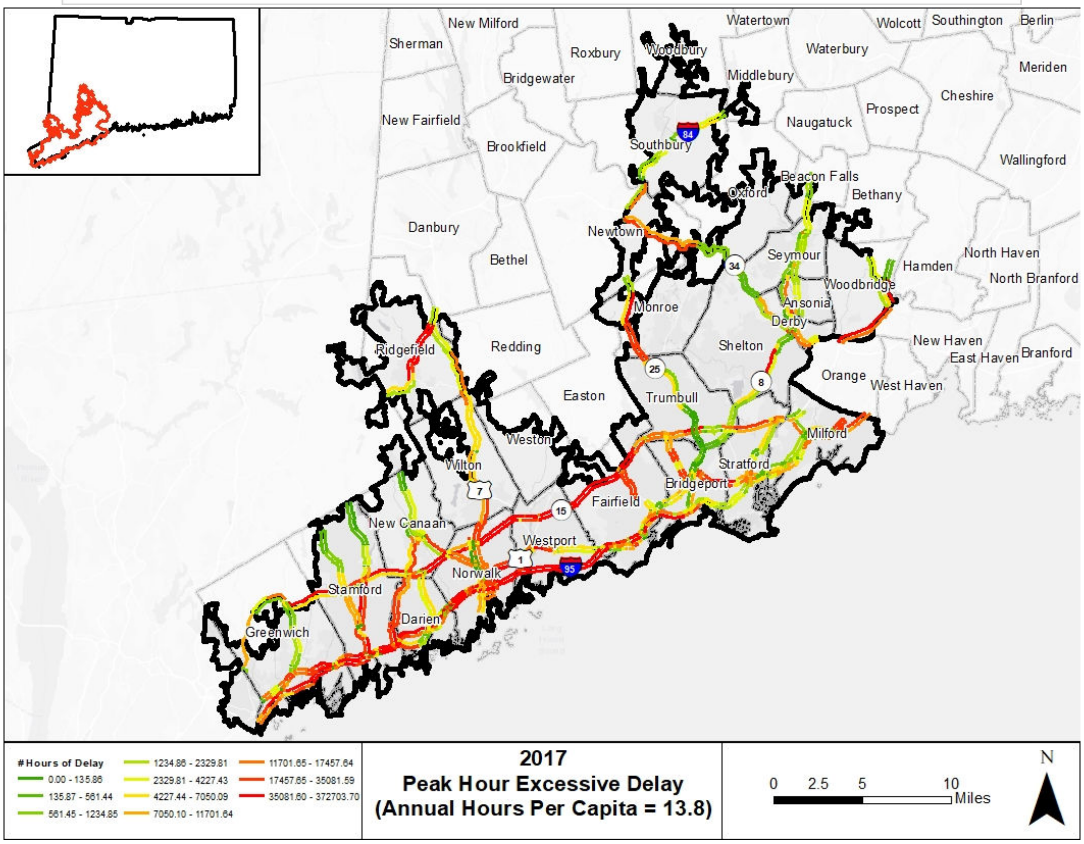
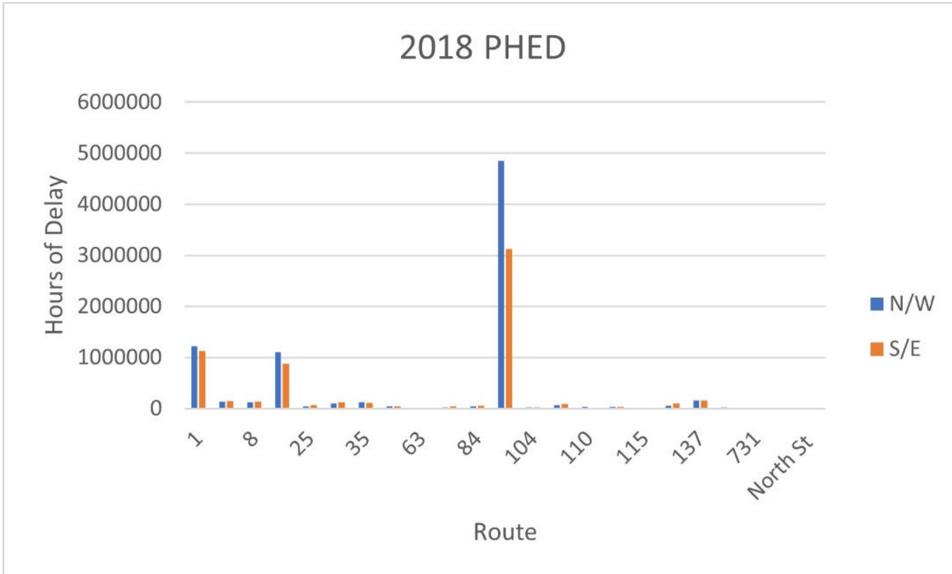
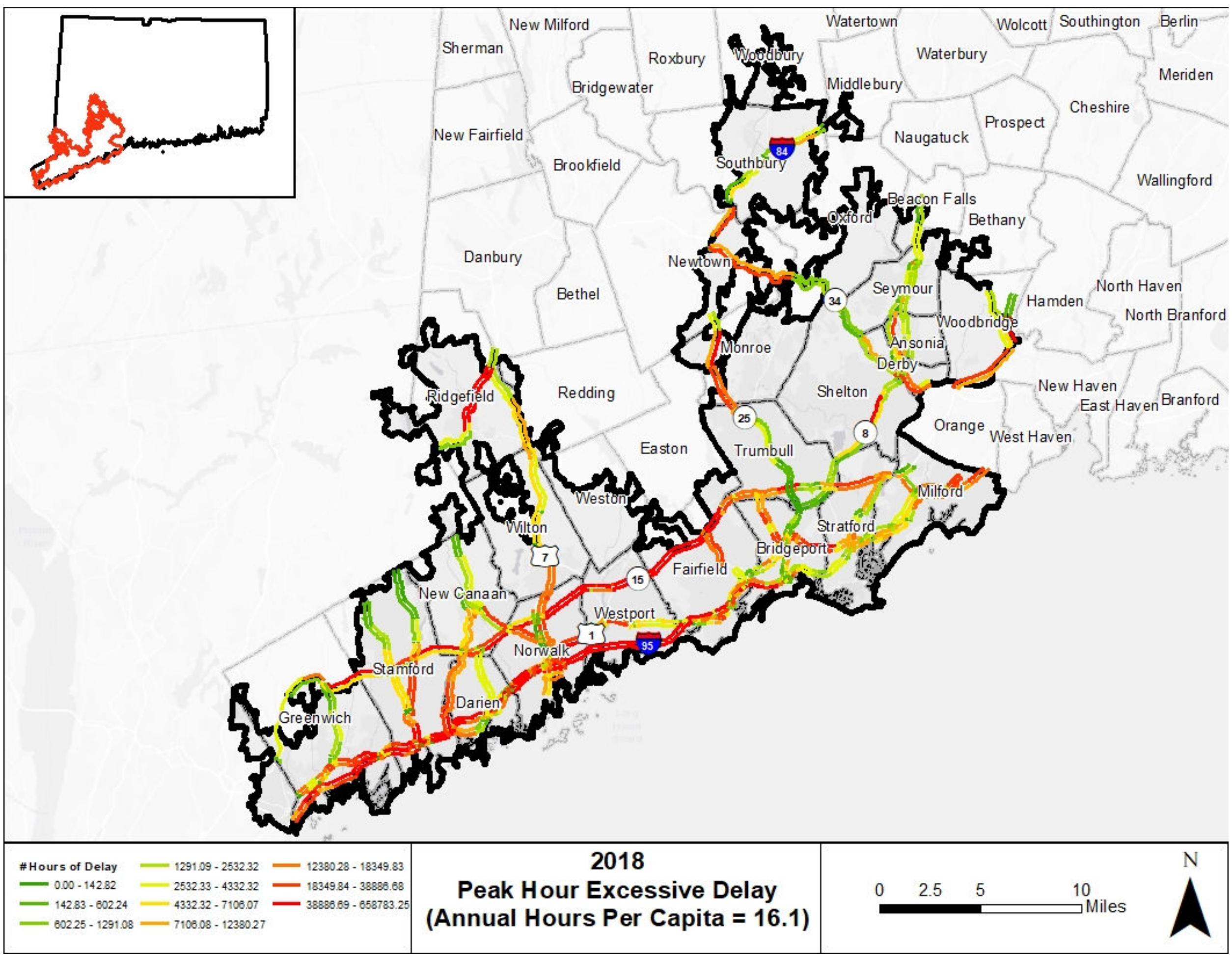
Westport
Norwalk
Stamford
Darien
Greenwich

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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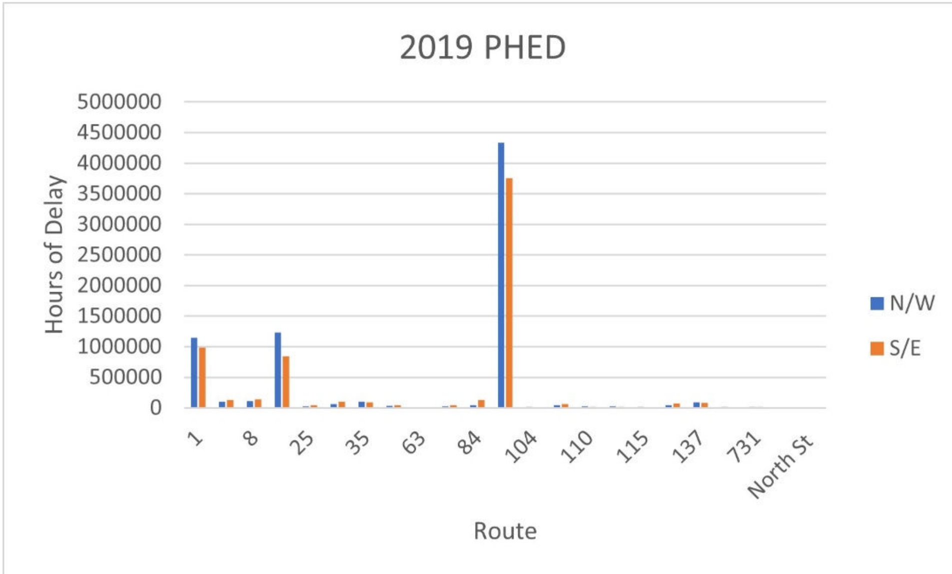
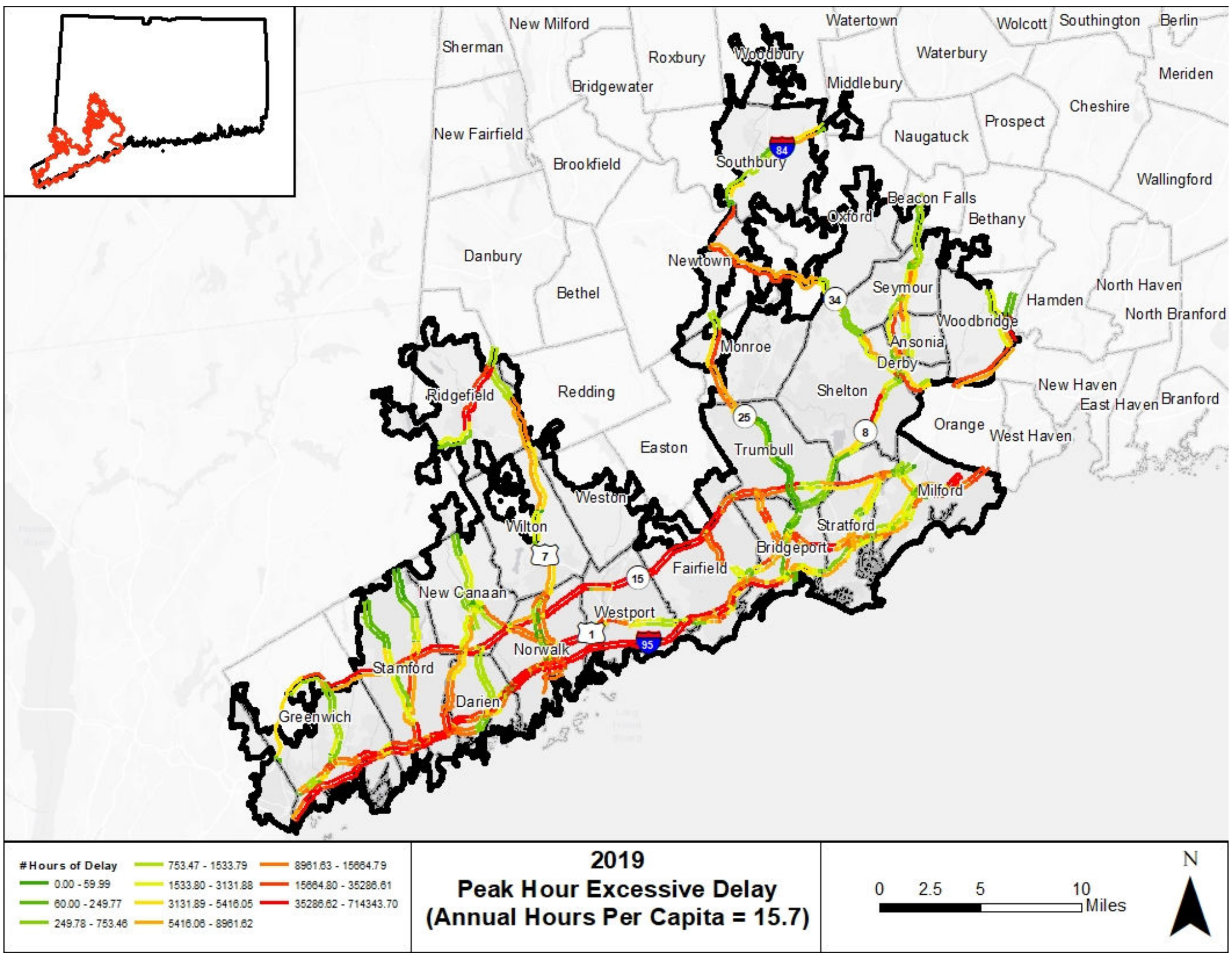
West Haven
Easton
Trumbull
Weston
Milford
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
Hours of Delay
0.00 - 142.82
142.83 - 602.24
602.25 - 1291.08
1291.09 - 2532.32
2532.33 - 4332.32
4332.32 - 7106.07
7106.08 - 12380.27
12380.28 - 18349.83
18349.84 - 38886.68
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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Trumbull
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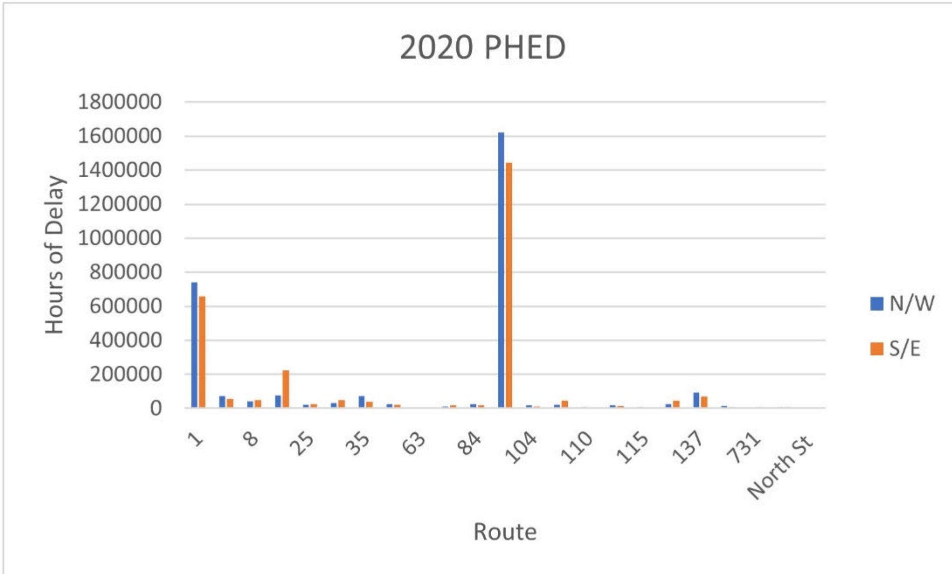
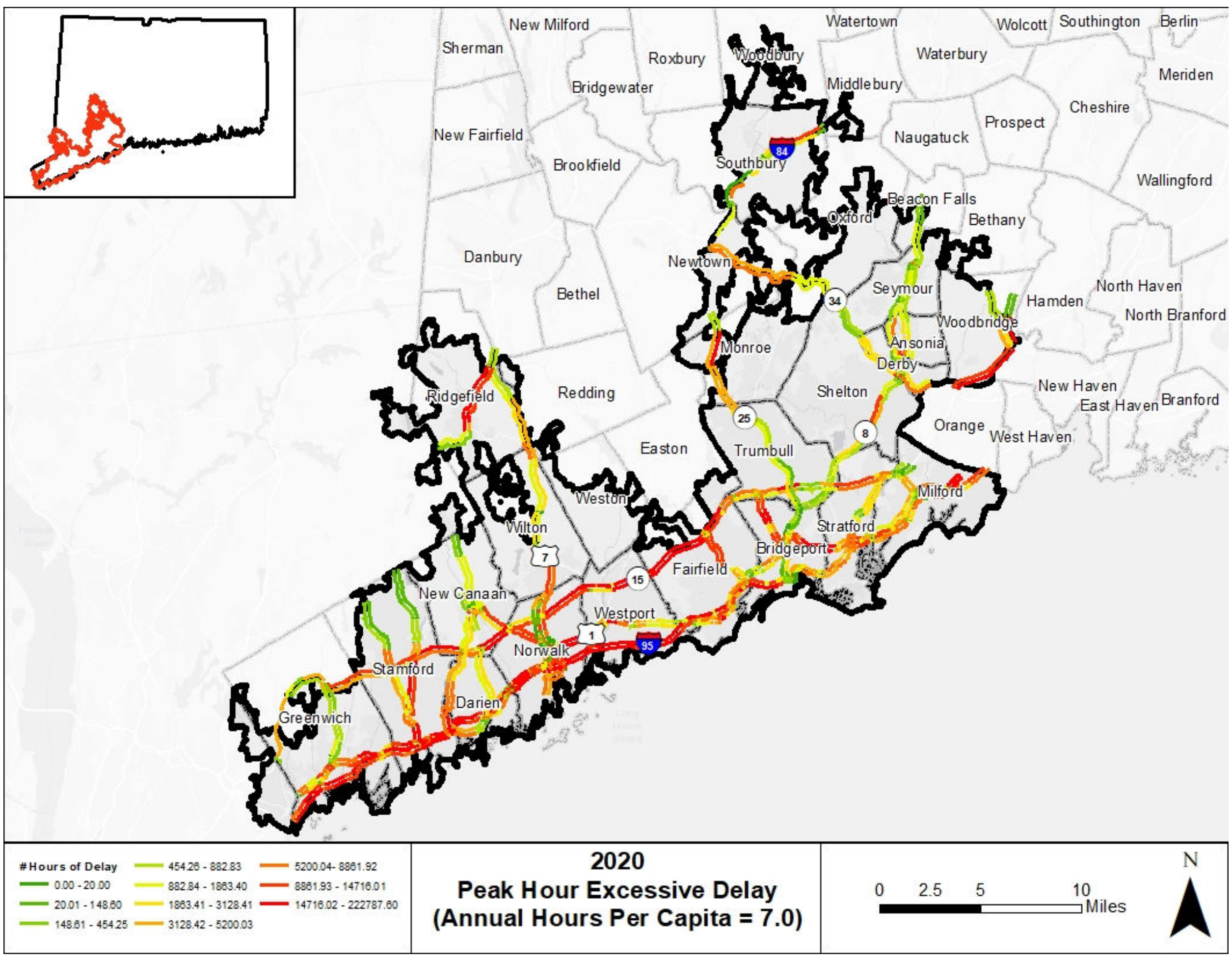
Wilton
Stratford
Bridgeport
Fairfield
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
84
34
25
8
7
15
1
95
Hours of Delay
0.00 - 59.99
60.00 - 249.77
249.78 - 753.46
753.47 - 1533.79
1533.80 - 3131.88
3131.89 - 5416.05
5416.06 - 8961.62
8961.63 - 15664.79
15664.80 - 35286.61
35286.62 - 714343.70
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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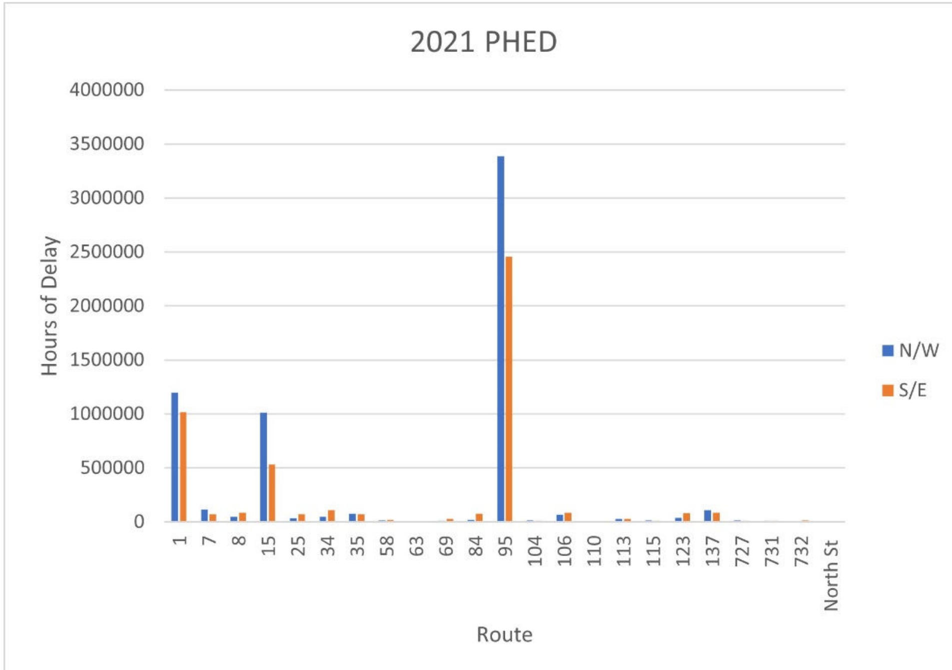
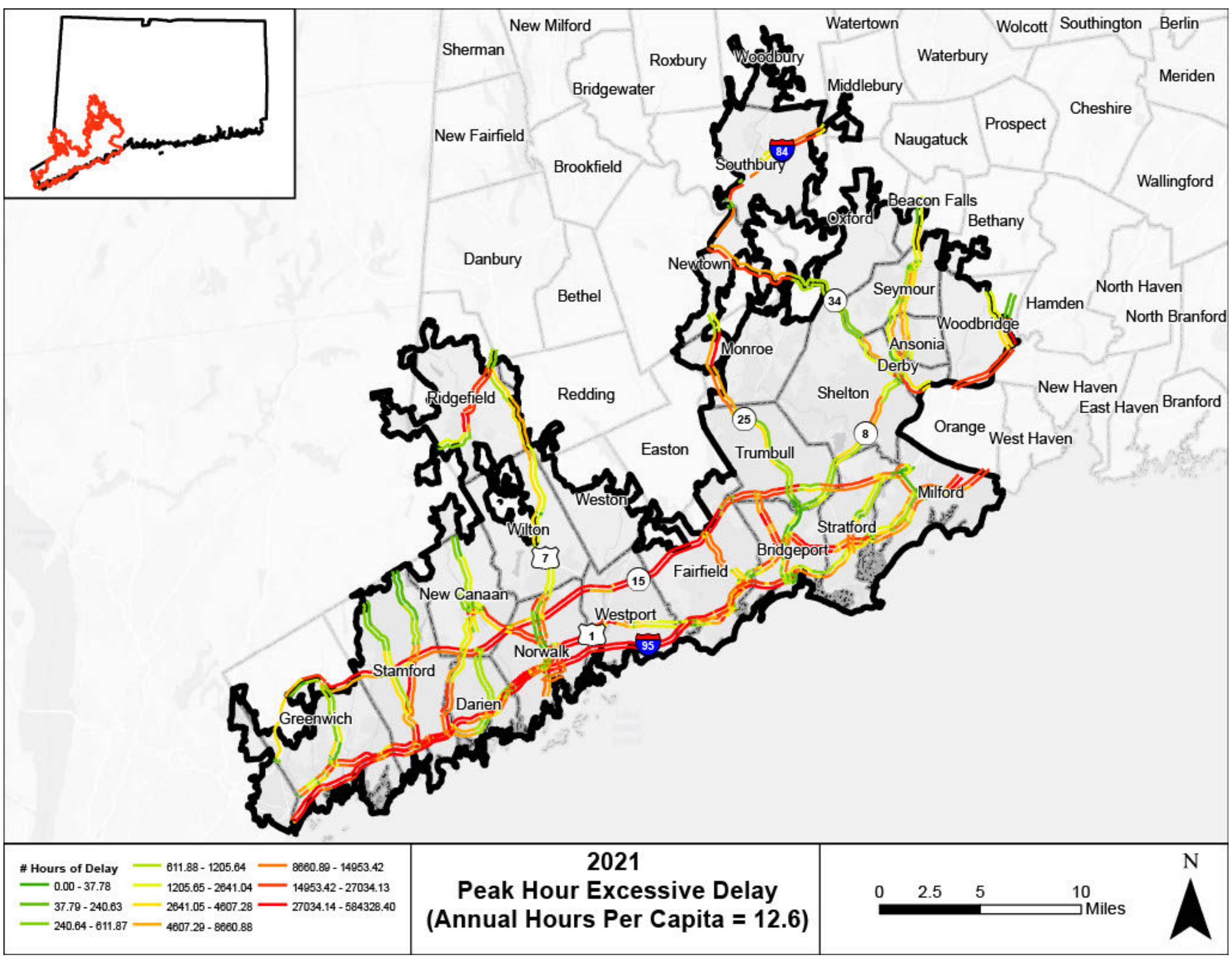
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich
84
34
25
8
7
15
1
95
Hours of Delay
0.00 - 20.00
20.01 - 148.60
148.61 - 454.25
454.26 - 882.83
882.84 - 1863.40
1863.41 - 3128.41
3128.42 - 5200.03
5200.04- 8861.92
8861.93 - 14716.01
14716.02 - 222787.60
2020
Peak Hour Excessive Delay
(Annual Hours 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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East Haven
Branford
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Orange
8
West Haven
Easton
Trumbull
Weston
Milford
Wilton
Stratford
Bridgeport
7
15
Fairfield
New Canaan
Westport
1
95
Norwalk
Stamford
Darien
Greenwich
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
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