2025

CONGESTION MANAGEMENT PROCESS

SCRCOG | South Central Regional Council of Governments

DRAFT REPORT

2025 CONGESTION MANAGEMENT PROCESS

Prepared For

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EXECUTIVE SUMMARY

The South Central Regional Council of Governments (SCRCOG), encompassing the New Haven Transportation Management Area (TMA) and the New Haven Urbanized Area (UZA), faces growing transportation challenges due to increasing traffic demand on its extensive roadway network. This Congestion Management Process (CMP) provides a comprehensive framework to monitor, evaluate, analyze, and mitigate traffic congestion while enhancing regional mobility, economic vitality, and system reliability. This CMP, developed through a data-driven, performance-based approach, identifies selected congested corridors, assesses the effectiveness of current strategies, and proposes evidence-based recommendations tailored to SCRCOG's unique characteristics.

This report comprises a tremendous amount of data from a variety of sources that was used to calculate performance measures to assess the level of congestion. This performance data has been presented in such a way that it provides an easy understanding of where the region is at now with respect to transportation performance and where it is going in the future.

Congestion Management Processes (CMPs) is an integral part of the planning process for the Transportation Management Area. This CMP update represents a vital step in ensuring that the South Central Regional Council of Governments can meet current and future transportation demands with innovative, sustainable, and effective strategies. Speed and travel time reliability vary greatly across the road network studied, and there is considerable room for improvement in many places for policy, program and infrastructure investments.

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1. Introduction

A Congestion Management Process (CMP) provides the framework for measuring system performance and managing congestion for a region. According to current federal planning regulations, metropolitan areas with populations greater than 200,000 are designated as Transportation Management Areas (TMAs) and are required to develop and update a CMP to provide for "safe and effective integrated management and operation of the transportation system."[1]

The New Haven TMA population exceeds the threshold set by federal law and therefore, responsible for evaluating the traffic congestion in its planning area, develop specific performance measurements and prepare a program to reduce that congestion. New Haven TMA includes the South Central Regional Council of Governments (SCRCOG) and the Lower Connecticut River Valley Council of Governments (RiverCOG). Since 2004, SCRCOG has carried out a transportation monitoring and management program and published congestion management report for the New Haven TMA in 2004, 2010, 2012, 2015, 2017, 2018 and in 2023.

The congestion management process is one of the major goals for the region in the SCRCOG Metropolitan Transportation Plan (MTP)[2]. The MTP identified managing congestion as a key factor in maintaining regional economic vitality while improving overall environmental quality.

Until recently, the CMP only focused on congestion during traditional morning and evening commuting hours. With changes in working hours and adoption of hybrid work environment, congestion is not tied to traditional peak hours anymore. Acknowledging the changes, SCRCOG wanted to monitor and analyze traffic conditions for both weekdays and weekends and for timeframes beyond morning and evening peak hours. Since the New Haven TMA comprises several shoreline towns that experience significant increase in traffic during summer months, seasonal traffic is also another area of interest.

This 2025 Congestion Management Process (CMP) Report represents a continuation of SCRCOG's efforts to better understand the transportation system throughout the Region. This report takes a systematic approach to monitor and evaluate transportation system performance and congestion management strategies in a regional context to make the best use of federal, state, and regional funding resources.

Figure 1 shows the CMP Network discussed in this report.

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1 Section 23 Code of Federal Regulations
2 SCRCOG MTP 2023-2050

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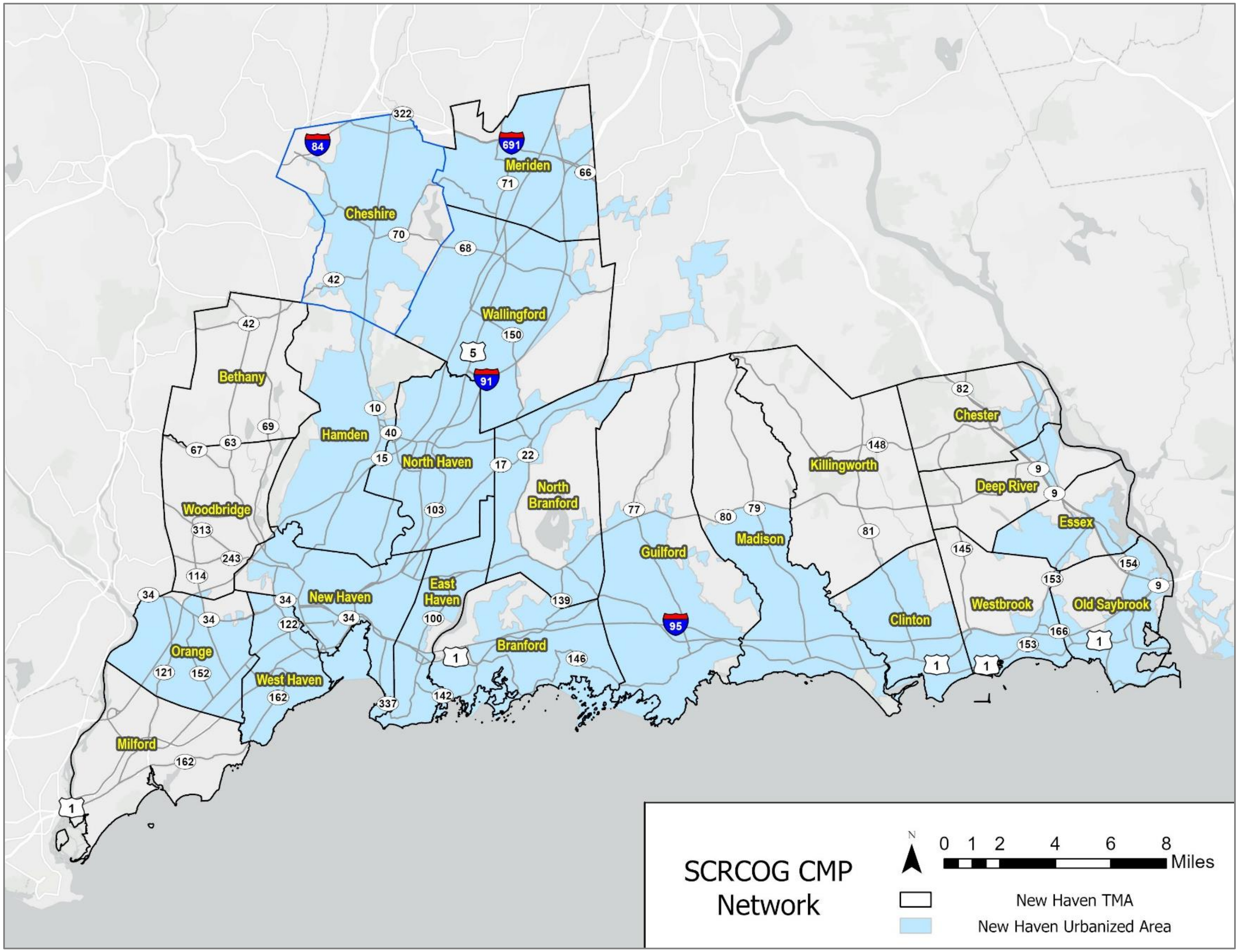

Figure 1: SCRCOG CMP Network

2. Congestion Management Process

The Safe Accountable Flexible Efficient Transportation Equity Act - A Legacy for the Users (SAFETEA-LU) stipulated the requirement for the use of the Congestion Management Process (CMP) in Transportation Management Areas (TMA)[3]. The CMP builds upon more than a decade of experience with planning for congestion management, as well as the accumulated knowledge of how greater availability of data, enhanced tools for data management and modeling, expanded use of intelligent transportation systems, and opportunities for regional cooperation and collaboration can improve the active management of the regional transportation system.

In 2011, Federal Highway Administration (FHWA) published "Congestion Management Process: A Guidebook"[4] that describes a flexible framework of eight actions that should be included in the development of a CMP. Figure 2 documents the process.

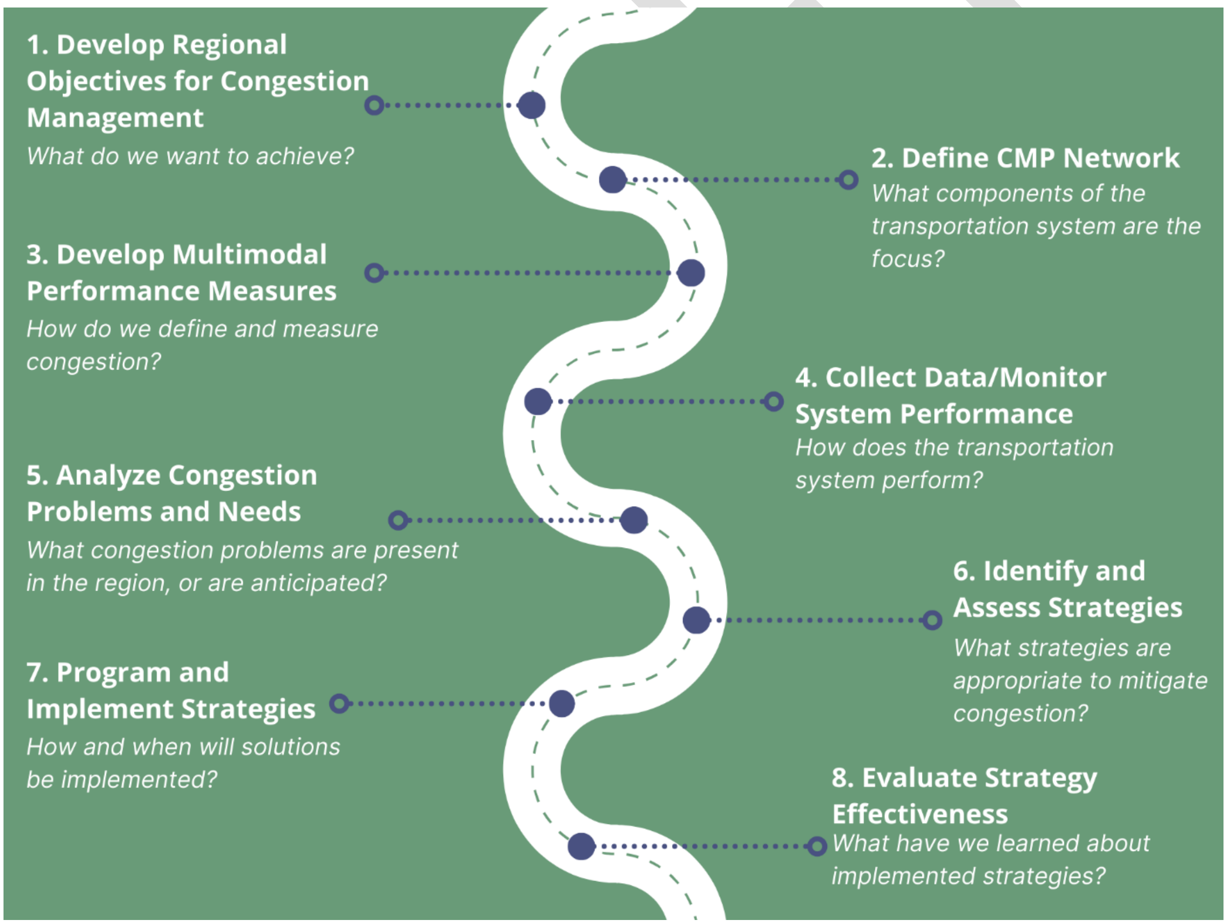

Figure 2: Congestion Management Process

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[3] SAFETEA-LU
[4] FHWA CMP Guidebook

3. Congestion Management Objectives

Congestion management objectives are defined based on the region's vision in regard to congestion and also with an understanding that a complete elimination of congestion may come at the expense of economic vitality and community livability. Therefore, it is important to establish what is considered "acceptable" based on state and regional performance measures goals.

SCRCOG is committed to maintaining and improving regional mobility needs and maximize efficient use of funding. The CMP aims to provide a systematic approach for a better understanding of existing and projected system performance and the effectiveness of various management strategies.

The list of objectives in this CMP originated from those documented in current Metropolitan Transportation Plans for the SCRCOG[5] and RiverCOG[6] Regions. The MTP functions as a framework for continued regional awareness and cooperation between the region's governments.

CMP Objectives

- **01.** Making wise use of available funding to bring the most benefit to the region through effective project prioritization and the identification of additional funding needs.
- **02.** Utilizing a congestion management process in framing transportation decisions that assesses both transportation demand management (TDM) and transportation supply management (TSM) initiatives.
- **03.** Preserving existing transportation resources to ensure that modes and service options are available for future operation.
- **04.** Working with member municipalities, state and federal agencies, and the transportation committee to develop regional solutions to transportation issues.
- **05.** Encouraging transportation decisions to reduce greenhouse gas emissions and improve coastal resiliency as SCRCOG is mindful of transportation impacts on the environment and climate change.

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[5] SCRCOG MTP 2023-2050

[6] LCRVCOG MTP 2023-2050

4. Congestion Management Network

For this report, the CMP network corresponds with the New Haven Transportation Management Area, which encompasses the entire SCRCOG Region, and several municipalities from the RiverCOG Region. As one of seven MPOs in the State, SCRCOG is responsible for developing and updating the CMP for New Haven TMA.

In transportation planning, a TMA (Transportation Management Area) is a designation for urbanized areas (UZAs) with populations of at least 200,000, while an UZA (Urbanized Area) is a statistical geographic entity designated by the Census Bureau, consisting of a central core and adjacent densely settled territory.

According to the 2020 census, the New Haven UZA comprises several municipalities within the New Haven TMA and also includes Cheshire, which is part of the Naugatuck Valley Council of Government (NVCOG). Since it is part of the New Haven UZA, this report also includes Cheshire in the CMP network.

The area of analysis encompasses 15 municipalities within the SCRCOG Region and 9 municipalities within the RiverCOG Region. The municipalities in the SCRCOG Region include Bethany, Branford, East Haven, Guilford, Hamden, Madison, Meriden, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven, and Woodbridge. Additionally, the nine municipalities in the RiverCOG Region include Chester, Clinton, Deep River, Essex, Killingworth, Lyme, Old Lyme, Old Saybrook, and Westbrook. Cheshire, which is part of NVCOG, is also part of the analysis.

The New Haven TMA is home to major employment centers, renowned colleges and universities, hospitals, airport and pristine shorelines that attract both commuter and non-commuter traffic. The Region's economic health depends upon the efficiency and extent of the Region's transportation system. The interstates together with the principal arterials carry most of the traffic in the region. Congestion is evident on certain portions of these roadways daily. Any congestion and operational inefficiencies in these roadways has an adverse impact on the growth and livability of the region.

The TMA has an extensive interstate system that includes I-95, I-91, and portion of I-691 as well as major arterials including Route Nos. 10, 17, 34,40, 63,68,71 and 80 and U.S. Route Nos. 1 and 5.

This report and associated analysis is based on the data derived from the National Performance Management Research Data Set (NPMRDS)[7]. The NPMRDS is a FHWA procured and sponsored archived speed and travel time data set, and it covers the

[7] NPMRDS

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roadways in the National Highway System (NHS)[8]. The NHS is a network of major roads that connect population centers, ports, airports, and other transportation facilities. It includes the roadways functionally classified as interstates and principal arterials. Figure 3 gives an overview of the study area and Figure 4 shows the road network used for congestion analysis.

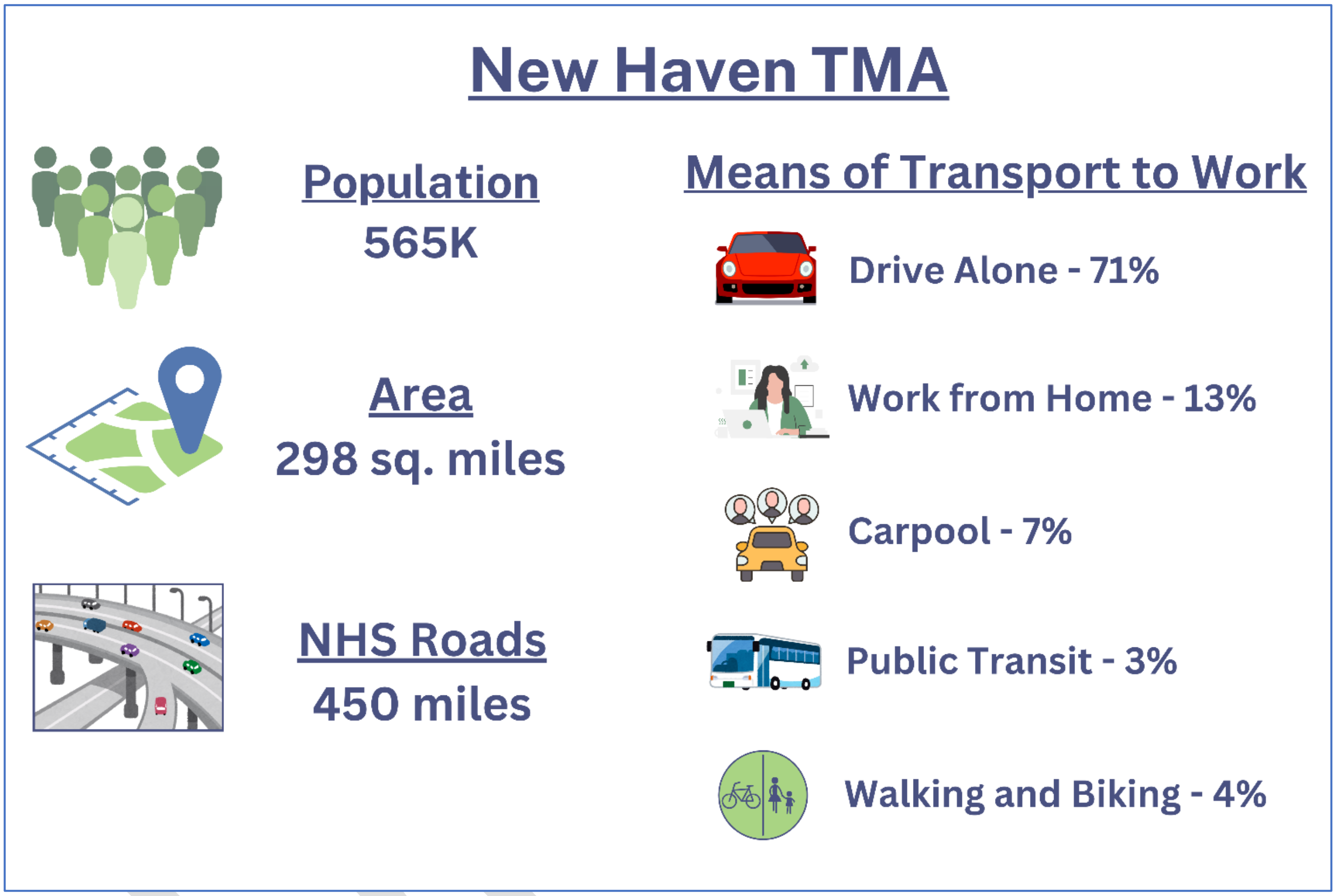

Figure 3: New Haven TMA (Source: 2023 American Community Survey)

[8] National Highway System

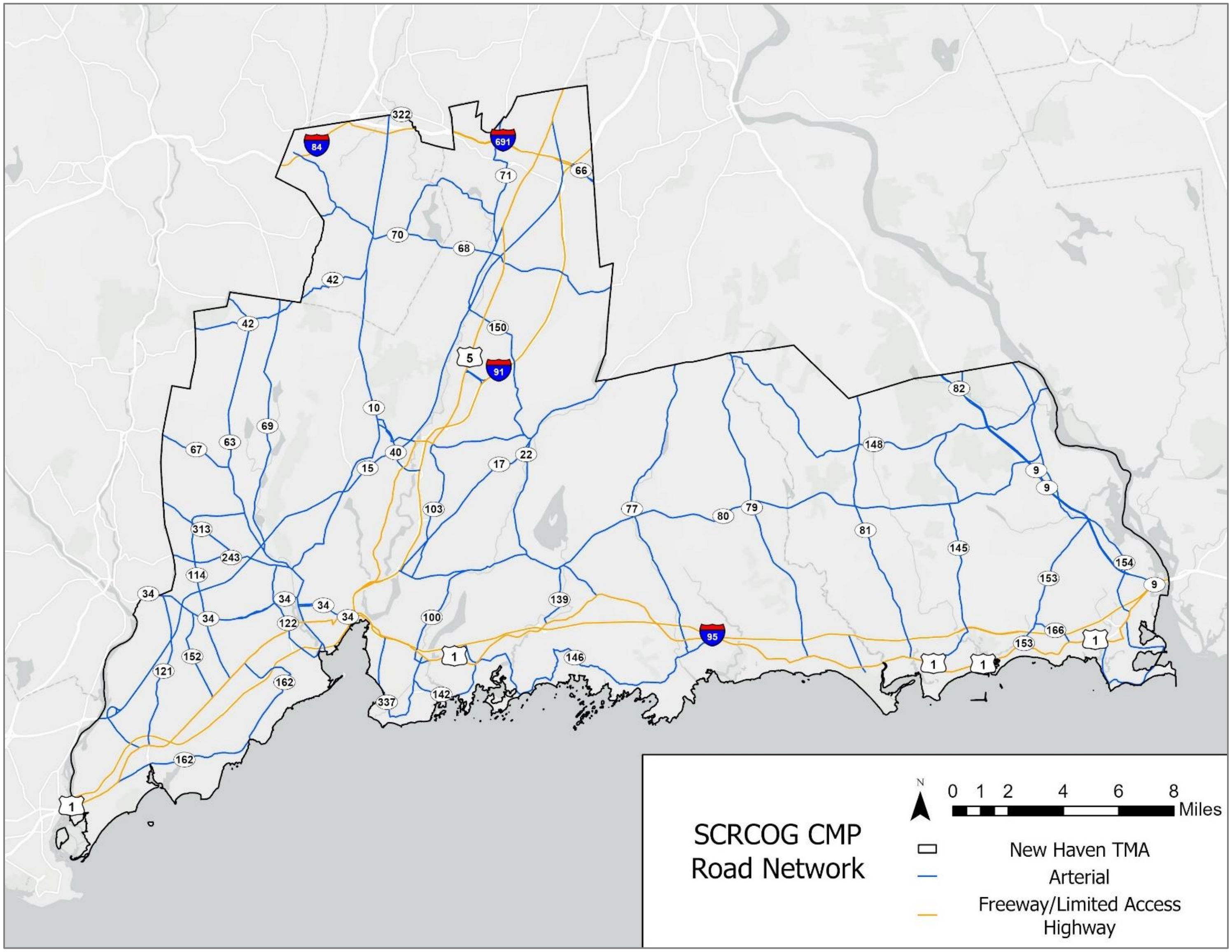

Figure 4: CMP Network

5. Performance Measures

Monitoring and evaluating the performance of a transportation system helps the regional and state authorities better understand the existing system performance needs, track regional success over time, and refine existing planning tools and models. The performance measures provide clear benchmarks into how well the transportation system is performing. It is critical for these measures to be relevant to the region and replicable for future updates of the CMP.

In the Congestion Management Process Guidebook, FHWA describes the characteristics of good performance measures

- Relate to goals and objectives
- Clearly communicate results to audiences
- Include multiple modes of travel
- Have consistency and accuracy
- Illustrate the effect of improvements
- Be applicable to existing and future conditions
- Use person- or goods-movement terms
- Allow for economic data collection or estimation
- Developed collaboratively

This report uses several performance measures as described in Table 1 that could be readily obtained through existing data sources, provide a unique perspective on transportation performance, and insert more clarity into how decision-makers understand the functioning of various transportation modes.

Measures should use data that is readily available or easily acquired and provide meaningful descriptions of how well the area is meeting its goals.

Table 1: Performance Measures

	Performance Measures	Source
Vehicle Throughput	Vehicle Miles of Travel (VMT)	CTDOT
Mobility	Average Speed	NPMRDS
	Delay	NPMRDS
	Peak Hour Excessive Delay (PHED)	CTDOT
Reliability	Travel Time Index (TTI)	NPMRDS
	Level of Travel Time Reliability (LOTTR)*	CTDOT

** Freeways Only*

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Vehicle Miles Traveled (VMT)

Average Travel Speed associated with a specific roadway is calculated using travel times and road segment lengths. The average observed travel speed is an excellent indicator of congestion in the roadway network and can highlight the need to identify solutions to mobility problems.

Average Speed

Average Travel Speed associated with a specific roadway is calculated using travel times and road segment lengths. The average observed travel speed is a good indicator of congestion in the roadway network and can highlight the need to identify solutions to mobility problems.

Delay

Delay is the extra time required to travel through a roadway segment or corridor during congested condition compared to the time required during free flow conditions.

Travel Time Index (TTI)

Travel time index (TTI) is a ratio of the average travel time and the free flow travel time. If the index or ratio is 1.0, it means that there is no delay. A ratio greater than 1.0 indicates that there is delay or congestion. For example, a ratio of 1.25 means that it takes 25 percent longer to travel a given distance in the corridor during the peak period than during off-peak periods.

Peak Hours of Excessive Delay (PHED)

Peak hour excessive delay (PHED) refers to the extra time spent traveling during congested conditions, defined by speeds below a threshold of 20 mph or 60% of the posted speed limit, specifically during peak traffic hours (6-10 am and 3-7 pm weekdays).

Level of Travel Time Reliability (LOTTR)

LOTTR is an index that shows the reliability and variability of speed on a roadway segment over a period of time. Roadway segments that have LOTTR higher than 1.50 are determined to be unreliable.

6. Data and Methodology

Previously, corridor performance has been evaluated using travel speeds and V/C ratios for the region's congested corridors. Travel time studies were conducted for the 2004 SCRCOG CMS Report, as well as for the 2010, 2012, 2014, 2015, 2017, 2018 and 2023 CMP updates. Travel time/speed data collected and processed within the GPS/GIS system was summarized by road segments defined by the user, based upon travel patterns and road characteristics. For each road segment, a threshold speed was established to represent a reasonable peak hour speed standard or goal considering posted speed limits, area characteristics, and road classification. A segment was considered congested when its average travel speed is below the threshold speed for its corresponding facility type. In the 2023 update Planning time index data was used for the first time. This data was provided by CTDOT and used directly for interstates and major arterials within the New Haven TMA.

This report takes a more updated approach to a data driven analysis for congestion. Until recently, the CMP only focused on congestion during traditional morning and evening commuting hours. With changes in working hours and adoption of hybrid work environment, congestion is not tied to traditional peak hours anymore. Acknowledging the changes, SCRCOG wanted to monitor and analyze traffic conditions for both weekdays and weekends and for timeframes beyond morning and evening peak hours. Since SCRCOG comprises several shoreline towns that experiences significant increase in traffic during summer months, seasonal traffic is also another area of interest.

The 2024 CMP update and associated analysis is based on the data derived from the National Performance Management Research Data Set (NPMRDS). The study time frame is the year 2023 since that was the most recent available year when this project started. Additionally, SCRCOG leveraged the data already analyzed and maintained by CTDOT.

Overview of the data used in this report is described below

Data Providers		NPMRDS, CTDOT
Year		2023
Road Network		NHS network within New Haven TMA/UZA
Time Period		
	Weekday	• Morning (6AM -10AM) • Midday (10AM – 3PM) • Evening (3PM-7PM
	Weekend	• 11AM -4PM

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NPMRDS Data

National Performance Management Research Data Set (NPMRDS) is sponsored by FHWA and developed in partnership with University of Maryland (UMD). NPMRDS allows agencies to access massive amounts of data from January 2017 forward on the National Highway System (NHS) road network at no cost[9].

The NPMRDS contains field-observed travel time and speed data collected anonymously from a fleet of probe vehicles (cars and trucks) equipped with mobile devices. Using time and location information from probe vehicles, the NPMRDS generates speed and travel time data aggregated in 5-minute, 15-minute, or 1-hour increments. The data are available across the National Highway System (NHS), with a spatial resolution defined by Traffic Message Channel (TMC) location codes. A TMC represents a unique, directional roadway segment that is about half a mile to a mile long in urban and suburban areas and could be as long as five to ten miles long in rural areas.

Methodology

The methodology for calculating performance measures is described below

$$\boldsymbol{Vehicle\ Miles\ Traveled\ (VMT) = AADT * Segment\ Length}$$

$$\boldsymbol{Average\ Speed = Average\ of\ Probe\ Vehicle\ Speed}$$

$$\boldsymbol{Delay = Average\ Speed - Free\ Flow\ Speed}$$

$$\boldsymbol{Travel\ Time\ Index\ (TTI) = \frac{Average\ Travel\ Time}{Free\ Flow\ Travel\ TIme}}$$

$$\boldsymbol{Level\ of\ Travel\ Time\ Reliability\ (LOTTR) = \frac{Average\ Travel\ Time}{Free\ Flow\ Travel\ TIme}}$$

$$\boldsymbol{Peak\ Hours\ of\ Excessive\ Delay\ (PHED) = ExcessiveDelay\ (hours) * AADT * 365}$$

Municipal Survey

To gather input from the municipalities, a survey was created and distributed among the planning department, engineering department, department of public works, mayors/first selectman and other town representatives. This survey helped to document the concerns the member municipalities have. Since the NPMRDS data only covers the national highway system, this survey sheds light on the roads that's not within the NHS.

[9] NPMRDS Data

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7. Freeway Performance Results

I-95 and I-91 are the two major interstate routes in New Haven TMA. A portion of I-691 and I-84 also passes through the selected CMP network.

I-95 runs east-west through the region and connects to New York to the west and to Rhode Island to the east. I 91 is a primary north-south route through Connecticut. To the south, it connects to I-95 in New Haven. To the north, it connects to the I-90 in Springfield, Massachusetts. Parts of I-691 connecting I-91 and I-84 is also within the study area.

CT-15 is a limited access highway/parkway that holds regional significance. Within New Haven TMA, it is mostly known as Wilber Cross Parkway and runs between Milford and Meriden. Together, these limited access highways carry a large volume of long-distance traffic.

There are other roads within the study area that has limited access highway designation for a portion of the length. But in most cases that comprises of a negligible percentage compared to the total length. These roads are included in the arterials chapter since they are better suited in the arterial network.

For the selected freeways/limited access highways, several performance measures such as VMT, average speed, delay and TTI were calculated for both weekdays and weekends using 2023 data.

Table 2 describes the extents of these highways.

Table 2: Limited Access Highways in the CMP Network

Routes	From	To	Length (miles)
I-84	I-691 Interchange, Cheshire	Cheshire/Waterbury Border	3.01
I-91	I-95 Interchange, New Haven	Meriden/Middletown Border	20.7
I-95	Stratford/Milford Border	Old Saybrook/Old Lyme Border	44.0
I-691	CT-71 (Chamberlin Hwy) , Meriden	CT-10 (Highland Ave) , Cheshire	5.6
CT-15	Stratford/Milford Border	US-5 (N Broad Street), Meriden	29.4

Vehicle Miles Traveled (VMT)

Figure 5 shows the VMT for all the limited access highways in the CMP network. The differences in the VMTS are expected as the total length of each of these highways within the study area varies. Some of the highest VMTs were observed for I-95 within the SCRCOG region, for I-91 south of US-5 and for CT-15 for the entire length.

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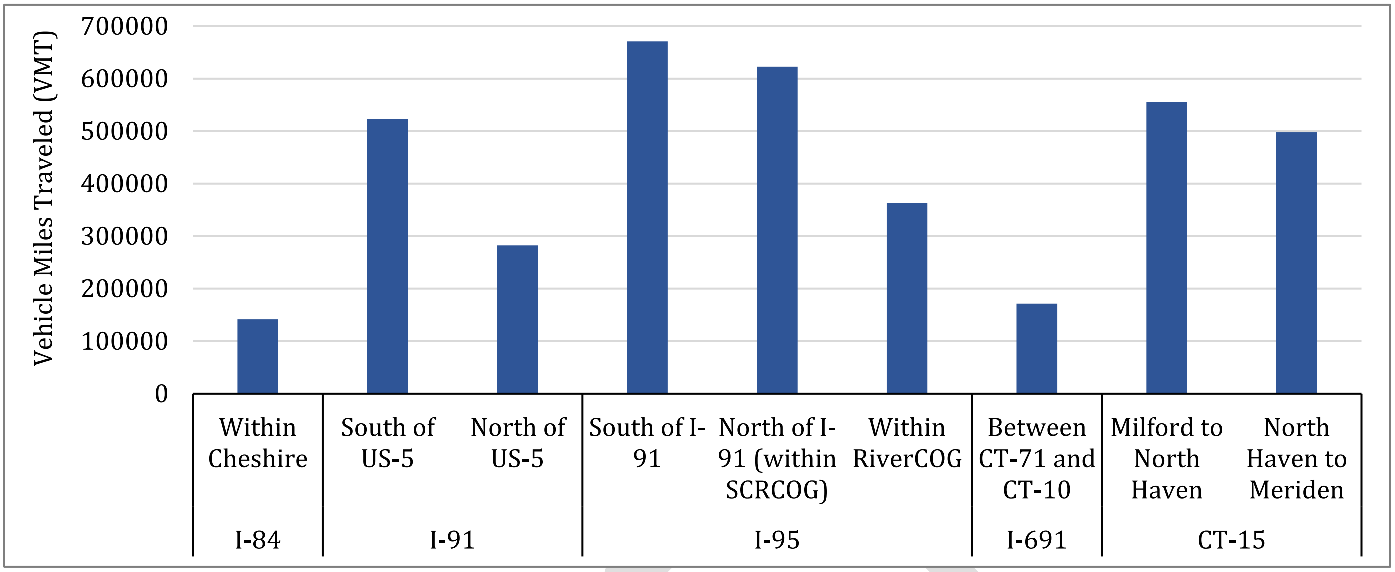

Figure 5: Freeway VMT within New Haven TMA/UZA

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Average Speed

Figure 6 shows the average speeds along the freeways during all the study periods. The speed limits, vehicle restrictions (trucks are not allowed on CT-15) and other geometric factors such as number of lanes, lane width, curvature etc. vary largely between these roads. Total length of these roads and the volume they carry within the study area also varies.

Delay

Delay was calculated as difference between free flow speed and average speed. If the free flow speed is higher than the average speed, that indicates congestion and associated delay. As this difference increases, the intensity of congestion also increases. Whereas, if the average speed is higher than the free flow speed, that indicates that the segment is operating without any delay or congestion.

Figure 7 shows the difference between the free flow speed and the average speed for all time periods for the arterial network. Westbound I-84 showed a speed difference of 14 mph indicating severe congestion. For CT-15, both directions showed moderate to severe congestion for all time periods. The highest speed difference was observed in the southbound direction between Milford and North Haven during weekday evening. The southbound I-91 seemed more congested than the northbound especially during the weekday evening peak period.

The portion of I-95 between Milford and New Haven (south of the I-91 interchange) was congested in both directions for all time periods. Southbound I-95 between New Haven and Madison also showed congestion for weekend evening.

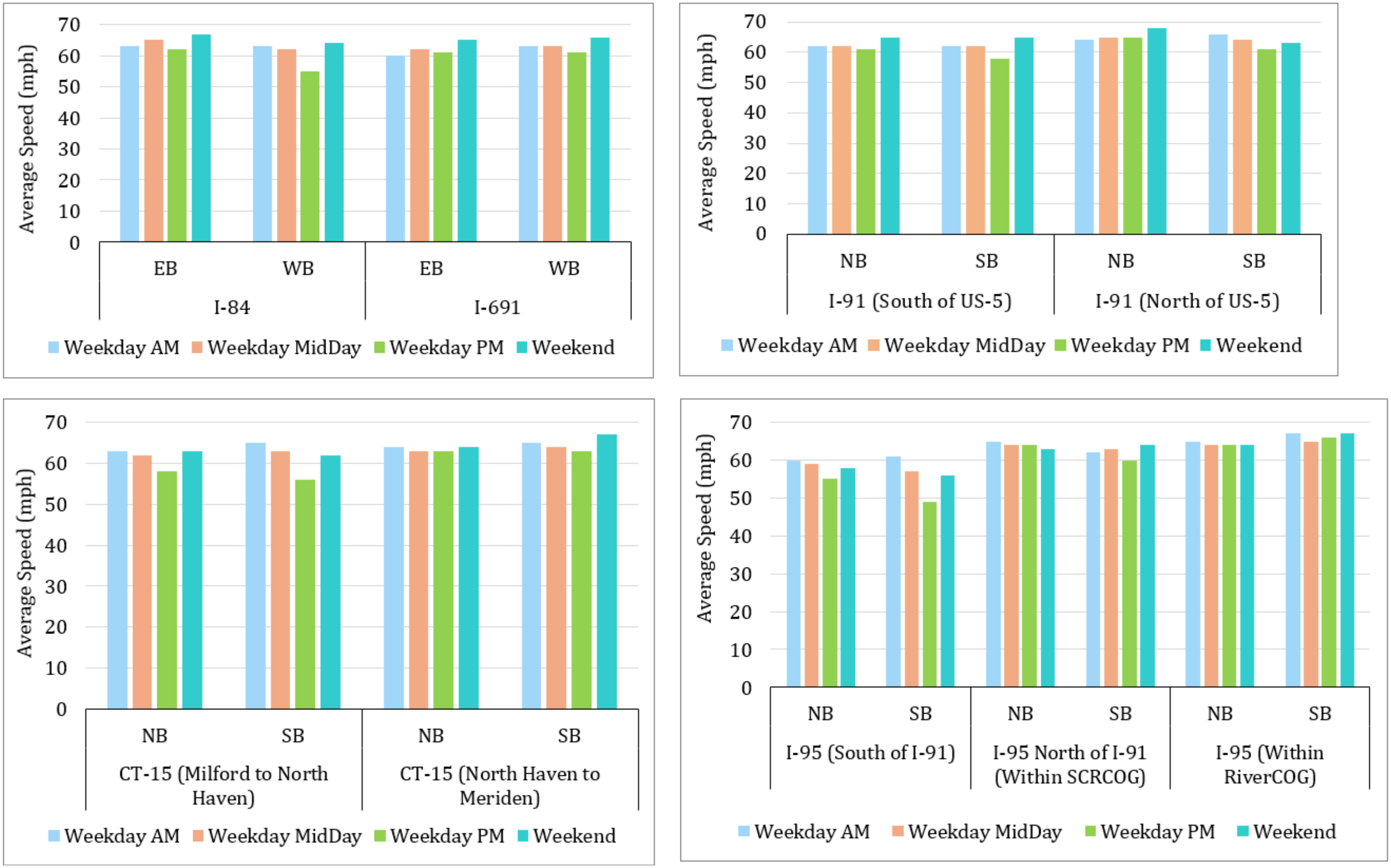

Figure 6: Freeway Average Speed Profile

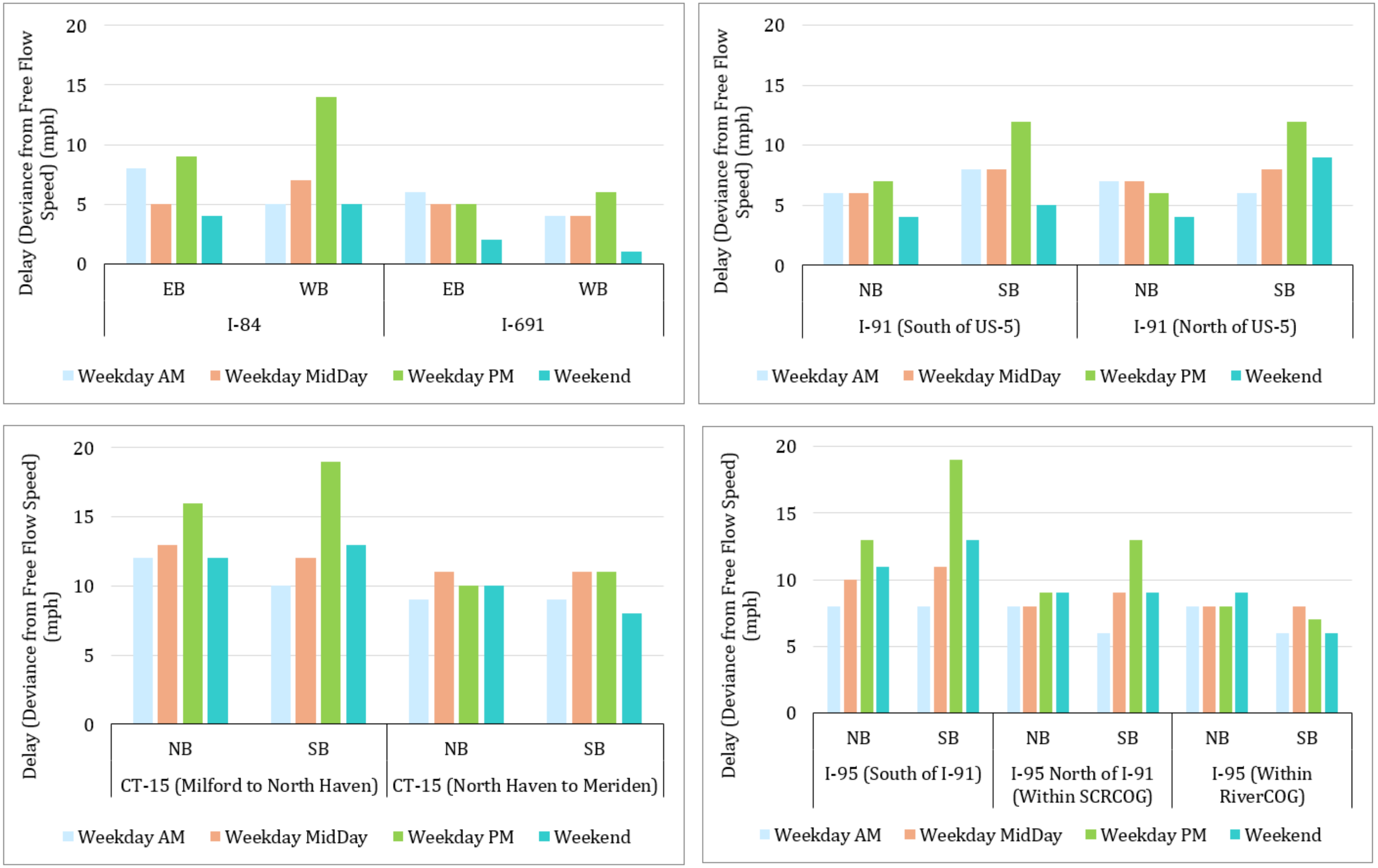

Figure 7: Freeway Speed Difference (Delay)

Travel Time Index (TTI)

TTI is a measure of travel time reliability that quantifies how much longer a trip takes during congested conditions compared to a trip with light traffic. Table 3 documents the TTI for the freeway network. Each roadway was divided into multiple sections to identify where the congestion is concentrated. Any value above 1.0 indicates unreliability but a value up to 1.5 is usually acceptable.

I-84 and I-691 was reliable for most parts. Southbound I-91 in Meriden near CT-15 interchange showed some unreliability in weekday evening and weekend periods. I-95 between Milford Parkway and Townsend Ave in New Haven indicated unreliable travel times during weekday evening. Sporadic changes in travel time reliability was also observed between Branford Connector in Branford and CT-77 (Church St) in Guilford. CT-15 showed signs of congestion and unreliability near Wheelers Farm Road in Milford, CT-34 (Derby Ave) interchange in Orange and CT-69 (Whalley Ave) interchange in New Haven.

Table 3: Travel Time Index (TTI) for Freeways

Road	From	To	Length	Direction	Travel Time Index (TTI)			
					Weekday			Weekend
					AM	Midday	PM	
I-84	Waterbury/Cheshire Border	CT-70(Waterbury Rd), Cheshire	1.16	EB	1.2	1.1	1.2	1.1
				WB	1.1	1.1	1.5	1.1
	CT-70(Waterbury Rd), Cheshire	I-691, Meriden	1.85	EB	1.1	1.1	1.2	1.1
				WB	1.1	1.1	1.3	1.1
I-91	I-95, New Haven	US-5 (State St), New Haven	1.40	NB	1.1	1.2	1.2	1.1
				SB	1.2	1.2	1.8	1.2
	US-5 (State St), New Haven	CT-80 (Foxon Blvd.), New Haven	1.14	NB	1.1	1.2	1.2	1.1
				SB	1.2	1.1	1.2	1.1
	CT-80 (Foxon Blvd.), New Haven	Montowese Ave, North Haven	2.30	NB	1.1	1.1	1.1	1.0
				SB	1.2	1.1	1.1	1.0
	Montowese Ave, North Haven	CT-40 (Mt Carmel Connector), North Haven	1.98	NB	1.1	1.1	1.1	1.0
				SB	1.1	1.0	1.1	1.0
	CT-40 (Mt Carmel Connector), North Haven	CT-22 (Clintonville Rd.), North Haven	1.10	NB	1.1	1.1	1.1	1.0
				SB	1.1	1.1	1.1	1.1
	CT-22 (Clintonville Rd.), North Haven	US-5 (Washington Ave), North Haven	1.15	NB	1.1	1.1	1.1	1.0
				SB	1.1	1.1	1.1	1.1
	US-5 (Washington Ave), North Haven	Wharton brook Connector, North Haven	2.30	NB	1.1	1.1	1.2	1.0
				SB	1.1	1.1	1.1	1.0
	Wharton brook Connector, North Haven	E Center St., Wallingford	2.14	NB	1.2	1.2	1.2	1.1
				SB	1.1	1.1	1.1	1.1
	E Center St., Wallingford	CT-68 (Barnes Rd.), Wallingford	2.93	NB	1.1	1.1	1.2	1.0
				SB	1.1	1.1	1.3	1.0
	CT-68 (Barnes Rd.), Wallingford	CT-15 (Willbur Cross Pkwy.), Meriden	2.56	NB	1.1	1.1	1.4	1.1
				SB	1.1	1.1	1.4	1.1
	CT-15 (Willbur Cross Pkwy.), Meriden	Meriden/Middletown Border	2.21	NB	1.2	1.2	1.2	1.2
				SB	1.1	1.3	1.6	1.9

Road	From	To	Length	Direction	Travel Time Index (TTI)			
					Weekday			Weekend
					AM	Midday	PM	
I-95	Stratford/Milford Border	Milford Parkway, Milford	3.20	NB	1.2	1.4	1.6	1.3
				SB	1.1	1.2	1.2	1.1
	Milford Parkway, Milford	US-1 (Boston Post Rd.)	1.74	NB	1.2	1.2	1.3	1.2
				SB	1.1	1.2	1.6	1.4
	US-1 (Boston Post Rd.)	Marsh Hill Rd, Orange	2.77	NB	1.2	1.2	1.6	1.3
				SB	1.1	1.2	1.6	1.2
	Marsh Hill Rd, Orange	CT-10 (Ella T Grasso Blvd.), New Haven	4.10	NB	1.2	1.2	1.7	1.3
				SB	1.2	1.4	2.2	1.7
	CT-10 (Ella T Grasso Blvd.), New Haven	SSR -337 (Townsend Ave), New Haven	3.05	NB	1.1	1.1	1.2	1.1
				SB	1.2	1.6	2.8	2.0
	SSR -337 (Townsend Ave), New Haven	N High St, East Haven	1.54	NB	1.1	1.1	1.2	1.1
				SB	1.1	1.1	1.1	1.1
	N High St, East Haven	Branford Connector, Branford	1.56	NB	1.1	1.1	1.2	1.1
				SB	1.1	1.2	1.3	1.1
	Branford Connector, Branford	US-1(E Main St.), Branford	3.20	NB	1.1	1.2	1.4	1.4
				SB	1.1	1.2	1.9	1.5
	US-1(E Main St.), Branford	CT-77 (Church St), Guilford	4.89	NB	1.1	1.2	1.3	1.2
				SB	1.1	1.2	1.9	1.4
	CT-77 (Church St), Guilford	CT-79 (Durham Rd.), Madison	4.59	NB	1.0	1.2	1.2	1.2
				SB	1.1	1.2	1.2	1.2
	CT-79 (Durham Rd.), Madison	CT-450 (Hammonasset Connector), Madison	1.63	NB	1.1	1.2	1.2	1.1
				SB	1.1	1.1	1.1	1.1
	CT-450 (Hammonasset Connector), Madison	CT-81 (Killingworth Turnpike), Clinton	2.14	NB	1.1	1.2	1.2	1.1
				SB	1.1	1.1	1.2	1.1
	CT-81 (Killingworth Turnpike), Clinton	CT-145 (Old Post Rd.), Westbrook	2.41	NB	1.1	1.1	1.1	1.1
				SB	1.1	1.2	1.2	1.1
	CT-145 (Old Post Rd.), Westbrook	CT-166 (Spencer Plains Rd.), Old Saybrook	3.63	NB	1.1	1.1	1.1	1.1
				SB	1.1	1.2	1.2	1.1
	CT-166 (Spencer Plains Rd.), Old Saybrook	CT-154 (Middlesex Turnpike), Old Saybrook	2.49	NB	1.1	1.1	1.2	1.1
				SB	1.1	1.2	1.3	1.1
	CT-154 (Middlesex Turnpike), Old Saybrook	Old Saybrook/Old Lyme Border	1.81	NB	1.1	1.2	1.2	1.2
				SB	1.1	1.2	1.1	1.2
I-691	I-91, Meriden	US-5 (N Broad St.), Meriden	1.30	EB	1.2	1.1	1.1	1.1
				WB	1.1	1.1	1.1	1.1
	US-5 (N Broad St.), Meriden	CT-71 (Chamberlin Hwy), Meriden	1.35	EB	1.1	1.1	1.1	1.1
				WB	1.1	1.1	1.1	1.0
	CT-71 (Chamberlin Hwy), Meriden	Meriden/Southington Border	1.70	EB	1.1	1.1	1.1	1.0
				WB	1.0	1.0	1.1	1.0
	I-84, Cheshire	CT-10 (Highland Ave), Cheshire	1.18	EB	1.1	1.1	1.1	1.0
				WB	1.1	1.1	1.2	1.1

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Road	From	To	Length	Direction	Travel Time Index (TTI)			
					Weekday			Weekend
					AM	Midday	PM	
CT-15	Stratford/Milford Border	Wheelers Farm Rd, Milford	1.10	NB	1.3	1.3	1.6	1.5
				SB	1.2	1.3	1.6	1.4
	Wheelers Farm Rd, Milford	Grassy Hill Rd, Orange	2.80	NB	1.1	1.2	1.2	1.2
				SB	1.2	1.2	1.3	1.2
	Grassy Hill Rd, Orange	CT-34 (Derby Ave), Orange	1.67	NB	1.2	1.2	1.3	1.2
				SB	1.2	1.2	1.3	1.2
	CT-34 (Derby Ave), Orange	CT-69 (Whalley Ave), New Haven	3.96	NB	1.3	1.4	1.7	1.6
				SB	1.2	1.3	2.3	1.4
	CT-69 (Whalley Ave), New Haven	CT-10 (Dixwell Ave), Hamden	3.49	NB	1.2	1.2	1.3	1.2
				SB	1.2	1.3	2.1	1.6
	CT-10 (Dixwell Ave), Hamden	Dixwell Ave, North Haven	2.06	NB	1.2	1.3	1.2	1.2
				SB	1.2	1.3	2.0	1.3
	Dixwell Ave, North Haven	Bishop St., North Haven	1.20	NB	1.2	1.2	1.2	1.1
				SB	1.2	1.3	1.5	1.2
	Bishop St., North Haven	S Turnpike Rd., Wallingford	5.11	NB	1.1	1.2	1.1	1.1
				SB	1.1	1.2	1.3	1.2
	S Turnpike Rd., Wallingford	US-5 (N Colony Rd.), Wallingford	2.93	NB	1.1	1.2	1.2	1.2
				SB	1.1	1.2	1.2	1.1
	US-5 (N Colony Rd.), Wallingford	I-91, Meriden	2.78	NB	1.2	1.3	1.3	1.4
				SB	1.2	1.2	1.2	1.1
	I-91, Meriden	I-691, Meriden	1.49	NB	1.1	1.2	1.2	1.2
				SB	1.1	1.2	1.2	1.3
	I-691, Meriden	US-5 (N Broad St.), Meriden	1.50	NB	1.2	1.1	1.1	1.1
				SB	1.1	1.1	1.2	1.2

1.0 -1.5   1.0 -1.5   1.6 – 2.0   >2.0

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8. Arterial Performance Results

Based on data availability and regional significance, a set of arterials were included in this CMP. VMT, average speed, delay and TTI were calculated for both weekdays and weekends using 2023 data. The arterials included for analysis in this section have at-grade intersections (with varying types of control), access driveways of varying density and direct access to abutting land uses. They serve as major activity centers in urban areas and can also serve rural areas. Delays on major arterial roads stem from a combination of regular occurrences like heavy traffic, frequent access points and poorly optimized traffic signals, and unexpected events like accidents and weather. Factors such as work zones and roadside activities also play a role in slowing traffic down. Understanding these causes is crucial for developing effective strategies to alleviate congestion and improve overall traffic flow. Table 4 describes the extents of the arterials analyzed in this CMP.

Table 4: Arterials in the CMP Network

Routes	From	To	Length (miles)
CT-9	CT-82, Chester	I-95 Exit 69, Old Saybrook	10.8
CT-10	I-95 Exit 44, New Haven	Cheshire/Southington Border	21.5
CT-17	CT-103 (Quinnipiac Ave), New Haven	Reeds Gap Rd, North Branford	13.4
CT-34	US-1 (Water Street), New Haven	Orange/Derby Border	7.8
CT-40	I-91 Exit 10, North Haven	CT-10 (Whitney Ave), Hamden	3.0
CT-63	CT-10 (Fitch St), New Haven	CT-42 (Cheshire Rd.), Bethany	11.5
CT-66	I-91 Exit 18, Meriden	E Main St, Meriden	0.9
CT-68	I-91 Exit 15, Wallingford	CT-70 (Waterbury Rd), Cheshire	9.1
CT-69	CT-63 (Whalley Ave), New Haven	CT-42 (Cheshire Rd), Cheshire	12.0
CT-70	Byam Rd, Cheshire	Cheshire Rd, Meriden	6.8
CT-71	Cook Ave, Meriden	I-691, Meriden	1.5
CT-80	I-91 Exit 7, New Haven	N Chestnut Hill Rd, Killingworth	16.8
US-5	US-1 (Water St), New Haven	Trumbull St, New Haven	0.8
US-1	Stratford/Milford Border	I-95 Exit 55, Branford	21.6

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Vehicle Miles Traveled (VMT)

Figure 8 shows the VMT for all the arterials in the CMP network. Some of the highest VMTs were observed for CT-9, CT-34 and US-1. And the lowest VMTs were observed for CT-66, CT-71 and US-5. This is not an indication that these arterials carry less traffic. VMT is directly related to the length of the roadway. Data coverage varies for these arterials, hence the extent and length included for analysis also varies.

Average Speed

Figure 9 shows the average speeds along the arterials during all the study periods. All or most of the time periods along CT-10, CT-63, CT-71, US-5 and US-1 showed average speed below 25 mph. For CT-17, CT-34, CT-68, CT-69, CT-70, and CT-80, average speed ranged between 25 mph and 35 mph. For CT-9, CT-40, and CT-66, average speed is over 35 mph. Specially for CT-9 and CT-66, average speed was above 55 mph. For most arterials, weekday mid-day or weekday PM speeds were lowest among all timeframes.

It is important to remember that the arterials are of various lengths and also the speed limits are different for different sections of these arterials. As evident from Figure 8, the traffic volume these arterials carry also varies. Road geometry such as number of lanes, lane width, curvature etc. plays a significant role in operational speed in addition to traffic volume.

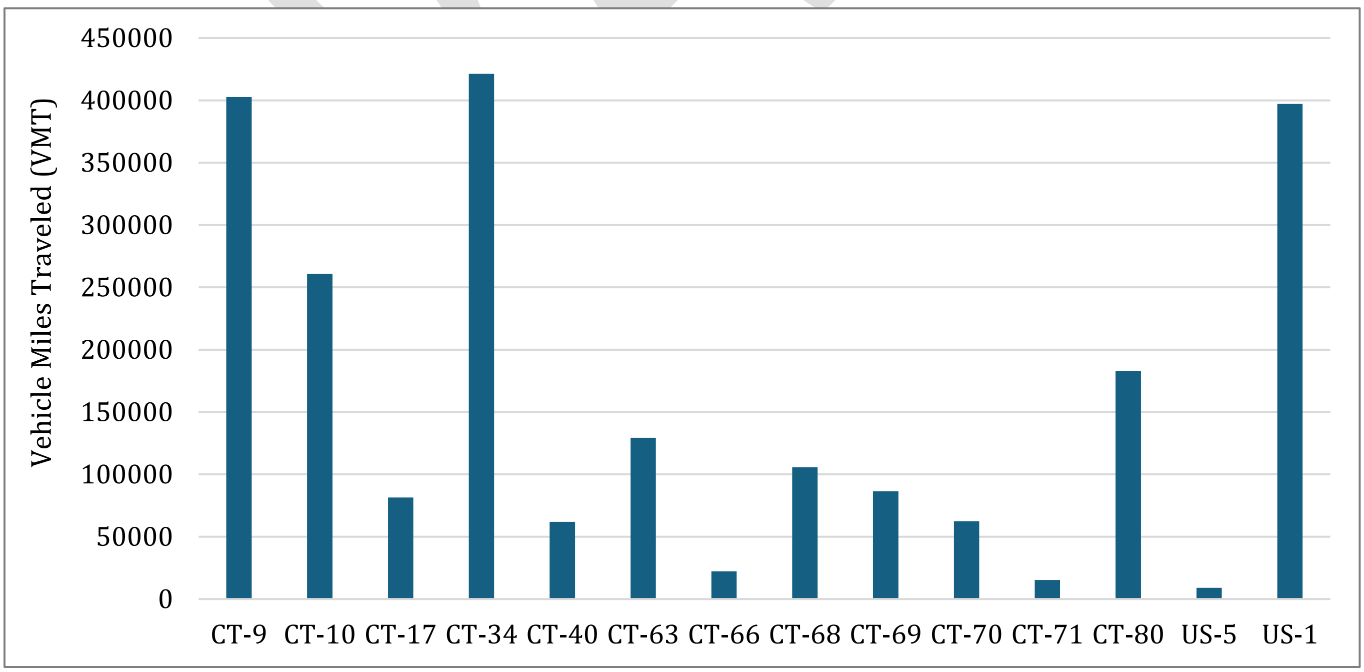

Figure 8: Arterial VMT within New Haven TMA/UZA

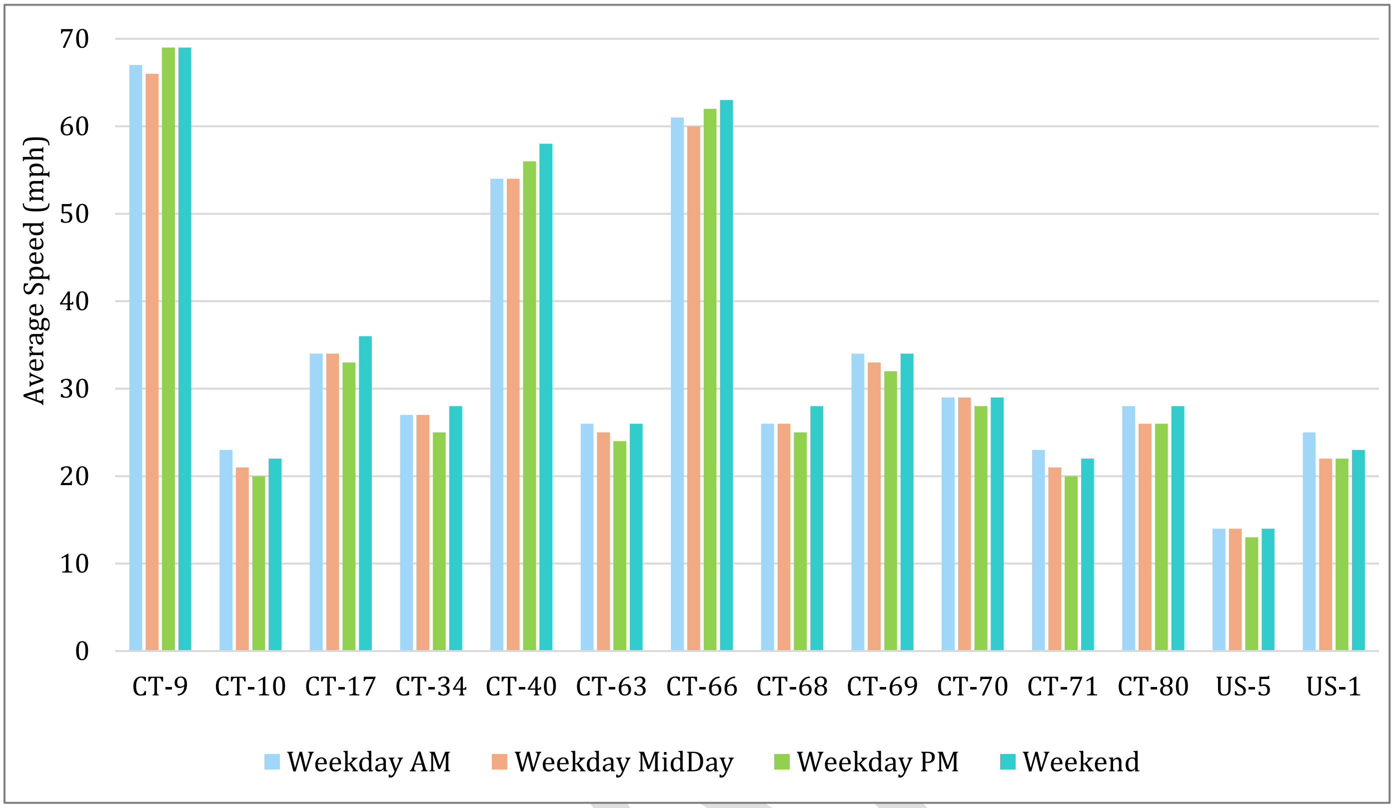

Figure 9: Arterial Average Speed Profile

Delay

Delay was calculated for the arterials in a similar fashion to the freeways. Figure 10 shows the difference between the free flow speed and the average speed for all time periods for the arterial network. Even though any deviation from free flow speed indicates congestion, a difference of 5mph is not unreasonable especially for urban areas. However, difference of 10mph or more means significant congestion. Except for CT-9 and CT-66, all other arterials had an average speed difference greater than 10 mph for both directions. More than 20 mph speed difference was observed for southbound CT-10 (weekday midday and weekend), and for westbound CT-68 (weekday evening).

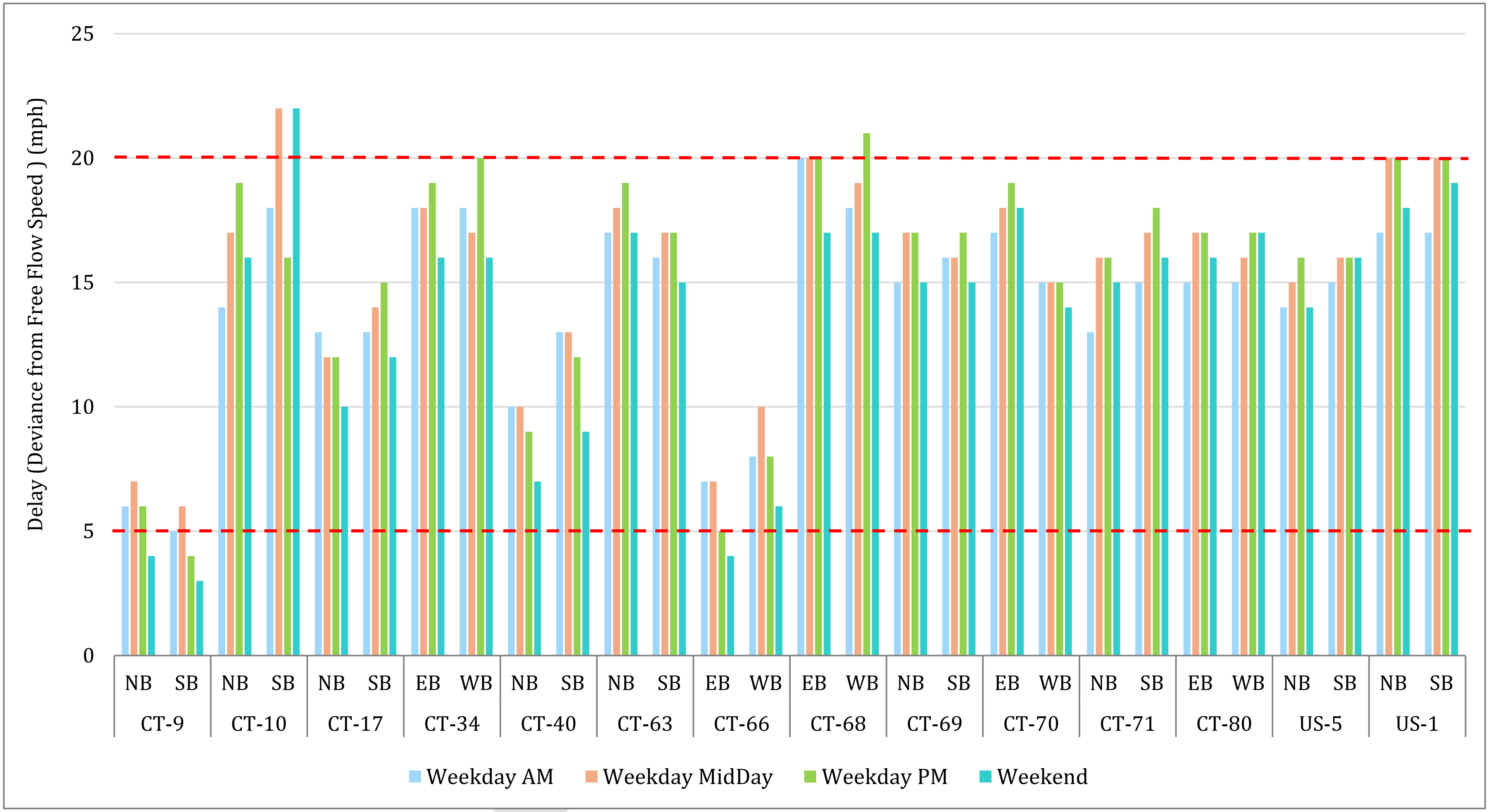

Figure 10: Arterial Speed Difference (Delay)

Travel Time Index (TTI)

Table 5 documents the TTI for the network. Each arterial was divided into multiple sections to identify where the congestion is concentrated.

CT-10, CT-71, US-5, and US-1 are unreliable throughout for all time periods. CT-34 was congested and unreliable between CT-122 (Forrest Rd) in West Haven and US-1 (Water Street) in New Haven. CT-63 in New Haven between CT-10 and CT-15 Exit 59 and CT-69 between Whalley Ave in New Haven and Clark Rd in Woodbridge also showed significant unreliability. Similar results were observed for CT-80 within New Haven between I-91 Exit 7 and CT-103 (Quinnipiac Ave).

Table 5: Travel Time Index (TTI) for Arterials

Road	From	To	Length	Direction	Travel Time Index (TTI)			
					Weekday			Weekend
					AM	Midday	PM	
CT-9	I-95 Exit 69, Old Saybrook	CT-154 (Middlesex Turnpike), Old Saybrook	1.17	NB	1.1	1.1	1.1	1.1
				SB	1.1	1.1	1.1	1.1
	CT-154 (Middlesex Turnpike), Old Saybrook	Plains Rd/West Ave, Essex	2.50	NB	1.1	1.1	1.1	1.1
				SB	1.1	1.1	1.1	1.1
	Plains Rd/West Ave, Essex	CT-154 (Deep River Rd), Essex	1.54	NB	1.1	1.1	1.1	1.1
				SB	1.1	1.1	1.1	1.0
	CT-154 (Deep River Rd), Essex	CT-80 (Elm St), Deep River	1.70	NB	1.1	1.1	1.1	1.0
				SB	1.1	1.1	1.1	1.0
	CT-80 (Elm St), Deep River	CT-148 (W Main St), Chester	2.20	NB	1.1	1.1	1.1	1.1
				SB	1.1	1.1	1.1	1.0
	CT-148 (W Main St), Chester	CT-82, Chester	1.65	NB	1.1	1.1	1.1	1.1
				SB	1.1	1.1	1.1	1.1
CT-10	I-95 Exit 44, New Haven	US-1 (Columbus Ave), New Haven	1.30	NB	1.9	2.1	2.3	2.1
				SB	2.4	2.7	2.4	2.8
	US-1 (Columbus Ave), New Haven	CT-34 (Legion Ave), New Haven	0.66	NB	2.0	2.0	2.3	2.0
				SB	2.6	2.5	2.8	2.5
	CT-34 (Legion Ave), New Haven	CT-63 (Whalley Ave), New Haven	1.48	NB	2.1	2.2	2.8	2.1
				SB	2.0	2.1	2.3	2.0
	CT-63 (Whalley Ave), New Haven	Dixwell Ave, Hamden	1.60	NB	2.1	2.2	2.3	2.0
				SB	2.3	2.4	2.7	2.1
	Dixwell Ave, Hamden	CT-15 Exit 60, Hamden	2.09	NB	2.5	2.7	2.8	2.6
				SB	2.1	2.3	2.7	2.4
	CT-15 Exit 60, Hamden	Whitney Ave, Hamden	1.73	NB	1.9	2.2	2.2	2.0
				SB	2.0	2.2	2.2	2.1
	Whitney Ave, Hamden	Ives St, Hamden	1.46	NB	1.8	2.0	2.2	1.9
				SB	1.8	2.1	2.1	2.0
	Ives St, Hamden	Shepard Ave, Hamden	2.40	NB	1.5	1.6	1.7	1.5
				SB	1.6	1.7	1.7	1.6
	Shepard Ave, Hamden	King Rd, Cheshire	2.50	NB	1.3	1.3	1.4	1.3
				SB	1.3	1.4	1.4	1.4
	King Rd, Cheshire	CT-68 (Main St), Cheshire	2.02	NB	1.8	1.9	2.1	2.2
				SB	1.9	2.1	2.1	2.0
	CT-68 (Main St), Cheshire	Cheshire/Southington Border	4.34	NB	1.9	1.9	1.9	1.7
				SB	1.8	1.8	1.7	1.6

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Road	From	To	Length	Direction	Travel Time Index (TTI)			
					Weekday			Weekend
					AM	Midday	PM	
CT-17	CT - 103 (Quinnipiac Ave), New Haven	CT-80 (Foxon Blvd), New Haven	1.49	NB	1.7	1.7	1.8	1.5
				SB	1.6	1.6	1.7	1.5
	CT-80 (Foxon Blvd), New Haven	Spring Rd, North Haven	1.30	NB	1.4	1.4	1.5	1.4
				SB	1.7	1.7	1.9	1.8
	Spring Rd, North Haven	Rimmon Rd, North Haven	1.80	NB	1.2	1.2	1.2	1.2
				SB	1.2	1.2	1.3	1.2
	Rimmon Rd, North Haven	CT-22 (Clintonville Rd), North Branford	2.33	NB	1.7	1.6	1.7	1.6
				SB	1.5	1.5	1.6	1.6
	CT-22 (Clintonville Rd), North Branford	Reeds Gap Rd., North Branford	2.36	NB	1.4	1.3	1.3	1.3
				SB	1.3	1.3	1.3	1.3
CT-34	Orange/Derby Border	CT-15 Exit 57, Orange	1.42	EB	1.5	1.5	1.5	1.4
				WB	1.5	1.5	1.8	1.5
	CT-15 Exit 57, Orange	CT-114 (Racebrook Rd), Orange	0.87	EB	1.7	1.7	1.9	1.7
				WB	1.4	1.4	1.6	1.5
	CT-114 (Racebrook Rd), Orange	CT-122 (Forrest Rd), West Haven	2.64	EB	1.6	1.5	1.6	1.5
				WB	1.4	1.4	1.6	1.4
	CT-122 (Forrest Rd), West Haven	CT-10 (Ella T Grasso Blvd), New Haven	1.18	EB	2.4	2.3	2.5	2.3
				WB	2.0	2.0	2.7	1.9
	CT-10 (Ella T Grasso Blvd), New Haven	US-1 (Water Street), New Haven	1.55	EB	2.2	2.5	2.8	1.9
				WB	2.4	2.4	2.6	2.2
CT-40	I-91 Exit 10, North Haven	Hartford Turnpike, North Haven	0.81	NB	1.2	1.2	1.2	1.1
				SB	1.3	1.3	1.2	1.2
	Hartford Turnpike, North Haven	CT-10 (Whitney Ave), Hamden	1.62	NB	1.3	1.3	1.3	1.2
				SB	1.2	1.3	1.2	1.2
CT-63	CT-10 (Fitch St), New Haven	CT-15 Exit 59, New Haven	1.58	NB	2.3	2.7	3.2	2.7
				SB	2.3	2.4	2.7	2.3
	CT-15 Exit 59, New Haven	CT-114 (Center Rd), Woodbridge	1.30	NB	1.5	1.6	1.5	1.5
				SB	1.5	1.6	1.6	1.5
	CT-114 (Center Rd), Woodbridge	CT-67 (Seymour Rd), Woodbridge	1.84	NB	1.3	1.4	1.3	1.3
				SB	1.3	1.3	1.2	1.2
	Valley Rd., Bethany	CT-42 (Cheshire Rd), Bethany	2.60	NB	1.4	1.4	1.4	1.5
				SB	1.3	1.3	1.2	1.3
CT-66	I-91 Exit 18, Meriden	E Main St, Meriden	0.90	EB	1.1	1.1	1.1	1.1
				WB	1.0	1.0	1.0	1.0
CT-68	CT-70 (Waterbury Rd), Cheshire	CT-10 (Highland Ave), Cheshire	1.69	EB	1.7	1.8	1.9	1.8
				WB	1.9	2.0	2.4	1.9
	CT-10 (Highland Ave), Cheshire	CT-70 (S Meriden Rd), Cheshire	1.23	EB	1.3	1.3	1.3	1.3
				WB	1.6	1.6	1.9	1.6
	CT-150 (Main St), Wallingford	I-91 Exit 15, Wallingford	2.95	EB	2.2	2.2	2.1	1.9
				WB	2.0	2.1	2.3	1.8
CT-69	CT-63 (Whalley Ave), New Haven	Clark Rd, Woodbridge	1.81	NB	2.1	2.4	2.6	2.3
				SB	2.9	3.0	3.3	2.8
	Clark Rd, Woodbridge	Dillon Rd, Woodbridge	1.25	NB	1.3	1.2	1.3	1.2
				SB	1.2	1.3	1.3	1.2
	Dillon Rd, Woodbridge	Hatfield Hill Rd, Bethany	2.54	NB	1.2	1.3	1.2	1.2
				SB	1.2	1.2	1.2	1.2
	Hatfield Hill Rd, Bethany	CT-42 (Cheshire Rd), Bethany	3.37	NB	1.3	1.4	1.4	1.4
				SB	1.3	1.3	1.3	1.3
CT-70	Byam Rd, Cheshire	CT-68 (Prospect Rd), Cheshire	2.83	EB	1.9	1.9	2.1	2.1
				WB	1.7	1.7	1.8	1.7
	CT-68 (Yalesville), Cheshire	Cheshire Rd, Meriden	3.94	EB	1.8	1.9	2.0	2.0
				WB	1.4	1.4	1.4	1.5

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Road	From	To	Length	Direction	Travel Time Index (TTI)			
					Weekday			Weekend
					AM	Midday	PM	
CT-71	Cook Ave, Meriden	W Main St, Meriden	0.52	NB	1.6	1.8	1.8	1.7
				SB	1.7	1.9	2.0	1.8
	W Main St, Meriden	Entrance Ramp to I-691, Meriden	0.84	NB	2.1	2.3	2.4	2.2
				SB	2.5	2.5	2.6	2.4
CT-80	I-91 Exit 7, New Haven	CT-103 (Quinnipiac Ave), New Haven	1.38	EB	2.3	2.6	2.8	2.3
				WB	2.2	2.6	2.6	2.3
	CT-103 (Quinnipiac Ave), New Haven	N High St, East Haven	1.92	EB	1.7	1.9	2.1	2.0
				WB	1.7	2.0	2.1	2.0
	N High St, East Haven	CT-22 (Forrest Rd.), North Branford	2.42	EB	1.5	1.4	1.4	1.4
				WB	1.4	1.4	1.5	1.4
	CT-22 (Forrest Rd.), North Branford	CT-22 (Notch Hill Rd.), North Branford	1.50	EB	1.5	1.4	1.5	1.5
				WB	1.5	1.5	1.5	1.4
	CT-22 (Notch Hill Rd.), North Branford	CT-77 (Durham Rd.), Guilford	3.20	EB	1.5	1.5	1.4	1.3
				WB	1.3	1.4	1.4	1.3
	CT-77 (Durham Rd.), Guilford	CT-79 (Durham Rd.), Madison	4.50	EB	1.3	1.3	1.2	1.2
				WB	1.3	1.3	1.3	1.3
	CT-79 (Durham Rd.), Madison	N Chestnut Hill Rd, Killingworth	1.78	EB	1.3	1.3	1.3	1.3
				WB	1.2	1.3	1.3	1.3
US-5	US-1 (Water St), New Haven	Trumbull St., New Haven	0.75	NB	2.1	2.1	2.4	2.1
				SB	2.3	2.4	2.5	2.4
US-1	Stratford/Milford Border	Schoolhouse Rd, Milford	1.74	NB	1.7	1.8	1.9	1.8
				SB	1.7	1.8	1.8	1.7
	Schoolhouse Rd, Milford	Meadow St, Milford	1.74	NB	2.0	2.3	2.3	2.2
				SB	2.0	2.2	2.2	2.1
	Meadow St, Milford	I-95 Exit 39B, Milford	1.45	NB	1.8	1.9	2.0	1.9
				SB	1.7	1.9	1.9	1.8
	I-95 Exit 39B, Milford	CT-152 (Orange Center Rd), Orange	2.05	NB	1.6	2.4	2.3	2.6
				SB	1.7	2.3	2.2	2.6
	CT-152 (Orange Center Rd), Orange	CT-162 (Bull Hill Ln), Orange	1.71	NB	1.7	2.0	2.0	1.9
				SB	1.8	2.0	2.0	1.9
	CT-162 (Bull Hill Ln), Orange	CT-122 (Forrest Rd), West Haven	2.09	NB	1.8	2.1	2.2	2.0
				SB	1.9	2.0	2.0	2.0
	CT-122 (Forrest Rd), West Haven	US-5 (State St), New Haven	2.25	NB	2.1	2.2	2.3	2.1
				SB	3.0	3.0	3.2	2.8
	US-5 (State St), New Haven	SSR -337 (Townsend Ave), New Haven	1.97	NB	2.2	2.2	2.3	2.1
				SB	2.2	2.2	2.4	2.2
	SSR -337 (Townsend Ave), New Haven	CT-100 (Main St), East Haven	1.86	NB	1.5	1.6	1.6	1.6
				SB	1.6	1.7	1.7	1.7
	CT-100 (Main St), East Haven	W Main St, Branford	1.96	NB	2.1	2.5	2.7	2.5
				SB	2.3	2.7	2.9	2.8
	W Main St, Branford	E Main St, Branford	1.76	NB	1.8	1.9	1.9	1.8
				SB	1.7	1.8	1.7	1.6
	E Main St, Branford	I-95 Exit 55, Branford	1.03	NB	1.7	1.9	1.9	1.7
				SB	1.8	1.9	2.0	1.7

1.0 -1.5   1.0 -1.5   1.6 – 2.0   >2.0

9. Overall Performance Results

Peak Hours of Excessive Delay (PHED)

Peak Hour Excessive Delay (PHED) is the measurement of additional delay over the regular delay in rush hour. This measure is applicable in urbanized areas with a population of 200,000 and above. CTDOT publishes this measure for all urbanized areas in the state and provides a yearly comparison. This measure is calculated for the time periods between 6 AM and 10 AM and 3 PM and 7 PM on weekdays.

Figure 11 shows how the PHED has changed for New Haven UZA in the last several years. In 2023, the hours of delay was the highest since 2019.

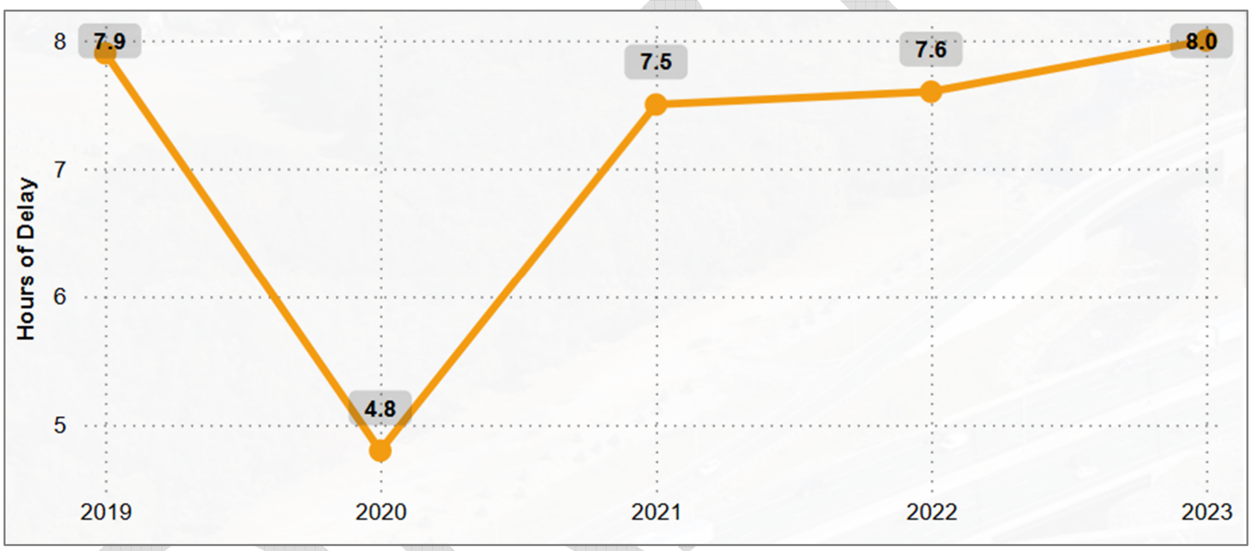

Figure 11: Peak Hours of Delay in New Haven UZA (Source: CTDOT)

Level of Travel Time Reliability (LOTTR)

The Travel Time Reliability is calculated by dividing the 80th percentile travel time by the 50th percentile travel time for each segment. Higher values of this Index indicate less reliable travel while lower values indicate more reliable truck travel. CTDOT calculates the level of reliability for all COGS and reports annually. A value of 1.5 has been established as a threshold and any value above this is considered unreliable. As shown in Figure 12 and Figure 13, recent years (particularly 2022–2023) show an increase in travel time unreliability, the trend is not consistently increasing over the full period from 2018 to 2023. A notable drop in unreliability occurred in 2020 and 2021, likely due to the COVID-19 pandemic, which significantly reduced traffic volumes and congestion. This disruption created an anomaly in the data, temporarily improving reliability before it began to worsen again as travel patterns normalized.

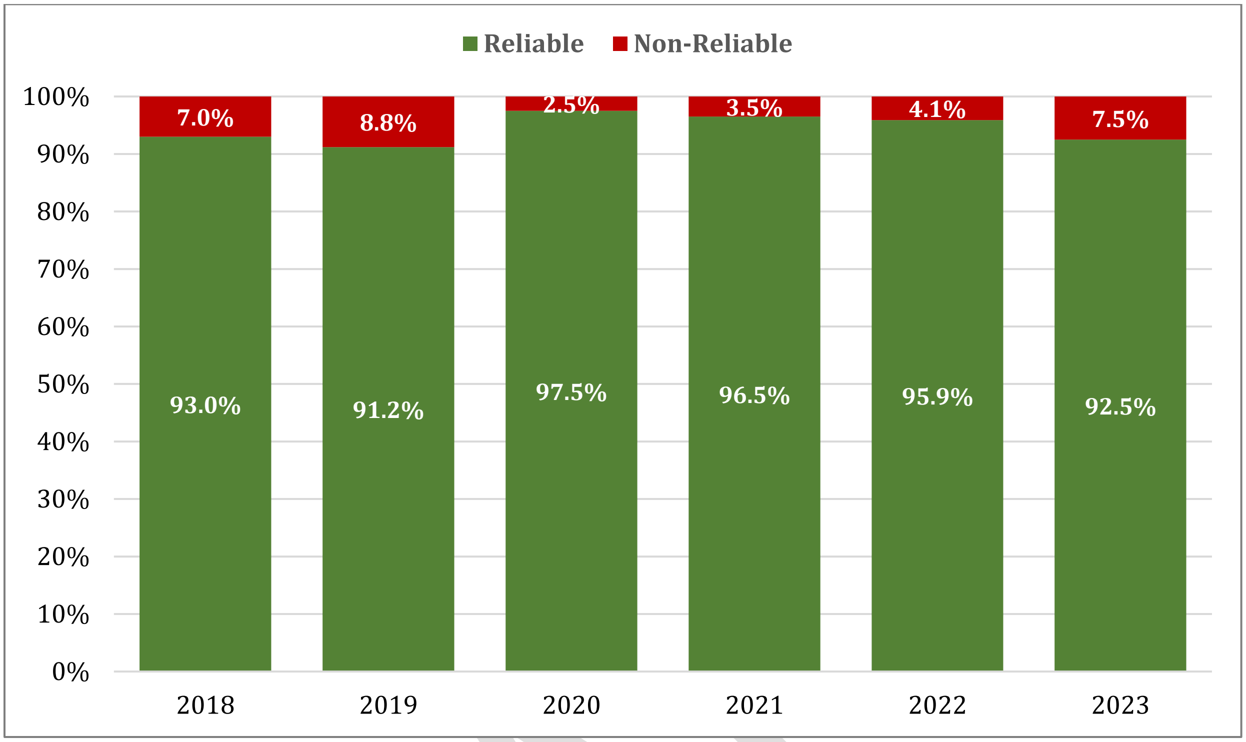

Figure 12: SCRCOG Interstate Reliability by Year (Source: CTDOT)

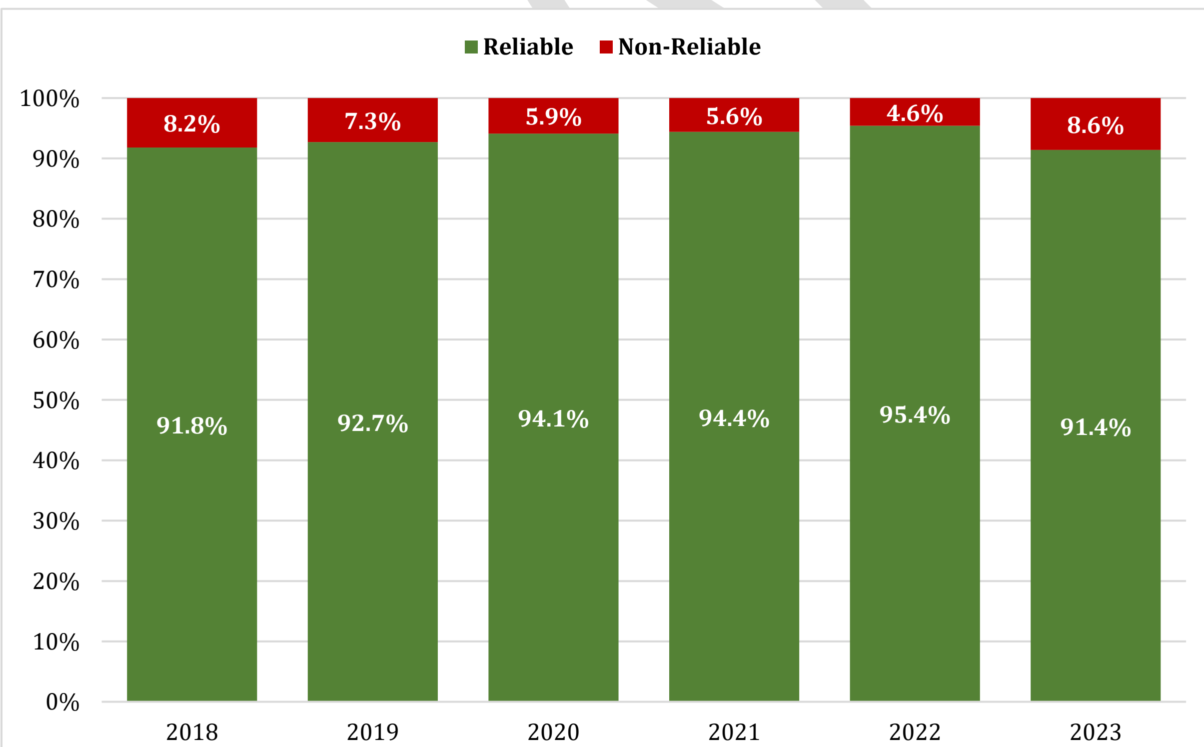

Figure 13: SCRCOG Non-Interstate Reliability by year (Source: CTDOT)

Congested Segments

The survey distributed among the municipal employees, and other officials gave them a chance to document their concerns about the roadways within their town. Table 6 documents the roadway sections that the municipalities have concerns about. All of these roads are not part of the National Highway System, hence, NPMRDS data was not available for most of these roads. However, the inputs from the municipalities represents local concerns irrespective of data availability.

Figure 14 to Figure 17 shows the delays for all roads within the SCRCOG CMP Network. Based on the data analysis documented in Chapter 7 and Chapter 8, certain roadway sections showed severe congestion and unreliability. Table **7** documents those sections and all sub sections within them.

Table 6: Locations of Concern from Municipal Survey

Town	Route
Madison	Route 450 (Hammonasset Park Connector)
	Exit Ramps to Madison, CT
North Haven	Route 5 - Washington Ave
	Route 5 & 22 - Clintonville Road
	Half Mile Road
	Benedict Drive
	Warner Road
West Haven	Boston Post Road near UNH/Atwood Apartments
	Sawmill Road/Railroad Ave due to train station
Woodbridge	Routes 69 and 63 closest to New Haven
North Branford	Branford Road (Route 139)
Orange	Route 1
	Route 15
	Route 34
Guilford	Route 1
New Haven	MLK Jr. Blvd/N. Frontage Rd
	S. Frontage Rd
	Trumbull Street
	Church Street
	Elm Street
Hamden	Dixwell Avenue
	Whitney Avenue
Wallingford	Route 5 between Circle Drive and Rt. 68 Connector
	Route 5 between Ward St and Christian St
	Route 68 between Hope Hill Rd and N Plains Industrial Rd
	Route 150 from N Main St to Pomeroy Ave
	Route 5 at Toelles Road

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Table 7: Most Congested Segments based on NPMRDS Data

Road	From	To
CT-10	I-95 Exit 44, New Haven	US-1 (Columbus Ave), New Haven
	US-1 (Columbus Ave), New Haven	CT-34 (Legion Ave), New Haven
	CT-34 (Legion Ave), New Haven	CT-63 (Whalley Ave), New Haven
	CT-63 (Whalley Ave), New Haven	Dixwell Ave, Hamden
	Dixwell Ave, Hamden	CT-15 Exit 60, Hamden
	CT-15 Exit 60, Hamden	Whitney Ave, Hamden
	Whitney Ave, Hamden	Ives St, Hamden
	King Rd, Cheshire	CT-68 (Main St), Cheshire
CT-34	CT-122 (Forrest Rd), West Haven	CT-10 (Ella T Grasso Blvd), New Haven
	CT-10 (Ella T Grasso Blvd), New Haven	US-1 (Water Street), New Haven
CT-63	CT-10 (Fitch St), New Haven	CT-15 Exit 59, New Haven
CT-68	CT-70 (Waterbury Rd), Cheshire	CT-10 (Highland Ave), Cheshire
	CT-150 (Main St), Wallingford	I-91 Exit 15, Wallingford
CT-69	CT-63 (Whalley Ave), New Haven	Clark Rd, Woodbridge
CT-70	Byam Rd, Cheshire	CT-68 (Prospect Rd), Cheshire
	CT-68 (YalesvilleRd), Cheshire	Cheshire Rd, Meriden
CT-71	W Main St, Meriden	Entrance Ramp to I-691, Meriden
CT-80	I-91 Exit 7, New Haven	CT-103 (Quinnipiac Ave), New Haven
	CT-103 (Quinnipiac Ave), New Haven	N High St, East Haven
US-5	US-1 (Water St), New Haven	Trumbull St., New Haven
US-1	Schoolhouse Rd, Milford	Meadow St, Milford
	Meadow St, Milford	I-95 Exit 39B, Milford
	I-95 Exit 39B, Milford	CT-152 (Orange Center Rd), Orange
	CT-152 (Orange Center Rd), Orange	CT-162 (Bull Hill Ln), Orange
	CT-162 (Bull Hill Ln), Orange	CT-122 (Forrest Rd), West Haven
	CT-122 (Forrest Rd), West Haven	US-5 (State St), New Haven
	US-5 (State St), New Haven	SSR -337 (Townsend Ave), New Haven
	CT-100 (Main St), East Haven	W Main St, Branford
I-95	Stratford/Milford Border	Milford Parkway, Milford
	Milford Parkway, Milford	US-1 (Boston Post Rd.)
	US-1 (Boston Post Rd.)	Marsh Hill Rd, Orange
	Marsh Hill Rd, Orange	CT-10 (Ella T Grasso Blvd.), New Haven
	CT-10 (Ella T Grasso Blvd.), New Haven	SSR -337 (Townsend Ave), New Haven
	Branford Connector, Branford	US-1(E Main St.), Branford
	US-1(E Main St.), Branford	CT-77 (Church St), Guilford
CT-15	Stratford/Milford Border	Wheelers Farm Rd, Milford
	CT-34 (Derby Ave), Orange	CT-69 (Whalley Ave), New Haven
	CT-69 (Whalley Ave), New Haven	CT-10 (Dixwell Ave), Hamden
	CT-10 (Dixwell Ave), Hamden	Dixwell Ave, North Haven

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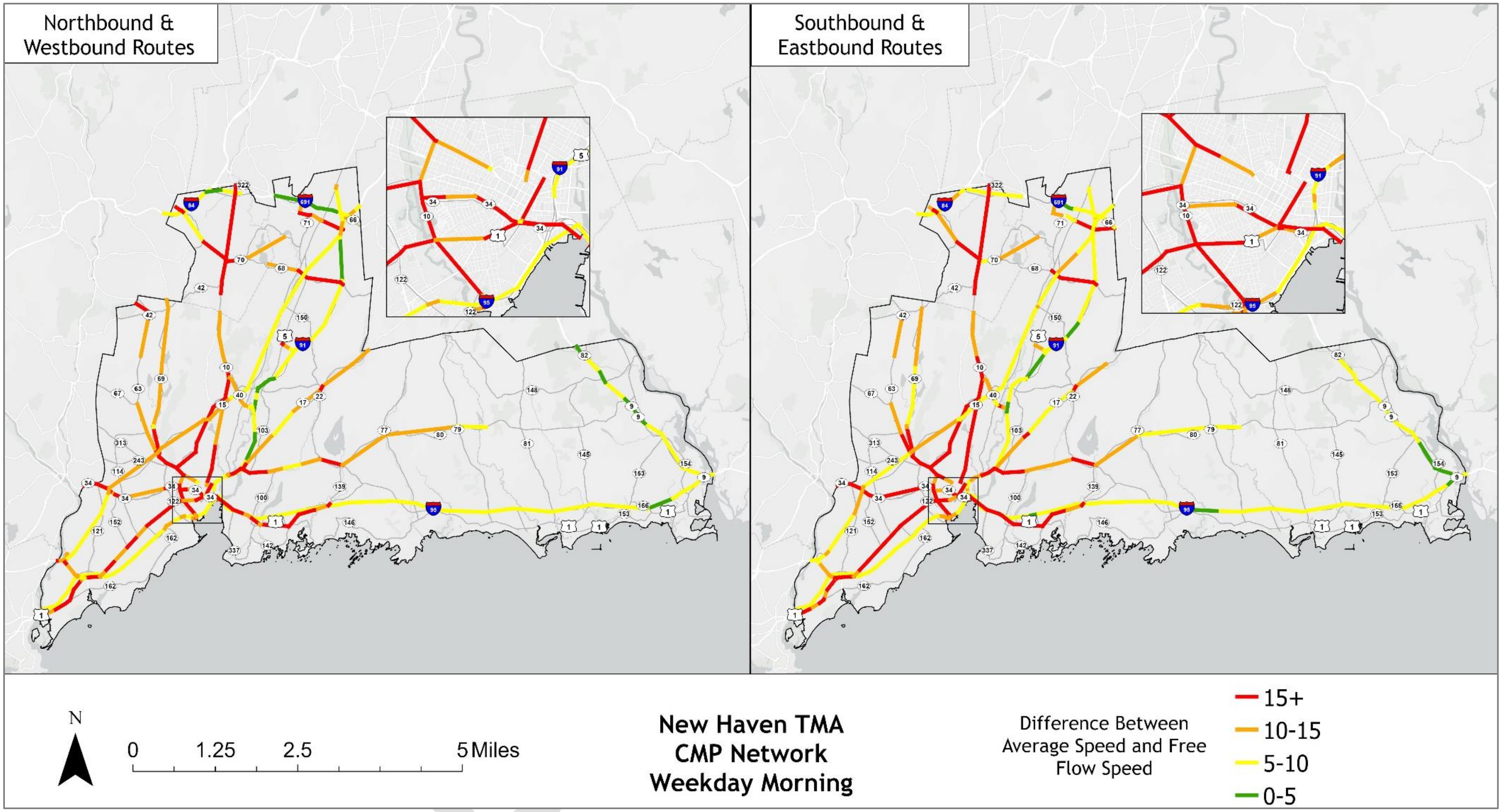

Figure 14: Average Delay during Weekday Morning

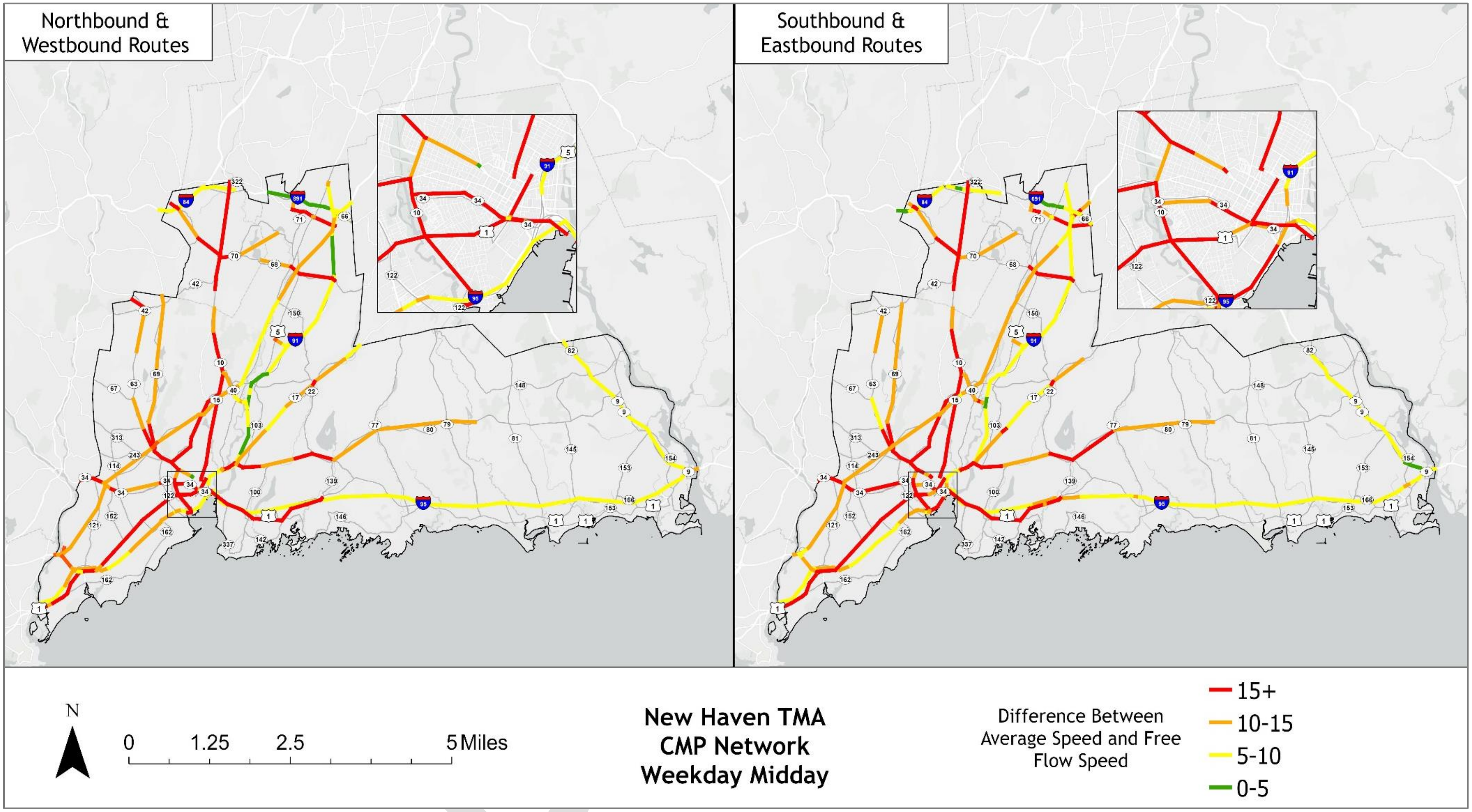

Figure 15: Average Delay during Weekday Midday

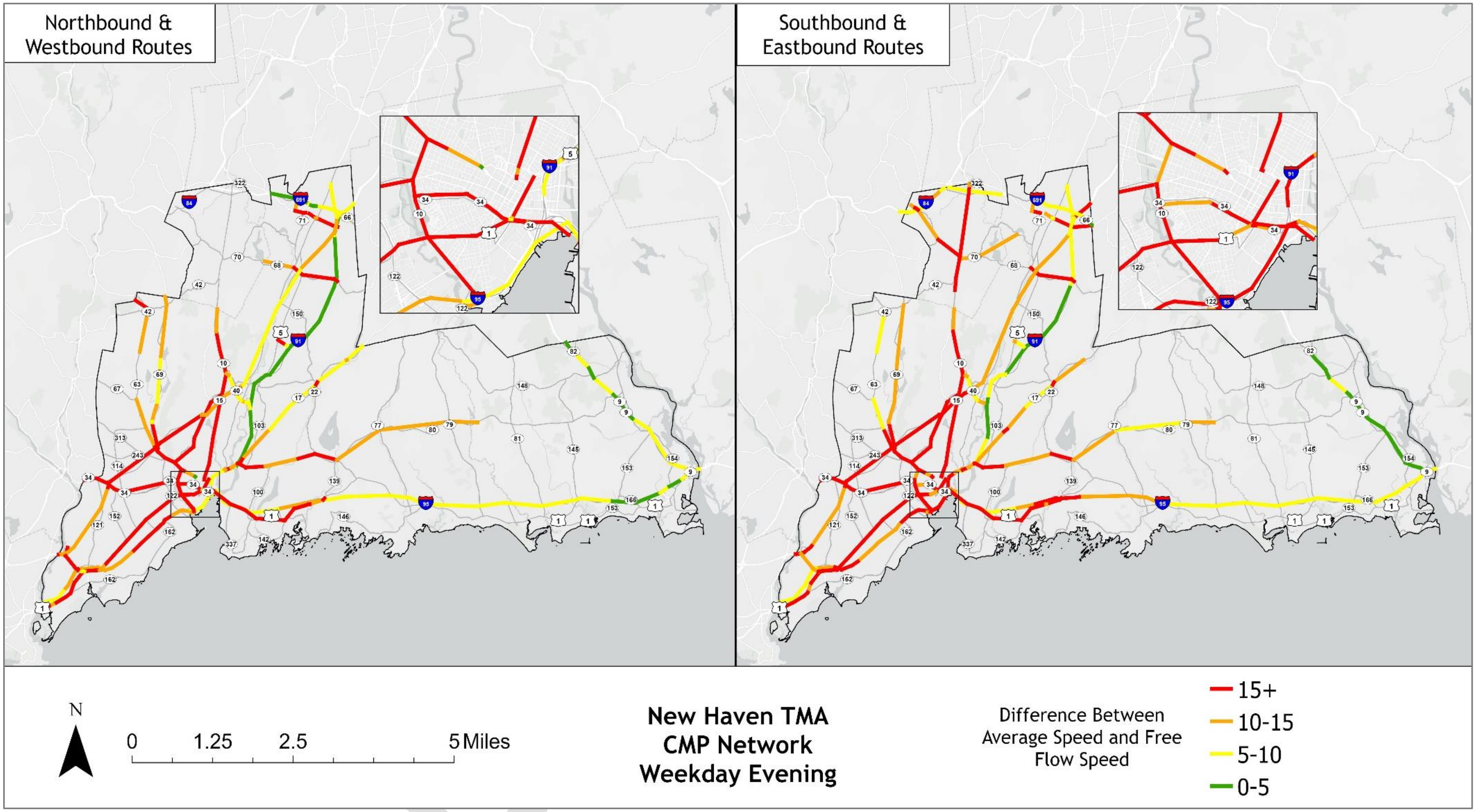

Figure 16: Average Delay during Weekday Evening

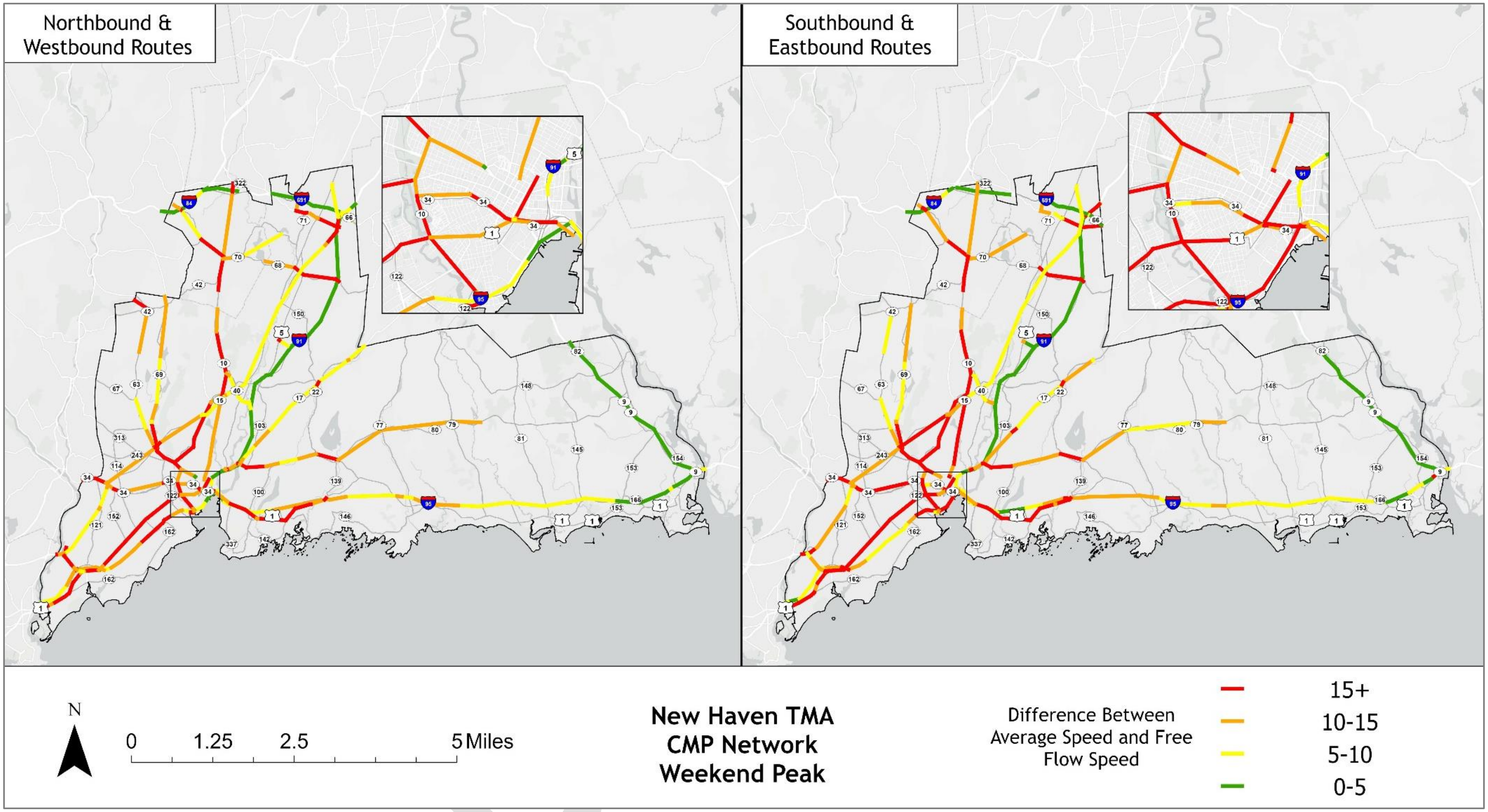

Figure 17: Average Delay during Weekend

10. Seasonal Traffic Case Studies

Congestion along the Connecticut shoreline during beach season, particularly during the summer months, is a common occurrence. Since SCRCOG comprises several shoreline towns that experiences significant increase in traffic during summer months, many municipalities are interested in identifying seasonal congestion issues. In an effort to address that, this report describes two case studies conducted as a part of this congestion management report.

Madison, CT

Madison boasts a variety of beaches, offering diverse experiences for residents and visitors alike. Surf Club Park/Beach, East Wharf Beach and West Wharf Beach are owned by the town and open for both residents and visitors. Hammonasset Beach State Park is also in Madison, and it is the largest public shoreline park in Connecticut. During summer months, the area surrounding the beaches experience significant delays, especially along Middle Beach Road, Surf Club Road and West Wharf Road since they provide access to the popular beaches and to the beach club and the hotel. When Hammonasset State Park reaches capacity, people often look for other beaches in town, leading to congestion near town beaches. Limited parking at the town beaches and the influx of visitors can lead to issues with people parking on side streets and walking to the beach, causing disruptions for residents.

The project team and SCRCOG staff met the representatives from the Town of Madison virtually and based on their input, selected several locations along W Wharf Rd, Middle Beach Rd., Seaview Ave and Waterbury Ave for data collection. On Saturday, July 27th, 2024, speed and volume data was collected at these locations. Figure 18 shows the data collection locations. Figure 19 shows the speed profiles at those locations.

From the recorded data, the average speed starts to drop below the speed limit along W Wharf Road as the vehicles approach the intersection with Middle Beach Rd. that provides access to West Wharf beach and the hotel. Speed continues to decrease significantly along the Middle Beach Rd as it provides several walking accesses to the beach. The lowest speed along this road was recorded near the Madison Beach Club. After that, the speed starts to increase slightly but still stays under the speed limit till the area near the Shoreline Resilience Center on Middle Beach Rd. After this point, speed started to increase till it reached the East Wharf Beach area. Lower speed was also observed along Seaside Ave and up to the intersection with Liberty Ave.

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Figure 18: Locations for Speed Data Collection on July 27th, 2024.

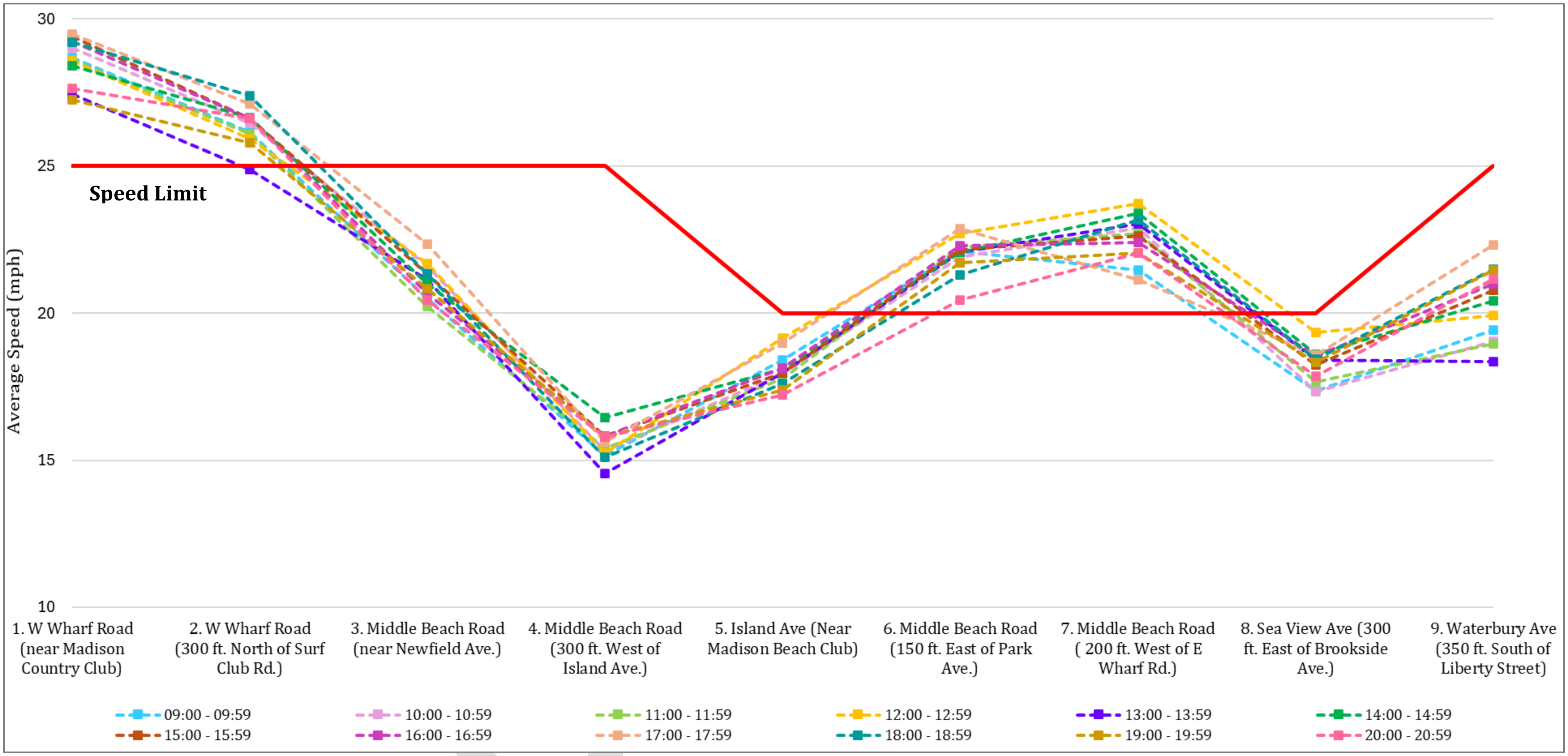

Figure 19: Average Speed Profiles along Madison Shoreline

Guilford, CT

Guilford, another shoreline town adjacent to Madison, offers a delightful beach experience along the Long Island Sound. Jacobs Beach, a public beach in Guilford, attracts many visitors during the summer months, which contributes to higher traffic volume on Whitfield Road and Seaside Avenue as they provide access to the beach. Whitfield Avenue also connects Jacobs Beach, the train station and the downtown businesses.

The project team and SCRCOG staff met the representatives from the Town of Guilford virtually and based on their input, selected several locations along Seaview Ave, Whitfield St. and Boston St. for data collection. On Saturday, July 6th, 2024, speed and volume data was collected at these locations. shows the data collection locations. Figure 20 shows the speed profiles at those locations.

Figure 20: Locations for Speed Data Collection on July 6th, 2024.

Figure 21 shows the speed profiles at those locations. From the recorded data, the average speed was below the speed limit along Seaside Ave as the vehicles approach the intersection with Whitfield St. Seaside Ave is the only access point for Jacobs Beach. The Chittenden Park, which is the southern terminus for the New England Trail is also accessible through Seaside Ave and situated right next to the beach. After the point where Whitfield St. splits directionally, speed continues to increase above the posted limit and stays above speed limit for all locations. The speed drops slightly near the Whitfield St and Boston St intersection but still remains above the speed limit.

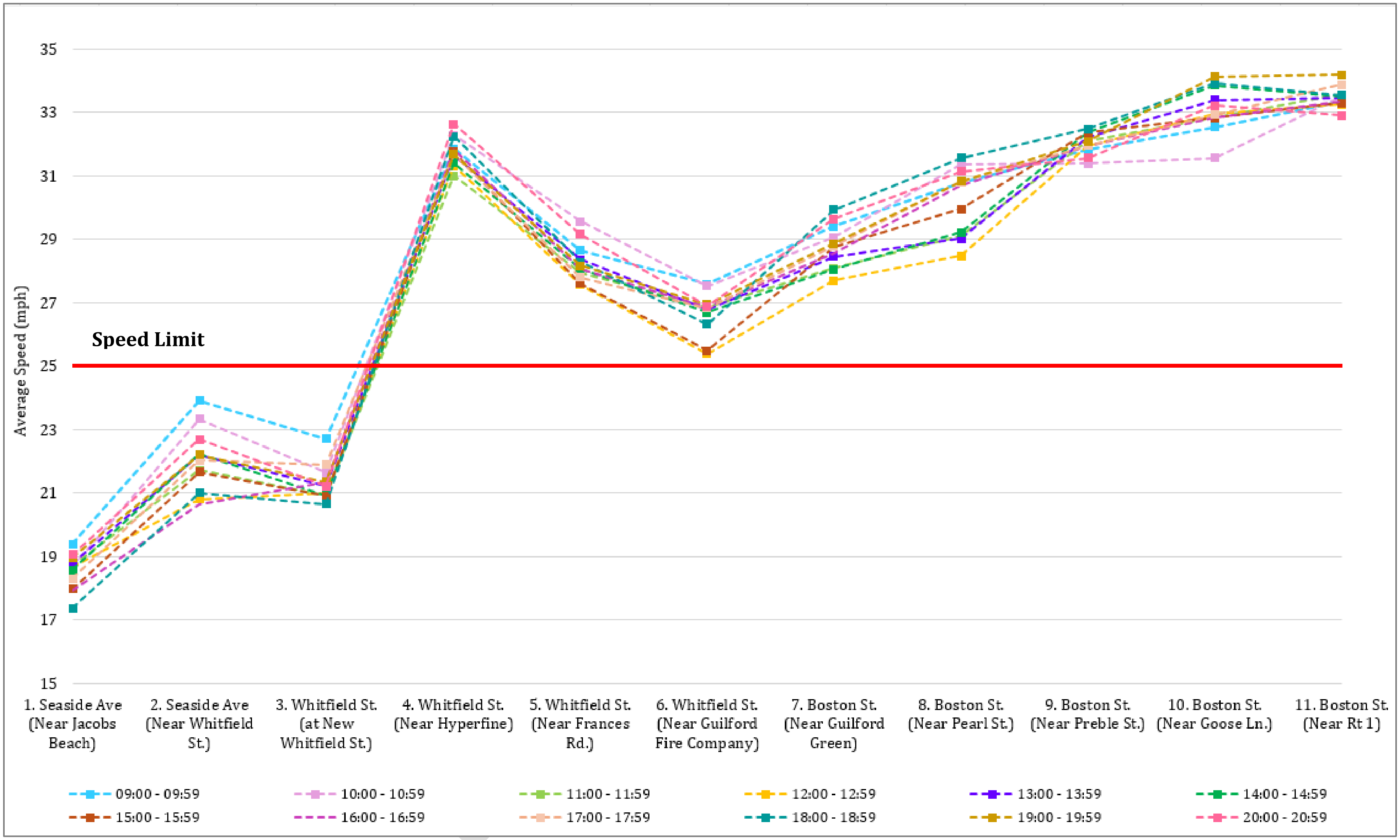

Figure 21: Average Speed Profiles along Guilford Shoreline

11. Congestion Mitigation Strategies

The identification and assessment of appropriate congestion mitigation strategies is a key component of the CMP. Even though a comprehensive set of strategies is available, it is important to evaluate the strategies against the congestion management objectives established for the region. Strategies should also fit into the context of the community and should be appropriate in regard to the role of the transportation facilities within the regional network. Strategies that promote safety, economic vitality, system preservation, and air quality in addition to improved operational performance should be prioritized.

FHWA broadly groups the congestion management strategies into the following categories.

Demand Management Strategies

Demand management strategies for congestion aim to reduce traffic volume and improve traffic flow by influencing travel behavior and choices.

Traffic Operations Strategies

Traffic operations strategies focus on using the existing system more efficiently rather than building new infrastructure. Many of these operations-based strategies are supported by the use of innovative design or technologies.

Public Transportation Strategies

Public transportation strategies for addressing congestion aim to make public transport more attractive, efficient, and convenient, thereby reducing reliance on private vehicles and easing traffic flow.

Road Capacity Strategies

This category of strategies addresses adding more base capacity to the road network, as well as redesigning specific bottlenecks to increase their capacity. Given the expense and possible adverse environmental impacts, this category should be considered a last resort if the other strategies fail to address the congestion issues.

The strategies selected from these four categories should ultimately help in achieving one or more of the following benefits.

1. Reduce single-occupancy vehicle (SOV) trips.
2. Increase public transit ridership.
3. Reduce greenhouse gas emissions.
4. Increase nonmotorized trips.
5. Improve pedestrian and bicycle safety.
6. Reduce vehicle trips.
7. Reduce travel time.
8. Improve roadway capacity.
9. Reduce the number of crashes.
10. Reduce delay due to non-recurring incidents.

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Recommended Strategies for SCRCOG

Table 8 shows the strategies recommended for the SCRCOG region. Most strategies overlap between multiple categories and can produce varying level of results based on how it is implemented. Table 9 describes each of these strategies and the benefits and costs associated with them. Some of these strategies are already being implemented in the region. The recommendations imply that these strategies should be either adopted or enhanced.

In order to reduce congestion and increase overall efficiency and reliability of the transportation network, SCRCOG needs to partner with neighboring COGs, CTDOT, transit agencies, and member municipalities.

Table 8: Congestion Mitigation Strategies for SCRCOG

Strategy	Demand Management Strategy	Traffic Operations Strategy	Public Transportation Strategy	Road Capacity Strategy
Mixed-Use Development				
Transit-Oriented Development				
Trail Oriented Development				
New Pedestrian and Bicycle Facilities				
Improvement of Existing Facilities				
Complete Streets				
Reducing Transit Fares				
Enhanced Transit Services				
Bus Rapid Transit (BRT)				
Employer Incentive Programs for Transit				
Transit Signal Priority				
Alternative Work Hours				
Hybrid Work Option				
Ridesharing				
Celebrate Alternative Travel Mode Events				
Traffic Signal Improvements				
Incident Detection and Management Systems				
Access Management				
Intersection Improvements				
Roundabouts				

Table 9: Description of Mitigation Strategies

Strategy	Description	Benefits	Cost	Timeframe
Mixed-Use Development	Mixed-use developments integrate residential, commercial, cultural, and recreational spaces within a single area. This approach aims to create walkable, self-sustaining communities where residents can access daily needs and activities without relying heavily on personal vehicles.	3, 4, 6	Low to Medium	Short to long term
Transit-Oriented Development	Transit-oriented developments (TOD) concentrates development around public transportation hubs, encouraging more people to utilize public transit and reducing reliance on personal vehicles.	1, 2, 3, 7	Low to Medium	Short to long term
Trail Oriented Development	Trail-oriented development is an urban design framework that links people to local businesses, community spaces, public services, and neighborhoods through trails and trail-supportive infrastructures.	3, 4, 6	Low to Medium	Short to long term
New Pedestrian and Bicycle Facilities	Providing new infrastructure and connectivity of bicycle and pedestrian facilities encourage people to use these modes more.	3, 4, 5, 6	Low to Medium	Short term
Improvement of Existing Pedestrian, Bicycle and Transit Facilities	Maintaining lighting, signage, striping, and installing curb cuts, curb extensions, median refuges, and raised crosswalks can increase bicycle and pedestrian safety. Bicycle racks and bike lockers at transit stations and other trip destinations increase security.	2, 3, 4, 5	Low	Short term
Complete Streets	Complete Streets policy may address a wide range of elements, such as sidewalks, bicycle lanes, bus lanes, public transportation stops, crossing opportunities, median islands, accessible pedestrian signals, curb extensions, modified vehicle travel lanes, streetscape, and landscape treatments.	3, 4, 5, 6, 7	Low	Short term
Reducing Transit Fares	This encourages additional transit use, to the extent that high fares are a real barrier to transit.	2, 3, 6	Low	Short term
Enhanced Transit Services	Increasing coverage and frequency makes transit more attractive to use and provides better accessibility to a greater share of the population.	2, 3, 6	Low to Medium	Short term

Strategy	Description	Benefits	Cost	Timeframe
Bus Rapid Transit (BRT)	Bus Rapid Transit (BRT) delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms and enhanced stations.	1, 2, 3, 6, 8	Medium to High	Medium to long term.
Employer Incentive Programs for Transit	Encourages additional transit use through transit subsidies of mass transit fares provided by employers.	1, 2, 3, 6	Low	Short term
Transit Signal Priority	Transit signal priority (TSP) is an operational strategy that facilitates in-service transit vehicles passing through signalized intersections. It can reduce transit delay at intersections and improve its on time performance or schedule adherence, thereby increasing the quality of transit service.	1, 2, 3, 6, 8	Low to Medium	Short term
Alternative Work Hours	This allows workers to arrive and leave work outside of the traditional commute period. It can be on a scheduled basis or a true flex-time arrangement.	6, 7, 8	Low	Short term
Hybrid Work Option	Policies or incentives to encourage employees to work fully or partially at home can significantly decrease the number of vehicles on the road, especially during peak hours.	1, 3, 6, 8	Low	Short term
Ridesharing	Programs to promote carpooling and vanpooling, including ride-matching services and policies that give ridesharing vehicles priority in traffic and parking.	1, 3, 6, 8	Low	Short term
Celebrate Alternative Travel Mode Events	There is a variety of events that promote, encourage, and educate people about alternative travel modes (e.g., Bike to Work Day, transit promotions, employer transportation fairs).	1, 3, 4, 6, 8	Low	Short term
Traffic Signal Improvements	Enhancements to timing/coordination plans and equipment to improve traffic flow and decrease the number of vehicles stops.	7, 8, 9	Low to Medium	Short term

Strategy	Description	Benefits	Cost	Timeframe
Freeway Incident Detection and Management Systems	This is an effective way to alleviate nonrecurring congestion. Systems typically include video monitoring, dispatch systems, and sometimes roving service patrol vehicles.	7, 8, 9, 10	Medium to High	Short term
Access Management	Planning and design practices that identify existing and future land use and arterial access points to maximize traffic safety and mobility. Strategies include medians, turn lanes, side/rear access points between businesses, shared access, and local land use ordinances to control access.	7, 8, 9	Low	Short to medium term
Intersection Improvements	Additional left-turn or right-turn lanes that separate turning vehicles from through-traffic.	7, 8, 9, 10	Medium to High	Medium-term
Roundabouts	An intersection modification that does not use traffic signal or stop sign controls. Provides continuous movement via entrance and exit lanes to/from a typically circular distribution roadway.	7, 8, 9	High	Medium-term

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12. Project Recommendations

Many of the corridors identified in this report are in various stages of improvement, whether initial studies are being conducted, study recommendations have been programmed as improvement projects, or plans are currently under construction. Table 10 provides a list of projects in the region that are expected to alleviate the congestion when completed.

Table 10: Active Projects within New Haven TMA

Project Number	Project Title	Town	Phase	Description
0402-0034	Move New Haven	New Haven	Final Design	Potential transit supportive options to strengthen and modernize the CTtransit New Haven bus system.
0014-0189	US1 CTSS Replacement	Branford, East haven	Final Design	Replacement of the Computerized Traffic Signal System (CTSS) along U.S. Route 1 from Beaver Road in Branford to Main Street in East Haven.
0061-0153	Hamden Ped/Bike Improvements	Hamden	Final-Design	Hamden's Walkable Sidewalk project includes ped/bike improvements at various locations.
0061-0156	Interchange Improvs CT15/SR707	Hamden	Planning	Interchange improvements at CT 15 and SR 707 in Hamden.
0079-0240	Reconfiguration of I-91/I-691/Rt15 Interchange	Meriden	Pre-Design	Reconfiguration of the I-91, I-691 and Route 15 interchange in Meriden to address significant operational issues associated with capacity, congestion and weaving.
0079-0246	Improve I-91 NB/I-691 WB/15 NB	Meriden, Wallingford	Construction	Improvements to I-91 Northbound, I-691 Westbound, and Route 15 Northbound in Meriden to address operational and safety concerns.
0083-0271	CT-15 Signs & Sign Supports	Hamden, Meriden, Milford, New Haven, North Haven, Orange, Wallingford, Woodbridge	Construction	Replacement of highway signs and sign supports along CT 15 (Wilbur Cross Parkway) from Milford to the Berlin Turnpike in Meriden.
0083-0272	I-95 - Int 38 SB Deceleration	Milford	Pre-Design	Extension of the deceleration lane for the I-95 Southbound off-ramp at Exit 38 (Milford Connector) in Milford.

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Project Number	Project Title	Town	Phase	Description
0083-0273	Resurface & Safety Improvements	Milford	Final Design	Signing and pavement marking changes on SR 796 (Milford Parkway) North and South in Milford to reconfigure lane arrangements, at entrance and exit ramps.
0092-0677	Downtown West Commuting Corridor	New Haven	Pre-Design	The purpose of the Downtown West Commuting Corridor project in New Haven is to establish a two-way, dedicated and protected cycle track from western residential neighborhoods and SCSU to downtown New Haven.
0092-0681	CT 10 and SR 745, New Haven	New Haven	Pre-Design	Intersection improv @ CT 10 & SR 745 & Kimberly Ave, including widening for dedicated turn lanes on CT 10 approaches, signal replacement, reconstruction of sidewalks.
0092-0689	CT-15 INT 59 Improvements	New Haven, Woodbridge	Pre-Design	Phase 2 of Interchange 59/Route 69 improvements in New Haven and Woodbridge to add appropriate acceleration and deceleration lanes for Route 15 at Exit 59, which connects to the subnetwork of Routes 63 & 69.
0092-0698	Shoreline Trail FY23 Earmark	East Haven, New Haven	Planning	Construct a 4.5 mile trail connecting downtown New Haven to the East Shore neighborhood.
0092-0701	Intersection Improvement US 1	New Haven	Planning	Intersection improvements on U.S. Route 1 (Union Avenue) at Columbus Avenue in New Haven to meet NHS standards.
0100-0182	CT-15 Int 62 NB Ramps Reconfiguration	North Haven, Hamden	Final Design	Improvements to the acceleration and deceleration lanes on CT 15 Exit 62 Northbound, as well as improvements to the ramp termini intersection with SR 717 (Dixwell Ave), to improve traffic operations in North Haven.
0106-0108	US 1 Operational Lane	Orange	Final Design	Installation of an operational lane (two-way left-turn lane) on US Route 1.
0154-0128	Bridge 00232 Replace & Int Imp	West Brook	Planning	Replacement of Bridge 00232 carrying CT Route 153 (Essex Road) over I-95 in Westbrook along with additional roadway and sidewalk improvements.

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Project Number	Project Title	Town	Phase	Description
0156-0186	I-95 Aux Lanes b/t Exits 42-43	West Haven	Planning	Construction of auxiliary lanes in both directions on I-95 between Exits 42 (CT 162) and 43 (CT 122/SR 745) in West Haven to improve traffic operations and reduce congestion issues.
0167-0108	Heroes Tunnel Improvements	New Haven, Woodbridge	Pre-Design	New and Rehabilitated Heroes Tunnel Carrying Route 15 under West Rock Ridge in Woodbridge and New Haven.
0170-3742	Detection Upgrade New Haven UA	East Haven, Meriden, New Haven, North Branford, North Haven, Old Saybrook, Orange, Wallingford	Planning	Detection upgrades at various traffic signals in the New Haven Urban Area to reduce vehicle delays and emissions.
0170-3743	Detection Upgrade Bridgeport-Stamford	Milford, Woodbridge	Final-Design	Detection upgrades at various traffic signals in the Bridgeport-Stamford Urban Area to reduce vehicle delays and emissions.
0172-0530	Wrong-Way Detection System D2	Deep River, East Lyme, Essex, Old Lyme, Old Saybrook, Westbrook, Saybrook	Construction	Implement wrong-way driver detection at various high-risk highway ramp locations in District 2.
0173-0500	Traffic Signal Safety Improvement Projects #1	Bethany, Branford, East Haven, Guilford, Madison, Milford, New Haven, North Haven, Wallingford, West Haven, Woodbridge, Meriden	Construction	Removal of nighttime flashing operation, installation of video cameras and backplates, and controller replacements at state-owned and maintained traffic signals in District 3 to reduce crashes.
0173-0519	D3 Traffic Control Signals	East Haven, Madison, New Haven, North Haven, West Haven	Final Design	Installation of a new traffic control signal in Madison and replacement of existing traffic control signals to meet current standards at various locations in District 3.
0173-0531	D3 Traffic Control Signals	Bethany, East Haven, Guilford, Madison, New Haven, North Branford	Final Design	Full replacement of certain traffic control signals, and partial replacement of others, to meet current standards at various locations in District 3.

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Project Number	Project Title	Town	Phase	Description
0173-0545	Wrong-Way Detection System D3	Branford, Guilford, Madison, Milford, New Haven, North Haven, Orange, Wallingford	Planning	Implement wrong-way driver detection at 45 high-risk (Risk Factor 0-2, all remaining high risk locations) highway ramp locations in District 3.
0173-0549	D3 Signals APS Upgrades	Branford, Guilford, Milford, New Haven, North Haven, Orange, Wallingford, West Haven, Woodbridge	Planning	Provide accessible pedestrian signals (APS), countdown signal heads, sidewalk ramps, and leading pedestrian intervals (as appropriate) at various state maintained traffic control signals in District 3.
0173-0551	D3 Traffic Control Signals	East Haven, Milford, North Haven, Wallingford, West Haven	Planning	Full replacement or partial upgrade (controller replacement only) of traffic control signals to meet current standards at various locations in District 3.
L043-0003	West End Streetscape Phase IV	East Haven	Construction	Sidewalk Improvement
L092-0005	Water Street (Route 1) Cycle Track	New Haven	In-Design	Bicycle/Pedestrian Improvement
L092-0006	Quinnipiac Avenue Improvements	New Haven	In-Design	Bicycle/Pedestrian Improvement
L092-0007	Valley Street Traffic Calming	New Haven	Construction	Traffic Calming
L092-0008	Whitney Avenue Improvements	New Haven	In-Design	Roadway Geometric Improvement
L092-0009	Sherman Parkway Traffic Calming	New Haven	In-Design	Traffic Calming
L167-0001	Amity(Rt63), Bradley, and Lucy(Rt749) Complete Streets	Woodbridge	In-Design	Bicycle/Pedestrian Improvement

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Recommended Projects

Table 9 provides a set of comprehensive strategies for system wide implementation. Based on the results of data analysis, municipality input, and review of existing/planned projects in the area, this report recommends several site specific projects to address municipality needs and data gaps. Table 11 provides a list of recommended projects. Each of these projects requires further planning, data collection and review to identify suitable alternatives.

Table 11: Project Recommendation

Corridor Studies			
Review of level of service to improve operations and safety through coordinated signal systems, roundabouts, road diets, access management, and improved pedestrian and bicycle facilities.			
	Corridor	*From*	*To*
1	East Main Street (Meriden)	Meriden Green, Meriden	Rt-66 Interchange, Meriden
2	Whitney Avenue	Cliff St, New Haven	Dixwell Ave, Hamden
3	CT-71 (Chamberlain Highway)	W Main St, Meriden	Meriden/Berlin Border
4	US-5 (Washington Ave)	CT-22 (Clintonville Rd.)	North Haven Town Line
5	US-5 (S Colony St.)	Wallingford Center	Wallingford Town Line
6	CT-68 (Church St)	Rt-150, Wallingford	I-91 Interchange, Wallingford
Intersection Improvements			
Review of signal timing and phasing, evaluation for implementing leading pedestrian intervals, ADA accessible sidewalk ramps, etc.			
1	North Branford	CT-139 and CT-22	
2	Wallingford	Route 5 at Toelles Road	
3	North Haven	Route 5 & 22 - Clintonville Road	
Speed Study			
Speed data collection to identify duration and extent of congestion to determine potential for a Traffic Study.			
1	North Haven	Half Mile Road Benedict Drive Warner Road	
Beach Traffic Management Plan			
A beach traffic management plan to identify strategies on managing potential traffic congestion and ensuring safe pedestrian and vehicular access to the beach area, including strategies for traffic flow, parking, and pedestrian access, as well as incident management and traveler information.			
1	Madison	Rt-450, US-1, W Wharf Rd, Middle Beach Rd., Sea View Ave	

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13. Conclusion and Next Steps

The CMP is an ongoing program of activities and an integral part of the planning process for the Transportation Management Area. SCRCOG and RiverCOG are in various stages of addressing congestion in the region through a range of efforts including; conducting studies, advancing the process of improvement plans, and constructing/implementing multimodal improvements. Although funding for maintaining an extensive data collection program is limited, the region's objectives to effectively prioritize projects, to use supply- and demand-side strategies to address transportation issues, to maintain aging infrastructure, to preserve multimodal transportation resources, to promote interconnection of modes, to encourage interagency cooperation to promote integrated land use and transportation planning, to work with appropriate entities to develop regional solutions to transportation issues, and to consider transportation impacts on the environment are all directly in line with values promoted in CMP guidelines.

Next Steps

- Continue collaboration between partner COGs and member municipalities.
- Continue to monitor the federal performance measures and identify additional performance measures to assess congestion.
- Expand the CMP Network to cover more roadways.
- Continue to promote the non-motorized travel modes through policies and projects.
- Continue to partner with the transit agencies to expand and promote transit ridership.
- Integrate recommendations from other studies (such as the SCRCOG Freight Study, SCRCOG Active Transportation Plan etc.) to increase overall efficiency of the network.

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