Old Colony Metropolitan Planning Organization (MPO)

Old Colony Congestion Management Process (CMP) 2018 Year-End Report

August 2019

Prepared Under Task 2500 (Management Systems & Travel Demand Modeling) of the
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ប្រសិនបើលោក-អ្នកត្រូវការបកប្រែព័ត៌មាននេះ សូមទាក់ទងអ្នកសម្របសម្រួលជំពូកទី**6** របស់ **MPO** តាមរយៈលេខទូរស័ព្ទ **508-583-1833** រួចភ្ជាប់ទៅលេខ **202**។

Arabic

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Updated April 2015

Old Colony Planning Council

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The views and opinions of the Old Colony Planning Council expressed herein do not necessarily state or reflect those of the U. S. Department of Transportation.

This Annual Report was prepared by the following members of the Old Colony Planning Council staff under the supervision of Charles Kilmer, Assistant Director/Transportation Program Manager, and the direction of Pasquale Ciaramella, Executive Director.

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The preparation of this report has been financed in part through a grant[s] from the Federal Highway Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(f)] of Title 23, U.S. Code.

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The Congestion Management Process (CMP)

Congestion on a transportation facility may be defined as the level of performance that is deemed unacceptable due to traffic interference. The acceptable level of performance varies from state to state. In addition, the types of transportation modes and links also vary from place to place. Therefore, the regulations require an effective CMP that provides information on enhancing performance and identifies effective congestion reducing strategies that meet the needs of the particular region.

The Fixing America's Surface Transportation (FAST) Act (Pub. L. No. 114-94), the first federal law to fund the nation's surface transportation, will provide $305 billion between fiscal years 2016 and 2020. The funding from the FAST Act will go towards highway, highway and motor vehicle safety, public transportation, motor carrier safety, hazardous materials safety, rail, and research, technology, and statistics programs. The most significant factor of the FAST Act is that it will provide federal funding for freight projects for the first time in the nation's history.[1]

Congestion Management Process:

"A systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs."

Interim Guidebook on the Congestion Management Process in Metropolitan Transportation Planning Federal Highway Administration (FHWA) & Federal Transit Administration (FTA)

The Congestion Management Process (CMP) is intended to be a substantive change in perspective and practice to address congestion management through a process that provides for effective management and operations; enhanced linkage to the planning and environmental review process; based on cooperatively developed travel demand reduction and operational management strategies as well as capacity increases.

A CMP is a process that monitors transportation facilities for congestion problems and seeks to implement congestion mitigation strategies through the following MPO Certification Documents: the Unified Planning Work Program (UPWP), the Transportation Improvement Program (TIP), and the Long-Range Transportation Plan (LRTP). A description of the federal requirements related to the CMP may be found in the 2016 Federal Register, section 450.322.

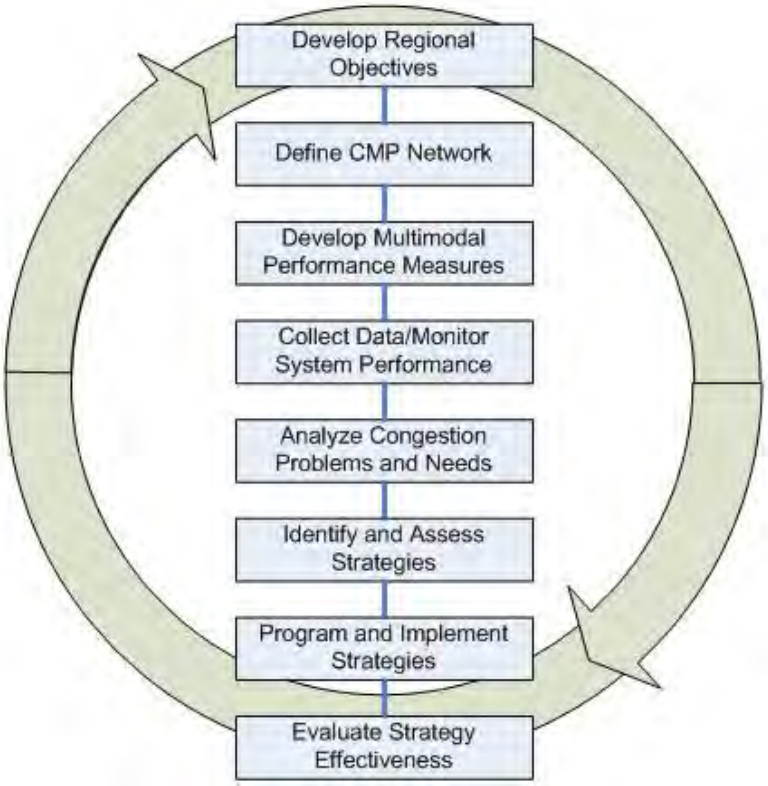
The purpose of the Congestion Management Process (CMP) is to identify congested locations; determine the causes of congestion; develop alternative strategies to mitigate congestion; evaluate the different potential mitigation strategies; propose alternative strategies that best address the causes and impacts of congestion; and track and evaluate the impact of previously implemented congestion management strategies. The CMP is intended to be an integral part of the metropolitan planning process, rather than a stand-alone process or system.

[1] Fixing America's Surface Transportation Act – Federal Highway Administration

Old Colony Congestion Management Process (CMP)

The Old Colony Congestion Management Process (CMP) follows the process model outlined by the Federal Highway Administration in their *Congestion Management Process: A Guidebook* guiding document. The Process Model presented by the Federal Highway Administration and Federal Transit Administration is built upon eight actions that are common to successful Congestion Management Processes. The graphic in Figure 1 illustrates these actions, and highlights the cyclical nature of the process. These actions, like the overall Congestion Management Process, are not stand alone actions but rather built into the entire transportation planning process and incorporated in MPO products such as the Long Range Transportation Plan, the Transportation Improvement Program, and the Unified Planning Work Program.

Figure 1: Elements of the Congestion Management Process



Development of Regional Objectives

The following Old Colony Congestion Management Process (CMP) objectives were first developed during the development of the 2016 Long Range Regional Transportation Plan, and further refined during the development of the 2020 Long Range Regional Transportation Plan. These objectives were developed in a collaborative effort with stakeholders such as the Federal Highway Administration (FHWA), the Massachusetts Department of Transportation (MassDOT), the Brockton Area Transit (BAT) Authority, and local communities.

Goal: Regional Mobility and Congestion Management: To reduce congestion, improve mobility, and improve access to critical essential services.

Objectives

- Promote Mode Shift by increasing use of transit, carpool/vanpool, and non-motorized transportation modes such as bicycling and walking
- Reduce traffic congestion, and improve level of service and access management
- Maintain and improve transit system efficiency and capacity
- Increase automobile and bicycle parking capacity and usage at transit stations and commuter lots
- Eliminate bottlenecks on limited access highways and on the freight network
- Improve and expand human service coordination, mobility, and accessibility for all modes
- Reduce number and size of gaps in the ADA-accessible sidewalk network
- Increase use of traffic signal priority (hold current green light) for transit vehicles and traffic signal pre-emption for emergency vehicles (override programmed phasing to provide approaching emergency vehicles a green light)
- Monitor utilization and congestion levels at commuter rail and Park & Ride parking facilities
- Improve accessibility for all modes to all users

Definition of the CMP Network

The Old Colony Congestion Management Process (CMP) regional network includes functionally classified roadways and transit facilities in the 17 communities that comprise the Old Colony Planning Metropolitan Planning Organization region in Southeastern Massachusetts. The 17 Old Colony member communities are Abington, Avon, Bridgewater, Brockton, Duxbury, East Bridgewater, Easton, Halifax, Hanover, Hanson, Kingston, Pembroke, Plymouth, Plympton, Stoughton, West Bridgewater, and Whitman.

The Roadway Network

The Old Colony CMP region contains over 2,000 centerline miles of road that provide motorists with the ability to travel throughout the region. The major roadway system in Southeastern Massachusetts and the regional highway network in the Old Colony CMP region are shown in Figure 3. Specifically, the Old Colony CMP region has 2,059.53 miles of urban roadways compared to 29.91 miles of rural roadways. Table 1 displays the characteristics of the centerline miles within the Old Colony CMP region.

Table 1: Old Colony CMP Region Centerline Miles by Functional Classification

Designation	Interstate	Arterial	Collector	Local	*Total*
Urban	1.20	404.86	260.86	1,392.61	***2,059.53***
Rural	0.00	1.49	11.63	16.79	***29.91***
Total	***1.20***	***406.35***	***272.49***	***1,409.40***	***2,089.44***

Source: MassDOT 2017 Road Inventory Year-End Report

Figure 2: Map of the Old Colony Region

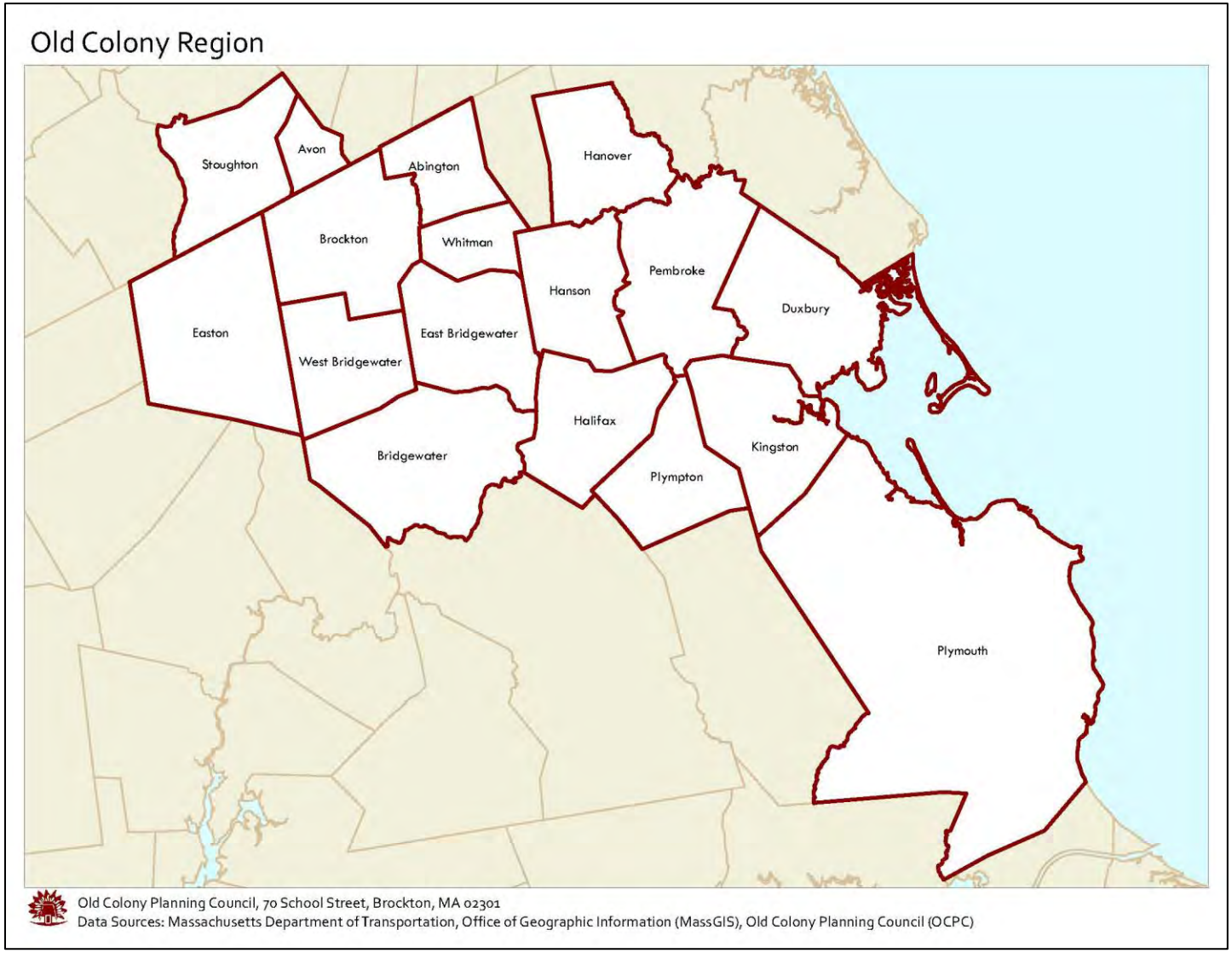
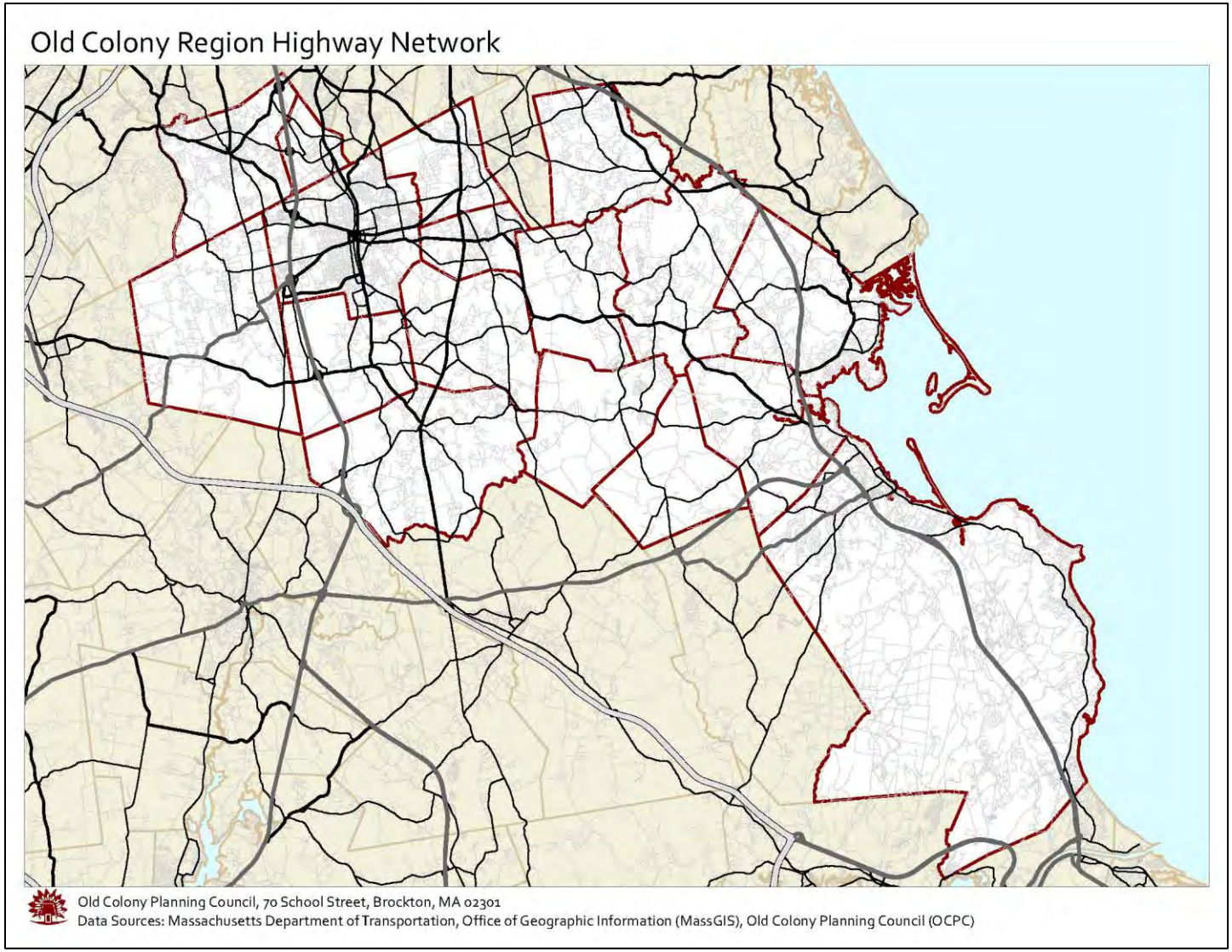


Figure 3: Map of the Old Colony Roadway Network



The Old Colony CMP region contains over 6,000 intersections that provide a variety of functionality and movement. Intersections are categorized by their functionality, ranging from "major" (arterial meeting arterial) to "minor" (local meeting local). This categorization helps determine data collection intervals, level of analysis, and improvement application.

The Old Colony CMP is designed to identify key intersections that demonstrate congestion, excessive delays, and circulation problems. The Old Colony CMP considers a congested intersection to have a Level of Service (LOS) of "D" or below. The LOS "D" threshold was chosen in order to capture intersections that are nearing congestion as well as those that are currently congested. This method is used to identify intersections that could benefit from short-term improvements rather than waiting for them to fall into the major or long-term improvement category.

Transit

The Old Colony CMP transit facilities include the Brockton Area Transit Authority (BAT) fixed route bus service, the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail service, and Park & Ride commuter lots located along the Route 24 and Route 3 corridors.

Brockton Area Transit Authority (BAT)

BAT provides local transit service in Abington, Avon, Bridgewater, Brockton, Easton, Rockland, Stoughton, West Bridgewater, and Whitman. BAT also provides service to the MBTA Ashmont Station in Dorchester and to Bridgewater State University (BSU). There are currently fourteen regularly scheduled routes in the fixed route system, which all except for Route 13 (the "Mini Maller"), Rockland Flex Ride, and Bridgewater State University originate from the BAT Intermodal Centre in Downtown Brockton.

The BAT system provides transportation to major employment centers and industrial parks, as well as to essential life services such as schools, medical facilities, and grocery and other shopping options. Additionally, BAT provides service to commuter rail stations, the MBTA Red Line (Ashmont Station) and connections to MBTA fixed bus routes.

In 2018, BAT completed a Transit Fare Equity Analysis and a Service Change Equity Analysis to see what potential changes a fare increase and certain service reductions would have on the low-income and minority populations of BAT's service area. The selected fare increase alternative (an increase from $1.25 to $1.50 on fixed route service) did not create a disparate impact on minority populations and did not create a disproportionate burden on low-income populations. The seven proposed fixed route service changes, as well as the four paratransit service changes, also did not create a disparate impact on minority populations and did not create a disproportionate burden on low-income populations.

Massachusetts Bay Transportation Authority (MBTA) Commuter Rail

The MBTA is the fifth largest mass transit system in the nation in terms of daily ridership. It serves a population of 4,817,014 (2010 census) in 176 cities and towns with an area of 3,249 square miles. To carry out its mission, it maintains 183 bus routes (including two Bus Rapid Transit (BRT) lines), three rapid transit lines, five light rail lines, four trackless trolley routes, and 13 commuter rail routes. The average weekday ridership for the entire system is approximately 1.3 million passenger trips.[2]

[2] MBTA.com. *The New MBTA*.

Of the 13 commuter rail lines, three provide service to the Old Colony region:

- Providence/Stoughton Line
- Middleboro/Lakeville Line
- Kingston/Plymouth Line

In total, sixteen commuter rail stations within the Old Colony CMP region are surveyed on a regular basis to determine utilization.

Park and Ride

The Old Colony CMP region includes several major limited access highways for interstate travel and inter-regional access. These highways include Route 24 and Route 3 and are an important component of the CMP System Performance Monitoring Program.

Route 24 Corridor

Route 24 (AmVets Memorial Highway) extends from Interstate 195 in Fall River north to Interstate 93 (commonly referred to as Route 128) in Randolph. Route 24 is currently 40 miles in length; has 21 interchanges; and at its busiest point, carries just over 120,000 vehicles per day.

In the Old Colony CMP region, there are two Park & Ride Facilities located on the Route 24 Corridor, which include the following:

- West Bridgewater – Route 24, Exit 16 (Route 106)
- Bridgewater – Route 24, Exit 15 (Route 104)

Route 3 Corridor

Route 3 (Pilgrims Highway) extends from Cape Cod north to Interstate 93 in Boston. Route 3 is currently 56 miles in length; has 26 interchanges; and at its busiest point, carries over 130,000 vehicles per day.

In the Old Colony CMP region, there are five Park & Ride Facilities located on the Route 3 Corridor, which include the following:

- Rockland – Route 3, Exit 14 (Route 228)
- Pembroke – Route 3, Exit 12 (Route 139)[3]
- Kingston – Route 3, Exit 10 (Route 3A & 53)
- Plymouth – Route 3, Exit 5 (Long Pond Road)
- Bourne – Route 3, Exit 1B (Route 6) (Sagamore)

Development of Multimodal Performance Measures

The following targets and performance measures were refined during the development of the 2020 Long Range Regional Transportation Plan to measure the progress and effectiveness of the Old Colony CMP concerning the associated specific objectives outlined in the CMP. These targets and performance measures include:

[3] The Pembroke Park & Ride Lot was sold in Fall 2018. An alternate location for Pembroke is expected to be opened in the future.

Objectives with specific Targets and Performance Measures

- Reduce traffic congestion and improve level of service management.
    - **Target and Performance Measure:** Monitor congestion levels on federal-aid eligible highway network annually, and highlight corridors with volume to capacity (v/c) ratios of 0.8 or greater for targeted study and/or improvements.
- Monitor utilization and congestion levels at commuter rail and park & ride parking facilities.
    - **Target and Performance Measure:** Record utilization data twice annually and report data to MassDOT.
- Improve accessibility for all modes to all users.
    - **Target and Performance Measure:** 50% of available Transportation Improvement Program funding allocated to projects that significantly improve bicycle and pedestrian mobility.
- Reduce greenhouse gas emissions and ground level ozone (NOx and VOCs) by all transportation modes.
    - **Target and Performance Measure:** 50% of TIP projects reduce GHGs while also reducing negative impacts on the natural environment (such as improved storm water management or the addition of green space).
- Monitor Level of Travel Time Reliability (LOTTR) on both the Interstate System and non-Interstate NHS.
    - **Target and Performance Measure:** Achieve a LOTTR of 68% on Interstate roads and 80% on non-Interstate roads by 2020 and 2022.
- Monitor Level of Truck Travel Time Reliability (TTTR) on the Interstate System.
    - **Target and Performance Measure:** Achieve a TTTR of 1.85 on Interstate NHS roads by 2022.
- Increase the Percentage of Non-SOV (Single Occupancy Vehicle) Travel.
    - **Target and Performance Measure:** Achieve 34.82% Non-SOV travel by 2020 and 35.46% by 2022.
- Reduce Peak Hour Excessive Delay (PHED) in the urbanized area (UZA) level.
    - **Target and Performance Measure:** Achieve a PHED of 18.31 annual hours per capita or lower by 2022.
- Reduce the total reduction of on-road mobile source emissions from projects funded under the Congestion Mitigation & Air Quality (CMAQ) program.
    - **Target and Performance Measure:** Reduce the emissions levels down to 1,622 CO_2 by 2020.
- Improve the time it takes commuters to get to work.
    - **Target and Performance Measure:** Reduce the average commute time for commuters who drive to work.
- Increase the amount of registered municipalities for Complete Streets policies.
    - **Target and Performance Measure:** Achieve 250 registered municipalities by 2020 and 275 registered municipalities by 2022 for Complete Streets policies.
- Increase the amount of approved Complete Streets policies.
    - **Target and Performance Measure:** Achieve 200 approved Complete Streets policies by 2020 and 250 approved Complete Streets policies by 2022.

Collection of Data and Monitoring of System Performance

Roadways

During 2018, traffic counts were collected at 128 locations on the highway network throughout the Old Colony region. These counts were conducted for numerous Local Highway Technical Assistance (LTA) Studies; corridor studies such as the Route 106 Corridor Study in the Unified Planning Work Program (UPWP); the MassDOT Traffic Count Program; and the Old Colony Congestion Management Process. The aforementioned data collection program yields several products that OCPC shares with its member communities, federal and state agencies, various stakeholders, and other interested parties on a regular basis. Of these traffic counts, 33 were collected on principal arterials and the Massachusetts state numbered highway network. Table 2 summarizes the data collected from these locations.

This traffic data collection program provides the CMP with Average Annual Daily Traffic; Vehicle Speeds; Percentages of Heavy Vehicles; and Volume to Capacity Ratios on major highways in the Old Colony CMP region. These outputs are important to the Old Colony CMP as they help determine where the heaviest traffic exists as well as which facilities are at or near capacity.

Volume-to-Capacity Ratio (V/C Ratio)

The volume to capacity ratio, which is based on the relationship between a facility's theoretical capacities to the actual volumes utilizing the system, is an important performance measure utilized in the congestion management process. The capacity of a road or facility can be thought of as its ability to process traffic, measured in both the physical space available and in time, or the speed in which vehicles can travel (how quickly, measured in time, the vehicle traverses the facility). Therefore, the higher the volume to capacity (V/C) ratio, the more congestion exists. A V/C ratio of 0.80 or above is used as a threshold for screening congested facilities. Table 3 summarizes the state numbered locations and Table 4 summarizes the local locations where there are V/C ratios of 0.80 or higher.

Intersections

In 2018, OCPC staff conducted manual intersection Turning Movement Counts (TMCs) at 47 locations throughout the region. These counts were conducted for numerous Local Highway Technical Assistance (LTA) Studies; UPWP Studies; and the Old Colony Congestion Management Process.

The TMCs conducted by OCPC are typically done during the morning (7-9 AM) and afternoon (4-6 PM) peak traffic periods and include data such as: total intersection traffic; peak period traffic; peak hour factors, and percentages of heavy vehicles based on FHWA Scheme F vehicle classification. The TMC counts provide OCPC staff with the ability to perform intersection Level-of-Service (LOS) analyses, which summarizes the operation of the specific facility.

Level of Service (LOS) Analyses

Level-of-service analysis is a qualitative and quantitative measure based on the analysis techniques published in the Highway Capacity Manual by the Transportation Research Board. Level-of-service is a

general measure that summarizes the overall operation of an intersection or transportation facility. It is based upon the operational conditions of a facility including lane use, traffic control, and lane width, and takes into account such factors as operating speeds, traffic interruptions, and freedom to maneuver. Level-of-service represents a range of operating conditions and is summarized with letter grades from “A” to “F”, with “A” being the most desirable.

The Old Colony CMP Intersection LOS Table in the Appendix displays the results of LOS analyses for intersections that have been assessed through the Old Colony Congestion Management Process and other planning tasks. The intersections that have been programmed in the Old Colony Unified Planning Work Program which demonstrated a LOS of “D” or below in either the AM or PM peak hours are listed in the previously mentioned Table.

As intersections are improved, they are re-analyzed to measure the effectiveness of the improvement. In addition, new intersections which demonstrated a LOS of “D” or below are continually added to the list; recounted; and re-analyzed on a regular schedule (based on functionality rating) to determine trends and identify potential improvements.

Table 2: Traffic Conditions on the State Numbered Routes and Arterials in the Region

Community	MA Route Number	Location	ADT	85th Percentile Speed	% Heavy Vehicles
Abington	123	Brockton Ave @ Brockton City Line	13,068	43 MPH	5.8%
Bridgewater	18/28	Bedford St, N of Cottage St	14,714	43 MPH	8.3%
East Bridgewater	106	West St, W of Bedford St	9,775	38 MPH	6.2%
Halifax	58	Monponsett St @ Plympton Town Line	6,249	48 MPH	10.7%
Halifax	106	Plymouth St @ Plympton Town Line	6,048	47 MPH	11.9%
Kingston	80	Brook St, E of Country Club Way	5,480	42 MPH	6.5%
Kingston	80	Brook St, E of Country Club Way (Weekend)	4,874	42 MPH	4.9%
Kingston	80	Elm St, S of Brook St	5,823	42 MPH	6.5%
Kingston	80	Elm St, S of Brook St (Weekend)	4,932	42 MPH	4.6%
Kingston	3A	Main St, E of Crescent St	13,975	34 MPH	9.4%
Kingston	3A	Main St, E of Howlands Ln	15,665	31 MPH	6.8%
Kingston	3A	Main St, W of Howlands Ln	15,664	35 MPH	10.9%
Kingston	3A	Main St, W of Old Orchard Ln	12,862	37 MPH	5.7%
Kingston	106	Main St, W of Elm St	14,443	38 MPH	5.9%
Kingston	106	Main St, W of Elm St (Weekend)	12,776	38 MPH	3.4%
Kingston	106	Main St, W of Summer St	13,002	39 MPH	6.6%
Kingston	106	Main St, W of Summer St (Weekend)	11,653	39 MPH	3.6%
Kingston	3A	Summer St, S of Green St	7,094	38 MPH	6.6%
Kingston	3A	Summer St, S of Green St (Weekend)	6,084	38 MPH	5.0%
Plymouth	3A	State St, N of Old County Rd	9,052	48 MPH	8.6%
Plymouth	3A	State St, S of Hedges Pond Rd	15,908	36 MPH	11.4%
Plymouth	3A	State St, S of Herring Pond Rd	10,020	42 MPH	5.3%
Plympton	106	County Rd @ Kingston Town Line	5,564	44 MPH	10.3%
Plympton	106	County Rd, W of Lake St	7,662	44 MPH	11.0%
Plympton	58	Main St @ Carver Town Line	9,249	48 MPH	11.8%
Plympton	58	Main St, N of Elm St	10,750	38 MPH	11.0%
Plympton	58	Palmer Rd, S of Center St	8,469	44 MPH	8.5%
Stoughton	27	Canton St, E of School St	10,180	36 MPH	7.0%
Stoughton	27	Canton St, W of School St	11,151	39 MPH	9.3%
Stoughton	139	Pleasant St, N of Lincoln St	10,238	40 MPH	6.3%
Stoughton	139	Pleasant St, S of Lincoln St	10,094	36 MPH	7.3%
Whitman	27	Temple St @ Brockton City Line	7,447	43 MPH	5.0%
Whitman	27	Temple St, E of Bedford St	12,767	40 MPH	14.5%

Table 3: State Numbered Locations with a V/C Ratio of 0.80 or Higher

Route	Community	Street	Location	ADT	V/C Ratio
3	Duxbury	Pilgrim Highway (Route 3)	N of Tremont Street (Route 3A)	58,488	0.82
3	Hanover	Pilgrim Highway (Route 3)	S of Washington Street (Route 53)	60,300	0.85
3	Kingston	Pilgrim Highway (Route 3)	At Duxbury Town Line	58,564	0.82
3	Kingston	Pilgrim Highway (Route 3)	At Plymouth Town Line	70,139	0.99
3	Kingston	Pilgrim Highway (Route 3)	N of Smiths Lane	65,895	0.93
3	Pembroke	Pilgrim Highway (Route 3)	At Marshfield Town Line	57,165	0.80
3	Plymouth	Pilgrim Highway (Route 3)	N of Clark Road	58,202	0.82
3	Plymouth	Pilgrim Highway (Route 3)	S of Long Pond Road	58,330	0.82
3	Plymouth	Pilgrim Highway (Route 3)	S of Samoset Street (Route 44)	74,692	1.05
24	Avon	AmVets Memorial Highway (Route 24)	S of New Pond Street	107,567	1.01
24	Bridgewater	AmVets Memorial Highway (Route 24)	N of Interstate 495	87,100	0.82
24	Brockton	AmVets Memorial Highway (Route 24)	At West Bridgewater Town Line	90,089	0.84
24	Brockton	AmVets Memorial Highway (Route 24)	N of Belmont Street (Route 123)	98,780	0.93
24	Stoughton	AmVets Memorial Highway (Route 24)	S of Lindelof Avenue (Route 139)	112,703	1.06
24	West Bridgewater	AmVets Memorial Highway (Route 24)	At Bridgewater Town Line	87,843	0.82
53/139	Pembroke	Columbia Road (Route 53/139)	At Hanover Town Line	30,000	0.84
106	West Bridgewater	West Center Street (Route 106)	Between Route 24 Ramps	15,006	0.84
106	West Bridgewater	West Center Street (Route 106)	E of AmVets Memorial Highway (Route 24)	28,776	0.81
106	West Bridgewater	West Center Street (Route 106)	E of West Street	29,325	0.82
106	West Bridgewater	West Center Street (Route 106)	W of Howard Street	31,766	0.89
106	West Bridgewater	West Center Street (Route 106)	W of Lincoln Street	30,436	0.86
106	West Bridgewater	West Center Street (Route 106)	W of North Elm Street	30,702	0.86
123	Brockton	Belmont Street (Route 123)	W of School Service Drive	29,096	0.82
138	Stoughton	Washington Street (Route 138)	S of Wyman Street	36,269	1.02
139	Pembroke	Church Street (Route 139)	E of Water Street	28,288	0.80

Table 4: Local Locations with a V/C Ratio of 0.80 or Higher

Community	Street	Location	ADT	V/C Ratio
Avon	Harrison Boulevard	E of AmVets Memorial Highway (Route 24)	31,141	0.88
Avon	New Pond Street	E of AmVets Memorial Highway (Route 24)	34,793	0.98
Avon	New Pond Street	W of AmVets Memorial Highway (Route 24)	32,387	0.91
Plymouth	Samoset Street	W of Algonquin Terrace	30,417	0.86
Plymouth	Samoset Street	W of Pilgrim Highway (Route 3)	36,054	1.01

Transit

OCPC uses the data from the Brockton Area Transit Authority (BAT) Farebox Route Revenue Reports to generate average daily ridership. The trends in ridership for the fixed route service, based upon the Old Colony Ridership Analysis tasks prepared for the Brockton Area Transit, show a decreasing trend in ridership from 10,258 per average weekday in FY 2014 to 9,840 in FY 2018. Table 5 shows the trends in ridership based on average daily ridership between FY 2014 and FY 2018 (five-year period).

Table 5: Brockton Area Transit (BAT) Average Daily Ridership

FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
10,258	10,165	9,874	9,595	9,840[4]

A number of important factors influence transit ridership such as cyclical downturns in the economy and gasoline prices, which have short-term impacts on travel demand and ridership. In addition, suburbanization of the communities surrounding Brockton, in both residential and job-related uses, affect fixed-route demand. In addition to ridership analysis of Farebox revenue prepared by Old Colony Planning Council, the Brockton Area Transit Authority (BAT) provides fixed-route and demand response (paratransit) service in the Old Colony Region, and regularly collects and reports its performance through its Performance Dashboard.

Passengers Per Seat

As a part of the Congestion Management Process, we analyzed ridership data from the FY18 BAT Ridership Report to determine what their Passengers per Seat (PPS) is for their system. To calculate this, OCPC used a randomizer from UMTA Circular 2710.1A, July 18, 1988, to select one of the six random dates in October 2017 (month within FY18 with the highest average ridership) from which ridership data was drawn for the FY18 BAT Ridership Report. The randomizer was also used to pick an interval for both morning (6-9 AM) and afternoon (3-6 PM) peak rush hour service. The randomizer selected October 25, 2017 with the 6 AM and 3:35 PM intervals. We then requested the list of buses that were used that day, so that the number of seats for each active bus could be determined. Tables 6 and 7 illustrate the raw data for the analysis, which includes pulse, bus number, seats per bus, and passengers per pulse (outbound, inbound, and total).

The Passengers Per Seat (PPS) was calculated for each route in both pulses, which was calculated by dividing the passengers by the number of seats on the bus. This was done for both outbound and inbound pulses (for the morning and afternoon pulses), and then combined to provide the aggregate PPS for the day. Tables 8, 9 and 10 show the calculations. As a system overall, the average PPS for the AM pulses was 0.55 PPS, the average PPS for the PM pulses was 0.77 PPS, and the average PPS for the whole day was 0.65 PPS. As a system without Ashmont, the average PPS for the AM pulses was 0.41 PPS, the average PPS for the PM pulses was 0.68 PPS, and the average PPS for the whole day was 0.53 PPS. With Ashmont by itself, the average PPS for the AM pulse was 2.18 PPS, the average PPS for the PM pulses was 1.99 PPS, and the average PPS for the whole day was 2.09 PPS.

[4] A new method was discovered and used to calculate BSU ridership, resulting in an increase in overall ridership. Under the existing method, the overall average ridership was 9,429 riders per day (a 1.73% decrease in overall ridership from FY17 and 8.08% decrease from FY14).

Table 6: BAT Morning Pulse Data (10/25/2017)

Pulse	6:00	6:00	6:00	6:00	6:00	6:00	6:00	6:00	6:00	6:00	6:00	6:00	6:00	
Route #	1	2	3	4	4A	5	6	8	9	10	11	12	14	
Bus #	1704	606	607	605	1701	1703	604	602	1007	1305	501	1204	603	
Seats	30	32	32	32	30	30	32	32	32	32	32	38	32	**Totals**
Passengers OB	9	16	16	34	12	9	12	5	8	5	0	142	27	295
Passengers IB	16	16	42	0	11	3	5	23	10	10	17	24	4	181
Passengers Total	25	32	58	34	23	12	17	28	18	15	17	166	31	476

Table 7: BAT Afternoon Pulse Data (10/25/2017)

Time	3:35	3:35	3:35	3:35	3:35	3:35	3:35	3:35	3:35	3:35	3:35	3:35	3:45	3:25	3:00	
Route #	1	2	3	4	4A	5	6	8	9	10	11	12	13	14	Rockland	
Bus #	1009	1001	603	503	510	608	1704	601	511	705	1305	701	1304	1705	312	
Seats	38	38	32	32	32	32	30	32	32	38	32	38	32	37	15	**Totals**
Passengers OB	56	24	61	51	20	3	28	36	13	6	6	78		10	2	394
Passengers IB	30	34	41	20	34	15	37	21	14	4	7	73		12	1	343
Passengers Total	86	58	102	71	54	18	65	57	27	10	13	151	10	22	3	747

Table 8: System Wide Passengers per Seat by Route (10/25/2017)

AM Pulse	1	2	3	4	4A	5	6	8	9	10	11	12	13	14	Rockland	Total
PPS OB	0.30	0.50	0.50	1.06	0.40	0.30	0.38	0.16	0.25	0.16	0.00	3.74	N/A	0.84	N/A	0.66
PPS IB	0.53	0.50	1.31	0.00	0.37	0.10	0.16	0.72	0.31	0.31	0.53	0.63	N/A	0.13	N/A	0.43
PPS Overall	0.42	0.50	0.91	0.53	0.38	0.20	0.27	0.44	0.28	0.23	0.27	2.18	N/A	0.48	N/A	0.55

PM Pulse	1	2	3	4	4A	5	6	8	9	10	11	12	13	14	Rockland	Total
PPS OB	1.47	0.63	1.91	1.59	0.63	0.09	0.93	1.13	0.41	0.16	0.19	2.05	N/A	0.27	0.13	0.83
PPS IB	0.79	0.89	1.28	0.63	1.06	0.47	1.23	0.66	0.44	0.11	0.22	1.92	N/A	0.32	0.07	0.72
PPS Overall	1.13	0.76	1.59	1.11	0.84	0.28	1.08	0.89	0.42	0.13	0.20	1.99	0.31	0.30	0.1	0.77

Total	1	2	3	4	4A	5	6	8	9	10	11	12	13	14	Rockland	Total
PPS OB	0.89	0.57	1.20	1.33	0.51	0.20	0.65	0.64	0.33	0.16	0.09	2.89	N/A	0.47	0.13	0.72
PPS IB	0.66	0.70	1.30	0.31	0.71	0.28	0.69	0.69	0.38	0.21	0.38	1.28	N/A	0.38	0.07	0.57
PPS Overall	0.77	0.63	1.25	0.82	0.61	0.24	0.67	0.66	0.35	0.18	0.23	2.09	0.31	0.42	0.1	0.65

Table 9: System Wide Passengers per Seat by Route (Without Ashmont) (10/25/2017)

AM Pulse	1	2	3	4	4A	5	6	8	9	10	11	13	14	Rockland	Total
PPS OB	0.30	0.50	0.50	1.06	0.40	0.30	0.38	0.16	0.25	0.16	0.00	N/A	0.84	N/A	0.40
PPS IB	0.53	0.50	1.31	0.00	0.37	0.10	0.16	0.72	0.31	0.31	0.53	N/A	0.13	N/A	0.41
PPS Overall	0.42	0.50	0.91	0.53	0.38	0.20	0.27	0.44	0.28	0.23	0.27	N/A	0.48	N/A	0.41

PM Pulse	1	2	3	4	4A	5	6	8	9	10	11	13	14	Rockland	Total
PPS OB	1.47	0.63	1.91	1.59	0.63	0.09	0.93	1.13	0.41	0.16	0.19	N/A	0.27	0.13	0.73
PPS IB	0.79	0.89	1.28	0.63	1.06	0.47	1.23	0.66	0.44	0.11	0.22	N/A	0.32	0.07	0.63
PPS Overall	1.13	0.76	1.59	1.11	0.84	0.28	1.08	0.89	0.42	0.13	0.20	0.31	0.30	0.10	0.68

Total	1	2	3	4	4A	5	6	8	9	10	11	13	14	Rockland	Total
PPS OB	0.89	0.57	1.20	1.33	0.51	0.20	0.65	0.64	0.33	0.16	0.09	N/A	0.34	0.13	0.54
PPS IB	0.66	0.70	1.30	0.31	0.71	0.28	0.69	0.69	0.38	0.21	0.38	N/A	0.37	0.07	0.52
PPS Overall	0.77	0.63	1.25	0.82	0.61	0.24	0.67	0.66	0.35	0.18	0.23	0.31	0.35	0.10	0.53

Table 10: Ashmont Passengers per Seat (10/25/2017)

AM	12
PPS Outbound	3.74
PPS Inbound	0.63
PPS Overall	2.18

PM	12
PPS Outbound	2.05
PPS Inbound	1.92
PPS Overall	1.99

Total	12
PPS Outbound	2.89
PPS Inbound	1.28
PPS Overall	2.09

Table 11: BAT Ridership and System Performance FY 2018

bat

Performance Dashboard FY18

Fixed Route	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan	Feb	Mar	Apr	May	June	Average	Standard	Goal	FY17
Total Passengers	199,128	221,904	240,999	257,367	236,166	210,763	190,755	216,018	211,305	233,741	288,486	212,682	226,610			226,742
Pass/Rev Hour	24.36	24.85	27.02	27.34	25.11	24.16	21.64	25.01	23.83	25.34	26.55	25.21	25.04	22.00	26.00	24.44
Pass/Rev Mile	1.99	1.98	2.18	2.21	2.04	1.96	1.71	2.08	1.92	2.05	2.13	2.02	2.02	2.00	2.20	2.07
On-Time	99.03%	98.85%	96.92%	96.07%	96.76%	97.64%	96.18%	98.77%	98.53%	98.42%	96.70%	96.93%	97.57%	95%	98%	96.74%
Demand Response	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**Average**	**Standard**	**Goal**	**FY17**
Total Passengers	13,399	14,884	14,198	15,821	15,125	14,319	13,624	13,551	13,190	14,147	15892	14934	14,424			14,220
Pass/Rev Hour	2.51	2.37	2.54	2.63	2.60	2.39	2.46	2.67	2.47	2.49	2.73	2.82	2.56	2.25	2.75	2.52
On-Time	90.63%	91.03%	88.17%	87.75%	88.56%	87.78%	86.27%	87.51%	87.82%	86.65%	86.37%	86.31%	87.90%	85%	90%	89.99%
Safety	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**Average**	**Standard**	**Goal**	**FY17**
Preventable FR Accidents/ 100K miles	0.95	2.64	0.98	0.83	2.45	1.75	0.77	0.00	0.00	0.97	1.85	1.89	1.26	3	2	0.52
Preventable DR Accidents/10K miles	0	0	0.4	0.18	0	0	0.41	0	0	1.83	1.89	0.00	0.39	3	2	0.78
Maintenance	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**Average**	**Standard**	**Goal**	**FY17**
Fixed Route Miles Between Breakdowns w/ passenger interruption	15,011.00	18,932.00	101,626.00	15,073.25	17,489.57	38,081.33	2,870.00	16,552.50	53,345.00	21,080.00	15,463.00	17,613.00	27,761	20,000	25,000	27,955
Demand Response Miles Between Breakdowns w/ passenger interruption	24,080.00	11,024.00	16,692.00	27,156.00	52,225.00	24,708.00	16,223.00	23,142.00	47,255.00	54,747.00	53,001.00	49,650.00	33,325	15,000	20,000	40,655
Customer Service	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**Average**	**Standard**	**Goal**	**FY17**
Valid Complaints /100,000 pax FR	2.51	2.70	1.83	3.05	3.35	1.57	5.15	1.59	1.03	1.47	1.79	0.94	2.25	8	5	3.09
Valid Complaints /10,000 pax DR	0.90	0.79	0.00	3.10	0.00	0.00	0.90	0.00	2.74	1.72	1.55	3.31	1.25	4	2	2.05

Source: Brockton Area Transit Authority

Commuter Rail and Park and Ride

Commuter Rail Facilities

The Old Colony Congestion Management Process data collection component includes two visits per year to the MBTA Commuter Rail lots to count the number of parked vehicles and bicycles to determine the availability of peak parking. This data collection effort takes place in the Spring (April) and Fall (October) of each year, during the mid-week period, and between the hours of 10:00 AM and 2:00 PM. In 2009, OCPC extended the data collection program area to include the Canton Junction and Canton Center Stations on the Providence/Stoughton Line. This was done to provide a complete assessment of parking lot utilization for the entire Stoughton Branch of the Providence/Stoughton Line.

As part of a comprehensive, system-wide process, the CMP includes a focus on vehicles per parking space at the peak parking time for commuter rail and park & ride lots, and transit passengers per seat (at the peak load point) for commuter rail and bus.

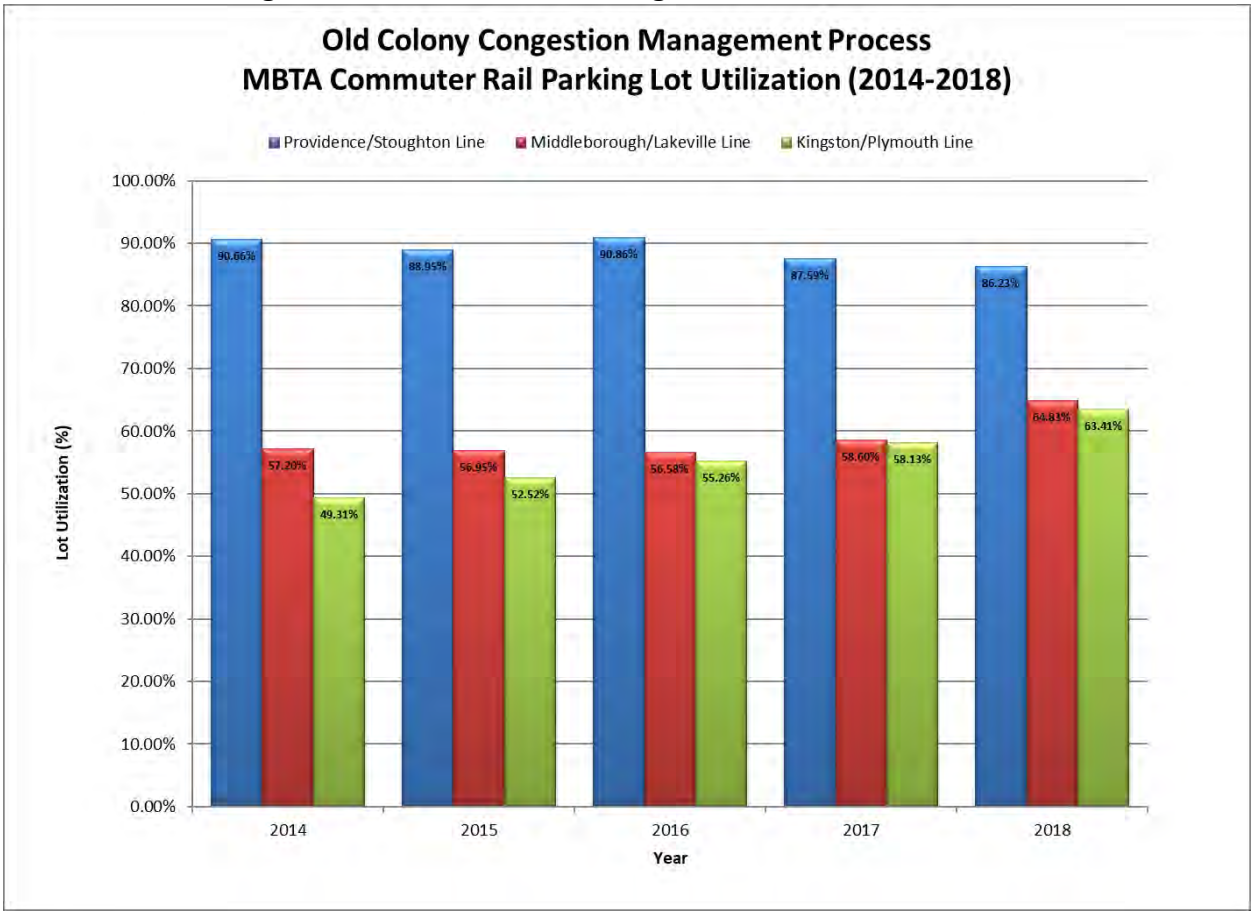
The Old Colony CMP uses the guidance provided in the ITE publication, *Transportation Planning Handbook*, which describes the effective supply of a lot as the level of occupancy for optimum operating efficiency. The ITE handbook states that a parking facility can be perceived as full at a level that is less than its actual capacity (number of spaces), which is at a range of 85 to 95 percent. The use of 85 percent as the threshold for capacity allows for unusual peaks in activity and loss of spaces due to snow cover and/or other special circumstances.

Table 7 summarizes the results of the 2018 Commuter Rail parking lot surveys, listing utilization rates for parked vehicles and bicycles at each station surveyed, while Figure 4 shows the 5-year trend in utilization for each commuter rail line in the region. While utilization varied from station to station in 2018, the stations in Stoughton, Canton (Stoughton/Providence Line) and Abington (Kingston/Plymouth Line) were observed to be at or near capacity while there remained a sufficient supply of available parking at the remaining stations on the Middleboro/Lakeville and Kingston/Plymouth lines. With the exception of some yearly fluctuations, utilization has remained at similar levels on the Stoughton/Providence Line over the five-year period from 2014 through 2018, while the Middleborough/Lakeville Line and Kingston/Plymouth Line have each increased over recent years.

Table 12: 2018 Commuter Rail Parking Lot Utilization

Location	Regular Spaces	♿ Spaces	Bicycle Spaces	April 2018 Regular Utilization	April 2018 ♿ Utilization	April 2018 Bicycle Utilization	October 2018 Regular Utilization	October 2018 ♿ Utilization	October 2018 Bicycle Utilization	2018 Average Regular Utilization	2018 Average ♿ Utilization	2018 Average Bicycle Utilization
Providence/Stoughton Line												
Canton Junction	752	12	48	74.47%	8.33%	2.08%	84.18%	16.67%	8.33%	79.32%	12.50%	5.21%
Canton Center	211	4	10	90.05%	50.00%	10.00%	90.05%	0.00%	40.00%	90.05%	25.00%	25.00%
Stoughton	322	10	13	98.45%	40.00%	15.38%	101.24%	30.00%	46.15%	99.84%	35.00%	30.77%
Middleborough/Lakeville Line												
Holbrook/Randolph	348	14	24	82.18%	7.14%	4.17%	76.44%	5.56%	8.33%	79.31%	6.35%	6.25%
Montello (Brockton)	412	12	36	39.32%	0.00%	0.00%	45.63%	16.67%	0.00%	42.48%	8.33%	0.00%
Downtown (Brockton)	323	11	32	57.59%	72.73%	0.00%	47.06%	27.27%	5.77%	52.32%	50.00%	2.88%
Campello (Brockton)	535	11	12	41.50%	18.18%	0.00%	42.06%	9.09%	0.00%	41.78%	13.64%	0.00%
Bridgewater	483	10	28	75.16%	0.00%	17.86%	80.75%	0.00%	0.00%	77.95%	0.00%	8.93%
Middleborough/Lakeville	758	13	8	77.44%	53.85%	37.50%	89.71%	38.46%	37.50%	83.58%	46.15%	37.50%
Kingston/Plymouth Line												
South Weymouth	530	9	28	68.66%	15.38%	25.00%	82.09%	23.08%	21.43%	75.37%	19.23%	23.21%
Abington	394	9	12	90.36%	11.11%	50.00%	92.89%	11.11%	33.33%	91.62%	11.11%	41.67%
Whitman	192	7	12	100.00%	14.29%	16.67%	63.54%	0.00%	33.33%	81.77%	7.14%	25.00%
Hanson	418	8	14	64.83%	0.00%	0.00%	73.92%	0.00%	0.00%	69.38%	0.00%	0.00%
Halifax	398	10	19	56.03%	0.00%	0.00%	66.58%	0.00%	10.53%	61.31%	0.00%	5.26%
Kingston	1,009	22	32	41.33%	13.64%	0.00%	49.55%	4.55%	9.38%	45.44%	9.09%	4.69%
Plymouth	92	4	4	8.70%	0.00%	0.00%	1.09%	0.00%	0.00%	4.89%	0.00%	0.00%
Total Providence/Stoughton Line	***1,285***	***26***	***71***	***83.04%***	***26.92%***	***5.63%***	***89.42%***	***19.23%***	***19.72%***	***86.23%***	***23.08%***	***12.68%***
Total Middleborough/Lakeville Line	***2,859***	***71***	***140***	***63.17%***	***25.35%***	***6.43%***	***66.49%***	***16.00%***	***4.60%***	***64.83%***	***20.68%***	***5.51%***
Total Kingston/Plymouth Line	***3,033***	***69***	***121***	***60.56%***	***9.59%***	***12.40%***	***66.26%***	***6.85%***	***15.70%***	***63.41%***	***8.22%***	***14.05%***
Total All Stations	***7,177***	***166***	***332***	***65.57%***	***18.82%***	***8.43%***	***70.46%***	***12.64%***	***11.20%***	***68.01%***	***15.73%***	***9.82%***

Figure 4: Commuter Rail Parking Lot Utilization, 2014-2018



Park & Ride Facilites

The Old Colony Congestion Management Process data collection component includes two visits per year to Park & Ride facilities along the AmVets Memorial Highway (Route 24) and Pilgrims Highway (Route 3) Corridors to count the number of parked vehicles and bicycles and to determine the availability of peak parking. In previous years the CMP included analysis of one Park-and-Ride facility on the Route 44 Corridor (Commerce Way in Plymouth) that was closed in 2015. This data collection effort takes place in concert with the aforementioned MBTA Commuter Rail counts in the Spring (April) and the Fall (October) of each year, during the mid-week period, and between the hours of 10:00 AM and 2:00 PM.

The Old Colony CMP uses the guidance provided in the ITE publication, *Transportation Planning Handbook*, which describes the effective supply of a lot as the level of occupancy for optimum operating efficiency. The ITE handbook states that a parking facility can be perceived as full at a level that is less than its actual capacity (number of spaces), which is at a range of 85 to 95 percent. The use of 85 percent as the threshold for capacity allows for unusual peaks in activity and loss of spaces due to snow cover and/or other special circumstances.

As part of a comprehensive, system-wide process, the Old Colony CMP includes a focus on vehicles per parking space at the peak parking time for commuter rail and park & ride lots, and transit passengers per seat (at the peak load point) for commuter rail and bus.

Figure 5 shows the 5-year trend in utilization for each Park & Ride corridor in the region, while Table 8 summarizes the results of the 2018 Park-and-Ride parking lot surveys, listing utilization rates for parked vehicles and bicycles at each facility surveyed. The Park-and-Ride system in the Old Colony region has been observed to be very popular, with the majority of the facilities surveyed at or near capacity. Overall, utilization has been stable on the Park-and-Ride system over the five-year period from 2014 through 2018, with the exception of the Park & Ride facility on Route 44 that ceased as a Park & Ride location in 2015.

Figure 5: Park-and-Ride Parking Lot Utilization, 2014-2018

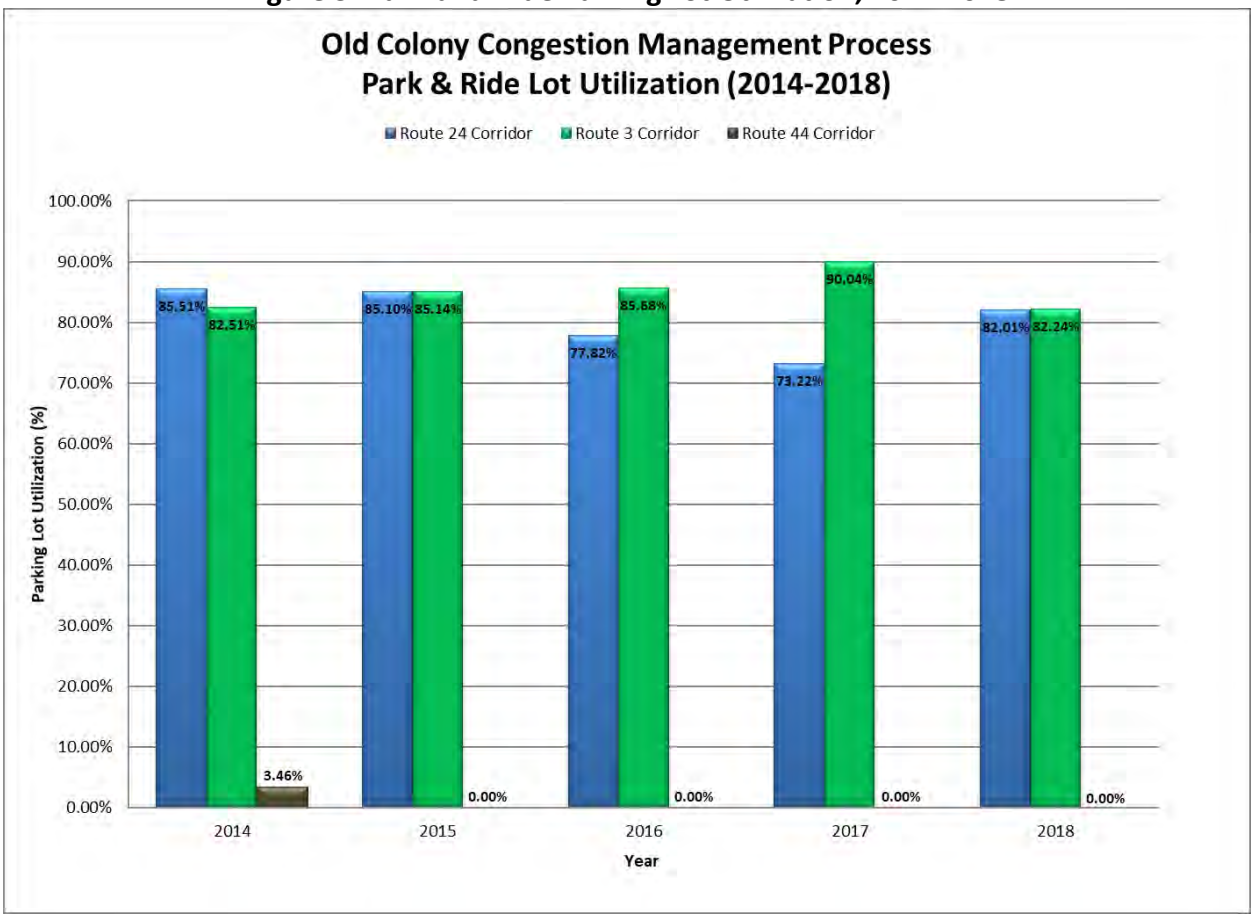


Table 13: 2018 Park-and-Ride Parking Lot Utilization

Location	Regular Spaces	♿ Spaces	Bicycle Spaces	April 2018 Regular Utilization	April 2018 ♿ Utilization	April 2018 Bicycles Utilization	October 2018 Regular Utilization	October 2018 ♿ Utilization	October 2018 Bicycles Utilization	2018 Average Regular Utilization	2018 Average ♿ Utilization	2018 Average Bicycles Utilization
Route 3 Corridor												
Rockland - Route 3, Exit 14 (Route 228)	417	8	0	94.24%	62.50%	0.00%	83.45%	75.00%	0.00%	88.85%	68.75%	0.00%
Pembroke - Route 3, Exit 12 (Route 139)	67	0	0	1.49%	0.00%	0.00%	0.00%	0.00%	0.00%	0.75%	0.00%	0.00%
Kingston - Route 3, Exit 10 (Route 3A & 53)	79	0	0	74.68%	0.00%	0.00%	86.08%	0.00%	0.00%	80.38%	0.00%	0.00%
Plymouth - Route 3, Exit 5 (Long Pond Road)	192	8	0	104.69%	62.50%	0.00%	85.42%	37.50%	0.00%	95.05%	50.00%	0.00%
Bourne - Route 3, Exit 1B (Route 6) (Sagamore)	390	6	10	86.67%	83.33%	0.00%	91.54%	100.00%	0.00%	89.10%	91.67%	0.00%
Route 24 Corridor												
West Bridgewater - Route 24, Exit 16 (Route 106)	179	7	11	88.83%	28.57%	0.00%	85.47%	14.29%	0.00%	87.15%	21.43%	0.00%
Bridgewater - Route 24, Exit 15 (Route 104)	60	0	0	71.67%	0.00%	0.00%	61.67%	0.00%	0.00%	66.67%	0.00%	0.00%
Total Route 3 Corridor	***1,145***	***22***	***10***	***86.64%***	***68.18%***	***0.00%***	***81.83%***	***68.18%***	***0.00%***	***84.24%***	***68.18%***	***0.00%***
Total Route 24 Corridor	***239***	***7***	***11***	***84.52%***	***28.57%***	***0.00%***	***79.50%***	***14.29%***	***0.00%***	***82.01%***	***21.43%***	***0.00%***
Total All Lots	***1,384***	***29***	***21***	***86.27%***	***58.62%***	***0.00%***	***81.43%***	***55.17%***	***9.52%***	***83.85%***	***56.90%***	***4.76%***

Analysis of Congestion Problems and Needs

The Old Colony Congestion Management Process has identified congested facilities across the transportation system in the Old Colony region where improvements may be targeted.

Roadways

Table 14 identifies roadway facilities that have been identified as congested through the Congestion Management Process and Unified Planning Work Program.

Table 14: Identified Congested Roadway Facilities in the Old Colony Region

Bottleneck Facility	Bottleneck Type (Cause)
Limited Access Highways & Interchanges	
AmVets Memorial Highway (Route 24) & Interstate 495 - Exit 14	Demand Surge / Merges / Weaves / Narrow Lanes
AmVets Memorial Highway (Route 24) & Pleasant Street (Route 104) - Exit 15	Demand Surge / Merges
AmVets Memorial Highway (Route 24) & West Center Street (Route 106) - Exit 16	Demand Surge / Merges
AmVets Memorial Highway (Route 24) & Belmont Street (Route 123) - Exit 17	Demand Surge / Merges
AmVets Memorial Highway (Route 24) & Reynolds Memorial Highway (Route 27) - Exit 18	Demand Surge / Merges
AmVets Memorial Highway (Route 24) & Harrison Boulevard/Central Street - Exit 19	Demand Surge / Merges
AmVets Memorial Highway (Route 24) & Lindelof Avenue (Route 139) - Exit 20	Demand Surge / Merges
Pilgrim Highway (Route 3) & Long Pond Road - Exit 5	Demand Surge
Pilgrim Highway (Route 3) & Samoset Street (Route 44) SB - Exit 6A	Demand Surge
Pilgrim Highway (Route 3) & Samoset Street SB - Exit 6B	Demand Surge / Lane Drop
Pilgrim Highway (Route 3) & Smiths Lane - Exit 8	Demand Surge
Pilgrim Highway (Route 3) & Main Street (Route 3A) - Exit 9	Demand Surge
Pilgrim Highway (Route 3) & Church Street (Route 139) - Exit 12	Demand Surge
Arterials	
Route 3A - Kingston - Railroad Tracks to Route 3	Demand Surge
Route 3A - Plymouth - Cherry Street to South Street	Demand Surge
Route 18 - Abington - Weymouth Town Line to Whitman Town Line	Lane Drop
Route 27 - Brockton - West Street to Route 14	Demand Surge
Route 27 - Stoughton - Stoughton Square to Brockton City Line	Demand Surge
Route 44 / Samoset Street - Plymouth - Pilgrim Hill Road to Court Street (Route 3A)	Demand Surge / Lane Drop
Route 104 - Bridgewater - Route 24 to Bridgewater Center	Demand Surge / Lane Drop
Route 106 - Halifax - Indian Pond Road to Route 58	Demand Surge
Route 106 - West Bridgewater - Route 24 to Route 28	Demand Surge
Route 123 - Easton & Brockton - Route 138 to Route 28	Demand Surge / Lane Drop
Route 138 - Stoughton - Canton Town Line to Route 27	Demand Surge
Central Street - Stoughton - Route 27 to Avon Town Line	Demand Surge
Main Street - Brockton - Howard Street to Plain Street	Demand Surge
Town Centers	
Bridgewater Center	Signal / Traffic Control (Systematic)
East Bridgewater Center	Signal / Systematic
Stoughton Square	Signal / Systematic
West Bridgewater Center	Signal
Whitman Center	Intersection

Intersections

The Old Colony Congestion Management Process has identified congested intersections throughout the region. These congested intersections are based on level of service analysis that has been completed through various tasks under the Unified Planning Work Program. Intersections with a calculated level of service grade of "D" or worse has been identified as a congested intersection. Of course, the degree of congestion varies between intersections. The level of service rating is indicative only of peak hour delay. Some locations may only experience congestion for a short period of time during the peak hour, while others the congestion is more chronic and lasts several hours throughout the day. Table 18 lists the intersections that have been identified as being congested.

Commuter Rail and Park and Ride

Parking lots at intermodal facilities are considered to be at capacity when utilization (parked motor vehicles) is 85 percent or greater of total spaces. Based on the data collected during 2018, the following facilities are at or beyond capacity:

Commuter Rail

- Canton Center: 90.05% Utilization
- Stoughton: 99.84% Utilization
- Abington: 91.62% Utilization

Park-and-Ride

- Rockland – Route 3, Exit 14 (Route 228): 88.85% Utilization
- Plymouth – Route 3, Exit 5 (Long Pond Road): 95.05% Utilization
- Bourne – Route 3, Exit 1A (Route 6) (Sagamore): 89.10% Utilization
- West Bridgewater – Route 24, Exit 16 (Route 106): 87.15% Utilization

Identification and Assessment of Strategies

The Old Colony planning staff recommends the funding of strategies and recommendations for improving congestion through the Old Colony Transportation Improvement Program (TIP) and other sources as appropriate. These strategies and recommendations are prepared through planning activities in the Unified Planning Work Program, and identified in consultation with stakeholders.

The following congestion management strategies are recommended for the Old Colony region:

- Travel Demand Management (TDM)
- Access Management
- Promote the Use of Non-motorized Modes of Travel
- Intelligent Transportation Systems (ITS)
- Public Transportation
- Highway Capacity
- Parking Capacity

Travel Demand Management (TDM)

Transportation Demand Management (TDM) techniques serve to reduce the number of single occupancy vehicle trips. Typical examples of TDM techniques include, but are not limited to; ridesharing/carpooling; shuttle services; telecommuting options; flexible work schedules; and bicycle and pedestrian accommodations. These techniques help reduce the amount of vehicle trips on the highway network and therefore reduce congestion. OCPC will continue to support enactment of TDM measures throughout the region and in development projects undergoing MEPA review.

> **Pros of Travel Demand Management**: Reduction in single occupant vehicle travel; Public health benefit from increases in walking and bicycling.

> **Cons of Travel Demand Management**: Dependent on program, highly localized; May not be highly effective in achieving regional mode shift goals and reducing large scale congestion.

Access Management

Access Management is defined as the planning of the design, location, and operation of driveways, median openings, interchanges, and street connections. Although some access management techniques include limiting the number of curb cuts, adding medians, and reducing turning movements, studies show that well planned access management design and modifications do not negatively impact businesses. Access Management applications result in reduced blocking of driveways by queues, better access between neighborhoods and businesses, and safer overall driving conditions.

Highway planning has traditionally focused on relieving bottlenecks and congestion in order to maximize traffic flow efficiency; however, commercial and retail activities have become significant within certain highway segments. In addition, a lack of control, placement, spacing, and width of curb cuts that provide access to adjacent properties has become prevalent throughout most of the arterial corridors within the OCPC communities. These conditions have led to situations in which traffic flow and safety have been compromised. The commercial and retail centers that have proliferated along important arterials and collectors are auto dependent, mainly single-use zoned, and extensive in development (spread out over large areas).

> **Pros of Access Management**: Effective in reducing localized congestion, especially along commercial corridors; Reduction/concentration of curb cuts and access points reduces overall number of conflicts and hence can improve safety.

> **Cons of Access Management**: Right-of-way obstacles; Often focused only on motorized travel; Not effective in reducing single occupancy vehicle dependency.

Promote the Use of Non-Motorized Modes of Travel

Promotion of the use of non-motorized modes of travel can be achieved by focusing on infrastructure improvements that promote the efficiency of bicycling and walking. Incorporating Complete Streets principles into the transportation planning process is also a critical component of this initiative.

Pedestrian infrastructure improvements may include:

- Installing new sidewalks where none currently exist
- Repairing and/or widening existing sidewalks
- Removing obstacles
- Installing pedestrian signals or improving existing signals
- Installing new and/or improved crosswalks and accompanying appropriate signage
- Creating buffers between sidewalks and vehicular traffic
- Traffic calming

Bicycle infrastructure improvements may include:

- Adding bicycle lanes
- Creating shared-use paths
- Installing bicycle parking amenities at transit facilities and other key destinations

Beyond promoting pedestrian and bicycle improvements system wide, Old Colony staff also seek to promote and encourage all communities in the Old Colony region to adopt official Complete Streets policies.

> **Pros of Promoting Non-Motorized Travel**: Public health benefit from increased physical activity and reduction in GHG emissions; Better facilities improve safety for vulnerable users; Reduction in dependency on motorized vehicles.
>
> **Cons of Promoting Non-Motorized Travel**: Larger scale improvements may have right-of-way and funding challenges.

Intelligent Transportation Systems (ITS)

Intelligent Transportation Systems (ITS) are applications of advanced technology in the field of transportation, with the goals of increasing operational efficiency and capacity, improving safety, reducing environmental costs, and enhancing personal mobility. Intelligent Transportation Systems are currently used in a wide variety of applications, such as: incident management and emergency response; electronic toll collection on highways; fare collection on transit systems; traffic signal control; and congestion management. Specifically, ITS increases safety, security, comfort, and convenience for transit passengers; improves transit efficiency and thus helps to reduce operating costs; assists transit operation managers and vehicle operators by automating many of their labor-intensive duties; and promotes an intermodal transportation system that helps motorists transition between their own passenger vehicles and the transit system.

> **Pros of Intelligent Transportation Systems**: Potential to be highly effective on reducing congestion and adjusting traffic flow; Adaptive nature of new technology allows adjustable applications for varying traffic conditions.

Cons of Intelligent Transportation Systems: High cost; Regional traffic management requires coordination across jurisdictions.

Promote Public Transportation

A robust public transportation system is a critical component of the transportation system. A choice of public transportation options creates incentive of convenience for commuters, reducing dependency on motorized travel especially single occupancy vehicles. Consideration of the following improvements and strategies are routinely assessed in promoting public transportation:

- Adjust transit schedules by time of day (allowing increased service frequency during peak demand hours by decreasing frequency during low demand hours)
- Increase the coverage area and hours of service
- Traffic signal priority for transit vehicles
- Provide real-time transit vehicle information (location / arrival time of vehicles) to users
- Provision for bicycles at transit facilities and on vehicles
- Improved bicycle and pedestrian connections to transit facilities
- Modernization of facilities and equipment

Pros of Promoting Public Transportation: Effective in reducing congestion by reducing reliance on personal motorized vehicles; May have Public Health benefit by increasing physical activity (i.e. walking to transit stops); Provides transportation options for vulnerable and mobility-challenged individuals.

Cons of Promoting Public Transportation: New service may be costly to implement; Low-density development in areas of the region creates service challenges.

Increasing Highway Capacity

While the other congestion management strategies listed here should be and routinely are considered first before highway capacity is considered, in some cases increasing highway capacity must remain an option for meeting the demands of an increasing population and expanding economy. Increasing capacity includes adding lanes to major, chronically congested highways such as Route 3.

Pros of Increasing Highway Capacity: May reduce impacts of congestion and improve air quality.

Cons of increasing Highway Capacity: New construction is often expensive with accompanying right-of-way and environmental impacts; Does not promote reduction in reliance on motorized travel.

Increasing Parking Capacity

The idea of increasing parking capacity at transit facilities is to remove vehicles from the roadways and have them utilize public transportation so that they do not have to worry about factors such as traffic and expensive parking costs. In 2018, seven CMP locations (three commuter rail stations and four Park & Ride lots) were above 85% utilized, which by definition makes them congested. All four of the congested Park

& Ride facilities provide bus services. Increasing the amount of available parking requires acquiring adjacent land to add parking spaces and potentially removing/re-adding or creating new security boundaries.

Pros of Increasing Parking Capacity: May reduce impacts of congestion and improve air quality; Could result in an increased ridership for the MBTA and bus Plymouth & Brockton bus service.

Cons of increasing Parking Capacity: New construction is often expensive with accompanying right-of-way and environmental impacts; Does not guarantee increased ridership; May not be the best use of funds related to public transportation.

Programming and Implementing Strategies

Table 10 describes which congestion management strategies are intended to be applied to the identified congested facilities.

Table 15: Applied Congestion Management Strategies for Identified Facilities

Congested Facility	Travel Demand Management	Access Management	Promote Non-Motorized Travel	ITS	Promote Public Transportation	Increase Highway Capacity	Increase Parking Capacity
Limited Access Highways & Interchanges							
AmVets Memorial Highway (Route 24) & Interstate 495 - Exit 14	X				X	X	
AmVets Memorial Highway (Route 24) & Pleasant Street (Route 104) - Exit 15	X				X	X	
AmVets Memorial Highway (Route 24) & West Center Street (Route 106) - Exit 16	X				X	X	
AmVets Memorial Highway (Route 24) & Belmont Street (Route 123) - Exit 17	X				X	X	
AmVets Memorial Highway (Route 24) & Reynolds Memorial Highway (Route 27) - Ex	X				X	X	
AmVets Memorial Highway (Route 24) & Harrison Boulevard/Central Street - Exit 19	X				X	X	
AmVets Memorial Highway (Route 24) & Lindelof Avenue (Route 139) - Exit 20	X				X	X	
Pilgrim Highway (Route 3) & Long Pond Road - Exit 5	X				X	X	
Pilgrim Highway (Route 3) & Samoset Street (Route 44) SB - Exit 6A	X				X	X	
Pilgrim Highway (Route 3) & Samoset Street SB - Exit 6B	X				X	X	
Pilgrim Highway (Route 3) & Smiths Lane - Exit 8	X				X	X	
Pilgrim Highway (Route 3) & Main Street (Route 3A) - Exit 9	X				X	X	
Pilgrim Highway (Route 3) & Church Street (Route 139) - Exit 12	X				X	X	
Arterials							
Route 3A - Kingston - Railroad Tracks to Route 3			X	X			
Route 3A - Plymouth - Cherry Street to South Street			X	X	X		
Route 18 - Abington - Weymouth Town Line to Whitman Town Line		X	X	X	X		
Route 27 - Brockton - West Street to Route 14			X	X			
Route 27 - Stoughton - Stoughton Square to Brockton City Line			X	X			
Route 44 / Samoset Street - Plymouth - Pilgrim Hill Road to Court Street (Route 3A)			X	X			
Route 104 - Bridgewater - Route 24 to Bridgewater Center			X	X			
Route 106 - Halifax - Indian Pond Road to Route 58		X	X				
Route 106 - West Bridgewater - Route 24 to Route 28		X	X			X	
Route 123 - Easton & Brockton - Route 138 to Route 28		X	X	X	X		
Route 138 - Stoughton - Canton Town Line to Route 27		X	X	X			
Central Street - Stoughton - Route 27 to Avon Town Line			X				
Main Street - Brockton - Howard Street to Plain Street			X				
Town Centers							
Bridgewater Center	X	X	X				
East Bridgewater Center	X	X	X				
Stoughton Square	X	X	X	X			
West Bridgewater Center	X	X	X	X			
Whitman Center	X	X	X				
Intersections							
Intersections with D and F LOS (see List)	X	X	X	X	X	X	
Commuter Rail and Park-and-Ride Parking Lots at Capacity							
Canton Junction Commuter Rail			X		X		
Stoughton Commuter Rail			X		X		X
Rockland Park and Ride			X		X		X
Plymouth Park-and-Ride			X		X		X
Bourne Park-and-Ride			X		X		X
West Bridgewater Park-and-Ride			X		X		X

Evaluation of Strategy Effectiveness

The effectiveness of the strategies presented in this Congestion Management Process report are routinely evaluated continuously as part of the Old Colony MPO's congestion management activities as well as across all transportation planning activities. The following metrics are currently applied in evaluating the strategies outlined in this CMP Report.

Table 16: Metrics for Evaluating Strategy Effectiveness

Strategy	Metrics
Travel Demand Management	Mode Share (% of people walking, bicycling, using transit, ridesharing)
Access Management	Travel speeds; Intersection and Corridor Delay; Hours of Congestion; Volume to Capacity Ratios
Promote Non-Motorized Travel	# of Communities with adopted Complete Streets policies; Mode Share; # of Bicycles Parked
Intelligent Transportation Systems	Travel speeds; Intersection and Corridor Delay; Hours of Congestion
Promote Public Transportation	Ridership; Parking Lot Utilization (Commuter Rail and Park-and-Ride); On-Time Records
Increased Highway Capacity	Travel speeds; Intersection and Corridor Delay; Hours of Congestion; Volume to Capacity Ratios
Increased Parking Capacity	Parking demand; Frequent 85% or higher utilization (Congested facilities)

The effectiveness of congestion management strategies is also measured against the performance targets identified in this CMP and the Regional Transportation Plan:

Congestion Management Target and Performance Measure: Monitor congestion levels on federal-aid eligible highway network annually, and highlight corridors with volume to capacity (V/C) ratios of 0.8 or greater for targeted study and/or improvements

- **2018 Status**: While this is an ongoing process, Old Colony planning staff have identified congested corridors based on existing traffic data and volume to capacity rations. Those corridors are listed in Table 3 of this report.

Congestion Management Target and Performance Measure: Record utilization data twice annually and report data to MassDOT

- **2018 Status**: Old Colony planning staff successfully recorded utilization data in April and October of 2018 and reported the data to MassDOT.

Congestion Management Target and Performance Measure: 50% of available Transportation Improvement Program funding allocated to projects that significantly improve bicycle and pedestrian mobility.

- **2018 Status**: 100% of the TIP projects in 2018 involved improving bicycle and/or pedestrian mobility.

Congestion Management Target and Performance Measure: 50% of TIP projects reduce GHGs while also reducing negative impacts on the natural environment (such as improved storm water management or the addition of green space).

- **2018 Status**: 100% of the TIP road projects and 100% of the 2018 bus replacement projects in 2018 had measureable reductions in GHGs.

Congestion Management Target and Performance Measure: Achieve a Level of Travel Time Reliability (LOTTR) of 68% on Interstate roads and 80% on non-Interstate roads by 2022.

- **2018 Status:** 100% LOTTR on Interstate Roads and 89.30% on non-Interstate Roads in the OCPC Region.

Congestion Management Target and Performance Measure: Achieve a Truck Travel Time Reliability (TTTR) Index of 1.85 on Interstate NHS roads by 2022.

- **2018 Status:** Interstate NHS Roads saw a TTTR Index of 1.675 in the OCPC Region.

Congestion Management Target and Performance Measure: Achieve 34.82% Non-SOV travel by 2020 and 35.46% by 2022.

- **2018 Status:** The percentage of commuters using a mode of transportation other than a single-occupancy vehicle was 33.9%.

Congestion Management Target and Performance Measure: Achieve a Peak Hour Excessive Delay (PHED) of 18.31 annual hours per capita or lower by 2022.

- **2018 Status:** NHS Roadways saw a PHED of 18.31 per capita.

Congestion Management Target and Performance Measure: Reduce the total reduction of on-road mobile source emissions from projects funded under the Congestion Mitigation & Air Quality (CMAQ) program to 1,622 CO_2 by 2020.

- **2018 Status:** Unknown.

Congestion Management Target and Performance Measure: Reduce the average commute time for commuters who drive to work.

- **2018 Status:** The average commute time in FY 18 was 29 minutes, which was 0.3 minutes higher than FY 17. This calculation was based on the 5-year ACS estimate.

Congestion Management Target and Performance Measure: Achieve 250 registered municipalities by 2020 and 275 registered municipalities by 2022 for Complete Streets policies.

- **2018 Status:** There were 207 registered municipalities in FY 18 for Complete Streets policies, which was 40 more than FY 17, and seven more than the 2018 Target.

Congestion Management Target and Performance Measure: Achieve 200 approved Complete Streets policies by 2020 and 250 approved Complete Streets policies by 2022.

- **2018 Status:** There were 162 approved Complete Streets policies in FY 18, which was 32 more than FY 17. There was no target set for this Performance Measure for 2018.

Table 18: Identified Congested Intersections (LOS of "D" or Worse)

Community	Intersection	Traffic Control	AM LOS	PM LOS	Notes
Abington	Bedford Street (Route 18) & North Avenue (Route 139)/Randolph Street (Route 139)	Signal	D	E	
Abington	Bedford Street (Route 18) & Shaw Avenue	Stop Sign	F	F	
Abington	Bedford Street (Route 18) & Washington Street/Elm Street	Stop Sign	F	F	
Abington	Bedford Street (Route 18) & Washington Street/Trucchi's	Stop Sign	F	F	
Abington	Brockton Avenue (Route 123) & Ashland Street	Stop Sign	E	D	
Abington	Brockton Avenue (Route 123) & Bedford Street (Route 18)	Signal	D	D	
Abington	Brockton Avenue (Route 123) & High Street	Stop Sign	F	F	
Abington	Brockton Avenue (Route 123) & Mill Street/Garden Street/Martin Street	Stop Sign	E	F	
Abington	Brockton Avenue (Route 123) & Rockland Street/Elm Street	Stop Sign	F	F	
Abington	Brockton Avenue (Route 123) & Vernon Street/Groveland Street	Signal	D	B	
Abington	Centre Avenue (Route 123) & Walnut Street	Stop Sign	D	C	
Abington	Hancock Street & Chestnut Street	Flashing Beacon	F	F	
Abington	North Avenue (Route 139) & Spruce Street	Stop Sign	C	F	
Abington	Plymouth Street (Route 58) & Summer Street	Signal	C	D	
Abington	Plymouth Street (Route 58) & Adams Street	Stop Sign	C	E	
Abington	Plymouth Street (Route 58) & Birch Street/Brighton Street	Stop Sign	E	F	
Abington	Plymouth Street (Route 58) & Central Street	Signal	D	C	
Abington	Plymouth Street (Route 58) & Centre Avenue (Route 123)	Signal	E	E	
Abington	Randolph Street (Route 139) & Chestnut Street / Old Randolph Street	Stop Sign	F	F	
Abington	Randolph Street (Route 139) & Hancock Street / Old Randolph Street	Stop Sign	F	F	
Abington	Randolph Street (Route 139) & Lincoln Street	Stop Sign	C	F	
Abington	Washington Street (Route 18) & Summer Street	Stop Sign	F	F	
Abington	Washington Street (Route 18) & Washington Street	Stop Sign	F	E	
Avon	East Main Street (Route 28) & Harrison Boulevard	Signal	C	D	
Avon	East Main Street (Route 28) & East Spring Street/West Spring Street	Flashing Beacon	F	F	TIP Programmed
Avon	Harrison Boulevard & West Main Street	Signal	D	F	
Avon	Memorial Drive (Route 28) & East Main Street	Stop Sign	E	D	
Bridgewater	Bedford Street (Route 18) & Worcester Street	Stop Sign	C	F	
Bridgewater	Bedford Street (Route 18/28) & Central Square/School Street	Yield	E	F	
Bridgewater	Bedford Street (Route 18/28) & Cottage Street	Stop Sign	C	D	
Bridgewater	Bedford Street (Route 18/28) & Flagg Street	Stop Sign	D	F	
Bridgewater	Bedford Street (Route 18/28) & Grove Street	Stop Sign	D	F	
Bridgewater	Bedford Street (Route 18/28) & Maple Avenue	Stop Sign	D	D	
Bridgewater	Broad Street (Route 104) & Main Street (Route 28)/Summer Street (Route 104)	Signal	D	E	
Bridgewater	Broad Street (Route 18) & Campus Plaza	Stop Sign	E	F	
Bridgewater	Broad Street (Route 18) & Dunkin Donuts	Stop Sign	F	E	
Bridgewater	Broad Street (Route 18) & High Street	Stop Sign	F	F	Reconstructed
Bridgewater	Broad Street (Route 18) & Main Street (Route 28)/Summer Street (Route 104)	Signal	D	E	

Table 18: Identified Congested Intersections (LOS "D" or Worse), Continued

Community	Intersection	Traffic Control	AM LOS	PM LOS	Notes
Bridgewater	Broad Street (Route 18) & McDonalds	Stop Sign	C	D	
Bridgewater	Broad Street (Route 18) & Stetson Street	Stop Sign	F	F	
Bridgewater	Pleasant Street (Route 104) & AmVets Memorial Highway (Route 24) NB Ramps	Signal	D	A	
Bridgewater	Pleasant Street (Route 104) & Birch Street	Stop Sign	F	F	
Bridgewater	Pleasant Street (Route 104) & Elm Street East	Stop Sign	D	F	
Bridgewater	Pleasant Street (Route 104) & Grove Street/Mt. Prospect Street	Stop Sign	F	F	
Bridgewater	Pleasant Street (Route 104) & North Street	Stop Sign	D	C	
Bridgewater	Pleasant Street (Route 104) & Prospect Street/Cumberland Farms	Signal	D	C	
Bridgewater	Pleasant Street (Route 104) & Scotland Boulevard	Stop Sign	F	F	
Bridgewater	Pleasant Street (Route 104) & South Street/Maple Avenue	Stop Sign	F	F	
Bridgewater	Pleasant Street (Route 104) & Vernon Street	Stop Sign	F	E	
Bridgewater	Plymouth Street (Route 104) & Burrill Avenue/BSU Spring Street Parking Lot	Stop Sign	F	F	
Bridgewater	Plymouth Street (Route 104) & Great Hill Drive/Hayward Street	Stop Sign	F	F	
Bridgewater	Plymouth Street (Route 104) & Hale Street	Stop Sign	F	F	
Bridgewater	Plymouth Street (Route 104) & Hooper Street/Morris Avenue	Stop Sign	F	F	
Bridgewater	Plymouth Street (Route 104) & Meadow Lane/BSU Sports Complex Facility	Stop Sign	F	F	
Bridgewater	South Street (Route 104) & Central Square/Church Street	Yield	D	E	
Brockton	Belmont Street (Route 123) & Linwood Street/Loraine Avenue	Stop Sign	F	F	Reconstructed
Brockton	Centre Street (Route 123) & Cary Street/Lyman Street	Signal	D	E	
Brockton	Centre Street (Route 123) & Libby Street/Crosby Street	Stop Sign	F	F	
Brockton	Centre Street (Route 123) & Plymouth Street	Stop Sign	F	F	
Brockton	Crescent Street (Route 27) & Alger Street (Route 14)	Signal	D	B	
Brockton	Crescent Street (Route 27) & Lyman Street	Signal	C	F	
Brockton	Crescent Street (Route 27) & Plymouth Street	Stop Sign	F	F	
Brockton	Crescent Street (Route 27) & Quincy Street/Massasoit Community College	Signal	F	F	TIP Programmed
Brockton	Main Street (Route 28) & Hayward Avenue	Stop Sign	D	D	
Brockton	Main Street (Route 28) & Sargent's Way/Sylvia Avenue	Signal	D	D	
Brockton	Montello Street (Route 28) & Centre Street (Route 123)	Signal	D	F	
Brockton	Montello Street (Route 28) & East Nilsson Street	Stop Sign	C	F	
Brockton	Montello Street (Route 28) & Plain Street	Stop Sign	D	F	
Brockton	North Montello Street (Route 28) & East Battles Street	Stop Sign	F	F	
Brockton	North Montello Street (Route 28) & Field Street/Livingston Road	Stop Sign	D	E	
Brockton	North Montello Street (Route 28) & Howard Street (Route 37)/Albion Street	Signal	D	E	
Brockton	North Montello Street (Route 28) & Wilmington Street	Stop Sign	D	F	
Brockton	North Pearl Street (Route 27) & Reynolds Memorial Highway (Route 27)	Signal	C	D	
Brockton	North Quincy Street & Boundary Avenue/Chestnut Street	Stop Sign	F	F	
Brockton	North Quincy Street & North Cary Street	Signal	F	F	
Brockton	Pleasant Street (Route 27) & Ash Street	Signal	F	F	Reconstructed

Table 18: Identified Congested Intersections (LOS of "D" or Worse), Continued

Community	Intersection	Traffic Control	AM LOS	PM LOS	Notes
Brockton	Pleasant Street (Route 27) & Belmont Avenue/Augusta Avenue	Signal	F	F	Reconstructed
Brockton	Pleasant Street (Route 27) & Prospect Street	Stop Sign	F	F	Reconstructed
Brockton	Pleasant Street (Route 27) & Spring Street	Stop Sign	C	F	Reconstructed
Brockton	Reynolds Memorial Highway (Route 27) & Westgate Drive/Christy's Drive	Signal	C	D	
Duxbury	Enterprise Street/Tremont Street (Route 3A) & Church Street/Tremont Street (Route 139)	Stop Sign	D	D	
Duxbury	Tremont Street (Route 3A) & Alden Street	Stop Sign	C	D	
Duxbury	Tremont Street (Route 3A) & Oak Street/Parks Street	Stop Sign	F	F	
Duxbury	Tremont Street (Route 3A) & Route 3 NB Ramps	Stop Sign	F	F	
Duxbury	Tremont Street (Route 3A) & Route 3 SB Ramps	Stop Sign	F	F	
Duxbury	Tremont Street (Route 3A) & Tobey Garden Street/Chestnut Street	Stop Sign	F	F	
East Bridgewater	Bedford Street (Route 18) & Central Street/Spring Street/Maple Avenue	Signal	F	F	
East Bridgewater	Bedford Street (Route 18) & Highland Street/Harvard Street	Signal	B	E	
East Bridgewater	Bedford Street (Route 18) & Union Street	Stop Sign	F	F	
East Bridgewater	Bedford Street (Route 18) & Water Street	Stop Sign	C	F	
East Bridgewater	Bedford Street (Route 18) & West Street (Route 106)/East Street	Signal	B	D	
East Bridgewater	Plymouth Street (Route 106) & Bridge Street	Stop Sign	C	E	
East Bridgewater	Plymouth Street (Route 106) & Washington Street	Stop Sign	C	D	
East Bridgewater	West Street (Route 106) & Spring Street	Stop Sign	B	D	
East Bridgewater	Whitman Street (Route 106) & Plymouth Street (Route 106)	Stop Sign	D	D	
Easton	Belmont Street (Route 123) & Bristol Drive	Stop Sign	D	E	
Easton	Depot Street (Route 123) & Center Street	Stop Sign	F	F	
Easton	Depot Street (Route 123) & Cross Street	Stop Sign	D	E	
Easton	Depot Street (Route 123) & Purchase Street	Stop Sign	F	F	
Easton	Foundry Street (Route 106) & Poquanticut Avenue	Stop Sign	E	D	
Easton	Foundry Street (Route 123) & Highland Street	Stop Sign	E	F	
Easton	Foundry Street (Route 123) & Old Foundry Street	Stop Sign	D	F	
Easton	Lincoln Street & Barrows Street	Stop Sign	C	E	
Easton	Main Street & Center Street/Lincoln Street	Stop Sign	F	F	
Easton	Main Street & Pond Street	Stop Sign	C	D	
Easton	Main Street & Sullivan Street	Stop Sign	C	D	
Easton	Turnpike Street & West Street/Purchase Street	Stop Sign	D	D	
Easton	Washington Street (Route 138) & Elm Street	Stop Sign	F	F	Under Design
Easton	Washington Street (Route 138) & Plymouth Drive	Stop Sign	E	F	
Easton	Washington Street (Route 138) & Purchase Street	Stop Sign	C	F	
Easton	Washington Street (Route 138) & Turnpike Street	Stop Sign	E	F	
Easton	Washington Street (Route 138) & Union Street	Stop Sign	F	F	TIP Programmed
Halifax	Plymouth Street (Route 106) & Carver Street	Stop Sign	D	D	
Halifax	Plymouth Street (Route 106) & Pine Street	Stop Sign	D	E	

Table 18: Identified Congested Intersections (LOS of "D" or Worse), Continued

Community	Intersection	Traffic Control	AM LOS	PM LOS	Notes
Halifax	Thompson Street (Route 105) & Plymouth Street (Route 106)	Stop Sign	C	D	
Hanover	Columbia Road (Route 53/139) & Broadway	Signal	E	D	
Hanover	Columbia Road (Route 53/139) & Rockland Street (Route 139)	Signal	C	D	
Hanover	Washington Street (Route 53) & East Street	Stop Sign	D	F	
Hanover	Washington Street (Route 53) & Hanover Mall Drive (AT&T/Trader Joe's)	Stop Sign	E	F	
Hanover	Washington Street (Route 53) & Hanover Street	Stop Sign	F	F	
Hanover	Washington Street (Route 53) & Route 3 SB Ramps/Hanover Mall	Signal	B	F	
Hanover	Washington Street (Route 53) & Woodland Drive	Stop Sign	C	F	
Hanson	Liberty Street (Route 58) & Maquan Street (Route 14)/Indian Head Street (Route 58)	Stop Sign	C	E	
Hanson	Monponsett Street (Route 58) & Union Street	Stop Sign	C	F	
Hanson	Spring Street (Route 58) & West Washington Street	Stop Sign	F	F	
Hanson	West Washington Street (Route 58) & East Washington Street/Liberty Street (Route 58)	Stop Sign	F	F	
Hanson	County Road (Route 14) & High Street	Stop Sign	B	D	
Kingston	Main Street (Route 106) & Elm Street	Stop Sign	B	D	
Kingston	Main Street (Route 3A) & Crescent Street/Foundry Lane	Stop Sign	C	D	
Kingston	Main Street (Route 3A) & Howlands Lane	Stop Sign	C	F	
Kingston	Main Street (Route 3A) & Landing Road	Stop Sign	F	F	
Kingston	Main Street (Route 3A) & Pilgrim Highway (Route 3) NB Ramps	Stop Sign	F	F	
Kingston	Main Street (Route 3A) & Pilgrim Highway (Route 3) SB Ramps	Signal	F	F	
Kingston	Main Street (Route 3A) & Spring Street	Stop Sign	C	E	
Kingston	Summer Street (Route 3A) & Cranberry Crossing	Stop Sign	F	F	
Kingston	Summer Street (Route 3A) & Main Street (Route 106)/Linden Street	Stop Sign	D	E	
Kingston	Summer Street (Route 53) & Tarkiln Road	Stop Sign	F	F	
Kingston	Summer Street (Route 53) & Tremont Street (Route 3A)	Signal	F	F	
Kingston	Wapping Road (Route 106) & Pembroke Street (Route 27)/Evergreen Street	Signal	D	D	
Pembroke	Church Street (Route 139) & Union Street/Old Oak Street	Signal	D	F	
Pembroke	Church Street (Route 139) & Pilgrim Highway (Route 3) NB Ramps	Signal	D	C	
Pembroke	Church Street (Route 139) & Pilgrim Highway (Route 3) SB Ramps	Signal	C	E	
Pembroke	Columbia Road (Route 53/139) & Old Washington Street	Stop Sign	E	F	
Pembroke	Schoosett Street (Route 139) & Water Street	Stop Sign	C	D	
Pembroke	Washington Street (Route 53) & Barker Street (Route 14)	Signal	A	D	
Pembroke	Washington Street (Route 53) at Pleasant Street	Signal	F	F	TIP Programmed
Pembroke	Washington Street (Route 53) & Water Street	Stop Sign	D	F	

Table 18: Identified Congested Intersections (LOS of "D" or Worse), Continued

Community	Intersection	Traffic Control	AM LOS	PM LOS	Notes
Plymouth	Main Street Extension (Route 3A) & Sandwich Street	Stop Sign	C	D	
Plymouth	Pilgrim Highway (Route 3) SB Off Ramp & Samoset Street WB	Stop Sign	C	F	
Plymouth	Samoset Street & Algonquin Terrace	Stop Sign	F	F	
Plymouth	Samoset Street & Pilgrim Highway (Route 3) NB On Ramp / Westerly Road	Signal	C	D	
Plymouth	Sandwich Street (Route 3A) & Lincoln Street	Stop Sign	F	F	
Plymouth	Sandwich Street (Route 3A) & South Street	Stop Sign	F	F	
Plymouth	Sandwich Street (Route 3A) & Water Street	Stop Sign	B	F	
Plymouth	State Road (Route 3A) & Hedges Pond Road	Stop Sign	B	E	
Plymouth	State Road (Route 3A) & Herring Pond Road	Stop Sign	F	F	
Plymouth	State Road (Route 3A) & Power House Road/Elliot Lane	Blinker	C	D	
Stoughton	Canton Street (Route 27) & Central Street/Tosca Drive	Stop Sign	F	F	
Stoughton	Canton Street (Route 27) & School Street/Summer Street	Stop Sign	F	F	
Stoughton	Central Street & Commercial Street	Stop Sign	D	F	
Stoughton	Central Street & Lincoln Street	Signal	B	D	
Stoughton	Central Street & Pearl Street	Signal	F	F	
Stoughton	Central Street & Pleasant Street (Route 139)	Signal	F	D	
Stoughton	Central Street & Turnpike Street	Signal	D	C	
Stoughton	Central Street (Route 27) & Island Street	Stop Sign	F	F	
Stoughton	Central Street (Route 27) & West Street	Stop Sign	F	F	
Stoughton	Lindelof Avenue (Route 139) & Kay Way/Technology Center Drive	Signal	D	C	
Stoughton	Lindelof Avenue (Route 139) Eastbound & AmVets Memorial Highway (Route 24) NB Ramps	Yield	F	F	
Stoughton	Lindelof Avenue (Route 139) Eastbound & AmVets Memorial Highway (Route 24) SB Ramps	Yield	E	F	
Stoughton	Lindelof Avenue (Route 139) Westbound & AmVets Memorial Highway (Route 24) SB Ramps	Yield	C	F	
Stoughton	Park Street (Route 27) & Ash Street	Stop Sign	D	F	
Stoughton	Park Street (Route 27) & Prospect Street	Stop Sign	E	F	
Stoughton	Park Street (Route 27) & South Street	Stop Sign	F	F	
Stoughton	Park Street (Route 27) & Sumner Street	Stop Sign	F	F	
Stoughton	Park Street (Route 27) & Turnpike Street	Stop Sign	F	F	
Stoughton	Pleasant Street (Route 139) & Lincoln Street	Stop Sign	C	F	
Stoughton	Pleasant Street (Route 139) & Pine Street	Stop Sign	F	F	
Stoughton	Pleasant Street (Route 139) & Prospect Street	Stop Sign	F	F	
Stoughton	Stoughton Center (Northern End)	Signal	C	E	

Table 18: Identified Congested Intersections (LOS of "D" or Worse), Continued

Community	Intersection	Traffic Control	AM LOS	PM LOS	Notes
Stoughton	Stoughton Center (Southern End)	Signal	E	E	
Stoughton	Washington Street (Route 138) & Central Street	Signal	D	E	Recently Reconstructed
Stoughton	Washington Street (Route 138) & Lincoln Street	Stop Sign	F	F	
Stoughton	Washington Street (Route 138) & Monk Street	Stop Sign	C	E	
Stoughton	Washington Street (Route 138) & School Street	Stop Sign	F	F	
Stoughton	Washington Street (Route 138) & York Street	Stop Sign	F	F	
West Bridgewater	East Center Street (Route 106) & East Street	Stop Sign	F	F	
West Bridgewater	North Main Street (Route 28) & Copeland Street	Stop Sign	B	D	
West Bridgewater	North Main Street (Route 28) & Howard Street	Stop Sign	F	D	
West Bridgewater	North Main Street (Route 28) & Matfield Street	Stop Sign	F	F	
West Bridgewater	North/South Main Streets (Route 28) & East/West Center Streets (Route 106)	Signal	F	F	Reconstructed
West Bridgewater	West Center Street (Route 106) & Crescent Street	Stop Sign	F	F	
West Bridgewater	West Center Street (Route 106) & Howard Street	Stop Sign	F	F	
West Bridgewater	West Center Street (Route 106) & Lincoln Street	Stop Sign	D	F	
West Bridgewater	West Center Street (Route 106) & North Elm Street / South Elm Street	Signal	C	F	
West Bridgewater	West Center Street (Route 106) & Prospect Street	Stop Sign	E	D	
West Bridgewater	West Center Street (Route 106) & West Street	Stop Sign	F	F	
Whitman	Bedford Street (Route 18) & Auburn Street (Route 14)	Signal	C	D	TIP Programmed
Whitman	Bedford Street (Route 18) & Warren Avenue	Stop Sign	D	E	
Whitman	Plymouth Street (Route 58) & Essex Street/Raynor Avenue	Roundabout	D	D	
Whitman	South Avenue (Route 27) & Broad Street	Stop Sign	B	D	
Whitman	South Avenue (Route 27) & Commercial Street	Stop Sign	C	E	
Whitman	South Avenue (Route 27) & Franklin Street (Route 27)/Pleasant Street	Stop Sign	C	F	
Whitman	South Avenue (Route 27) & Park Avenue	Stop Sign	C	F	
Whitman	South Avenue (Route 27) & Raynor Avenue	Stop Sign	D	F	
Whitman	Temple Street (Route 27) & Beulah Street	Stop Sign	C	D	
Whitman	Temple Street (Route 27) & High Street	Signal	C	F	
Whitman	Temple Street (Route 27) & West Street	Stop Sign	C	F	
Whitman	Temple Street (Route 27) at Washington Street	Stop Sign	F	F	