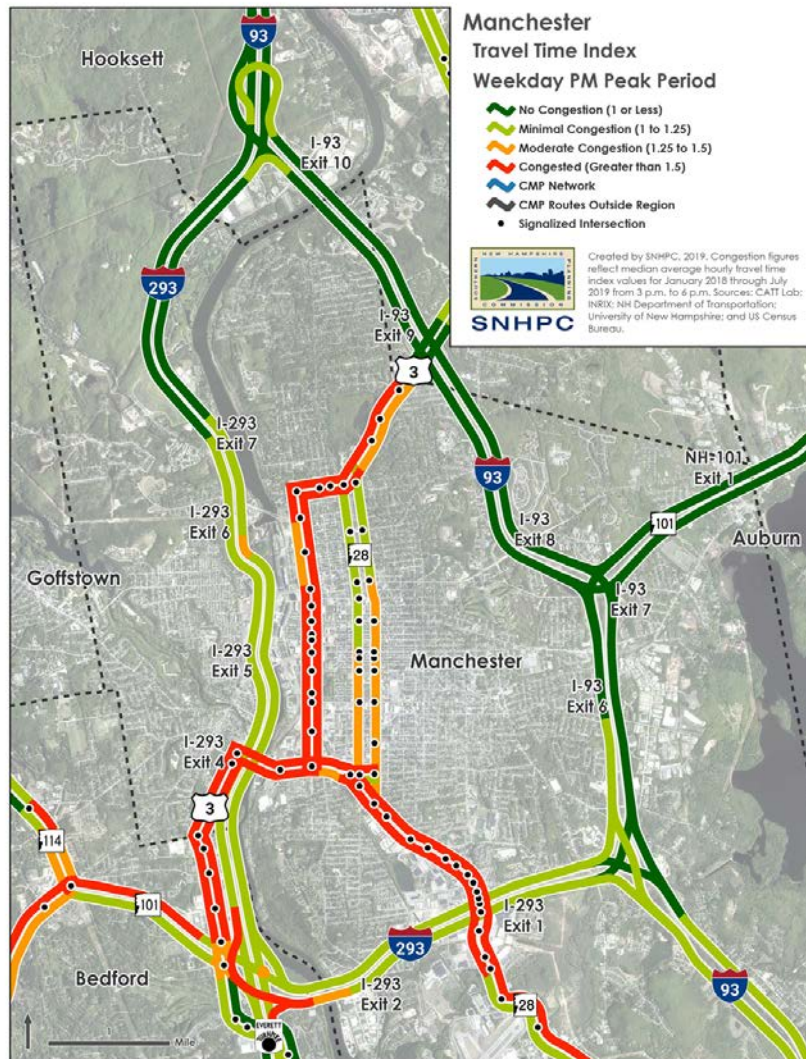


Congestion Management Process (CMP) Route Strategies



October 27th, 2020

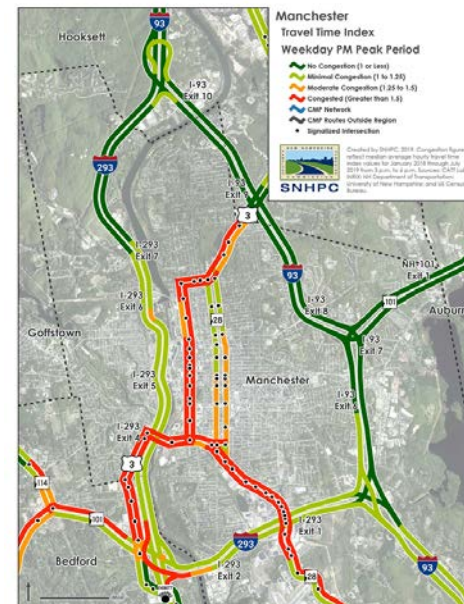
Carl Eppich

Southern New Hampshire
Planning Commission

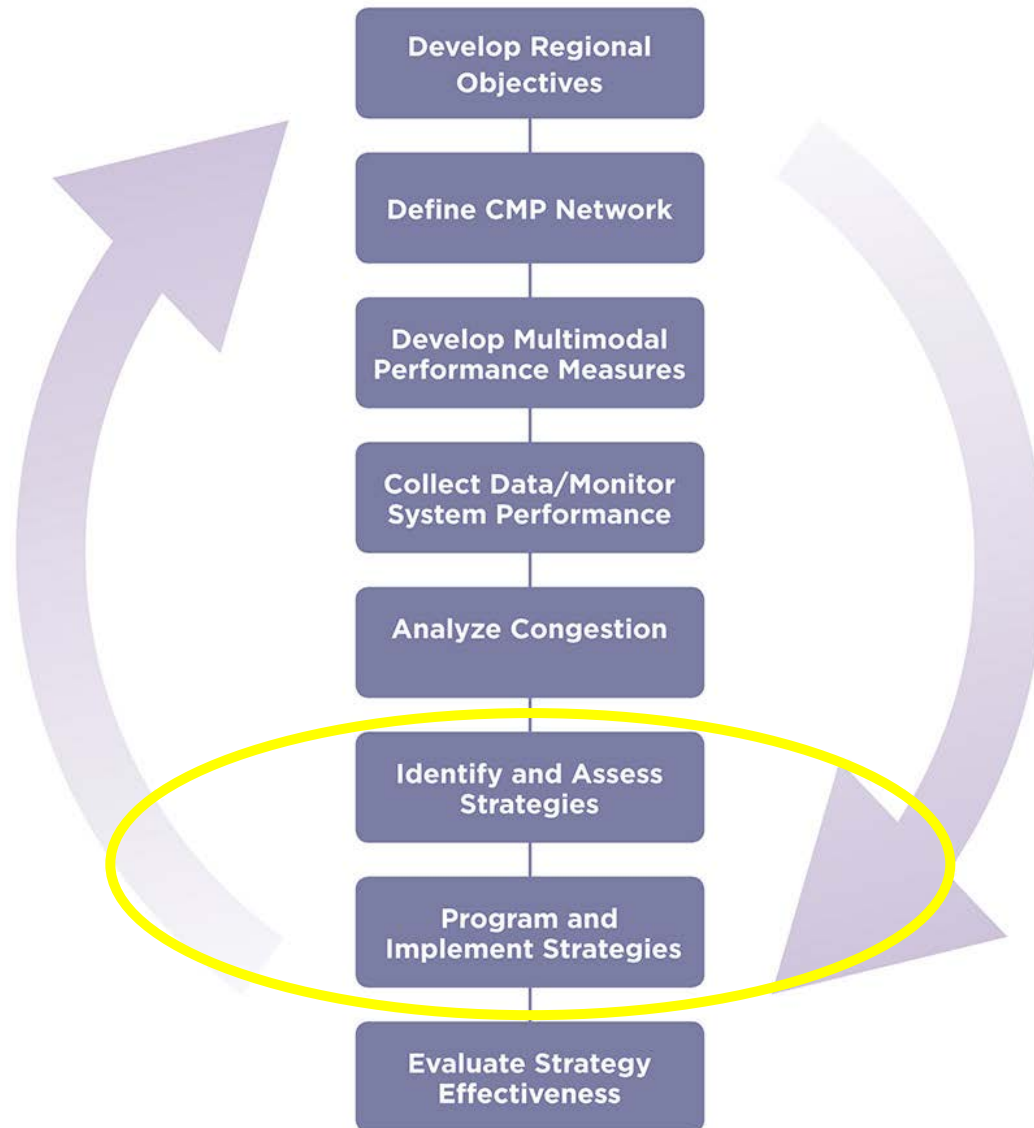


Presentation Overview

- Federal Highway Administration (FHWA) Eight-Step Process for CMPs
- Our CMP Network (Map)
- Strategies - Congestion Problems and Needs Analysis



FHWA Eight-step “Actions” Process

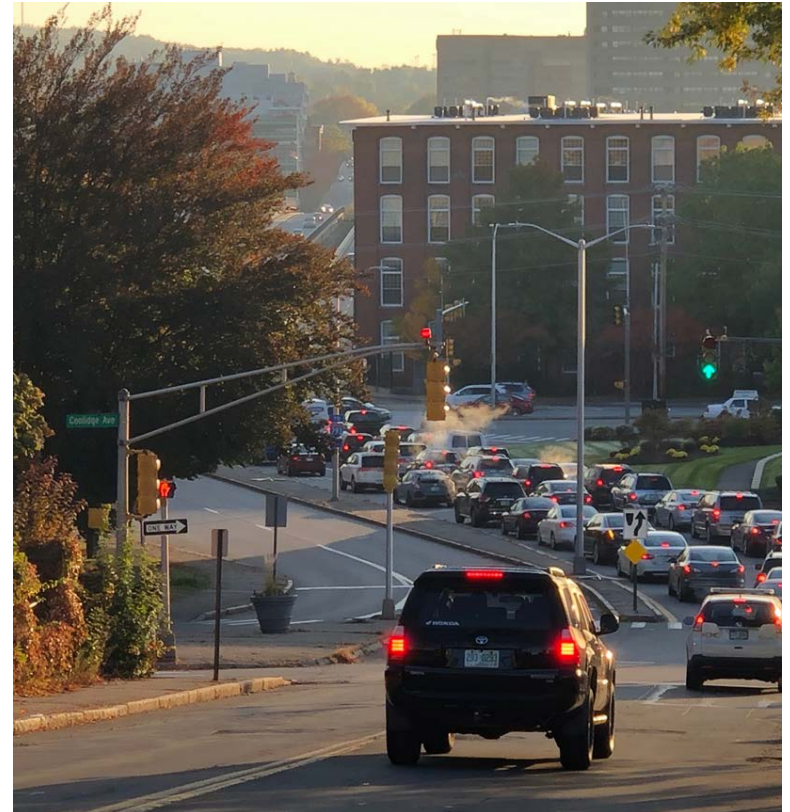


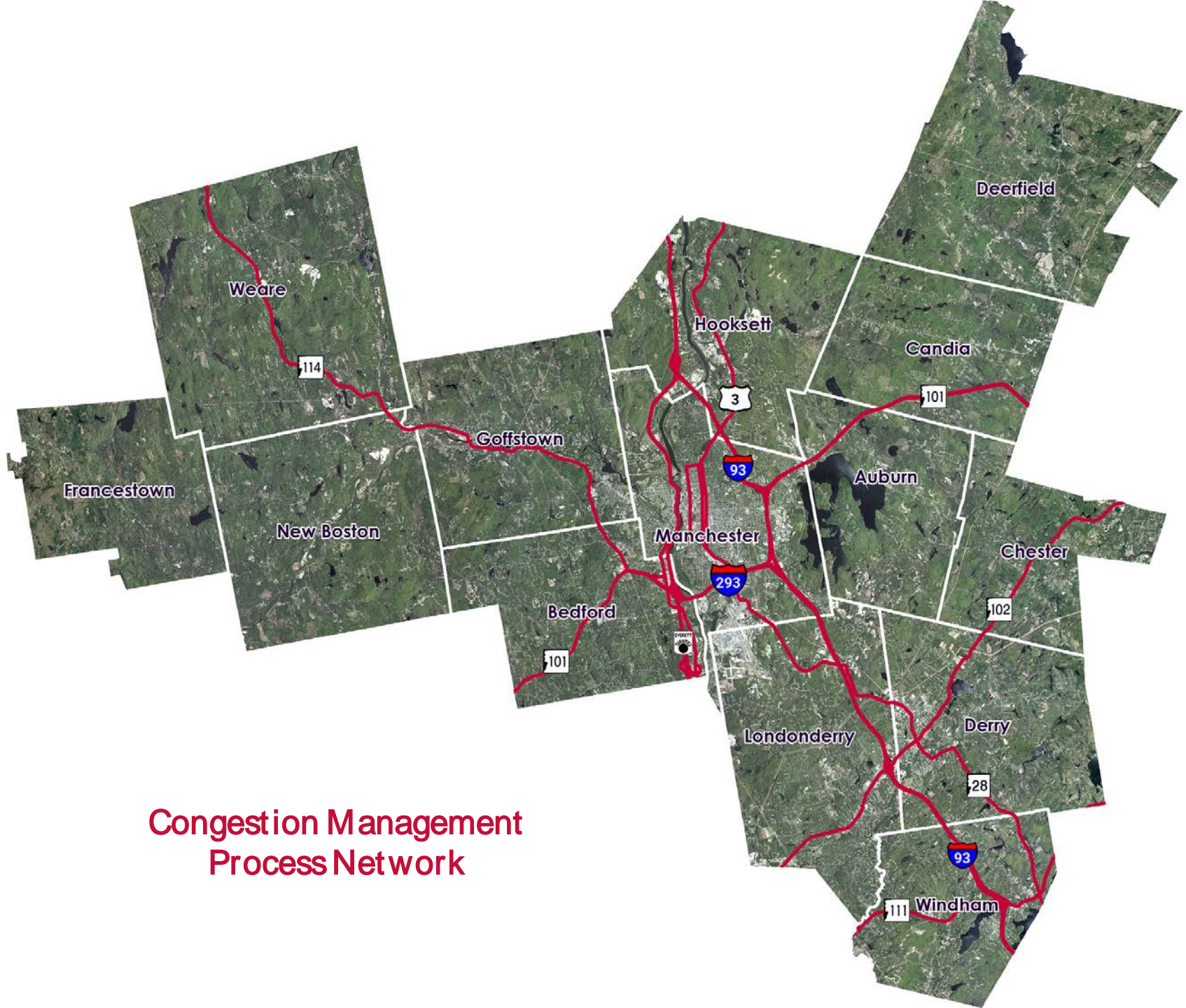
U.S. Department
of Transportation

**Federal Highway
Administration**

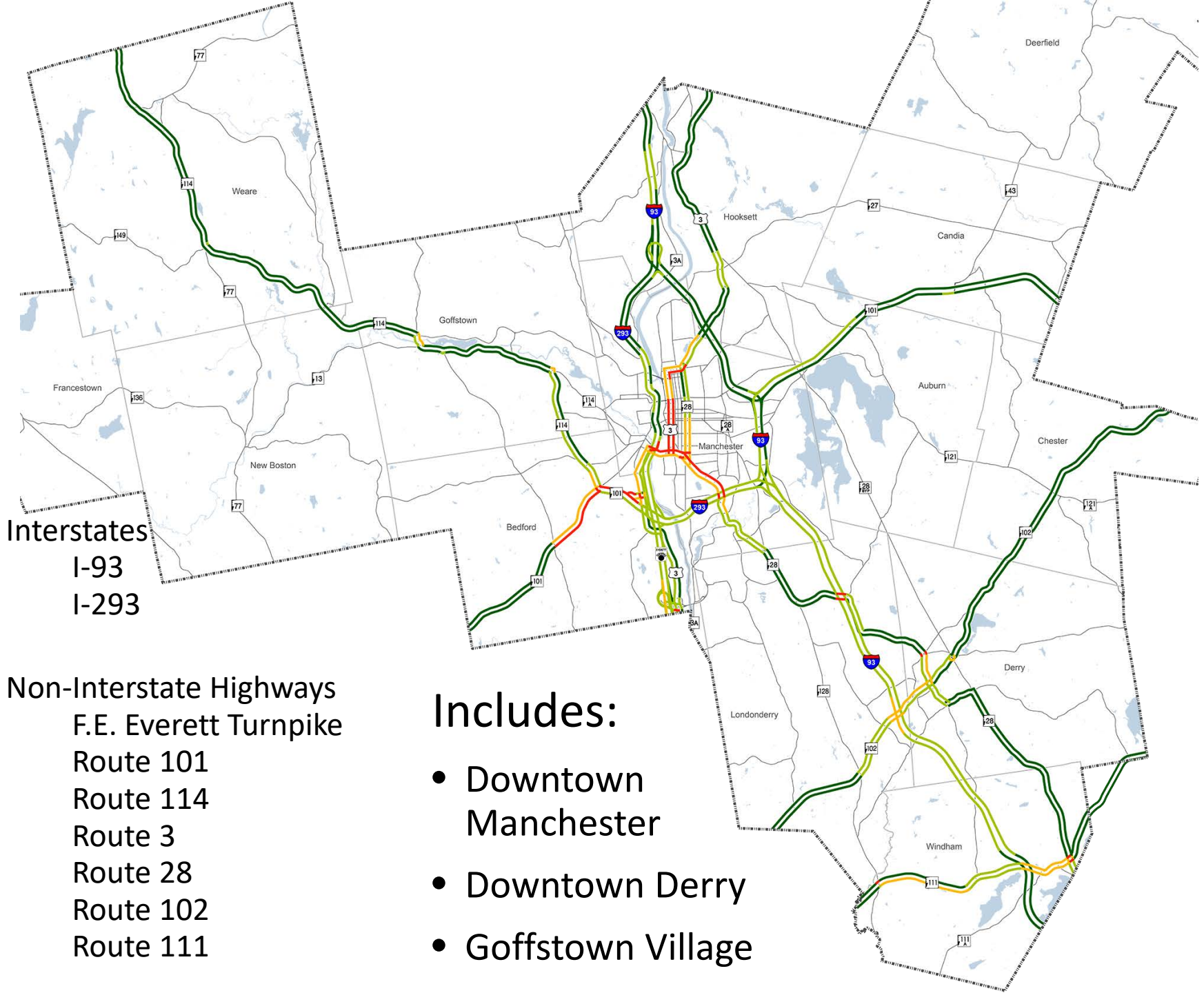
Why a Congestion Management Process

- CMPs objectives and strategies:
 - Identify congestion and its causes
 - Apply congestion mitigation strategies
 - to improve system performance and reliability
 - Evaluate effectiveness of implemented strategies





**Congestion Management
Process Network**



Refresher on the Travel Time Index (TTI)

SNHPC Regional Congestion Thresholds			
Amount of Congestion	Observed Speed	Average Free-flow-Speed	TTI
No Congestion	10 min.	10 min.	≤ 1
Mild Congestion	12.5 min.	10 min.	$>1 \leq 1.25$
Moderate Congestion	15 min.	10 min.	$>1.25 \leq 1.5$
Congestion	15 plus min.	10 min.	>1.5

- The **Travel Time Index** is the ratio of **travel time** in the peak period to the **travel time** at free-flow conditions.

i.e. A value of 1.5 indicates a 20 minute free-flow trip takes 30 minutes in the peak.

- **Speed and travel time data:**

Travel time and speed samples are available from data providers commercially-available probe vehicle speed and delay data.



Congestion Problems and Needs Analysis

What are the congestion problems in the region?

- Traffic volume, bottlenecks
- Peak travel a.m. & p.m.
- Seasonal
- Work Zones
- Incidents
- Traffic Control Devices
- Weather

Differ by corridor, facilities









CMP Strategies “Menu”

Roadway Management Strategies	
①	Traffic Signal Timing or Coordination Improvements
②	Traffic Signal Equipment Modernization
③	ITS- Traveler Information Devices
④	ITS- Communications Network and Roadway Monitoring
Transit and Travel Demand Management Strategies	
⑤	Parking Management
⑥	Dedicated Transit Lanes
⑦	Transit Service Expansion
⑧	Transit Signal Priority
⑨	Electronic Toll or Fare Collections
Physical Infrastructure Improvement Strategies	
⑩	Off-street Multi-use Path
⑪	On-street Bicycle Treatments
⑫	Park & Ride Facility
⑬	Access Management
⑭	Intersection/Interchange Reconfiguration or Improvements
⑮	Roundabout Conversion
⑯	Auxiliary/Acceleration/Deceleration Lanes or Ramp Improvements
⑰	New Grade-separated Intersections/Interchanges
⑱	New Travel Lanes
⑲	New Roadways
⑳	Engineering and/or Operations Study

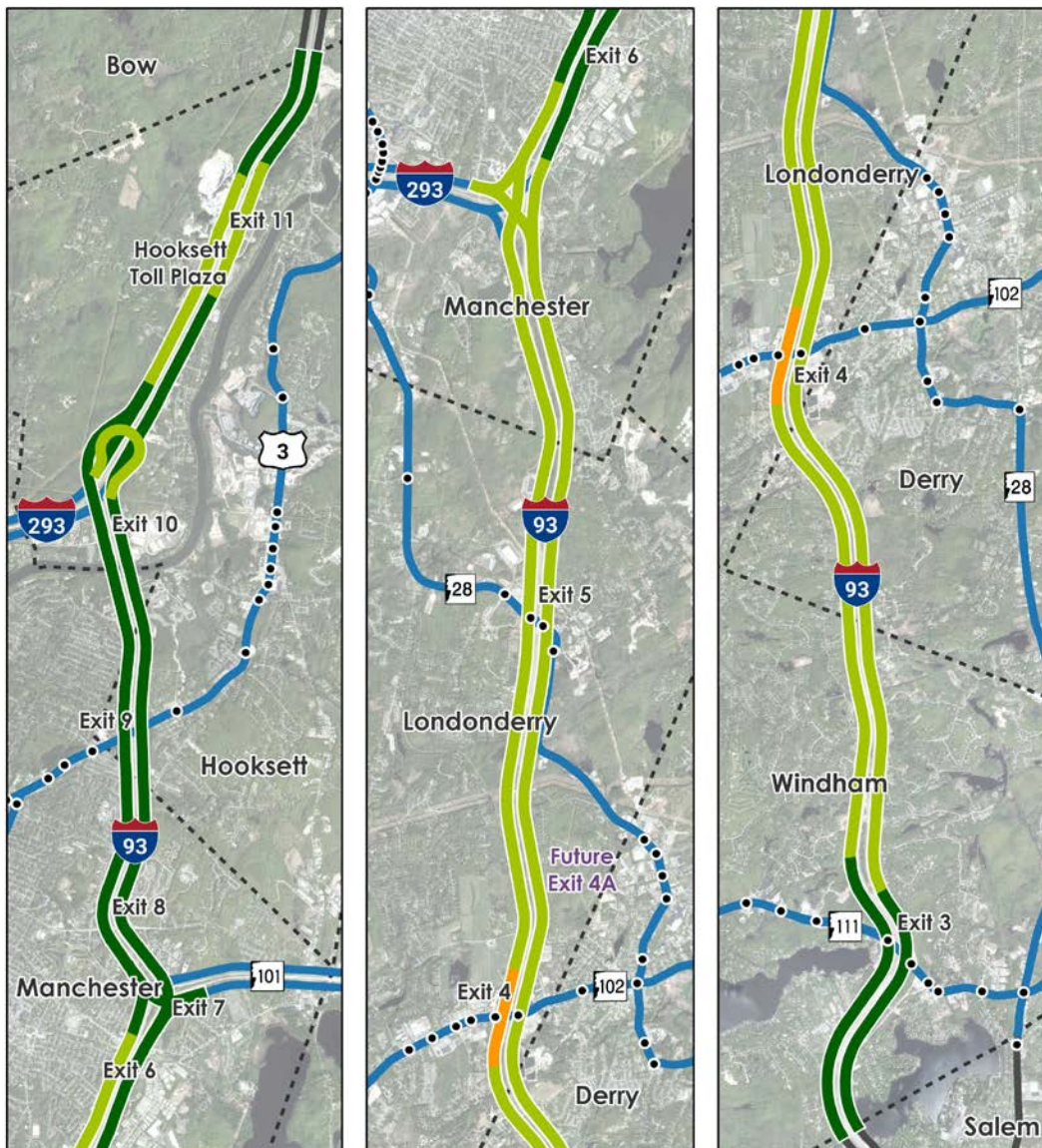
CMP Congestion Legend



-  No Congestion (1 or Less)
-  Minimal Congestion (1 to 1.25)
-  Moderate Congestion (1.25 to 1.5)
-  Congested (Greater than 1.5)
-  CMP Network
-  CMP Routes Outside Region
- Signalized Intersection

Interstate 93

AM Peak



Interstate 93 Travel Time Index Weekday AM Peak Period

Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for January 2018 through July 2019 from 6 a.m. to 9 a.m. Sources: CATT Lab; Google Maps; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.

- No Congestion (1 or Less)
- Minimal Congestion (1 to 1.25)
- Moderate Congestion (1.25 to 1.5)
- Congested (Greater than 1.5)
- CMP Network
- CMP Routes Outside Region
- Signalized Intersection

1 Mile



Interstate 93

PM Peak

Roadway Management Strategies:

• **Strategy 1 – Traffic Signal Timing or Coordination Improvements**

- Implement an adaptive signal control framework or other means of signal coordination at the I-93 Exit 8 ramp intersections at Wellington Road.

Transit and Travel Demand Management Strategies:

• **Strategy 7 - Transit Service Expansion**

- Implement the I-93 commuter transit service envisioned in the NHDOT Strategic Statewide Transit Assessment to Consider transitioning the Hooksett Toll Plaza to connect Tuscan Village in Salem to downtown Manchester via Exit 3 in Windham and Exit 4 in Londonderry.

• **Strategy 9- Electronic Toll or Fare Collections**

- All Electronic Tolling.

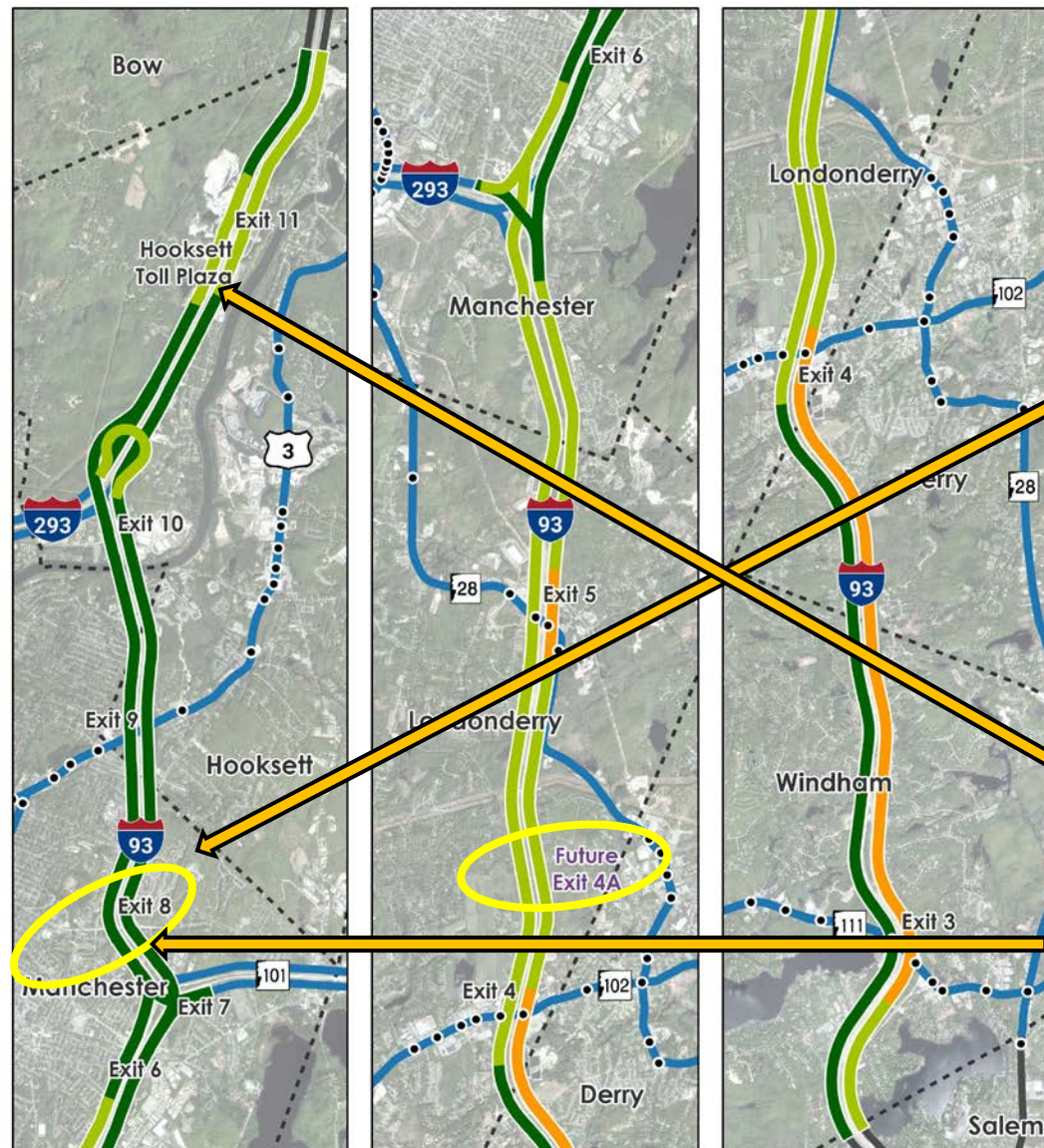
Physical Infrastructure Improvement Strategies:

• **Strategy 14 – Intersection/Interchange Reconfiguration or Improvements**

- Evaluate potential capacity improvements at the intersections of Wellington Road/I-93 NB Ramps and Wellington Road/I-93 SB Ramps in Manchester.

• **Strategy 17 – New Grade Separated Interchanges**

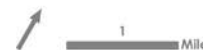
- Complete the construction of I-93 Exit 4A in Derry and Londonderry.



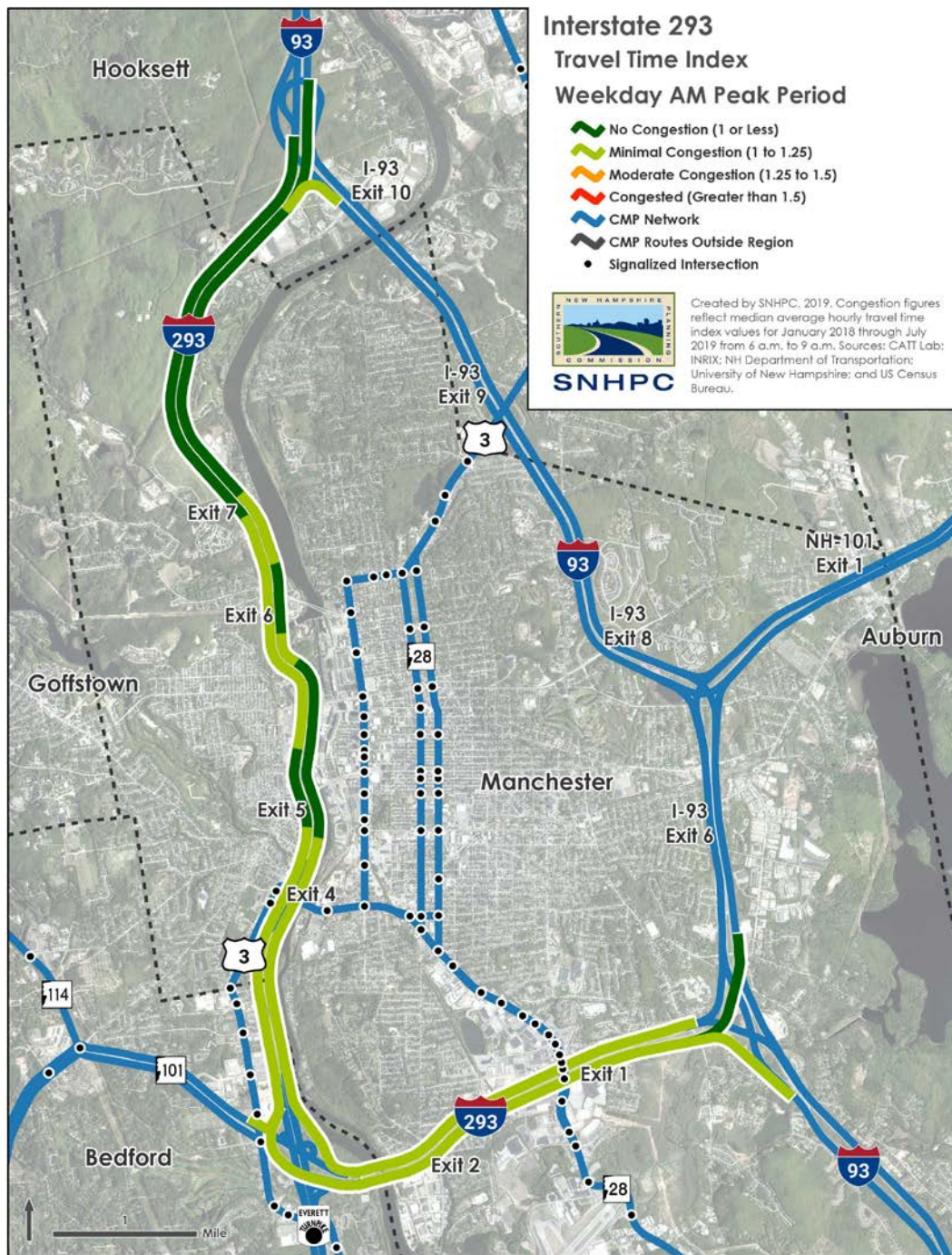
Interstate 93 Travel Time Index Weekday PM Peak Period

Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for January 2018 through July 2019 from 3 p.m. to 6 p.m. Sources: CATT Lab; Google Maps; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.

- No Congestion (1 or Less)
- Minimal Congestion (1 to 1.25)
- Moderate Congestion (1.25 to 1.5)
- Congested (Greater than 1.5)
- CMP Network
- CMP Routes Outside Region
- Signalized Intersection



SNHPC



Interstate 293

AM Peak

Interstate 293

PM Peak



Roadway Management Strategies:

- **Strategy 3 - Traveler Information Devices**
 - Continue to deploy ITS traveler information devices, including variable message boards that display live travel time, incident, and other information for traveler route decision making.

Transit and Travel Demand Management Strategies:

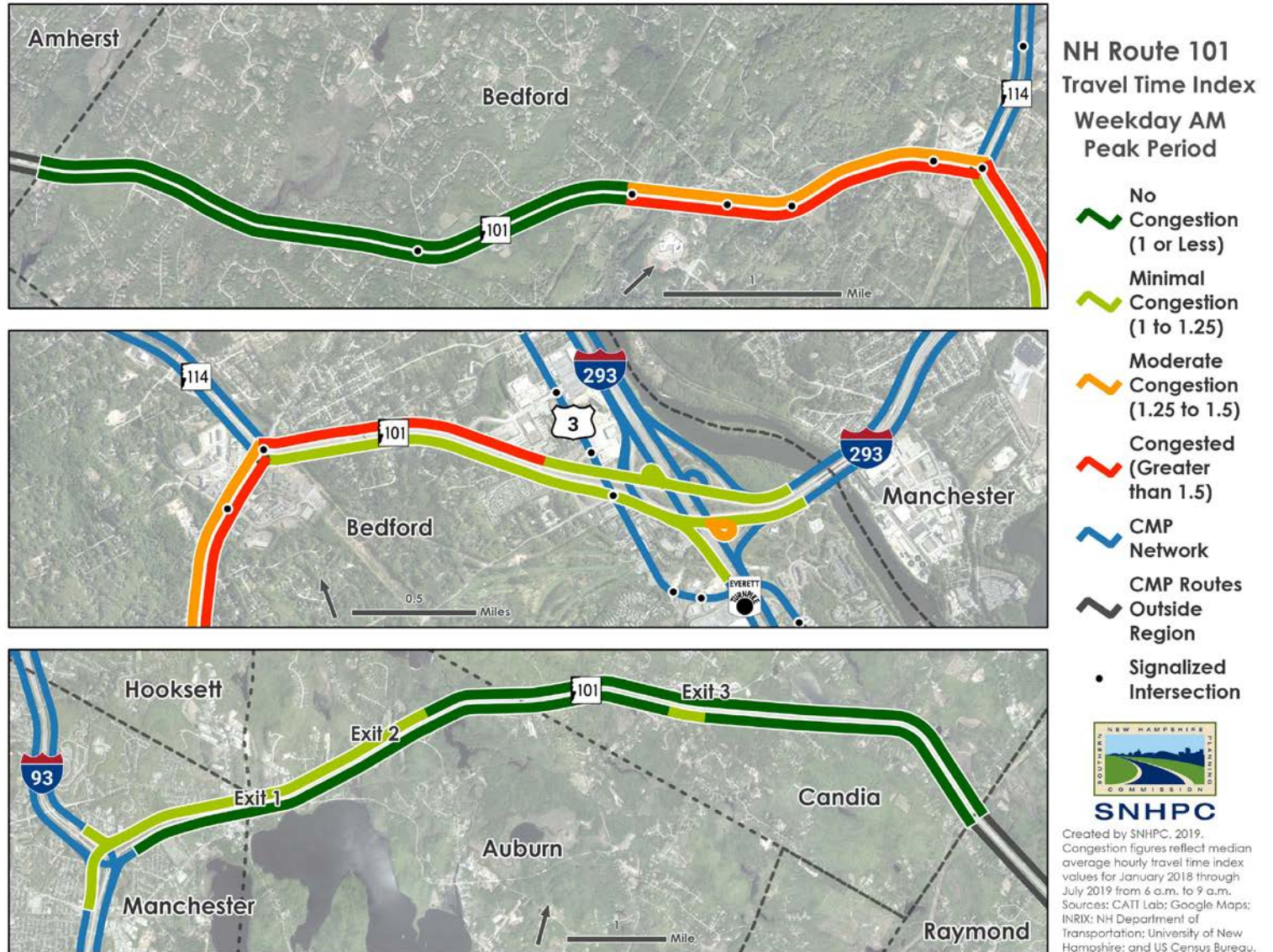
- **Strategy 7 - Transit Service Expansion**
 - Evaluate the feasibility of establishing commuter transit service to the Manchester Millyard from the I-293 corridor.

Physical Infrastructure Improvement Strategies:

- **Strategy 14 – Intersection/Interchange Reconfiguration or Improvements**
 - Construct the pending reconfiguration of I-293 Exit 6.
 - Reconfigure the interchange of I-293 Exit 4.
 - Reconfigure the interchange of I-293/NH Route 101/F.E. Everett Turnpike.
- **Strategy 17 – New Grade Separated Interchanges**
 - Complete construction on the pending I-293 Exit 7 interchange relocation.
- **Strategy 20 - Engineering and/or Operations Study**
 - Support an engineering study of Second Street and the I-293 corridor from Exit 5 to the I-293/NH Route 101/F.E. Everett Turnpike interchange to consider mainline expansion to 3 lanes and evaluate alternatives for the reconfiguration of both I-293 Exit 4 and the I-293/NH Route 101/F.E. Everett Turnpike interchange.

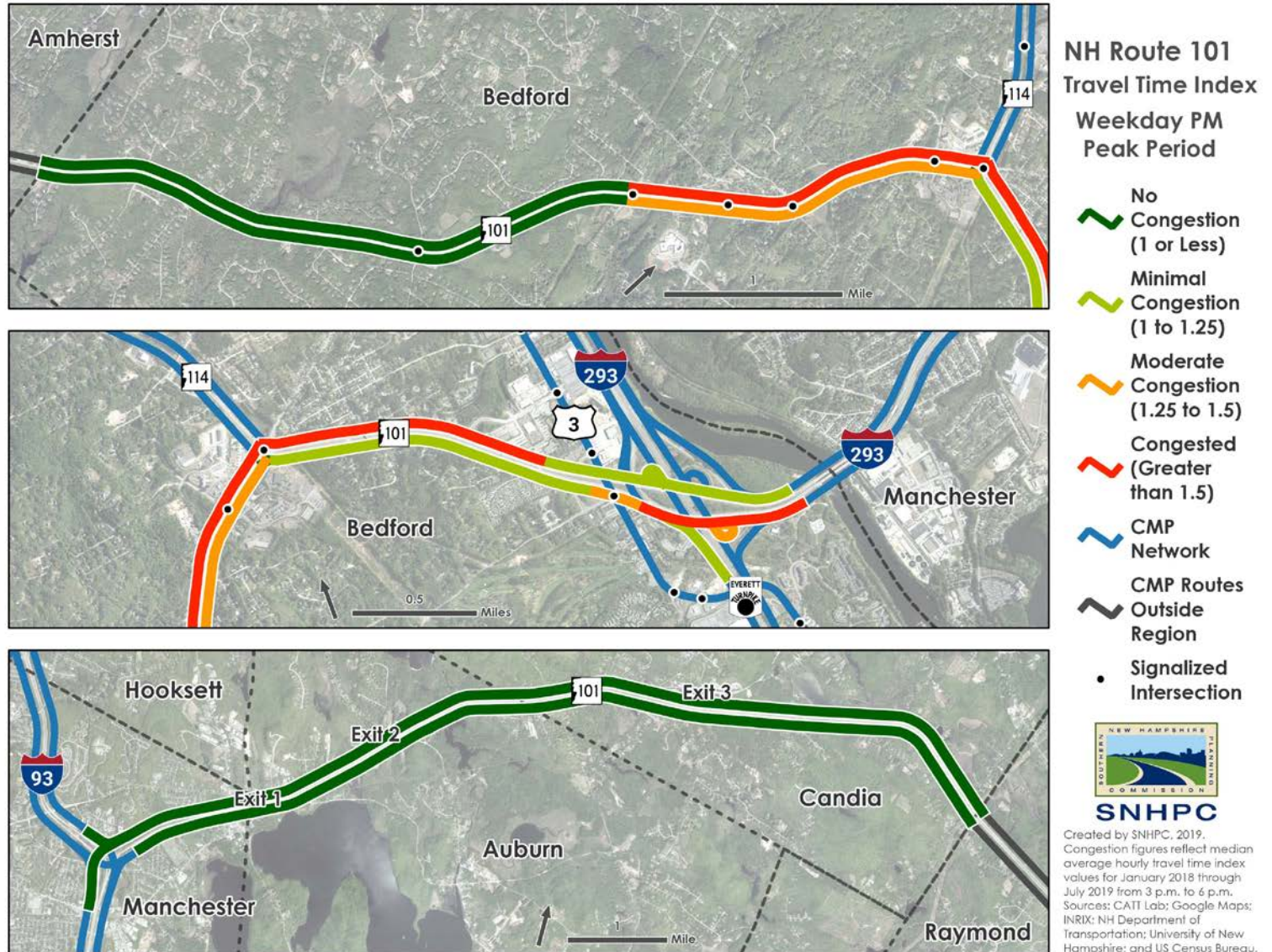
NH Route 101

AM Peak



NH Route 101

PM Peak



Roadway Management Strategies:

- **Strategy 1 – Traffic Signal Timing or Coordination Improvements**
 - Evaluate the feasibility of implementing an adaptive signal control system at the intersection of NH Route 101/NH Route 114/Boynton Street and adjacent signalized intersections.

Transit and Travel Demand Management Strategies:

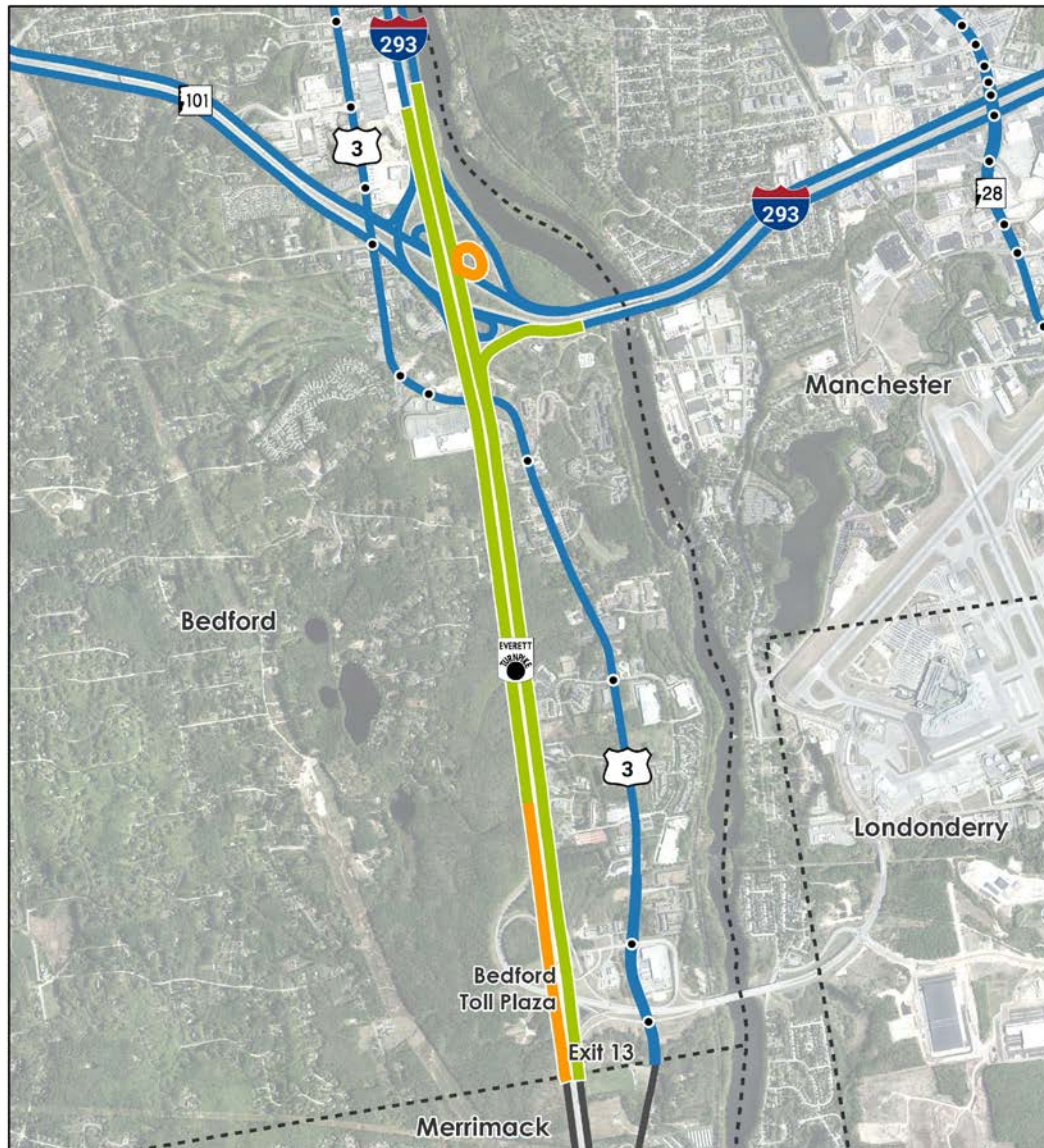
- **Strategy 7 - Transit Service Expansion**
 - Implement the NH Route 101 commuter transit service envisioned in the NHDOT Strategic Statewide Transit Assessment to connect Portsmouth with Manchester, including connections to the Portsmouth Transportation Center and park-and-ride facilities in Hampton, Epping, and Raymond.

Physical Infrastructure Improvement Strategies:

- **Strategy 18 – New Travel Lanes**
 - Complete a capacity expansion of NH Route 101 from Wallace Road to the Amherst Town Line.
- **Strategy 20 - Engineering and/or Operations Study**
 - Support an engineering study that would consider grade-separated design alternatives at the intersection of NH Route 101/NH Route 114/Boynton Street in Bedford.
 - Support an engineering study of Second Street and the I-293 corridor from Exit 5 to the I-293/NH Route 101/F.E. Everett Turnpike interchange which would, in part, evaluate alternatives for the reconfiguration of the I-293/NH Route 101/F.E. Everett Turnpike interchange.

F.E. Everett Turnpike

AM Peak



F. E. Everett Turnpike Travel Time Index Weekday AM Peak Period

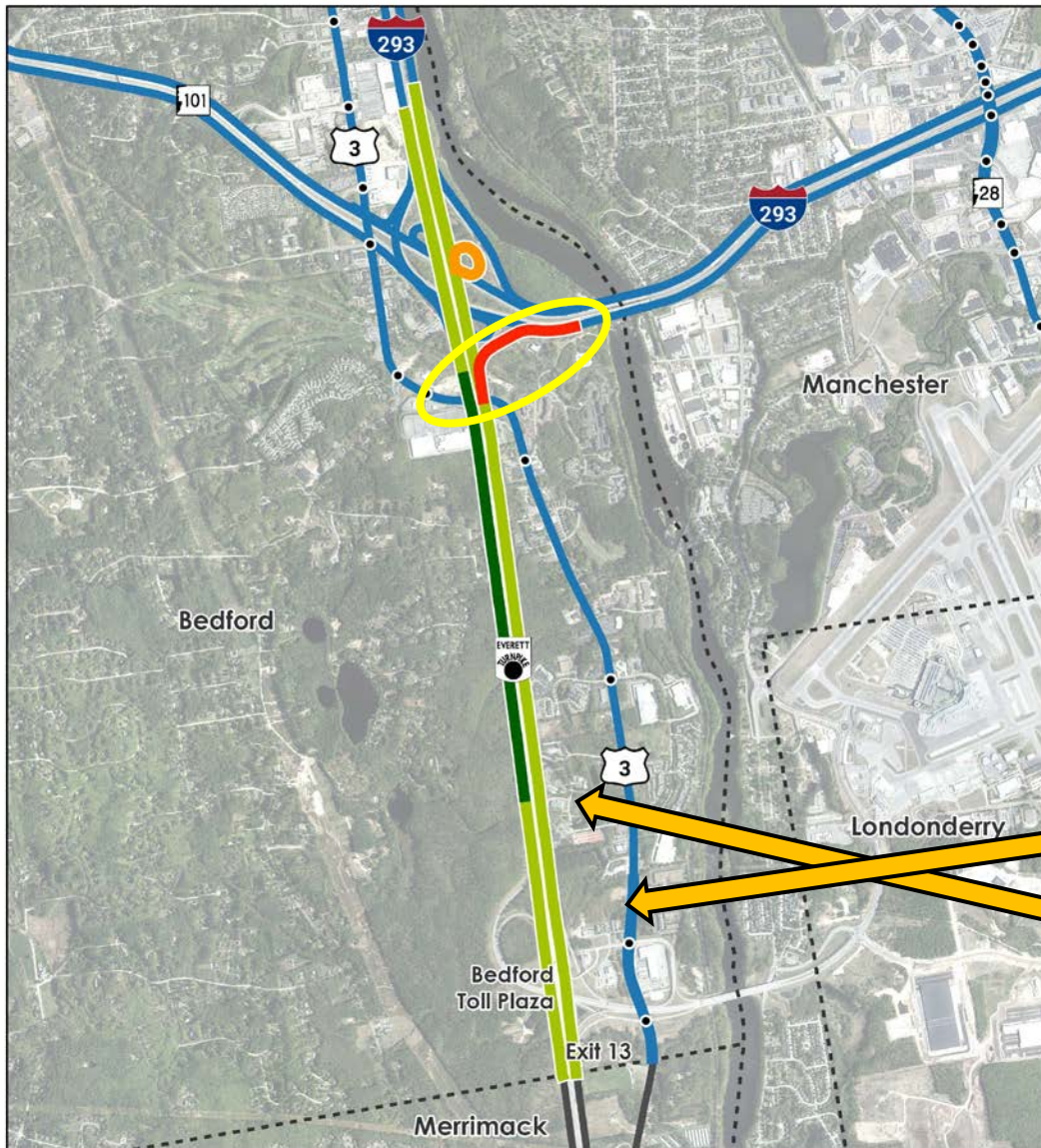
Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for January 2018 through July 2019 from 6 a.m. to 9 a.m. Sources: CATT Lab; Google Maps; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.

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- Minimal Congestion (1 to 1.25)
- Moderate Congestion (1.25 to 1.5)
- Congested (Greater than 1.5)
- CMP Network
- CMP Routes Outside Region
- Signalized Intersection



F.E. Everett Turnpike

PM Peak



Roadway Management Strategies:

- **Strategy 3 - Traveler Information Devices**

- Continue to deploy ITS traveler information devices, including variable message boards that display live travel time, incident, and other information for traveler route decision making.

Transit and Travel Demand Management Strategies:

- **Strategy 9- Electronic Toll or Fare Collections**

- Implement All Electronic Tolling at the Bedford Toll Plaza.

Physical Infrastructure Improvement Strategies:

- **Strategy 18 – New Travel Lanes**

- Complete construction of F.E. Everett Turnpike mainline expansion to three lanes in each direction from Exit 8 Nashua to the I-293/NH Route 101/F.E. Everett Turnpike interchange.

F. E. Everett Turnpike Travel Time Index Weekday PM Peak Period

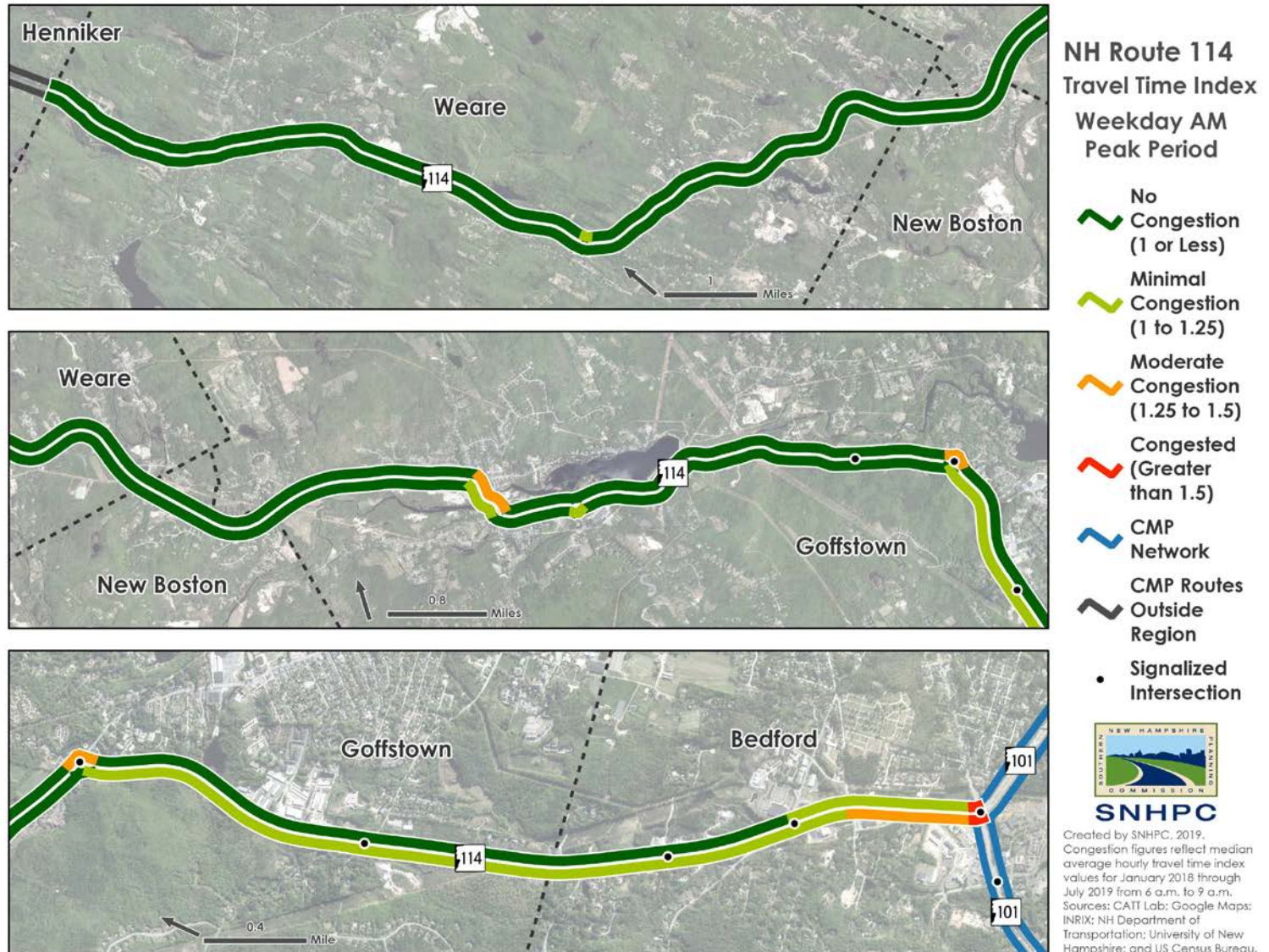
Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for January 2018 through July 2019 from 3 p.m. to 6 p.m. Sources: CATT Lab; Google Maps; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.

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- Signalized Intersection



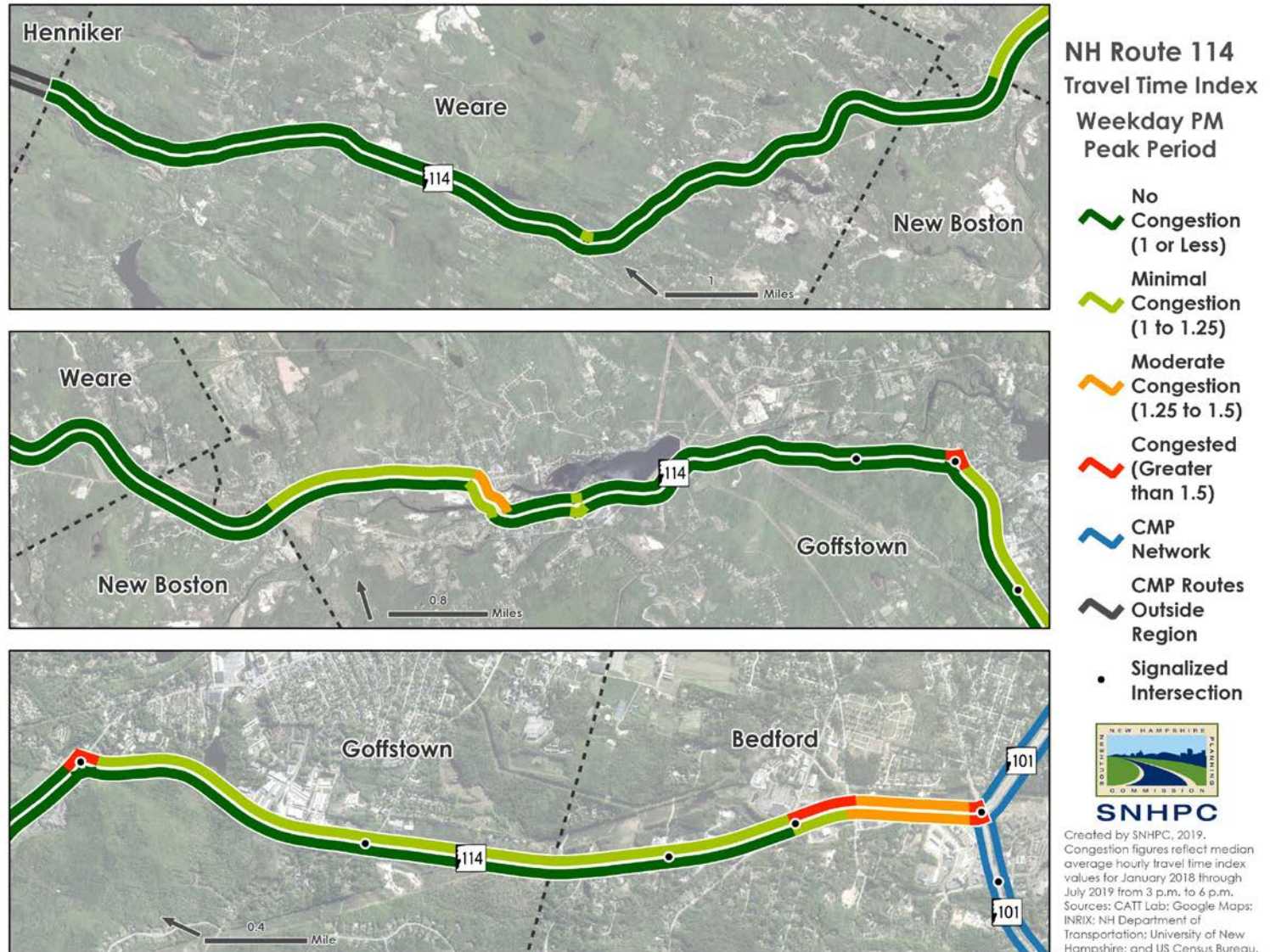
NH Route 114

AM Peak



NH Route 114

PM Peak



Roadway Management Strategies:

- **Strategy 1 – Traffic Signal Timing or Coordination Improvements**
 - Evaluate the feasibility of implementing an adaptive signal control system at the intersection of NH Route 101/NH Route 114/Boynton Street and adjacent signalized intersections on NH Route 114 in Bedford.

Transit and Travel Demand Management Strategies:

- **Strategy 7 - Transit Service Expansion**
 - Extend commuter bus service along the NH Route 114 corridor linking Weare and Goffstown to Bedford and Manchester.
- **Strategy 12- Park & Ride Facility**
 - Identify potential park-and-ride facility locations on the NH Route 114 corridor and study the feasibility of developing lots with access to the trail network and potential commuter bus stop locations.

Physical Infrastructure Improvement Strategies:

- **Strategy 20 - Engineering and/or Operations Study**
 - Complete the pending corridor study of NH Route 114 from NH Route 101 in Bedford to Henry Bridge Road in Goffstown to identify potential operational and capacity improvements.
 - Support an engineering study that would consider grade-separated design alternatives at the intersection of NH Route 101/NH Route 114/Boynton Street in Bedford.

US Route 3

AM Peak



US Route 3 Travel Time Index Weekday AM Peak Period

Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for January 2018 through July 2019 from 6 a.m. to 9 a.m. Sources: CATT Lab; Google Maps; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.

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- Minimal Congestion (1 to 1.25)
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- Congested (Greater than 1.5)
- CMP Network
- CMP Routes Outside Region
- Signalized Intersection



US Route 3

PM Peak

Active Roadway Management:

- **Strategy 1: Expanded Traffic Signal Timing and Coordination** – Upgrade signals and controllers and consider signal improvements for pedestrian and bicycle traffic.

Travel Demand Management:

- **Strategy 10: Transit Signal Priority** – Enable buses to extend “green time” to stay on schedule. More dependable departure and arrival times increases bus ridership utilization by riders

Physical Roadway Capacity:

- **Strategy 11: On-street Bicycle Treatments** – Study and implement bicycling facilities to encourage mode shift for trips into downtown Manchester.
- **Strategy 14: Intersection Turn Lanes** – Provide overhead signage and more distinct turn-lane markings at intersections.



US Route 3
Travel Time Index
Weekday PM Peak Period

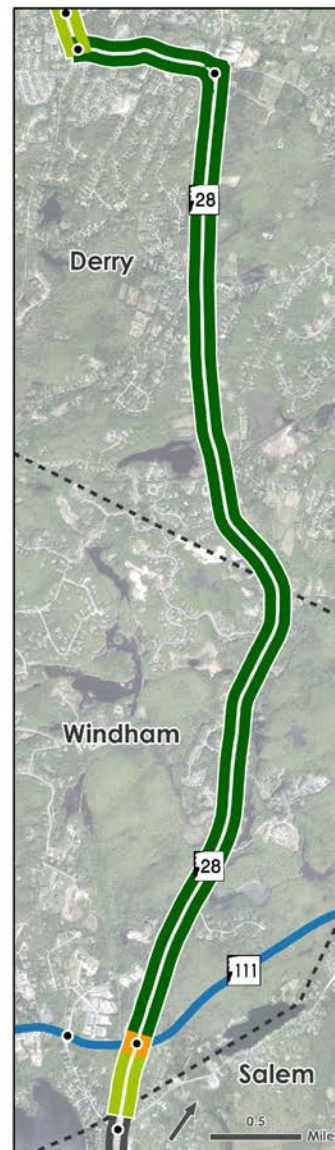
Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for January 2018 through July 2019 from 3 p.m. to 6 p.m. Sources: CATT Lab; Google Maps; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.

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- CMP Network
- CMP Routes Outside Region
- Signalized Intersection



NH Route 28

AM Peak



NH Route 28 Travel Time Index Weekday AM Peak Period

Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for January 2018 through July 2019 from 6 a.m. to 9 a.m. Sources: CATT Lab; Google Maps; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.

- No Congestion (1 or Less)
- Minimal Congestion (1 to 1.25)
- Moderate Congestion (1.25 to 1.5)
- Congested (Greater than 1.5)
- CMP Network
- CMP Routes Outside Region
- Signalized Intersection



NH Route 28

PM Peak

Strategies:

Active Roadway Management:

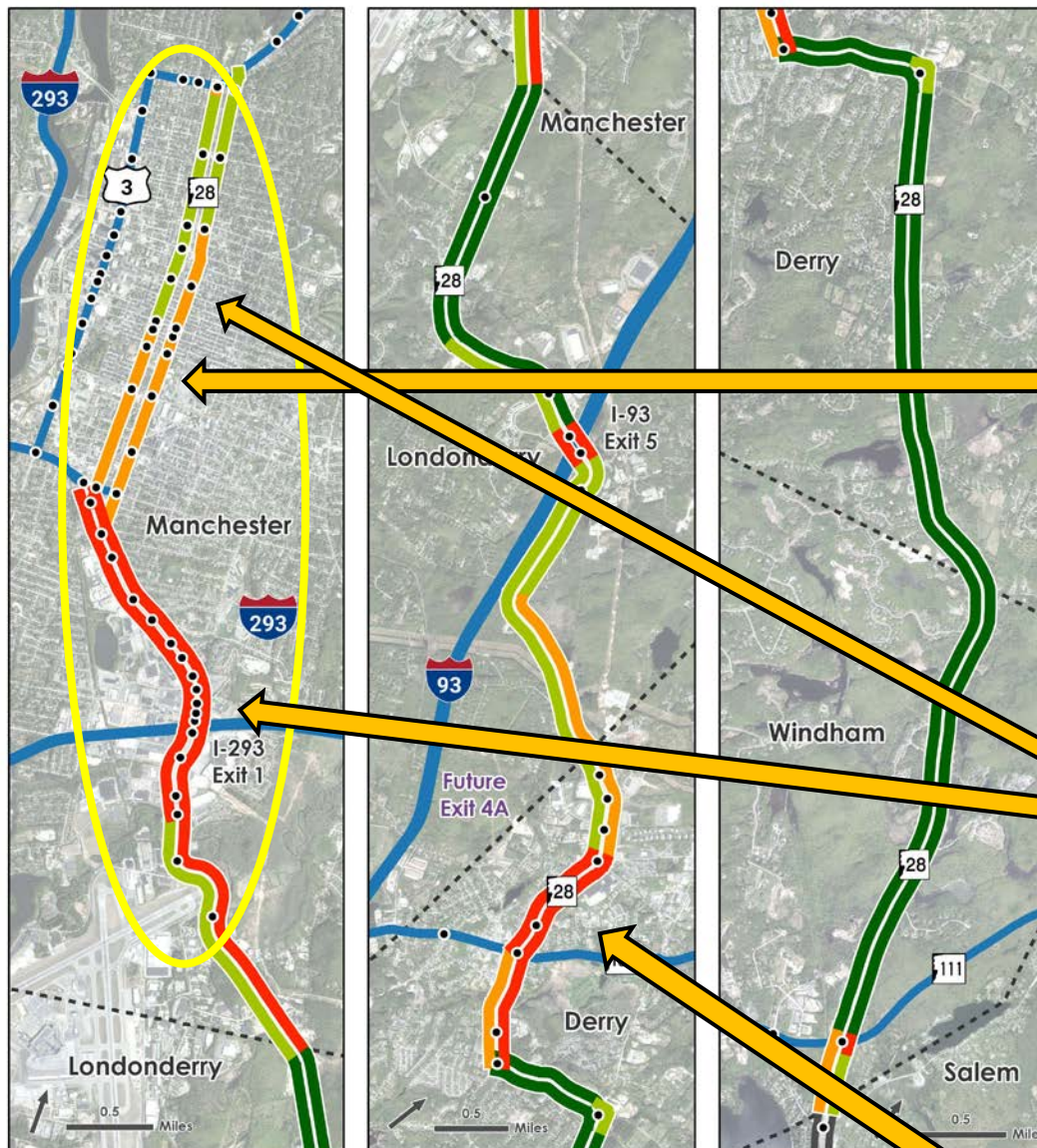
- **Strategy 2- Traffic Signal Equipment Modernization - ITS**– Upgrade signal transit, pedestrian, and bicyclist capabilities, add bus transit priority, and coordinated crosswalk phases.
- **Strategy 5- Access Management** – At the intersection of Hooksett Road (Route 3), Beech Street and Webster Street, there are opportunities to consolidate or eliminate some curb-cuts near the traffic signal.

Travel Demand Management:

- **Strategy 10- Transit Signal Priority** – There are 14 signals along these segments which are close to each other and could improve bus transit on-time performance. Transit signal priority equipment would assist in keeping buses on time.
- **Strategy 13- On-street Bicycle Facilities**– Provide appropriate on-street bicycle markings (protected or unprotected lanes; shared lane markings, etc.) to encourage and provide a sanctioned route for bicyclists.

Physical Roadway Capacity:

- **Strategy 22- New Roadways**– Implement the Exit 4A recommendations that impact this intersection.



NH Route 28
Travel Time Index
Weekday PM Peak Period

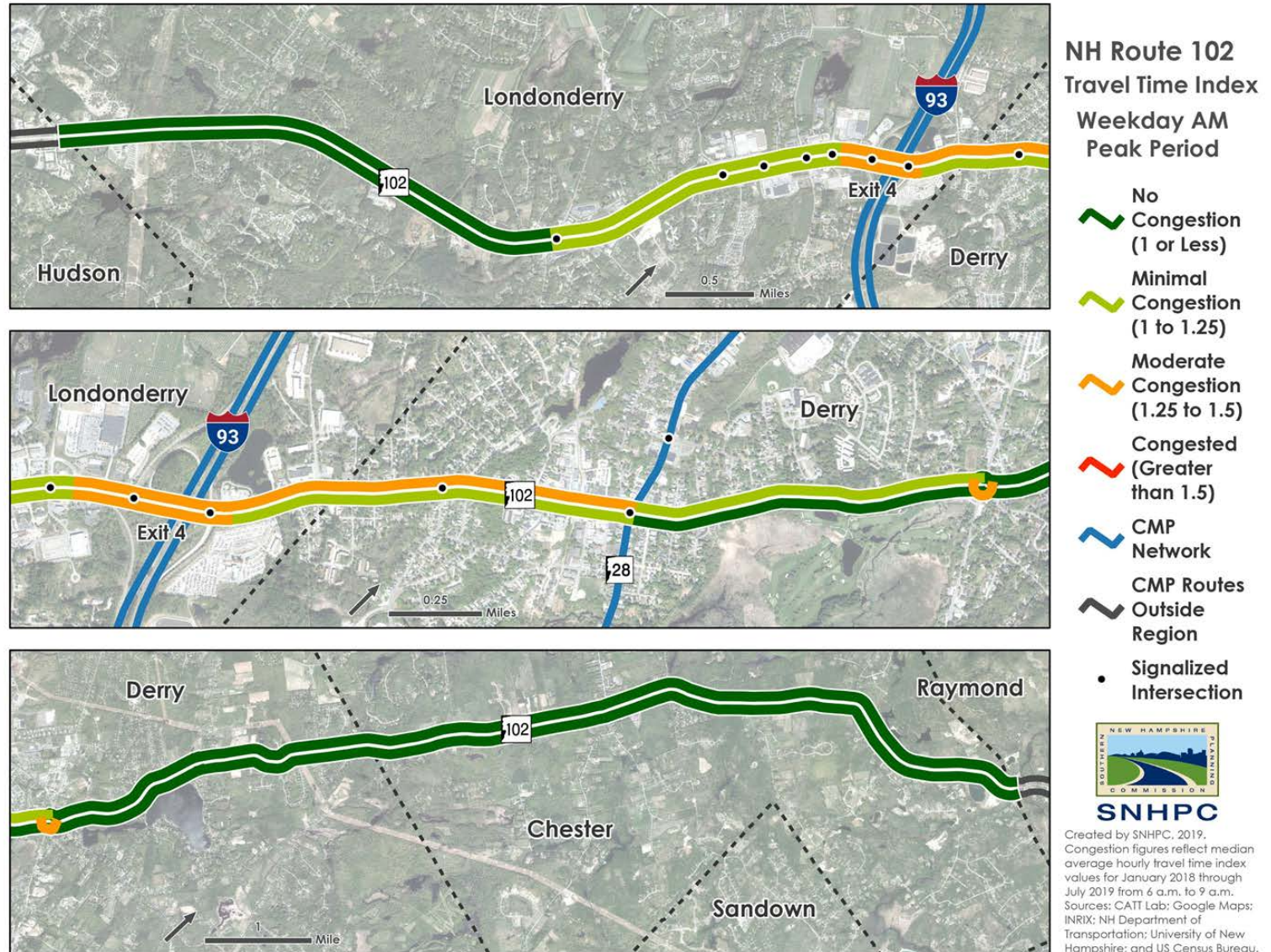
Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for January 2018 through July 2019 from 3 p.m. to 6 p.m. Sources: CATT Lab; Google Maps; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.

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- CMP Routes Outside Region
- Signalized Intersection



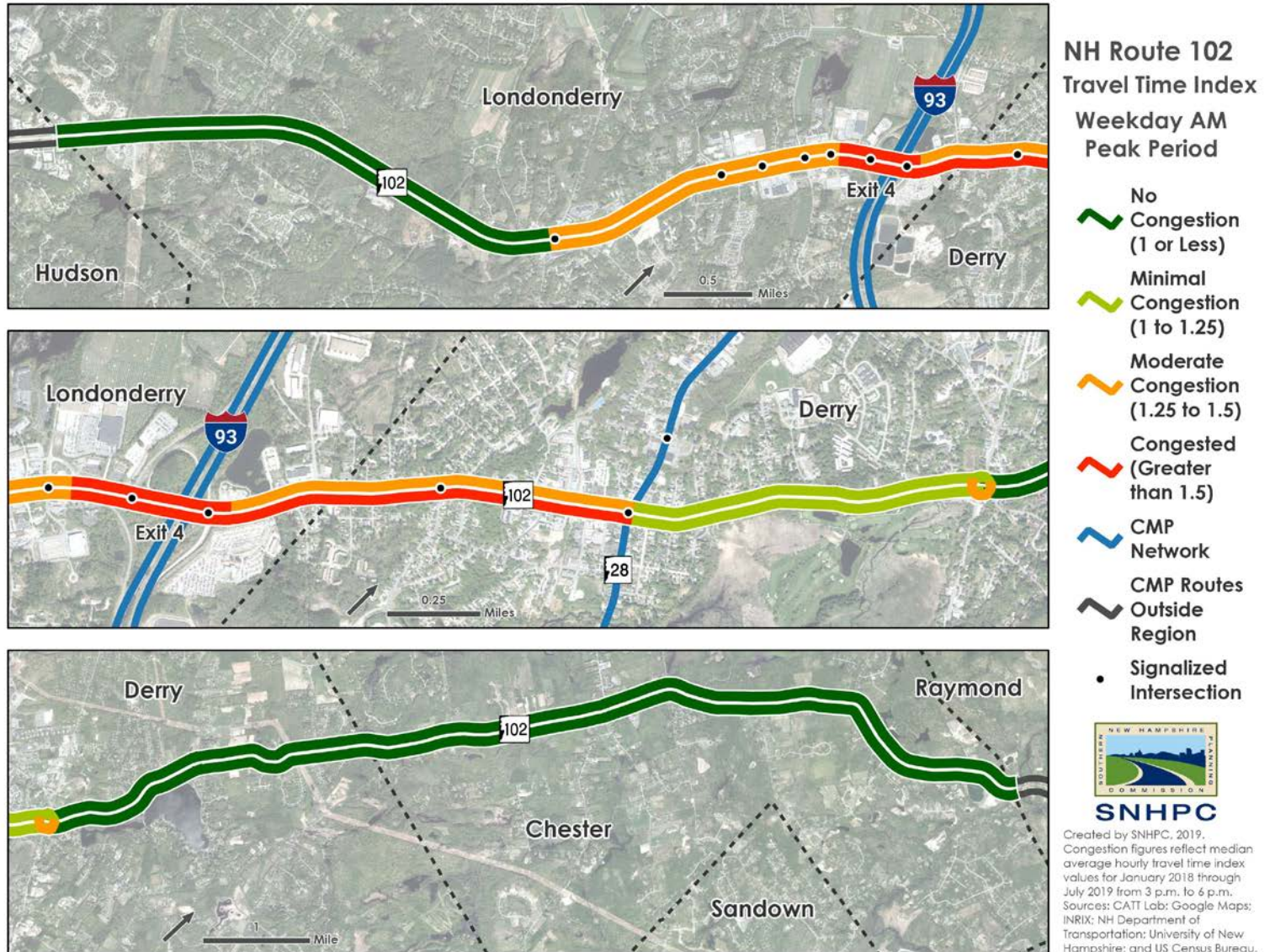
NH Route 102

AM Peak



NH Route 102

PM Peak



Strategies:

Roadway Management Strategies:

- **Strategy 1 – Traffic Signal Timing or Coordination Improvements**
 - Evaluate the feasibility of implementing an adaptive signal control system or signal performance measures on NH Route 102 from I-93 Exit 4 to NH Route 128.

Transit and Travel Demand Management Strategies:

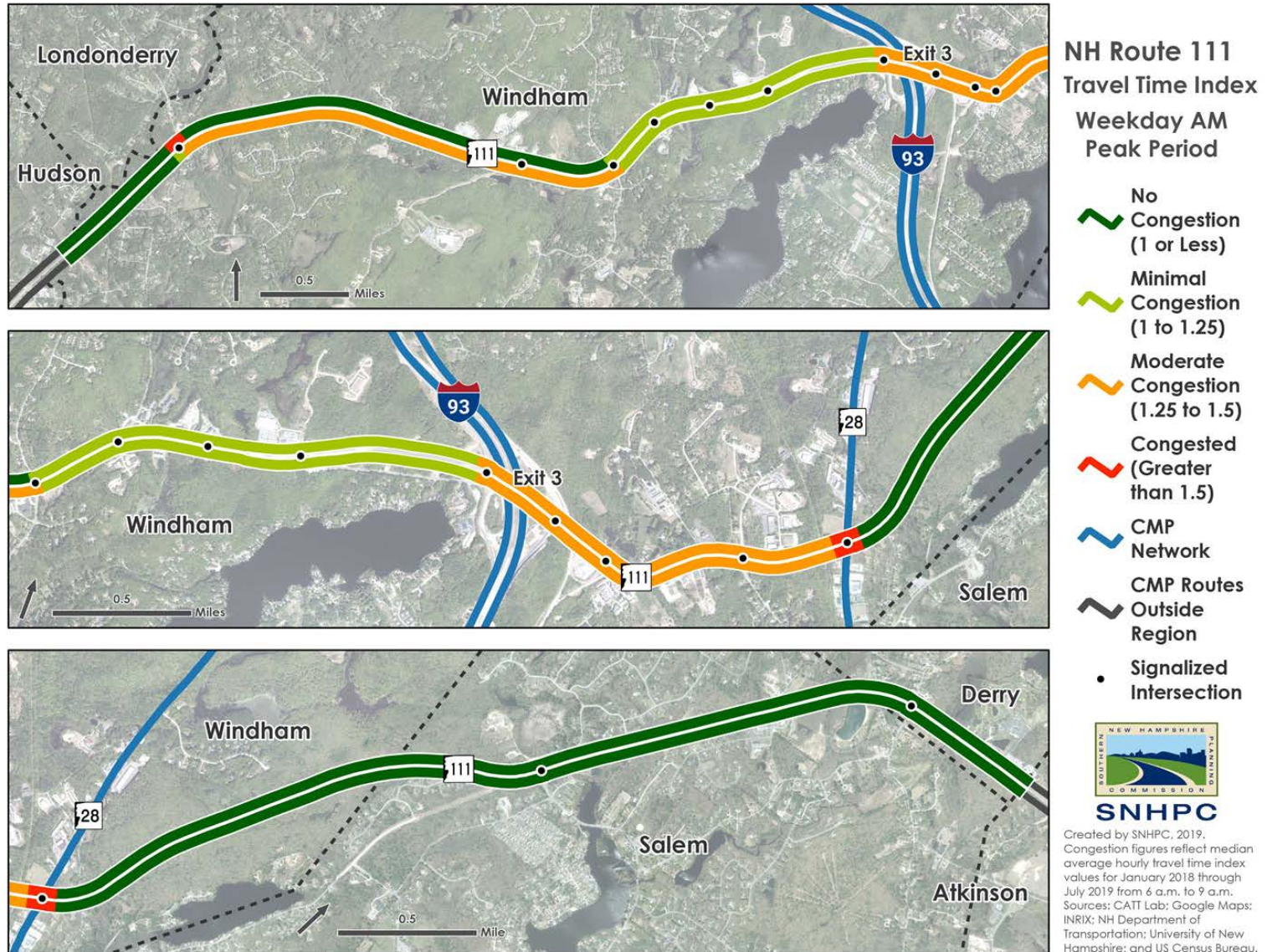
- **Strategy 7 - Transit Service Expansion**
 - Implement the I-93 commuter transit service envisioned in the NHDOT Strategic Statewide Transit Assessment to connect Tuscan Village in Salem to downtown Manchester via Exit 3 in Windham and Exit 4 in Londonderry, as this service could help to mitigate congestion in the vicinity of NH Route 102/I-93 Exit 4.

Physical Infrastructure Improvement Strategies:

- **Strategy 11- On-street Bicycle Treatments**
 - Improve on-street bicycle treatments on NH Route 102 in downtown Derry, including considering bicycle lanes and adding bicycle racks.
- **Strategy 18 – New Travel Lanes**
 - Add travel lanes on NH Route 102 from I-93 Exit 4 to NH Route 128.

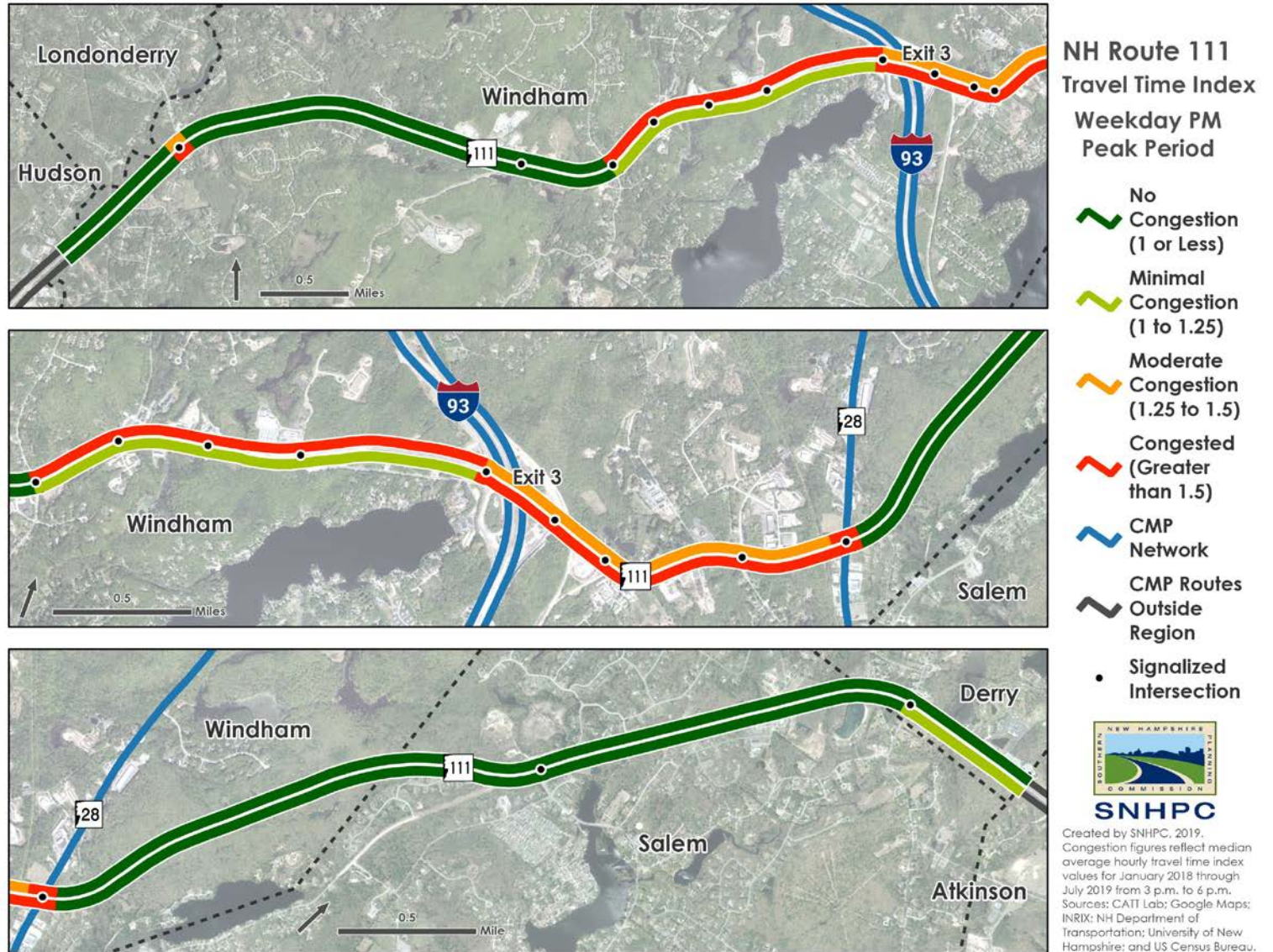
NH Route 111

AM Peak



NH Route 111

PM Peak



Strategies:

Roadway Management Strategies:

- **Strategy 1 – Traffic Signal Timing or Coordination Improvements**
 - Evaluate the feasibility of implementing an adaptive signal control system or signal performance measures from the NH Route 111/NH Route 28 intersection to the I-93 Exit 3 Interchange.

Transit and Travel Demand Management Strategies:

- **Strategy 7 - Transit Service Expansion**
 - Develop transit service along the NH Route 111 corridor linking Salem and Nashua via the Town of Windham as identified in the NHDOT Strategic Statewide Transit Assessment.

Physical Infrastructure Improvement Strategies:

- **Strategy 15 – Roundabout Conversion**
 - Convert the intersections of NH Route 111/Wall Street, NH Route 111/Windham Village Green, NH Route 111/North Lowell Road, and NH Route 111/Hardwood Road to roundabouts.
- **Strategy 18 – New Travel Lanes**
 - Add travel lanes on NH Route 111 from I-93 Exit 3 through the intersection of NH Route 111/Hardwood Road.

Congestion Management Process Strategies

Discussion and Questions



Carl Eppich, AICP
ceppich@snhpc.org



Regional Objectives for CMP

Aligned with the Regional Transportation Plan

Highways

Examples:

- To contribute to the development of an accessible and efficient system of streets and highways that provides travel choices ... throughout the region and incorporates a Complete Streets approach where applicable.
- To develop and annually update travel time index (TTI) data for each corridor in the CMP network for at least one [or the two] peak period[s].
- To improve air quality and energy conservation by reducing single-occupancy vehicle congestion and using alternatively fueled low or no-emissions vehicles.
- Ridesharing, telecommuting, and Transportation Demand Management (TDM) techniques and policies to reduce congestion, peak hour demand, and single-occupancy vehicles



Regional Objectives for CMP

Aligned with the Regional Transportation Plan

Bicycles and Pedestrians

Examples:

- To encourage the use of alternative modes of transportation such as walking and cycling through participation in a planning process that supports the development of a multi-modal transportation system for the region.
- To ensure that pedestrian and bicycle transportation components are properly incorporated into the design of transportation infrastructure improvements.



Regional Objectives for CMP

Aligned with the Regional Transportation Plan

Transit

Examples:

- To assist and encourage member communities in the pursuit of opportunities for transit-oriented development and other practices encouraging transit use.
- Provide increased availability of public transportation.
- To facilitate and promote the expansion of passenger and freight rail transportation in the SNHPC region by maintaining a multi-modal planning approach.



CMP Network

Interstates

I-93

I-293

Non-Interstate Highways

F.E. Everett Turnpike

Route 101

Route 114

Route 3

Route 28

Route 102

Route 111

Includes:

- Downtown Manchester
- Downtown Derry
- Goffstown Village



Multimodal CMP Performance Measures

Objective:

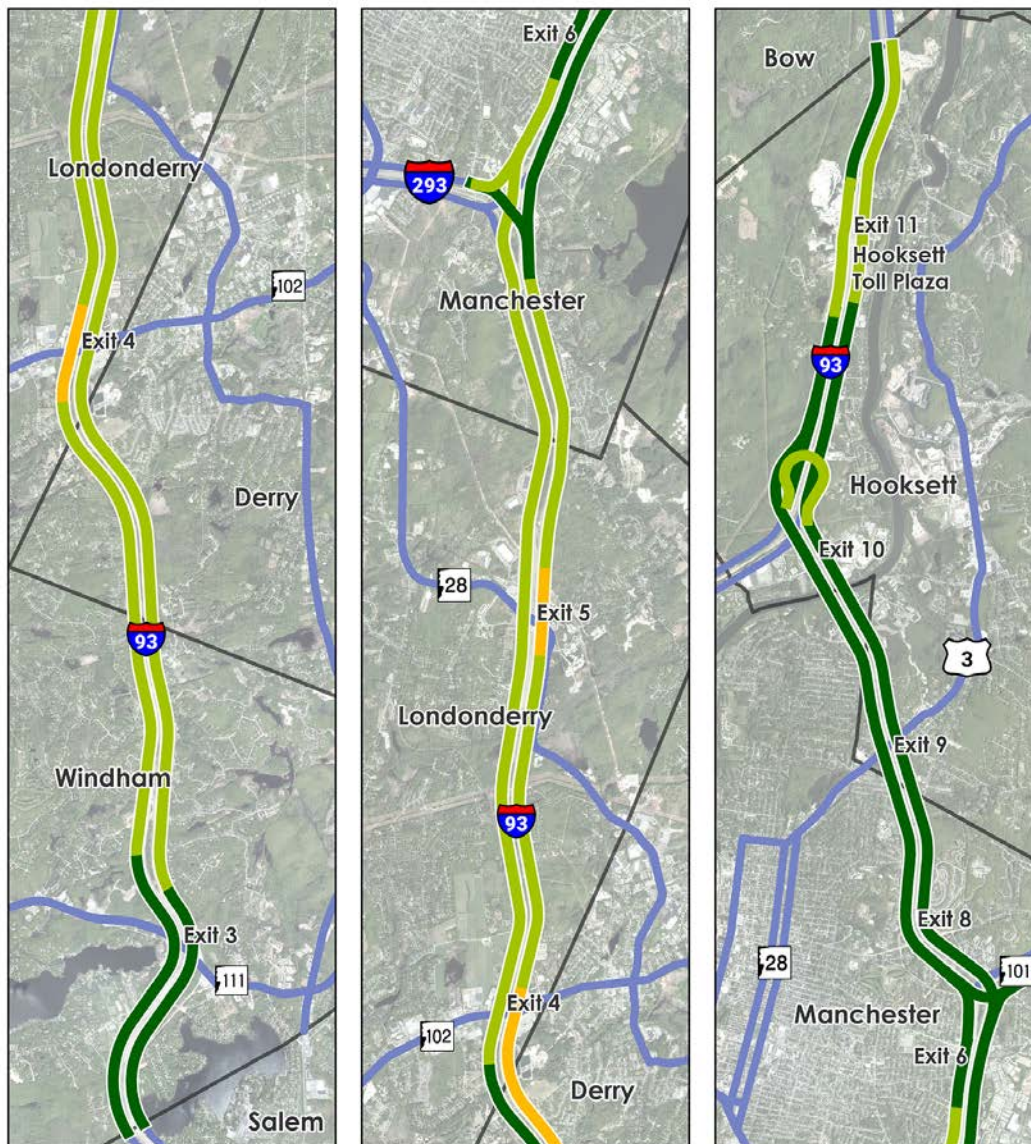
Reduce recurring congestion on interstates, and other major highways and arteries.

- Travel Time Index
 - e.g. Travel Time reliability
 - e.g. Person hours of delay by mode
 - e.g. Freight delivery reliability

Others(future)

e.g. Transit: on-time reliability





Interstate 93 **Travel Time Index** **Weekdays 3-6 pm**

Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for peak periods from January 2018 through July 2019. Sources: Calf Lab; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.

- No Congestion (1 or Less)
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- Moderate Congestion (1.25 to 1.5)
- Congested (Greater than 1.5)
- CMP Network



SNHPC CMP Network

Morning TTI

<https://arcg.is/u5SPz>

Evening TTI

<https://arcg.is/0DSGvr>

Example CMP Strategies

Example CMP Strategies		
Improvement Type		
Travel Demand Management	Travel Alternatives	Non-single occupancy vehicle incentives, telecommuting, alternate work schedules
	Land Use	Smart growth, Transit Oriented Development, parking strategies
	Pricing	High Occupancy Toll Lanes, pricing for time of day, activity centers, parking
	HOV	Rideshare matching, van pools, guaranteed ride home
	Transit	Subsidized fares, trip itinerary planning
	Bicycles & Pedestrians	Bike share networks, seamless transit connections, bike parking and lockers
	Freight	Truck only lanes, delivery restrictions
Operational Improvements	Arterial	Information systems, signal management, adaptive control, and timing
	Interstate Highway	Open roll tolling, information systems, incident management, work zone management, ITS, managed lanes, variable speed limits, ramp metering & closures.
	Transit	Automatic Vehicle Location (AVL), signal priority, que jumping/bypasses, express service, variable message signs
	Bicycles & Pedestrians	Bikes on board, lifts, advance green signal priority,
	Freight	Automatic Vehicle Location (AVL), roadside electronic screening, passing rail sidings
Additional Capacity	Highway	Widened or new roads/lanes, toll roads and lanes, managed lanes
	Transit	New bus routes, services or rail lines, (busways/BRT), Additional services and route frequencies
	Bicycles & Pedestrians	Separated facilities, Bike share networks, widened/new sidewalks, new/expanded sidewalks, new/expanded trail networks
	Freight	Truck only lanes, rail improvements



NH-114

NH-114A Junction (Goffstown) to NH-101 Junction (Bedford)

06:00 07:00 08:00 09:00 15:00 16:00 17:00 18:00

Southbound

1.07	1.40	1.27	1.19	1.22	1.28	1.24	1.19
1.38	1.50	1.46	1.43	1.63	2.09	1.90	1.79

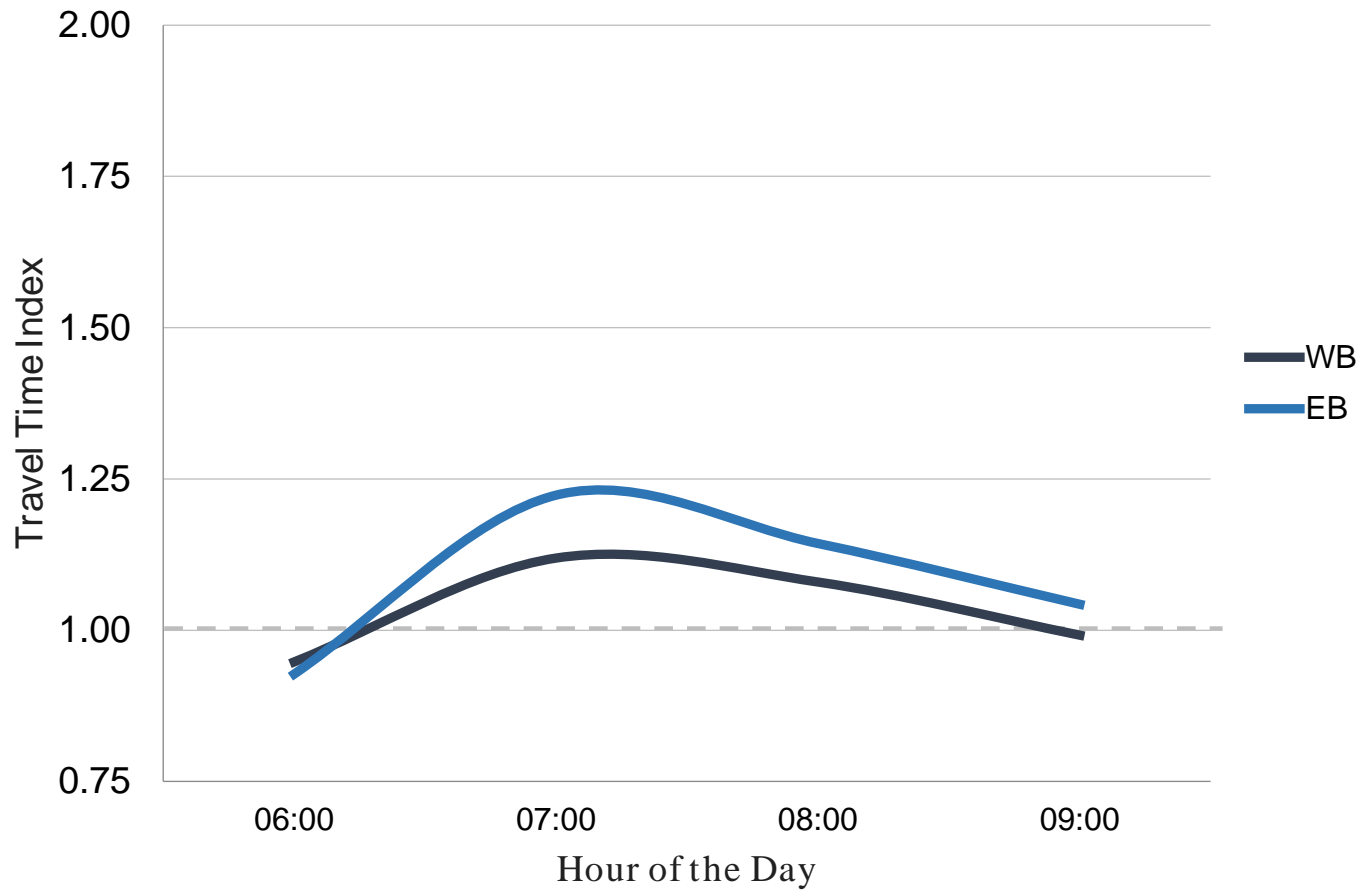
Northbound

What's the data look like...



tmc_code	measurement_tstamp	speed	average_speed	reference_speed	travel_time_seconds	data_density
129+09365	1/1/2018 6:00	42	43	48	86.77	A
129-06428	1/1/2018 6:00	43.49	49	54	321.87	A
129-06427	1/1/2018 6:00	53.87	55	68	22.16	A
129+09366	1/1/2018 6:00	47		51	121.65	A
129P06426	1/1/2018 6:00	62.41	60	73	35.76	A
129-06426	1/1/2018 6:00	60.33	60	71	19.45	A
129P06427	1/1/2018 6:00	62.36	61	71	32.51	A
129P04241	1/1/2018 6:00	49.21	56	70	59.5	B

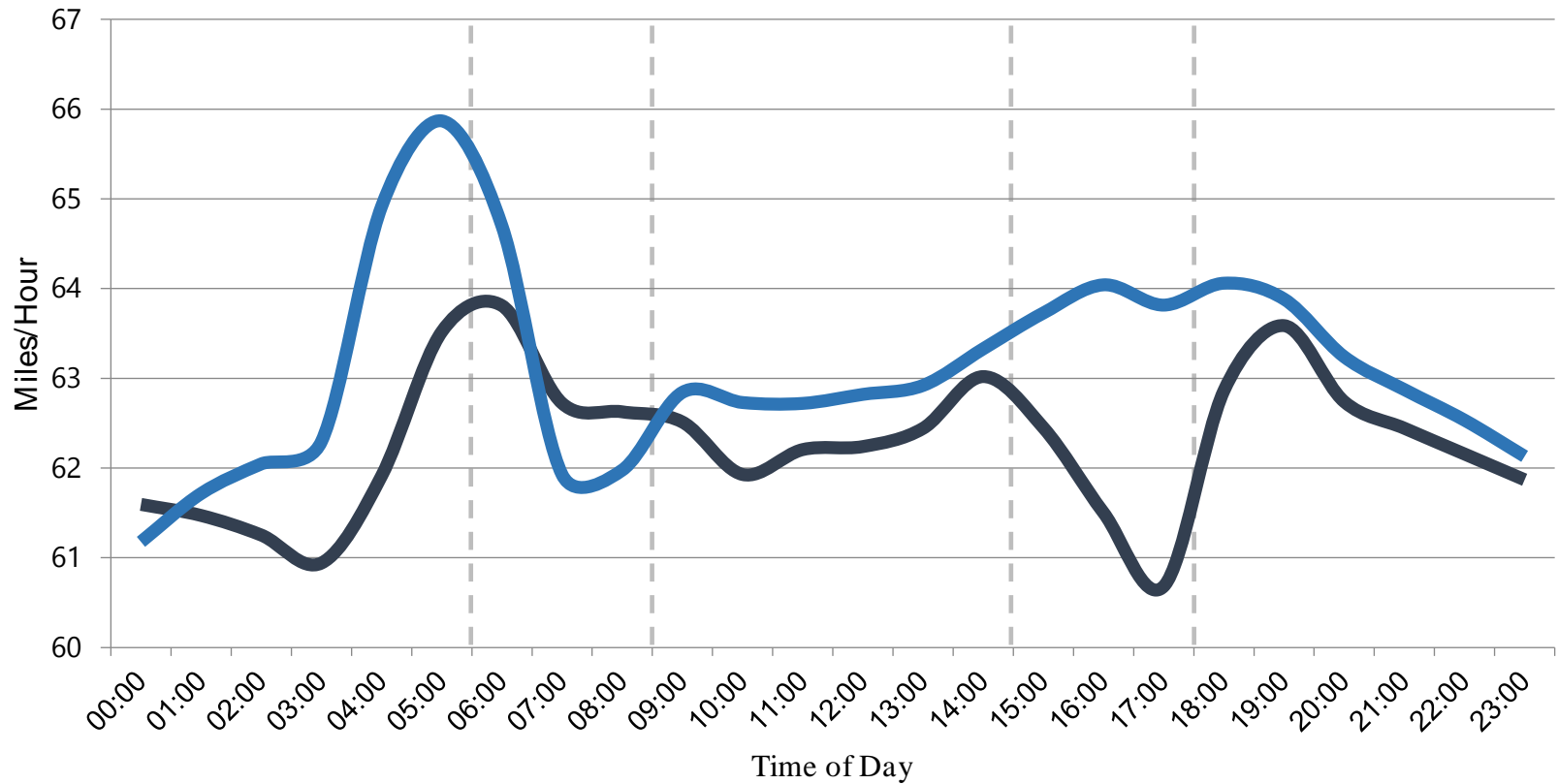
NH-111 Morning Travel Time Index Windham-Hudson Line to I-93 Junction (Windham)



January 2018-July 2019

Sources: CATT Lab; INRIX.

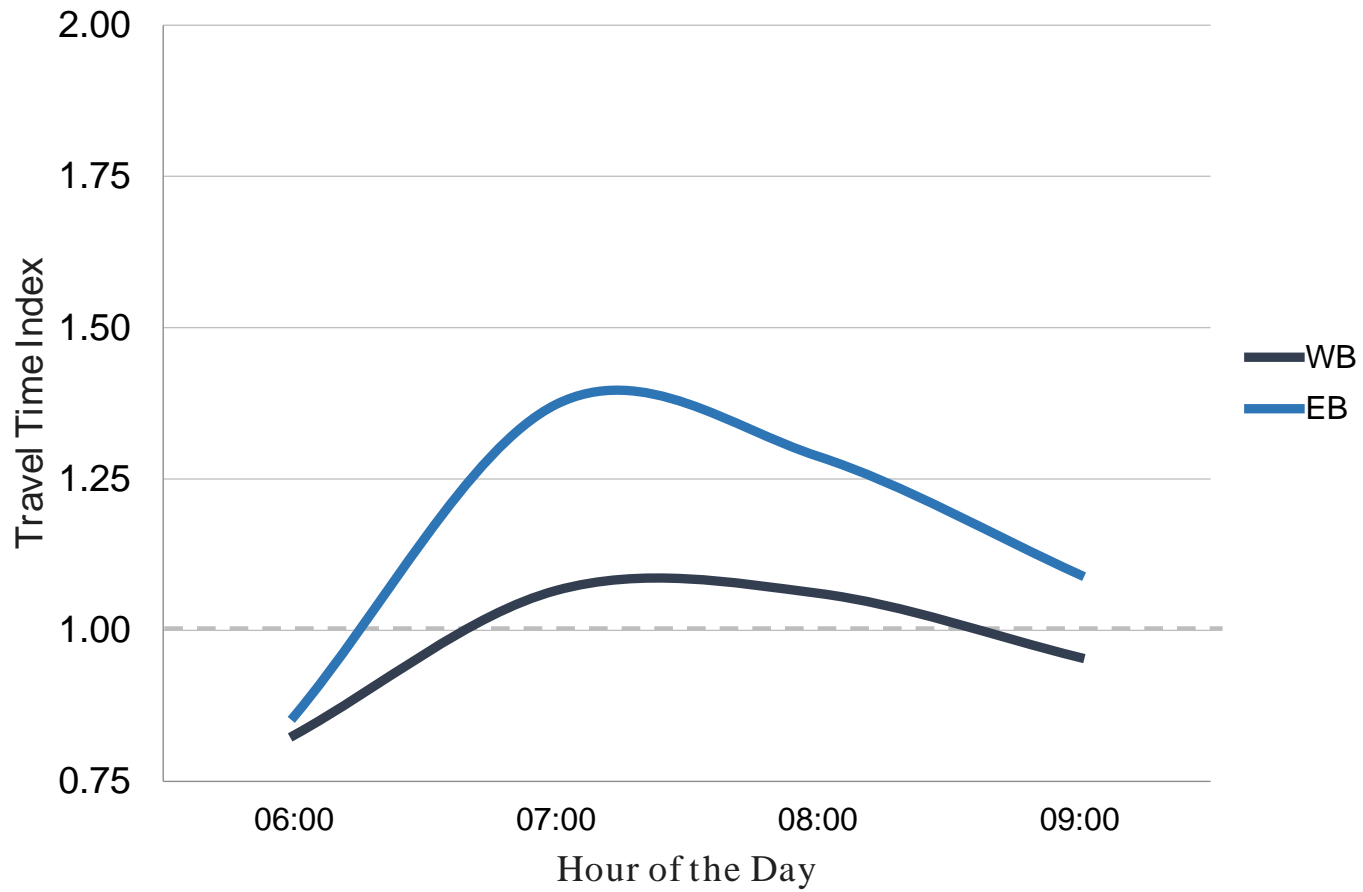
I-93 Average Speed: Southern NH Planning Commission Region



Nov 2017-October 2018

■ I-93 N Weekday ■ I-93 S Weekday

NH-101 Morning Travel Time Index Bedford-Amherst Line to NH-114 Junction (Bedford)

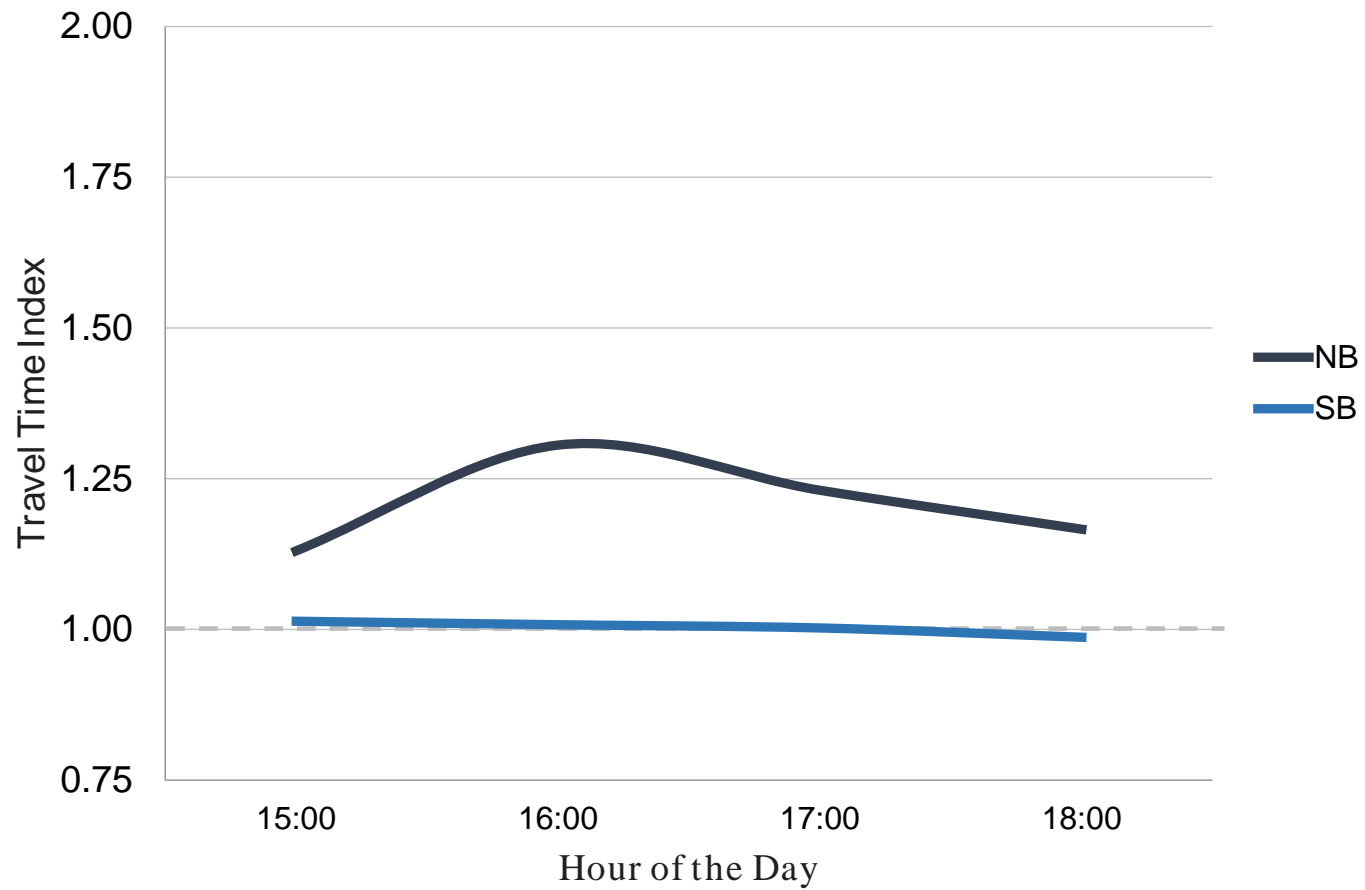


January 2018-July 2019

Sources: CATT Lab; INRIX.

I-93 Evening Travel Time Index

I-293 Junction (Manchester) to Windham-Salem Line



January 2018-July 2019

Sources: CATT Lab; INRIX.