Congestion Management Process (CMP)

October 15

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Southern New Hampshire Planning Commission

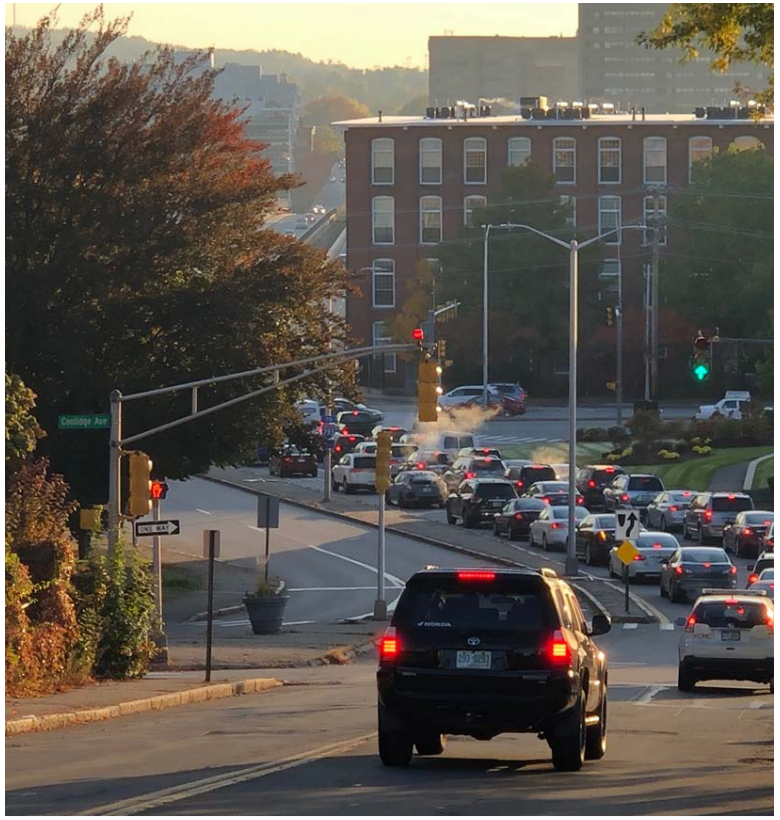
Presentation Overview

- Why a Congestion Management Process
- SNHPC's role as an MPO in a Transportation Management Area (TMA)
- Federal Highway Administration (FHWA) Eight-Step Process for CMPs
- Our CMP Network (Map)
- Multi-Modal CMP Performance Measures
- Congestion Problems and Needs Analysis

  (Travel Time Index, highways)

Why a Congestion Management Process

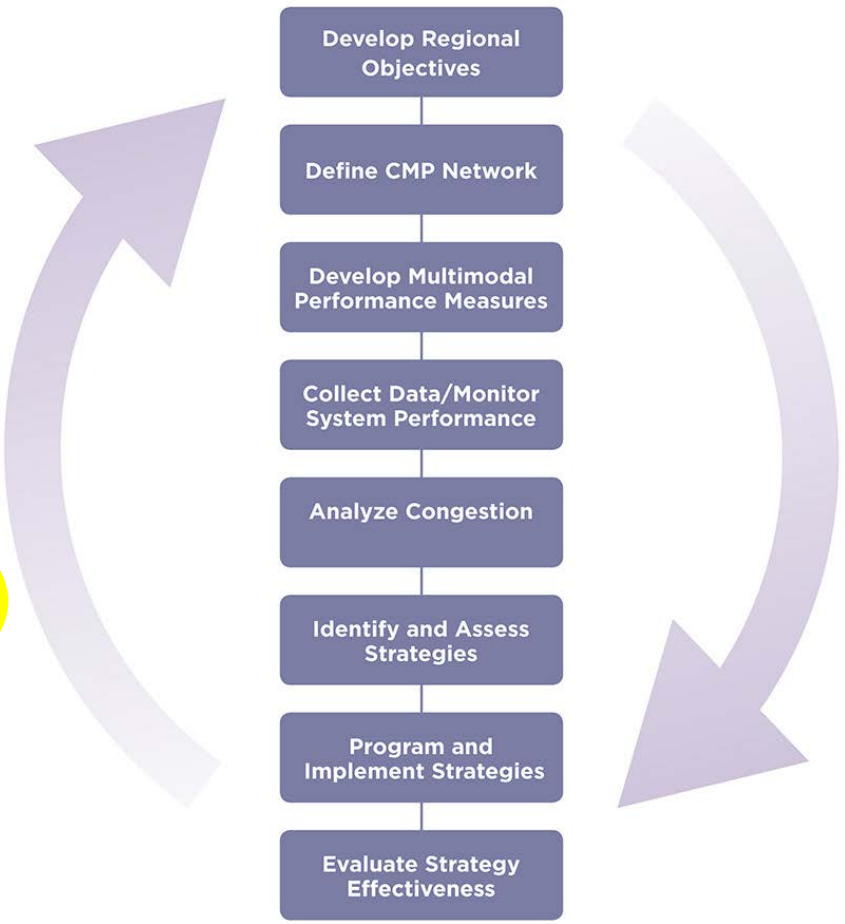
- In 2012, SNHPC MPO became a Transportation Management Area or “TMA”
- TMAs are required to develop CMPs
- CMPs objectives:
  - Identify congestion and its causes
  - Apply congestion mitigation strategies
    - to improve system performance and reliability
  - Evaluate effectiveness of implemented strategies



FHWA Eight-step "Actions" Process

U.S. Department of Transportation
Federal Highway Administration

1. Develop Regional Objectives for Congestion Management
2. Define CMP Network
3. Develop Multimodal Performance Measures
4. Collect Data/Monitor System Performance
5. Analyze Congestion Problems and Needs
6. Identify and Assess Strategies
7. Program and Implement Strategies *(2-year, 10-year plans)*
8. Evaluate Strategy Effectiveness *(over time – future years)*



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

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.

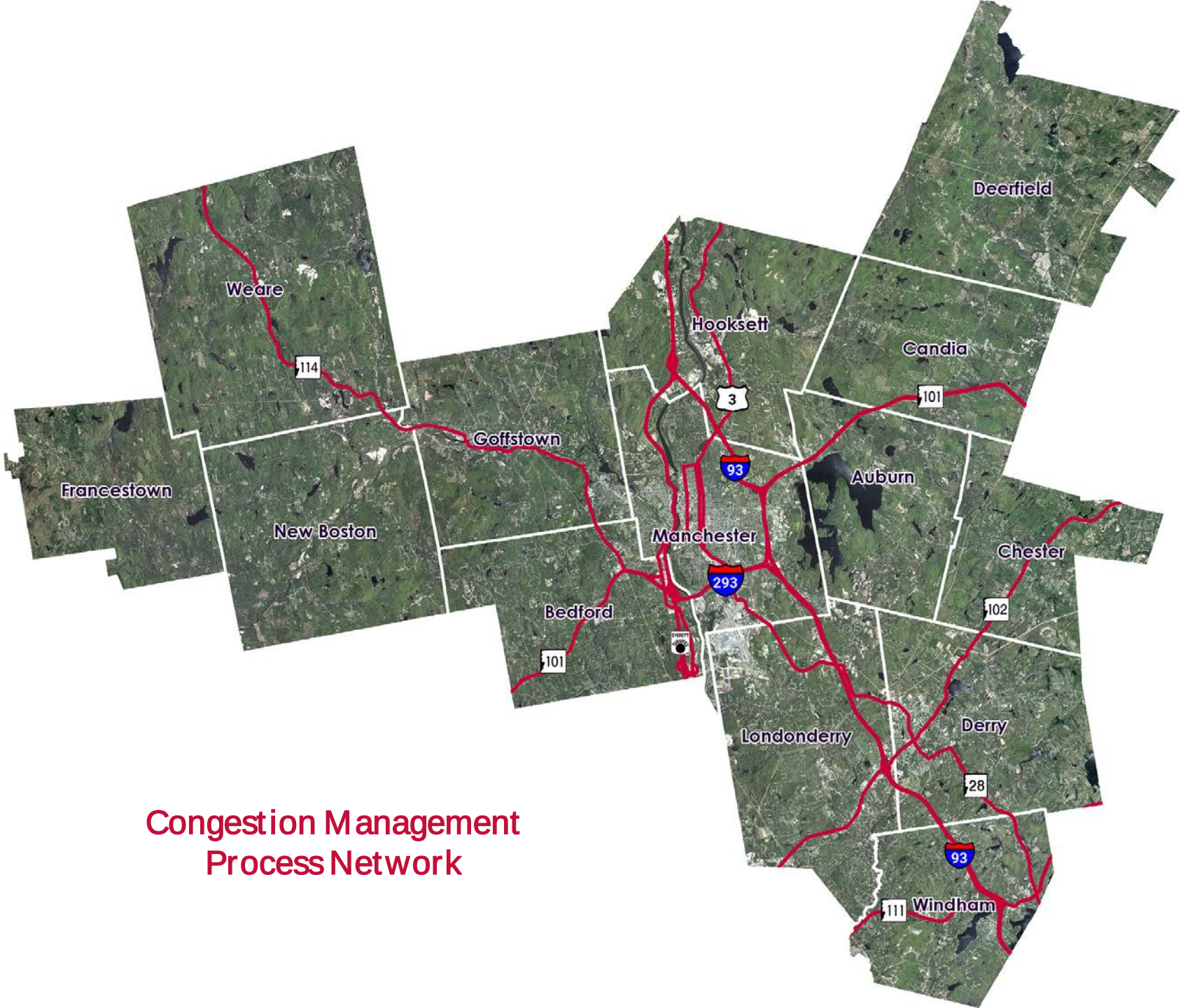
Regional Objectives for CMP

Aligned with the Regional Transportation Plan

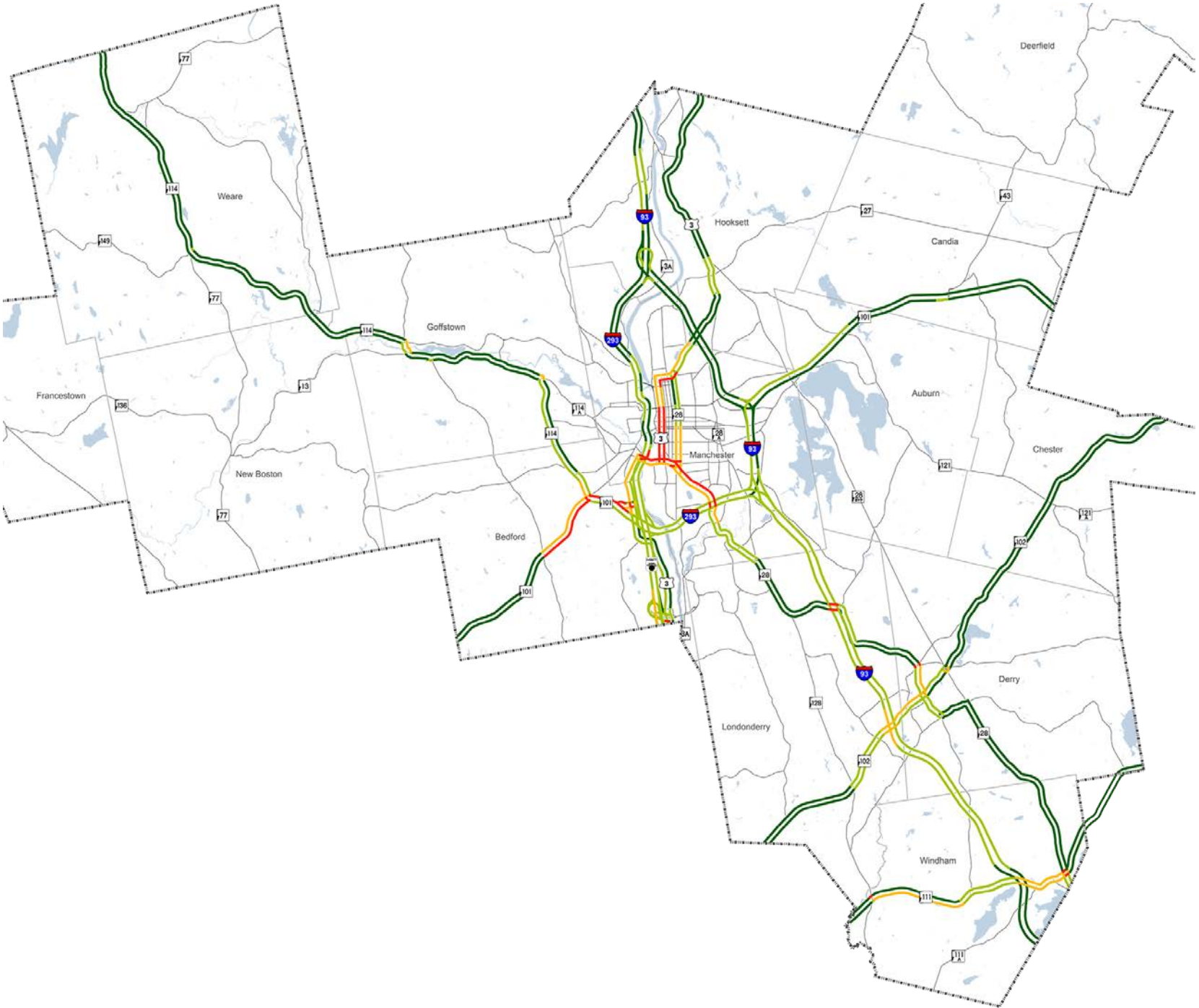
Bicycles and Pedestrians

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.



Congestion Management Process Network


Deerfield
Weare
Hooksett
Candia
Goffstown
Auburn
Francestown
Manchester
Chester
New Boston
Bedford
Derry
Londonderry
Windham
93
293
3
3A
77
114
149
13
136
114A
26
28
28A
101
121
121A
43
27
102
128
111
111A

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

Refresher on the Travel Time Index (TTI)

- 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?**

Before congestion management strategies can be identified, it is necessary to identify what the problems are, where they are located, and what is causing them. This action serves as a critical link between data collection and strategy identification.

Federal regulations require that the CMP include

"methods to monitor and evaluate the performance of the multimodal transportation system, [and] identify the causes of recurring and non-recurring congestion."

23 CFR 450.320 (c) 1

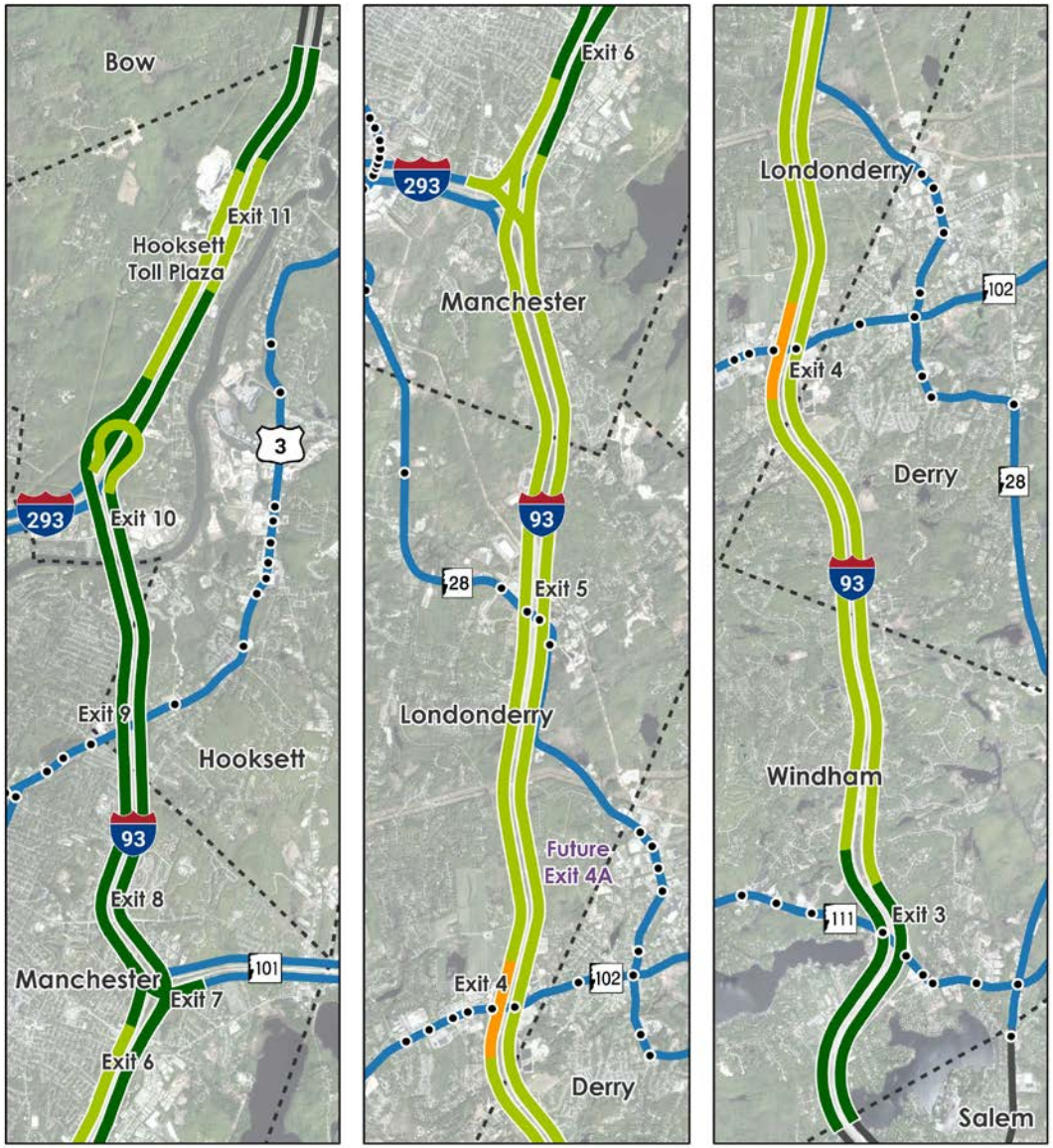
- What are the congestion problems in the region?
- Peak travel a.m. & p.m.
- Seasonal
- Incidents
- Weather
- Differ by corridor, facilities

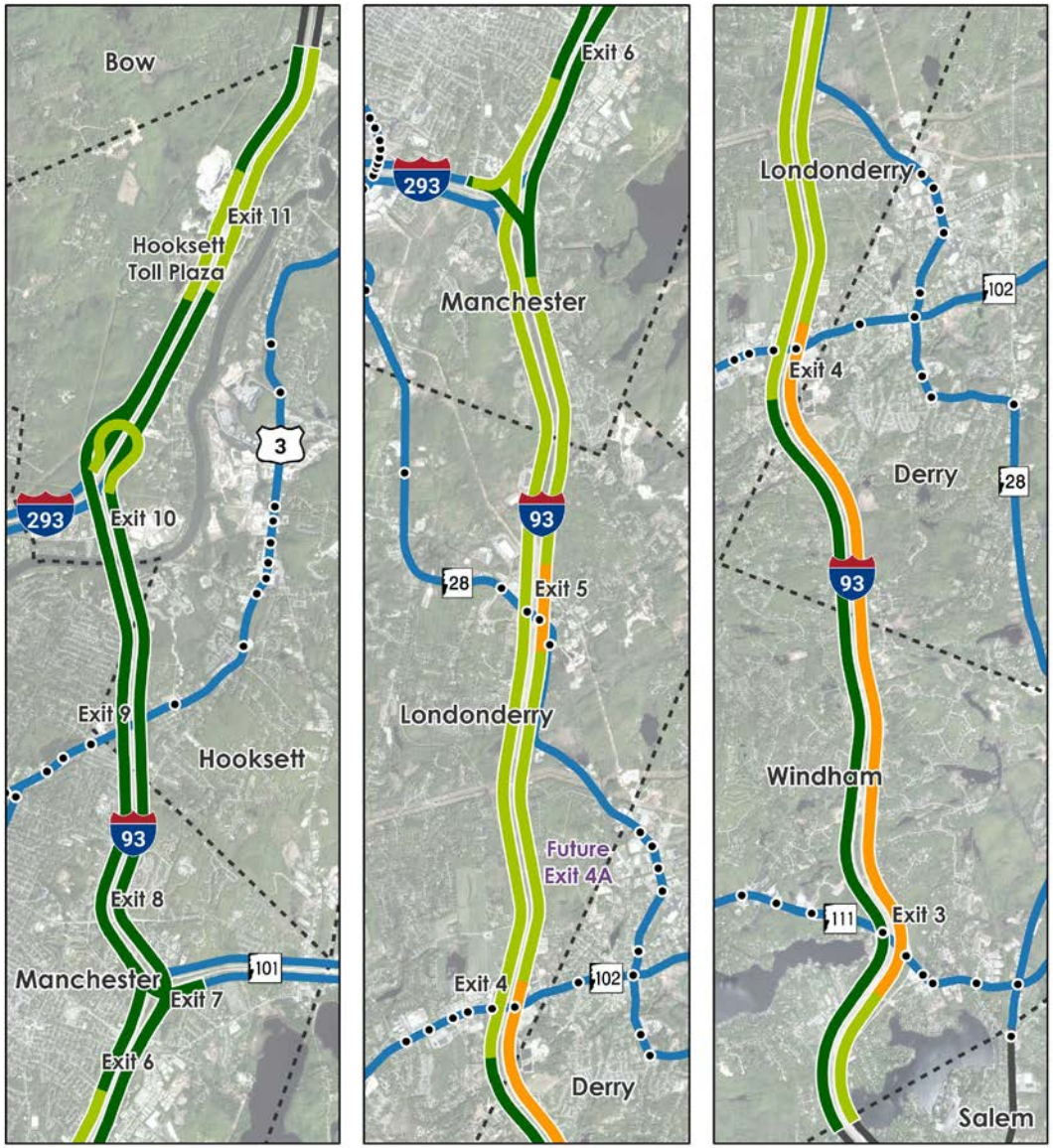
CMP Strategies "Menu"

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

Interstate 93

AM Peak





Interstate 93

PM Peak

Interstate 93

Roadway Management Strategies:

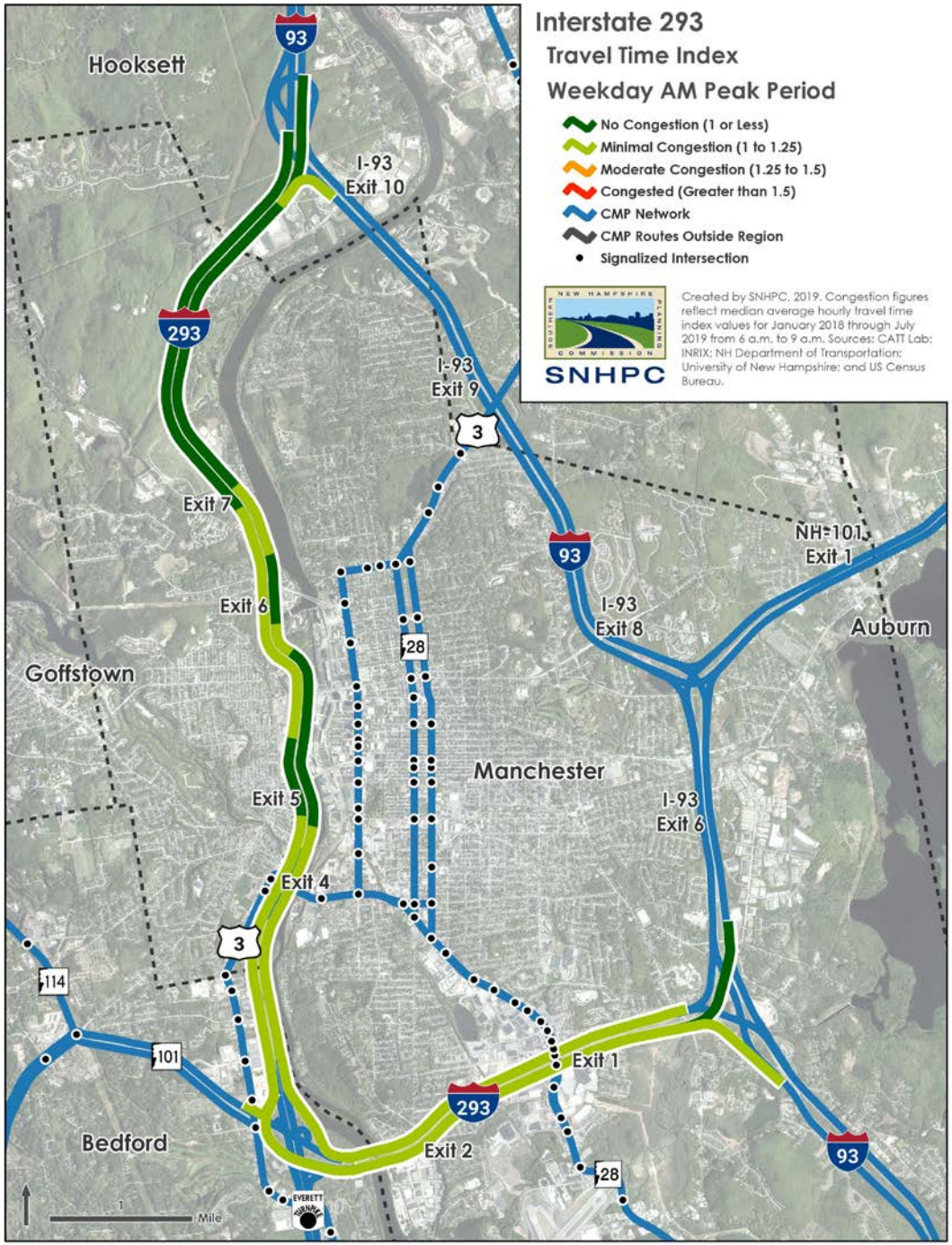
- **Strategy 1 – Traffic Signal Timing or Coordination Improvements**
  - Implement an adaptive signal control framework or other means of signal coordination at the I-93 Exit 8 ramp intersections at Wellington Road.
- **Strategy 3 - Traveler Information Devices**
  - Continue to deploy ITS traveler information devices, including variable message boards that display live travel time, incident, and other information for traveler route decision making.
- **Strategy 4 - Communications Network and Roadway Monitoring**
  - Deploy roadway monitoring infrastructure, including but not limited to closed-circuit video and sensors to provide real-time traffic information to the NHDOT Traffic Management Center.

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.

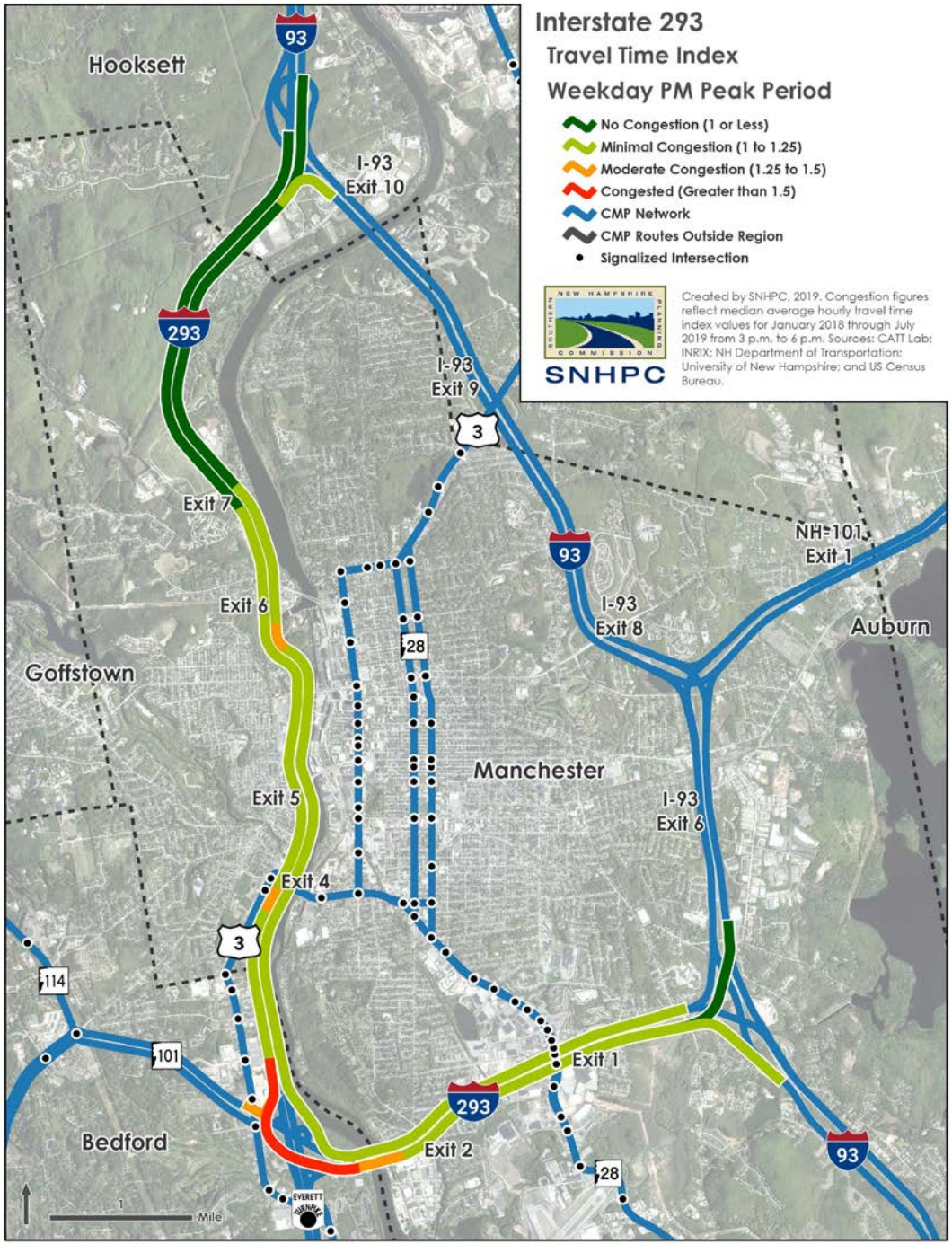
Physical Infrastructure Improvement Strategies:

- **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.
- **Strategy 18 – New Travel Lanes**
  - Complete the expansion of I-93 to four lanes between Salem and Manchester.
- **Strategy 20 – Engineering and/or Operations Study**
  - Support the development of the Capitol Corridor Project Development Phase to determining the engineering needs and operational costs of implementing north-south commuter rail service connecting Manchester to Boston.



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.
- **Strategy 4 - Communications Network and Roadway Monitoring**
  - Deploy roadway monitoring infrastructure, including but not limited to closed-circuit video and sensors to provide real-time traffic information to the NHDOT Traffic Management Center.

Transit and Travel Demand Management Strategies:

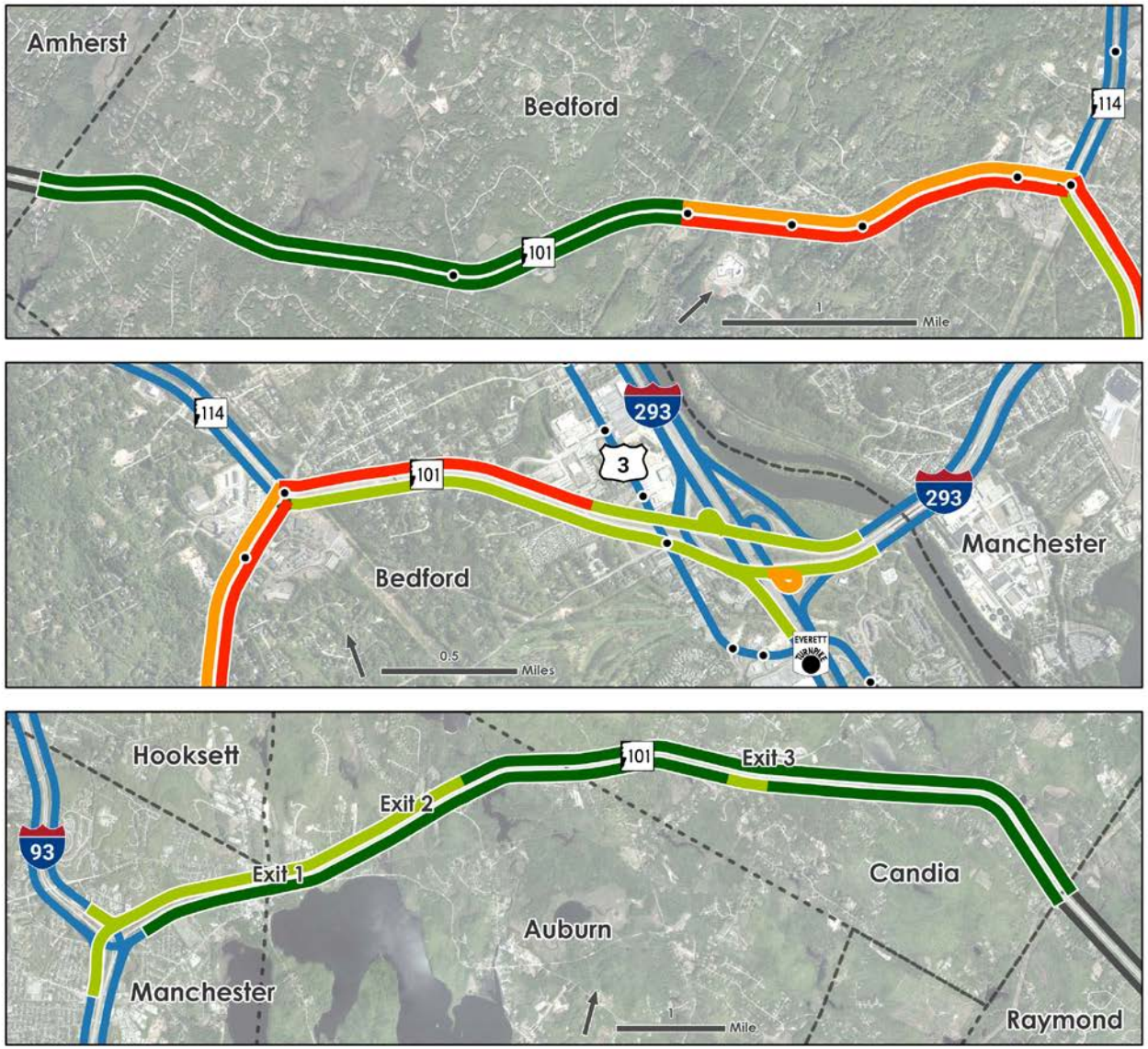
- **Strategy 7 - Transit Service Expansion**
  - Evaluate the feasibility of establishing commuter transit service to the Manchester Millyard from the I-293 corridor.

Physical Infrastructure Improvement Strategies:

- **Strategy 12- Park & Ride Facility**
  - Identify potential park-and-ride facility locations in the area around the I-293/NH Route 101/F.E. Everett Turnpike interchange and study the feasibility of constructing a facility.
- **Strategy 14 – Intersection/Interchange Reconfiguration or Improvements**
  - Complete construction on 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 18 – New Travel Lanes**
  - Complete the pending expansion of the I-293 mainline to 3 lanes in each direction from north of Exit 5 through the relocated Exit 7.
  - Evaluate the feasibility of expanding the I-293 mainline to 3 lanes in each direction from Exit 5 to the I-293/NH Route 101/F.E. Everett Turnpike interchange.
- **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

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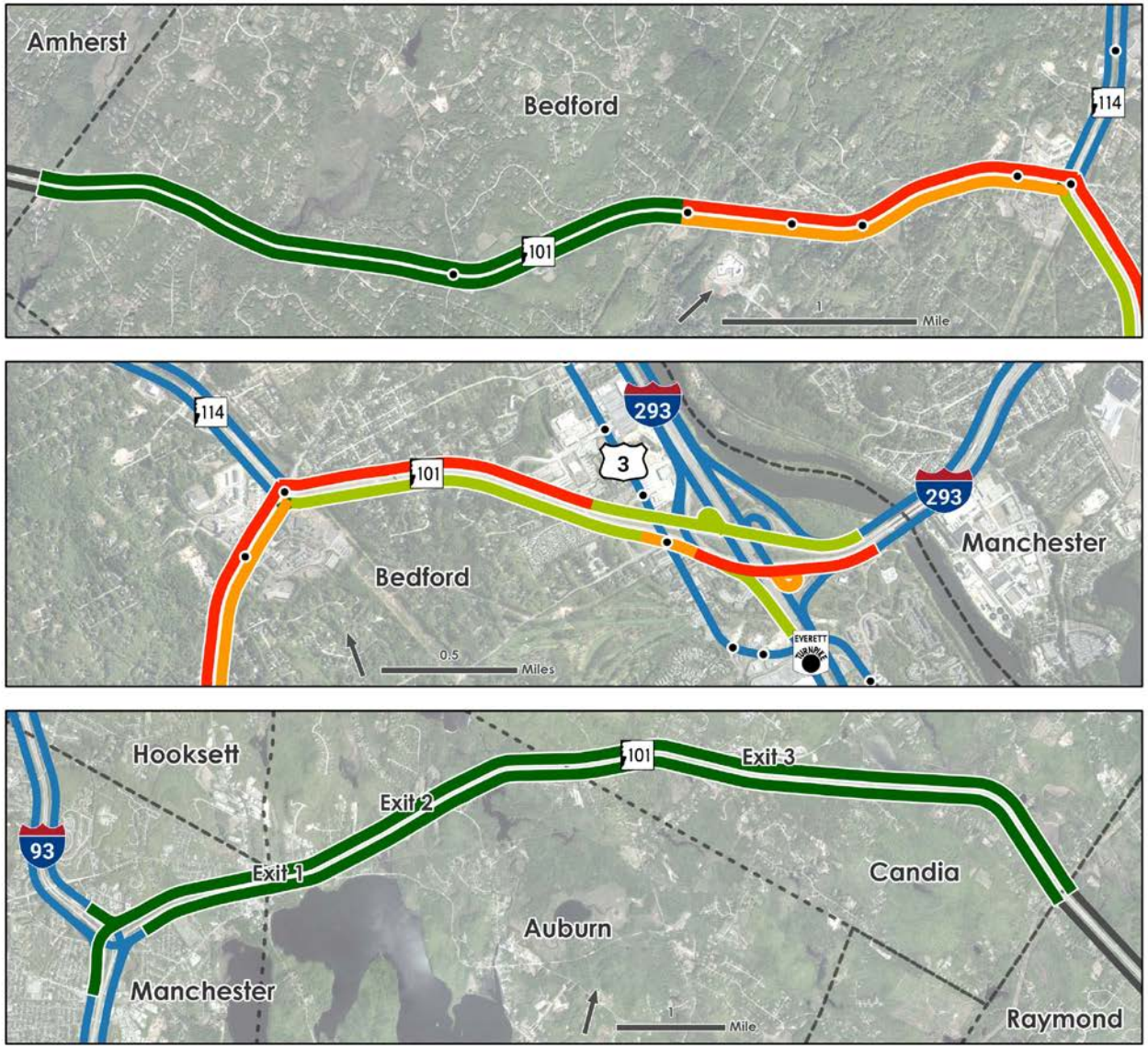


NH Route 101

Roadway Management Strategies:

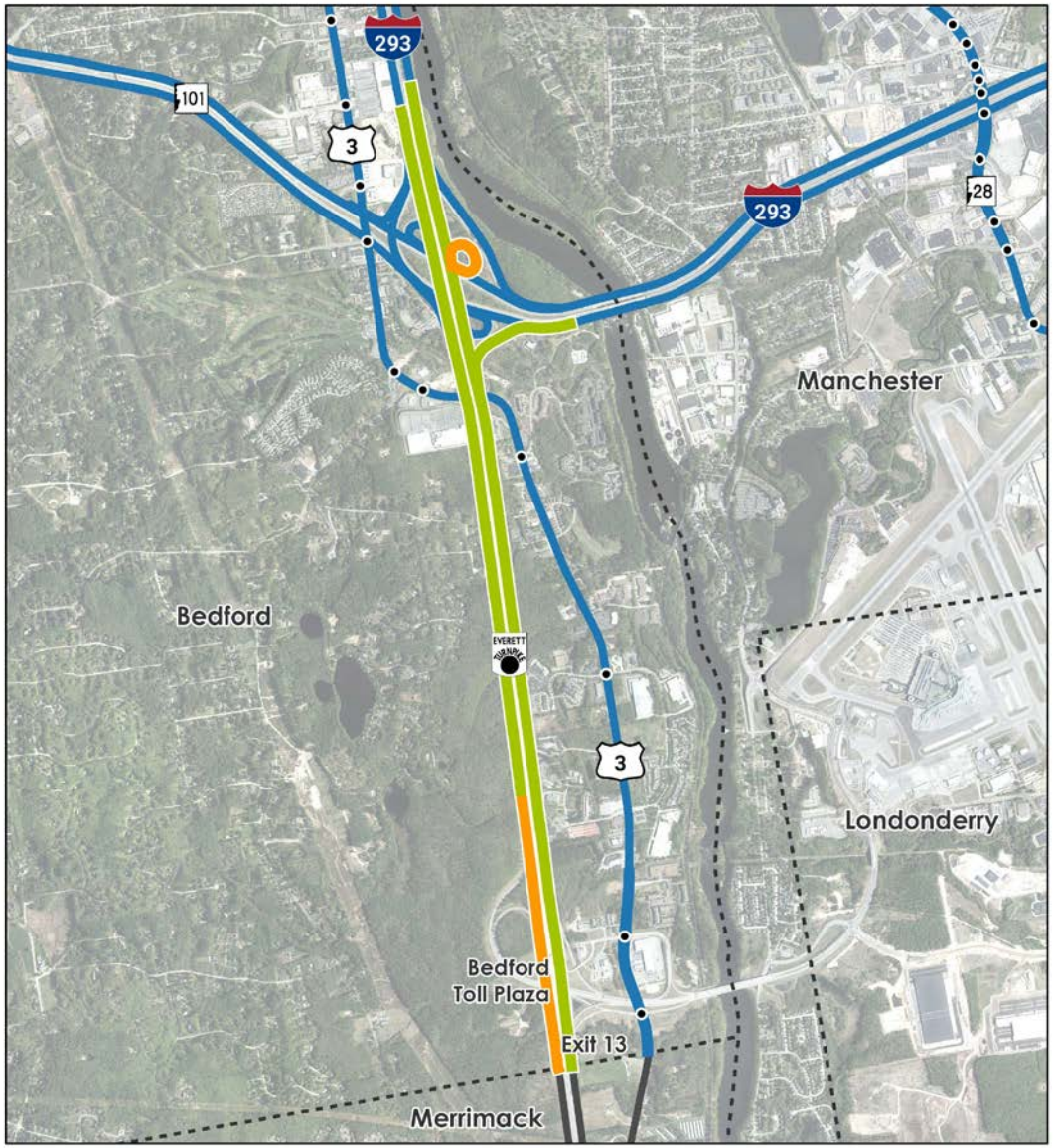
- **Strategy 1 – Traffic Signal Timing or Coordination Improvements**
  - Evaluate the feasibility of implementing an adaptive signal control system at the intersection of NH Route 101/NH Route 114/Boynton Street and adjacent signalized intersections.
- **Strategy 3 - Traveler Information Devices**
  - 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, with an emphasis on the limited access section of NH Route 101 east of Manchester.
- **Strategy 4 - Communications Network and Roadway Monitoring**
  - Deploy roadway monitoring infrastructure, including but not limited to closed-circuit video and sensors to provide real-time traffic information to the NHDOT Traffic Management Center, with an emphasis on the limited access section of NH Route 101 east of Manchester.

- *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 10 - Off-street Multi-use Path**
  - Construct a 10' Multi-use Path along NH Route 101 from Wayside Drive in Bedford to the Amherst Town Line.
- **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.

- 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

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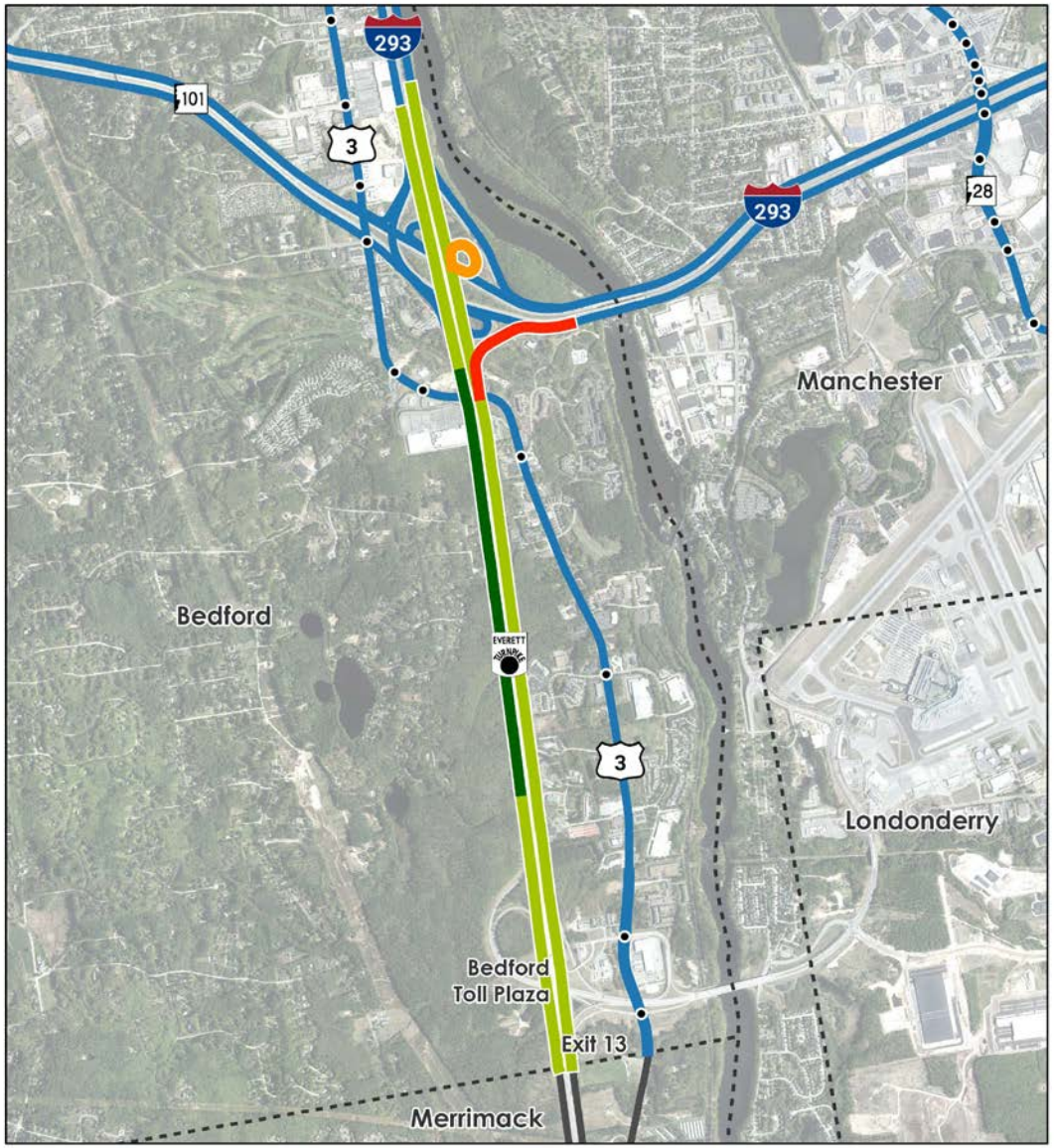
F.E. Everett Turnpike

PM Peak



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.

- 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

F.E. Everett Turnpike

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.
- **Strategy 4 - Communications Network and Roadway Monitoring**
  - Deploy roadway monitoring infrastructure, including but not limited to closed-circuit video and sensors to provide real-time traffic information to the NHDOT Traffic Management Center.

Transit and Travel Demand Management Strategies:

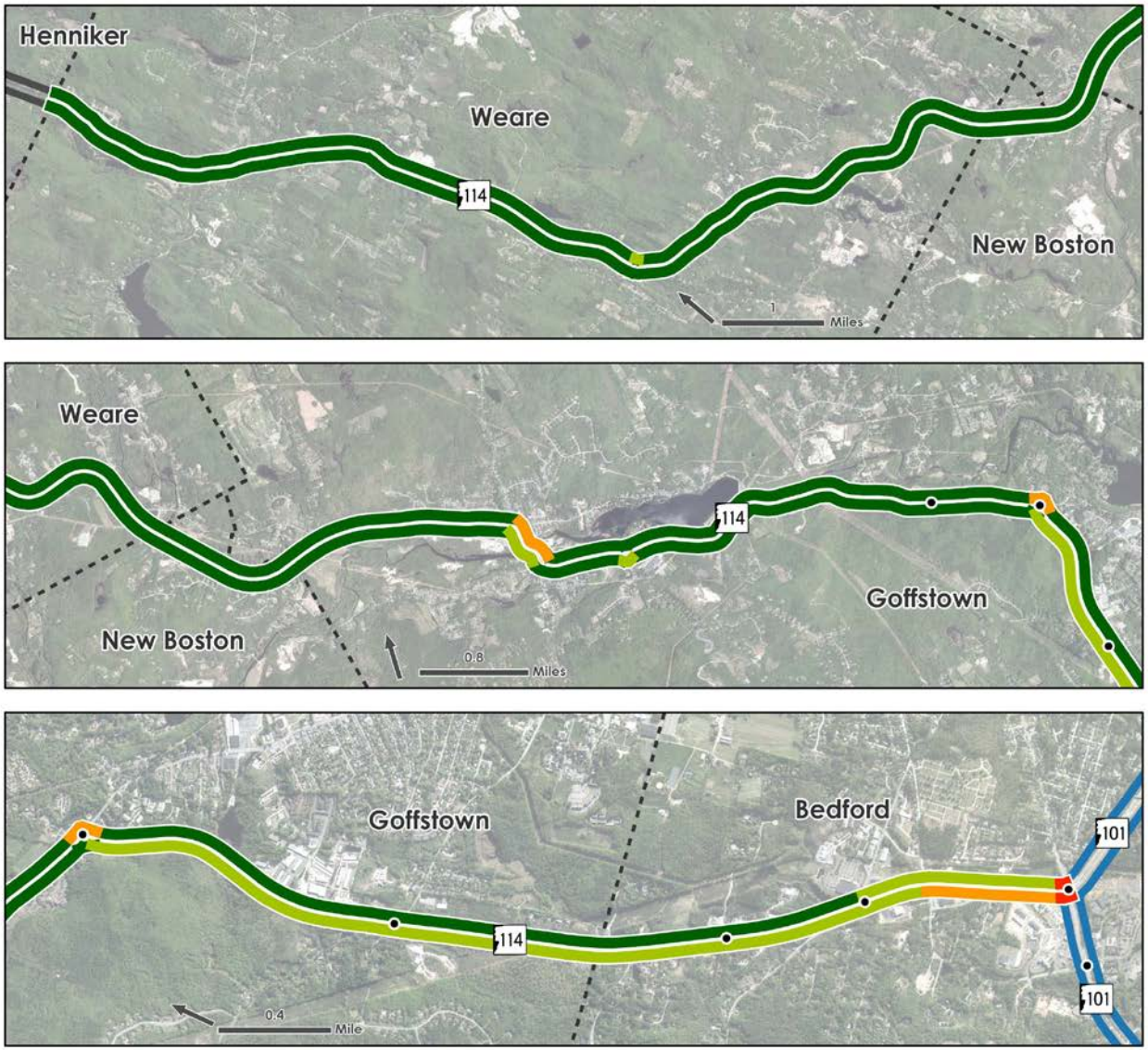
- **Strategy 9- Electronic Toll or Fare Collections**
  - Implement All Electronic Tolling at the Bedford Toll Plaza.

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.
- **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 which would, in part, evaluate alternatives for the reconfiguration of the I-293/NH Route 101/F.E. Everett Turnpike interchange.

NH Route 114

AM Peak



NH Route 114
Travel Time Index
Weekday AM Peak Period

- 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

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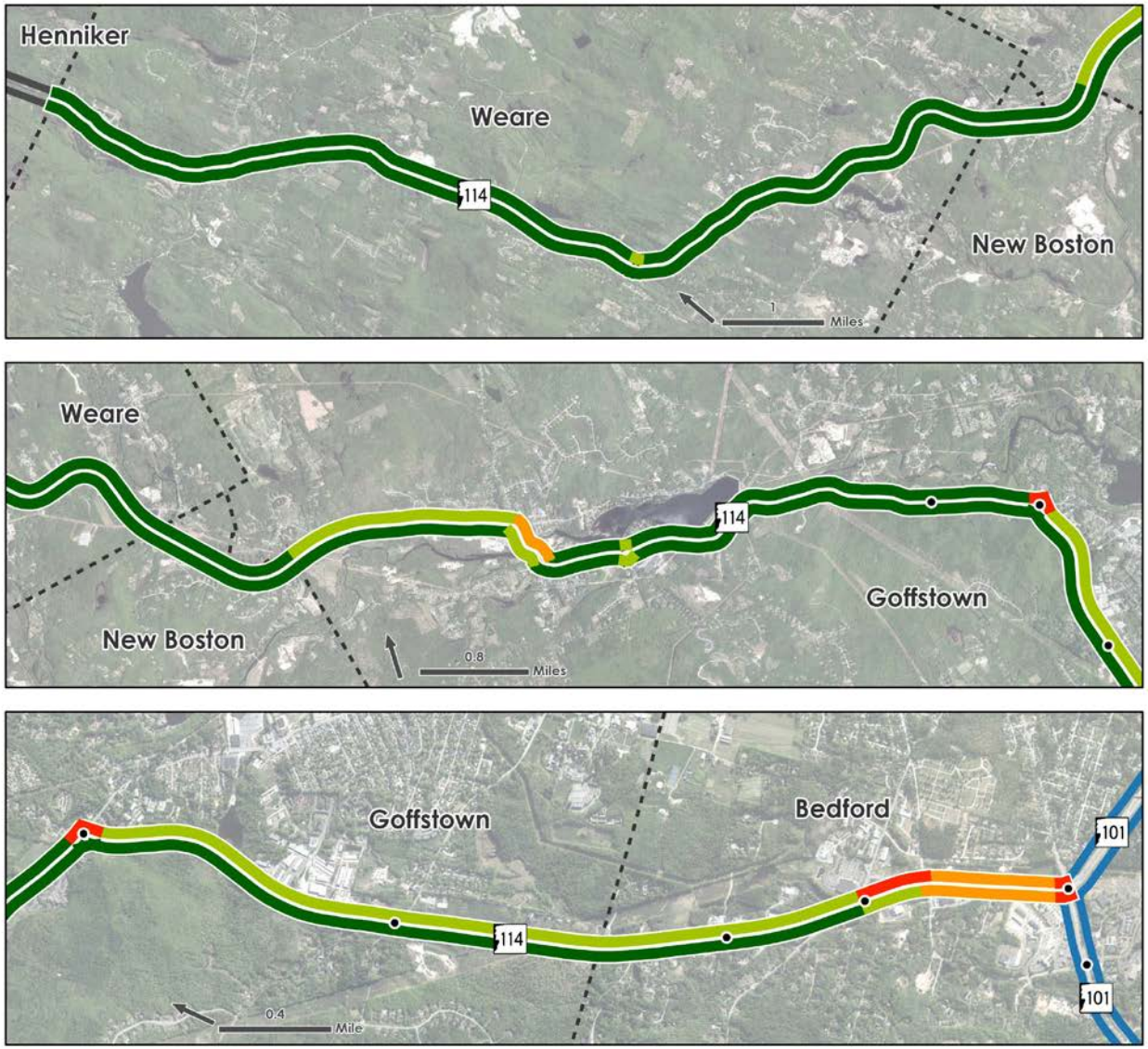
NH Route 114

PM Peak



NH Route 114

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:

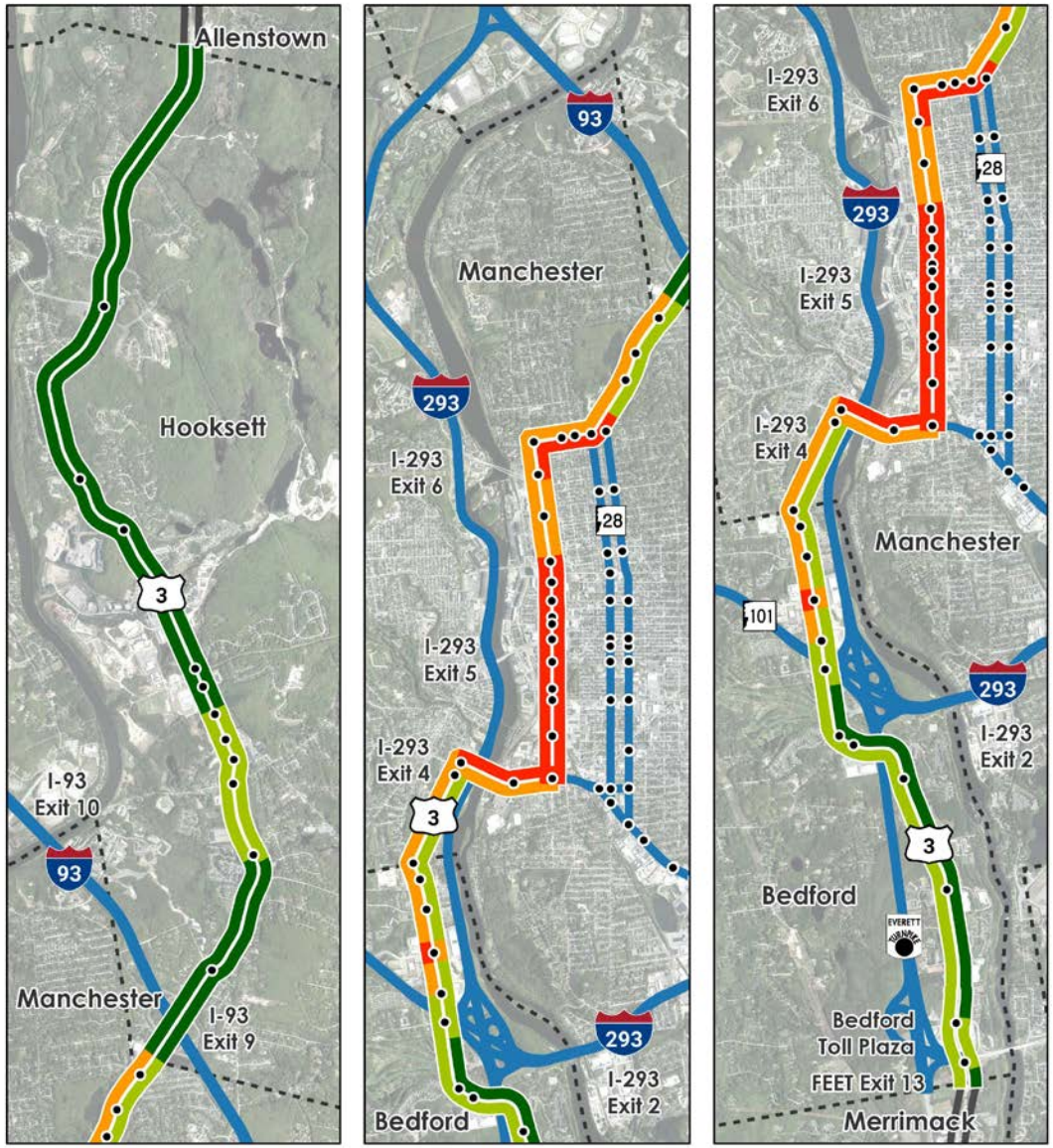
- **Strategy 7 - Transit Service Expansion**
  - Extend commuter bus service along the NH Route 114 corridor linking Weare and Goffstown to Bedford and Manchester.
- **Strategy 12- Park & Ride Facility**
  - Identify potential park-and-ride facility locations on the NH Route 114 corridor and study the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



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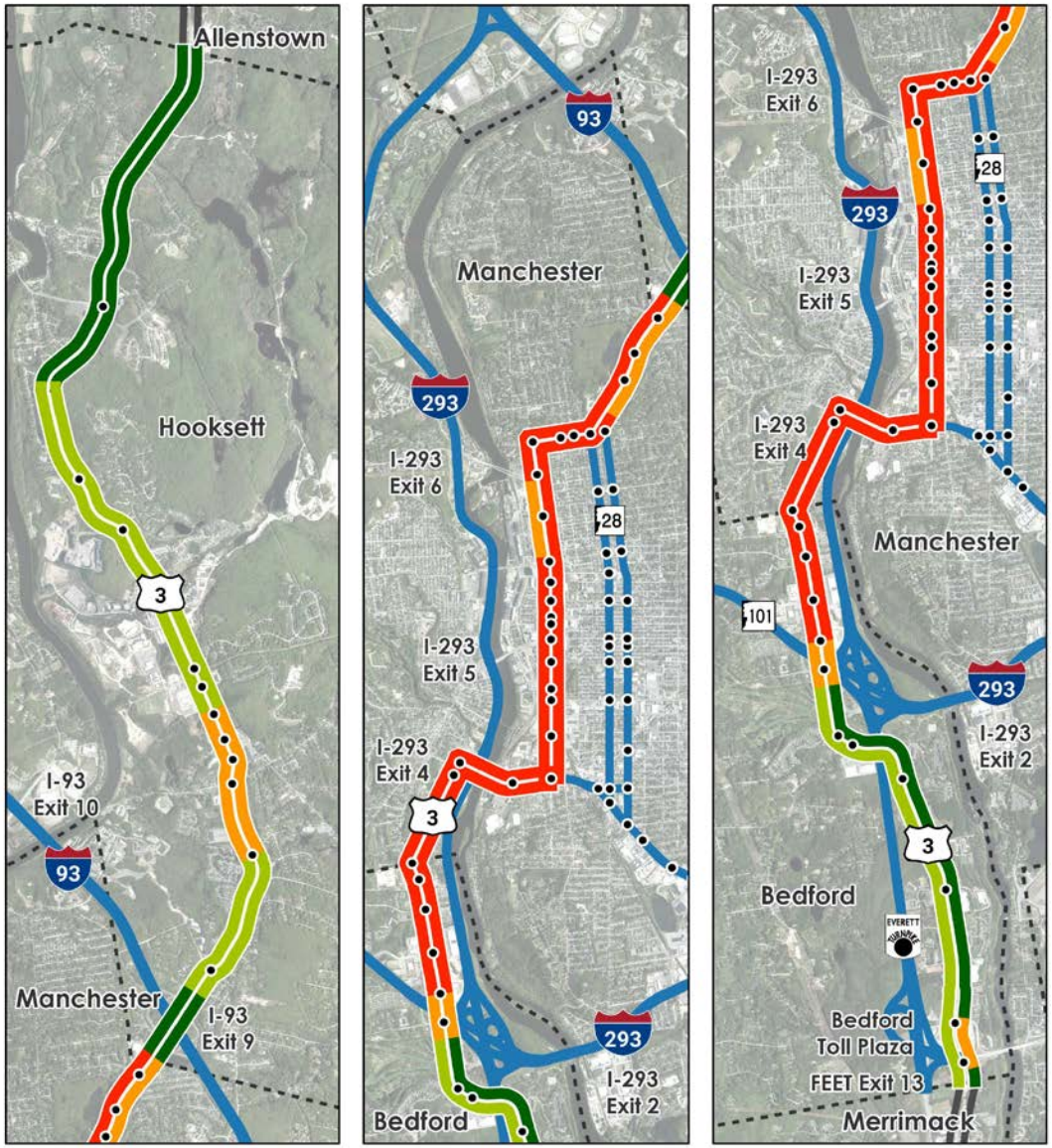


US Route 3

PM Peak

- Hooksett to Manchester City Line
- Manchester
  - Hooksett line to Salmon Street
  - Downtown
- West Side/Bedford

Strategies Manchester north:

Active Roadway Management:

- **Strategy 1: Expanded Traffic Signal Timing and Coordination –** Upgrade signals and controllers and consider signal improvements for pedestrian and bicycle traffic.
- **Strategy 5: Access Management** – Consolidate or eliminate access to sites where possible

Travel Demand Management:

- **Strategy 7: Transit Service Expansion –**Increase headway frequencies to 20 or 30 minutes. There is currently very limited bus transit service in the corridor, with bus routes all limited to once every hour. Bus utilization as a choice increases with more frequent buses that provide more opportunities to be used regularly.
- **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 if the bus travel times are dependable.

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, especially at Beech Street.

Strategies Manchester Downtown:

- *Active Roadway Management*
  - **Strategy 1: Expanded Traffic Signal Timing and Coordination –** Upgrade signals and controllers to adaptive control and include additional pedestrian, bicycle, pedestrian, and bus transit priority capabilities.
  - **Strategy 2: Traffic Signal Equipment Modernization –** Upgrade controller capabilities to enable adaptive control and multimodal traffic detection.
  - **Strategy 5: Access Management –** Consolidate or eliminate access on sites where possible. Considering this portion of the corridor has dense adjacent land development, the opportunities are limited.
- *Travel Demand Management*
  - **Strategy 7: Transit Service Expansion –** Increase headway frequencies to 20 or 30 minutes. There is currently very limited bus transit service in the corridor, with bus routes all limited to once every hour. Bus utilization as a choice increases with mor frequent buses that provide more opportunities to be used regularly.
  - **Strategy 8: Transit Signal Priority –** Add TSP capabilities at intersections through which the local buses are routed. This technology enables buses to communicate their approach with the signals and to extend "green time" allowing buses through the intersection resulting in improved on-schedule performance.
- *Physical Roadway Capacity*
  - **Strategy 11: On-street Bicycle Treatments –** Study and implement bicycling facilities that encourage mode shift for trips to and from downtown Manchester. An additional benefit of these treatments is improved safety to bicyclists.
  - **Strategy 13: Parking Management** – Look at parking optimization opportunities, including increasing on side streets, removal on Elm, and back-in parking. Parking is very important to businesses and changes require working with adjacent businesses.

NH Route 3

Strategies West Side & Bedford :

Active Roadway Management

- **Strategy 1: Expanded Traffic Signal Timing and Coordination – Upgrade** signals and controllers and develop signal plans to accommodate special events and adaptive control.
- **Strategy 5: Access Management**– Consolidate or eliminate access on sites where possible. While this has been accomplished for the most part on the east side of the river, there are likely opportunities on the west side on Second Street.

Travel Demand Management

- **Strategy 8: Transit Service Expansion –** Increase headway frequencies to 20 or 30 minutes and provide shelters at high on-boarding locations. There is currently very limited bus transit service in the corridor, with bus routes all limited to once every hour. Bus utilization as a choice increases with more frequent buses, and the addition of shelters for passengers waiting to board the bus .
- **Strategy 10: Transit Signal Priority –**TSP capabilities at intersections through which the local buses are routed. This technology enables buses to communicate their approach with the signals and to extend "green time" allowing buses through the intersection resulting in improved on-schedule performance.
- **Strategy 11: On-street Bicycle Treatments**– Study and implement bicycling facilities to encourage mode shift for trips into downtown Manchester.

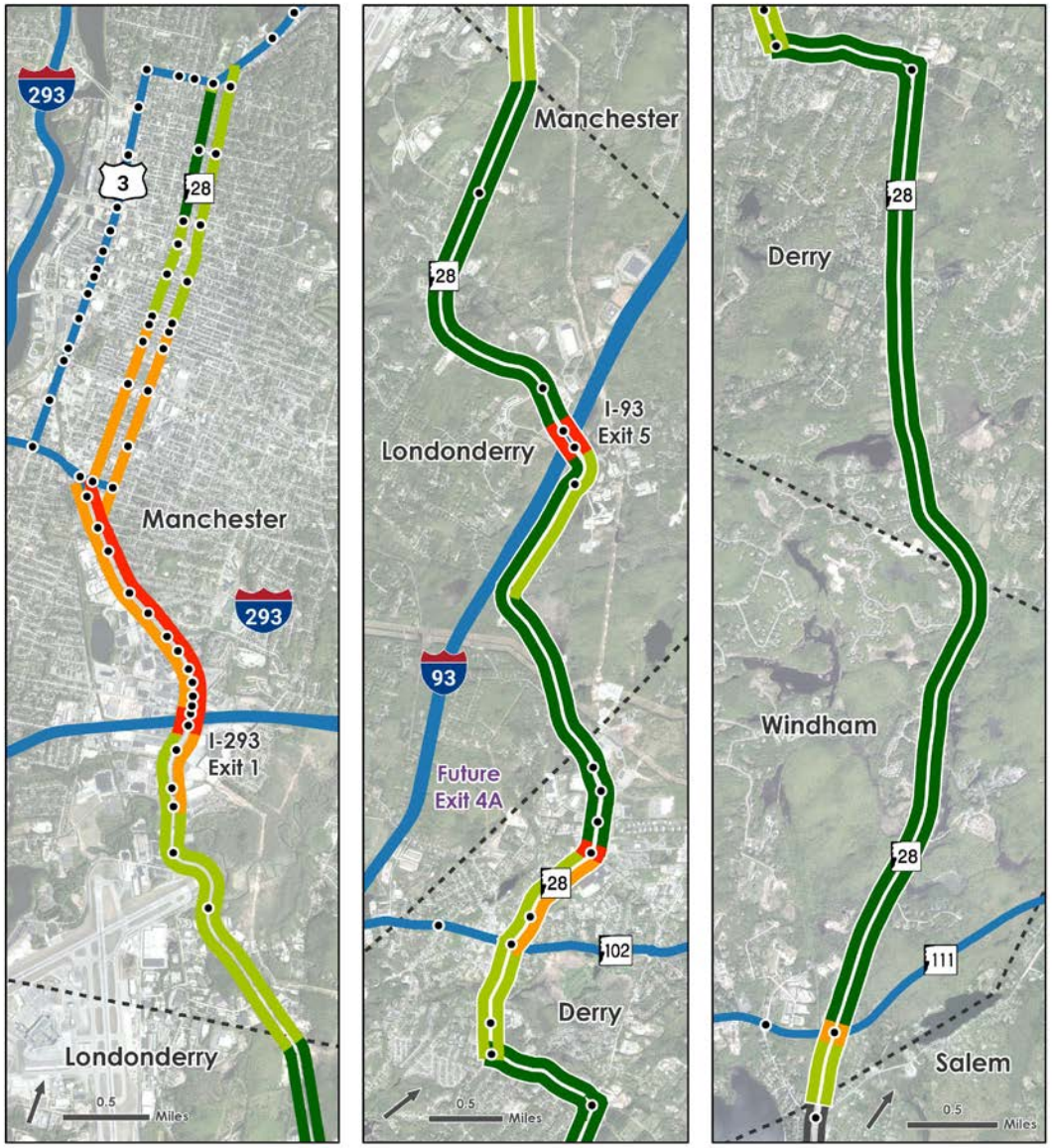
Physical Roadway Capacity

- **Strategy 16: Intersection turn lanes –** Provide overhead signage and more distinct turn-lane markings at intersections, especially Second Street. *Active Roadway Management*

- **Strategy 1: Expanded traffic signal timing and coordination – ITS–** Upgrade signals equipment including controllers and develop modern signal timing time-of-day signal plans to accommodate peak shopping times and days and migrate to adaptive control.
- **Strategy 2: Traffic equipment modernization -** Upgrade signals to provide adaptive control. The variances in traffic in the area including peak shopping times and days require a signal system that can detect and adapt to changing conditions.

- *In Bedford:*

  - **Strategy 5: Access Management**– Continue to implement the recommend or eliminate access on sites where possible.



NH Route 28

AM Peak

NH Route 28
Travel Time Index
Weekday AM Peak Period

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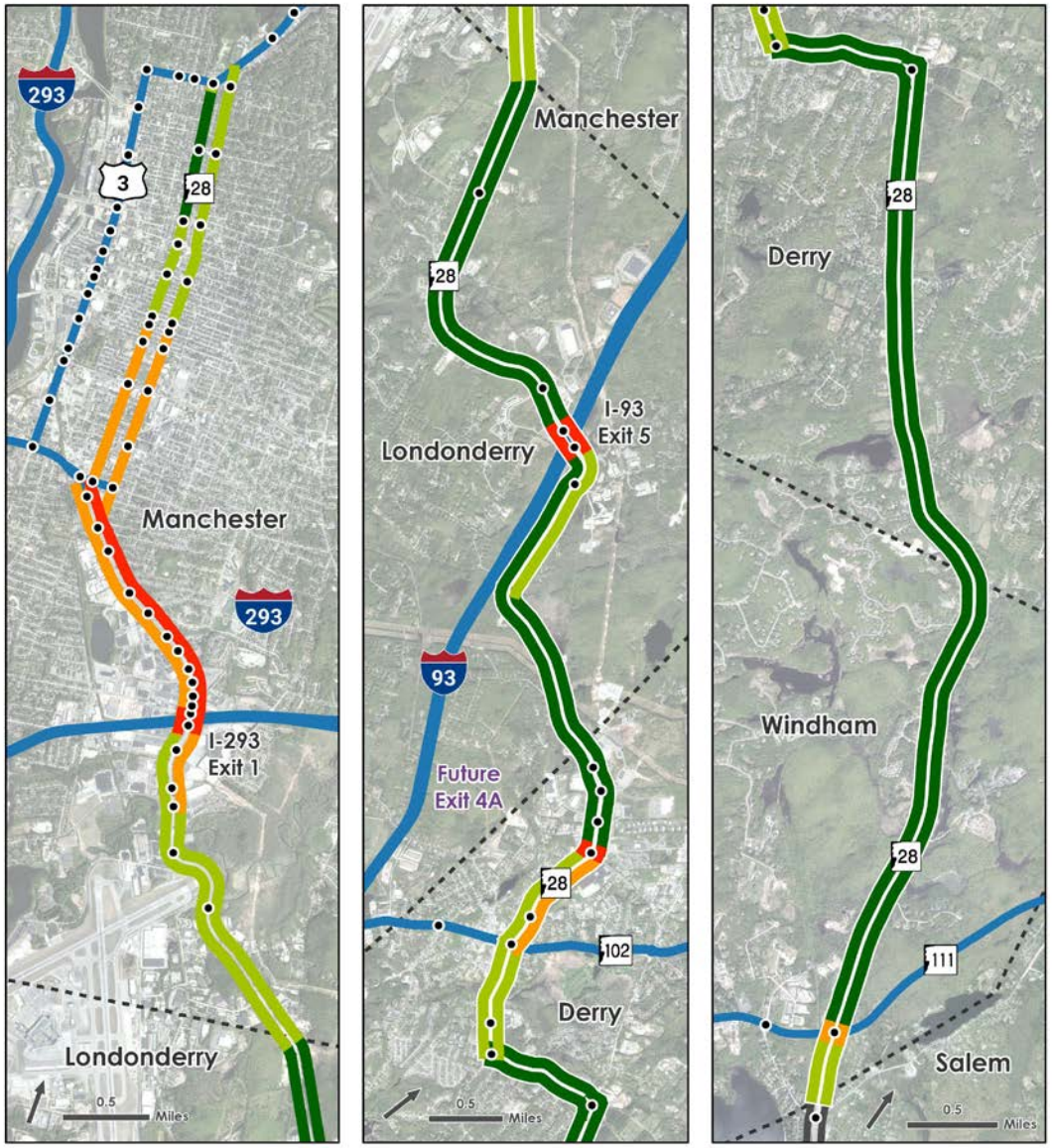
- No Congestion (1 or Less)
- Minimal Congestion (1 to 1.25)
- Moderate Congestion (1.25 to 1.5)
- Congested (Greater than 1.5)
- CMP Network
- CMP Routes Outside Region
- Signalized Intersection

SNHPC

NH Route 28

PM Peak



NH Route 28
Travel Time Index
Weekday AM Peak Period

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- CMP Network
- CMP Routes Outside Region
- Signalized Intersection

SNHPC

NH Route 28

Spruce Street to Cilley Road- *Northbound* and *Southbound*: Commuter peak; Signal coordination or timing; Local access management

- **Cilley Road to Willow Street** - *Northbound and Southbound:* Commuter peak; Signal coordination or timing; Local access management

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.

Travel Demand Management:

- **Strategy 6: Dedicated Transit Lanes –** Recent dedicated bicycle lanes could be converted to bus/bike only lanes. When the downtown portion of Beech or Maple are congested, this would help to keep buses on time, and encourage bus utilization.
- **Strategy 8:** Transit Service Expansion – The downtown area of the route would benefit from increased bus frequency (headway speeds) and potentially relieve congestion at certain peak times.
- **Strategy 12: Off-street multi-use paths** – Improve the sidewalks to allow place for less-confident bicyclists and pedestrians to use buffered paths simultaneously.
- **Strategy 13: On-street Bicycle Treatments** - Duplicate the dedicated bicycle lanes and markings of Maple Street on Beech Street.

Physical Roadway Capacity

- **Strategy 22: New Roadways** – Parallel roads connecting South Commercial Street and Elm Street to Sundial Avenue and Willow Street.

NH Route 28

AM Moderate Congestion locations and causes:

- **Beech Street* to I-293 Interchange-** *Southbound:* Seasonal; Commuter peak; Special events; Signal coordination or timing.
- **Maple Street* to I-293 Interchange-** *Northbound:* Seasonal; Commuter peak; Special events; Signal coordination or timing.
- **I-293 Interchange to Goffs Falls Rd – Huse Road -** *Northbound:* Seasonal; Commuter peak; Special Events; Access Management

**Beech and Maple are one-way pairs parallel in the downtown area. Originally two-lanes wide for automobiles, Beech Street now has a dedicated bike-lane southbound.*

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 8- Transit Service Expansion –** The downtown area of the route would benefit from increased bus frequency (headway speeds) and potentially relieve congestion at certain peak times.
- **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 Capabilities:

- **Strategy 16- Intersection Turn Lanes -** *Hooksett Road (Route 3), Beech Street and Webster Street* intersection - This complex and high-volume intersection could potentially facilitate better traffic flow with improved turn lanes. A study should be conducted to look at intersection improvements.
- **Strategy 17- Roundabout Study –** *Hooksett Road (Route 3), Beech Street and Webster Street* intersection -This complex and high-volume intersection could potentially facilitate better traffic flow with a roundabout. A study should be conducted to look at intersection improvements.
- **Strategy 18- Auxiliary/Accel/Deceleration Lanes –** *I-293 Interchange*- Provide lane extensions on the approaches to the on ramps to I-293 near the Mall of New Hampshire.

NH Route 28

NH Route 28 ***in Londonderry and Derry:***

AM Congested locations and causes:

- **Exit 5 Interchange** – *Northbound and Southbound:* Commute; Work Zones; Signal Timing
- **Tsienneto Road Intersection –** *Northbound and Southbound*: Commute; Signal Timing
- **NH-102 to Tsienneto Road** – *Northbound:* Seasonal; Commuter Peak; Traffic Incidents; Signal Timing

Strategies:

Active Roadway Management:

- **Strategy 1- Expanded Traffic Signal Timing and Coordination – ITS –** The signals' in the vicinity of the Exit 5 interchange may need signal timing optimization and/or transition to adaptive control.
- **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** - Although there are not many, there are opportunities to consolidate or remove driveway access points, providing a marginal improvement to motor vehicle flows.

Travel Demand Management:

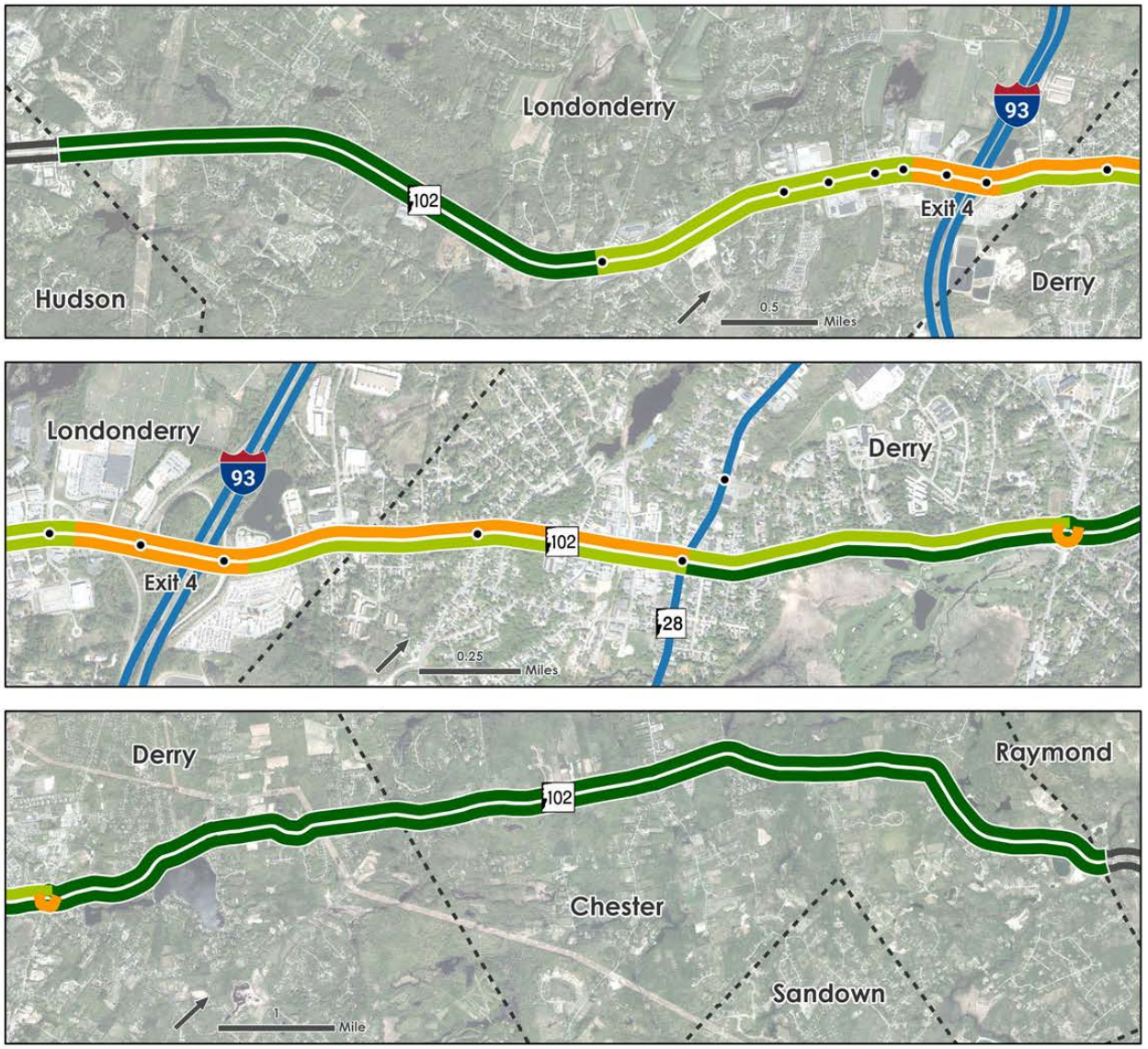
- **Strategy 12- Off-street Multi-use Path** –Continue the development of the Granite State Rail Trail which runs adjacent to the Route 28 corridor in Londonderry.
- **Strategy 13- On-street Bicycle Facilities** – Evaluate the opportunity, add bike lane marking and provide wider shoulders where necessary to accommodate bicycle commuting between Derry and Manchester. Wide shoulders exist on much of Route 28 in these segments from the Mall of New Hampshire south to Derry.

Physical Roadway Capacity:

- **Strategy 16- Intersection Turn Lanes - I**mplement the Exit 4A recommendations that impact this intersection.
- **Strategy 22- New Roadways –** Implement the Exit 4A recommendations that impact this intersection.

NH Route 102

AM Peak



NH Route 102
Travel Time Index
Weekday AM Peak Period

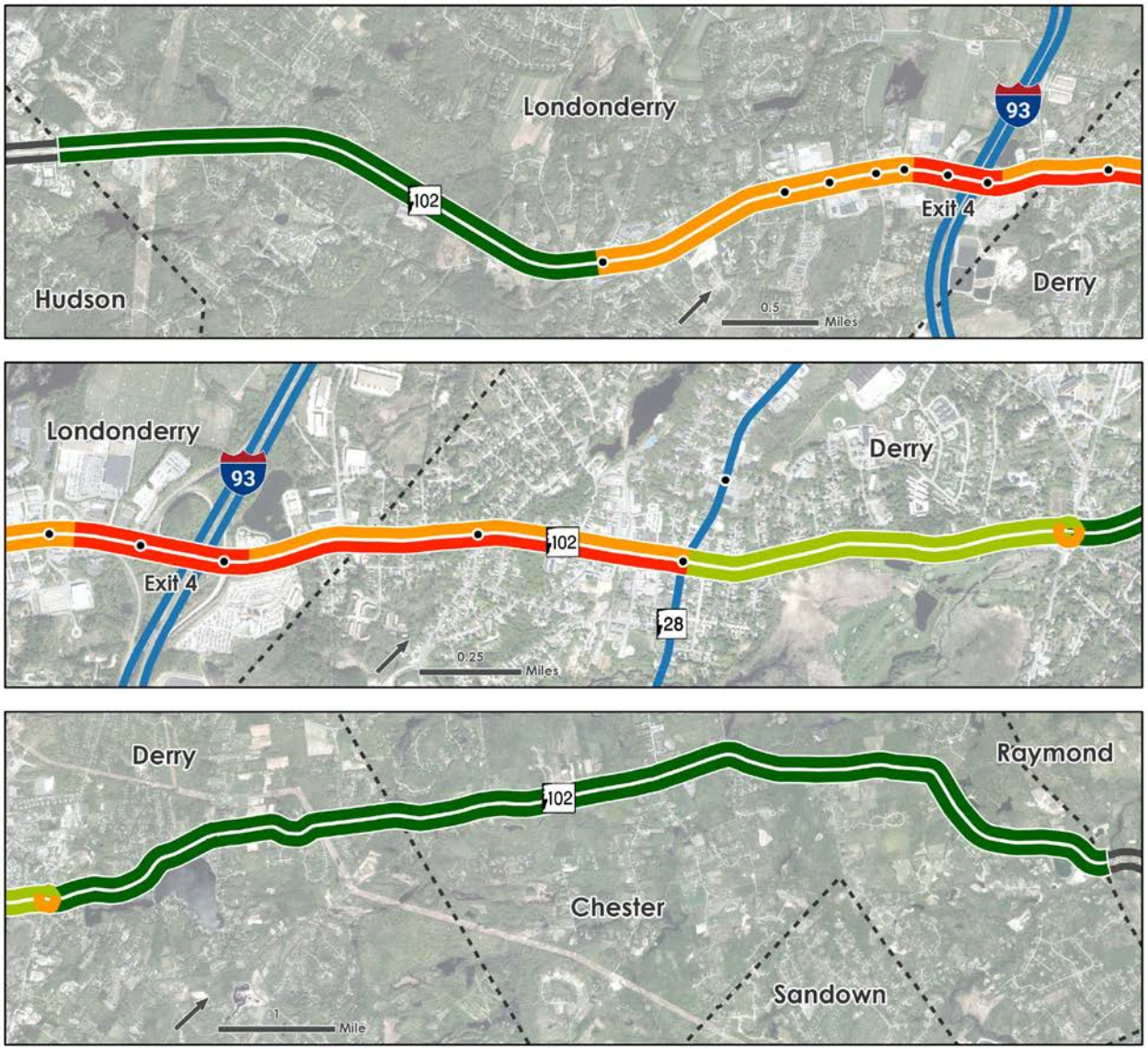
- No Congestion (1 or Less)
- Minimal Congestion (1 to 1.25)
- Moderate Congestion (1.25 to 1.5)
- Congested (Greater than 1.5)
- CMP Network
- CMP Routes Outside Region
- Signalized Intersection

SNHPC

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.

NH Route 102

PM Peak



NH Route 102
Travel Time Index
Weekday AM Peak Period

- 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

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.

Strategies:

Active Roadway Management:

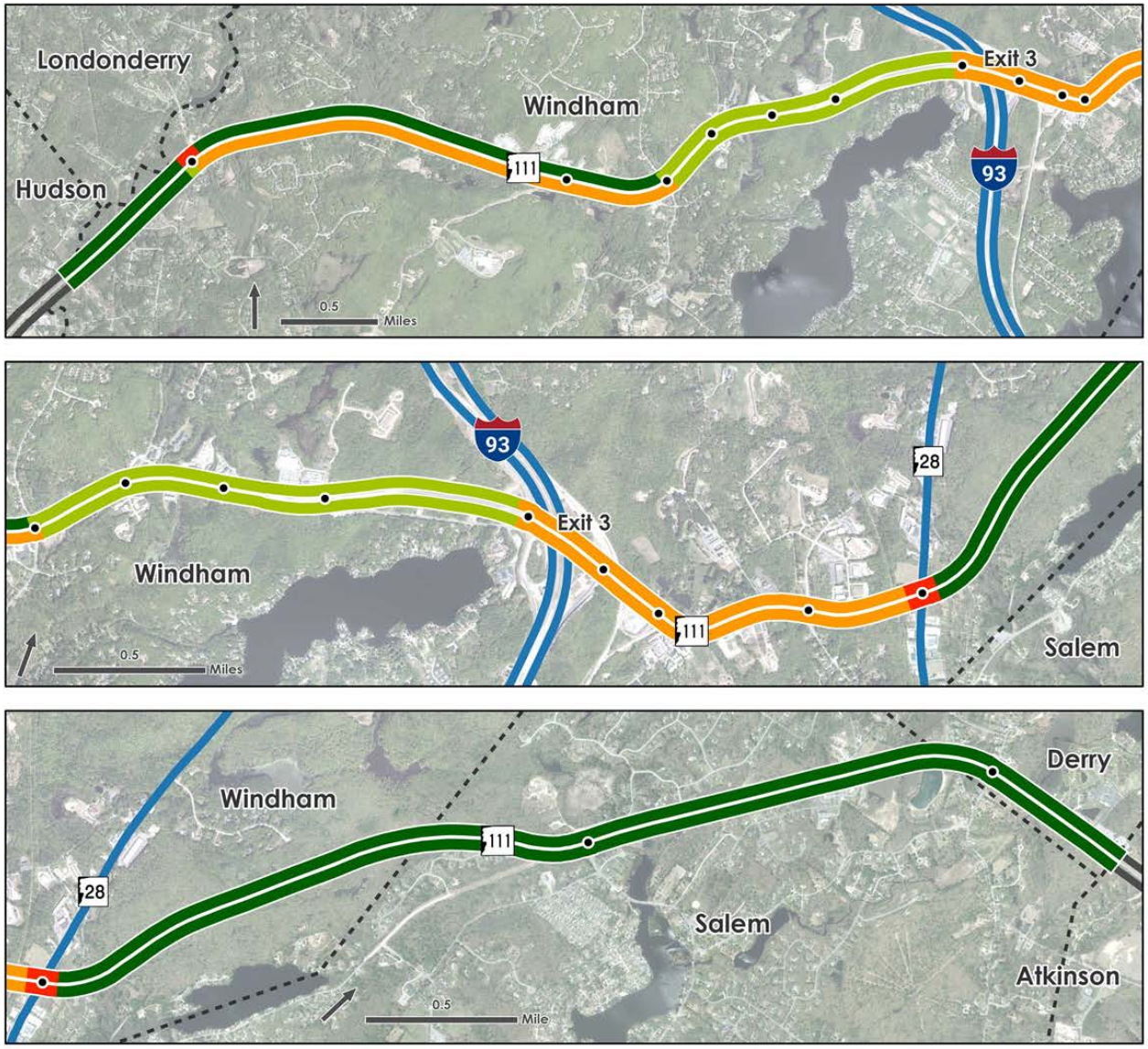
- **Strategy 1- Expanded Traffic Signal Timing** - Upgrade and coordinate signals and controllers. The corridor

Physical Roadway Capacity:

- **Strategy 13- On-street bicycle treatments –** Considering the proximity of 102 to the high school in Derry, add bicycle infrastructure to 102 where not present
- **Strategy 17- Roundabout (new, replace)** – Update the rotary to a modern roundabout with slow entry and exit geometry and provide safe crosswalks, lighting and bicycle infrastructure.

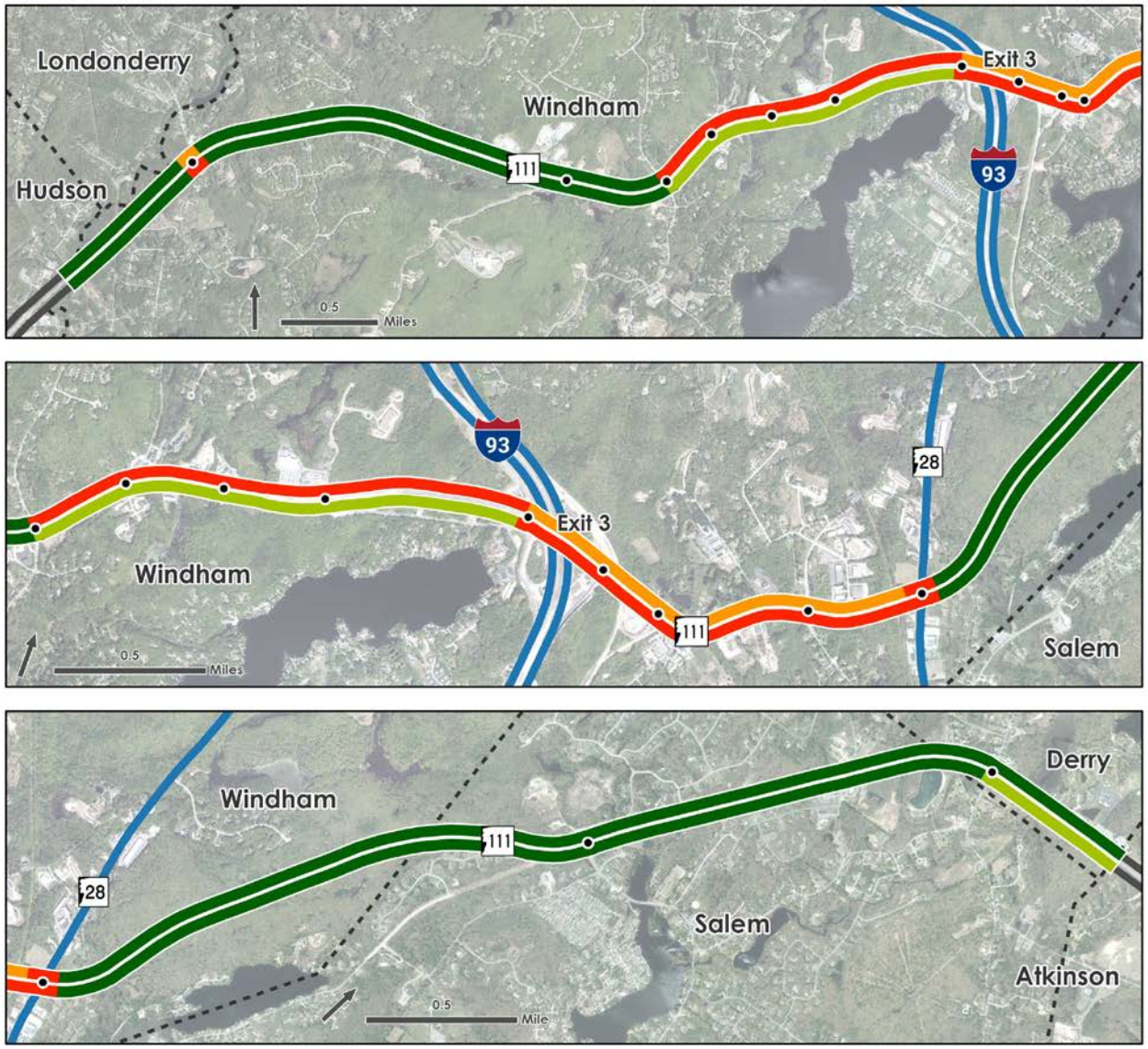
NH Route 111

AM Peak



NH Route 111

PM Peak



Strategies:

Active Roadway Management:

- **Strategy 1- Expanded Traffic Signal Timing** – Upgrade signals and if possible coordinate signals with upstream (northerly)nearby signals. The moderate congestion appears to be related to the signal at peak travel times.

- **Strategy 2 - Traffic Signal Equipment Modernization – ITS(2)** – There are several signals in the corridor that may need upgrading to handle coordination or adaptive control.

Travel Demand Management:

- **Strategy 8- Transit service expansion –** When warranted, add commuter bus service between Salem and Nashua (NH Transit Study, 2019)

Congestion Management Process

Discussion and Questions

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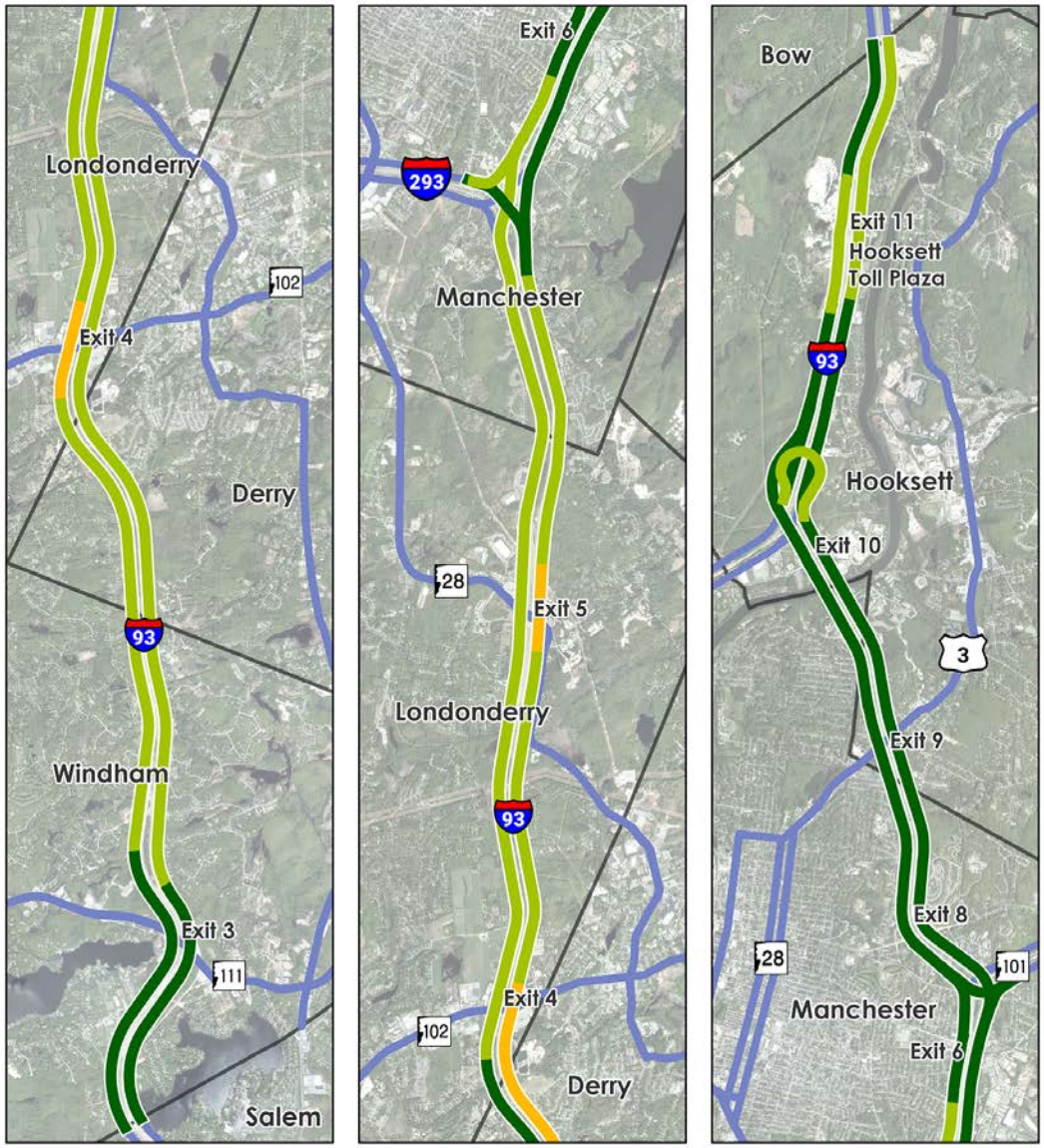


Interstate 93
Travel Time Index
Weekdays 3-6 pm

- 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

0 1 Miles

SNHPC

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

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, guarenteed ride home
	Transit	Subsidized fares, trip itinerary planning
	Bicycles & Pedestrians	Bike share networks, seemless transit connections, bike parking and lockers
	Freight	Truck only lanes, delivery resrictions
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	Seperated facilities, Bike share networks, widened/new sidewalks, ne/expanded sidewalks, new/expanded trail networks
	Freight	Truck only lanes, rail improvements

NH-114

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

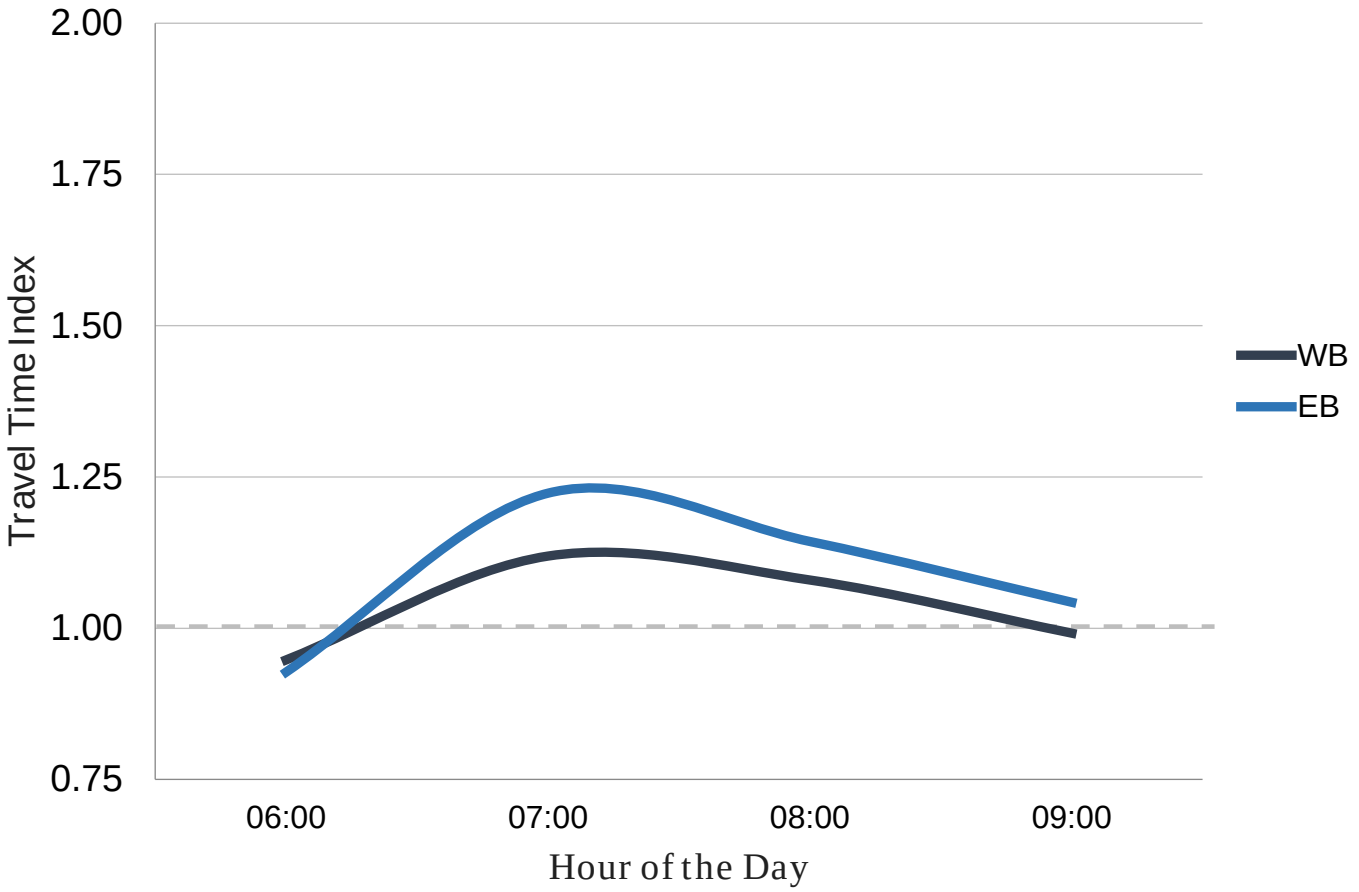
	06:00	07:00	08:00	09:00	15:00	16:00	17:00	18:00
Southbound	1.07	1.40	1.27	1.19	1.22	1.28	1.24	1.19
Northbound	1.38	1.50	1.46	1.43	1.63	2.09	1.90	1.79

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

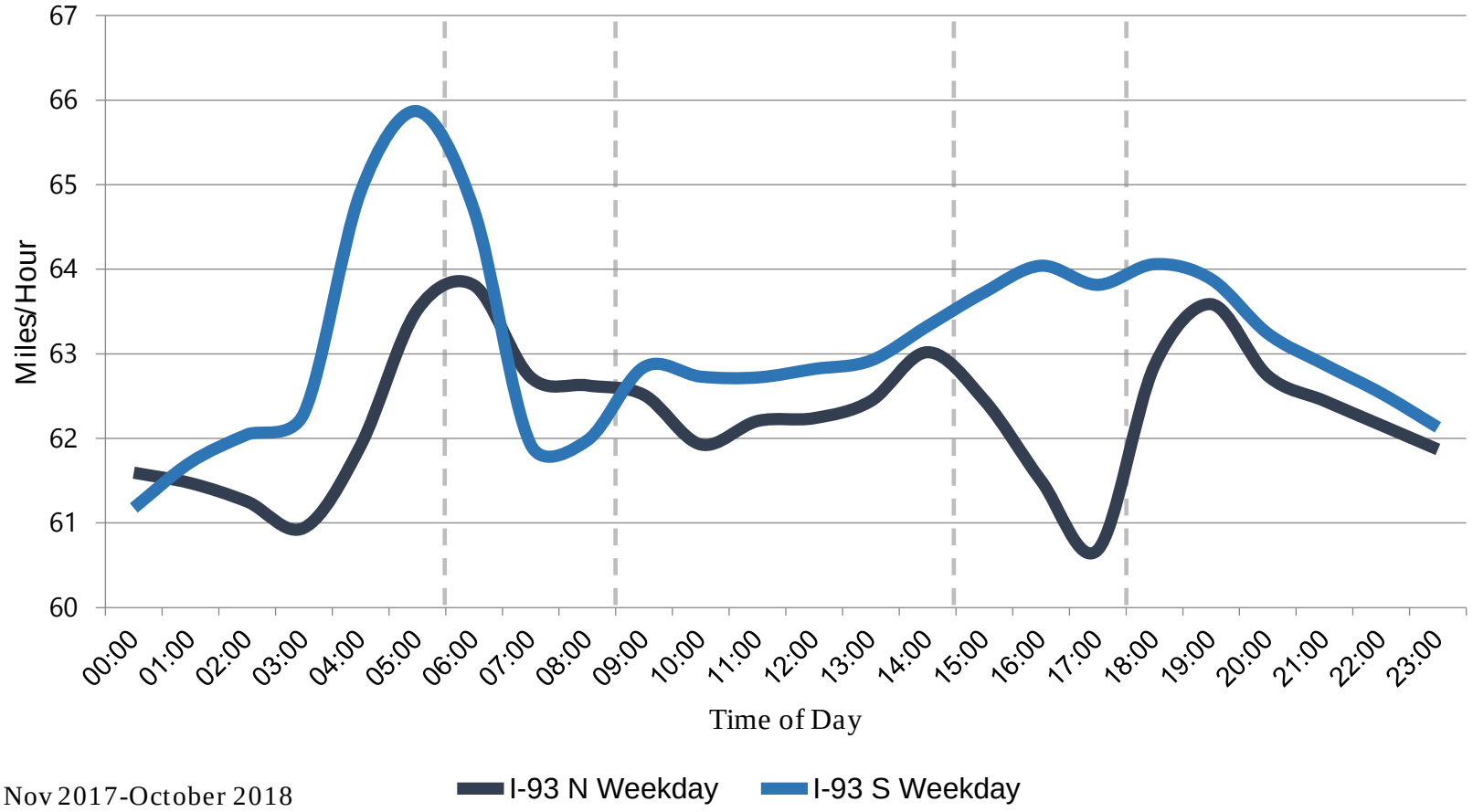
Windham-Hudson Line to I-93 Junction (Windham)



January 2018-July 2019

Sources: CATT Lab; INRIX.

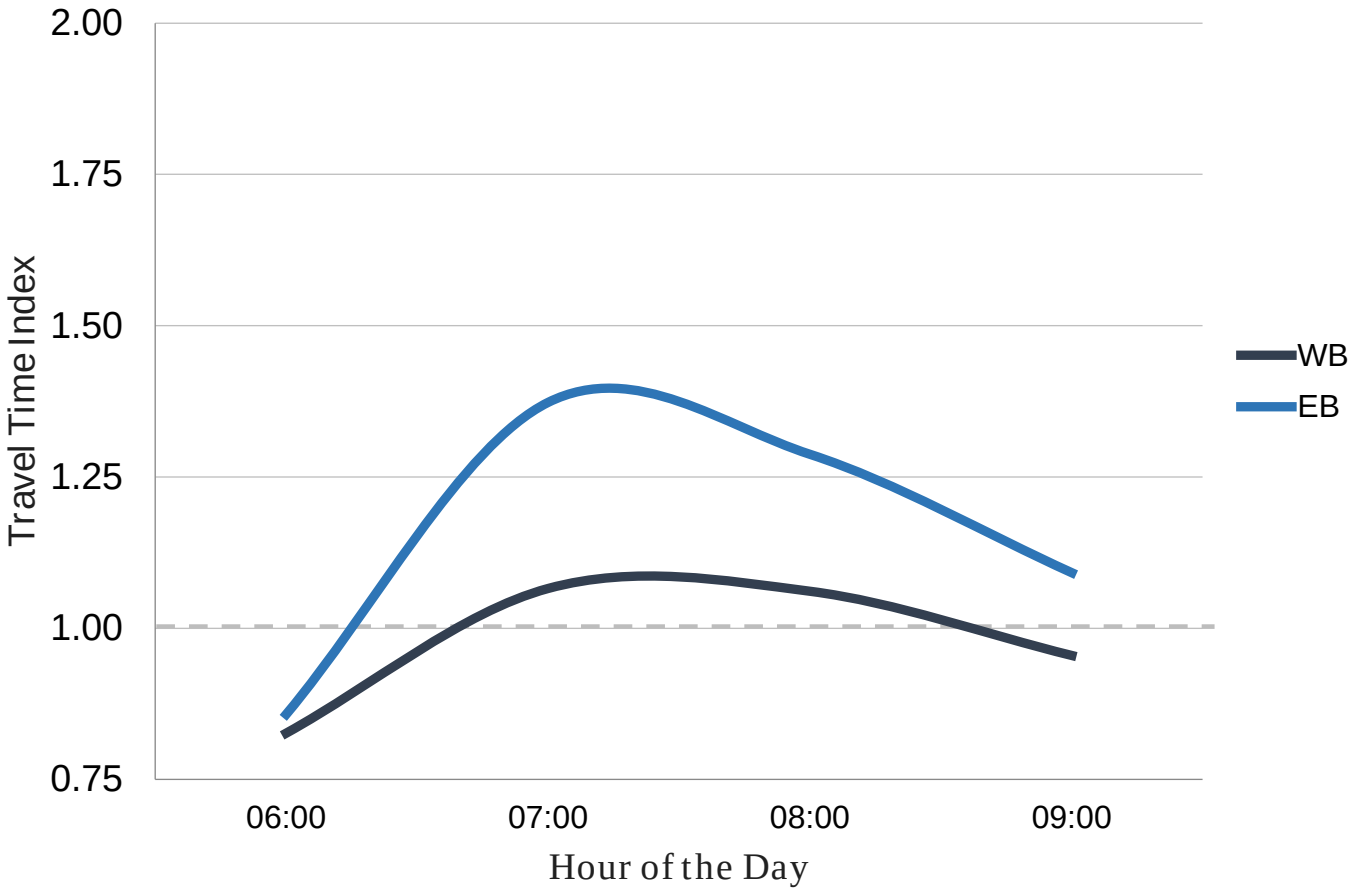
I-93 Average Speed: Southern NH Planning Commission Region



Nov 2017-October 2018

NH-101 Morning Travel Time Index

Bedford-Amherst Line to NH-114 Junction (Bedford)

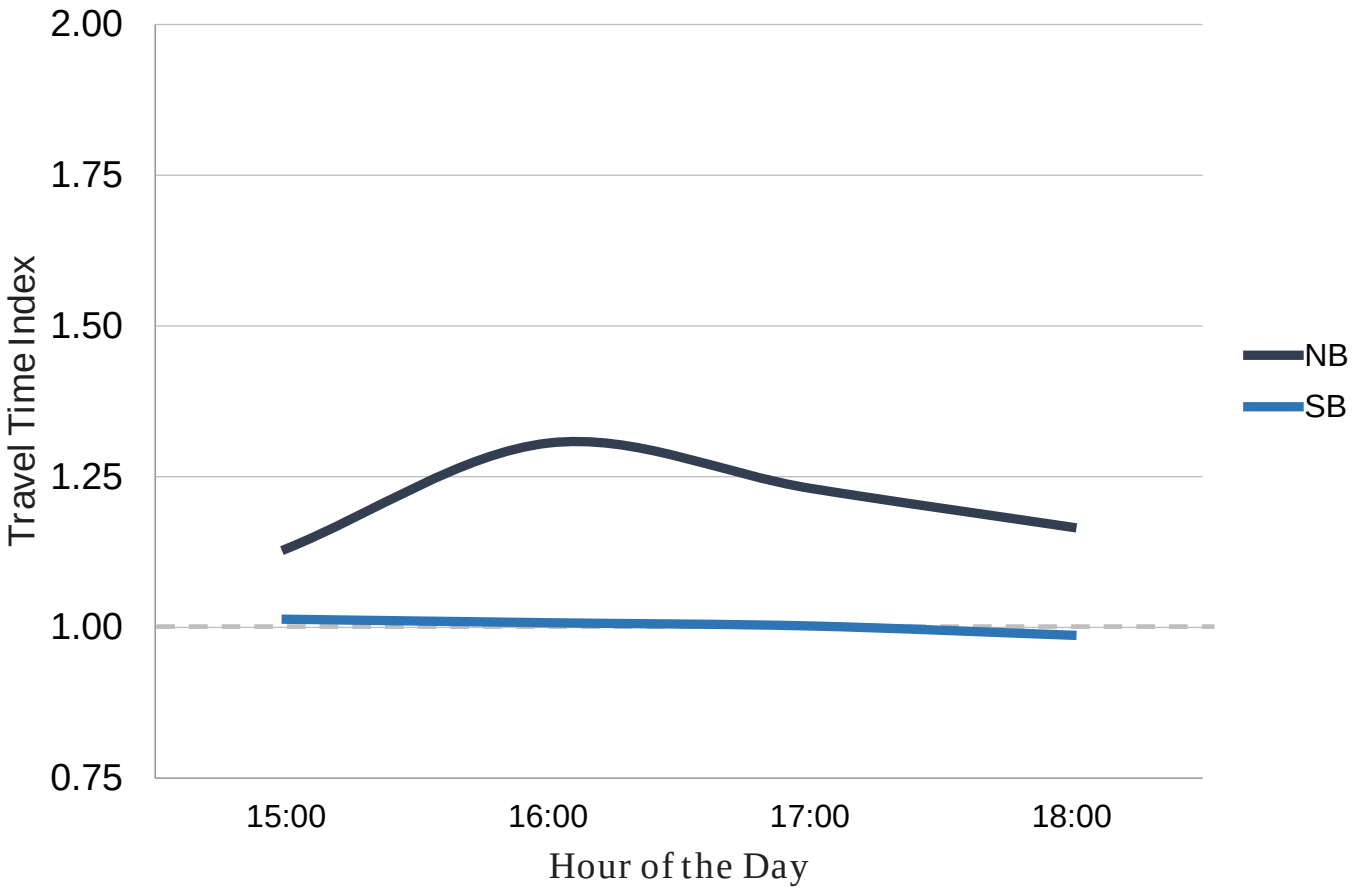


January 2018-July 2019

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.