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

1. Develop Regional Objectives
2. Define CMP Network
3. Develop Multimodal Performance Measures
4. Collect Data/Monitor System Performance
5. Analyze Congestion
6. Identify and Assess Strategies
7. Program and Implement Strategies
8. Evaluate Strategy Effectiveness

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
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
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.

<table>
<thead>
<tr>
<th>Amount of Congestion</th>
<th>Observed Speed</th>
<th>Average Free-flow-Speed</th>
<th>TTI</th>
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<td>10 min.</td>
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<td>≤1</td>
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<tr>
<td>Mild Congestion</td>
<td>12.5 min.</td>
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<tr>
<td>Moderate Congestion</td>
<td>15 min.</td>
<td>10 min.</td>
<td>&gt;1.25≤ 1.5</td>
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<tr>
<td>Congestion</td>
<td>15 plus min.</td>
<td>10 min.</td>
<td>&gt;1.5</td>
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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”

<table>
<thead>
<tr>
<th>Roadway Management Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>① Traffic Signal Timing or Coordination Improvements</td>
</tr>
<tr>
<td>② Traffic Signal Equipment Modernization</td>
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<tr>
<td>③ ITS - Traveler Information Devices</td>
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<td>④ ITS - Communications Network and Roadway Monitoring</td>
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<table>
<thead>
<tr>
<th>Transit and Travel Demand Management Strategies</th>
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<tr>
<td>⑤ Parking Management</td>
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<td>⑥ Dedicated Transit Lanes</td>
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<tr>
<td>⑦ Transit Service Expansion</td>
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<tr>
<td>⑧ Transit Signal Priority</td>
</tr>
<tr>
<td>⑨ Electronic Toll or Fare Collections</td>
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<table>
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<tr>
<th>Physical Infrastructure Improvement Strategies</th>
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<tbody>
<tr>
<td>⑩ Off-street Multi-use Path</td>
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<tr>
<td>⑪ On-street Bicycle Treatments</td>
</tr>
<tr>
<td>⑫ Park &amp; Ride Facility</td>
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<tr>
<td>⑬ Access Management</td>
</tr>
<tr>
<td>⑭ Intersection/Interchange Reconfiguration or Improvements</td>
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<tr>
<td>⑮ Roundabout Conversion</td>
</tr>
<tr>
<td>⑯ Auxiliary/Acceleration/Deceleration Lanes or Ramp Improvements</td>
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<tr>
<td>⑰ New Grade-separated Intersections/Interchanges</td>
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<td>⑱ New Travel Lanes</td>
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<tr>
<td>⑲ New Roadways</td>
</tr>
<tr>
<td>⑳ Engineering and/or Operations Study</td>
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</tbody>
</table>
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
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 293

AM Peak
Intersate 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
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

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: CBT Lab; Google Maps; INRIX; NH Department of Transportation; University of New Hampshire and US Census Bureau.
NH Route 101

PM Peak

NH Route 101
Travel Time Index
Weekday PM 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

Created by SNHPC, 2019. Congestion figures reflect median average hourly travel time index values for January 2018 through July 2019. Sources: CAT Lab; Google Maps; NEXUS, NH Department of Transportation; University of New Hampshire and US Census Bureau.
**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

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.
NH Route 114

PM Peak

NH Route 114
Travel Time Index
Weekday PM 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

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: CAT Local Google Maps; INRIX; NH Department of Transportation; University of New Hampshire; and US Census Bureau.
Roadway Management Strategies:

• **Strategy 1 – Traffic Signal Timing or Coordination Improvements**
  o 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**
  o Extend commuter bus service along the NH Route 114 corridor linking Weare and Goffstown to Bedford and Manchester.

• **Strategy 12 - Park & Ride Facility**
  o 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**
  o 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.
  o 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

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.
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.
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.
**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

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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
SNHPC CMP Network

Morning TTI
https://arcg.is/u5SPz

Evening TTI
https://arcg.is/0DSGvr
## Example CMP Strategies

<table>
<thead>
<tr>
<th>Improvement Type</th>
<th>Travel Alternatives</th>
<th>Land Use</th>
<th>Pricing</th>
<th>HOV</th>
<th>Transit</th>
<th>Bicycles &amp; Pedestrians</th>
<th>Freight</th>
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<tbody>
<tr>
<td>Travel Demand Management</td>
<td>Non-single occupancy vehicle incentives, telecommuting, alternate work schedules</td>
<td>Smart growth, Transit Oriented Development, parking strategies</td>
<td>High Occupancy Toll Lanes, pricing for time of day, activity centers, parking</td>
<td>Rideshare matching, van pools, guaranteed ride home</td>
<td>Subsidized fares, trip itinerary planning</td>
<td>Bike share networks, seamless transit connections, bike parking and lockers</td>
<td>Truck only lanes, delivery restrictions</td>
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<td>Land Use</td>
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<td>Automatic Vehicle Location (AVL), signal priority, que jumping/bypasses, express service, variable message signs</td>
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<td><strong>Freight</strong></td>
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<tr>
<td>Highway</td>
<td>Widened or new roads/lanes, toll roads and lanes, managed lanes</td>
<td>New bus routes, services or rail lines, (busways/BRT), Additional services and route frequencies</td>
<td>Separated facilities, Bike share networks, widened/new sidewalks, new/expanded trail networks</td>
<td>Truck only lanes, rail improvements</td>
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<tr>
<td>Transit</td>
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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

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

January 2018-July 2019
Sources: CATT Lab; INRIX.
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.