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Introduction

The Baltimore Regional Transportation Board (BRTB), as the metropolitan planning organization (MPO) for the Baltimore region, is required to implement a Congestion Management Process (CMP) as part of its metropolitan transportation planning process. Rather than a stand-alone management system that simply collects and reports data on congestion, the CMP is intended to be an integral component of the transportation planning process.

The CMP should function as a systematic, regionally accepted approach to identify the causes of congestion and develop solutions to address congestion problems. By collecting accurate, up-to-date information on transportation system performance, analyzing the causes of congestion, providing clear objectives in managing congestion, and assessing strategies to meet those objectives, the CMP is intended to move potential solutions into the funding and implementation stages.

Since the CMP is intended as a regional process that is fully integrated into the metropolitan transportation planning process, development of the CMP should engage a wide array of stakeholders who play an important role in transportation planning and operations within the region. In fact, the CMP development offers an opportunity to engage a wide array of stakeholders at the state and local levels, as well as federal partners and private industry.

It also offers an opportunity to broaden the traditional partner focus to include system operators and staff who focus on Transportation Systems Maintenance and Operation (TSMO), including partners involved in intelligent transportation systems (ITS), demand management, and emergency management.

A CMP Steering Committee was convened for this project to provide input and guidance and serve as the main conduit for coordination with regional partners. The CMP Steering Committee is comprised of representatives from local planning, transportation, public works, and emergency management agencies as well as state and federal transportation agencies.
Using This Guide

This guide was developed to illustrate congestion management strategies for the Baltimore region to consider implementing to address identified congestion or mobility issues; the strategies support the regional CMP objectives. The guide organizes individual congestion management strategies into broad categories:

- Demand Management & Regional
- Pricing
- Land Use
- Transportation Systems Management Operations (TSMO)
- Public Transportation
- Bicycle/Pedestrian/Micro-Mobility
- Road Capacity

Under each category, individual congestion management strategies are described. Descriptions include examples of where the strategy has been implemented, an overview of facilities or contexts where the strategy may be applied, and which CMP objectives are addressed. Following the full list of strategies, each CMP objective is presented along with a list of applicable strategies, which may be used to help support selection of strategies to help address different types of congestion or mobility challenges.

CMP Objectives

As part of the CMP development, regional congestion management objectives were identified that support the regional goals and objectives. These objectives define what the region wants to achieve and are an essential part of an objectives-driven, performance-based approach that supports the regional transportation planning process.

Congestion management objectives should draw from the regional vision and goals that are articulated in the metropolitan transportation plan. These objectives serve as a primary point of connection between the CMP and the metropolitan transportation plan and should reflect what the public and stakeholders value. The objectives also serve as a basis for defining performance measures to measure progress toward these objectives.
## Congestion Management Objectives

<table>
<thead>
<tr>
<th>Objective</th>
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<tr>
<td>Enhance access to jobs and other opportunities</td>
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<tr>
<td>Improve travel times and reduce traveler delay on all modes of travel</td>
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<td>Improve travel time reliability (consistency and predictability of travel times) and resiliency for motorists and transit</td>
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<td>Improve freight reliability</td>
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<td>Enhance travel choices, including access to transit, safe and convenient bicycling and walking, and other alternatives to driving alone</td>
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<td>Reduce traffic incidents that contribute to traveler delays and loss of life or injury</td>
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<tr>
<td>Enhance inter-jurisdictional coordination to optimize transportation system performance</td>
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## Applicability

The applicability identifies five options that provides context recommendations of where strategies may be applied. These options include highway, arterial, local, rail, and non-roadway specific. The intent is to identify the appropriate contexts for each strategy.

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<tr>
<th>Context</th>
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<th>Rail</th>
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## Objectives

Optimize Transit  
Real-Time Transit Data  
Transit Trip Planner  
Enhanced Transit-Supportive Infrastructure  
Universal Farecards  
Bus Rapid Transit  
Expanded Transit Network  
Increase Transit Frequency/Service  
Transit Priority Treatments  
First/Last Mile Connections  
Ferry Boats

## Strategies

### Public Transportation Strategies

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<thead>
<tr>
<th>Strategy</th>
<th>Optimize Transit</th>
<th>Real-Time Transit Data</th>
<th>Transit Trip Planner</th>
<th>Enhanced Transit-Supportive Infrastructure</th>
<th>Universal Farecards</th>
<th>Bus Rapid Transit</th>
<th>Expanded Transit Network</th>
<th>Increase Transit Frequency/Service</th>
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<td>Intersection Improvements</td>
<td>Freight Network Upgrades</td>
<td>Freight Rail/Port Capacity</td>
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<td>Operational Improvements</td>
<td>New HOV or HOT Lanes</td>
<td>Removing Bottlenecks</td>
<td>Adding Turn Lanes</td>
<td>Grade Separated Intersections</td>
<td>Closing Network Gaps</td>
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Demand Management & Regional Strategies

Demand Management is an approach to managing traffic congestion that promotes the use of available transportation resources and infrastructure already in place. The focus of demand management is on providing traveler choices by promoting alternatives to driving alone (such as carpooling, vanpooling, transit, bicycle, or walking), options that reduce the need to travel (such as telecommuting, compressed work week schedules, or combining trips), and shifting travel from congested to less congested times or routes. Demand Management strategies are often programs and policies that manage demand on the transportation system and promotes more efficient modes of travel with the overall goal to improve travel reliability.

Employer Outreach Programs

Programs that partner with employers to encourage transit use, ridesharing/carpooling, or bicycling to get employees to jobsites; strategies include marketing/outreach for transit, travel demand management services, carpool matching programs, and employee incentives for carpooling or using transit, in an effort to reduce the burden on the transportation system.

Examples

Commuter Choice Maryland offers employers monthly pass distribution options which encourage employees to ride MTA CityLink, LocalLink, Commuter Bus, Light RailLink, Metro SubwayLink, and MARC Train for less than full fare.

Applicability

CMP Objectives
Commuter Benefits Policies

Policies that require or encourage employers to offer commuter benefits programs – either pretax employee-paid, or employer-paid – that incentivize employees to use transit, carpool/vanpool, or bike to work, and thereby ease congestion.

Examples
Permanent Maryland State employees are entitled to use MTA's BaltimoreLink at no charge with a valid State ID card. In Washington D.C. there is an ordinance that requires all D.C. companies with 20 or more employees to offer Commuter Benefits for transit to their employees (D.C. Commuter Benefits Law is part of the Sustainable D.C. Omnibus Amendment Act of 2014).

Applicability

CMP Objectives

Parking Cash Out Policies

Policies that require employers that offer parking benefits to also offer a cash-out option to employees, to de-incentivize commuting by single-occupancy vehicle.

Examples
The University of Maryland parking cash-out program (implemented 2019/2020 academic year) offers incentives to the first 75 staff members and the first 25 graduate students who agreed to give up their parking pass for the entire academic year.

Applicability

CMP Objectives
Regional Coordination

Congestion occurs on state, county, and city operated roadways and between jurisdictional boundaries. Inter-jurisdictional coordination among state and local agencies can lead to more effective congestion management solutions for specific corridors and within the region.

Examples

The CMP Steering Committee is comprised of representatives from MDOT Transportation Business Units and all jurisdictions in the region. The Steering Committee works to guide the development for the regional CMP.

Applicability

CMP Objectives

Additional Resources

FHWA Integrating Demand Management
FHWA Congestion Control and Demand Management
MWCOG Demand Management Strategies
Pricing Strategies

Pricing is an approach to managing the overall demand during the peak demand hours and can be applied to managing the number of vehicles traveling on roadways/highways during the peak period or managing the parking demand. The goal of pricing strategies is to reduce or shift the demand (discretionary trips or parking) to off-peak periods or to other modes of travel allowing traffic to flow more efficiently. Shifting a portion of the demand provides a more reliable travel time and reliability of available parking during the peak and off-peak period.

Value/Congestion Pricing

Pricing roads or lanes to encourage travel during off-peak hours, in high-occupancy vehicles, in environmentally friendly vehicles, or using other modes of travel to ease congestion.

Examples
The Intercounty Connector (MD 200) in Montgomery and Prince George’s Counties, Maryland and I-95 in Baltimore, Maryland are all-electronic toll roads with variable prices to manage volumes.

Applicability

CMP Objectives
Demand-Responsive Parking Pricing

Demand-responsive parking pricing, fluctuating block-by-block and time of day or week to improve reliability of available parking and encourage travel by alternative modes.

Examples
The Parking Authority of Baltimore City started using demand for parking spaces to determine the hourly parking meter rate on blocks in Central Downtown. Using data collected every six months, the Parking Authority adjusts rates to help create one or two available parking spaces on each block.

Applicability

CMP Objectives

VMT Fees
A mileage-based user fee that charges motorists based on the number of vehicle miles traveled, in some cases as an alternative to collecting fuel taxes, to encourage more efficient travel and reduce total miles traveled on roadways.

Examples
I-95 Corridor Coalition Mileage-Based User Fee Pilot Study. i95coalitionmbuf.org

Applicability

CMP Objectives

Additional Resources

FHWA What is Congestion Pricing?
FHWA Overview of Parking and Access Pricing Strategies
Land Use Strategies

Land Use management is an approach to addressing traffic congestion by effectively managing and directing growth. Land Use strategies aim to improve travel efficiency and reduce vehicle travel by developing more efficient land use patterns that support the need for fewer and shorter vehicle trips, and support use of transit, bicycling, and walking.

Land Use Controls

Update zoning and land use policies to support and encourage mixed use development and transit-friendly and walkable neighborhoods that reduce the number of trips needed by car.

Examples

Howard County has an Adequate Public Facilities Ordinance that is designed to direct growth to areas where adequate infrastructure exists or will exist.

Applicability

CMP Objectives

Growth Management

Establish a regional or county-level boundary to control urban sprawl and promote higher-density development that facilitates travel by transit, walking, or biking.

Examples

Maryland Department of Planning designated Priority Funding Areas. Howard County has an Agricultural Land Preservation Program designed to preserve farmland in the rural west part of the county and focus growth in other parts of the county.

Applicability

CMP Objectives
Transit-Oriented Developments

Newly constructed or redeveloped commercial or residential properties located near a transit stop or hub to facilitate travel by transit, enabled by zoning or other incentives.

Examples
The 2006 Comprehensive Master Plan for the City of Baltimore outlines a strategy for implementing projects around transit stations that meet Transit-Oriented Development (TOD) objectives. Additionally, the City of Baltimore Development Guidebook contains a checklist for TOD to guide Baltimore City agencies in reviewing proposed projects near transit stations, and in assessing the transit-friendliness of land-use plans, codes, and ordinances.

Applicability

High-Density Development Incentives

Using density bonuses to allow developers to build beyond zoned densities if they provide certain amenities, or tax incentives or create special tax districts to finance infrastructure improvements and/or development, all with the goal to reduce the number of trips by car.

Examples
Montgomery County, Maryland requires 12.5 percent of all new residential units be affordable but the required affordable percentage rises to 15 percent for projects that take advantage of the County’s density bonus program.

Applicability

CMP Objectives

Strategy Categories - Land Use Strategies
Policies to reduce or remove parking minimums and allow developers to offer alternative solutions to providing access and to de-incentivize driving.

**Examples**
San Francisco Parking Policy Reforms set requirements and limits on existing parking and new parking facility development.

Chattanooga Area Regional Transit Authority developed peripheral parking garages and provided free shuttle service on either end of the business district.

**Applicability**

**CMP Objectives**

**Additional Resources**

- [FHWA Linking Transportation and Land Use](#)
- [TRB Transportation and Land Development – A Look Forward](#)
- [FHWA Freight and Land Use Handbook](#)
- [Transit-Oriented Development in Maryland](#)
Transportation Systems Management and Operations (TSMO) strategies are intended to effectively manage and operate existing facilities and systems. The strategies focus on maximizing the performance of the existing transportation facilities and infrastructure by improving system efficiency, reliability, and safety.

**Incident Management**

Programs to effectively manage the response to incidents and reduce incident clearance time to reduce congestion impacts.

**Examples**

MDOT’s Coordinated Highways Action Response Team (CHART) focuses on mitigation of non-recurring congestion due to crashes, breakdowns, and weather.

**Traffic Signal Coordination**

Coordinates a system of traffic signals to improve the operation of one or more directional movements that eases congestion by keeping traffic moving.

**Examples**

In 2016, MDOT SHA’s Signal Retiming Program reduced delay by 875,000 hours and saved 231,000 gallons of fuel. In the Baltimore region, MD 139 - I-695 Ramps to Kenilworth Drive experienced a significant reduction in vehicle hour delay.
Adaptive Traffic Signals
System that continuously monitors traffic conditions and dynamically adjusts the signal timing to optimize one or more operational objectives to improve traffic flow, best suited for arterials that experience high variability or unpredictable traffic demand.

Examples
Installed as part of MDOT's “Smart Signals” program at MD 2 in Annapolis, MD 3 in Crofton, and MD 22 in Aberdeen, Maryland.

Applicability

CMP Objectives

Adaptive Ramp Metering
Traffic signals installed on freeway/highway entrance ramps to control the frequency at which vehicles enter the highway and facilitate traffic flow to improve the efficiency and optimize the operations.

Examples
Several ramp meter locations along I-270 from I-70 to I-495 included as part of the I-270 Innovative Congestion Management program, in Montgomery and Frederick Counties, Maryland.

Applicability

CMP Objectives
**Active Traffic Management**

System that actively monitors traffic and roadway conditions and manages recurring and non-recurring congestion through dynamic messaging and lane control, enhanced detection, and queue warnings.

**Examples**
Dynamic messaging is used on the I-95 corridor in the Baltimore region to provide information on travel times, accidents, and lane closures.

**Applicability**

**CMP Objectives**

**Real-Time Truck Parking Information**

Uses real-time data showing availability of suitable and safe parking spaces for freight vehicles to reduce unnecessary delays in finding parking, reduce freight cost, and improve safety for all motorists.

**Examples**
Illinois Department of Transportation (IDOT) has introduced a Truck Parking Information Management System (TPIMS) Project. A total of 53 IDOT Rest Areas will receive TPIMS that will include improved video security systems, electronic information kiosks, and automated truck parking counting systems.

**Applicability**

**CMP Objectives**
**Truck Weigh Technology**
Uses technology, weigh-in-motion or virtual weigh station devices, that capture and record truck axle weights and gross vehicle weights as they drive over a sensor, facilitating truck movement by removing the need to stop at a static weigh station.

**Examples**
Virtual weigh-in-motions stations along I-83 in Parkton, Maryland and US 301 in Galena, Maryland.

**Applicability**

**CMP Objectives**

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**Reversible Commuter Lanes**
Reversing the direction of travel on a two-way road to add peak direction capacity and decreases congestion by utilizing available land capacity from the off-peak direction.

**Examples**
Hanover Street from I-95 to MD 2 in Baltimore City, Maryland, US 29 in Silver Spring, Maryland, US 50 at the Chesapeake Bay Bridge, Maryland.

**Applicability**

**CMP Objectives**
Access Management
Reducing access points on roadways to minimize traffic disruption due to turning vehicles, weaving conflicts and improve traffic flow.

Examples
US 301/MD 304 interchange construction in Queen Anne’s County to reduce conflict points of traffic accessing US 301 from MD 304.

Applicability

CMP Objectives

Moveable Median Barriers
Providing a reversible lane during peak or other relevant periods controlled by a moveable median barrier to provide additional capacity.

Examples
The Delaware River Port Authority utilizes moveable barriers on the Walt Whitman Bridge, Ben Franklin Bridge, and Commodore Barry Bridge in the Philadelphia region.

Applicability

CMP Objectives
**Electronic Toll Collection**

System that electronically charges a toll to an established customer account or by pay-by-plate eliminating the need to stop at a toll plaza and improving the traffic flow through the toll facilities.

**Examples**
US 40 at the Hatem Bridge, I-695 at the Francis Scott Key Bridge, US 50 at the Chesapeake Bay Bridge, MD 200 Intercounty Connector.

**Applicability**

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**CMP Objectives**

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**Hard Shoulder Running**

Vehicles temporarily use the shoulder lane during peak periods and in response to incidents or other conditions as warranted to improve traffic flow.

**Examples**
Use of inside shoulder lane on I-695 as a new travel lane during peak period as part of the proposed I-695 TSMO Project.

**Applicability**

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**CMP Objectives**

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Restrict Intersection Movements

Restricting turning movements along a mainline roadway at key intersections during peak periods to reduce vehicle conflict and improve traffic flow.

Examples
MD 139 (Charles Street) in Baltimore, Maryland.

Applicability

CMP Objectives

Geometric Improvements

Design improvements on roadways and at intersections to increase capacity for motorists, pedestrians, and/or bicyclists.

Examples
Key Highway at Light Street intersection improvements includes sidewalk and ADA upgrades as well as Gwynns Falls Trail Extension, both in Baltimore, Maryland.

Applicability

CMP Objectives
One-Way/Two-Way Street Conversion

Converting two-way streets to one-way or one-way streets to two-way operations to improve multimodal accessibility, improve safety, and increase redundancy of the network, to improve reliability and reduce disruptions.

Examples
Allegheny County, Pennsylvania converted roadways in North Park to one-way with three separate travel ways, including a center lane for one-way vehicle flow, a parallel flow bike lane on the right, and a contra-flow bike lane on the left. This reduced vehicle/bicycle conflict to increase safety for all modes.

Applicability

CMP Objectives

Transit Signal Priority

Technology that communicates between a traffic signal and an approaching bus to give priority to the approaching transit vehicle to reduce delay at intersection and improve reliability.

Examples
BaltimoreLink uses transit signal priority at key intersections along York Road and Loch Raven Boulevard in Baltimore, Maryland.

Applicability

CMP Objectives
**Traveler Information Systems**
Dynamic message signs, traveler radio, or other platforms to inform motorists of changing roadway conditions, including delays or incidents, to reduce the impacts of congestion due to incidents.

**Examples**
MDOT CHART services, MD 511, and WAZE.

**Applicability**

**CMP Objectives**

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**Work Zone Management**
Use of sensors and infrared cameras installed on temporary traffic control devices to detect delays and incidents and to communicate information to emergency responders and transportation management centers to facilitate response and communications to travelers.

**Examples**
DDOT’s I-295 reconstruction utilized ITS in the form of 13 portable DMS, 8 portable speed sensors, 2 portable Remote Traffic Microwave Sensors, and cameras to allow DDOT to monitor traffic conditions and provide real-time work zone traffic information to users.

**Applicability**

**CMP Objectives**
Road/Weather Information Systems (RWIS)

RWIS stations installed along roadways have instruments and equipment that provide weather and road surface conditions to transportation management centers.

Examples
MDOT SHA CHART has over 50 local weather stations along Maryland roadways that provide data including air temperature, pavement temperature, wind speed and direction, humidity, dew point, and any precipitation type. This data is available to the general public on CHART’s website.

Applicability

Traffic Management for Special Events

Advanced planning and coordination to manage special event traffic, including sharing real-time information with other stakeholders to minimize disruptions.

Examples
Sporting and concert events at M&T Bank Stadium or Camden Yards in Baltimore, Maryland.

Applicability

CMP Objectives
Freight Management
Ensuring efficient freight loading and unloading systems to reduce detention time at facilities.

Examples
Seagirt Marine Terminal Modernization: Berth Improvements TIP project to modernize and improve the Seagirt Marine Terminal to allow freight to move more efficiently through the terminal.

Applicability

CMP Objectives

Off-Hours Delivery Programs
Encouraging goods delivery to businesses during off-peak hours to reduce truck traffic on roadways during congested periods.

Examples
The Off-Hour Deliveries (OHD) Program in New York City focuses on shifting truck deliveries from peak period to off hours (7pm to 6am). This allows trucks to avoid congestion, creating a more reliable travel and delivery time, reducing emissions, creating less double parking, and increased safety for trucks, pedestrians, and bicyclists.

Applicability

CMP Objectives
Public Transportation Strategies

Public Transportation is an approach that focuses on improving access and increasing the capacity of existing services and facilities. The goal of public transportation strategies is to improve the safety and convenience for users and increase the desirability of public transportation.

Optimize Transit

Realigning transit routes, transit service schedules, or transit stop locations to improve efficiency, reliability and attractiveness of transit.

Examples

MTA BaltimoreLink overhauled the transit system throughout the region.

Additional Resources

FHWA TSMO Guidance

AASHTO TSMO Guidance

MDOT SHA 2018 TSMO Strategic Plan

FHWA Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation
Public Transportation Strategies

Public Transportation is an approach that focuses on improving access and increasing the capacity of existing services and facilities. The goal of public transportation strategies is to improve the safety and convenience for users and increase the desirability of public transportation.

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Examples
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Applicability

CMP Objectives

Real-Time Transit Data

Resources that provide transit users real-time information on transit schedules and arrivals using vehicle location data to improve the transit experience.

Examples
MTA Transit App provides bus route status and step-by-step directions to locations.

Applicability

CMP Objectives
Transit Trip Planner

An app or similar that uses real-time data to plot and customize routes for an individual that may also have a built-in reward system to encourage commuters to travel by transit.

Examples
incenTrip is a multimodal trip planning app that provides reward points in the Washington metropolitan region.

Applicability

CMP Objectives

Enhanced Transit-Supportive Infrastructure

Providing safer transit stops with supportive facilities, such as benches, bus shelters, and lighting, as well as, real-time arrival information and, fare payment facilities.

Examples
FLASH bus rapid transit stations in Montgomery County, Maryland.

Applicability

CMP Objectives
**Universal Farecards**

Develop electronic transit fare payment systems compatible across multiple transportation agencies or transit services in a region to facilitate transit use.

**Examples**

CharmPass mobile ticketing app from MDOT MTA.

**Applicability**

![Applicability Icon]

**CMP Objectives**

![CMP Objectives Icon]

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**Bus Rapid Transit**

Bus-based transit system that makes use of dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms, and/or enhanced stations to deliver faster, more efficient service as a cheaper, more adaptive alternative to rail-based transit.

**Examples**

FLASH BRT in Montgomery County, Maryland.

**Applicability**

![Applicability Icon]

**CMP Objectives**

![CMP Objectives Icon]
**Expanded Transit Network**

Expand existing transit network by adding new routes, new stops, new types of service, or more frequent service to improve and encourage transit use.

**Examples**

BaltimoreLink added expanded and more frequent service to address needs while eliminating underutilized stops and routes.

**Applicability**

**CMP Objectives**

**Increase Transit Frequency/Service**

Provide more frequent service by reducing headways or expanding service hours from peak-only to off-peak or mid-day hours.

**Examples**

The Towson Circulator will provide a new fixed route service to serve the Charles Street, I-695, Loch Raven Boulevard, and Baltimore City/County Boundary areas.

**Applicability**

**CMP Objectives**
Transit Priority Treatments
A variety of treatments and options that can help improvement transit service. Treatments and options include transit signal priority, dedicated bus lanes, queue jumps for transit vehicles, and farside bus stops.

Examples
BaltimoreLink uses transit signal priority at key intersections along York Road and Loch Raven Boulevard. BaltimoreLink also uses dedicated bus lanes on Pratt and Lombard Streets.

Applicability

CMP Objectives

First/Last Mile Connections
Enhancing pedestrian and bicycle facilities that provide access to transit stations, provisions for bicycles on transit vehicles and at transit stops, including providing secure bike parking at transit stops and bike on bus/train storage to facilitate transit use.

Examples
Metropolitan Atlanta Rapid Transit Authority partnered with ride-sharing services to provide connections to and from MARTA rail stations, and increased service when transit is not operating.

HART HyperLINK, Hillsborough County, Florida is a first/last mile shared-ride service smartphone app that connects users to a designated HART stop.

Applicability

CMP Objectives
Ferry Boats
Passenger transportation across waterways to provide alternative modes of travel and reduce traffic.

Examples
Baltimore Water Taxi, Wharf Water Taxi in Washington, D.C.

Applicability

CMP Objectives

Additional Resources

NACTO Transit System Strategies

MTA Transit Priority Toolkit
Bicycle/Pedestrian and Micro-mobility Strategies

Bicycle/pedestrian and micro-mobility strategies focus on reducing congestion by improving the safety and convenience of traveling by bicycling, walking, or other micro-mobility options. These strategies aim to provide more opportunities to access destinations by non-motorized transportation options.

Bike Lanes
Adding bike lanes and other bike facilities along streets to enhance bike accessibility and safety and improve attractiveness of bicycle transportation.

Examples
Baltimore City Bike Lanes.

Applicability

CMP Objectives

Traffic Calming
The combination of physical and non-physical measures that reduce speeding and improve conditions for non-motorized street users, i.e. mini roundabouts, bump-outs, pedestrian refuge islands, and digital speed signs.

Examples
Mini roundabout and speed humps installed on Ridgely Rd in Lutherville, Maryland.

Applicability

CMP Objectives
**Pedestrian Infrastructure**

Improve safety and access for pedestrians by adding sidewalks to fill gaps in sidewalk, crosswalks, and pedestrian signals.

**Examples**

Patapsco Avenue from Magnolia Avenue to Patapsco River Bridge TIP project will provide sidewalk connections, ramps, crosswalks, and lighting improvements. A mixed-use trail and pedestrian accommodations will be constructed as well.

**Applicability**

![Pedestrian Infrastructure Icon]

**CMP Objectives**

![Pedestrian Infrastructure Icons]

**Streetscape**

Provide a more pleasant and inviting pedestrian environment by enhancing lighting, adding benches, widening sidewalks, and adding decorative treatments.

**Examples**

The MD 30 Business Streetscape in Hampstead from North Woods Trail to CSX Railroad.

**Applicability**

![Streetscape Icon]

**CMP Objectives**

![Streetscape Icon]
**Road Diets**
Remove a vehicular travel lane to dedicate space for other modes, often creating a shorter crossing distance for pedestrians and reducing speeds.

**Examples**
Harford Road between Echodale and White Avenues.

**Applicability**

**CMP Objectives**

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**Expand Trail Network**
Constructing or improving off-street trails to allow easier, lower-stress regional transportation by bicycling or walking.

**Examples**
The Gwynns Falls Trail and Patapsco Trail projects in Maryland.

**Applicability**

**CMP Objectives**

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Bikeshare Program
Programs to allow users to temporarily use a shared bicycle accessed at a bikeshare station to facilitate non-vehicular transportation options.

Examples
Pace Bikeshare in Annapolis, Capital Bikeshare in Washington, D.C.

Applicability

CMP Objectives

Electric Scooter Sharing
Scooters or other sharable mobility options that do not have a central hub and provide an alternative transportation option for short trips.

Examples
Jump, Lime, and Spin in Baltimore City.

Applicability

CMP Objectives
**Ride Sourcing Applications**
A variety of mobile applications that matches passengers with drivers using their personal, non-commercial vehicles.

**Examples**
Uber or Lyft.

**Applicability**

**CMP Objectives**

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**Microtransit**
A form of demand responsive transit that offers small scale public transit services. These services can offer fixed routes and schedules and flexible routes and flexible scheduling of minibus vehicles.

**Examples**
The Central Ohio Transit Authority (COTA) operates COTA//Plus a new micro-transit on-demand service that provides customers with further access to jobs, healthcare and more, while offering a fast, convenient, and comfortable transit solution.

**Applicability**

**CMP Objectives**
**Car Sharing**
A way to rent a car by the hour or the day and can be reserved in advance or last-minute. Cars are reserved online or through mobile applications.

**Examples**
Zipcar, Turo, GetAround, or Car2Go.

**Applicability**

**CMP Objectives**

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**Carpooling Applications**
Mobile applications that connect drivers with riders to facilitate ridesharing and carpooling.

**Examples**
Commuter Connections connects people who live and work near each other with similar schedules who are interested in carpooling or vanpooling. Commuter Connections also provides information on transit services, park and ride locations, and telework centers. Via is a carpool service mobile application with the goal to fill as many seats as possible in cars headed towards popular destinations.

UberPool allows users going to a common destination to share rides with others.

**Applicability**

**CMP Objectives**
Autonomous Vehicle Services
On-demand self-driving vehicle companies that expand overall connectivity.

Examples
Olli shuttle in the National Harbor, Maryland and Drive.ai pilot programs in both Frisco and Arlington, Texas.

Applicability

CMP Objectives

Additional Resources
FHWA The Need for Bicycle and Pedestrian Mobility
FHWA Separated Bike Lane Planning and Design Guide
FHWA Road Diets
Road Capacity Strategies

Road capacity is an approach to mitigating traffic congestion by considering infrastructure or operational improvements. Road capacity strategies add capacity to existing roads.

**Spot Improvements**

Improvements to increase the capacity of a roadway in isolated and/or bottleneck locations, including but not limited to filling in gaps between lane drops and adding auxiliary lanes between close acceleration and deceleration lanes.

**Examples**

An auxiliary lane was added between MD 147 and Perring Parkway on I-695 to connect the existing acceleration and deceleration lanes.

**Applicability**

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**CMP Objectives**

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**Intersection Improvements**

Improvements to increase the safety and/or capacity of an intersection, including but not limited to: Adding turn lanes, channelizing right turns, adding pedestrian facilities, bus pull-off areas, signal phasing adjustments.

**Examples**

MD 174 at Severn Road received a new eastbound to northbound left turn lane, an extension of the existing westbound to northbound right turn lane, and traffic signal upgrades.

**Applicability**

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**CMP Objectives**

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Strategy Categories - Road Capacity Strategies
Freight Network Upgrades
Improvements to freight corridors or locations where freight facilities are lacking.

Examples
Howard Street Tunnel TIP project involves reconstruction to create double-stack access to and from the Port of Baltimore.

Applicability

CMP Objectives

Freight Rail/Port Capacity
Increasing capacity and general attractiveness of other modes of transporting freight to reduce truck traffic on highways.

Examples
Baltimore & Potomac (B&P) Tunnel Project Selected Alternative consists of four new tracks and can accommodate double-stack container freight cars.

Applicability

CMP Objectives
Safety Improvements

Improvements to increase the safety of vehicles or pedestrians along a roadway or at an intersection.

Examples
Pennington Avenue Rehabilitation TIP project to rehabilitate the roadway and provide ADA compliant sidewalks, ramps, crosswalks, signal, signing, lighting, and pavement marking improvements.

Applicability

CMP Objectives

Operational Improvements

Improvements to sections of roadway or intersections that have a positive benefit on traffic operations.

Examples
A roundabout was constructed at Tufton Road at Worthington Ave/Greenspring Ave in Baltimore County to relieve morning queues along Worthington Avenue that often exceeded one mile.

Applicability

CMP Objectives
**New HOV or HOT Lanes**

Constructing new lanes or converting existing travel lanes to HOV or HOT lanes to reduce the attractiveness of single-occupancy vehicle trips.

**Examples**

Express Toll Lanes on I-95 north of the Fort McHenry Tunnel, Baltimore, Maryland.

**Applicability**

![Applicability Diagram]

**CMP Objectives**

![CMP Objectives Icons]

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**Removing Bottlenecks**

Expanding capacity on roadways at locations where there is a decrease in capacity by adding additional travel lanes or other congestion relief methods.

**Examples**

I-695 Baltimore Beltway: US 40 to MD 144 widening from three to four travel lanes to alleviate the bottleneck at US 40.

**Applicability**

![Applicability Diagram]

**CMP Objectives**

![CMP Objectives Icons]
Adding Turn Lanes
Adding a center two-way left turn lane to arterial or local roads with closely spaced access points between intersections.

Examples
MD 45 (York Rd) contains a center two-way left turn lane between major intersections along the 6-mile Timonium/Cockeysville, Maryland corridor between I-695 and Shawan Road.

Applicability

CMP Objectives

Grade Separated Intersections
Constructing an interchange at a congested or unsafe intersection to add capacity or mitigate a safety issue.

Examples
MD 32 at Linden Church Road, US 301 at MD 304 in Maryland.

Applicability

CMP Objectives
Closing Network Gaps
Building new roadways to connect areas with limited accessibility and areas where there is a disconnect in the roadway network.

Examples
Hanover Road Corridor Improvement TIP project to construct a section of Hanover Road between Ridge Road and New Ridge Road on a new alignment in Maryland.

Applicability

CMP Objectives

Add Travel Lanes
Increasing capacity along roadways by adding additional travel lanes.

Examples
MD 32 widening from a two-lane roadway to a four-lane divided roadway between MD 108 to Linden Church Road in Maryland.

Applicability

CMP Objectives

Additional Resources
FHWA Efficient Use of Highway Capacity Summary
Objective 1
Enhance access to jobs and other opportunities

Public Transportation
- Optimize Transit
- Real-Time Transit Data
- Transit Trip Planner
- Enhanced Transit-Supportive Infrastructure
- Universal Farecards
- Expand Transit Network
- Transit Priority Treatments
- Bus Rapid Transit
- Increase Transit Frequency/Service
- First/Last Mile Connections
- Ferry Boats

Bicycle / Pedestrian & Micro-mobility
- Bike Lanes
- Traffic Calming
- Pedestrian Infrastructure
- Streetscape
- Road Diets
- Expand Trail Network
- Bikeshare Program
- Electric Scooter Sharing
- Ride Sourcing Applications
- Microtransit
- Car Sharing
- Carpooling Applications
- Autonomous Vehicle Services

Land Use
- Land Use Controls
- Growth Management
- Transit-Oriented Developments
- High-Density Development Incentives
- Parking Management

Pricing
- Demand-Responsive Parking Pricing

TSMO
- One-Way/Two-Way Street Conversion
- Transit Signal Priority

Road Capacity
- Intersection Improvements
- Closing Network Gaps

Demand Management
- Employer Outreach Programs
- Commuter Benefits Policies
- Parking Cash Out Policies
Objective 2

Improve travel times and reduce traveler delay

Public Transportation
- Real-Time Transit Data
- Transit Trip Planner
- Bus Rapid Transit
- Transit Priority Treatments
- Ferry Boats

TSMO
- Incident Management
- Traffic Signal Coordination
- Adaptive Traffic Signals
- Adaptive Ramp Metering
- Active Traffic Management
- Reversible Commuter Lanes
- Access Management
- Moveable Median Barriers
- Electronic Toll Collection
- Hard Shoulder Running
- Restrict Intersection Movements
- Geometric Improvements
- One-Way/Two-Way Street Conversion
- Transit Signal Priority
- Traveler Information Systems
- Work Zone Management
- Road/Weather Information Systems
- Traffic Management for Special Events
- Off-Hours Delivery Programs
- Freight Management

Pricing
- Value/Congestion Pricing
- Demand-Responsive Parking Pricing
- VMT Fees

Road Capacity
- Spot Improvements
- Intersection Improvements
- Safety Improvements
- Operational Improvements
- New HOV or HOT Lanes
- Removing Bottlenecks
- Adding Turn Lanes
- Grade Separated Intersections
- Closing Network Gaps
- Add Travel Lanes
Objective 3

Improve travel times reliability

**Public Transportation**
- Real-Time Transit Data
- Transit Trip Planner
- Bus Rapid Transit
- Transit Priority Treatments
- Ferry Boats

**TSMO**
- Incident Management
- Traffic Signal Coordination
- Adaptive Traffic Signals
- Adaptive Ramp Metering
- Active Traffic Management
- Reversible Commuter Lanes
- Access Management
- Moveable Median Barriers
- Hard Shoulder Running
- Restrict Intersection Movements
- Geometric Improvements
- One-Way/Two-Way Street Conversion
- Transit Signal Priority
- Traveler Information Systems
- Work Zone Management
- Road/Weather Information Systems
- Traffic Management for Special Events
- Off-Hours Delivery Programs

**Pricing**
- Value/Congestion Pricing

**Road Capacity**
- Spot Improvements
- Intersection Improvements
- Safety Improvements
- Operational Improvements
- New HOV or HOT Lanes
- Removing Bottlenecks
- Adding Turn Lanes
- Grade Separated Intersections
- Closing Network Gaps
- Add Travel Lanes
Objective 4

Improve freight reliability

Road Capacity
- Freight Network Upgrades
- Freight Rail/ Port Capacity

TSMO
- Real-Time Truck Parking Information
- Truck Weigh Technology
- Freight Management
- Off-Hours Delivery Programs
Objective 5
Enhance travel choices

Public Transportation
- Optimize Transit
- Real-Time Transit Data
- Transit Trip Planner
- Enhanced Transit-Supportive Infrastructure
- Universal Farecards
- Bus Rapid Transit
- Expand Transit Network
- Increase Transit Frequency/Service
- Transit Priority Treatments
- First/Last Mile Connections
- Ferry Boats

TSMO
- One-Way/Two-Way Street Conversion
- Transit Signal Priority

Bicycle / Pedestrian & Micro-mobility
- Bike Lanes
- Traffic Calming
- Pedestrian Infrastructure
- Streetscape
- Road Diets
- Expand Trail Network
- Bikeshare Program
- Electric Scooter Sharing
- Ride Sourcing Applications
- Microtransit
- Car Sharing
- Carpooling Applications
- Autonomous Vehicle Services

Land Use
- Land Use Controls
- Growth Management
- Transit-Oriented Developments
- High-Density Development Incentives
- Parking Management

Demand Management
- Employer Outreach Programs
- Commuter Benefits Policies
- Parking Cash Out Policies

Pricing
- Demand-Responsive Parking Pricing

Road Capacity
- Intersection Improvements
Objective 6
Reduce traffic incidents

Public Transportation
- Ferry Boats

TSMO
- Incident Management
- Traffic Signal Coordination
- Adaptive Traffic Signals
- Adaptive Ramp Metering
- Active Traffic Management
- Truck Weigh Technology
- Access Management
- Moveable Median Barriers
- Electronic Toll Collection
- Hard Shoulder Running
- Restrict Intersection Movements
- Geometric Improvements
- One-Way/Two-Way Street Conversion
- Traveler Information Systems
- Work Zone Management
- Road/Weather Information Systems
- Traffic Management for Special Events
- Off-Hours Delivery Programs

Pricing
- Value/Congestion Pricing

Road Capacity
- Spot Improvements
- Intersection Improvements
- Freight Network Upgrades
- Safety Improvements
- Operational Improvements
- New HOV or HOT Lanes
- Removing Bottlenecks
- Adding Turn Lanes
- Grade Separated Intersections
- Closing Network Gaps
- Add Travel Lanes

Bicycle / Pedestrian & Micro-mobility
- Bike Lanes
- Traffic Calming
- Pedestrian Infrastructure
- Streetscape
- Road Diets

CMP Objective / Strategy Chart - Objective 6
Objective 7
Enhance inter-jurisdictional coordination

Demand Management
Regional Coordination