York Area Metropolitan Planning Organization's

Congestion Management Process

Updated April 2015

Prepared by the York County Planning Commission for the York Area Metropolitan Planning Organization
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Chapter One
Introduction

Legislative History

In 2005, the York Area Metropolitan Planning Organization (YAMPO) adopted a Congestion Management System (CMS). The CMS was an ongoing effort by the York County Planning Commission on behalf of the YAMPO to fulfill an assigned task in the Unified Planning Work Program (UPWP). For the first time, the YAMPO identified congestion on a countywide scale.

In August of 2005, a new federal law, the Safe Accountable Flexible Efficient Transportation Equity Act-A Legacy for Users (SAFETEA-LU), facilitated an update from a CMS to a Congestion Management Process (CMP). SAFETEA-LU intended for a Congestion Management Process to be a systematic process for identifying congestion, implementing solutions, and evaluating the success of those strategies. In 2011, the YAMPO modified the CMS to reflect these changes in federal law and re-adopted it as the CMP.

More recently, Moving Ahead for Progress in the 21st Century, adopted in July 2012, continued the requirement of establishing a process by which MPOs monitor and address congestion using quantitative performance measures.

This 2014 update of the CMP incorporates recent developments in data collection technology that enhance the identification and monitoring of congestion and travel throughout York County.

Goals and Objectives

A number of documents adopted by the YAMPO guide the overall goal of reducing and eliminating congestion in York County. The YAMPO 2013-2040 Long Range Transportation Plan (LRTP) identifies what percentage of Transportation Improvement Program (TIP) funding the YAMPO should dedicate to congestion-mitigating projects through the year 2040, but the LRTP does not identify projects or locations. The YAMPO has designated the CMP and its companion document, the Annual Report on Congestion (ARC), to serve this purpose.

Geographically, the CMP evaluates congestion in a variety of areas, including roadway corridors, standalone intersections, entrance and exit ramps, and transit routes. These areas are evaluated and ranked using objective performance measures detailed in later sections. This evaluation is presented to the YAMPO each year in the ARC.

In areas with significant congestion, the YAMPO collects additional data to develop a more complete understanding of the problem. Using this information, the YAMPO uses the CMP Toolbox to develop mitigation strategies and projects in conjunction with transportation stakeholders like the public, municipal leaders, transit providers, and advocates of alternative transportation modes. The YAMPO considers all modes of transportation as possible solutions.

Finally, the CMP includes a process to evaluate the effectiveness of implemented strategies and projects.
Chapter Two
Congestion Management Process

Step 1: Stage 1 – Congested Segment Identification

Terms and Definitions

Current Dataset – refers to the data currently purchased from TomTom that covers a period of two years, ending in the year prior to the current year. The dataset consists of average travel speed and is reported on a network basis by roadway segment, as defined by the information provider. The average speed data is reported by roadway segment for three different times during the day: AM Peak Period (7AM – 9AM), PM Peak Period (4PM – 6PM), and a Free Flow time period defined as “night time” and by travel direction. Any future dataset that contains this average speed data for a two-year period reported per roadway segment by direction with these three (or very similar) time periods would be acceptable.

Travel Time Index (TTI) - unrestricted speed (as defined)/ congested speed. This ratio is used to indicate the amount of delay experienced on a roadway by comparing an unrestricted speed to the speed experienced during a peak hour when it is typically congested.

Free Flow Speed – average travel speed for a specified roadway segment measured during a “night time” period, such as between 11PM – 1AM when a vehicle is able to travel without experiencing any delay.

Posted Speed – the actual posted speed or speed limit speed for a specified roadway segment.

TTI(FF) – Free Flow (or night time) speed/ congested speed

TTI(PS) – Posted Speed (or speed limit) speed/ congested speed

TTI(FF) Threshold = 1.5 – The TTI(FF) value that designates a congested roadway segment for the purpose of the YAMPO CMP and that is reported as such in the ARC.

Process

Stage 1 of the CMP is the identification of individual roadway segments that are congested. Congestion is defined in our CMP as those segments with a TTI(FF) value of 1.5 or greater.

Step 2: Stage 2 – Identified Congestion Segment Evaluation

Terms and Definitions

Peak Low Speed – the lower of the average speed values of either the AM Peak Period or the PM Peak Period

Delay per Mile per Vehicle (DMV) – the amount of delay in time (seconds) experienced by one vehicle on a specified roadway during the peak period with the lower average speed; the delay is the difference in travel time between the posted speed and the average speed experienced during the worse of either peak hour period.
Regional Peak Hour Percentage (RPH%) – the traffic volume traveling on a roadway during the hour of highest traffic volume during a 24-hour day period; expressed as a percentage of total 24-hour traffic volume. The traffic volume data is collected by YCPC staff, using the YCPC Planning Regions to group traffic count data together for regional sample sets.

AADT – Annual Average Daily Traffic; reported in PennDOT’s Roadway Management System (RMS), this is the nationally accepted measurement for roadway traffic volume.

Segment Length – the length in feet of a given roadway segment. For the purposes of this report, it is the length of the roadway segment measured by ArcMap software from the TomTom dataset.

Total Delay per Mile (TTLD) – the amount of delay in time (seconds) experienced by all of the vehicles on a specified roadway during the peak period with the lower average speed; the delay is the difference in travel time between the posted speed and the average speed experienced during the worse of either peak hour period times the number of vehicles traveling on the roadway during peak hour.

Process
In Stage 2, those segments identified in Stage 1 are evaluated by amount of delay by two different delay measurements:

- Delay per Mile per Vehicle (DMV)
- Total Delay per Mile (TTLD)

Using the DMV value, the Stage 1 segments are ranked, and the top 100 segments are selected. Using the TTLD value, the Stage 1 segments are ranked, and the top 100 segments are selected.

These selected segments, totaling a maximum number of 200 segments, are then designated as Stage 2 segments.

Step 3: Stage 3 – Congested Element Analysis

Terms and Definitions
Identified Intersection – the intersection of two (or more) roadways with at least one roadway segment that was identified in Stage 1 as a congested roadway segment.

Identified Adjacent Intersections – two or more Identified Intersections that are adjacent but not on the same roadway or only two Identified Intersections that are adjacent and on the same roadway.

Identified Corridor – three or more adjacent Identified Intersections on the same roadway.

Process
In Stage 3, those segments identified in Stage 2 are analyzed geographically and categorized as one of three groups:

- Identified Intersections
- Identified Adjacent Intersections
- Identified Corridors
Step 4: Stage 4 – Analysis of TTLDM for Each Element

Process
In Stage 4, the TTLDM for each of the Congested Elements defined in Stage 3 (Intersections, Adjacent Intersections, and Corridors) are calculated and analyzed by travel direction and time of day. In the final step of Stage 4, a 3-year average TTLDM will be calculated when the minimum number of datasets has been acquired. Until that time, TTLDM values from previous ARCs will be used where appropriate.

Step 5: Stage 5 – Additional Factors for Congested Element Investment Decisions

Terms and Definitions
NHS – National Highway System; a designation for roadways of national network significance as defined by FHWA from the MAP-21 legislation (or the current transportation legislation in effect).

Transit Route – a designation for the roadways used by rabbittransit's fixed route system.

ADTT – Average Daily Truck Traffic; similar to AADT but for trucks only.

ADTT Threshold >= 1,000 truck trips per day – the volume of truck traffic that designates a specific roadway segment as truck traffic significant for the purposes of the YAMPO CMP and is reported as such in the ARC.

Future VOC Threshold > 0.75 – the Volume-to-Capacity ratio value in future years that signifies that a roadway segment will continue to be or may become congested in the future. This value is calculated using the York County Travel Demand Model.

Growth Area Designation (GAD Primary, GAD Secondary, GAD Future) – YAMPO Long Range Plan Selection Criteria states that all capacity adding projects must be in a Primary, Secondary or Future Growth Area as designated in the York County Growth Management Plan that is an element of the York County Comprehensive Plan.

Process
At this point in the CMP, the transportation network congestion has been identified, evaluated and analyzed. In order to help the YAMPO in upcoming investment decisions, additional information for each of the Stage 2 roadway segments and the Stage 3 congested elements are provided. The additional information is:

• NHS designation
• Transit Route designation
• ADTT – truck volumes greater than 1,000 truck trips per day
• Future VOC – future year VOC values of greater than 0.75
• Growth Area Designation – Primary, Secondary, Future
Step 6 – YAMPO Selection and LPN Process

Process
Using the data from Step 4 and Step 5, the YAMPO selects those Stage 3 intersections (adjacent intersections and/or corridors) to begin the LPN process. During the LPN process, the cause(s) for delay are identified, and mitigation strategies are employed to develop alternative solutions to address the cause(s). During the Level 2 portion of the LPN process, a project may be selected, and then approved to the Long Range Transportation Plan to be reviewed as a candidate project during the next Transportation Improvement Program (TIP) update.

At this point, the CMP circles back to the being the cycle for the next Annual Report on Congestion with the identification of congested road segments in the new dataset.

Step 7 – Mitigation Strategy Implementation

Process
For those intersections chosen for the LPN process, data from the current and prior Annual Reports on Congestion are compiled. Through the various stages of TIP update and project engineering, design and construction phases, travel time and delay data will be collected in the same manner through the annual report process for analysis when the project is completed.

Step 8 – Mitigation Strategy Performance Tracking

Process
Travel time and delay data will be processed for each project chosen through the CMP for a period of up to two years after the project’s construction has been completed. These results will be compared to the travel time and delay data from before the intersection was selected and while the intersection project was under construction.

Step 9 – Mitigation Strategy Evaluation

Process
Using the current and historic data from Step 8, the various mitigation strategies used in the completed projects will be analyzed for overall success or failure in reducing congestion throughout York County. The results of this evaluation will be reported to the YAMPO.
Chapter 3
CMP Parameters

Just about every driver in York County experiences being delayed in traffic. The reasons though can vary as to why this happens. The most common reason in this area is peak hour traffic as people travel to and from their work place. Other reasons include crashes, work zones and weather.

What is Congestion?

The 2005 CMS Plan defined congestion as follows:

Congestion is an impediment to optimal driving conditions/vehicle movements that includes goods as well as people, and creates a level of service (LOS) that is no longer acceptable. The level of LOS may vary by the type of transportation facility, geographic location, and time of day. Acceptance of the transportation system is measured in time loss, or inconvenience, or delays, and is expressed as driver frustration.

Congestion is classified into recurring and non-recurring traffic conditions as follows:

- **Recurring congestion** is caused by demands that exist virtually every day where traffic demand exceeds existing roadway capacity.

- **Non-recurring congestion** is caused by traffic incidents that are unexpected or traffic impediments that are present for a limited time.

In 2005 a CMS Working Group developed standards as to what is considered recurring and non-recurring congestion in York County. These standards continue to be used in the 2013 CMP. Capacity, signal timing, poor roadway condition and design, uncontrolled growth, and construction projects that exceed a one year construction season were deemed to be recurring congestion. Non-recurring congestion was labeled as crashes, disabled vehicles, weather, delivery vehicles, special events, and work zones.

The CMP will not directly address non-recurring congestion. However through the utilization of Intelligent Transportation System (ITS) technology, such as 511PA and PennDOT’s Traffic Command Center, both recurring and non-recurring congested conditions can be managed by identifying problems and alerting motorist. This is accomplished through the use of video cameras and variable message boards. Motorist can be alerted to incidents that may cause a delay. The ITS infrastructure is currently located along Interstate 83 and U.S. Route 30. The York Area Metropolitan Planning Organization in recent years has committed funds to maintain ITS system in York County.

All Modes of Transportation

Congestion is not limited to just personal passenger vehicles. Transit, Rail, Freight, Air and Sea transportation can experience congestion just as easily. Congestion of these modes of transportation can be difficult to identify through the use of performance measures. The reason being is that the data is not always easily obtained for analysis purposes. Private companies are usually the ones providing
services over these alternate modes of transportation and are more likely to make decisions about expansion of facilities and services in order to reduce the congestion they are experiencing.

Not only can these alternate modes of transportation experience congestion, they can also be the source of congestion problems. High volumes of trucks, active railroad crossings and lack of transit are examples of how alternate modes can contribute to congestion problems. But it is anticipated that these alternate modes will be looked at as a way to alleviate congestion. The CMP will look to include these alternate modes of transportation into the development of mitigation strategies step of the process.

While the main focus of the CMP is to identify roadway congestion it is important to monitor congestion within these alternate modes of transportation. This can be accomplished by reaching out to those providers and including them in the process and by building stronger relationships with those providers, with the intent to share information regarding potential congestion problems.
A “Toolbox” of mitigation strategies was assembled that includes all strategies that could be used to address both recurring and non-recurring congestion. The mitigation strategies in the “Toolbox” include measures utilizing all modes of transportation, as well as ways to encourage more efficient patterns of land use and development. In many cases, multiple mitigation strategies will be applied in an attempt to reduce/eliminate congested roadways.

### Mitigation Strategies Toolbox

#### Growth Management

- **Land Use Policies /Regulations**
  Encourage more efficient patterns of commercial or residential development in defined growth areas. Specific land use policies and/or regulations that could significantly decrease both the total number of trips and overall trip lengths, as well as making transit use, bicycling and walking more viable include, but are not limited to the following:
  - Encourage development in existing communities
  - Discourage development outside of designated growth areas
  - Promote higher density and mixed uses in proximity to existing or planned transit service
  - Establish a policy for new and existing subdivisions to include sidewalks, bike paths, and transit facilities where appropriate
  - Develop and adopt Official Maps

#### Commuter Options

- **Commuter Services of Pennsylvania**
  Commuter Services of Pennsylvania is a professionally staffed organization funded by federal Congestion Mitigation & Air Quality funds. They offer free services that work to reduce traffic congestion by helping commuters find alternatives, other than driving alone, and by reaching out to employers so they can help their workforce find those options.
  Examples of options include:
  - Rideshare Matching Services
  - Carpooling and Vanpooling programs
  - Employer based incentives for promoting commuting options
  - Telecommuting
  - Transit
  - Biking and Walking programs

- **Improved/Expanded Commuter Bicycle Network**
  Include on-road facilities, pathways and greenways and connection to transit

- **Bicycle Storage System**
<table>
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<th><strong>Provide safe and secure places for bicyclists to store their bicycles</strong></th>
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| **Improved/Expanded Pedestrian Network**  
  Include sidewalks, overpasses/tunnels, pedestrian only streets, greenways, and walkways |

**Alternative Modes Capital Improvements**

| **Service Expansion**  
  Improve service frequency and service area |
|--------------------------|
| **Traffic Signal Priority**  
  Improve traffic flow for transit vehicles traveling through signalized intersections |
| **Transit Fare Reduction/Reduced Rate of Fare**  
  Include system-wide reductions, peak discounts and subsidized programs |
| **Transit Information System**  
  Improve in-vehicle and station information systems, by that, improving the dissemination of transit related information to the user |

**Access Management**

| **Land Use**  
  Access Management regulations should be addressed in Subdivision/Zoning Ordinances |
|--------------------------|
| **Access Control**  
  Reduction or elimination of “side street friction”, especially from driveways via traffic engineering, regulatory techniques and purchase of access rights |
| **Median Control**  
  Reduction of centerline and “side street friction”, via traffic engineering and regulatory techniques |
| **Frontage Roads**  
  Auxiliary roadways which provide a separated lane or lanes for access to abutting land use along freeways and arterial roadways |
Addition of General Purpose Lanes

- **Add HOV Lanes**
  Most Appropriate use on freeways and expressways

- **HOV Toll Savings**
  Preferential pricing to multi-occupant vehicles. Needs infrastructure to administer toll collection

- **Freeway, Interstate, and Arterial Lanes**
  Increase the capacity of congested arterial roadways through additional travel lanes

- **Truck Climbing Lanes**
  Add lanes where trucks encounter significant grades

- **Reversible Lanes**
  Change lane directions according to peak hour traffic

- **New/Improved Shoulders**
  To reduce driver friction, emergency pull off for vehicles, and to facilitate non-motorized modes of travel. The recommended width is eight feet, this is supported in the Long Range Transportation Plan

Traffic Operational Improvements

- **Intersection Geometric Improvements**
  Improvements to intersection geometrics to improve overall efficiency and operation

- **Intersection Channelization**
  Infrastructure improvements that provide physical separation or delineation of conflicting traffic movements

- **Intersection Turn Restrictions**
  Provide intersection turn restriction (time of day) to reduce conflicts and increase overall intersection performance

- **Truck Restrictions**
  Restrict trucks to a designated lane where practical

- **Signalization Improvements**
  Improve signal operations through re-timing signal phases. Improve traffic signal progression along identified corridors. Expand use of Adaptive Control Systems to improve traffic flow on identified corridors.
| **Work Zones**  
| Lane closures should occur outside of peak hours |
| **Traffic Calming**  
| A variety of techniques, ranging from low cost pavement markings to higher cost physical improvements, used to reduce traffic speeds and increase safety. No techniques should reduce capacity. |

**Freeway Operations and Management**

| **Elimination of Bottlenecks**  
| Eliminate high-traffic areas where one or more travel lane(s) is dropped |
| **Ramp Metering**  
| Meter vehicular access to a highway during peak periods to optimize the operational capacity of the highway |
| **Incident Management**  
| Utilize traveler radio, travel alert notification (ITS, 511PA, cell phone alerts), and general public outreach to enhance incident related alternatives to routes and emergency management response. Enhance coordination of State Police, PennDOT and first responders to better inform each other and the public during an incident |
| **Municipal Websites**  
| Encourage Municipalities to post work zones on their website and inform motorist of duration of the work zone and alternative routes |