LAREDO
METROPOLITAN TRANSPORTATION PLANNING
ORGANIZATION

Congestion Management Process

2014

THE LAREDO MPO
CONGESTION MANAGEMENT PROCESS

PREPARED BY: MPO STAFF

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RESOLUTION NO. MPO 2014-01

LAREDO
LAREDO URBAN TRANSPORTATION STUDY
metropolitan planning organization

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CONGESTION MANAGEMENT PROCESS

Why Do We Need A CMP?

Traffic congestion is an everyday fact of life, and it's getting worse every day. Federal rules (23 CFR Part 450 Section 320) require that metropolitan planning organizations designated Transportation Management Areas (TMA's) develop and implement a Congestion Management Process (CMP) as part of their metropolitan transportation planning process. The Laredo MPO was designated a TMA in 2013. A TMA is defined as an urbanized area with a population over 200,000 (as determined by the latest decennial census). Development and implementation of the Laredo MPO's Congestion Management Process is required by January of 2014.

What is a Congestion Management Process (CMP)?

A Congestion Management Process (CMP) is a systematic and regionally accepted approach for managing congestion. It provides accurate, up-to-date information on transportation system performance and assesses alternative strategies for congestion management that meet state and local needs. The CMP is intended to move congestion management strategies into the funding and implementation stages of project development. **Congestion management** is the application of congestion management and reduction strategies to improve transportation system performance and reliability by reducing the adverse impacts of congestion on the movement of people and goods.

What is the Purpose of a Congestion Management Process (CMP)?

The Laredo Metropolitan Planning Organization's (LMPO) Congestion Management Process (CMP) is intended to serve as an organized and transparent way for our planning area to indentify and manage congestion, connect performance measures to support funding for projects, and evaluate recommended strategies to ensure we are effectively addressing congestion.

How Does the Congestion Management Process (CMP) Work?

The Federal Highway Administration's Congestion Management Process: A Guidebook describes a CMP as an "on-going process, (that is) continually progressing and adjusting over time as (local) goals and objectives change, new congestion issues arise, new information sources become available, and new strategies are indentified and evaluated." In general, a congestion management process includes the following activities:

- **Development of Objectives** –This is the process by which process participants decide what the congestion management goals and objectives are for their area. When developing a local area's objectives it is important to consider, "What is the desired outcome?" and "What do we want to achieve?" It may not be feasible or desirable to try to eliminate all congestion, and so it is important to define objectives for congestion management that achieve the desired outcome. Some MPOs also define congestion management principles, which shape how congestion is addressed from a policy perspective.

- **Define a Network**-This is the process whereby the MPO and its planning partners decide what parts of the transportation system will be targeted for focus. It involves defining both the geographic area and system elements (e.g. freeways, major arterials, and/or transit routes) that will be analyzed in the congestion management process.

- **Develop Performance Measures** – Perceived congestion is entirely dependent on geographic location and experience. In other words, what might be perceived as horrendous congestion in a smaller town, might not even register as delay worth mentioning in a larger urban area. Therefore, an important part of the congestion management process is local stakeholders deciding what they consider "unacceptable congestion" is in their area. The CMP will address, "How we define and measure congestion?" In order to do so, performance measures are developed that are used to measure congestion in our area. These performance measures should relate to, and support locally defined objectives.

- **Collect Data/Monitor System Performance** - After performance measures are defined, data is collected and analyzed to determine the transportation system's performance. Data collection may be on-going and involve a wide range of data sources and partners. Said data collection efforts ensure that decision makers have current measures of transportation system performance both before and after congestion mitigation strategies are implemented.

- **Analyze Congestion Problems and Needs** - Using the data collected together with analysis techniques, the CMP addresses questions like, "What congestion problems are present in the region, or are anticipated?" and "What are the sources of unacceptable congestion?"

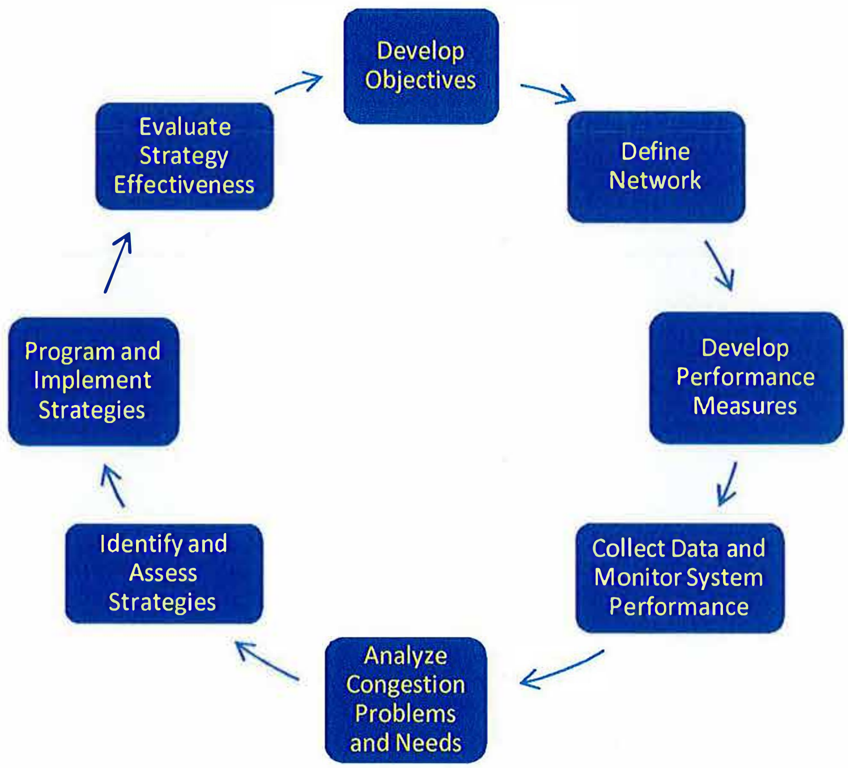
- **Identify and Assess Strategies** –Once congested areas or locations are identified, the MPO, working in concert with its planning partners, seeks to discover what mitigation strategies would be most likely to improve system performance. Possible suitable congestion mitigation strategies are identified and assessed for implementation feasibility and likelihood of success. Identification and assessment of possible congestion mitigation strategies may be conducted as part of the Metropolitan Transportation Plan (MTP) development, corridor studies, or other project studies.

- **Program and Implement Strategies**- This process involves answering the question, "How and when solutions will be implemented?" It typically involves including the selected congestion mitigation strategies in the MTP, determining funding sources, prioritizing strategies, allocating funding in the TIP, and ultimately, implementing these strategies.

- **Monitor Strategy Effectiveness -** Finally, efforts should be undertaken to assess, "What have we learned about the congestion mitigation strategies we have already implemented?" This process will be tied closely to monitoring system performance and is designed to inform future decision making about the effectiveness of transportation strategies.

The structure of the Laredo MPO's CMP is depicted in Figure 1. The boxes represent the different elements in the CMP. The figure underscores the cyclical and on-going nature of the congestion management process

Figure 1. The Laredo MPO's Congestion Management Process



What Are Congestion Management Objectives?

The foundation of the congestion management process is the identification of the goals and objectives for local congestion management. Locally defined objectives delineate what local leader's wants to achieve regarding congestion management, and are an essential part of an objectives-driven, performance-based approach to transportation planning. These objectives also serve as primary linkage between the CMP and the Metropolitan Transportation Plan (MTP). A vision statement, goals and objectives were developed for the Laredo MPO's congestion management process based on those included in existing planning documents and by using the FHWA's congestion management guidebook as a reference. The MPO will work to promote projects and policies that support the stated vision, goals and objectives.

Vision

Develop a transportation system that offers safe, efficient, and affordable travel choices for people and goods, while supporting economic development and long term quality of life

Goals and Objectives

Goal: Provide a safe transportation system.

- Promote policies and projects that reduce the number and severity of vehicle collisions.

Goal: Provide an efficient transportation system.

- Encourage a proactive approach to addressing future transportation needs.
- Promote policies and projects that reduce travel delay.

Goal: Provide affordable travel choices for people and goods.

- Promote the increase of viable, affordable travel choices for people and goods.
- Promote policies and programs to increase transit ridership on existing services.
- Promote awareness of multimodal facilities.

Goal: A transportation system that promotes economic vigor and long term quality of life

- Promote the efficient and effective connection of people, jobs, goods and services.
- Promote the minimization of environmental impact and improved environmental quality.
- Promote the unique identities and qualities of neighborhoods, communities, and region as a whole.

What is the CMP Network?

In order to focus transportation planning efforts, the CMP identifies where congestion occurs and what are its causes. Federal regulation 23 CFR 500.109 defines **congestion** as "the level at which transportation system performance is unacceptable due to excessive travel times and delays." According to the Federal Highway Administration (FHWA), roadway congestion is comprised of three key elements: severity, extent, and duration. The blending of these elements will determine the overall effect of congestion on roadway users. Three dimensions of congestion include the following:

- **Severity** - refers to the magnitude of the congestion problem at its peak. Severity has been traditionally measures through indicators such as volume/capacity (V/C) ratios or Level of Service (LOS) measures
- **Extent** - describes the number of system users or components (e.g. vehicles, pedestrians, transit routes, lanes miles) affected by congestion.
- **Duration** - describes the length in time that users experience congested conditions.

Because these elements have a direct relationship, any increase in one will subsequently result in an increase in the others. Therefore, as roadway congestion continues to build (increased severity), more travel will occur under congested conditions (increased duration) affecting an increasing number of motorists and roadway facilities (increased extent).

Congestion occurs due to a number of planned and unplanned events either in isolation or in tandem. Congestion can be generally classified as either recurring or non-recurring.

Different types of congestion are:

Recurring Congestion which include:

- Peak Period, Freight, Intersection, Freeway Corridor, Non-freeway corridor, School related, Central Business District, Bottleneck or hot spot, Railroad crossing, or parking related.

Non-Recurring Congestion which include:

- Incident related or Special event traffic

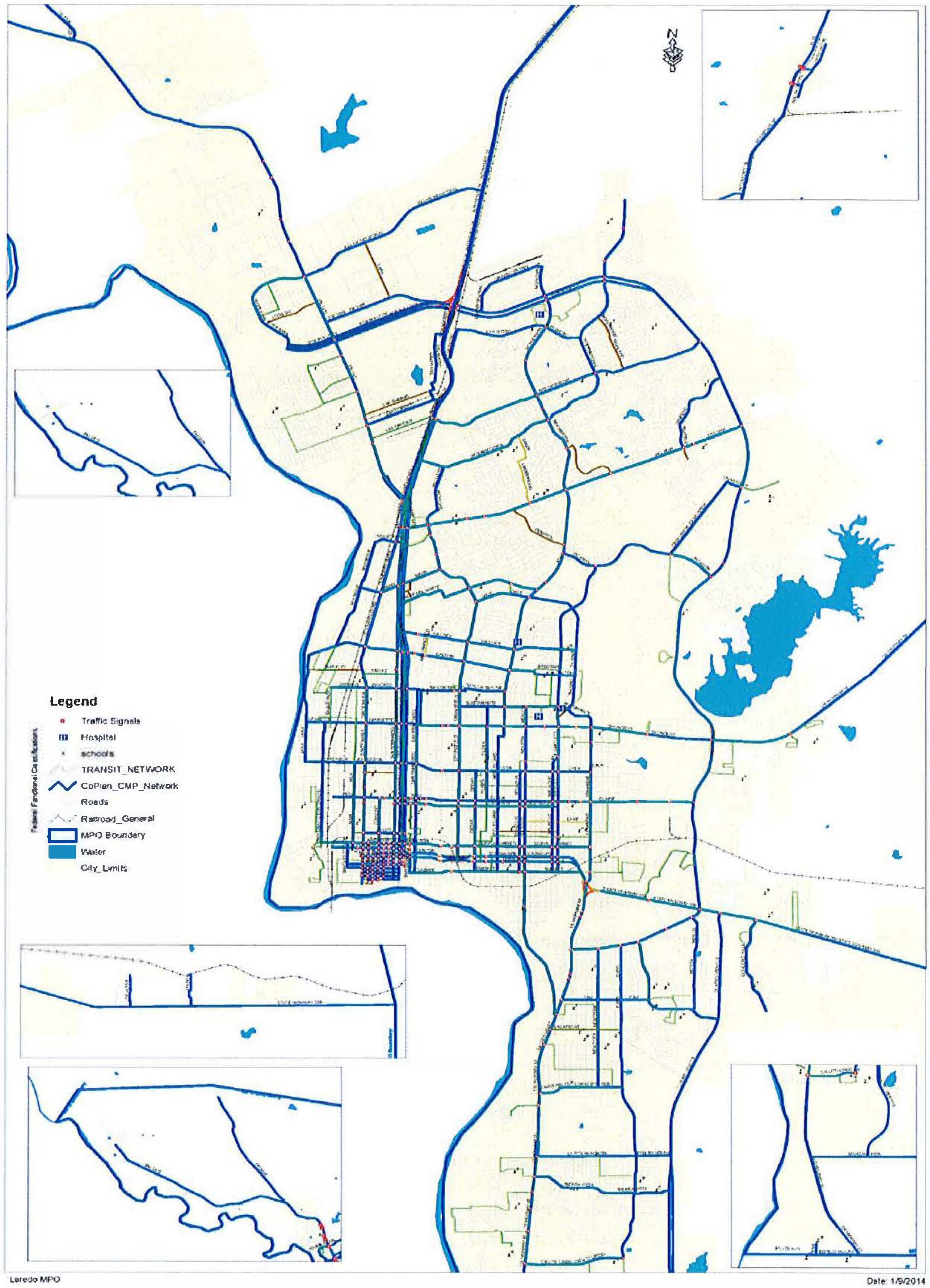
The congestion management process will focus on the routes that make up the CMP network. Efforts to improve traffic conditions in the region will begin on the CMP network, and the level of congestion on the network will serve as a gauge for overall congestion in the area.

Identification of Laredo's CMP network was initiated in 2013. In the March, May and October of 2013 the MPO Technical Committee held meetings to identify the draft congestion management network. The Technical Committee is comprised of 24 area agency representatives including: the Texas Department of Transportation, the City of Laredo' Transit, Airport, Bridge, Engineering and Traffic Departments, Webb County's Planning, Engineering, and Rural Transit Agencies, the South Texas Economic Development Council; the Federal Highway Administration, both the local school districts, and private sector representatives including Kansas City Southern Railroad, Union Pacific Railroad, and from local area freight transportation providers

Maps of the area's complete transportation network, along with maps of a draft proposed CMP network were distributed. Enlarged views of the proposed CMP network were also projected for all the participants to view. Section by section the entire CMP network was reviewed and discussed in order to gather the participant's knowledge of congested locations, operational issues, safety concerns, route usage and history. The network was modified per the comments and recommendations of the participants.

At present, the draft network includes 272 centerline miles of roadways in the MPO region. It includes 92 different roadways divided into 1154 separate segments ranging from 500 feet to 11.4 miles in length. Additional technical review and public involvement will be sought to further refine and identify a finalized the CMP network. Figure 2 shows the Draft CMP network which identifies the roadways and transit routes currently included in the network.

Figure 2: 2013 DRAFT CMP Network



What Performance Measures Will the CMP Utilize?

Developing performance measures to identify, and assess congestion is a critical element of the congestion management process. Performance measures are objective ways to determine the degree of success a project, program, or initiative has had in achieving its stated goals and objectives. In other words, they are ways to track progress.

Performance measures should display the following characteristics:

- Easily understood by the public, staff, and elected officials so they can be incorporated into the overall transportation decision-making process; and,
- Sensitive to various modes of transportation such as freight and transit.
- Sensitive to peaking characteristics and the amount of time that congestion is experienced during the day.
- Sensitive to congestion mitigation strategies so discernable changes can be detected.
- Able to be modeled and forecasted in order to estimate future congestion levels.

Still, the most significant constraint in selecting performance measures is the availability of data and the resources available to undertake data collection. A comprehensive series of performance measures will not be useful without reliable data to back it up.

The following travel characteristics and definitions will help provide information and are suggested for data collection methods intended to assess system performance and congestion challenges facing the area:

Travel Time Measures

- *Average Travel Speed* -The average travel speed is computed as the distance traveled divided by the average total time to traverse a given highway segment. It is obtained from a travel time study along the route. The total time includes stopped delays in addition to the actual time of motion. Necessary number of travel time runs depends on the variance in travel time, the acceptable degree of precision, and the level of confidence desired. Therefore, average travel speeds are a poor measure of roadway congestion.

- *Average Travel Time* -The average travel time is defined as the total time to traverse a length of a roadway under prevailing traffic conditions. All stopped delays are included in the average travel time. The average travel time measure can be used to compare the quality of service of various alternate routes from a point of origin to a point of the destination.

- *Average Travel Rate* -This measure is the average time, generally in minutes, required to travel a prescribed distance (one mile or one kilometer) along a route or through a system of routes. An average travel rate is the reciprocal of average travel speed, and is generally reported in minutes per mile (per kilometer). Average travel rates can measure congestion on both a corridor and a sub-area/area wide level.

- *Total Delay* - Total delay or stopped delay is the time that a vehicle is stopped in traffic or at an intersection. Expressed in seconds per vehicle, stopped delay can be measured as the actual "locked wheel" time, or in terms of time less than a very slow speed, such as 5 mph. The Highway Capacity Manual's (HCM) delay equation uses turning movement volumes to capacity ratios to determine stopped delays at intersections. Intersection delay is not a good performance measure for the following two reasons.

- The inability to forecast turning movements of an intersection, and
- It is not readily adaptable as a corridor or area wide measure.

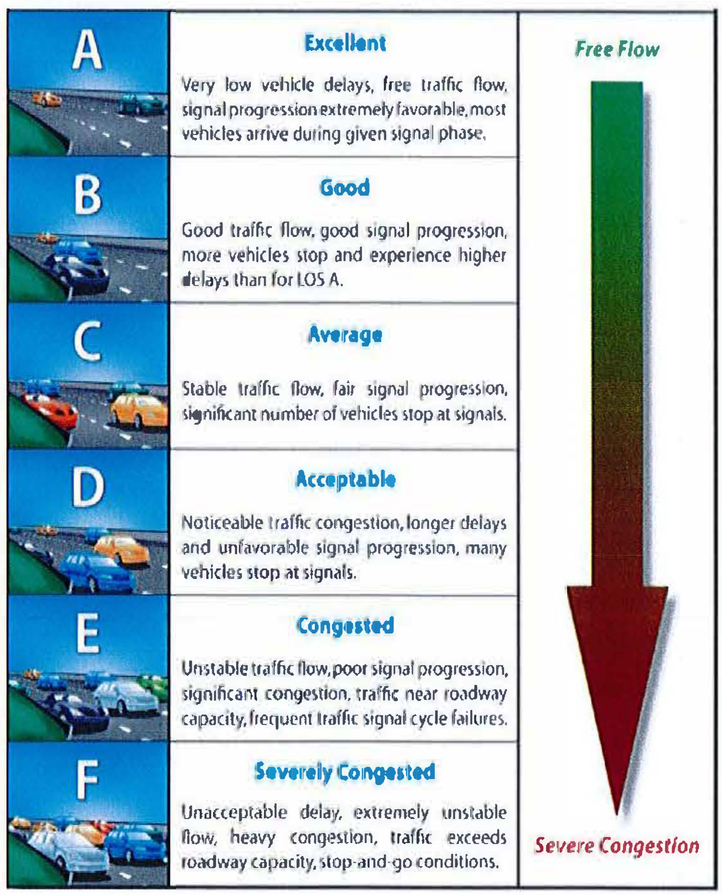
However, delay studies are useful for determining the locations, causes and lengths of delays. Total delay information can only be used to locate and measure spot areas of congestion.

Volume to Capacity Ratios

The volume to capacity ratio (V/C) is defined as the ratio or relationship between the demand flow rate to the capacity of the traffic facility. In more general terms, this relationship examines the number of vehicles using the roadway versus the number of vehicles the roadway was designed to comfortably accommodate. Volume to capacity ratios are useful in measuring congestion intensity along a roadway. This method is popular because data on existing traffic volumes are easy to obtain and the measures (i.e. traffic volumes and roadway capacities) can be projected by the area's travel demand model.

Level of Service

The most common performance measure currently used to define congestion involves Level-of-Service (LOS). The 2000 Highway Capacity Manual (HCM) defines LOS as: a qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience.



Six different levels are defined (LOS A, B, C, D, E, and F) with LOS A representing the best condition and LOS E and F representing the worst condition. LOS can be defined and measured differently depending upon the roadway facility it is describing. A definition of congestion involving LOS values is common, with many agencies indicating either LOS E or F as congestion. However, because of the various methods of determining LOS, these values are usually not comparable between roadway classifications.

Accident Rates

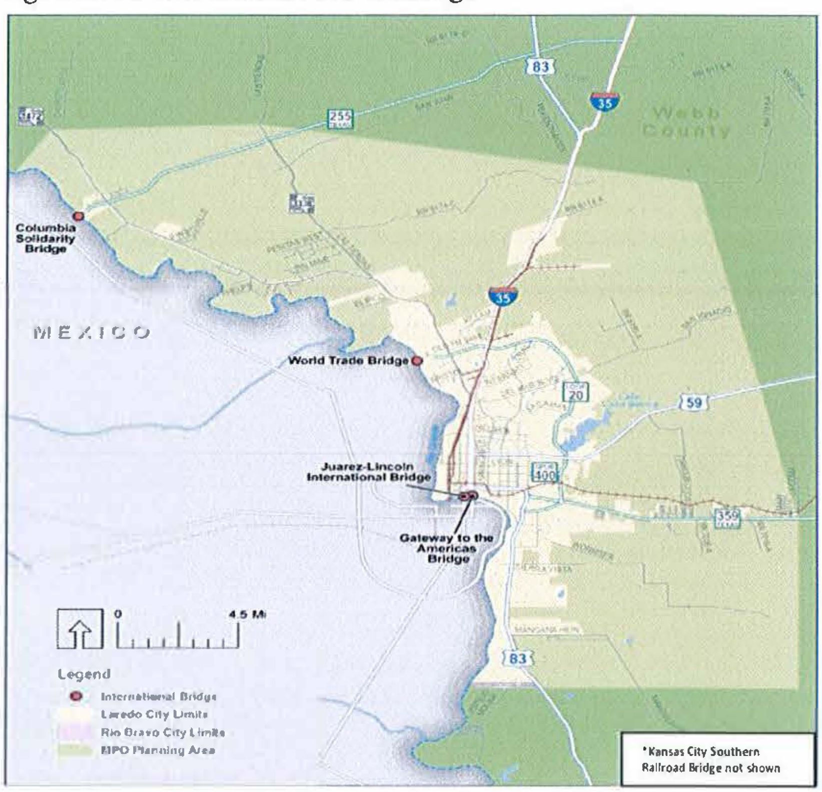
Crash rate data can be an indicator of congestion. Crash measures can identify if there are a location of high concentration of accidents on your network. Field analysis of locations of increased accident frequency or severity can assist in identifying potential projects to improve roadway function and safety. Common improvements may include adding turn lanes, adding traffic signals, implementing traffic devices, or improving sight distance, etc.

There are certain limitations to using crash data to reduce congestion, especially if used as a sole congestion indicator. The nature of accidents, and the way they are recorded, makes it difficult to measure congestion from accident rates alone. At very high traffic volumes when there is a bottleneck of traffic and the inability to change lanes, there may also be a reduction in friction between vehicles and corresponding reduction in accidents. Hence, though there may significant levels of congestion, the crash rates would be relatively low due to the inability of the vehicles to move freely. There is also a wide variance in the reporting of accident data by local law enforcement agencies. Not all accidents are reported and often exact accident locations are not identified. Accident rates are applicable as spot, corridor, and area wide measures, but are not suitable lone measures of congestion.

Freight Performance Measures.
Border traffic at the international bridge crossings is a significant concern in the Laredo region. In fact, according to the Laredo Development Foundation, the city of Laredo is the number one inland port on the US/Mexico border. Figure 3 below shows the location of 4 of the 5 international bridge crossings situated in the Laredo area:

- Gateway to the Americas (Bridge #1)
- Juarez-Lincoln Bridge (Bridge #2)
- Laredo-Colombia Solidarity Bridge (Bridge #3)
- World Trade Bridge (Bridge #4)
- Kansas City Southern International Railroad Bridge

Figure 3: International Border Crossings*



These crossings are not only important in terms of international trade and commerce, but also in terms of the overall movement and mobility patterns of the two countries and immediate communities on both sides of the international border. Clearly, these crossings play an important role on both a local and international scale.

Increased population and trade will continue to be a concern in the Laredo region, and so the international border crossings must be able to keep up with user demands. Because of this, it is important to that the Laredo MPO, together with local, State and Federal agencies, understand the existing conditions of the crossings in order to identify potential improvements of the infrastructure. Measures that focus on goods movement generally utilize other types of performance measures identified above, such as volume-to-capacity ratios or travel time measures, but focus on roadways with a high volume of trucks or designated freight corridors. The purpose of these measures is to highlight congestion that affects freight since consideration of solutions specifically-targeted to freight traffic issues may be needed.

Congestion Index (CI).
The Congestion Index is the ratio of the actual average speed to the weighted average posted speed limit. Travel time, speed, and delay are the building blocks which are then used to calculate the Congestion Index (CI) which is determined as follows:

Congestion Index (CI) = Actual Average Speed / Weighted Average Posted Speed Limit
Actual Average Speed = Average speed of all runs on a segment
Weighted Average Posted Speed Limit = Average of all posted speed limits on the segment weighted by length

In December of 2013, the MPO technical committee evaluated congestion index thresholds to define what will be used as "unacceptable" congestion indices for the MPO area. The Technical Committee adopted a CI rate threshold of 0.60 or 60% of posted speed limit. In effect, a 0.60 CI relates to an average speed through a segment of 24 mph when the posted speed is 40 mph. With relation to travel time, if a commuter was able to drive through a corridor at the posted speed and arrive at the destination in 20 minutes, the delay encountered with a CI of 0.6 would result in a travel time of 33 minutes. Those with a ratio of 0.60 - 0.99 are considered stable and those ≥1.00 are free-flow.

As the congestion management process is intended to be a continuing process, the Policy Committee will periodically revisit its selected performance measures in order to make any adjustments as needed to adjust to evolving technologies, or network conditions.

How Will Data Collection and Network Monitoring Occur?

The key to effective transportation planning decisions is the use of accurate and viable transportation data. The continuous data collection and system performance monitoring is important to determine congestion level and severity, and to evaluate the effectiveness of implemented mitigation strategies. Data collection for the adopted performance measures will be lead by the Laredo MPO working in conjunction with its planning partners. As with all planning efforts, public involvement is critical. The Laredo MPO congestion management process will require the public's participation and input on a regular basis.

An outline of the data collection efforts recommended to address each of the performance measures is provided below, along with the agencies responsible for collecting the data. System-wide data collection efforts will be focused on the CMP network, as appropriate for the particular performance measure.

Traffic Counts
Volume to capacity ratios calculations require inputs based on the average daily traffic (ADT) volumes on the congestion management network segments and planning level capacities as estimated in the local travel demand model. TxDOT collects traffic volume data by vehicle type (i.e., cars, trucks, motorcycles) via the use of automated traffic recorders (ATR) on an annual basis at six non-border crossing locations throughout the Laredo region. These counters collect the number of vehicles in intervals of 15 minutes and/or one hour per 24-hour periods. The data is compiled and processed annually into a database managed by TXDOT. Laredo MPO will work with TXDOT in obtaining this data for the required locations.

This established data collection mechanism ensures that data necessary for CMP performance monitoring is available. Analysis of the collected data will be conducted to coincide with the CMP updates. Laredo MPO will utilize Geographic Information System (GIS) to analyze the data. To supplement TxDOT's ATR counts, periodic twenty-four hour tube counts shall be recorded at the other facilities in coordination with local agencies. This 24-hour count will also help the MPO in establishing the peak hour for each CMP network.

Travel Time
Travel time studies along the CMP corridors during the peak periods and non-peak periods will be conducted periodically to understand the congestion characteristics of the corridor. Optimally, the travel time studies will be conducted at a minimum of three days in a week, preferably Tuesday, Wednesday and Thursday, without any public holidays, during the peak hours. The exact peak hour timings will be established though the 24-hour counts.

1. AM peak hour
2. Mid-day off-peak hour
3. PM peak hour

Numerous methods have been documented and tested for obtaining travel time information to support transportation systems monitoring. In summary, these methods include:

- Blue tooth-based travel time measurement involves identifying and matching the Median Access Control (MAC) address of Blue tooth-enabled devices carried by motorists as they pass a detector location
  - Bluetooth-based travel time measurement in the Laredo MPO region may be available in the future.
- The floating car method in which a test car attempts to "float" in the traffic stream by passing as many vehicles that pass the test car.
  - The floating car method is recommended to collecting data to supplement the Bluetooth-based travel time measurement.
- The follow car method in which a test car driver selects representative vehicles in the traffic stream in which to follow.
  - The follow car method is not recommended as it may result in an inaccurate representation of traffic conditions if the test car follows a vehicle driving much faster or slower than prevailing traffic.

- The license plate method positions survey the start and end of a test section (roadway segment or corridor). Surveyors record the time when vehicles pass the start and end points including the last few numbers of the license plate of each vehicle passing the observation points.
- The photographic method uses video surveillance equipment to record traffic traveling on a test section.
  - The license plate and photographic method are not recommended as it may require specialized equipment.
- The interview method uses surveyors to ask commuters to record the origin, destination, start time, and end time of their daily trips.
  - While the interview method can be used to collect a large amount of information, inadequate control over data collection procedures may result in unreliable data
- The test car method involves a "test car" to drive from a starting point to an ending point along a designated route. Surveyors in the test cars use Global Positioning System(GPS) units to record the travel times at starting, ending, and intermediate points along

One, all, or a combination of data collection methods may be used depending on a variety of factors including: desired data parameters, network conditions, and funding availability.

Crash Data

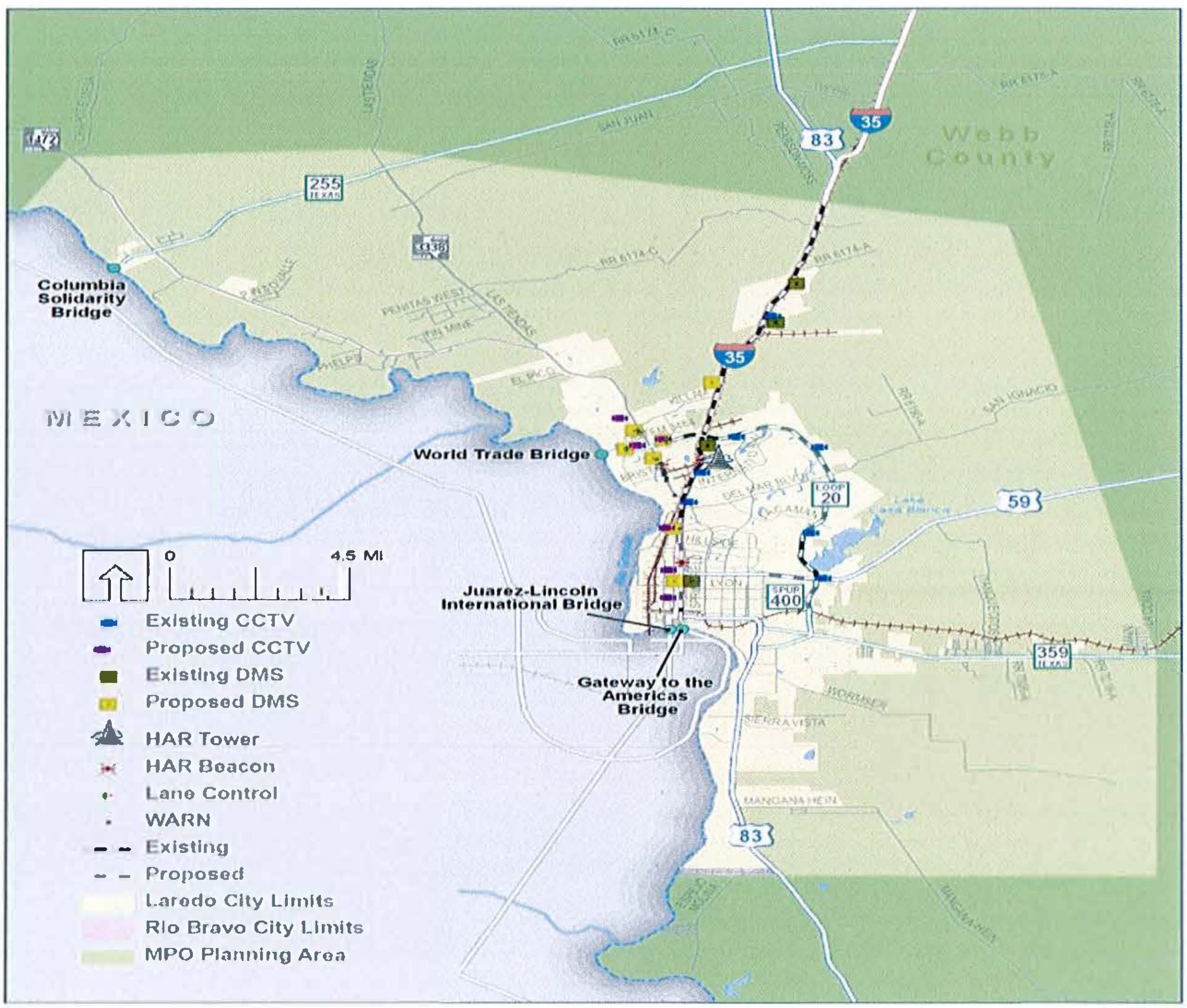
The number of crashes is a surrogate measure for non-recurring congestion; accidents along the CMP network may result in expected delays and unreliable travel times. Crash data is maintained by the TXDOT for all roadways. Although there tends to be a lag time of one to three years in reporting accident data, the most current accident data should be compiled for all CMP network segments. The Laredo MPO will work with TXDOT in obtaining the latest data for the region. Laredo MPO will utilize GIS and spread sheet calculations to analyze the data and analysis of the collected data will be conducted to coincide with the CMP updates. This data may be used to identify crash hot spots and crash rates for the network.

SRATIS Data

STRATIS is an acronym for "S●uth Texas Regional Advanced Transportation Information System." It is the transportation management center administered by TxDOT's Laredo District and has been operational since February 2004. The mission of the program is "to provide best transportation and emergency management services through the use of the area's collective resources to maximize safety and mobility to the public". From the STRATIS center, TxDOT has access to ITS infrastructure such as Closed Circuit Television (CCTV) Cameras, Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), Lane Control Signals, and Video Image Vehicle Detection System (VIVIDS). TxDOT has also deployed several miles of fiber optic cable around the City to provide communications to their roadside infrastructure. The total length of TxDOT fiber will more than double in the future with TxDOT's planned deployments and will include most of Loop 20 and Interstate 35 within the Laredo region. HAR is used by TxDOT to broadcast traveler information messages to drivers. DMSs provide up-to-date information about traffic flow conditions that helps drivers to make decisions about their trip. A railroad coordination system called the Wireless Advisory Railroad Network (WARN) is in place to inform drivers of closures at railroad crossings. TxDOT also provides "Twitter" feeds about local traffic information.

The STRATIS system is connected to the City of Laredo Transportation Management Center (TMC) to share CCTV camera feeds and control. This connection also allows the City of Laredo TMC to view messages that have been placed on the DMSs. TxDOT has also provided monitors to the City of Laredo 911 Dispatch Center to provide CCTV camera images to the center. The STRATIS center assists the local law enforcement agencies in detecting and responding to traffic incidents or any emergency incidents. These centers enable better communication and response times resulting in faster clearing of incidents, improved mobility and air quality, and reduced risk of further incidents. STRATIS data is a valuable resource to the congestion management process in identifying international border crossing delays, traffic incidents, travel times, and lane closures. STATIS data may be accessed at the following website http://its.txdot.gov/LRD/lrd.htm. Figure 4 illustrates the existing and planned ITS deployments by TxDOT in the Laredo region.

Figure 4: TxDOT ITS Deployment



Intelligent Transportation System Data
Intelligent Transportation Systems have been defined as: "the application of advanced sensor, computer, electronics, and communication technologies and management strategies—in an integrated manner—to improve the safety and efficiency of the surface transportation system". Per 23 CFR 940.9, "Any region that is currently implementing ITS projects shall have a regional ITS architecture by April 8, 2005 ...(which is) intended to guide the development of ITS projects and programs while maintaining consistency with ITS strategies and projects contained in applicable transportation plans."

The Laredo Regional ITS Architecture and Deployment Plan was completed in June of 2003. The purpose of a regional ITS architecture is to illustrate and document regional integration so that planning and deployment of ITS projects can take place in an organized and coordinated fashion. ITS projects in the region receiving funding from the national highway trust fund must adhere to the regional ITS architecture. A region may be specified at a corridor, metropolitan, statewide, or multi-state level, although the Metropolitan Planning Area is the minimum regional size within a metropolitan area. The Laredo Region boundaries were defined to include Webb, Duval, LaSalle and Dimmit counties.

The City of Laredo developed it's ITS Master Plan in January of 2005. The plan intended to coordinate the deployment of ITS, focus on the highest priority needs, and develop a plan for operating and maintaining the City of Laredo's system. Objectives of the plan include: identification of ITS components, technology, and project concepts that have the potential to improve traveler safety, decrease traffic congestion, and generally manage the growth that experiences in its transportation infrastructure. Development of the plan accomplished the following goals:

- Identified priority ITS services for the City of Laredo
- Developed a vision and mission statement
- Identified stakeholder needs
- Documented existing and planned transportation and communication projects in the City
- Identified and prioritized projects including project phasing
- Ensured consistency with the Regional ITS Architecture

The data collected and projects identified thru the ITS Regional Architecture and City of Laredo ITS Master Plan development processes are another valuable avenue of data for the congestion management process.

What Congestion Mitigation Strategies Are Available?

The CMP is intended to provide a performance based approach to address persistent congestion problems and prioritize investments. There are many congestion management strategies available, all of which differ in terms of effectiveness, cost, complexity, and difficulty of implementation. Congestion management strategies are not one size fits all. Congested roadways and intersections have to be properly examined to evaluate which congestion mitigation strategy will effectively improve the congestion related problems. The CMP framework identifies numerous congestion mitigation strategies that can individually or collectively improve the operational efficiency of the Laredo transportation system. When suitable strategies are implemented, improvements impact auto, transit, pedestrian, and bicycle usage. The following sections identify a range of strategies available that can be grouped broadly into the following categories

Transportation Demand Management (TDM)
Travel Demand Management (TDM) nonautomotive travel modes, and land use management can all help to provide travelers with more options and reduce the number of vehicles or trips during congested periods. These include strategies that substitute communication for travel, or encourage regional cooperation to change development patterns and/or reduce sprawl. These include:

Promoting Alternatives
- Programs that encourage transit use and ridesharing, such as marketing/outreach for transit and travel demand management (TDM) services
- Pedestrian and bicycle improvements and other strategies that promote non-motorized travel

Managing and Pricing Assets
- Congestion pricing strategies, including high occupancy toll (HOT) lanes
- Parking management
- Pricing fees for parking spaces by the number of persons in the vehicle and the time of day or location
- Pricing fees for the use of travel lanes by the number of persons in the vehicle and the time of day.
- Increasing intercity freight rail or port capacity to reduce truck use of highways.

Work Patterns
- Flexible work hours programs
- Telecommuting programs

Land Uses
- Land use controls or zoning to support/encourage mixed use development and TDM friendly neighborhoods.
- Growth management restrictions such as urban growth boundaries.
- Development of policies that support transit-oriented designs for corridors and communities involving homes, jobsites, and shops.
- Incentives for high-density development, such as tax incentives.

Traffic Operational Improvements
These strategies focus on getting more out of what we have. Rather than building new infrastructure, many transportation agencies have embraced strategies that deal with operation of the existing network of roads. Many of these operations-based strategies are supported by the use of enhanced technologies or Intelligent Transportation Systems (ITS). These include:

Highway/Freeway Operations
- Metering traffic onto freeways
- Reversible commuter lanes
- Access management
- Movable median barriers to add capacity during peak periods
- Automated toll collection improvements
- Conversion of HOV lanes to High Occupancy Toll (HOT) lanes

- Bus-only shoulder lanes

Arterial and Local Roads Operations

- Optimizing the timing of traffic signals
- Restricting turns at key intersections
- Geometric improvements to roads and intersections
- Converting streets to one-way operations
- Transit signal priority
- Access management
- Traffic calming
- Road diets (narrowing or removing of travel lanes, often on undivided multilane facilities – e.g. converting from a 4-lane cross-section to a 3-lane cross-section)

Other Operations Strategies

- Faster and anticipatory responses to traffic incidents (incident management)
- Traveler information systems
- Improved management of work zones
- Identifying weather and road surface problems and rapidly targeting responses
- Anticipating and addressing special events, including emergency evacuations, that cause surges in traffic

Public Transportation Strategies

Improving transit operations, improving access to transit, and expanding transit service can help reduce the number of vehicles on the road by making transit more attractive or accessible. These strategies may be closely linked to strategies in the previous two categories (demand management and traffic operations). As with traffic operations, transit operations are often enhanced by ITS. These include:

Operations Strategies

- Realigned transit service schedules and stop locations
- Providing real-time information on transit schedules and arrivals using vehicle location data
- Providing travelers with information on travel conditions as well as alternative routes and modes
- Monitoring the security of transit patrons, stations, and vehicles
- Enhanced transit amenities and safety
- Universal fare cards for regions with multiple transit agencies
- Transit signal priority
- Bus rapid transit

Capacity Strategies

- Reserved travel lanes or rights-of-way for transit operators, including use of shoulders during peak periods
- More frequent transit or expanded hours of service
- Expanding the transit network through new bus and rail services

Accessibility Strategies

- Improvements to bicycle and pedestrian facilities that provide access to transit stops
- Provisions for bicycles on transit vehicles and at transit stops (bikes on trains and buses, secure bicycle parking at stops.

Road Capacity Strategies

This category of strategies addresses adding more base capacity to the road network, such as adding additional lanes and building new highways, as well as redesigning specific bottlenecks (such as interchanges and intersections) to increase their capacity. Given the expense and possible adverse environmental impacts of new single-occupant vehicle capacity, management and operations strategies should be given due consideration before additional capacity is considered. These include:

- Constructing new HOV or HOT lanes
- Removing bottlenecks
- Intersection improvements
- Center turn lanes
- Overpasses or underpasses at congested intersections
- Closing gaps in the street network
- Add travel lanes on major freeways and streets (including truck climbing lanes on grades)

How Are Congestion Mitigation Strategies Assessed, Selected, and Implemented?

Implementation of congestion management strategies occurs through inclusion of strategies in the fiscally-constrained MTP and TIP. Any project, including those identified thru the congestion management process, may be considered for incorporation through the adopted respective document development processes. The MTP development process currently requires that projects considered for incorporation be evaluated on a variety of criteria including: traffic operations, safety, modal impacts, community development, project cost, project readiness, environmental impacts, and system management. In future the MTP scoring criteria may include scoring elements that give weight to projects based on CMP data. Projects scoring highest may then be considered for inclusion in the fiscally constrained TIP. After all necessary contractual, procedural, regulatory, environmental (NEPA analysis) and public involvement requirements are fulfilled; the project may then be implemented.

At the corridor level, more specific strategies such as bicycle and pedestrian improvements and operational improvements can be assessed in studies and implemented using a variety of funding sources, including Federal funding streams such as the Surface Transportation Program (STP), National Highway System (NHS) funds, and the Congestion Mitigation and Air Quality Improvement (CMAQ) Program, as well as through state or local funding or other discretionary funding sources.

Funding of the congestion management process and the selected management strategies is of paramount importance to the success of the process. The Laredo MPO intends to give careful consideration to identification of federal or nonfederal funding for potential CMP-related programs and projects. Customary project funding identification will occur during the MTP and TIP development processes, while data collection, project monitoring and evaluation efforts made by the MPO will be funded thru MPO planning funds.

How Will Success Be Monitored?

Evaluation of strategy effectiveness is an essential, required element of the CMP. The primary goal of this action is to ensure that implemented strategies are effective at addressing congestion as intended, and to make changes based on the findings as necessary. Two general approaches are used for this type of analysis:

(1) **System-level performance evaluation** – Regional analysis of historical trends to identify improvement or degradation in system performance, in relation to objectives; and

(2) **Strategy effectiveness evaluation** - Project-level or program-level analysis of conditions before and after the implementation of a congestion mitigation effort.

Findings that show improvement in congested conditions due to specific implemented strategies can be used to encourage further implementation of these strategies, while negative findings may be useful for discouraging or downplaying the effectiveness of similar strategies in similar situations. The information learned from evaluation should be used to inform the TIP and MTP, as well as other steps within the CMP, notably the identification and assessment of strategies.

The periodic and on-going data gathering efforts required under the congestion management process provides a two-fold benefit including: the provision of up to date network performance data, while also confirming the efficacy or failure of implemented congestion management strategies in achieving system performance improvement. Thus, at its core the CMP incorporates a feedback loop which provides local decision makers with a valuable mechanism for measuring the success of previously implemented congestion management strategies.