Permian Basin Metropolitan Planning Organization

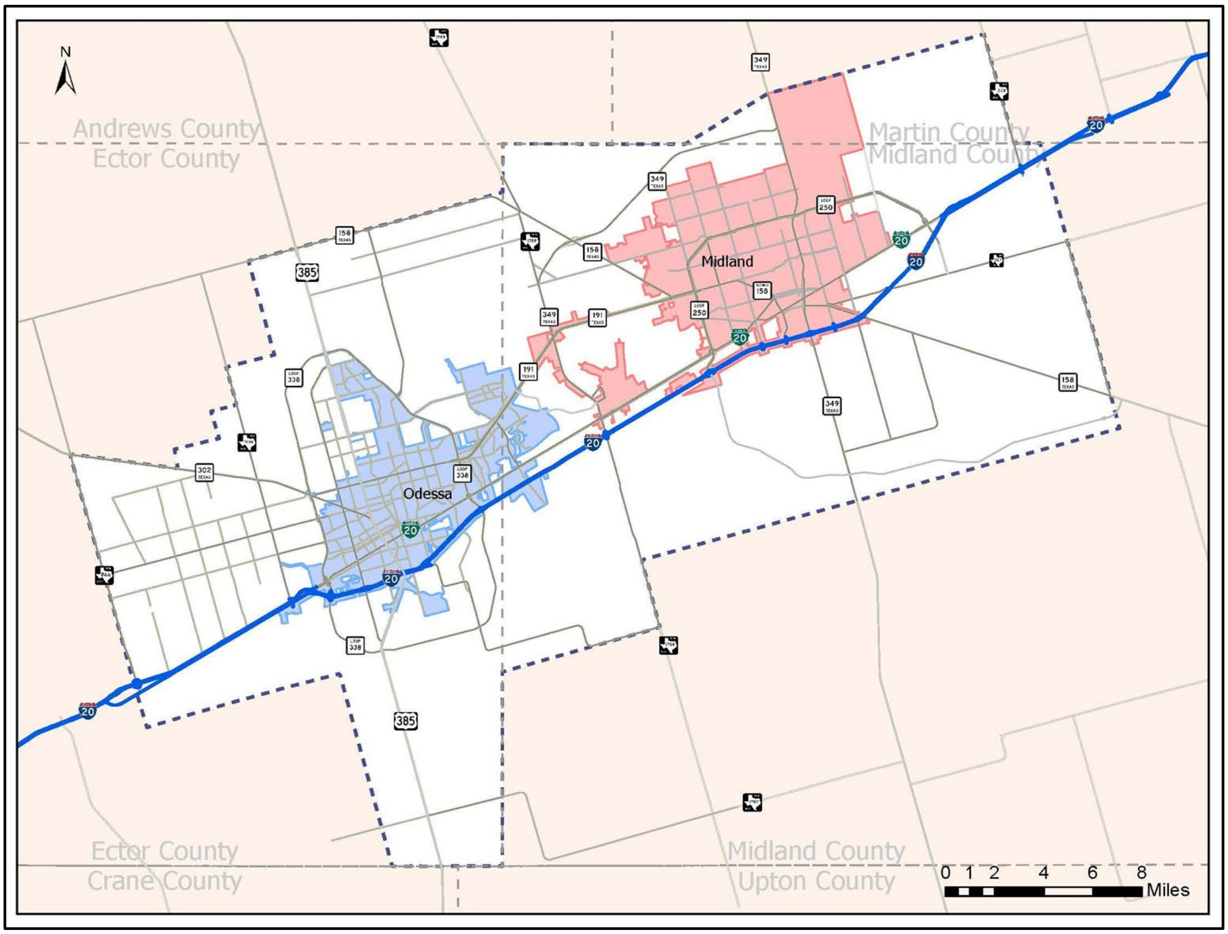
Congestion Management Process (CMP)

2024 Update

Approved by Policy Board: January 29, 2024

1. Introduction

This document is the updated 2024 Congestion Management Process (CMP) for the Permian Basin Metropolitan Planning Organization (PBMPO) planning area, shown in Map 1.1. This CMP includes applicable assumptions, methodologies, performance measures, and potential congestion mitigation strategies to address mobility issues.



Map 1.1 – The Permian Basin MPO area boundary which encompasses 739 square miles and includes the Cities of Midland and Odessa and a portion of Ector, Martin, and Midland Counties.

What is Congestion Management?

Congestion management is the application of strategies and transportation system improvements to enhance system performance and reliability. These enhancements are accomplished by reducing the adverse impacts of congestion on the movement of people and goods.

What is a Congestion Management Process?

A CMP is a federally required systematic and regionally accepted approach for managing congestion within a transportation management area (TMA). The CMP provides accurate, up-to-date information on transportation system performance. It also assesses various strategies for mobility, while meeting state and local needs. The CMP is intended to move these congestion management strategies into the funding and implementation stages tied to investments on the multimodal transportation network. The CMP, as defined in federal regulations, is intended to serve as a systematic process that provides safe and effective integrated management and operation of the multimodal transportation system. The process includes eight main steps:

1. Develop congestion management objectives
2. Define a congestion monitoring network
3. Develop multimodal performance measures
4. Collect data and monitor system performance
5. Analyze congestion problems and needs
6. Identify and assess congestion management strategies
7. Program and implement congestion management strategies
8. Evaluate strategy effectiveness

A CMP should address a TMA's specific congestion issues. Congestion is relative among metropolitan areas – and often even within a single metropolitan area. The CMP has become an important tool for addressing persistent congestion problems, project selection, and prioritizing investments.

2. Approach to Data Collection

The flexibility in CMP development allows MPOs to design their own approaches and processes to fit their individual needs. The CMP is an on-going process, continuously progressing and adjusting over time as goals and objectives change. New congestion issues arise, new information sources become available, and new strategies are identified and evaluated.

A major advancement since the previous Permian Basin MPO's CMP is the availability of technological tools for identifying congestion, including:

- Congestion Management Process Assessment Tools (COMPAT) which provides annual travel time index (TTI), hours of delay, and planning time index (PTI), among other measures. These data are based upon yearly averages and provide an annual "snapshot" based upon INRIX (a private company) data received from the previous year.
- INRIX has its own set of tools which became available in mid-2023 to Texas MPOs through a licensing agreement with the Texas Department of Transportation (TxDOT). INRIX provides roadway analytics through not only fixed sensors, but in-vehicle data collection in real-time.
- Regional Integrated Transportation Information System (RITIS) is another web-based software suite that uses INRIX and other datasets to perform more in-depth analysis of transportation conditions over various time periods and selected criteria. This extensive traffic analysis software also became available in mid-2023 to the MPOs.

In addition to the above new resources, the PBMPO continues to make use of geographic information system (GIS) transportation data received from TxDOT's Crash Reporting Information System (CRIS) data, the building permit/subdivision platting data from the Cities of Midland and Odessa, and Census data growth patterns and projections, and work with TxDOT's Transportation Planning and Programming Division (TPP) on a travel demand model (TDM).

2.1 Analysis of Data within the Congestion Network

The CMP identifies congestion locations and causes. By completing this task, a clearer focus can be applied to transportation planning efforts. Most of PBMPO's planning area congestion is experienced on roads included in the congestion monitoring network (Map 3.1). According to the Federal Highway Administration (FHWA), roadway congestion consists of three key elements: severity, extent, and duration. The blending of these elements determines the overall congestion effect on roadway users. Congestion severity refers to the magnitude of the problem at its peak. Congestion extent describes the geographic area or number of affected motorists. Duration describes the lengths of times that users experience congested conditions. Because these elements have direct relationships, any increase in one will subsequently result in an increase in the other elements. Therefore, as roadway congestion severity increases, congestion duration will increase. These increases will impact greater numbers of motorists and roadway facilities, thus increasing the extent. The PBMPO Policy Board considers existing and future congestion identified through the CMP when prioritizing and funding projects and programs.

Congestion occurs due to several foreseeable and unforeseeable events, either in isolation or in combination. Congestion is classified as either recurring or non-recurring. PBMPO uses the recently available tools to differentiate the types of recurring congestion associated with peak travel times, freight movement, intersection locations, various corridor classifications, schools, business districts, bottlenecks, at-grade rail crossings, and parking. INRIX, other data, and toolsets, also assist in identifying non-recurring congestion associated with incidents such as crashes, construction, and weather-related events.

PBMPO's CMP focuses on regionally significant roadways, including freeways, frontage roads, major arterial streets, intersections, interchanges, and corridor segments that comprise the congestion monitoring network. PBMPO uses TTI and other related data to develop congestion thresholds. These thresholds identify which road segments are "congested" and "near-congested." The thresholds may change over time as congestion measures increase or decrease throughout the CMP network. Projects on roads near or above congestion thresholds receive points in the project scoring process

2.2 Performance Measures

Developing performance measures to identify, assess, and communicate congestion is critical. One key to CMP effectiveness is the ability of the MPO staff to adequately assess system performance to identify problem areas. Understandable communications of that information to the public and decision-makers is also important. A performance measure, such as TTI or cost of delay, is used to determine the extent of a congestion issue. PBMPO adopted (in 2021) a performance measure threshold for congestion using a TTI of 1.5 or greater to identify a road or road segment as being congested. The Midland-Odessa Urban Transportation District (MOUTD), operating as the EZ-Rider transit agency, uses other metrics such as "on-time" performance rates for stops along their bus routes.

Performance measures serve as indicators to better understand transportation facility usage and the traveler characteristics. Performance measures can also be assessed over time to indicate whether congestion management strategies are successful and produce meaningful and/or desired outcomes. By monitoring performance and the outcomes from implemented improvement strategies, the quality of decision-making in the planning process can be improved and limited financial resources can be expended more effectively. The requirement for on-going assessment of the performance measures leads to the need to identify measures that are quantifiable, without placing a heavy burden on time, cost, or PBMPO staff training. This CMP establishes a set of performance measures that can be calculated from real world data on an annual basis, or on an ad-hoc basis using INRIX/RITIS and other tools. All results provide PBMPO with useful information to encourage better transportation investment decisions.

The federal CMP requirements do not mandate specific performance measures that must be used during the process. Identifying appropriate congestion performance measures is up to each MPO. Although a wide range of performance measures is available, those selected for PBMPO CMP must be understandable, outcome—oriented, and supported by regularly available data. Two specific and measurable performance objectives to be established and monitored by PBMPO are: 1) reduce traffic delays on network freeways and arterial streets identified as having the most serious travel delays; and 2) reduce transit travel delays on routes having serious schedule delays. Over time, PBMPO identifies and uses specific measures and determines effectiveness in addressing congestion. As necessary, the PBMPO Policy Board will reconsider funding and scheduling priority amendments. Since 2018, the PBMPO Policy Board has regularly taken action to support TxDOT's adopted congestion performance targets.

Several performance metrics for measuring congestion are most recently (as of 2023) available in the RITIS Probe Data Analytic Suite for the MPO staff to perform congestion scans or create performance charts. These performance metrics include:

- Comparative Speed — Measured speed as a percentage of the historical average speed for this time of day and day of week.
- Congestion: Free Flow Speed — Measured speed as a percentage of the free flow speed.
- Congestion: Posted Speed Limit — Measured speed as a percentage of the posted speed limit.
- Historical Average Congestion: Free Flow Speed — Historical average speed as a percentage of the free flow speed for this time of day and day of week.

- Historical Average Congestion: Posted Speed Limit — Historical average speed as a percentage of the posted speed limit for this time of day and day of week.
- Buffer Time — The extra time (or time cushion) that travelers must add to their average travel time when planning trips to ensure on-time arrival (95% Travel Time - Average Travel Time).
- Buffer Index — The Buffer Time's percentage value of the Average Travel Time ((95% Travel Time - Average Travel Time) / Average Travel Time). Its value increases as reliability gets worse. For example, a buffer index of .4 (40 percent) means that, for a 20-minute average travel time, a traveler should budget an additional 8 minutes (20 minutes x 40 percent = 8 minutes) to ensure on-time arrival most of the time.
- Planning Time — The total time a traveler should plan for to ensure on-time arrival (95% Travel Time).
- Planning Time Index: Free Flow Speed — The total travel time that should be planned when an adequate buffer time is included (95% Travel Time / Free-flow Travel Time). The planning time index differs from the buffer index because it includes typical delay as well as unexpected delay. Thus, the planning time index compares near-worst case travel time to a travel time in light or free-flow traffic. For example, a planning time index of 1.60 means that, for a 15-minute trip in light traffic, the total time that should be planned for the trip is 24 minutes (15 minutes x 1.60 = 24 minutes).
- Planning Time Index: Posted Speed Limit — The total travel time that should be planned when an adequate buffer time is included (95% Travel Time / Speed Limit Travel Time). The planning time index differs from the buffer index in that it includes typical delay as well as unexpected delay. Thus, the planning time index compares near-worst case travel time to a travel time in traffic moving at the posted speed limit. For example, a planning time index of 1.60 means that, for a 15-minute trip when moving at the speed limit, the total time that should be planned for the trip is 24 minutes (15 minutes x 1.60 = 24 minutes).
- Travel Time Index: Free Flow Speed — Travel time represented as a percentage of the ideal travel time (Travel Time / Free-flow Travel Time).
- Travel Time Index: Posted Speed Limit — Travel time represented as a percentage of the ideal travel time (Travel Time / Speed Limit Travel Time).

In addition, the following performance measures/variables are utilized in the COMPAT tool PBMPO has often used over the past three years:

- Person Hours of Delay – The difference in travel time from uncongested traffic and congested traffic. This is for all persons in vehicles traveling for a year
- Congested Costs – The annual costs to travelers due to such factors as loss productivity and extra vehicle wear
- Average-Annual Daily Traffic (AADT) – The total volume of traffic on a highway segment for one year, divided by the number of days in the year
- Vehicle Miles of Travel – The mileage traveled by all vehicles on a highway segment over an average day in a year
- Peak Vehicle Miles of Travel – The mileage traveled by all vehicles on a highway segment in the peak period over an average day in a year
- Truck AADT – The total volume of truck traffic on a highway segment for one year, divided by the number of days in the year

- Truck Vehicle Miles of Travel – The mileage traveled by all trucks on a highway segment over an average day in a year
- Truck Person-Hours of Delay – The difference in travel time from uncongested traffic and congested traffic. This is for all truck person-hours traveling for a year
- Reference Speed – The average speed of vehicles in uncongested conditions
- Congested Speed – The average speed of vehicles in congested conditions
- Truck Reference Speed – The average speed of trucks in uncongested conditions
- Truck Congested Speed – The average speed of trucks in congested conditions
- Travel Time Index – The ratio of the peak-period travel time as compared to the free-flow travel time. This measure is computed for the AM peak period (6:00 a.m. to 9:00 a.m.) and PM peak period (4:00 p.m. to 7:00 p.m.) on weekdays
- Truck Travel Time Index – The ratio of the peak-period travel time for trucks as compared to the free-flow travel time for trucks. This measure is computed for the AM peak period (6:00 a.m. to 9:00 a.m.) and PM peak period (4:00 p.m. to 7:00 p.m.) on weekdays
- Planning Time Index (PTI) 80 – The ratio of the 80th percentile travel time as compared to the free- flow travel time
- Planning Time Index 95 – The ratio of the 95th percentile travel time as compared to the free-flow travel time
- Truck Planning Time Index 80 – The ratio of the 80th percentile truck travel time as compared to the truck free-flow travel time
- Truck Planning Time Index 95 – The ratio of the 95th percentile truck travel time as compared to the truck free-flow travel time
- Congested CO2 Lbs. – The extra CO2 emitted from vehicles in congested conditions
- Normal CO2 Lbs. – The CO2 emitted from vehicles in uncongested conditions

The final two criteria above are of special interest to PBMPO with the current Infrastructure Investment and Jobs Act (IIJA) funding available for exploring carbon reduction strategies. Other performance measures that PBMPO utilize include:

- Crash Measures – Crash measures identify if there is a high concentration of crashes at a particular location along a corridor or at a particular turning movement at an intersection or cross street. Crashes certainly impact travel conditions and can be the cause of non-recurring congestion along corridors and intersections. Identifying "hot spot" crash locations and examining the location in the field can assist in identifying potential projects to improve the safety and function of the roadway corridor or intersection. Common improvements could include improving sight distance, adding turn lanes, adding traffic signals, implementing traffic calming devices, etc. Crash measures in PBMPO's area could include the following:
    - Number of crashes along a specified corridor
    - Number of crashes at a particular intersection
    - Type of crashes along a specified corridor
    - Type of crashes at a particular intersection
    - Number of crashes per million vehicle-miles over a section of roadway
- Transit Travel Condition Measures – These measures provide information on the conditions experienced by public transit users. Aspects of transit travel conditions include vehicle ridership vs. load capacity and on- time performance reliability. Thus, transit travel condition measures in the Permian Basin MPO area include the following:
    - Transit ridership

- Transit capacity along congested corridors
- Transit availability
- Transit scheduling delays due to congestion

Two of the main factors in deciding a mode of travel include the availability and the reliability of transit. Because automobiles provide both availability and reliability, most trips are completed using cars. Examining transit ridership and capacities along congested corridors will assist in identifying potential route extensions and modifications that may encourage more transit "choice" ridership. If public transportation is not available along a congested corridor, this may be a potential corridor to review alternatives to improve congestion.

3. PBMPO Congestion Management Process

The PBMPO planning area population, according to the most recent U.S. Census estimates, is 340,455. Within this area, PBMPO has the responsibility of coordinating safe and efficient movement of people and goods on the multi-modal public transportation system. The PBMPO multi-modal transportation system includes facilities for pedestrians, bicyclists, transit riders, air transport users, and automobile/truck users.

The PBMPO CMP is modeled after the process suggested in the FHWA *Congestion Management Process: A Guidebook*. Figure 3.1 visualizes the step-by-step process, emphasizing the ongoing nature of the CMP. The eight-step process includes the following actions:

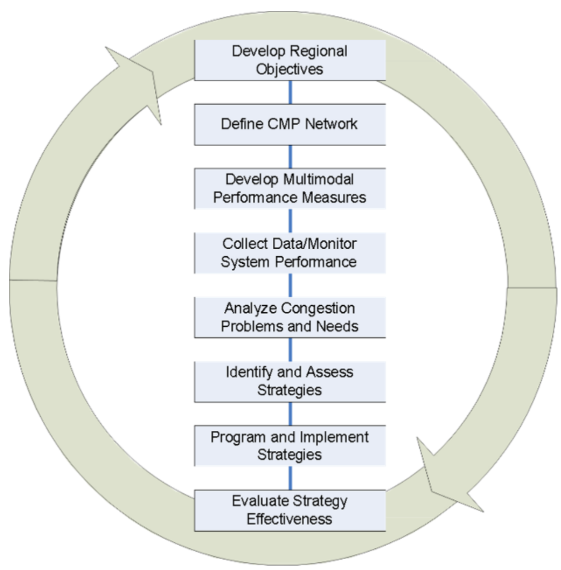


Figure 3.1 – Elements of the Congestion Management Process

Develop Regional Objectives – First, MPO needs to answer the questions: "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 in this step it is important to define the regional objectives for congestion management that are designed to achieve the desired outcome. Some MPOs also define congestion management principles, which shape how congestion is addressed from a policy perspective.

Define the CMP Network - Second, answering the question, "What components of the transportation system are the focus?" involves defining both the geographic scope and system elements (e.g., freeways, major arterials, transit routes) that will be analyzed in the CMP.

Develop Performance Measures – Third, the CMP addresses the question, "How do we define and measure congestion?" This involves developing performance measures to be used to measure congestion on both a regional and local scale. These performance measures should support the regional objectives.

Collect Data/Monitor System Performance - After performance measures are defined, data is collected and analyzed to determine, "How does the transportation system perform?" Data collection may be ongoing and involve a wide range of data sources from various planning partners.

Analyze Congestion Problems and Needs - Using available data and analysis techniques, the CMP should address the questions, "What congestion problems are present in the region, or are anticipated?" and "What are the sources of unacceptable congestion?"

Identify and Assess Strategies - Working together with the MPO's planning partners, the CMP should address the question, "What strategies are appropriate to mitigate congestion?" This step involves both identifying and assessing potential strategies and may include efforts conducted as part of the development of the MTP, corridor studies, or project studies.

Program and Implement Strategies – Then the question, "How and when will solutions be implemented?" needs to be answered. This involves: including strategies in the MTP; determining funding sources; prioritizing strategies; allocating funding in the TIP; and, ultimately, implementing the strategies.

Monitor Strategy Effectiveness – Lastly, "What have we learned about implemented strategies?" This step will be tied closely to monitoring system performance and is designed to inform future decision making about the effectiveness of transportation strategies. From the lessons learned in this step, the process begins again in a continuous process of monitoring and improving congestion management processes within the region.

3.1 Develop the Vision, Goals and Objectives

The CMP foundation begins with identifying a vision, goals, and objectives for reliable goods and people movement. The vision states what the transportation system should look like in the future. Goals state how the MPO will reach the vision and objectives state how the MPO will achieve the goals. They are an essential part of a data-driven, performance-based approach to transportation planning.

Generally, the vision, goals and objectives used for the CMP are the same as those adopted by the Policy Board for the MTP.

> The PBMPO vision is *"To have an affordable system of transportation infrastructure and services that safely connects the regional community and fosters economic prosperity and quality of life."*

The PBMPO's technical advisory committee (TAC) and the general public have indicated through planning processes that congestion is one of the highest priorities when recommending transportation infrastructure investments. Capturing the full spectrum of regional priorities in the transportation planning process, the CMP includes many of the same MTP goals related to congestion and performance targets. The sections that follow identify performance measures and data collection to evaluate progress toward overall goals which are often indirectly related to congestion. Table 3.1 presents the congestion related goals and objectives from PBMPO's current MTP, Forward 45.

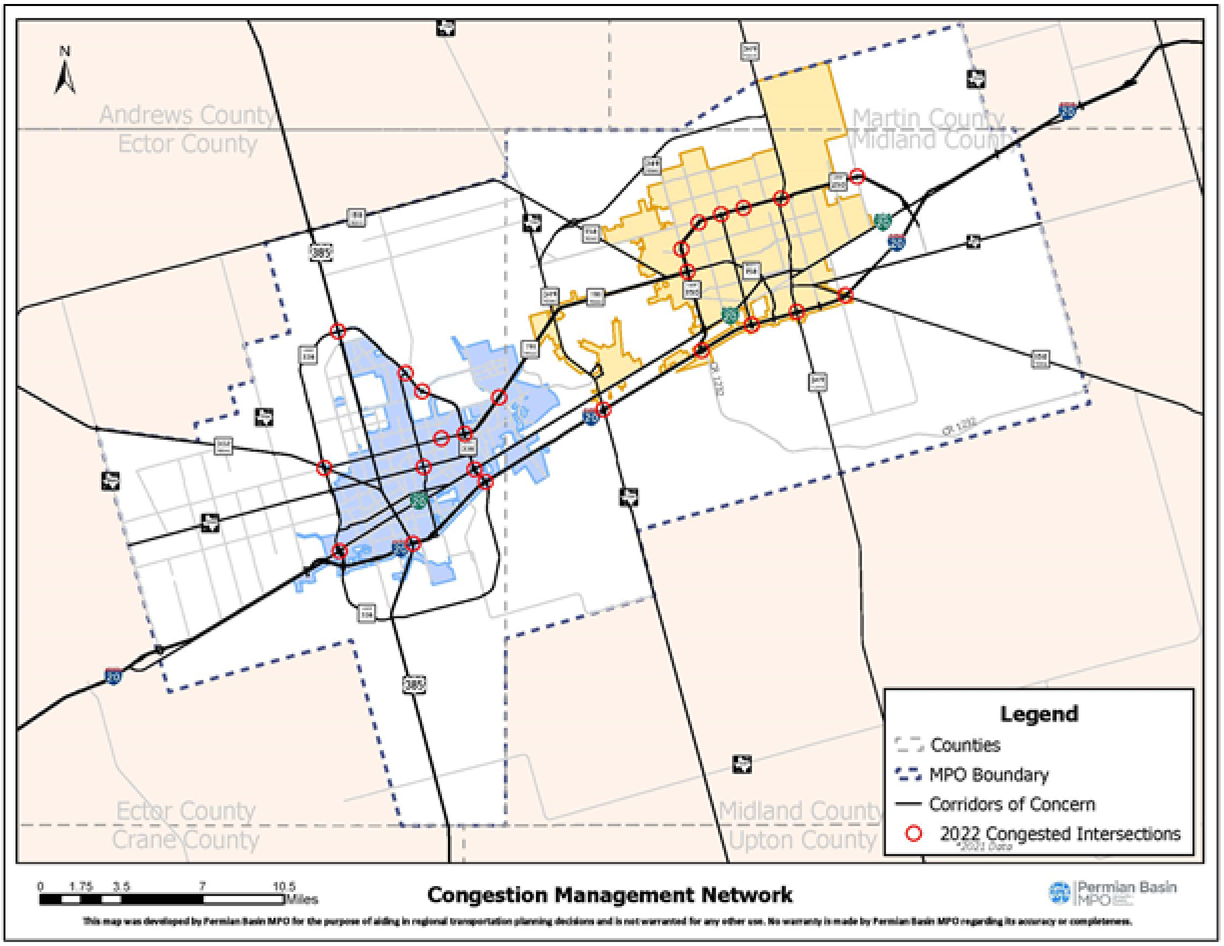
GOAL 1:	**Improve the overall quality of life for the traveling public.**
·	Work with partner entities and stakeholders to address livability issues and local policies affecting transportation, neighborhoods, and safety.
·	Incorporate best practices related to safety during the planning process.
·	Reduce crashes resulting in fatalities, injuries, and property damage within the region.
·	Promote regional efforts to maintain the existing system to keep it in optimal condition.
GOAL 2:	**Incorporate multiple modes of transportation in the planning process.**
·	Facilitate discussions with the member agencies, the public and transit providers related to transit service.
·	Partner with public agencies and private companies to increase bicycle and pedestrian traffic.
·	Connect infrastructure and services by reducing gaps and conflicts in the multimodal transportation system.
GOAL 3:	**Reduce congestion and decrease time delays on the transportation system.**
·	Implement and maintain the Congestion Management Process as a tool to analyze and identify congestion problems and needs.
·	Encourage ride sharing and alternative working hours to alleviate congestion.
·	Encourage increased participation in transit, cycling, and walking for purposes beyond recreation.
·	Utilize Planning and Environmental Linkage studies and other tools for developing new infrastructure prior to considering significant investment.
GOAL 4:	**Identify critical system issues and areas as identified through the Congestion Management Process.**
·	Employ tools such as Intelligent Transportation Systems and enhanced technology to maximize system efficiency.
GOAL 5:	**Identify non-traditional funding sources or apply for resources beyond what is allocated.**
·	Increase available funding sources to complete more projects on the transportation system.
·	Example: Explore effective/innovative uses of recent Carbon Reduction funding to reduce emissions in congested locations.
GOAL 6:	**Ensure that freight is moved safely, efficiently, and seamlessly throughout the region.**
·	Coordinate efforts with partner entities and stakeholders to improve the movement of freight.
·	Example: Explore the need for extended Free Right-Turn Lanes to accommodate several trucks and reduce congestion.

Table 3.1 – Goals and Objectives related to the PBMPO's Congestion Monitoring Plan (Source: Abridged list from the MTP – Forward 45)

3.2 Define the CMP Network

The CMP identifies congestion locations and causes. By completing this task, a clearer focus can be applied to transportation planning and programming efforts. Most of the PBMPO congestion occurs on facilities in the congestion monitoring network map (Map 3.1).

The primary focus of the 2024 updated CMP is on road and transit impacted congestion; however, other modes of transportation may also be reviewed as data becomes available to PBMPO. For the 2024 CMP update, PBMPO relied more on quantitative data than qualitative public perception. Public input is still very much a part of the CMP today as it is made available to the public for comment and input and requires a public hearing for adoption.



Map 3.1 – The Congestion Monitoring Network showing regionally significant corridors in dark lines and intersections that exhibit congestion.

The simple graphic below (Figure 3.2) from the FHWA publication on travel time reliability puts quantitative measured data in perspective with qualitative public perception.

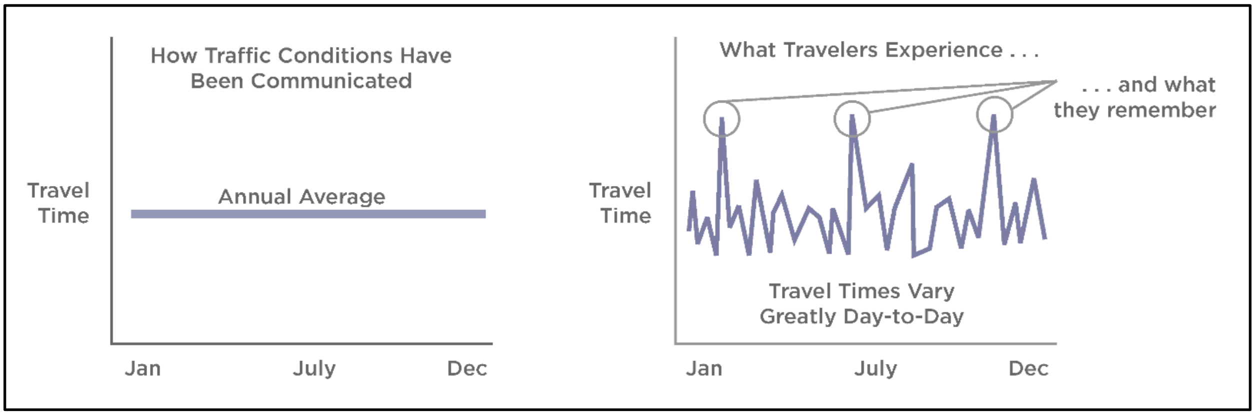
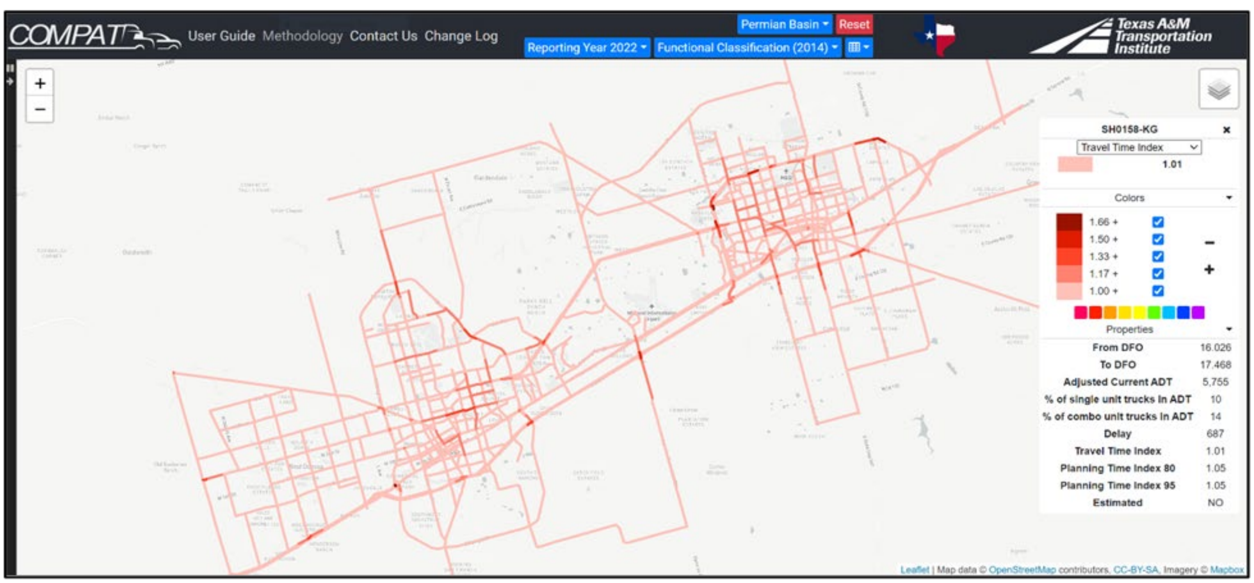


Figure 3.2 – A quantitative annual average of travel time to the actual data of the ups and downs in travel time and what the public tends to remember. (Source: FHWA)

One of the valuable tools that PBMPO uses is COMPAT, which can identify, among other metrics, the TTI as the ratio of the travel time during the peak period to the time required to make the same trip during off-peak periods. A value of 1.25, for example, indicates a 20-minute off-peak trip requires 25 minutes during the peak period. PBMPO has adopted a TTI of 1.5 as a threshold in scoring potential projects higher on the congestion rating in the project selection process. The COMPAT-generated Map 3.2 shows the TTI for the reporting year 2022 (based upon 2021 data). Because the TTI is based upon an annual average of both Wednesdays and Saturdays over the year, great travel time fluctuations do not appear, as noted in Figure 3.3.



Map 3.2 – COMPAT Travel Time Index along the significant road corridors within the PBMPO planning area shown as an annual average for the reporting year 2022 based upon 2021 INRIX data.

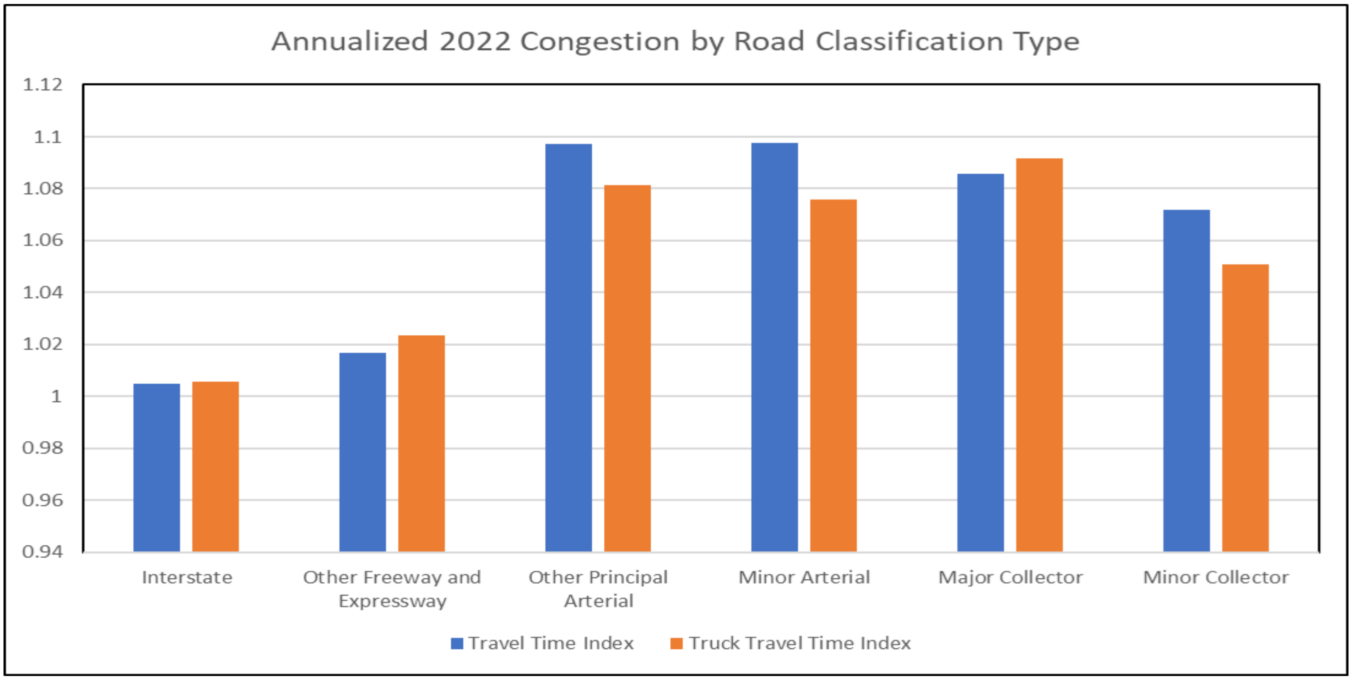
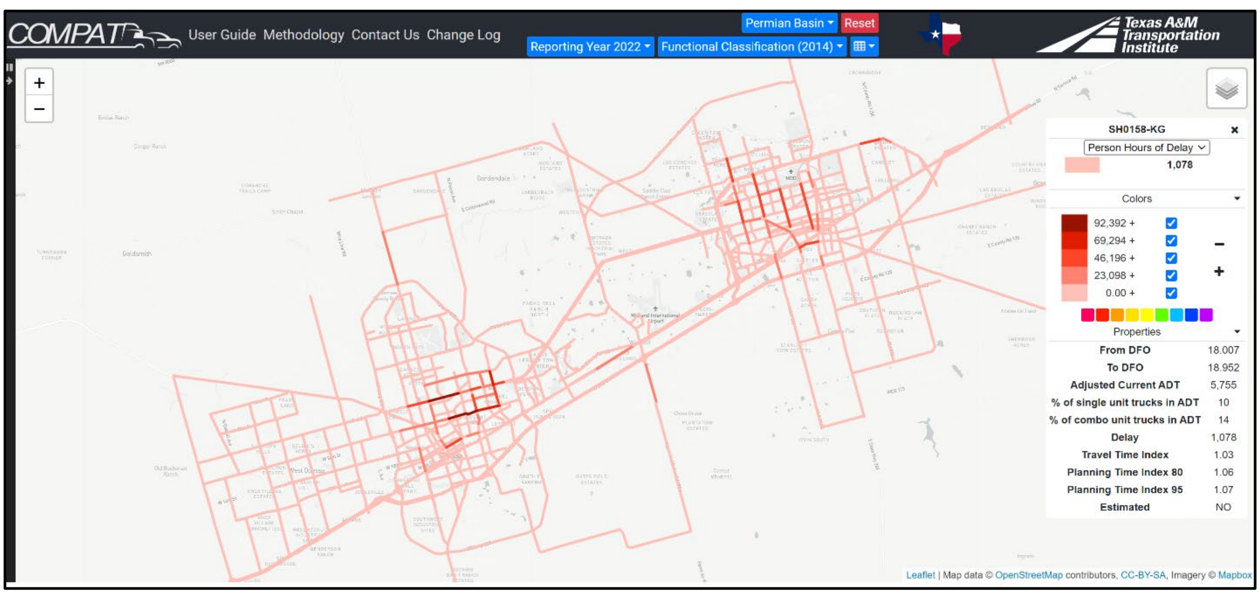


Figure 3.3 – A chart representing the annualized raw data from COMPAT congestion map shown in Map 3.2 identifying the narrow variation of the Travel Time Index across various road classifications. (Source: COMPAT)

Another metric for measuring congestion throughout PBMPO's transportation planning network is the person hours of delay. Person hours of delay measures the delay per mile during the peak periods, which can be in the 6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m. ranges.

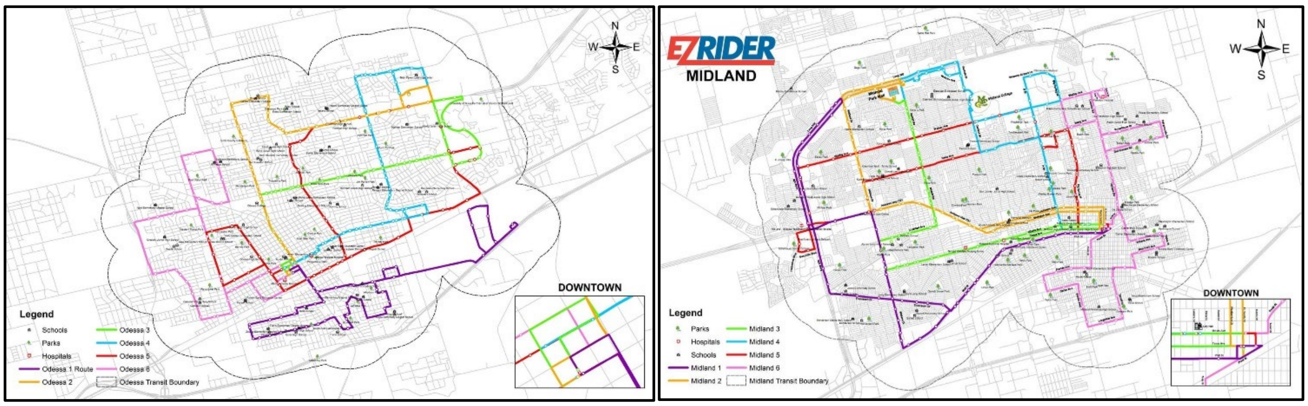


Map 3.3 – COMPAT Person Hours of Delay along the significant road corridors within the PBMPO planning area shown as an annual average for the reporting year 2022 based upon 2021 INRIX data.

3.3 Develop Multimodal Performance Measures

PBMPO works closely with the EZ-Rider, the MPO's only public transit agency. EZ-Rider has six fixed routes within each city – Midland and Odessa, including EZ-Connect. EZ-Connect is a commuter service between the cities of Midland and Odessa.

With representation on PBMPO's Policy Board, MOUTD staff keep the MPO informed of ridership and on-time performance measures throughout their route networks. The majority of transit system congestion is very similar to the commuting public with occasional rerouting around construction areas that may impact safety and accessibility to various bus stops.



Map 3.4 – EZ-Rider Bus Routes within each of the PBMPO cities Odessa and Midland. An EZ-Connect commuter route (not shown) also travels between the two cities along Business I-20. (Source: MOUTD/EZ-Rider)

3.4 Collect Data/Monitor System Performance

PBMPO accesses several resources for collecting and monitoring traffic data. Figure 3.4 is an example of a closer road segment along SH-191 in Odessa analysis using COMPAT, identified locally as 42nd Street, as it transitions from a freeway to an arterial from the east.

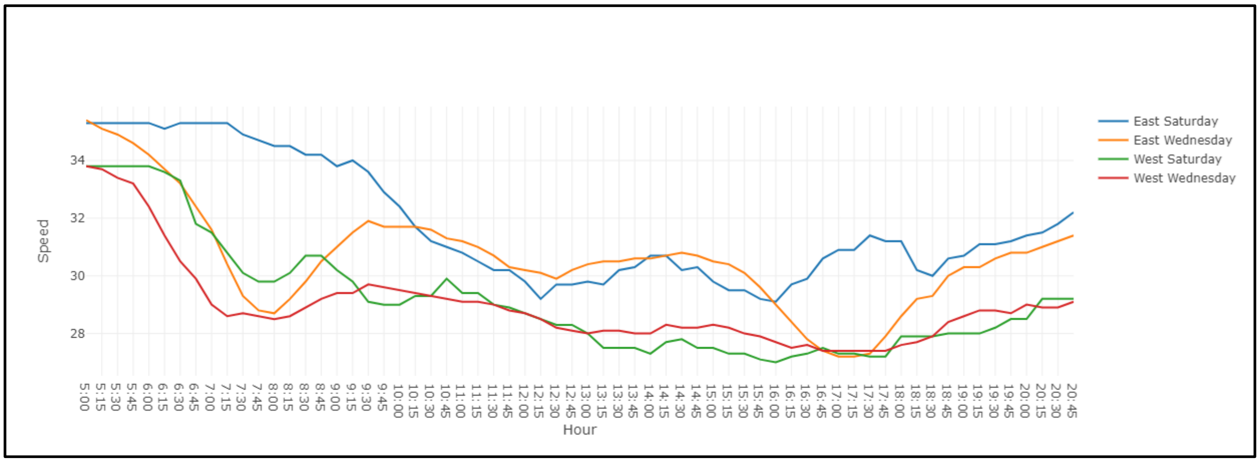


Figure 3.4 – COMPAT Speed Profile along a selected segment of 42nd St/SH-191 between N Grandview Ave and SL-338 in a commercial area of Odessa. These are <u>2021 annual averages of traffic speed for all Wednesdays</u> and <u>all Saturdays</u> with the designated direction and time of day.

Figure 3.5 is a more detailed look at the same road segment using the same INRIX data in the RITIS software showing the weekday average for September 2023.

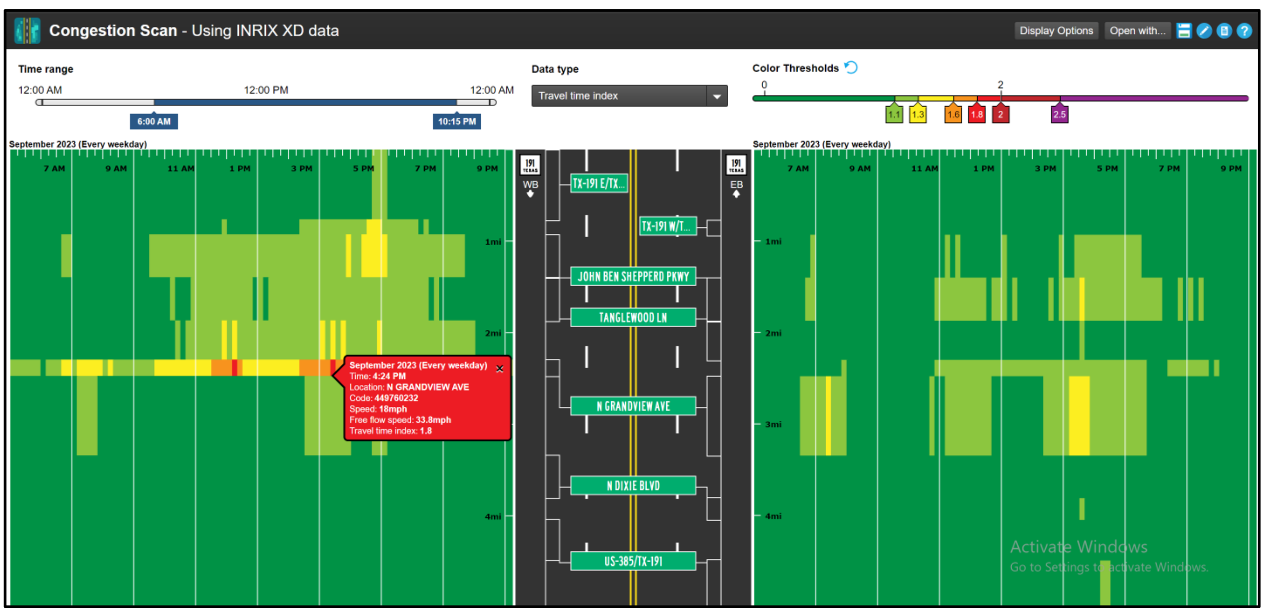


Figure 3.5 – A congestion analysis of SH-191 (42nd Street) averaging weekdays only in the month of September 2023. (Source: MPO Staff analysis using RITIS Region Explorer – Congestion Scan CMP Tool)

Another tool for PBMPO to utilize is the INRIX IQ web-based interface for monitoring system performance in real-time. Figure 3.6 shows a screen capture of the areas (shown in red) that are experiencing significant congestion. Other options include selection for minor congestion, speed, and relative speed (the difference between the current reported speed and the typical speed for the current time of day and day of week).

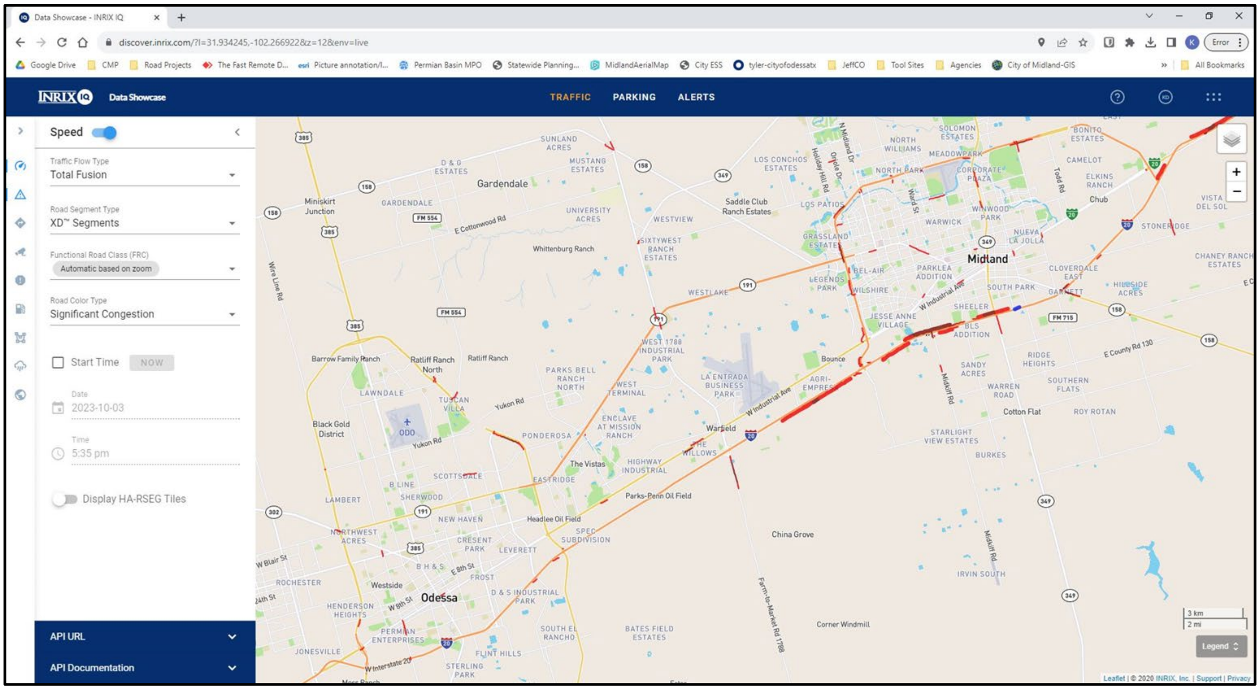


Figure 3.6 – A "live" view of the PBMPO system performance in terms of Severe Congestion (on October 3rd , 2023 at 5:35 pm). Other options within this INRIX IQ interface allow for viewing such things as reported incidents, construction, weather events, and views observed by traffic cameras among other selections. (Source: INRIX IQ – Data Showcase)

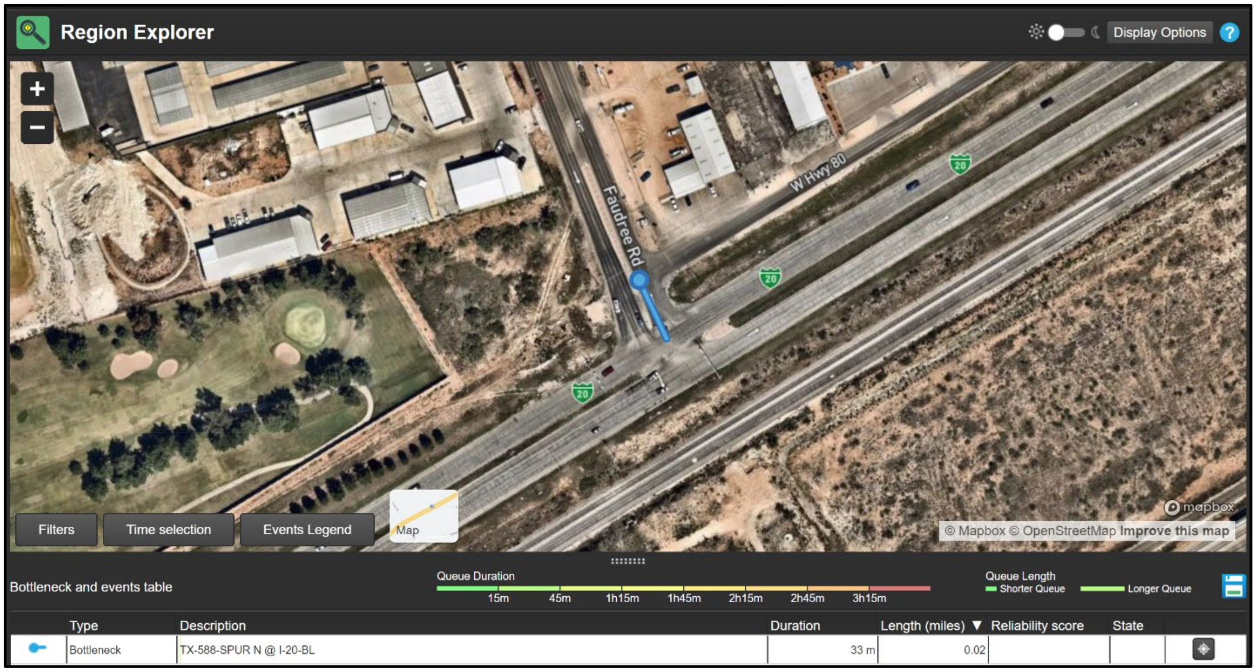
3.5 Analyze Congestion Problems and Needs

One shortcoming of looking at the CMP Network based upon annualized data averages is missing recurring congestion events that occur during peak travel hours. Those events may not display in a map or report due to the short congested road segment length. PBMPO is committed to continually taking a closer look at the way congestion data is analyzed with evolving analysis tools.

Map 3.5 is an example of recurring congestion during peak travel times on any given weekday on State Spur 588 (Faudree Road) at its intersection with Business I-20. The map shows the location of a bottleneck at this location with the blue circle representing the head/beginning of the bottleneck and the blue line the length of the bottleneck. Note that the aerial imagery is not perfectly aligned with the precise location of the bottleneck, which is on the southbound side of Faudree Road. While the length of the bottleneck is only 0.02 miles (approximately 100'), the duration of this congested bottleneck is

33 minutes. Ground truthing was observed of this congested area over months by PBMPO staff during regular commuting. The primary congestion cause is the result of the short length of the free right-turn for Faudree Road traffic heading south and turning west onto Business I-20.

As a result of the short right-turn only lane, the vehicle queue often blocks the outside left-turn lane heading south on Faudree and attempting to turn east on Business I-20. The double left-turn onto Business I-20 east then becomes an essentially open lane without cars being able to utilize it due to the SB Faudree Road traffic intending to turn west on Business I-20 blocking this lane.

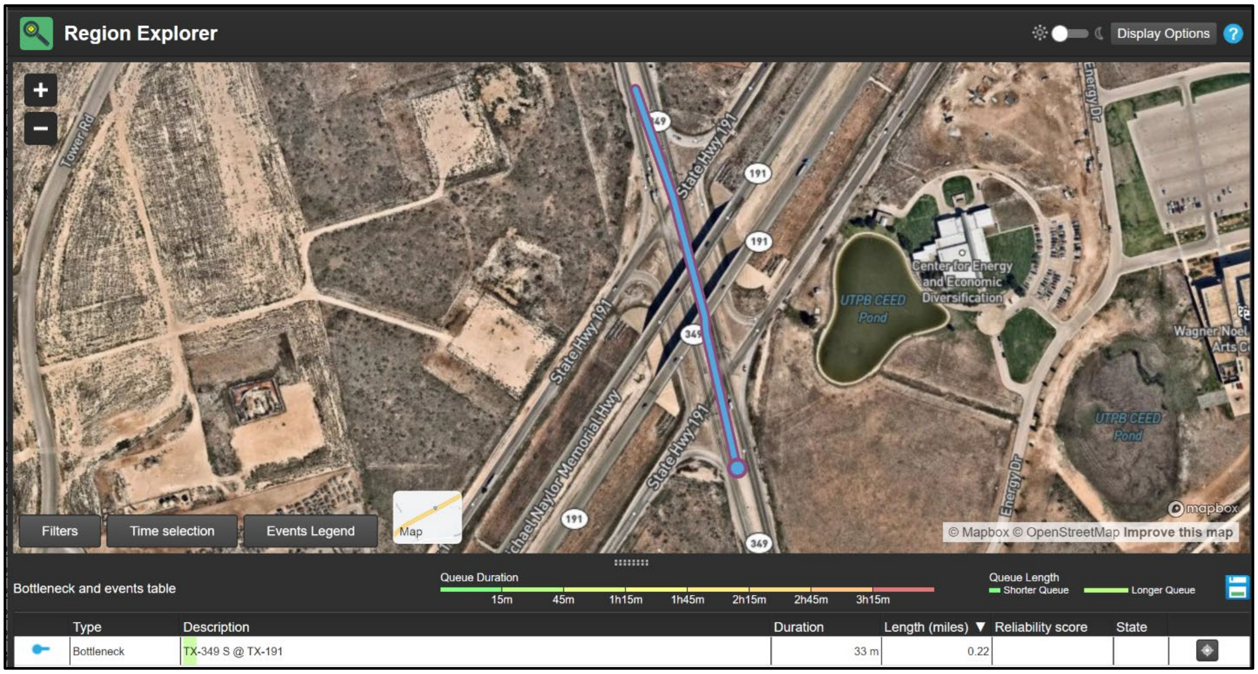


Map 3.5 – TX-588-SPUR (Faudree Road) @ Business I-20 identifying the length and duration of an example recurring traffic bottleneck during a peak weekday travel hour. (Source: MPO Staff analysis using RITIS Region Explorer – Bottleneck CMP Tool)

It is worth mentioning that the queuing length of free right-turn lanes in PBMPO planning area is inadequate in multiple locations. PBMPO is interested in working closely with TxDOT and local agencies to determine if solutions to expand designated right-turn queue lengths at heavily congested locations might be implemented. Roadway configurations that may have been adequate for traffic years ago may now be creating congested bottlenecks, not only due to PBMPO's volume of truck to car ratios with increased petroleum activity, but to area population increases of roughly 30% over the past ten years.

Map 3.6 is another such example of a bottleneck intersection. While this example is a routinely congested intersection, the length and duration of the bottleneck shown here again in blue is exacerbated by a short free right-turn lane on northbound SH 349/FM 1788 to eastbound SH 191.

PBMPO staff ground truthing observations found that a significant contributing factor to the bottleneck shown on Map 3.6 is due to inadequate right-turn queue length. This same situation regularly occurs with eastbound SH 191 traffic turning south onto SH 349/FM 1788. Transportation System Management (TSM) and intersection design can both be utilized to improve conditions such as these.



Map 3.6 – TX-349 (FM-1788) @ SH-191 identifying the length and duration of an example recurring traffic bottleneck during a peak weekday travel hour. (Source: MPO Staff analysis using RITIS Region Explorer – Bottleneck CMP Tool)

3.6 Identify and Assess Strategies

It is important to understand the nature of congestion when identifying and addressing strategies to alleviate congestion. Non-recurring congestion due to construction, weather, or road incidents would be accurately addressed through the road network's resiliency. That is, to have a plan for alternative routes for known construction work, or the ability of the road network to accommodate single events such as crashes or weather events as motorists are rerouted. Recurring congestion can be attributable to various factors including the volume of traffic during peak travel times, traffic light signal timing, road configuration. Or, as in the example in Figure 3.7, it may be a combination of factors resulting in a traffic bottleneck. At a high-level, bottlenecks are locations on the roadway where conditions have fallen below a certain percent of the reference speed for an extended period of time. Bottleneck temporal and geospatial extents can be used to determine which locations are particularly troublesome for the traveling public. This is the case on the heavily truck-traveled FM 1788 traveling northbound just south I-20.

Another tool, the bottleneck profile, provides summary information for each bottleneck including the average maximum queue length, average duration and total duration.

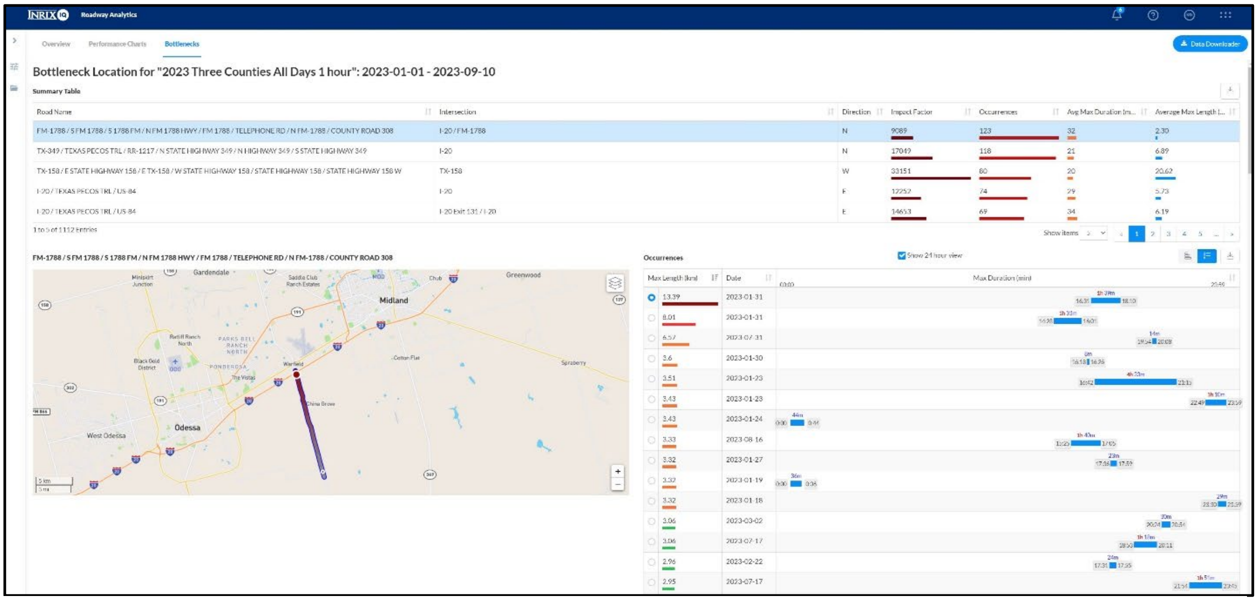


Figure 3.7 – A Bottleneck Profile shown for FM-1788 where severe congestion is recurring at various points throughout the day. (Source: MPO Staff analysis using INRIX IQ – Roadway Analytics Tool)

Bottleneck strategy assessment for the example shown on FM 1788 would be collaborative with PBMPO TAC. Project scoring for congestion criteria on this road segment would be relatively high. Potential congestion mitigation strategies to remove the bottleneck might include the addition of another northbound lane and extension of the right-turn only lane further south allowing more queued traffic to move from the through lanes to enter eastbound I-20.

3.7 Program and Implement Strategies

PBMPO uses the CMP to address persistent congestion problems and help prioritize transportation investments. There are many congestion management strategies and each differs in terms of implementation effectiveness, cost, complexity, and difficulty. Congestion management strategies are not one size fits all. Rather, congested roadways and intersections must 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 will individually or collectively improve the operational efficiency of PBMPO transportation facilities. When implemented, the improvements impact auto, transit, pedestrian, and bicycle usage. Several proven congestion management strategies that can be used to mitigate congestion in PBMPO region include:

- Transportation System Management and Operations Strategies (TSMO) – Enhancing the efficiency of the transportation system can be achieved by implementing traffic operational and management strategies, which can allow more effective management of the supply and use of existing roadway facilities. It can increase effective capacity by optimizing traffic operations without constructing additional lanes. This is low cost, requires minimal right-of-way, and can be constructed or implemented quicker than other congestion management strategies.

- Access Management Strategies – As defined by FHWA, access management is "the proactive management of vehicular access points to land parcels adjacent to all manner of roadways". Thus, access management strategies control the entrance and exit of vehicles on the roadway to remove potential conflict points between vehicles. These include access spacing, driveway spacing, safe turning lanes, median treatments such as two-way left-turn lanes, and right-of-way management.
- Transportation Systems Management (TSM) – Optimize the efficiency of the transportation system by improving vehicle flow. The TSM approach to congestion mitigation seeks to identify operational improvements to enhance the capacity of existing transportation systems. TSM improvements are designed to improve traffic flow and the movement of vehicles and goods, which in turn improves air quality, system accessibility, and safety. These include road geometric improvements, traffic signal timing, and way-finding signage improvements.
- Incident Management Strategies – Implemented as responses to roadway incidents, such as crashes that may cause non-recurring congestion and include strategies to improve response time and reduce accident clearance times.
- Intelligent Transportation Systems (ITS) and Dynamic Message Signs – Information technology to improve the functionality of the transportation system.

Utilizing new tools for analysis and effectively managing and mitigating congestion in PBMPO's planning area, requires a multilevel, multi-jurisdictional approach. Analyzing every congested corridor or intersection and developing a strategy for congestion remediation is not a function of this document. Specific corridor studies and analysis are recommended as part of the congestion management process. Identification of congestion areas will generally fall to the parties identified as responsible for each corridor. However PBMPO plays an active role in ensuring the 2024 CMP is fully incorporated into each of the following:

- PBMPO MTP
- TxDOT 10-year Unified Transportation Plan
- PBMPO 4-year Transportation Improvement Program (TIP)

Additionally, some strategies fall outside of the purview of PBMPO and its transportation planning partners. For instance, efficient land-use and specific site plan development review would be valuable in identifying potential development corridor access points that may contribute to congestion.

Given that the region's need for transportation investments is greater than available funding, it is important to prioritize investments that provide the most benefit to the region in terms of regional goals and objectives. This analysis provides a systematic methodology for evaluating and ranking individual projects of fiscally responsible MTP, UTP and TIP. Strategy recommendations to address congestion are federally mandated and are an integral part of the CMP. PBMPO's well-rounded suite of strategies include:

- Preserve existing transportation system condition
- Improve system performance through operation and management
- Promote non-vehicular modes
- Add capacity where it is the best option to relieve congestion
- Public transportation strategies that enhance access to and the effectiveness of transit

While not yet available at the time of this 2024 CMP update, significant consideration should be given to the 2050 TDM, which is expected from TxDOT's TPP Division in early 2024. Other documents for consideration in programming and implementing CMP strategies should include the State Loop 338 Study, PBMPO Resiliency Plan, PBMPO Comprehensive Safety Action Plan, as well as long-range consideration of PBMPO Interregional Corridor Planning and Environmental Linkages (PEL) Study.

3.8 Monitor Strategy Effectiveness

A key part of effective transportation planning decisions is the use of accurate and viable transportation data. All project planning, programming, and subsequent monitoring should be completed using viable and current data. Relevant data allows decision makers to complete a needs assessment and consider project development involving the MTP and TIP as applicable. Prioritization of funding should include review of available data, which relate to the performance measures in Section 2.2. Project results analysis will follow project implementation. Data collection will be accomplished in cooperation with PBMPO member agencies and other partners. Some of the costs required for detailed congestion and corridor analysis efforts may be funded through PBMPO. However, much of the traffic count data and accident data are provided by PBMPO's member agencies.

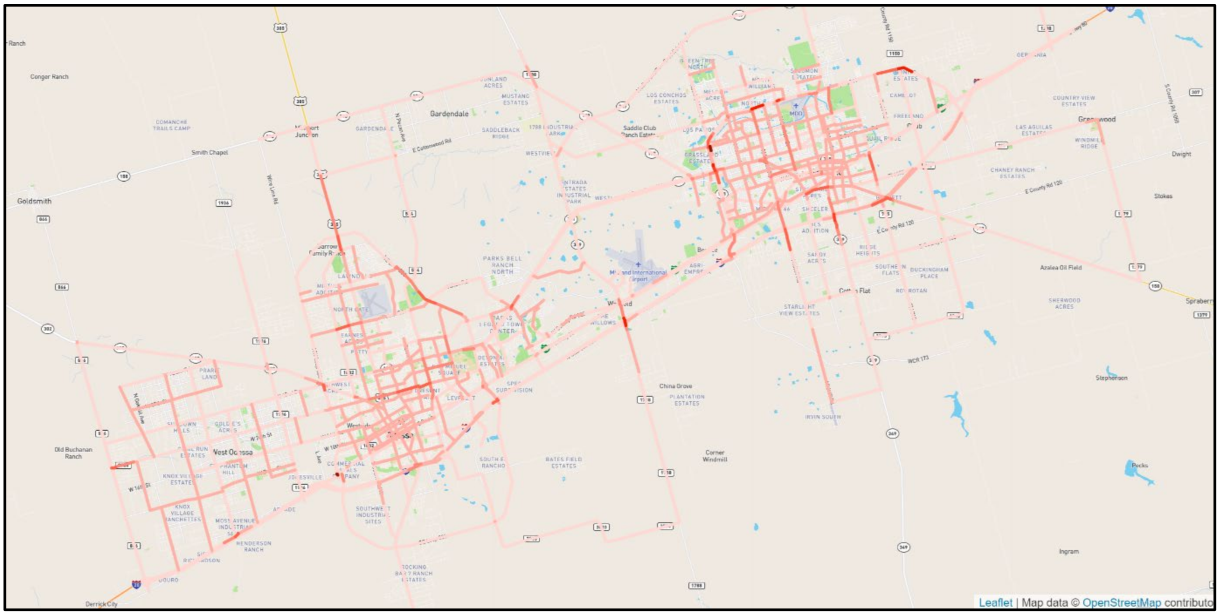
Previously PBMPO would rely on an annual data collection effort to measure how effectively the region is managing congestion. However, with advancements in technologies and the availability of data through cellphones and in-vehicle collection devices, a wealth of data is available from real-time to specific historical dates and times. TxDOT's support will provide MPOs with these newly available data and congestion analysis tools (in the form of INRIX IQ/RITIS) cannot be overstated. Post analysis of a completed road project's effectiveness, to road incidents such as construction or vehicle crashes become an extremely valuable CMP tool.

Volume to capacity ratios and other information should continue to be calculated based on the average daily traffic (ADT) on CMP network segments and planning-level capacities as estimated in the regional TTDM. While TxDOT has automatic traffic recorders (ATRs) at numerous locations in metropolitan area, technology has been rapidly shifting to “vehicle probe data.'' These datasets retrieve anonymous cell phone, bluetooth, and other vehicle position and speed data. Whichever established data collection mechanism is used, it ensures that necessary CMP performance monitoring data is available. PBMPO will continually utilize GIS mapping to analyze the data, including for future CMP updates.

Travel time studies should be conducted along the CMP corridors during the peak periods and non-peak periods to better understand the congestion characteristics of the corridor. CRIS data provides the number of crashes along any given corridor and is an indicator for non-recurring congestion; crashes along the CMP network may result in expected delays and unreliable travel times. This crash data is maintained by the TxDOT for all roadways and allows for queries on several criteria (i.e., excessive speed, impaired driver, type of crash – vehicle/vehicle or vehicle/pedestrian, and many other variables.

4. Regionally Significant Corridors

All regionally significant roads within PBMPO's planning area experience non-recurring congestion throughout the year. Non-recurring congestion primarily is typically based upon construction or an event such as a crash. The recurring congestion is primarily centered around the morning and evening peak periods. If the data is annualized however, as in Map 4.1, across all the functional classifications, very few regionally significant corridors stand out as congested.



Map 4.1 – The PBMPO planning region's congestion shown by the Travel Time Index from the COMPAT CMP Tool showing the 2022 annualized congestion across all Wednesdays and Saturdays. (Source: COMPAT Tool – Travel Time Index)

Figure 4.1 provides the annualized average TTI for Map 4.1 outlined by road classification type and the congestion measure experienced by all vehicles and for trucks only. Note that "on average," PBMPO planning area's regionally significant corridors remain below the 1.5 TTI congestion threshold that the MPO Policy Board has adopted.

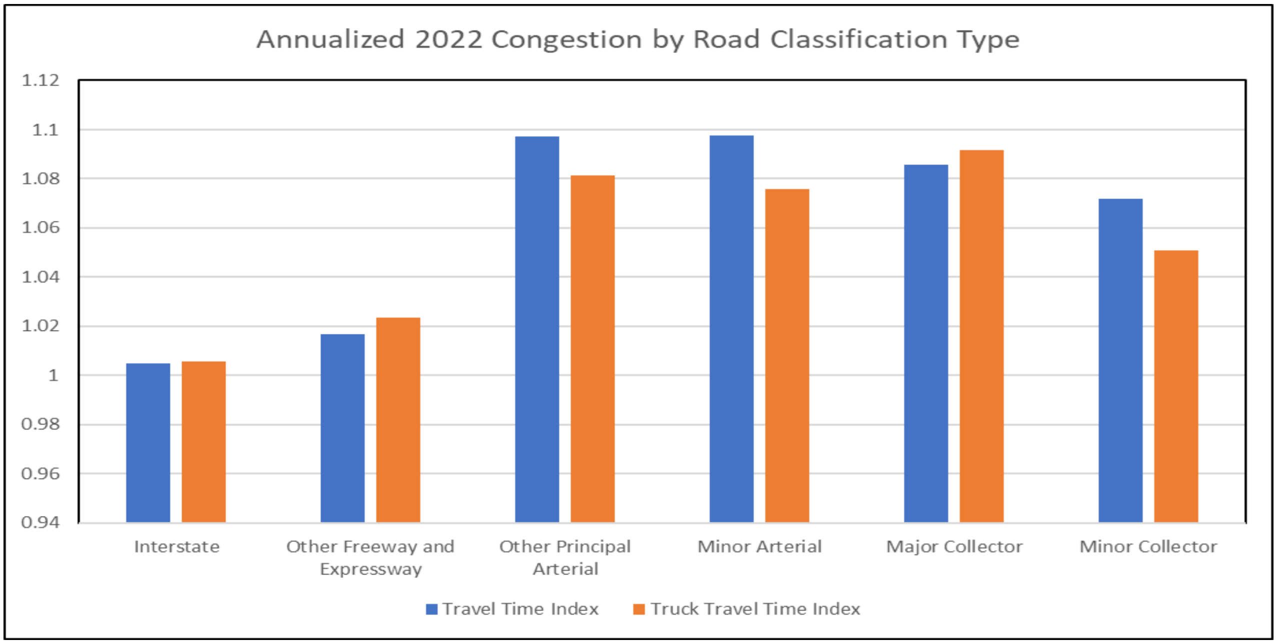
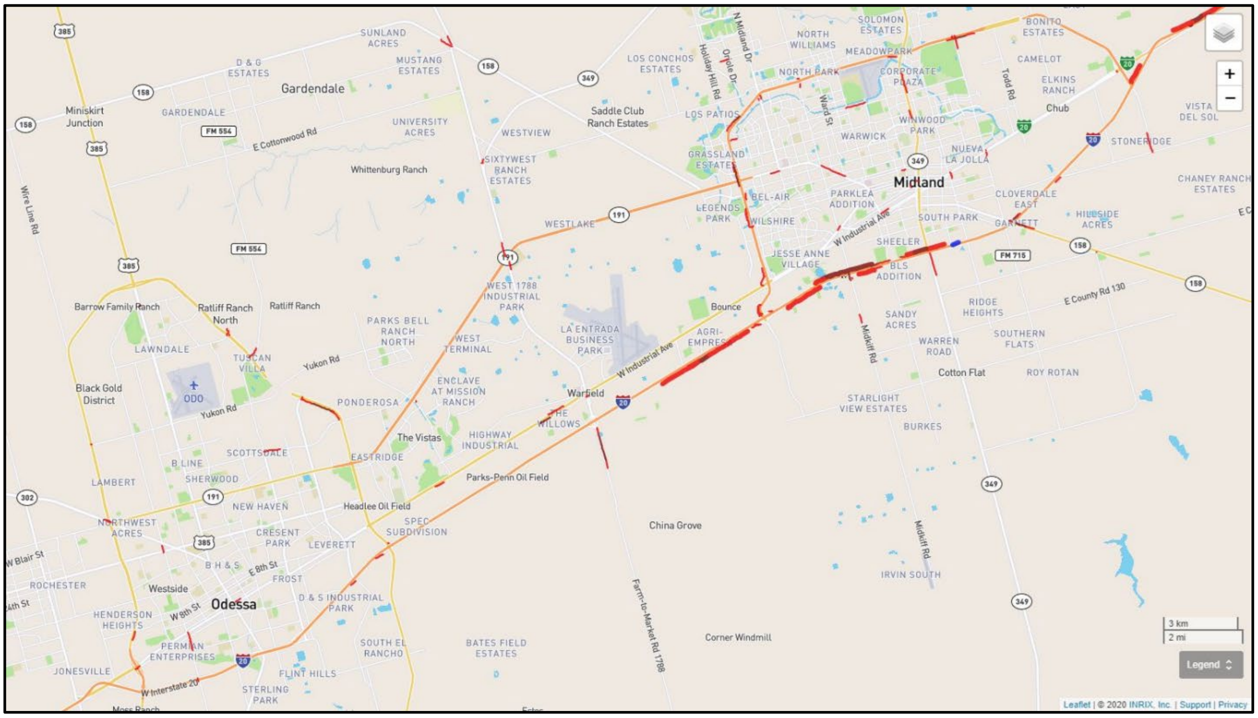


Figure 4.1 – The PBMPO planning region's Travel Time Index showing the 2022 annualized congestion across the various road functional classifications for all vehicles and for trucks. (Source: COMPAT Tool – Travel Time Index)

Map 4.2 shows the results of utilizing another tool to examine regionally significant road congestion at a single point in time. In this case the MPO staff can analyze actual congested travel speeds in real-time. Note the great difference between Maps 4.1 showing annualized averages of congestion – which is helpful in identifying recurring problem areas over time, and Map 4.2 which is a snapshot of congestion as it appeared on October 3rd at 5:30 during the evening peak period. This map highlights the significantly congested corridor along IH 20 in Midland, which is currently under reconstruction.

Given the 42-mile scope of the IH 20 reconstruction over the next 20 years, it can be expected this construction project will have an increase in overall annualized congestion rates in the PBMPO region. This impact is likely to be observed in the next annualized data refresh in the February 2024 COMPAT update. The IH 20 corridor widening, reconfigured interchanges, and frontage road conversion to one-way operations, will result in congestion for each construction phase in the foreseeable future.



Map 4.2 – The PBMPO planning region's corridors shown in red that are classified as experiencing Significant Congestion as measured by the congestion speed during a single day evening rush hour (Source: INRIX IQ – Data Showcase showing Significantly Congested travel speed)

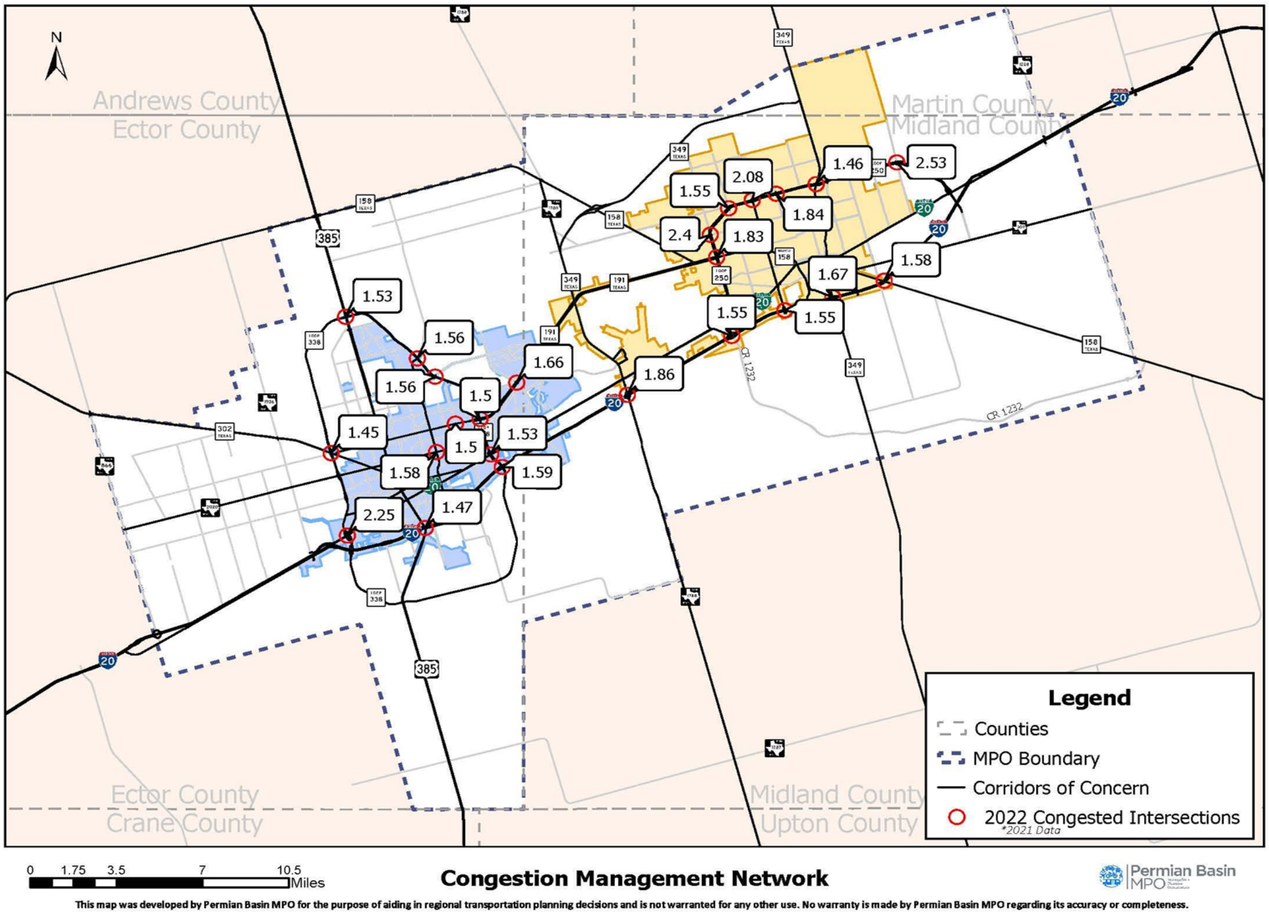
While the PBMPO is not overly congested in general, compared to larger Texas MPOs, it does have some corridors of concern that will become more congested during the next 25 years without mitigation. PBMPO will use 2050 TDM once TxDOT delivers it. Table 4.1 identifies congested intersections along PBMPO's corridors of concern based upon numerous data sets mentioned previously.

Corridors of concern are important corridors that currently function below the 1.50 TTI and need monitoring to avoid unacceptable congestion. Corridor profiles show the travel corridor, surrounding land uses, and areas of need. Table 4.1 and Map 4.3 indicate congested intersections near or above the 1.50 TTI threshold. Table 4.1 also indicates the status of congestion mitigation efforts where applicable.

PBMPO Most Congested Intersections and Resolution Status				
County	**Intersections**	**TTI**	**Projects**	**Status**
Ector	US 385 at N SL 338	1.53	New Interchange	Complete
Ector	State Highway 302 at W SL 338	1.45	Outside of UTP	-
Ector	B-20 at W SL 338	2.25	Part of Corridor Study	Study Complete
Ector	Interstate 20 at US 385	1.47	Part of I-20 Reconstruction	Ongoing
Ector	E SL 338 at Grandview Ave	1.56	Part of I-20 Reconstruction	Ongoing
Ector	E SL 338 at Yukon	1.56	New Interchange	Complete
Ector	SH 191 at E SL 338	1.50	Part of Corridor Study	Study Complete
Ector	BI-20 at E SL 338	1.53	Part of Corridor Study	Study Complete
Ector	Interstate 20 at E SL 338	1.59	Part of I-20 Reconstruction	Letting 2024
Ector	N Grandview at University Ave	1.58	None Known	-
Ector	SH 191 at JBS Parkway	1.50	None Known	-
Ector	SH 191 at Faudree	1.66	Faudree Widening (City)	Ongoing
Midland	Interstate 20 at 1788	1.86	Part of I-20 Reconstruction	Ongoing
Midland	Interstate 20 at W SL 250	1.55	Part of I-20 Reconstruction	Ongoing
Midland	Interstate 20 at S Midkiff Rd	1.55	Part of I-20 Reconstruction	Ongoing
Midland	Interstate 20 at SH 349	1.67	Reconstruct Interchange	est 2027
Midland	Interstate 20 at SH 158	1.58	Reconstruct Interchange	est 2029
Midland	SL 250 at Elkins Rd	2.53	New Interchange	Complete
Midland	SL 250 at SH 349	1.46	None Known	-
Midland	SL 250 at Garfield	1.84	None Known	-
Midland	SL 250 at N Midkiff Rd	2.08	Widen WB/SB Turn Lanes	Complete
Midland	SL 250 at Midland Dr	1.55	None Known	-
Midland	SL 250 at Wadley	2.40	None Known	-
Midland	SL 250 at SH 191	1.83	Intersection Improvements	Complete

**2022 Data Retrieved from TTI Congestion Management Process Assessment Tool (COMPAT)*

Table 4.1 – Congested Intersections along the PBMPO's Corridors of Concern and corresponding projects



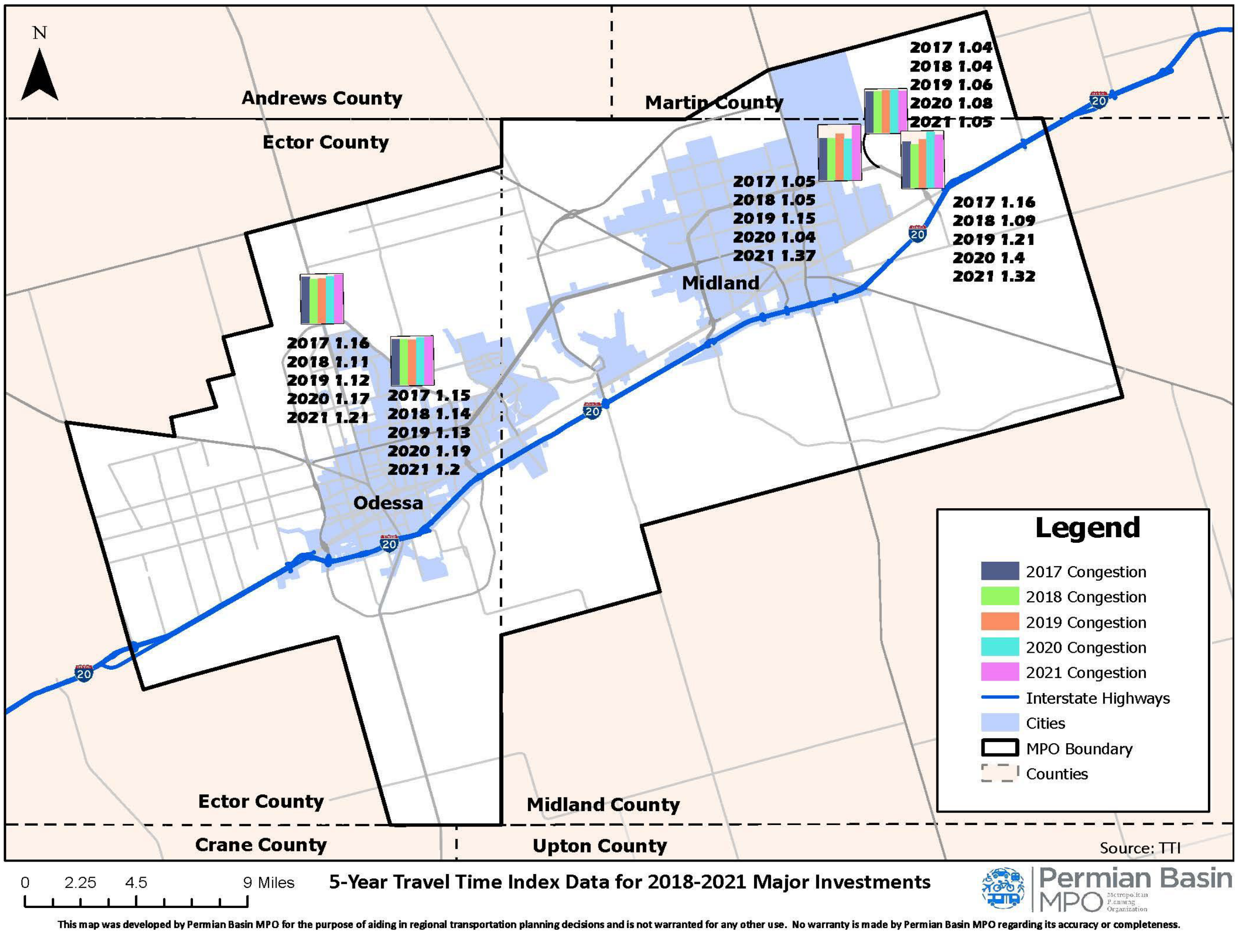
Map 4.3 – Congested Intersections along the PBMPO's Corridors of Concern

4.1 Anticipated Outcomes of 2022-2023 Construction

The COMPAT tool lists compiled data labeled 2022; however, the data is from the year 2021. In the year 2021 and through the fall of 2023, most of the locations where congestion is high were in varying phases of construction or reconstruction. It is anticipated that the Loop 250 interchange at Elkins Road, the Loop 250 interchange at SH 158, the IH 20 interchange at FM 1788/SH 349, and the IH 20 interchange at Midkiff Road will all indicate lower TTIs after construction completion. As part of the CMP strategy, PBMPO staff will make a presentation to the Policy Board showing the "before and after '' TTI levels at the stated locations as well as other congested spots. These feedback loops will indicate if the projects attained desired outcomes.

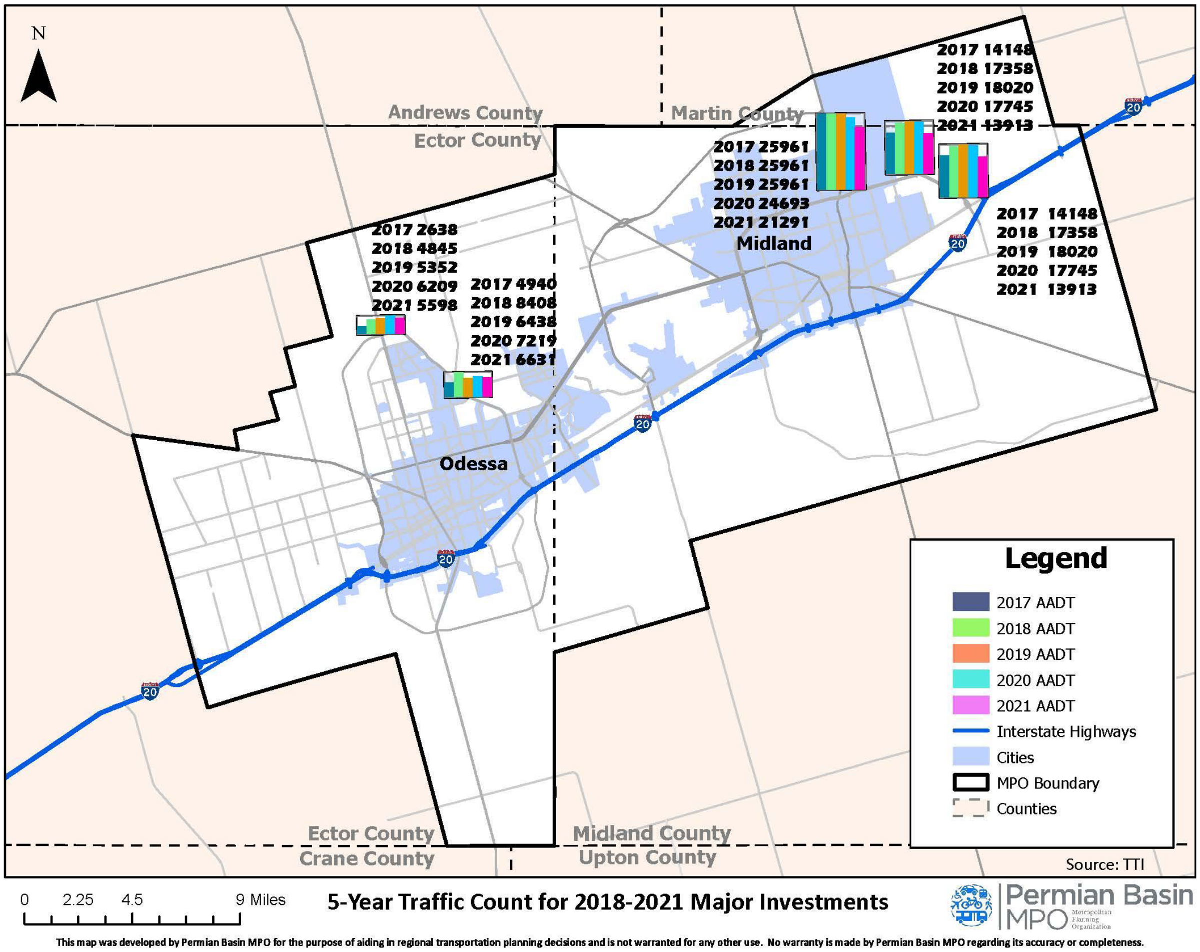
In April 2023 staff presented a summary of performance measure impacts at five new interchange locations. All of the interchange investments occurred after FY 2018 so the ability to show "before and after'' conditions using the COMPAT tool was readily available. The information shared with the Policy Board pertained to safety as well as congestion. The congestion component is attached as an Appendix to this CMP update. Staff will continue to provide the Policy Board and stakeholders with a summary of the results from PBMPO capital investments.

APPENDIX A



A. Map Showing TTI from 2018-2021 at selected locations (data from 2017-2020)

APPENDIX B



B. Map Showing Traffic Count History for 2018-2021 at selected locations (data from 2017-2020)

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