Appendix D:

Congestion Management Process
### Introduction.

Traffic Congestion describes a transportation cost incurred by users where as a road reaches its capacity, each additional vehicle imposes more total delay on others than they bear, resulting in economically excessive traffic volumes.\(^1\) Congestion can be recurrent (occurring on a regular basis) or non-recurrent (for example, due to a traffic accident.) Congestion Management Process allows urban regions to identify congestion hot spots and key corridors, and to recommend solutions in dealing with congestion.

Winston-Salem Urban Area MPO is a transportation management area (TMA), defined as an urbanized area with a population of over 200,000 individuals. As a TMA, WSUAMPO is required to update the region’s Congestion Management Process (CMP) on a regular basis.

Federal Highways Administration Congestion Management Process Guidebook\(^2\) defines CMP as follows:

> A congestion management process (CMP) is a systematic and regionally-accepted approach for managing congestion that provides accurate, up-to-date information on transportation system performance and assesses alternative strategies for congestion management that meet state and local needs.

Congestion Management Process was first introduced as part of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, under the term Congestion Management System (CMS). Congestion Management requirements were continued under the Transportation Equity Act for the 21\(^{st}\) Century (TEA-21). The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) transitioned to the concept of treating congestion management as a process, recognizing that the CMP is not intended to be a stand-alone document, but rather part of an overall metropolitan transportation planning process\(^3\).

Under the FAST Act, Congestion Management Process requirements previously in place for an urban area over 200,000 in population were retained. In addition, the FAST Act identified the following specific examples of travel demand reduction strategies for a congestion management process for MPOs that serve a TMA [23 U.S.C. 134(k)(3)]:

- Intercity bus operators

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\(^3\)Ibid
• Employer-based commuting programs such as a carpool program, vanpool program, transit benefit program, parking cash-out program, shuttle program or telework program
• Job access projects
• Operational management strategies

Congestion has a real effect on everyday lives and businesses, increasing the delay in shipments and adding hours to time spent commuting. TTI Urban Mobility Report, 2019\(^4\) indicates that congestion in the U.S. has been consistently growing from 1982 to 2017, with the following congestion-related negative impacts identified:

• In 2017, congestion caused urban Americans to travel an extra 8.8 billion hours and purchase an extra 3.3 billion gallons of fuel for a congestion cost of $166 billion.
• Trucks account for $20 billion (11 percent) of the cost, a bigger share than their 7 percent of traffic.
• The average auto commuter spends 54 hours in congestion and wastes 21 gallons of fuel due to congestion at a cost of $1,080 in wasted time and fuel.
• 2017 Congestion costs were at $179 billion based on cost of delay and additional fuel cost; 11 percent ($20 billion) of the delay cost was the effect of congestion on truck operations
• The cost to the average auto commuter was $1,080; it was an inflation-adjusted $610 in 1982.

The Texas Transportation Institute Urban Mobility Report 2019\(^5\) also includes specific congestion metrics for Winston-Salem region and indicates that by 2017, annual total delay per commuter in the Winston-Salem region has increased to 27 hours per auto commuter, making it 167\(^{th}\) highest region by commuter delay. Based on 7,930,000 hours of total annual delay, an estimated annual congestion cost of $159,000,000 has been calculated by TTI researchers for Winston-Salem region, resulting in 2,618,000 gallons of excessive fuel consumption. This amounts to an annual congestion cost of $487 per average auto commuter in the region.


\(^5\) Ibid.
While COVID has temporarily put a pause on increase in congestion, typical travel and congestion is likely to return to its trajectory of upward climb when the post-COVID conditions normalize and economic activity is back to where it was prior to the start of the Pandemic.

The Process

In working with the Steering Committee for the Metropolitan Transportation Plan, and with additional feedback from the public input received through an online survey, the following goals and objectives have been identified for the MTP and have been carried forward into the CMP update process.
## Table D1: Winston-Salem Urban Area MPO MTP 2045 Goals and Objectives

<table>
<thead>
<tr>
<th>Goals</th>
<th>Objectives</th>
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</table>
| **I. Improve mobility and accessibility for people and goods across the region** | 1) Promote equitable transportation options for low-income and minority communities, and the aging population  
2) Reduce congestion on key interstates and arterial corridors  
3) Improve freight access to industrial/distribution centers and freight terminals, such as airports and railyards  
4) Support improvements to the rail infrastructure including railroad crossing improvements and intermodal facilities  
5) Improve availability of premium transit options such as express bus routes, light rail and streetcar lines  
6) Improve last mile access to public transit with enhanced pedestrian safety, bicycle and shared mobility options at major transit stops |
| **II. Support smart regional growth and economic development** | 1) Improve transportation options between urban job centers and rural and suburban places  
2) Increase the number of jobs accessible within a reasonable commute travel time  
3) Enhance connections between major destinations such as employment and education centers, medical and transit facilities and neighborhoods  
4) Ensure transportation infrastructure is supportive of visitor trips and tourism |
| **III. Create Vibrant, Healthy, and Resilient Communities** | 1) Improve the connectivity of walking, bicycling and greenway network  
2) Protect and strengthen a sense of place and vibrancy of downtowns and walkable mixed-use activity centers  
3) Retrofit arterial corridors and major roadways to be consistent with complete streets principles  
4) Integrate land use and transportation planning  
5) Incorporate resilience concepts into transportation projects by planning for extreme weather and stormwater impacts as part of transportation projects |
| **IV. Improve safety and security of the transportation network** | 1) Prioritize safety improvements at intersection locations with high frequency of crashes and fatalities  
2) Reduce the number and severity of crashes and safety incidents on major arterial corridors  
3) Reduce the number and severity of bicycle and pedestrian crashes  
4) Enable improved safety through ITS improvements  
5) Improve transportation network connectivity and redundancy for more efficient emergency response |
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V. Support transportation for tomorrow

1) Reduce Greenhouse Gas Emissions associated with transportation sector though increased use of alternative fuels, TDM strategies, transit, walking and bicycling
2) Support alternative fuels and autonomous and connected vehicles infrastructure improvements
3) Prioritize Intelligent Transportation Systems (ITS) infrastructure to address congestion and travel time reliability
4) Designate “feet first” areas where walkability, bicycling and transit service is prioritized ahead of mobility for autonomous vehicles

VI. Ensure maintenance of existing infrastructure and services

1) Ensure adequate funding to preserve and maintain the integrity of the existing transportation infrastructure
2) Prioritize funding to support existing transit services and transit state of good repair
3) Promote public-private partnerships in addressing transportation needs

During the May 5-May 21, 2020 timeframe, an online public survey was held as part of the Metropolitan Transportation Plan update process. During this period, a total of 419 unique responses were received. Survey participants were asked to complete various questions and tasks to gauge problem locations, areas of high demand, budget allocation, project type prioritization, and sociodemographic information.

As part of the survey, participants were asked to place interactive map markers to document their frequent destinations or areas of concern. Under “roadway/traffic” category for interactive map exercise performed as part of the survey, congestion was the most frequent choice. Figure D2 below illustrates the types of concerns noted for roadway/traffic category.
Figure D2: Public Survey Responses (May 2020) Indicating Roadway and Traffic Concerns, by Specific Type of Concern

Figure D3 below provides a map of locations for roadway concerns noted by survey participants. There are several notable concentrations for roadway congestion concerns—in the area around Bermuda Run, south and southwest of Kernersville, along Hanes Mall Boulevard, and along key east-west and north-south corridors in Winston-Salem.
Figure D3: Public Survey Responses (May 2020) Roadway Concerns Locations
Identifying Priority Congested Corridors

The MTP includes several approaches to identifying and addressing congestion along corridors and in key areas. These included an analysis of HERE data (probe and Bluetooth data) and the region’s travel demand model for the baseline year—referred to as Existing Conditions—and forecasted to 2045 with the regional travel demand model. The congested corridors are identified below, and while both methods indicate overlapping areas, their methodologies are different and provide contrasting perspectives.

Traffic congestion during the PM peak period was analyzed using real-time HERE data from 2018. Congestion appears to be most frequent and severe along key sections of major arterial corridors, many of them running in the north-south direction and connecting to I-40, US 421, and US 52. Congested arterials include segments of Silas Creek Parkway and Martin Luther King, Jr. Dr. See Figure D4 below for PM Peak congestion hotspots based on HERE data.

The PART PTRM model was used to identify priority congested corridors for the baseline 2017 and final MTP horizon year of 2045. Corridors of approximately one mile or longer with functional classifications of Principal Arterial or higher were selected if the volume over congestion (Volume/Capacity) exceeded the threshold of 0.90 during the PM Peak Period (3PM-6PM). These corridors are listed in Table D3 and shown for the baseline and year 2045 in Figure D5 and Figure D6, respectively.

There are several projects within the 2045 MTP that are anticipated to reduce congestion along the identified corridors in 2045. These improvements are not able to be modeled in PTRM due to the model’s limitations. The adoption of ITS along the I-40, Silas Creek Parkway, US-52, and I-74 is likely to reduce congestion through improving incident response times, improving safety, and improved traffic flow. Additionally, the 2045 MTP includes intersection and interchange improvement projects along these corridors that—while unable to be modeled—will also likely address congestion issues. Congestion-reduction strategies are explained in greater detail below.
# Table D2 - List of Congested Corridors by Scenario during PM Peak Period

<table>
<thead>
<tr>
<th>2017 Congested Corridors</th>
<th>2045 Congested Corridors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salem Parkway (US 158, 421, NC 150): Reidsville Road to Hawthorne Road SW</td>
<td>Salem Parkway (US 158, 421, NC 150): Reidsville Road to Hawthorne Road SW</td>
</tr>
<tr>
<td>Clemmons Road (US 158): Twins Way to Harper Road</td>
<td>Germanton Road (NC 8, SR 1725): Oak Summit Road to Old Hollow Road</td>
</tr>
<tr>
<td>Interstate 40: E Clemmonsville Road through S Main Street (Winston-Salem)</td>
<td>Interstate 40: Jonestown Road through S Peace Haven Road</td>
</tr>
<tr>
<td>US 421: Silas Creek Parkway to I-40</td>
<td>Interstate 40: I-74 through S Main Street</td>
</tr>
<tr>
<td>Kernersville Road (SR 4315): Masten Drive to Hastings Hill Road</td>
<td>NC 801: Andrew Road to I-40</td>
</tr>
<tr>
<td>Peters Creek Parkway (NC 150): Lumber Lane to Brewer Road</td>
<td>Peters Creek Parkway (NC 150): Lumber Lane to I-40</td>
</tr>
<tr>
<td>Silas Creek Parkway (NC 67): Salem Parkway to Pennington Lane</td>
<td>Reidsville Road (US 158): Winston-Salem Northern Beltway to Old Hollow Road</td>
</tr>
<tr>
<td>Stratford Road (South) (US 158): I-40 to Kimwell Drive</td>
<td>Silas Creek Parkway (NC 67): Salem Parkway to Kirklees Road</td>
</tr>
<tr>
<td>US 52 (NC 8): US 421 to E 25th Street</td>
<td>Stratford Road (South) (US 158): W Clemmonsville Road to Idols Road</td>
</tr>
<tr>
<td></td>
<td>Stratford Road (South) (US 158): I-40 to Kimwell Drive</td>
</tr>
<tr>
<td></td>
<td>US 158: Baltimore Road to Laird Road</td>
</tr>
<tr>
<td></td>
<td>US 421 (West): Silas Creek Parkway to I-40</td>
</tr>
<tr>
<td></td>
<td>US 52 (NC 8): Waughton Street to Rams Drive</td>
</tr>
<tr>
<td></td>
<td>US 52 (NC 8): US 421 to E 25th Street</td>
</tr>
</tbody>
</table>
Figure D4 - Percent of Time Roadway Corridors are Congested during PM Peak, based on 2018 HERE Data for Tuesday-Thursday

Percent of Time Congested*
- 0.00% - 15.00%
- 15.01% - 40.00%
- 40.01% - 60.00%
- 60.01% - 80.00%
- 80.01% - 100.00%

*A roadway is 'in congestion' whenever the average speed over a five-minute interval falls below 75% of the free-flow speed

*: For time intervals with a confidence score >80%

Source: HERE Data for Tue-Thu
Figure D5 - Congested Corridors for 2017 Baseline during PM Peak Period

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Figure D6 - Congested Corridors for 2045 Horizon Year during PM Peak Period
Strategies for Relieving Congestion

Addressing recurring congestion in the Winston-Salem Urban Area may include but is not limited to the following strategies:

- Transportation Demand Management
- Public Transportation
- Improvements to Bicycle and Pedestrian Infrastructure
- Parking Management and Pricing
- Intelligent Transportation Systems (ITS)
- Roadway Modernization and Operational Improvements, Access Management and Innovative Intersections
- Roadway Capacity Expansion

Transportation Demand Management

PART’s Commuter Operations Department manages the Transportation Demand Management (TDM) program for the greater Triad region. The department works to educate, advocate, and provide alternative transportation strategies to reduce single-occupancy vehicle trips in the Triad. The department serves as a resource for commuters interested in riding transit, carpooling, or vanpooling.

Vanpool Program

The PART Vanpool Program provides eligible groups of five or more commuters with a 7 or 15 passenger van to use to commute to and from work. The month-to-month lease includes the vehicle, insurance, maintenance, gas, and in some cases an Emergency Ride Home. The vanpool fare is determined by the size of the van and the number of miles the van travels per month. The fare is then split evenly by the number of participants. What makes the vanpool program unique is that it is operated by members of the group and travels based on the schedules developed by the group. As of calendar year 2019, the vanpool program is averaging 54 leased vans per month.
**Expected benefits to the network:** The vanpool program equates to more than 13 million miles of reduced single occupancy travel on our roadways each year with a PART fleet of 65 vans.

**Funding source:** PART (combination of federal and state funding)
- Vanpool users pay a monthly fare

**Responsible party:** PART

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**Carpool Support**

PART plays an active role in promoting carpooling in the region through a partnership with the Share the Ride NC (STRNC) statewide rideshare matching platform. STRNC, which is accessible on [PART’s website](https://www.partnc.org/), allows commuters in North Carolina to quickly and securely find other individuals who share similar commutes and work hours, and are interested in carpooling or vanpooling. Commuters simply create a profile, identify and communicate with matches, and start sharing the ride. As of January 2020, there are 177 individuals registered in the STRNC platform.

[Image of carpooling vehicle]

**Expected benefits to the network:** Carpooling program benefits would be similar to those provided by the Vanpool Program listed above through the reduction of single occupancy vehicle travel. Specifically, carpooling programs where users are traveling to and from the same area for their trips to work are likely to produce benefits during the peak hours where single occupancy vehicle work trips are a major contributing factor to congestion.

**Funding source:** PART/Share the Ride NC (combination of federal and state funding)

**Responsible party:** PART/Share the Ride NC

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**PARTnership Program for Employers**

In 2018, the Commuter Resources Department implemented the PARTnership Program. The PARTnership is a free full-service resource for employers in the Triad. The goal of the program is to improve mobility for employees by identifying alternatives to driving alone, marketing...
sustainable options, and reporting results. As a member of the PARTnership, employers are eligible to take advantage of incentives such as PART’s Triad XPass Employer Discount Program. The XPass program provides a 30% discount off the cost of a PART 31-Day and 10-Ride bus pass through PART’s TouchPass Mobile & Smartcard faring system.

**Expected benefits to the network:** As new employers are added to the new Employer Partnerships program, reduced single occupancy vehicle travel on roadways is expected. Specifically, as more employers join the incentive program, more eligible employees who might otherwise take a solo car trip may be encouraged to take a bus.

**Funding source:** PART (combination of federal and state funding)

**Responsible party:** PART

Public Transportation

*Continuing and Expanding Frequency and Service Area of Existing Public Transportation Services*

Public Transportation services bring a variety of benefits not just to users who have improved mobility options, but to the society as a whole. Todd Littman in *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook* identifies the following public transit project benefits categories: improved transit service, increased transit travel, reduced automobile travel and transit-oriented development. Under the umbrella of reduced automobile travel, the following benefits to the society at large and to the traveling public are recognized:

Reduced Automobile Travel Benefits:

- Reduced traffic congestion
- Road and parking facility cost savings
- Consumer savings
- Reduced chauffeuring burdens
- Increased traffic safety
- Energy conservation

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WSUAMPO MTP 2045 included the following funded public transportation improvements as part of the financial plan. Additional improvements to local and express bus routes and new public transportation modes were identified as part of the unfunded MTP/Comprehensive Transportation Plan.

- **WS-Tran-040 Upgrade WSTA Administrative and Maintenance Building** The existing WSTA Administrative and Maintenance Building, located at 1060 Trade Street in Winston-Salem, is in need of modernization and capacity enhancements to further WSTA’s mission. Design services for the new building are anticipated to be procured in Fall 2020. The estimated planning-level cost estimate for this facility is $20 million, pending a feasibility study.
  
  **Funding source:** Federal/Local
  
  **Responsible party:** WSTA

- **WS-Tran-047 Increase Frequency on WSTA Route 96** This project would improve WSTA Route 96 all day headways from 60-minutes to 30-minutes. Route 96 is the second highest ridership route in the WSTA system, serving 13,563 customers in October 2019. Route 96 serves Downtown Winston-Salem, New Walkertown Rd. & Dellabrook Rd., Teresa Ave. & Carver School Rd., and Butterfield Dr. & Oak Ridge Dr. Improving the headway of this route can lead to increased ridership by allowing customers to better fit their transit trip to their schedule, whether getting to a job, shopping for groceries, or visiting friends. It is estimated that one additional bus and operator will be needed to operate Route 96 with 30-minute headways. The capital cost of one additional WSTA bus is $800,000 while annual operating expenses were calculated to be approximately $500,000.
  
  **Expected benefits to the network:** Incorporating headway changes to Route 96 will allow congestion to be alleviated on the corridors mentioned above. Downtown Winston-Salem and New Walkertown Road would benefit immensely from higher frequency services, making it more attractive for more citizens to adopt transit as an alternative to a personal use vehicle.
  
  **Funding source:** Federal/Local
  
  **Responsible party:** WSTA

- **WS-Tran-054 Increase Frequency on WSTA Route 92** This project would improve WSTA Route 92 all day headways from 60-minutes to 30-minutes. Route 92 is the third highest ridership route in the WSTA system, serving 12,893 customers in October 2019.
Route 92 serves Downtown Winston-Salem, Cleveland Ave & 25th St., Patterson Ave. & Indiana Ave., and Oak Summit Rd. & Old Rural Hall Rd. Improving the headway of this route can lead to increased ridership by allowing customers to better fit their transit trip to their schedule, whether getting to a job, shopping for groceries, or visiting friends. It is estimated that one additional bus and operator will be needed to operate Route 92 with 30-minute headways. The capital cost of one additional WSTA bus is $800,000 while annual operating expenses were calculated to be approximately $500,000.

**Expected benefits to the network:** Incorporating headway changes to Route 96 will allow congestion to be alleviated on the corridors mentioned above. Downtown Winston-Salem and New Walkertown Road would benefit immensely from higher frequency services, making it more attractive for more citizens to adopt transit as an alternative to a personal use vehicle.

**Funding source:** Federal/Local

**Responsible party:** WSTA

- **WS-Tran-055 Improve PART Route 1 Mid-Day Service**

  PART has identified the need to improve their urban express routes including Route 1 (Winston- Salem Express), Route 2 (Greensboro Express), and Route 3 (High Point Express). All three routes meet near the Piedmont Triad Airport at the CTC. These three routes currently operate with 30- minute peak headways and hourly off-peak headways. Enhancing midday service will allow for improved regional transit connections throughout the day. PART estimated that the improvement to these three routes would result in 5,904 additional operating hours per year and would necessitate additional annual operating funds of $820,990.56.

  **Expected benefits to the network:** All three routes meet near the Piedmont Triad Airport at the CTC and utilize major corridors such as Interstate 40, Salem Parkway, and Eastchester Drive – adding extra service to these routes will allow users and potential users more flexibility to get to their destinations by utilizing transit.

  **Funding source:** Federal, State, Local

  **Responsible party:** PART

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*Electronic Fare Collection and Fare Free Transit*

PART launched TouchPass fare collection system-wide in August 2019. TouchPass uses electronic fare collection to replace the use of paper magstripe passes. Passengers no longer have to wait in line at the ticket window to buy a pass but can purchase their pass over the
internet using the secure TouchPass system. Along with the implementation of TouchPass, PART
Express added daily and monthly Fare Capping to its fare structure. The TouchPass system is
administered through the Commuter Resources Department Regional Call Center. During its first
year of implementation 75% of PART Express passengers were taking advantage of the
TouchPass platform.

The Winston-Salem Department of Transportation (WSDOT) along with the Winston-Salem Transit
Authority (WSTA) are conducting a comprehensive transit route study to evaluate trip times, modify
services, and ways to reduce congestion and rely more on transit as a form of transportation. In the
following CMP update WSUAMPO will bring in strategies that were identified at the conclusion of the
WSTA route study.

**Bicycle and Pedestrian Infrastructure**

Bicycle and pedestrian trips can help reduce congestion on highway corridors where it is feasible
and safe to make shorter trips on foot and by bicycle. Littman (2020) notes that in urban areas,
between 10-30% of trips are short trips that could be potentially shifted to active transportation;
poor walking and bicycling conditions are likely to result in additional vehicular trips in the
following circumstances:

- Poor walking and cycling conditions force people to drive for even short
  trips, for example across a driveway
- Poor walking and cycling conditions increase chauffeuring trips (special trips
  made to transport a non-driver)
- Poor walking and cycling conditions discourage public transit and rideshare
  travel (car- and vanpooling), which reduces longer vehicle trips.  

Littman notes that bicycling trips on narrow, congested roadways with faster speeds without a
dedicated bicycle facility could cause additional congestion by slowing down traffic; however,
where adequate on-road or off-road bicycle facilities are provided, active transportation is
unlikely to cause significant congestion impacts.

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7 Littman, Todd. (2020, June 5). Evaluating Active Transport Benefits and Costs Guide to Valuing Walking and
Cycling Improvements and Encouragement Programs. Victoria Transport Policy Institute Retrieved from

8 Littman, Todd. (2020, June 5). Evaluating Active Transport Benefits and Costs Guide to Valuing Walking and
Cycling Improvements and Encouragement Programs. Victoria Transport Policy Institute Retrieved from
WSUAMPO MTP 2045 identifies a number of stand-alone bicycle, pedestrian and greenway projects as part of the financial plan. Additional bicycle and pedestrian infrastructure improvements are expected to be implemented as part of roadway projects under the NCDOT Complete Streets Policy.

A list of sample projects and their expected benefits on the network are documented below.

**EB-5722 Silas Creek Parkway Sidewalk** This project will construct a sidewalk from Drumcliffe Street to Lockland Avenue.

**Expected benefits to the network:** Figure D4 displays HERE data (Bluetooth and probe sources collecting speed and travel time data) and shows that Eastbound NC 67 (Silas Creek Parkway) experiences a state of congestion for most of PM peak hours. The Silas Creek Parkway Sidewalk will improve connectivity to Forsyth Technical Community College for both the Main and West Campus. Forsyth Technical Community College is a major center of education and employment. The sidewalk has the potential to facilitate mode shift by improving the ability for users to walk from one side of campus to another without using their car. The sidewalk will improve access to bus stops that currently lack amenities and are generally located in patches of grass along the side of the road close to high-speed facilities. Supporting signalization upgrades for pedestrians at Miller/Silas Creek Pkwy and Ebert/Silas Creek Parkway will improve safety and encourage more pedestrian activity. The sidewalk provides an easier way to walk to bus stops, which could encourage replacement of single vehicle trips to transit. This sidewalk terminates approximately a quarter mile from Forsyth Medical Center and Hanes Mall, which are both major centers of employment and activity. Improved walkability in the areas adjacent to Hanes Mall has the potential to help relieve the significant bottlenecks observed in this area. Improvements to pedestrian safety decreasing the likelihood of pedestrian crashes and thereby nonrecurring congestion are anticipated; this will improve pedestrian infrastructure availability around transit stops, enabling improved links with transit, thereby taking cars off the road; the connectivity of the pedestrian network will improve, thereby making walking trips more convenient for more people, reducing the need for single occupancy vehicle travel; improvements to travel time are anticipated for all users as a result of fewer cars on the road.

**Funding source:** STBG-DA, Federal/Local

**Responsible party:** City of Winston-Salem

**Multimodal Projects in Town of Kernersville: Southern Street Greenway & South Cherry Street Sidewalk.** The Town of Kernersville is implementing a series of bicycle and pedestrian projects which will provide an alternative to single occupancy vehicle travel by enhancing connectivity between residential areas and commercial hubs.
**Expected benefits to the network:** The South Cherry Street Sidewalk will extend the existing Cherry Street sidewalk facilities from Durham Street to Oakhurst Drive. The sidewalk will extend to several medium-to-high density residential areas, including multifamily developments, which could open the door for residents to replace a short car trip to the shopping center and other activity areas with a pedestrian trip. S. Cherry Street and adjacent facilities face a state of congestion during most peak hours; shifted trips from the roadway to the sidewalk could help provide relief during these times. The Southern Street Greenway is another planned project that will receive funding for construction in the near-term. The Southern Street Greenway will eventually connect to the Kerner Mill Greenway, which cuts across many residential areas and provides connections to shopping centers. The Kerner Mill Greenway and Southern Street Greenway are part of the Piedmont Regional Trails Plan to enhance connectivity.

**Funding source:** STBG-DA, Federal/Local

**Responsible party:** Town of Kernersville

**EB-5840, EB-6008 Salem Parkway Multi-Use Paths**
The multi-use paths connect the Strollway and Peters Creek Parkway and Peters Creek Parkway and Lockland Avenue.

**Expected benefits to the network:** These projects will reduce car dependence in the increasingly densifying urban core of Winston-Salem by providing safe, separated facilities for bicyclists and pedestrians who need to traverse US-421 to access employment and other resources. EB-5840, a multi-use path which connects the Strollway with Peters Creek Parkway, will specifically help mitigate the anticipated congestion along Salem Parkway (US-421) in 2045 by providing a reliable means of traversing US-421 without depending on a motor vehicle to do so. The nearby local roads which may experience congestion during peak hours would also see some relief. Current bicycle riders may currently use 1st Street or Glade Street, both of which are somewhat difficult to bike on due to challenging traffic patterns and terrain. Separated facilities are more likely to invite a greater variety of bicyclists and thus lead to more potential single-vehicle trips diverted. EB-6008, a multi-use path which connects Peters Creek Parkway and Lockland Avenue, will provide critical links between residential areas, Wake Forest Baptist Medical Center, Truist Stadium, and downtown. Wake Forest Baptist Medical Center is the largest employer in Winston-Salem and many health care workers live downtown or in neighborhoods adjacent to the hospital; this multi-use path will better enable people who work in this major employment center to replace short vehicular trips with walking or bicycle trips. Overall, each of these projects provide the safe infrastructure needed to enable those who might otherwise opt for a vehicular trip to shift their mode and thereby reduce traffic volume on these roads which are expected to face increased pressure with population growth. Improvements to pedestrian safety decreasing the likelihood of pedestrian crashes and thereby nonrecurring congestion are anticipated; this will improve
pedestrian infrastructure availability around transit stops, enabling improved links with transit, thereby taking cars off the road; the connectivity of the pedestrian network will improve, thereby making walking trips more convenient for more people, reducing the need for single occupancy vehicle travel; improvements to travel time are anticipated for all users as a result of fewer cars on the road.

**Funding source:** Federal/Local

**Responsible party:** City of Winston-Salem

**Parking Management and Pricing**

Winston-Salem Urban Area MPO planning region includes a number of vibrant downtowns with a mix of land uses. As the region continue to grow and develop, managing parking in downtown areas is important to support congestion management goals while ensuring that local businesses can still thrive and their customers can access the parking they need. The transportation system is seeing an evolution from simple parking pricing and management to a curb space management approach to divide space by time and zones among on-street parking, goods delivery, ride-hailing, transit stops, bike lanes, and other elements of complete streets design creates conflicts that must be actively managed. Designs and policies along active main street corridors can have a significant impact on travel behavior and first-mile/last-mile options for passenger trips and deliveries. WSUAMPO member jurisdictions are encouraged to consider the following curbside management policy ideas and planning strategies in downtown areas:

**Off-Street Parking and Wayfinding:** On-street and off-street parking serve different needs and can affect traffic demand on the street network. Off-street parking can influence on-street parking usage where higher turnover is desired for customers making short-term trips. Improved wayfinding to off-street parking improves the drivers experience. With higher reliance on cell phone navigation apps, drivers can consider parking options as part of their route planning, rather than after arriving at their destination. Parking lot signage and wayfinding can reduce the congestion caused by vehicles cruising for on-street parking. Examples in and around MPO communities - areas such as the 6th/Cherry/Trade Parking Deck in Winston-Salem, Main Street surface lot in Kernersville, and the new wayfinding signs in and around downtown Winston-Salem provide clear opportunities for drivers to get into downtown areas and park quickly without causing more congestion in already crowded downtown areas. Off-street parking has become popular in Winston-Salem due to the need for more parking for increased amounts of people being drawn to the downtown area.

**On-Street Parking Turnover and Pricing:** Most main streets in the WSUAMPO have free on-street parking. If a jurisdiction desires higher turnover in these spaces, increasing enforcement adherence to time limits or charging a parking fee are two options. Increasing
on-street parking turnover ensures adequate parking spaces are available for individuals making short trips or visiting a retail shop or restaurant. Recent technology improvements have made it more affordable for municipalities to acquire parking payment infrastructure such as multi-space meters and parking apps. In and around the MPO communities there are many areas where on-street parking is present, in many areas of Winston-Salem there is on-street metered parking where drivers can pay for a spot for an amount of time. The Town of Kernersville offers on-street parking to many of the people who visit the downtown area to get to businesses that interest them. Many zones in MPO communities are 2 hour parking zones so the turnover will happen naturally so that more vehicles are continuously entering and exiting the zones helping to alleviate congestion.

_Loading Zones and Dual Use Zones:_ Delivery vehicles of all sizes must navigate the limited spaces within historical downtowns and limited loading zones. Owners of locally owned small businesses often load out of their personal vehicles. Planning for adequate loading zones ensures space is available as deliveries increase. Dual use of zones (such as on-street parking and commercial loading zones) by time-of-day and day-of-week can also increase loading space capacity. Pedestrian and vehicular conflicts can be reduced by designating dual use space for ride-hailing and taxis during weekends and evenings.

_Complete Streets at the Curb:_ Bicycles, pedestrian, and transit mix at the curb with delivery trucks and on-street parking. Safety considerations such as appropriate spacing between transit stops (such as the potential Graham and Mebane circulator stops) and commercial loading zones, driveways, crosswalks, and intersections are needed to improve visibility. Bicycle facilities such as bike lanes or lane reconfigurations can create space for a variety of street uses. Streetscaping enhancements that widen sidewalks or provide pedestrian bulb outs make space for transit shelters and outdoor dining, yielding a more welcoming and pedestrian-oriented environment. ADA compliance for adequate handicap on-street parking spaces per block and curb cuts improve accessibility and safety for all users. Pedestrian accessibility has been increasing in member MPO communities for some time with the implementation of ADA compliance for many areas in Winston-Salem, Lewisville, Clemmons, Kernersville, Walkertown, and King. WSUAMPO will continue to improve conditions as the shift continues to a more pedestrian friendly environment. The New Walkertown Road Plan is an example that would incorporate many aspects of safe transportation; pedestrian signals, crosswalks, a cut out for a bus pull in area, new bus shelters, as well as new lighting.

_Community Prioritization and Pilot Programs:_ Each main street is unique, so understanding local stakeholders’ priorities along each block helps determine how curb space should be used and managed. Pilot programs are great ways to test out new strategies before installing them. Dual use zones and bike lanes are suitable pilot projects.
Intelligent Transportation Systems (ITS)

The 2045 MTP recommends the adoption of the Intelligent Transportation Systems (ITS) throughout the WSUAMPO area as described in the Triad Regional Intelligent Transportation Systems Strategic Deployment Plan. The Strategic Deployment Plan (SDP) “establishes the foundation for the SDP through stakeholder engagement and a regional gap assessment; follows the process into the project development, prioritization, and creation of the regional ITS architecture; and, consolidates the outputs of the SDP and provides details related to implementing a project, along with processes for maintaining and updating the SDP.”9 ITS technology treatments include advanced signal technologies, enhanced surveillance, en-route traveler information, Bus on Shoulder support, ramp metering, transit signal priority, and incident response (see Table D3). These types of improvements can decrease congestion, reduce travel times, improve transit on time performance, and increase safety.

9 Triad Regional Intelligent Transportation Systems Strategic Deployment Plan, May 2020
### Table D3 - ITS Treatment Strategies

<table>
<thead>
<tr>
<th>Treatment Strategy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>En-Route Traveler Information Improvements</td>
<td>Real time updates broadcast to the vehicle (e.g. Dynamic Message Signs (DMS), X2V communications).</td>
</tr>
<tr>
<td>Advanced Signal Technology</td>
<td>Optimized coordination for signal operations (e.g. ATSPM, adaptive signals).</td>
</tr>
<tr>
<td>Bus on Shoulder</td>
<td>Use of the shoulder as a travel lane by buses when mainline travel speeds drop below specific thresholds.</td>
</tr>
<tr>
<td>Hard Shoulder Running</td>
<td>Use of the shoulder as a travel lane by all vehicles during specific scenarios such as peak periods or during a major incident.</td>
</tr>
<tr>
<td>Ramp Metering</td>
<td>Traffic signals operated at freeway on-ramps to control the rate and impact of vehicles entering mainline traffic.</td>
</tr>
<tr>
<td>Transit Signal Priority</td>
<td>Operational improvements that can extend the green time of a traffic signal when transit vehicles are behind schedule.</td>
</tr>
<tr>
<td>Enhanced Surveillance</td>
<td>Increased surveillance coverage to provide continuous monitoring capabilities on a roadway. Includes both blind spot and new corridor coverage.</td>
</tr>
<tr>
<td>Integrated Corridor Management</td>
<td>Management of a corridor as a system rather than as individual transportation networks.</td>
</tr>
<tr>
<td>Communication Upgrades</td>
<td>Improved communication for resiliency and redundancy through either additional connections or expanded bandwidth.</td>
</tr>
</tbody>
</table>

The 2045 MTP incorporates the recommended corridors from the Triad Regional ITS Strategic Deployment Plan. These projects are shown in Table D4 and are included as funded in the 2035 Horizon Year. They are also shown as part of the recommended Autonomous Vehicle (AV) Corridor network in see Figure D7 (the AV and ITS concepts are also described in 2045 MTP Chapter 5.6).
Table D4 - ITS Projects in MTP

<table>
<thead>
<tr>
<th>MTP_ID</th>
<th>Facility</th>
<th>STIP ID</th>
<th>Project Description</th>
<th>Estimated Base Cost (2020 Millions USD)</th>
<th>Estimated YOE or Horizon Year</th>
<th>Future Cost in YOE (Millions USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS-ITS-Rdwy-402</td>
<td>Silas Creek Pkwy from Hanes Mall Blvd to Robinhood Rd</td>
<td>N/A</td>
<td>ITS: Advanced Signal Technology</td>
<td>$0.120</td>
<td>2035</td>
<td>$0.155</td>
</tr>
<tr>
<td>WS-ITS-Rdwy-403</td>
<td>US 421 Salem Parkway from NC 67 to US 158</td>
<td>N/A</td>
<td>ITS: Bus on Shoulder, Enhanced Surveillance</td>
<td>$0.578</td>
<td>2035</td>
<td>$0.748</td>
</tr>
<tr>
<td>WS-ITS-Rdwy-404</td>
<td>US 52 from US 421 to Patterson Ave</td>
<td>N/A</td>
<td>ITS: Bus on Shoulder</td>
<td>$0.304</td>
<td>2035</td>
<td>$0.393</td>
</tr>
<tr>
<td>WS-ITS-Rdwy-406</td>
<td>I-40 from US 421 to Oak Grove Church Rd</td>
<td>N/A</td>
<td>ITS: Bus on Shoulder, Ramp Metering, Enhanced Surveillance</td>
<td>$0.380</td>
<td>2035</td>
<td>$0.491</td>
</tr>
<tr>
<td>WS-ITS-Rdwy-407</td>
<td>I-74 from I-40 to High Point Rd</td>
<td>N/A</td>
<td>ITS: Bus on Shoulder</td>
<td>$3.097</td>
<td>2035</td>
<td>$4.008</td>
</tr>
</tbody>
</table>

While no ITS projects are currently listed in the STIP, ITS is a potential strategy that can be used by the MPO to help address congestion issues. There are competitive funding opportunities available for implementing ITS strategies at the local level available in the Infrastructure Investment and Jobs Act. Two potential ITS improvements from the table above and their expected benefits to the network are explained below, along with the responsible party for implementation and potential funding source.

**WS-ITS-Rdwy-402 Silas Creek Parkway from Hanes Mall Blvd to Robinhood Road** – This project will consist of the installation of Advanced Signal Technology. This technology will optimize signal operations such as timing, phasing, and servicing. This in turn will reduce congestion and increase traffic efficiency and safety on this arterial roadway. The HERE data shows that Eastbound and Westbound Silas Creek Parkway (NC 67) experiences congestion most of the PM peak hours.
**Funding source:** Federal/Local

**Responsible party:** NCDOT

WS-ITS-Rdwy-403 US 421 Salem Parkway from NC 67 to US 158 – This project is intended to allow buses on the shoulder to reduce growing congestion and offer a low-cost approach that can provide better transit options for commuters. Per the HERE data analysis this facility experiences congestion most of the PM peak hours.

**Funding source:** Federal/Local

**Responsible party:** NCDOT
Figure D7 - ITS Project and Autonomous Vehicle Corridor Networks, as Identified in MTP 2045
Access Management
Access Management is a term used to describe changing land use planning and roadway design practices to limit the number of driveways and intersections on arterials and highways, constructing medians to control turning movements, encouraging clustered development, and creating more pedestrian-oriented street designs; Access Management tends to increase traffic speeds, reduce congestion delays and reduce crashes.

The Federal Highway Administration identifies the following Access Management techniques:

- **Access Spacing**: increasing the distance between traffic signals improves the flow of traffic on major arterials, reduces congestion, and improves air quality for heavily traveled corridors.
- **Driveway Spacing**: Fewer driveways spaced further apart allows for more orderly merging of traffic and present fewer challenges to drivers.
- **Safe Turning Lanes**: dedicated left- and right-turn, indirect left-turns and U-turns, and roundabouts keep through-traffic flowing. Roundabouts represent an opportunity to reduce an intersection with many conflict points or a severe crash history (T-bone crashes) to one that operates with fewer conflict points and less severe crashes (sideswipes) if they occur.
- **Median Treatments**: two-way left-turn lanes (TWLTL) and nontraversable, raised medians are examples of some of the most effective means to regulate access and reduce crashes.
- **Right-of-Way Management**: as it pertains to R/W reservation for future widenings, good sight distance, access location, and other access-related issues.

The goals of access management are to create a system that focuses on effective ingress and egress to a facility, efficient spacing and design to preserve the functional integrity, and overall operational viability of street and road systems.

Roadway Modernization and Operational Improvements
Roadway modernization attempts to maintain the transportation network while enhancing facilities that may not currently meet standards. This includes upgrades to the traveled way, signal system, transit facilities, and pedestrian/bicycle facilities to modernize transportation infrastructure for all modes. The implementation of roadway modernization allows enhancements to the transportation system that will enhance safety, improve efficiency, and

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address operational concerns without making major changes such as roadway widening or the construction of new roadway facilities.

Operational Improvements could include smaller improvements at particular intersections or interchange locations to improve the traffic flow while avoiding a major widening. Examples of operational improvements could include the following project types:

- Ramp Metering
- Ramp Closures
- Congestion Pricing
- Signal Retiming
- Signal Coordination
- Reversible Lanes
- Adaptive Signals
- Raised medians
- Right/Left Turn Channelization

Operational Improvements can often address the worst congestion issues along a corridor while carrying a lower cost than a major widening project.

**Innovative Intersections**

The implementation of innovative intersections address complex conditions to reduce delay, enhance efficiency, and improve safety at locations where traditional countermeasures do not adequately address operational and safety concerns. Innovative intersections attempt to enhance the traveled way for all roadway users and seek to integrate all modes of transportation in the design. Innovative intersections may convey the following additional benefits compared to conventional intersection treatments:

- Improved safety
- Increased efficiency
- Increased capacity
- Shorter wait times
- Long-term cost effectiveness

The following types of at-grade innovative intersection designs may be considered when conventional treatments do not adequately mitigate existing and future transportation problems\(^\text{12}\):

- **Bowtie**: left-turn movements from the mainline and side street are completed at an adjacent roundabout

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• Continuous Green-T: One major street through movement passes through the intersection without stopping, and the opposite major street is typically controlled by a traffic signal. Left-turn movements from the side street use a channelized receiving lane on the major street to merge into the flow of traffic.
• Displaced Left Turn (DLT): Left-turn movements cross to the other side of opposing through-traffic in advance of the main intersection. Left turns and opposing through movements occur simultaneously at the main intersection.
• Median U-Turn (MUT): Left-turn movements from one or both roadways make U-turns at dedicated median openings.
• Quadrant Roadway (QR): One main intersection and two secondary intersections that are linked by a connector road in any quadrant of the intersection. All left-turn movements use the secondary intersections and connector road to complete left-turn movements.
• Restricted Crossing U-Turn (RCUT): All side street movements make a right turn at the intersection. Side street left-turn and through movements turn right and make a U-turn at a dedicated downstream median opening to complete the desired movement.
• Split Intersection: Divides the major street into two one-way streets that meet the side street at separate intersections.
• Roundabout and Mini Roundabout: A circular intersection where traffic moves counterclockwise around a center island. A mini roundabout operates under the same traffic flow principles, but the center island is fully traversable for large vehicles.

Roundabouts Can Serve as Gateway Features in Addition to Providing Improved Traffic Flow Benefits. Example from Davidson, NC.

The State of North Carolina has analyzed and constructed many of the above referenced intersection designs and additional innovative interchange designs across the state. As the Winston-Salem Urban Area MPO planning region grows and traffic congestion increases,
innovative intersections may be needed to alleviate the growing congestion and balance the accommodations for all modes of transportation.

Below are two projects programmed in the STIP and one recently completed roadway modernization project. The expected benefits to the network, along with responsible party for implementation and possible funding sources are explored. The third project explores a recently completed roadway modernization project with positive benefits to the network.

- **U-6003 – New Route** – SR (Piney Grove Road) to NC 150 (North Main Street in Kernersville). Construct two lane divided facility with Bicycle / Pedestrian accommodations.
  
  **Expected benefits to network:** This new facility would help to reduce traffic from adjacent streets thus reducing congestion and improves air quality. This would provide alternate methods of travel for pedestrians and bicyclist which would also reduce VMT.

  **Funding Source:** State – STI – Highway Trust Funds

  **Responsible Party:** NCDOT Division 9

- **U-5899 – New Route** – Forum Parkway Connector, SR 3955 (Forum Parkway) to NC 66 (University Parkway) in Rural Hall. Construct 2-Lane Divided Roadway.
  
  **Expected benefits to network:** The construction of this new facility will give easier access to the business district which will reduce congestion on adjacent streets. This project also plans for an improved intersection alignment at Cross Baptist Church Road and Forum Parkway. This improves safety and keeps traffic moving and reduce crashes.

  **Funding Source:** State – STI – Highway Trust Funds

  **Responsible Party:** NCDOT Division 9

- **U-2925 – Salem Creek Connector** – MLK Jr. Drive south of Winston Salem State University to Rams Drive at the Piedmont Triad Research Park.
  
  **Expected benefits to network:** The construction of this new facility will give easier access to the downtown area and to Winston-Salem State University. It would also make it easier for people to access U.S. 52 and for pedestrians to access the University.
Roadway Capacity Expansion

Roadway widening and strategic new location roadway projects can help address significant roadway congestion problems where the other strategies considered are insufficient. While the 2045 MTP emphasizes modernization and multimodal improvements, it includes several significant capacity improvement projects. These projects are described below:

- **I-40 Widening (WS-Rdwy-107)** – This 2045 Horizon Year project is the addition of travel lanes from six to eight on Interstate 40 from I-40/Salem Parkway to the connection with I-74.

  **Expected benefits to network:** The project would improve direct routes for both local and through traffic and provide a critical connection to the Northern Beltway. This project would also reduce VMT, VHT, and preserve the value of existing infrastructure investments and projects. Finally, the widening and additional capacity could be utilized for managed lanes when coupled with the ITS improvements noted above. Stretches of I-40, including I-40 from I-74 through South Main Street are identified as congested corridors in 2045. Capacity expansion coupled with ITS improvements and other roadway modernization projects are expected to ease congestion along this corridor, delivering improvements and maintaining system reliability for all users, including freight. Truck travel time reliability, travel time index, percent of time spent in congestion, and state of good repair improvements are anticipated.

  **Funding source:** NCDOT

  **Responsible party:** NCDOT

- **I-74, US 52 Widening (WS-Rdwy-035)** – This 2045 Horizon Year project is the addition of travel lanes from four to six on Interstate 74 from NC 65 (WNB) Ext 118 to Moore / RJR Drive Exit 122.

  **Expected benefits to the network:** The project would improve direct routes for both local and through traffic. This project would also reduce VMT, VHT, and preserve the value of existing infrastructure investments and projects. With population growth in Rural Hall and Tobaccoville expected to climb, the addition of capacity between NC 65 (Bethania-Rural Hall Rd.) to Moore / RJR Drive may help maintain a state of relatively low congestion and help provide relief to NC-65, which currently spends around half of peak hours in a state of congestion.

  **Funding source:** NCDOT

  **Responsible party:** NCDOT
• Northern Beltway (MTP project series WS-Rdwy-(69 through 75, 78-79, and 80 through 84) – This project series is a new location four-lane median divided freeway facility from US 311 around the east, north, and west of Winston-Salem to US 157 (Stratford Road).

**Expected benefits to the network:** This project diverts general and truck traffic off of congested routes needed by local trips. It is also anticipated to reduce congestion on Silas Creek Parkway, US 52, US 421, NC 66, University Parkway/Cherry Street, and NC 158 (Stratford Road). The project’s Horizon Years span from the 2025 through 2045.

**Funding source:** NCDOT  
**Responsible party:** NCDOT

### Monitoring Congestion Over Time

It is expected that the region will continue to monitor congestion both for priority congested corridors, and along other key freeway and principal arterial facilities over time. Tables D5 and D6 below illustrate the difference in Vehicular Miles Traveled and Vehicle Hours Traveled during PM Peak, by scenario, out to 2045. Metropolitan Transportation Plan 2045 recommended list of projects results in a decrease in the trips and travel time spent during PM peak that occurs under congested conditions (volume to capacity ratio of over 0.9), as compared with 2045 Existing plus Committed Scenario (2045 expected population and employment growth paired with improvements committed in the 2020-2029 STIP).

**Table D5 PM Peak Period VMT and VHT Under Congested Conditions by County, by Scenario**

<table>
<thead>
<tr>
<th>County</th>
<th>2017</th>
<th>2025</th>
<th>2035</th>
<th>2045 E+C</th>
<th>2045 E+C</th>
<th>2017</th>
<th>2025</th>
<th>2035</th>
<th>2045 E+C</th>
<th>2045 E+C</th>
<th>2017</th>
<th>2025</th>
<th>2035</th>
<th>2045 E+C</th>
<th>2045 E+C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davidson</td>
<td>1,915</td>
<td>1,958</td>
<td>2,075</td>
<td>2,385</td>
<td>1,992</td>
<td>56</td>
<td>61</td>
<td>72</td>
<td>74</td>
<td>67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Davie</td>
<td>16,721</td>
<td>16,382</td>
<td>23,801</td>
<td>43,268</td>
<td>23,942</td>
<td>982</td>
<td>1,054</td>
<td>1,941</td>
<td>3,369</td>
<td>1,967</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forsyth</td>
<td>210,560</td>
<td>383,414</td>
<td>417,366</td>
<td>756,042</td>
<td>374,226</td>
<td>8,051</td>
<td>14,214</td>
<td>16,665</td>
<td>32,899</td>
<td>17,797</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stokes</td>
<td>422</td>
<td>422</td>
<td>422</td>
<td>422</td>
<td>422</td>
<td>422</td>
<td>422</td>
<td>422</td>
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<td>422</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yadkin</td>
<td>9,900</td>
<td>15,329</td>
<td>18,678</td>
<td>36,342</td>
<td>19,851</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM Period Total</td>
<td>229,195</td>
<td>401,753</td>
<td>443,241</td>
<td>801,714</td>
<td>400,160</td>
<td>9,990</td>
<td>15,329</td>
<td>18,678</td>
<td>36,342</td>
<td>19,851</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td>7.52%</td>
<td>12.18%</td>
<td>12.09%</td>
<td>19.36%</td>
<td>9.68%</td>
<td>12.60%</td>
<td>17.53%</td>
<td>19.19%</td>
<td>30.28%</td>
<td>18.09%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assessment of Congestion Management Strategies and System Performance

In keeping with peer MPO practices, the Winston-Salem Urban Area Metropolitan Planning Organization (WSUAMPO) will adopt a “Status of the Systems Report” to fulfill the required periodic assessment component of the congestion management process. This report will provide a biennial update on system performance and how the implementation of congestion management strategies has impacted the system at both the corridor and system level. Stated performance measures are subject to change with data availability and MPO priorities.

The evaluation of strategy effectiveness and system performance will be measured by tracking the following performance measures:
1. Reduce congestion and delays for freight and all users of the regional transportation system.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Data Source</th>
<th>Availability</th>
<th>Performance Measure(s)</th>
<th>Related CMP Objective</th>
<th>Baseline and Target or Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Time Data</td>
<td>National Performance Measures Research Dataset</td>
<td>National Truck Network: Interstates, US Highways, and some State Highways</td>
<td>Truck travel time reliability index (PM Peak Hours 3-6 PM)</td>
<td>Improve truck travel time reliability.</td>
<td>2018: 1.84 2021: 1.56 Target or Trend: Decrease</td>
</tr>
<tr>
<td>Travel Time Data</td>
<td>HERE</td>
<td>Interstates, US Highways, State Highways, and Major Roads</td>
<td>Travel Time Index (PM Peak Hours 3-6 PM)</td>
<td>Maintain/improve travel time index across the system.</td>
<td>2018: 1.05 2021: 1.04 TAMU Mobility Report, 2018: 1.11 Target or Trend: Maintain/Decrease – focus on improving congested corridors</td>
</tr>
<tr>
<td>Travel Time Data</td>
<td>HERE</td>
<td>Interstates, US Highways, State Highways, and Major Roads</td>
<td>% of time the system is in congestion (during PM Peak Hours, 3-6 PM)</td>
<td>Reduce the amount of time and miles users spend in congestion.</td>
<td>2018: 13.3% 2021: 10.5% Target or Trend: Down</td>
</tr>
</tbody>
</table>
| Transit Data       | WSTA, PART                                       | All WSTA Routes, All PART Routes serving the MPO*                            | • Ridership by route  
• Systemwide on-time-performance (OTP)                                              | Improve transit ridership and on-time performance across routes.                      | WSTA On-Time Performance: 85.2% (2021) PART On-Time Performance: Route 1 – 94% (May – Jul 2021) |
### PART On-Time Performance:

**Route 17** – 86%  
(May – Jul 2021)

**Target or Trend:**  
Increase all
2. Support growth and system improvements that enable the efficient movement of goods and people.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Data Source</th>
<th>Availability</th>
<th>Performance Measure(s)</th>
<th>Related CMP Objective</th>
<th>Baseline and Target or Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle and Pedestrian Infrastructure Data</td>
<td>MPO, NCDOT Roads Shapefiles</td>
<td>All sidewalks and bicycle facilities in the MPO</td>
<td>Miles of sidewalk and bicycle facilities added.</td>
<td>Improve the connectivity of the bicycle system and the sidewalk system.</td>
<td>Baseline: 688.3 mi. of sidewalk (2021) Target or Trend: Increase in miles of sidewalk and bicycle facilities.</td>
</tr>
</tbody>
</table>
| Signal Infrastructure Data | MPO, NCDOT                   | All signalized intersections within the MPO      | - Number of signalized intersections evaluated for retiming or other improvements (annual count).  
- Number of signalized intersections retimed or improved annual count | Regularly evaluate signalized intersections and upgrade signal systems along areas of congestion. | Baseline: Varies  
Target: Signal upgrades along important and congested corridors. |
3. Create an environment that enables mode shift to reduce single occupancy vehicle travel.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Data Source</th>
<th>Availability</th>
<th>Performance Measure</th>
<th>Related CMP Objective</th>
<th>Baseline and Target or Trend</th>
</tr>
</thead>
</table>
| Bicycle and Pedestrian Infrastructure Data and Transit Data | WSTA, Populus (SPIN), FLOW Bikeshare, and MPO | Varies; Central Business District/Downtown | • Percent of stops accessible by sidewalk  
• Number of stops within ¼ mile of a bikeshare station  
• Average daily scooter ridership in Downtown Winston-Salem | Improve the availability of bicycle and pedestrian infrastructure around transit stops. | Baseline: 60.6% (597/984 WSTA stops)  
117.9 Scooter Trips Per Day (2021)  
Target or Trend: Increase all. |
4. Improve the safety of the regional transportation system for all users.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Data Source</th>
<th>Availability</th>
<th>Performance Measure</th>
<th>Related CMP Objective</th>
<th>Baseline and Target or Trend</th>
</tr>
</thead>
</table>
| Safety Data  | NCDOT HSIP        | MPO, Statewide     | • Number of crashes involving fatalities  
• Fatality rate  
• Number of crashes involving serious injuries  
• Serious injury rate | Reduce the number and rate of fatal and serious injury crashes on the WSUAMPO roadway system. | See attached report from NCDOT.  
Target: Decrease in accordance with NCDOT goals. |
| Safety Data  | NCDOT HSIP        | MPO, Statewide     | • Number of nonmotorized crashes involving fatalities  
• Nonmotorized fatality rate  
• Nonmotorized serious injury rate | Reduce the number and rate of nonmotorized fatal and serious injury crashes on the WSUAMPO roadway system. | See attached report from NCDOT.  
Target: Decrease in accordance with NCDOT goals. |
### 2022 Winston-Salem Urban Area MPO HSIP Safety Measures

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatalities</th>
<th>Fatality Rate</th>
<th>Serious Injuries</th>
<th>Serious Injury Rate</th>
<th>Non-motorized Fatalities and Serious Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>41</td>
<td>0.910</td>
<td>83</td>
<td>1.842</td>
<td>13</td>
</tr>
<tr>
<td>2009</td>
<td>35</td>
<td>0.768</td>
<td>58</td>
<td>1.273</td>
<td>13</td>
</tr>
<tr>
<td>2010</td>
<td>31</td>
<td>0.697</td>
<td>66</td>
<td>1.438</td>
<td>14</td>
</tr>
<tr>
<td>2011</td>
<td>36</td>
<td>0.759</td>
<td>70</td>
<td>1.475</td>
<td>14</td>
</tr>
<tr>
<td>2012</td>
<td>44</td>
<td>0.933</td>
<td>74</td>
<td>1.570</td>
<td>17</td>
</tr>
<tr>
<td>2013</td>
<td>31</td>
<td>0.646</td>
<td>99</td>
<td>2.063</td>
<td>7</td>
</tr>
<tr>
<td>2014</td>
<td>40</td>
<td>0.842</td>
<td>90</td>
<td>1.895</td>
<td>15</td>
</tr>
<tr>
<td>2015</td>
<td>44</td>
<td>0.900</td>
<td>93</td>
<td>1.903</td>
<td>11</td>
</tr>
<tr>
<td>2016</td>
<td>49</td>
<td>0.985</td>
<td>90</td>
<td>1.772</td>
<td>14</td>
</tr>
<tr>
<td>2017</td>
<td>54</td>
<td>1.027</td>
<td>165</td>
<td>3.338</td>
<td>25</td>
</tr>
<tr>
<td>2018</td>
<td>50</td>
<td>0.918</td>
<td>170</td>
<td>1.772</td>
<td>32</td>
</tr>
<tr>
<td>2019</td>
<td>41</td>
<td>0.769</td>
<td>172</td>
<td>3.227</td>
<td>25</td>
</tr>
<tr>
<td>2020</td>
<td>51</td>
<td>1.122</td>
<td>211</td>
<td>4.643</td>
<td>32</td>
</tr>
</tbody>
</table>

---

### 2022 Winston-Salem Urban Area MPO HSIP Safety Targets

- If adopting the State’s methodology of reducing fatalities and serious injuries by half by the year 2035

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatalities (5 Year Average)</th>
<th>Fatality Rate (5 Year Average)</th>
<th>Serious Injuries (5 Year Average)</th>
<th>Serious Injury Rate (5 Year Average)</th>
<th>Non-motorized Fatalities and Serious Injuries (5 Year Average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 - 2012</td>
<td>37.6</td>
<td>0.813</td>
<td>70.2</td>
<td>1.520</td>
<td>14.2</td>
</tr>
<tr>
<td>2009 - 2013</td>
<td>35.6</td>
<td>0.761</td>
<td>73.4</td>
<td>1.564</td>
<td>13.0</td>
</tr>
<tr>
<td>2010 - 2014</td>
<td>36.6</td>
<td>0.775</td>
<td>79.9</td>
<td>1.688</td>
<td>13.4</td>
</tr>
<tr>
<td>2011 - 2015</td>
<td>39.0</td>
<td>0.816</td>
<td>85.2</td>
<td>1.783</td>
<td>12.8</td>
</tr>
<tr>
<td>2012 - 2016</td>
<td>41.6</td>
<td>0.857</td>
<td>89.2</td>
<td>1.841</td>
<td>12.8</td>
</tr>
<tr>
<td>2013 - 2017</td>
<td>43.6</td>
<td>0.876</td>
<td>107.4</td>
<td>2.154</td>
<td>14.4</td>
</tr>
<tr>
<td>2014 - 2018</td>
<td>47.4</td>
<td>0.930</td>
<td>121.6</td>
<td>2.366</td>
<td>19.4</td>
</tr>
<tr>
<td>2015 - 2019</td>
<td>47.6</td>
<td>0.916</td>
<td>128.0</td>
<td>2.632</td>
<td>21.4</td>
</tr>
<tr>
<td>2016 - 2020</td>
<td>49.0</td>
<td>0.960</td>
<td>161.6</td>
<td>3.180</td>
<td>25.6</td>
</tr>
<tr>
<td>2022 Target*</td>
<td>42.2</td>
<td>0.904</td>
<td>126.0</td>
<td>2.386</td>
<td>20.3</td>
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</table>

*Figure D8. NCDOT Annual Highway Safety Improvement Program (HSIP) Scoring*
Assessment of Significant Progress (cntd)
- FHWA assessed NCDOT’s CY 2019 safety targets in early 2021
- Based on FHWA’s review, North Carolina has not met or made significant progress toward achieving its safety performance targets.

“Assessment” of Winston-Salem Urban Area MPO Targets

<table>
<thead>
<tr>
<th>Performance Measures</th>
<th>5-year Rolling Averages</th>
<th>Target Achieved?</th>
<th>(Actual) Better than Baseline?</th>
<th>Met or Made Significant Progress?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatalities (5 Year Average)</td>
<td>37.9</td>
<td>47.6</td>
<td>43.6</td>
<td>No</td>
</tr>
<tr>
<td>Fatality Rate (5 Year Average)</td>
<td>0.768</td>
<td>0.916</td>
<td>0.876</td>
<td>No</td>
</tr>
<tr>
<td>Serious Injuries (5 Year Average)</td>
<td>89.9</td>
<td>138.0</td>
<td>107.4</td>
<td>No</td>
</tr>
<tr>
<td>Serious Injury Rate (5 Year Average)</td>
<td>1.820</td>
<td>2.632</td>
<td>2.154</td>
<td>No</td>
</tr>
<tr>
<td>Non-motorized Fatalities and Serious Injuries (5 Year Average)</td>
<td>13.2</td>
<td>21.4</td>
<td>14.4</td>
<td>No</td>
</tr>
</tbody>
</table>

Figure D9. NCDOT Annual Highway Safety Improvement Program (HSIP) Target Assessment
## 5. Improve existing infrastructure and maintain a state of good repair.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Data Source</th>
<th>Availability</th>
<th>Performance Measure</th>
<th>Related CMP Objective</th>
<th>Baseline and Target or Trend</th>
</tr>
</thead>
</table>
| Infrastructure Data      | NCDOT                                       | State-Maintained Roads in the MPO | • Percent of pavement in good condition in terms of total system mileage            | Increase the percentage of miles of roadway in good condition.                          | Baseline: 62.8% Good 23.1% Fair 14.1% Poor  
Target: Increase % in good condition                                                  |
|                         |                                             |                         | • Percent of pavement in poor condition in terms of total system mileage             |                                                                                        |                                                                                           |
| Infrastructure Data      | National Bridge Inventory / NCDOT           | NBI Bridges within MPO  | • Percent of bridges rated in good condition as a share of all NBI bridges in the MPO. | Increase the number of bridges in good condition.                                     | 2021 NBI Baseline: 38.7% Good 49.8% Fair 11.5% Poor  
Target/Trend: Increase % of good bridges, Decrease % of poor bridges.                |