MTP 2050

Chapter 4
System Management

Credit: Eastborough

MTP 4.1

Introduction

System management focuses on keeping transportation networks operating smoothly, safely, and efficiently. It encompasses the ongoing maintenance of infrastructure, the integration of advanced technologies, and the implementation of strategies to manage demand, safety, congestion, and resilience. Together, these efforts ensure that transportation systems remain reliable and adaptable to future challenges. Effective system management involves various components, including:

Existing Maintenance Needs & Programs

Current maintenance needs, available funding sources, and other potential maintenance funding models that may help to ensure the upkeep and sustainability of transportation infrastructure.

Intelligent Transportation Systems (ITS)

Innovative technologies and systems that enhance the operational performance of transportation networks through data and traffic management.

Transportation Safety

Existing conditions and potential strategies focused on improving the safety of road users, reducing crashes, and addressing potential hazards.

Transportation Demand Management

Techniques and initiatives designed to optimize the use of available transportation infrastructure by modeling travel demand and considering strategies for managing it.

Congestion Management

Strategies to reduce traffic congestion, improve mobility, and ensure smoother transportation flows across key corridors.

Security and System Resilience

Measures to protect transportation networks from potential threats and ensure their ability to withstand and recover from disruptions.

4.2 Existing Maintenance Needs & Programs

Critical to sustaining a reliable transportation network is addressing physical maintenance of the transportation system, which includes:

- Repairing or replacing bridges in poor physical condition
- Repaving or reconstructing roads in poor physical condition
- Repaving or reconstructing sidewalks and bikeways in poor physical condition
- Maintaining or replacing public transit assests and infrastructure in poor physical condition

Bridges

According to the National Bridge Inventory (NBI), which includes both bridges on the National Highway System (NHS) and non-NHS bridges, approximately 1.6% of bridge deck area in the WAMPO region was in poor condition in 2023. This means more than 185,000 square feet of bridge deck area will need to be evaluated for repair or replacement.

Figure 4.2.1 2023 Bridges in Good, Fair, and Poor Conditions

Condition	Number of Bridges	Bridge Area (Sq. Ft.)	Percent
Good	958	7,017,268	62.1%
Fair	381	4,092,814	36.2%
Poor	42	185,076	1.6%
Total	1381	11,295,157	100.0%

Pavement

The Kansas Department of Transportation (KDOT) provided 2023 pavement-condition data for the National Highway System (NHS) in the WAMPO region, which included I-35, I-135, I-235, US-54/400, K-96, K-254, and K-15. According to these data, 3.6 lane miles of the NHS in the WAMPO region, or 0.6% of the total, are in poor condition. Meanwhile, many thousands of lane miles of non-NHS roads in the WAMPO region also require careful monitoring and potential maintenance.

Figure 4.2.2 2023 Pavement Conditions on the National Highway System

Condition	Lane Miles	Percent
Good	308.7	48.5%
Fair	323.6	50.9%
Poor	3.6	0.6%
Total	636.0	100.0%

Sidewalks and Bikeways

According to an analysis of satellite imagery performed by WAMPO in 2023, there are over 2,100 miles of sidewalks and multiuse paths in the region. This active-transportation infrastructure requires regular assessment and upkeep to maintain safe and accessible pathways for nonmotorized travel.

Public Transit

The WAMPO region is served by multiple public transit agencies, including Wichita Transit, Sedgwick County Transportation, Butler County Transit, the Derby Dash, and the Haysville Hustle, with assets (e.g., buses, vans) and facilities requiring ongoing maintenance and periodic replacement. Ensuring that these agencies have well-maintained vehicles and facilities is essential for a reliable public transit system.

Electronic Transportation Infrastructure

Transportation infrastructure is no longer limited to bridges and pavement. Recent improvements in operations and data collection methods have led to digital traffic controls and integrated computer networks that require maintenance and management. Older technologies are being systematically replaced with newer options. For example, in-pavement magnetic loops used for vehicle detection at signalized intersections are being phased out, while video detection systems, which in some deployments can identify not only vehicles but also pedestrians and bicycles, are becoming more popular. Meanwhile, traditional incandescent bulbs in traffic signals are being replaced with more efficient light emitting diodes (LEDs).

Funding Programs

To address ongoing maintenance concerns, there are several federal programs that can potentially fund maintenance and replacement projects for deteriorating infrastructure or transit assets. Of particular interest are federal grant programs that provide consistent yearly funding for transportation and transit projects. Some formula funding programs available to local and state governments include:

SURFACE TRANSPORTATION BLOCK GRANT (STBG) PROGRAM

STBG funds provide flexible federal funding for a variety of transportation projects, including the maintenance and repair of roads, bridges, and other infrastructure. These funds can be used to help address poor infrastructure condition through repaving, reconstruction, and rehabilitation.

OFF-SYSTEM BRIDGE PROGRAM

KDOT sets aside an apportionment of Surface Transportation Block Grant (STBG) and Bridge Program Funds for the replacement or rehabilitation of eligible bridges located on roads that are not on the federal-aid system. These funds play a crucial role in maintaining infrastructure that is not served by other conventional federal funding sources.

KANSAS LOCAL BRIDGE IMPROVEMENT PROGRAM

The Kansas Local Bridge Improvement Program (KLBIP) is a state-funded initiative that helps local public agencies replace or rehabilitate locally-owned, deficient bridges. The program focuses on improving the overall transportation system across Kansas by targeting bridges that are not eligible for the Off-System Bridge Program or are too costly to replace under it.

FTA 5339 GRANTS FOR BUSES AND BUS FACILITIES FORMULA PROGRAM

The FTA 5339 grant program helps fund the purchase, replacement, and modernization of buses and bus-related infrastructure. This program supports transit agencies in improving bus service and maintaining reliable fleets for transit agencies.

FTA 5307 URBANIZED AREA FORMULA GRANTS

The FTA 5307 program provides federal funding to transit agencies in urbanized areas, primarily for capital investments, maintenance, and operating expenses. These funds are important for maintaining transit assets, such as buses, rail cars, and facilities, ensuring they remain in good condition and operational.

TRANSPORTATION ALTERNATIVES (TA) PROGRAM

TA funds support nonmotorized transportation projects, such as sidewalks, bikeways, and multiuse paths. These funds may be used to repair or rebuild sidewalks and bikeways, ensuring safe and accessible paths for years to come.

BRIDGE INVESTMENT PROGRAM

Another funding opportunity for addressing bridge maintenance and repair needs is the Bridge Investment Program (BIP), established under the Bipartisan Infrastructure Law in 2021. Its focus is on reducing the number of bridges in poor or at-risk condition, which can help ensure that crucial bridges remain safe and operational. This is a competitive grant program open to a variety of applicants, including local governments and Metropolitan Planning Organizations. This funding could potentially complement existing programs, providing more flexibility to address the region's bridge-infrastructure maintenance.

4.3

Intelligent Transportation Systems (ITS)

As traffic volumes increase on the transportation system, the ability to manage road network capacity, mitigate subsequent congestion, and ensure road user safety becomes increasingly complex. Intelligent Transportation Systems (ITS) provide a possible solution to this complexity. ITS can also reduce congestion and improve safety. ITS refers to a broad range of technologies that integrate advanced communication, electronics, and information processing technologies to better manage and optimize transportation infrastructure and services. A few examples of ITS technologies include:

- Traffic Signals and Control Systems: These include technologies like adaptive traffic signals that adjust based on real-time traffic conditions, helping to reduce congestion and improve traffic flow.
- Dynamic Message Signs: Electronic signs that provide real-time updates to drivers, such as information about traffic incidents, road closures, travel times, and weather conditions.
- Real-Time Traffic Cameras: These cameras provide live video feeds of road conditions, allowing traffic managers to monitor congestion, detect crashes, and respond quickly to incidents, enhancing road safety and reducing delays.
- Real-Time Integrated Sensors: These sensors monitor traffic volume, vehicle types, and road conditions, allowing for efficient congestion management.

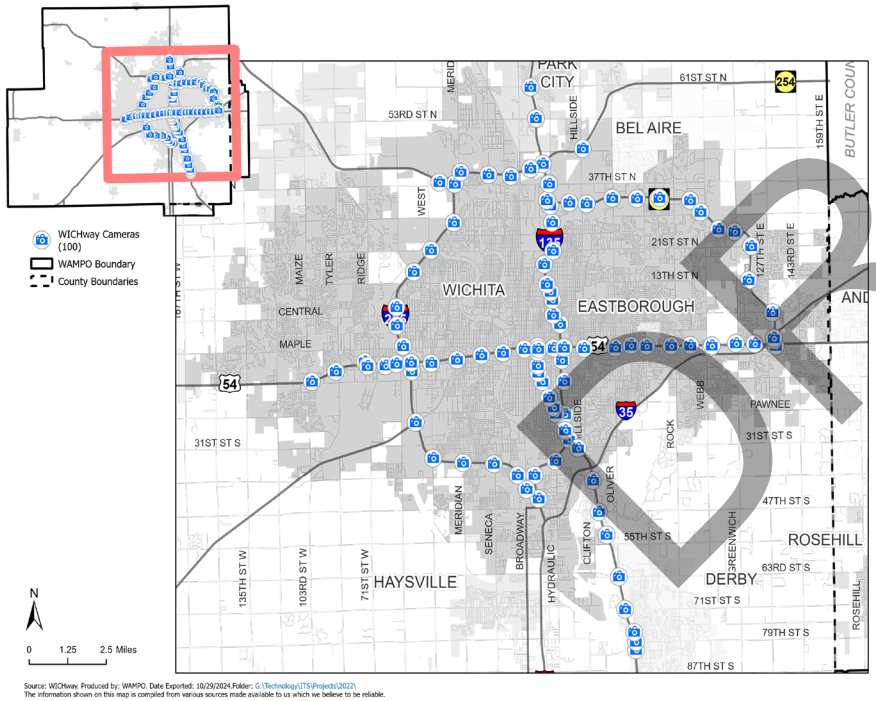
Intelligent Transportation Systems also encompass cutting-edge technologies like connected vehicles (V2X), enabling communication between vehicles and infrastructure. As cities invest in advanced infrastructure like connected vehicles and smart traffic management, transportation systems will become more efficient, and resilient to changing conditions.

ITS in the Region: WICHway

WICHway is the Intelligent Transportation System (ITS) for the highway network in the Wichita area. It is owned and operated by the Kansas Department of Transportation in cooperation with many partners including Sedgwick County, City of Wichita, City of Derby, Kansas Highway Patrol (KHP), Kansas Turnpike Authority (KTA), the Federal Highway Administration (FHWA), and WAMPO.

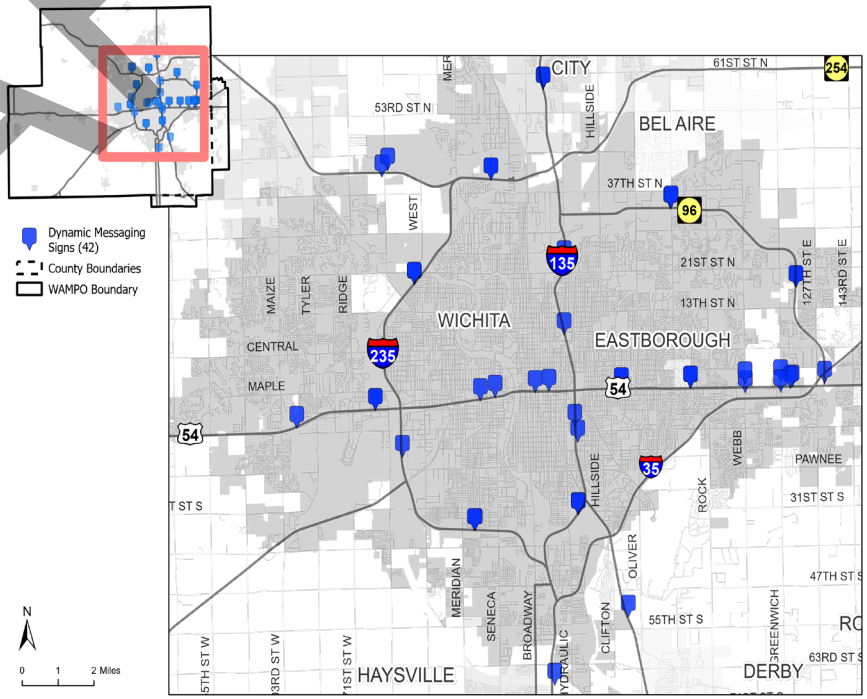
The WICHway network has 100 closed-circuit cameras, 79 traffic sensors, and 42 dynamic message signs. A Traffic Management Center is operated 24/7 to monitor current traffic conditions, post messages, and update the website (www.WICHway.org) to help drivers navigate through incidents, severe weather, maintenance and construction zones plus any occasional special events or other factors affecting traffic. The locations of these cameras can be seen in Map 4.3.1 along with the Dynamic Message Sign (DMS) deployments in Map 4.3.2

Map 4.3.1: WICHway Camera Network



Source: WICHway. Produced by: WAMPO. Date Exported: 10/29/2024.Folder: G:\Technology\ITS\Projects\2022\
The information shown on this map is compiled from various sources made available to us which we believe to be reliable.

Map 4.3.2: WICHway Dynamic Messaging Signs



Source: WICHway. Produced by: WAMPO. Date Exported: 10/29/2024.Folder: G:\Technology\ITS\Projects\2022\
The information shown on this map is compiled from various sources made available to us which we believe to be reliable.

Regional ITS Architecture

To better coordinate between local operators and among various ITS equipment deployments, WAMPO maintains the Regional Intelligent Transportation Systems (ITS) Architecture, with its most recent update anticipated to be complete in 2025. The architecture documents ITS infrastructure, devices, personnel, and maintainers, so that planning, deployment, and communication can take place in an organized and coordinated fashion. Without such a unified framework, opportunities for improving efficiency, safety, and data-sharing may be lost; at the extreme, a region could risk deploying incompatible or redundant technologies. The Regional ITS Architecture ensures that all stakeholders are aligned on ITS gaps and priorities. To learn more about the Regional ITS Architecture, please see Appendix H: Regional ITS Architecture.

4.4 Transportation Safety

WAMPO is committed to safety and wants to ensure people arrive safely to their destinations. Whether you walk, roll, ride, or drive, everyone has the right to safe travel. WAMPO's transportation safety initiatives strive to reduce transportation fatalities and serious injuries by supporting comprehensive, system-wide, multimodal, data-driven, and proactive regional and statewide transportation planning processes that integrate safety into surface transportation decision-making.

Transportation safety is a required factor in the transportation planning process and transportation professionals are key partners in ensuring that safety is an integral component of all planning processes. With knowledge and understanding of safety and safety planning, transportation professionals can enhance collaboration, communication, and coordination with safety specialists and partners to reduce and eliminate serious injuries and fatalities.

SAFE SYSTEM APPROACH

The US Department of Transportation has adopted the Safe System Approach to address roadway safety challenges. This approach has been embraced as an effective way to address and mitigate the risks inherent in our enormous and complex transportation system. It works by building and reinforcing multiple layers of protection to both prevent crashes from happening in the first place and minimize the harm caused to those involved when crashes do occur. It is a holistic and comprehensive approach that provides a guiding framework to make places safer for people.

The Safe System Approach requires a culture that places safety first and foremost in road system investment decisions. It also acknowledges that road users are human beings and that humans will inevitably make mistakes. As shown in Figure 4.4.1, the Safe System Approach considers five elements of a safe transportation system—safe road users, safe vehicles, safe speeds, safe roads, and post-crash care—in an integrated and holistic manner. A true systems approach involves optimizing across all the elements to create layers of protection against harm on the roads.

Both WAMPO and KDOT have adopted the Safe System Approach and are utilizing it to guide efforts.

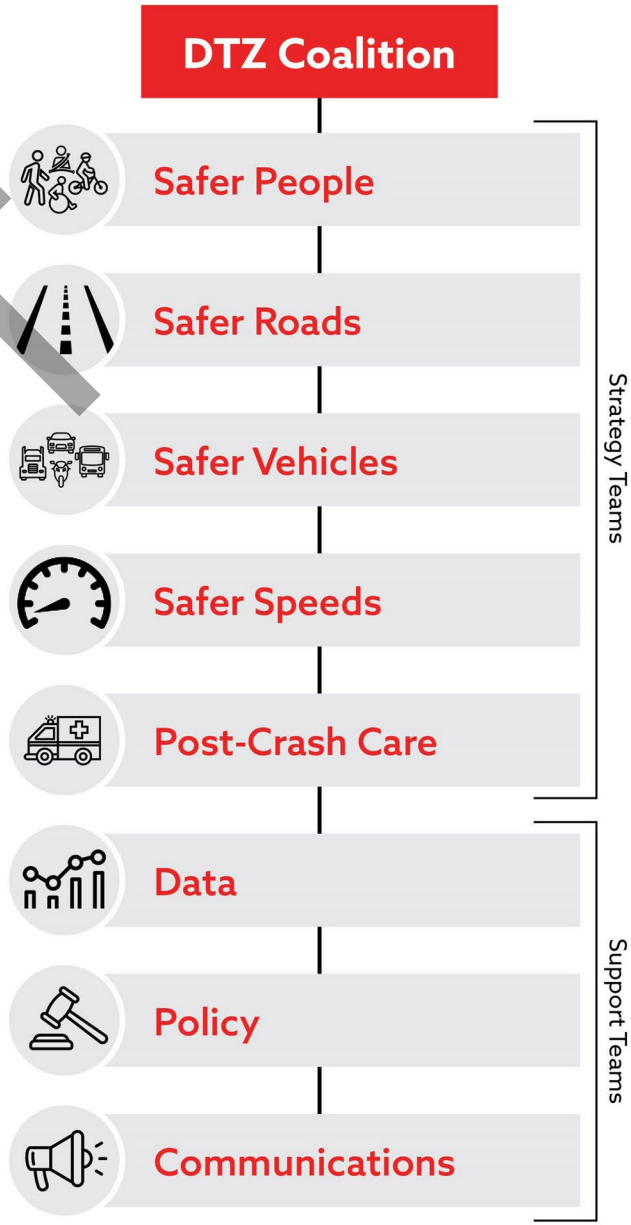
Figure 4.4.1: Safe System Approach

KDOT DRIVE TO ZERO

Every five years, the State of Kansas is required to update its Strategic Highway Safety Plan (SHSP), a guiding framework for reducing fatalities and serious injuries on all public roads. The 2025-2029 Kansas Drive to Zero Plan is a collaborative, data-driven process that brings together and draws on the strengths and resources of safety partners across the state.

The Kansas Department of Transportation (KDOT) has established the Drive to Zero (DTZ) Coalition, an executive-level body consisting of members of state and federal agencies, non-profit and advocacy organizations, the private sector, and the Kansas House and Senate Transportation Committees. The plan is supported by Strategy and Support Teams. More information can be found at: https://kansasdrivetozero.com/.

Figure 4.4.2: Drive To Zero (DTZ) Coalition



WAMPO Safety Initiatives

COMPREHENSIVE SAFETY ACTION PLAN (CSAP)

WAMPO's Comprehensive Safety Action Plan (CSAP) was adopted by the Transportation Policy Board in December 2023 and identifies behavioral and engineering solutions to reduce severe crashes and fatalities. The plan follows the Safe System Approach, acknowledging that severe crash outcomes are preventable, despite the inevitability of human error, and integrates this mindset in the pursuit of zero fatalities and serious injuries on WAMPO-area roads. The plan was developed with input from a team of Transportation Safety Technical Advisors (TSTA), WAMPO staff, and community partners.

Vision

The WAMPO region envisions a path towards zero road deaths through innovative infrastructure, comprehensive education, and community-wide collaboration, underpinned by the principles of the Safe System Approach.

Goals

- Reduce conflicts at intersections.
- Create safer roads for all road users.
- Employ a variety of tactics to reduce vehicle speeds.

The CSAP includes an implementation plan with time frames and comprehensive strategies and includes a Countermeasures Toolkit for Engineers. WAMPO staff, the TSTA team, and members of the ICT Safe coalition oversee the implementation of the strategies. The full plan can be found in Appendix I and online: www.wampo.org/safety.

CRASH DATA ANALYSIS

Over 100,000 crashes occurred in the WAMPO region between 2012 and 2021. Crash data were studied to provide a complete and thorough review of the transportation system. These data were analyzed through a variety of aspects, including maintaining authority, contributing factors, equivalent property damage, and more. Heat maps were created to illustrate and determine crash hot spots for different crash types and factors. Table 4.4.1 shows a breakdown of the crashes by type.

Table 4.4.1: WAMPO Area Crash Types

	All Crashes	Fatal Crashes	Serious Injury Crashes	Fatal/Serious Injury Crash %
Other Motor Vehicle	77,457	246	806	1.36%
Fixed Object	15,338	120	376	3.23%
Parked Motor Vehicle	5,650	10	20	0.53%
Animal	4,044		7	0.17%
Overturned	2,985	78	241	10.69%
Pedestrian	1,028	81	159	23.35%
Pedal cycle (bike)	1,012	14	88	10.08%
Other Object	816	4	7	1.35%
Other-Non-Collision	734	6	26	4.36%
Unknown	96	1	1	2.08%
Railway Train	42	4	2	14.29%

*KDOT crash reporting separates Collisions with Other Vehicles into further breakdowns of type (e.g., Angle-Side Impact, Head-On). These data indicate that Angle-Side Impact, Rear End, and Sideswipe-Same Direction are the most common crashes. Angle-Side Impact, Head-On, and Sideswipe Opposite Direction have the highest percentage of fatalities and serious injuries.

Driver Behavior Contributing Circumstances

Contributing circumstances related to driver behavior are subject to testimonials from those involved in the crash and/or from witnesses. While this information is often underreported, the data available still provide information regarding the behaviors that trend most often. This information can help direct efforts toward behavior change. For both intersection and non-intersection crashes, when indicated on the crash report, some form of Distraction or Driver Inattention was the most frequently indicated contributing factor.

Table 4.4.2: Driver Behavior Contributing Circumstances

	Intersection		Non-Intersection		Combined
	Crashes	Percentage	Crashes	Percentage	Percentage
Right of Way Violation	1,653	15.91%	2,095	15.54%	15.70%
Inattention – General	1,374	13.22%	1,765	13.09%	13.15%
Followed Too Closely	942	9.07%	1,191	8.83%	8.93%
Unknown	658	6.33%	877	6.50%	6.43%
Too Fast for Conditions	539	5.19%	769	5.70%	5.48%
Improper Lane Change	396	3.81%	489	3.63%	3.71%
*Ran Red Light	339	3.26%	459	3.40%	3.34%
Right of Way Violation / Inattention – General	188	1.81%	243	1.80%	1.81%
Other Distractions In or On Vehicle	146	1.41%	191	1.42%	1.41%
Improper Backing	142	1.37%	162	1.20%	1.27%
Inattention – General / Too Fast for Conditions	134	1.29%	145	1.08%	1.17%
Avoidance or Evasive Action	133	1.28%	185	1.37%	1.33%
Followed Too Closely / Inattention General	127	1.22%	309	2.29%	1.83%
Improper Turn	127	1.22%	145	1.08%	1.14%
Disregarded Signs – Signals – Markings	118	1.14%	183	1.36%	1.26%
Inattention – General / Followed Too Closely	115	1.11%			0.48%
Under the Influence of Alcohol	115	1.11%	161	1.19%	1.16%
Inattention – General / Improper Lane Change	108	1.04%			0.45%
Careless or Reckless Driving	96	0.92%	130	0.96%	0.95%
Ill or Medical Condition	85	0.82%	87	0.65%	0.72%
Distraction Not In or On Vehicle	80	0.77%	89	0.66%	0.71%
Fell Asleep or Fatigued	66	0.64%	107	0.79%	0.72%
Oversteering – Overcorrection	57	0.55%	83	0.62%	0.59%
Mobile Phone			60	0.45%	0.25%
Under the Influence of Alcohol / Careless or Reckless Driving	51	0.49%	56	0.42%	0.45%
Other	44	0.42%	44	0.33%	0.37%

*Even though not listed as intersection, 339 crashes were coded as Ran Red Light; if these are moved into the intersection list, Ran Red Light would be around 6% and be number 6 on the intersection list.

Emphasis Areas

Emphasis Areas help prioritize resources and efforts toward specific areas with the highest risk and potential for improvement. By focusing on these areas, decision-makers can address the most pressing issues, such as intersections with high crash rates or sections of roads with frequent speeding violations, leading to a more effective and targeted safety strategy. Additionally, Emphasis Areas provide a clear framework for measuring the success of road safety initiatives, allowing for data-driven decision-making and continuous improvement in crash prevention.

The top ten safety issue areas were identified based on the crash trend data analysis, and the members of the Transportation Safety Technical Advisors (TSTA) voted on the top three they believed would make the biggest impact to study further as Emphasis Areas. They are:

- Intersections
- Speed
- Vulnerable Road Users (VRUs)

ICT SAFE: A REGIONAL TRANSPORTATION COALITION

ICT Safe's mission is to reduce transportation-related fatalities and serious injuries in the WAMPO region by implementing the Comprehensive Safety Action Plan (CSAP). The coalition includes a diverse range of stakeholders involved in education, engineering, advocacy, enforcement, and emergency response. ICT Safe is an overarching coalition with several committees, including the Active Transportation Committee (ATC) and Drive Safe Sedgwick. ATC focuses on supporting and encouraging nonmotorized forms of travel while Drive Safe Sedgwick focuses on reducing impaired driving and distracted driving and increasing seatbelt use and adherence to speed limits. The coalition and committees meet quarterly and help oversee the implementation of the CSAP strategies.

COMPLETE STREETS & VISION ZERO

WAMPO envisions a path toward zero road deaths through innovative infrastructure, comprehensive education, and community-wide collaboration, underpinned by the principles of the Safe System Approach. A Complete Street is safe, and feels safe, for all users and focuses on safety, comfort, and connectivity to destinations. WAMPO is currently working with partners to develop Complete Streets and Vision Zero policies and toolkits for the WAMPO region.

SAFE ROUTES TO SCHOOL

Safe Routes to School (SRTS) is an essential program that aims to create secure pathways for students to commute to and from school using active modes of transportation, such as walking and biking. By ensuring safe travel routes for students, we not only encourage healthier lifestyles but also work towards alleviating traffic congestion and reducing the community's carbon footprint. SRTS improvements around schools not only benefit the students, but also the staff, families, and residents moving through the area. WAMPO is dedicating funding to assist public and private schools with the development of SRTS plans. Please visit www.saferoutes.ksdot.gov/ and www.wampo.org/srts for more information.

For additional information on education and transportation, please refer to Chapter 2.3.

SAFE STREETS & ROADS FOR ALL: DEMONSTRATION GRANT

The Safe Streets and Roads for All (SS4A) grant program, established by the Bipartisan Infrastructure Law in 2021, will provide $5 billion in SS4A grant funding over five years. The competitive funding opportunity solicits applications to improve roadway safety by significantly reducing or eliminating roadway fatalities and serious injuries through safety action plan development and projects focused on all users. WAMPO was awarded an SS4A Demonstration grant by the US Department of Transportation in December 2023. Funding, including KDOT and local match, will be utilized to complete Safety Analysis plans and to install and evaluate temporary safety improvements across the WAMPO region. These plans and temporary demonstration projects will help determine what safety improvements will be most effective in reducing serious injuries and fatalities at high-crash locations.

WAMPO's comprehensive safety initiatives and meeting details can be found online at: www.wampo.org/safety.

4.5 Transportation Demand Management

Transportation demand management is a general term for strategies to facilitate travel options that result in more efficient use of transportation resources and infrastructure. Transportation demand management programs and projects can help reduce traffic congestion without adding roadway capacity. The goals of transportation demand management are to improve travel reliability, improve air quality, manage congestion, and increase economic development.

Transportation demand management strategies can be categorized into four groups:

- Travel Options – Strategies to improve and/or expand transportation options, such as extended public-transit hours of operation
- Work Travel Patterns – E.g., work shifts that start and end during non-peak travel periods, commuting by alternate modes of transportation
- Incentives and Policies – Aligning transportation options with adopted policies and plans aimed at increasing investment in public transit, bicycling, and walking amenities and infrastructure
- Supportive Land Use – Partnering with land-use agencies to ensure mixed-land-use planning that will result in developments with small street-block sizes, activated ground floors (i.e., buildings with retail and service establishments on the ground floor, but other uses on higher floors), and facilities that promote sustainable modes of travel

Table 4.5.1 lists some potential transportation demand management strategies. It is not exhaustive, as additional strategies and innovative solutions are always being developed in cities around the world. The estimated-cost categories are based on the values of capital projects: Low is anything under $1 million, medium is $1-5 million, and high is greater than $5 million.

Table 4.5.1: Potential Transportation Demand Management Strategies

Strategy	Cost*
Active parking management: Using technology to better manage parking inventory	Medium
Alternative work hours for commutes during non-peak hours	Low
Bus stops to maximize rider accessibility and safety	Low
Congestion pricing	High
Dynamic lane assignment	Medium
Employee rideshare	Low
Employee transit & active transportation incentives	Low
High Occupancy Vehicle (HOV) lanes	Medium
Land-use development policies	Low
Mobility hubs connect transit to other modes such as bike share or scooters	High
Parallel route usage & management to mitigate congestion	High
Park-and-ride locations	Medium
Protected bike lanes	Low
Regional trails and sidewalks	Medium
Signal timing optimization	Medium
Transit signal priority	Medium
Truck-lane designations & restrictions	Low
Variable-message signs	Medium
Work-zone intelligent transportation systems	Medium

* Low is anything under $1 million, medium is $1-5 million, and high is greater than $5 million

Forecasting Travel Demand

To ascertain the level of need for/usefulness of various transportation demand management strategies and where that need/usefulness is greatest, it is necessary to have a clear idea of how heavily used the transportation system currently is, what future usage is likely to be like, and how economics, demographics, and infrastructure affect that usage.

WAMPO maintains a travel demand model for the Wichita, KS metropolitan area, a necessary tool for MPOs to develop long-range plans and properly evaluate future projects in the region, while ensuring compliance with federal regulations. It simulates the interaction between regional land development patterns and the transportation system and allows the region to understand the impact transportation investments and land-use decisions have on travel.

This model informed the development of MTP 2050 by looking at transportation-system and travel changes associated with anticipated job and population growth and with planned infrastructure improvements. These forecasts of travel helped identify future transportation-system needs and provided a snapshot of future system performance. A comparison of travel demand model outputs for the base year (2022) and for the future scenario year (2050), with anticipated population and employment growth and planned future transportation projects, predicts some noteworthy changes in travel between now and 2050.

Table 4.5.2 summarizes the outputs of the travel demand model for the 2022 Base Scenario and the 2050 Build Scenario, which includes all of the changes to the roadway network that are called for in the MTP 2050 Fiscally Constrained Project List (see Chapter 7). In response to population and employment growth, person trips within the model region (which is slightly larger than the official WAMPO region) are forecast to increase almost twenty percent over a period of 28 years, with a slight increase in the average number of trips per person. Corresponding, but slightly smaller, increases are forecast for vehicle trips, vehicle miles traveled (VMT), and vehicle hours traveled (VHT). However, VMT and VHT per capita are forecast to slightly decrease. This is reflective of a forecast slight decrease in both average vehicle-trip distance and average vehicle-trip duration. This is at least partially explained by a forecast slight decrease in average vehicle trip speed (resulting from traffic congestion), which discourages motor-vehicle travel. Another likely explanation for shorter vehicle-trip distances and durations is that increases in the numbers of people and jobs in the region reduce the average distance/travel time between origins and potential destinations.

Table 4.5.2: Summary of 2022 Base Scenario and 2050 Build Scenario Outputs from the WAMPO Travel Demand Model

TDM Output Summary Statistics	Scenario		Difference	% Difference
	2022 Base	2050 Build		
Person Trips (internal to the region)	1,837,310	2,204,331	367,021	19.98%
Person Trips Per Capita	3.39	3.42	0.03	0.88%
Vehicle Trips (including external trips & truck trips)	1,530,805	1,810,366	279,562	18.26%
Vehicle Miles Traveled	12,768,085	14,781,246	2,013,161	15.77%
Vehicle Miles Traveled Per Capita	23.56	22.93	-0.63	-2.66%
Vehicle Hours Traveled	318,009	371,077	53,068	16.69%
Vehicle Hours Traveled Per Capita	0.59	0.58	-0.01	-1.88%
Average Vehicle Trip Distance (miles)	8.34	8.16	-0.18	-2.11%
Average Vehicle Trip Duration (minutes)	12.46	12.30	-0.17	-1.33%
Average Vehicle Trip Speed (mph)	40.15	39.83	-0.32	-0.79%

Table 4.5.3 summarizes projected person-trip mode shares in the 2022 Base Scenario and 2050 Build Scenario. The most common travel mode is single-occupant motor vehicle, followed by multiple-occupant motor vehicle, with smaller numbers of trips made by bus or by nonmotorized modes. Not much change in mode shares is forecast between 2022 and 2050.

Table 4.5.3: Summary of 2022 Base Scenario and 2050 Build Scenario Person-Trip Mode-Share Outputs from the WAMPO Travel Demand Model

Mode	Scenario		Difference
	2022 Base	2050 Build	
Single-Occupant Vehicle	47.87%	47.86%	-0.01%
Multiple-Occupant Vehicle	38.97%	38.90%	-0.07%
School Bus	5.33%	5.30%	-0.03%
Pedestrian	4.97%	5.04%	0.07%
Bicycle	1.59%	1.59%	0.00%
Public Transit	0.64%	0.67%	0.03%
Other	0.63%	0.65%	0.02%
Total	100.00%	100.00%	0.00%

For more information on the development, uses, and outputs of the WAMPO travel demand model, please see Appendix F.

Credit: Prairie Sunset Trail - Michael Negrete

4.6 Congestion Management

Congestion Management

As metropolitan areas expand, congestion along the road network becomes an increasingly significant issue. It impacts travel times and the overall quality of life for residents. Management of congestion can be accomplished through a variety of strategies including demand management, infrastructure improvements, and traffic flow optimization. By analyzing travel patterns, transportation planners can identify areas prone to congestion and prioritize interventions like signal optimization, public transit enhancements, or roadway expansions. These efforts not only reduce delays but also improve air quality and promote more sustainable mobility options within the metropolitan region. The goal of congestion management is not to eliminate traffic entirely but to maintain an efficient, reliable, and safe transportation system as urban areas continue to grow. For MPO's such as WAMPO, comprehensive strategic approaches to congestion are formalized through the development of a Congestion Management Process (CMP).

Congestion Management Process (CMP)

The implementation of a CMP is federally mandated for metropolitan areas such as WAMPO that boast populations exceeding 200,000 residents. This regulation underscores the critical need to address congestion challenges in urban settings. The primary purpose of a CMP is to establish a methodical and comprehensive approach to managing congestion, grounded in the performance of the regional transportation system.

At its core, a Congestion Management Process (CMP) provides a strategic framework for systematically assessing congestion mitigation efforts. It further establishes a structure for monitoring the effectiveness of these interventions and supports the development of future strategies. This process includes a comprehensive analysis of traffic flow, roadway capacity, and transit performance to specifically evaluate how well current measures reduce congestion and improve travel efficiency. To learn more about congestion management and to view WAMPO's most recent CMP, please see Appendix G, Congestion Management Process.

4.7 Security and System Resilience

The federal Bipartisan Infrastructure Law (BIL) establishes the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Formula Program to help make surface transportation more resilient to natural hazards, including climate change, sea level rise, flooding, extreme weather events, and other natural disasters through support of planning activities, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure.

By the Federal Highway Administration definition, resilience is "the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."

Following the passage of the FAST Act, the Federal Highway Administration and the Federal Transit Administration updated the metropolitan and statewide transportation planning regulations to reflect these new requirements. The transportation planning rule includes:

- A new planning factor for states and metropolitan planning organizations (MPOs) to consider and implement: improving the resiliency and reliability of the transportation system (23 CFR 450.206(a)(9) and 23 CFR 450.306(b)(9)).
- A recommendation for MPOs to consult with agencies and officials responsible for natural disaster risk reduction when developing a metropolitan transportation plan and the transportation improvement program (23 CFR 450.316(b)).
- A requirement that the metropolitan transportation plan assess capital investment and other strategies that reduce the vulnerability of the existing transportation infrastructure to natural disasters (23 CFR 450.324(f(7)).

SYSTEM RESILIENCE

The impacts of a changing climate and extreme weather events are one of the hazards that threaten our nation's transportation systems. Flooding, extreme heat, and severe storm events endanger the long-term investments that federal, state, and local governments have made in transportation infrastructure. Changes in climate have intensified the magnitude, duration, and frequency of these events for many regions in the United States, a trend that is projected to continue. As a result, transportation agencies across the country are assessing ways to protect, preserve, and improve their assets in the face of increasing climate change and extreme weather events.
The WAMPO region has a long history with tornadoes, hail, strong winds, temperature swings, and other weather phenomena. These varied, and at times unpredictable, weather patterns have shaped an increasingly resilient and prepared system of emergency responders and transportation system resources.

The WAMPO region is located in "Tornado Alley," a large area that covers parts of South Dakota, Nebraska, Kansas, Oklahoma, and Texas where tornadoes occur more frequently than elsewhere. Several large, damaging tornadoes have hit the region over the years, including one in 1991 that hit Haysville, Wichita, and Andover, another in 1999 that devastated Haysville, and in 2022 that hit Andover.

Ground - Level Ozone

Ozone season runs April thru October, when temperatures are high and southern winds are strong. High temperatures mix with emissions from motor vehicles to form ground-level ozone; ozone levels in the region have close to exceeding the allowable standard over the last several years but have not exceeded the standard to date.

Stormwater Drainage, Overland Flooding, & Groundwater Intrusion

Natural features, including the area's relative flatness, its floodplains associated with the Arkansas River and the Ninnescah River, and the prevalence of basements make overland storm water drainage and groundwater intrusion particularly challenging problems in the region.

Hazardous Water

Groundwater and soil contamination associated with industries in the early to middle part of the 20th century exist at three sites in the region. These areas are currently being remediated to standards.

Agricultural Chemicals Runoff

It is common practice to use herbicides, pesticides, and fertilizer in modern-day agricultural operations, residential lawns, and commercial turf management; and rain carries these chemicals to surrounding water bodies and groundwater. When unnatural levels of fertilizer runoff take place, harmful algae blooms occur and lead to unsafe water bodies.

Private Water & Sewer System

Private drinking water wells, irrigation wells, and septic systems are often found in rural residential areas located in unincorporated areas. Local regulations require testing prior to purchase of the property, and then individual homeowners are responsible for upkeep and testing.

Earthquakes

Over the last few years, earthquake frequency has increased across northern Oklahoma and south-central Kansas. Scientists continue to study the causes and impacts.

Climate Change/Extreme Weather

Like many other communities, climate change is an emerging issue in the WAMPO region. Changes in historical climate trends, such as warmer winters and droughts that are more frequent, impact farmers and are a general concern.

SECURITY AND EMERGENCY MANAGEMENT

Sedgwick County Emergency Management (SCEM) is a lead organization overseeing emergency planning in the region. The Local Emergency Operations Plan (LEOP) was approved by the Kansas Division of Emergency Management in 2022. The LEOP is designed to address natural and manmade hazards that could adversely affect the County. The LEOP applies to all county government departments and agencies that are tasked to provide assistance in a disaster or emergency situation. It describes the fundamental policies, strategies and general concept of operations to be used in control of the emergency from its onset through the post-disaster phase.

The LEOP is an all-hazards plan that addresses evacuations; sheltering; post-disaster response and recovery; deployment of resources; communications, and warning systems. It also defines the responsibilities of county departments and volunteer organizations. The LEOP describes the basic strategies, assumptions and mechanisms through which the County will mobilize resources and conduct activities to guide and support local emergency management efforts through preparedness, response, recovery, and prevention.

Wichita State University's Environmental Finance Center (EFC) is one of 10 Environmental Finance Centers located across the country that provide communities with professional training, technical assistance and applied research. They help communities build capacity to address environmental challenges and provide quality of life for everyone.

One of the key ingredients of successful, premiere cities is sustainability. When decision-makers focus and take action on initiatives that increase a region's environmental, social, and economic life, in equal measure, the community is able to grow and thrive.

A community focused on sustainability will experience:

- Financial benefits through reduced municipal costs for energy, water, infrastructure, and maintenance; and increased tax and fee revenues due to increased economic activity
- Healthy residents through access to clean air, water, and food as well as opportunities to be physically active
- Economic growth as businesses choose to establish and remain in the community because the workforce is healthy and happy and and because cost savings on energy, water, etc. are realized due to smart development and building standards

A 2022 report published by the EFC evaluated projects, programs, policies, and partnerships to improve sustainability for the City of Wichita. The report includes guidance on transportation, built environment, renewable energy and low-carbon fuels, and green space. www.wichita.edu/academics/fairmount_las/hugowall/efc/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