

2020 Bastrop County Transportation Plan

CAMPO

CAPITAL AREA METROPOLITAN
PLANNING ORGANIZATION

2020 Bastrop County Transportation Plan

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EXECUTIVE SUMMARY

Introduction

The draft Bastrop County Transportation Plan was developed by Capital Area Metropolitan Planning Organization (CAMPO) staff at the request of the Bastrop County Commissioners Court and as part of the Regional Arterials Concept Inventory (RACI). This draft Plan serves as an update to the 2016 Bastrop County Transportation Plan. The primary focus of this effort was to plan for future growth with mobility choices that are **safe, convenient, reliable, and efficient**. This Plan includes a public outreach component, an analysis of the county's existing conditions, and a concept plan with recommended improvements over the next 25 years.

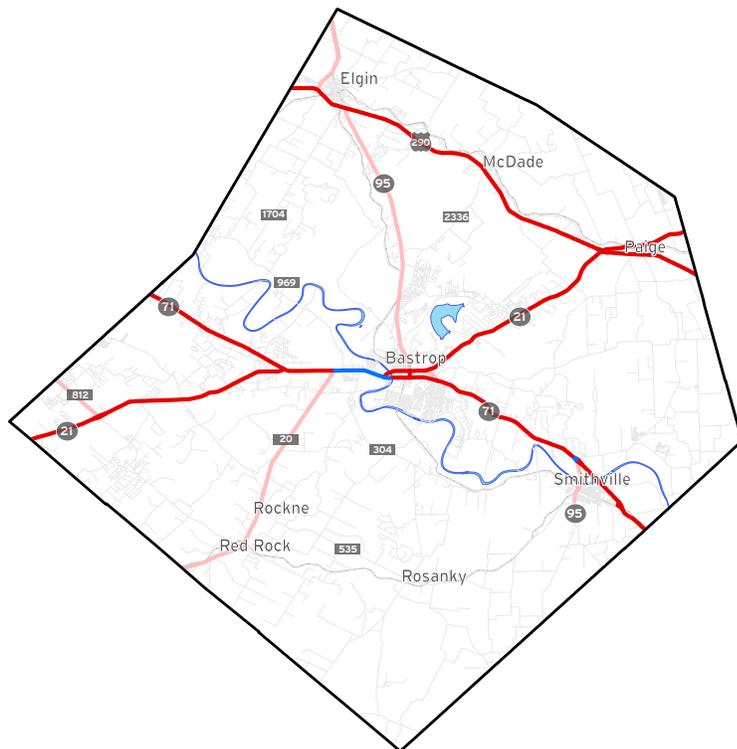
Plan Approach

Public Outreach

The Plan started with the public outreach process that informed the RACI, spanning from February 2018 to June 2019. A stated goal of the planning work was to reach all people, including vulnerable populations. Most responses showed that residents commute primarily within Bastrop County or to Travis County. Prominent themes from the public outreach responses showed that there is a need to improve existing network connectivity, especially to Travis County, add new grade separations to bypass railroad crossings, and provide additional river crossings.



Existing Arterial Network



Existing Conditions Analysis

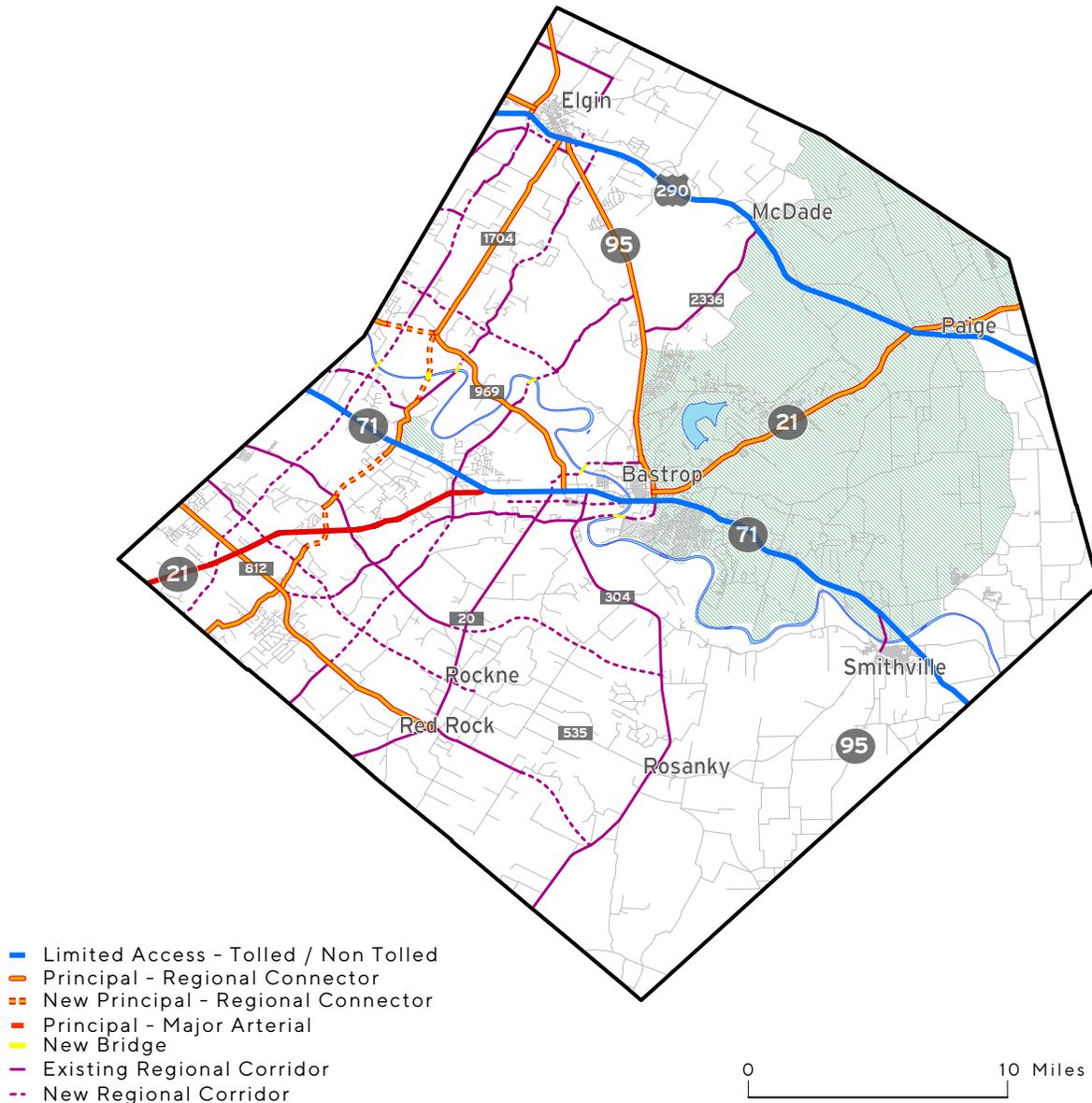
Over 2 million vehicle miles are traveled each day in Bastrop County. Like much of the wider Capital Area region, the arterial system is under-performing and the pressures of growth make clear the lack of network connectivity and redundancy. Bastrop County, having witnessed more natural disasters in recent years than in many other areas in Texas, is in need of an arterial system that can safely and reliably move travelers and first responders across the county. Enhancing mobility to meet these needs can also address the high crash rates that were found on many of the most significant roadways within the county, including portions of SH 21, SH 95, and FM 2336.



Concept Plan & Recommendations

The Recommended Arterial Network envisions an improved and reliable network of major and minor arterials that support a growing Bastrop County. In addition to enhancing these roadways, the Recommended Arterial Network also includes new regional connectors and corridors parallel to SH 71, new roadways connecting Elgin directly with FM 969, SH 71, FM 812, and Caldwell County, and creating a network extending east from FM 20. Many of these specific improvements and new facilities were identified in local plans, including the 2016 Bastrop County Transportation Plan, and further refined through public involvement and Steering Committee feedback as a part of the RACI. These recommendations will benefit residents and travelers in Bastrop County through savings in time and miles traveled, and they will help to provide a safer and more resilient transportation system.

Recommended Arterial Network



CHAPTER 1 PROCESS

Introduction

This Plan is an update to the 2016 Bastrop County Transportation Plan. Since the implementation of the 2016 Bastrop County Transportation Plan, the Capital Area Metropolitan Planning Organization (CAMPO) created a Regional Arterials Concept Inventory (RACI) that analyzed regional roadway scenarios to help the Capital Area plan for future growth with mobility choices that are **safe, convenient, reliable, and efficient**. This Plan includes recommended improvements and new facilities identified in the RACI for Bastrop County.

2016 BASTROP COUNTY TRANSPORTATION PLAN OBJECTIVES

- Promote transportation safety, particularly among vulnerable populations
- Support economic vitality
- Enhance quality of place
- Promote state of good repair
- Consider multi-modal solutions
- Comply with CAMPO 'Platinum Planning' principles

REGIONAL ARTERIALS CONCEPT INVENTORY OBJECTIVES

- Improve safety for all arterial users
- Improve network efficiency and flexibility to reduce travel times and distance
- Plan for growth more effectively
- Design multi-modally to provide more choices to move people and goods
- Protect and preserve the environment
- Foster a system that promotes prosperity and vitality

2016 Bastrop County Transportation Plan and RACI Similarities

The 2016 Bastrop County Transportation Plan and the RACI share several goals that guided the planning efforts, such as improving safety, promoting economic development goals, and supporting a more sustainable environment. The plans also share key elements, namely significant public outreach, including analysis of the existing roadway networks, visions for future improvements through a concept plan or thoroughfare plan, and policy recommendations to achieve their stated goals.

2016 Bastrop County Transportation Plan and RACI Differences

The two plans does differ in scope. Most importantly, the RACI prioritized regional movements when developing roadway concepts. As a county-level plan, the 2016 Transportation Plan had a greater emphasis on mobility within the county and between its major towns and activity centers. Another difference between the two plans is that the RACI was developed without consideration of fiscal constraints while the 2016 Bastrop County Transportation Plan produced a fiscally constrained program of projects. As such, when developing the RACI, CAMPO partnered with Bastrop County staff and elected officials to ensure that any new or improved facilities outside of the 2016 Plan's constraints or focus were considered for inclusion in the RACI concept plan.

2020 Bastrop County Transportation Plan Update

The 2020 Bastrop County Transportation Plan Update is built from the goals and results of the 2016 Bastrop County Transportation Plan and the RACI. Both plans look to create a safe hierarchy of roads that will support Bastrop County's economic future and enhance the quality of life. Although the two plans do differ in that the 2016 Bastrop County Transportation Plan has a greater emphasis on local roads and the RACI prioritized regional mobility, they work together to provide a comprehensive vision for the county's future roadway network. Integrating and building on these complementary characteristics, this Plan serves as a key update to the 2016 planning effort and as a guide to future transportation planning in Bastrop County.



Multi-modal



Growth



Equity
Health



Safety



Mobility



Environment

Plan Process



CAMPO worked closely with the Regional Arterials Steering Committee to guide the RACI process through regular meetings and presentations. Representatives from both Bastrop County and the City of Elgin served on the Regional Arterials Steering Committee. Extensive outreach was conducted with local government officials and the public through a series of meetings. The Plan team then conducted comprehensive analyses which ultimately resulted in recommendations to improve the function of Bastrop County's arterial network.

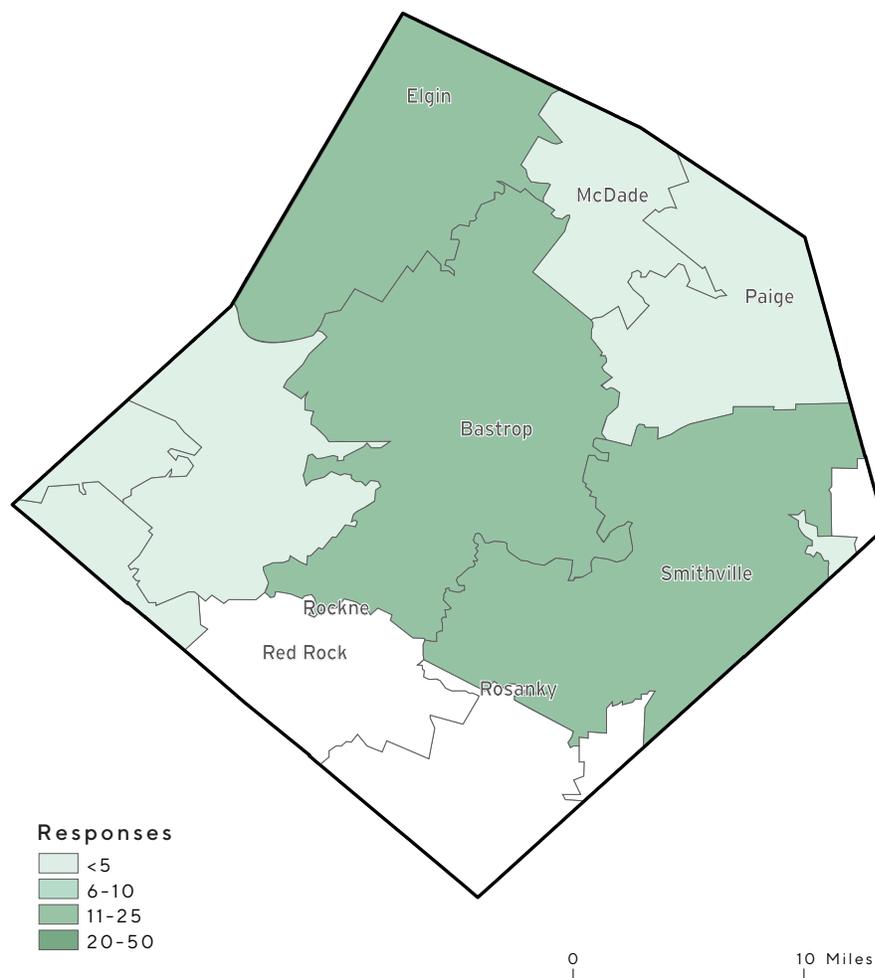


Public Outreach

Public outreach commenced in February 2018 and concluded in June 2019. Early outreach focused on sharing background information on the RACI and gathering input on existing conditions, needs, and priorities. Later outreach focused on gathering public feedback related to the Concept Plan analyses and recommendations. An overarching goal of the community engagement process was to be inclusive and equitable, reaching the general public to include vulnerable populations such as people with low-income, minority groups, those with limited English proficiency, seniors, zero-car households, and people with disabilities. All meeting materials and input opportunities were available on the project webpage, and those that could not attend meetings in person were also offered the opportunity to view meeting materials through an Online Open House, to an online questionnaire, or to provide comments via email.

In total, 70 Bastrop County survey responses were collected that spanned nine of the thirteen county zip codes. When asked about their commute destinations, a portion of respondents stayed within the county while the next most popular destination was the City of Austin. In general, Bastrop County participants and local government representatives agreed with the purpose of the RACI and recognized the critical need to address congestion and bottlenecks in the network, specifically on roadways connecting to Travis County. Additionally, the public noted a desire for improved pedestrian and public transit options, including improved CARTS service and potential rail options.

Public Outreach Responses by Zip Code



Bastrop County Public Outreach Key Themes

- Grade separations to bypass railroad crossings
- Connections to north and east Travis County
- Additional river crossings
- Improvements to existing arterials



CHAPTER 2

EXISTING CONDITIONS

Introduction to Existing Conditions

This chapter provides the “big picture” of how the existing arterial roadway network impacts the way Bastrop County residents live, work, and play, and identifies the county’s needs to improve access to desired job markets, services, and recreational opportunities.

What is an Arterial Road?

This Plan uses Texas Department of Transportation (TxDOT) and Federal Highway Administration (FHWA) definitions of the functional classifications of roadways as a starting point for further discussion. Figure 2.1 illustrates FHWA’s functional classifications. However, the 2016 Bastrop County Transportation Plan functional classification system differs from those of TxDOT and FHWA so the roadways were grouped to be consistent with FHWA’s system.

The U.S. Department of Transportation (USDOT) and Federal Highway Administration (FHWA) support state and local governments in the design, construction, and maintenance of the nation’s highway system. TxDOT defines Off-System roadways as any roadway not designated on the State Highway System and not maintained by TxDOT. Conversely, On-System roadways are designated on the State Highway System and maintained by TxDOT. Maintenance of off-system roadways is the responsibility of the local jurisdiction in which the road is located. CAMPO may partner to fund improvements to many of the on-system arterials and high functioning off-system roads with local governments. On-system and off-system roads can be further classified by functional classifications, as noted in the paragraph above, which groups roadways into classes based on traffic characteristics and the types of service they provide.

FHWA Classification Table	
Interstate	Interstates are the highest level of roadway and designed for long-distance travel offering limited access.
Freeway	These roads have directional travel lanes and are separated by some type of physical barriers. Access is purely controlled by interchanges and on- and off-ramps to maximize their mobility function.
Tollroad	Roadways (either public or private) where passengers pay a usage fee to use the roadway.
Expressway	Roadways with directional travel lanes that are typically separated with controlled access to maximize mobility.
Principal Arterials	Roads serve major centers and provide a high level of mobility, but abutting land uses can be served directly.
Minor Arterials	Provide service for trips of moderate length and offer connectivity to the higher arterial system.
Collector	Gather traffic from local roads and funnel users to the arterial network.
Local	Classified by default of all used roads other than arterials and collectors. Designed to minimize through traffic and are often used at the very beginning or end of a trip.

Figure 2.1

For the purposes of this Plan, CAMPO defined an arterial as a road that connects to limited access roadways (freeways), local streets, and destinations. Arterials are smaller than a major access-controlled roadway, such as IH-35, but larger than a local neighborhood street. Similar to the rest of the Capital Area, Bastrop County arterials are used frequently to commute between home, work, and school. TxDOT and FHWA definitions of functional classifications were used as a baseline for evaluating and redefining these classifications using our regional context.

Grouping-up process - Deferred to TxDOT Classification Table

2016 Bastrop County Transportation Plan	TxDOT	CAMPO Regional Functional Classification
-	Toll	Limited Access (Non-tolled/tolled)
Interstate Freeway Expressway	Interstate Freeway Expressway	
Principal Arterial	Principal Arterial	Principal Arterial Major Arterial Regional Connector
Minor Arterial	Minor Arterial	Minor Arterial
Collector	Major collector Minor Collector	Collector
Local	Local	Local

Figure 2.2



Bastrop County Existing Arterial Network

The Bastrop County Existing Arterial Network Map highlights arterials using CAMPO's Regional Functional Classification Type, which includes existing limited access, principal, and minor arterials. Principal Arterials that connect Bastrop County with surrounding counties are US 290, SH 71 (portions are Limited Access), and SH 21. Minor Arterials in the county include SH 95, FM 20, and FM 812.

Existing Arterial Network

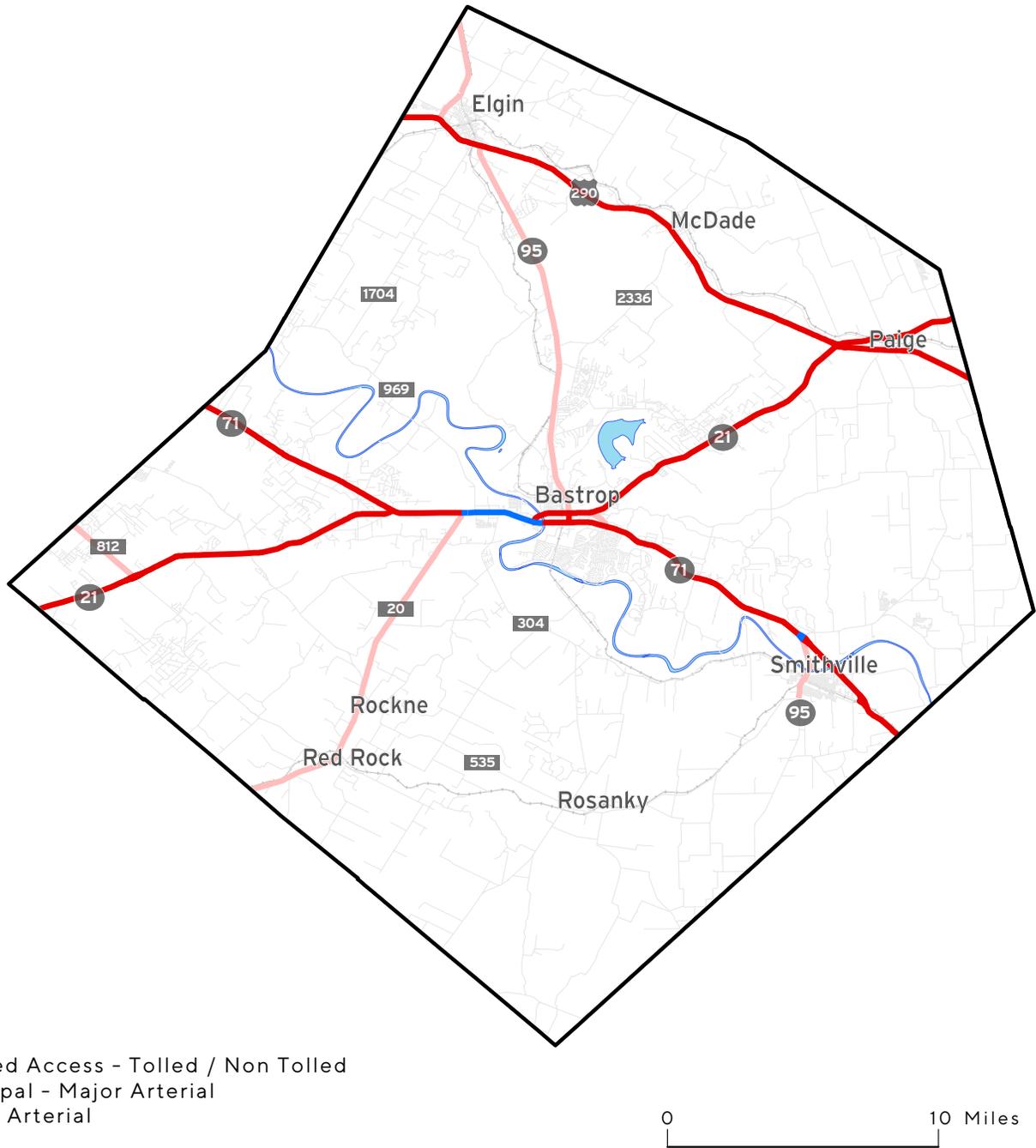


Figure 2.3

Existing Network Performance

Bastrop County residents work and play in different communities across the Capital Area and depend heavily on the arterial network during their commutes. The performance of the existing network is related to the interaction between the supply of roadways and demand from people. Demand can be described as the number of roadway users, their origins and destinations, and how they traverse the roadway (car, bike, transit, etc.). Supply can be described as the amount of roadways and the type of roadway, i.e. miles of bike lanes, lane miles of roadways for automobiles, and transit. Performance is a measure of the relationship between supply and demand. Roadway performance can suffer when demand is greater than supply. Poor performance is often the result when the supply is not appropriate for the demand, there is a lack of additional choices in the wider network, or the function of the road conflicts with how it has been designed to balance access and mobility concerns.

Travel times of people are impacted by both supply and access to facilities whether it be roadways, bicycle lanes, or pedestrian facilities. Figure 2.4 summarizes how the supply of different facilities impacts overall mobility in the region. A considerable share of centerline miles in Bastrop County are classified as **Local Roads (42%)**.

Percent of Centerline Miles by CAMPO Regional Classification Type ¹							
Facility Type	Bastrop	Burnet	Caldwell	Hays	Travis	Williamson	CAMPO Region
Limited Access	3%	0%	1%	6%	10%	4%	6%
Tolled-Limited Access	0%	0%	8%	0%	7%	5%	5%
Principal Arterial	21%	12%	17%	17%	29%	25%	23%
Minor Arterial	20%	8%	26%	25%	17%	29%	21%
Collector	14%	30%	11%	14%	2%	2%	8%
Local	42%	50%	37%	38%	35%	35%	37%
Total Network Miles	497	386	433	649	1,979	1,502	5,446

Figure 2.4

Vehicle miles traveled (VMT) represents the demand on the regional roadway network. Today, over **2 million** vehicle miles are traveled each day in Bastrop County (approximately **4%** of the entire Capital Area). Over half the regional demand occurs in Travis County.

Vehicle Miles Traveled by County ¹		
County	VMT	% VMT
Bastrop	2,301,000	4%
Burnet	2,258,000	4%
Caldwell	1,676,000	3%
Hays	7,251,000	12%
Travis	30,273,000	53%
Williamson	13,733,000	24%
Total	57,492,000	100%

Figure 2.5

¹ 2020 baseline represents the current transportation network performance

2020 Bastrop County Transportation Plan

Vehicle Hours Traveled by County ¹		
County	VHT	% VHT
Bastrop	45,000	3%
Burnet	51,000	4%
Caldwell	32,000	2%
Hays	161,000	12%
Travis	796,000	58%
Williamson	296,000	21%
Total	1,381,000	100%

Figure 2.6

Vehicle hours traveled (VHT) represents the time spent on the network each day. Drivers in Bastrop County spend almost **45,000 hours** a day traveling within the county (approximately **3%** of vehicle hours traveled within the entire region). Over half the time spent traveling is on the regional arterial network.

VMT and VHT by Functional Class In Bastrop County ¹		
Functional Class	VMT	VHT
Limited Access	193,000	3,000
Principal Arterial	1,520,000	29,000
Minor Arterial	431,000	9,000
Collector	76,000	2,000
Local	12,000	300
Toll Facilities	-	-
Other	70,000	1,000
Total	2,302,000	44,300

Figure 2.7

More than **65%** of the VMT in Bastrop County occurs on regional arterials, while more than **85%** of VHT is on the county-wide arterial network.



¹ 2020 baseline represents the current transportation network performance

Network Connectivity

The structure of the roadway network plays a significant role in determining the effectiveness of travel and impacts the form and function of communities. Ideally, and in congruence with the goals and vision of the RACI, arterials contribute to a well-connected, efficient network that provides safe, direct, redundant, and convenient access for multiple modes of transportation (including motorized and non-motorized modes). Arterials can and should provide a wide range of travel opportunities with varying speeds, using a broad set of cross-sections, for different travel purposes and various context zones (urban, suburban, rural). Today the region’s arterials are under-performing and lack the necessary connectivity and redundancy for efficient transportation. Due to a variety of constraints, additional demand is put on the limited access roadways. As the arterial network is improved, volume can be shifted to take the load off the limited access corridors.

This Plan evaluates the existing arterial network and assesses existing policies to achieve the goals mentioned above. Building upon a solid understanding of current conditions, the Concept Plan acts as a guide for future network development and provides tools to reach the vision for the arterial network.

Connectivity is key as no single roadway can provide utility without connecting to other roadways. Today, limited-access roadways do not have sufficient arterial support as they carry the brunt of the volume and demand in the Capital Area. A better-connected road network can reduce VMT and VHT by providing more direct routes between origins and destinations, while a lack of connectivity often causes circuitous and indirect trips.

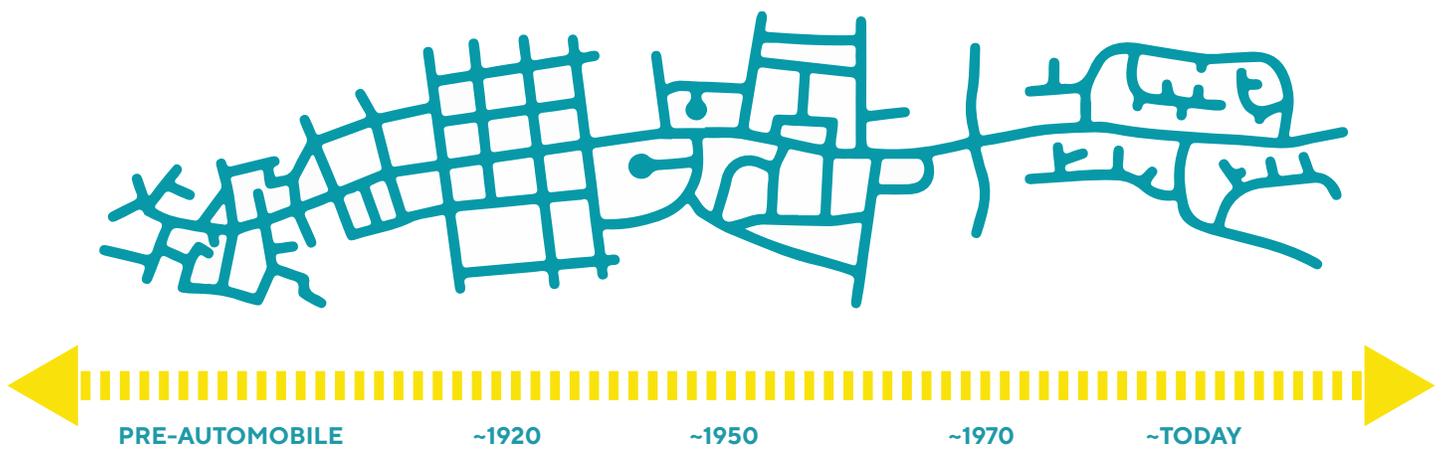


Figure 2.8

Network Redundancy

Redundancy is a key feature of a connected network because it provides alternative routing to destinations that may be due to construction, extreme congestion, or roadway incidents. It is extremely important to emergency response services, but it is often overlooked when roadway planning and design simply focuses on corridor improvements. There are very few communities in the Capital Area that specifically reference network redundancy or include alternative routing, except when requiring a minimum of two access points to new subdivisions. This is a holdover of traditional subdivision planning that has occurred in the past 50 years. Figure 2.8 illustrates the general evolution of roadway network design found in the United States.

Block Dimensions

Block dimensions (block length, face, or size), intersection density, street density, connected node ratios, the connectivity index (CI), grid pattern, and pedestrian route directness provide different ways to measure connectivity and redundancy in a network.^{2,3} Further definition and methodology for evaluating these variables are provided in greater detail in the RACI.

Intersection Density

The Bastrop County Intersection Density Map, Figure 2.9, illustrates where intersection density is greatest. Generally, intersection density is greatest within urban areas and in the core of the region. Within Bastrop County specifically, the analysis identifies Smithville as the city with the highest intersection density in the county. Block lengths for east-west corridors within Smithville's central business district are less than 350 feet long with a distribution of approximately 16 intersections per mile (not including alley access).

Factors Limiting Connectivity

Various factors can limit the connectivity of a transportation network, including: geographic barriers (e.g. water features like the Colorado River and Lake Bastrop), man-made barriers (e.g. airports, roadway viaducts, and other existing infrastructure), ROW constraints in developed or protected areas, and safety hazards (turns or slopes that limit a motorist's line of sight). Finding creative ways to provide greater connectivity and redundancy will be key to meeting growing demand. Enhancing existing roadways and providing new strategically placed river crossings, such as SH 230 in Smithville, helps connect major roadways and distribute trips throughout the network.



² Victoria Transportation Institute Online Encyclopedia. Roadway Connectivity, 2010. Accessed at <https://bit.ly/23p81Si>

³ Metro (2004), Street Connectivity: An Evaluation of Case Studies in the Portland Region.

Intersection Density

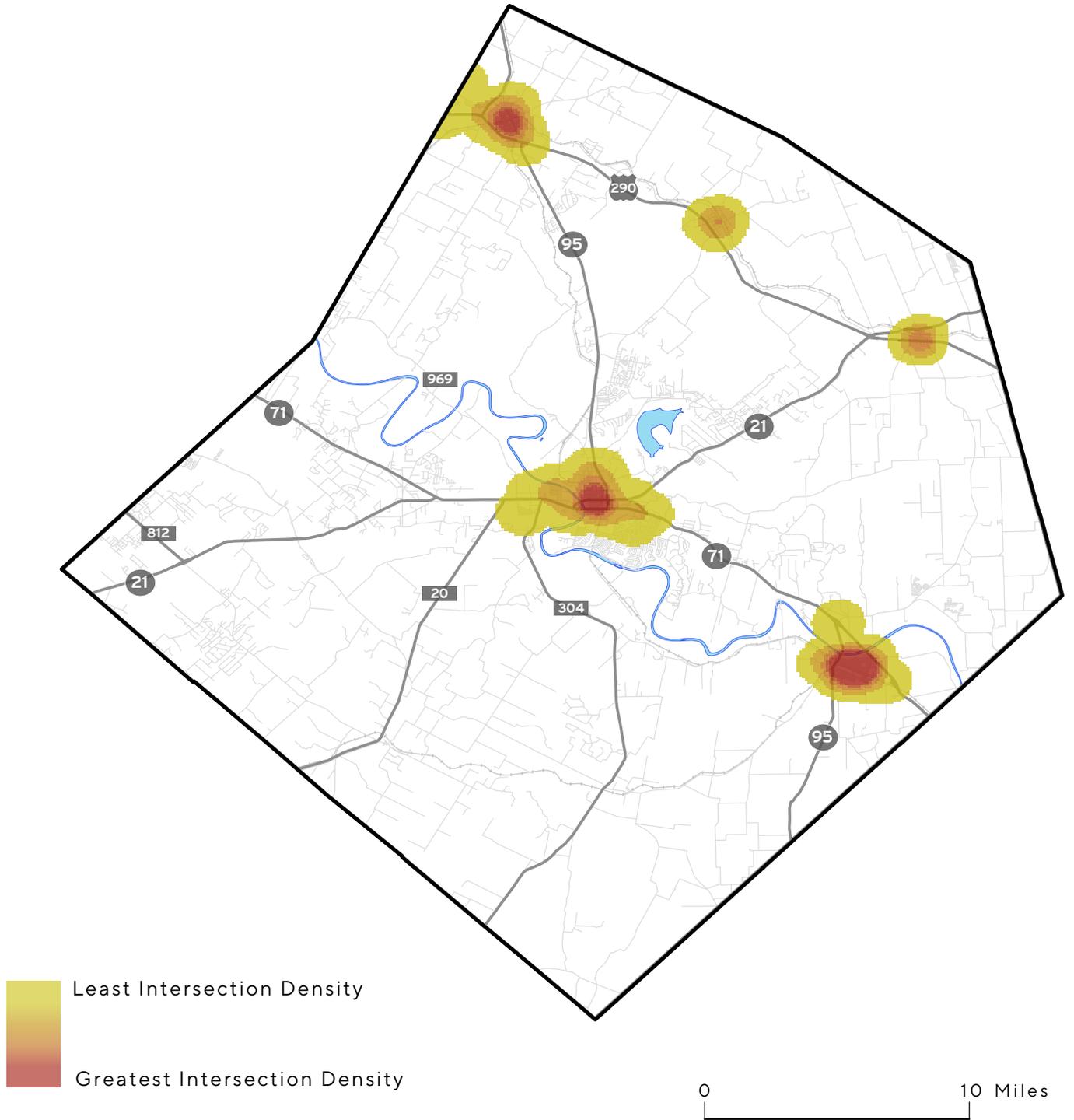


Figure 2.9

Traffic Generators

Traffic generators, like employment centers and commercial districts, dictate why and where people travel. In Bastrop County, traffic generators are most prominent near the Cities of Bastrop, Smithville, and Elgin. When prioritizing roadway improvements, it is important to consider where traffic generators are and where they will be in the future to appropriately serve the county's growth.

Safety Analysis

The Crash Rates and Dangerous Corridors Map, Figure 2.10, identifies roadway segments that experienced more than two times the statewide average crash rate for the same period (years 2014 - 2016) as defined by TxDOT's statewide crash statistics reports.⁴ In addition to the crash rate analysis, CAMPO worked with municipalities and residents as part of the outreach process for the CAMPO Regional Active Transportation Plan to identify corridors that are perceived to be dangerous, particularly for pedestrians and cyclists. Better managing access to driveways, as well as collector and local roads, along arterials is a key factor to improve safety since many rural areas see faster-moving traffic and blind curves. In Bastrop County, high crash rates were found on the most widely used arterials: SH 21, FM 812 (near Circuit of the Americas), and SH 95, which is of particular concern due to these being primary transportation routes within the county. FM 969 and FM 2336 have crash rates that exceed the median rate since they serve as alternative routes to state and US highways while only being undivided two-lane arterials. The intersections of SH 95 and SH 21 in Bastrop and US 290 and SH 95 are seen as particularly dangerous, which was identified in stakeholder outreach for the RACI. Focusing on improvements for these roadways can provide substantial gains in safety.



⁴ Texas Motor Vehicle Crash Statistics. TxDOT, 2016. Accessed at <https://bit.ly/2YZ6CCj>

Crash Rate and Dangerous Corridors

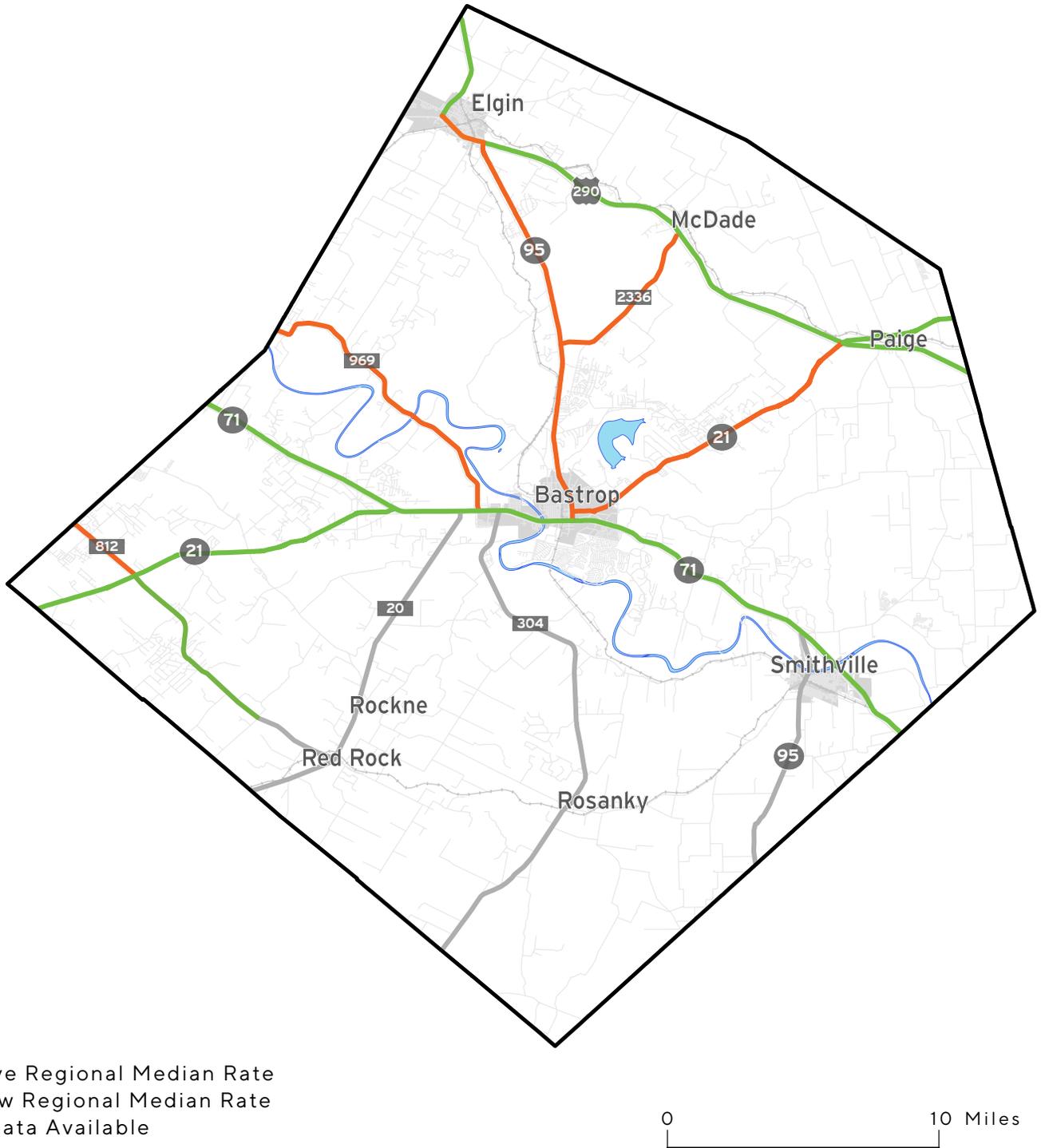


Figure 2.10

Emergency Response

Travel time and network performance is vital to the safety and well-being of residents as it is a performance indicator for emergency response times. The “Bastrop County Average Emergency Response Time Service Goal” for Emergency Medical Services (EMS) is set at 11 minutes without traffic delays. As indicated in Figure 2.12, there are several areas in the outer region of Bastrop County where response times are greater than the identified goal. These areas have inadequate response times due to poor road connectivity, barriers like the Colorado River, and traffic congestion, especially on arterials.

Enhanced network connectivity can improve travel times and reduce the size of the emergency response challenge zones. As shown in the Crash Rate Map, rural communities along SH 21 and SH 95 have some of the highest crash rates in Bastrop County and have an emergency response time greater than 11 minutes. These areas of Bastrop County could improve emergency response times by enhancing the efficiency of SH 21 and SH 95.

In addition to crashes, CAMPO has analyzed emergency evacuation and response in its planning process. The CAMPO region and Bastrop County, in particular, have witnessed many flood and wildfire events that require quick evacuation by residents. Bastrop County has received six Presidential Disaster Declarations over the past nine years. The 2011 Bastrop County Complex Fire, the most destructive wildfire in Texas history, and the impact of Hurricane Harvey in 2017 are two notable examples of disaster impacts in the county.

Congested arterials add travel time for all users, including emergency responders. Local first responders, as well as federal and state resources, such as Camp Swift must be able to reach communities when deployed during emergency events. Many of the region’s most vulnerable populations live in the outlying areas of the Capital Area and travel greater distances for health care and emergencies. New and improved connections can decrease travel times and reduce the size of the emergency response challenge zones. However, new arterials and increased capacity may not always be the most effective way to serve these areas. Additional emergency response infrastructure could also help close the gaps.

Local codes and ordinances can also improve emergency response times by establishing a framework to mitigate, prepare, respond, and recover from any emergency. Figure 2.11 outlines the share of communities that have identified emergency management policies in the Capital Area. Within Bastrop County, the cities of Bastrop, Elgin, and Smithville have emergency management plans in place in addition to the county’s plan.

Redundancy/Emergency Management Policy Summary		
	Policy	Number of Communities’ Codes/Ordinances with Related Policy
1	Requires More Than One Subdivision Access Point	13 of 24
2	Has Evacuation Route Policy	5 of 24

Figure 2.11

Emergency Response

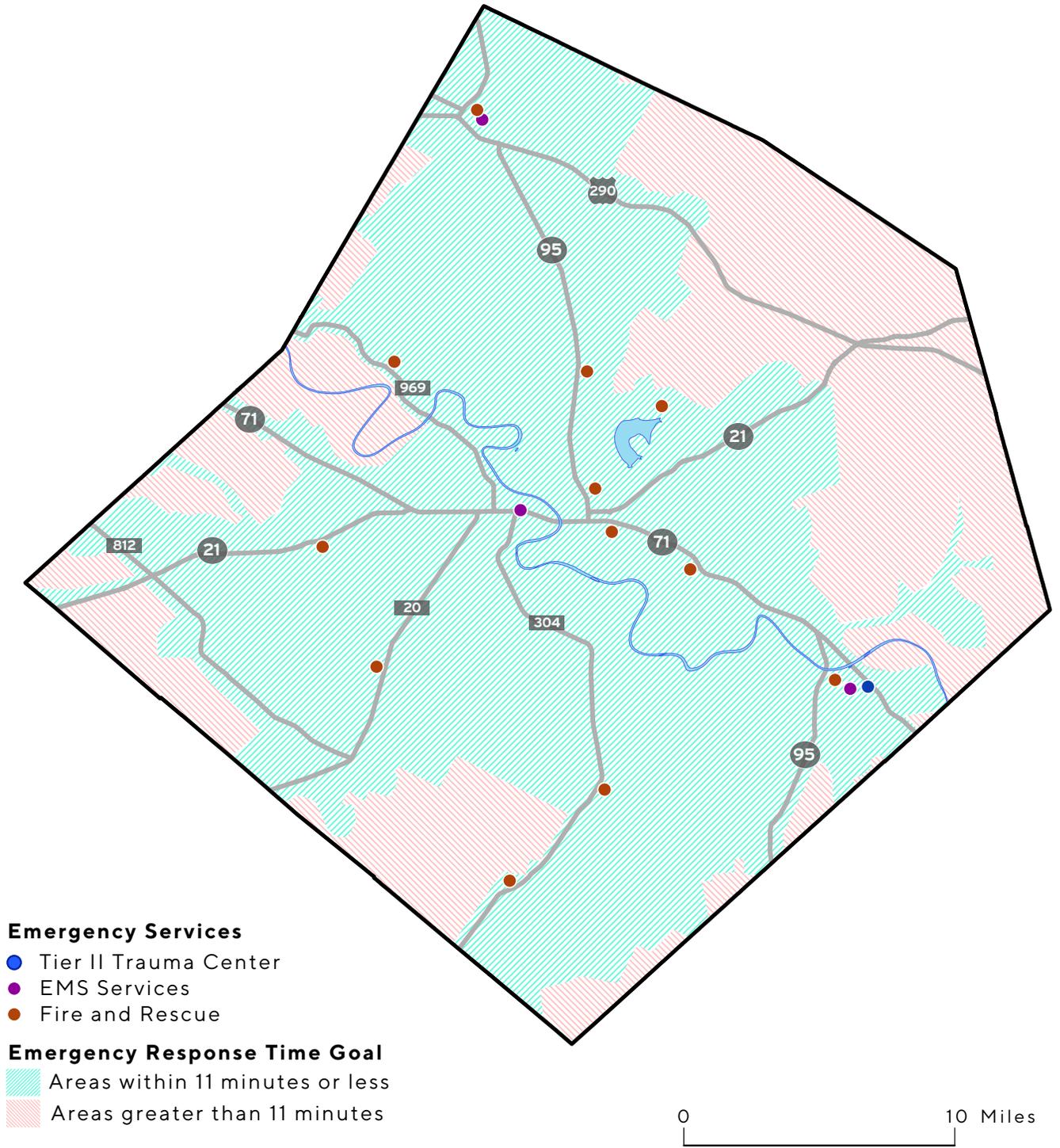


Figure 2.12

Vulnerability

Consideration of vulnerable populations is another significant aspect of CAMPO's planning process. A portion of the Capital Area's population is considered vulnerable, which includes the traditional characteristics from Title VI/ Environmental Justice definitions established by the Federal Highway Administration (FHWA). Title VI of the Civil Rights Act and Executive Order 12898 (Environmental Justice) are laws that forbid discrimination based on race, color, national origin, and minority/low-income status. CAMPO's definition of vulnerable populations expands on these characteristics to include school-aged children, seniors, and persons with disabilities. People considered vulnerable may require special consideration with regard to transportation. Whether it is transportation to and from medical appointments, shopping, work, or emergency evacuations, many of these people rely on public transportation systems, which are less accessible in rural areas. Many may also use transportation provided by non-profit organizations, senior services, or city agencies. Seniors with disabilities who have low incomes represent a particularly vulnerable group.

Those who may require transportation assistance include:

- Individuals who cannot independently get to a transit stop,
- Individuals who live independently and require transportation from their location,
- Individuals who live in a group setting (e.g., group home, assisted living center) that require transportation directly from their location,
- Individuals in acute care/in-patient facilities,
- Individuals with disabilities, and
- Individuals with limited English proficiency.

Bastrop County has a moderate number of vulnerable populations as compared to the wider Capital Area region. Vulnerable populations, displayed in Figure 2.13, tend to be clustered in rural southwestern and central Bastrop County, as well as in the more developed areas. A well-connected, multi-modal network that facilitates various activities can make a significant difference in the quality of life for vulnerable populations.

Vulnerability

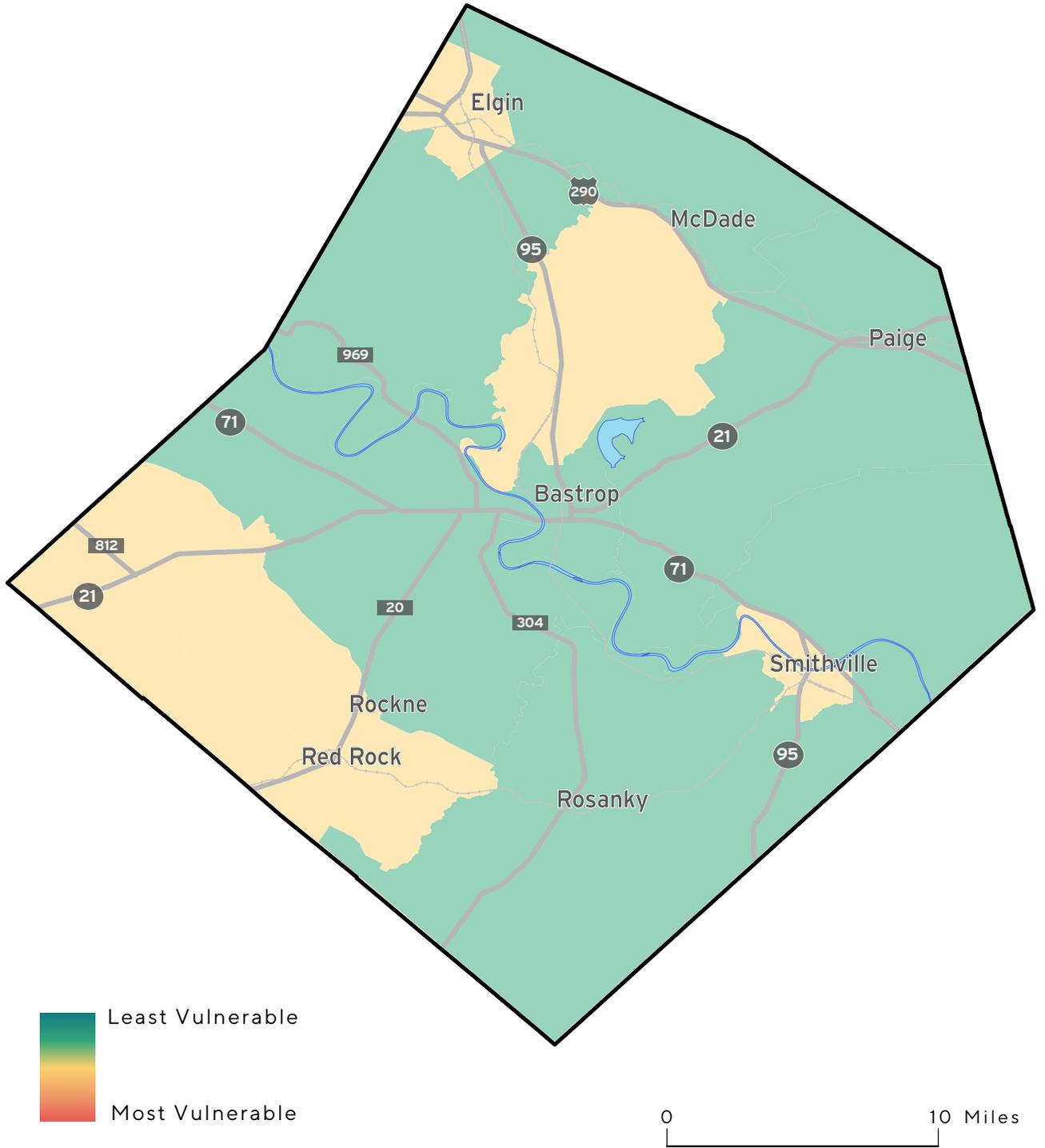


Figure 2.13

Environmental Considerations

Protecting and preserving the environment is one of the six identified goals of the RACI and this 2020 Plan. Careful and thoughtful consideration of Bastrop County’s environmental resources and amenities during the planning process can ensure their sustainability. If new or improved roadways have the potential to impact environmentally sensitive areas such as floodplains, karst features, and preserved lands, an additional consideration for applying relevant context sensitive solutions will be necessary. The following maps shows environmentally sensitive areas in Bastrop County.

Transportation plans often consider how to minimize impacts to preserved lands, as well as protected species such as the Houston Toad in Bastrop County. Figure 2.14 presents the location of preserved areas, cemeteries, and critical habitats in Bastrop County. An understanding of where these protected lands are located and how to best minimize the impacts to protected species in Bastrop County can help to promote sustainability and network efficiency.

Soil plasticity, shown in Figure 2.15, is particularly important relating to infrastructure as it contributes to the overall life-cycle cost. Soils, particularly clay soils, contract and expand causing damage to infrastructure, such as roadbeds. Any extreme may add to life-cycle costs or require additional engineering techniques. Most of Bastrop County contains medium and low plasticity soils. Low plasticity, hard soils are located along the Colorado River and where the sub-crop and outcrop of the Carrizo - Wilcox aquifer meet.

Context Sensitive Design

Context Sensitive Design (CSD) incorporates stakeholder input and local environmental characteristics into the design and development of roadway or transit corridors. Given the aforementioned environmental considerations, CAMPO uses CSD tools to help achieve its goal of fostering a system that promotes prosperity and vitality for all communities across the region. CSD goes beyond a traditional “one size fits all” roadway design approach, and instead tailors solutions to meet the needs and desires of affected stakeholders and fit the specific environments in which they are being constructed. CAMPO recognizes that each community is unique and CSD helps align roadway design with evolving road and community characteristics.



Preserved Lands

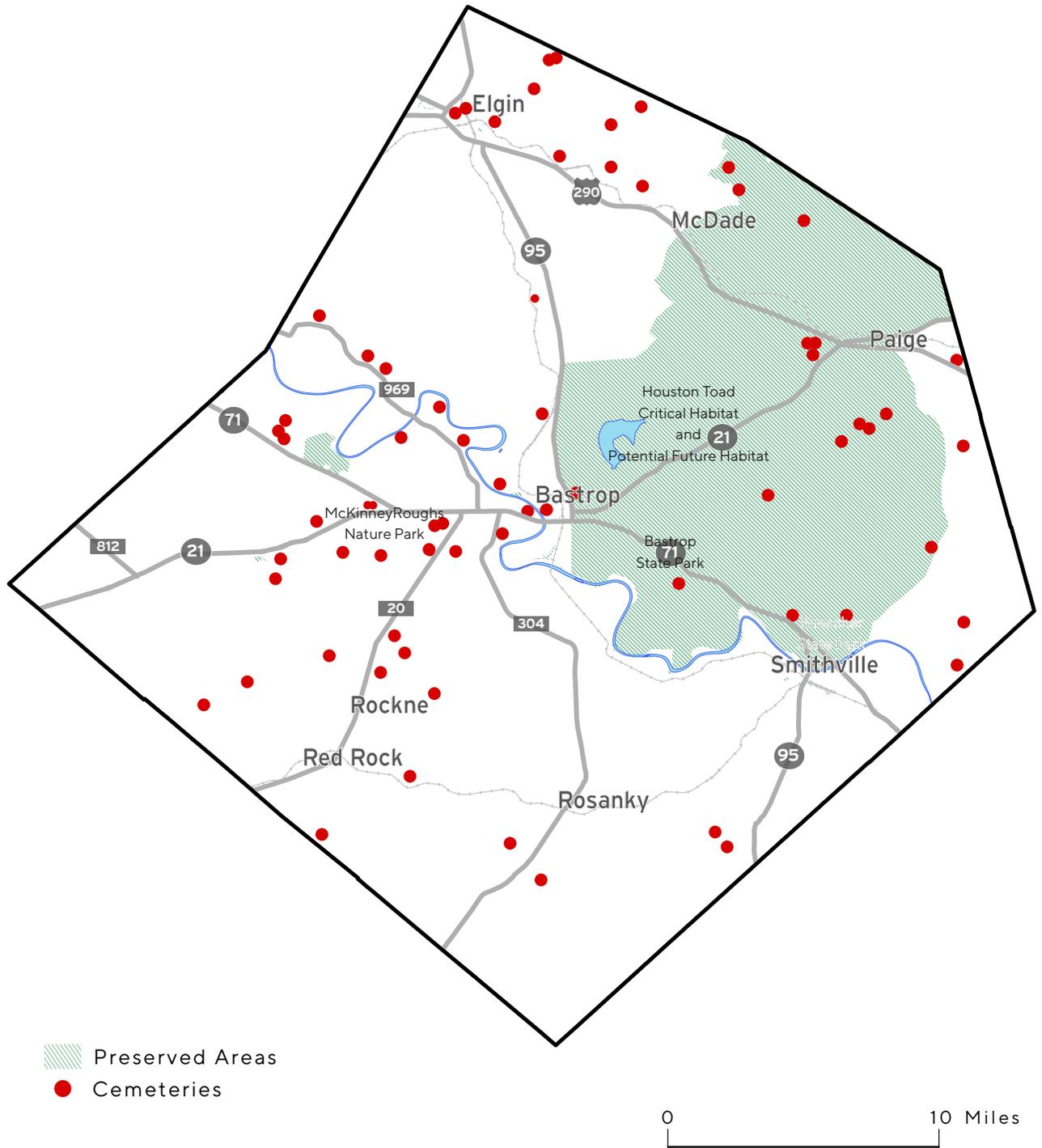


Figure 2.14

Soil Plasticity

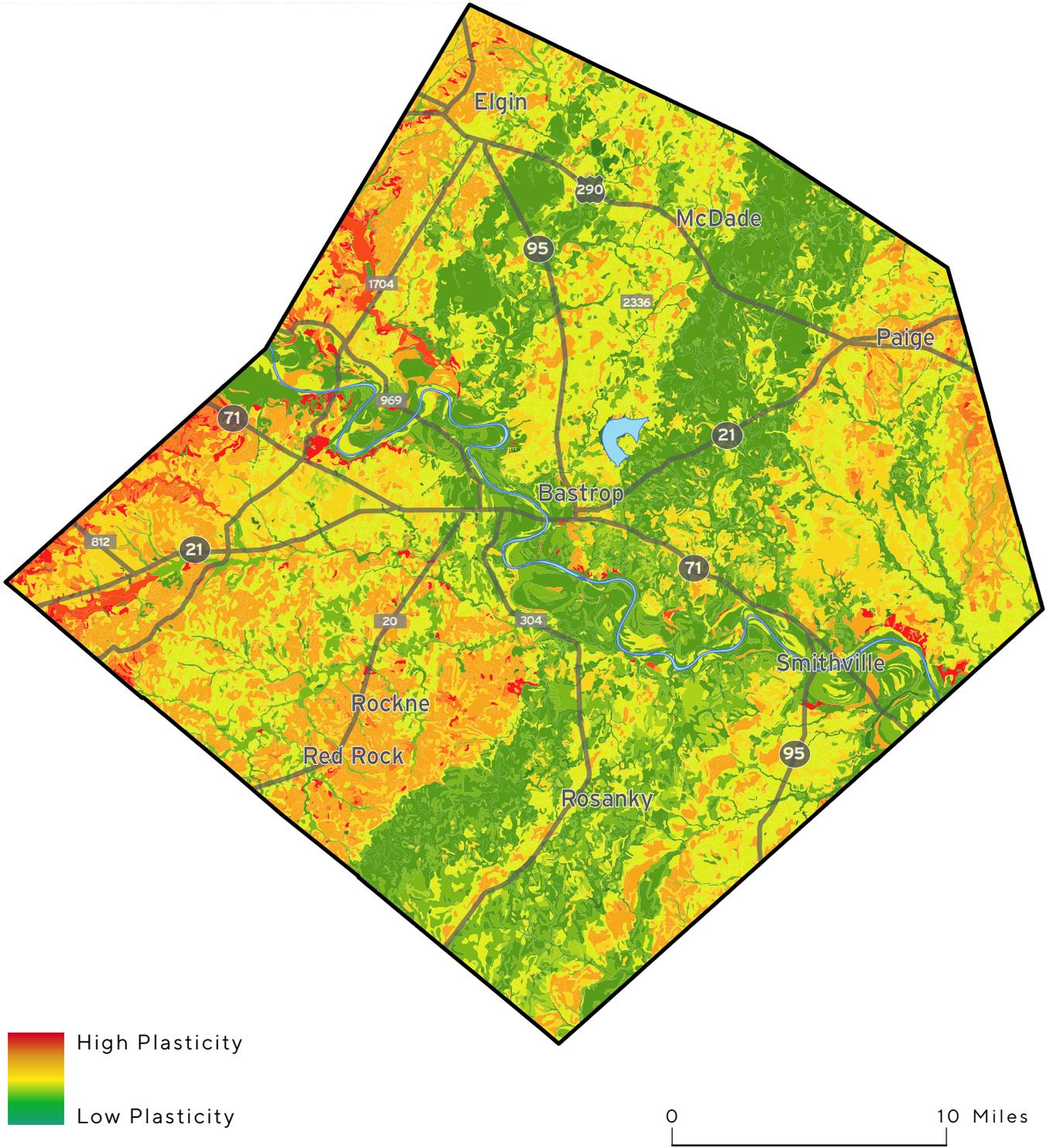


Figure 2.15

Bastrop County Growth

As Bastrop County continues to grow, updated development codes and subdivision regulations can accommodate growth in an efficient and economically productive way. A strong and connected arterial network facilitates local economic development, including freight transportation, in each of the county's developed areas. The Building Bastrop Block (B3) Code, adopted by the City of Bastrop in 2019, is an example of a local development regulation that is helping to orient development to the transportation system using a scalable farm-block approach. This type of approach preserves the city's historic pattern of development while enabling a future roadway system that supports a growing community. Subdivision regulations like these allow for well-connected and scalable road networks to encourage context-sensitive growth, enabling the network to function as designed and improving overall transportation efficiency and safety for all users.

Freight

The Texas Freight Mobility Plan analyzed potential demand for freight in 2045 and showed that overall state-wide tonnage is expected to nearly double between 2016 and 2045. Several roadways in the Capital Area are shown to experience a Level of Service (LOS) F, a standard measurement for peak-period roadway performance, in existing conditions (2016) as well as 2045. This often means that demand is exceeding the ability of the road to serve users without stop-and-go traffic. SH 21, SH 71, and SH 95 within Bastrop County are listed as part of the Texas Highway Freight Network.

SH 21 Case Study

SH 21 was examined as a test case corridor in the RACI because it is one of the most significant routes connecting multiple jurisdictions within Bastrop, Caldwell, and Hays Counties to the regional network. This Principal Arterial is planned to be upgraded to a Regional Connector classification, which demands increased capacity, as well as improved safety, access management, and operational improvements. Forecasted growth along the corridor, a history of increasing traffic volumes, and barriers such as the Colorado River and steep topography assert the need for enhancements. These enhancements will be required to upgrade SH 21 to a functional Regional Connector.

Currently, only 22% of the 53.9-mile corridor is divided by a turn lane or median and a portion of the road appears in Figure 2.10 as having an above-average crash rate. Undivided portions of the corridor and driveways present a greater number of conflict points, increasing safety hazards, especially where line-of-sight is constrained by the terrain. The intersections at SH 71 and RM 150 experienced the highest number of crashes, accounting for approximately 10% of all crashes along the corridor in 2016. Improved guard rail designs, turn-lanes, and grade-separations would improve these safety hazards.

There are more than two driveways per mile and two intersections per mile. Reducing access points with grade separations and other intersection enhancements would improve operations at key locations. Operational needs will vary where transit is made available. By the year 2040, the entire length of the corridor is proposed to be divided with 4-6 lanes. The RACI also proposed three-level diamond interchanges at SH 71 and FM 812 in Bastrop County, as well as SH 130/ US 183, SH 80, SH 123, RM 150, and RM 12 in surrounding counties. The SH 21 case study is found in Section 4 of the RACI and provides additional context on how these improvements could be applied in Bastrop County.

CHAPTER 3 CONCEPT PLAN

Scenario Planning

The Bastrop County Concept Plan is a product of the RACI scenario planning methods which used the CAMPO 2040 Regional Travel Demand Model. The scenario planning networks were developed in coordination with the RACI Steering Committee to show how varying improvements to the arterial network would benefit regional connectivity. These networks and the eventual results of the scenario planning exercise were presented to stakeholders throughout the Capital Area. For any given year, the model quantifies the vehicular demand for roadways and provides resulting travel times based on that demand. Specific details related to the development of the Capital Area Concept Plan can be found in Chapter 4 of the RACI.

Model networks were analyzed in the RACI to evaluate varying suites of transportation improvement packages for Bastrop County. The first network, Future No-Build, represents the region's current roadways with the projected 2040 population. This "Future No-Build" network provides a look into the future performance of roadways if no improvements are made to the network despite population growth over the next 20 years. Network A, as it was identified in the RACI, is a network where only the region's most significant arterials are improved, and new major arterials are added to eliminate gaps within the regional connections. Network B was developed to qualitatively illustrate how facilities could increase person throughput by utilizing lane management techniques like high-occupancy vehicle (HOV) lanes. The Combined Concept Network, Network C, builds upon the arterial network developed in Network A with more emphasis placed on increasing the number and connectivity of minor arterials throughout the region. Network D, also known as the Regional and Supporting Connections Network, added supporting minor arterial improvements that provide the greatest contribution to the top tier roadways in Bastrop County. The overall results of the RACI model network analysis illustrate how network performance will worsen as Bastrop County grows if no network changes are made. However, the results show that strategic investments can have a substantial positive impact on the regional network. The network results can be found in Chapter 4 of the RACI.

The results of this scenario planning exercise specific to Bastrop County can be found in Figure 3.1, including the Regional and Supporting Connections Network, which forms this plan's Recommended Arterial Network for Bastrop County.

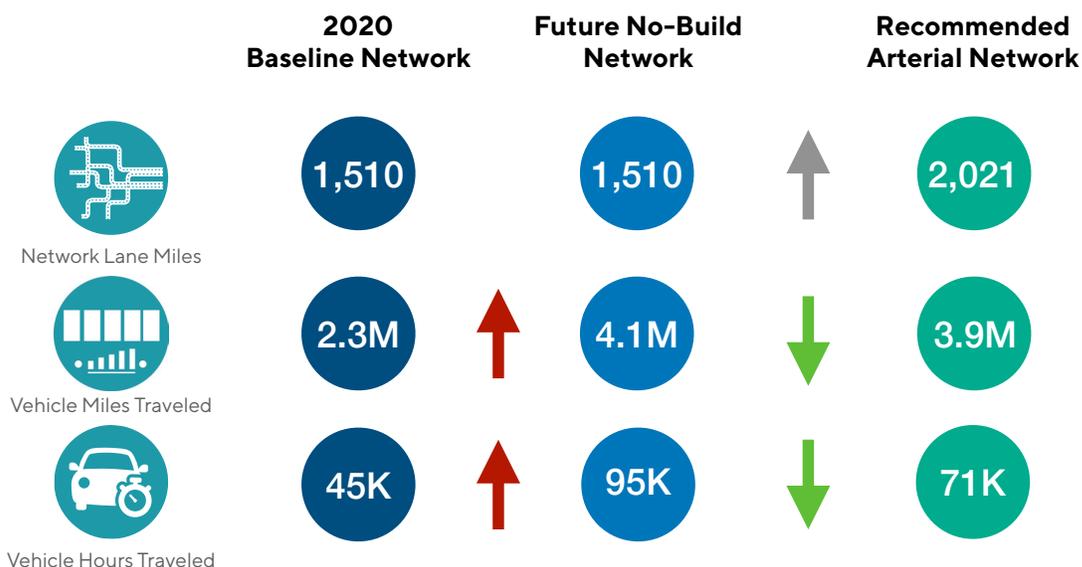


Figure 3.1

Performance Measures



Coding improvements include digitizing the existing, planned, and desired roadway connections into the regional model network and assigning attributes such as number of lanes and functional class based on the proposed improvement. The Travel Demand Model provides performance metrics which are used to evaluate and compare scenarios. The performance metrics are described below:

Centerline Mileage – the sum of the length of each roadway in the region. Increasing centerline mileage is equivalent to adding new roadways to the region’s current network.

Network Lane Mileage – the sum of the length of each roadway multiplied by the number of lanes within each segment of roadway. Increasing lane mileage is equivalent to adding new roadways and/or widening existing roadways. Adding lane mileage increases roadway capacity.

Vehicle to Capacity Ratio (V/C) – represents how “full” a roadway is. By dividing demand (VMT) by the capacity (lane miles) the result is the V/C ratio. A V/C under .85 means the roadway is operating at or near free-flow conditions. A V/C ratio of .85 to 1 means that a roadway segment is operating near or at full capacity. A V/C ratio above 1 means the roadway segment is operating over capacity.

Vehicle Miles of Travel (VMT) – represents vehicular demand. VMT is calculated by multiplying the number of vehicles on a roadway segment by the length of that segment. VMT can be calculated for individual roadways or for the entire regional roadway network.

Vehicle Hours of Travel (VHT) – the amount of time vehicles are on the roadways. VHT is calculated by multiplying the number of vehicles on a roadway by the travel time of the roadway. VHT typically decreases when improvements are made. When VHT is decreased, network speed is increased.

AM and PM Peak – time period during the morning (6:00am - 9:00am) and afternoon (3:30pm - 6:30pm) commute to and from work. The AM and PM peak are periods of the day where traffic demand is at its highest point.

V/C ratio Ranges	
V/C Ratio	Description
0.0 - 0.85	Roadway operating at 85% of its capacity or less; free-flow traffic to slow traffic
0.85 - 1.0	Roadway operating between 85% and 100% of its capacity; stop and go
1.0 - 1.5	Roadway operating between 100% and 150% over capacity; congested
1.5 +	Roadway operating at over 150% of its capacity; “parking-lot” traffic

Figure 3.2

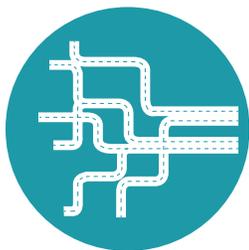
2020 Bastrop County Transportation Plan

2020 Baseline Network

The Baseline Network includes the current system of roadways and planned improvements contained in the Transportation Improvement Program (TIP). TIP projects are funded for construction and will be completed in the next 3-5 years.

Bastrop County contains approximately 9% of the total lane miles in the Baseline Network within the Capital Area and serves approximately 4% of the total demand, accounting for 3% of the total VHT within the region. The Baseline model results for Bastrop County are shown below.

2020 Baseline Network performance measures



Network Lane Mileage 1,510



VMT 2,301,000

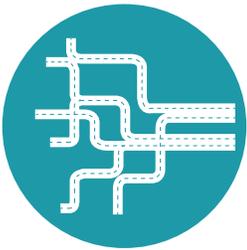


VHT 45,000

Future No-Build Network

The Future No-Build Network differs from the Baseline Network in that the population and employment is based on the 2040 adopted demographic forecast. That forecast presented a doubling of the region’s current population and no roadway improvements beyond those contained in the Baseline Network. This type of scenario is often referred to as a “Do-nothing” network and is used to compare the impacts of improvements made in other networks. The key takeaway from this analysis is that as lane miles remain constant, roadway demand is expected to increase by 76% by 2045. The Future No-Build model results for Bastrop County are shown below.

Future No-Build Network performance measures



Network Lane Mileage 1,510



VMT 4,059,000



VHT 95,000

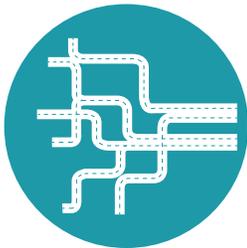
Recommended Arterial Network

The Recommended Arterial Network identifies improvements that provide the greatest contribution to the highest functioning roadways in Bastrop County. As anticipated, SH 71 and US 290, which serve as connectors between Bastrop County and the City of Austin, are two of the highest congested corridors in Bastrop County. This aligns with findings in the 2016 Bastrop County Transportation Plan, as SH 71 through the City of Bastrop and to the west was seen to have a Level of Service (LOS) of F and was identified as a deficiently operating corridor.

Analysis from the RACI indicates that Bastrop County would benefit from new regional corridors and connectors adjacent to SH 71, a new roadway connecting Elgin directly with FM 812 in the southern part of the county, and the development of a network extending east from FM 20. Figure 3.4 details the improvements that form the Recommended Arterial Network.

The Recommended Arterial Network model results are shown below. Compared to the Future No-Build Scenario, the improvements from this network results in a reduction of approximately 124,000 VMT and roughly 24,000 VHT.

Recommended Arterial Network performance measures



Network Lane Mileage 2,021



VMT 3,900,000



VHT 71,000

Recommended Arterial Network

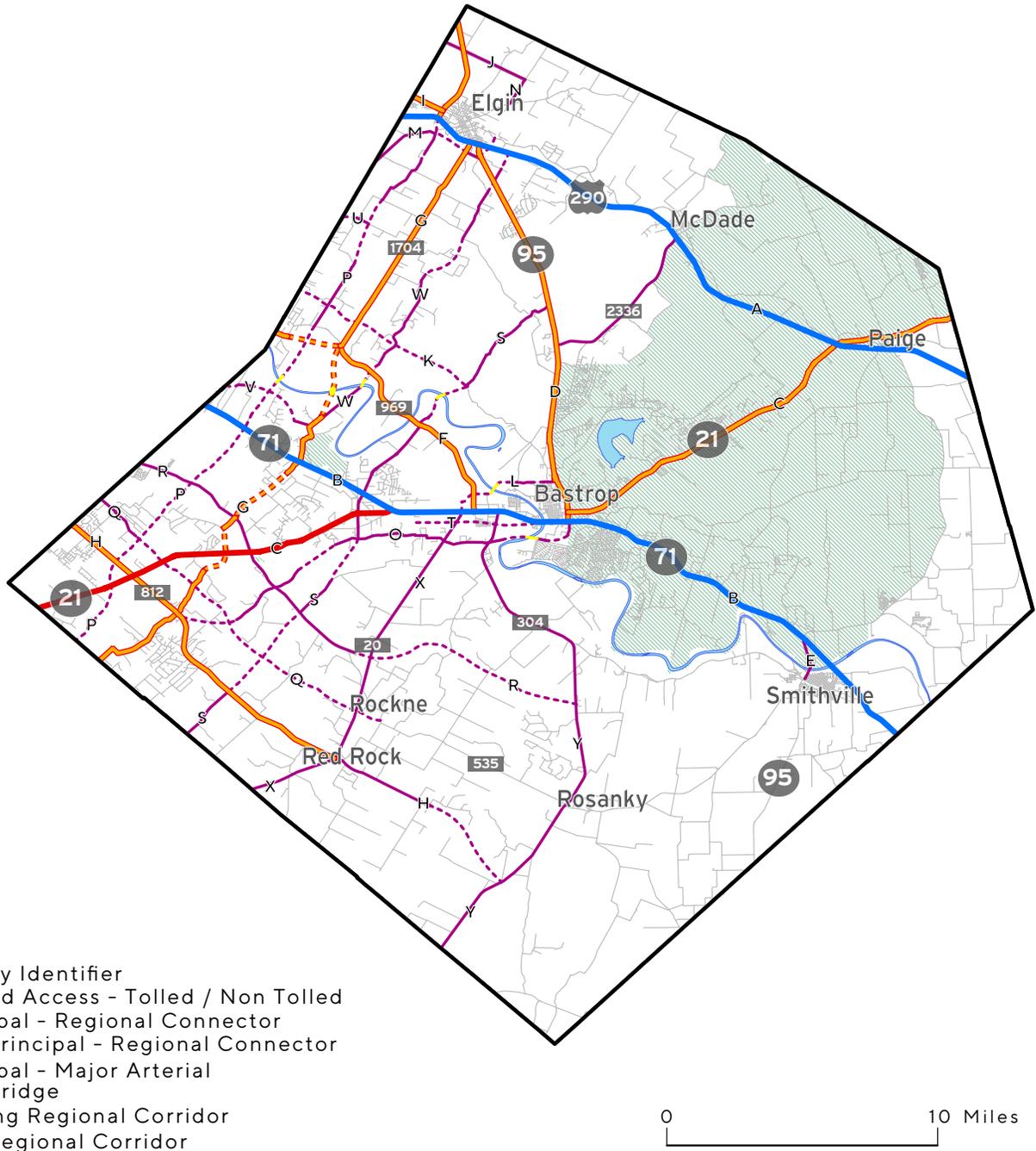


Figure 3.3

2020 Bastrop County Transportation Plan

The Recommended Arterial Network presents a comprehensive long-range vision for Bastrop County’s future roadway network. Many of these specific improvements and new facilities were identified in local plans, including the 2016 Bastrop County Transportation Plan, and further refined through public involvement and Steering Committee feedback as a part of the RACI. As a part of that same planning process, these concepts were vetted through multiple rounds of engagement by local elected officials. As detailed in the RACI report, once a network of locally planned and desired arterials was produced CAMPO staff performed “a regional ‘gap’ analysis to determine where missing connections between planned and existing facilities may be or where demographic forecasts show a lack in the supply of arterial roadways.”⁵

Given the growth projections of Bastrop County within the plan horizon, the county will have the need for both the regional and supporting connections as described in the RACI. Regional connectors provide for longer distance travel across the county and the broader region, while a supporting network of mostly minor arterial roadways allow for added redundancy and key connections between communities and to regional connectors. Thus, this network is recommended to meet those demands and the goals for the future of Bastrop County.

The improvements, shown in Figure 3.3 and detailed in Figure 3.8, will benefit residents and travelers in Bastrop County through savings in time and miles traveled. These transportation improvements can help provide greater and more efficient connections for communities to key service providers and essential retailers, such as grocery stores and health clinics. Perhaps most importantly, these improvements will also enhance the safety of the roadway network and better facilitate emergency response. These roadway recommendations support mobility, quality of life, and the economic success of the county and the region, helping to advance the goals of this Plan and the 2016 Plan.

⁵ CAMPO RACI, pg. ix.

Projecting Cost

While this Plan does not offer preliminary or anticipated costs for the recommended network, the RACI presented a preliminary programmatic cost analysis based upon comparable, planned project cost improvements in 2019 dollars. The programmatic costs are based upon additional lane miles in each functional classification beyond what is in the existing and committed network. The lengths utilized represent general corridor locations.

To develop a preliminary programming cost, research was conducted to collect costs from similar projects on a cost per lane mile basis. The Williamson County Corridor Program, TxDOT’s Mobility35 program, and various national publications from DOT’s (Arkansas DOT, Utah DOT, Oklahoma DOT) were reviewed and used to develop costs per additional lane mile for each of our three major categories: Regional Connector, Major Arterial, and Minor Arterial. The Williamson County Corridor and Mobility35 Programs were utilized to create the base case per category and used the national publications to verify the numbers that were developed. Programmatic costs evaluated ranged from roughly \$1 million to \$7 million per lane mile depending on project complexity. Based upon these numbers a cost per lane mile was developed for each roadway classification. All comparable costs include only construction costs.

The per additional lane mile cost developed for the three categories is: Limited Access Facilities - \$2,500,000/lane mile, other Regional Connectors and Major Arterials - \$2,000,000/lane mile, and Minor Arterials - \$1,900,000/lane mile. These per lane mile costs represent an average across the total study. In general, these costs include standard improvements including pavement and base materials, drainage improvements, basic pedestrian accommodations, basic vegetation and stabilization, basic retaining walls, safety treatments (guardrail, barrier, etc.), and other ancillary improvements.

Due to the high-level nature of these costs, an additional 30% contingency was added to each segment. This contingency accounts for unforeseen project costs as well as additional project costs such as Traffic Management Systems (digital message signs, traffic counters, communications cables, etc.), aesthetic treatments, and more robust bicycle and pedestrian improvements. An additional 20% was added to the total cost to account for project development, engineering, and construction engineering and inspection costs.

Additional detail and a listing of the preliminary programming costs developed for the RACI starts on page 162 of the RACI report.

Bastrop County Cross-Sections

While roadway design will ultimately be determined through future studies, the following cross-sections (Figures 3.4 to 3.7) can help visualize how the improved roadways found in the recommended network may function. The RACI offers a comprehensive set of cross-sections in the Pattern Book, starting on page 292.

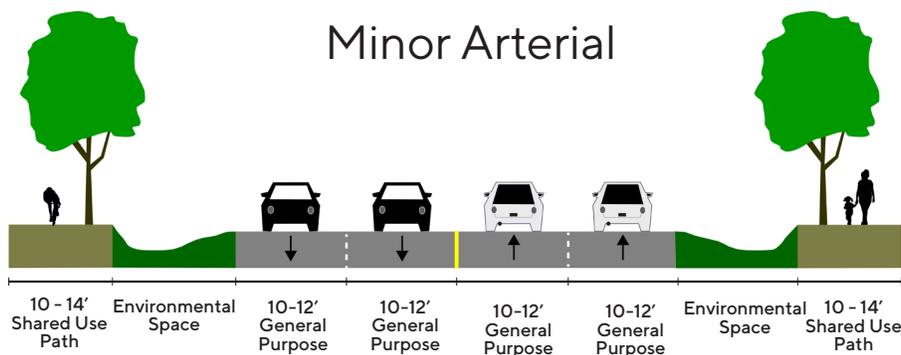


Figure 3.4

Minor Arterial

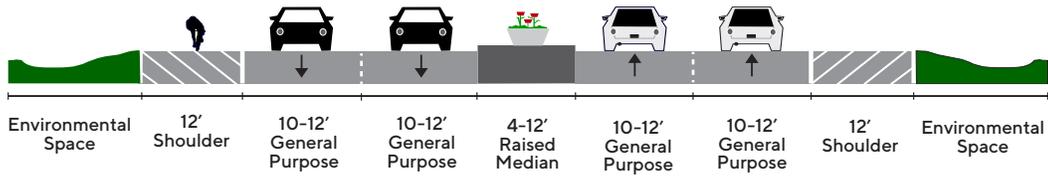


Figure 3.5

Principal - Major Arterial

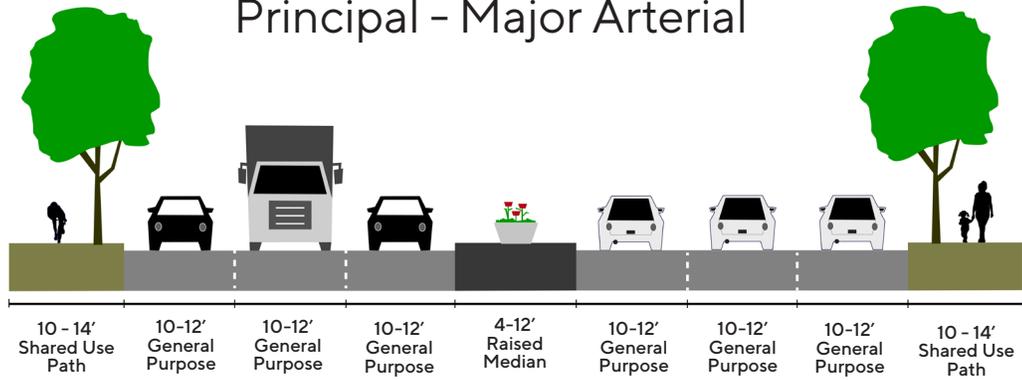


Figure 3.6

Regional Connector

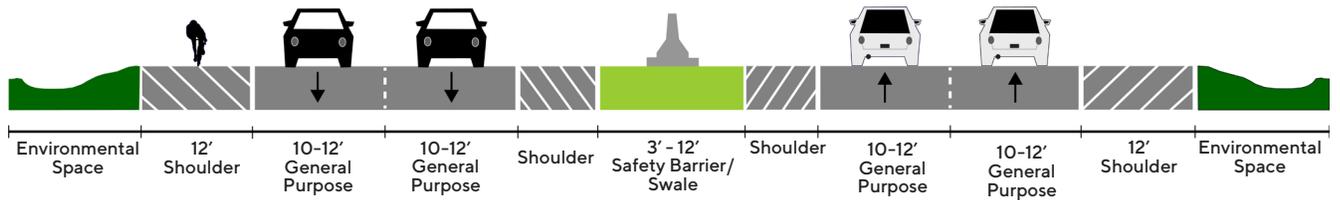


Figure 3.7

Limited Access

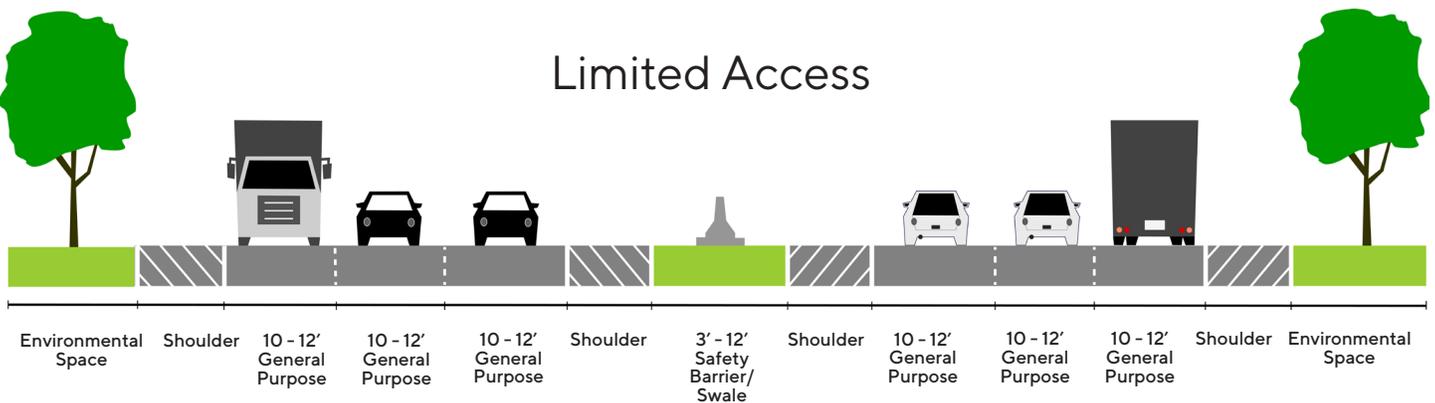


Figure 3.8

2020 Recommended Arterial Network Improvements

Facility (Facility Identifier)	From	To	Current - 2018			Future - 2045		
			Current Functional Class	Design Type	Number of Lanes	Proposed Functional Class	Design Type	Number of Lanes
US 290 (A)	Travis County Line	SH 95 W (FM 973 by 2025)	Principal (Major Arterial)	Divided	4	Limited Access	Divided	6 GP + 6 Frontage
	SH 95 E	SH 21	Principal (Major Arterial)	Undivided	4	Limited Access	Divided	6 GP + 4 Frontage
	SH 21	Lee County Line	Principal (Major Arterial)	Divided	4	Limited Access	Divided	4 GP + 4 Frontage
SH 71 (B)	Travis County Line	SH 95 W	Principal (Major Arterial)	Divided	4	Limited Access	Divided	6 GP + 4 Frontage
	SH 95 W	Fayette County Line	Principal (Major Arterial)	Divided	4	Limited Access	Divided	4
SH 21 (C)	Caldwell County Line	SH 71	Principal (Major Arterial)	Undivided	2	Principal (Regional Connector)	Divided	6
	SH 71/95	US 290	Principal (Major Arterial)	Undivided/ Divided	2 - 4	Principal (Regional Connector)	Divided	4
	US 290	Lee County Line	Principal (Major Arterial)	Undivided	4	Principal (Regional Connector)	Divided	4
SH 95 (D)	Travis County Line	US 290	Minor Arterial	Undivided	2 - 4	Principal (Regional Connector)	Divided	4
	US 290	SH 71	Minor Arterial	Undivided	2 - 4	Principal (Regional Connector)	Divided	4
SH 230 (E)	SH 71	N 3rd St	Minor Arterial	Undivided	2	Minor Arterial	Divided	4
FM 969 (F)	Travis County Line	SH 71	Major Collector	Undivided	2 - 4	Principal (Regional Connector)	Divided	6
FM 1704/ FM 1185 Connector (G)	US 290	Caldwell County Line	Major Collector/ New Facility	Undivided	2	Principal (Regional Connector)	Divided	4

GP = General Purpose

Figure 3.9

Facility	From	To	Current - 2018			Future - 2045		
			Current Functional Class	Design Type	Number of Lanes	Proposed Functional Class	Design Type	Number of Lanes
FM 812 (H)	Travis County Line	SH 304	Minor Arterial	Undivided	2 - 4	Principal (Regional Connector)	Divided	6
FM 1100/ Pflugerville Pkwy (I)	Travis County Line	SH 95	Collector/ New Facility	Divided/ Undivided	2	Principal (Regional Connector)	Divided	4
CR 87 (J)	Travis County Line	CR 84	Collector	Undivided	2	Minor Arterial	Undivided	2
Central Travis / Bastrop NF (K)	Travis County Line	CR 157	Collector	Undivided	2	Minor Arterial	Divided	4
Lindell Ln / Mesquite St (L)	Travis County Line	SH 95	Collector	Undivided	2	Minor Arterial	Undivided	2
Littig Rd (M)	Travis County Line	SH 95	Collector	Undivided	2	Minor Arterial	Divided	4
CR 84 (N)	CR 461	Blake Manor Rd	Collector	Undivided	2	Minor Arterial	Divided	2 - 4
Shiloh Rd (O)	FM 812	SH 304	Collector	Undivided	2	Minor Arterial	Undivided	2 - 4
Saratoga Farms (P)	US 290	Caldwell Rd at TX 21	New Facility	New Facility	New Facility	Minor Arterial	Divided	4
Burleson / Elroy Rd / CR 219 (Q)	Travis County Line	FM 535	New Facility	New Facility	New Facility	Minor Arterial	Divided / Undivided	2 - 4
Edmondson / McDonald Ln (R)	Travis County Line	SH 304	New Facility	New Facility	New Facility	Minor Arterial	Undivided	2 - 4
Bastrop County New Facility 217 (S)	SH 95	Caldwell County Line	New Facility	New Facility	New Facility	Minor Arterial	Divided	4

Figure 3.9

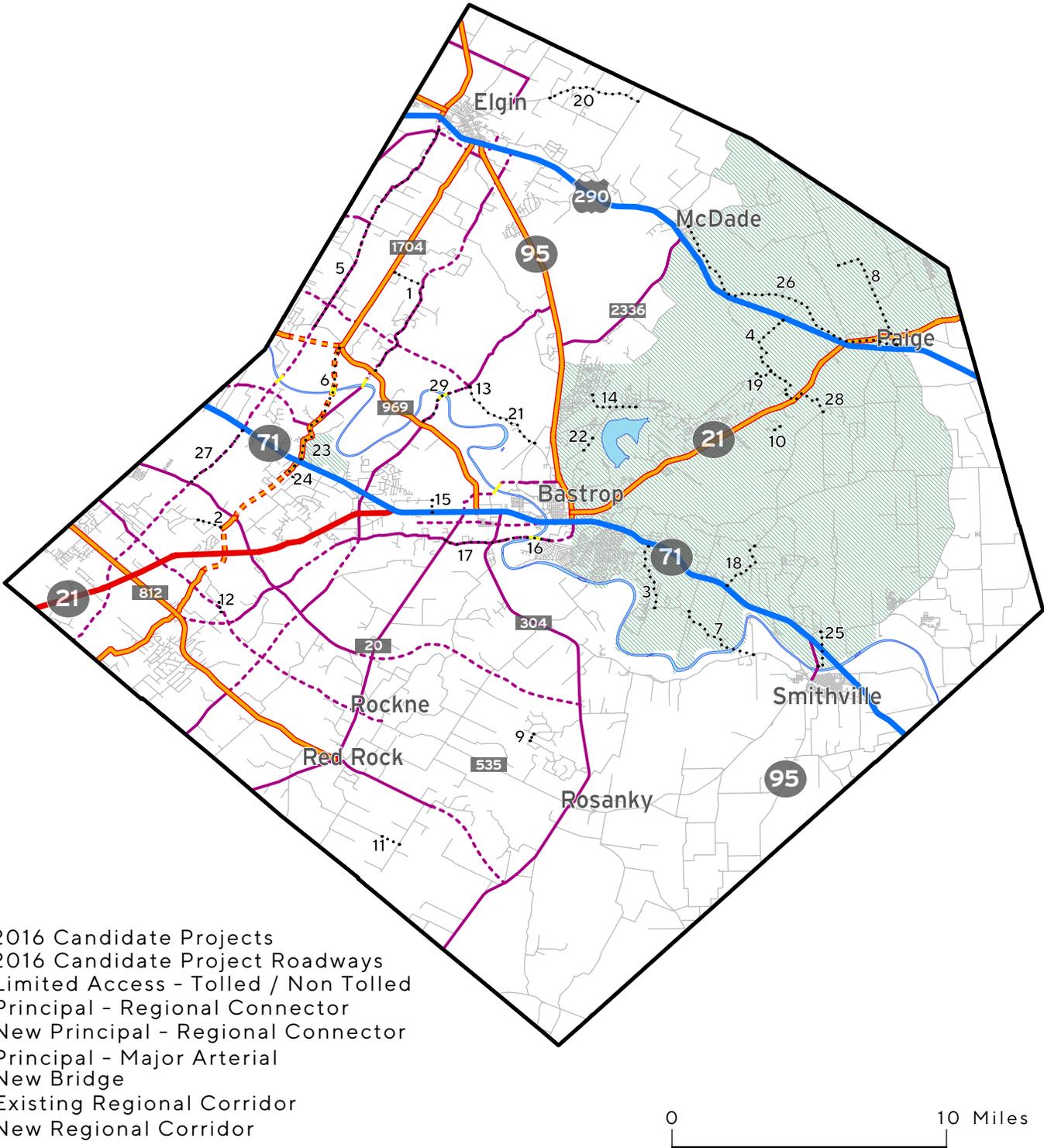
Facility (Map Letter)	From	To	Current - 2018			Future - 2045		
			Current Functional Class	Design Type	Number of Lanes	Proposed Functional Class	Design Type	Number of Lanes
New Facility (T)	Future Collector	SH 21	New Facility	New Facility	New Facility	Minor Arterial	Divided	4
New Facility (U)	Travis County Line	CR 68	New Facility	New Facility	New Facility	Minor Arterial	Undivided	2
New Facility (V)	Travis County Line	FM 1704/FM 1185 Connector	New Facility	New Facility	New Facility	Minor Arterial	Undivided	4
US 290/CR 241 Connector (W)	US 290	FM 1704/FM 1185 Connector	New Facility	New Facility	New Facility	Minor Arterial	Undivided	2
FM 20 (X)	SH 71	Caldwell County	Minor Arterial	Undivided	2	Minor Arterial	Divided	4
SH 304 (Y)	SH 71	Caldwell County	Major Collector	Undivided	2	Minor Arterial	Divided	4

Figure 3.9

2016 Candidate Projects

The Candidate Project list presented in the 2016 Plan provides a complimentary set of roadway improvements to those presented in this Plan. They are presented here to show how they support this Plan's Recommended Network and to highlight the congruity between the two planning efforts. A map depicting both the Candidate Projects and the Recommended Network is shown in Figure 3.10. Please note that in some cases, Candidate Projects overlap with corridors in the Recommended Network. A table, Figure 3.11, follows that provides a description of each project.

Proposed Thoroughfare Network (Consolidated)



- 1 2016 Candidate Projects
- ... 2016 Candidate Project Roadways
- Limited Access - Tolloed / Non Tolloed
- Principal - Regional Connector
- - - New Principal - Regional Connector
- Principal - Major Arterial
- New Bridge
- Existing Regional Corridor
- - - New Regional Corridor

Figure 3.10

2016 Candidate Project Improvements

Facility (Facility Identifier)	From	To	At	Project Description	Project Length
Lower Elgin Road (1)	FM 1704	FM 969	-	Realign/Straighten to address visibility / safety concerns	6.5 Miles
Thousand Oaks Drive (2)	-	-	-	Realign/Straighten to address visibility / safety concerns	1 Mile
McAllister Road (3)	Crafts Prarie Road	SH 71		Realign/Straighten to address visibility / safety concerns	2.9 Miles
Old Potato Road (4)	SH 21	US 290	-	Realign/Straighten to address visibility / safety concerns	4.2 Miles
Upper Elgin River Road (5)	Central Avenue	FM 969	-	Realign/Straighten to address visibility / safety concerns	9.8 Miles
FM 1704 Bridge (6)	-	-	FM 1704	Extend FM 1704 south of FM 969 and connect to Colorado Dr. via a new bridge across the Colorado River; upgrade Colorado Dr. to an Arterial from the new bridge to SH 71	5.7 Miles
New Bridge (7)	-	-	New Bridge	Construct a new bridge across the Colorado River from Ponderosa Rd. to FM 2571, providing a new connection between Bastrop and Smithville.	3.1 Miles
Stockdale Ranch Road (8)	SH 21	Paint Creek Road	-	Upgrade to a Collector	5.8 Miles
New Road: Pine Canyon / La Reata Connection (9)	Pine Canyon	La Reata	-	New Road to provide better access between the neighborhoods	.3 Miles
New Road: Old Piney Trail / Squirrel Run Connection (10)	Old Piney Trail	Squirrel Run	-	New Road connecting Old Piney Trail/Kinsey Road and Squirrel Run	.2 Miles
Bateman Road Extension (11)	Bateman Road	Red Rock Rand Road	-	Extend Bateman Road to Red Rock Rand Road to provide better connectivity to neighborhoods located along Red Rock Rand Road and Sand Hills Road	.8 Miles

Figure 3.11

Facility	From	To	At	Project Description	Project Length
New Road (12)	Mesquite Drive	Morris Lane	-	Enhance connectivity and access to neighborhoods along Mesquite Drive	.5 Miles
FM 1209 (13)	-	-	FM 969	Realign FM 1209 at FM 969 intersection near planned XS Ranch bridge	.8 Miles
Green Valley Drive (14)	Rainforest Drive	Old FM 1441	-	Realign/Straighten to address visibility / safety concerns	1 Mile
New Road (15)	Woodlands Drive	SH 71 Frontage Road		New road connecting Woodlands Dr. south to the SH 71 frontage road	.5 Miles
New Bridge (16)	SH 304 / Shiloh Road	Lovers Lane		Connect SH 304/Shiloh Road to Lovers Lane and Tahitian Village via a new bridge across the Colorado River; connect with Margies Way	2.3 Miles
Shiloh Road (17)	SH 20	SH 304		Upgrade to a Collector	1.7 Miles
Cottletown Drive (18)	SH 71	Park Road 1C		Realign/Straighten to address visibility issues and high crash rates.	2.3 Miles
McBride Lane (19)	Cardinal Lane/Drive	Old Potato Road		Extend McBride Lane connect neighborhoods along Cardinal Lane/Drive with Old Potato Road	.5 Miles
Old Lexington Road (20)	Pleasant Grove Loop	FM 696	-	Realign and upgrade to Minor Arterial to address visibility/ safety concerns; extend to FM 696	3.1 Miles
Old Sayers Road (21)	Phelan Road	Sayers Road	-	Upgrade to a Collector Road in response to growth in XS Ranch	3.7 Miles
New Construction (22)	Old McDade	Mooney Road			.1 Miles

Figure 3.11

Facility (Map Letter)	From	To	At	Project Description	Project Length
Pope Bend North (23)	-	-	South of Hodge Lane	Realign to address visibility / safety concerns	.6 Miles
Pope Bend South (24)	Cedar Creek High School	Simpson Avenue	-	Realign to address visibility / safety concerns	.2 Miles
Two Mile Lane /American Legion Rd. Hike/Bike Trail (25)	Entrance to Buescher State Park	Loop 230/SH 95	-	Add a 10 foot wide hike/bike trail	.8 Miles
Old Highway 20 Hike/Bike Trail (26)	Marlin Street in McDade	Gonzales Street in Paige	-	Construct a hike and bike trail (shared-use path)	10.3 Miles
New Road (27)	SH 71	Pearce Lane/ FM 535	-	Construct a new Arterial Road	3 Miles
South Old Potato Road (28)	SH 21	Antioch Road		Implement continuous monitoring and operational improvements to address visibility / safety concerns	1.1 Miles
XS Ranch Bridge and Road (29)	FM 1209/ FM 969 Intersection	Sayers Road		Construct a new bridge across the Colorado River to connect XS Ranch to FM 1209/FM 969 Intersection	2.2 Miles

Figure 3.11