



MISSOURI STATEWIDE TRANSIT NEEDS ASSESSMENT

MISSOURI PUBLIC TRANSIT ASSOCIATION

May 2022

Final Report

Prepared by:
Lochmueller Group

Prepared for:
Missouri Public Transit Association
Missouri Department of Transportation



<https://mopublictransit.org/>

**LOCHMUELLER
GROUP**



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Acknowledgements

This project and the subsequent report were made possible by contributions from the Missouri Department of Transportation (MoDOT), the Missouri Public Transit Association (MPTA) and member agencies. The report contents and opinions, although based on factual data as much as possible and vetted by a project Steering Committee are the work of the Lochmueller Group, Inc., and may not necessarily represent official positions of MoDOT.



Executive Summary

The Missouri Statewide Transit Needs Assessment project was undertaken by Lochmueller Group, Inc. of St. Louis, Missouri in partnership with the Missouri Public Transit Association (MPTA), the Missouri Department of Transportation (MoDOT), and the member agencies of the MPTA.

Study highlights include:

- Transit is important to Missouri with more than 156,000 Missourians riding transit on approximately 2,000 vehicles across the state every day;
- Transit providers are in need of more state funding to meet the peer average of \$7.34 per capita. Currently as of publication of this report, state funding is \$0.28 per capita;
- There are unmet transit demand needs for more trips in every corner of the state. Total trips would need to increase by more than 39 million annually to meet derived demand estimates, costing more than \$341 million in additional operating dollars;
- Vehicle needs are acute, exacerbated by the COVID-19 pandemic. These needs are valued at more than \$240 million dollars to meet the Federal Transit Administration (FTA) useful life benchmark (ULB);
- Supply chain, microchip issues, and Buy America requirements are exacerbating wait times for new vehicles, even when funding is available;
- The COVID-19 pandemic is making it harder to attract, train, and retain operators, and maintenance personnel and mechanics to transit agencies, hampering service delivery.

Those issues are explored in more detail below in the following sections and in the full report that follows.

Transit Operations, Funding, & Administration in Missouri

Transit is a key component of daily life for many Missourians. Every day, more than 156,000 Missourians ride transit, on more than 2,000 vehicles across the state, operated, maintained, planned, and administered by 4,500 workers, resulting in \$1.28 billion in direct economic impact annually. Direct and indirect output from the Missouri transit industry tops \$3.6 billion annually.

Regarding funding, the current level of investment for transit in Missouri per capita significantly lags peer states as outlined by **Figure 1**.

Missouri would need to increase funding significantly to reach even the peer average. During this current legislative session (2022) the Missouri legislature has taken steps to increase transit investment to a historic level of more than \$8.7 million. A level not seen for two-decades. Still this increase is not enough as demonstrated by needs outlined further in the report. Moreover, concerted efforts will be needed on the part of many stakeholders to ensure those investment allocations occur annually.

Even with increased funding and support from MoDOT, and the State Legislature, the transit operators in Missouri have other struggles. Among them currently is a dire labor shortage. Finding candidates to train as drivers or mechanics is a challenge. Increasing tightness in the labor market is an issue across the transit industry as well as other markets statewide and nationally. Finding, training, and retaining drivers, getting them, and keeping them behind the wheel takes time and effort, and the pool of applicants is increasingly small. The same can be said for mechanics and vehicle maintainers. Labor issues compound funding and vehicle issues and create a tough environment for effective and efficient service delivery.

FIGURE 1. PER CAPITA STATE FUNDING FOR TRANSIT

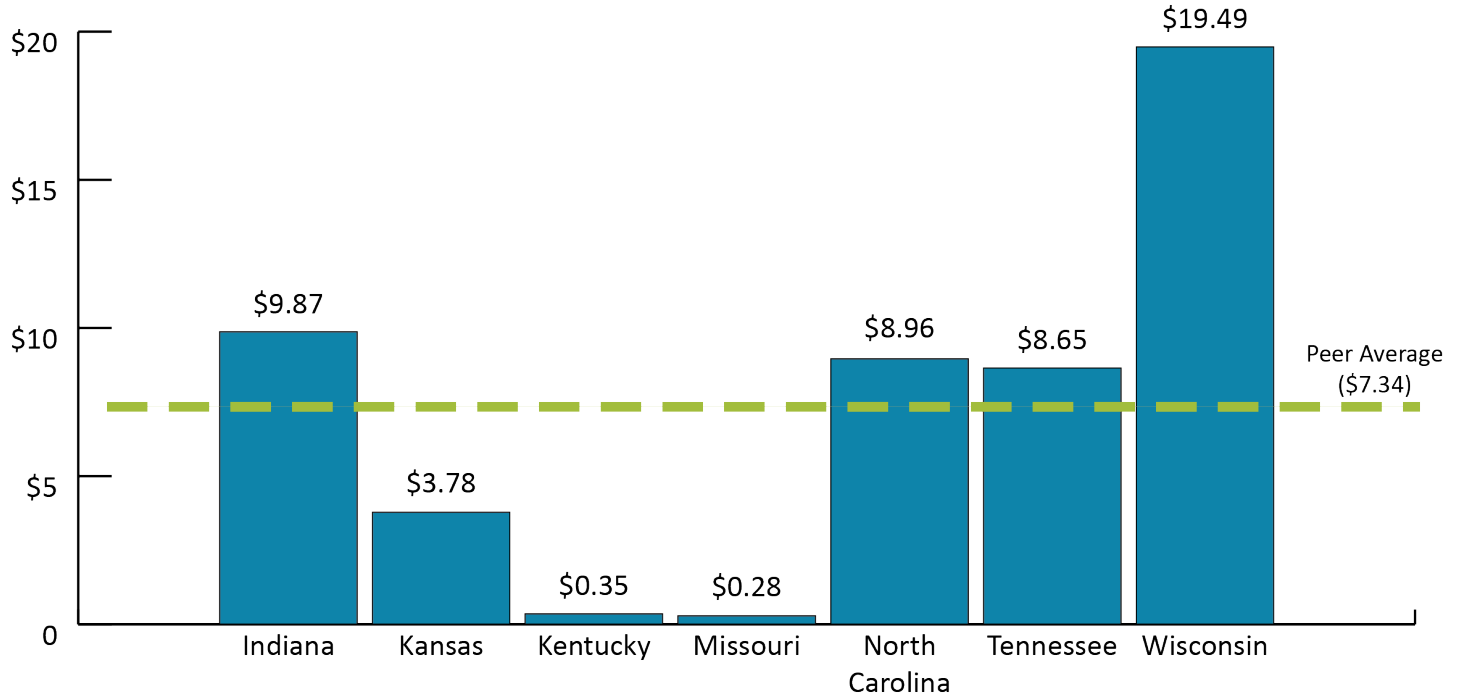


TABLE 1. STATEWIDE POTENTIAL UNMET DEMAND AND COSTS

System Type	Unmet Demand (trips/year)	100% Unmet Demand Cost	50% Unmet Demand Cost
Large Urban	22,571,080	\$141,014,104	\$70,507,052
Small City	167,340	\$1,259,943	\$629,972
Rural, General	8,619,076	\$157,078,617	\$78,539,309
Rural, Program	7,643,767	\$41,658,530	\$20,829,265
Total	39,001,263	\$341,011,194	\$170,505,598

Transit Needs Assessment

A peer-based demand analysis exercise was undertaken based on methodologies established by previous projects and research. This is a comparative analysis that examined peer systems in the US to ones operating in Missouri. The demand calculated is a potential and not actual derived demand from a travel forecasting model or more rigorous exercise. Nonetheless, the demand can be used to compare and benchmark what additional quantitatively measured transit services might be needed based on a peer comparison, which matches in many regards the qualitative and anecdotal evidence expressed by agencies and customers across Missouri.

Overall, the needed or unmet demand is just over 39 million trips per year broken out by the different service types as shown in **Table 1**.

Demand is especially acute for more rural areas for non-programmed transportation needs (i.e., needs for individuals who do not qualify for Veterans Administration (VA), Medicare, Medicaid, or other programs). Demand exists in urban areas as well, and in every part of the state and every operator and system have some unmet needs, despite the outcomes of the peer comparisons. Providing 100% of the unmet demand could cost more than \$341 million per year, while providing 50% of the needs cuts the cost to \$171 million in today's dollars.

Transit Assets & Needs

The focus of this analysis was on rolling stock or vehicles. When evaluating the State of Good Repair (SGR) for transit assets, state DOTs and individual transit agencies have the option to define the maximum age of an asset or the point at which an asset enters the state of good repair backlog— also known as the useful life benchmark (ULB). The FTA defines ULB as the average number of years for a vehicle to reach a 2.5 rating on the FTA Transit Economic Requirements Model (TERM) scale, assuming a standard maintenance schedule.

MoDOT's performance target for rolling stock is no more than 45% of any asset class in operation beyond their useful life. Based on these standards, MoDOT has achieved its goal or is close to it, for all asset classes except for articulated buses. To meet the \$11 million. However, FTA's standards are a bit more rigid, and their SGR threshold would require 100% of the vehicles to be in the required SGR. This would be an investment of \$241 million. All are expressed in today's dollars.

Recent events due to the COVID-19 pandemic and subsequent supply chain disruptions for computer chips, parts, and skilled labor to assemble components and whole vehicles are lengthening the time it takes to procure and enter vehicles into actual service. Estimates range that from the time of ordering to the time for delivery of vehicles, regardless of type (bus or cutaway), is about 2 to 5 years. This increased delay only exacerbates issues with vehicle replacement and causes many agencies to continue to operate vehicles that are well beyond their ULB, are less dependable to operate, and cost more to maintain.

Goals & Recommendations

The goals and recommendations for this study were developed in coordination with MPTA and the project steering committee. Goals and recommendations fit into four main categories as shown below.

The implementation timeframes as indicated below are a function of time to undertake and achieve the goal or recommendation. Short-term recommendations are those that can be achieved in 1 - 5 years, mid-term is those that can be achieved in 6 - 10 years, and long-term are those taking 10 years or more for achievement.



Funding

- Short - Return state funding levels to 2002 benchmarks
- Mid - Increase funding to be more in line with neighboring states (focused on operations)
- Mid - Increase state matching funds for capital / \$0 match for non-program rural transit
- Long - Rework FTA 5311 Reimbursement Regulations



Research & Policy

- Short - Rescope or expand the RTAP program
- Short - On-line virtual best practices and data clearinghouse
- Short - Expand virtual education opportunities
- Mid - MO Transit Summit (solely focused on technical issues and exchange)
- Mid - Research best practices for service delivery and apply to MO



Data & Data Collection

- Short - Statewide GTFS data set
- Short - Statewide TAM data set
- Short - Statewide Provider data set
- Mid - Statewide planning tool (TBEST)



Service Delivery, Operations, & Assets

- Mid - Increase revenue miles and revenue hours (non-programmed rural)
- Mid - Increase passengers per revenue hour (efficiency)
- Mid - Replace vehicles so none are beyond useful life recommendations
- Long - Seek to fill 5% of unmet needs within 5 years, 7.5% of same within 10 years, and 10% in 15 years

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Introduction & Purpose

The Missouri Statewide Transit Assessment project seeks to evaluate current transit service levels, identify areas where current service levels do not meet the existing demand for transit, and develop strategies to offer additional and/or more efficient transit service in the state. Guiding principles of the study were developed to establish a strategic direction for the project and to ensure the study provides the MPTA and its members with valuable, credible, and relevant contents and conclusions. The guiding principles for this project were developed with input from the project Steering Committee and are detailed below.



Guiding Principles

- The execution of the project should serve as a catalyst to educate the public and stakeholders about the importance of transit and to elevate the discussion of transit and the role it plays not only for mobility but for economic development.
- The project is and should be statewide in scope and should be objective and data driven in terms of what it examines and how it forms conclusions.
- The project data should identify any gaps regarding unmet needs or service areas focusing on new service or expanded service, framing that discussion in terms of service quantity, quality, and funding.
- The project and its outcomes should assist local and regional agencies with future transit planning across the state.
- The project should produce a guide for future mobility enhancements prioritizing investments in the short-, medium- and long-term time frames.
- The project should develop policies and investment priorities that seek to better deliver transit service to customers and communities.

Current State of Transit

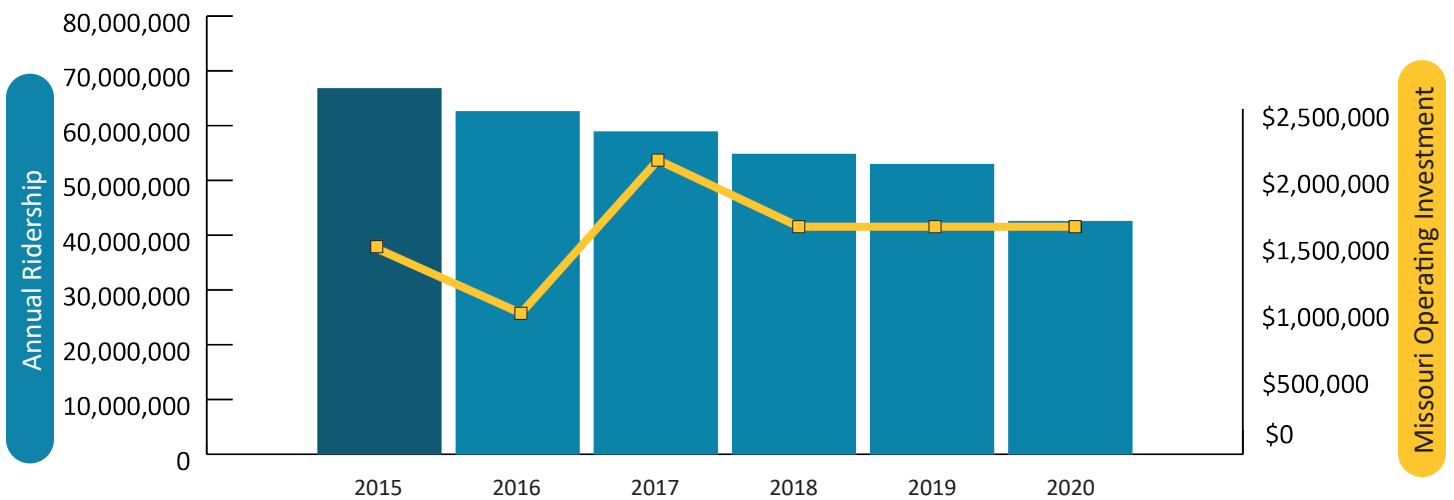
Prior to the onset of the global pandemic in March 2020, many transit systems across the US and in Missouri were dealing with declining ridership and increasing service delivery costs. Agencies struggled with providing cost-effective services. Hub and spoke models of service, with peak service oriented to a central business district, were not meeting the challenges of a workforce that needed transit in dispersed and often lower density areas covering not just business hours Monday through Friday. The relative prosperity after the 2008 recession, the price of fuel, wages, and the availability of extended loans for automobiles all contributed to declining ridership. Then, in March of 2020 a global pandemic driven by the COVID-19 virus struck the US and the world, effectively shutting down large sectors of the economy, including the retail, travel, service, and hospitality sectors, which impacted these industries very hard. Also emerging was work from home (WFH) provisions for other sectors of employment. Both resulted in transit ridership plummeting in the first quarter of 2020. Although, ridership is and has started to rebound, the subsequent variants of the virus coupled by inflation and high fuel prices, as well as a driver shortage by this writing in the second quarter of 2022, has kept ridership well below pre-pandemic levels. Recovery for the transit industry will be slow, despite infusions of investment in the Bipartisan Infrastructure Law (BIL). A concerted and concentrated effort will be

needed to return transit ridership and efficiency back to some fraction of pre-pandemic levels. **Figure 2** shows the declining ridership in Missouri since 2015 as well as state operating investments in transit during the same time period.

On November 15, 2021, President Biden signed the Infrastructure Investment and Jobs Act (IIJA) into law. The IIJA provides \$108.2 billion for public transit over five years, an increase of \$42.4 billion from current levels. It is unclear at this time the amount and type of investments that will be made in Missouri as a result of the IIJA.

One of the issues transit is currently facing is an acute labor shortage. Finding candidates to train as drivers or mechanics is a challenge. Increasing tightness in the labor market are issues across the transit industry, across other industries and markets, across Missouri, and across the US. Finding, training, and getting drivers behind the wheel takes time and the pool of applicants is increasingly small. The same can be said for mechanics and vehicle maintainers as well. Labor issues compound funding and vehicle issues and create a tough environment for effective and efficient service delivery.

FIGURE 2. MISSOURI RIDERSHIP & FUNDING TRENDS



Role & Benefit of Transit in Missouri

Public transit provides numerous societal benefits that extend beyond those that use the service. For example, transit vehicles contribute to lower traffic congestion by lessening reliance on car trips. Trips made by transit typically produce less greenhouse gas emissions and cost less, particularly when compared to single-occupant vehicles (SOVs). Public transit also contributes to equity goals and increases the available workforce by providing mobility options for those that cannot drive or afford a vehicle.

State and Federal investments in Missouri are guided by the long-range transportation plan (LRTP), most recently updated in 2018. The Missouri LRTP develops a mission and citizen driven goals that guide the state's approach to enhancing and maintaining the transportation network.

Missouri Long Range Transportation Plan -Mission Statement-

“Provide a world-class transportation system that is safe, innovative, reliable, and dedicated to a prosperous Missouri.”

TABLE 2. MISSOURI LRTP GOALS¹

2018 LRTP Goals	Transit Benefits
Keep all travelers safe, no matter the mode of transportation	A person is 90% less likely of being involved in a crash by taking transit as opposed to commuting by car.
Invest in projects that spur economic growth and create jobs	Every \$1 invested in transit generates \$5 in economic returns.
Give Missourians better transportation choices	In Missouri, nearly 82% of workers commute by car while only 1.6% commute by public transit.
Improve reliability and reduce congestion on Missouri's transportation system	The use of public transportation saves the United States 6 billion gallons of gas annually.

In addition to the numerous ways that transit can benefit Missouri's stated goals for the transportation system, the LRTP also recognizes key trends that may contribute to a larger role for transit in the future. These important trends include an aging population, growing cities, and a growing interest in modal choice. As these trends continue, the demand for transit will also grow.

In 2019, Citizens for Modern Transit, in partnership with the MPTA and AARP St. Louis, commissioned the Economic Impact of Public Transit in the State of Missouri. As noted in the study, transit service providers in Missouri spend approximately \$675 million each year on operations, capital improvements, and labor while providing over 60 million rides. Approximately 4,500 workers are employed by transit service providers across the state. The combination of service, spending, and employment contributes to a direct economic impact of \$1.28 billion each year in Missouri. The direct spending by agencies on transit also triggers another \$2.4 billion in statewide activity and \$1.03 billion in added household earnings. This translates to an almost seven to one return on investment (ROI) in Missouri.

¹ <https://www.apta.com/news-publications/public-transportation-facts/>

State Role in Transit

Functions related to the administration and delivery of public transportation by the state are the responsibility of the Missouri Department of Transportation (MoDOT) transit section. The MoDOT Transit Section administers various state and federal funding programs and reporting requirements.

MoDOT administers Federal Transit Administration (FTA) funding programs in the state. These programs include:

- Section 5303 – MPO consolidated and statewide planning
- Section 5310 – formula grants for the enhanced mobility of seniors and individuals with disabilities
- Section 5311 – formula grants for rural areas
- Section 5339 – formula grants for bus and bus facilities

In addition to overseeing the distribution of FTA funding for local transit service providers, MoDOT also assists and ensures FTA reporting requirements are met. Federal legislation requires service providers who receive FTA funding to report to the FTA's National Transit Database (NTD). These transit service providers are also required to develop and implement transit asset management (TAM) plans. It is the responsibility of MoDOT to ensure compliance with federal requirements for all local transit service providers that receive FTA funds.

On November 15, 2021, President Joseph Biden signed the Infrastructure Investment and Jobs Act (IIJA) into law. The IIJA provides \$108.2 billion for public transit over five years, an increase of \$42.4 billion from current levels.

Rural Transportation Assistance

The FTA also provides funding to states for the Rural Transportation Assistance Program (RTAP). The RTAP is a funding source to support nonurbanized transit activities in four areas: (1) training, (2) technical assistance, (3) research, and (4) support services. MoDOT contracts with Missouri University of Science and Technology to manage the RTAP program in Missouri. The Missouri RTAP currently focuses on providing driver training courses.

State Transit Assistance Program

The Missouri State Transit Assistance Program provides state financial assistance for operating and capital costs incurred by both urban and rural public transit providers. Funds are appropriated and administered by MoDOT.

MEHTAP

The Missouri Elderly and Handicapped Transportation Assistance Program (MEHTAP) provides funds to agencies that serve the mobility needs of elderly and handicapped Missouri residents. MEHTAP funds are appropriated from the general fund and the state transportation fund.



Missouri's Transit Network & Providers

As reported and published in the 2019 NTD, Missouri is home to 32 transit service providers. Transit service providers are stratified by reporter types. **Table 3** describes the reporter types while **Figure 3** shows a map of all transit agencies in Missouri. Two agencies, OATS and SMTS provide service in multiple counties and are shown by their service areas.

TABLE 3. NATIONAL TRANSIT DATABASE REPORTER TYPES

NTD Reporter Type	Description	Number of Agencies in Missouri
Full Reporter	Agencies that operate more than 30 vehicles across all modes	5
Reduced Reporter	Agencies that operate less than 30 vehicles across all modes	6
Rural Reporter	Agencies that are subrecipients of 5311 funds	21

FIGURE 3. MISSOURI TRANSIT SERVICE PROVIDERS

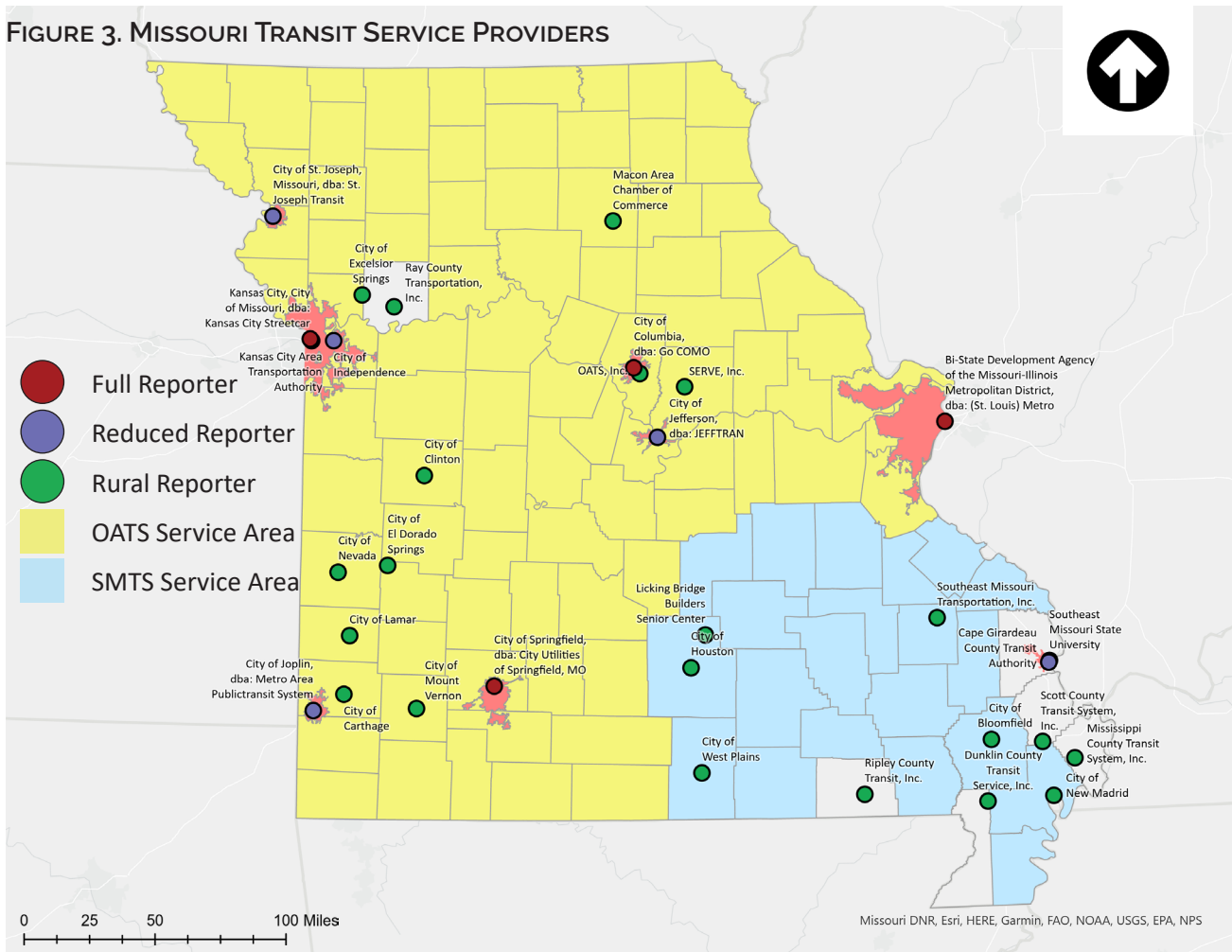


TABLE 4. LIST OF MISSOURI TRANSIT SERVICE PROVIDERS

Agency	City	Organization Type	NTD Reporter Type	Vehicles Operated in Maximum Service (VOMS)
Bi-State Development Agency of the Missouri-Illinois Metropolitan District, dba: (St. Louis) Metro	St. Louis	Independent Public Agency or Authority of Transit Service	Full Reporter	484
Cape Girardeau County Transit Authority	Cape Girardeau	Independent Public Agency or Authority of Transit Service	Reduced Reporter	30
City of Bloomfield	Bloomfield	City, County or Local Government Unit or Department of Transportation	Rural Reporter	2
City of Carthage	Carthage	City, County or Local Government Unit or Department of Transportation	Rural Reporter	2
City of Clinton	Clinton	City, County or Local Government Unit or Department of Transportation	Rural Reporter	4
City of Columbia, dba: Go COMO	Columbia	City, County or Local Government Unit or Department of Transportation	Full Reporter	36
City of El Dorado Springs	El Dorado Springs	City, County or Local Government Unit or Department of Transportation	Rural Reporter	2
City of Excelsior Springs	Excelsior Springs	City, County or Local Government Unit or Department of Transportation	Rural Reporter	2
City of Houston	Houston	City, County or Local Government Unit or Department of Transportation	Rural Reporter	2
City of Independence	Independence	City, County or Local Government Unit or Department of Transportation	Reduced Reporter	14
City of Jefferson, dba: JEFFTRAN	Jefferson City	City, County or Local Government Unit or Department of Transportation	Reduced Reporter	17
City of Joplin, dba: Metro Area Public Transit System	Joplin	City, County or Local Government Unit or Department of Transportation	Reduced Reporter	9
City of Lamar	Lamar	City, County or Local Government Unit or Department of Transportation	Rural Reporter	3
City of Mount Vernon	Mt. Vernon	City, County or Local Government Unit or Department of Transportation	Rural Reporter	3
City of Nevada	Nevada	City, County or Local Government Unit or Department of Transportation	Rural Reporter	1
City of New Madrid	New Madrid	City, County or Local Government Unit or Department of Transportation	Rural Reporter	2
City of Springfield, dba: City Utilities of Springfield, MO	Springfield	City, County or Local Government Unit or Department of Transportation	Full Reporter	22

Agency	City	Organization Type	NTD Reporter Type	Vehicles Operated in Maximum Service (VOMS)
City of St. Joseph, Missouri, dba: St. Joseph Transit	St. Joseph	City, County or Local Government Unit or Department of Transportation	Reduced Reporter	16
City of West Plains	West Plains	City, County or Local Government Unit or Department of Transportation	Rural Reporter	4
Dunklin County Transit Service, Inc.	Malden	Private-Non-Profit Corporation	Rural Reporter	12
Kansas City Area Transportation Authority	Kansas City	Independent Public Agency or Authority of Transit Service	Full Reporter	317
Kansas City, City of Missouri, dba: Kansas City Streetcar	Kansas City	City, County or Local Government Unit or Department of Transportation	Full Reporter	4
Licking Bridge Builders Senior Center	Licking	Private-Non-Profit Corporation	Rural Reporter	2
Macon Area Chamber of Commerce	Macon	Private-Non-Profit Corporation	Rural Reporter	1
Mississippi County Transit System, Inc.	East Prairie	Private-Non-Profit Corporation	Rural Reporter	6
OATS, Inc.	Columbia	Private-Non-Profit Corporation	Rural Reporter	806
Ray County Transportation, Inc.	Richmond	Private-Non-Profit Corporation	Rural Reporter	22
Ripley County Transit, Inc.	Doniphan	Private-Non-Profit Corporation	Rural Reporter	15
Scott County Transit System, Inc.	Sikeston	Private-Non-Profit Corporation	Rural Reporter	7
SERVE, Inc.	Fulton	Private-Non-Profit Corporation	Rural Reporter	11
Southeast Missouri State University	Cape Girardeau	University	Reduced Reporter	6
Southeast Missouri Transportation, Inc.	Fredericktown	Private-Non-Profit Corporation	Rural Reporter	167

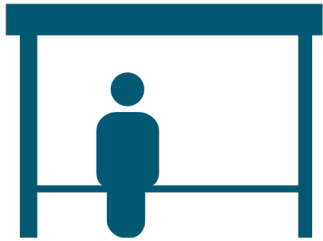
Note: Three agencies appear on older NTD reports that are not included in the scope of this report:

1. Franklin County Transportation Council, last NTD report 2017
2. Loop Trolley Transportation Development District, last NTD report 2017
3. Stoddard County Transit Service, last NTD report 2018

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Agency Profiles

The following pages provide detailed agency profiles for the 11 full and reduced reporters. Agency profiles are shown as a summary snapshot based on available NTD data. Rural reporter profiles are shown in **Table 5**.



57 Million

Number of Transit Trips (2019)



2,000

Number of Transit Vehicles (2019)



4,500

Number of Transit Workers



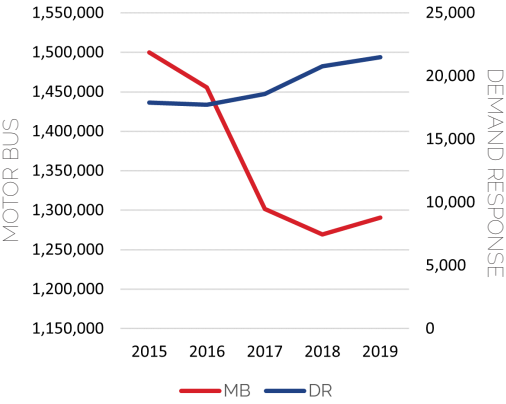
\$1.28 Billion

Dollars of Direct Economic Impact

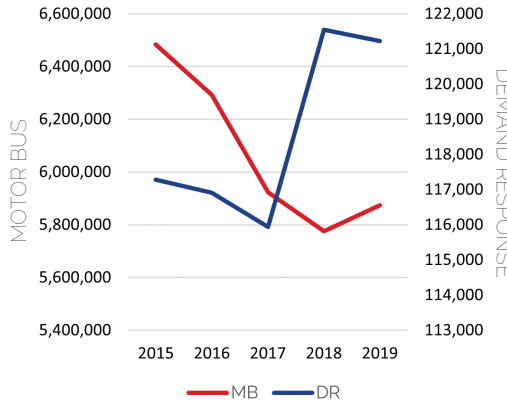
City Utilities of Springfield (CU Transit)

Service Area: City of Springfield, MO
 Service Area Population: 192,644
 Services Provided: Bus, Demand Response

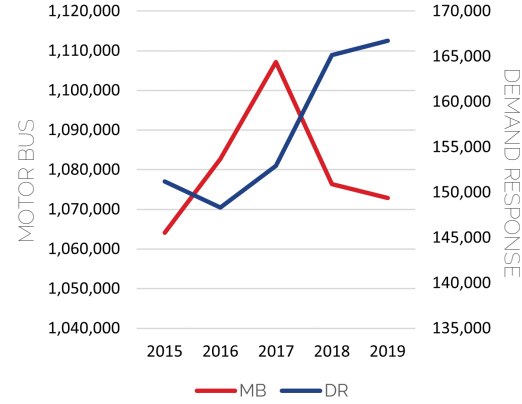
ANNUAL RIDERSHIP



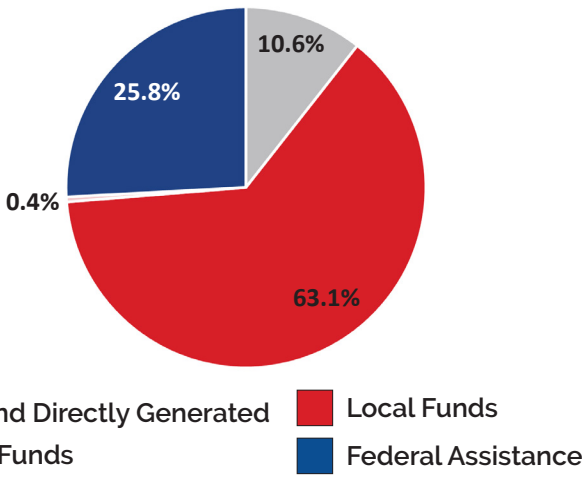
PASSENGER MILES



VEHICLE MILES



OPERATING FUNDING SOURCES



10%

Farebox Recovery



60

No. FTE Employees

49

No. Drivers



34

Total Vehicles

22

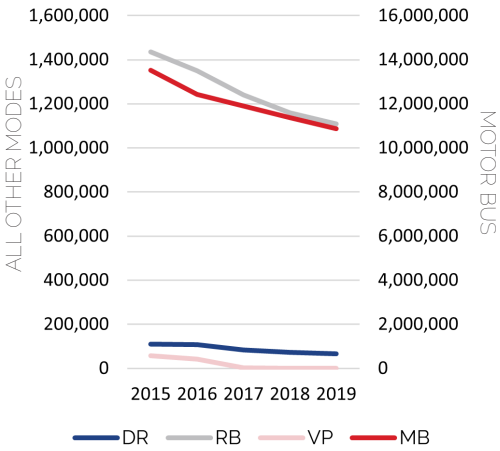
Peak Vehicles

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	\$7.77	\$106.24	\$9.87	\$55.63	0.1	1.9
Bus	\$7.91	\$115.73	\$1.44	\$6.56	1.2	17.6
Total	\$7.89	\$114.47	\$1.61	\$7.37	1.1	15.5

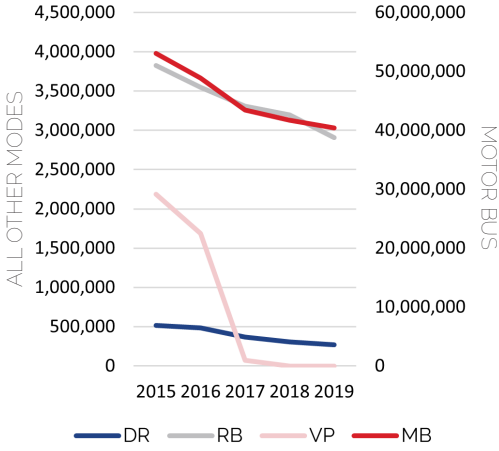
Kansas City Area Transportation Authority (KCATA)

Service Area: Kansas City, MO-KS
 Service Area Population: 1,136,076
 Services Provided: Bus (Direct Operator and Purchased Transport), Demand Response

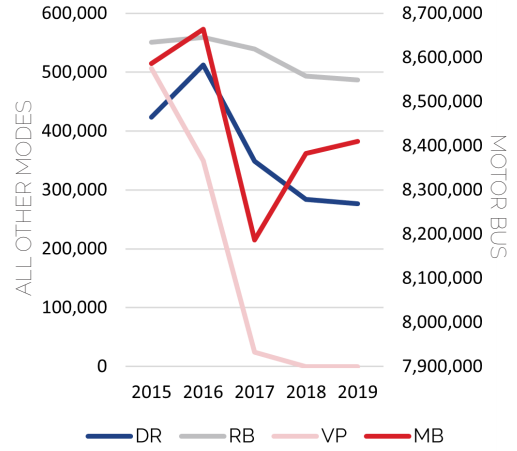
ANNUAL RIDERSHIP



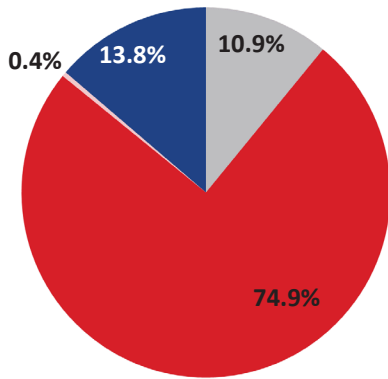
PASSENGER MILES



VEHICLE MILES



OPERATING FUNDING SOURCES



- Fare and Directly Generated
- Local Funds
- State Funds
- Federal Assistance



11%

Farebox Recovery



751

No. FTE Employees

520

No. Drivers



364

Total Vehicles

317

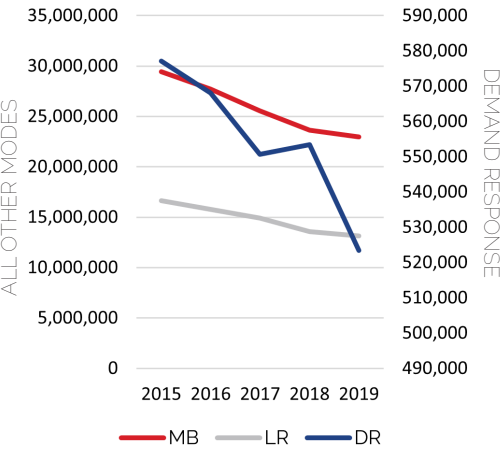
Peak Vehicles

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	\$4.97	\$77.53	\$6.06	\$41.12	0.1	1.9
Demand Response - Taxi	\$4.38	\$91.99	\$4.22	\$24.05	0.2	3.8
Bus	\$10.67	\$147.23	\$1.96	\$7.28	1.5	20.2
Bus Rapid Transit	\$14.28	\$143.55	\$2.24	\$5.86	2.4	24.5
Vanpool	\$0.84	\$32.10	\$0.19	\$6.70	0.1	4.8
Total	\$8.94	\$130.18	\$2.09	\$8.03	1.1	16.2

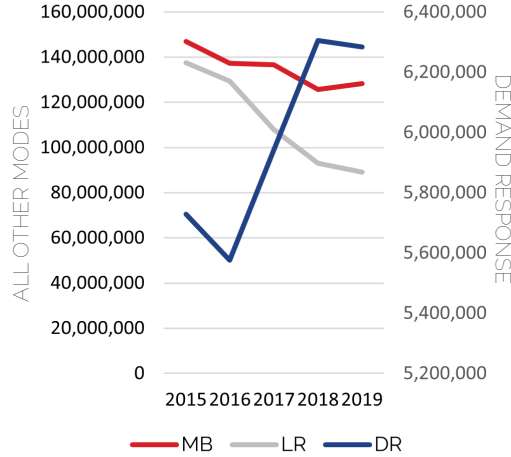
Bi-State Development Agency (Metro Transit)

Service Area: St. Louis, MO-IL
 Service Area Population: 1,566,004
 Services Provided: Bus, Demand Response

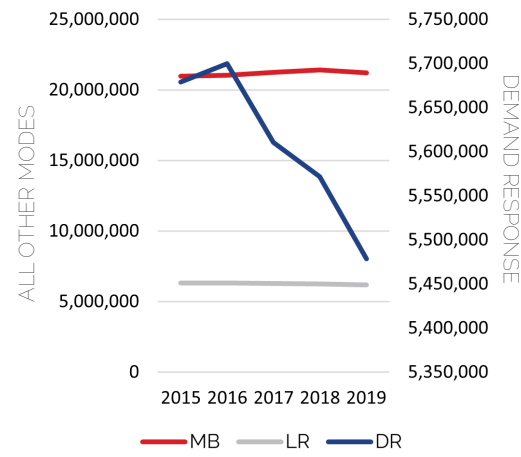
ANNUAL RIDERSHIP



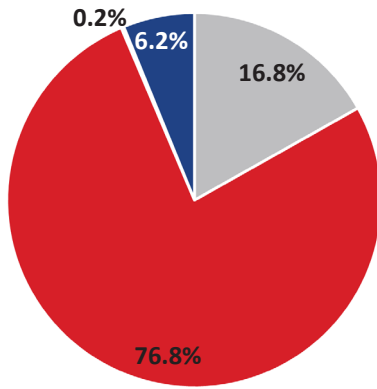
PASSENGER MILES



VEHICLE MILES



OPERATING FUNDING SOURCES



19%

Farebox Recovery



2,040

No. FTE Employees

1,347

No. Drivers



612

Total Vehicles

484

Peak Vehicles

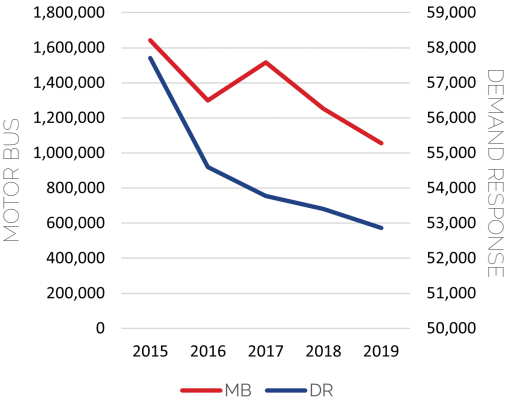
- Fare and Directly Generated
- Local Funds
- State Funds
- Federal Assistance

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	\$5.13	\$91.58	\$4.20	\$50.46	0.1	1.8
Light Rail	\$13.99	\$327.83	\$0.96	\$6.51	2.2	50.4
Bus	\$9.15	\$122.72	\$1.32	\$7.37	1.2	16.7
Total	\$9.45	\$145.82	\$1.26	\$7.67	1.2	19.0

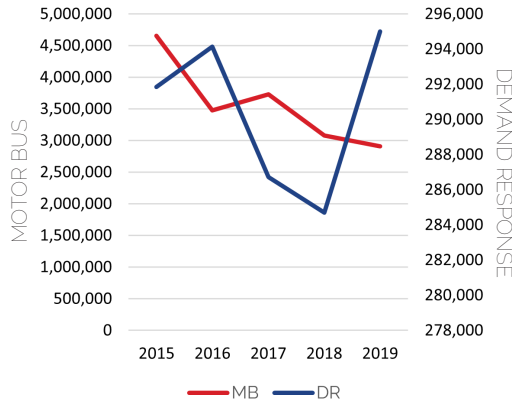
City of Columbia (Go COMO)

Service Area: Columbia, MO
 Service Area Population: 121,351
 Services Provided: Bus, Demand Response

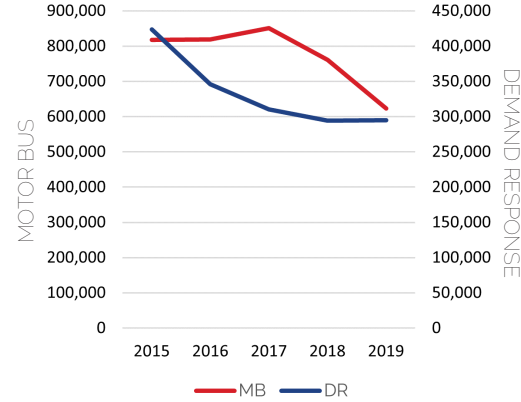
ANNUAL RIDERSHIP



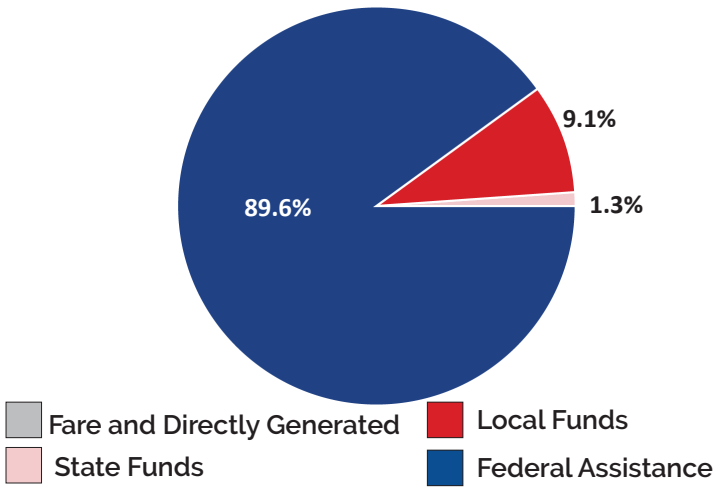
PASSENGER MILES



VEHICLE MILES



OPERATING FUNDING SOURCES



22%

Farebox Recovery



47

No. FTE Employees

29

No. Drivers



41

Total Vehicles

23

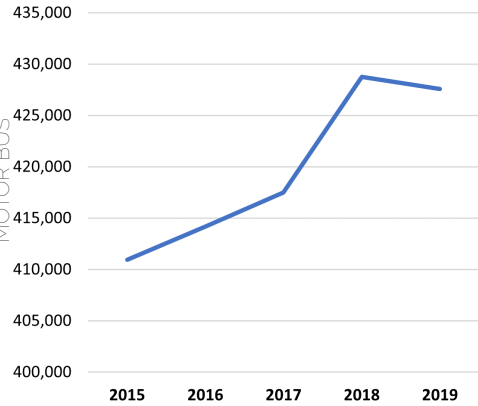
Peak Vehicles

Mode	Service Efficiency			Service Effectiveness		
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	\$4.87	\$65.86	\$4.43	\$24.73	0.2	2.7
Bus	\$9.23	\$93.11	\$1.94	\$5.35	1.7	17.4
Total	\$7.90	\$86.39	\$2.17	\$6.27	1.3	13.8

St. Joseph Transit (The Ride)

Service Area: St. Joseph, MO-KS
 Service Area Population: 77,645
 Services Provided: Bus

ANNUAL RIDERSHIP



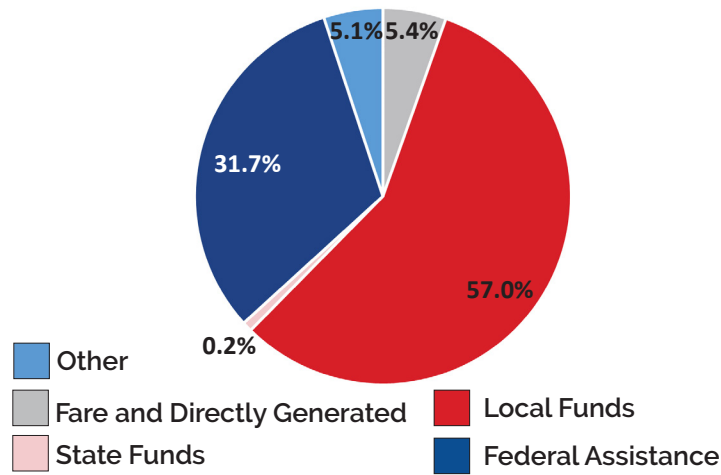
PASSENGER MILES

Limited Reporter

VEHICLE MILES

Limited Reporter

OPERATING FUNDING SOURCES



5%

Farebox Recovery



--

No. FTE Employees

--

No. Drivers



16

Total Vehicles

--

Peak Vehicles

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Bus	\$6.73	\$84.07	---	\$12.65	0.5	6.6
Total	\$6.73	\$84.07	---	\$12.65	0.5	6.6

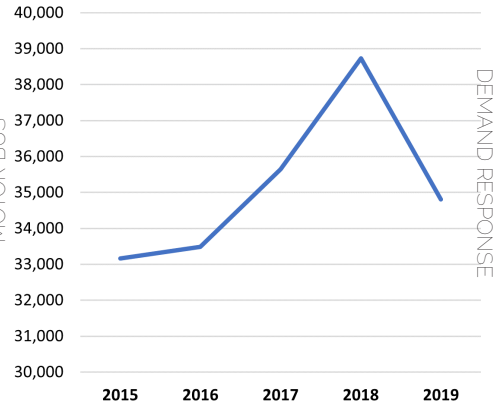
City of Joplin Metro Area Public Transit System (MAPS)

Service Area: Joplin, MO
 Service Area Population: 75,000
 Services Provided: Bus, Demand Response

ANNUAL RIDERSHIP

PASSENGER MILES

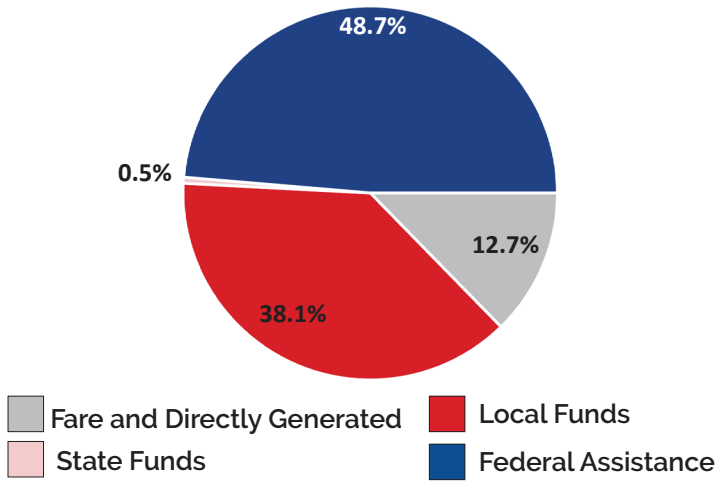
VEHICLE MILES



Limited Reporter

Limited Reporter

OPERATING FUNDING SOURCES



13%

Farebox Recovery



No. FTE Employees

No. Drivers



9

Total Vehicles

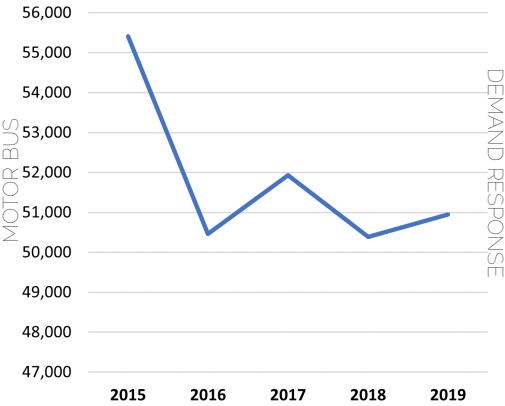
Peak Vehicles

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	\$4.09	\$56.93	---	\$23.76	0.2	2.4
Bus	\$4.35	\$54.21	---	5.75	0.8	9.4
Total	\$4.18	55.90	---	\$11.05	0.4	5.1

City of Jefferson (JeffTran)

Service Area: Jefferson City, MO
 Service Area Population: 42,588
 Services Provided: Bus, Demand Response

ANNUAL RIDERSHIP



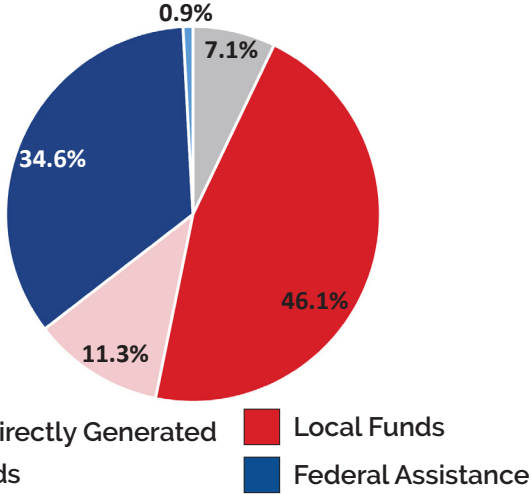
PASSENGER MILES

Limited Reporter

VEHICLE MILES

Limited Reporter

OPERATING FUNDING SOURCES



7%

Farebox Recovery



--

No. FTE Employees

--

No. Drivers



17

Total Vehicles

--

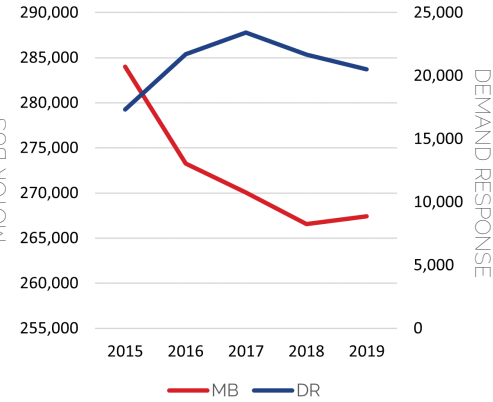
Peak Vehicles

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	\$4.39	\$59.00	---	\$18.77	0.2	3.1
Bus	\$4.60	\$78.39	---	\$6.33	0.7	12.4
Total	\$4.51	\$69.00	---	\$8.72	0.5	7.9

City of Independence (IndeBus)

Service Area: Independence, MO
 Service Area Population: 116,830
 Services Provided: Bus (purchased), Demand Response

ANNUAL RIDERSHIP



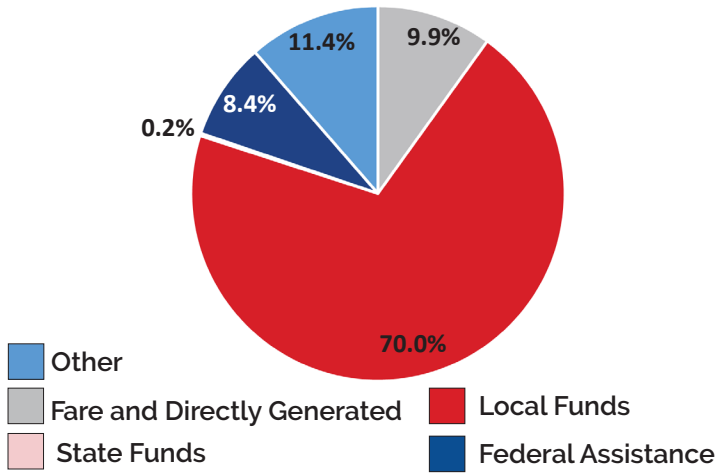
PASSENGER MILES

Limited Reporter

VEHICLE MILES

Limited Reporter

OPERATING FUNDING SOURCES



10%

Farebox Recovery



--

No. FTE Employees

--

No. Drivers



14

Total Vehicles

--

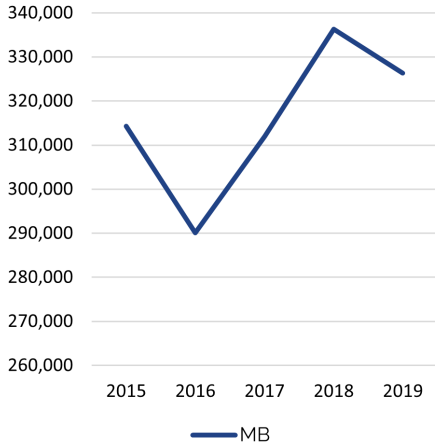
Peak Vehicles

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	\$4.58	\$59.04	---	\$30.71	0.1	1.9
Bus	\$6.52	\$88.35	---	\$5.90	1.1	15.0
Total	\$5.82	\$77.38	---	\$7.66	0.8	10.1

Southeast Missouri State University (SEMO)

Service Area: Cape Girardeau, MO-IL
 Service Area Population: 16,987
 Services Provided: Bus

ANNUAL RIDERSHIP



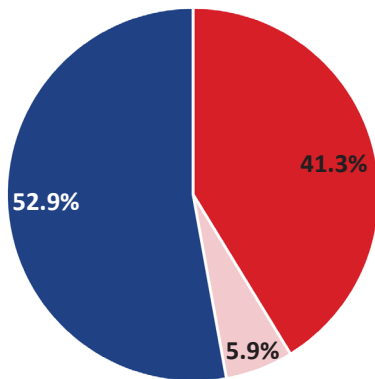
PASSENGER MILES

Limited Reporter

VEHICLE MILES

Limited Reporter

OPERATING FUNDING SOURCES



State Funds

Local Funds
 Federal Assistance



0%

Farebox Recovery



No. FTE Employees

No. Drivers



6

Total Vehicles

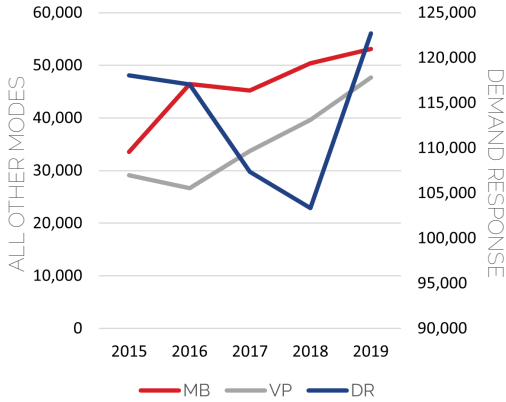
Peak Vehicles

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Bus	\$2.81	\$30.84	---	\$0.93	3.0	33.0
Total	\$9.45	\$145.82	---	\$0.93	3.0	33.0

Cape Girardeau County Transit Authority (CGCTA)

Service Area: Cape Girardeau, MO-IL
 Service Area Population: 78,753
 Services Provided: Bus, Demand Response, Vanpool

ANNUAL RIDERSHIP



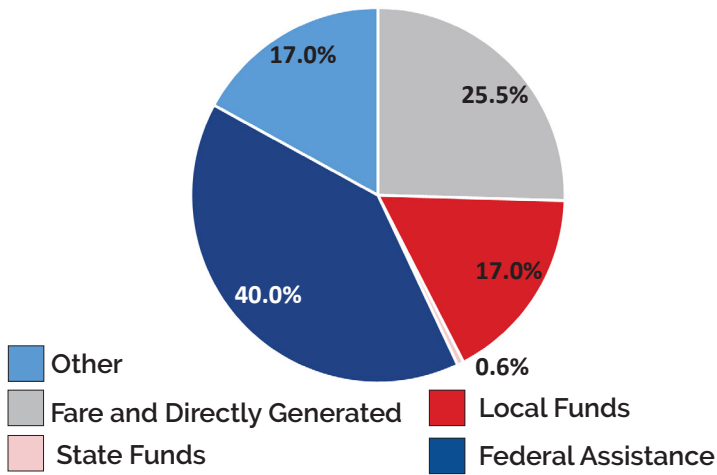
PASSENGER MILES

Limited Reporter

VEHICLE MILES

Limited Reporter

OPERATING FUNDING SOURCES



26%

Farebox Recovery



--

No. FTE Employees

--

No. Drivers



30

Total Vehicles

--

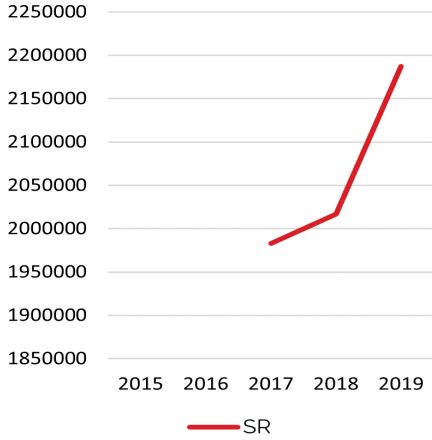
Peak Vehicles

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	\$2.09	\$37.25	---	\$19.85	0.1	1.9
Bus	\$1.79	\$24.52	---	\$3.99	0.4	6.1
Vanpool	\$0.84	\$23.22	---	\$2.87	0.3	8.1
Total	\$1.82	\$34.84	---	\$12.48	0.2	2.8

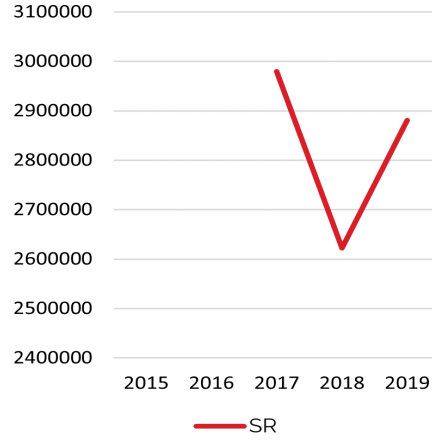
Kansas City, Missouri (Kansas City Streetcar Authority)

Service Area: Kansas City, MO-KS
 Service Area Population: 11,953
 Services Provided: Streetcar Rail

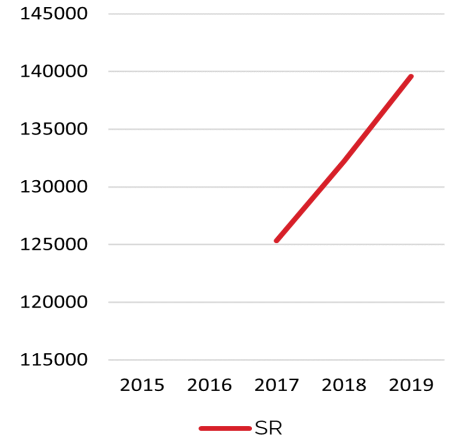
ANNUAL RIDERSHIP



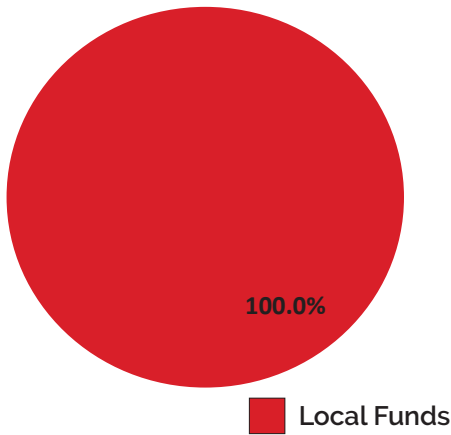
PASSENGER MILES



VEHICLE MILES



OPERATING FUNDING SOURCES



0%

Farebox Recovery



--

No. FTE Employees

--

No. Drivers



4

Total Vehicles

4

Peak Vehicles

Mode	Service Efficiency		Service Effectiveness			
	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour	Operating Expenses per Passenger Mile	Operating Expenses per Unlinked Passenger Trips	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Streetcar	\$37.16	\$263.82	\$1.78	\$2.34	15.9	112.5
Total	\$37.16	\$263.82	\$1.78	\$2.34	15.9	112.5

Rural System Profiles

TABLE 5. RURAL TRANSIT AGENCIES

Agency	City	Annual Passenger Trips	Vehicle Revenue Miles	Vehicle Revenue Hours
City of Bloomfield	Bloomfield	4,656	7,150	1,876
City of Carthage	Carthage	14,356	49,169	4,745
City of Clinton	Clinton	14,575	32,632	4,101
City of El Dorado Springs	El Dorado Springs	12,688	24,928	1,815
City of Excelsior Springs	Excelsior Springs	8,609	25,567	2,443
City of Houston	Houston	15,904	16,410	1,704
City of Lamar	Lamar	21,400	42,113	2,410
City of Mount Vernon	Mt. Vernon	16,994	30,660	3,490
City of Nevada	Nevada	6,762	26,924	3,223
City of New Madrid	New Madrid	7,297	13,641	1,649
City of West Plains	West Plains	12,898	40,642	3,510
Dunklin County Transit Service, Inc.	Malden	34,813	216,014	9,088
Licking Bridge Builders Senior Center	Licking	1,547	38,837	2,100
Macon Area Chamber of Commerce	Macon	2,870	9,227	1,120
Mississippi County Transit System, Inc.	East Prairie	20,100	184,717	8,355
OATS, Inc.	Columbia	1,420,691	14,653,297	772,284
Ray County Transportation, Inc.	Richmond	53,842	390,936	29,710
Ripley County Transit, Inc.	Doniphan	14,602	296,705	13,481
Scott County Transit System, Inc.	Sikeston	23,605	136,418	7,702
SERVE, Inc.	Fulton	34,137	235,277	14,710
Southeast Missouri Transportation, Inc.	Fredericktown	313,392	3,629,861	192,587

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Demographic Profile

A demographic profile and Mobility Needs Index (MNI) were created to illustrate where potential demographic factors align to indicate a need for transit services. Per guidance from MPTA and outlined in the project scope, the following demographic indicators were used in this analysis.

Population density (Figure 4)

Population density is a key indicator of transit need and also serves as a proxy indicator for several other factors that influence transit. Communities with higher density are more likely to use transit services due to the land use and commuting patterns in these areas. There are concentrations of population density near the major metropolitan areas of St. Louis and Kansas City as well as near other urban areas of Jefferson City, Columbia, and Springfield. Large portions of the state are rural in nature and are therefore low density.

Population age 65 and over (Figure 5)

This population group relies more on transit services due to mobility challenges associated with aging and declining driving abilities. There are high numbers of people over age 65 in and around St. Louis and Kansas City as well as Springfield. However, there are also pockets throughout southern Missouri between Springfield, Jefferson City, and Cape Girardeau where many seniors live in more rural areas.

Population age 18 and under (Figure 6)

Similar to seniors, this population group relies on transit due to mobility challenges associated with not having access to a car. This group contains those too young to drive and those young people who cannot yet afford a vehicle or choose not to drive. The distribution closely resembles seniors with high numbers in the cities of St. Louis, Kansas City, and Springfield. This group is also associated with locations with major universities such as Columbia, Rolla, and Cape Girardeau.



Population with a disability (Figure 7)

This population group relies on transit services due to physical or mental barriers to using other forms of transportation. There are large numbers of people with a disability throughout the metropolitan areas of St. Louis and Kansas City as well as in the southern portion of the state.

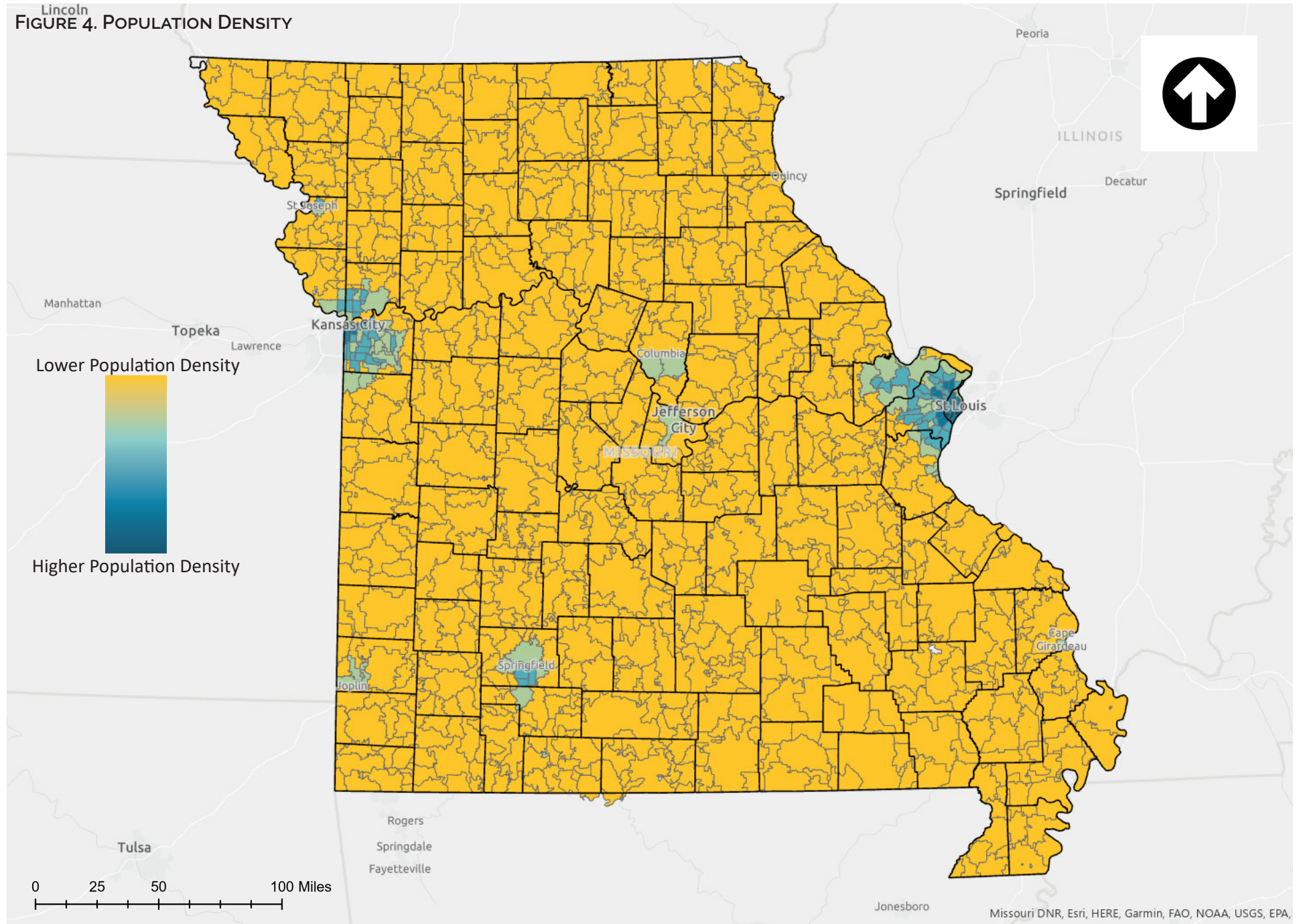
Population in poverty (Figure 8)

Transportation costs, which may include auto loans, insurance, fuel, and maintenance, often make up the second largest household expense behind housing. For those in poverty, it is more challenging to afford an automobile and so they rely on transit to get to work, school, shopping, etc. Poverty exists in locations throughout the state. However, higher concentrations of low-income residents can be found in and around the metropolitan areas and across the rural areas of southern Missouri.

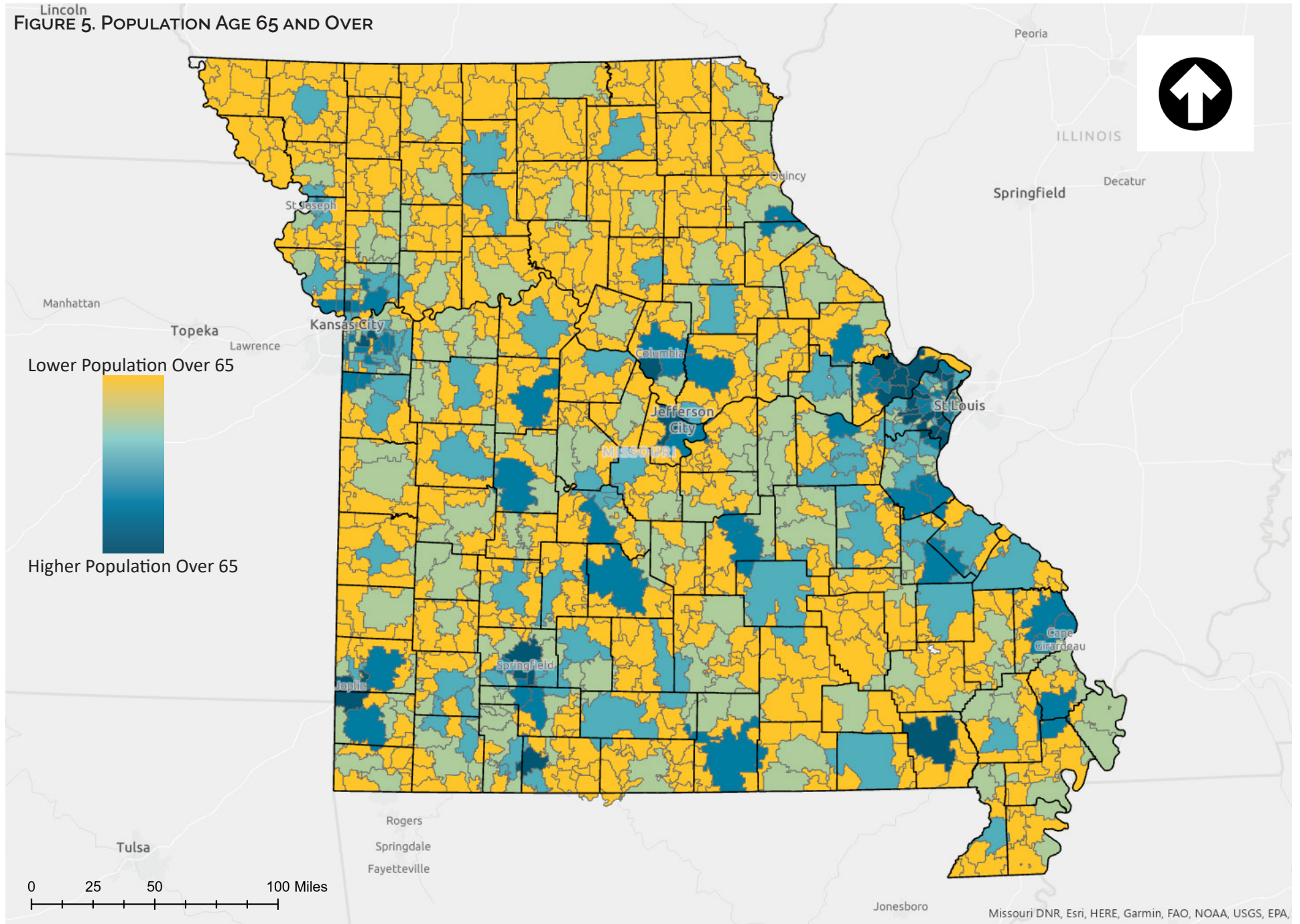
Workers with no access to a vehicle (Figure 9)

This group clearly relies on transit more than those with access to a vehicle. Workers may not have access to a vehicle for a variety of reasons not yet captured in the other demographic indicators. This indicator shows a stark difference between the more urban parts of the state and the rural areas. Many more workers rely on transit in St. Louis, Kansas City, Springfield, and Columbia due to lack of a vehicle as compared to the more rural areas in the north and portions of the south.

Lincoln
FIGURE 4. POPULATION DENSITY

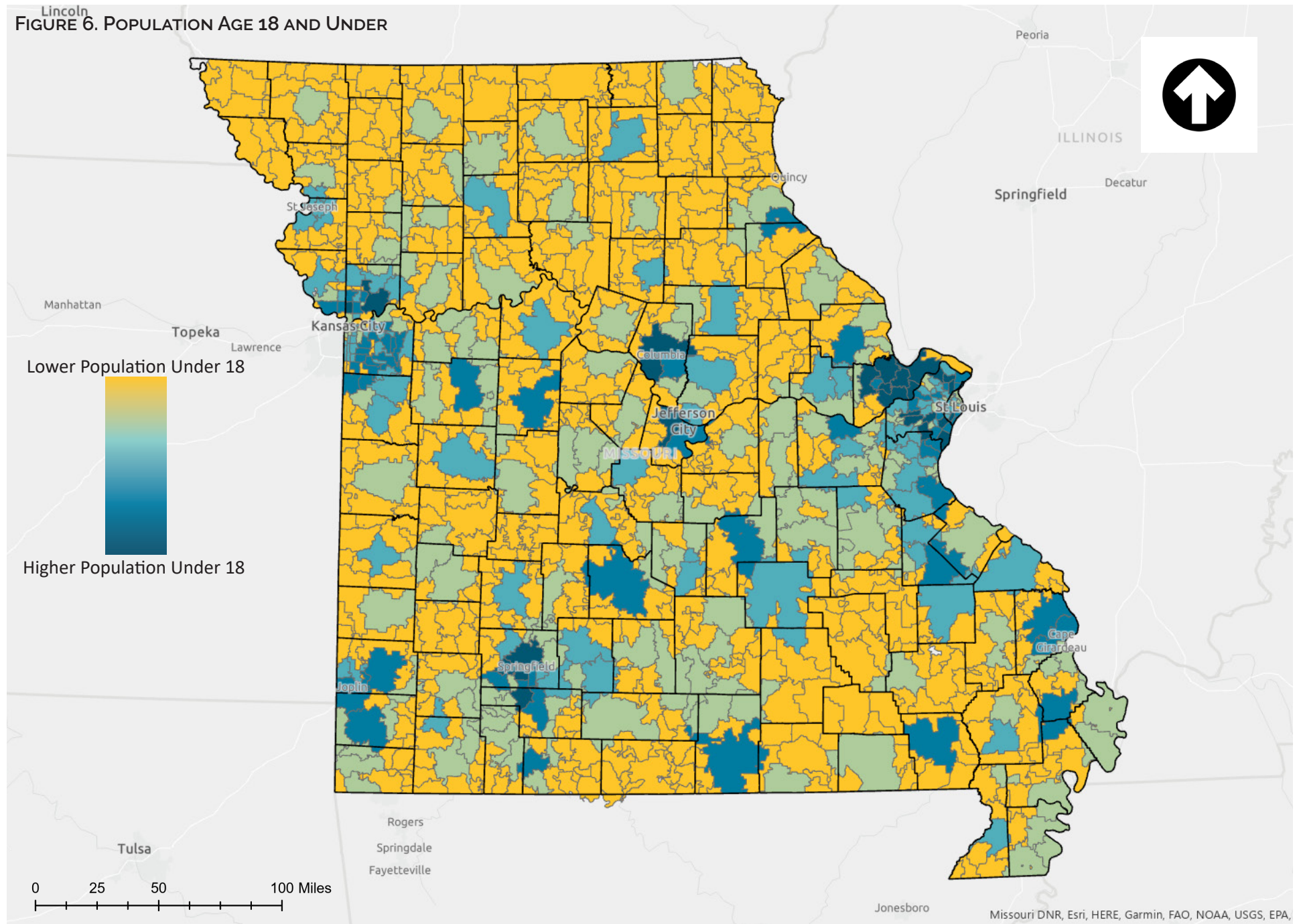


Lincoln
FIGURE 5. POPULATION AGE 65 AND OVER

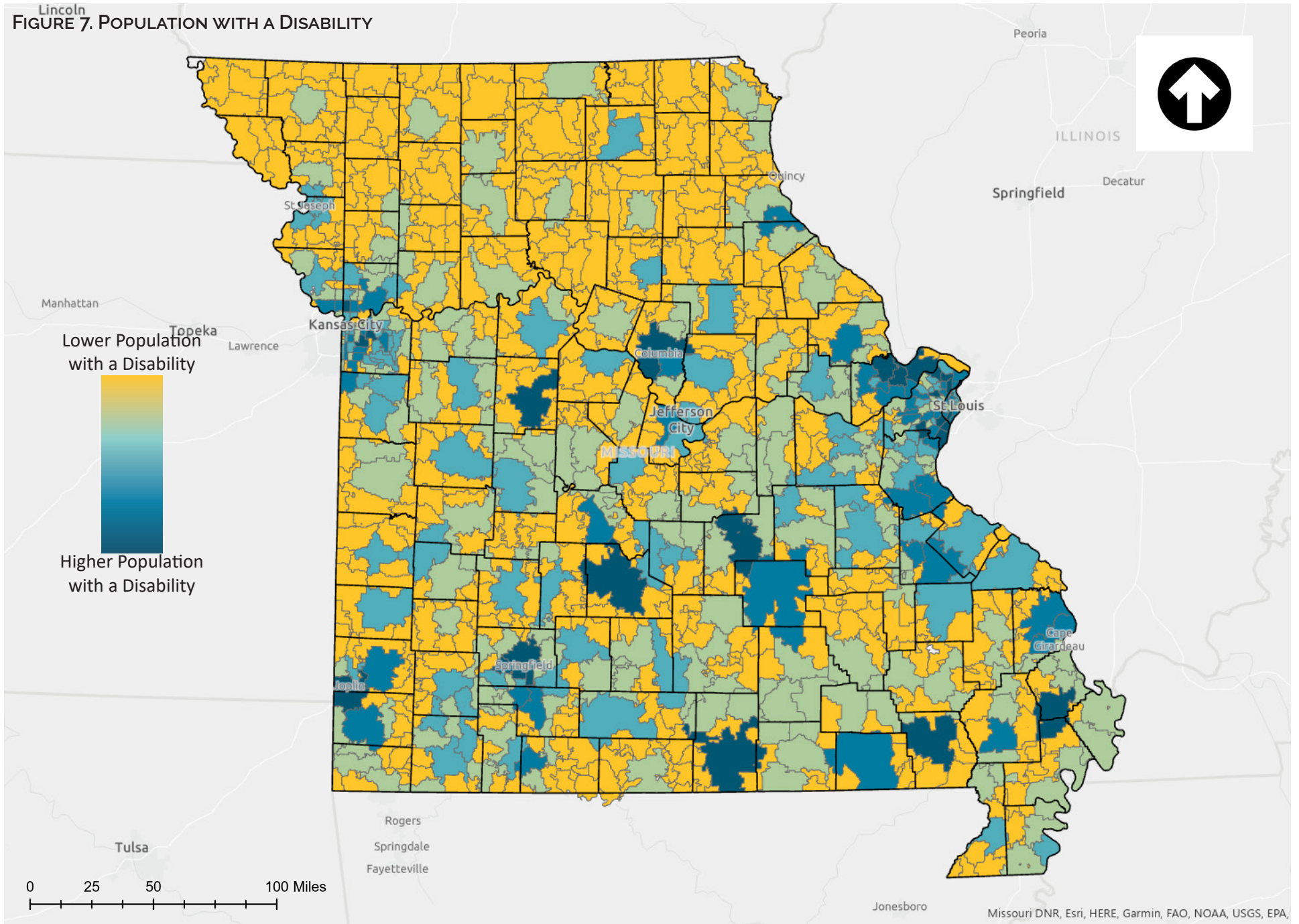


Missouri DNR, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA,

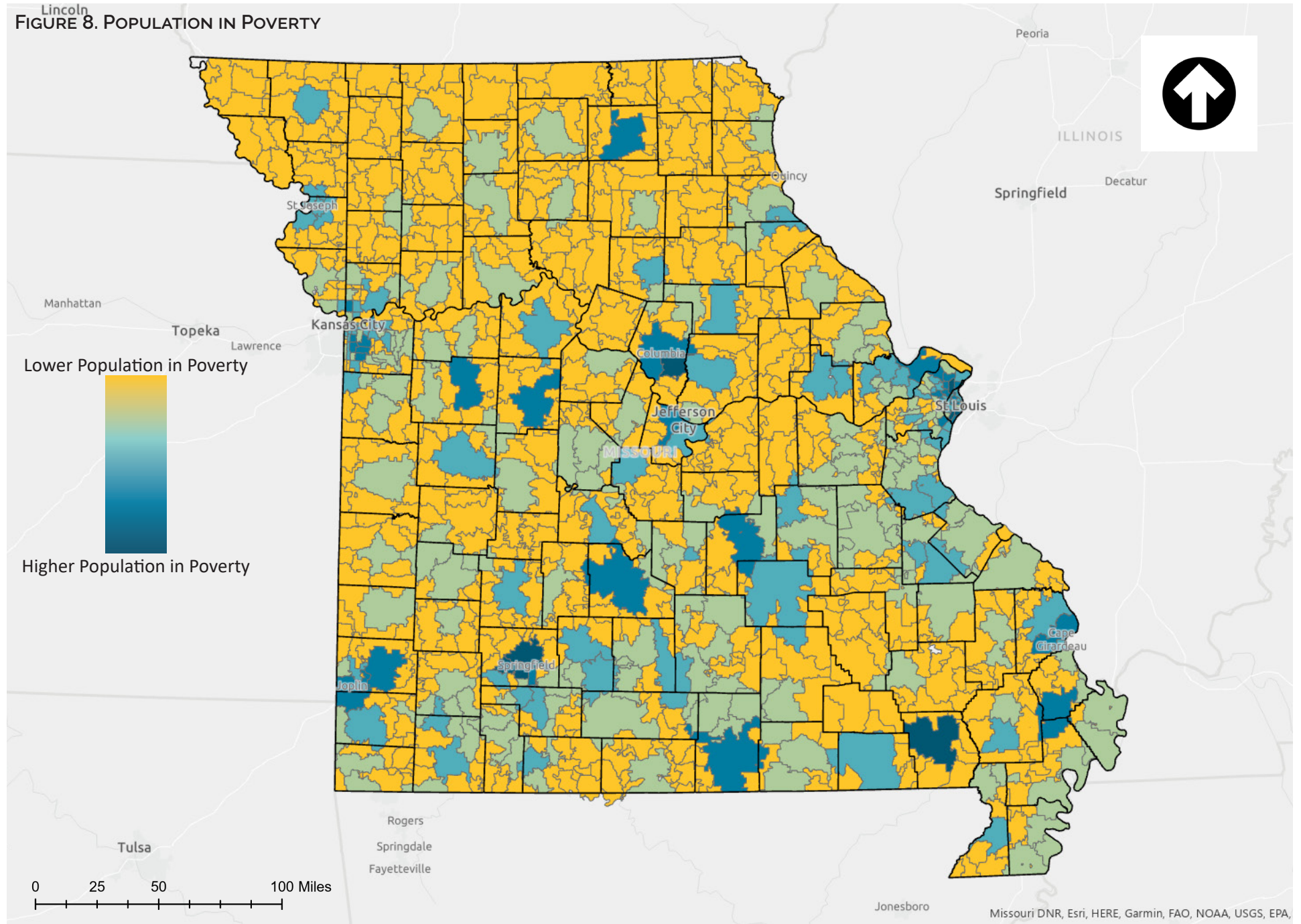
Lincoln
FIGURE 6. POPULATION AGE 18 AND UNDER



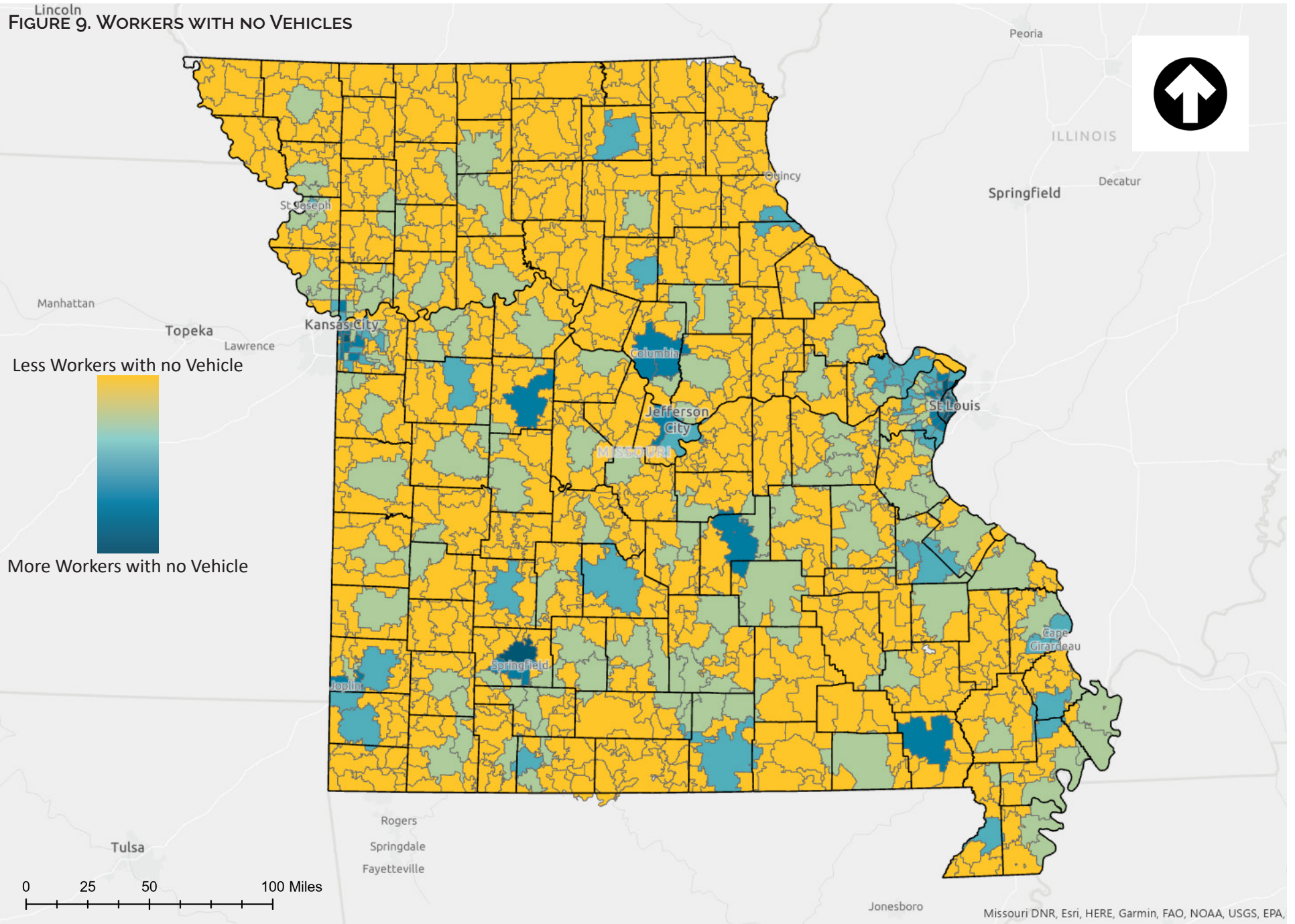
Lincoln
FIGURE 7. POPULATION WITH A DISABILITY



Lincoln
FIGURE 8. POPULATION IN POVERTY



Lincoln
FIGURE 9. WORKERS WITH NO VEHICLES



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Mobility Needs Index

As shown and described previously, demographic indicators can illustrate which groups are more likely to need transit in Missouri. Since individual indicators vary throughout the state, it is a challenge to interpret them collectively. An effective way to evaluate all indicators together is by creating a composite indicator, in this case called the Mobility Needs Index (MNI). Composite indicators are frequently used to measure complex trends in a simplistic, easy to understand way. Some well-known composite indicators include the Human Development Index, Income Inequality Database (Gini Index), and the Environmental Sustainability Index. A composite indicator has various advantages that make it an ideal descriptor for this project. Advantages of the Mobility Needs Index include:

- Reduce size and scope of multiple indicators
- Can summarize complex set of indicators; in this case, independent demographic groups that may require transit for a variety of reasons.
- Supports easy interpretation by policy and/or decision makers

To develop the MNI, each demographic indicator at the zip code level is normalized on a scale to allow for aggregation of similar units. The MNI represents the average of the normalized indicators. Higher MNI values represent more need for transit. Since the MNI is the collection of multiple indicators, the results indicate the level of need regardless of the demographic makeup of the zip code. For example, an urban zip code may have an MNI influenced strongly by high population density and high number workers without a vehicle; meanwhile, a rural zip code may have an MNI influenced strongly by high poverty and a high population with a disability. In both cases, the MNI may suggest those zip codes have a high need for transit despite the drivers of that need being unique to the local conditions.

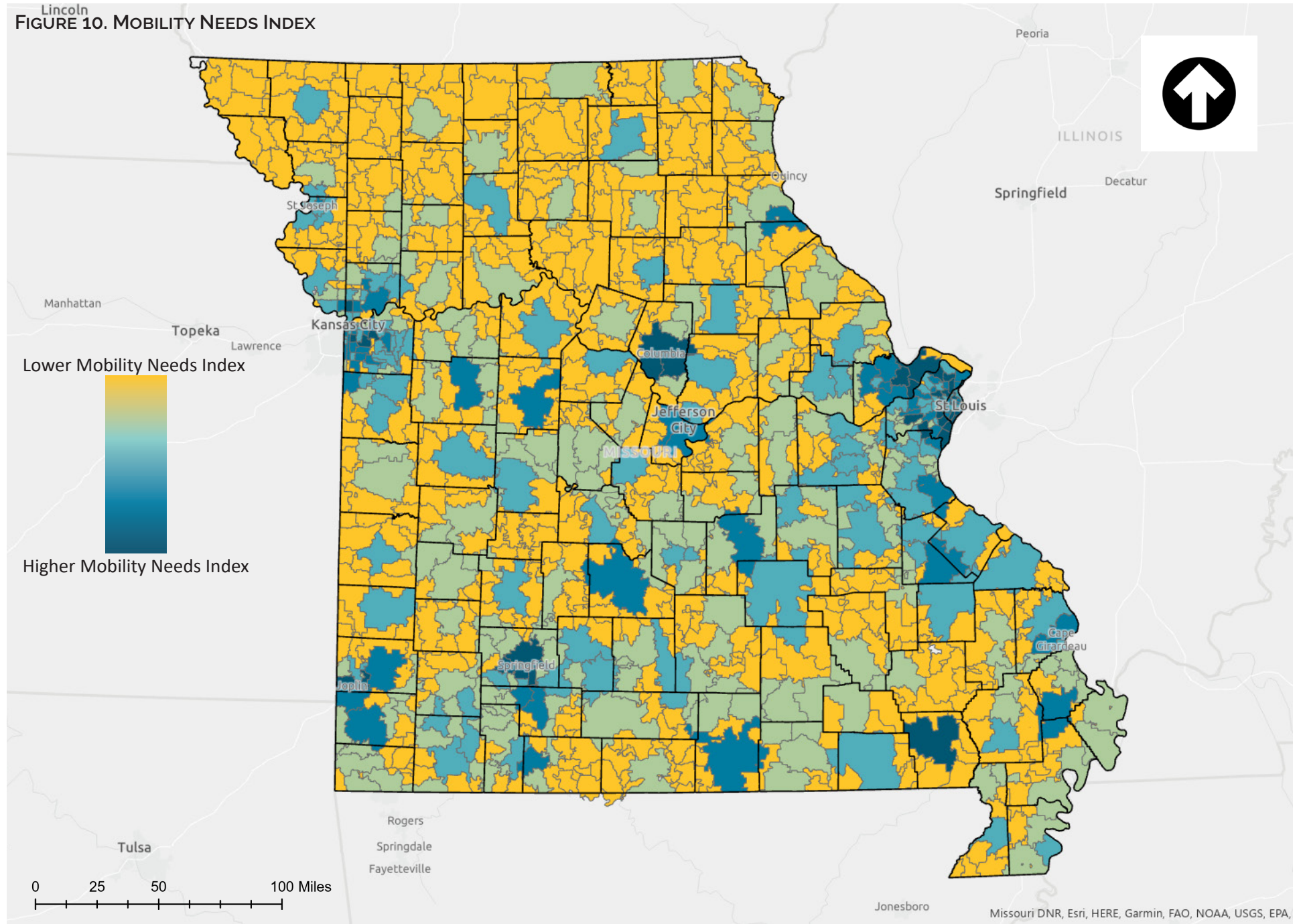
Figure 10 illustrates the MNI for each zip code in Missouri. As expected, transit need tracks closely with population centers and we see high MNI values in St. Louis, Kansas City, Springfield, Columbia, Joplin, and other cities. However, we also observe high MNI values in suburban and exurban areas around St. Louis and Kansas City and in the central part of the state.

25% of Missouri zip codes have a high need for transit, where the MNI is higher than the state average. Those zip codes represent approximately 82% of the state's total population. This shows that the need for transit is statewide and not concentrated solely in urbanized areas. Exurban and rural areas across the state demonstrate the need for transit despite lower population densities.

Since many transit service providers serve communities at the county level, it is helpful to consider needs across multiple geographic scales. 101 out of 115 counties in the state include a zip code with a high need for transit. Of those, 73 out 101 counties do not have a local transit service provider and are either without transit entirely or rely on regional transit service providers. All the counties that lack transit services are rural despite the need as shown by the MNI.

For a detailed description of the demographic profile and Mobility Needs Index methodology, see **Appendix A**.

Lincoln
FIGURE 10. MOBILITY NEEDS INDEX



Transit Service Evaluation

The transit service evaluation identifies potential transit demand in different geographies throughout the state. This potential demand was then compared to actual transit ridership levels to determine the extent, if any, of potential unmet demand. The levels of potential unmet demand are then illustrated by the anticipated cost of deploying transit service to meet the demand. This was then used to estimate funding gaps that exist to meet that demand.

While the Mobility Needs Index (MNI) computed for this study relies on demographic indicators to quantify and compare a community's need for transit, the transit service evaluation attempts to quantify and compare the number of annual transit trips based on needs and the actual annual number of transit trips taken.

Multiple approaches were used to estimate potential demand depending on the transit agency and service area characteristics. Service areas were classified in three groups:

- Large Urban Systems
- Small Urban Systems
- Rural Systems

For each group, a unique approach was utilized to estimate potential transit trip demand and any corresponding unmet demand. This analysis was unable to evaluate local circumstances in detail but rather focused on the broader trends revealed across communities of similar size and type to quantify unmet needs and the estimated funding necessary to support those needs.



Large Urban Systems

For large urban systems, a peer-based analysis was performed based on methodologies established by previous projects and research. The Urban Integrated National Transit Database (iNTD)¹ was used to identify and select agency peers. Each large urban system in Missouri was compared with five peers with the highest likeness scores from outside of the state.

For each agency/mode, potential demands were derived from peer agencies and not a travel demand model or other more rigorous exercise. The estimated potential demand was then compared to current ridership or actual usage to determine if any unmet demand is present. For unmet demands, agency reported expenses were used to calculate the additional funding needed to fulfill the unmet demand throughout their service area. A summary of each large urban agency's unmet demand and cost to expand service to meet 100% and 50% of the unmet demand is shown in **Table 6**.

All large urban systems in the state have potential unmet demand except for KCATA's bus service whose ridership exceeds potential demand. There are various possible explanations for this. For one, KCATA may be attracting a substantial number of choice riders, riders who use transit by choice but do not rely on it. Or, since this analysis relied on a peer comparison to determine potential demand, KCATA might simply outperform its peer agencies in terms of ridership. That is not to say that there is not unmet need, but rather local conditions are producing higher than expected ridership. More information on the methodology is found in **Appendix B**.

For a more detailed look at the two largest transit providers in the state, **Figures 11 and 12** show the urban areas of St. Louis and Kansas City and their respective transit need as demonstrated by the MNI.

The average MNI value in the St. Louis region is nearly double the statewide average and the highest levels of transit need can be seen in suburban locations such as St. Charles, Florissant, Affton, and Oakville. The highest need zip code in the region is near Jennings and Bellefontaine Neighbors in north St. Louis County. Despite high percentages of poverty, disability, and lack of vehicle access seen in north St. Louis City, the MNI measures total populations and total need, so MNI values are lower in parts of north St. Louis City compared to similarly urbanized neighborhoods in south St. Louis City. While population decline in the most distressed areas of the city have decreased the total need for transit, there is clearly a need for transit throughout the St. Louis region and special consideration should be given to communities that disproportionately rely on transit.

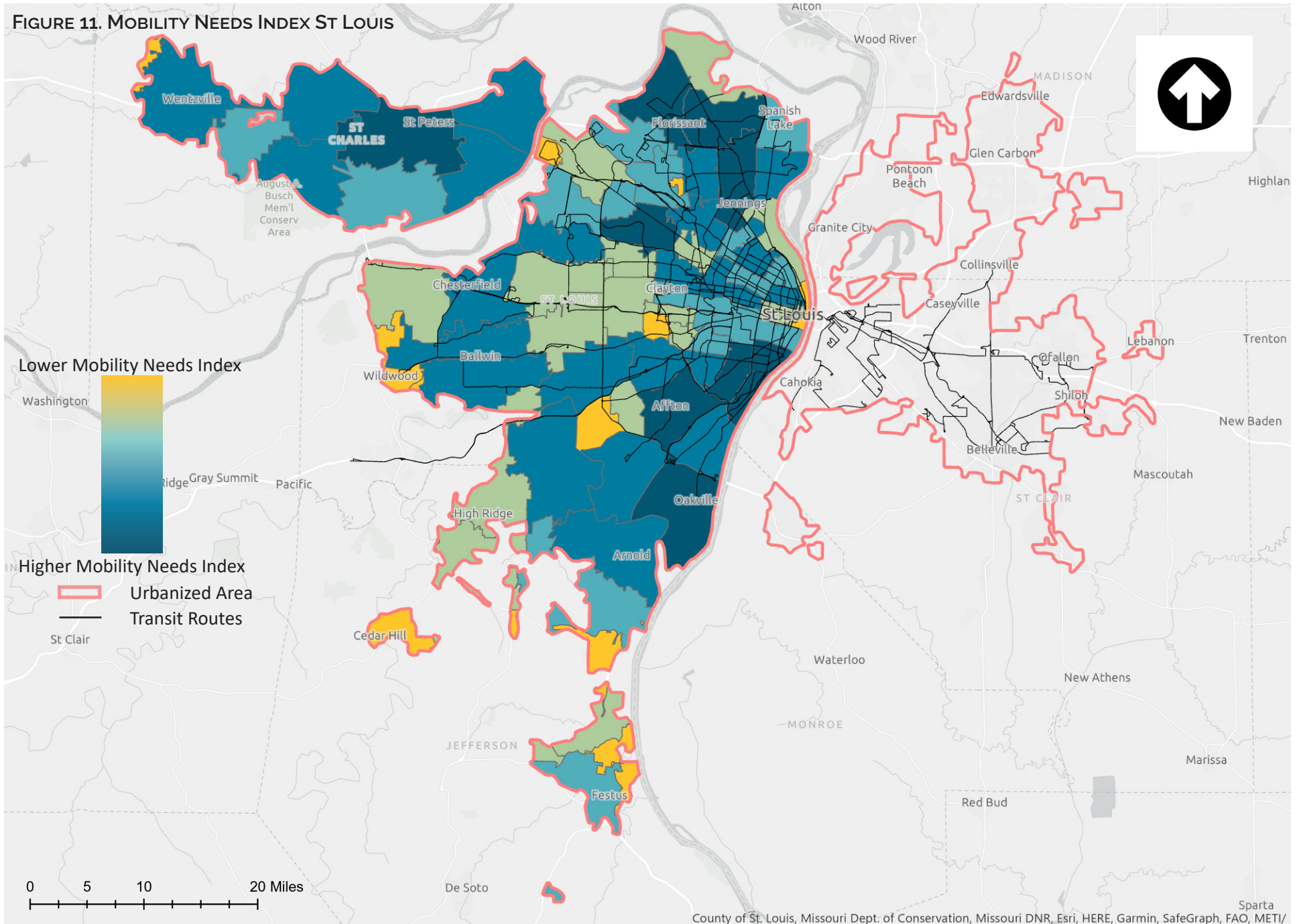
Similarly, the average MNI value in the Kansas City region is significantly higher than the statewide average. Over 70% of Kansas City zip codes have MNI values above the statewide average. The highest MNI values are seen in suburban communities of Independence, Blue Springs, Grandview, and Gladstone. Interestingly, while high MNI values in St. Louis are primarily driven by high poverty and lack of vehicle access, high MNI values in Kansas City are driven by high populations over age 65 and high populations with a disability.

TABLE 6. LARGE URBAN SYSTEMS POTENTIAL UNMET DEMAND AND COSTS

Agency	Mode	Percent of Demand Met	Unmet Demand (trips/year)	Cost to Meet 100% of Unmet Demand	Cost to Meet 50% of Unmet Demand
Bi-State	MB – Motorbus	73%	8,737,111	\$63,169,919	\$31,584,959
Bi-State	LR – Light Rail	58%	10,861,722	\$64,557,034	\$32,278,517
Go COMO	MB – Motorbus	57%	1,017,927	\$5,533,526	\$2,766,763
CU Transit	MB – Motorbus	62%	845,630	\$5,531,331	\$2,765,665
KCATA	MB – Motorbus	124%	0	n/a	n/a
KCATA	RB – Rapid Bus	85%	218,400	\$1,167,627	\$583,814
KC Streetcar	SR – Streetcar	70%	890,290	\$1,054,667	\$527,334
Total			22,571,080	\$141,014,104	\$70,507,052

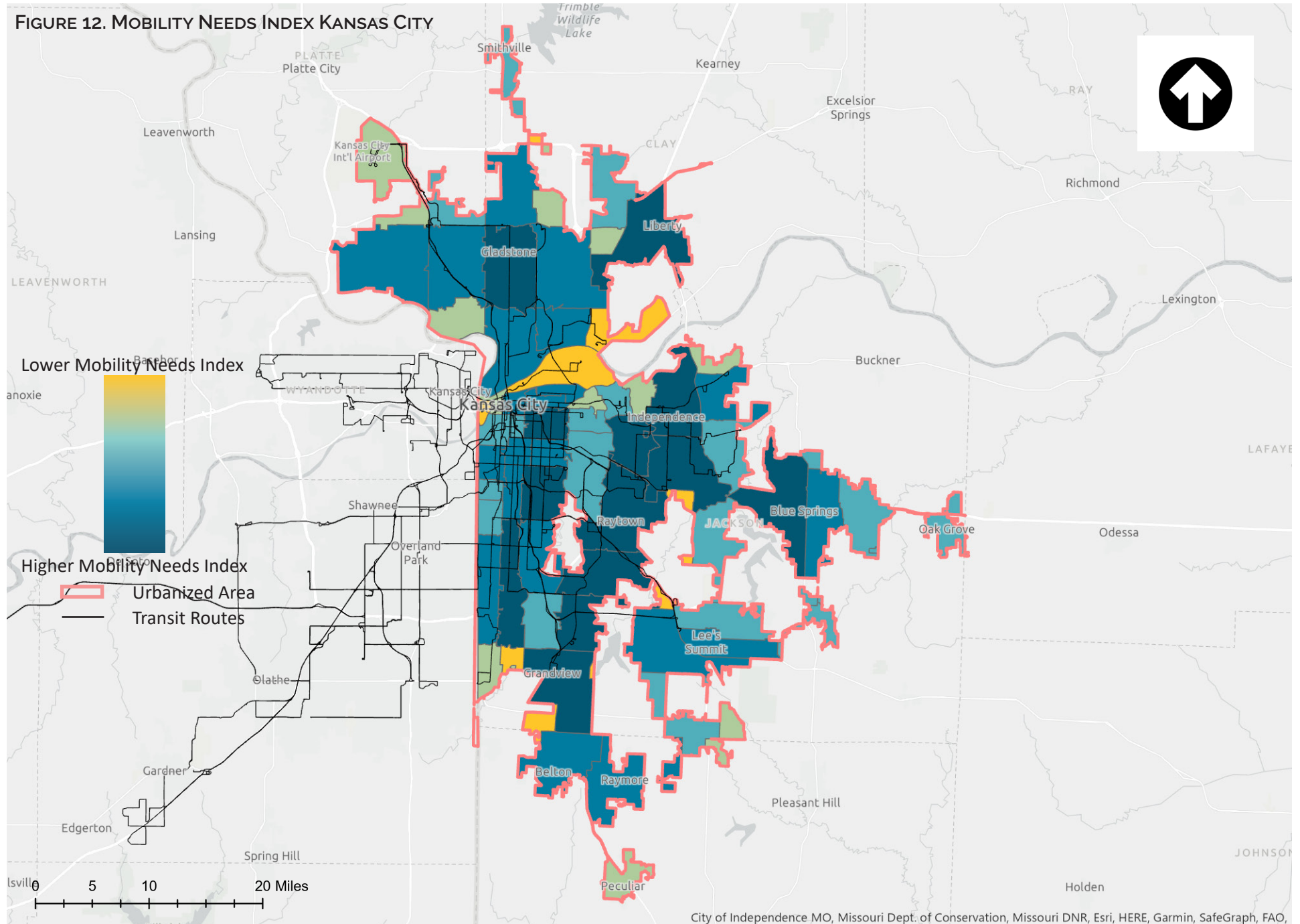
¹ https://www.ftis.org/urban_iNTD.aspx

FIGURE 11. MOBILITY NEEDS INDEX ST LOUIS



County of St. Louis, Missouri Dept. of Conservation, Missouri DNR, Esri, HERE, Garmin, SafeGraph, FAO, METI/

FIGURE 12. MOBILITY NEEDS INDEX KANSAS CITY



Small Urban Systems

For systems within urbanized areas that are not NTD full reporter types, the peer comparison approach could not be utilized in the same manner as with the large urban systems that are full reporter. TCRP Report 161 details a formula-based approach to estimate transit trip demand for these types of systems¹. Passenger trip demand is estimated as a function of population, the amount of service being provided, and major trip generators such as colleges and universities.

The estimated potential demand is compared to actual ridership to determine the unmet demand. Based on each agency's reported cost per trip, a total cost of additional transit service to meet the demand is estimated. **Table 7** shows each small city agency's unmet demand and estimated cost to meet 100% and 50% of unmet demand.

This analysis shows that JEFFTRAN, IndeBUS, and SEMO are serving 100%+ of their demand. Similar to KCATA, this may indicate that those agencies are attracting a substantial number of choice riders. It may not indicate there is no unmet need, but rather local conditions are producing higher than expected ridership.

TABLE 7. SMALL CITY SYSTEMS POTENTIAL UNMET DEMAND AND COSTS

Agency	Ridership (Annual Passenger Trips)	Percent of Demand Met	Unmet Demand (trips/year)	Cost to Meet 100% of Unmet Demand	Cost to Meet 50% of Unmet Demand
Cape Girardeau Transit Authority	45,739	49%	47,356	\$222,097	\$111,049
JEFFTRAN	237,539	147%	0	n/a	n/a
City of Joplin	97,890	66%	51,321	\$202,203	\$101,102
St. Joseph Transit	419,790	86%	68,664	\$835,642	\$417,821
City of Independence (IndeBus)	272,265	121%	0	n/a	n/a
SEMO	316,412	209%	0	n/a	n/a
Total			167,340	\$1,259,943	\$629,972

1 https://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_161.pdf

Rural Systems

Over several decades, there has been a significant amount of research into forecasting transit trip demand in rural and/or low-density areas. These are areas where traditional fixed route service is not cost effective. These areas are instead commonly served by demand response type services. Following the guidance outlined in TCRP Report 161, a formula-based approach was used to estimate potential transit trip demand in these areas. Within the category of rural systems, two separate demand estimation methodologies were utilized for program and non-program demand. Program trips are those made because of a specific social service program and are associated with 5310¹ and 5311² FTA programming, respectively. Non-program trips are those made by the public for a broad range of trip purposes.

Rural, Non-Program (General Public) Demand

Since the operating cost per trip can vary among the various service providers and because some counties are served by multiple providers, a ridership weighted average cost per trip was calculated and used to determine the cost of adding transit service to meet 100% and 50% of potential unmet demand. **Table 8** summarizes the non-program or public demand and unmet demand.

Rural, Program Demand

Like the other evaluations, the estimated potential demand for this category of service was then compared to actual ridership. In this case, we combined reported 5310 and 5311 programs to determine the actual ridership. The program demand and unmet demand summary is provided in **Table 8**.

TABLE 8. RURAL SYSTEMS POTENTIAL UNMET DEMAND AND COSTS

Demand Type	Estimated Annual Demand	Ridership	Percent of Demand Met	Unmet Demand (trips/year)	100% Unmet Demand Cost	50% Unmet Demand Cost
General Public Demand	10,882,578	2,263,504	21%	8,619,076	\$157,078,617*	\$78,539,309*
Program Demand	14,275,416	6,631,649	46%	7,643,767	\$41,658,530**	\$20,829,265**

*Ridership weighted average cost per trip is \$18.22 per trip
 **Average cost per trip based on 2019 FTA program allocation and 80/20 split and Missouri MEHTAP funding is \$5.45

1 <https://www.transit.dot.gov/funding/grants/enhanced-mobility-seniors-individuals-disabilities-section-5310>

2 <https://www.transit.dot.gov/rural-formula-grants-5311>

Statewide Needs Summary

This analysis indicates a statewide potential unmet demand of almost 38 million transit trips per year. While meeting 100% of demand may not be possible, the state requires approximately \$150 million in additional annual transit spending to serve just 50% of potential unmet demand. **Table 9** breaks down the potential unmet demand and costs to meet the unmet demand by system type.

Current State of Transit Funding

When compared to peer states of similar size and urban/rural split, Missouri falls well short in terms of per capita funding for transit (as shown in **Figure 13**). Despite a large need for more transit, Missouri spends approximately \$0.28 per person on transit¹. Meanwhile, peer states on average, spend \$7.34 per person on transit.

The need for additional state funding is particularly acute in rural areas that currently rely disproportionately on local sources of funding. **Figures 14 and 15** show the cost to meet the rural potential unmet demand by state house and state senate district.

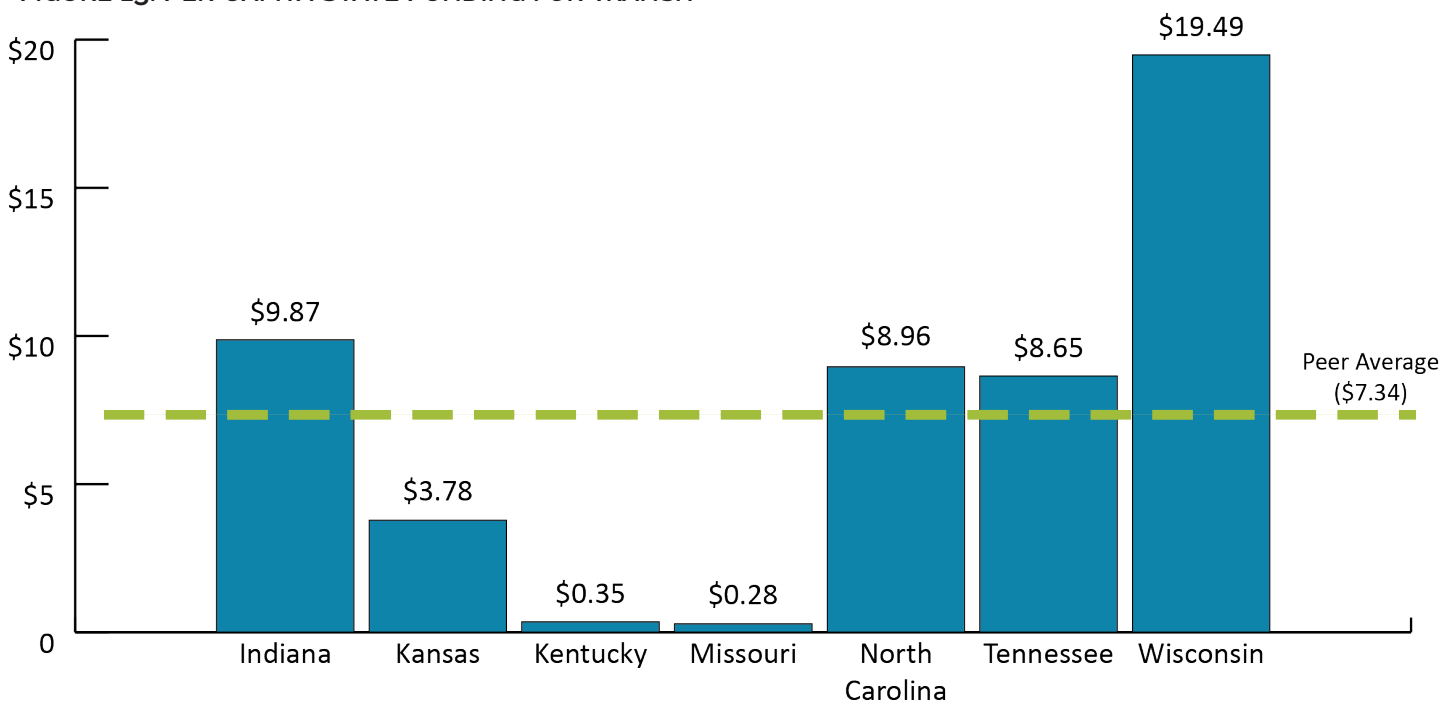
During this current legislative session for early 2022, there are proposals to increase funding. Still this increase is not nearly enough as demonstrated by needs outline further in the report. Moreover, concerted efforts will be need on the part of many stakeholders to ensure those investment allocations occur annually.

For a more details regarding the service evaluation and a more detailed breakdown by political districts, see **Appendix B**.

TABLE 9. STATEWIDE POTENTIAL UNMET DEMAND AND COSTS

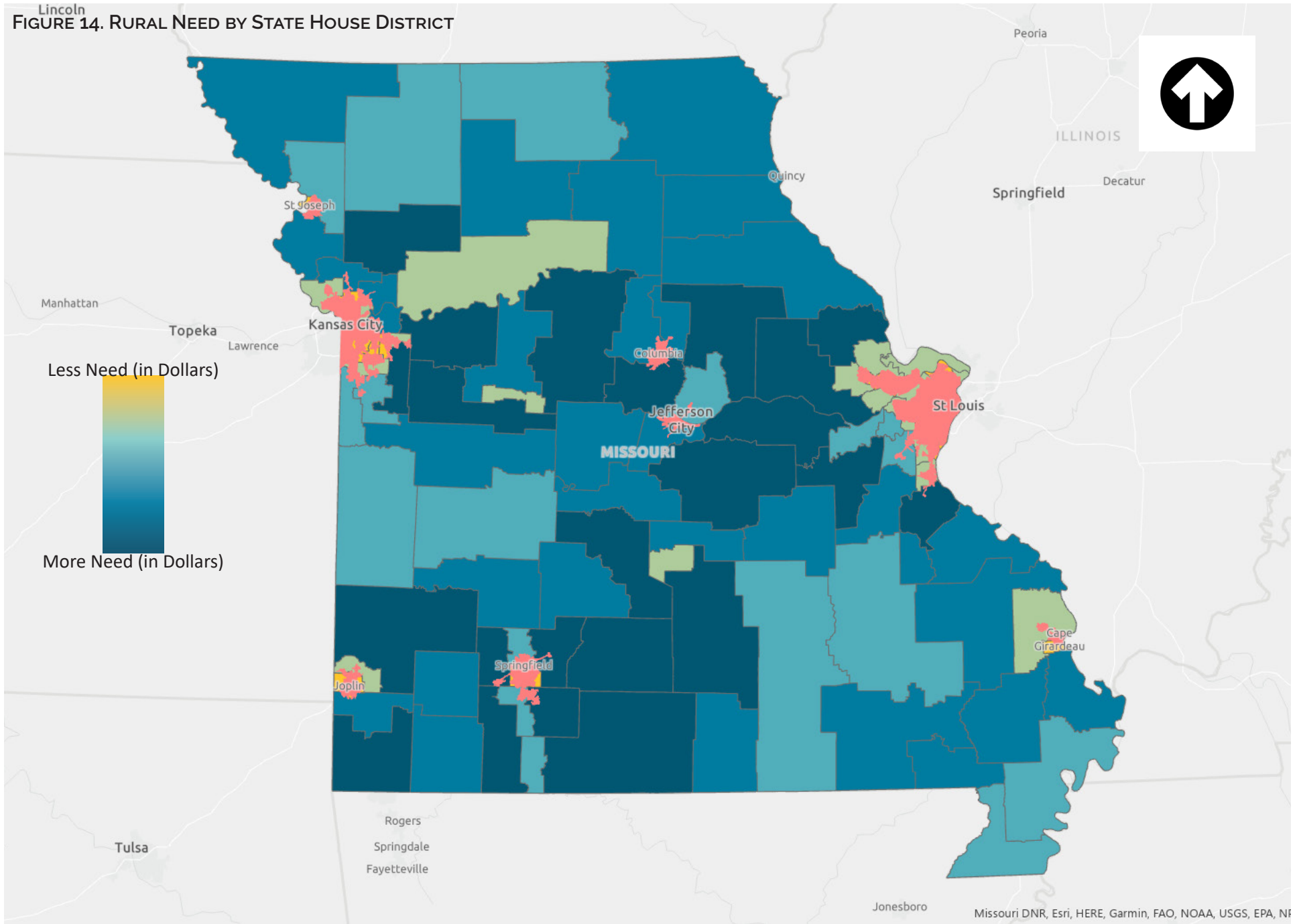
System Type	Unmet Demand (trips/year)	100% Unmet Demand Cost	50% Unmet Demand Cost
Large Urban	22,571,080	\$141,014,104	\$70,507,052
Small City	167,340	\$1,259,943	\$629,972
Rural, General	8,619,076	\$157,078,617	\$78,539,309
Rural, Program	7,643,767	\$41,658,530	\$20,829,265
Total	39,001,263	\$341,011,194	\$170,505,598

FIGURE 13. PER CAPITA STATE FUNDING FOR TRANSIT



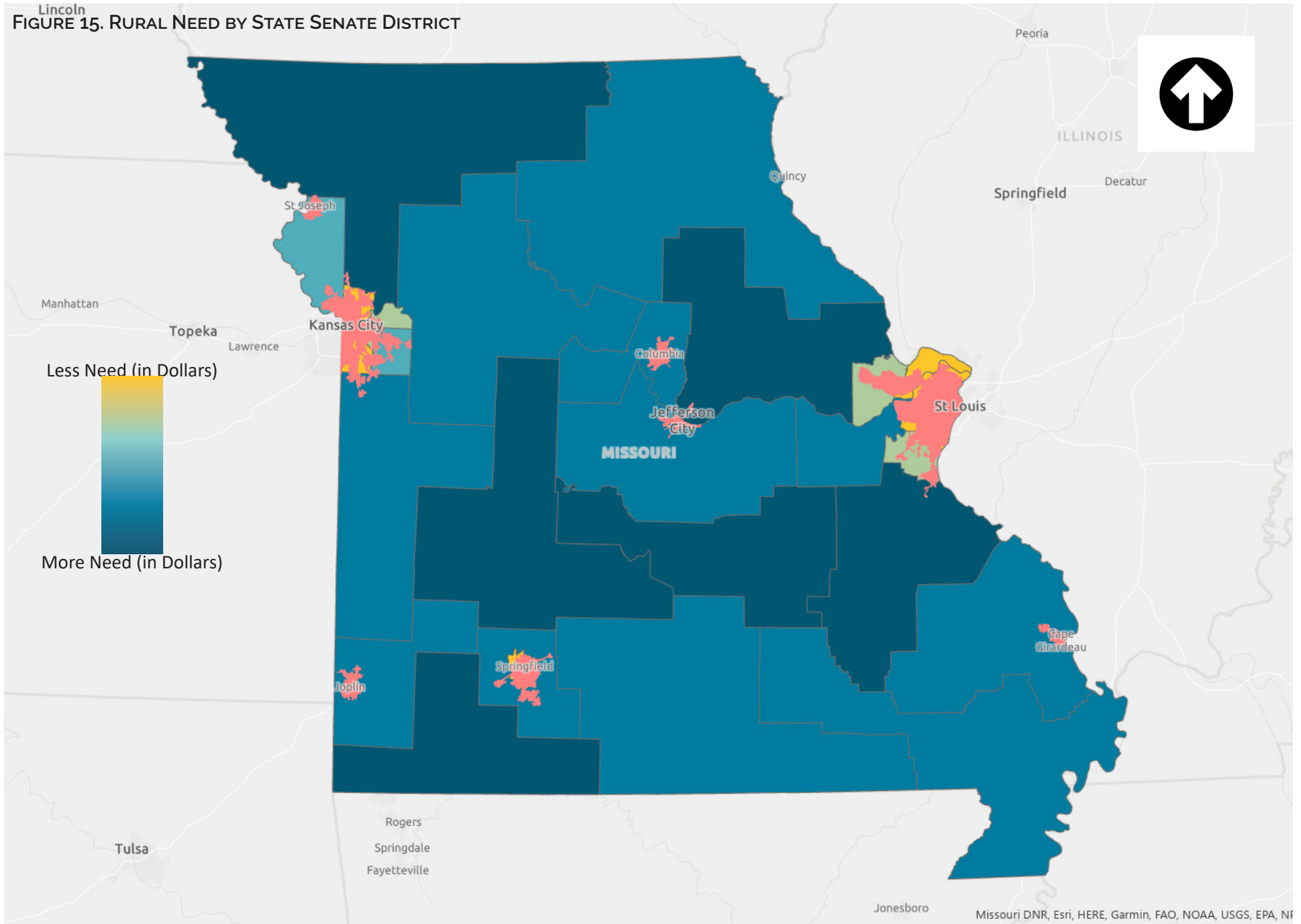
¹ <https://store.transportation.org/Item/PublicationDetail?ID=4563>

Lincoln
FIGURE 14. RURAL NEED BY STATE HOUSE DISTRICT



Missouri DNR, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NF

Lincoln
FIGURE 15. RURAL NEED BY STATE SENATE DISTRICT



Missouri DNR, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NF

State of Good Repair Analysis

Critical to the safety and performance of a public transportation system is the condition of its capital assets—most notably, its rolling stock, equipment, facilities, and infrastructure. When transit assets are not in a state of good repair, the consequences include increased safety risks, decreased system reliability, higher maintenance costs, and lower system reliability and performance. The objective of the Transit Asset Management (TAM) system is to ensure that public transit providers maintain their capital assets in a state of good repair so that their capital assets can perform their designed function; that the use of their assets in their current condition do not pose a known, unacceptable safety risk; and their lifecycle investment has been met or recovered, including all scheduled maintenance, rehabilitation, and replacements.

Using available information, the team predicted the future conditions of current assets and projected replacement years of all transit revenue vehicles over a 12-year period, calculating the total and annual investment needs necessary to bring the transit systems of Missouri’s agencies into a state of good repair.

Asset Inventory

The transit asset inventory is a listing of each agency’s property and specific information about those properties. Typically, an inventory is broken into four categories: (1) Equipment, (2) Rolling Stock, (3) Facilities (maintenance and administration), and (4) Infrastructure. For the purposes of this report, the evaluation was limited to only the rolling stock. Rolling stock is perhaps the most important asset as it is the one that most directly impacts the customer daily. More specifically, this analysis only examined revenue vehicles for public transportation. In total, there are 2,418 transit revenue vehicles in Missouri. As shown in **Figure 16**, the largest proportion of those vehicles (40%) are cutaways. A cutaway is a transit vehicle where a bus body is mounted on a van or truck chassis. The next most commonly used vehicles are buses (31%), followed by minivans (15%) and vans (6%).

Of all the transit agencies in Missouri, four agencies own and maintain 86% of all revenue vehicles in the state (**Figure 17**). OATS operates 36% of all Missouri rolling stock and their fleet is comprised almost entirely of cutaway vehicles and minivans. Bi-State Development Agency and KCATA follow with 26% and 17% of the state’s rolling stock, respectively, with many of their fleets being buses/articulated buses. SMTS operates 7% of the state’s rolling stock, primarily cutaways and minivans. All other agencies together operate the remaining 14% of rolling stock.

FIGURE 16. ROLLING STOCK BY VEHICLE TYPE

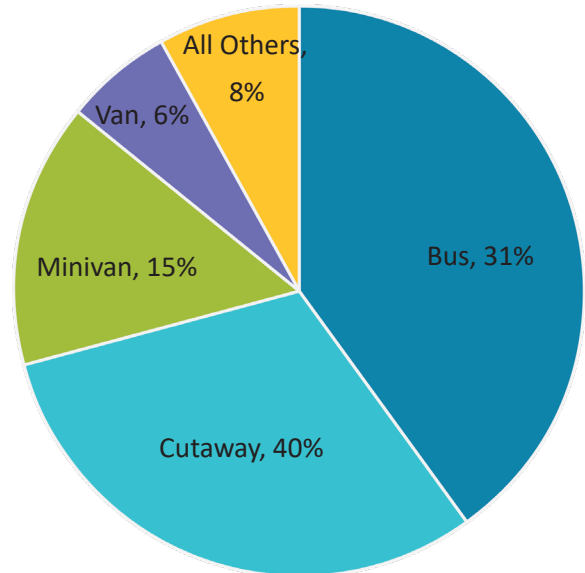
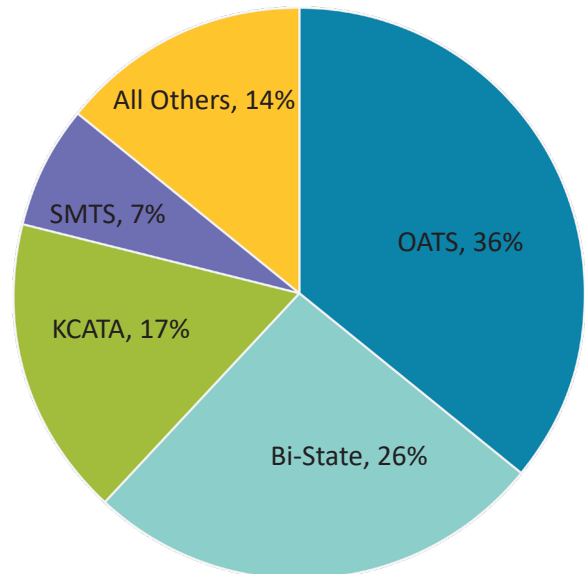


FIGURE 17. ROLLING STOCK BY TRANSIT AGENCY



State of Good Repair

State of good repair (SGR) means the condition enables a capital asset to operate at a full level of performance. When evaluating the SGR for transit assets, state DOTs and individual transit agencies have the option to define the maximum age of an asset or the point at which an asset enters the state of good repair backlog— also known as the useful life benchmark (ULB). The FTA defines ULB as the average number of years for a vehicle to reach a 2.5 rating on the FTA Transit Economic Requirements Model (TERM) scale, assuming a standard maintenance schedule.

Because useful life is a benchmark being used by the NTD and TAM Final Rule to determine a vehicle's state of good repair, the age of all the vehicles reported by Missouri transit agencies were compared to their useful life threshold as currently established by MoDOT for this state of good repair analysis. All vehicle ages were extrapolated based on data provided by transit agencies to the NTD reported for FY2019.

MoDOT's performance target for rolling stock is no more than 45% of any asset class in operation beyond useful life. Based on these standards, MoDOT has achieved its goal for all asset classes except for articulated buses. **Table 10** details the transit asset inventory beyond useful life by vehicle class.

To estimate the total replacement costs to achieve a state of good repair, the project team surveyed transit agencies and vehicle dealers to estimate reasonable costs for replacement vehicles in today's dollars. The estimated vehicle replacement costs are shown in **Table 11**.

TABLE 11. VEHICLE PER UNIT REPLACEMENT COSTS

Vehicle Type	Estimated Vehicle Cost
BU - Bus	\$600,000
AB - Articulated Bus	\$1,330,000
VN - Van	\$66,000
CU - Cutaway Bus	\$97,000
AO - Automobile	\$24,000
MV - Minivan	\$36,000
SV - Sport Utility Vehicle	\$30,000
LR - Light Rail Vehicle	\$3,000,000
SR - Streetcar	\$6,430,000

TABLE 10. MISSOURI INVENTORY BEYOND USEFUL LIFE

Vehicle Type	Total Number of Assets	Useful Life Benchmark (years)	Total Assets Beyond ULB	Percentage of Asset Class Beyond ULB
BU - Bus	741	14	138	19%
AB - Articulated Bus	14	14	14	100%
VN - Van	158	8	26	16%
CU - Cutaway Bus	960	10	414	43%
AO - Automobile	76	8	17	22%
MV - Minivan	373	8	129	35%
SV - Sport Utility Vehicle	5	8	0	0%
LR - Light Rail Vehicle	87	31	31	36%
SR - Streetcar	4	31	0	0%

State of Good Repair

Based on the vehicle replacement cost assumptions, it would cost approximately \$241M to bring Missouri's entire rolling stock into a state of good repair; however, it would only cost approximately \$10.6M to bring Missouri transit agencies up to MoDOT's performance standards of no more than 45% of any asset class beyond useful life. **Table 12** displays the estimate cost to replace the current total backlog as of FY2019 as well as the current backlog to meet MoDOT's performance standards.

Replacement Schedule

To determine a replacement schedule, several assumptions were made. First, it was assumed that no current backlog existed for replacement vehicles at Year 0. Second, it was assumed all agencies would replace 100% of revenue vehicles beyond ULB during the year each vehicle reached 12 years of age.

Based on the findings and estimates provided in **Table 12** and the assumed replacement schedule, **Table 13** provides the estimated vehicle replacement costs in today's dollars over the next 12 years, beginning with year 1 in 2023.

Assuming the Missouri transit agencies aim to bring 100% of their fleet into a state of good repair, it would cost, on average, approximately \$42.3 million dollars (not adjusted for inflation) annually each year over the next 12 years.

For a detailed description of the state of good repair analysis methodology, see **Appendix C**.

TABLE 13. VEHICLE REPLACEMENT COSTS BY YEAR

Year	Estimated Cost
Year 1 (2023)	\$34,387,000
Year 2 (2024)	\$24,704,000
Year 3 (2025)	\$22,233,000
Year 4 (2026)	\$59,687,000
Year 5 (2027)	\$52,194,000
Year 6 (2028)	\$39,665,000
Year 7 (2029)	\$55,171,000
Year 8 (2030)	\$71,968,000
Year 9 (2031)	\$12,639,000
Year 10 (2032)	\$41,410,000
Year 11 (2033)	\$76,037,000
Year 12 (2034)	\$18,252,000

Recent events due to the COVID-19 pandemic and subsequent supply chain disruptions for computer chips, parts, and skilled labor to assemble components and whole vehicles are lengthening the time it takes to procure and enter vehicles into actual service. Estimates range from two to five years from the time of ordering to the time for delivering of vehicles. This increased delay only exacerbates issues with vehicle replacement and causes many agencies to hang onto, and continue to operate, vehicles that are beyond their ULB, are less reliable to operate, and cost more to maintain.

TABLE 12. COST TO ACHIEVE STATE OF GOOD REPAIR

Vehicle Type	Total Beyond ULB	Cost to Achieve 100% SGR	Backlog to Meet MoDOT Standard	Cost to Achieve MoDOT Standard
BU - Bus	138	\$82,800,000	0	\$0
AB - Articulated Bus	14	\$18,620,000	8	\$10,640,000
VN - Van	26	\$1,716,000	0	\$0
CU - Cutaway Bus	414	\$40,158,000	0	\$0
AO - Automobile	17	\$408,000	0	\$0
MV - Minivan	129	\$4,644,000	0	\$0
SV - Sport Utility Vehicle	0	\$0	0	\$0
LR - Light Rail Vehicle	31	\$93,000,000	0	\$0
Total	769	\$241,346,000	8	\$10,640,000

Goals & Recommendations

The goals and recommendations for this study were developed in coordination with MPTA and the project steering committee and are aligned with the conclusions of the data driven process. Goals and recommendations are primarily in four broad categories:

1. Funding
2. Research & Policy
3. Data & Data Collection
4. Service Delivery, Operations & Assets

Each recommendation was assigned a time frame for implementation and completion. Short-term recommendations are those that can be achieved in 1 - 5 years, mid-term is those that can be achieved in 6 - 10 years, and long-term are those taking 10 years or more for achievement (see the illustration for implementation details and short descriptions).

Funding

With regard to funding, the overall goal is to increase funding for transit across the state to be more in line with the funding levels of surrounding states. Merely asking for more money is often not viable. Therefore, specifically this goal is aimed at providing more resources on several fronts. First, this means increasing the state funding and investment level in Missouri which is currently at \$0.28 per person. Surrounding states significantly outspend Missouri as detailed on **page 41**. Even a return to funding at the levels seen in 2002 would be a good intermediate start. Currently, there is over a \$120 million dollar need for additional operation and probably a similar need on the capital side.

Similarly, the state matching funds for capital acquisitions, often vehicles, should also be increased. Going a step further, there should be a \$0 match for non-programmed rural transit providers since they have the most trouble procuring new vehicles and maintaining operations.

Lastly, the FTA 5311 reimbursement regulation that limit what can be counted as match and how MoDOT interprets the split for funding for 5311 operations and the reimbursement rate(s) needs to be reexamined. Since this is a federal program, whose rules are codified in federal law, this is a more complex and lengthy effort.

Research & Policy

Developing transit service operations analysis like those contained in the report takes an investment. Snapshot data is but one element that can be captured by projects like this. However, data over time is much more powerful as it can reveal trends and needs in a more proactive manner. Similar, creation of educational pieces is also important. Lastly, the dissemination of factual data is also power.

Therefore, the Missouri Rural Transit Assistance Program (RTAP) should be rescoped to take on an expanded role and perhaps be the premier program to conduct transit data collection, research, and outreach. This could be modeled on the mission statements of land grant universities throughout the US whose missions traditionally focus on research, education, and extension.

A rescoped RTAP or other program could also create an online or virtual repository of researched best practices and a sortable and shareable transit database for all providers across Missouri. This would allow planners, researchers, and those involved with transit service delivery to have access to a robust set of operational and cost data.

On the education and outreach front, there would be value in holding a Missouri Transit Summit focused on face-to-face networking to discuss technical issues and peer information exchange. Likewise, the opportunities for virtual education ought to be expanded to include a wider range of topics than those that are currently being delivered.

Goals & Recommendations

Data Collection

Regardless of whether the RTAP program is rescoped and/or expanded, there is a need for a repository of statewide transit service, operations, asset, and performance data that is Missouri-centric. This would include a one-stop repository for all the service areas, geographies, and the line data and attributes that make up the transit services. These files, often in general transit feed specification (GTFS) format could be collected and updated by the agencies and housed in one location. GTFS files allow planners and others to look at service provisions and compare that to spatial attributes of the demographics and population such as was done for this report and project. Similarly, all the transit asset management data that is currently collected by MoDOT from the providers could be digitized and put online in a spreadsheet or in look up tables to facilitate data analysis on assets. A statewide repository of basic operator information like those portrayed in the service profiles would also be helpful.

Lastly, the creation of an online transit planning, estimation and simulation tool might be something of value for Missouri. This could be modeled on the Florida Department of Transportation Transit Office's Transit Boardings Estimation and Simulation Tool (TBEST). TBEST is a multi-faceted GIS-based modeling, planning and analysis tool which integrates socio-economic, land use, and transit network data into a unique platform for scenario-based transit ridership estimation and analysis.

Service Delivery Operations & Assets

This goal is probably at the heart of why this project and the creation of this report was undertaken. The goal here is to increase ridership and efficiency of the current systems across the state and to do so with the most modern and functional fleet of rolling stock.

The goal should be to increase transit ridership levels and address the needs of the unmet demands across the state. The total unmet need for ridership is to provide an additional 39 million trips costing about \$171M annually. To get there, incremental steps are needed. Specifically, the providers, their partners and advocates should seek to fill 5% of unmet needs within 5 years, 7.5% within 10 years, and 10% within 15 years. This would be an increase in the number of trips by approximately 1.9 million, 2.9 million, and 3.9 million respectively in those timeframes. Given current cost considerations, this would consume \$17.1 million in additional funds for 5%, rising to \$26.5 million for 10% and rising again to \$34.2 million in costs to meet the 15% incremental ridership thresholds in current year dollars.

For non-programmed rural needs, this could be partially achieved by increasing the amount of revenue miles and hours that are delivered, because this is the number of miles where the vehicles are actively engaged in providing services, i.e., when passengers are on board them.

Likewise, there ought to be an efficiency metric that is measurable, and this would entail increasing the number of passengers per revenue hour, which would provide more transit bang for the buck.

Lastly, Missouri should seek to replace vehicles in such a manner so that none of them are beyond their useful life as measured by the FTA. This would cost an additional \$220m in current year dollars. Assuming a smooth 12-year replacement cycle, this is approximately \$35 million per year.

Goals & Recommendations



Funding

- Short - Return state funding levels to 2002 benchmarks
- Mid - Increase funding to be more in line with neighboring states (focused on operations)
- Mid - Increase state matching funds for capital / \$0 match for non-program rural transit
- Long - Rework FTA 5311 Reimbursement Regulations



Research & Policy

- Short - Rescope or expand the RTAP program
- Short - On-line virtual best practices and data clearinghouse
- Short - Expand virtual education opportunities
- Mid - MO Transit Summit (solely focused on technical issues and exchange)
- Mid - Research best practices for service delivery and apply to MO



Data & Data Collection

- Short - Statewide GTFS data set
- Short - Statewide TAM data set
- Short - Statewide Provider data set
- Mid - Statewide planning tool (TBEST)



Service Delivery, Operations, & Assets

- Mid - Increase revenue miles and revenue hours (non-programmed rural)
- Mid - Increase passengers per revenue hour (efficiency)
- Mid - Replace vehicles so none are beyond useful life recommendations
- Long - Seek to fill 5% of unmet needs within 5 years, 7.5% of same within 10 years, and 10% in 15 years

Appendix A

Appendix B

Appendix C