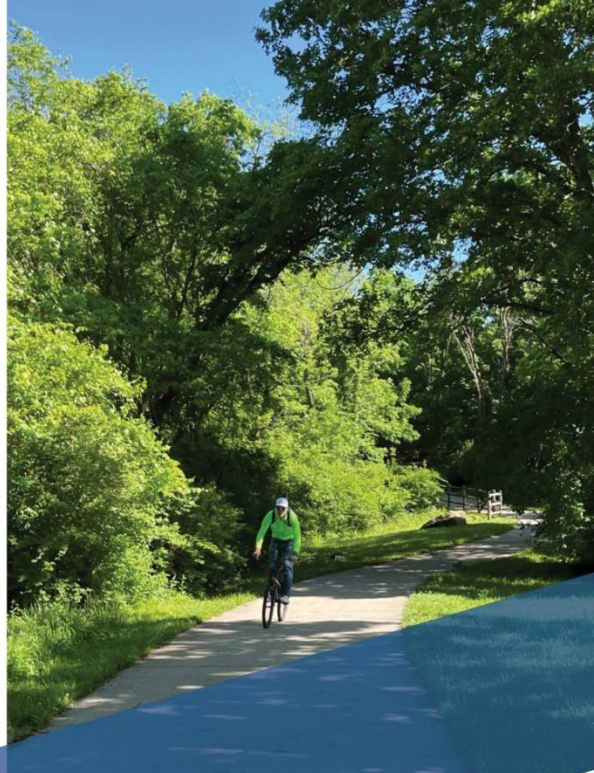

I-29, I-35, U.S. 169 PEL Baseline Conditions

DRAFT

September 2022

In Partnership with:

U.S. Department of Transportation
Federal Highway Administration

MARC
Mid-America Regional Council

KANSAS CITY MISSOURI

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Figures

Tables

ACRONYMS

AADT	Average Annual Daily Traffic
ACM	Asbestos Containing Material
ADT	Annual Daily Traffic
AQL	Aquatic Life
ARAN	Automatic Road Analyzer
ASTM	American Society for Testing and Materials
BG	Block Group
BRT	Bus Rapid Transit
CAA	Clean Air Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
DHHS	Department of Health and Human Services
DTA	Dynamic Traffic Assignment
DWS	Drinking Water Supply
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
E-Start	Environmental Site Tracking and Research Tool
FEIS	Final Environmental Impact Study
FNB	Future No-Build
GIS	Geographic Information System
GNIS	Geographic Names Information System
HHP	Human-Health Protection (Fish Consumption)
HOS	Hours of Service
HSM	Highway Safety Manual
HSWA	Hazardous and Solid Waste Amendment
IND	Industrial
IRR	Irrigation
IPaC	Information for Planning and Consulting
KCATA	Kansas City Area Transportation
KCSA	Kansas City Streetcar Authority
LBP	Lead Based Paint
LEP	Limited English Proficiency
LPA	Local Public Agency
LWCF	Land and Water Conservation Fund
LWW	Livestock and Wildlife Watering
MARC	Mid-America Regional Council
MCI	Kansas City International Airport
MDC	Missouri Department of Conservation

MDNR	Missouri Department of Natural Resources
MIS	Major Investment Study
MKC	Charles B. Wheeler Downtown Airport
MoDOT	Missouri Department of Transportation
MOEs	Measures of Effectiveness
MSDIS	Missouri Spatial Data Information Service
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFHL	National Flood Hazard Layer
NHD	National Hydrology Database
NHS	National Highway System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OD	Origin Destination
PASER	Pavement Surface Evaluation and Rating
PDO	Property Damage Only
PEL	Planning and Environmental Linkages
RCRA	Resource Conservation and Recovery Act
ROW	Right-of-way
SCR	Secondary Contact Recreation
SEMA	State Emergency Management Agency
STIP	Statewide Transportation Improvement Program
TAZ	Traffic Analysis Zone
UMKC	University of Missouri, Kansas City
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USFWS	U.S. Fish and Wildlife Services
USGS	U.S. Geographical Survey
WBC	Whole Body Contact Recreation

1.0 Introduction

The Missouri Department of Transportation (MoDOT) is initiating a Planning and Environmental Linkages (PEL) Study of the I-29, I-35 and U.S. 169 corridors. MoDOT desires to develop both short-term and long-term alternatives and proposed actions for improving existing safety, reducing congestion, improving operational performance, addressing asset management and positioning for future transportation needs along I-29, I-35 and U.S. 169.

The Baseline Conditions provides an existing and future no-build conditions analysis of the community's transportation assets of the I-29, I-35 and U.S. 169 corridors and surrounding area. This report is organized into the following chapters:

- Chapter 2 - Previous Studies
- Chapter 3 - Data Collection
- Chapter 4 - Existing Conditions
- Chapter 5 - Public Engagement
- Chapter 6 - Purpose and Need

1.1 PEL Study Area

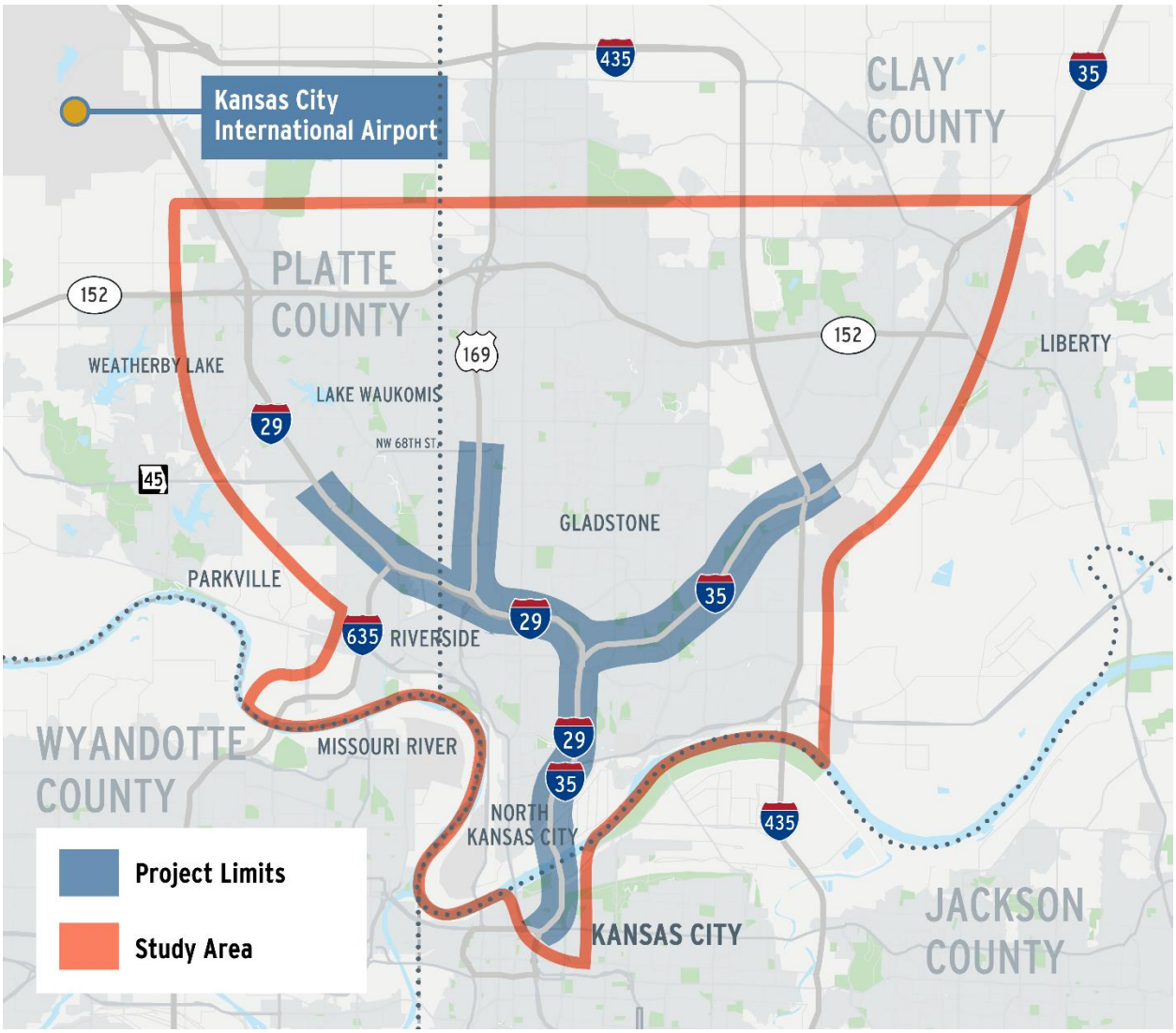
The PEL study area is generally depicted in

and extends through portions of Clay, Jackson, and Platte Counties. As shown in blue, the project limits extend along sections of I-29, I-35 and U.S. 169. The project limits include:

- I-29, from Highway 45 to the I-29/I-35 merge, continuing south across the Missouri River to the northeast corner of the downtown freeway loop.
- I-35, from I-435 to the I-29/I-35 merge.
- U.S. 169, from NW 68th Street to I-29.

The study area fully encompasses the project limits and accounts for areas beyond those limits that are anticipated to influence parameters such as traffic operations. The study area also encompasses a broad area to account for community resources, natural resources, and other potential environmental constraints.

Figure 1: PEL Study Area

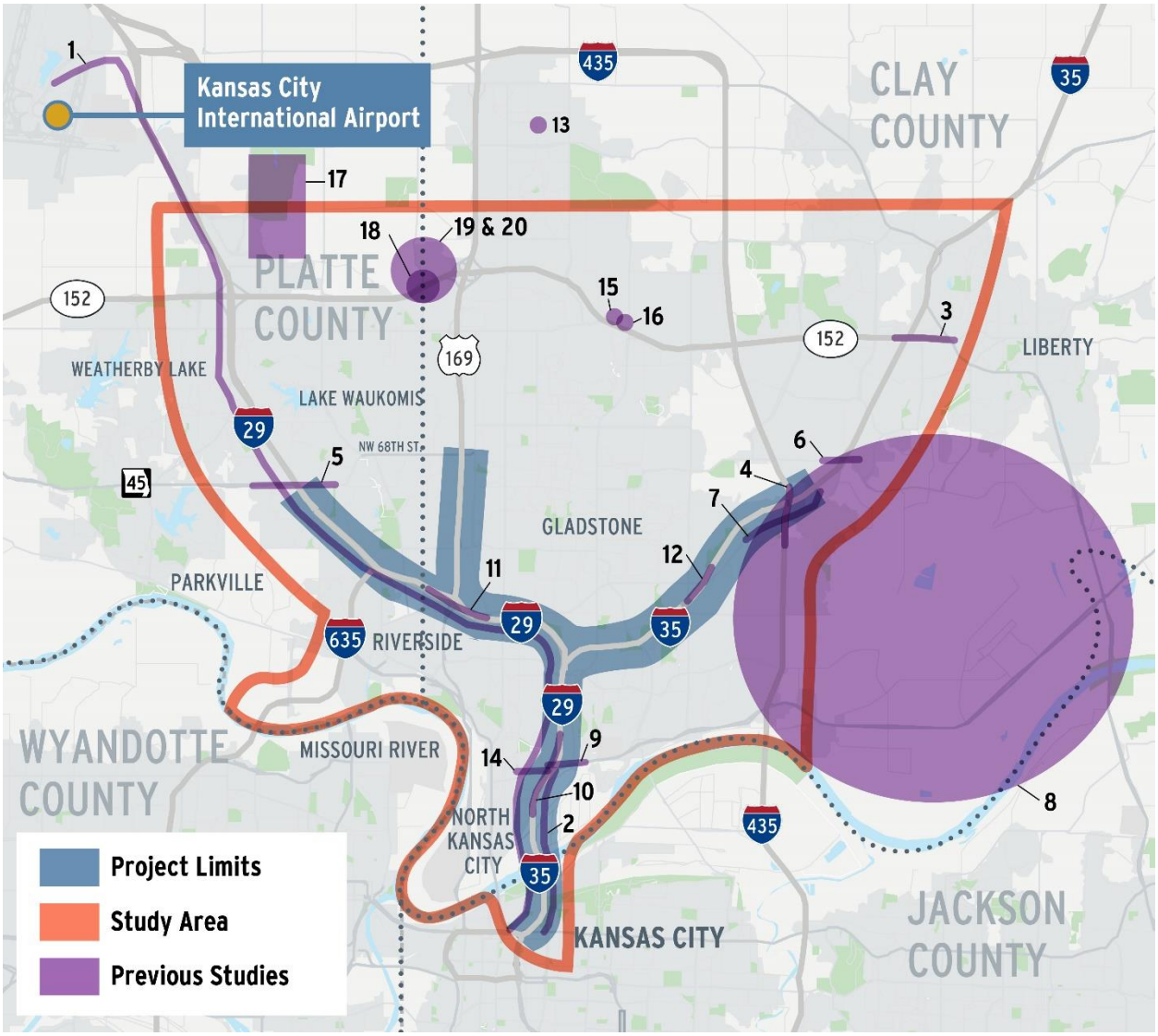


Source: HNTB

2.0 Previous Studies

Previous studies within the study area were reviewed based on their relevance to the PEL Study. A summary of the 20 studies and projects included in the review is located in **Appendix A**. While there are likely other studies completed in the study area, these 20 were considered to have the greatest applicability to the I-29, I-35, U.S.169 PEL. It is not intended to be a complete list of projects in the study area. **Figure 2** shows the location of the 20 projects. The numbers on the figure correspond to the project numbers identified in **Appendix A**. The information contained in these summaries is intended to be a quick reference guide of the history and recommendations provided throughout the study area and the adjoining transportation network that may impact or benefit the future improvement strategies being considered for optimizing the full corridor.

Figure 2: Previous Studies



Source: HNTB. Note: The numbers correspond to projects shown in Appendix A

The previous studies have all dealt with similar trends of growth and development in the northland. Frequent recommendations in the studies included interchange reconfigurations, with roughly half analyzing an interchange with a goal to improve traffic operations. Most studies summarized the traffic flow, operational levels of service, accessibility, and safety and identified key areas for improvements. The purpose of each project was to improve the existing lane geometry/configuration to meet the expected future growth in each respective area. Three key studies important to highlight are discussed below. The Northland-Downtown Major Investment Study and the I-29/I-35 at The Paseo Bridge FEIS represent two major highway improvement studies performed by MoDOT in the study area and the Connected KC 2050 is the most current Long Range Transportation Plan representing transportation investments planned through 2050 in the study area. These three studies represent the most comprehensive current list of future needs in the study area and represent the best starting point for initial improvement alternatives to be analyzed.

All studies are summarized in **Appendix A**.

- **Connected KC 2050** - The Kansas City metro's regional Long Range Transportation Plan, Connected KC 2050, is a long-term fiscally constrained plan to upgrade and improve transportation infrastructure in the Kansas City metropolitan area. With the focus on growth and redevelopment in the region, the plan hopes to achieve greater access to opportunity, improved public health and safety, a healthier environment, more transportation options, and economic vitality. Based off the project map, the I-29, I-35, U.S.169 PEL has the opportunity to assist with the regional goals while filling in and focusing on areas where the current regional plan might not be considering. While the plan does have multimodal projects identified in the study area, there are no plans shown for the I-29, I-35 and U.S.169 study corridors. This is the first project in Appendix A and does not have a number in Figure 2 because it's a regional study.

- **Northland-Downtown Major Investment Study** - The Northland Downtown Major Investment Study (MIS) is one of the most pertinent studies to the I-29, I-35, U.S. 169 PEL. In 2002, MoDOT, the Mid-America Regional Council (MARC), the Kansas City Area Transportation Authority (KCATA), and other contributors funded a planning study focusing on the downtown business district and the U.S. 169, I-29/I-35, and Route 9 connections. The focus of the study was to look at redeveloping the existing areas while also analyzing all access points to downtown. After narrowing in on a few key areas, the study prioritized analysis of the I-29/I-35 bridge crossings into downtown and current infrastructure and capacity concerns. This project is No. 1 on **Figure 2**.

- **I-29/I-35 Paseo Bridge Final Environmental Impact Statement (FEIS)** - As discussed in the Northland Downtown MIS, The Paseo Bridge river crossing into downtown from the north is a major point of concern. The FEIS found that the best way to improve the current configuration would be to rebuild and widen The Paseo Bridge to six through lanes with room for up to two additional lanes for potential growth. A combination of access changes would be made to improve the safety and traffic flow for city traffic in the

I-29/I-35 corridor. The Record of Decision on the FEIS allowed for the approval to construct the new (6-lane bridge) with approval to widen to an 8-lane bridge in the future. The 6-lane bridge opened in 2011. The Paseo Bridge was renamed the Christopher Kit Bond Bridge. This project is No. 1 on **Figure 2**.

The remainder of the previous studies reviewed focused on at least one of the six topics below and often addressed multiple.

- Safety
- Traffic Operations
- Accessibility
- Land Development
- Project Coordination
- Multimodal

3.0 Data Collection

Data is an important component of the PEL. Therefore, it was important to develop a Data Collection Plan to clearly outline the necessary data collection activities. The Data Collection Plan documented the need for relevant corridor data including traffic, safety, engineering, right-of-way (ROW), environmental, and other data from MoDOT, the study partners, and other sources. The Data Collection Plan determined the data requirements, availability, and sources. The Plan was reviewed and approved by MoDOT at the beginning of the study. The Data Collection Plan is provided in **Appendix B**.

4.0 Existing Conditions

This chapter provides the existing conditions of the PEL study area to represent the baseline conditions. The chapter is organized into the following sections:

- 4.1 Environmental
- 4.2 Traffic and Safety
- 4.3 Multimodal
- 4.4 Engineering

4.1 Environmental Conditions

4.1.1 Methodology

In order to identify the environmental and infrastructure constraints associated with the study area, information was collected through on-line database searches, imagery analyses, Google Maps, and desktop geographic information system (GIS) analyses. Where applicable, the constraints identified throughout this document are shown graphically in their respective sections.

4.1.2 Population and Employment

Population and employment density at the county level and per square mile by traffic analysis zone (TAZ) was analyzed to understand where people live and work in the study area. A TAZ is an area defined by a state or local transportation agency used for tabulating traffic data for to-and-from work and places of residence. These geographical units are used in traffic forecast modeling.[1]

Population

The study area consists of three counties: Clay, Jackson, and Platte. Jackson County is not part of the northland, but a small part of the county is in the southeast limits of the study area. **Table 1** lists the number of people who live or are projected to live in a TAZ within or intersecting the study area in each county in 2015 and 2050. 2015 data was used as this is the base year data that MARC is using in their travel demand model. The year 2050 was used as a projection year because it corresponds with MARC's regional transportation plan, Connected KC 2050. Overall, the population of the study area is expected to increase by 86,568 people (40%) or roughly 2,474 people (1.14%) every year. The Twin Creeks KC is comprised of approximately 15,000 acres of multi-use development is expected to account for a significant portion of the projected population growth in the study area from 2015 to 2050. Twin Creeks is located north of M-152 and west of U.S. 169.

[1] Traffic Analysis Zones, https://onlinepubs.trb.org/onlinepubs/conferences/2017/censusdata/TAZ_Paper.pdf

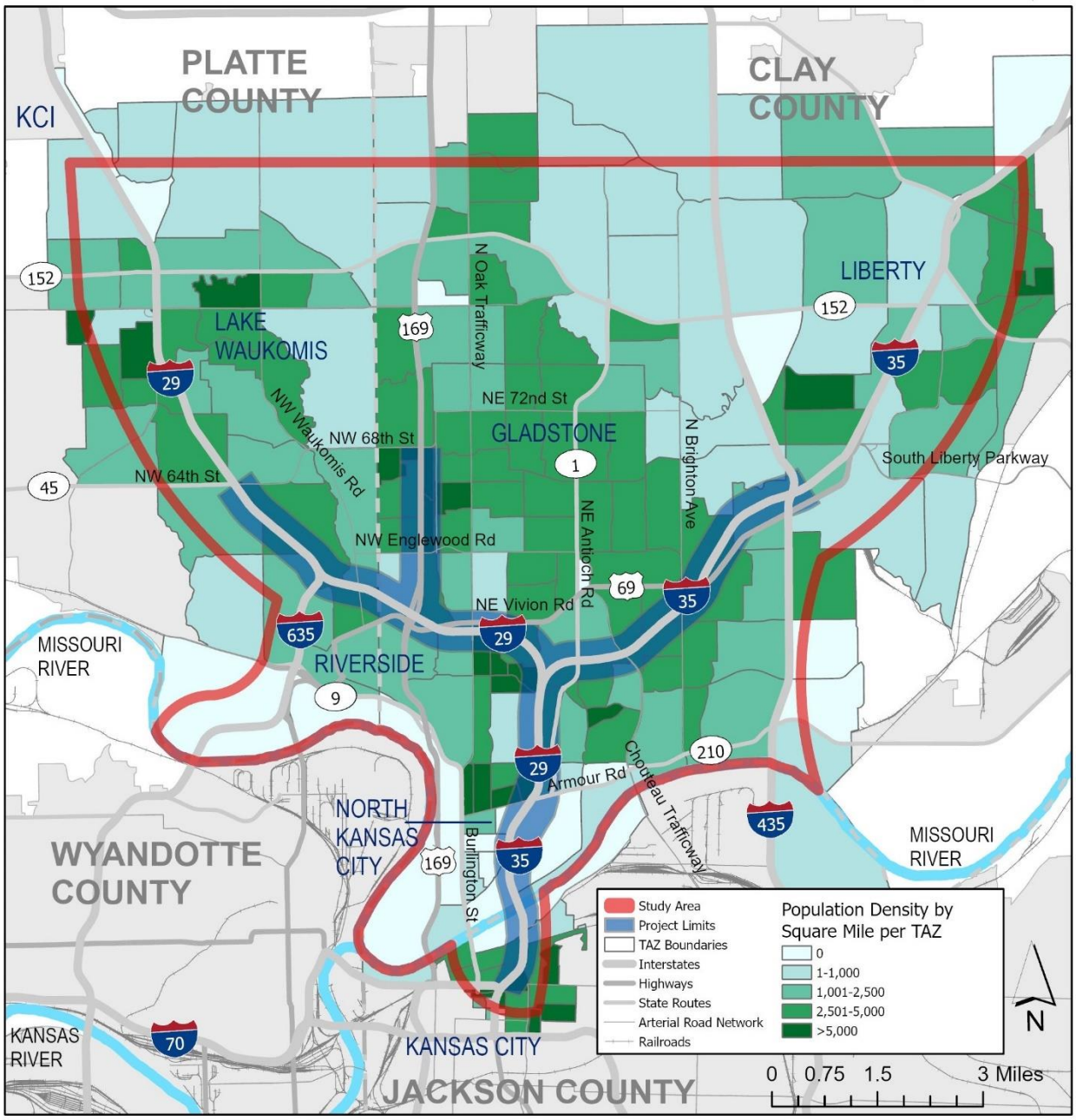
Table 1: Population in Study Area by County (2015 and 2050)

County Name	Population in Study Area (2015)	Population in Study Area (2050)	% of Total Study Area (2015)	% of Total Study Area (2050)
Clay	157,952	211,534	73%	69%
Jackson	8,785	16,428	4%	5%
Platte	51,062	77,871	23%	25%
Total	**217,799**	**305,833**	**100%**	**100%**

Source: MARC.

Error! Reference source not found. shows the number of residents per square mile in each TAZ within or intersecting the study area in 2015. TAZs with larger population per square mile are generally located in downtown Kansas City, in pockets along I-35 and I-29, and in the Gladstone area. Areas in the northern part of the study area generally have lower numbers of residents per area of the TAZ.

Figure 3: Population in the Study Area by TAZ (2015)



Source: MARC.

Employment

Table 2 lists the number of people who are employed in a TAZ within or intersecting the study area in each county in 2015 and 2050. In 2015, roughly two-thirds (69%) of employees in the study area work in Clay County. Platte County has 21% and Jackson County has 10% of all employees in the study area since the study area does not include downtown within the freeway loop. All counties in the study area are expected to grow in number of employees. In June 2022,

Ford Motor Company announced that they would be adding 1,100 employees to increase production of the Transit commercial van and the new E-Transit electric vehicle.[2]
Overall, the employment of the study area is expected to increase by 63,055 people (58%) or roughly 1,802 people (1.66%) every year.

Table 2: Employment in Study Area by County (2015 and 2050)

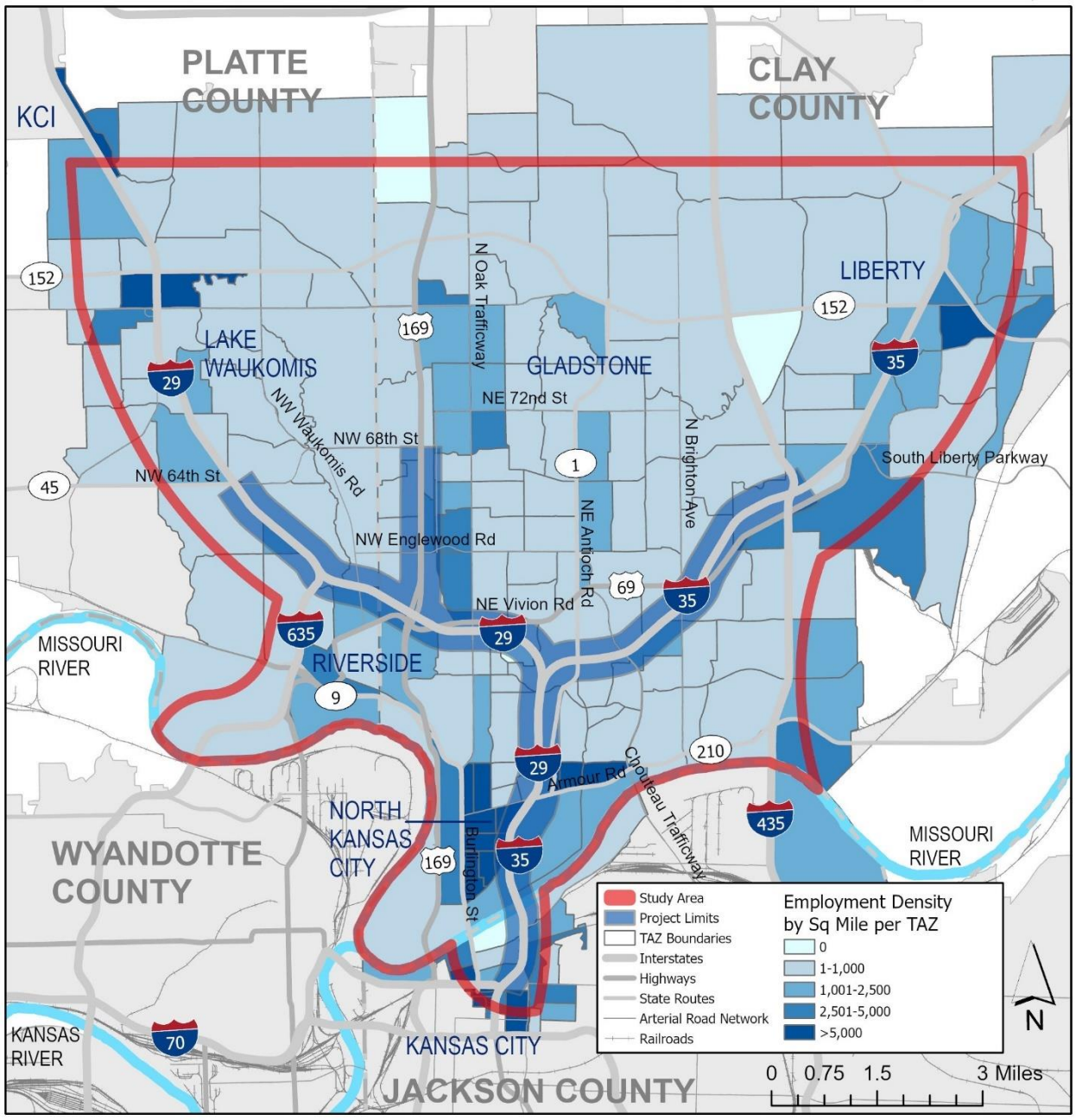
County Name	Employment per County (2015)	Employment per County (2050)	% of Total Study Area (2015)	% of Total Study Area (2050)
Clay	77,245	120,011	67%	69%
Jackson	13,029	13,918	11%	8%
Platte	25,078	40,838	22%	23%
Total	**115,352**	**174,767**	**100%**	**100%**

Source: MARC.

Figure 4 shows the number of employees per square mile in each TAZ within or intersecting the study area for 2015. High concentrations of employees per square mile in each TAZ are in North Kansas City (Cerner Headquarters, Harrah's Casino, North Kansas City Hospital), east of the downtown freeway loop, the northwest corner of I-29 (KCI Corridor) in the study area, and the northeast corner of I-35 (Claycomo Ford Plant) in the study area. There are also pockets of high-density employment along the study corridors.

[2] KCUR, Ford Motor Company announcement, June 2022

Figure 4: Employment in the Study Area by TAZ (2015)



Source: MARC

When looking at both population and employment, there is a trend for low employee TAZs to have a greater number of residents and vice versa. This shows that people are living in one part of the study area and traveling to work in another. For example, North Kansas City shows lower population in TAZs but a higher number of employees in the same TAZs. One area with both a higher number of employees and residents is east of the downtown freeway loop due to the high-density housing mixed with a greater number of employment and business opportunities. Employment trends have also shown substantial development along arterial corridors and near major interstates and highways with easy access. Population and employment growth rates

(40% and 58%, respectively) show that population is projected to increase employment more than employment numbers from 2015 to 2050. This shows that slightly more people are expected to be employed in the study area than people moving to the study area.

4.1.3 Socio-Economic Demographics

The study area encompasses portions of 63 census tracts as delineated by the U.S. Census Bureau (USCB). Within the 63 census tracts, 201 census block groups (BG) were identified to be at least partially contained by the study area as delineated by the USCB in 2020. The census BGs were used in the socioeconomic analyses.

Environmental Justice Populations

Executive Order (EO) 12898 entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" mandates that federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs on minority and low-income populations. The FHWA Order 6640.23A defines a minority as a person who is Black (having origins in any of the black racial groups of Africa); Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race); Asian American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or American Indian and Alaska Native (having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition). Minority populations are defined as a percentage of minority persons approaching or exceeding 50% of a census BG population.

Table 3 presents the demographic percentages of the minority groups present within the study area. Minority populations within the census BGs that are either wholly or partially contained in the study area account for approximately 30% of the total population.

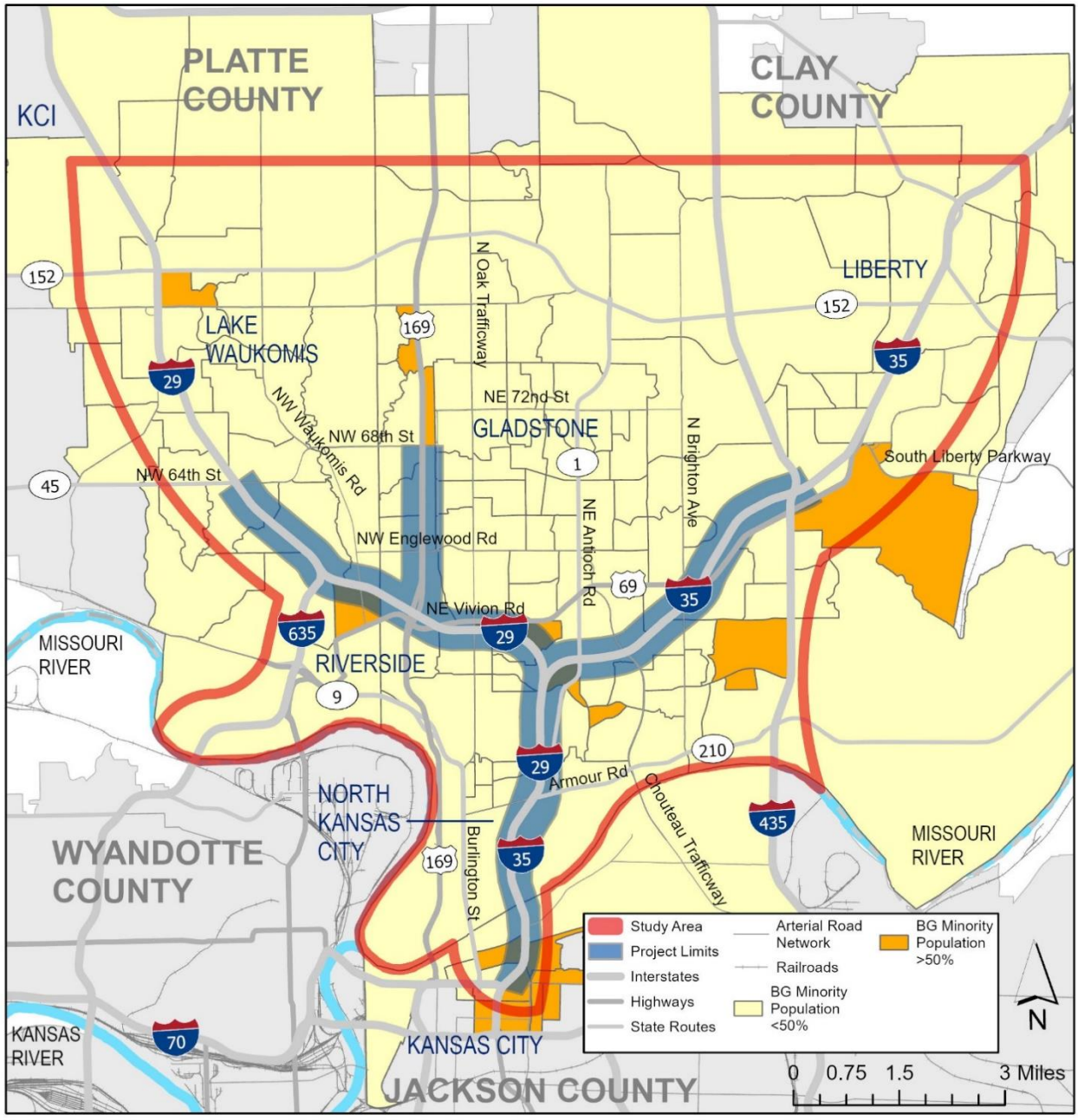
Table 3: Race/Ethnicity in Study Area

Minority Populations	Percentage
Black or African American	11%
American Indian and Alaska Native	0%
Asian	3%
Native Hawaiian and Other Pacific Islander	1%
Other Race	0%
Two or More Races	6%
Hispanic or Latino	9%
Percent Minority for Study Area	**30%**

Source: U.S. Census Bureau, 2020 Redistricting Data SF (PL 94-171), P2

Figure 5 presents the distribution of minority populations within the study area that are greater than 50% at the census BG level. A corresponding table identifying minority percentages at the census BG level is presented in **Appendix D**.

Figure 5: Minority Population



Source: U.S. Census Bureau, 2020 Redistricting Data SF (PL 94-171), P2

A low-income population is defined as one with a median income for a family of four equal to or below the Department of Health and Human Services (DHHS) poverty guidelines of $27,750 for 2022. The average median household income for the entire study area is $72,984. Out of 201 census BGs within the study area, 15 did not report a median household income. Of the 186

census BGs reporting a median household income, six reported median household incomes below the $27,750 poverty threshold. Median household incomes for the study area range from $13,200 to $191,786. **Figure 6** presents the distribution of low-income populations within the study area at the census BG level. A corresponding table identifying median household incomes at the census block BG is presented in **Appendix D**.

Figure 6: Low Income Population

Source: U.S. Census Bureau, B19013 Median Household Income in the Past 12 Months, 2020 ACS 5- Year Estimates.

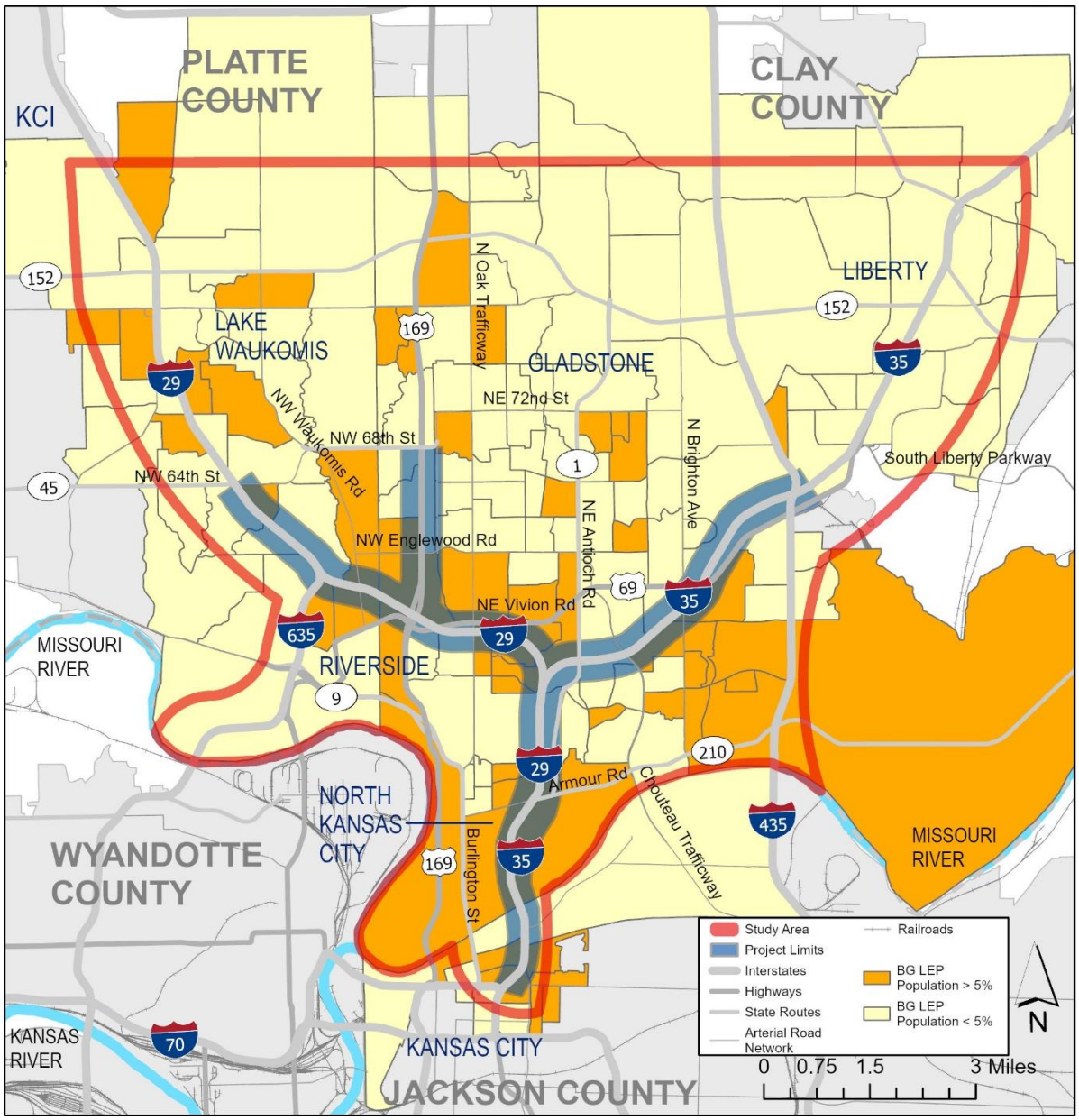
Limited English Proficiency Populations

Limited English Proficiency (LEP) persons are defined as individuals who speak English less than "very well." EO 13166, "Improving Access to Services for Persons with Limited English Proficiency" requires federal agencies to examine the services they provide and identify any need for services to those with LEP. The EO requires federal agencies to work to ensure that recipients of federal financial assistance provide meaningful access to their LEP applicants and beneficiaries. Failure to ensure that LEP persons can effectively participate in or benefit from federally assisted programs and activities may violate the prohibition under Title VI of the Civil Rights Restoration Act of 1987 and Title VI regulations against national origin discrimination.

Figure 7 presents the census BGs with LEP populations greater than 5%.[3] A corresponding table identifying LEP populations at the census BG level is presented in **Appendix D**. Of the 201 census BGs in the study area, three did not report a population. Of the remaining 198 census BGs reporting a population, 57 have LEP populations greater than 5%.

[3] Safe Harbor LEP Threshold – Identifies actions that will be considered strong evidence of compliance with Title VI of the Civil Rights Act obligations. Safe Harbor requires written translations of vital documents for each LEP group that meets the threshold.

Figure 7: Limited English Proficiency Population



Source: U.S. Census Bureau, B16004, Age by Language Spoken at Home by Ability to Speak English for the Population 5 Years and Over, 2020 ACS 5-Year Estimates.

In compliance with EO 13166, public involvement efforts will need to employ the use of bilingual material and/or simultaneous translation, as applicable, so that LEP populations would have meaningful access to the programs, services, and information provided. More information on public involvement activities is provided in Chapter 5.

Historically Disadvantaged Community

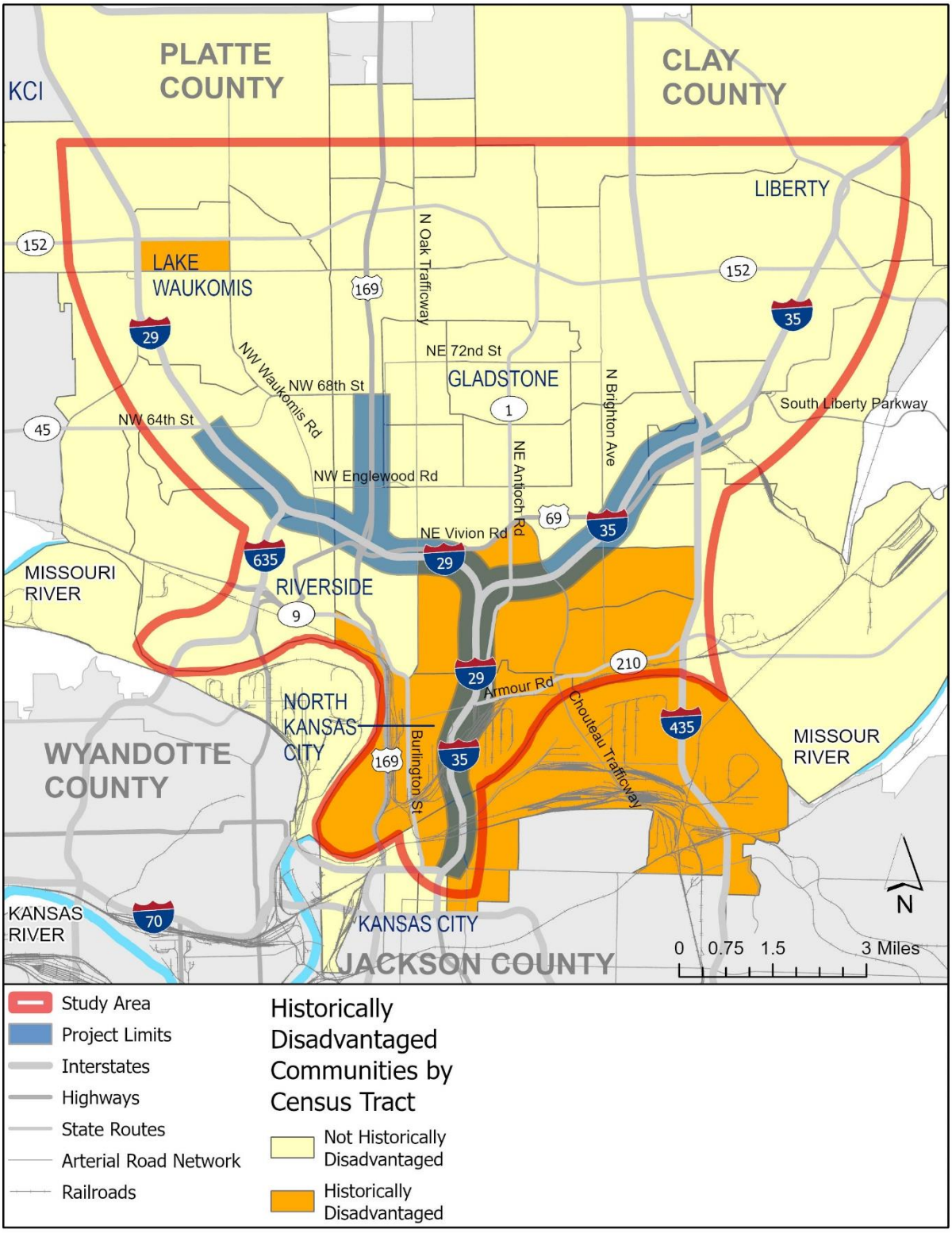
The Justice40 Initiative was created to confront and address decades of underinvestment in disadvantaged communities. Justice40 is an opportunity to address gaps in transportation infrastructure and public services by working toward the goal that many of the Department of

Transportation's (DOT) grants, programs, and initiatives allocate at least 40% of the benefits from federal investments to disadvantaged communities. Consistent with the Office of Management and Budget's (OMB) Interim Guidance for the Justice40 Initiative, DOT's interim definition of Historically Disadvantaged Communities (DAC) includes (a) certain qualifying census tracts, (b) any Tribal land, or (c) any territory or possession of the United States. The DOT's interim definition for DACs was developed by an internal and external collaborative research process. It includes data for 22 indicators collected at the census tract level and grouped into the following six (6) categories of transportation disadvantage.

- **Transportation access disadvantage** identifies communities and places that spend more, and take longer, to get where they need to go.
- **Health disadvantage** identifies communities based on variables associated with adverse health outcomes, disability, as well as environmental exposures.
- **Environmental disadvantage** identifies communities with disproportionately high levels of certain air pollutants and high potential presence of lead-based paint in housing units.
- **Economic disadvantage** identifies areas and populations with high poverty, low wealth, lack of local jobs, low homeownership, low educational attainment, and high inequality.
- **Resilience disadvantage** identifies communities vulnerable to hazards caused by climate change.
- **Equity disadvantage** identifies communities with a high percentile of persons (age 5+) who speak English "less than well."

As shown in **Figure 8,** DACs are present within the PEL study area, primarily located in the southern portion of the study area, with one DAC located in the community of Lake Waukomis.

Figure 8: Historically Disadvantaged Communities



Source: U.S. DOT, Transportation Disadvantaged Census Tracts (Historically Disadvantaged Communities).

4.1.4 Land Use

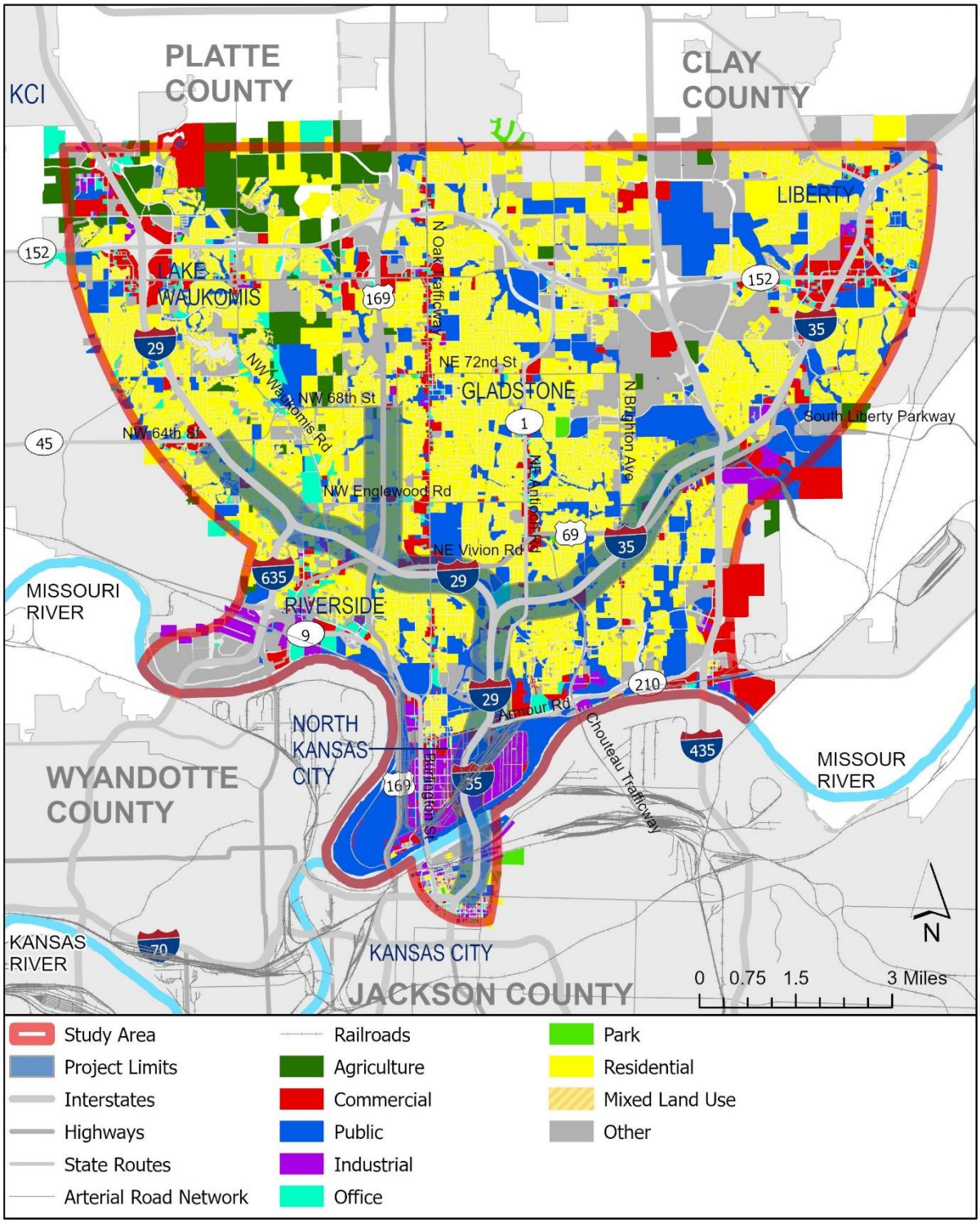
Land uses in the study area include agriculture, commercial, public, industrial, office, park, residential, mixed land use, and other uses. **Table 4** lists the existing land use categories used for the analysis and their definitions.

Table 4: Existing Land Use Category Definitions

Existing Land Use Category	Category Definition
Agriculture	Agriculture
Commercial	Commercial spaces, hotel/motel
Industrial	Industrial/ business
Mixed Land Use	Mixed Land Use (example- commercial and residential combined)
Office	Offices
Park	Parks
Public	Education, Public/Semi-Public, Utility
Residential	All residential (multi-family, single family, and apartments)
Other	Parking, ROW, ROW RR, Vacant

Figure 9 shows the location of these land uses in the study area. Residential areas are located throughout the study area while a majority of commercial areas are along major roadways such as I-29, I-35, U.S. 169, and N Oak Trafficway.

Figure 9: Existing Land Use



Source: MARC

Table 5 presents the acres of each land use and the percentage of area each land use occupies in the study area. 'Residential' and 'Other' land uses are the top two land use categories. 'Other' includes parking areas, ROW, ROW RR, and vacant land. These areas are predominantly located along the Missouri River in the southwest corner of the study area, in the northeast corner around the intersection of Hwy 152 and I-435 and are scattered in the northwest corner of the study area.

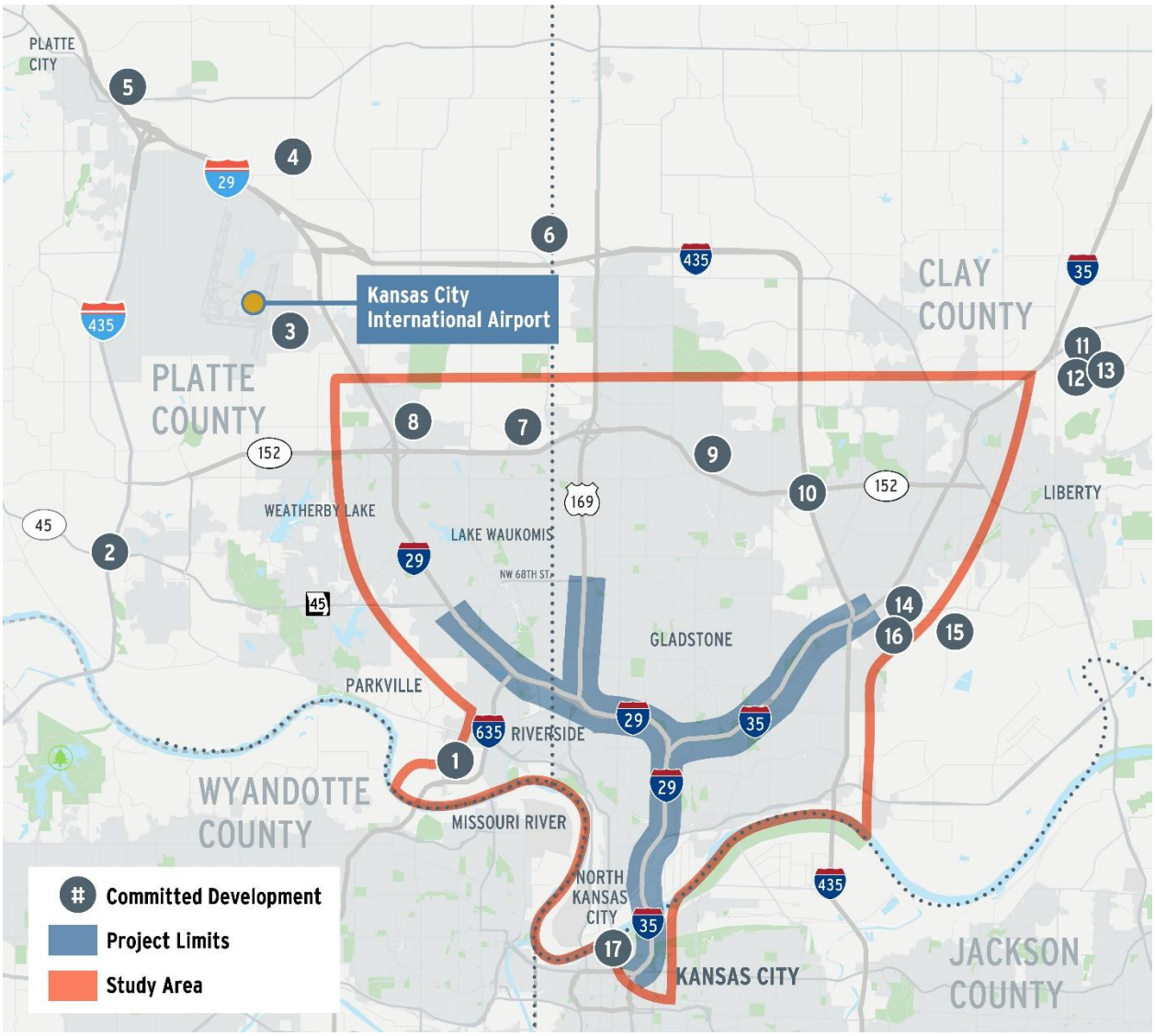
Table 5: Existing Land Use Percent of Study Area

Existing Land Use Category	Acres	Percentage of Study Area
Agriculture	2,788	4.0%
Commercial	4,365	6.3%
Industrial	1,825	2.6%
Mixed Land Use	1	<0.1%
Office	1,557	2.2%
Park	260	0.4%
Public	9,662	13.9%
Residential	24,467	35.3%
Other	24,467	35.3%
Total	**69,393**	**100%**

Source: MARC
Note: 'Other' land use category includes all parking space, ROW, ROW RR, and vacant lots/s pace in the study area.

The northland is expected to add 100,000 new residents and 60,000 new employees by 2050 according to MARC. The growth in employment can be attributed to new non-residential projects being planned provided by the Platte and Clay County Economic Development Corporations. **Figure 10** shows the location of the new non-residential projects and **Table 6** identifies each project.

Figure 10: Known Large Non-Residential Projects



Source: Platte County EDC, Clay County EDC. Note: Corresponding data found in Table 6

Table 6: Known Large Non-Residential Projects

Platte County	Clay County	Jackson County
1. KC Current Soccer Training Facility 2. Creekside 3. KCI Intermodal Business Centre 4. KCI 29 Logistics Park 5. Platte International Commerce Center 6. Golden Plains Technology Park 7. Twin Creeks/ Platte Purchase 8. Tiffany Greens	9. Staley Corners/ Marketplace 152 10. 587 Project 11. Heartland Cold Storage Logistics Center 12. Heartland Meadows Commerce Center 13. Liberty Heartland Logistics Center 14. Liberty Parkway Plaza & Logistics Center 15. Liberty Commerce Center 16. Ford Plant	17. KC Riverfront

Source: Platte County EDC, Clay County EDC. Note: Corresponding data found in Figure 9

4.1.5 Schools

There are 102 schools generally spread evenly throughout the study area in population centers. Schools in the study area are listed in **Table 7** and shown in **Figure 11.**

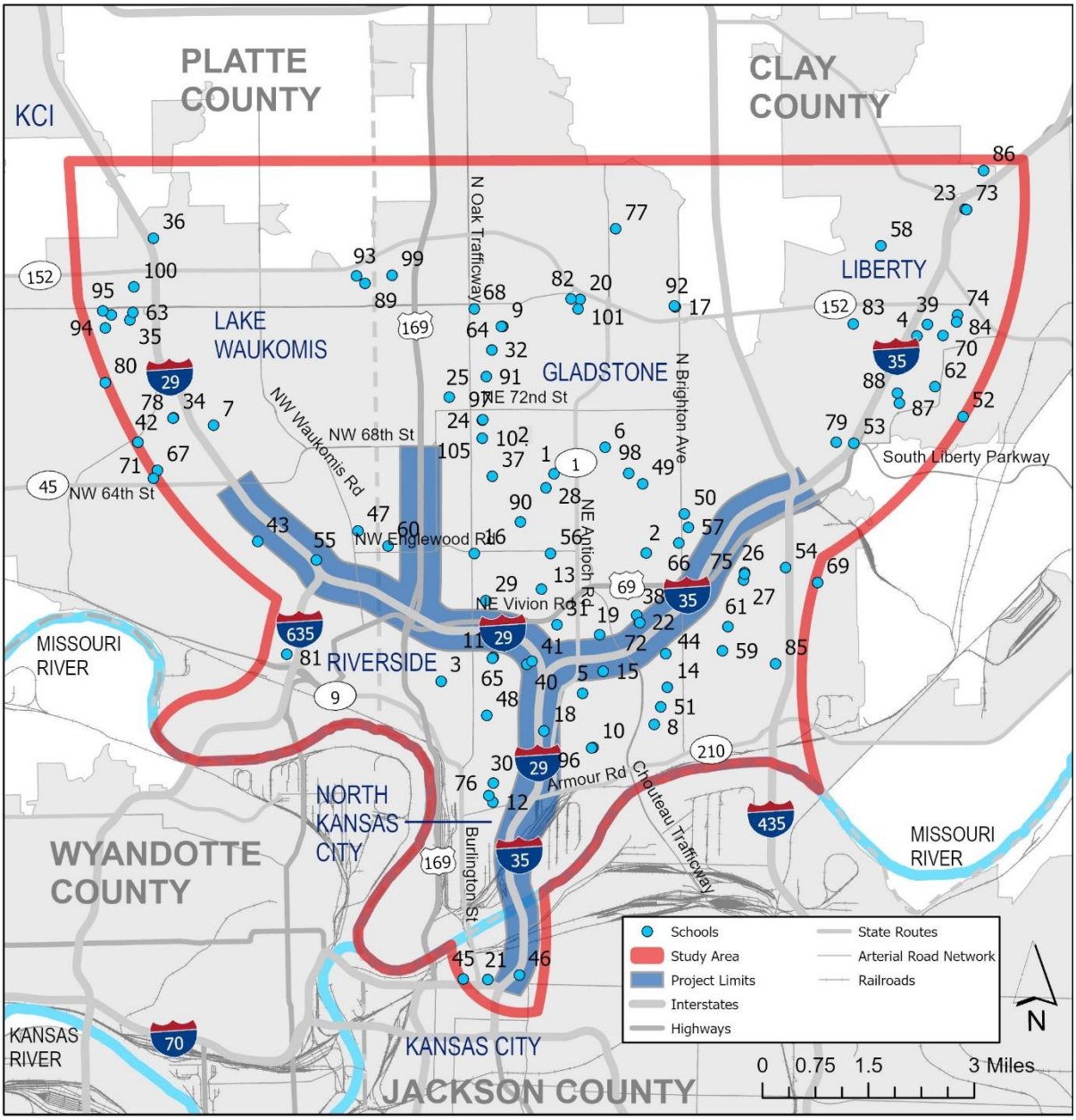
Table 7: Schools in Study Area

Map ID	Name	Map ID	Name
1	Antioch Middle School	52	Withers School
2	Big Shoal School	53	Pleasant Valley School (historical)
3	Briarcliff Elementary School	54	Greenwood School (historical)
4	Brick Monroe School	55	Northern Heights School (historical)
5	Brookwood School	56	Holy Cross Lutheran School
6	Chapel Hill Elementary School	57	Ravenwood Elementary School
7	Thomas B Chinn Elementary School	58	Shoal Creek Elementary School
8	Chouteau Elementary School	59	Topping Elementary School
9	Clardy School	60	West Englewood Elementary School
10	Cooley School	61	Winnetonka High School
11	Crestview School	62	Alexander Doniphan Elementary School
12	Daag School	63	Alfred L Renner Elementary School
13	Davidson Elementary School	64	Clardy Elementary School
14	Eastgate Middle School	65	Crestview Elementary School
15	Eastwood School	66	Eagle Heights Baptist School
16	Englewood School	67	English Landing Elementary School
17	Faubion School	68	Gashland Elementary School
18	Forest Hills North School	69	Gracemor Elementary School

Map ID	Name	Map ID	Name
19	Golden Oaks Education Center	70	Juvenile Justice Center
20	Kansas City Metropolitan Junior College	71	Lakeview Middle School
21	Karnes School	72	Lakewood Elementary School
22	Lakewood School	73	Lewis and Clark Elementary School
23	Lewis	74	Liberty Academy
24	Linden East School	75	Maple Park Middle School
25	Linden West Elementary School	76	North Kansas City High School
26	Maple Park Junior High School	77	Northview Elementary School
27	Maplewood Elementary School	78	Plaza Middle School
28	Meadowbrook Elementary School	79	Pleasant Valley Early Childhood Center
29	Midwestern Theological Seminary	80	Prairie Point Elementary School
30	Norclay School	81	Park Hill South High School
31	Northgate Middle School	82	Maple Valley School
32	Oak Park High School	83	Liberty Oaks Elementary School
33	Park Hill High School	84	Liberty Senior High School
34	Park Hill Junior High School	85	Faith Academy
35	Renner School	86	Warren Hills Elementary School
36	Roanridge Institute	87	South Valley Middle School
37	Saint Charles Borromeo School	88	South Valley Junior High School
38	Saint Gabriel Catholic School	89	Pathfinder Elementary School
39	Saint James School	90	Oakwood Manor Elementary School
40	Saint Patrick's Elementary School	91	Star Day Treatment Center
41	Saint Pius X High School	92	Northwest Regional Youth Center
42	Saint Therese North Parish School	93	Barry School
43	Southeast Elementary School	94	Congress Middle School
44	Winnwood Elementary School	95	Park Hill Day School
45	Buchanan School	96	Outreach Christian Education School
46	Garrison School	97	Oakhill Day School
47	Line Creek Elementary School	98	Saint Andrew the Apostle School
48	Glenwood School	99	National American University Zona Rosa Campus
49	Big Shoal School	100	Grantham University
50	Hoy School	101	Metropolitan Community College Maple Woods Campus
51	Moscow School	102	Northland Innovation Center

Source: Geographic Names Information System (GNIS), Google Maps

Figure 11: Schools in Study Area



Source: Geographic Names Information System (GNIS), Google Maps

4.1.6 Places of Worship

There are 99 places of worship generally spread evenly throughout the study area in population centers. The places of worship are listed in **Table 8** and shown in **Figure 12**.

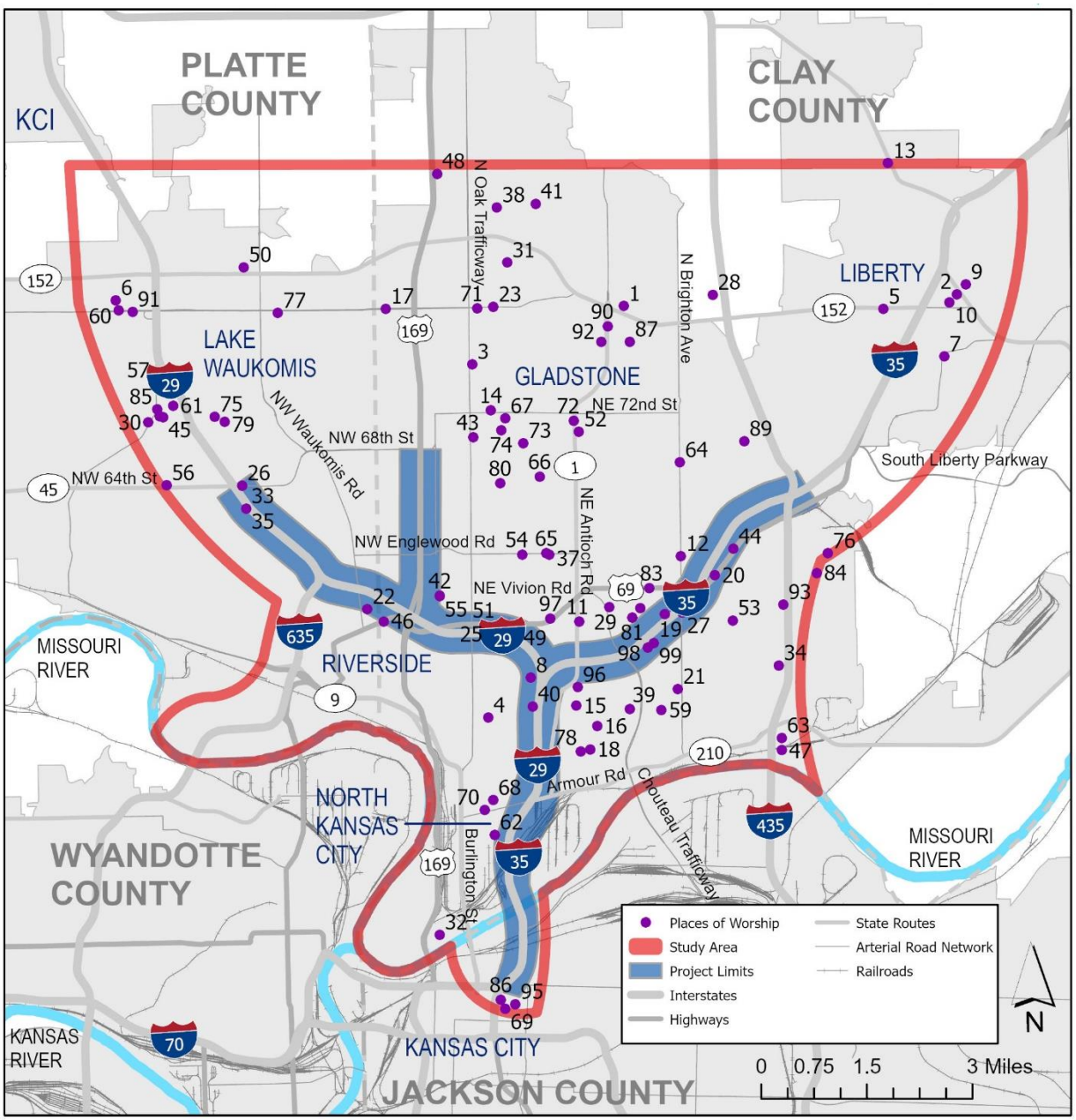
Table 8: Places of Worship in Study Area

Map ID	Name	Map ID	Name
1	Bethel Church	51	Northgate Baptist Church
2	Calvary Church	52	Northland Chinese Christian Church
3	Gashland Church	53	Northland Christian Church
4	Glenwood Church	54	Northminster Presbyterian Church
5	Pentecostal Church	55	Northside Christian Church
6	Pine Ridge Church	56	Northwest Bible Church
7	Saint Andrews Church	57	Park Hill Baptist Church
8	Saint Patrick's Church	58	Park Hill Christian Church
9	Saint Stephen Church	59	Parvin Road Church of Holiness
10	Union Church	60	Pine Ridge Presbyterian Church
11	Antioch Church	61	Platte Woods United Methodist Church
12	Mount Olive Church	62	Prodigal House Ministries
13	Little Shoal Baptist Church	63	Randolph Baptist Church
14	Antioch Bible Baptist Church	64	Cornerstone Wesleyan Church
15	Avondale Baptist Church	65	Englewood Baptist Church
16	Avondale United Methodist Church	66	Fairview Christian Church
17	Barry Christian Church	67	Faubion United Methodist Church
18	Berean Apostolic Worship Center	68	First Baptist Church of North Kansas City
19	Beth Haven Church	69	First Christian Church
20	Bethany Baptist Chapel	70	First Christian Church of North Kansas City
21	Bethel United Church of Christ	71	Gashland Baptist Church
22	Central District Pentecostal Church of God	72	Gladstone Baptist Church
23	Christ Church Unity North	73	Gladstone Church of God
24	Christ Lutheran Church Missouri Synod	74	Gladstone Fellowship Pentecostal Church of God
25	Church in Kansas City	75	Gloria Dei Lutheran Church
26	Church Of Christ of Roanridge	76	Gracemor Christian Church
27	Church of God of Prophecy	77	Rock of Ages Lutheran Church
28	Church of the Cross	78	Rockcreek Fellowship Assembly of God Church
29	Church of the Good Shepherd	79	Rolling Hills Community Church
30	Church of the Redeemer	80	Saint Charles Church
31	Greater Monumental Baptist Church of Jesus Christ	81	Saint Gabriel Archangel Church
32	Harlem Baptist Church	82	Saint James Lutheran Church
33	Harmony Vineyard Church	83	Saint Luke Presbyterian Church

Map ID	Name	Map ID	Name
34	Harvest Church	84	Saint Raphaels Church
35	Heartland Church of Christ	85	Saint Therese North Church
36	Hillside Christian Church	86	Set Free Church of Kansas City
37	Holy Cross Lutheran Church	87	Seventh Day Adventist Church
38	Holy Family Parish Church	88	Sherwood Bible Church
39	Immanuel Presbyterian Church	89	Shoal Creek Celebration Center
40	Kansas City Korean Baptist Church	90	Tenth Church of Christ Science
41	King of Kings Lutheran Church	91	Tiffany Fellowship Church
42	Kingdom Hall of Jehovahs Witnesses	92	Timothy Baptist Church
43	Linden Baptist Church	93	Tower View Baptist Church
44	McMurry United Methodist Church	94	Trinity Christian Center
45	Merry Moments Preschool	95	Unity Church Universal
46	Metro Baptist Church	96	Victory Free Will Baptist Church
47	Moment of Truth Bible Church	97	Vivion Road Church of Christ
48	New Life Community Church	98	Winnwood Baptist Church
49	North Cross United Methodist Church	99	Winnwood United Methodist Church
50	North Heartland Community Church		

Source: Geographic Names Information System (GNIS), Google Maps

Figure 12: Places of Worship in Study Area



Source: Geographic Names Information System (GNIS), Google Maps

4.1.7 Airports/Heliports

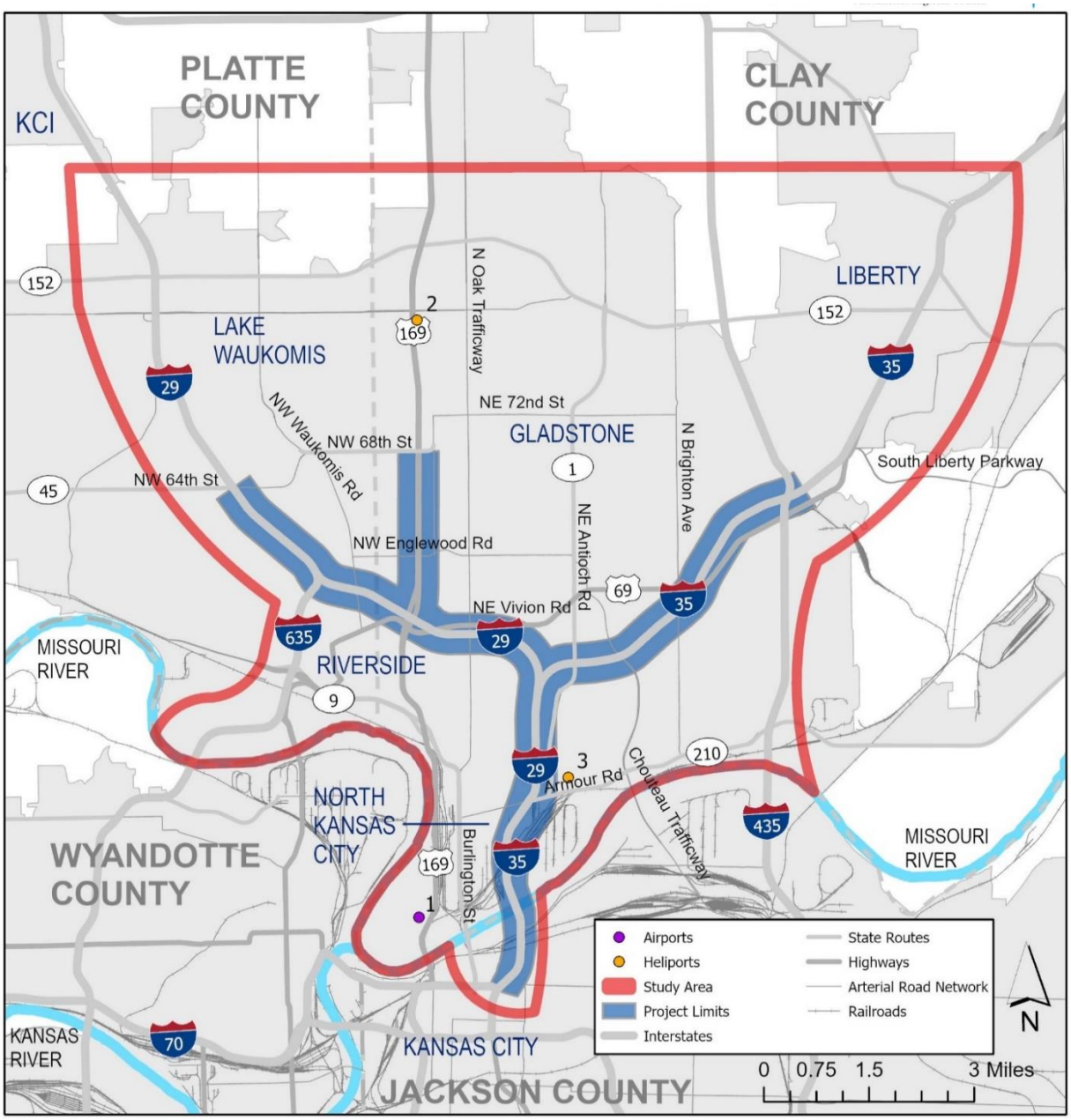
There is one airport and two heliports in the study area, listed in **Table 9** and shown in **Figure 13**. The airport and one of the heliports are located in the southern portion of the study area, and one heliport is located along U.S. 169 in the northern portion of the study area.

Table 9: Airports/Heliports in Study Area

Map ID	Airport Name
1	Charles B. Wheeler Downtown
Map ID	**Heliport Name**
2	North Patrol Division Station
3	North Kansas City Hospital

Source: Geographic Names Information System (GNIS), Google Maps

Figure 13: Airports and Heliports in Study Area



Source: Geographic Names Information System (GNIS), Google Maps

4.1.8 Cemeteries

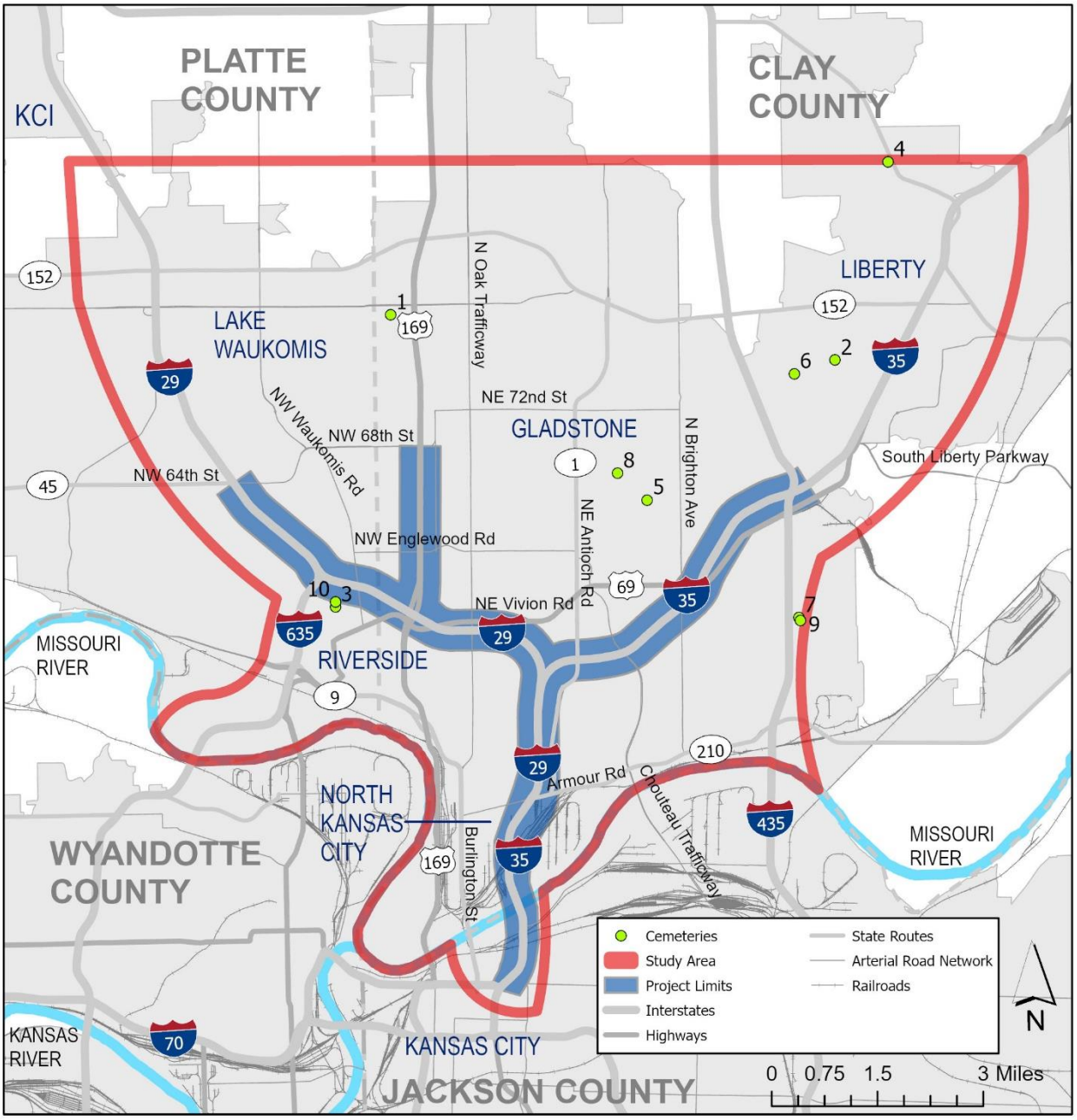
There are ten cemeteries generally spread out within the central and northern portions of the study area, listed in **Table 10** and shown in **Figure 14**.

Table 10: Cemeteries in Study Area

Map ID	Name
1	Barry Cemetery
2	Davidson Cemetery
3	East Slope Memorial Gardens
4	Little Shoal Cemetery
5	New Stark Cemetery
6	Pence Cemetery
7	Roger Cemetery
8	White Chapel Cemetery
9	Crowley Cemetery
10	Saint Matthews Cemetery

Source: Geographic Names Information System (GNIS), Google Maps

Figure 14: Cemeteries in Study Area



Source: Geographic Names Information System (GNIS), Google Maps

4.1.9 Police Facilities

There are nine police facilities in the study area, listed in **Table 11.** As shown in **Figure 15**, emergency services are generally spread out in the study area's population centers and along roadway corridors.

Table 11: Police Facilities in Study Area

Map ID	Name
1	Lake Waukomis Police Department
2	Gladstone Police Department
3	North Kansas City Police Department
4	Pleasant Valley Police Department
5	Platte Woods Police Department
6	Northmoor Police Department
7	Riverside City Police Department
8	Kansas City Police Department
9	Claycomo Police Department

Source: Geographic Names Information System (GNIS), Google Maps

4.1.10 Fire Facilities

There are 19 fire facilities in the study area, listed in **Table 12.** As shown in **Figure 15**, emergency services are generally spread out in the study area's population centers and along roadway corridors.

Table 12: Fire Facilities in Study Area

Map ID	Name
1	Kansas City Missouri Fire Department Station 25
2	Kansas City Missouri Fire Department Station 44
3	Lake Waukomis Fire Department
4	Kansas City Missouri Fire Department Station 40
5	Kansas City Missouri Fire Department Station 38
6	Kansas City Missouri Fire Department Station 34
7	Kansas City Missouri Fire Department Station 14
8	Kansas City Missouri Fire Department Station 6
9	Kansas City Missouri Fire Department Station 4
10	Gladstone Fire Department Station 2
11	Pleasant Valley Fire Department
12	North Kansas City Fire Marshal
13	North Kansas City Fire Department Station 2
14	Kansas City Missouri Fire Department Station 10
15	North Kansas City Fire Department Station 1
16	Gladstone Fire Department Station 1

Map ID	Name
17	Claycomo Fire and Rescue
18	Avondale Volunteer Fire Department
19	Riverside Fire Department

Source: Geographic Names Information System (GNIS), Google Maps

4.1.11 Hospitals

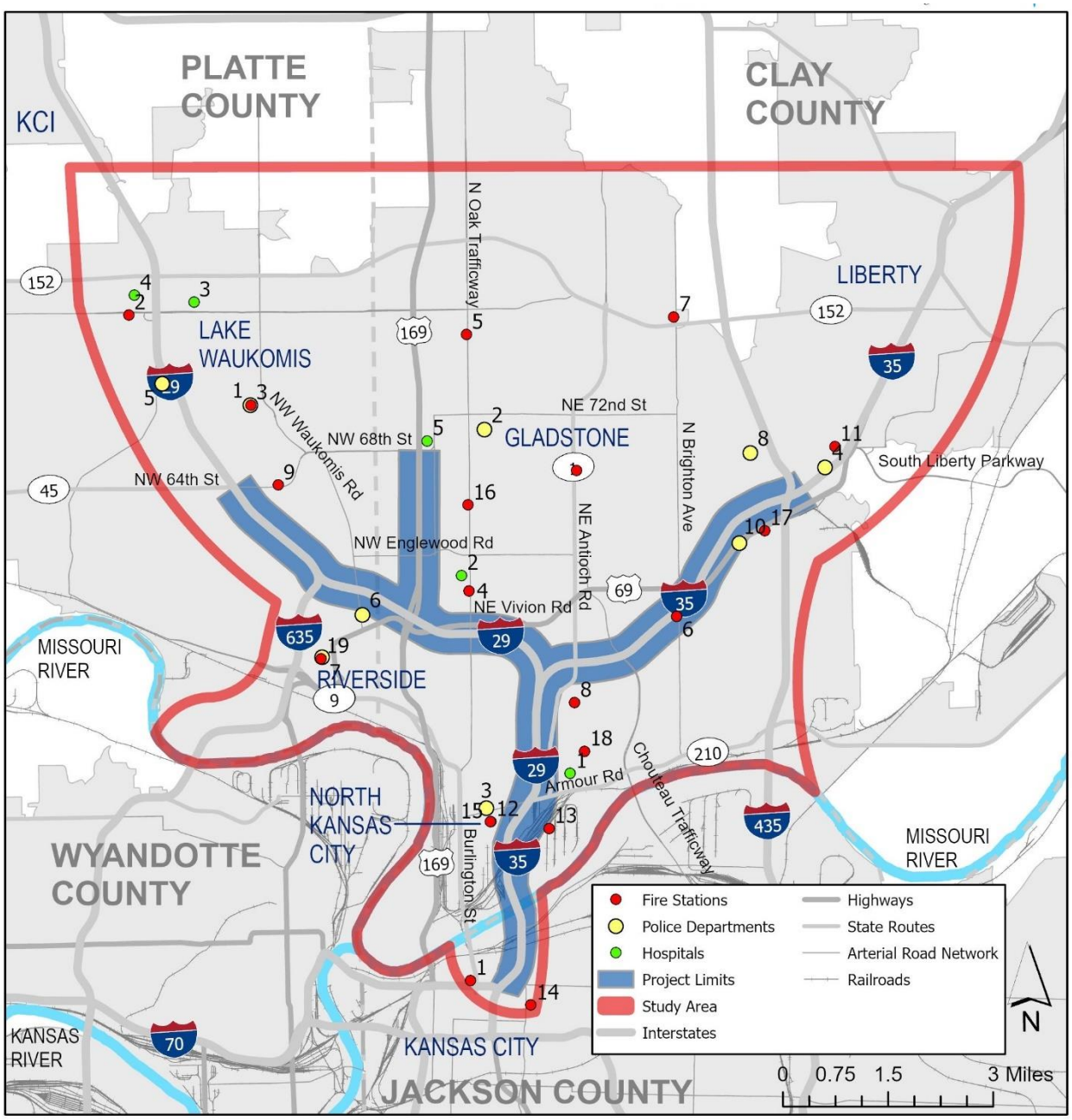
There are six hospitals in the study area, listed in **Table 13.** As shown in Error! Reference source not found., fire, police, and hospital services are generally spread out in the study area's population centers and along roadway corridors**.**

Table 13: Hospitals in Study Area

Map ID	Name
1	North Kansas City Hospital
2	Creekwood Surgery Center
3	Saint Luke's North Hospital - Barry Road
4	North Kansas City Hospital Center Wellness Center
5	Kindred Hospital Northland

Source: Geographic Names Information System (GNIS), Google Maps

Figure 15: Fire, Police and Hospital Services in Study Area



Source: Geographic Names Information System (GNIS), Google Maps

4.1.12 Parks and Recreational Resources

Section 4(f) Resources

A Section 4(f) resource is any significant publicly owned park, recreation area, wildlife and waterfowl refuge, or historic property (including archeological sites) protected by 23 Code of Federal Regulations (CFR) 774. Federally funded DOT actions cannot impact Section 4(f) eligible sites unless there is no "feasible and prudent" alternative. There are 87 parks and/or

recreation areas and one wildlife refuge (Big Muddy National Fish and Wildlife Refuge) potentially eligible for Section 4(f) protection in the study area. A list of Section 4(f) parks and one wildlife refuge are provided in **Table 14.** Section 4(f) historic properties and archeological sites are listed in **Table 14** and **Table 15**, respectively. As shown in **Figure 16**, their locations are generally widespread throughout the study area. If proposed improvements result in a use of these types of properties, a Section 4(f) evaluation will be required during the National Environmental Policy Act (NEPA) phase.

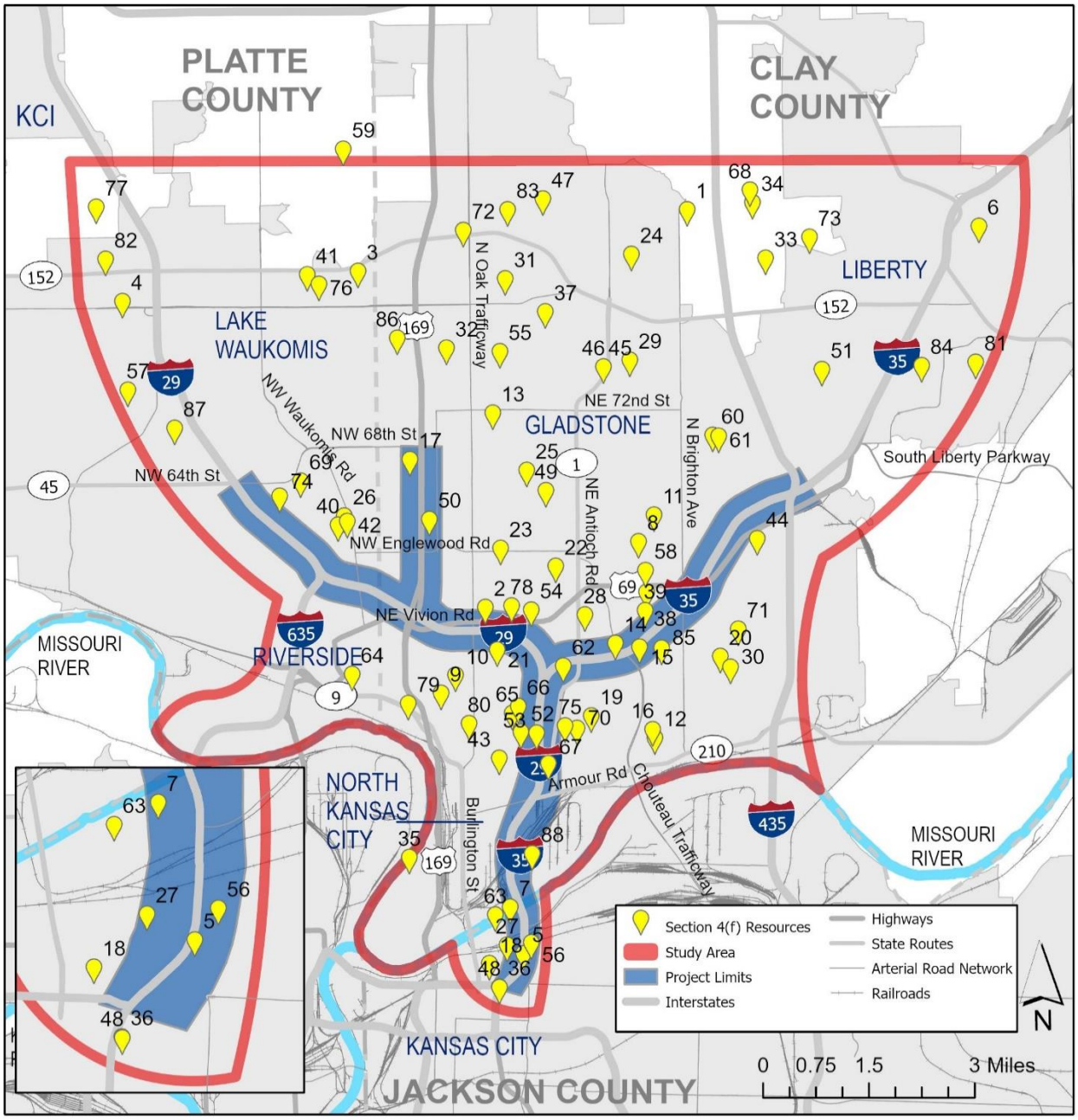
Table 14: Section 4(f) Resources in Study Area

Map ID	Name	Map ID	Name
1	AJ Wilson Sports Complex	45	Maple Woods Natural Area
2	Anita B Gorman Park	46	Maple Woods Nature Preserve
3	Barry Platte Park	47	Maplewoods Greenway
4	Barry Road Park	48	Margaret Kemp Park
5	Belvidere Park	49	Meadow Brook Park
6	Bennett Park	50	Morgan Tract Park
7	Berkley River Park	51	North Brook Park
8	Big Shoal Park	52	North Hills Park
9	Briarcliff Greenway	53	North Hills Park
10	Briarcliff Park	54	Northgate Park
11	Brookhill Park	55	Oak Grove Park
12	Buckeye Greenway	56	Overlook at Pendleton Heights
13	Central Park	57	Park Forest Park
14	Chaumiere Woods Park	58	Penguin Park
15	Chouteau Greenway	59	Platte Purchase Park
16	Chouteau Park	60	Pleasant Valley Park
17	Clayton Park	61	Pleasant Valley Road Athletic Complex
18	Columbus Square	62	Prather Park
19	Cooley Park	63	Richard L Berkley Riverfront Park
20	Creekwood Park	64	Riverside Race Track (historical)
21	Crestview Park	65	Riverview Greenway
22	Davidson Park	66	Riverview Park
23	Englewood Park	67	River Forest Park
24	Essex Park	68	Robert H. Hodge Park
25	Flora Park	69	Robinhood Park
26	Frank Vaydik Park	70	Rock Creek Park
27	Garrison Square	71	Searcy Creek Parkway

Map ID	Name	Map ID	Name
28	Golden Oaks Park	72	Sherrydale Park
29	Happy Rock Park	73	Shoal Creek Golf Course
30	Hidden Valley Park	74	Strathbury Park
31	Highland View Park	75	Sunset Park
32	Hobby Hill Park	76	Sycamore Knoll Park
33	Hodge Park	77	Tiffany Hills Park
34	Hodge Park Athletic Field	78	Vivion Road Backyard Wildlife Demonstration Garden
35	Holland Park	79	Waterwell Athletic Complex
36	Kemp Playground	80	Waterworks Park
37	Kirby Creek Park	81	Westboro/Canterbury Greenway
38	Lakewood Greenway	82	Wildberry Park
39	Lakewood Park	83	Willow Brooke Park
40	Line Creek Greenway	84	Wilshire Park
41	Line Creek Meadows	85	Winnwood Park
42	Line Creek Park	86	Wood Bridge Park
43	Macken Park	87	Woodsmoke Park
44	Maple Park	88	Big Muddy National Fish and Wildlife Refuge

Source: Geographic Names Information System (GNIS), Google Maps

Figure 16: Section 4(f) Resources in Study Area



Source: Geographic Names Information System (GNIS), Google Maps

Section 6(f) Resources

A Section 6(f) resource is any public outdoor recreational land acquired or improved with funds authorized under the Land and Water Conservation Fund (LWCF) Act of 1965. Facilities that are LWCF funded must be maintained for outdoor recreation in perpetuity. Impacts to Section 6(f) properties require mitigation that includes replacement of at least equal value and recreation utility. Based on review of the National Park Service database and listed in **Table 15**, there are

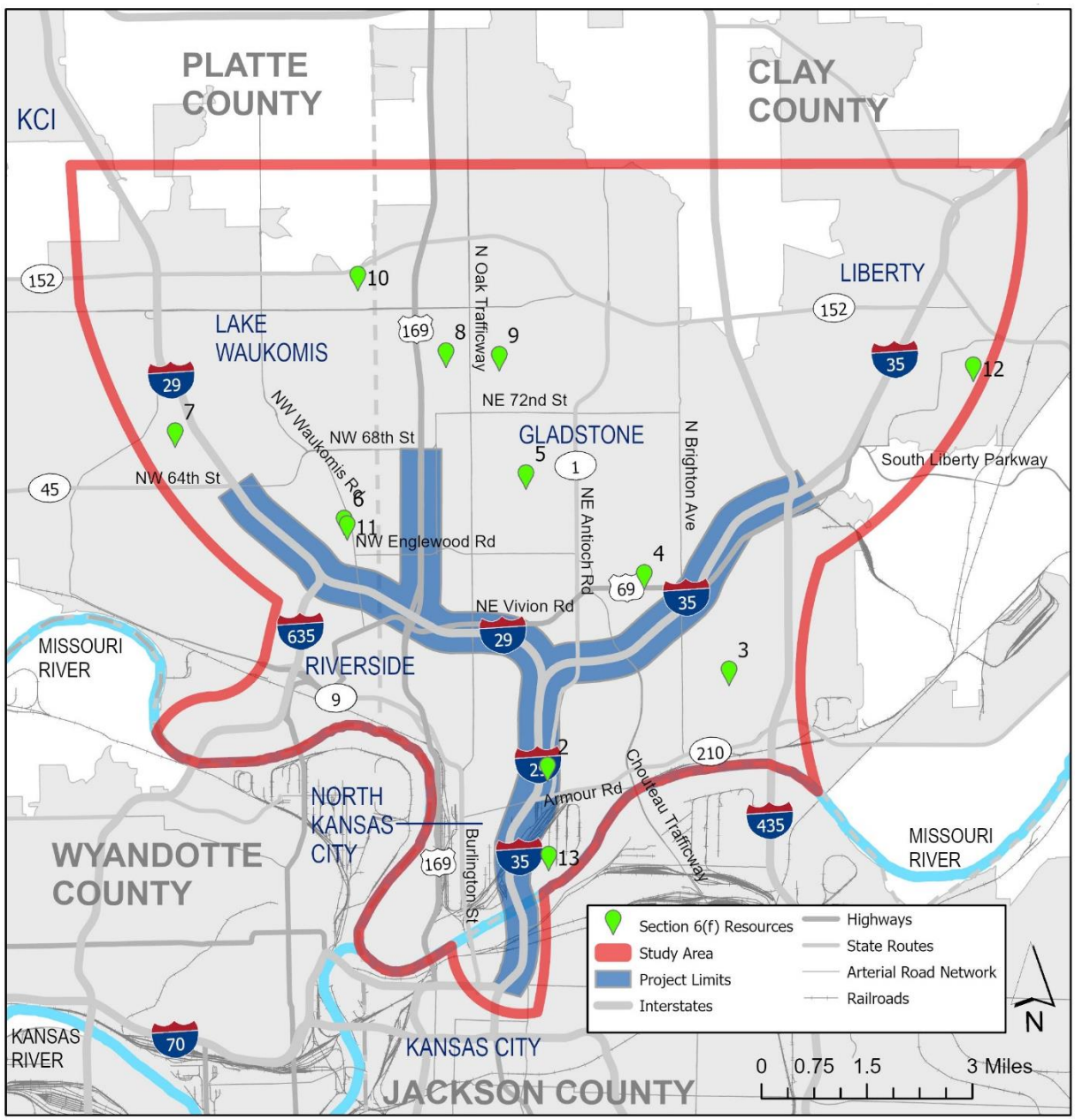
13 Section 6(f) resources within the study area. As shown in **Figure 17**, their locations are generally widespread throughout the study area.

Table 15: Section 6(f) Resources in Study Area

Map ID	Section 6(f) Parks
1	River Bluff Park
2	River Forest Park
3	Hidden Valley Park
4	Penguin Park
5	Flora Park
6	Frank Vaydik Park
7	Woodsmoke Park
8	Hobby Hill Park
9	Oak Grove Park
10	Barry Platte Park
11	Line Creek Park
12	Westboro-Canterbury Greenway
13	Big Muddy National Fish and Wildlife Refuge

Source: Land and Water Conservation Fund (LWCF) map, Geographic Names Information System (GNIS), Google Maps

Figure 17: Section 6(f) Resources in Study Area



Source: The Land and Water Conservation Fund (LWCF) map, Geographic Names Information System (GNIS), Google Maps

4.1.13 Natural Resources

Vegetation

The majority of the study area is within an urbanized area. There are large sections of upland and riparian forests located in parks and stream corridors. Grassed areas within the residential and industrial areas are predominantly comprised of maintained, cool-season grasses.

Wildlife Habitat and Migration Patterns

The study area contains habitat that may provide suitable habitat for threatened and endangered species. Wildlife habitat within the study area consists of forested areas, the Missouri River and other streams, and bridges that could provide nesting sites for migratory birds and roosting sites for bat species.

Threatened and Endangered Species

Federally listed threatened and endangered species are subject to the protection afforded under Section 7 of the Endangered Species Act of 1973, as amended (ESA) (16USC 1531 et seq.). The ESA provides protection of animal and plant species that have been determined to be in population decline and are in jeopardy of becoming extinct.

Table 16 below lists the species identified as potentially occurring within the study area during searches of the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) and the Missouri Department of Conservation's (MDC) Missouri Natural Heritage Program databases on July 15, 2022.

Table 16: Threatened and Endangered Species Potentially Occurring Within the Study Area

Common Name	Scientific Name	Federal Status[1]	State Status[2]	Critical Habitat w/in Study Area
Invertebrates				
Monarch Butterfly	*Danaus plexippus*	Candidate		None
Fishes				
Pallid Sturgeon	*Scaphirhynchus albus*	Endangered	Endangered	None
Mammals				
Gray Bat	*Myotis grisescens*	Endangered		None
Indiana Bat	*Myotis sodalis*	Endangered	Endangered	None
Northern Long-Eared Bat	*Myotis septentrionalis*	Threatened		None

Source: U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) Database; Missouri Department of Conservation's (MDC) Natural Heritage Program Database

Water Quality

Section 303(d) of the Clean Water Act (CWA) requires states to identify all water bodies where state water quality standards are not being met. Missouri's water quality standards are defined in the Code of State Regulations 10 CSR 20-7.031. The water quality standards describe the desired condition of Missouri's waterbodies and the methods being utilized to reach or protect those conditions. The Missouri Department of Natural Resources (MDNR) maintains a list of Missouri Section 303(d) impaired waters. The current approved list (2020) was reviewed to

determine if any surface waters within the study area were listed as impaired. The Missouri River and Line Creek were both listed as impaired waters. The impairments of both streams are discussed further below.

- The Missouri River is listed as impaired for the pollutant Escherichia coli (W) which affects the use of the Missouri River for whole body contact recreation.

- Line Creek is listed as impaired for the pollutant Escherichia coli (W) which affects the use of Line Creek for whole body contact recreation.

Surface Waters

Surface waters within the study area include the Missouri River, Kansas River, Brush Creek, Buckeye Creek, Burlington Creek, East Creek, East Fork Shoal Creek, Jumping Branch, Line Creek, Little Shoal Creek, Mill Creek, Old Maids Creek, Rock Creek, Rush Creek, Searcy Branch, Second Creek, Shoal Creek, White Aloe Branch, and unnamed tributaries. The study area is located within the Independence-Sugar (1024011), Platte (10240012), Lower Kansas, Kansas (10270104), and Lower Missouri-Crooked (10300101) 8-digit hydrologic units. **Table 17** below summarizes the stream classifications, use categories, and impairments for the streams/rivers within the study area.

Table 17: Waterbody Classification and Impairment

Water Body	Stream Classification	Use Classification*	Impairment	Impaired Use
Missouri River	Perennial	AQL, DWS, IND, IRR, LWW, SCR, WBC, HHP	Escherichia coli (W)	WBC
Line Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	Escherichia coli (W)	WBC
Brush Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Buckeye Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Burlington Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
East Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
East Fork	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
East Fork Shoal Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Jumping Branch	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Little Shoal Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Mill Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Old Maids Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None

Water Body	Stream Classification	Use Classification*	Impairment	Impaired Use
Rock Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Rush Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Searcy Branch	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Second Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Shoal Creek	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
White Aloe Branch	Intermittent	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Unnamed Tributaries	Intermittent/artificial paths	AQL, IRR, LWW, SCR, WBC, HHP	None	None
Wells	NONE	N/A	Unknown	Unknown
Other	NONE	N/A	None	None

* Use Classifications: AQL – Aquatic Life; DWS – Drinking Water Supply; IND - Industrial; IRR - Irrigation; HHP – Human-Health Protection (Fish Consumption); LWW – Livestock & Wildlife Watering; SCR – Secondary Contact Recreation; WBC – Whole Body Contact Recreation

Source: Missouri Department of Natural Resources (MDNR) GIS Data

Water and Monitoring Wells

There are over 2,100 water and monitoring wells within the study area, of which about 1,005 (48%) are abandoned and about 1,020 (49%) are monitoring wells used to monitor for a variety of parameters. The remaining 59 wells (3%) have various listed uses such as domestic, public, irrigation, supply, and unknown. Wells can also act as pathways of pollutants to groundwater.

Other

There are no known Outstanding National Resource Waters, Outstanding State Resource Waters, cold water habitat, losing streams, or biocriteria reference locations within the study area.

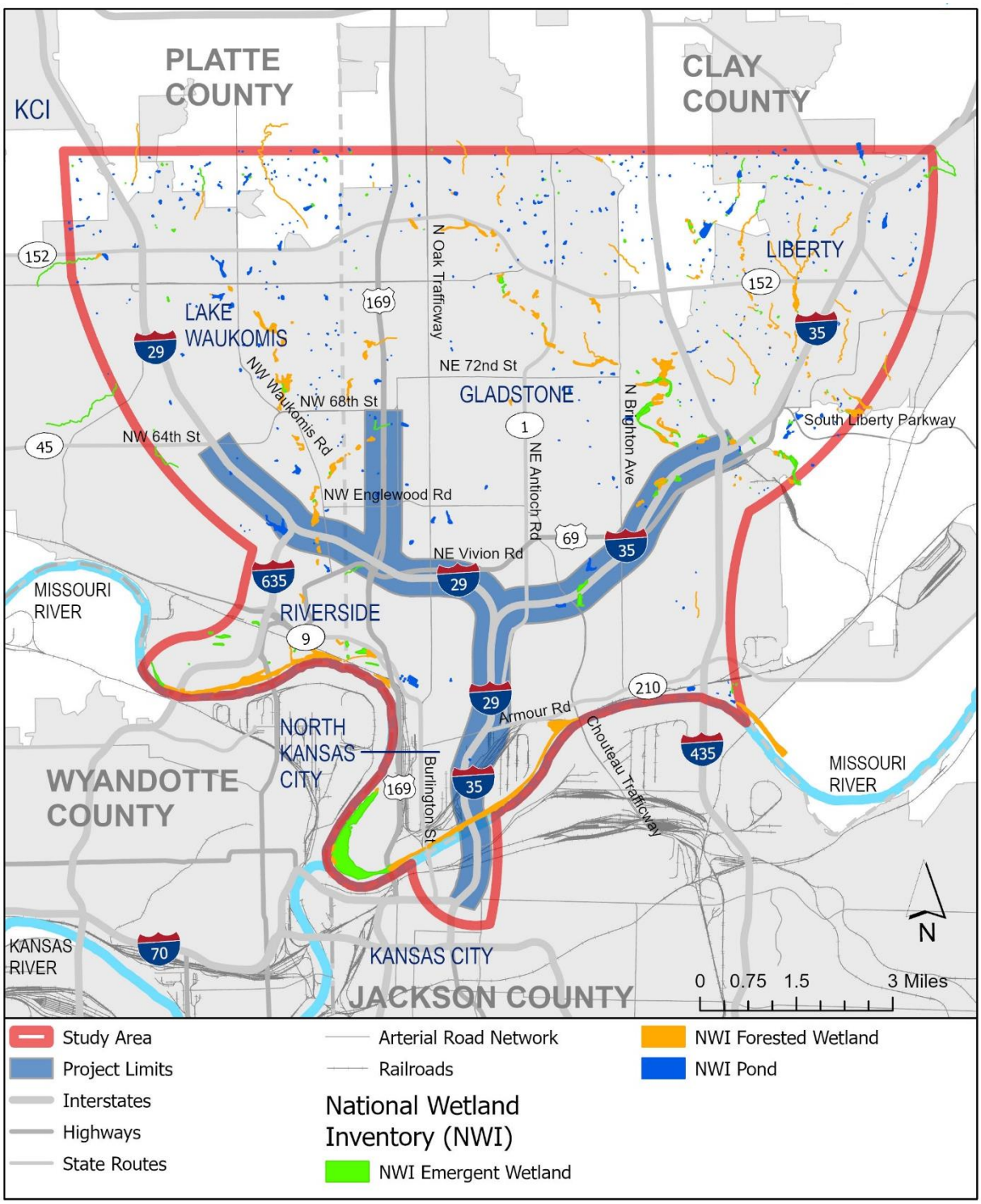
Waters of the U.S., including Wetlands

Wetland resources are protected under Section 404 of the Clean Water Act (33 US Code [USC] 1344) and Executive Order (EO) 11990 Protection of Wetlands (Environmental Protection Agency (EPA), 1977). This section describes the wetlands, streams, and ponds/lakes within the study area. This analysis was performed using GIS and the USFWS National Wetlands Inventory (NWI) and U.S Geological Survey (USGS) National Hydrology Database (NHD) mapping data.

The NWI wetlands identified within the study area included 405 riverine wetlands located within the various stream/river channels, 142 freshwater emergent wetlands, and 235 freshwater forested/shrub wetlands. The NWI data also identified one lake and 420 freshwater ponds within

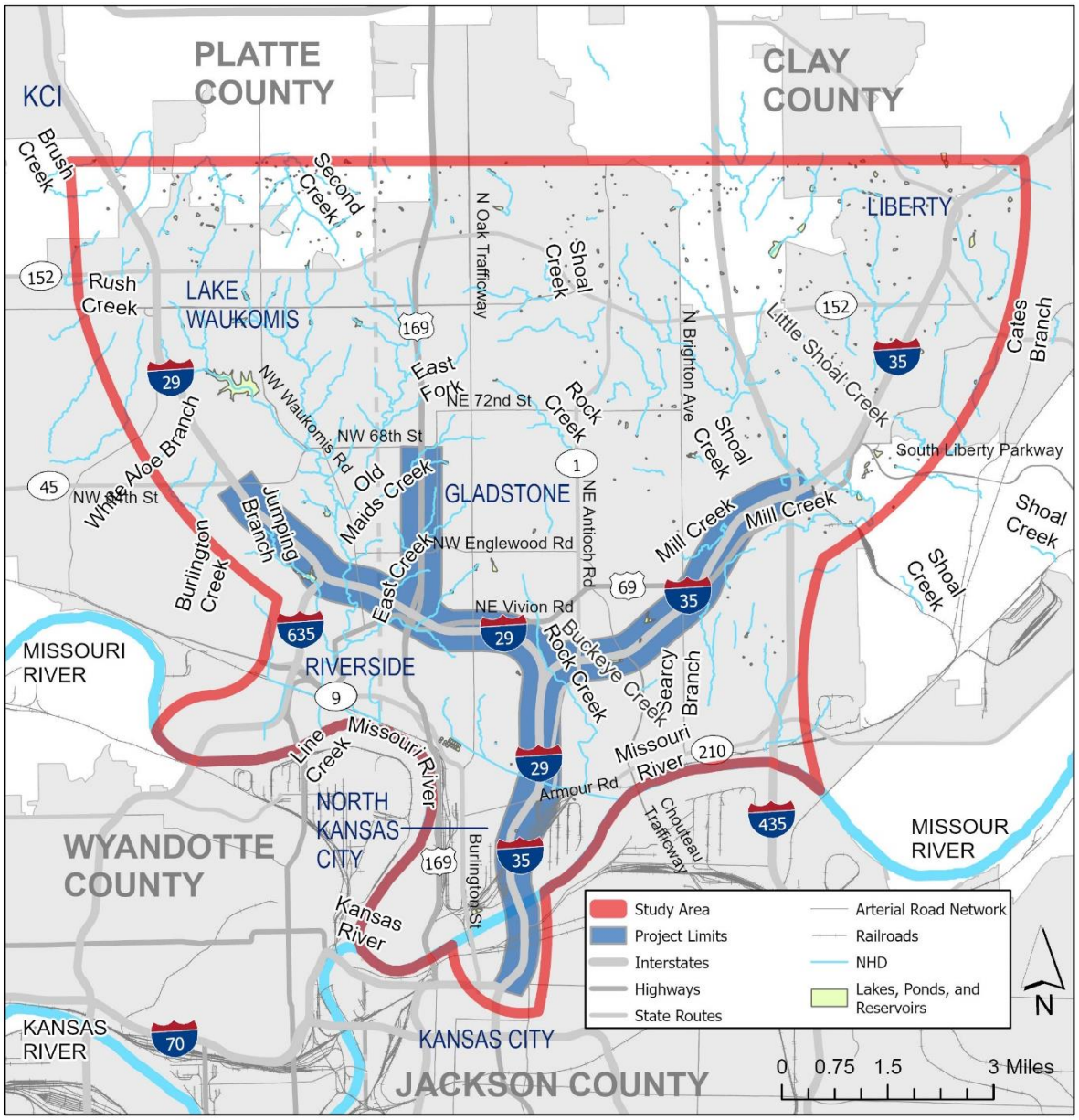
the study area. **Figure 18** shows NWI locations generally spread along the Missouri River and throughout central and northern portions of the study area. **Figure 19** shows NHD locations generally widespread throughout the study area.

Figure 18: National Wetland Inventory (NWI)



Source: Geographic Names Information System (GNIS), Google Maps

Figure 19: National Hydrology Database (NHD)



Source: Geographic Names Information System (GNIS), Google Maps

NWI mapped wetlands may or may not be considered jurisdictional by the U.S. Army Corps of Engineers (USACE). To determine if NWI mapped wetlands are jurisdictional, wetland delineations will need to be performed following the methods of the 1987 Corps of Engineers Wetlands Delineation Manual and the Midwest Regional Supplement. A wetland delineation may identify wetlands that are not shown in the NWI data. Section 404 of the Clean Water Act (CWA) prohibits the discharge of dredged or fill material (i.e., sand, soil, rock, construction materials) into waters of the U.S. without a permit from the USACE and may require mitigation.

Floodways and Floodplains

Floodplains are low-lying land areas that are susceptible to being inundated by floodwaters from any source. Executive Order 11988 on Floodplain Management directs federal agencies "to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative."

Regulatory Floodway

FEMA defines the regulatory floodway as "the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height."

Study Area Regulatory Floodways and Floodplains

The FEMA National Flood Hazard Layer (NFHL) was utilized in ArcGIS to identify floodways and floodplains within the study area. The floodways and floodplains, identified and shown in **Figure 20**, were associated with the following streams/rivers:

- Missouri River: floodway and 100-year floodplain
- Line Creek: floodway and 100-year floodplain
- Second Creek: floodway and 100-year floodplain
- Rush Creek: 100-year floodplain
- East Fork: floodway and 100-year floodplain
- Old Maids Creek: floodway and 100-year floodplain
- Jumping Branch: floodway and 100-year floodplain
- East Creek: floodway and 100-year floodplain
- Rock Creek: floodway and 100-year floodplain
- Buckeye Creek: floodway and 100-year floodplain
- Searcy Branch: floodway and 100-year floodplain
- Mill Creek: floodway and 100-year floodplain
- Shoal Creek: floodway and 100-year floodplain
- Little Shoal Creek: floodway and 100-year floodplain
- East Fork Shoal Creek: floodway and 100-year floodplain
- Burlington Creek: floodway and 100-year floodplain, and
- White Aloe Branch: 100-year floodplain.

The Missouri State Emergency Management Agency (SEMA) issues floodplain development permits for projects undertaken by the State of Missouri. A "no-rise" certificate would be required before a permit is issued for projects proposed within regulatory floodways.

Flood Protection Levees

The USACE Civil Works program manages the nation's water resources. Through the Levee Safety Program, the USACE partners with levee sponsors to manage levees that help reduce flood risks to people, businesses, critical infrastructure, and the environment. The protection of the levees and other USACE Civil Works projects are provided by two regulations:

- Section 408: Through Section 408, the USACE may grant permission for another party to alter a Civil Works project as long as the USACE determines that the proposed alteration will not be injurious to the public interest and will not impair the usefulness of the Civil Works project.

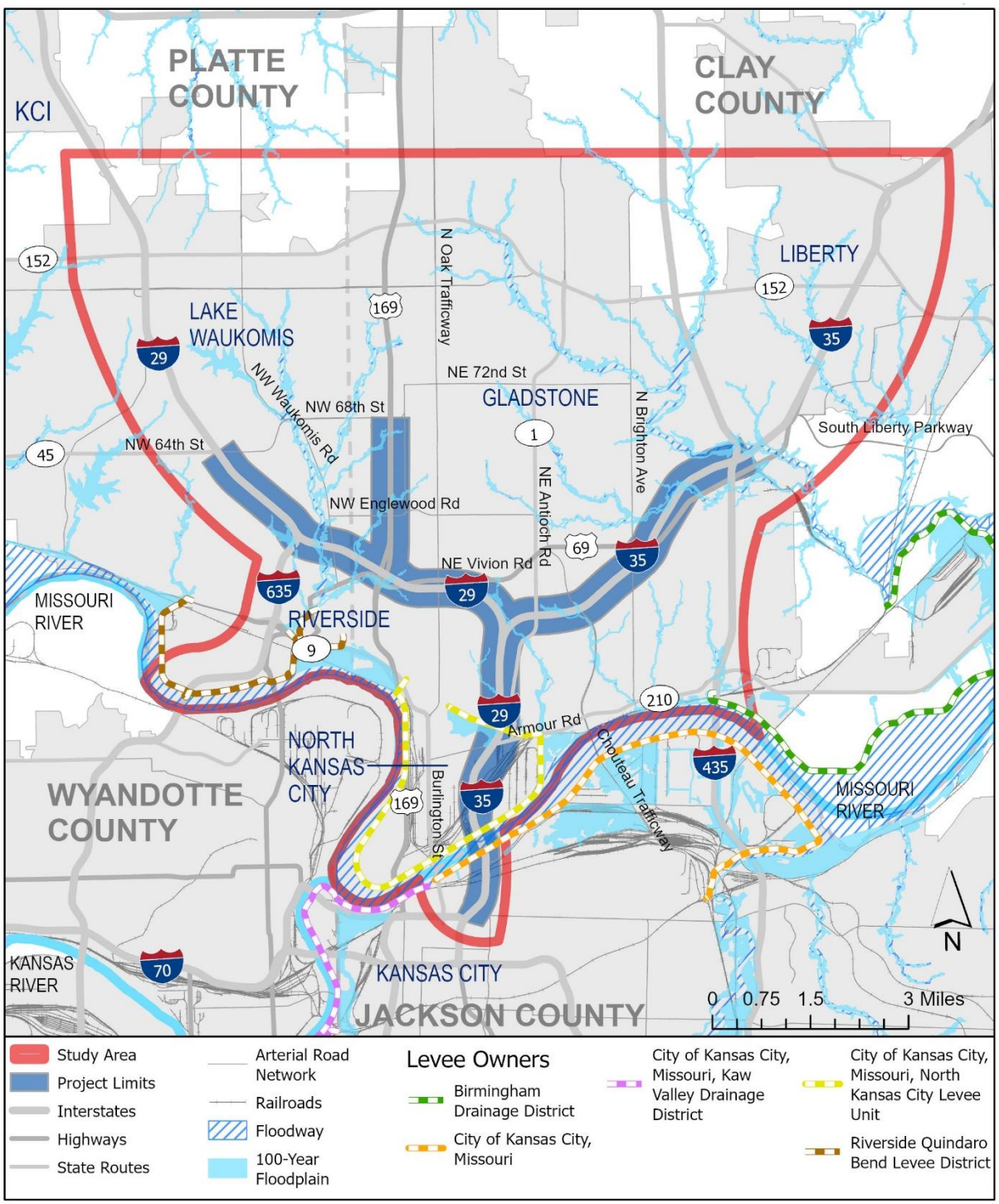
- Section 14: Section 14 of the Rivers and Harbors Act of 1899, as amended, and codified at 33 USC 408 (Section 408) provides that the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for the alteration or use of any USACE Civil Works project.

Study Area Levees

The existing levees within the study area are maintained by the levee's sponsor. Each sponsor is responsible for the operation, maintenance, repair, rehabilitation, and replacement of their structure. The levees must meet inspection requirements conducted by the USACE.
The local sponsors are responsible for controlling construction within the critical area of the levee. The USACE provides engineering review to ensure that any work within or near the levee does not reduce the level of protection or integrity of the levee. The critical area is typically the area 300 feet riverward to 500 feet landward of a levee centerline. In some instances, the critical area is extended beyond 500 feet if there are any impacts to the levee.

Within the study area, there are four total levees located on both sides of the Missouri River**.** Two levees are sponsored by the Riverside Quindaro Bend Levee District, one levee is sponsored by the Birmingham Drainage District, and the fourth levee is sponsored by the City of Kansas City, Missouri, North Kansas City Levee Unit. **Figure 20** shows the locations of the four levees along the Missouri River.

Figure 20: Floodplains and Levees



Source: Geographic Names Information System (GNIS), Google Maps

4.1.14 Other Items of Considerations

Hazardous Materials

The Resource Conservation and Recovery Act (RCRA) of 1976 gives the U.S. Environmental Protection Agency (EPA) the authority to regulate the disposal of hazardous waste. The EPA has delegated authority for executing most of the requirements of RCRA in Missouri to the Missouri Department of Natural Resources (MDNR) Hazardous Waste Program. The Hazardous and Solid Waste Amendment (HSWA) of 1984 mandates corrective action at hazardous waste facilities for all releases of hazardous waste to the environment and includes provisions to regulate underground storage tanks.

A review of available MDNR on-line databases was performed for the study area to determine if any known sites producing, storing, and/or disposing of toxic or hazardous materials might affect the proposed study alternatives. GIS data was downloaded from the MDNR's Environmental Site Tracking and Research Tool (E-Start).

At this time, no recommendations from the PEL study have been identified; therefore, level of risk is not determined for sites within the study area. An environmental regulatory records review assessment (radius report) in accordance with the American Society for Testing and Materials (ASTM) Practice E1527-05, with exceptions to accommodate the particular situations and needs of roadway projects, would be necessary during the schematic and NEPA phase of project development; and if proposed improvements result in a use of these types of properties, a more detailed evaluation will be required.

As listed in **Table 18,** the study area includes the following hazardous materials sites:

- Two Brownfield Assessment Sites
  - One immediately adjacent to I-29 just north of Missouri River
  - One in Gladstone, approx. 3500 feet east of U.S. 169
- 12 Active Hazardous Waste Program Cleanup Sites
- Three Operating Underground Storage Tank Facilities where Investigation/Corrective Action is Ongoing or Incomplete
- Five Former Underground Storage Tank Facilities where Investigation/Corrective Action is Ongoing or Incomplete

Table 18: Hazardous Materials Sites in Study Area

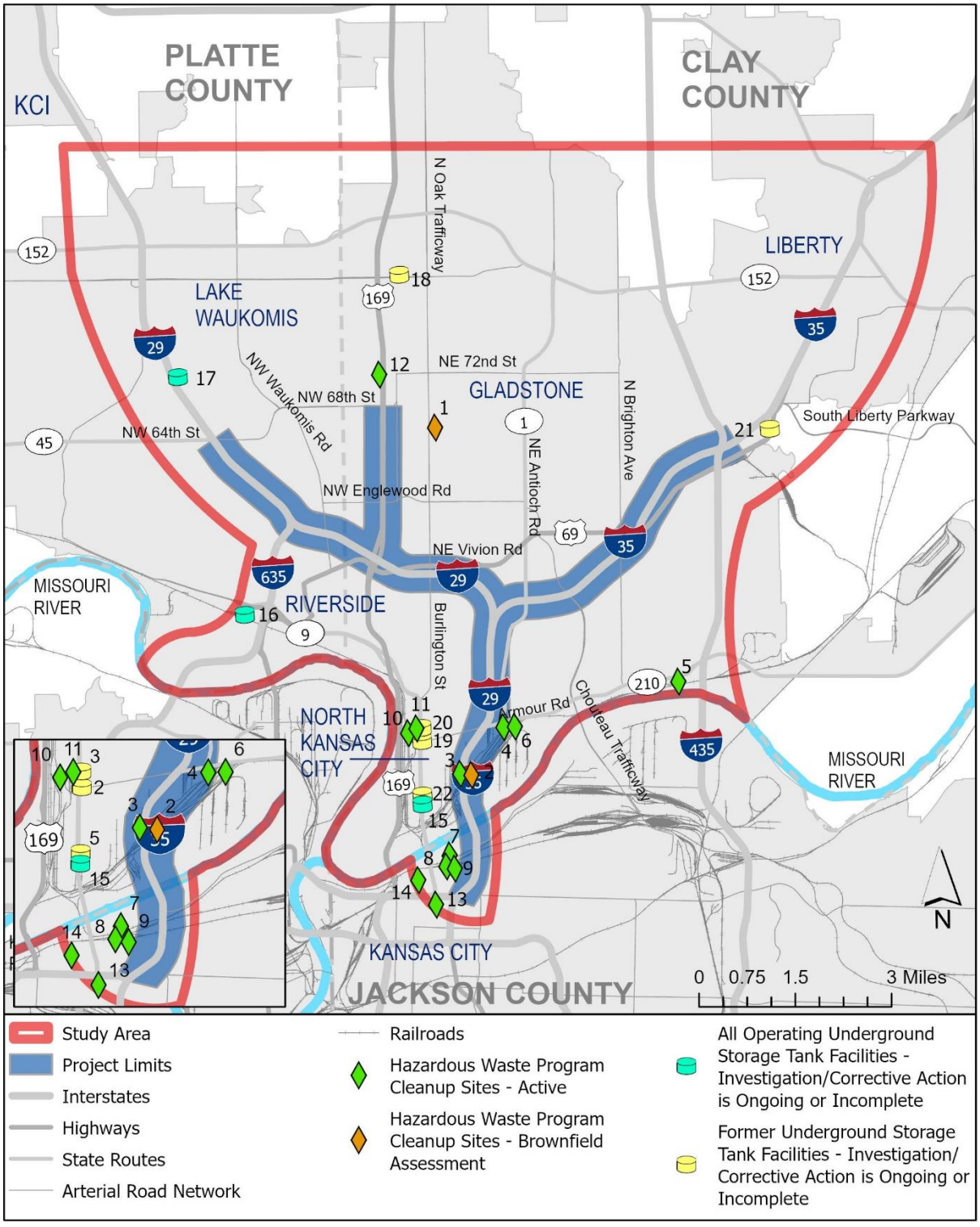
Map ID	Site	Status
1	Brownfield Assessment	Active
2	Brownfield Assessment	Active
3	Hazardous Waste Program Cleanup Site	Active
4	Hazardous Waste Program Cleanup Site	Active

Map ID	Site	Status
5	Hazardous Waste Program Cleanup Site	Active
6	Hazardous Waste Program Cleanup Site	Active
7	Hazardous Waste Program Cleanup Site	Active
8	Hazardous Waste Program Cleanup Site	Active
9	Hazardous Waste Program Cleanup Site	Active
10	Hazardous Waste Program Cleanup Site	Active
11	Hazardous Waste Program Cleanup Site	Active
12	Hazardous Waste Program Cleanup Site	Active
13	Hazardous Waste Program Cleanup Site	Active
14	Hazardous Waste Program Cleanup Site	Active
15	Operating Underground Storage Tank Facilities	Investigation/Corrective Action Ongoing or Incomplete
16	Operating Underground Storage Tank Facilities	Investigation/Corrective Action Ongoing or Incomplete
17	Operating Underground Storage Tank Facilities	Investigation/Corrective Action Ongoing or Incomplete
18	Former Underground Storage Tank Facilities	Investigation/Corrective Action Ongoing or Incomplete
19	Former Underground Storage Tank Facilities	Investigation/Corrective Action Ongoing or Incomplete
20	Former Underground Storage Tank Facilities	Investigation/Corrective Action Ongoing or Incomplete
21	Former Underground Storage Tank Facilities	Investigation/Corrective Action Ongoing or Incomplete
22	Former Underground Storage Tank Facilities	Investigation/Corrective Action Ongoing or Incomplete

Source: Missouri Department of Natural Resources (MDNR) GIS Data

The above hazardous materials sites, as shown in **Figure 21**, are generally clustered in the southern portion of the study area near population centers, as well as having a few sites scattered throughout the central and northern portions of the study area.

Figure 21: Hazardous Materials Sites in Study Area



Source: Missouri Department of Natural Resources (MDNR) GIS Data

A more detailed assessment of impacts to these sites would need to occur for the alternatives identified.

Several overhead and underground utilities are present throughout the study area. Proposed improvements may affect these areas and may result in the need for the relocation or modification of these facilities. There is no known contamination associated with existing utilities; however, the potential exists that contamination could be encountered during utility adjustments. Coordination with utility companies concerning potential contamination would be addressed during the ROW stage of project development.

If the preferred alternative identified through the NEPA process requires the demolition and removal of bridge and/or building structures, asbestos containing materials (ACM) and lead based paint (LBP) testing may be necessary. It is recommended that ACM and LBP testing be performed on the structures to be removed dependent upon the age of the individual structure.

Oil and Gas Wells

There are 103 oil and gas wells present within the study area as follows: 71 abandoned commercial gas wells, two plugged commercial gas wells, two orphaned commercial gas wells, six abandoned private gas wells, two plugged private gas wells, 10 abandoned oil wells, and 10 plugged oil wells. Oil and gas wells in the study area are listed in **Table 19.** As shown in **Figure 22**, oil and gas wells are generally located southeast of I-35, west of Riverside close to the Missouri River, and in the northeast and northwest corners of the study area.

Table 19: Oil and Gas Wells in Study Area

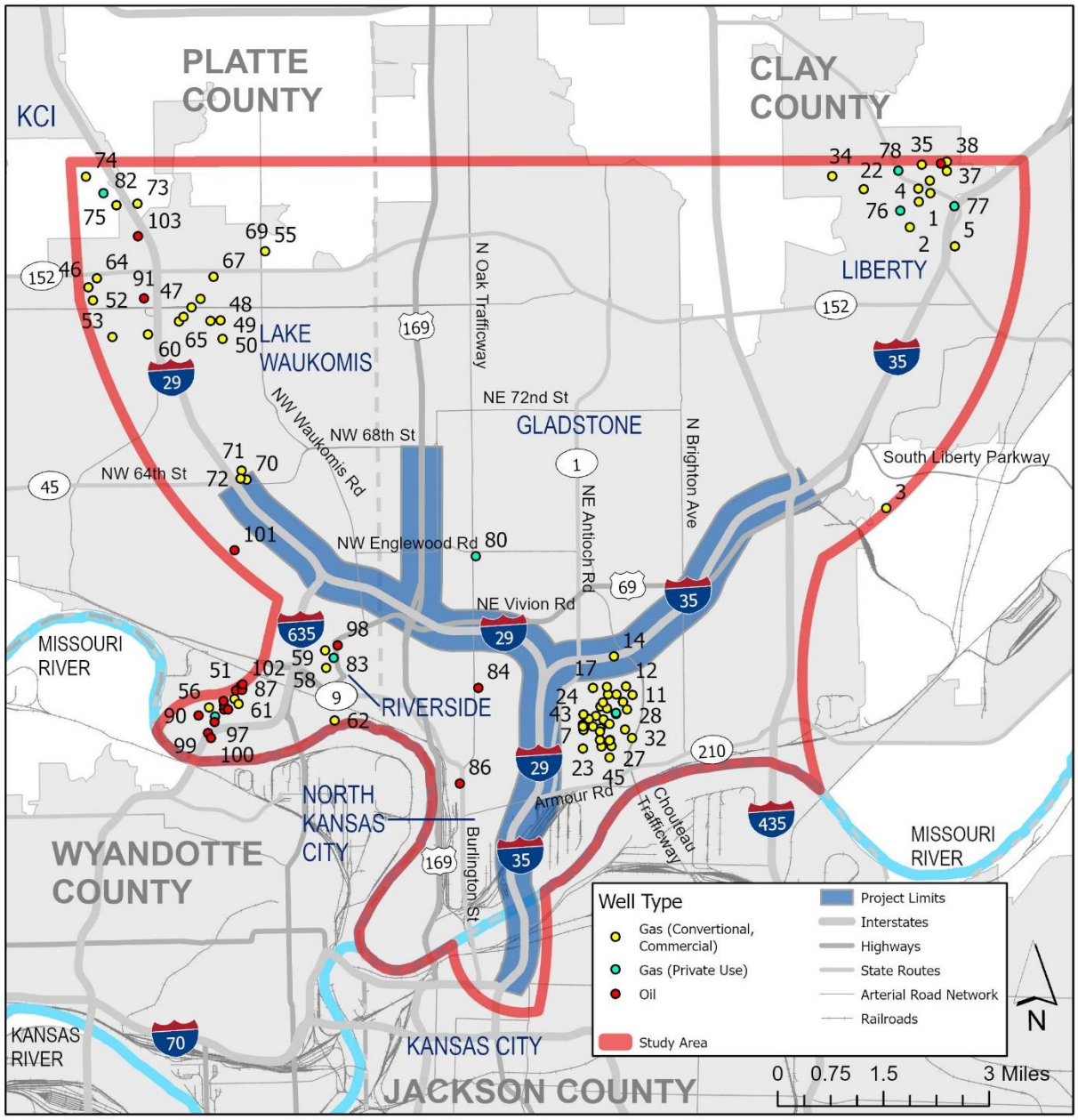
Map ID	Well Type	Status	Map ID	Well Type	Status
1	Gas (Conventional, Commercial)	Abandoned	53	Gas (Conventional, Commercial)	Abandoned
2	Gas (Conventional, Commercial)	Abandoned	54	Gas (Conventional, Commercial)	Abandoned
3	Gas (Conventional, Commercial)	Abandoned	55	Gas (Conventional, Commercial)	Abandoned
4	Gas (Conventional, Commercial)	Abandoned	56	Gas (Conventional, Commercial)	Plugged - Approved
5	Gas (Conventional, Commercial)	Abandoned	57	Gas (Conventional, Commercial)	Abandoned
6	Gas (Conventional, Commercial)	Abandoned	58	Gas (Conventional, Commercial)	Abandoned
7	Gas (Conventional, Commercial)	Abandoned	59	Gas (Conventional, Commercial)	Abandoned
8	Gas (Conventional, Commercial)	Abandoned	60	Gas (Conventional, Commercial)	Abandoned
9	Gas (Conventional, Commercial)	Abandoned	61	Gas (Conventional, Commercial)	Abandoned
10	Gas (Conventional, Commercial)	Abandoned	62	Gas (Conventional, Commercial)	Abandoned
11	Gas (Conventional, Commercial)	Abandoned	63	Gas (Conventional, Commercial)	Abandoned

Map ID	Well Type	Status	Map ID	Well Type	Status
12	Gas (Conventional, Commercial)	Abandoned	64	Gas (Conventional, Commercial)	Abandoned
13	Gas (Conventional, Commercial)	Abandoned	65	Gas (Conventional, Commercial)	Abandoned
14	Gas (Conventional, Commercial)	Abandoned	66	Gas (Conventional, Commercial)	Abandoned
15	Gas (Conventional, Commercial)	Abandoned	67	Gas (Conventional, Commercial)	Abandoned
16	Gas (Conventional, Commercial)	Abandoned	68	Gas (Conventional, Commercial)	Abandoned
17	Gas (Conventional, Commercial)	Abandoned	69	Gas (Conventional, Commercial)	Abandoned
18	Gas (Conventional, Commercial)	Abandoned	70	Gas (Conventional, Commercial)	Abandoned
19	Gas (Conventional, Commercial)	Abandoned	71	Gas (Conventional, Commercial)	Abandoned
20	Gas (Conventional, Commercial)	Abandoned	72	Gas (Conventional, Commercial)	Abandoned
21	Gas (Conventional, Commercial)	Abandoned	73	Gas (Conventional, Commercial)	Plugged - Approved
22	Gas (Conventional, Commercial)	Abandoned	74	Gas (Conventional, Commercial)	Orphaned
23	Gas (Conventional, Commercial)	Abandoned	75	Gas (Conventional, Commercial)	Orphaned
24	Gas (Conventional, Commercial)	Abandoned	76	Gas (Private Use)	Abandoned
25	Gas (Conventional, Commercial)	Abandoned	77	Gas (Private Use)	Abandoned
26	Gas (Conventional, Commercial)	Abandoned	78	Gas (Private Use)	Abandoned
27	Gas (Conventional, Commercial)	Abandoned	79	Gas (Private Use)	Abandoned
28	Gas (Conventional, Commercial)	Abandoned	80	Gas (Private Use)	Abandoned
29	Gas (Conventional, Commercial)	Abandoned	81	Gas (Private Use)	Plugged - Approved
30	Gas (Conventional, Commercial)	Abandoned	82	Gas (Private Use)	Plugged - Approved
31	Gas (Conventional, Commercial)	Abandoned	83	Gas (Private Use)	Abandoned
32	Gas (Conventional, Commercial)	Abandoned	84	Oil	Abandoned
33	Gas (Conventional, Commercial)	Abandoned	85	Oil	Abandoned
34	Gas (Conventional, Commercial)	Abandoned	86	Oil	Abandoned
35	Gas (Conventional, Commercial)	Abandoned	87	Oil	Plugged - Approved
36	Gas (Conventional, Commercial)	Abandoned	88	Oil	Plugged - Approved
37	Gas (Conventional, Commercial)	Abandoned	89	Oil	Plugged - Approved

Map ID	Well Type	Status	Map ID	Well Type	Status
38	Gas (Conventional, Commercial)	Abandoned	90	Oil	Abandoned
39	Gas (Conventional, Commercial)	Abandoned	91	Oil	Abandoned
40	Gas (Conventional, Commercial)	Abandoned	92	Oil	Plugged - Approved
41	Gas (Conventional, Commercial)	Abandoned	93	Oil	Plugged - Approved
42	Gas (Conventional, Commercial)	Abandoned	94	Oil	Plugged - Approved
43	Gas (Conventional, Commercial)	Abandoned	95	Oil	Plugged - Approved
44	Gas (Conventional, Commercial)	Abandoned	96	Oil	Abandoned
45	Gas (Conventional, Commercial)	Abandoned	97	Oil	Plugged - Approved
46	Gas (Conventional, Commercial)	Abandoned	98	Oil	Abandoned
47	Gas (Conventional, Commercial)	Abandoned	99	Oil	Plugged - Approved
48	Gas (Conventional, Commercial)	Abandoned	100	Oil	Abandoned
49	Gas (Conventional, Commercial)	Abandoned	101	Oil	Abandoned
50	Gas (Conventional, Commercial)	Abandoned	102	Oil	Plugged - Approved
51	Gas (Conventional, Commercial)	Abandoned	103	Oil	Abandoned
52	Gas (Conventional, Commercial)	Abandoned			

Source: Missouri Spatial Data Information Service (MSDIS)

Figure 22: Oil and Gas Wells in Study Area



Source: Missouri Spatial Data Information Service (MSDIS)

Historic Resources

Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places (NRHP) is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources. There are 28 properties, three historic districts, and one town in the study area listed on the NRHP. In addition, there are three properties in the study area listed on the Kansas City Register of Historic Places, but not on the NRHP. Only resources listed on the

NRHP and Kansas City Register of Historic Places have been identified. A comprehensive architectural survey has not been completed, thus additional resources eligible for listing have not been identified. Historic properties listed on the NRHP and Kansas City Register of Historic Places are presented in **Table 20**. As shown in **Figure 23**, the majority of historic properties are located in the southern portion of the study area near population centers. As discussed in Section 4.1.12, these historic properties are eligible for Section 4(f) protection by 23 CFR 774.

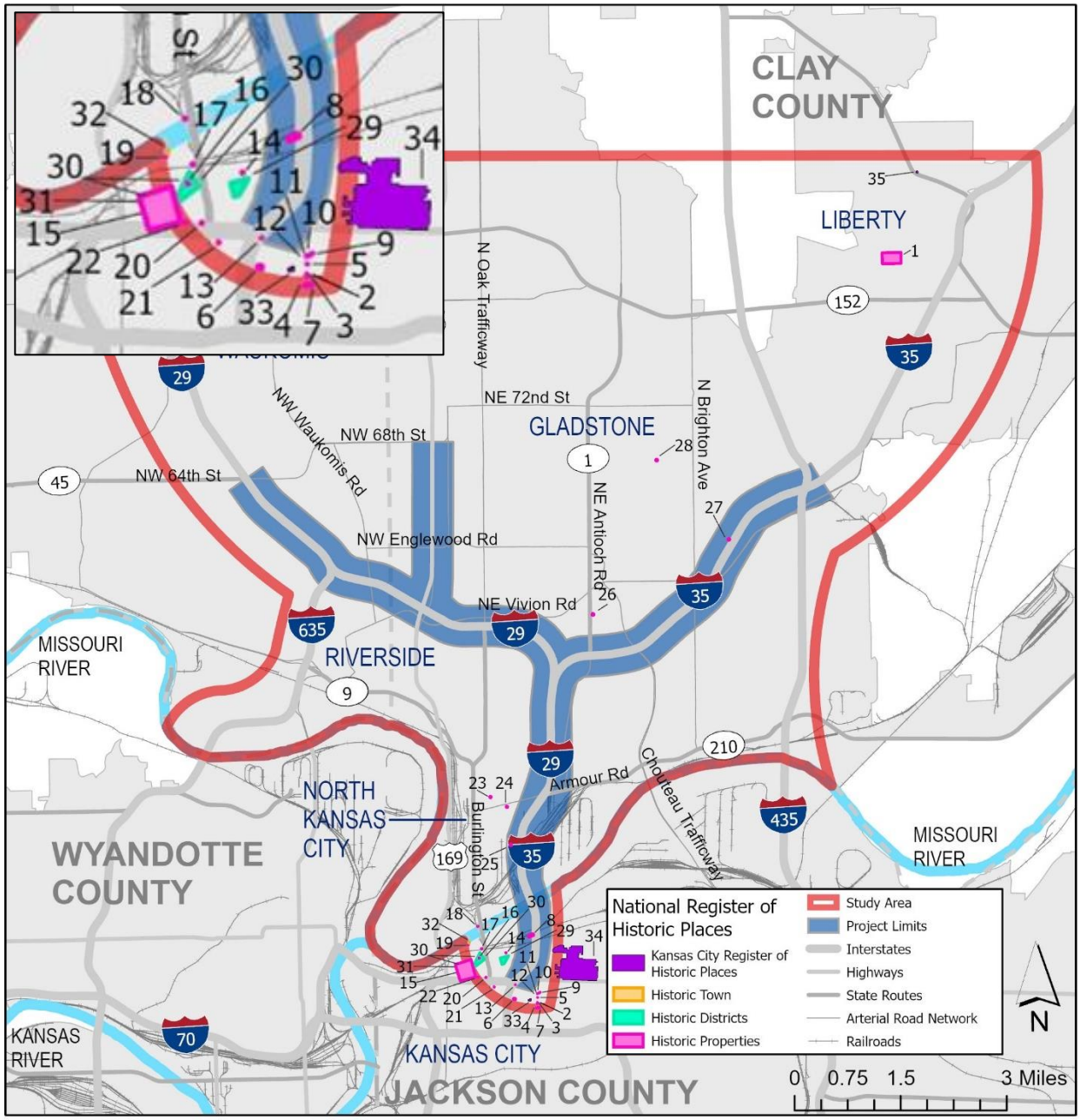
Table 20: Historic Resources in Study Area

Map ID	National Register of Historic Places
Historic Properties	
1	Compton, Dr. James, House*
2	Kansas City Masonic Temple*
3	Antioch Christian Church
4	Henderson, Dr. Generous, House*
5	Wheeling Corrugating Company Building
6	Sears, Roebuck and Company Warehouse Building
7	Helping Hand Institute Building
8	McMahon Apartments
9	Maples Apartments
10	Circle Apartments
11	Virginia Apartments
12	Kessler Apartments
13	Ellsworth Apartments
14	Maryland Apartments
15	The Parkview
16	Vaccaro, Joe, Soda Water Manufacturing Company Building
17	Blackstone Hotel
18	Buick Automobile Company Building
19	Kelley--Reppert Motor Company Building
20	Kansas City Cold Storage Company Building
21	Studna Garage Building
22	A.B.C. Storage and Van Company Building
23	Atkins--Johnson Farmhouse Property
24	Smith and Sons Manufacturing Company Building
25	Armour Theatre Building
26	Eldridge Arnold Homestead (Woodneath)*
27	Williams S. Mitchell (Suction-head type dredge)

Map ID	National Register of Historic Places
Historic Properties	
28	Kansas City Public Library Building*
Historic Districts	
29	Holy Rosary Historic District
30	Old Town Historic District (Boundary Increase IV)
31	Old Town Historic District (Boundary Increase)
Historic Town	
32	Town of Kansas Site
Map ID	**Kansas City Register of Historic Places**
33	Unity Headquarters Building
34	Pendleton Heights Historic District
35	Poage-Arnold Residence (Three Gables)

*Note: * Also listed on the Kansas City Register of Historic Places*
Source: Geographic Names Information System (GNIS), Google Maps

Figure 23: Historic Resources in Study Area



Source: Geographic Names Information System (GNIS), Google Maps

Archeological Resources

As identified in **Table 21**, there are five listed and nine eligible archeological sites within the study area. In order to protect the sites from looting and further destruction, all archeological site information and locations are not subject to the Freedom of Information Act and are not to be distributed to the public. Accordingly, none of the archeological sites are shown on a map. As discussed in Section 4.1.12, these archeological sites are eligible for Section 4(f) protection by 23 CFR 774.

Table 21: Archeological Resources in Study Area

Site ID	NRHP Status	Description
23CL123	Eligible	Site 23CL123 is a prehistoric artifact scatter/historic European grave site first documented in 1969. Located along a ridge overlooking the Missouri River, 23CL123 has been heavily modified during the construction of the interchange of I-435 and Route 210. The portion of the ridge containing the European graves was left intact during the road construction in the center of a full cloverleaf, which also included a portion of the prehistoric component. The site likely continues to the north along the ridge, however, only MoDOT right of way was tested.
23CL1453	Eligible	Site 23CL1453 is an Urban/Industrial (1900-1960) occupation site with a remaining outbuilding foundation. Historic building materials are associated with the site.
23CL1463	Eligible	Site 23CL1463 is a prehistoric Late Woodland site with hearth, post molds, and deep pit features. Lithic and ceramic artifacts are associated with the site.
23CL1464	Eligible	Site 23CL1464 is a prehistoric lithic scatter/historic habitation site with an associated privy, house cellar, house foundation, and well/cistern. Prehistoric lithic artifacts and historic building materials are associated with the site.
23CL1498	Eligible	Site 23CL498 is a historic late 19th century farmstead consisting of ruins of outbuilding, foundational remnants of two additional buildings and associated features including remnants of a collapsed chimney, stone lined well with a modern concrete cap, and a subterranean cellar. Artifacts consisting of various building materials are associated with the site.
23CL1504	Eligible	Site 23CL1504 is a prehistoric Middle to Late Archaic lithic tool cache. The lithic artifacts were found in the western 1/4 of the garden just south of the brick home.
23CL1508	Listed	Site 23CL1508 is an unidentified historic period farmstead with remains of various outbuildings. Artifacts consisting of various building materials were associated with the site. Condition of buildings are variable and some have been demolished.
23CL1531	Listed	Site 23CL1531 is a historic period site consisting of house, barn, sheds, and other outbuildings dating from Antebellum period (1821-1861) through Urban / Industrial period (1900-1960). The site is now a historic site open to the general public.
23CL1546	Eligible	Site 23CL1546 is an undefined prehistoric lithic scatter at the top of a ridge overlooking the Missouri River. The site likely continues along the ridge to the north and was likely present to the south prior to road construction, however, only MoDOT right of way was tested for this project. Site is eligible for the NRHP due to intact soils with the presence of cultural lithic remains.
23CL411	Eligible	Site 23CL411 is a prehistoric lithic scatter/historic farmstead site. Prehistoric lithic flakes and historic building materials are associated with the site. The buildings (and outbuildings) have been remodeled from time to time. It is currently the location of Stroud's Restaurant.
23JA422	Eligible	Site 23JA422 is a Euromerican 19th to early 20th century habitation site. Artifacts consisting of ceramics, glass, metal, and building materials are associated with the site.

Site ID	NRHP Status	Description
23PL2	Listed	Site 23PL2 is a prehistoric Woodland period site consisting of a storage pit feature. Lithics, ceramics, and unidentified animal bone were associated with the site. The site is located in a developed urban area.
23PL318	Listed	Site 23PL318 is a prehistoric Woodland period site with a lithic, ceramics, and unidentified animal bone scatter.

Source: Geographic Names Information System (GNIS), Google Maps

Portions of the study area on or near major rivers and streams are more likely to contain unrecorded archeological sites.

Air Quality

Under the Clean Air Act (CAA), the federal government established the National Ambient Air Quality Standards (NAAQS) to protect public health, safety, and welfare from known or anticipated effects of six criteria pollutants: sulfur dioxide, particulate matter, carbon monoxide, nitrogen dioxide, ozone, and lead. Transportation substantially contributes to four of the six criteria pollutants: ozone, carbon monoxide, particulate matter, and nitrogen dioxide. If an area is determined to not be in attainment with any transportation-related criteria pollutant, they are required to undergo evaluation of regionally significant projects to ensure the overall plan conforms with an approved emissions budget, also known as demonstrating transportation conformity.

The Clay, Jackson, and Platte counties are designated as in attainment for all transportation-related criteria pollutants at this time; and therefore, conformity requirements of 40 CFR Part 93 do not apply and no further action is required.

Noise

The 1972 Federal-Aid Highway Act required FHWA to develop a noise standard for new Federal-Aid highway projects. FHWA regulations require MoDOT to 1) Identify traffic noise impacts and examine potential mitigation measures; 2) Incorporate reasonable and feasible noise mitigation measures into its highway projects; and 3) Coordinate with local officials to provide helpful information on compatible land use planning and control during the planning and design of a highway project. MoDOT's *Engineering Policy Guide 127.13 Noise* describes their implementation of the requirements of FHWA's noise standard at 23 Code of Federal Regulations (CFR) Part 772.

Sensitive noise receptors within the study area include parks and recreation areas, daycares, schools, cemeteries, residences, motels, hotels, places of worship, libraries, and any other lands on which serenity and quite are of extraordinary significance and serve and important need, and where the preservation of those qualities is essential if the lands continue to serve their intended purpose.

4.2 Traffic and Safety Conditions

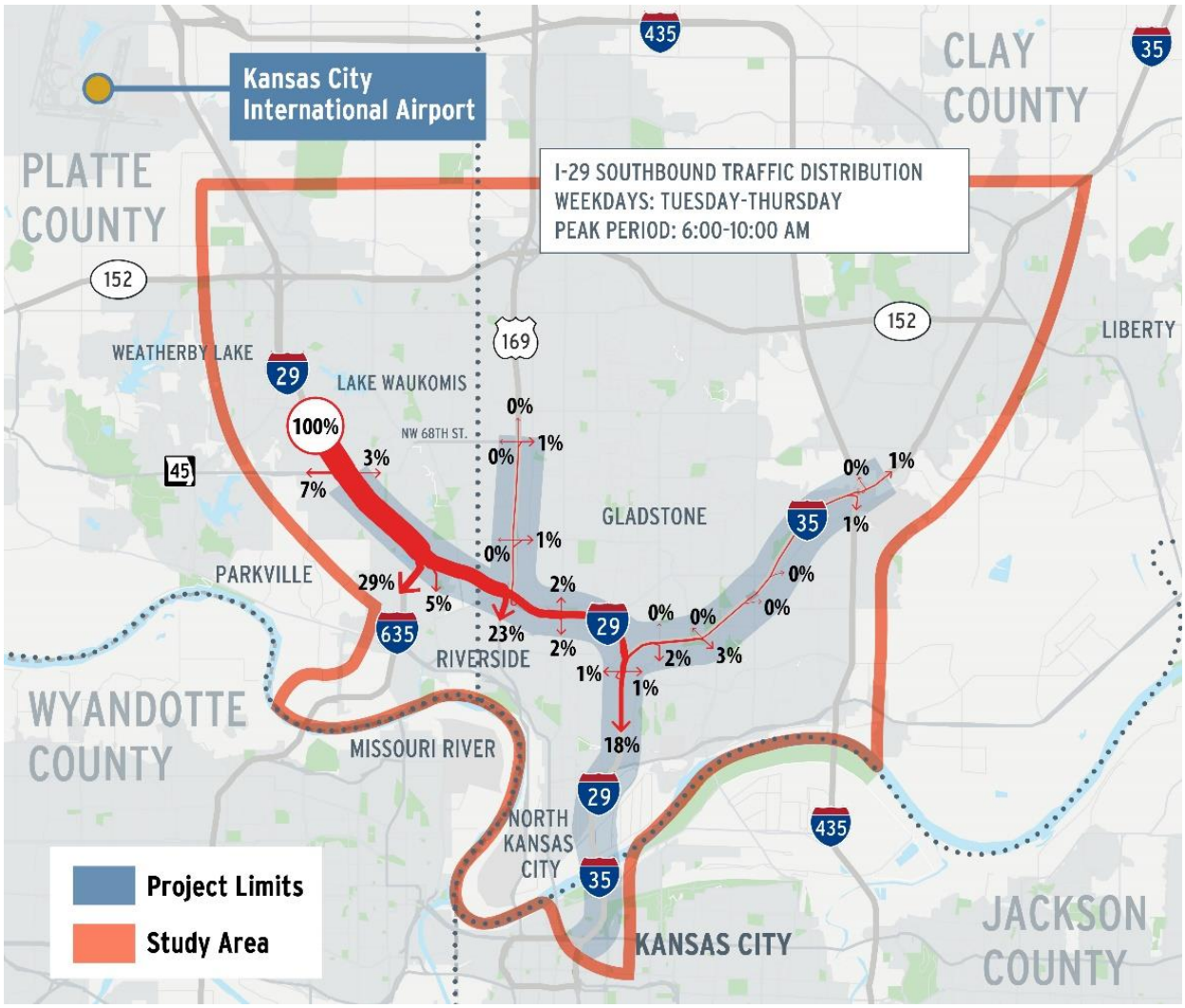
The following section presents the existing and future no-build traffic and safety conditions in the study area.

4.2.1 Study Area Travel Patterns

StreetLight 2019 data was collected along the I-29, I-35 and U.S. 169 corridors within the study area. The database uses connected devices to measure vehicle, transit, bike, and foot traffic. The data provides traffic counts, Origin-Destination (OD) data, and other transportation metrics for the project corridors. This data was used to identify travel patterns and determine where traffic was going after entering the study area on each of the corridors. The data was analyzed in the peak travel direction on each of the corridors.

As shown in **Figure 24**, drivers on southbound I-29 during the morning peak period are primarily destined to southbound I-635 (29%), southbound U.S. 169 (23%), and continuing southbound on I-29/I-35 (18%). This represents typical commuter patterns within the Kansas City Metro area. The remaining traffic primarily exits at the service interchanges with 2% utilizing northbound U.S. 169, 7% using northbound I-35, and only 1% continuing north on I-35 outside of the study corridors.

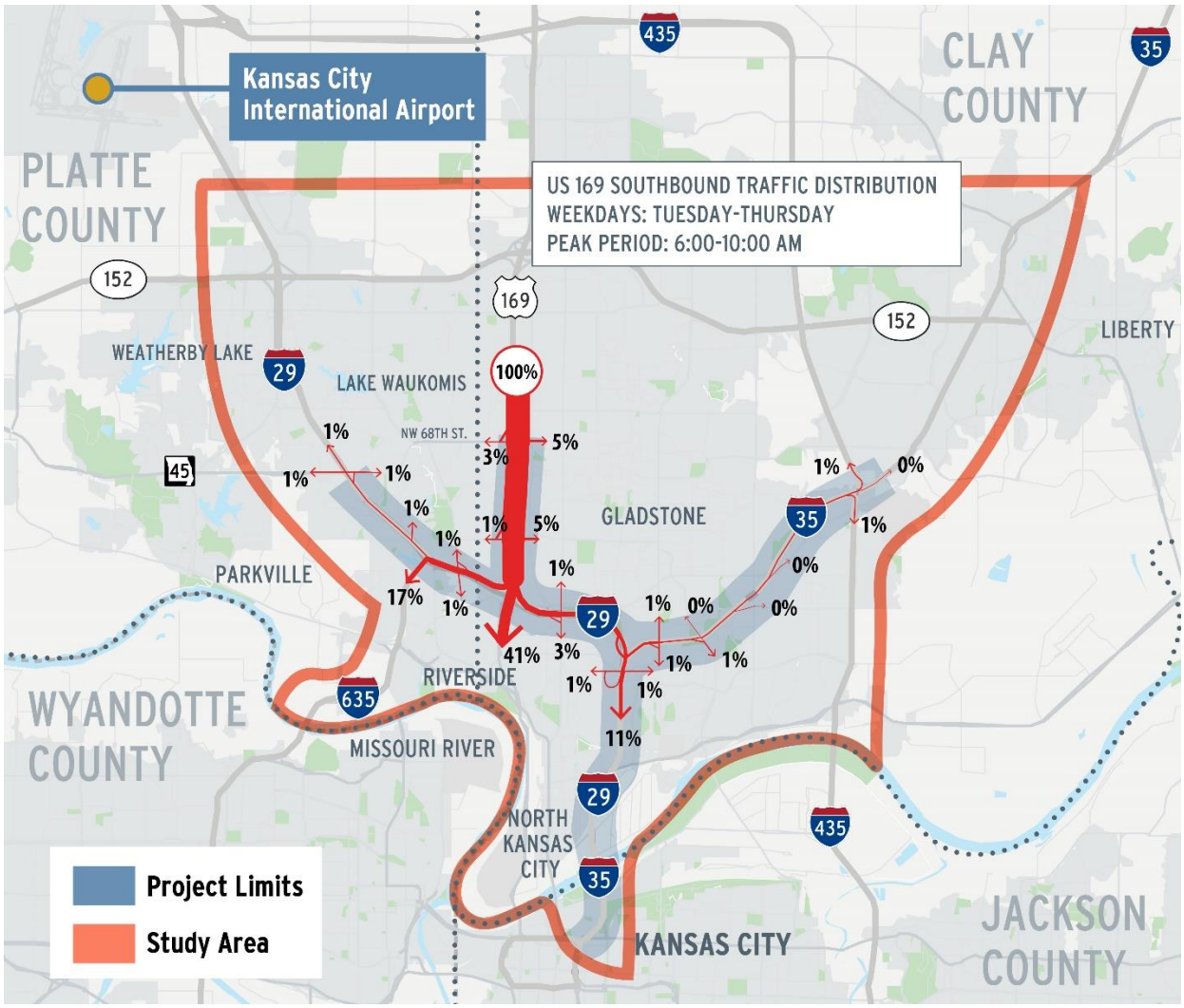
Figure 24: SB I-29 Destinations – Existing AM Peak Period



Source: StreetLight, 2019

The southbound U.S. 169 travel patterns during the morning peak period are shown below in **Figure 25**. Drivers are primarily destined to southbound U.S. 169 (41%), southbound I-635 (17%), and southbound on I-29/I-35 (11%). These patterns are typical of commuters in the Kansas City Metro area. Fourteen percent of the traffic exits at the service interchanges along U.S. 169. The remaining traffic primarily exits at the service interchanges along I-29 (9%) and I-35 (5%).

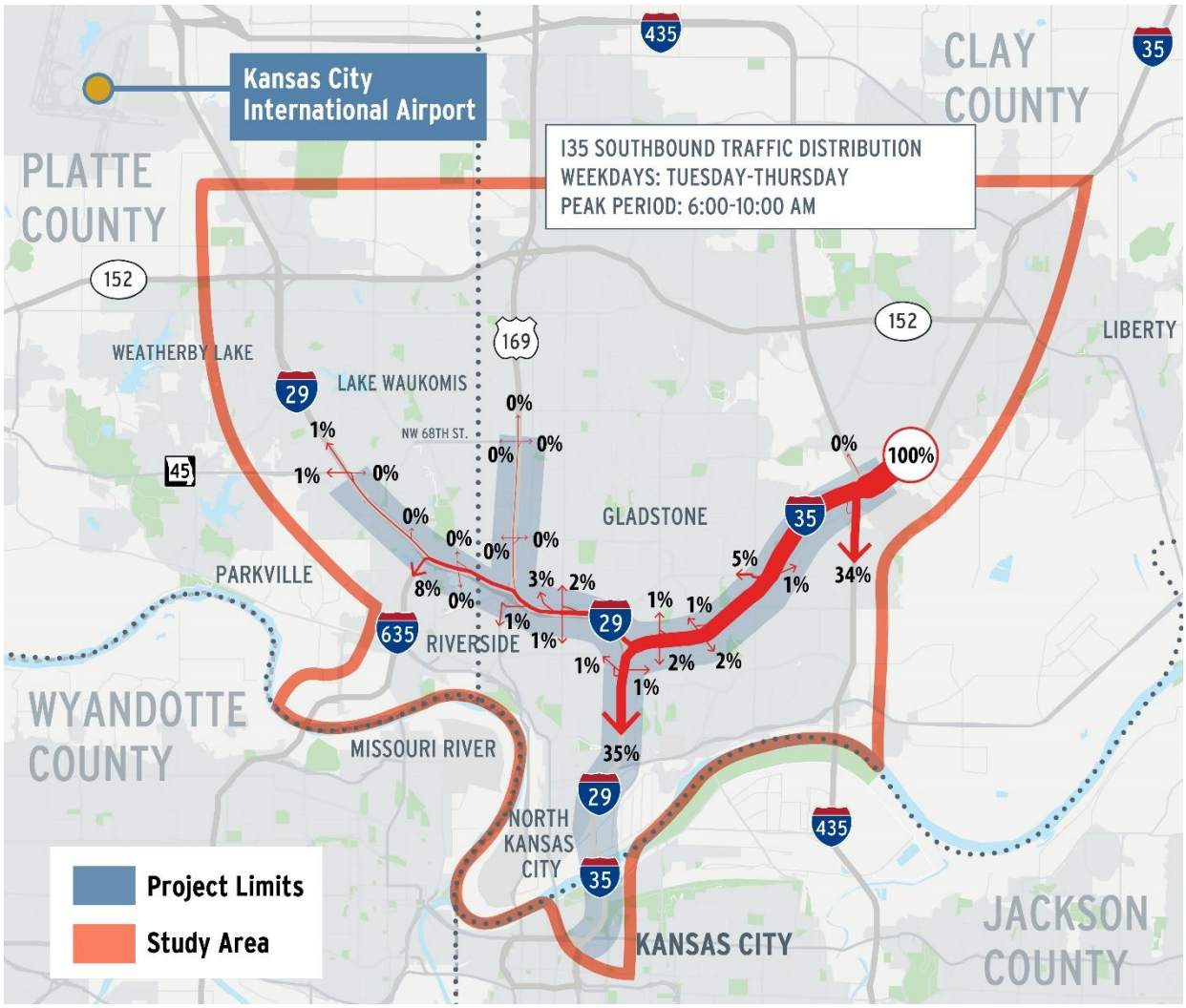
Figure 25: SB U.S. 169 Destinations – Existing AM Peak Period



Source: StreetLight, 2019

Figure 26 shows the southbound I-35 traffic distribution during the morning peak period. These drivers are primarily destined to southbound I-435 (34%) and continue southbound on I-29/I-35 (35%). These patterns are typical commuter patterns within the Kansas City Metro area. Eight percent of southbound I-35 traffic utilizes I-29 to southbound I-635. It is likely that some of this traffic is utilizing I-635 to bypass downtown Kansas City. Some drivers exit at the service interchanges along I-35 and the southern section of I-29, with very little traffic (2%) utilizing I-29 north of I-635.

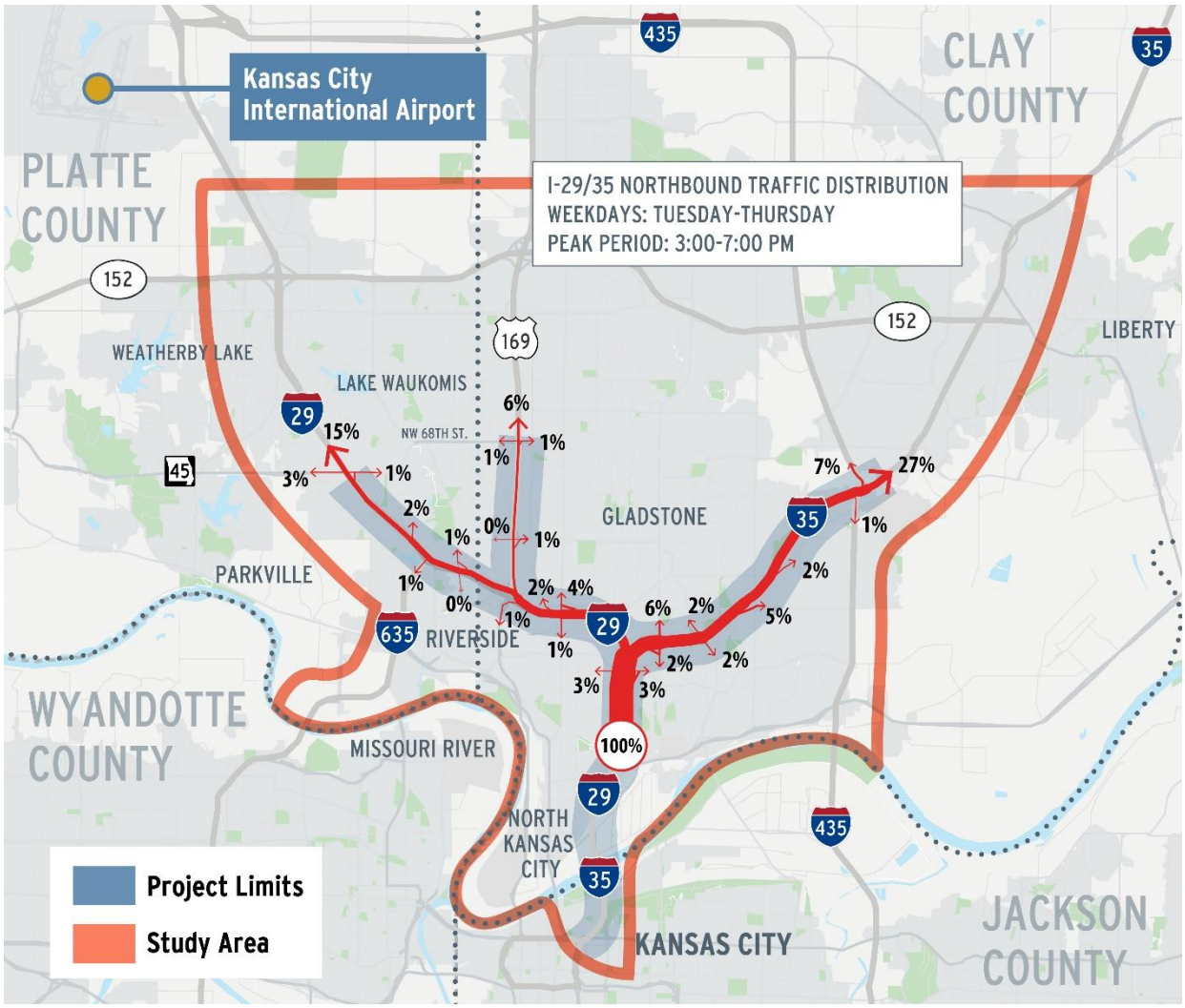
Figure 26: SB I-35 Destinations – Existing AM Peak Period



Source: StreetLight, 2019

The northbound I-29/I-35 travel patterns during the evening peak period are shown below in **Figure 27**. 55% of this traffic utilizes northbound I-35, with 27% continuing north on I-35 out of the study area. 39% of the traffic uses northbound I-29, with 15% continuing north on I-29 out of the study area. Of the 39% using I-29, 9% utilizes northbound U.S. 169. The remaining 6% exits the freeway at NE Parvin Road prior to the I-29/I-35 split.

Figure 27: NB I-29/I-35 Destinations – Existing PM Peak Period



Source: StreetLight, 2019

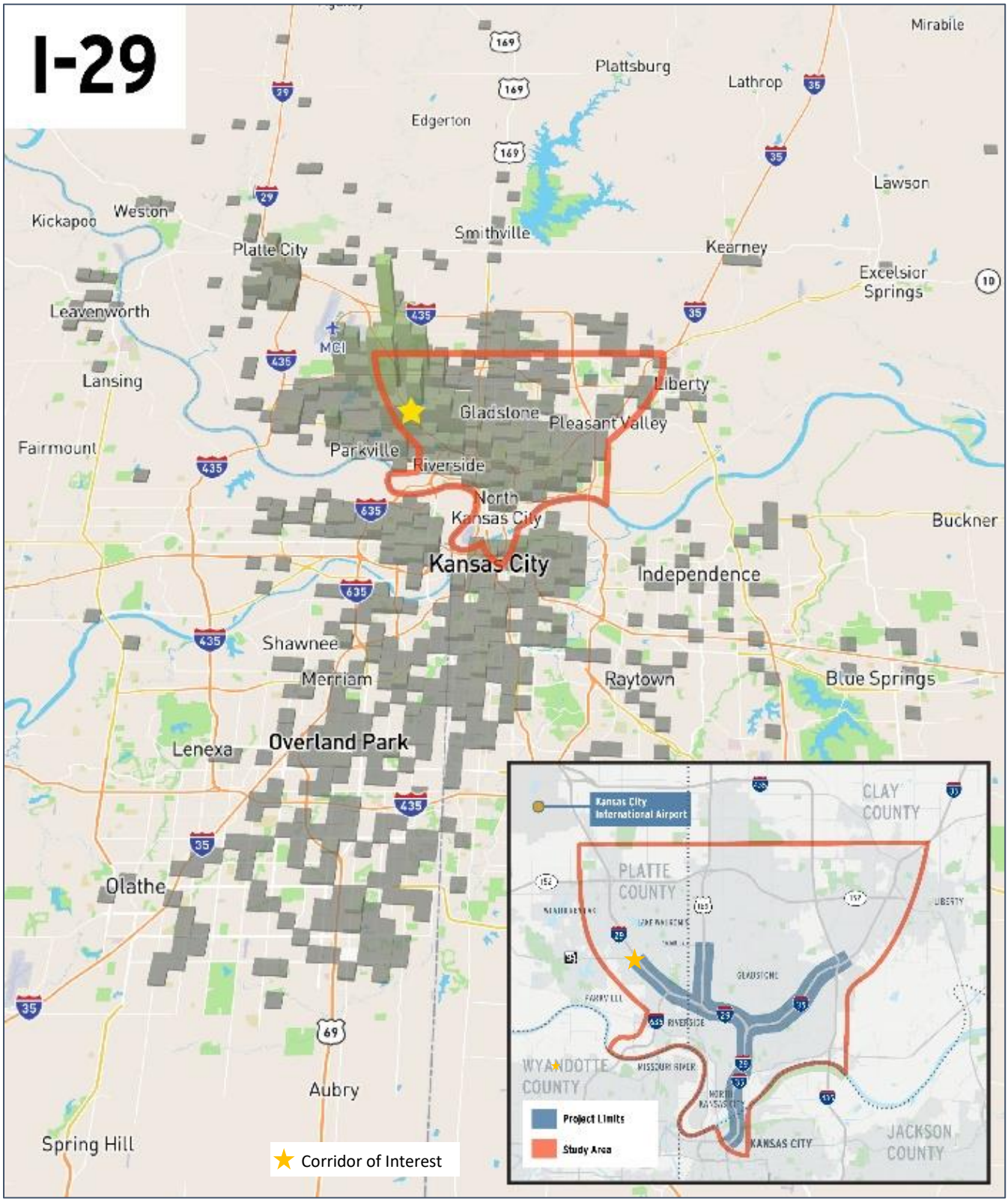
In addition to OD information, the StreetLight data provides details on the home and work locations of drivers on the three corridors. This information is shown below in **Figure 28** through **Figure 34**. The gold stars on the figures indicate the location along each corridor the data is representing, which is the home or work location of all vehicles that pass through that specific location on the corridor. The “taller” and lighter squares represent more home or work locations of vehicles on the corridor while the “shorter” and darker squares represent fewer home or work locations.

In general, the denser home locations for drivers on the I-29/I-35 and I-29 corridors can be found near the identified zone, indicating that many trips along the corridors through the zones can be attributed to people living nearby. The home locations of drivers on I-35 extend along I-35 to Liberty and further north to Kearney and Excelsior Springs and beyond. In addition, the data also indicates that these corridors serve a broad Kansas City regional area with home locations extending well south of the Missouri River in Missouri and into Kansas.

Similar to the home locations, the denser work locations for drivers on the I-29/I-35 and I-29 corridors can generally be found near the identified gold star location, indicating that many trips along the corridor through the gold star location are related to people working nearby. The primary work locations of vehicles on I-35 are in Liberty, with some extending north into Kearney and Excelsior Springs. There are a couple of work locations in North Kansas City that also have numerous vehicles using I-35. Like the home locations, this data also indicates that these corridors serve a broad Kansas City regional area with work locations extending well south of the Missouri River in Missouri and into Kansas.

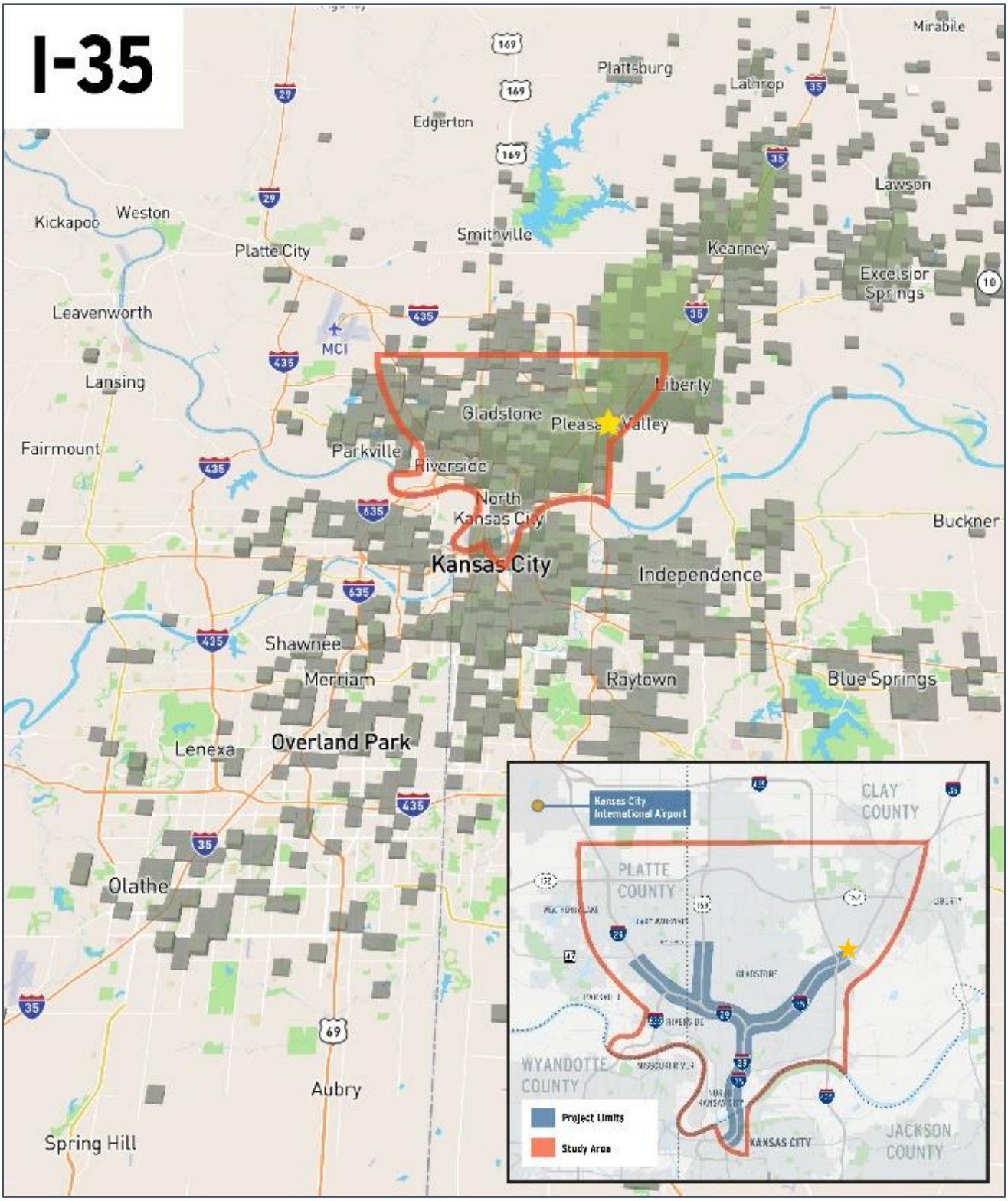
Average annual daily traffic (AADT) and truck percentages are shown on **Figure 34**. The I-29/I-35 segment has the most AADT due to both interstates merging heading into and out of downtown Kansas City. However, there is still a considerable amount of traffic moving from I-29 to I-35 and vice versa. Truck percentages are highest on I-35 at over 18%. The I-29/I-35 corridor also sees a higher percentage of truck traffic, over 11 percent, compared to I-29 and US-169. The passenger vehicle volumes on I-29/I-35 help to temper the truck percentage compared to I-35 where AADT’s are lower.

Figure 28: Existing I-29 Weekday Traffic Home Locations



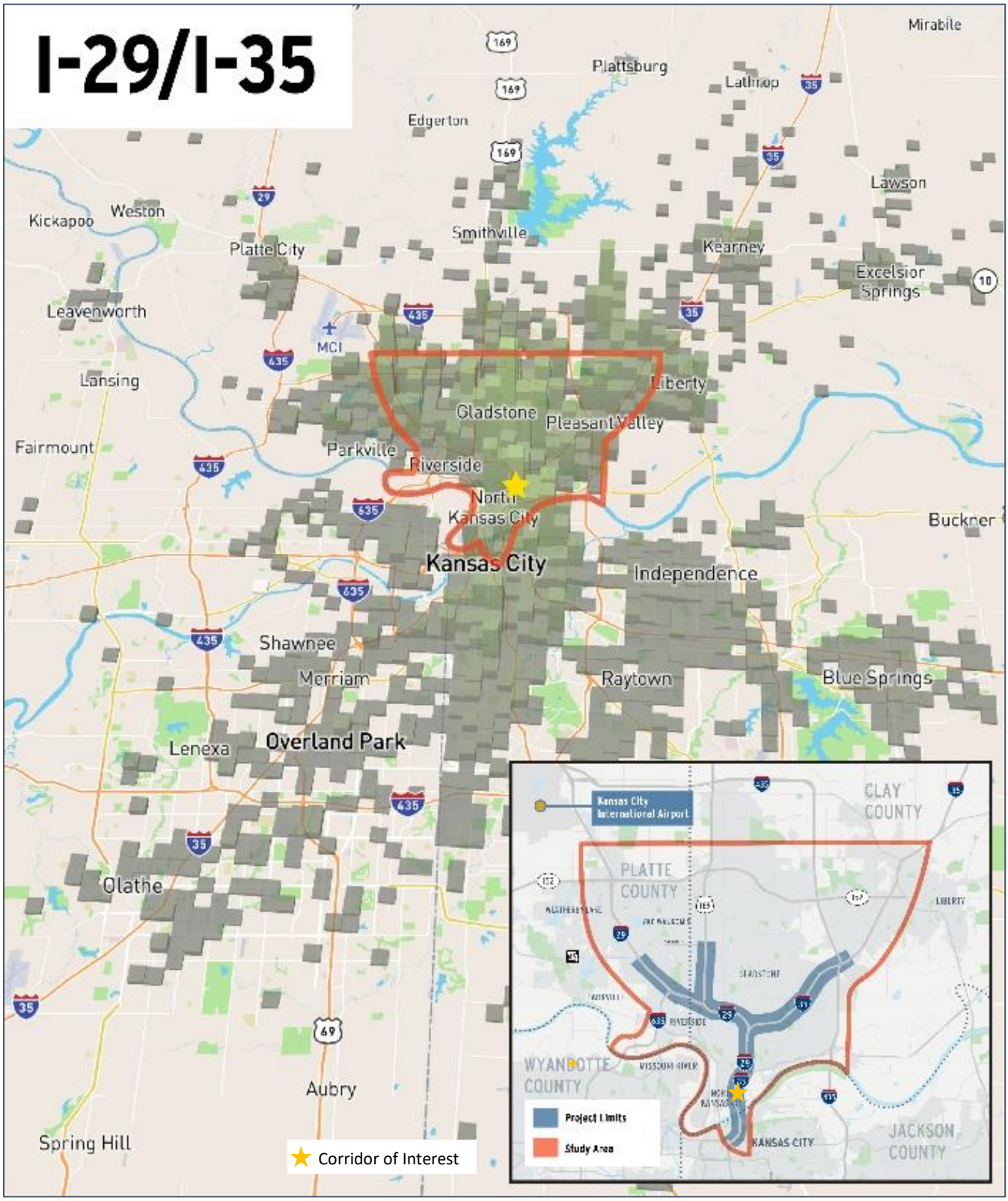
Source: StreetLight, 2022.

Figure 29: Existing I-35 Weekday Traffic Home Locations



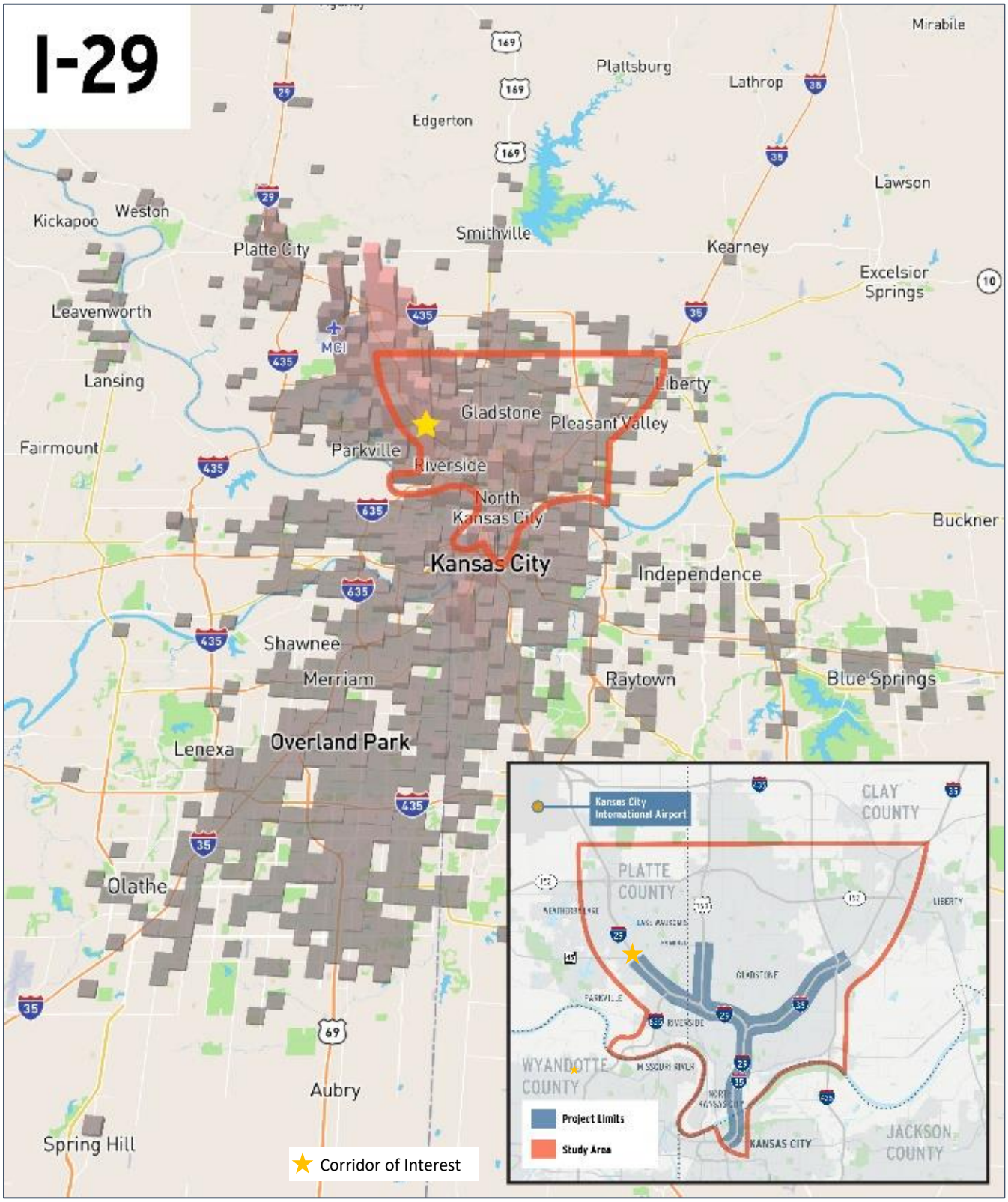
Source: StreetLight, 2022.

Figure 30: Existing I-29/I-35 Weekday Traffic Home Locations



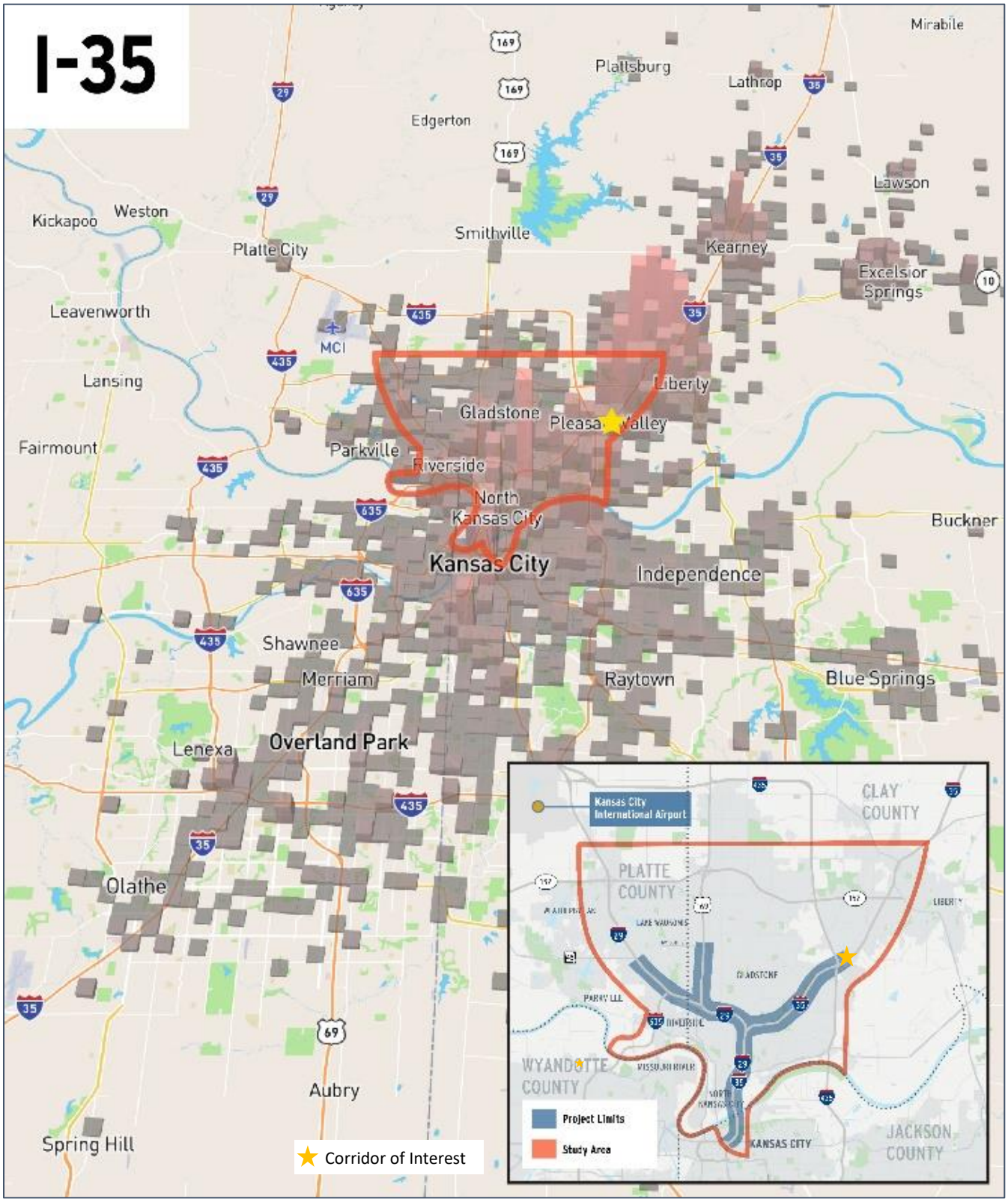
Source: StreetLight, 2022.

Figure 31: Existing I-29 Weekday Traffic Work Locations



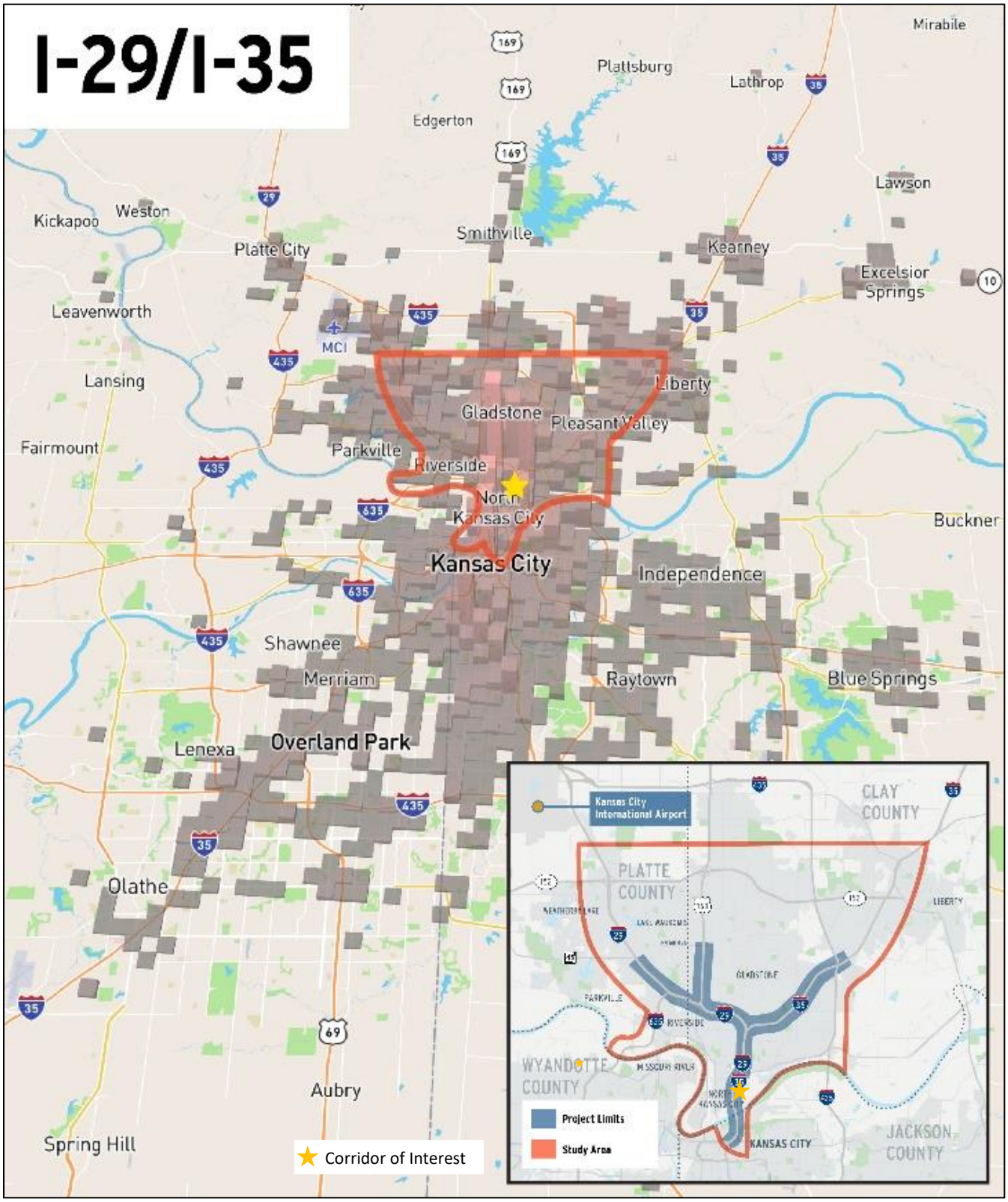
Source: StreetLight, 2022.

Figure 32: Existing I-35 Weekday Traffic Work Locations



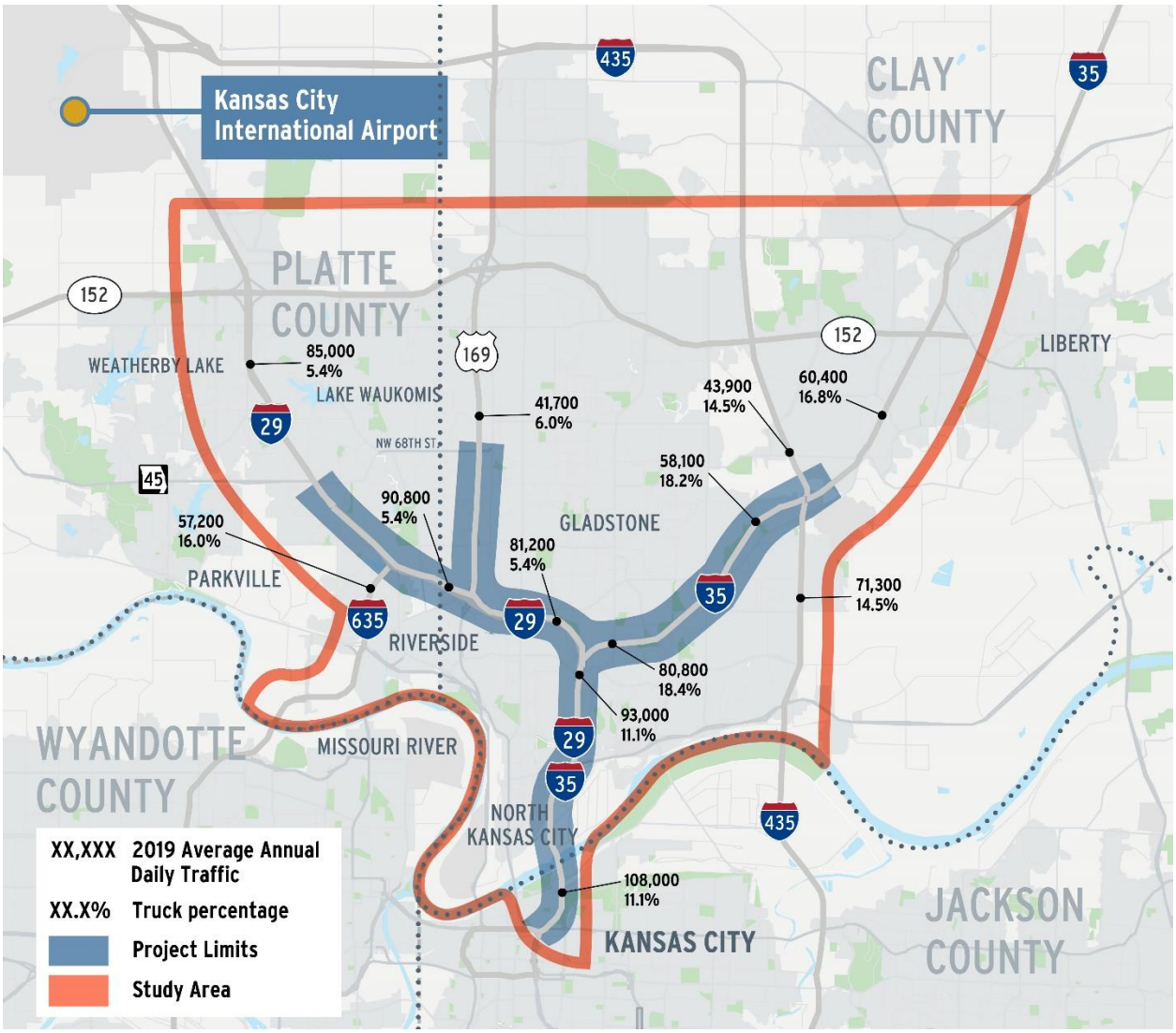
Source: StreetLight, 2022.

Figure 33: Existing I-29/I-35 Weekday Traffic Work Locations



Source: StreetLight, 2022.

Figure 34: Truck Traffic Percentages



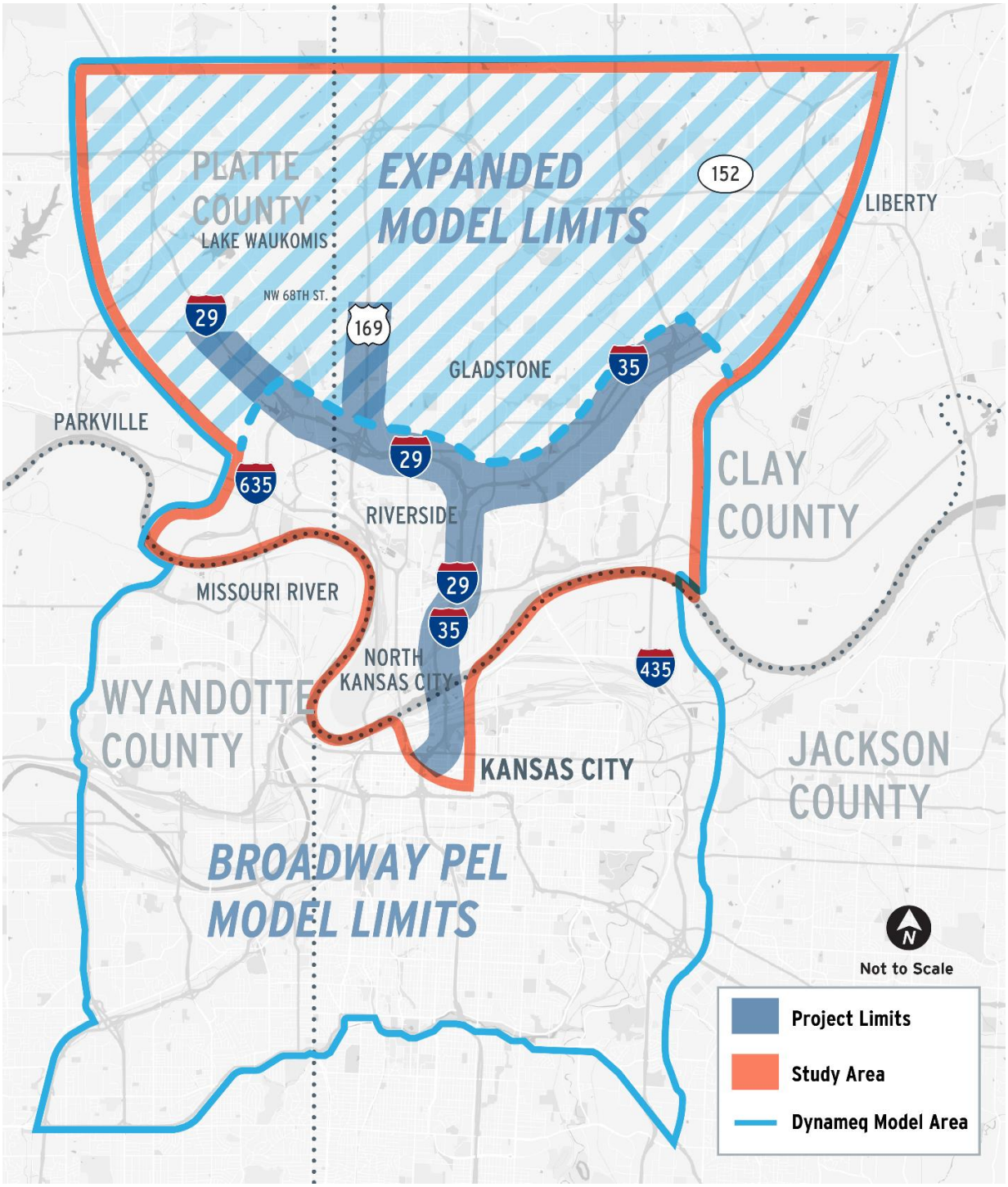
Source: MoDOT

4.2.2 Methodology for Building the Traffic Network

Dynameq version 4.4 was used for traffic analysis. Dynameq is a mesoscopic traffic simulation software that combines the benefits of travel demand models and microsimulation models. It uses dynamic traffic assignment (DTA) to shift traffic around on the roadways based on network congestion and analyzes traffic operations to report measures of effectiveness (MOEs) such as density, speed, and delay. Dynameq is a product from the same software developer (INRO) as EMME, which is the platform used by Mid-America Regional Council (MARC) for the regional travel demand model. Therefore, there are efficiencies in transferring origin-destination data from the regional EMME model to the subarea Dynameq model. A previously-developed Dynameq model of downtown Kansas City - created for the Broadway PEL study – was leveraged and expanded for the purposes of this study.

The limits of the original Broadway PEL Dynameq model were between I-635 and I-435 from Shawnee Mission Parkway and Dr. Martin Luther King Jr. Boulevard / Blue Parkway on the south to I-29 and I-35 on the north. This study expanded the model area north to M-152 between I-29 and I-35 as shown in **Figure 35**.

Figure 35: Dynameq Travel Model Area



Source: HNTB

Although the project limits mostly consist of roadways north of downtown, the study team wanted to realize the benefits of maintaining the Dynameq model that was used in the Broadway PEL and adding to it for this study to create a regional mesoscopic model that better represented regional travel and could be used for future projects. After the Broadway PEL Dynameq model was expanded with the EMME network, both networks were joined under one scenario. The expanded portion had to be updated to include the correct intersection network geometry, signal timing plans and speed limits. No network changes were made to the Broadway PEL portion of the network (south of the Missouri River).

Because Dynameq can import network geometries and signal timings from Synchro, the study team was able to utilize Synchro files where available to streamline the network editing process for parts of the network. All other portions of the study area network were manually modified to match satellite imagery. After the network geometry was completely built out, signal timing plans were imported for the AM and PM peak periods. Then the team added 15-minute and hourly counts on the roadway segments where data was available. Due to the COVID-19 pandemic, the most reliable traffic counts were taken before the year 2020. An annual growth factor of 2.8% was calculated from a large set of MoDOT counts from 2014 and 2017 and used to adjust the counts to a 2016 base year – the same base year used in the Broadway PEL Study. The counts coded into the network were used later in the calibration stage.

The last step before being able to run the model was to add the EMME OD matrices provided by MARC to the Dynameq model. The model's temporal limits are from 6:00 – 9:00 AM and from 3:00 – 7:00 PM. Given these timeframes, a total of seven OD matrices were provided for the expanded Dynameq network from the EMME model, each representing one hour of the peak period. An additional hourly OD matrix was included in each scenario as a model seeding period. The intention of a seeding period is to load vehicles onto the network before the peak begins so that results collected during the first hour of the peak accounts for the vehicles that would already be travelling on the network prior to the peak period beginning. After the study team verified that the origin and destination unique identifiers matched those in the Dynameq model, the AM and PM scenarios were run, beginning the process of calibration.

The Dynameq network was calibrated based on existing 2016 traffic counts, NPMRDS data showing typical speeds on the major highways in the study area and Google Traffic data. Both the AM and PM existing model scenarios were run using DTA up to 100 times or until network convergence was achieved – meaning maximum route choice efficiency was achieved. The DTA simulation results were calibrated by comparing the hourly flow volumes on each network segment with the corresponding traffic count that was imported prior to running the model. Calibration of the model involved identifying the largest discrepancies between link volumes and counts. After traffic counts were rechecked, the matrix adjustment tool was utilized. This tool runs an automated procedure (often referred to as Origin-Destination Matrix Estimation, or ODME) for adjusting the demand matrices of a DTA to improve the similarity between simulated volumes and traffic counts. Once this procedure was completed, the overall model strength in the AM and PM improved to be within the thresholds recommended by the software developer,

representing existing 2016 traffic conditions. Speeds on the network were then compared to NPMRDS data to ensure that congestion existing in areas of the model were consistent with one another.

Development of the Future No-Build (FNB) models began with a review of the assumed land use in the MARC regional model. The study team and stakeholders identified several large developments in and around the study area that could significantly impact future traffic volumes. MARC noted that the initial MARC 2050 land use forecast was developed based on the 2010 census and that the employment control total could be underestimated. Therefore, MARC agreed to add the larger northland non-residential developments to support the PEL study as shown previously in **Figure 10**. Once the land use was updated, MARC ran their regional EMME travel model and provided future subarea OD matrices to the study team in order to develop future traffic volumes. Details of the traffic forecasting process can be found in the Traffic Forecasting Memo in **Appendix C**. In addition to vehicle demand updates, the FNB models include committed roadway projects, such as the new Buck O'Neil bridge project.

4.2.3 Existing 2019 and 2050 Future No-Build Traffic Results

All traffic results are presented by reporting peak hour vehicle speeds on the following mainline segments: I-29, I-35, I-29/35 and U.S.169. Results are reported for the peak direction of travel, which are southbound during the AM and northbound during the PM using National Performance Management Regional Data Set (NPMRDS), from March 2019, 7:00 to 8:00 AM & 5:00 to 6:00 PM. NPMRDS is nationally collected sample location-based data from mobile phones and vehicle fleets. A Traffic Forecasting Memo was developed to provide a methodology for the projection of traffic for the 2050 planning horizon year. The Traffic Forecasting Memo was also reviewed by MoDOT at the beginning of the study. It is provided in **Appendix C**.

Existing Traffic – AM Peak

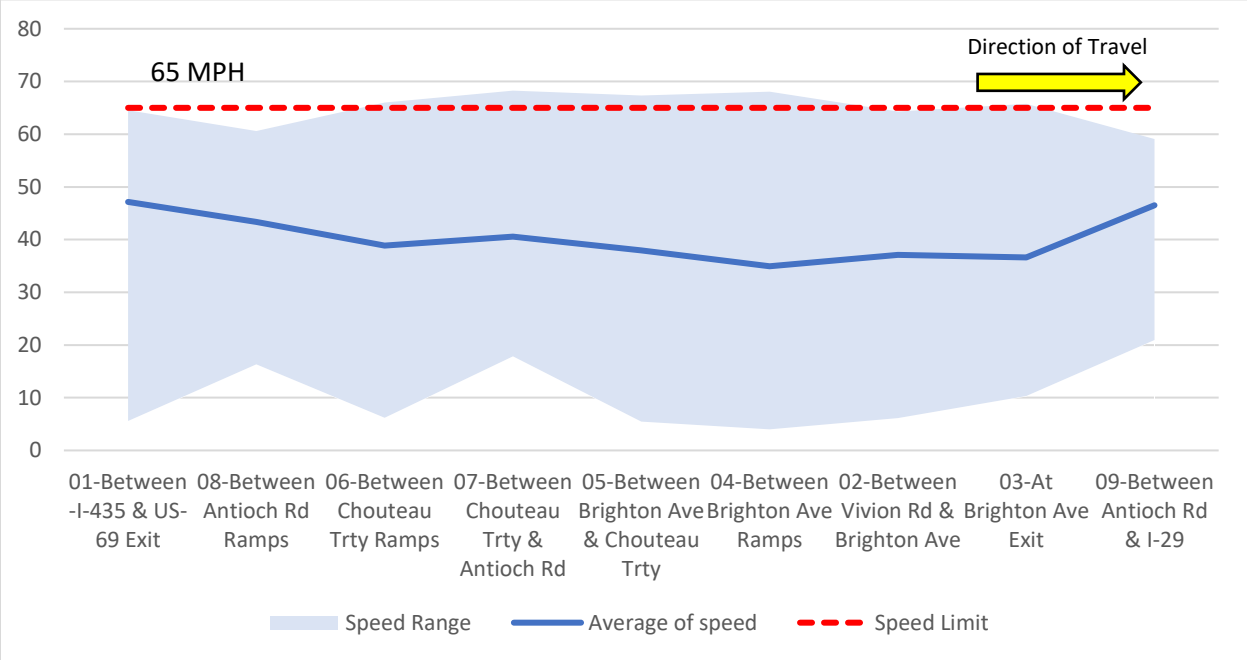
I-35 Corridor

The limits for I-35 in the analysis area are from the interchange with I-29 to just north of Pleasant Valley Road. **Figure 36** below shows the results for hourly traffic average speed in the peak direction. For this segment, the average speed is approximately 25 mph lower than the posted speed of 65 mph. However, there is a large range of speed variability with speeds ranging from the posted speed to 10 mph. Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

The slower speeds are due to narrow shoulder widths coupled with vehicles weaving between the closely spaced interchanges of Chouteau Trafficway, NE Antioch Road and I-29. In particular, more than 1,000 peak hour vehicles based on recent counts are taking the ramp to northbound I-29; those vehicles stack in the right lane through the NE Antioch Rd. interchange as they approach the ramp to northbound I-29. After NE Antioch Rd. and once the vehicles to

northbound I-29 have exited, speeds begin to recover heading into the merge with southbound I-29.

Figure 36: Existing (2019) I-35 Southbound AM Peak Hour Travel Speeds



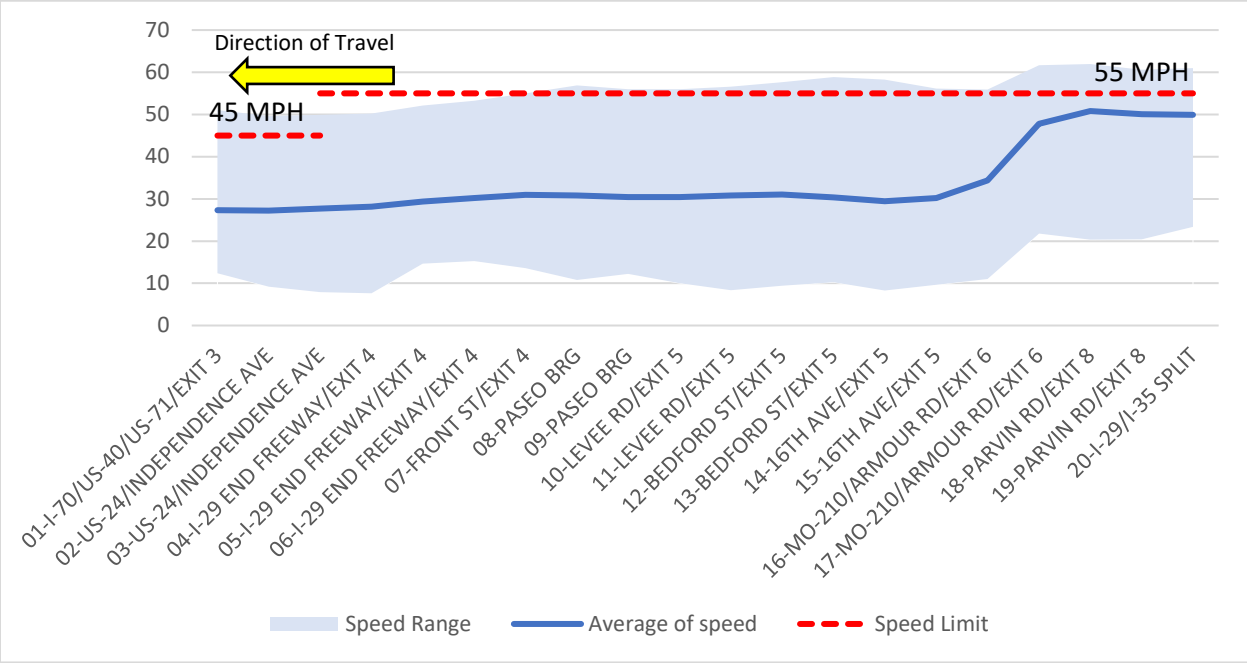
Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM & 5:00 to 6:00 PM

I-29 / I-35 Corridor

The limits for the I-29/I-35 combined corridor in the analysis area are from the interchange for I-29 and I-35 down to the northeast corner of the downtown loop (Independence Avenue). **Figure 37** shows the results for peak hour average speed in the peak direction. At the start of this segment, speeds average near 50 mph but then deteriorate to around 30 MPH south of Route 210.

Slower speeds are due to drivers changing lanes to position for their downtown destinations including a left lane exit at The Paseo, a major split at the northeast corner of the downtown loop and other closely spaced interchanges around the loop that cause vehicles to slow for other merging and diverging vehicles. Congestion may also be due to the narrow viaducts that cause driver discomfort with the braking and weaving, especially with trucks.

Figure 37: Existing (2019) I-29 / I-35 Southbound AM Peak Hour Travel Speeds



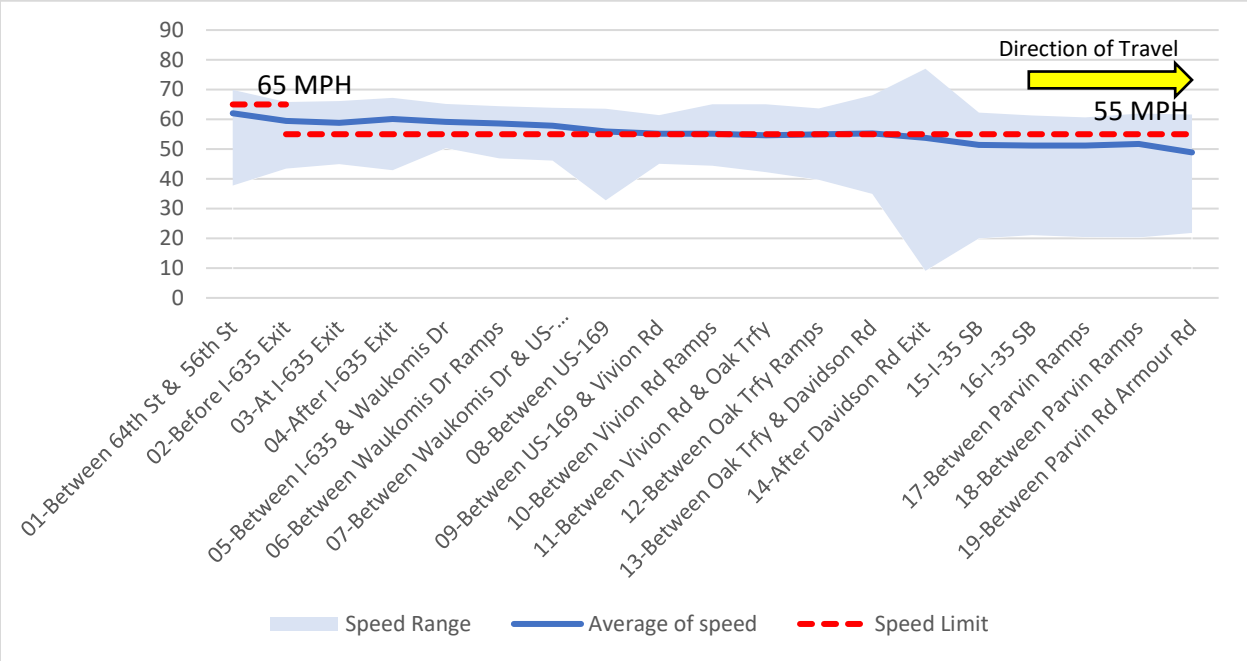
Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM & 5:00 to 6:00 PM

I-29 Corridor

The limits for I-29 are from Route 45 and NW 64th Street to the I-35 interchange. **Figure 38** shows the results for peak hour average speed in the peak direction. For this segment, the average speed is near the posted speeds of 55 mph and 65 mph. There is some speed variability with speeds dropping to 10 and 20 mph. Speed variability could be a result of non-recurring congestion such as incidents and weather.

Closely spaced interchanges from U.S. 169 to N. Oak Trafficway and a short merge at the N. Oak Trafficway on-ramp create undesirable short weaves and vehicle slowdowns. Regardless, speeds on the majority of the corridor show nearly free-flow conditions throughout the morning peak. Approaching the merge with I-35 when NE Davidson Road merges at the same time that I-29 reduces to a single lane, speeds are reduced slightly. There is no clear peak directional volume south of I-635 which is unique to any other freeway locations in the study area. This is because some drivers originating from I-35 to the north and traveling to destinations in Kansas use northbound I-29 as a link between southbound I-35 and southbound I-635.

Figure 38: Existing (2019) I-29 Southbound AM Peak Hour Travel Speeds



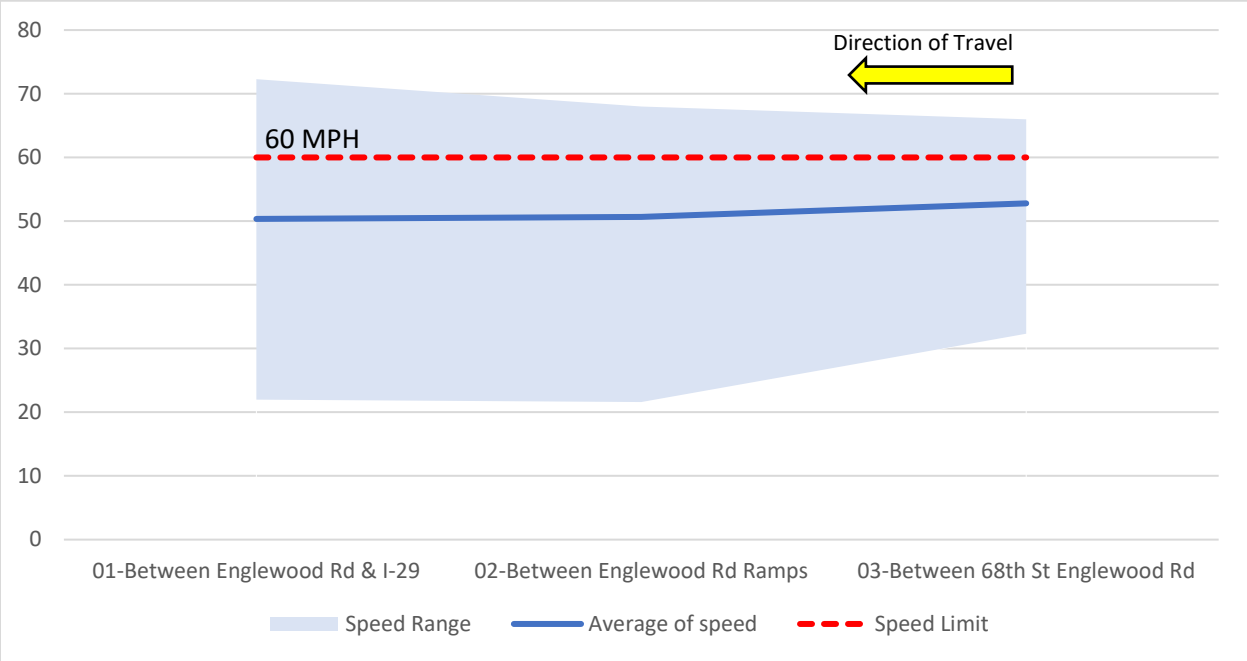
Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM & 5:00 to 6:00 PM

U.S. 169 Corridor

The limits for U.S. 169 extend from NW 68th Street to I-29. **Figure 39** shows the results for peak hour average speed in the peak direction. Average speeds are approximately 10 mph below posted speeds. There is some speed variability with speeds dropping to 20 and 30 mph. Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

The reduced speed is thought to be a result of the U.S. 169 connection with I-29 including the left exit with southbound I-29.

Figure 39: Existing (2019) U.S. 169 Southbound AM Peak Hour Travel Speeds



Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM & 5:00 to 6:00 PM

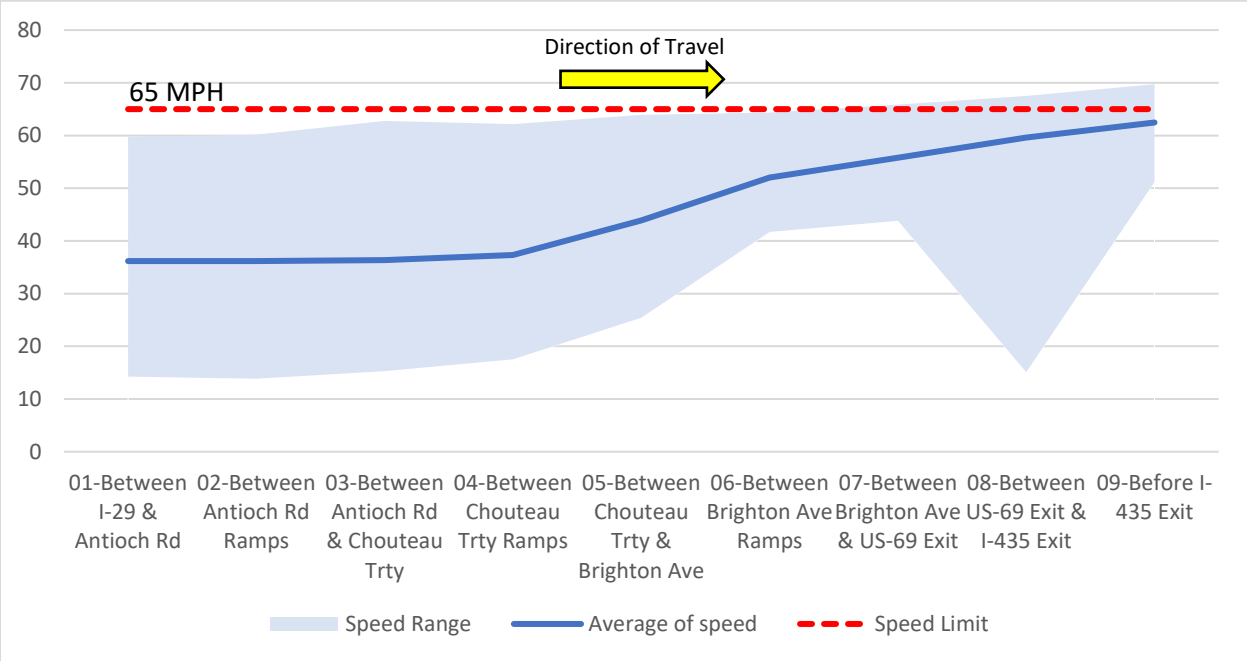
Existing Traffic – PM Peak

I-35 Corridor

Figure 40 shows the results for peak hour average speed in the peak direction. Average speeds are approximately 30 mph below posted speeds just north of the I-29/I-35 split at Antioch Road and gradually increase in speed to the posted speed at the north end of the study corridor at I-435. There are portions of the corridor with speed variability dropping to 15 mph. Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

Inside shoulder widths around the NE Antioch Road and Chouteau Parkway interchanges are more narrow than other parts of the corridor which can naturally factor into why reduced speeds are occurring in this location. Additionally, the auxiliary lane that begins at the ramp from southbound I-29 ends at the Chouteau exit ramp, acting as a lane drop and requiring vehicles continuing north on I-35 to transition into two through lanes. There is a mainline capacity issue northbound between Pleasant Valley and Route 291 that can backup beyond I-435 at times.

Figure 40: Existing (2019) I-35 Northbound PM Peak Hour Travel Speeds



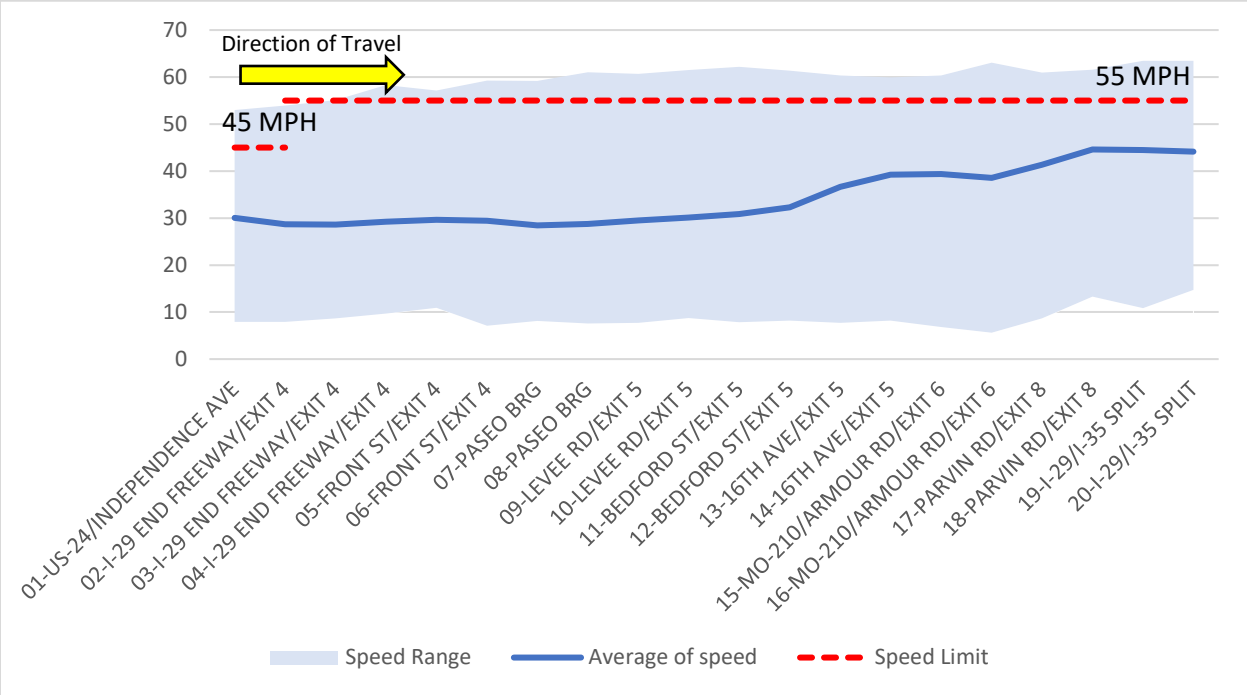
Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM & 5:00 to 6:00 PM

I-29 / I-35 Corridor

Average speeds are approximately 25 mph below posted speeds coming out of downtown and gradually increase after the Missouri River to within 10 mph of the posted 55 mph speed, as shown in **Figure 41**. There are portions of the corridor with speed variability dropping to below 10 mph. Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

Slower speeds can be attributed to industrial land uses and heavy truck traffic in the area as well as steeper grades around the Front Street Interchange. The northbound section between Route 210 and the I-29/I-35 split has slower speeds due to the decision lanes and weaving around NE Parvin Road.

Figure 41: Existing (2019) I-29 / I-35 Northbound PM Peak Hour Travel Speeds



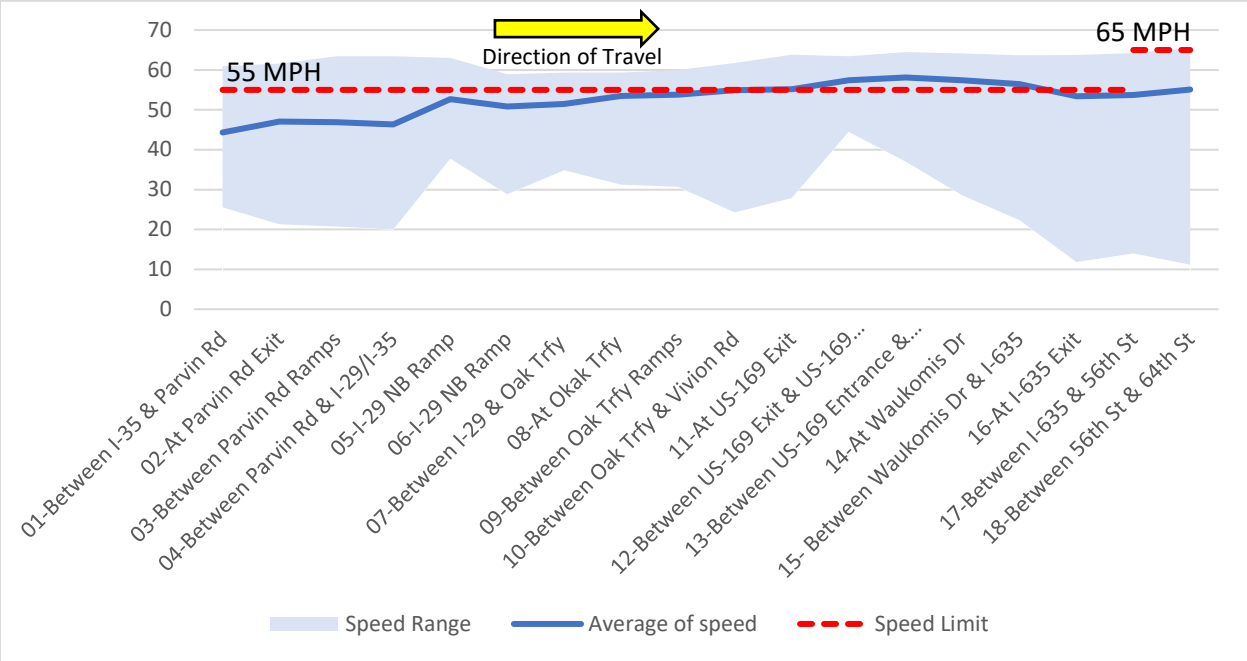
Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM & 5:00 to 6:00 PM

I-29 Corridor

Figure 42 shows the results for peak hour average speed in the peak direction. For this segment, the average speed is near the posted speeds of 55 mph. There is some speed variability with speeds dropping to 10 and 20 mph. Speed variability could be a result of non-recurring congestion such as incidents and weather.

Closely spaced interchanges from U.S. 169 to N. Oak Trafficway create undesirable short weaves and vehicle slowdowns. Regardless, speeds on the majority of the corridor show nearly free-flow conditions throughout the evening peak.

Figure 42: Existing (2019) I-29 Northbound PM Peak Hour Travel Speeds



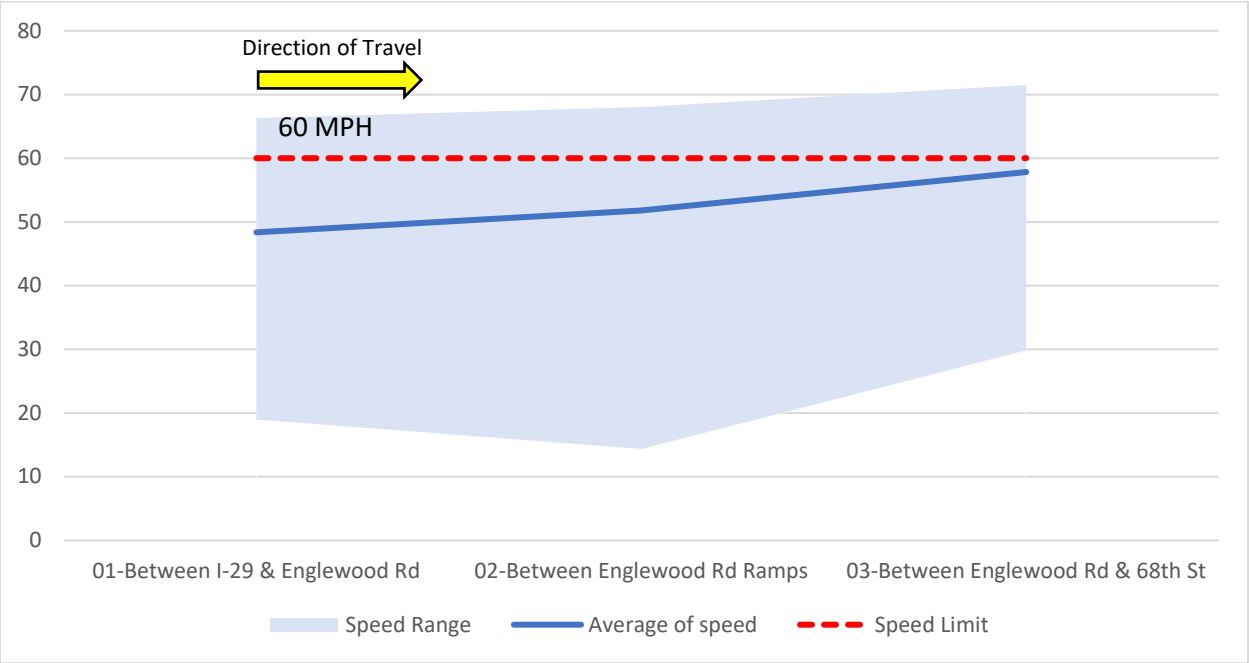
Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM & 5:00 to 6:00 PM

U.S.169 Corridor

Figure 43 shows the results for peak hour average speed in the peak direction. Average speeds are approximately 10 mph below posted speeds but are near posted speeds at the north end of the study corridor. There is some speed variability with speeds dropping to 15 and 20 mph. Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

The reduced speed is thought to be a result of the U.S. 169 connection with I-29 including the left exit with southbound I-29.

Figure 43: Existing (2019) U.S. 169 NB PM Travel Speeds



Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM & 5:00 to 6:00 PM

Future No-Build Traffic – AM Peak

Results from the Future No-Build Dynameq AM model are still under development as of the writing of this report and will be provided in the next draft of the document.

Future No-Build Traffic – PM Peak

Results from the Future No-Build Dynameq PM model are still under development as of the writing of this report and will be provided in the next draft of the document.

4.2.4 Existing and Future No-Build Traffic Conclusions

StreetLight Origin-Destination Data was collected along the I-29, I-35 and U.S. 169 corridors and used to identify travel patterns and determine where traffic was going after entering the study area on each of the corridors. In the AM peak, the top three destinations for traffic on southbound I-29 was I-635, U.S. 169, and I-29/I-35. From southbound U.S. 169 north of NW 68th Street, more traffic was destined to U.S. 169 south of I-29 than anywhere else. The next biggest destinations were I-635 and I-29/I-35. Traffic on southbound I-35 was mostly destined for either I-435 or I-29/I-35. In the PM peak, the traffic on northbound I-29/I-35 was destined for I-35 more than anywhere else, then I-29.

In addition to OD information, the StreetLight data provides details on the home and work locations of drivers on the three corridors. In general, the data indicates that many trips along the I-29/I-35 and I-29 corridors through the zones can be attributed to people living along the corridor in the study area, whereas the home locations of drivers on I-35 extend beyond the study area along I-35 to Liberty and further north to Kearney and Excelsior Springs. In addition, the data also indicates that these corridors serve a broad Kansas City regional area with home locations extending well south of the Missouri River in Missouri and into Kansas.

The work locations of weekday traffic on the I-29/I-35 and I-29 corridors is similar to that of the home locations – near the corridor within the study area. The primary work locations of vehicles on I-35 are in Liberty, with a couple of work locations in North Kansas City. Like the home locations, this data also indicates that these corridors serve a broad Kansas City regional area with work locations extending well south of the Missouri River in Missouri and into Kansas. Over 11 percent of vehicles travelling on I-29/I-35 and over 18 percent of vehicles on I-35 are heavy trucks. Existing industrial land uses adjacent to the interstate, such as the Northeast Industrial District and Claycomo Ford Plant, contribute to the higher percentages in the corridor. Traffic simulations using Dynameq software were created to replicate Existing 2016 traffic conditions within the study area. Traffic analysis results indicate that the primary locations where issues currently exist are located at the same locations, but in opposite directions, in both the AM and PM peak periods:

- I-35 northbound and southbound between N Brighton Avenue and NE Antioch Road
- I-29/35 northbound and southbound between Bedford Avenue and Berkley Parkway

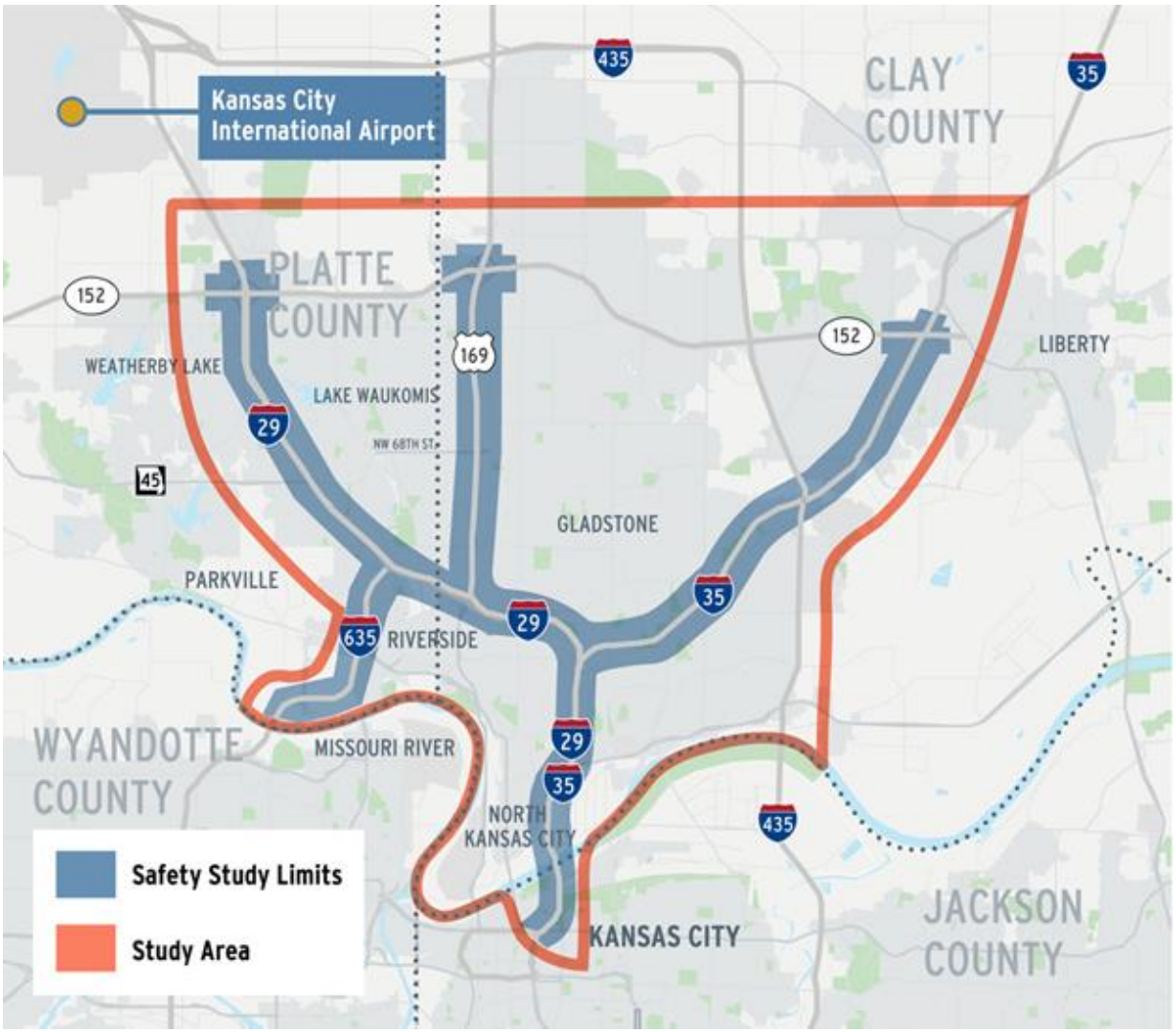
By 2050, issues in the study area will extend to the following locations:

[Results will be added once the No-Build AM and PM models are completed]

4.2.5 Safety Methodology

In conjunction with the traffic operational analysis, an existing and future no build crash analysis was conducted for the I-29, I-35, U.S 169 and I-635 mainlines and portions of M-152. Additionally, all system-to-system ramps, service ramps and ramp terminal intersections along the study corridors were included in the analysis. The Safety Study Limits extend beyond the Project Limits to analyze safety concerns and crashes within areas that have a high potential to impact traffic operations and safety within the Project Limits. **Figure 44** illustrates the limits of the safety analysis for this study.

Figure 44: Safety Analysis Study Limits



Source: HNTB

The existing safety analysis was conducted using crash data, obtained from MoDOT's Data Zone, for the most current complete five-year period at the time of the analysis (2016-2020). The safety analysis includes a summary of various existing crash characteristics including crash type, crash severity and other prevailing conditions. Crash rates were calculated for the study corridors and compared to Missouri statewide crash averages for similar facilities.

4.2.6 Safety Segmentation Approach

Geographic Information Systems (GIS) was used to geolocate crashes within the project study limits using the crash's latitude and longitude; this information was available within the crash dataset. In GIS, the project corridors were segmented into reasonable areas for analysis. These areas were based on the following:

- **Highway System-to-System Ramps:** gore point to gore point of the ramp at system-to-system interchanges
- **Highway Mainline Interchange Segments:** The area between ramp gore points at an interchange
- **Highway Mainline Segments:** The remaining area of the mainline outside of the interchange
- **Ramps:** From ramp gore point to gore point for system-to-system ramps and ramp gore point to ramp terminal analysis zone for service ramps
- **Ramp Terminals:** 500-foot zone around the center of the ramp terminal

Lengths of the segmented areas vary. For highway mainline segments exceeding two miles, the segments were cut in half to provide a smaller analysis zone. In cases where interchanges are closely spaced, shorter segment lengths were established along highway mainlines. Shorter segment lengths have the potential to skew crash rates, as they can inaccurately depict elevated crash frequencies based on the smaller sample size.

4.2.7 Safety Quantitative Assessment Approach

A quantitative analysis of crash characteristics within each segment was performed utilizing the data derived from the GIS analysis. Crash characteristics that were evaluated consist of the following:

- **Crash Severity:** Fatal, Serious Injury, Minor Injury, Property Damage Only (PDO)
- **Crash Type:** Head-on, Angle, Sideswipe, Single Vehicle, etc.
- **Weather Conditions:** No Adverse Conditions, Cloudy, Rain, Snow, Fog, etc.
- **Road Conditions:** Dry, Wet, Snow, Ice, Debris, Mud/Dirt/Sand, etc.

The two most serious levels of crashes (Fatal and Serious Injury) were analyzed in more detail to determine specific circumstances leading to their cause. Addressing Fatal and Serious Injury crashes have the highest potential to save lives of the traveling public.
Once crash characteristics were quantified for each segment, crash rates for all highway mainline segments were calculated. The following equation was used to determine the crash rates:

- **Crash Rate** = (Total Crashes x 100,000,000)/ (ADT x 365 x Number of Years x Segment Length)
    - **ADT** = Average Daily Traffic, obtained from traffic count maps or from the traffic counts used in the traffic analysis.
    - **Segment Length** = Centerline segment length of the polygon segment measured in miles. Distances are measured in ArcGIS.

Mainline crash rates were then compared to statewide crash averages, obtained from MoDOT for similar facilities for the same time period of the safety analysis. Crash rates for the system-to-system ramps, service ramps and ramp terminal intersections were not calculated because no statewide averages exist for comparison.

Utilizing GIS, a density heat map or hotspot analysis was conducted for each study corridor. This analysis identifies areas with high concentrations of crashes.

Existing Safety Analysis

The project study area is typified by relatively low severity crashes which are primarily single vehicle, rear end or sideswipe in nature. These crash characteristics point to areas of lower speeds and high congestion. Solutions for these types of crashes usually involve reducing conflict points such as merges and diverges and lowering the overall congestion of a corridor. Crashes primarily occurred during clear and dry conditions.

Overall, the safety analysis identified three specific segments of the study area corridors as areas of concern. These areas each contain a high occurrence of specific types or levels of severity of crashes. They include.

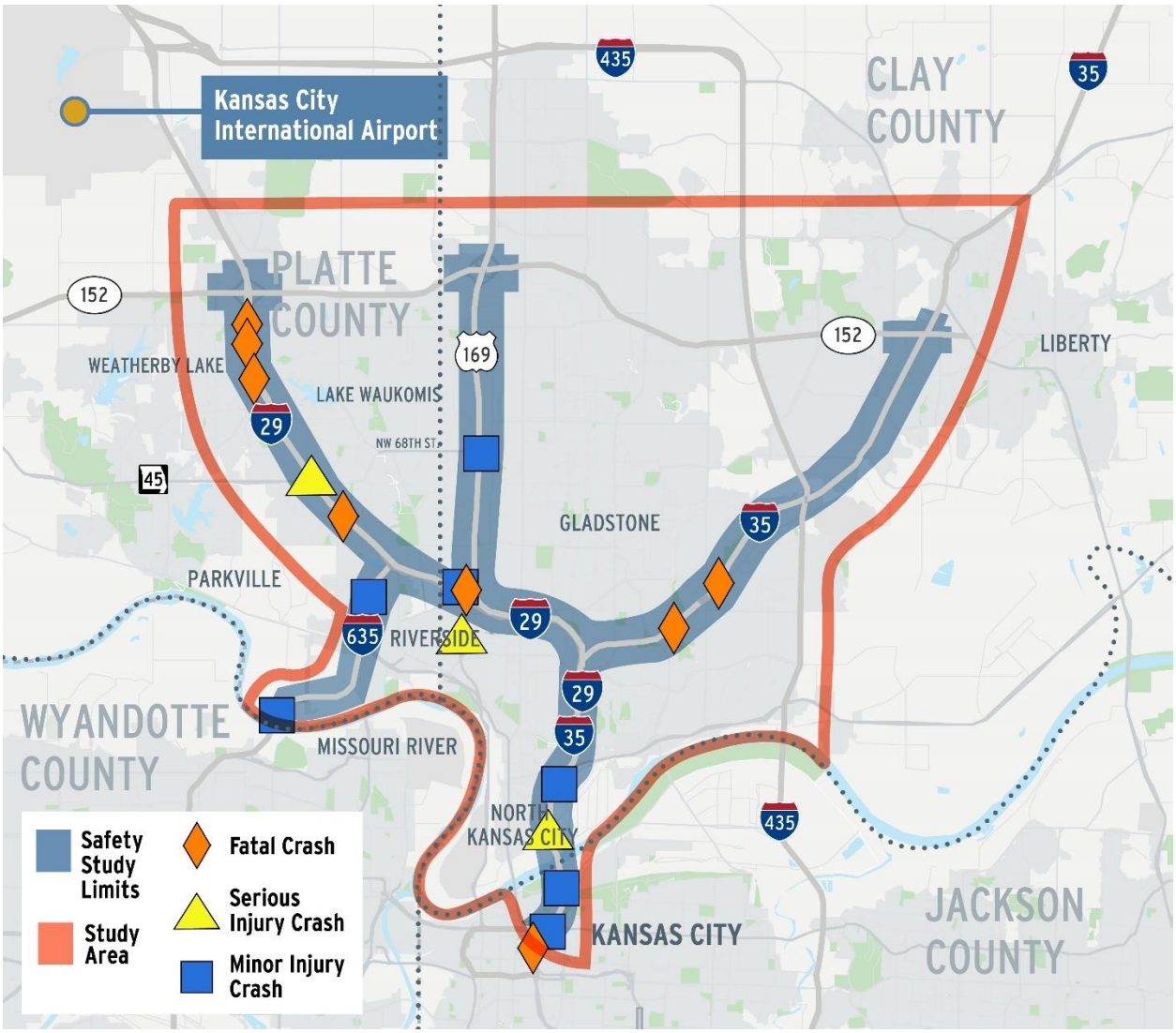
- The I-29/I-35 Combined Corridor between I-70 and the north approach of the Kit Bond Bridge: This area experienced 12 fatal or serious injury crashes during the study period, many where a vehicle overtook a slower moving vehicle.
- I-35 from the I-29/I-35 interchange to the N Brighton Avenue interchange: This segment contains all of the fatal crashes and most of the serious injury crashes along the I-35 corridor. Most of these crashes involved striking guardrails, cable barrier or concrete barriers; however, overall trends of those types of crashes were in line with crash trends for the overall corridor.
- I-29 between NW 72nd Street and M-152: This area experienced high rates of fatal and serious injury crashes, specifically pedestrian related, head-on, and out of control crashes.

Below is a high-level summary of each corridor within the project study area. A detailed existing safety analysis is included in **Appendix E** of this document.

Pedestrian Involved Crashes

Pedestrian involved crashes along each highway corridor were analyzed. These crashes include ones where a pedestrian was involved in the primary incident or a secondary incident while emergency services were responding to the primary incident. **Figure 45** shows the location of the pedestrian involved crashes.

Figure 45: Pedestrian Highway Mainline Involved Crashes



Source: HNTB

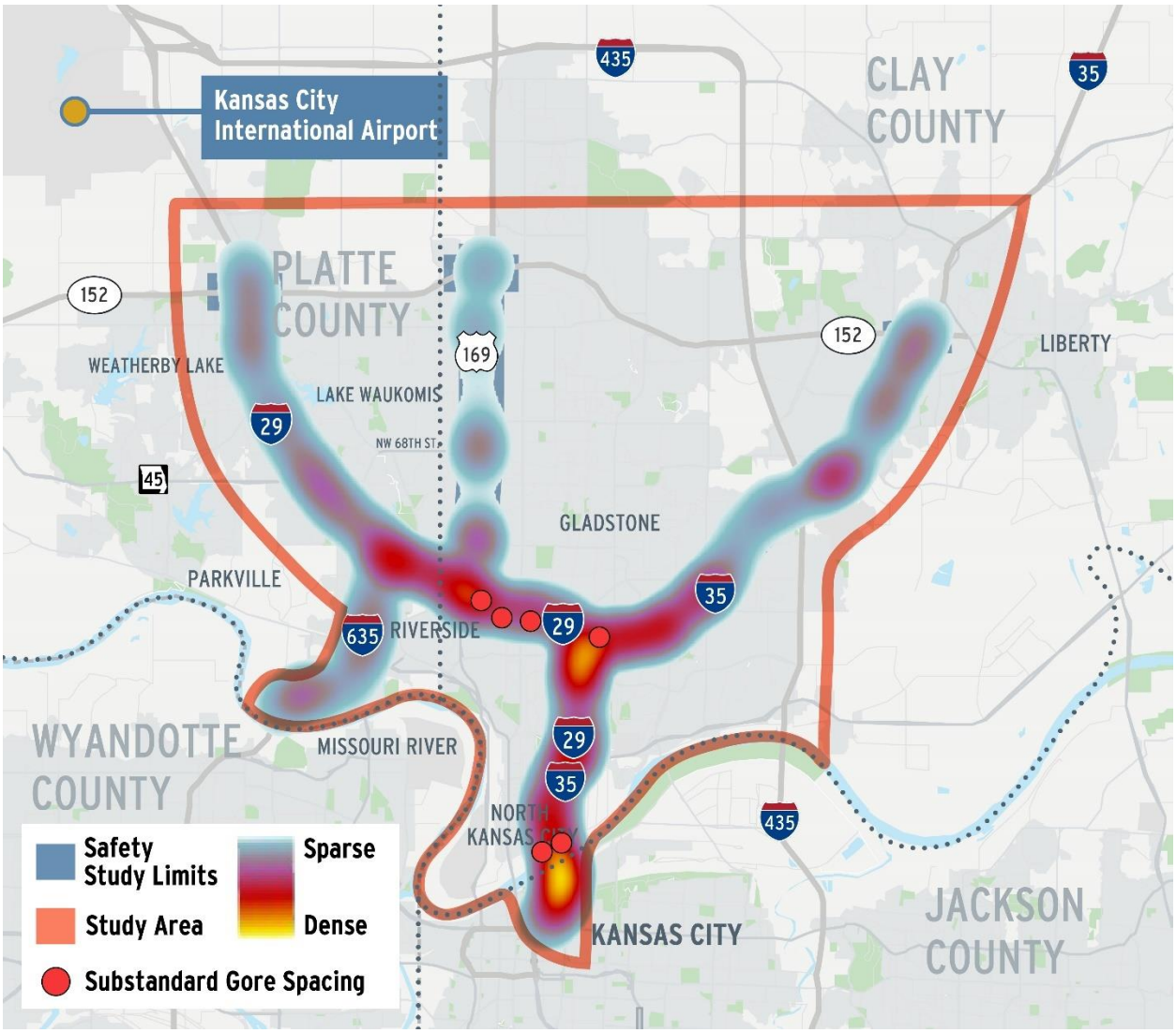
Over the 5-year study period, 18 pedestrian involved crashes occurred along the highway portions of the study area. They occurred along all corridors, however a cluster of fatal crashes occurred near the NW Barry Road interchange. Two of these directly involved the pedestrian being struck on the roadway, the other had the pedestrian struck in a secondary incident. According to crash reports several involved pedestrians walking in travel lanes and failing to move out of the path of vehicles. Overall, there does not appear to be a widespread issue with pedestrian involved crashes along the highways.

Substandard Geometric Features

Substandard geometric features (Gore Spacing, Acceleration and Deceleration Lane Length) identified in section 4.4.4 of this report were compared to crash hotspot maps for all highway corridors.

Figure 46 shows the locations of substandard gore spacing. These primarily occur along I-29 between U.S. 169 and the I-29/I-35 split, an area of high crash densities. Additionally, along the combined I-29/I-35 corridor, the on-ramps from Bedford Avenue/Levee Road have substandard spacing and sit on the edge of the crash hotspot at the southern limits of the study corridor.

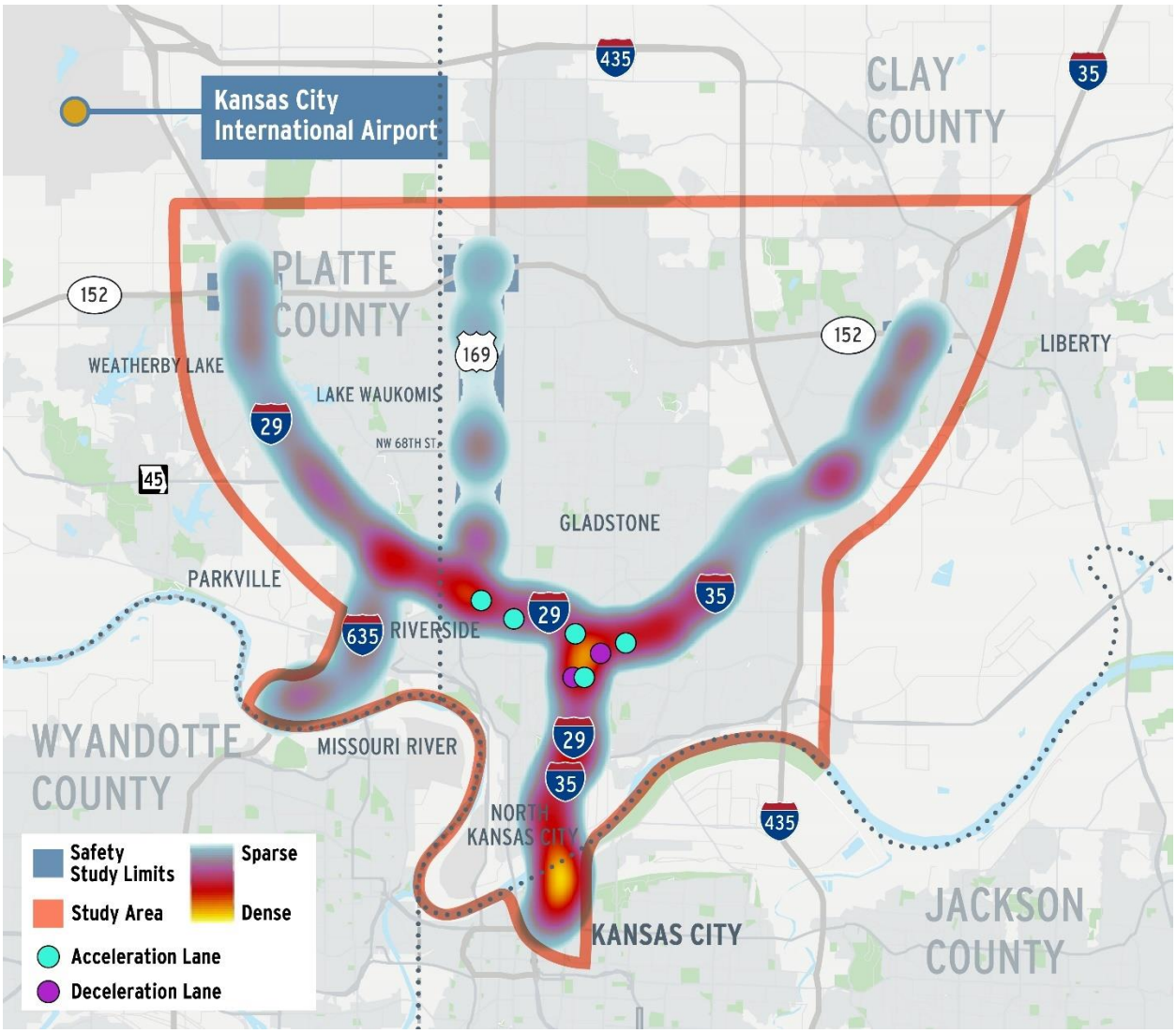
Figure 46: Substandard Gore Spacing - Safety



Source: HNTB

Figure 47 shows the locations with substandard acceleration and deceleration lanes. These are all located along I-29 between U.S. 169 and the I-29/I-35 split. Five of these are located within the I-29/I-35 interchange, in an area with a high concentration of crashes.

Figure 47: Substandard Acceleration and Deceleration Lanes and Crash Density



Source: HNTB

I-29/I-35 Combined Corridor

Running from the northeast corner of the downtown loop to the I-29/I-35 split, this portion of the study area experienced 1,341 crashes during the study period or an average of 0.13 crashes per mile per day over the 5-year period. The corridor is primarily comprised of low severity crashes (property damage only and minor injury) made up of single vehicle, rear end and sideswipe. Of the 1,341 crashes reported, approximately 77% of all crashes resulted in property damage only, 23% of crashes caused some form of injury to vehicle occupants, and less than 1% of crashes (three crashes) resulted in a fatality. Crash types were primarily comprised of

rear end (51.5%), sideswipe (27.1%), and single vehicle (15.1%). Crash rates that exceed the statewide average for an interstate are found on eight of its nine segments, with some exceeding it for both total and fatal crashes as well as combined fatal and serious injury crashes. **Figure 48** shows the crash density and location of fatal and serious injury crashes in the corridor.

The area from Independence Avenue north across the Kit Bond Bridge through the Bedford Ave/Levee Rd interchange contains some of the highest crash rates along the corridor. Overall, this portion of the project area is primarily minor injury and property damage only crashes, however 17 fatal and serious injury crashes occurred during the study period. The common theme between many of these higher severity crashes was speeding or a vehicle overtaking one traveling slower.

I-29 Corridor

The I-29 corridor stretches from the I-29/I-35 split north to the M-152 interchange, covering 12 miles. It experienced 1,463 crashes during the study period or approximately 0.1 crashes per mile per day over the 5-year study period. In general crashes were shown to be low severity rear end, passing and out-of-control which typically indicate areas of high congestion and lower speeds. Of the 1,463 crashes reported, approximately 81% of all crashes resulted in property damage only, 18% of crashes caused some form of injury to vehicle occupants, and less than 1% of crashes (nine crashes) resulted in a fatality. Crashes occurring along freeway segments primarily consisted of rear end (36%), sideswipe (27%), and single vehicle (26%) collisions. **Figure 48** shows the crash density and location of fatal and serious injury crashes in the corridor.

While the I-29 corridor does have portions that exceed the statewide average for interstates for total and fatal crashes, it has noticeably lower crash rates than the I-29/I-35 combined or I-35 corridors. Total crash rates north of the I-635 interchange area are well below the statewide average; the exception are fatal crash rates between NW 72nd Street and M-152. This may be due to the overall characteristics of the roadway cross-section and lower traffic volumes. Two areas of focus were identified, from the I-29/I-35 split to I-635 and NW 72nd Street to M-152. The I-29/I-35 split to I-635 has crash rates exceeding the statewide average for interstates, but it does experience the highest levels of traffic volume. It experiences higher rates of what are considered congestion related crashes, low severity queue type crashes. The I-29 corridor from NW 72nd Street to M-152 experienced high rates of fatal and serious injury crashes, specifically pedestrian related, head-on and out-of-control crashes on the mainline.

I-35 Corridor

An approximate 10-mile stretch of the I-35 corridor, split into 12 study segments, was evaluated from the I-29/I-35 interchange to the interchange at M-152. Between the years 2016-2020, 1,166 crashes were reported along the facility or approximately 0.1 crashes per mile per day over the 5-year study period, which represents 24% of all crashes reported along freeways

within the project study limits. Of the 1,166 crashes reported, approximately 83% of all crashes resulted in property damage only, 16% of crashes caused some form of injury to vehicle occupants, and less than 1% of crashes (four crashes) resulted in a fatality. Crashes occurring along freeway segments primarily consisted of rear end (41%) and single vehicle (31%) collisions. **Figure 48** shows the crash density and location of fatal and serious injury crashes in the corridor.

Crash rates were determined to exceed statewide averages for nine of the 12 identified freeway segments along I-35. Several segments surpass two or all three crash rate categories. Segments that have surpassed statewide averages were noted to share similarities in crash severity and crash type. Crashes occurring along these segments primarily resulted in property damage only with rear end collisions being the leading crash type.

Two areas were specifically identified in the analysis as high crash locations; the I-29/I-35 interchange through the N Brighton Avenue interchange, and between the I-435 and U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy interchange. The I-29/I-35 interchange to N Brighton Avenue interchange portion of the corridor contains all of the fatal crashes and most of the serious injury crashes. A potential trend among those crashes involved striking guardrails, cable barrier or concrete barriers; however, the overall rate of these types of crashes was in line with the rest of the corridor. The portion of the corridor between the I-435 and U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy interchange was shown to have a high density of crashes but only one of the fatal or serious injury crashes. While from a severity level this area isn't a concern, the high density of lower severity, congestion type crashes should be considered with making improvements.

U.S. 169 Corridor

An eight mile stretch of the U.S. 169 corridor was evaluated from I-29 to M-152. From 2016 through 2020, 422 crashes were reported or approximately 0.03 crashes per mile per day over the 5-year study period. Approximately 77% of all crashes resulted in property damage only, 22% of crashes caused some form of injury to vehicle occupants, and 1% of crashes (four crashes) resulted in a fatality. Crashes occurring along freeway segments primarily consisted of single vehicle (37%) and rear end crashes (35%). **Figure 48** shows the crash density and location of fatal and serious injury crashes in the corridor.

In general, crashes on U.S. 169 were shown to be low severity rear end and out of control which typically indicate areas of high congestion and lower speeds. While several segments do experience crash rates that exceed statewide averages, the number of fatal and serious injury crashes is low compared to other corridors in the study. Segments that do experience fatal crash rates that exceed the statewide average each contain only one fatal crash and are of relatively short segment length (0.5 miles). Segments less than 1-mile can distort crash rates.

No specific segments or concerns were identified from a crash trend standpoint along the U.S. 169 corridor with the exception of two pedestrian involved crashes around the U.S. 169 and I-29 interchange. These crashes occurred on two different portions of the interchange and no

correlation between the crashes was determined, this may require further consideration from an engineering standpoint to better deter pedestrians from accessing the freeway.

I-635 Corridor

A four mile stretch of the I-635 corridor was evaluated from the Missouri River to the interchange at I-29. The I-635 portion of the project study area experiences lower traffic volumes than other interstate facilities within the project study area; the corridor also experiences lower rates of traffic crashes. Between the years 2016-2020, 352 crashes were reported, or approximately 0.05 crashes per mile per day during the 5-year study period, along the facility, which represents 7% of all crashes reported along freeways within the project study limits. Of the 352 crashes reported, approximately 76% of all crashes resulted in property damage only, 23% of crashes caused some form of injury to vehicle occupants, and less than 1% of crashes (one crash) resulted in a fatality. Crashes occurring along freeway segments primarily consisted of single vehicle (47%) and rear end (20%) crashes.

Three of the four corridor segments exceeded statewide crash averages for interstates for either total or fatal crashes. Crashes occurring along these segments primarily resulted in property damage only with rear end collisions being the leading crash type.

The hotspot analysis identified the Horizons Parkway interchange to have the highest concentration of crashes along the I-635 corridor, but these were low severity in nature. The single fatal crash along the corridor during the study period was a wrong way driver. Considering all of this, no specific trends have been identified from a safety standpoint for the I-635 corridor.

M-152 Corridor

Two segments of the M-152 corridor were evaluated along the freeway mainline at the interchanges with I-29 and U.S. 169. Between the years 2016-2020, 90 crashes were reported along the facility, which represents 2% of all crashes reported along freeways within the project study limits. Of the 90 crashes reported, approximately 77% of all crashes resulted in property damage only and roughly 23% of crashes caused some form of injury to vehicle occupants; however, no fatalities were reported.

The analyzed segments of M-152 experienced mostly low severity primarily rear end and angle crashes. This is expected as both segments analyzed are at interchanges and contain high levels of congestion and merge/diverge movements. None exceeded the statewide crash rate for similar facilities.

Ramps and Ramp Terminals

System-to-system ramps, service ramps, and ramp terminals were analyzed across the entire study area. In total, 49 system-to-system ramps, 84 service ramps and 40 ramp terminal

intersections were identified. 2,551 crashes occurred at these locations between the years 2016 and 2020. Of the 2,551 crashes reported, approximately 75% resulted in property damage only, 23% caused minor injury, and approximately 1% of crashes were fatal or resulted in a serious injury.

In general crashes on service ramps and ramp terminal intersections were low severity with 76% property damage only and 23% minor injury, which resulted in primarily rear end (39%) and angle (22%) collisions. Additionally, MoDOT has identified several ramps and ramp terminals that may require further considerations under future phases. This compiled list of ramps and ramp terminals can be seen in **Table 22**.

Table 22: Ramps and Ramp Terminals For Future Consideration

Ramps and Ramp Terminals
I-29/I-35 - Independence Ave Ramp Terminal
I-29/I-35 - Berkley Pkwy and E Front St SPUI
I-29/I-35 NB - Route 210 (Armour Rd) Ramp Terminal (On Ramp)
I-29/I-35 NB - Route 210 (Armour Rd) Ramp Terminal
I-35 NB - NE Antioch Rd Ramp Terminal
I-35 SB - NE Antioch Rd Ramp Terminal
I-35 NB - N Chouteau Trfy Ramp Terminal
I-35 SB - N Chouteau Trfy Ramp Terminal
I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Ramp Terminal
I-35 NB - NW Barry Rd (M-152) Ramp Terminal
I-35 SB - NW Barry Rd (M-152) Ramp Terminal
I-29 NB - Route 45 and NW 64th St Ramp Terminal
I-29 SB - Route 45 and NW 64th St Ramp Terminal
I-29 SB - NW 72nd St Ramp Terminal
I-29 SB - NW Barry Rd Ramp Terminal
I-29 NB - NW Barry Rd Ramp Terminal
US 169 NB & Barry Rd Ramp Terminal
US 169 NB & Englewood Rd Ramp Terminal

Source: MoDOT

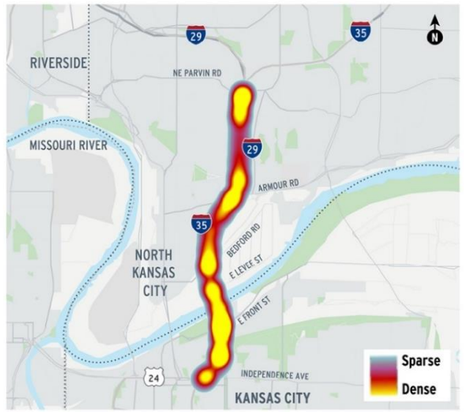
Future No-Build Safety Analysis

A Highway Safety Manual (HSM) analysis of the study corridors was not completed for the future no-build scenario. The project area is typified by relatively low severity crashes which are primarily single vehicle, rear end or sideswipe in nature. These crash characteristics point to areas of lower speeds and high congestion. Increases in traffic volumes in the future would result in more congestion in a no-build scenario and, therefore, likely more of these crash types. Areas already identified with safety concerns would likely worsen. Also, increased congestion will cause queues to extend further than they do today, potentially causing safety issues in areas not identified as problems today. As traffic operational concerns are addressed through build alternatives, more detailed analysis of the safety issues and potential future safety benefits of projects at those locations should be considered.

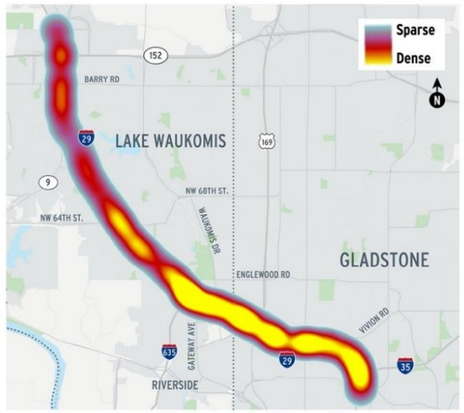
Figure 48: Traffic Safety-Crash Density and Fatal and Serious Injury Crashes

Crash Density

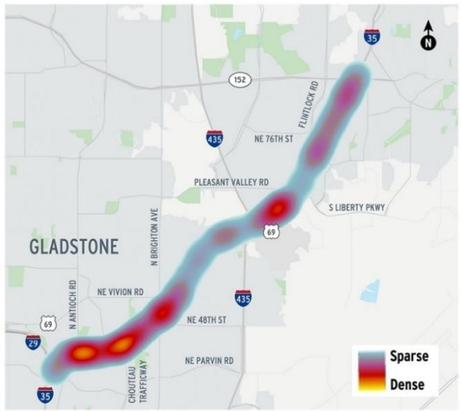
I-29/I-35



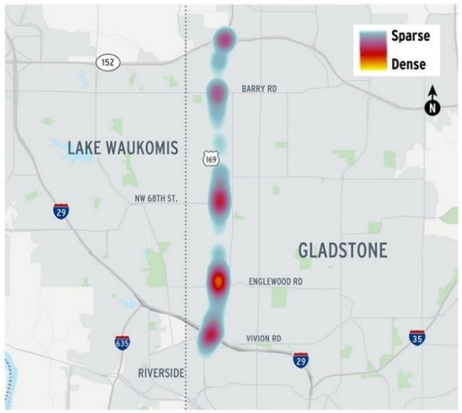
I-29



I-35

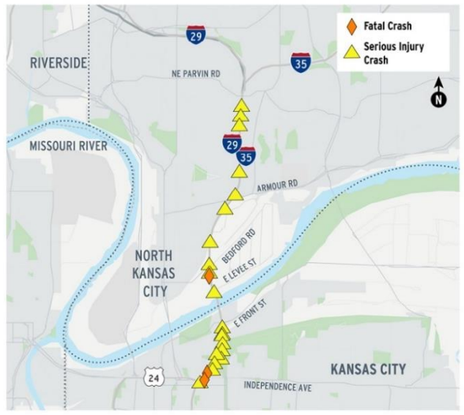


U.S. 169



Fatal and Serious Injury Crashes

I-29/I-35



I-29

I-35

U.S. 169

4.3 Multimodal Conditions

This section provides an overview of the existing multimodal network considerations within the study area. Multimodal considerations include the interstate and highway network, alternative transportation modes such as public transit service as well as active modes such as walking and biking. This section also addresses freight transportation.

4.3.1 Methodology

To understand the existing multimodal networks based within the study area, information was collected via online searches, imagery, map, GIS analyses, Google Maps, and varying plans from agencies/organizations. The information has been categorized by transportation mode throughout the following pages.

4.3.2 Highways and Roadways

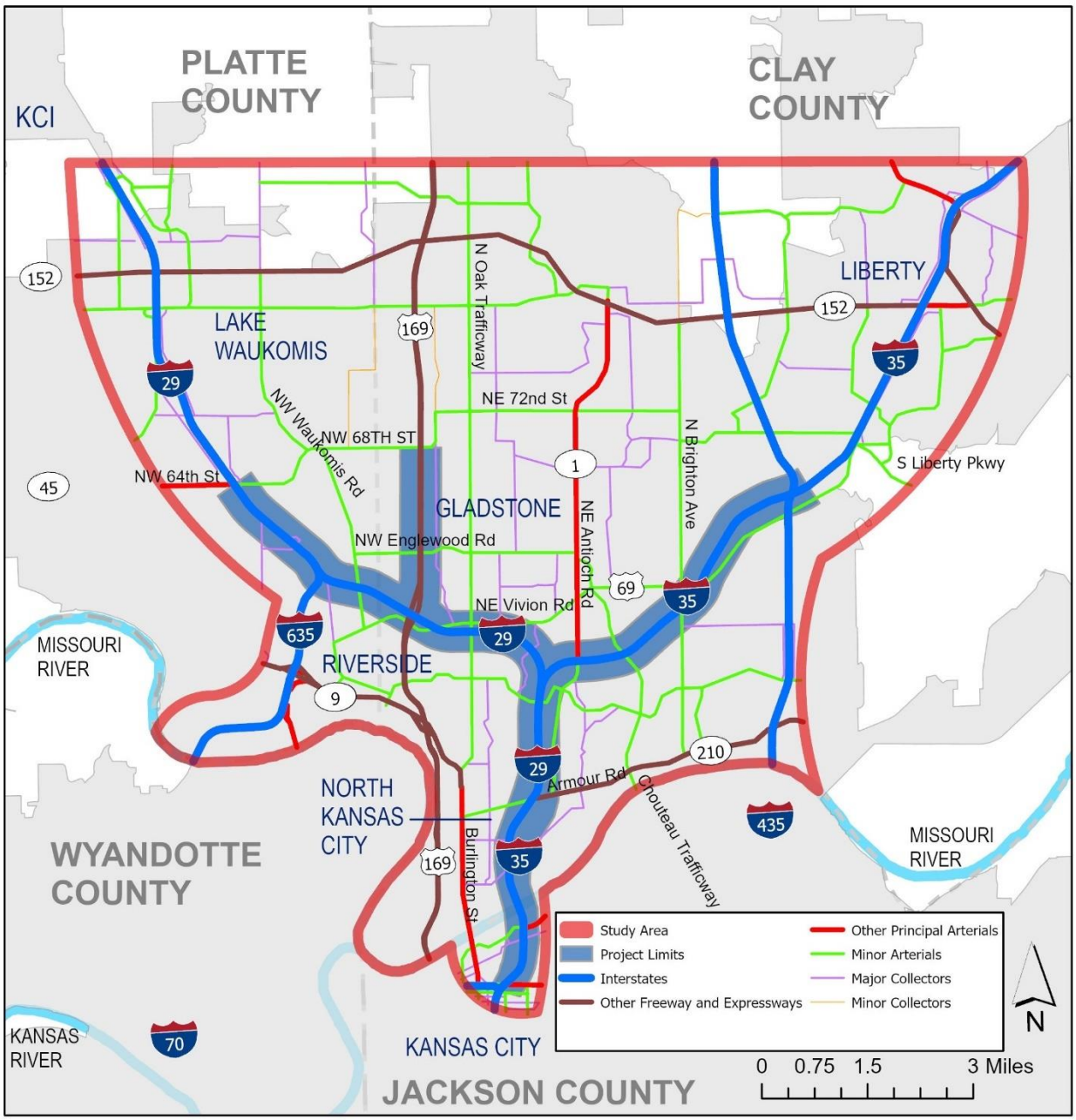
Ranking 28th in the nation for roadway miles per capita and carrying around 47 million vehicle miles of travel per day, the highway and roadway network in the Kansas City region are the foundation of the transportation system[4].

Functional Class

The FHWA uses a set of criteria to determine the 'functional classification' of roadways. These classes are designated based on the service a particular roadway was designed to give and are intended to summarize and report the roadway system. There are approximately 258 miles of roadway classifications represented in the study area shown in **Figure 49**.

[4] "Existing Transportation Facilities", Connected KC 2050, accessed August 10, 2022, https://connectedkc.org/wp-content/uploads/2020/04/Existing-transportation-facilities.pdf

Figure 49: Roadway Functional Classifications



Source: Connected KC 2050, MoDOT Functional Class System

National Highway System (NHS)

The NHS consists of roadways important to the nation's economy, defense, and mobility, and includes interstates, principal arterials, strategic highways, major strategic highway connectors, and intermodal connectors. This network is shown in **Figure 50.**

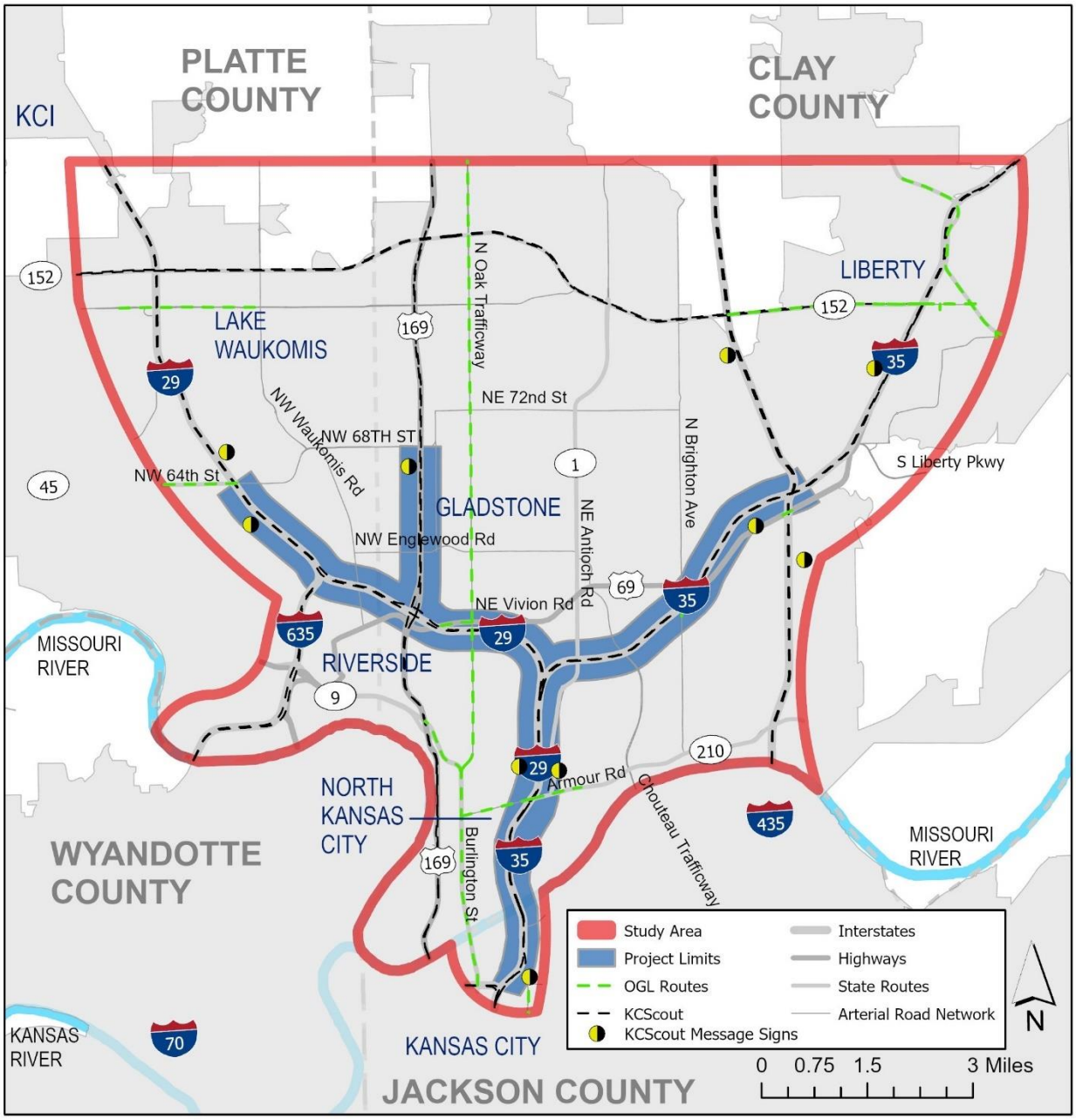
Intelligent Transportation Systems (ITS) Infrastructure

The Highlands area of Kansas City has two major ITS infrastructures in place, Operation Green Light (OGL) and KCScout. The first of these, OGL, is an effort to improve the operational characteristics of traffic signals on major routes in the area. This is accomplished through varying methods such as signal timing coordination, communications, incident response, knowledge and resource sharing, and prompt diagnosis and dispatch for malfunctions. This system is shown on **Figure 50** as the green dots and lines representing the OGL routes and intersections equipped with the system[5].

In addition to OGL, KCScout is the second ITS infrastructure represented in the area. KCScout is a traffic management system designed to improve system speed by decreasing the number of rush-hour incidents and improving emergency response times to clear incidents quickly. This system is also shown in **Figure 50** as the black dashed lines along routes equipped with the system, with KCScout message boards represented by half black half yellow circles[6]. According to the information in **Figure 50**, there is approximately 27 miles of routes operating with OGL equipment, covering 83 intersections. KCScout covers approximately 63 miles of interstate in the region with 9 message signs.

[5] "Operation Green Light", MARC, accessed September 14, 2022, https://www.marc.org/transportation/transportation-programs/operation-green-light
[6] "KCScout", KCScout, accessed September 14, 2022, http://www.kcscout.com/

Figure 50: Highways and ITS Infrastructure



Source: Connected KC 2050, MARC, KCScout

System Condition

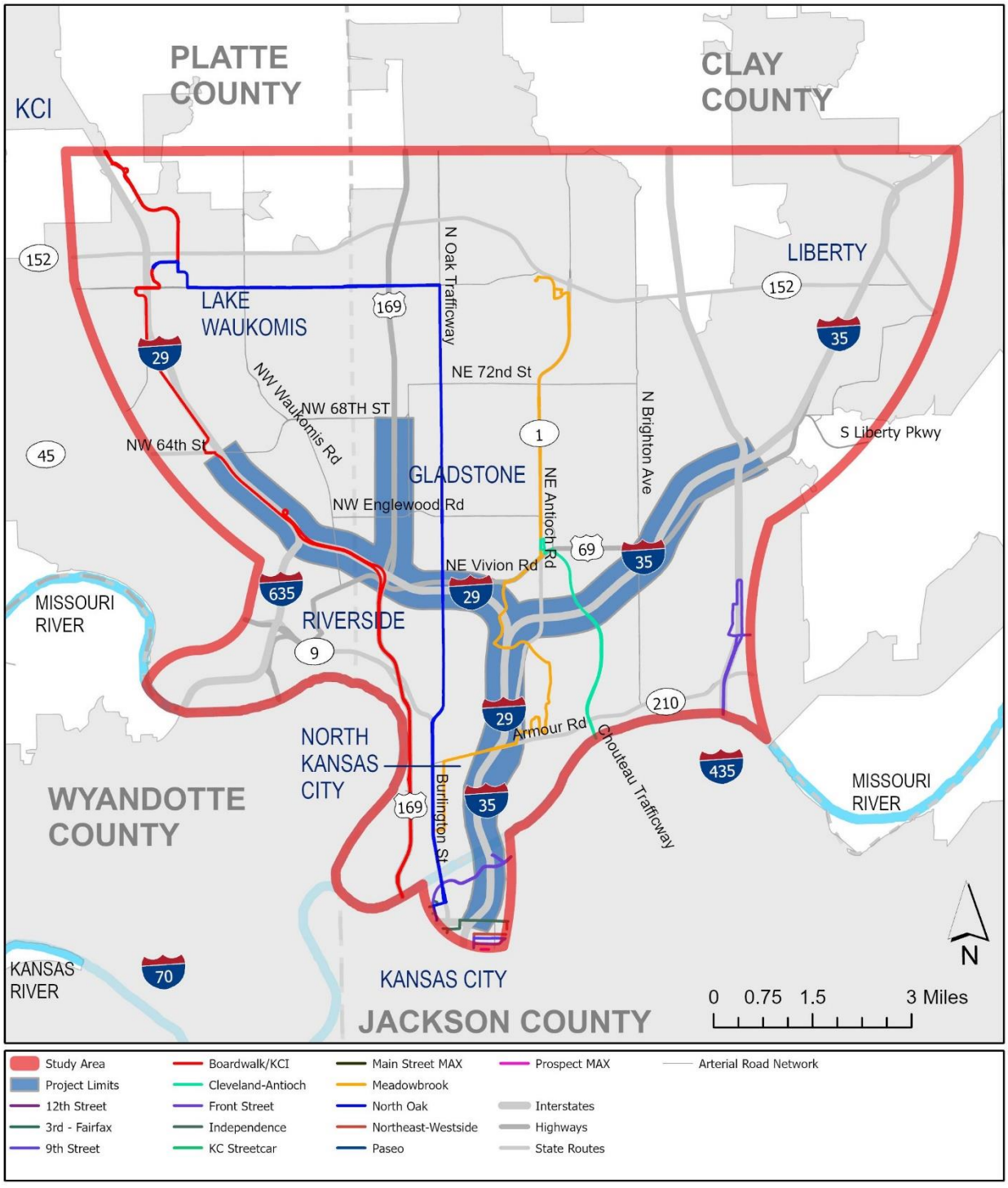
The condition of pavement is important for the roadway network to keep functioning, as it affects drivers and freight moving through the region. According to Connected KC 2050's performance measures report, approximately 80% of pavement was reported to be in 'Good' condition on interstates, while less than 1% of pavement was reported as being 'poor'. 52% of non-interstate pavement was reported as being in 'Good' condition while less than 1% was reported as 'Poor' condition[7]. For more detailed analysis, please reference section 4.4 Engineering Conditions.

Local Public Transit Service

The Kansas City Area Transportation Authority (KCATA) provides public transit service in the Kansas City portion of the northland and contracted service for Riverside, North Kansas City and Gladstone. The RideKC Streetcar line is operated by the Kansas City Streetcar Authority (KCSA). The KCATA provides both fixed-route and flex-route services. Combined, these services under the RideKC brand form the core of the study area's public transportation system. **Figure 51** shows the existing local public transit service in the study area.

[7] "System Performance Report", Connected KC 2050, accessed July 18, 2022, https://connectedkc.org/wp-content/uploads/2020/03/Performance-measures.pdf.

Figure 51: Existing Local Public Transit Services



Source: Connected KC 2050, KCATA

The transit services operating within the study area, shown in **Figure 51**, are operated by KCATA and the KCSA. These services include the following routes:[8]

- 12th Street
- 3rd - Fairfax
- 9th Street
- Boardwalk/KCI
- Cleveland-Antioch
- Front Street
- Independence
- KC Streetcar
- Main Street MAX
- Meadowbrook
- North Oak
- Northeast - Westside
- The Paseo
- Prospect MAX

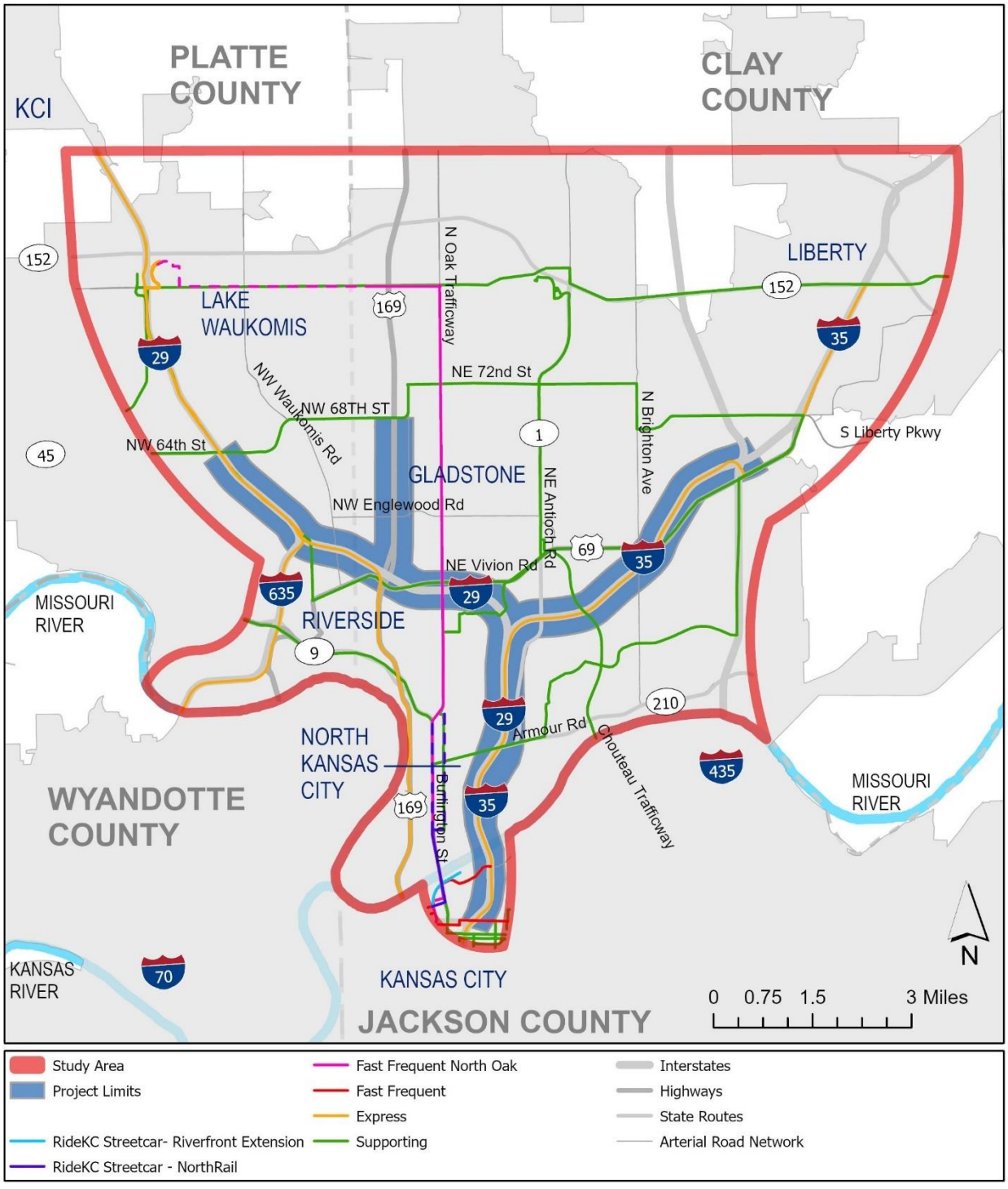
The area within the northland had an average daily ridership of approximately 2,644. To convert this to annual riders an annualization factor was calculated by dividing the total number of unlinked trips by the number of average weekday unlinked trips that the KCATA reported, 12,409,231 total riders and 40,784 average weekday ridership, to FTA for 2019[9]. Using this calculation, KCATA's annualization factor is 304.26, and total ridership for the northland is around 804,390, or about 6.2% of the total ridership in 2019 of the KCATA.

Fast and Frequent Service

There are two transit services considered to be 'Fast and Frequent', the RideKC Streetcar and the RideKC MAX bus services. Both have service frequencies of at least every 15 minutes and longer hours of operations. Frequency reduces waiting and makes connections easier. The fast and frequent services function as the 'spine' of the transit system, connecting key corridors and activity centers together and are supported by 'supporting' services such as local bus service, flex service, and others. The future fast and frequent routes are shown in **Figure 52**.

[8] "RideKC Maps and Schedules", RideKC, last modified October 24, 2021, https://ridekc.org/routes.
[9] "Kansas City Area Transportation Authority", FTA Transit Agency Profiles, accessed August 29, 2022, https://www.transit.dot.gov/sites/fta.dot.gov/files/transit_agency_profile_doc/2019/70005.pdf

Figure 52: Future Fast Frequent Services



Source: Connected KC 2050, North Oak Corridor Study

RideKC Streetcar

The existing 2.2-mile RideKC Streetcar line operates in mixed-traffic from the River Market through downtown Kansas City to Union Station. The RideKC Streetcar has had over six million trips since its opening in 2016. A very small portion of the northernmost streetcar network, part of the loop that runs through the River Market area, is within the study area as shown in **Figure 52**. KCSA reported over 1 million passenger trips in 2021[10]. This is a substantial increase from 2020 when the total ridership was 782,556. KCSA increased operating hours and service as the demand for ridership increased. This was also in response to the increase in activity and the workforce returning downtown.

There are currently two RideKC Streetcar extensions being implemented: a south extension from Union Station to the University of Missouri, Kansas City (UMKC), and a short Riverfront extension linking the River Market and the Berkley Riverfront area. In addition to these two extensions, there are two planning studies underway to evaluate the feasibility for future extensions: an East-West Study evaluating connections between the Kansas Medical Center and the Truman Sports Complex and a north extension across the Missouri River into North Kansas City. The KCSA is currently working with the KCATA and the City of North Kansas City to refresh the 2014 NorthRail study that evaluated the feasibility of a north extension of the RideKC Streetcar across the Missouri River. The current NorthRail Study is evaluating river crossing options (with a focus on the Heart of America Bridge), preferred alignment (Burlington vs. Swift, shown on **Figure 52** as dotted lines), and stop locations including a logical northern terminus around 32nd Avenue. The study also includes a financial analysis of capital and operating costs, funding sources, and possible federal grant opportunities. The objective is to evaluate overall feasibility and reach consensus on a locally preferred alternative based on community input. This study is estimated to be complete by the end of 2022. This NorthRail extension is expected to support major elements of North Kansas City's Master Plan and provide enhanced, fast and frequent, multimodal connectivity across the Missouri River.

Fast and Frequent Bus Service

There are currently three fast and frequent routes operating within the Kansas City region: Main MAX (of which a small portion of its loop around the River Market lies within the study area, seen in **Figure 52**), Troost MAX, and the Prospect MAX. MAX service incorporates features of Bus Rapid Transit (BRT) into its system and has been in operation since 2005[6]. KCATA reported approximately 1.1 million riders using these MAX routes in 2019, about 8.9% of their total ridership that year[11]. There are plans for a future network of fast and frequent routes identified in MARC Smart Moves 3.0 (RideKC's long-term transit and mobility plan for the region). In 2019, KCATA partnered with the cities of Kansas City, North Kansas City, and

[10] "KCSA, *2019 KCSA Daily Ridership*, 2019, distributed by KCSA.
[11] "Kansas City Area Transportation Authority", FTA Transit Agency Profiles, accessed August 29, 2022, https://www.transit.dot.gov/sites/fta.dot.gov/files/transit_agency_profile_doc/2019/70005.pdf

Gladstone on the North Oak Transit Improvement Study to evaluate the feasibility of a fast and frequent route along the Burlington/North Oak corridor. The study concluded that a fast and frequent route along this corridor is warranted. The preferred fast and frequent route would run from Crown Center in Kansas City north to 3rd and Grand in the River Market then cross the Missouri River and proceed along Burlington/North Oak to Barry Road. The route will then switch to local service along Barry Road to Boardwalk Square. The service plan for the recommended enhanced North Oak service will align with KCATA's stated guidelines for fast and frequent service. The recommended service would operate from 4:45 a.m. – 12:00 a.m. Monday through Friday (weekdays), 6:15 a.m. – 11:45 p.m. on Saturdays, and 8:15 a.m. – 11:45 p.m. on Sundays. Service levels would be approximately twice the current service level on Route 201 with 15-minute frequency during the weekday and 30-minute service on evenings and weekends. In addition to more frequent service, the service would include branded vehicles and highly visible stations (similar to MAX service). Two types of stations are recommended: enhanced stations with a high level of passenger amenities and improved stops (at lower volume locations) with basic amenities. The preferred route is shown in **Figure 52** as the bright pink line running north/south through the middle of the study area.

Flex

Flex services in the network pick up and drop off passengers upon request within their service area. Three flex zones exist fully or partially within the study area:

- 297 Tiffany Springs
- 298 North KC
- 299 Gladstone-Antioch

In addition, several on-demand transit options exist such as RideKC Freedom (the region's ADA paratransit service), and RideKC Microtransit, to serve riders with more limited mobility options or to provide service in limited-service areas[6].

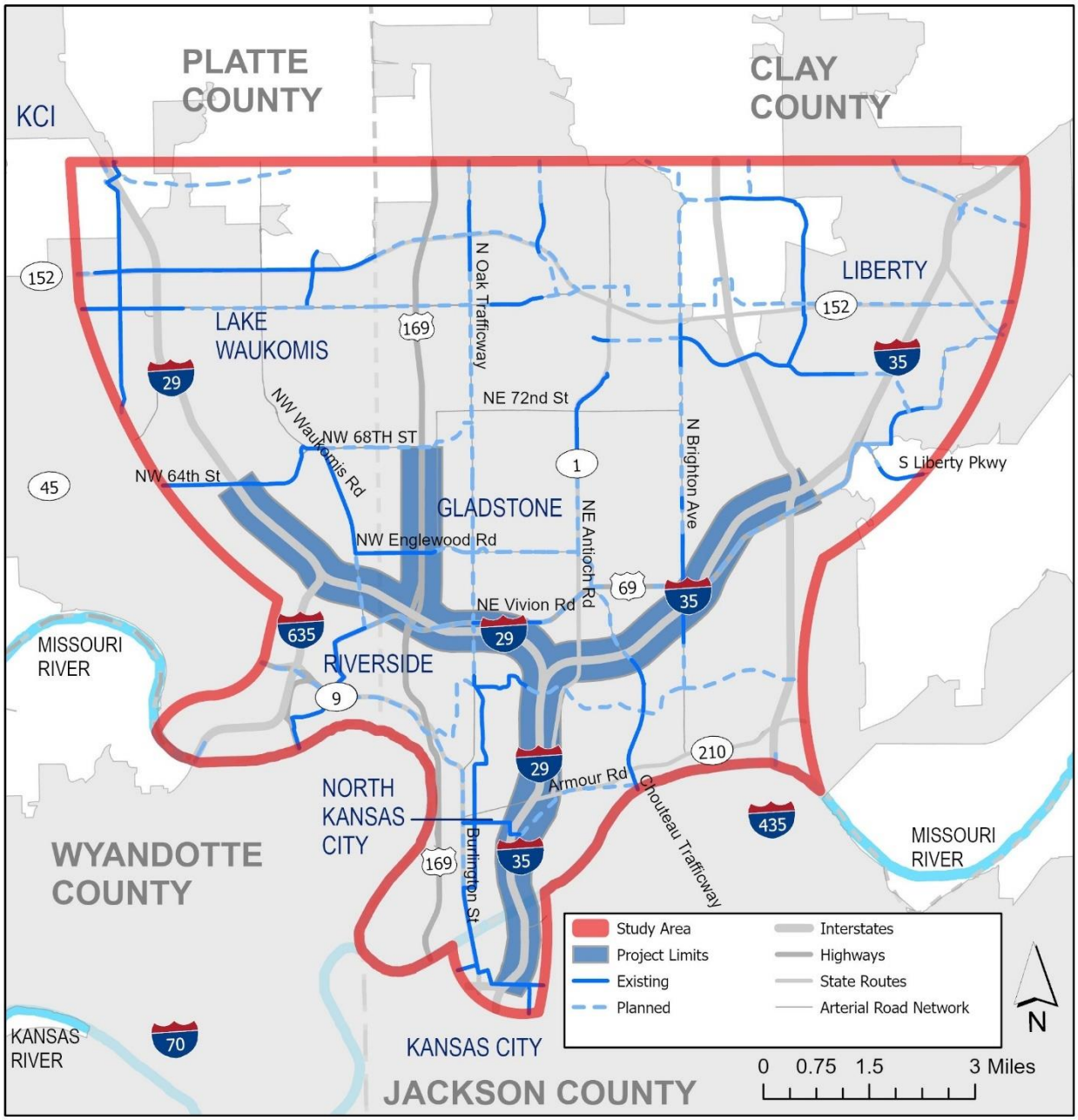
Bike/Ped/Micro Mobility

Active mobility is increasingly becoming a popular option for resident's transportation needs. E-scooters and e-bikes are examples that have been introduced in portions of the study area, with scooters becoming a mainstay in the region. E-bikes are gaining popularity due to decreasing costs and helping with getting around the varied topography in the region. North Kansas City is implementing complete street improvements that include separated bicycle facilities (also referred to as cycle tracks) and enhanced pedestrian crossings along Armour Road and Burlington Street. The improvements along Burlington will connect to the North Oak corridor complete street improvements in Kansas City north of 32nd Street.

The local bike system in the region, RideKC Bike, is a partnership between the KCATA, BikeWalkKC, and Drop Mobility[12]. This system provides an integration of public transit and shared use mobility featuring a mix of traditional bikes and e-bikes. **Figure 53** shows the existing bike network and the planned future network, while **Figure 54** shows what type of bike facilities make up the existing system. Current and upcoming trail and bike route improvements that are identified as Local Public Agency (LPA) projects are listed in **Table 27** under *Section 4.4.2: Current and Upcoming Projects*.

[12] "About", RideKC Bike, accessed July 12, 2022, http://ridekcbike.com/about/.

Figure 53: Existing and Planned Bike Networks



Source: Connected KC 2050

RideKC Bike Kiosks

RideKC's bike kiosks offer a 24/7 public bike sharing system as part of RideKC Bike, offering both classic bikes and e-bikes, to ensure that all Kansas City residents have access to a healthy form of mobility. There are four locations within the study area, all but one within the City of North Kansas City:

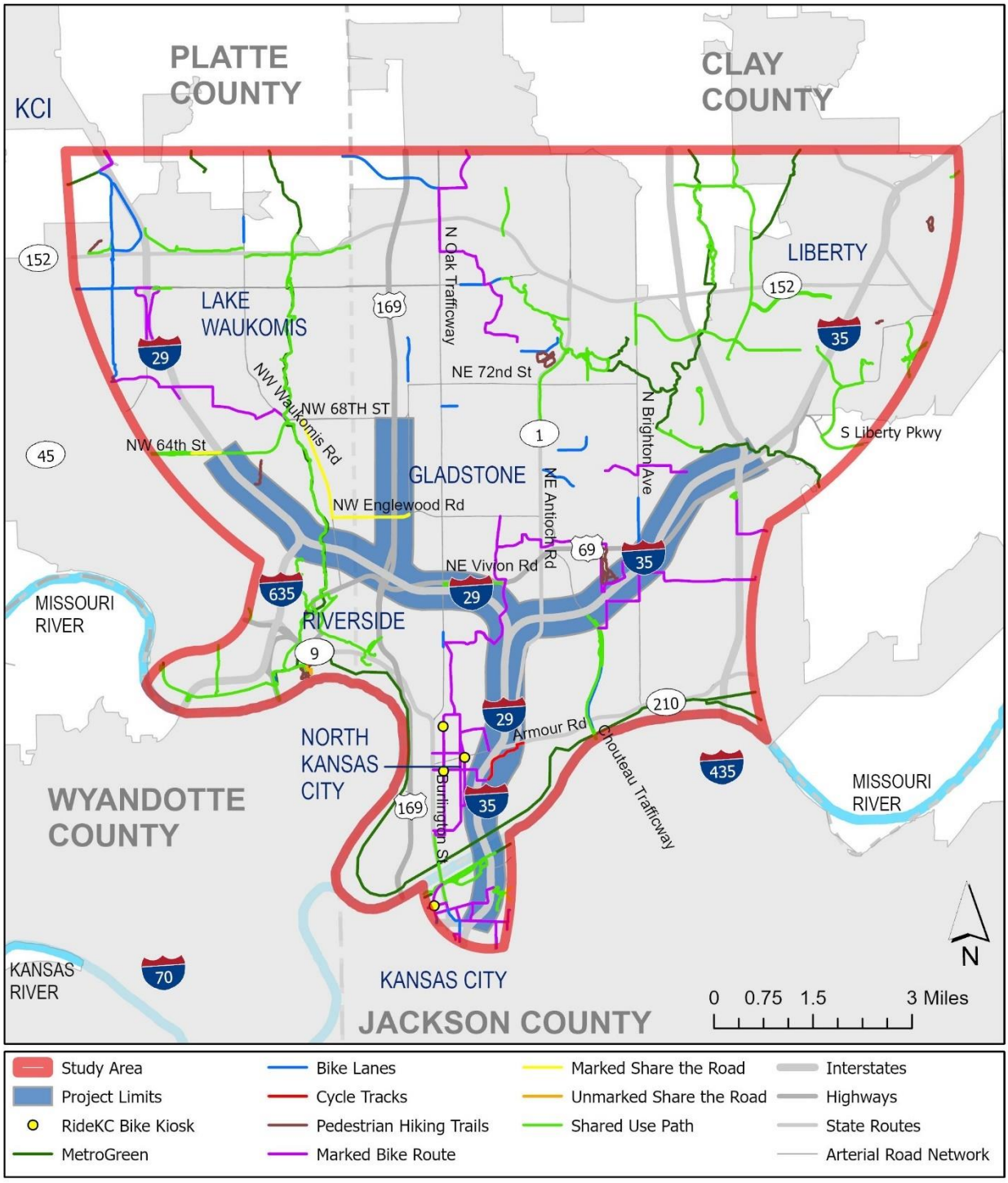
- 29th & Swift
- 18th & Swift
- Armour & Iron
- 3rd & Grand

Local Bikeways and Trails[13]

A multitude of trails and paths exist for pedestrians and bicyclists to use to get around the northland, shown in **Figure 54**. The portions of the network within the study area include numerous types of trails and paths, listed and described in **Table 23**.

[13] "Local Bikeways and Trails (Existing)", accessed July 12, 2022, https://connectedkc.org/plan-documents/.

Figure 54: Existing Bike and Trail Networks



Source: Connected KC 2050

Table 23: Trails Within Study Area

Trail Type	Description	# Of Miles Within Study Area
Cycle Tracks	Two-Way on-street paths for bicycles physically separated from vehicle traffic.	0.9
Bike Lanes	Striped lanes in the roadway for use by bicycles. May also be used by electric scooters.	12.6
Marked Bike Routes	Streets with posted signs indicating a preferred route for bicycles.	34
Marked Share the Road	Street markings depicting a bicycle with arrows ("Sharrows") or signage reminding motorists to share the road with bicycles.	2.9
Unmarked Share the Road	Roadways that do not include specific bicycle-related signage yet are open to both bicycle and motorist travel.	0.3
Pedestrian Hiking Trail	A trail within a park area for the exclusive use of runners and walkers. May be paved, or in an unpaved natural state.	5.9
Shared Use Path	A multipurpose trail intended exclusively for non-motorized users, including pedestrians and cyclists.	55.7
Mountain Bike Trails	An unpaved trail for the exclusive use of mountain biking	0.0
Equestrian Trails	A trail designed for horseback riding use that may also allow hiking and mountain biking.	0.0

Source: Connected KC 2050

MetroGreen Trails[14]

MetroGreen is a system of interconnected public and private natural areas, parks, greenways, and trails linking communities throughout the Kansas City region with a total of 324 of the envisioned 1,144 miles of path currently completed. The MetroGreen Action Plan provides a vision for the continued development of this network, which can be seen in **Figure 54**. Portions of the MetroGreen system within the study area are quantified in **Table 24** below:

[14] "MetroGreen", Connected KC 2050, accessed July 12, 2022, https://gis2.marc2.org/arcgis/rest/services/Transportation/ConnectedKC2050/MapServer/2.

Table 24: Miles in Study Area per Project Phase

Phase	# Of Miles Within Study Area
Existing	16.8
Planned - Phase 1	1.1
Planned - Phase 3	21.9

Source: Connected KC 2050.

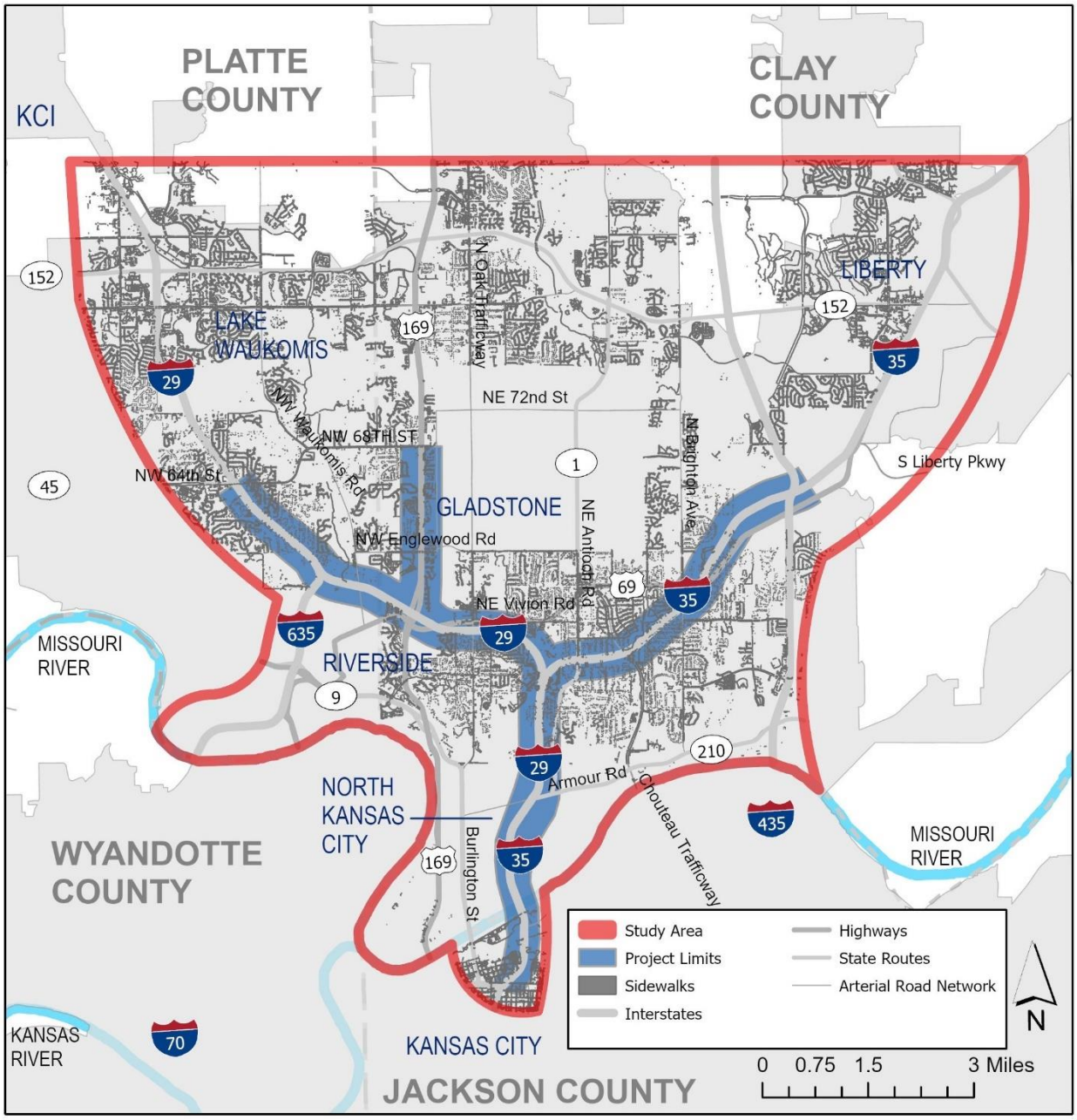
Sidewalk System

Sidewalks are the major infrastructure component for pedestrian access to the region, and thus poor sidewalk coverage is a major barrier for pedestrian activity. In addition, it causes problems in pedestrian access to transit services, or the 'first/last mile' problem. This can be seen in the North Oak Transit Study which noted that over 90% of those that rode the North Oak bus route accessed it by walking to a stop[15], showing that pedestrian access is important for transit use. Unfortunately, a good portion of the neighborhoods surrounding the North Oak corridor lack continuous sidewalks. Fortunately, there have been recent investments along the North Oak corridor in Kansas City from the North Kansas City limits at 32nd Street to N. Indianola Avenue with new sidewalks, bicycle facilities and new bus stops. These improvements connect to the recently expanded Briarcliff Nature Trail.

The sidewalk system within the study area, shown in **Figure 55**, is filled with gaps and does not fully cover the pedestrian network (Note: that sidewalk data for Gladstone is not available). Based on GIS data from KCMO, **Table 25** shows roads that intersect with I-29, I-35 and U.S. 169 and how many, if any, sidewalks that exist from 0 being none to 2 representing sidewalks present on both sides of the road crossing the corridor. Note that even though some of these roads may have sidewalks, gaps are still present in many of these networks. For example, Guinotte Avenue may have sidewalks on both sides of the street, but they are not continuous and have many gaps in between sections.

[15] "Connecting the Northland", North Oak Corridor Transit Study, accessed August 30, 2022, https://ridekc.org/assets/uploads/documents/NorthOak_Report_20191018_Final.pdf

Figure 55: Sidewalks



Source: Connected KC 2050; KCMO

The sidewalk system within the study area, shown in **Figure 55**, is filled with gaps and does not fully cover the pedestrian network (Note that sidewalk data for Gladstone is not available). Based on GIS data from KCMO, **Table 25** shows roads that intersect with I-29, I-35 and U.S. 169 and how many, if any, sidewalks that exist from 0 being none to 2 representing sidewalks present on both sides of the road crossing the corridor. Note that even though some of these roads may have sidewalks, gaps are still present in many of these networks. For example, Guinotte Avenue may have sidewalks on both sides of the street, but they are not continuous

and have many gaps in between sections. Another example is the sidewalks at the bridge on N Brighton Avenue do not extend within MoDOT right of way from ramp to ramp.

Table 25: Existing Sidewalks on Streets Crossing I-29, I-35 and U.S. 169 within the Project Limits

Road Name	# Of Sidewalks
I-29 Corridor	
NW 64th St.	1
NW Roanridge Rd./NW 56th St.	2[a]
NW Waukomis Dr.	2[b]
N Oak Trfwy.	0
NE Davidson Rd.	0
I-35 Corridor	
N Bryant St.	2[c]
NE Poe St.	2
NE Vivion Rd.	0
N Brighton Ave.	2
N Chouteau Pkwy.	1
NE Antioch Rd./Route 1	0[d]
U.S. 169 Corridor	
NW 68th St.	2
NW Englewood Rd.	2
I-29/35 Corridor	
NE Parvin Rd.	0
Route 210 (Armour Road)	2
E 16th Ave.	0
Bedford Ave.	0
Levee Rd.	0
Berkley Pkwy.	0
Guinotte Ave.	2
Dora St.	0
Independence Ave.	2

Source: Connected KC 2050, 2022; KCMO, 2022.

a - Active bridge replacement project added sidewalk with connectivity to two bus stops.

b - Active bridge replacement project includes sidewalk/shared use path at interchange.

c - Bryant Bridge has sidewalks planned on both sides. The job is in scoping and the replacement would replace them.

d - KCMO job programmed that should add sidewalk on south side.

Connectivity across the highways and expressways is another challenge in the northland. **Table 25** shows that of the 22 roads that intersect with the highways/expressways of the project area, 12 (55%) have at least one sidewalk connections that cross over or under the highways. Highways and expressways have traditionally been barriers to pedestrian and bicycle access, so it is imperative that these connections exist for pedestrians and cyclists to get to safely cross under or over these facilities and to wherever they need to go.

Planned Transit Network

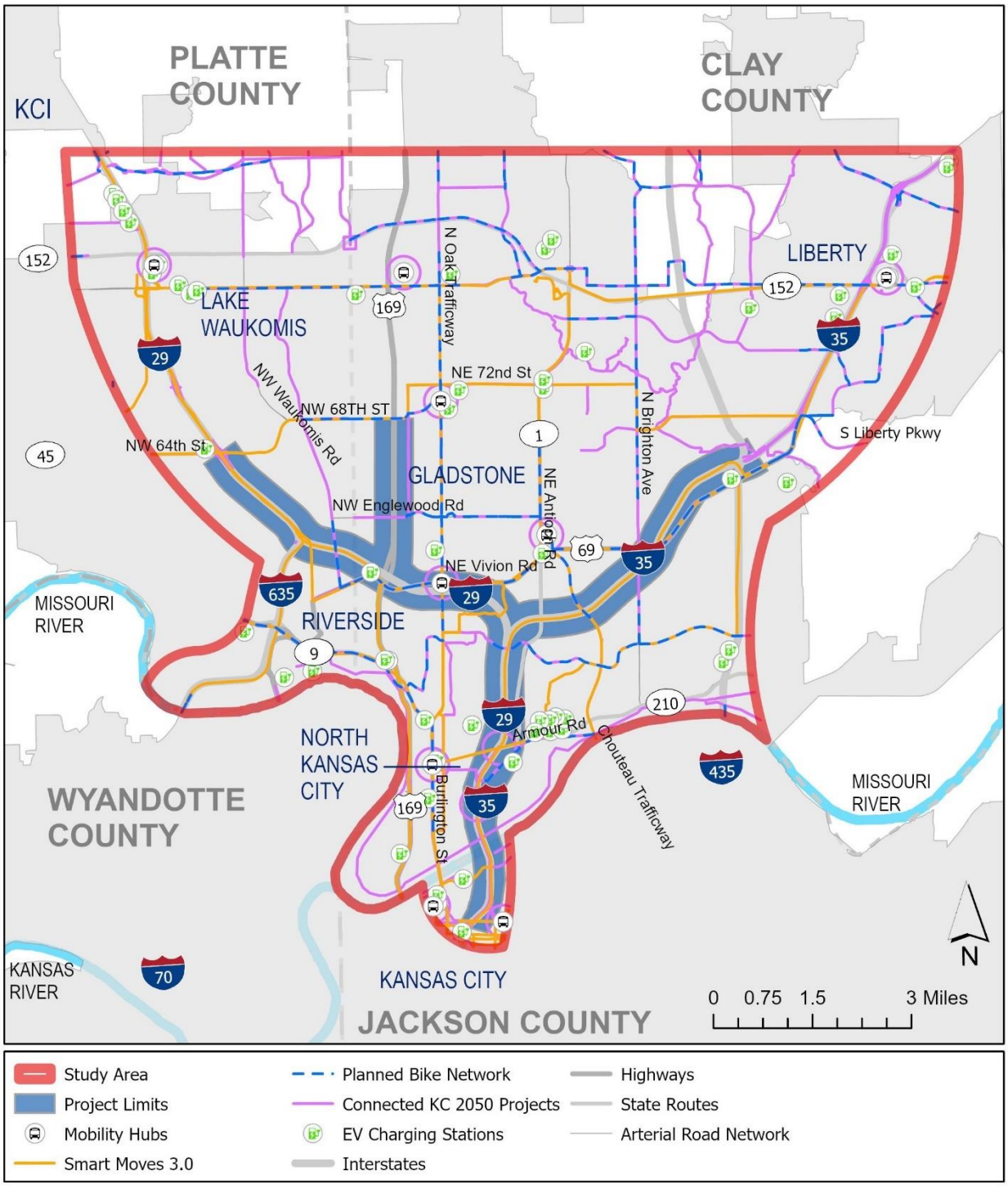
As part of the Connected KC 2050 plan, there are several components in place to advance public and active transit in the northland, seen in **Figure 56**. These range from sidewalk and bike lane implementation projects to complete street designs, as well as the implementation of mobility hubs and electric vehicle charging stations.

Covered in the Smart Moves 3.0 plan RideKC plans to implement several of these mobility hubs throughout the region[16]. These mobility hubs would be centered in community hot spots where a variety of transit services can come together, where you could potentially switch from bike to bus, bus to streetcar, rent a car or bike, hail a ride, meet a vanpool, or charge an electric vehicle to name a few options. There are nine of these hubs, shown in **Figure 56**, that will fall within the boundaries of the study area, one of which falls within the project limits (marked with a *):

- 3rd and Grand
- Antioch Center
- Boardwalk Square
- Gladstone
- KCU
- Liberty/Connister Commuter Lot
- Metro North
- North Kansas City
- North Oak and Vivion*

[16] "RideKC Smart Moves", KC Smart Moves, accessed July 13, 2022, http://www.kcsmartmoves.org/.

Figure 56: Planned Transit and Bike/Ped Network



Source: Connected KC 2050.

Aviation

The northland is home to the Kansas City International Airport (KCI) and the Charles B. Wheeler Downtown Airport (Downtown Airport). Both facilities are managed by the KCMO Aviation Department. The Kansas City Airport System is an Enterprise Fund Department of KCMO and is supported wholly by airport user charges. KCI generates a significant amount of traffic for commercial flight operations in terms of arrivals and departures as well as air cargo.

Additionally, there is a significant amount of development on the I-29 corridor south of KCI. KCI spans more than 10,000 acres, three terminals, and three runways that can accommodate up to 139 aircraft operations per hour. The KCMO Aviation Department reports that 7,667,004 passengers traveled through KCI in 2021, up 70.8 percent from 2020 and down 34.9 percent from 2019 before the pandemic. Air cargo tonnages, which consist of both freight and mail transported by air, for all carriers at KCI were up 36.2 percent in December with a total of 26.1 million pounds handled. For 2021, 245.8 million pounds of air cargo were handled, up 24.0 percent. Air freight handled at KCI during December amounted to 25.9 million pounds, up 36.0 percent year-over-year. For all of 2021, air freight was up 24.7 percent with a total of 243.7 million pounds handled. Air mail for December was up 68.9 percent from December 2020 with 252,621 pounds handled. Air mail for 2021 was down 26.5 percent from 2020 with 2.1 million pounds handled. A new single terminal is currently under construction and will open in the Spring of 2023. The new single terminal KCI will have 39 gates and will include a 6,300-spot parking garage, enhanced food and beverage options and amenities.

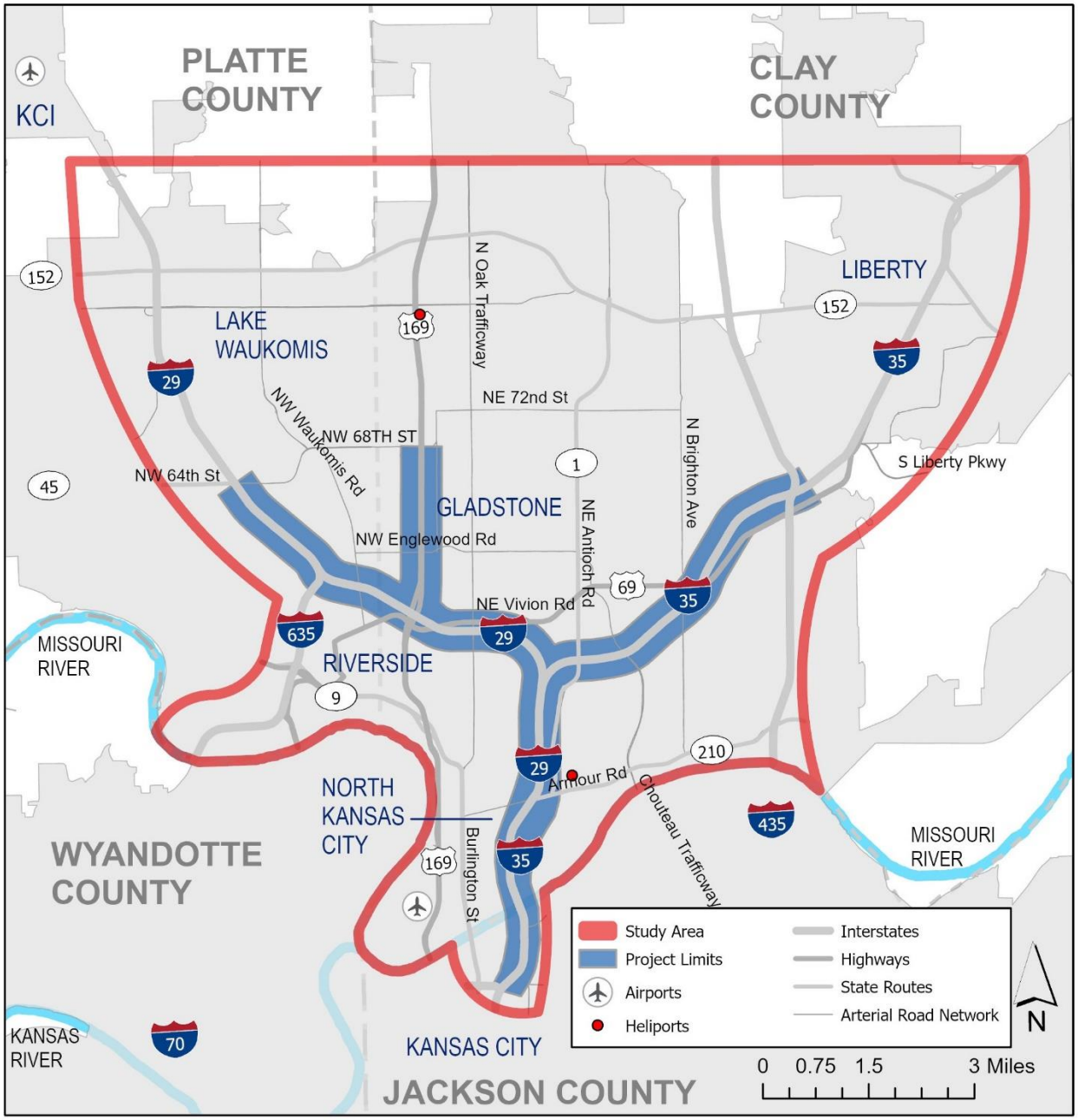
The Downtown Airport spans approximately 695 acres and is located just across the Missouri River from KCMO's downtown core and serves 700 flights per day. Originally home to commercial aviation, the airport now attracts many corporate, charter and recreational flyers. The airport also serves a critical health need as it is the primary location where organ transports are handled in Kansas City. It is also where many critical care transports, such as those that need transported via helicopter from airport to Children's Mercy (neonatal) after they are flown in by plane. Fixed-base operators service nearly 300 based aircraft, as well as itinerant and charter aircraft, offering fuel, full maintenance, aircraft rentals, sales, and flight training.

There is one airport located within the study area, the Charles B. Wheeler Downtown Airport, in addition to two heliports, shown in **Figure 57**. There are many helipads in the study area that are now shown.

Charles B. Wheeler Downtown (MKC)[17] serves as the primary alternative to the Kansas City International Airport (MCI) for larger general aviation and business jets. The airport is a city-owned, public-use airport serving Kansas City, Missouri and can accommodate up to 700 aircraft per day. The airport is open 24 hours a day.

[17] "Charles B. Wheeler Downtown Airport", flymkc, accessed June 23, 2022, https://www.flymkc.com/.

Figure 57: Regional Aviation Facilities



Source: Connected KC 2050

Future numbers of aircraft based at MKC are expected to increase by 11% to 237 aircraft, with an expected annual operations increase of 22% to 85,600 flights by 2035[18].
The two heliports belong to the North Patrol Division Station and the North Kansas City Hospital.

Rail

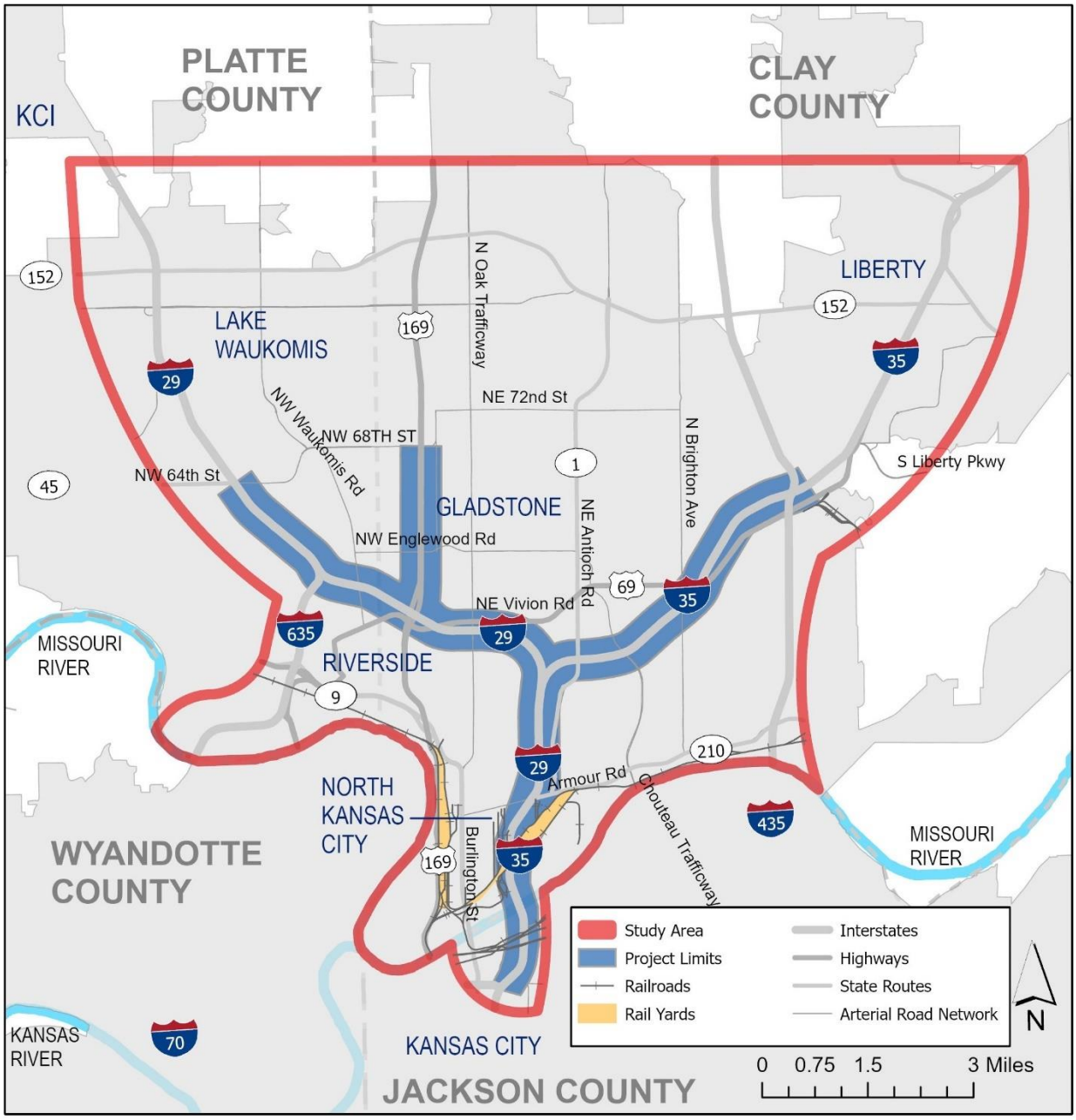
While the Kansas City region is connected to passenger rail service, there are no stations or passenger rail located within the study area. Instead, there exists a portion of Kansas City's freight rail network.

There are approximately 36.1 miles of freight rail tracks in the area as seen in **Figure 58**[19]. These rails are owned by two railroad companies along with a privately owned company:

- BNSF
- NS
- National Starch

[18] "Charles B Wheeler Downtown Airport", MARC, accessed July 19, 2022, https://www.marc2.org/assets/transportation/RASP/DowntownCharlesBWheeler/MARC_SystemPlanSummary_MKC.pdf
[19] "Railroads", Connected KC 2050, accessed June 22, 2022, https://connectedkc.org/plan-documents/.

Figure 58: Rail Network



Source: Connected KC 2050

Rail Yards

In addition to the freight rail tracks, there are two freight rail yards shown in **Figure 58** within the study area[20]:

- North Kansas City Yard
- Murray Yard

Freight

Historically, much of the growth of Kansas City has come from its position as a major freight hub in the Midwest. Kansas City ranks as the second largest rail center in the nation and is among the top five trucking centers in the nation. Additionally, KCI is one of the most important air-freight hubs in the immediate region.

In 2019 the Kansas City area handled almost 214 million tons of freight cargo from varying modes. By 2045, this is expected to increase to nearly 300 million tons of cargo. Top commodities coming into the area included motorized vehicles, electronics, mixed freight, foodstuffs, and machinery. Top commodities leaving the area included machinery, pharmaceuticals, chemical products, electronics, and foodstuffs[21].

According to the Connected KC 2050 Plan's Freight section, there are 5 key trends in freight transportation moving into the future[22]:

1. Increasing demand from e-markets results in the need for smaller warehouses closer to dense population centers.
2. Increasing technological advances in the sharing economy, internet and data, on-demand logistics (like 3D printing), autonomous equipment and vehicles, and alternative fuels for freight transportation fleets.
3. Degrading infrastructure quality across the nation.
4. Changes in safety regulations.
5. Continued globalization of economy.

Figure 59 shows the freight activity areas, bottlenecks, and freight related companies in the study area.

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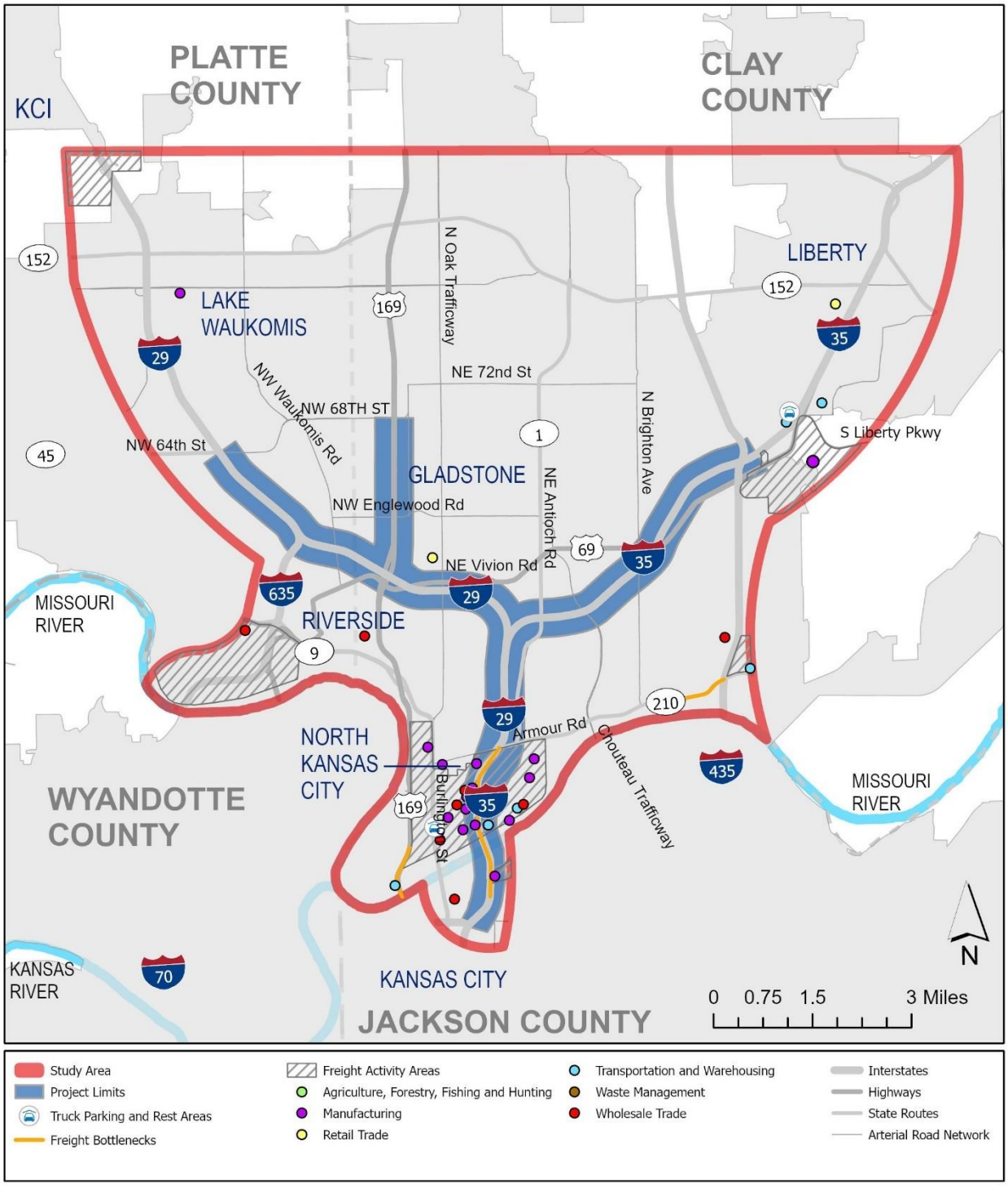
[20] "Rail Yards", Connected KC 2050, accessed June 22, 2022, https://connectedkc.org/plan-documents/.
[21] "Freight", Connected KC 2050, accessed August 9, 2022, https://connectedkc.org/wp-content/uploads/2020/04/Freight.pdf
[22] "Freight", Connected KC 2050, accessed August 9, 2022, https://connectedkc.org/wp-content/uploads/2020/04/Freight.pdf

Figure 59: Freight Related Transportation



Source: Connected KC 2050

Freight Activity Areas

Freight activity areas are based primarily on their land use, acreage, and some small adjustments then made based on employment. These areas must meet one of two requirements to be recognized as a freight activity area[23]:

- Have at least 250 acres of freight related land use, including proposed vacant / agricultural-related land use; and
- If there is less than 250 acres, then the area would be required to have over 3,000 manufacturing jobs.

According to the MARC freight map, the study area has six freight activity areas (note that some are only partially within the study area, marked by a *):

- North Kansas City
- Executive Park*
- Horizons*
- Claycomo Ford* – (Recently added 1,100 jobs to assist in electric vehicle production.)
- Hunt Midwest*
- KCI / Air Cargo & Industrial*

Freight Bottlenecks

According to FHWA, a freight bottleneck is defined as "a period of five minutes or more when a segment experienced reported speeds of below 60% of the reference speed (the 85th percentile of all observed speeds for all time periods)"[24]. The study area has three freight bottlenecks according to the MARC freight map:

- U.S. 169 S north of I-70
- I-29/I-35 between Route 210 (Armour Road) and Independence Avenue
- M-210 west of I-435

[23] "Freight Activity Area", MARC, accessed July 13, 2022, https://gis2.marc2.org/arcgis/rest/services/Transportation/FreightMap/MapServer/16.
[24] "Freight Bottlenecks", Connected KC 2050, accessed July 13, 2022, https://gis2.marc2.org/arcgis/rest/services/Transportation/ConnectedKC2050/MapServer/24.

Freight Related Companies

Many companies and industries within the study area deal with freight. According to the data within Connected KC 2050, there were 33 industries/companies among six designated industry fields within the study area[25].

Manufacturing:

- Bunzl Processor Div.
- Claycomo Ford Plant
- Hershey Co.
- Ingredion Inc.
- International Paper Co.
- KCI Inc.
- McConnel & Assoc.
- Midwest Apparel Group Inc.
- Pioneer Container Corp.
- Pizza Blends Inc.
- Polynt Composites USA Inc. (Two locations)

Regal Plastic Supply Co.

- Tnemec Co. Inc.
- Waldinger Corp.
- Walker Food Products Co.

Retail Trade:

- Sam's Club (Two locations)

Transportation and Warehousing:

- Consolidated Transfer Co. Inc.
- Liquid Transport
- R+L Carriers
- Signature Flight Support
- Terminal Consolidation
- Wagner Industries

Wholesale Trade:

- Brand Energy & Infrastructure
- Faurecia Automotive
- Ferrellgas

[25] "Freight Related Companies", Connected KC 2050, accessed July 13, 2022, https://connectedkc.org/plan-documents/.

- Gavilon Grain LLC
- Joseph T & Son Inc.
- Laufer Group Intl.
- Major Brands Inc.
- Midwest Medical Resources Inc.
- SYGMA Network Inc.

Truck Parking / Rest Areas

Truck parking and rest areas offer amenities and rest to freight drivers moving through the region. It was mentioned in the Connected KC 2050 plan that one of the challenges for future expected amounts of truck freight in the region was truck parking. There are two of these facilities within the study area, shown in **Figure 59**, based on data from the MARC freight map:

- North Kansas City
- Pleasant Valley

4.4 Engineering Conditions

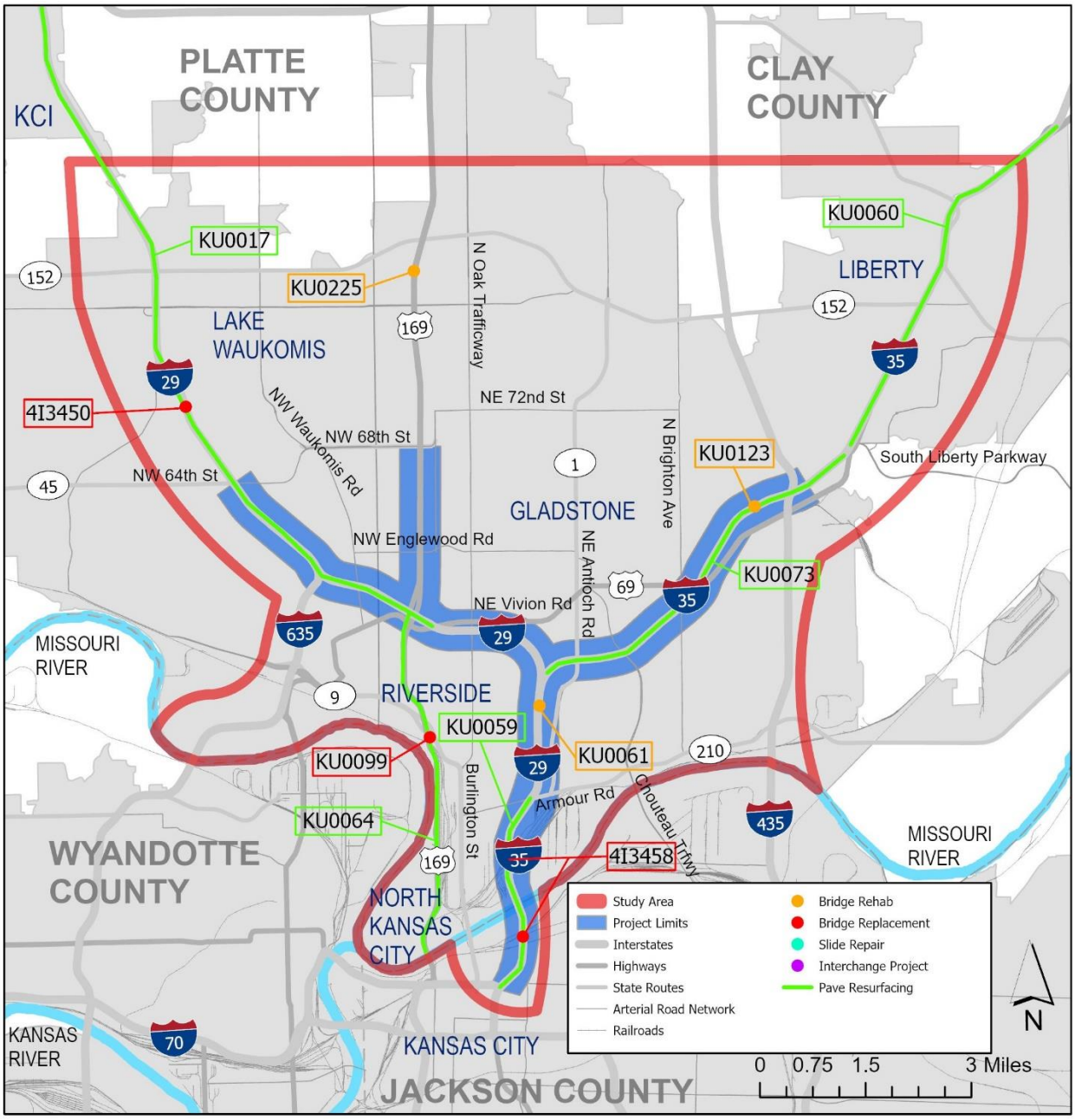
4.4.1 Methodology

In order to identify aging and substandard infrastructure within the identified project area, information was collected using Google Earth, MoDOT's Automatic Road Analyzer (ARAN) Viewer, Statewide Transportation Improvement Program (STIP) projects from 2023 to 2027, Local Public Agency (LPA) projects from 2023 to 2024, and MoDOT Bridge Inventory data. Existing conditions and deficiencies identified through the analysis are not formal engineering assessments and will require further engineering inspection and analysis.

4.4.2 Current and Upcoming Projects

Recent projects and ones posting in the near future were analyzed using the Missouri 2023 - 2027 STIP and the 2023 - 2024 LPA project lists provided by MoDOT. Roadway, bridge, and intersection improvement projects in the study area were catalogued and mapped in **Figure 60,** refer to **Table 26** and **Table 27**Error! Reference source not found. for further information about the projects shown.

Figure 60: MoDOT STIP (2023-2027) and Major LPA (2023-2024) Projects



Source: MoDOT 2021-2027 STIP Projects and 2014-2024 LPA Projects, 2022

Table 26: MoDOT STIP Projects 2023-2027 within the Study Area

Project Number	County	Route	Description / Location	Letting Date
KU0017	Platte	I-29 S	Pavement resurfacing from 0.8 mile south of Mexico Avenue to Rte. 69.	8/1/2024
KU0073	Clay	I-35 N	Pavement and shoulder resurfacing from bridge over Pleasant Valley Rd. to the I-29/I-35 split. Includes ramps at NE Antioch Road, Chouteau Trafficway, Winn Road and Rte. 69.	9/1/2024
KU0059	Clay	I-29 S	Pavement resurfacing from 0.2 mile north of NE Parvin Rd. to Rte. 210.	11/1/2024
KU0060	Clay	I-35 S	Pavement resurfacing from 1.6 miles north of 128th Street to Pleasant Valley Rd.	10/1/2024
KU0064	Clay	U.S. 169 S	Pavement resurfacing from I-29 to the Buck O'Neil Bridge.	10/1/2025
KU0225	Clay	Ramp I-29S to I-35N N	Bridge rehabilitation over I-35, 0.2 mile south of NE Davidson Rd. and 0.5 mile west of Rte. 1.	11/1/2026
KU0123	Clay	CST Bryant St. N	Bridge rehabilitation over I-35, 0.3 mile east of Poe Street and 0.5 mile west of I-435.	1/1/2027
KU0061	Clay	I-29 S	Bridge replacement over NE Parvin Rd. 0.7 mile south of Rte. 1 and 1.5 miles north of Rte. 210.	2/1/2027
4I3450	Platte	I-29 N	Bridge replacement over NW 72nd Street.	1/20/2023
4I3458	Clay	I-29 S	Bridge replacement over Guinotte Avenue 0.4 mile south of Missouri River and 0.7 mile north of Rte. 24 and over Bedford Ave. 1 mile south of Rte. 210 and 0.5 mile north of Missouri River.	5/1/2028
KU0099	Clay	U.S. 169 N	NB Bridge replacement over BNSF Railway 2.7 miles north of Harlem Road and 0.6 mile south of Rte. 9.	10/1/2025

Source: MoDOT 2021-2027 STIP Projects, 2022

Other LPA projects such as improvements to minor-local roads, trail improvements and bike-routes within the study area were listed in **Table 27**.

Table 27: Other LPA Projects 2023-2024 within the Study Area

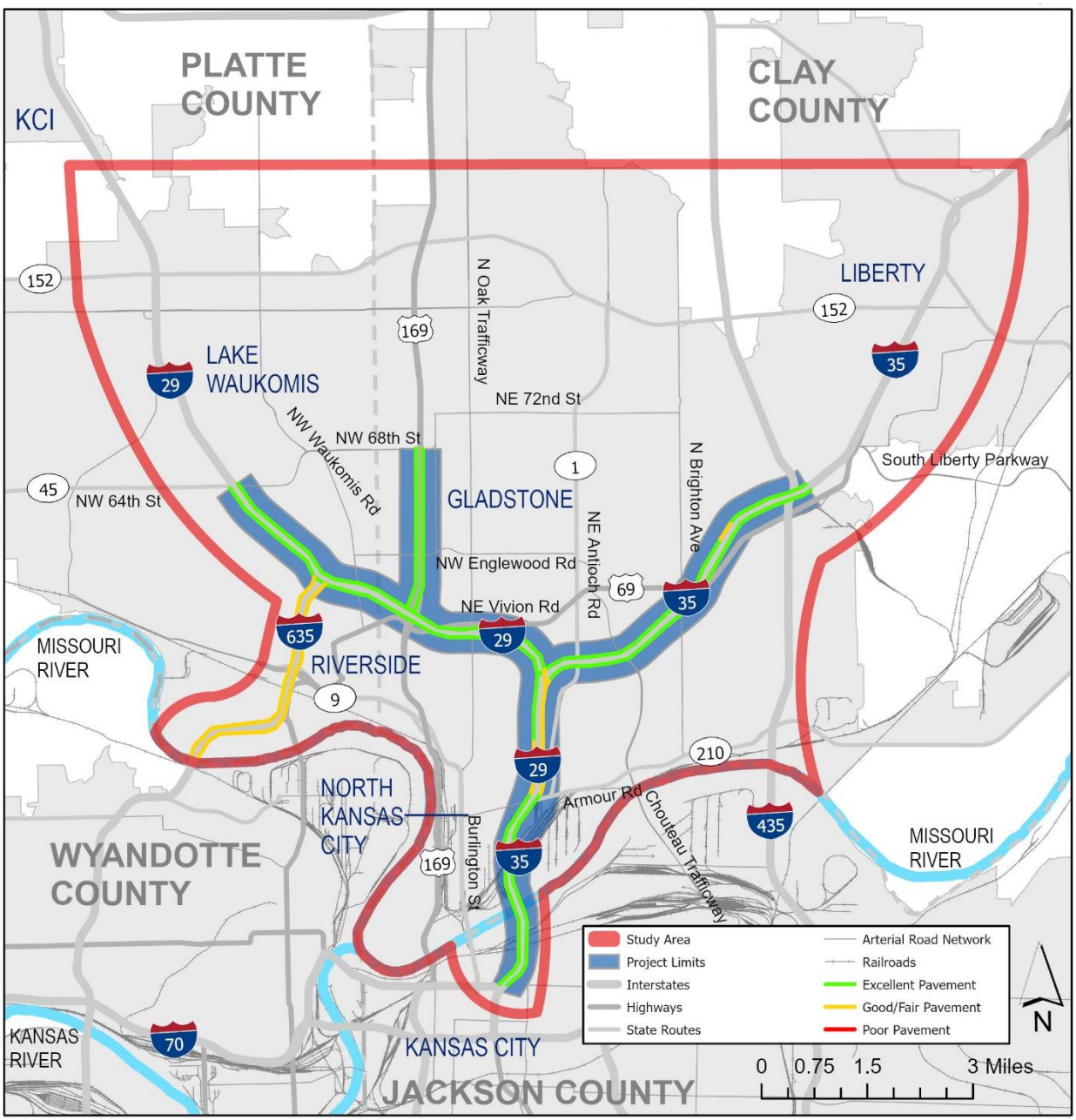
Federal Aid Project Number	County	Project Description/Location	Project Status	FFY
STBG- 3323(414)	Clay	Downtown Gladstone North Oak Complete Street	PE	2023
STBG-3392(407)	Clay	Traffic Signal at 291 and Blue Jay Drive	PE	2023
TAP-3323(415)	Clay	Vivion Road Trail Extension - From Mulberry Road to N. Belleview.	PE	2024
STBG-3302 (427)	Clay	Burlington Corridor Phase 3	PE	2024

Source: MoDOT 2014-2024 LPA Projects, 2022

4.4.3 Existing Pavement Conditions

The existing pavement conditions for I-29, I-35 and U.S. 169 were determined using MoDOT's Automatic Road Analyzer (ARAN). The information and analysis were summarized in **Figure 61**. MoDOT uses the Pavement Surface Evaluation and Rating (PASER) to evaluate the existing pavement conditions. PASER has a rating from 1 to 10, with 10 being excellent condition or new pavement, and 1 being failed or needs total reconstruction. In **Figure 61**, excellent pavement was considered for the sections with a PASER rating of 9-10, good/fair pavement was considered for the sections with a 6-8 rating, and poor pavement was considered for sections with a rating less than 6.

Figure 61: Existing Pavement Conditions Map



Source: MoDOT ARAN Viewer, 2022

4.4.4 Geometric Deficiencies

Geometric deficiencies were identified by using Google Earth, posted speed limits, field visits, and AASHTO's A *Policy on Geometric Design of Highways and Streets*, "Greenbook", 7th Edition, 2018. Substandard acceleration and deceleration lanes, insufficient gore spacing, deficiencies due to interchange geometry, and sight distance issues are listed in this section.

Shoulder Widths

Table 28 lists shoulder widths in each major corridor within the study area. Per AASHTO's *A Policy on Design Standards – Interstate System*, on interstates, outside shoulders less than 10' wide and inside shoulders less than 4' wide are considered narrow. On sections where interstates have three or more lanes, inside shoulders less than 10' wide are considered narrow as well.

Table 28: Shoulder Widths within the Study Area

Location	Right Shoulder Width	Left Shoulder Width
NB I-35		
Independence Ave. - The Paseo on gore	10	10
The Paseo on gore - Front St off gore	5	5
Front St. - Bedford Ave.	10	10
Bedford Ave. - E 14th Ave	5	5
E 14th Ave. - Armour Rd.	10	10
Armour Rd. - Parvin Interchange Median	10	12
Parvin Interchange Median - NB I-29 exit	10	6
NB I-29 exit - NE Antioch Rd. bridge	10	6
NE Antioch Rd. Bridge	6	4
Antioch on gore - N Brighton Ave.	10	2
N Brighton Ave. - NE Vivion Rd. ramp to I-35 SB	10	2
NE Vivion Rd. ramp to I-35 SB - NE Vivion Rd. Bridge	11	4
NE Vivion Rd. Bridge - Vivion on gore	10	12
Vivion on gore - MM 12.2	6	6
MM 12.2 - Exit 13	6	4
SB I-35		
End of Pleasant Valley Rd. Ramp to I-35 S - MM 13.6	8	6
MM 13.6 - MM 13.2	8	4
MM 13.2 - N Bryant St.	12	4
N Bryant St. - Poe St.	6	6
Poe St. - MM 11.6	6	6
MM 11.6 - Exit 11	6	6
Exit 11 – NE Vivion Rd. ramp to I-35 S	10	0
NE Vivion Rd. ramp to I-35 S - Chouteau Trfwy Ramp to I-35 S	10	2
Chouteau Trfwy Ramp to I-35 S - NE Antioch Rd.	8	2
NE Antioch Rd. - I-29/I-35 Merge	12	8
I-29/I-35 Merge - NE Parvin Rd.	12	6
NE Parvin Rd. - end of NE Parvin Rd. Ramp to I-35 S	10	6
end of NE Parvin Rd. Ramp to I-35 S - MM 7.0	10	15
MM 7.0 - Exit 6	10	15
Exit 6 - Armour Rd. ramp to I-35 S	10	15
Armour Rd. ramp to I-35 S - MM 6.2	7	10
MM 6.2 - Linn St. ramp to I-35 S	10	10

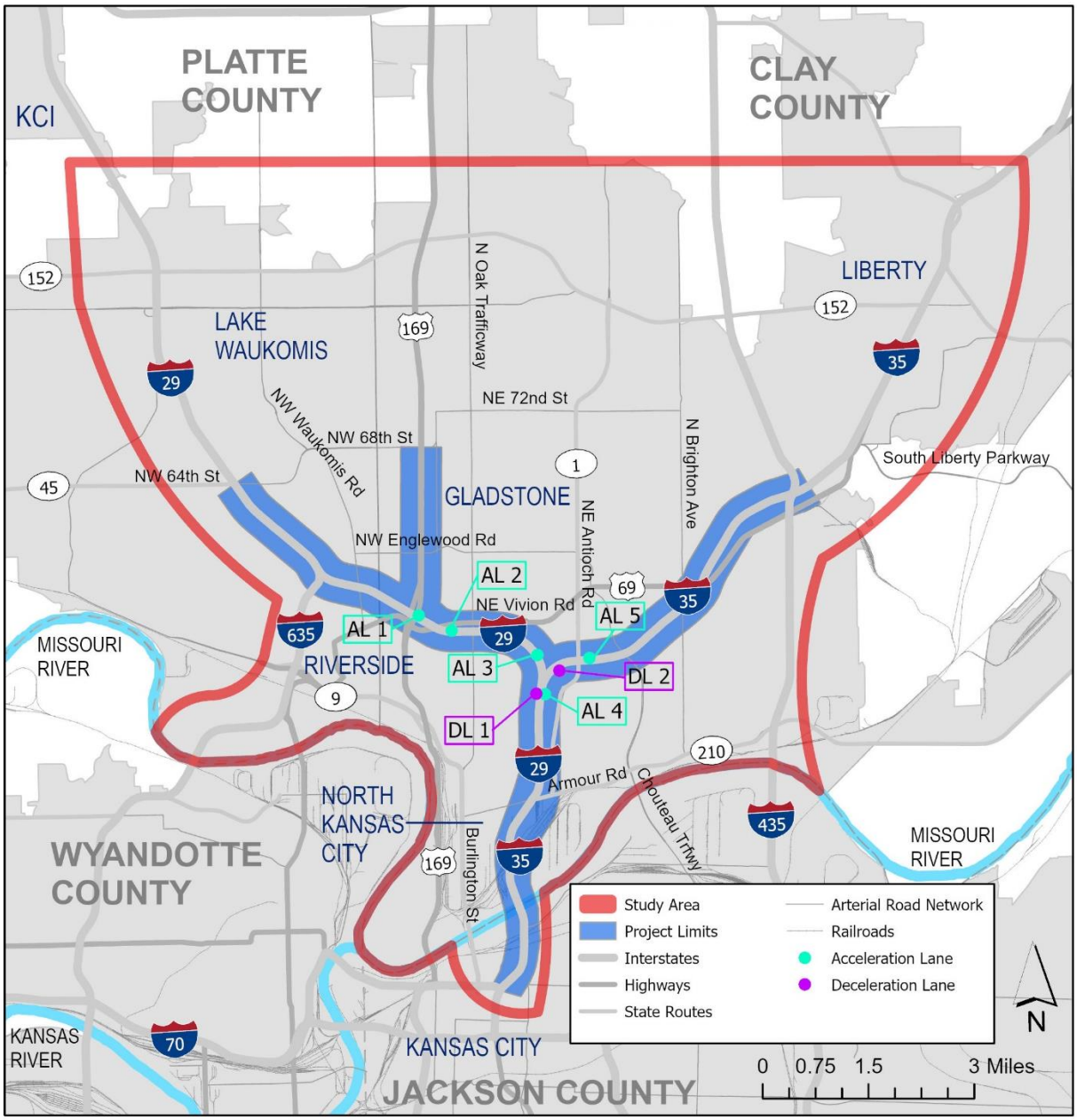
Linn St. Ramp - Exit 5	6	4
Levee Rd. - Missouri River Bridge	8	10
Missouri River Bridge	10	11
E Front St. - Dora St.	6	3
Dora Street - Exit 4A	10	8
Exit 4A - Independence Ave.	11	11
NB I-29		
Exit 8B (I-29 North) - Exit 1A	8	8
Exit 1A - I-35 S ramp to I-29 N	10	6
I-35 S ramp to I-29 N - NE Davidson Rd.	8	6
NE Davidson Rd. - end of NE Davidson ramp to I-29 North	10	6
end of NE Davidson ramp to I-29 North - MM 1.2	12	3
MM 1.2 - N Oak Trfwy.	10	4
N Oak Trafficway - Exit 2A	Minimum 6	Minimum 4
Exit 2A - US 169 S Overpass	10	4
US 169 S Overpass - US 169 (N & S) ramp to I-29 N	12	8
US 169 (N & S) ramp to I-29 N - MM 2.8	12	12
MM 2.8 - MM 3.2	12	8
MM 3.2 – NW Waukomis Dr. Overpass	10	8
NW Waukomis Drive Overpass - MM 3.6	10	10
MM 3.6 - I-29/I-635 S split	10	10
I-29/I-635 S split - I-635 ramp to I-29 N	8	8
I-635 ramp to I-29 N - MM 4.4	8	6
Exit 4 - State Rt. 45	10	8
SB I-29		
State Rt 45 - NW Prairie View Rd ramp to I-29 S	Minimum 8	Minimum 7
NW Prairie View Rd. ramp to I-29 S - Exit 3B	8	6
Exit 3B - Exit 3C	Minimum 4	Minimum 4
Exit 3C - N Oak Trfwy.	Minimum 8	Minimum 8
N Oak Trfwy. - MM 0.4	Minimum 4	Minimum 2.5
MM 0.4 - I-35 Merge	Minimum 8	Minimum 8
NB U.S. 169		
NW Vivion Rd. Exit Gore - I-29 N Exit	10	8
I-29 N Exit I-29 N Overpass	Minimum 4	Minimum 4
(Under) I-29 N Overpass	Minimum 2	Minimum 1
I-29 N Overpass - NW Englewood Rd. Exit	10	Minimum 2.5
NW Englewood Rd. Exit - NW Englewood ramp to US 169 N	Minimum 8	6
NW Englewood ramp to US 169 N - NW 68th St. Exit	10	6
NW 68th St. Exit - NW Barry Rd.	10	Minimum 4
NW Barry Road - Rt. 152 Interchange	Minimum 4	Minimum 8
(Within) Rt. 152 Interchange	Minimum 6	Minimum 6
NW 96th St Interchange	10	8
SB U.S. 169		
NW 96th St Interchange	Minimum 8	Minimum 6
Rt. 152 Interchange	Minimum 8	Minimum 5
Rt. 152 Interchange - NW Barry Rd. Interchange	8	6
(Within) NW Barry Rd. Interchange	9	Minimum 4

NW Barry Rd. Interchange - NW 68th St.	10	9
NW 68th St. Exit - NW 68th St. ramp to US 169 S	Minimum 8	Minimum 6
NW 68th St. ramp to US 169 S - NW Englewood Rd. Exit	Minimum 8	Minimum 6
NW Englewood Rd. Exit - NW Englewood Rd. ramp to US 169 S	Minimum 8	Minimum 6
NW Englewood Rd. ramp to US 169 S - I-29	Minimum 6	Minimum 6
I-29 - NW Vivion Rd. On Ramp	Minimum 4	Minimum 4

Acceleration and Deceleration Lanes

Figure 62 shows the location of substandard acceleration and deceleration lanes identified within the study area. Refer to **Table 29**, and **Table 30** for further information on deficiencies in acceleration lanes and deceleration lanes, respectively.

Figure 62: Substandard Acceleration and Deceleration Lanes



Source: HNTB analysis using Google Earth

Table 29: Substandard Acceleration Lanes

ID	Location	Direction	Ramp	Lane Design	Posted Ramp Speed	Posted HWY Speed	Existing Length	AASHTO Minimum Recommended Lane Length
AL 1	I-29	NB	On-ramp from NW Vivion Rd. to NB I-29	Parallel	25 mph	55 mph	150 ft	780 ft
AL 2	I-29	NB	On-Ramp from N Oak Trfwy. to NB I-29	Parallel	25 mph	55 mph	120 ft	810 ft
AL 3	I-29	NB	On-Ramp from NE Davidson Rd. to NB I-29	Parallel	45 mph	55 mph	150 ft	432 ft
AL 4	I-29	NB	On-ramp from NE Parvin Rd. to NB I-29	Parallel	20 mph	55 mph	80 ft	810 ft
AL 5	I-35	NB	On-ramp from NE Antioch Rd. to NB I-35	Parallel	45 mph	65 mph	60 ft	600 ft

Source: Google Earth, 2022 and AASHTO Greenbook

Table 30: Substandard Deceleration Lanes

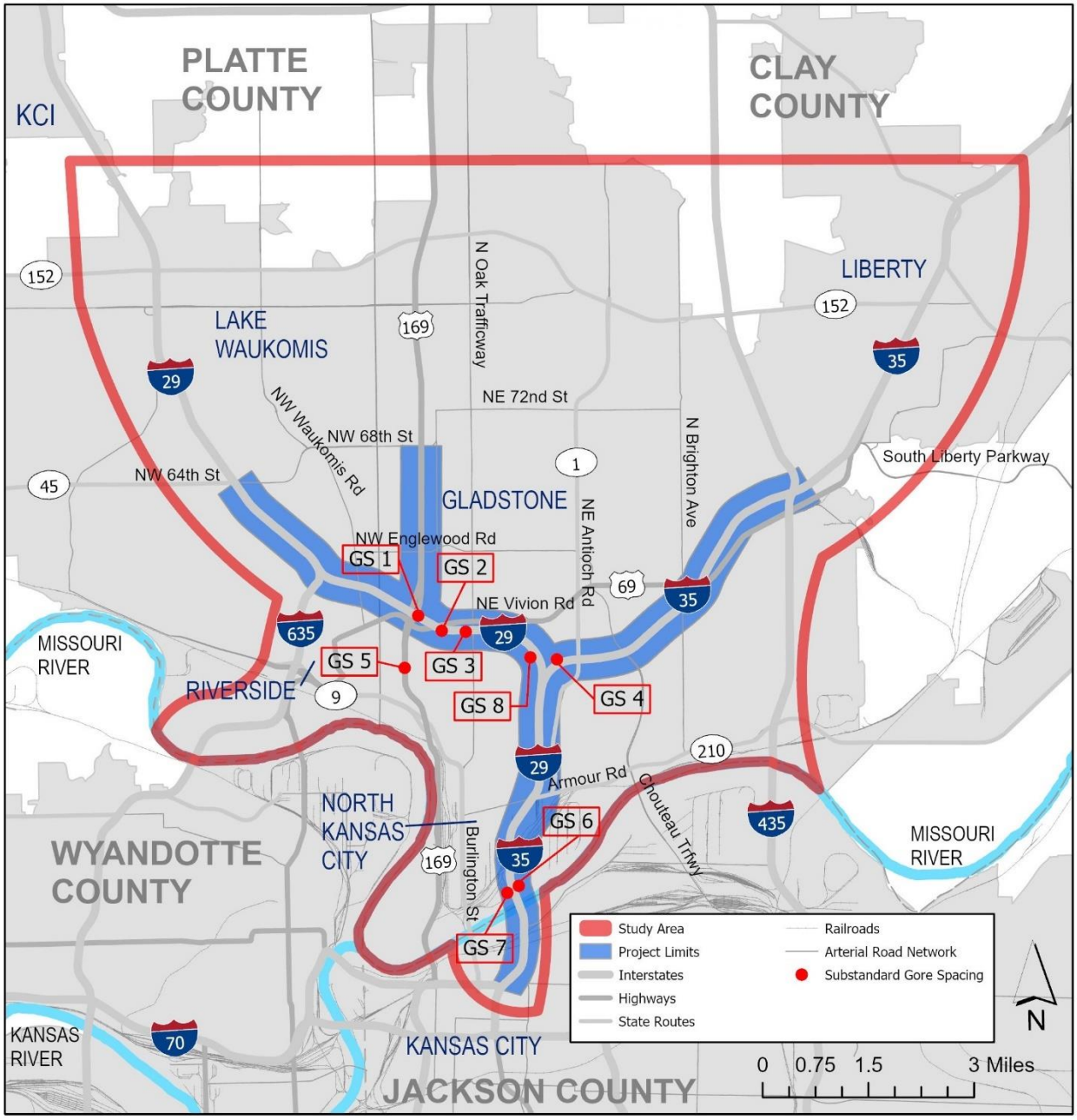
ID	Location	Direction	Ramp	Lane Design	Posted Ramp Speed	Posted HWY Speed	Existing Length	AASHTO Minimum Recommended Lane Length
DL 1	I-35	SB	Off-ramp from SB I-35 to NE Parvin Rd.	Parallel	20 mph	55 mph	200 ft	440 ft
DL 2	I-35	NB	Off-ramp from NB I-35 to NE Antioch Rd.	Tangent	30 mph	65 mph	0 ft	470 ft

Source: Google Earth, 2022 and AASHTO Greenbook

Gore Spacing

Figure 63 shows the location of substandard gore spacings identified withing the study area. Refer to **Table 31** for further information on gore spacing deficiencies.

Figure 63: Substandard Gore Spacing



Source: HNTB analysis using Google Earth, 2022

Table 31: Substandard Gore Spacing

Identifier	Location	Direction	Ramps	Existing Gore Spacing	AASHTO Minimum Recommended Ramp Spacing
GS 1	I-29	NB	On-ramp from WB Vivion Rd. to NB I-29 – Off-ramp from NB I-29 to NB U.S. 169	450 ft	2000 ft
GS 2	I-29	SB	On-ramp from EB Vivion Rd. to SB I-29 – Off-ramp from SB I-29 to SB N Oak Trfwy.	400 ft	1600 ft
GS 3	I-29	SB	On-ramp from SB N Oak Trfwy. to SB I-29 – Off-ramp from SB I-29 to NB N Oak Trfwy.	890 ft	1500 ft
GS 4	I-35	SB	On-Ramp from SB NE Antioch Rd. to SB I-35 – Off-ramp from SB I-35 to NB I-29	380 ft	2000 ft
GS 5	U.S. 169	SB	On-ramp from NW Vivion Rd. (U.S. 69) to SB U.S. 169 – Off-ramp from SB U.S. 169 to NW Briarcliff Pkwy	1350 ft	1600 ft
GS 6	I-35	NB	On-ramp from Levee Rd. and off-ramp from NB I-29 – On-ramp from tangent section to NB I-29	375 ft	1000 ft
GS 7	I-35	SB	On-ramp from Bedford Ave. and off-ramp from SB I-29 – On-ramp from tangent section to SB I-29	370 ft	1000 ft
GS 8	I-29	SB	Off-ramp from SB I-29 to NB I-35 – Off-ramp from SB I-29 to NE Davidson RD.	500 ft	1000 ft

Source: Google Earth, 2022 and AASHTO Greenbook.

4.4.5 Interchange Geometry Deficiencies

Table 32 lists all the interchanges analyzed withing the study area and identifies interchanges with missing movements, with left exits or entrances, and whether the interchange is located within one mile of another interchange. The following section also identifies geometric deficiencies not shown in **Table 32** at interchanges in the project limits.

Table 32: Interchange Geometry Deficiencies

Interchange	Type	Full or Partial	Missing Movements	Missing Movements Description	Less than 1 Mile to Other Interchange	Left Exits or Entrances
I-29 at Route 45 (NW 64th St.)	Diamond	Full	-	-	-	-
I-29 at NW 56th St.	Atypical	Partial	X	From NW 56th St to I-29 N, from I-29 S to NW 56th St	X	X
I-29 at I-635	Directional	Full	-	-	-	-
I-29 at NW Gateway Ave.	Directional	Partial	X	From NB I-29 to NW Gateway Ave.	-	-
I-29 at NW Waukomis Dr. (Route AA)	Half Diamond	Partial	X	From NW Waukomis Dr. to NB I-29, from SB I-29 to NW Waukomis Dr.	X	-
I-29 at U.S. 169	Directional with Loop Ramp	Partial	X	From NB I-29 to SB U.S. 169, from NB U.S. 169 to SB I-29	X	X
I-29 at U.S. 69 (NW Vivion Rd.)	Partial Cloverleaf / Diamond Combination	Partial	X	From WB U.S. 69 to SB I-29	X	-
I-29 at N Oak Trafficway	Partial Cloverleaf	Partial	X	From NB I-29 to SB N Oak Trfwy, from SB N Oak Trfwy to NB I-29	X	-
I-29 at NE Davidson Rd.	Diamond	Full	-	-	X	-
I-29 at I-35	Directional	Full	-	-	X	X
I-29/I-35 at NE Parvin Rd.	Folded Diamond	Full	-	-	X	-
I-29/I-35 at Route 210 (Armour Rd.)	Partial Cloverleaf / Diamond	Full	-	-	X	-

Interchange	Type	Full or Partial	Missing Movements	Missing Movements Description	Less than 1 Mile to Other Interchange	Left Exits or Entrances
	Combination					
I-29/I-35 at Diamond Pkwy and E 16th Ave.	Half Diamond	Partial	X	From E 16th Ave. to NB I-29/I-35, from SB I-29/I-35 to E 16th Ave.	X	-
I-29/I-35 at Bedford Ave/Levee Rd.	Full Diamond with Slip Ramps	Full	-	-	X	-
I-29/I-35 at Berkley Pkwy and E Front St.	Single Point Urban Interchange (SPUI)	Full	-	-	X	-
I-29/I-35 at The Paseo	Directional	Partial	X	From NB The Paseo to SB I-35, from NB I-35 to SB The Paseo	X	X
I-29/I-35 at Independence Ave	Atypical	Partial	X			
I-29/I-35 at I-70/I-35	Directional	Full	-	-	X	-
I-35 at Route 1 (NE Antioch Rd.)	Diamond	Full	-	-	X	-
I-35 at N Chouteau Parkway	Diamond	Full	-	-	X	-
I-35 at N Brighton Ave.	Half Diamond with Slip Ramp	Partial	X	From N Brighton Ave to NB I-35, from SB I-35 to N Brighton Ave	X	-
I-35 at U.S. 69 (NE Vivion Rd.)	Atypical	Partial	X	From NB I-35 to WB U.S. 69	X	X
I-35 at I-435	Directional	Partial	X	From SB I-35 to NB I-435	X	X
I-435 at U.S. 69	Diamond	Full	X (1)	(1)		
U.S. 169 at NW Englewood Rd.	Diamond	Full	-	-	X	-

Interchange	Type	Full or Partial	Missing Movements	Missing Movements Description	Less than 1 Mile to Other Interchange	Left Exits or Entrances
U.S. 169 at NW 68th St.	Diamond	Full	-	-	-	-
U.S. 169 at U.S. 69 (NW Vivion Rd)	Half Diamond	Partial	X	From SB U.S. 169 to U.S. 69, from U.S. 69 to NB U.S. 169	X	-

Source: Google Maps, 2022.
Note 1: This interchange also accommodates movements with I-35, but it does not accommodate the movement from U.S. 69 to NB I-35.

I-29 at I-35 Interchange

- Southbound I-29 reduces from three lanes (two travel lanes, one acceleration lane) to one lane in a span of 400 feet, south of NE Davidson Road. The proximity of the ramp merge to the lane drop causes a “funnel” effect and leads to a congestion during periods of peak traffic.

I-29 at N Oak Trafficway Interchange

- The loop ramp from southbound I-29 to northbound N Oak Trafficway has an advisory speed of 20 mph. Per AASHTO Greenbook, the minimum design speed for a ramp based on a 55-mph-highway design speed should be 30 mph. However, for loop ramps only, AASHTO Greenbook recommends a minimum loop ramp design speed of 20 mph for highways with design speeds above 50 mph.

I-29 at U.S. 169 Interchange

- The southbound U.S. 169 to southbound I-29 ramp is a left exit requiring drivers to make atypical maneuvers. This left exit occurs approximately 0.5 mile south of the NW Englewood Road interchange. As a result, drivers traveling from NW Englewood Road to I-29 have limited time and space to make this maneuver. Additionally, drivers traveling from the left on-ramp acceleration lane from southbound 169 to southbound I-29 to the exit ramp to NW Vivion Road or to the exit ramp to southbound North Oak Trafficway have a very short distance to maneuver.

- There is no direct connection from northbound U.S. 169 to southbound I-29. Drivers must exit U.S. 169 onto NW Vivion Road then take the on-ramp to southbound I-29. This is approximately 1 mile out-of-direction of travel.

- There is no direct connection from northbound I-29 to southbound U.S. 169. Drivers must exit I-29 to NE Vivion Road then take the on-ramp to southbound U.S. 169. This is approximately 1.5 miles out-of-direction of travel.

I-35 at U.S. 69 (Vivion Road) Interchange

- The I-35 and U.S. 69 interchange has an atypical configuration which may lead to some driver confusion.

- The northbound I-35 ramp to northbound U.S. 69 has an adverse curve towards the right followed by another curve to the left while northbound I-35 is curving to the left. This ramp is posted with an advisory speed limit of 45mph.

- Drivers traveling on the on-ramp from southbound U.S. 69 ramp to southbound I-35 have a stop condition at a skewed intersection for northbound U.S. 69.

- The northbound I-35 exit to northbound U.S. 69 has residential driveways prior to merging with northbound U.S. 69. In this case, drivers are focused on merging to U.S. 69 and not focused on drivers going in or out of the driveways.

- The ramp from southbound U.S. 69 to southbound I-35 is a left entrance. Drivers traveling on southbound I-35 may not expect the left entrance. Furthermore, the recommended gap, after the acceleration length, to merge to southbound I-35 is less than the minimum 300 ft recommended by AASHTO Greenbook.

- The off-ramp from southbound I-35 to U.S. 69 does not meet the minimum design speed per AASHTO Greenbook. This off-ramp has a posted advisory speed of 15 mph. Per AASHTO Greenbook, since SB I-35 has a posted speed limit of 65 mph, this off-ramp should have a minimum design of speed of 20 mph. AASHTO Greenbook recommends a ramp design speed of 30 mph for highways with a design speed of 65 mph.

- There is no direct connection from northbound I-35 to southbound/westbound U.S. 69. Drivers must exit at the N Brighton Avenue or exit at the U.S. 69 interchange and drive north 1.64 miles out-of-direction of travel to the I-35/I-435 interchange.

I-35 at N Brighton Ave Interchange

- The I-35 at N Brighton Avenue interchange is a half diamond interchange which causes some driver expectancy confusion. There is not a turn lane from northbound Brighton Ave. to southbound I-35 nor any signals for this movement.

- The ramp from NE Winn Road to I-35 south is a slip ramp from a two-way street and requires drivers traveling south on Winn Road to cross northbound traffic to enter the

ramp. Northbound Winn Road drivers have a “STOP” and “No Right Turn” sign. Winn Road drivers cannot turn right; they must travel north to the U.S. 69 interchange to enter the interstate.

I-35 at NE Antioch Rd Interchange

- Because of the proximity of the on-ramp from southbound I-29 to northbound I-35 and the off-ramp from northbound I-35 to NE Antioch Road and the added lane after the on-ramp, drivers on northbound I-35 may have difficulties with certain maneuvers.

I-29/I-35 at NE Parvin Road

- As stated in **Table 29** and shown in **Figure 62**, the on-ramp from NE Parvin Road to northbound I-29/I-35 has a short acceleration length. Furthermore, drivers traveling on this ramp need to maneuver across two lanes of traffic to continue on northbound I-29.

- The ramp from NE Parvin Road to northbound I-29/I-35 has a steep grade and a tight ramp radius that may not meet the minimum design speed per AASHTO Greenbook. From aerial, this ramp has a tighter radius than the loop ramp from southbound I-29/I-35 to Parving Rd which has an advisory speed of 20 mph. Therefore, the loop ramp from NE Parvin Road to northbound I-29/I-35 may not meet the minimum design speed per AASHTO Greenbook as stated above.

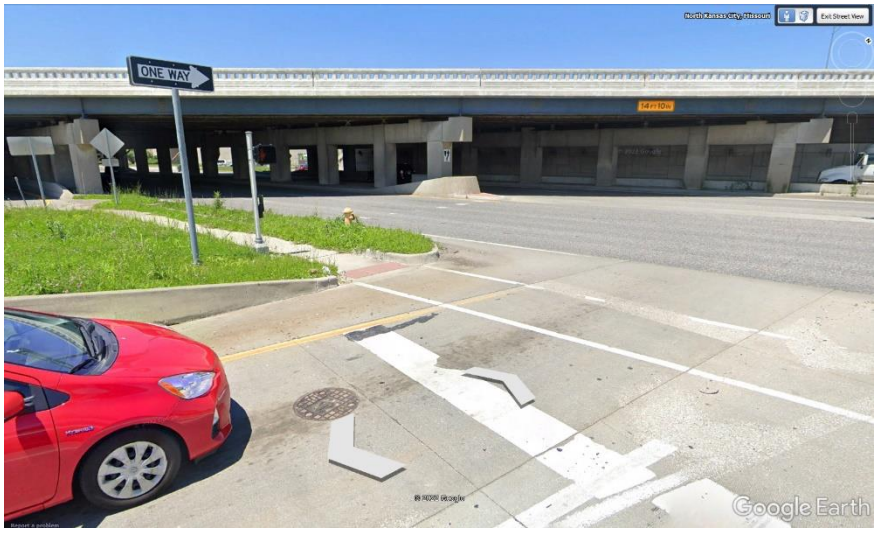
- The loop ramp from southbound I-29 to Parvin Rd has an advisory speed of 20 mph. Per AASHTO Greenbook, the minimum design speed for a ramp based on a 55-mph design speed should be 30 mph. However, for loop ramps only, AASHTO Greenbook recommends a minimum ramp design speed of 20 mph for highways design speeds above 50 mph.

4.4.6 Sight Distance Deficiencies

Northbound and southbound I-29/I-35 exit to Armour Road

This intersection is signalized, but right-turn on red is allowed. The bridge piers and intersection configuration limit the ability of a driver making a right-hand turn to see oncoming traffic. **Figure 64** and **Figure 65** are views from each of these ramp terminals.

Figure 64: Northbound I-29/I-35 Ramp Terminal onto Route 210 (Armour Rd.)



Source: Google Earth, 2022

Figure 65: Southbound I-29/I-35 Ramp Terminal onto Route 210 (Armour Rd.)

Source: Google Earth, 2022

Northbound and southbound I-29 exit to NE Davidson Road

Bridge piers, guide signs in the wrong location, and vegetation limit the ability of a driver making a right-hand turn to see oncoming traffic. An important consideration is that NE Davidson Road has bike lanes on both shoulders. **Figure 66** and **Figure 67** are pictures taken from each of these ramp terminals.

Figure 66: Northbound I-29 Ramp Terminal onto NE Davidson Road

Source: Photo taken on 9/22/2022

Figure 67: Southbound I-29 Ramp Terminal onto NE Davidson Road

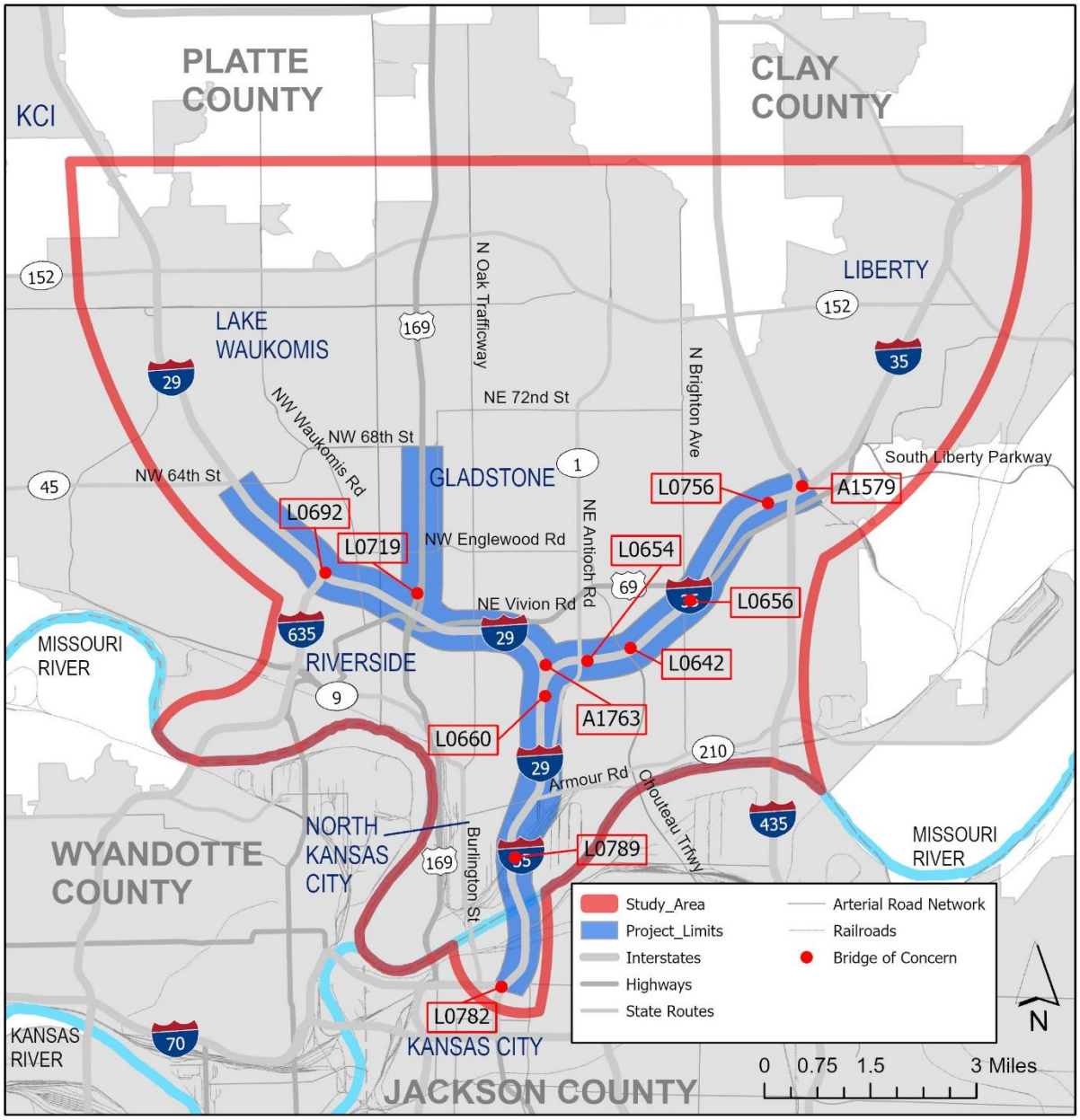
Source: Photo taken on 9/22/2022.

4.4.7 Bridge Concerns

Bridge inventory data was provided by MoDOT for all bridges within the study area. This data was analyzed with specific focus on substructure, superstructure, deck, vertical clearances, and whether bridge railings, guardrail transitions, approach guardrail, and guardrail ends meet acceptable standards. MoDOT assigns a rating to the deck, superstructure, and substructure condition of each bridge. A rating of 8 or 9 is considered very good or excellent condition, a rating from 5 to 7 is considered fair, satisfactory, or good condition, and when the assigned rating is less than or equal to 4, the bridge is considered deficient or in poor condition.

Additionally, annual daily traffic (ADT) and percent truck traffic have been considered. **Figure 68** displays the locations of the bridges of high concern within the project area. Pertinent data for each of these bridges is listed in **Table 32**.

Figure 68: High Priority Bridges of Concern Locations



Source: MoDOT Bridge Inventory, 2022.

Table 33: High Priority Bridges of Concern

Bridge No.	Yr. Built	Facility Carried	Feature Intersected	ADT	% Truck Traffic	Guardrail Barrier Conditions (See Notes)	Deck Rating Code	Super. Rating Code	Sub. Rating Code
L0656	1954	U.S. 69 to I-35 S	I-35	1860	5	1	5	5	4
L0756	1958	Bryant St. S	I-35	3416	5	1, 2, 3, 4	6	6	5
L0782	1953	Independence Ave. W	I-29	6115	7	1, 2, 3, 4	7	7	6
A1579	1969	Ramp I-35 S to I-435 S	I-35	13556	16	1, 3, 4	6	6	8
A1763	1967	Ramp I-29 S to I-35 N	I-35, I-29	15833	12	-	5	5	6
L0642	1954	I-35 N	MO 269	34299	18	-	6	6	5
L0654	1954	I-35 S	MO 1	40177	18	4	7	8	5
L0660	1954	I-29 N	NE Parvin Rd.	51393	12	-	7	5	6
L0692	1957	Ramp NW Gateway Ave.	I-29, Ramp I-635 N to I-29	3608	5	-	5	5	6
L0719	1957	I-29 N	Ramp U.S. 169 S to I-29 S, U.S. 1	56182	6	-	7	6	5
L0789	1953	I-29 S	14TH Ave, BNSF Railroad	110905	12	-	6	5	5

Source: MoDOT Bridge Inventory, 2022.
Guardrail/Barrier Condition Notes:
Note 1: Bridge railing does not meet standard.
Note 2: Approach guardrail does not meet standard.
Note 3: Approach guardrail ends do not meet standard.
Note 4: Bridge barrier transition does not meet standard.

The bridges listed in **Table 33** are a high priority concern due to their structural condition as well as the high ADT and high percent truck traffic carried. The highest priority concern was structural condition, especially for bridges with high traffic volumes. Other concerning criteria that may indicate a need for rehabilitation or replacement were posted loads and vertical clearance issues, which are documented below in **Table 34** and **Table 35** respectively. Some of these bridges overlap with those of high priority, while others are structurally sound but exhibit other deficiencies.

Table 34: Bridges with Load Postings

Bridge Number	Year Built	Facility Carried	Feature Intersected	Load Posting (tons)
A1159	1967	I-29 N	MO 45	N/A
A1580	1969	Ramp I-435 N to I-35 S	I-35, I-435	65
A1763	1967	Ramp I-29 S to I-35 N	I-35, I-29	65
L0641	1954	I-35 S	MO 269	65
L0656	1954	U.S. 69 S	I-35	65
L0689	1957	I-29 S	Line CR	N/A
L0692	1957	Ramp NW Gateway Ave.	I-29, Ramp I-635N to I-29	55
L0756	1958	Bryant St S	I-35	45
L0757	1958	U.S. 69 S	I-35	50
L0782	1953	Independence Ave. W	I-29	40
L0788	1953	I-29 S	Guinotte Ave.	65
L0789	1953	I-29 S	14TH Ave, BNSF Railroad	45

Source: MoDOT Bridge Inventory, 2022.
Note: Bridges with N/A were noted to have a load posting, but the load limit was not available.

Table 35: Bridges with Vertical Clearance Issues

Bridge Number	Year Built	Facility Carried	Feature Intersected	Vertical Clearance
A1159	1967	I-29 S	MO 45	**Under:** 15'-5"
A1159	1967	I-29 N	MO 45	**Under:** 15"-1"
A1579	1969	Ramp I-35 S to I-435 S	I-35	**Over:** 15'-0" **Under:** 15'-10"
A1582	1969	Ramp I-35 N to I-435 S	U.S. 69	**Under:** 15'-4"
A1583	1969	Ramp I-435 N to I-35 N	U.S. 69	**Under:** 15'-8"
A1687	1967	Ramp I-29 N to I-635 S	I-29, Ramp I-29 S to NW Gateway Ave.	**Under:** 16'-2"
A1761	1967	Ramp I-35 S to I-29 N	Ramp I-29 N to NE Davidson Rd.	**Under:** 15'-1"
A1762	1967	Ramp 1-29 S to I-35 N	NE Davidson Rd.	**Under:** 15'-1"

Bridge Number	Year Built	Facility Carried	Feature Intersected	Vertical Clearance
A1763	1967	Ramp I-29 S to I-35 N	I-35, I-29	**Under:** 15’-8”
A3389	1981	Ramp I-435 S to U.S. 69 N	I-35	**Over:** 16’-0” **Under:** 16’-2”
A3416	1981	I-435 S	U.S. 69	**Under:** 15’-10”
A5604	1996	U.S. 169 N	NW Englewood Rd.	**Under:** 14’-11”
A5605	1996	U.S. 169 S	NW Englewood Rd.	**Under:** 14’-9”
A6200	2000	U.S. 169 S	NW 68th St	**Under:** 14’-7”
A7644	2010	Ramp I-29 S to Independence Ave.	I-29	**Under:** 15’-4”
A7647	2009	I-29 S	Ramp Front St E to I-29 N	**Under:** 14’-11”
A7654	2010	I-29 S	Ramp MO 210 to I-29 S, Ramp M	**Under:** 14’-11”
L0642	1954	I-35 N	MO 269	**Under:** 16’-0”
L0653	1954	I-35 N	MO 1	**Under:** 15’-3”
L0654	1954	I-35 S	MO 1	**Under:** 15’-3”
L0656	1954	U.S. 69	I-35	**Under:** 14’-11”
L0658	1955	I-29 N	I-35	**Under:** 15’-8”
L0659	1954	I-29 S	NE Parvin Rd.	**Under:** 14’-11”
L0699	1955	I-29 S	NE Davidson Rd.	**Under:** 14’-9”
L0701	1957	I-29 N	N Oak Trfwy.	**Under:** 15’-3”
L0702	1957	I-29 S	N Oak Trfwy.	**Under:** 15’-3”
L0720	1957	I-29 S	U.S. 69	**Under:** 15’-3”
L0721	1957	I-29 N	U.S. 69	**Under:** 14’-7”
L0756	1958	Bryant St. S	I-35	**Under:** 16’-0”
L0782	1953	Independence Ave. W	I-29	**Under:** 14’-11”
L0788	1953	I-29 S	Guinotte Ave, Dora St.	**Under:** 14’-5”
L0789	1953	I-29 S	14TH Ave, BNSF Railroad	**Under:** 16’-0”

Source: MoDOT Bridge Inventory, 2022

Note: “Under” indicates the vertical clearance under the roadway to the intersected feature. “Over” indicates the vertical clearance over the roadway to the intersected feature.

5.0 Public Engagement

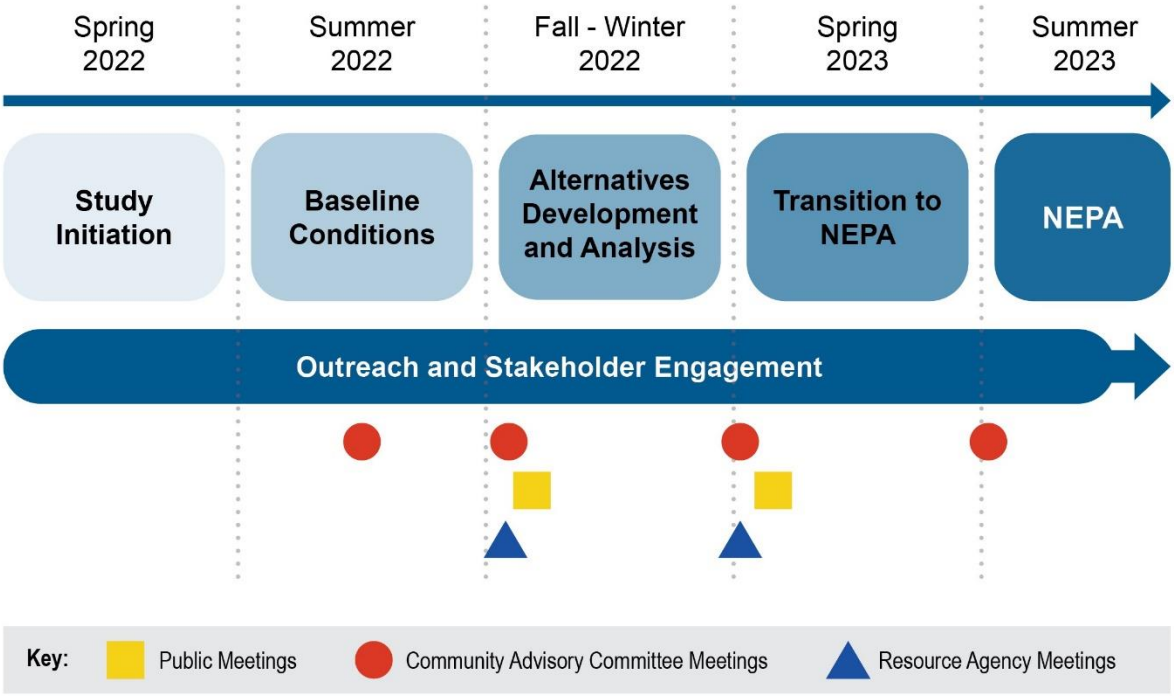
The following chapter summarizes the resource agency and tribal coordination, stakeholder engagement, and public involvement activities that have or will be taking place during the Baseline Conditions phase of the I-29, I-35, U.S. 169 PEL study as well as future public engagement activities planned for the PEL.

5.1 Public Involvement Plan

To provide a framework for all public involvement activities, the study team created a Public Involvement Plan. The detailed Plan summarizes public outreach goals and objectives and identifies the specific stakeholder groups to be included during the PEL study. The plan also outlines all activities, messaging, outreach methods and deliverables. To help inform the Public Involvement Plan, conversations were had between the project team and various interested stakeholders including, but not limited to, resource agencies, tribes, local officials, businesses and the public. Materials were presented in languages alternative to English as needed and specific outreach to underserved populations identified will be done through neighborhood groups and community groups.

Ongoing and anticipated public involvement activities are outlined in **Figure 69** and summarized below:

Figure 69: Schedule of Planned Public Involvement Activities Throughout Study Phases



Source: HNTB

5.1.1 Resource Agency Coordination

The study team, in partnership with FHWA, created a list of key federal, state and local resource agencies and officials that would be considered coordinating agencies. All tribal coordination occurred through MoDOT and FHWA. Two meetings will be held with resource agencies to provide them an update and gather input. These groups were invited to become coordinating agencies and receive all updates and project information.

5.1.2 Purpose and Need Analysis Agency Coordination

Agencies will be able to provide their feedback on all aspects of the PEL including the Purpose and Need, Alternatives Development and Analysis as shown in **Figure 69**.

At the beginning of the study, key stakeholders were identified to participate in interviews to help understand project concerns, opportunities, and issues. Key stakeholders that were selected for interviews included the:

- Northland Chamber,
- Northland Chamber Planning and Development Committee,
- Northland Neighborhoods Inc.,
- Kansas City Area Transportation Authority, and
- North Kansas City Business Council

These stakeholders were identified because they were representative of a large group of study area residents and could provide a unique and knowledgeable perspective that could further inform the study. Interviews took place in June 2022. In summary, the key concerns and opportunities that were discussed included:

- **Increasing Development** - Several stakeholders noted that there is substantial development occurring in the northland with the area to grow significantly in the coming years. Many expressed concerns about the influx of housing and industrial development leading to higher congestion within the study area. Specific development areas identified included the Twin Creeks and Platteville regions. It was also noted that the North Kansas City School District is growing by 300 students annually.
- **Design and Maintenance -** Many stakeholders asked that the study team consider choosing alternatives that will not require substantial upkeep and maintenance and will still be aesthetically pleasing well into the future. Currently, many residential areas are overrun with weeds, unkept grass, and garbage. Stakeholders want their community to look maintained and inviting to residents.
- **Sustainability and Safety -** There were numerous safety concerns raised about current structures along I-29 and I-35. Other common issues included traffic noise, storm drainage structures, and safer pedestrian crossings.
- **Active Transportation (Bicycle and Pedestrian) -** Increased bicycle lane access and connectivity is a concern for various stakeholders. Specifically, along NW Vivion

Road and M-152 bike trail into the metro North Crossing Development.

- **Public Transportation -** COVID-19 led to a significant revamping of the public transportation throughout the northland. Recently, the KCATA has consolidated underperforming northland bus routes with more efficient routes. For many riders, there is a strong desire for more efficient, accessible, and less congested bus routes.
- **Funding -** There were several questions about the budget, funding sources, and the timeline for when funds would need to be secured.

5.1.3 Public Engagement Activities

Table 36 outlines the public engagement activities that have already or will be taking place over the course of the PEL study.

Table 36: Public Outreach Schedule

Date	Activity	Topic
June 2022	Stakeholder Interviews (5)	• Study Introduction • Initial Interviews and Data Gathering
June 9, 2022	Northland Chamber Presentation	
June 24, 2022	Platte County EDC	
July 7, 2022	Community Advisory Committee Meeting #1	
July 27, 2022	MARC Presentation	
October 5, 2022	Resource Agency Meeting #1	• Study Introduction • Baseline Conditions • Alternatives Development & Analysis Introduction
October 18, 2022	Community Advisory Committee Meeting #2	
October 2022	Public Survey	
October 27, 2022	Public Meeting #1	
Feb/March 2023	Community Advisory Committee Meeting #3	• Alternatives Development & Analysis Results • Transition to NEPA Recommendations
March/April 2023	Resource Agency Meeting #2	
March/April 2023	Public Meeting #2	
May/June 2023	Community Advisory Committee Meeting #4	• Transition to NEPA Recommendations • Final PEL

Source: HNTB

5.1.4 Public Meetings

As part of MoDOT's extensive public outreach activities, there will be two public meetings that will provide the general public with the opportunity to learn more about the project, speak with the project team, and provide input. The first public meeting will be held in October 2022.

5.1.5 Community Presentations

To further engage community members and civic organizations, a variety of community presentations were given by MoDOT and the study team. The purpose of these presentations was to introduce the project and provide organizations with an opportunity to submit their feedback. The first of these presentations was given to the Northland Chamber Planning and Development Committee on June 9, 2022. A second presentation was given to the MARC Highway Committee, on July 27, 2022. More presentations are anticipated as the study advances.

5.1.6 Community Advisory Group

The study team created a list of stakeholders that may have significant interest in the study or who lived/worked throughout the study area. Those stakeholders were contacted by MoDOT to inquire about their interest in serving on the Community Advisory Group. The committee is comprised of 36 members who represent a range of industries, interests, and communities in the study area. The purpose of this committee is to provide MoDOT with meaningful and insightful input relating to safety, congestion, and other issues along I-29,I-35, and U.S.169. The committee is not required to reach a consensus on issues, however the influence they provide in considering detailed aspects of the project aides MoDOT in making the best possible decisions needed to advance the study.

The first meeting was held virtually July 7, 2022, via Zoom and 21 members attended. This meeting was designed to introduce the study and gather initial feedback on the preliminary Purpose and Need, study goals, and guiding principles. The next meeting is scheduled for October 18, 2022.

5.1.7 Public Survey

In October 2022, MoDOT will disseminate a public survey to gather input on the project's preliminary Purpose and Need. This survey will be published on a date that aligns with the first public meeting and will give the general public the opportunity to be engaged with the study and submit their questions and concerns to the Study Team.

5.1.8 Additional Outreach and Collateral

As part of MoDOT's outreach efforts, materials such as flyers and newsletters will be developed for meetings to promote public meetings. All materials will be created in alternative languages if needed as identified in Chapter 4. Specific efforts will be made to build awareness of the study in underserved populations by working with neighborhood groups and community groups. MoDOT's website provides information about the study and a way to sign up for additional information and to get the latest updates or notifications about upcoming events. The website link is: www.modot.org/i-29i-35us-169-corridor-study

6.0 Purpose and Need

This chapter provides a summary of the purpose and need for improvements along I-29,I-35, and the U.S. 169 project limits. The purpose and need are part of the Planning and Environmental Linkages study process. The study will assess the issues and needs identified below.

6.1 Structural and Functional Roadway and Bridge Deficiencies

As discussed in Section 4.4, various roadways throughout the study area have geometric and structural issues. From a geometric standpoint, several locations were identified with substandard acceleration lanes (**Table 29**), deceleration lanes (**Table 30**), and gore spacing (**Table 31**). Several roads in the study area also have substandard interchange geometry and inadequate sight distances at intersections. As shown in **Figure 68,** 13 bridges are considered high priority bridges of concern based on their deck, substructure, superstructure, and/or guardrail/barrier conditions, as well as the ADT and percent truck traffic on these bridges. Other concerning criteria that indicate a need for bridge rehabilitation or replacement include posted loads and vertical clearance issues, as documented in **Table 34** and **Table 35** respectively.

6.2 Roadway Safety Issues

As discussed in Section 4.2.7, an existing and future no build crash analysis was conducted for the I-29, I-35, U.S 169 and I-635 mainlines, portions of M-152 as well as all system-to-system ramps, service ramps and ramp terminal intersections along the study corridors. The study area is typified by relatively low severity crashes which are primarily single vehicle, rear end or sideswipe in nature. These crash characteristics point to areas of lower speeds and high congestion. Solutions for these types of crashes usually involve reducing conflict points such as merges and diverges and lowering the overall congestion of a corridor. Crashes primarily occur during clear and dry conditions. Overall, the safety analysis identified three specific segments of the study area corridors as areas of concern. These areas each contain a high occurrence of specific types or levels of severity of crashes and considerations should be made during the alternatives analysis portion of this study. They include:

- The I-29/I-35 combined corridor between Independence Avenue and the north side of the Kit Bond Bridge: This area experienced 10 fatal or serious injury crashes during the study analysis period, many where a vehicle overtook a slower moving vehicle. Additionally, there were eight head-on crashes within this area between The Paseo ramps and immediately north of the Bedford Avenue/Levee Road interchange.

- I-35 from the I-29/I-35 interchange to the N Brighton Avenue interchange: This portion of the I-35 corridor contains all of the fatal crashes and most of the serious injury crashes along the I-35 corridor. Most of these crashes involved striking guardrails, cable barrier or concrete barriers, however overall trends of those types of crashes were in line with the overall corridor.

- I-29 between 72nd Street and M-152: This area experienced high rates of fatal and serious injury crashes, specifically pedestrian related, head-on, and out-of-control crashes.

A high-level summary of each corridor in the study area is presented in **Table 37**.

Table 37: Crash Data Summary for Corridors in Study Area

Corridor	No. of Crashes	Damage Type			Crash Type		
		Property Damage	Injury	Fatal	Rear End	Sideswipe or Angle*	Single Vehicle
I-29/I-35 Combined	1,341	77%	23%	<1%	52%	27%	15%
I-29	1,463	81%	18%	<1%	36%	27%	26%
I-35	1,166	83%	16%	<1%	41%	--	31%
U.S. 169	422	77%	22%	1%	35%	--	37%
I-635	352	76%	23%	<1%	20%	--	47%
M-152	302	71%	29%	--	35%	22%*	--
Ramps/ Ramp Terminals	2,567	75%	23%	<1%	--	--	--

Source: 2016-2020 MoDOT Crash Data

6.3 Traffic Congestion and Access Issues, Including Heavy Truck Traffic

Traffic analysis of the existing conditions within the study area shows several locations where speeds drop below free-flow speed. In the AM peak, speeds drop on southbound I-35 between N Brighton Avenue and I-29 due to vehicles changing lanes and positioning for the I-29 merge. In particular, more than 1,000 peak hour vehicles are taking the ramp to northbound I-29; those vehicles stack in the right lane through the NE Antioch Road interchange as they approach the ramp to northbound I-29. Farther south, speeds again drop beginning around the Christopher Kit Bond Bridge due to drivers changing lanes to position for their downtown destinations including a left lane exit at The Paseo, a major split at the northeast corner of the downtown loop and other closely spaced interchanges around the loop. Speeds on southbound U.S. 169 and I-29 are generally at or near free flow speeds during the AM peak.

In the PM peak, congested locations mirror those in the AM peak. On northbound I-29/I-35, reduced speeds surround the Christopher Kit Bond Bridge. Slower speeds can be attributed to industrial land uses and heavy truck traffic in the area as well as steeper grade differences

between the ramps at Front Street and I-29/I-35. Farther north after the split with I-29, a reduction in average speed occurs on I-35 around the NE Antioch Road and N Chouteau Parkway interchanges. The auxiliary lane that begins at the ramp from southbound I-29 ends at the N Chouteau Parkway exit ramp, acting as a lane drop and requiring vehicles continuing north on I-35 to transition into two through lanes. Near free flow speeds exist throughout the rest of northbound I-35 and along I-29 and U.S. 169.

Heavy truck traffic can negatively impact the traffic operations on I-29/I-35, I-35, and arterial roadways. Over 11 percent of vehicles travelling on I-29/I-35 and over 18 percent of vehicles on I-35 are heavy trucks. Existing industrial land uses adjacent to the interstate, such as the Northeast Industrial District and Claycomo Ford Plant, contribute to the higher percentages in the corridor. Slower truck traffic coming on and off of the interstate can quickly erode network performance, especially during peak periods.

StreetLight Origin-Destination Data was collected along the I-29, I-35 and U.S. 169 corridors and used to identify travel patterns and determine where traffic was going after entering the study area on each of the corridors. In the AM peak, the top three destinations for traffic on southbound I-29 was I-635, U.S. 169, and I-29/I-35. From southbound U.S. 169 north of NW 68th Street, more traffic was destined to U.S. 169 south of I-29 than anywhere else. The next biggest destinations were I-635 and I-29 / I-35. Traffic on southbound I-35 was mostly destined for either I-435 or I-29/I-35. In the PM peak, the traffic on northbound I-29/I-35 was destined for I-35 more than anywhere else, then I-29.

Mid-America Regional Council also assesses congestion in the region in the Congestion Management Report, 2021, which measured traffic congestion in 2019 and 2020.

6.4 Growth in the Northland

The population and employment of the study area counties is expected to increase by 40% and 37%, respectively, from 2015 to 2050. As shown in **Figure 10,** growth in the northland is also demonstrated by the many non-residential projects planned for Platte and Clay Counties, as well as Jackson County.

6.5 Lack of Transit and other Multimodal Alternatives

Much of the northland is challenging to serve with high-frequency fixed-route transit due to several factors including its geographic size, low-density land use pattern, dispersed activity centers, few major east-west and north-south arterial roads (compared to other parts of the metro area) and disconnected pedestrian and bicycle networks. The major northland transit routes 201, 229, 231, 233, 235, 236, 237, 238, and 535 serve the I-29, I-35 and U.S. 169, Burlington/North Oak, and Antioch corridors. Most of these routes have service frequencies between 30 and 60 minutes. In addition, service to KCI is lacking – only two routes provide service to the airport, one with a 30 to 60-minute frequency (only operating on weekdays) and

the other is a limited express service moving from downtown Kansas City to KCI (also only operating on weekdays).

The other challenging issue is that although there is good coverage on the major corridors, these corridors are separated by one or two miles and first and last connections into the surrounding neighborhoods are challenging due to the disconnected sidewalk network. In addition, many of the arterial roads that intersect project area Interstates and highways do not have pedestrian facilities crossing under/over them, shown in **Table 25**, making active transportation and transit inefficient and, potentially, dangerous. Where bike facilities do exist, they are often shared with pedestrians on shared use walking trails or use marked/shared roads (sharrows), which tend to provide less protection for cyclists.

The Connected KC 2050 Plan identified 10 major bottlenecks that hamper freight access into and out of the Kansas City area. Three of these bottlenecks occur within the study area:

- US 169 at I-70/I-35/US-40/US-24, Buck O'Neil (under construction),
- I-29/I-35 S at Independence Avenue, and
- MO-210 E at I-435 (completed in 2019)

These bottlenecks are caused by traffic congestion on highways that serve large volumes of freight truck traffic. The expected increase in future freight demand is only expected to exacerbate this issue without operational changes[26].

The study also identified the need for additional truck parking facilities, allowing drivers to meet their federally mandated hours of services (HOS) rest breaks and off-duty requirements, and to provide parking for staging for just-in-time deliveries to area distribution and manufacturing facilities, including the Claycomo Ford Plant. Drivers who have not found parking before exceeding their HOS or are early for their just in time delivery slot, are often forced to park in unauthorized, unsafe locations including highway shoulders, on and off ramps, or on local streets. There are currently two truck parking locations in the study area.

6.6 Purpose of the Project

In summary, the northland growth is resulting in traffic, safety, engineering and multimodal needs in the project limits as discussed above. As a result, the purpose of the project is to:

- Address structural and functional roadway deficiencies, including pavement and bridge conditions
- Improve roadway safety

[26] "Understanding Freight Bottlenecks", US FHWA, accessed August 25, 2022, https://highways.dot.gov/public-roads/marapr-2007/understanding-freight-bottlenecks

- Improve roadway capacity, mobility and access to meet traffic and freight movement demands to meet future growth in the northland
- Provide transit and multimodal alternatives

6.7 Study Goals

In addition to the purpose and need, study goals were established to balance transportation and environmental outcomes of the PEL. Input sought from the Community Advisory Committee, resource agencies and the public was incorporated to develop study goals and guiding principles. The study goals were used in the evaluation of alternatives. A listing of the study goals is presented below.

- Avoid and/or minimize impacts to the human and natural environment
- Sustain public and agency input and support for the project
- Maximize cost efficiency
- Improve system reliability
- Improve opportunity for regional connectivity
- Improve local vehicle access to downtown Kansas City and other communities north of the river
- Improve access to industrial and retail centers and neighborhoods
- Connect bicycle pedestrian friendly facilities
- Accommodate existing transit, future transit and transit-oriented development
- Minimize roadway disruptions during construction
- Improve safety
- Reduce congestion
- Accommodate freight movement
- Reduce maintenance

6.8 Guiding Principles

Guiding principles that will influence the overall project include (listed in no particular order):

- Open public participation process
- Support of local, regional, and statewide land use and transportation plans
- Support equity and mobility needs
- Context Sensitive Solutions
- Aesthetically pleasing
- Optimize opportunities for economic development
- Future flexibility
- Modernize transportation system
- Augment or improve the built and natural environment