FUTURE 64 COMMUNITY TRANSPORTATION TOGETHER

KINGSHIGHWAY TO JEFFERSON

ENVIRONMENTAL CONSTRAINTS TECHNICAL REPORT

Prepared for:

MoDOT

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos containing material
AST	Aboveground Storage Tank
BVCP	Brownfield voluntary cleanup program
BTEX	Benzene, toluene, ethylbenzene and xylene
CA	Community Assessment
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regionals
CWA	Clean Water Act
dBA	A-weighted decibels
DCA	Dichloroethane
DTL	Default target level
ESA	Environmental Site Assessment
EWG	East-West Gateway Council of Governments
FEMA	Federal Emergency and Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FTA	Federal Transit Administration
GIS	Geographic information systems
HVAC	Heating, ventilation, air conditioning
IDNR	Illinois Department of Natural Resources
IPaC	Information Planning and Consultation
LBP	Lead based paint
LAeq	A-weighted equivalent continuous sound level
LAmax	Maximum A-weighted noise level
Leq	Equivalent continuous sound level
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
MoDOT	Missouri Department of Transportation
MRBCA	Missouri Risk-Based Corrective Action Guidance
MS4	Municipal separate storm sewer system
MSD	Metropolitan St. Louis Sewer District
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Protection Act
NHD	National Hydrologic Datasets
NHPA	National Historic Preservation Act
NLCD	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyl

PCE	Tetrachloroethylene
PEL	Planning and Environmental Linkages
PM_{10}	Particulate matter less than 10 microns in diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in diameter
RCRA	Resource Conservation and Recovery Act
RSL	Regional screening levels
SARA	Superfund Amendments and Reauthorization Act
SHPO	State Historic Preservation Officer
SLUP	Strategic Land Use Plan
SWPPP	Stormwater Pollution Prevention Plan
TCE	Tetrachloroethylene
TCIG	Transportation Corridor Improvement Group
TPH-GRO	Total petroleum hydrocarbon-gas range organics
TS4	Transportation separate storm sewer system
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United Sates Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground storage tank
VCP	Voluntary cleanup program
VOC	Volatile organic compound
WOUS	Waters of the United States

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1.0 INTRODUCTION

The Missouri Department of Transportation (MoDOT) is conducting a Planning and Environmental Linkages (PEL) study for the Interstate 64 (I-64) corridor from the east side of Kingshighway Blvd. to the west side of Jefferson Ave. The goal of a PEL study process is to gather enough detail and produce certain products that are intended to streamline the environmental review (National Environmental Policy Act [NEPA] or permitting) processes for future projects that may take place within a study corridor, such as I-64. The PEL study will develop existing conditions, a Purpose and Need statement, preliminary screening of alternatives and elimination of unreasonable alternatives, a preliminary identification of environmental impacts and environmental mitigation, and a funding and phasing implementation plan. The Future64 PEL study process is being conducted consistent with requirements of 23 USC 168 and 23 CFR 450.212 and 450.318.

This technical report focuses on environmental constraints present within a defined study area related to land use and zoning; air quality; hazardous materials; visual environment; socioeconomics and environmental justice; historic, architectural, and archaeological resources; natural resources; parks and recreation; and traffic noise.

A methodical desktop review of each resource with field checks, as necessary, were completed to identify the existing environmental constraints.

Tribal governments and federal, state, and local agencies will be consulted during the PEL study process to identify areas of concern. Feedback gained through public engagement will give essential context of the environmental resources that may otherwise be overlooked.

1.1 PROJECT OVERVIEW

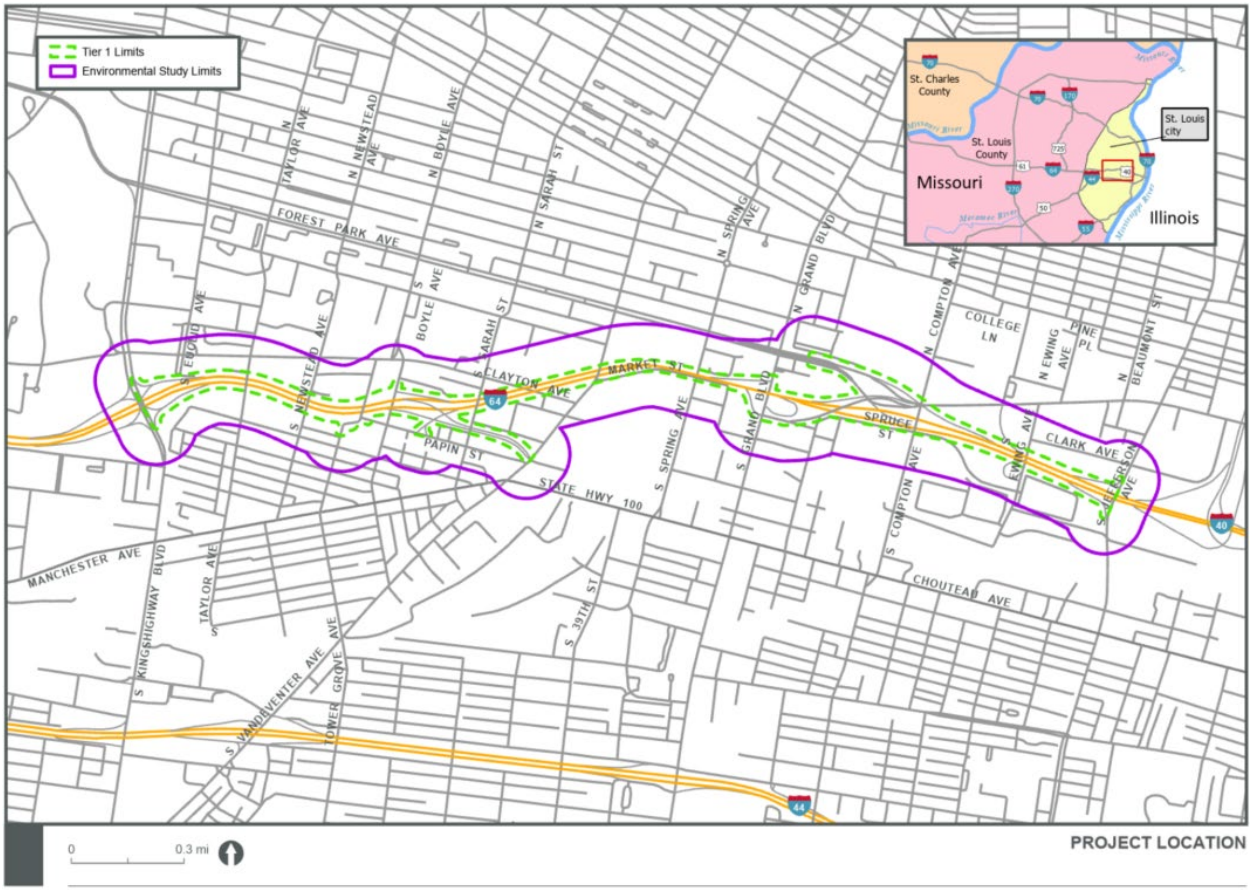
A key focus of the Future64 PEL study is to address immediate asset management needs in the corridor by capitalizing on the opportunity to examine the corridor holistically. The goal is to develop an actionable plan for near-term and long-term improvements within the study area. The study area is rapidly redeveloping as a denser, urban environment where major stakeholders are actively planning for new employment centers, housing units, retail, and entertainment. Additionally, the study area features significant existing or planned multimodal investments and, therefore, other modes than passenger vehicles are being considered. The Future64 PEL study will examine how the reconstruction of I-64 can be better integrated with these other modes and support their use. I-64 is directly tied to the local City of St. Louis street grid; therefore, the study area includes portions of the local transportation network, which necessitates an urban corridor-based approach to coordinate investment needs for MoDOT and other local agencies and partners. The PEL study is managed by the Transportation Corridor Improvement Group (TCIG), which includes MoDOT, the City of St. Louis, the East-West Gateway Council of Governments (EWG), and Metro Transit. The Federal Highway Administration (FHWA) is also involved throughout the process.

1.2 ENVIRONMENTAL STUDY AREA

Through coordination with the TCIG, the environmental study area limits (referred to as the study area) were set to 500 feet from the Future64 Tier 1 limits, which is the area between

Kingshighway Blvd. and Jefferson Ave. specific to the interstate system and contained within MoDOT right-of-way (Figure 1). Existing conditions for most of the resources in this report were identified within this study area, unless otherwise stated. The study areas for the socioeconomics and environmental justice, and water quality resources were adjusted to encompass additional areas that might have an influence on or be affected by future projects. They are defined in Section 8.0 and Section 14.0, respectively.

Figure 1. Environmental Study Area



1.3 HISTORY OF THE FUTURE64 STUDY AREA

1.3.1 Connectivity

I-64 through St. Louis originally was a local route known as the "Red Feather Expressway," which began at the intersection of Skinker Blvd. and Clayton Ave. and continued east to the intersection of Market St. and Vandeventer Ave. Construction of the expressway began in the early 1930s, and was completed in 1937. After its opening, a series of projects expanded the highway farther east to the current interchange with Market St. During this same period, a western expansion of the expressway was constructed through St. Louis County known as the Daniel Boone Highway. In 1959, the western terminus of the "Red Feather Expressway" was connected to the Daniel Boone section, and was known as Route 40.

Construction continued into the 1980s as traffic volume increased with the completion of the westbound viaduct. In 1987, FHWA designated the portion of Route 40 between I-270 and I-44 as I-64.

No major projects occurred on I-64 between the late 1980s and mid-2000s. In the mid-2000s, MoDOT began updating I-64 between I-270 and Kingshighway Blvd. to accommodate higher speeds and larger traffic volumes. East of Kingshighway Blvd., Compton Bridge was replaced in 2005. In the decade that followed, MoDOT upgraded I-64 at the Poplar St. Bridge, 6th St., and Jefferson Ave. interchanges. There was major growth in what is known as the Cortex Innovation District necessitating bridge replacements at Taylor Ave., Newstead Ave., Tower Grove Ave., and Boyle Ave. starting in 2012. Concurrent with the bridge replacement projects, an eastbound I-64 off ramp to Tower Grove Ave and westbound I-64 on-ramp from Boyle Ave. was added to the corridor. Other than the improvements mentioned, most of I-64 from Kingshighway Blvd. to Jefferson Ave. is the original infrastructure that was constructed between the 1930s and 1980s.

1.3.2 Land Use

St. Louis was first settled by Europeans in 1764 as a fur trading post due its location near navigable waters and being out of the floodplain. In 1803, St. Louis was sold to the United States from the French as part of the Louisiana Purchase. Famed for the starting point of western expansion by explorers Meriwether Lewis and William Clark, the town would eventually be known as the Gateway to the West. The area became well established in the 19th century as a center for trade. Until 1876, the City of St. Louis was part of St. Louis County, but was then voted to separate from the county as the nation's first home rule city. Growth continued, driven by rail and water transportation, and St. Louis was ranked the fourth largest city in the nation by the 1890s.

Several institutions saw the importance of St. Louis during its early establishment. Within the study area are portions of St. Louis University (1818), Washington University in St. Louis (1853), and Harris Stowe State College (1857). These schools helped develop industry leaders and foster the growth of the city.

In the early 1900s the city continued to grow through industry, which subsequently brought migrant workers. St. Louis industry consisted of factories, warehouses, breweries, and power plants. One of the major factories in the study area is the Foundry, which was originally the Century Electric Co. It was known for producing electric motors and eventually constructed a foundry on site to maintain production (Lawrence Group, 2022). Other historical industrial sites include the Laclede Gas Light Company on Chouteau Ave. and east of Taylor Ave., and the 138th Infantry Missouri National Guard Armory west of Grand Blvd. and south of I-64.

Forest Park hosted a World's Fair: the Louisiana Purchase Exposition in 1904. World War I and World War II industries attracted additional migrants to the city, resulting in suburban expansion into St. Louis County as the city became overpopulated. The flux of people fleeing to the suburbs caused the City of St. Louis to focus on making improvements within their limits. In the 1950s there was renewed growth with emphasis placed on public housing programs, transportation, and construction of the Gateway Arch and Busch Memorial Stadium (City of St. Louis, 2022a).

1.3.3 Natural Resources

The following natural resources have been affected by growth in the study area:

- Air Quality – The industriousness of the city led to increased levels of ozone by 1991. More information can be found in Section 5.0.
- Terrestrial Habitat and Ecological Significance- Since the 1800s, the growth of St. Louis has resulted in a continued decrease in terrestrial habitat. Forest Park remains one of the few large tracks of land providing ecological benefit.
- Floodplains – Constructed in 1974, the St. Louis Flood Protection Project Levee System runs 11.4 miles along the western bank of the Mississippi River. It protects 7,472 people and 700 buildings (USACE, 2022). It is important to note the floodplains do not extend into the study area.
- Water Resources – The more prominent river that flows through the study area is the River des Peres. During the growth of the city, this river became toxic from pollution and would continually flood. In the 1930s, the Works Progress Administration project diverted the entire channel underground (Missouri Historical Society, 2022).

1.3.4 Human Resources

The following human resources have been affected by growth in the study area:

- Hazardous Materials- The historically industrious nature of the city resulted in several hazardous sites in the study area that are recorded in Missouri's E-START database. These sites are shown in Section 6.0.
- Visual Environment- Continued development and booming populations resulted in rapid expansion of I-64 mainline and bridges. The result of this expansion gives the study area the visual character it has today.
- Parks and Recreation – Forest Park is one of three parks in the study area and is by far the oldest, dating back to 1874 (University of Missouri- St. Louis, 2022). Hudlin Park was previously an extension of Forest Park, but after Barne's Hospital built its underground parking garage in 1974, a section of the park was cut off and renamed Hudlin Park (Washington University School of Medicine in St. Louis, 2022). Chouteau Park is one of St. Louis' newest parks, being developed in 2008.

2.0 PREVIOUS PLANNING STUDIES

Several studies have investigated various aspects of the environmental concerns in the study area. The following studies were reviewed to inform this report (listed by date published).

- Forest Park Southeast Revitalization Plan (Urban Design Associates, 1999)
- Parks and Open Space Plan (City of St. Louis, 2004)

- Strategic Land Use Plan of the St. Louis Comprehensive Plan (City of St. Louis, 2005)
- I-64 - Route 40 Corridor, City of St. Louis and St. Louis County, Final Environmental Impact Statement (MoDOT, 2005)
- Cortex West Redevelopment Plan (CORTEX West Redevelopment Corporation, 2005)
- Ecological Approach to Infrastructure Development For the East-West Gateway (EWG, 2011)
- St. Louis Midtown 353 Redevelopment Plan (Development Strategies, 2016)
- Brickline Greenway Designs and Plans (Previously Chouteau Greenway)
  - The Making of a Greenway (Great Rivers Greenway, 2019)
  - The Chouteau Greenway Framework (Great Rivers Greenway, 2019)
  - The Loop + The Stitch Chouteau Greenway (Stoss Landscape Urbanism et al., 2018)
  - Chouteau Greenway Braid (James Corner Field Operations et al., 2018)
  - +StL Growing an Urban Mosaic (TLS Landscape Architecture et al., 2018)
- Environmental Racism in St. Louis (Washington University School of Law, 2019)
- Design Downtown STL Master Plan (Interface Studio, 2020)

2.1 SUMMARY OF RELEVANT STUDIES

Forest Park Southeast Revitalization Plan

This study focused on improving the Forest Park Southeast neighborhood by receiving feedback from the community and identifying nine areas of improvement. These areas included emphasizing residential over commercial, provide various housing types and price ranges, support rehabilitation of historic houses, etc. This study provides valuable context for how the community envisions the neighborhood in the future. However, the City of St. Louis Commission did not adopt this plan, and the Strategic Land Use Plan (SLUP) of the St. Louis Comprehensive Plan took its place.

Parks and Open Space Plan

The SLUP was used as a springboard to start the Parks and Open Space Plan, which emphasized improving the city parks system, greenways and bike trails, streetscape aesthetics, and restoration of the natural environment. The guiding principles from the SLUP helped the plan identify the themes and actions that are carried forward through an implementation guide. This study emphasizes the importance the city and community places on the development of parks, open spaces, and natural areas. Similar to the Forest Park Southeast Revitalization Plan, this plan was not adopted by the City Commission.

Strategic Land Use Plan of the St. Louis Comprehensive Plan

This is the City of St. Louis active planning document that informs the community and developers of the land use focus in the city. It was adopted in 2005 to replace the previous planning document implemented in 1947. It is continuously revised to adapt current goals and visions of the city. The SLUP outlines five major themes, including eliminating problems, solidifying district identity, promoting district improvement, assembling land/buildings, and

building a toolbox. Understanding and implementing the strategies in this document is paramount to the success of implementing future projects identified as part of the Future64 PEL study.

I-64 - Route 40 Corridor, City of St. Louis and St. Louis County, Final Environmental Impact Statement

The Final Environmental Impact Statement for a MoDOT project to reconstruct the existing I-64/US 40 facility with new interchange configurations, bridges, and roadways was completed in 2015. The eastern terminus of the project extended to the west of Sarah St., which is in the Future64 study area. This report identifies environmental concerns that may be adjacent or within the Future64 study area related to historic resources, socioeconomic factors, hazardous sites, and noise.

Cortex West Redevelopment Plan

The principal rationale for the creation of this plan in Midtown St. Louis is the unique juxtaposition of the region's primary life science resources within this area. The Redevelopment Area is generally bounded by Forest Park Ave. and Laclede Ave. on the north, US 40/I-64 on the south, Newstead Ave. and Taylor Ave. on the west, and Vandeventer Ave. on the east. Goals of this plan are to encourage the development of urban businesses and research. which is already present through Washington University Medical Center, Barnes-Jewish Hospital, and St. Louis Children's Hospital, and St. Louis University's Medical School. This plan suggests removing or rehabilitating blight in the area, which is present in the deteriorating infrastructure.

Ecological Approach to Infrastructure Development For the East-West Gateway

This plan created an ecological significance map for the eight-county East-West Gateway planning region surrounding St. Louis. This map was developed by ranking patches of natural and semi-natural vegetation using a suite of attribute variables important to ecological significance. For transportation projects, this mapping provides a quick method for identifying natural communities that may provide many benefits to the local ecology of the study area.

St. Louis Midtown 353 Redevelopment Plan

In 2016, an ordinance approved this redevelopment plan of midtown, which stretches from 39th St., Spring Ave., and Vandeventer Ave. on the west to Compton Ave. on the east, and from Laclede Ave. and I-64 on the north to Park Ave. and I-44 on the south. In total, the 324-acre plan aims to follow the Cortex concept of an "Urban Business / Research District" that was advanced in the mid-2000s. The goal of the plan is to foster the development of new businesses and institutions that complement and take advantage of these existing institutional anchors and create an environment that links their respective urban campuses. Redevelopment of the area would incur sustained economic benefits and substantial private investment.

Brickline Greenway Plans and Designs (Previously Chouteau Greenway)

In 2017, the Great Rivers Greenway hosted a design competition for the Brickline Greenway, which would connect Forest Park to the Gateway Arch. The goal of the greenway is to provide equitable opportunity for the community, promote economic development, and add unique character through architectural designs and landscaping. This planning study addresses just part

of the greenway trail systems that intertwine through St. Louis, which are an important consideration for land uses in the Future64 study area.

Environmental Racism in St. Louis

Washington University School of Law conducted this study to identify the environmental injustices that disproportionately endanger public health for the people of color and low-income individuals, and to advocate for remedies to these injustices. These environmental concerns included lead poisoning, asthma, mold, air pollution, home energy costs, and limited access to food. Socioeconomics and environmental justice are vital considerations in transportation studies, and this study gives valuable context to the Future 64 study area.

Design Downtown STL Master Plan

The Design Downtown STL Master Plan is the result of a year-long collaborative process to create a vision for the future of Downtown St. Louis, which encompasses a 2.2 square mile area bordered by Cole St. to the north, Chouteau Ave. to the south, the Mississippi River to the east, and Jefferson Ave. to the west. The last adopted plan for Downtown (Downtown Now) was completed over 20 years ago. There are two prior plans for the Downtown area that provide a foundation for the Design Downtown STL planning effort. The 1999 Downtown Now Plan was officially adopted by the City of St. Louis and remains the official neighborhood plan for Downtown. A 10-year update (Downtown Next) was completed but not formally adopted by the City Commission . More than 20 planning studies and project plans have been written in the past 20 years within downtown, St. Louis, and the region. The Design Downtown STL Master Plan embodies these plans and helps connect the ideas and purpose behind them, making this plan a valuable resource for identifying needs of the Future64 study area.

3.0 LAND USE AND ZONING

3.1 REGULATORY CONTEXT

Land use analysis is a required component of PEL study analysis within 23 USC 168. Land use and development analysis is done to inform future transportation improvements and to determine consistency with local plans. Since the study area is entirely within St. Louis city limits, land use planning is the primary responsibility of the City of St. Louis. However, neighborhoods within the Future64 study limits may have more granular plans that touch on specific needs.

3.2 RESOURCE DESCRIPTION

Current and future land use represent the way landscape is utilized and how it will grow with the community. Zoning and trends in growth patterns reveal areas for improvement and how the City of St. Louis can develop to match socioeconomic needs. Transportation infrastructure plays a vital role in connecting land uses and is, therefore, considered for this PEL study.

3.3 METHODOLOGY

A thorough desktop review was conducted of geographic information systems (GIS) data for current and future planned land use and zoning data available through the City of St. Louis. The Planning Department for the City of St. Louis prepared the SLUP in 2005, which identifies land use needs and future improvements. The SLUP and the Comprehensive Plan are reviewed

annually and have been amended ten times since inception. Other land use plans have been prepared for the area and are described in Section 2.0. These documents are referenced when describing the existing land use in the study area. Google Maps and Google Earth were also used to identify notable commercial types and neighborhoods in the study area.

A Community Assessment Baseline Technical Memorandum prepared by Development Strategies documents an in-depth investigation of the economy and market within an expanded study area north and south of the Future64 study area (Appendix A). A more detailed description of the technical memorandum is in the Socioeconomics section – Section XX. The land use and zoning data from the technical memorandum informed the existing conditions analysis for these resources in the environmental study area defined in Section 1.2.

3.4 RESULTS

3.4.1 Existing Land Use

Zoning in the study area is a mix of residential, commercial, business, industrial, and unrestricted uses, as shown in Figure 2. Several public and private schools are in the study area, including St. Louis University, Harris-Stowe State University, Gateway/Hubert Wheeler Elementary, and Stix ECC Elementary. The unrestricted zoning is a mix of industrial and commercial. The study area can be divided into three zones—Kingshighway Blvd. to Sarah St., Sarah St. to Grand Blvd., and Grand Blvd. to Jefferson Ave.

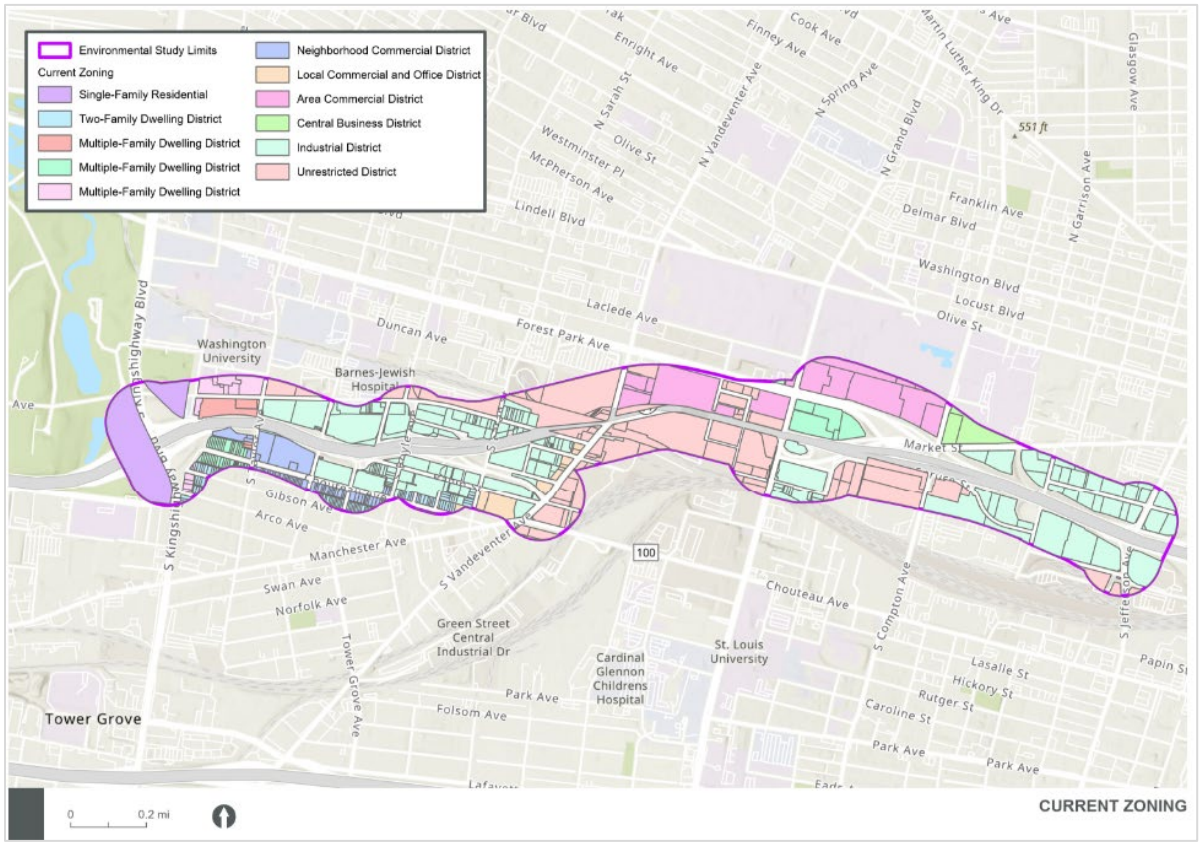
- Kingshighway Blvd. to Sarah St. is zoned primarily residential and industrial. Residential buildings are located along the outskirts of the study area, with the industrial zones being focused closer to I-64. However, zoning districts do not actually imply the current land use. For example, Chouteau Park and Stix ECC Elementary School are in industrial zones. A current land use map shown in Figure 3 is a more accurate depiction of the land uses in the area. Multifamily residential uses include Aventura at Forest Park Apartments, Hue Apartments, townhomes between Kingshighway Blvd. and Taylor Ave. Other single-family residential uses are along Chouteau Ave. Commercial buildings dominate the north side of I-64 and include Washington University, Central Institute for the Deaf, Shriners Children's St. Louis Hospital, and Barne's Jewish Hospital.

- Sarah St. to Grand Blvd. is zoned primarily industrial and unrestricted. This area includes such companies as IKEA, soap and coffee manufacturers, the Armory District, and various other enterprises. The Foundry, located north of I-64 and south of Forest Park Ave., is the only location with food and beverage businesses within this section of the study area. The Brickline Greenway trail is currently under construction in this area and will extend to the Mississippi River.

- Grand Blvd. to Jefferson Ave. is zoned a mix of residential, commercial, industrial, and unrestricted. The area north of Market St. and Forest Park Ave. includes Marchetti Towers Apartments and Grand Forest Apartment Complex, which are west of the St. Louis University Chaifetz Sports Arena and Harris Stowe State College Sports Fields. Between I-

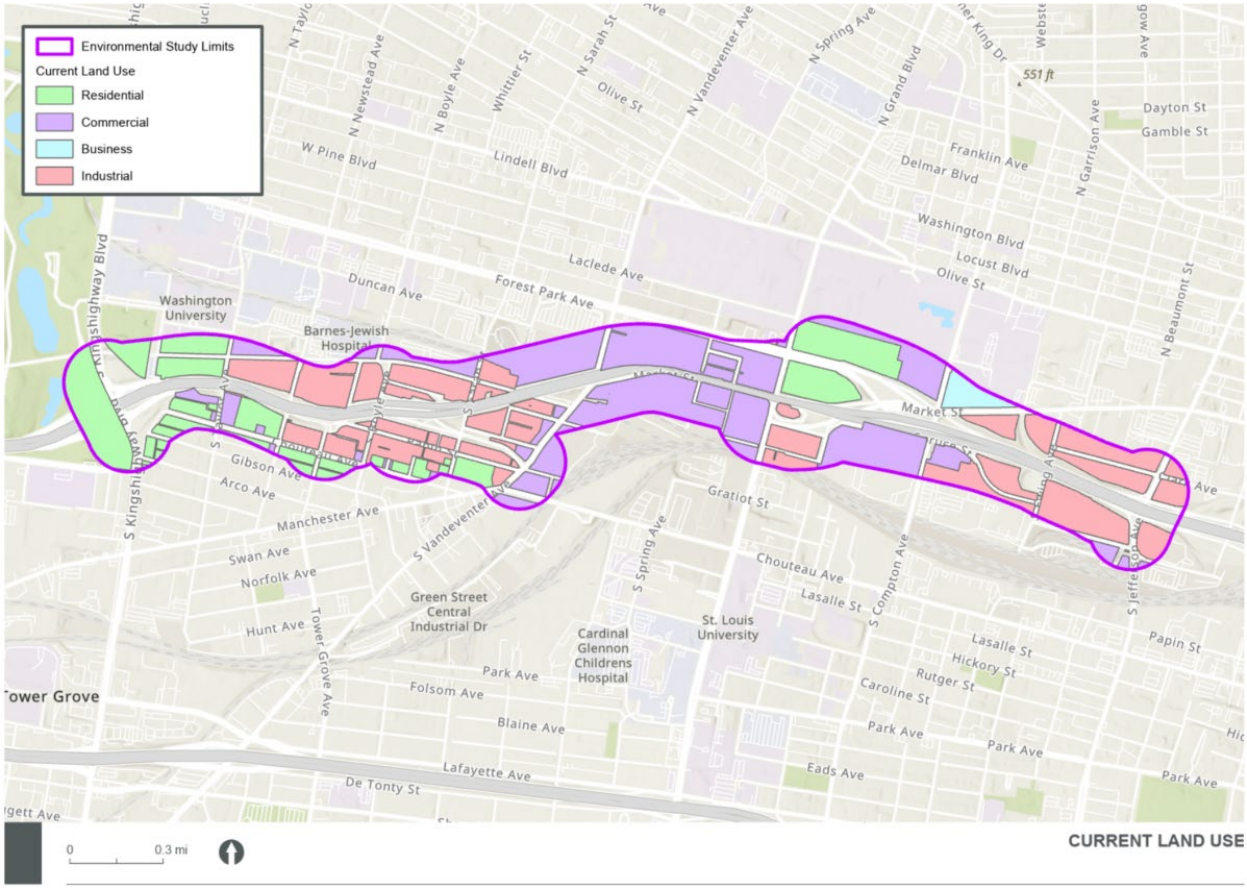
64 and Forest Park Ave. are the Council Tower Senior Apartments. The south side of I-64 to Jefferson Ave. is primarily non-public facing commercial enterprises except for the Residence Inn Hotel, Gateway Region YMCA, and Starbucks.

Figure 2. Existing Zoning Districts 2021



Source: (City of St. Louis Building Division, 2022)

Figure 3: Current Land Use

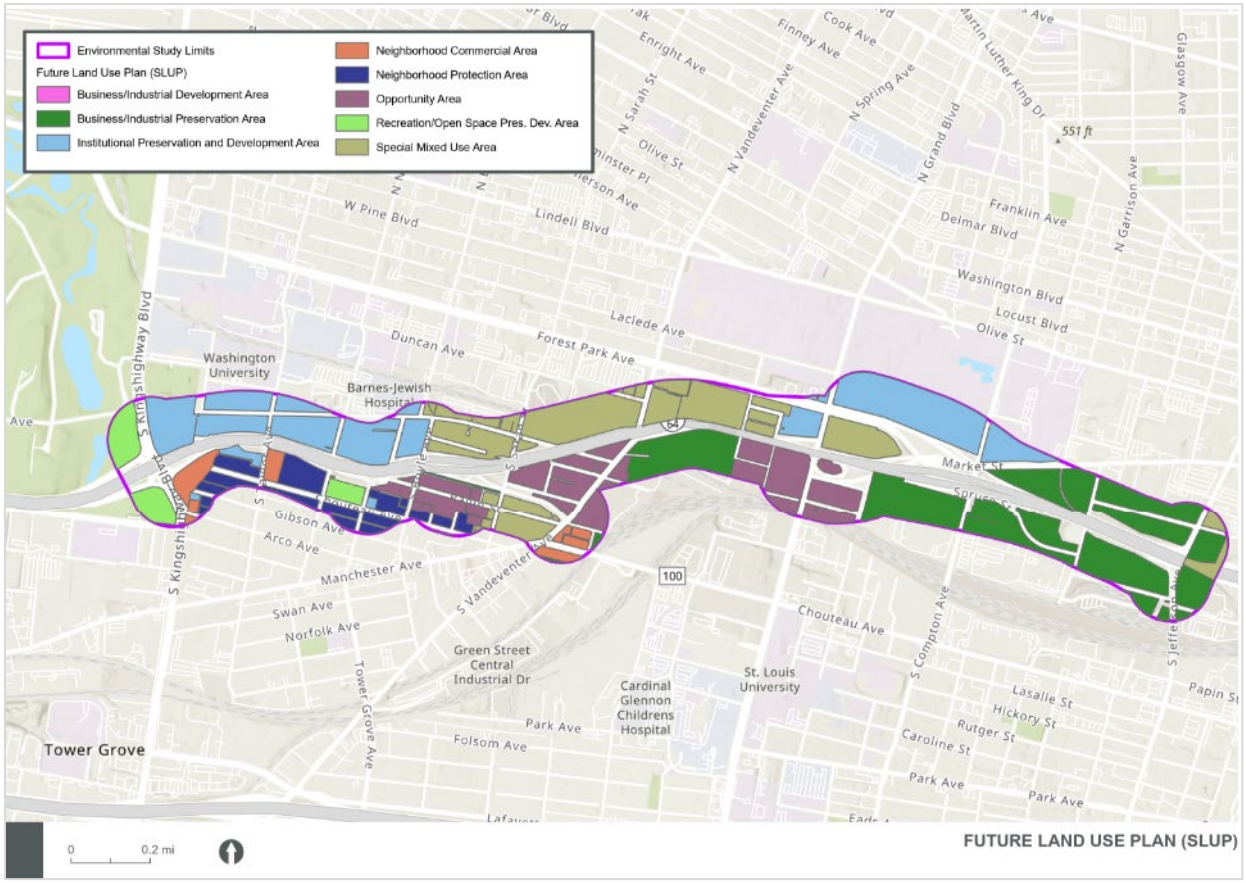


3.4.2 Future Land Use

The SLUP divided the future land use plan into zones of preservation, development, and specific areas for improvement. Areas of preservation are meant to promote the existing land use, while development areas have flexibility in preserving the land use through in-kind redevelopment or making modifications to the land use through a different kind of development. Opportunity areas are key underutilized locations where the use of the land is in transition.

Location and site characteristics of these areas offer particular challenges or opportunities that could be advantageous to a range of development activity. Special mixed-use areas are like downtown St. Louis where it is intended that a unique mix of uses be preserved and developed. As Figure 4 shows, the outer edges of the study area have a relatively similar land use plan compared to current zoning. The central portion of the study area has been identified as an area with opportunity and special mixed use.

Figure 4. Future Land Use



Source: (City of St. Louis Planning Dept., 2005)

The land use planning studies reviewed in Section 2.0 outline improvement opportunities for urban business and research, greenway trails, and environmental socioeconomic equity. The Cortex West Redevelopment Plan and newer St. Louis Midtown 353 Redevelopment Plan outline the importance of additional urban business and scientific research facilities in the area. The plan emphasizes how investing in the universities and hospitals in the area will increase long-term job opportunities and maintain the leadership St. Louis academia and businesses have in the national market.

The Forest Park Southeast Revitalization Plan, Parks and Open Space Plan, and Brickline Greenway Design Plan highlight the importance communities place on natural spaces, parks, bike-ped modality, and landscaping. The Brickline Greenway Design Plan connects Forest Park to the Gateway Arch and would present an opportunity to incorporate the aforementioned community ideals.

The Community Assessment Baseline Technical Memorandum describes the tremendous growth and development in real estate over the past 20 years in the study area. There has been an increase in single- and multifamily homes, biotechnology and research institutions, hospital

infrastructure, and private mixed-use development. Overall, the study area has seen growth across the board in recent years, with projections indicating further growth.

Just east of Jefferson Ave. begins the St. Louis Downtown area, which has been a spotlight for planning studies over the last 20 years. The most current document written is the Design Downtown STL Master Plan, which has been adopted by the St. Louis City Commission. The plan highlights the need for adding residential homes and increasing job growth. A lack of street activity has contributed to an increased crime rate, and the plan advocates for the planned Brickline Greenway and residential growth. Overall, the plan's goal is to unite the vision of multiple planning studies, neighborhoods, and stakeholders to empower positive change.

3.5 RECOMMENDATIONS

Local government and private stakeholders are investing heavily in the Future64 study area, which speaks to the necessity for public engagement during the PEL study process. As this area continues to develop, it is recommended that MoDOT consider changes to City of St. Louis zoning districts and SLUP as more residential and commercial properties are established so that future projects are considering the changing land use. Furthermore, several planning studies already unite the ideas of residents and stakeholders and showcase the needs in the area. Incorporating the results of these studies and ideals into the Future64 PEL study process will set the framework for projects in the study area to blend with the needs of the corridor and surrounding communities.

4.0 RIGHT-OF-WAY

4.1 REGULATORY CONTEXT

According to the MoDOT Engineering Policy Guide, "The acquisition of right-of-way for transportation improvements is a complex undertaking. All activities associated with acquisition, including those applicable to title search, appraisal, negotiations, payments, closings, condemnation, possession and other related activities, shall be identical, and shall be identically applied in all dealings with property owners from whom lands, property or rights must be acquired for transportation purposes without regard to the owner's race, color, religion, national origin, sex, age, ancestry or physical ability" (MoDOT, 2022a).

Applicable federal laws include the 5th and 14th Amendments to the U.S. Constitution and the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. The MoDOT Engineering Policy Guide outlines the policy and procedures necessary for right-of-way acquisition and includes federal requirements. Future projects in the study area must follow these requirements if right-of-way acquisition is necessary.

4.2 RESOURCE DESCRIPTION

MoDOT Engineering Policy Guide states, "right-of-way is defined as the property and rights wherein necessary to construct and maintain the main roadways and necessary outer roadways, entrances, and crossroads. The minimum width of right-of-way established for each project is that necessary to accommodate construction and provide proper maintenance of the roadway without an undue number of jogs in the right-of-way line" (MoDOT, 2022a).

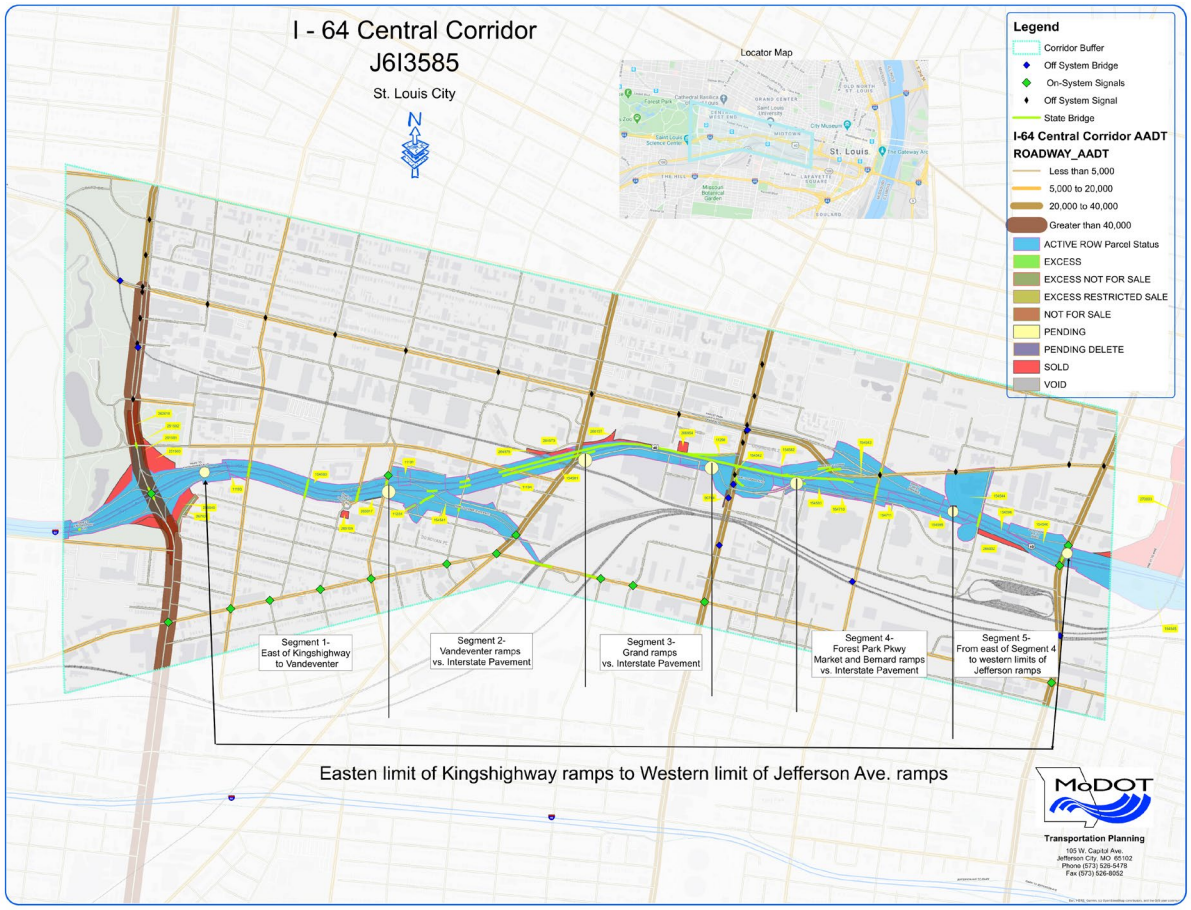
4.3 METHODOLOGY

City of St. Louis geospatial parcel viewer was used in conjunction with aerial imagery to identify the existing MoDOT right-of-way limits.

4.4 RESULTS

Beginning from Kingshighway Blvd. to Sarah St., the right-of-way width varies greatly from the parcel blocks that accommodate the winding highway and various interchanges, such as Papin St. and Tower Grove Ave. Extending east to Grand Blvd., I-64 begins to merge and raise to a double-decker, which narrows the right-of-way to around 100 feet. Between Grand Blvd. and Compton Ave. is a large interchange where Market St. and Forest Park Ave. connect to I-64. The right-of-way north of I-64 and south of Forest Park Ave. is separated by the Council Tower senior apartments and is not owned by MoDOT. Figure 5 shows the right-of-way boundaries and parcel status in the study area.

Figure 5. Existing Right-of-Way and Parcel Status



Source: MoDOT.

5.0 AIR QUALITY

5.1 REGULATORY CONTEXT

Neither the PEL statute nor the PEL regulations require air quality analysis for a PEL study. The Clean Air Act (CAA) requires the United States Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standards (NAAQS). The USEPA then tracks levels of carbon monoxide, lead, particulate matter, ozone, nitrogen dioxide, and sulfur dioxide, which are compared to the NAAQS, and this determines an area's attainment status. All non-attainment areas, or areas that exceed air quality thresholds, are subject to a provision in CAA §176(c) known as transportation conformity. The intent of the transportation conformity process is to fully coordinate transportation and air quality planning so that the implementation of transportation plans, programs, and projects will not 1) cause or contribute to any new violation of the NAAQS, 2) increase the frequency or severity of any existing NAAQS violations, or 3) delay timely attainment of the NAAQS or any required interim emissions reductions or other milestones in any area (FTA, 2022). USEPA delegates the responsibility of enforcing the conformity requirements to FHWA. Transportation conformity is not required for a PEL study.

5.2 RESOURCE DESCRIPTION

The USEPA has established NAAQS and tracks levels of ozone (8-hour and 1-Hour), particulate matter less than 2.5 microns ($PM_{2.5}$) and less than 10 microns (PM_{10}), sulfur dioxide, lead, carbon monoxide, and nitrogen dioxide (USEPA, 2022a). Gasoline vehicles and highway projects can negatively contribute to air quality, which is an important consideration for areas with elevated levels of these pollutants.

5.3 METHODOLOGY

Air quality standards are tracked by political boundaries, such as a county or city. The smallest-scale area recorded near the study area is the City of St. Louis; therefore, the study area was set to these limits. The USEPA Green Book contains the most recent data on areas that are in non-attainment. USEPA last updated the Green Book on December 31, 2021, (USEPA, 2022b).The Green Book was accessed on January 27, 2022, to identify the air pollutants in the City of St. Louis that were in non-attainment.

5.4 RESULTS

As of January 27, 2021, the City of St. Louis is has been in non-attainment for 8-hour ozone since 2018. No other pollutants are in non-attainment. The history of the City of St. Louis non-attainment air pollutants is shown in Table 1. Sources of ozone include vehicle emissions, vehicular traffic, and construction (Congressional Research Service, 2022).

Table 1. Non-Attainment Air Pollutants for City of St. Louis, Missouri

Pollutant	Currently in Non-Attainment	Years
8-Hour Ozone	Yes	2018-2021
1-Hour Ozone	No	-
PM_{10}	No	-

Pollutant	Currently in Non-Attainment	Years
$PM_{2.5}$	No	2005-2018
Carbon Monoxide	No	1992-1998
Sulfur Dioxide	No	-
Lead	No	-
Nitrogen Dioxide	No	-

Source: (USEPA, 2022b), accessed January 27, 2021.

5.5 RECOMMENDATIONS

The study area is in a nonattainment area for ozone. Therefore, the conformity requirements of the CAA apply. This means that any improvements that result from this PEL study process are subject to regional and local conformity requirements. Future transportation improvements must be included in a fiscally constrained metropolitan transportation plan and in a Transportation Improvement Program. During future NEPA processes, local air quality analysis is needed to assess whether future ozone conditions may cause an exceedance of the NAAQS. If so, mitigation will be required.

6.0 HAZARDOUS MATERIALS

6.1 REGULATORY CONTEXT

Hazardous materials analysis is not required for a PEL study. Hazardous materials are regulated by the Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Superfund Amendments and Reauthorization Act (SARA). If any of these sites would to be infringed upon as a result of future transportation projects, these legislations would require MoDOT to potentially complete a Phase 1 Environmental Site Assessment (ESA) during a future NEPA process. A Phase 1 ESA is a survey that identifies current and historic land use, and any potential contaminated sites such as those listed in Table 3. If future projects within the study limits impact identified contaminated sites, remedial action may be necessary.

6.2 RESOURCE DESCRIPTION

Identifying hazardous materials is important for planning transportation projects as changes to I-64 could overlap with areas that have the potential to release contaminants into the environment, which could impact public health and the environment. These areas may include underground storage tanks, commercial properties with current or historic use of hazardous materials, and active or remediated spill sites.

6.3 METHODOLOGY

Within Missouri, the USEPA delegates the management and regulation of hazardous materials to the Missouri Department of Natural Resources (MDNR) that records hazardous material sites in its E-Start GIS database (MDNR, 2022a). The following hazardous sites are documented in the

database: Superfund Federal Facilities, Hazardous Waste Treatment, Storage and Disposal Facilities, Brownfields/ Voluntary Cleanup Program, Brownfield Assessments, and Petroleum and Hazardous Substance Storage Tank Facilities. This database was accessed on February 11, 2022, to determine the presence of potentially hazardous materials located in the study area.

6.4 RESULTS

Table 2 lists the underground storage tanks (UST) located in the study area. USTs typically contain petroleum and are most used by the public at gas stations. Table 2 identifies each UST as either operating, former, or other known petroleum facilities. Operating USTs are actively being used, while former USTs and other known petroleum facilities are not currently used. The ID number corresponds to the location in Figure 6.

There are three active service stations and one UST at Barnes-Jewish Hospital. The inactive USTs are located on a mix of industrial or commercial properties, such as rail yards, trucking companies, and rental car companies.

Table 2. Operating, Former, or Other Known Hazardous Material Underground Storage Facilities

ID	Facility Name	Address	Hazardous Storage Type	Contaminants
28	CROWN 40 INC	300 S JEFFERSON	All Operating UST Facilities	Petroleum constituents
9	QUIKTRIP #671	904 S VANDEVENTER AVE.	All Operating UST Facilities	Petroleum constituents
4	CLAYTON AVE. BUILDING	4353 CLAYTON AVE.	All Operating UST Facilities	Petroleum constituents
12	ALLIANCE PETROLEUM LLC DBA VANDEVENTER PHILLIPS 66	733 S VANDEVENTER AVE.	All Operating UST Facilities	Petroleum constituents
6	GOEDECKE, WOOD & CO, INC	4101 CLAYTON AVE.	Former UST Facilities	Petroleum constituents
14	STORAGE LOT	4450 W PAPIN ST.	Former UST Facilities	Petroleum constituents
21	FAMOUS BARR	3728 MARKET ST.	Former UST Facilities	Petroleum constituents
18	FRUEHAUF TRAILER SERVICES INC	214 S VANDEVENTER AVE.	Former UST Facilities	Petroleum constituents
8	FIN-CLAIR CORPORATION	4001 GRATIOT	Former UST Facilities	Petroleum constituents
10	GENERAL EQUIPMENT COMPANY	3952 CLAYTON AVE.	Former UST Facilities	Petroleum constituents

Table 2. Operating, Former, or Other Known Hazardous Material Underground Storage Facilities

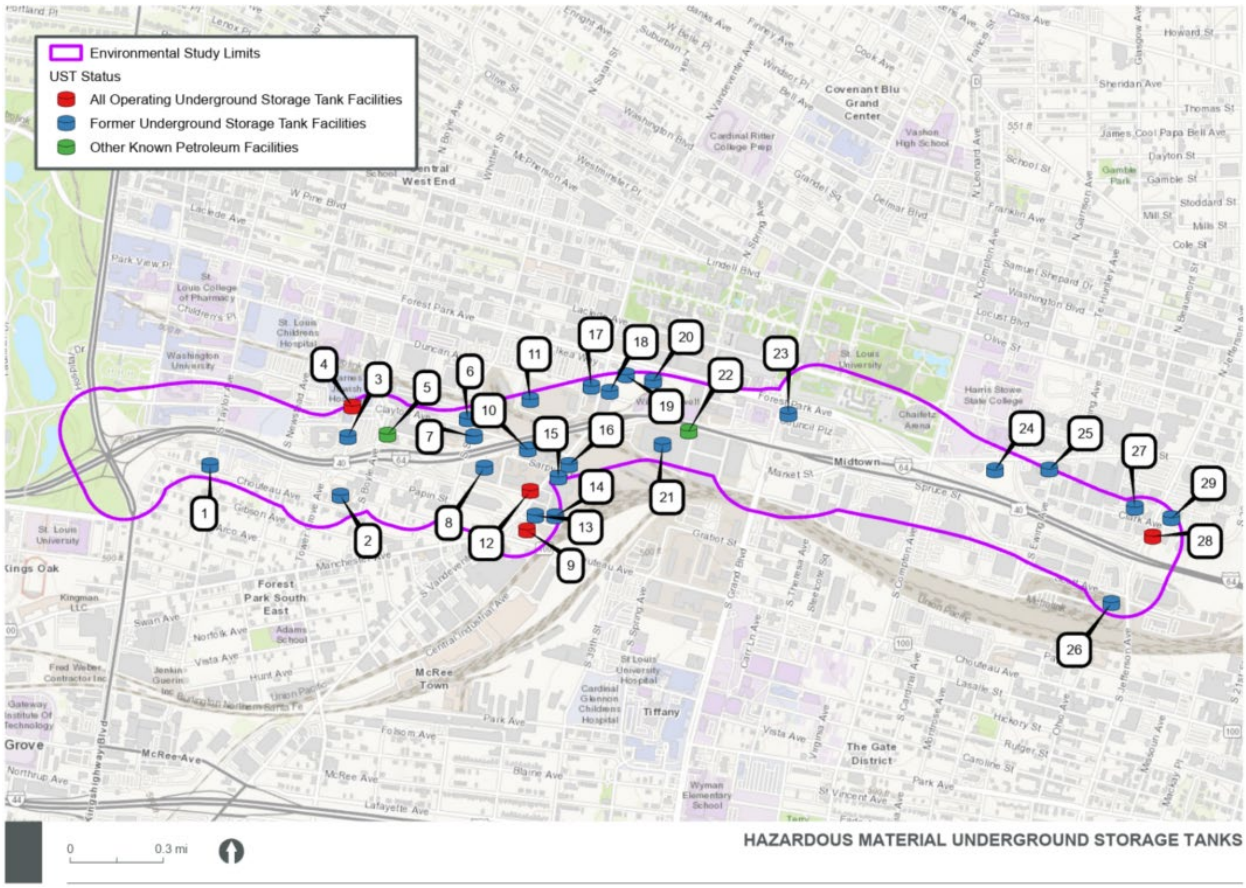
ID	Facility Name	Address	Hazardous Storage Type	Contaminants
24	HERTZ EQUIPMENT CORPORATION	3030 MARKET ST.	Former UST Facilities	Petroleum constituents
3	PEPSI-COLA BOTTLING CO OF ST LOUIS	647 TOWER GROVE AVE.	Former UST Facilities	Petroleum constituents
2	ARCHWAY SALES	4321 CHOUTEAU	Former UST Facilities	Petroleum constituents
20	WAGNER DIV COOPER IND	3700 FOREST PARK BLVD.	Former UST Facilities	Petroleum constituents
7	FLINT INK, CORPORATION	4044 CLAYTON AVE.	Former UST Facilities	Petroleum constituents
29	CREDIT SYSTEMS INC	220 S JEFFERSON AVE.	Former UST Facilities	Petroleum constituents
15	VANDEVENTER TRUCK SALES	700 S VANDEVENTER AVE.	Former UST Facilities	Petroleum constituents
25	SUNOCO STATION-FORMERLY	2900 MARKET ST.	Former UST Facilities	Petroleum constituents
19	FOREST PARKWAY	3834 FOREST PARKWAY	Former UST Facilities	Petroleum constituents
13	UNION PACIFIC	824 S VANDEVENTER AVE.	Former UST Facilities	Petroleum constituents
27	YELLOW FREIGHT SYSTEM INC	2701 CLARK ST.	Former UST Facilities	Petroleum constituents
26	FORMER RAILROAD INSPECTION YARD	JEFFERSON AND SCOTT AVE.	Former UST Facilities	Petroleum constituents
16	LACLEDE CAB COMPANY	600 S VANDEVENTER	Former UST Facilities	Benzene, TPH-GRO, Petroleum constituents
11	4018 DUNCAN AVE.NUE	4018 DUNCAN AVE.	Former UST Facilities	Lead, Petroleum constituents
23	FORMER COUNCIL PLAZA 66 SERVICE STATION/DEL TACO	212 S GRAND BLVD.	Former UST Facilities	Petroleum constituents
17	IKEA PROPERTY	225-231 S VANDEVENTER	Former UST Facilities	Lead, Petroleum constituents

Table 2. Operating, Former, or Other Known Hazardous Material Underground Storage Facilities

ID	Facility Name	Address	Hazardous Storage Type	Contaminants
1	STOCHL CO, INC	4501 CHOUTEAU AVE.	Former UST Facilities	Petroleum constituents
5	ST LOUIS CRYSTAL WATER COMPANY	704 S BOYLE AVE.	Other Known Petroleum Facilities	
22	FAMOUS BARR - SPRING AVE. WAREHOUSE	SPRING AVE. AND MARKET ST.	Other Known Petroleum Facilities	Petroleum constituents

Source: (MDNR, 2022a)

Figure 6. Underground Storage Tanks

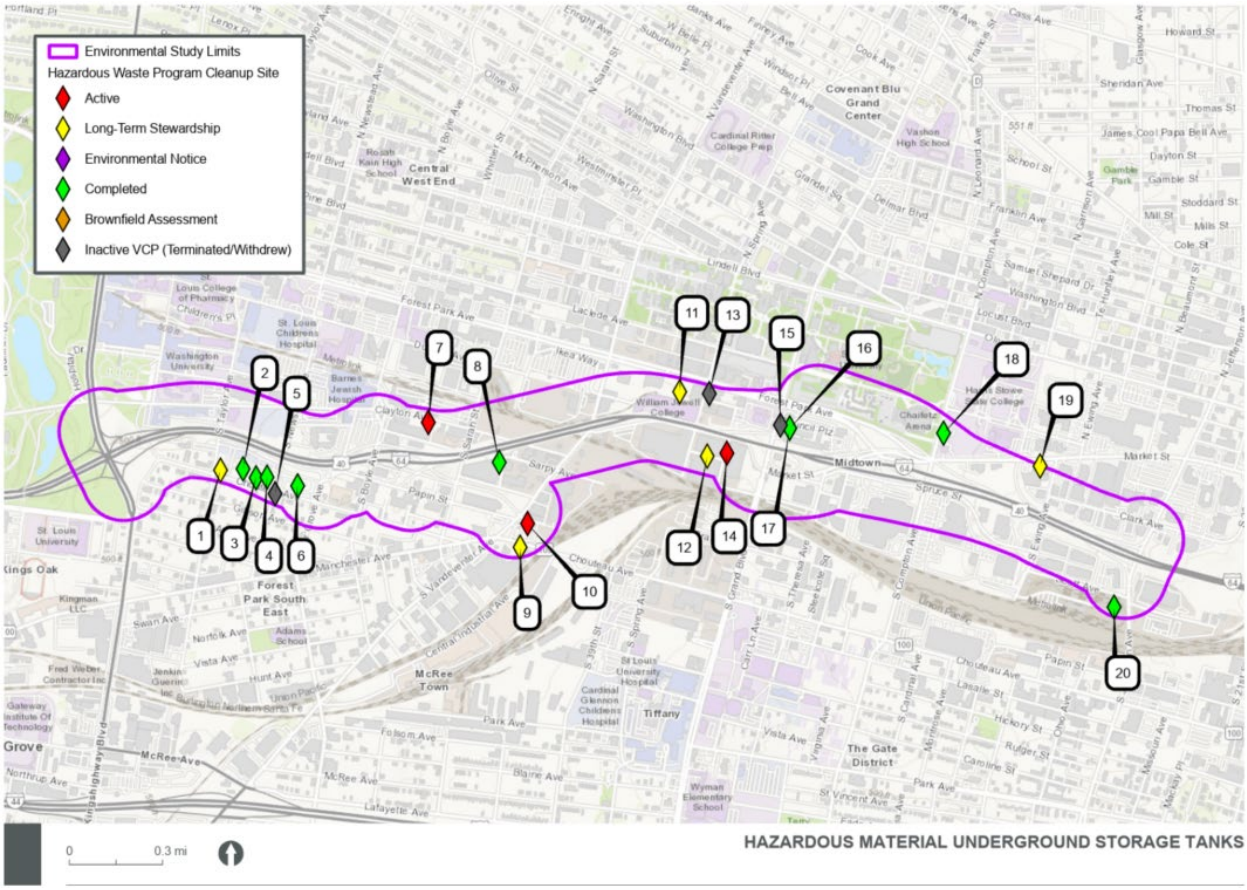


Source: (MDNR, 2022a)

Listed in Table 3 are hazardous waste cleanup sites, also known as brownfield sites, in the study area. The ID number can be associated with the site's location in Figure 7. Inactive voluntary cleanup programs (VCP) are sites that the community has previously identified and inspected, but the contaminants have not been contained. Completed sites have been inspected, cleaned, and confirmed safe. Long-term stewardship sites have contaminants that are not easily extracted from the environment and require many years to contain. Lastly, active sites are those that are not under long-term stewardship and in the process of containing.

There are three active sites, three inactive VCPs, nine completed sites, and six long-term stewardship sites in the study area.

Figure 7. Hazardous Program Cleanup Sites



Source: (MDNR, 2022a)

6.5 RECOMMENDATIONS

With four active USTs and nine active or long-term hazardous sites in the study area, MoDOT must consider the potential impacts to these sites and any associated remedial action at the sites that could result from construction of future projects in the study area.

Table 3. Hazardous Waste Cleanup Sites

ID	Name	Address	Activity Status	Clean Up Summary
13	Falstaff Development	3674-3690 Forest Park Ave.	Inactive VCP	Phase I and II ESA revealed the presence of asbestos-containing materials (ACM), lead-based paint (LBP), suspect polychlorinated biphenyl (PCB)-containing fluorescent light ballasts and mercury-containing light tubes, possible freon in the air conditioners and potential mercury in the heating, ventilating, and air conditioning (HVAC) system. The site has applied to the brownfield voluntary cleanup program (BVCP) to address these issues.
15	Council Towers Redevelopment Project	310 S. Grand Blvd.	Inactive VCP	A Phase II ESA documents ACM, LBP, and miscellaneous items, such as fluorescent bulbs and ballasts; mercury-containing thermostats; and a quantity of paints, solvents, detergents, etc. used for building maintenance.
5	Jones Storage Building	4398 Chouteau Ave.	Inactive VCP	Previous inspections have revealed the presence of ACM, LBP, and household hazardous waste throughout the building. Estimated reuse is expected to remain as residential.
18	Vashon Park Recreation Center	3145 Market St.	Completed	An ESA revealed the existence of residual petroleum contamination in soils surrounding an underground fuel oil tank formerly located between the recreational building and the swimming pool. Actions were taken in accordance with the MDNR-approved Remedial Action Plan to remediate the site through excavation and off-site disposal.
20	Former Railroad Maintenance Yard	Jefferson Ave. at Scott St.	Completed	An ESA revealed the existence of petroleum, PCB and metals contamination in surface and subsurface soil and fill material on the site. In accordance with the MDNR-approved Remedial Action Plan for the site, contaminated soils were excavated and disposed of off site.
16	Council Plaza Redevelopment Parcel 1	300 S. Grand	Completed	Remediation consisted of abatement of hazardous building materials. These included ACM, LBP, fluorescent light bulbs, PCB-containing light ballasts, and miscellaneous hazardous materials. No hazardous building materials were left in the buildings.
17	Council Plaza Redevelopment Parcel 2	300 S. Grand	Completed	A Phase II ESA was conducted to assess potential impacts to soil and groundwater. Groundwater was not encountered. Elevated levels of lead and polycyclic aromatic hydrocarbons (PAH) were discovered in soil. Black material observed in soil borings was suspected to be petroleum hydrocarbons from the former truck sales and service facility.

Table 3. Hazardous Waste Cleanup Sites

ID	Name	Address	Activity Status	Clean Up Summary
				A work plan was approved to investigate and excavate soil. However, when soil was excavated, the black material was discovered to be part of a buried roadway, so soil was not removed. A Risk Assessment was conducted using soil data from the two sampling events and it was determined that the site met residential standards.
2	Laclede Gas Station G-Lot A	4427 Chouteau Ave.	Completed	Soil contaminated with lead was excavated and disposed of off site in a permitted landfill. Soil that tested hazardous for lead was stabilized to render the soil non-hazardous and all soil was disposed as special waste. The remediation included disposal of almost 7 million gallons of water, 3,376 tons of lead-contaminated soil, and LBP and ACM inside the building.
3	Laclede Gas Station G-Lot B1	4427 Chouteau Ave.	Completed	Non-friable ACM, present in roof panels and window glazing, was removed and disposed of. LBP on the interior walls, steel structure, roof drain, windows, and signs, was removed and disposed of.
4	Laclede Gas Station G-Lot C1	4427 Chouteau Ave.	Completed	Soil contaminated with lead was excavated and disposed off site in a permitted landfill. Soil that tested hazardous for lead was stabilized to render the soil non-hazardous, and all soil was disposed as special waste.
14	Green Street Armory	500 Prospect Ave.	Active	ACM and LBP were identified throughout the building. Universal wastes, heavy metal-containing light bulbs, PCB-containing light ballasts, mercury-containing switches, exit signs, water fountains, smoke detectors, etc., are located throughout the building. An unregulated fuel oil UST was discovered on the northeastern section of the building interior near the basement boiler room. Limited ESA confirmed the presence of heavy metals, petroleum products, and PAHs in site soil and groundwater.
6	Forest West	4359 Chouteau Ave.	Completed	An ESA was performed using the Missouri Risk-Based Corrective Action Guidance (MRBCA, 2006). The City of St Louis chose to use conservative target levels for the site, which would allow for unrestricted use. 2,225 tons of lead-contaminated soil and debris were excavated from the site and landfilled.

Table 3. Hazardous Waste Cleanup Sites

ID	Name	Address	Activity Status	Clean Up Summary
8	MicroFinish Facility	4001 Gratiot St.	Completed	Metals and trichloroethylene (TCE) were present above the default target levels (DTL) in soil and groundwater at the site. Site investigations revealed that no contaminants of concern in the soil or groundwater exceeded residential risk-based target levels.
7	Sarah Clayton Development: Parcel A	4101-4123 Sarpy Ave. & 4100-4146 Clayton Rd.	Active	A 2016 Phase I found that 12 USTs were used on site during the 1950s to store various industrial chemicals. Foundation staining was observed within a former hydraulic lift area. The site is currently vacant with only concrete pads and foundations remaining.
1	Station G Apartments	920 S. Taylor	Long-Term Stewardship	Total Petroleum Hydrocarbons - Diesel Range Organics found in the groundwater in the southeast area of site were at a concentration slightly above the applicable non-residential Risk-Based Target Level in a small area around two monitoring wells. Continued monitoring over a few years demonstrated that the contamination remained isolated to this area. Additionally, the size of the impacted area was not considered sufficient to cause an inhalation risk to workers, in the event a building might be placed over that area. The current, and future, use of the area is as a parking lot.
11	Century Foundry	3700 Forest Park Ave.	Long-Term Stewardship	An ESA indicated heavy metals and PAHs in the soil and groundwater, as well as the site buildings. Remedial actions included the following: excavation and disposal of heavy metal and/or PAHs impacted soil/fill material; removal and disposal of lead-impacted foundry sands from the Foundry building; abatement of ACM from the on-site structures; Management of building components containing heavy metal-based paint through an Operation and Maintenance Plan; removal and disposal of universal waste materials from the structures. removal of a Heating Oil UST from the south portion of the Byco Building. A Tier 1 ESA (MRCA, 2006) was performed and there are no complete pathways.
9	Independent Petrochemical Corporation	3960 Chouteau Ave.	Long-Term Stewardship	In November 2014, additional sampling activities (sub-slab soil gas, indoor air, and ambient air) were conducted at the site. Two of the volatile organic compounds (VOC) that had been detected at elevated levels in the previous sub-slab samples—1,1-dichloroethane (1,1-dichloroethane [DCA]) and TCE—were identified in the November 2014 sub-slab soil gas samples at concentrations exceeding the USEPA regional screening levels (RSL) for industrial air. The two indoor samples collected in the bar

Table 3. Hazardous Waste Cleanup Sites

ID	Name	Address	Activity Status	Clean Up Summary
				contained 1,1-DCA, tetrachloroethylene (PCE), TCE, and vinyl chloride. The indoor air sample collected in the warehouse contained PCE. USEPA Region 7 has recommended a vapor intrusion mitigation system in order to protect the workers and patrons of businesses at/near the site. A vapor mitigation system was installed in January 2016, and an Environmental Covenant with certain activity and use limitations was executed in September 2016.
19	Tip Top Cleaners - Market St.	2908 Market St.	Long-Term Stewardship	The PCE that was detected in the on-site soil and groundwater was delineated. A vapor intrusion investigation was conducted, with both sub-slab and indoor air samples obtained. Sample analyses indicated that PCE vapors were present both under and inside the building. A radon system was installed to vent the PCE vapors from under the building slab. Subsequent indoor air samples have indicated non-detect for vapors inside the building. A covenant is placed in the property chain-of-title to limit the site to non-residential land use and to ensure that the mitigation system continues operating.
12	Green Street Armory/AUL Area: BVCP	3660 Market St.	Long-Term Stewardship	Remedial actions included the removal of ACM and the two indoor small arms firing ranges. Miscellaneous hazardous materials and universal waste were also removed from the building. The PCBs light ballasts and two pad-mounted transformers in the basement boiler room were removed. LBP was removed from some building components and encapsulated on the steel trusses and associated framing of the Armory roof and the concrete columns in the basement garage. An operation and maintenance plan was prepared for the LBP left in place.
10	QuikTrip #671	904 S. Vandeventer Ave.	Active	In 2001, a city permit was issued for a non-regulated gasoline UST to be installed on the site. City permits also indicated that the southeastern portion of the site housed a PCE aboveground storage tank (AST), naphthalene UST, and oil and solvent ASTs associated with Independent Oil Corporation and Hudson Chemical Company. Soil and groundwater samples collected from several Phase II ESA borings identified analytes that exceeded the MRBCA DTLs. Benzo(a)pyrene was detected in soil samples above the DTLs in two borings. VOCs including vinyl chloride, cis-1,2-dichloroethene, tetrachloroethene, total petroleum hydrocarbon-gas range organics (TPH-GRO) and

Table 3. Hazardous Waste Cleanup Sites

ID	Name	Address	Activity Status	Clean Up Summary
				benzene, toluene, ethylbenzene and xylenes (BTEX) were detected in soil and groundwater samples above the DTLs.

Source: (MDNR, 2022a)

7.0 VISUAL ENVIRONMENTS

7.1 REGULATORY CONTEXT

There is no specific regulatory requirement for visual impact analysis in a PEL study or during the NEPA process, but it is typically addressed in NEPA under the community impact assessment mandated by FHWA. Further, FHWA provides guidance on identifying visual impact through the Visual Impact Assessment guidance in the Environmental Toolkit (FHWA, 2022a). Visual impacts are a key part of the overall community impacts of a transportation project.

7.2 RESOURCE DESCRIPTION

Highways and bridges have varying degrees of impact on the visual character of an area. Because I-64 is a major highway within the City of St. Louis, travelers gain a unique perspective of the city from the elevated highway in the central portion of the study area. On the other hand, because the highway has a large footprint, not generally considered aesthetically beneficial to the cityscape, which can be considered a negative impact for those looking at the highway.

7.3 METHODOLOGY

The land uses on either side of I-64 define the existing visual character of the study area. This is because the highway has raised berms along the alignment that hinder the viewshed looking toward and away from I-64, with the exception of the raised highway along the central portion of the study limits. Furthermore, several buildings adjacent to the right-of-way are elevated above the highway and further impede the viewshed. The visual character was evaluated using the environmental study area defined in Section 1.2. Data collected for the land use and zoning analysis in Section 3.0 was used to inform what entities may be visually impacted by transportation improvements in the study area. Aerial and Google Street view imagery were used to gain perspective of the current visual environs. Locations where screenshots of the street view imagery were captured are shown in Figure 8.

7.4 RESULTS

From Kingshighway Blvd. to Tower Grove Ave. there is primarily residential zoning and land use that includes Hudlin and Chouteau Park, Shriners Children's Hospital, Hilton Hotel, Aventura at Forest Park Apartments, and Stix ECC Elementary School. This stretch of highway has a berm along both edges of the highway that limits the viewshed to and from these entities. However, some of the buildings have multiple stories, which increases the visibility as elevation in the building increases. There are several commercial properties adjacent to the I-64 to Vandeventer Ave. interchange, some of which are being converted into apartments. Visually, this area has a higher impact from I-64 than its western counterpart.

Between Tower Grove Ave. and Compton Ave., I-64 becomes elevated and at Vandeventer Ave. turns into a double-decker where westbound lanes sit on top of the eastbound alignment. Adjacent to this section of highway are mostly commercial and industrial buildings. Notable locations include City Foundry STL and IKEA. Most of these buildings are dwarfed by I-64 with some extending higher than it. This stretch of I-64 has the highest visual impact in the study area given its elevation. While it offers a unique vantage point to see the cityscape, there is a negative impact on adjacent buildings whose tenants look upon the highway.

From the Market St. and Compton Ave. interchange to Jefferson Ave., the existing real estate includes St. Louis University, Harris-Stowe State University, apartment complexes, and commercial. Like the western part of study area, there is a berm on either side of I-64, which impedes the negative visual impact, but buildings directly adjacent to the highway or in the multistory buildings have a direct line of sight to the highway.

Google Street view photos were used to highlight the main characteristics of the highway. These locations were mapped in Figure 8. Imagery in Figure 9. through Figure 19 shows typical highway sections and prominent interchanges throughout the study area from the perspectives on the highway and looking toward it.

At the western and eastern termini of the study area, I-64 has a moderate impact on buildings directly adjacent to I-64 but it quickly subsides at the edge of the study area. The central portion of I-64 from Tower Grove Ave. to Compton Ave. has the highest impact since it is elevated above the majority of parcels in the study area.

Figure 8. Google Street View Imagery Locations

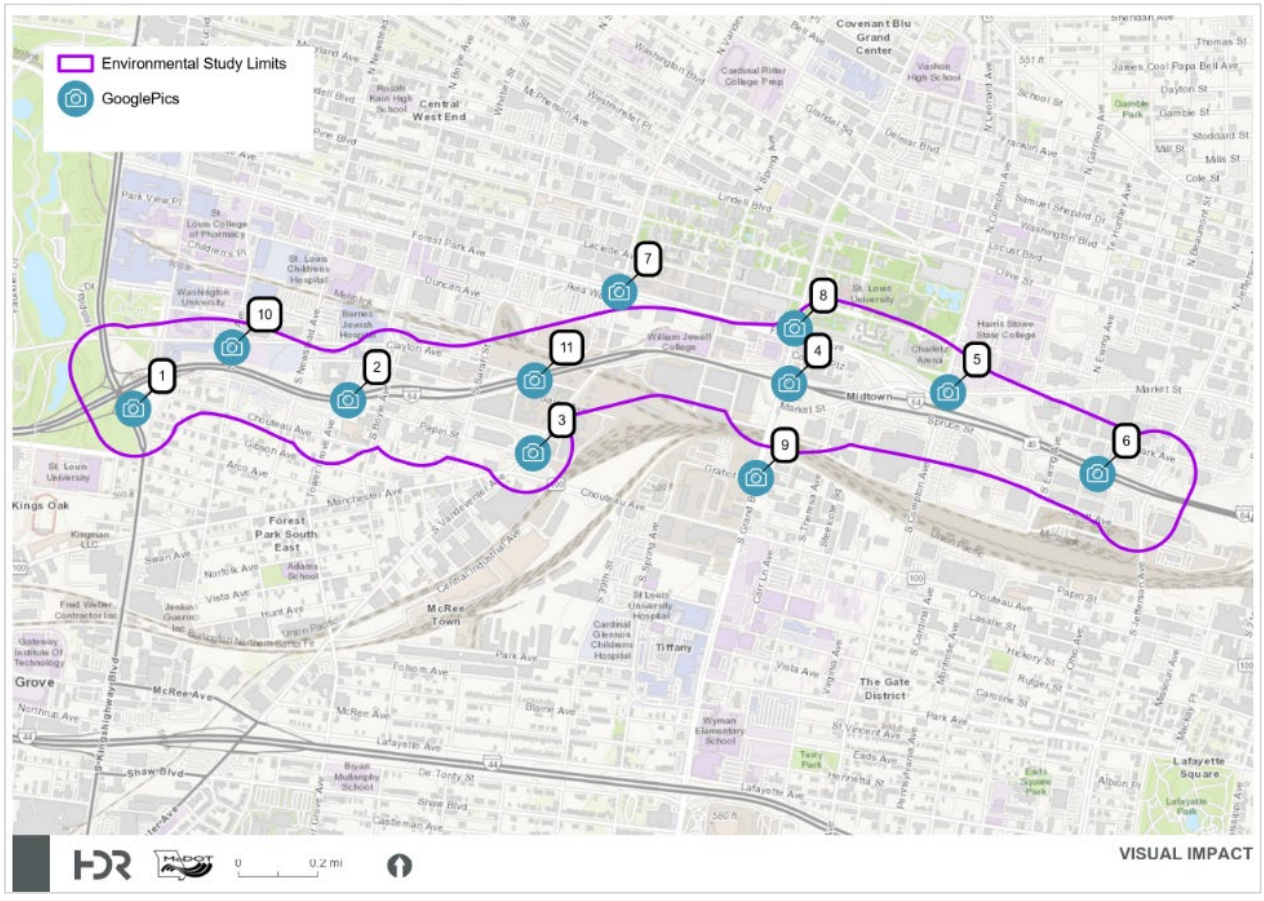


Figure 9. Map I.D. 1 - Typical Highway Section— Kingshighway Blvd. to I-64

I-64 eastbound on-ramp overlooking the western corridor limits.

Figure 10. Map I.D. 2 - Typical Highway Crossing—Tower Grove Ave. and I-64 Eastbound

Typical highway crossing on the western half of the study area.

Figure 11. Map I.D. 3 – Vandeventer Ave. and I-64 On-/Off-Ramp

Figure 12. Map I.D. 4 - Typical Highway Section—I-64 west over Grand Blvd.

Typical scene from the raised highway within the central limits of the study area.

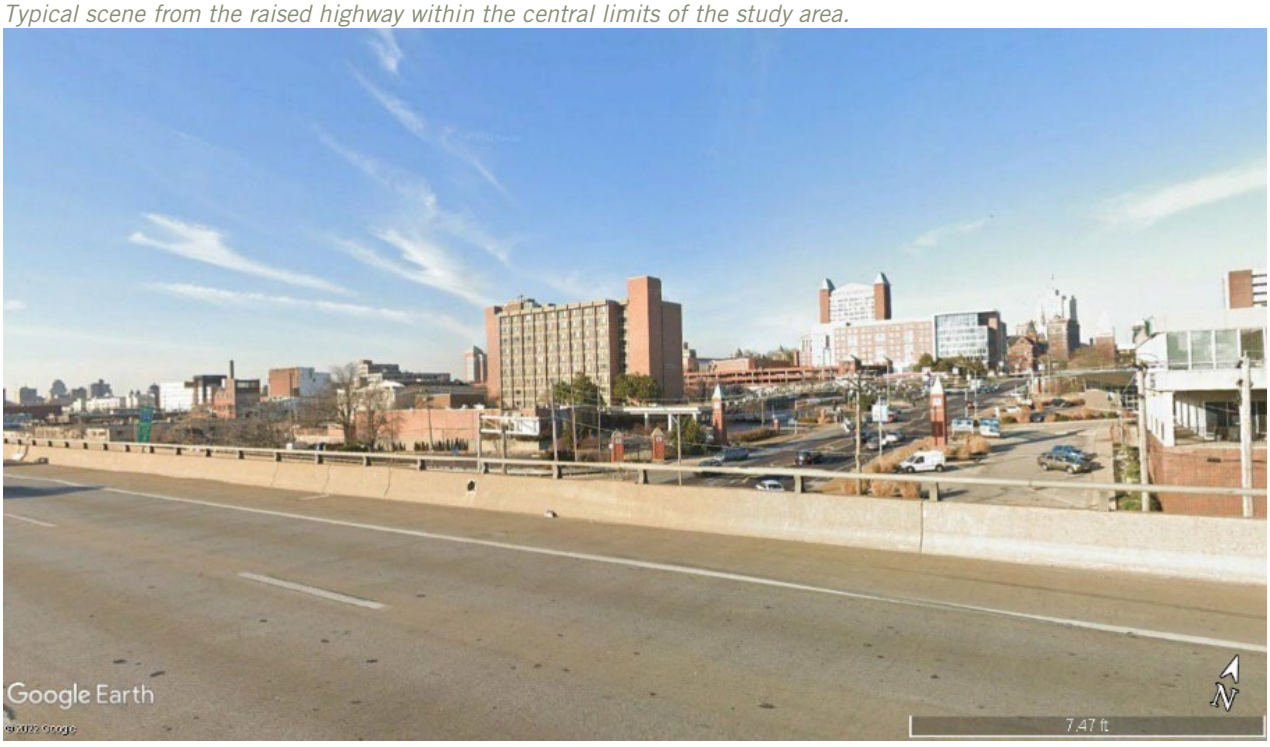


Figure 13. Map I.D. 5 - Typical Highway Section—Market St. and Compton Ave.

Intersection over I-64 west off-ramp.

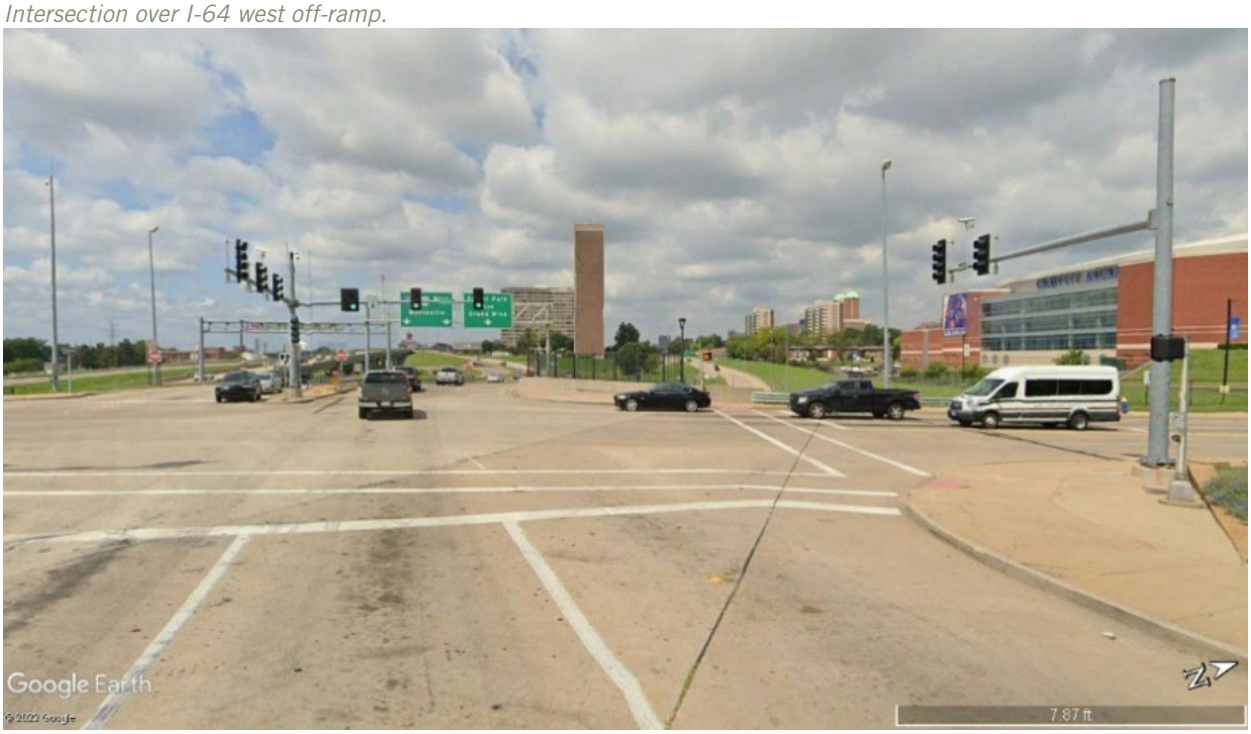


Figure 14. Map I.D. 6 - Typical Highway Section—I-64 Eastbound and Jefferson Ave.

Figure 15. Map I.D. 7 - Typical Highway Section—Vandeventer Ave. and Forest Park Ave

Looking south toward I-64.

Figure 16. Map I.D. 8 - Typical Highway Section—Forest Park Ave. and Grand Blvd. Intersection

Looking south toward I-64.

Figure 17. Map I.D. 9 - Typical Highway Section—Grand Blvd.

Looking north toward I-64 highlighting visible distance of the central corridor.

Figure 18. Map I.D. 10 - Typical Highway Section— Clayton Ave. and Taylor Ave

Looking south toward I-64; typical bridge crossing over western half of the study area.

Figure 19. Map I.D. 11 - Typical Highway Section—I-64 Eastbound over Clayton Ave.

Typical scene from the raised highway in the central limits of the study area.

Bridges represent a large portion of the visual impact of this highway. Throughout the Tier-1 limits there are 22 bridges, 13 of which were built before 1983; the newest bridge was constructed in 2020. Shown in Figure 20, one of the older bridges built in 1954 is over Grand Blvd. Design of this bridge is purely functional, with no additional features to improve its visual appearance. The lack of visual appeal is a deterrent for pedestrian use as it creates a perceived increase in distance. Pedestrian route selection is well documented and shown to prefer the shortest perceived route (Rodríguez, 2015).

As a contrast, the bridges over I-64 from Kingshighway Blvd. to Boyle Ave. that were constructed in the 2010s have decorative pillars at the termini and adjacent landscaping, which creates a more attractive structure. A street view picture of the Kingshighway Blvd. bridge is shown in Figure 21. Grand Blvd. approaching I-64 is also an example of a 21st century bridge that uses Victorian-style cues by placing cathedral-like towers on the termini (shown in Figure 17 and Figure 22). The Compton Ave. bridge over I-64, Figure 23, was built in 2005 and represents a transitional phase between the functional design to aesthetically pleasing bridges.

Figure 20. Grand Blvd. Bridge over Eastbound I-64, Built in 1954

Figure 21. Kingshighway Blvd. Bridge over I-64

Figure 22. Grand Blvd. Bridge to I-64

Showcase Victorian-style bridge design.

Figure 23. Compton Ave. Bridge over I-64

7.5 RECOMMENDATIONS

Currently, the viewshed of I-64 has a moderate to high visual impact on the public within the environmental study area. The raised highway and bridges along the I-64 corridor represent the highest impact. The older bridges in the study area were built primarily for function and do not have visually appealing elements. The 21st century bridges incorporate various architectural styles that add unique character. These newer bridges epitomize the opportunity MoDOT could take as the older structures are reconstructed. I-64 also offers a particular viewshed of the cityscape that is not found elsewhere, which should be considered on future projects with elevation changes on the existing alignment. Noise walls may also be considered to in areas where the viewshed to the highway is determined to have a negative impact.

8.0 SOCIOECONOMIC CONDITIONS AND ENVIRONMENTAL JUSTICE

8.1 REGULATORY CONTEXT

Neither the PEL statute or PEL regulations require analysis of socioeconomic conditions, including those to minority or low-income populations. Historically, transportation projects did not always consider socioeconomic conditions that may have caused disproportionately high and adverse impacts to minority or low-income populations. In 1994, Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations required federal agencies to identify and address adverse impacts to human health and environmental impacts.

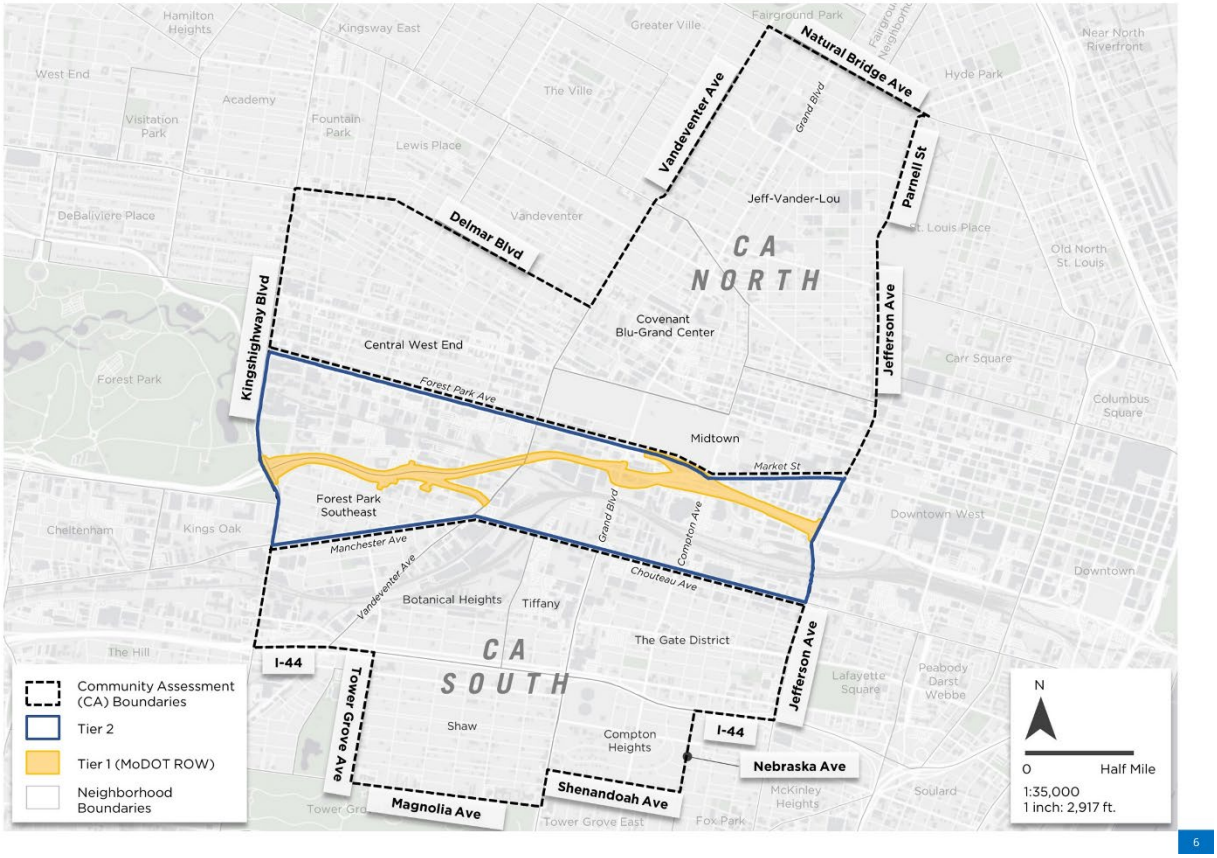
8.2 RESOURCE DESCRIPTION

Socioeconomic resources can include access to jobs; neighborhood connectivity that can enhance the marketability of redevelopment sites within the Future64 study area; and improved access to regional multimodal transportation networks, including transit, greenways, and bicycle and pedestrian infrastructure. It is important to understand these social and market benefits in combination with the broader economic impacts that support community goals toward equity, environmental sustainability, and quality of place and life.

Environmental justice is defined as the fair treatment and meaningful involvement of all people, regardless of race, ethnicity, income, national origin, or educational level with respect to the development, implementation and enforcement of environmental laws, regulations, and policies (USDOT, 2022a). Transportation projects can have profound, sprawling impacts on the socioeconomics of an area.

Given the complexity of this resource, it was documented in the Community Assessment Baseline Technical Memorandum (Development Strategies, Inc., 2022). The Community Assessment Baseline Technical Memorandum investigated the people and neighborhoods north and south of the Future64 study area. This Community Assessment area (CA area) (shown in Figure 24) was established based on community transportation needs in relation to I-64 and on feedback from the TCIG. The technical memorandum describes the in depth the demographics, housing, transportation equity, and travel patterns of the neighborhoods in the CA area. The following is a summary of this memorandum, which is included in Appendix A.

Figure 24. Community Assessment Area



8.3 METHODOLOGY

The study area for this resource extends to the CA area shown in Figure 24 so that all potentially impacted socioeconomic conditions were considered.

Data was also collected for the region, City of St. Louis, and the Future 64 Tier 2 limits so that comparisons could be made between those areas and the CA area and trends could be identified. Tier 2 limits were set to include the cross streets and multimodal facilities that are part of the transportation system north and south of I-64 between Forest Park Ave to the north and Route 100 (Chouteau Ave./Manchester Ave.) to the south.

The Community Assessment Baseline Technical Memorandum used publicly available census data from the U.S. Census Bureau to assess the current conditions of the area. Census data is grouped together based on political boundaries. The block group is the smallest geographic unit for which the U.S. Census Bureau publishes sample data. Therefore, all block groups within the CA area were included in the analysis. As of April 5, 2022, only Census data for 2021 and

earlier is available. The data helped to identify population and household trends, demographic makeup, neighborhood stability, and vulnerable populations.

8.4 RESULTS

The City of St. Louis population grew 3.2 percent between 2010 and 2021 to a population of 309,000. The CA area population grew 3.3 percent between 2010 and 2021 to a population of 42,100. Figure 25 shows most of the population exists outside of the Tier 2 limits is because most of the Tier 2 limits area is commercial or industrial.

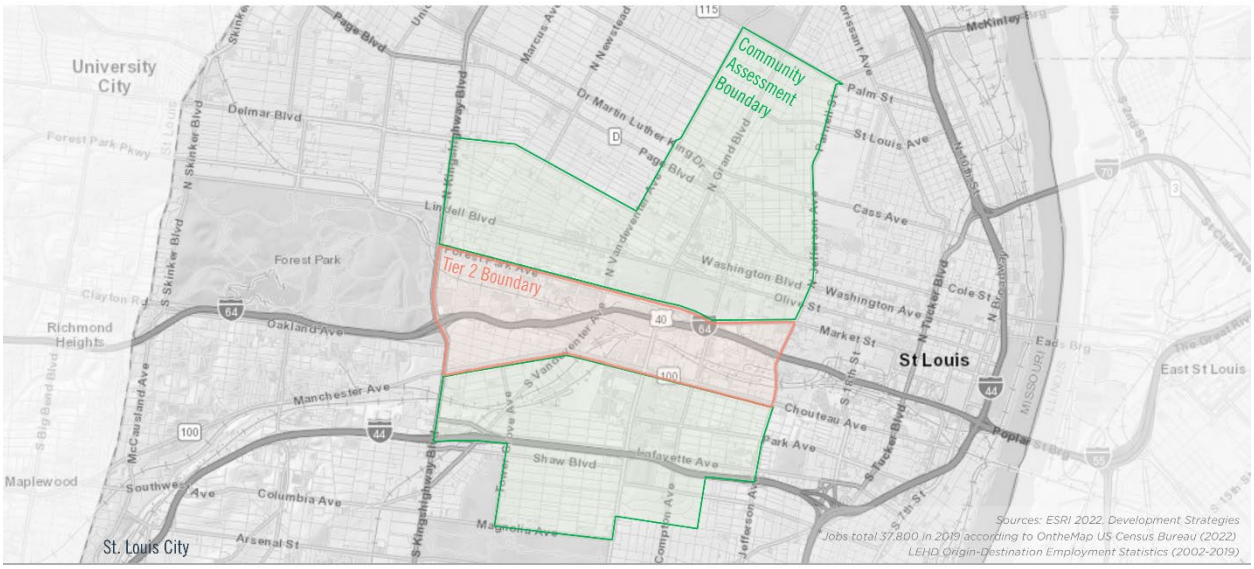
Median income is slightly higher within the CA area, but there are block groups with income below $30,000, which can be attributed to the large student population of St. Louis University and Harris-Stowe State University, shown in Figure 26. Household poverty varies throughout the CA area; however, there are significantly higher concentrations around Covenant Blue-Grand Center and Jeff Vander-Lou Neighborhoods.

Racial composition in the CA area and within the Tier 2 limits is similar to that of the City of St. Louis. As Figure 27 shows, most of the residents within the CA area are white nearest the I-64 right-of-way. However, the percentage of minority populations starkly increases toward the northern community of Jeff-Vander-Lou.

Other metrics for identifying environmental justice areas are USDOT's defined Disadvantaged Communities, where 22 key indicators are collected at the census tract level and grouped in six categories of transportation disadvantage. These categories include transportation access, health, environmental, economic, resilience, and social. Except for Shaw, Compton Heights, and Central West End, the entire CA area consists of USDOT-designated Disadvantaged Communities, as mapped in Figure 28. Overall, the CA area has similar socioeconomic trends to that of the City of St. Louis, but disadvantaged communities are still within this area. Further metrics and comparisons can be found in the Community Assessment Baseline Technical Memorandum in Appendix A.

Data about households with no personal vehicle indicates the concentration of a transit-dependent population. Figure 29 shows a larger concentration of households without a vehicle in the east and northeast portions of the CA area, given in large part to the student population and weaker socioeconomic conditions. This emphasizes the lack of bike and pedestrian access in the CA area.

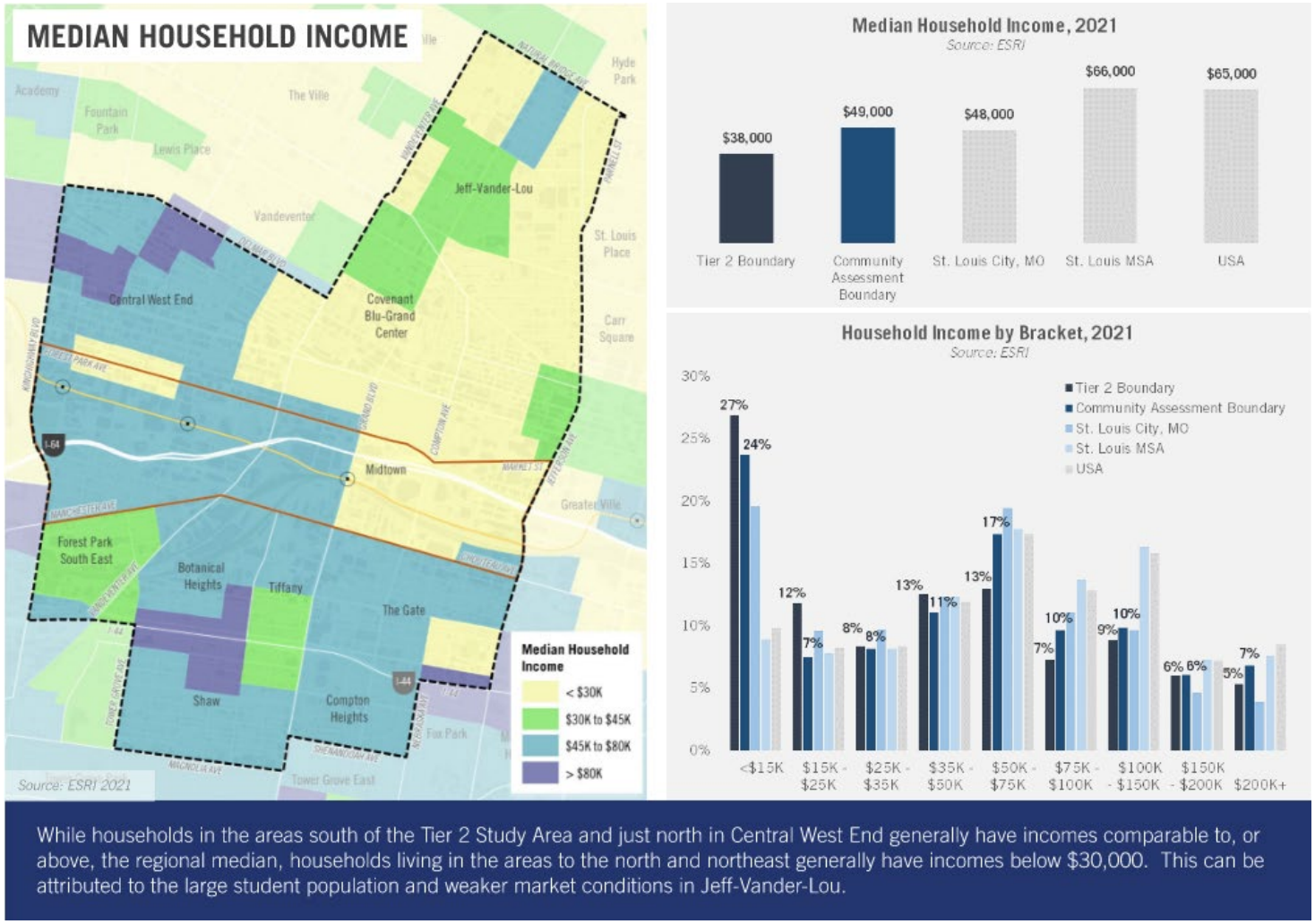
Figure 25. City, CA Area, and Tier 2 Limits Key Metrics



KEY METRICS	ST. LOUIS CITY	COMMUNITY ASSESSMENT BDRY	TIER 2 BDRY
Population	309,000	42,100	4,300
Employment	249,000	57,600	26,900*
Population Growth (2010-21)	(3.2%)	3.3%	18.7%
Median Household Income	$48,000	$49,300	$37,700
Total Households	176,000	24,300	2,500

Source: (U.S. Census Bureau, 2021)

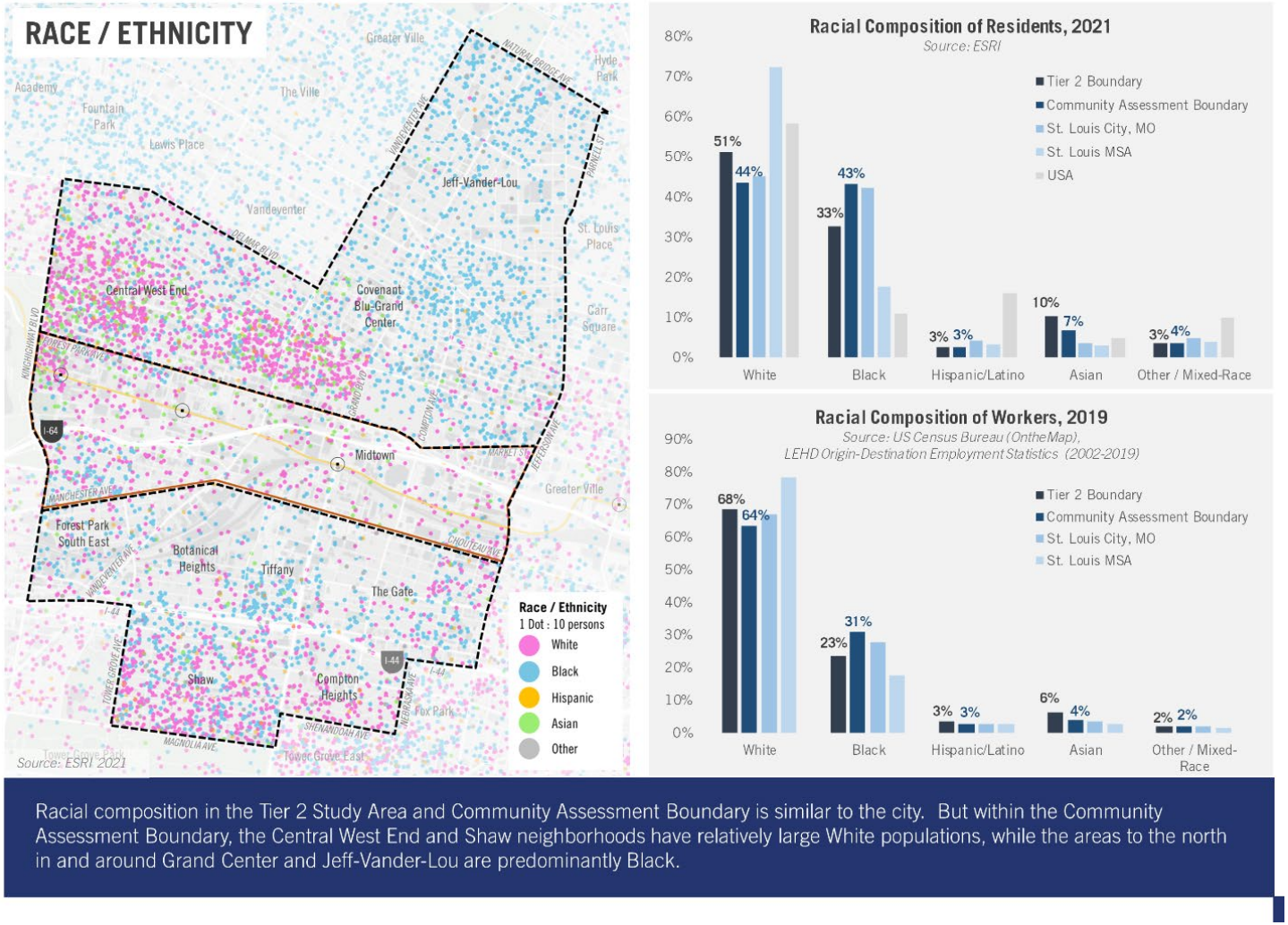
Figure 26. Household Income



While households in the areas south of the Tier 2 Study Area and just north in Central West End generally have incomes comparable to, or above, the regional median, households living in the areas to the north and northeast generally have incomes below $30,000. This can be attributed to the large student population and weaker market conditions in Jeff-Vander-Lou.

Source: (U.S. Census Bureau, 2021)

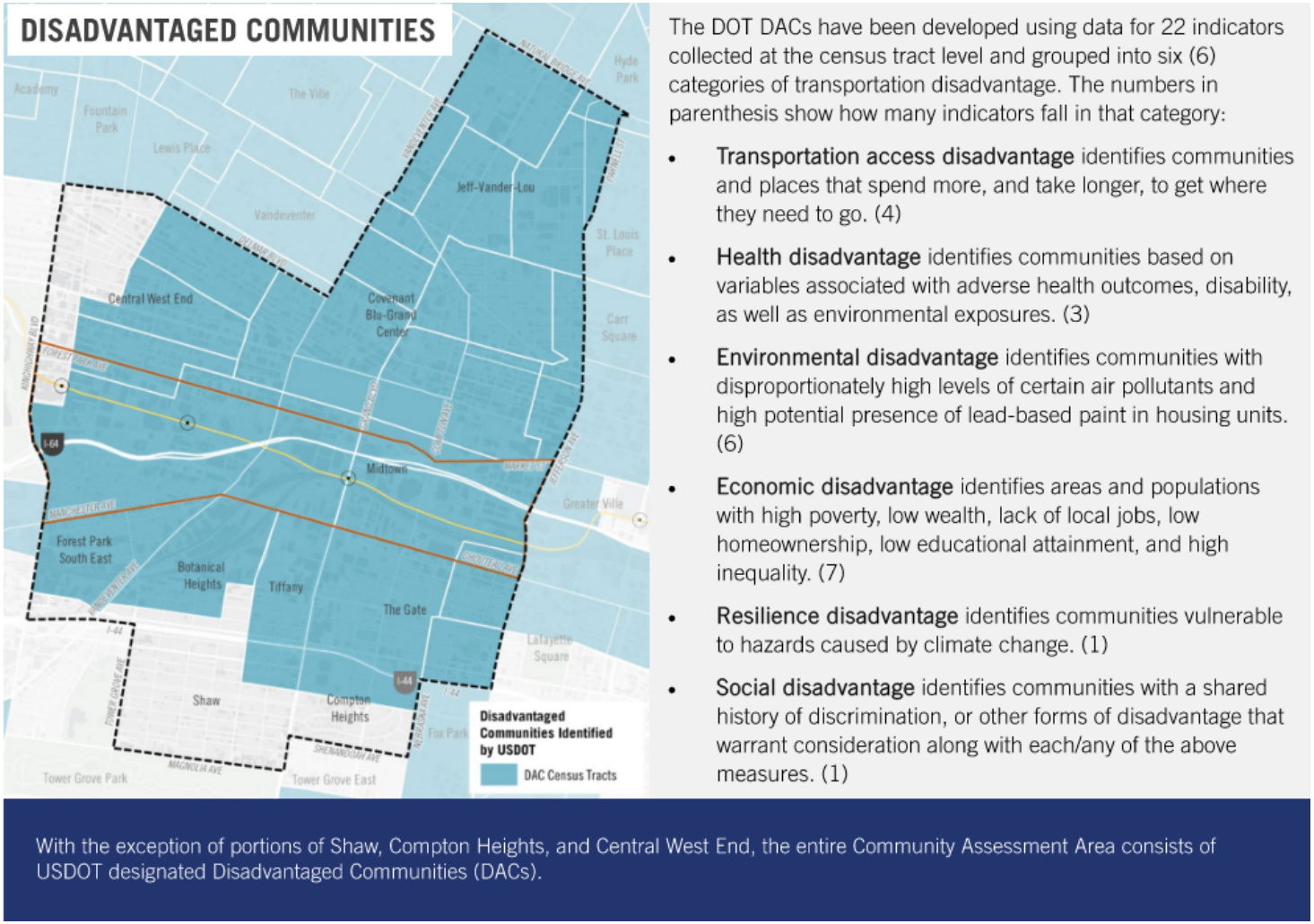
Figure 27. Race/Ethnicity



Racial composition in the Tier 2 Study Area and Community Assessment Boundary is similar to the city. But within the Community Assessment Boundary, the Central West End and Shaw neighborhoods have relatively large White populations, while the areas to the north in and around Grand Center and Jeff-Vander-Lou are predominantly Black.

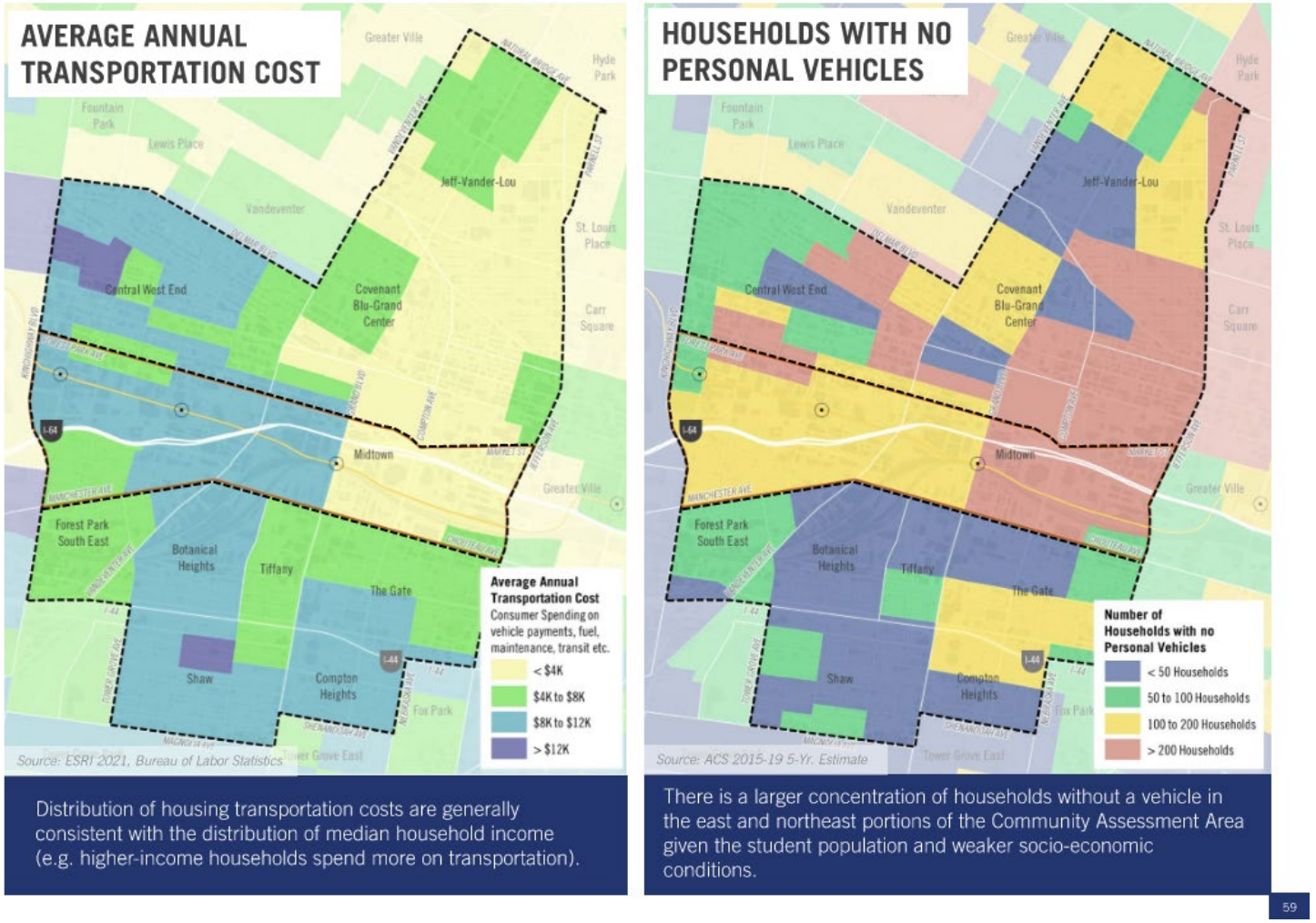
Source: (U.S. Census Bureau, 2021)

Figure 28. Transportation Equity—USDOT-Defined Disadvantaged Communities



Source: (USDOT, 2022b)

Figure 29. Transportation Equity – Annual Transportation Cost & Households With No Personal Vehicles



Source: (U.S. Census Bureau, 2021)

8.5 RECOMMENDATIONS

As future transportation projects transition to the NEPA phase, MoDOT should consider the modality of future projects and how they can improve connectivity across communities, specifically in disadvantaged areas, which is most of the CA area. Bike/ped routes play an important role in this as the data shows a prevalence of zero-car households. Covenant Blu-Grand Center and Jeff-Vander-Lou are two key communities that have high percentages of low-income and minority populations and should be a primary audience for focused outreach, such as pop-up events and local meetings, as well as the commercial areas that may experience impacts.

9.0 HISTORIC ARCHITECTURAL RESOURCES

9.1 REGULATORY CONTEXT

Section 106 of the National Historic Preservation Act (NHPA) and Section 4(f) of the Department of Transportation Act, require that MoDOT consider the potential impacts that any federally funded or permitted project may pose to significant cultural resources. Cultural resources include archaeological sites, buildings, structures (e.g., bridges), objects, and districts. The significance of a cultural resource is evaluated by applying a set of criteria that are set forth by the National Register of Historic Places (NRHP). Cultural resources that meet the criteria of eligibility for listing, or already listed, on the National Register are referred to as "historic properties" (MoDOT, 2022b).

9.2 RESOURCE DESCRIPTION

Historic architecture can include residential, commercial, industrial facilities, and bridges. They hold intrinsic and extrinsic values within St. Louis, and preserving these resources for their cultural significance is important so future generations can learn from them and appreciate their history. Transportation projects may directly impact these resources through displacements needed to acquire new right-of-way, or indirectly by visual or audible impacts to the historic property.

9.3 METHODOLOGY

The study area for this resource was the same as the environmental study defined in Section 1.2. A designated Area of Potential Effect has not been determined since the Section 106 process does not begin until a future NEPA process is underway. Potentially historic architectural resources of concern are defined in the MoDOT Engineering Principles Guide as any buildings that are 45 years or older (MoDOT, 2022b). City of St. Louis GIS parcel data was accessed on March 25, 2022, to identify these potentially historic buildings by filtering the dataset by the parcels recorded year built to 1977 and older (City of St. Louis, 2022b). In addition, the Missouri State Historic Preservation Officer (SHPO) database was accessed on March 11, 2022, to identify eligible or NRHP-listed buildings and districts (Missouri State Parks, 2022).

9.4 RESULTS

Historic resources are placed under four different categories of eligibility: listed, eligible, not eligible, and unevaluated. Listed resources are currently on the NRHP, eligible sites have been evaluated and are waiting for listing by the Keeper of the NRHP, not eligible sites have been

evaluated and do not meet criteria for NRHP listing, and unevaluated sites are possibly historic but require survey.

The Missouri SHPO database documented eight NRHP-listed aboveground properties, three NRHP-listed historic districts, six "106 Determinations of Eligibility," and two "Eligibility Assessments" within or overlapping the study area. These properties are listed in Table 4 and mapped in Figure 30. There have been three architectural surveys in the study area, which are listed in Table 5. City of St. Louis parcel data listed 262 buildings in the study area that were built before 1973. Based on MoDOT guidelines, these buildings are potentially historic and are mapped in Figure 31. It is important to note these buildings would require a survey by a licensed architectural historian, which the Missouri SHPO would use to determine eligibility for NHRP listing.

Table 4. Aboveground Historical Resources

SHPO Number or Property Name	Type and Address	Resource Date(s)	NRHP Evaluation
Lambskin Temple	Individual property, 1054 S. Kingshighway Blvd., St. Louis, MO	1927	Listed 1987
Vashon Community Center (EA-SLC-058)	Individual property, 3145 Market St., St. Louis, MO	1936	Listed 2005
Rock Spring School	Individual property, 3974 Sarpy Ave., St. Louis, MO	1898	Listed 1992
NRSLC302 / Laclede Gas Light Company Pumping Station G	Individual property, 4401 Chouteau Ave., St. Louis, MO	1901-1956	Listed 2007
NRSLC324 (EA-SLC-079) / Council Plaza	Individual property, 300 S Grand Blvd., St. Louis, MO	1964-1968	Listed 2007
NRSLC431 / Central Institute for the Deaf	Individual property, 800 S. Euclid Ave., St. louis, MO	1929-1951	Listed 2015
NRSLC449 (EA-SLC-053) / 138th Infantry Missouri National Guard Armory	Individual property, 3660 Market St., St. Louis, MO	1937-1938	Listed 2017
NRSLC446 (EA-SLC-138) / Century Electric Foundry Complex	District, 3711-3739, 3815, 3749 Market, 37-3800 Forest Park, St. Louis, MO	1929-1972	Listed 2016
NRSLC428 / Shriners' Hospital for Crippled Children	Individual property, 700-28 S. Euclid Ave. & 4565 Clayton Ave., St. Louis, MO	1924-1963	Listed 2015
Forest Park Southeast Historic District	District, bounded by Chouteau Gibson, Oakland, Taylor St., St. Louis, MO	Late 19th – early 20th century	Listed 2001

Table 4. Aboveground Historical Resources

SHPO Number or Property Name	Type and Address	Resource Date(s)	NRHP Evaluation
Central Institute for the Deaf Clinic and Research Building	Individual Property, 909 S. Taylor Ave., St. Louis, MO	1951	Listed 2004
035-SLC-19 / Seven Pools WPA constructed	106 Determination of Eligibility	1935	Potentially eligible
112-SLC-13	106 Determination of Eligibility for 12 individual properties	1962-1966	Not eligible individually, but may be eligible as historic district
EA-SLC-007 / Falstaff Brewing Corp Plant No. 1	Eligibility Assessment, 3674-3686 Forest Park Ave., St. Louis, MO	Not specified	Determined not eligible 2006
EA-SLC-016 / Peverl Building	Eligibility Assessment, 3975 Papin St., St. Louis, MO	Not specified	Determined not eligible 2010
EA-SLC-053 – same property as NRSLC449	Eligibility Assessment		Listed (same property as NRSLC449)
EA-SLC-058 – same property as "Vashon Community Center"	Eligibility Assessment		Listed (same property as "Vashon Community Center")
EA-SLC-079 – same property as NRSLC324	Eligibility Assessment		Listed (same property as NRSLC324)
EA-SLC-138 – same as NRSLC446	Eligibility Assessment		Listed (same as NRSLC446)

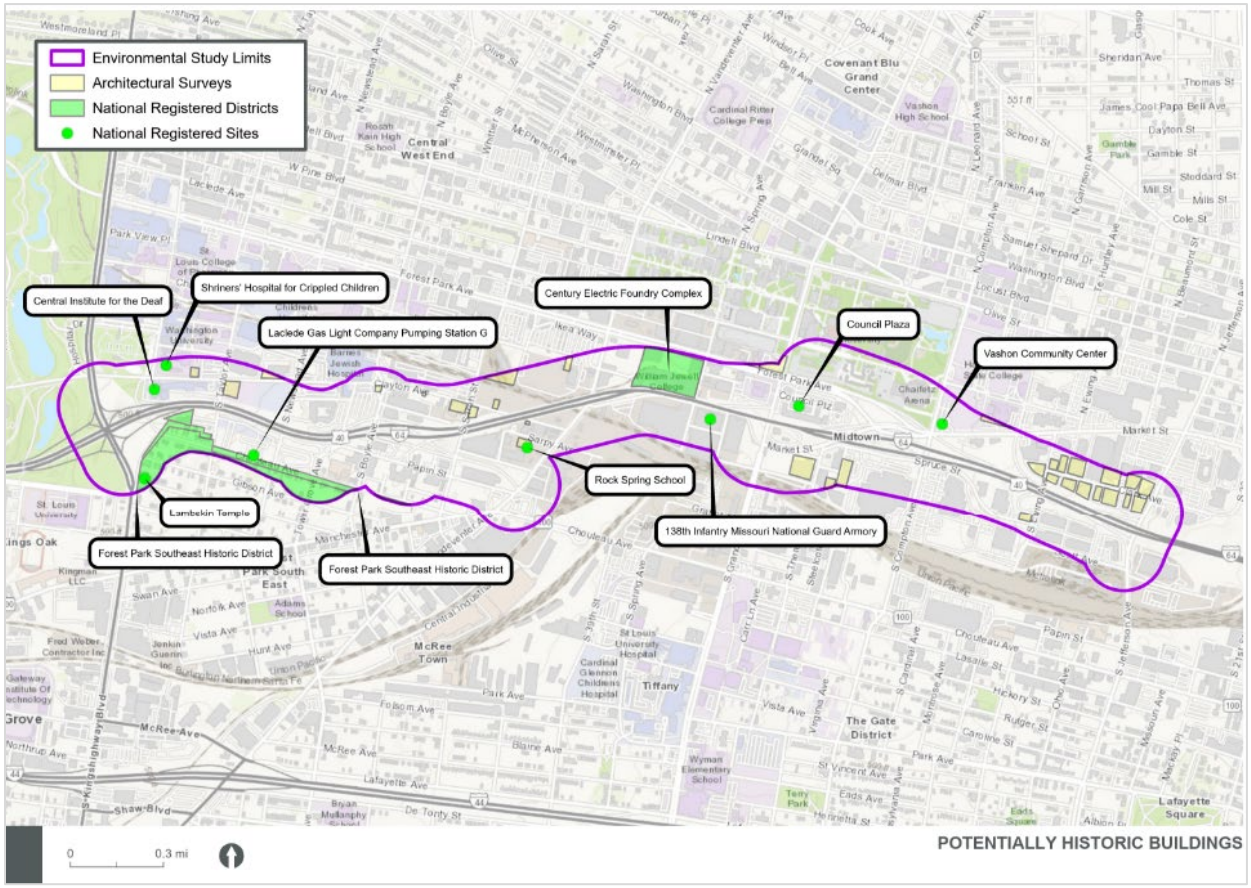
Source: (Missouri State Parks, 2022)

Table 5. Architectural Resources Surveys in the Study Area

Number	Type
SLC-AS-011	1987 architectural survey
SLC-AS-047	2012 architectural survey
SLC-AS-054	2016 architectural survey
SLC-AS-019	1987 architectural survey

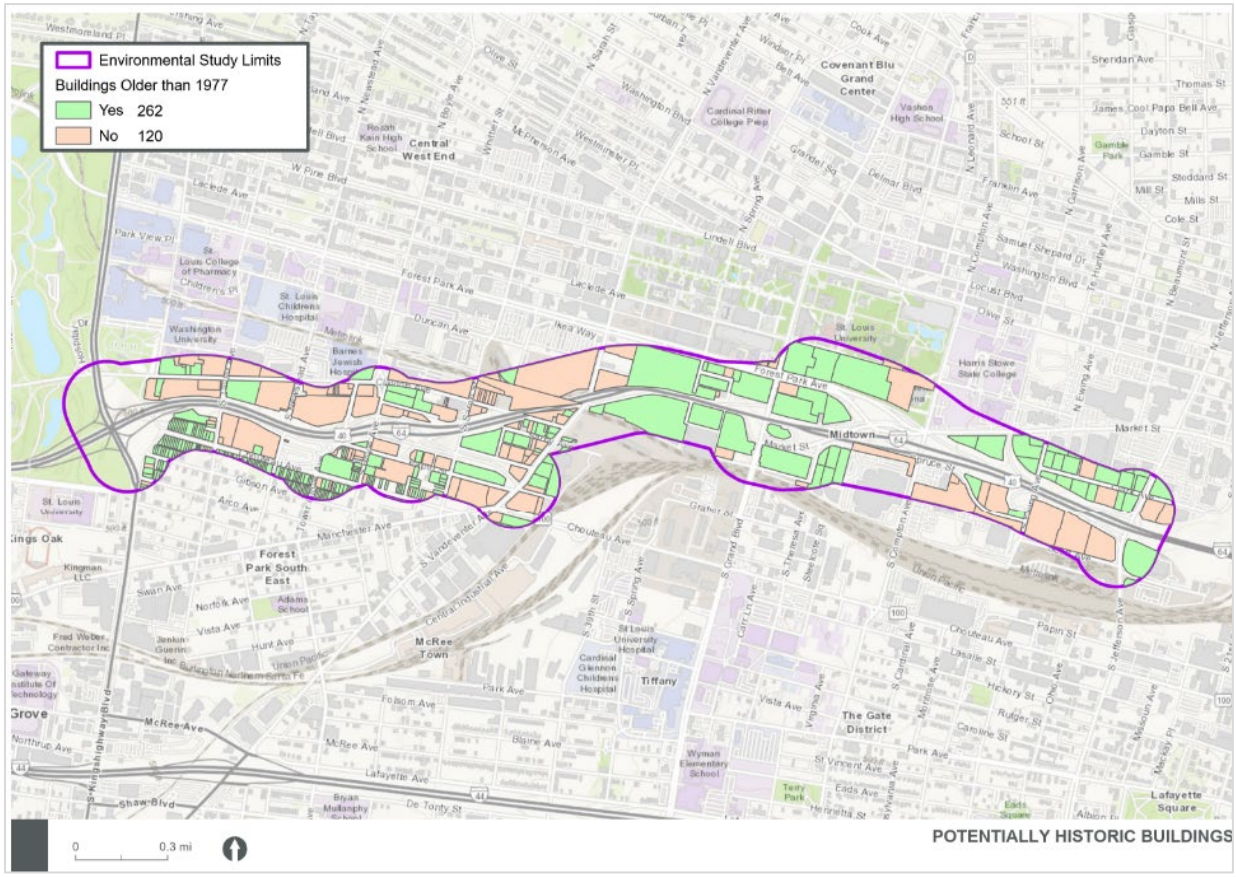
Source: (Missouri State Parks, 2022)

Figure 30. NHRP-Listed Historic Resources



Source: (Missouri State Parks, 2022)

Figure 31. Potentially Historic Buildings



Source: (City of St. Louis, 2022b)

9.5 RECOMMENDATIONS

Most of the study area has historic resources, including, eight NHRP listed sites, 262 potentially historic buildings, and three historic districts. As projects move forward to NEPA, individual Section 106 studies and consultation with the Missouri SHPO will be necessary. Dependent upon the SHPO's determination, any direct or indirect visual impacts to unevaluated, eligible, or listed NRHP sites may require further survey and potential mitigation. The probability for impacts on these resources is high because they can be affected both directly and visually. Therefore, it is recommended that MoDOT keeps this resource under high consideration.

10.0 ARCHAEOLOGICAL RESOURCES

10.1 REGULATORY CONTEXT

The study area for this resource was the same as the environmental study defined in Section 1.2. The regulatory process for archaeological historic resources is similar to that of architectural. Under Section 106 of NHPA, MoDOT is required to consult with Missouri SHPO on potential

impacts to archaeological sites. What triggers an archaeological survey could be any of the following.

- Ground disturbance within existing or proposed right-of-way or easements;
- Modifications to a bridge or culvert; and/or
- A project destroys, relocates, or encroaches upon a building(s) or other features on a property, including sidewalks, fences, gateposts, entrance gates, and walls that may be contemporary with the building.

Furthermore, Native American tribes whose historical range is in the study area should be consulted with for any concerns they may have for tribal sites. If direct impacts to archaeological resources are possible, mitigation may be required before construction of the project. Native American tribes may also request a tribal member be present during construction.

10.2 RESOURCE DESCRIPTION

Archaeological sites are areas that may contain prehistoric or historic artifacts. Prehistoric artifacts may consist of stone tools, such as arrowheads; flakes of chert from the manufacture of tools; pottery; bone; or mussel shell concentrations. Sometimes artifacts will appear in a feature, such as a hearth or storage pit that may include a distinct outline, charcoal, and mottled soils. Historic artifacts may include bottles, broken china, nails, window glass and features, such as old wells, cisterns, foundations, root cellars or privy pits (MoDOT, 2022b).

Some information, such as the location of archaeological sites, may be subject to the provisions of Section 304 of the NHPA. Section 304 allows the applicable lead federal agency to withhold from disclosure to the public information about the location, character, or ownership of a historic property if the applicable the lead federal agency determines that disclosure may: 1) cause a significant invasion of privacy and 2) risk harm to the historic property (MoDOT, 2022b).

10.3 METHODOLOGY

Missouri SHPO maintains a database of all archaeological sites and surveys that are within the state. The database was accessed on March 11, 2022, to identify any known sites and surveys within the study area (Missouri State Parks, 2022).

10.4 RESULTS

Review of the MDNR Archaeology Viewer revealed five previously identified historic archaeological sites are within or overlap the study area. Cultural survey SL-932 indicates that Sites 23SL2328 and 23SL2329 are eligible for listing on the NHRP. Survey SL-1081 was done for mitigation to those two sites. Table 6 lists the 12 cultural resources surveys that have been done in the study area. As noted, the location of archaeological sites is not disclosed to the public, and are not disclosed in this report.

Table 6. Cultural Resources Surveys in the Study Area

Number	Type
JA-196	1999 cultural resources survey
SL-204	1996 cultural resources survey
SL-458	1997 cultural resources survey
SL-459	2002 cultural resources survey
SL-675	2007 cultural resources survey
SL-932	2012 cultural resources survey
SL-1081	2014 cultural resources survey
SL-1188	2018 cultural resources survey

Source: (Missouri State Parks, 2022)

10.5 RECOMMENDATIONS

MoDOT and FHWA will require an archaeological survey that includes subsurface investigations during a future NEPA process. If previously recorded sites, including those that were impacted by previous projects, will be impacted, additional Phase II testing may be required. Coordination with Missouri SHPO is paramount for any projects within this study area.

11.0 TERRESTRIAL HABITAT AND ECOLOGICAL SIGNIFICANCE

11.1 REGULATORY CONTEXT

The statutory requirements for PEL studies (23 United States Code [USC] 168) specifically mention impacts to regional ecosystems as a factor to analyze. Similarly, the guidance in Appendix A of 23 Code of Federal Regulations (CFR) 450 mentions the need to consider environmentally sensitive areas. There are no federal regulations that protect natural habitat communities specifically. However, areas of habitat designated by the United States Fish and Wildlife Service (USFWS) as “critical habitat” for protected species are protected through Section 7 of the Endangered Species Act. Additional information about protected species is included in Section 12.0. Natural habitats and associated water quality are also indirectly protected by Section 401 of the Clean Water Act (CWA). Section 401 requires a Water Quality Certification for any activities requiring a federal permit.

11.2 RESOURCE DESCRIPTION

Natural terrestrial habitats are habitat for plant and animal species. Natural communities provide habitat for wildlife, and they contribute to good air and water quality. To avoid or minimize impacts to natural resources through future projects in the study area, it is key that terrestrial habitats are documented.

11.3 METHODOLOGY

Google Earth aerial photography (2021), EWG's ecological significance mapping layer (EWG, 2017), and United States Department of Agriculture (USDA) National Land Cover Dataset layer (NLCD, 2019) were reviewed to identify undeveloped areas, woodlands, and riparian buffers that may hold terrestrial habitat or ecological significance. EWG consulted with the Missouri Department of Conservation (MDC), Illinois DNR (IDNR), USFWS, and University of Missouri-Columbia to create a dataset that quantified the value of ecological significance of an area, which includes the City of St. Louis. The ecological significance mapping incorporated the NLCD, which uses aerial imagery to qualify what type of land cover exists on the landscape.

11.4 RESULTS

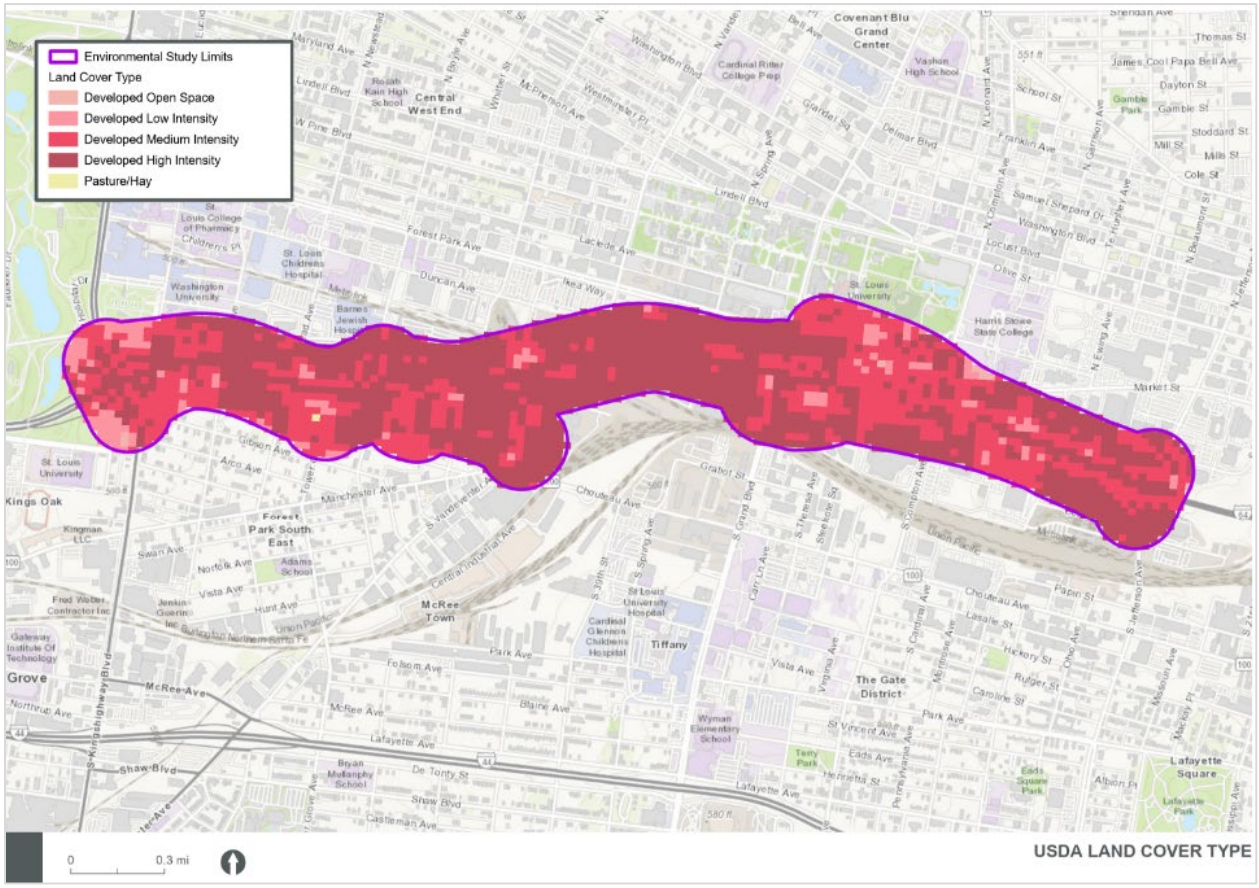
Much of the study area has been developed for residential and commercial land uses, leading to the loss, alteration, and/or fragmentation of natural habitats. The NLCD shown in Figure 32 depicts the entire study limit as being developed at low to high intensities with less than 1 percent open spaces throughout. These open spaces include Hudlin Park, Chouteau Park, Stix ECC Elementary School playground, and Forest Park. The habitat fragmentation in the area limits the ecological benefit of the open spaces to primarily birds, small mammals, and insects. Larger mammals that have adapted to urban environments, such as deer, coyotes, opossums, and racoons, may also utilize these open spaces. Because these areas are primarily landscaped and maintained to some extent, high-disturbance tolerant plants, including many introduced plants, likely dominate the vegetation. These introduced plants generally offer little forage value to wildlife, especially threatened and endangered species. None of the other locations in the study area offer significant ecological benefit since they are comprised of impervious surfaces and invasive plants, offer no cover, or fulfill any of the life requirements for threatened or endangered species, which in St. Louis County includes the Indiana bat, Northern Long-eared bat, and Gray bat. While some species of bats use old buildings and bridges for roosting during the day, Indiana and Northern Long-eared bats typically roost underneath tree bark and rocky crevices during the summer and hibernate in caves during the winter. Gray bats are cave obligates and will not utilize urban infrastructure. These species are further discussed in Section 12.0.

EWG ecological significance mapping shown in 33 corroborates aerial imagery and USDA NLCD where the quality of habitat in the study area was primarily a rating of 1 (Very Poor) with some areas having a rating of 2 (Poor).

11.5 RECOMMENDATIONS

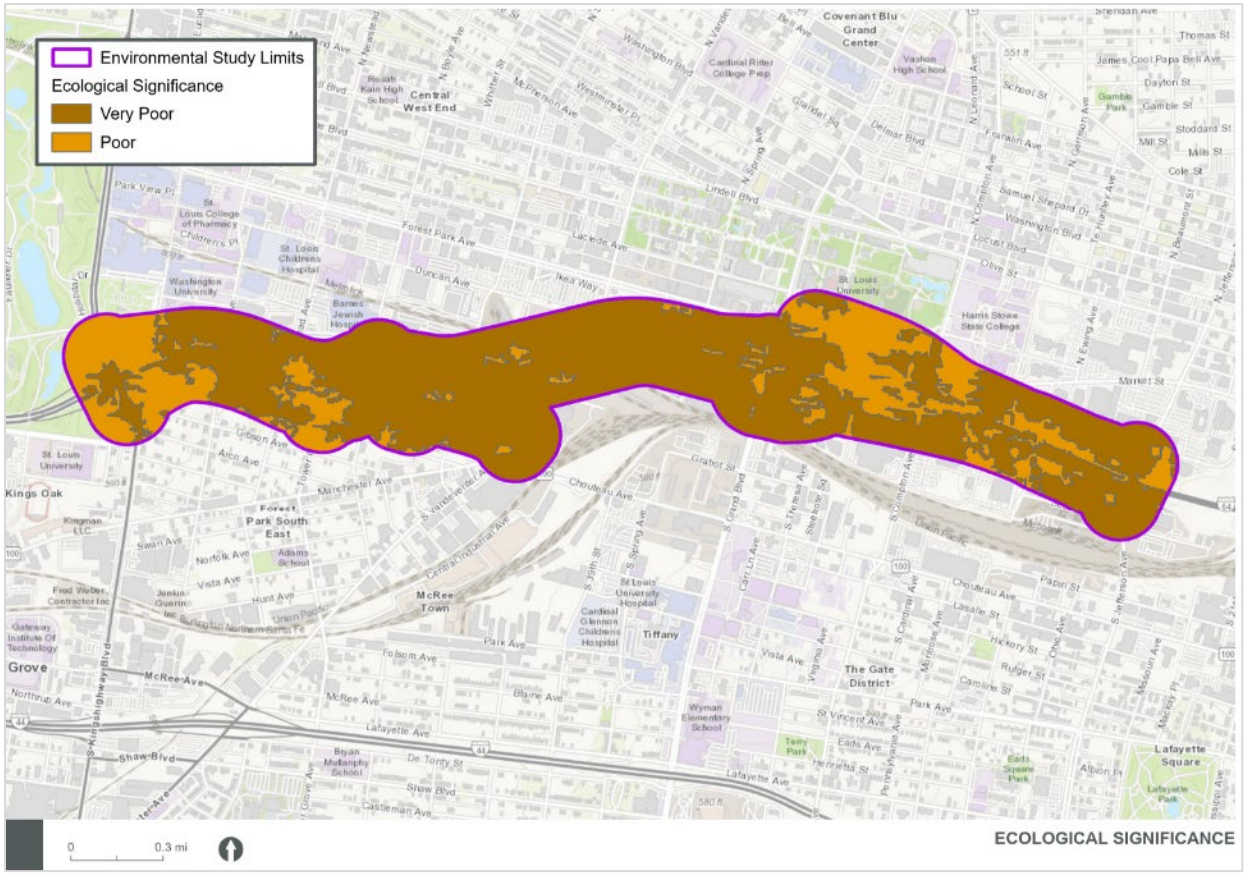
Because of the current land uses and high levels of development present in the study area, impacts to natural habitat communities associated with any future projects in the study area would be relatively minor. During future NEPA analysis, local agencies should consider ways to improve this resource in future projects through native landscaping, creating new parks, or other methods of adding ecological benefit.

Figure 32. Land Cover Types



Source: (USGS, 2019)

Figure 33. Ecological Significance Ratings



Source: (EWG, 2017)

12.0 THREATENED AND ENDANGERED SPECIES

12.1 REGULATORY CONTEXT

The Endangered Species Act of 1973 is the primary federal law that serves to protect federally protected (endangered and threatened) species. This includes the species themselves, as well as the habitat they may occupy. Protected species that may exist in the study area require evaluation when projects are federally funded or when resources are located along a highway right-of-way. Therefore, coordination with USFWS and MDC will be necessary for any future transportation projects in study area so a determination can be made on the possibility of impacts to the species listed in Table 7. If impacts are anticipated, mitigation and timing of impacts will be discussed between the respective agencies.

12.2 RESOURCE DESCRIPTION

Threatened and endangered species are wildlife, fish, and plants that are protected under the Endangered Species Act. They are put on the threatened and endangered specieis list because the species populations numbers are low, and USFWS has determined they are highly sensitive to becoming extinct. To recover the population of these species requires additional protections

and resources. These protections make it unlawful to legally harm these species directly or indirectly through destroying habitat or resources essential to their survival.

12.3 METHODOLOGY

Literature and reference material was reviewed to obtain and document information related to protected species. Specifically, USFWS Information Planning and Consultation (IPaC) and MDC Missouri Natural Heritage Program were consulted to identify threatened and endangered species that may exist in the study area.

12.4 RESULTS

USFWS IPaC lists the federally and state endangered Indiana bat and federally threatened Northern long-eared bat, as well as the candidate species Monarch butterfly, as possibly occurring in the study area. MDC Natural Heritage also lists both bat species as possibly occurring in the study area. Both species of bats hibernate during winter months in caves and mines, called hibernaculum. During the summer months, they roost and raise young under the bark of trees in wooded areas (often riparian forests and upland forests near perennial streams). There are no known hibernaculum or maternity roost trees within five miles of the study area, and a lack of trees within the urbanized study area makes future transportation projects unlikely to negatively impact either species.

Monarch butterflies are candidate species for USFWS federal listing. Healthy and abundant milkweed is needed for oviposition and larval consumption. Sufficient quality and quantity of nectar from flowers is needed for adult feeding throughout the breeding and migration seasons. Habitat provides a specific roosting microclimate for overwintering, protection from the elements (e.g., rain, wind, hail, excessive radiation), and moderate temperatures that are warm enough to prevent freezing yet cool enough to prevent lipid depletion. Nectar and clean water sources located near roosting sites. The presence of nectar and milkweed resources along the migration route when butterflies are present and the size and spatial arrangement of habitat patches are generally thought to be important aspects but are currently unknown. Roosting sites may also be important for monarchs along their fall migration route. Unless funding is received from USFWS for a future project, conferencing for monarchs is not required.

Table 7. Threatened and Endangered Species That May Occur in the Study Area

Species	State Status	Federal Status	Critical Habitat in Study Limits
Indiana Bat	Endangered	Endangered	No
Northern Long-eared Bat	-	Threatened*	No
Monarch Butterfly	-	Candidate	No

*USFWS has proposed listing the Northern Long-eared Bat as endangered, and this could take effect November 2022.
Source: (USFWS, 2022) and (MDC, 2022).

12.5 RECOMMENDATIONS

Coordination should take place with USFWS and MDC on potential impacts to threatened and endangered species. It is unlikely though that any mitigation will be required because of the lack of habitat for the species listed in Table 7. It is recommended that MoDOT look for signs of bat roosting on bridges that are within 1,000 feet of suitable summer habitat.

13.0 FLOODPLAINS

13.1 REGULATORY CONTEXT

PEL regulations do not specifically address floodplain protection. Floodplain protection during NEPA is required under several federal, state, and local laws, including Executive Order 11988 entitled "Floodplain Management," which requires avoidance of modifications to and supporting development in floodplains. Floodplains subject to inundation by the 1-percent-annual-chance flood event are regulated by the Federal Emergency Management Agency (FEMA). Any project in a floodway must be reviewed to determine if the project will increase flood heights. An engineering analysis must be conducted before a permit can be issued. The community's permit file must have a record of the results of this analysis, which can be in the form of a No-rise Certification. This No-rise Certification must be supported by technical data and signed by a registered professional engineer (FEMA, 2022). Since the study area does not occur in a floodway, agency coordination is not required.

13.2 RESOURCE DESCRIPTION

Floodplains are low-lying areas next to rivers, streams, and other waterbodies that are susceptible to flooding during rain events. These areas provide important functions, such as providing storage for flood waters, protecting the surrounding environment from erosion, and providing habitat for wildlife. Therefore, agencies are required to reduce the risk of impacts to floodplains and their associated floodway. (FEMA, 2022).

13.3 METHODOLOGY

FEMA publishes maps that show areas of regulated floodplains and floodways. The Flood Insurance Rate Map (FIRM) is the most common of these flood maps, and it delineates special hazard areas. Therefore, FEMA national flood hazard layer mapping was used to identify if any portions of the study area are within flood zones (FEMA, 2022).

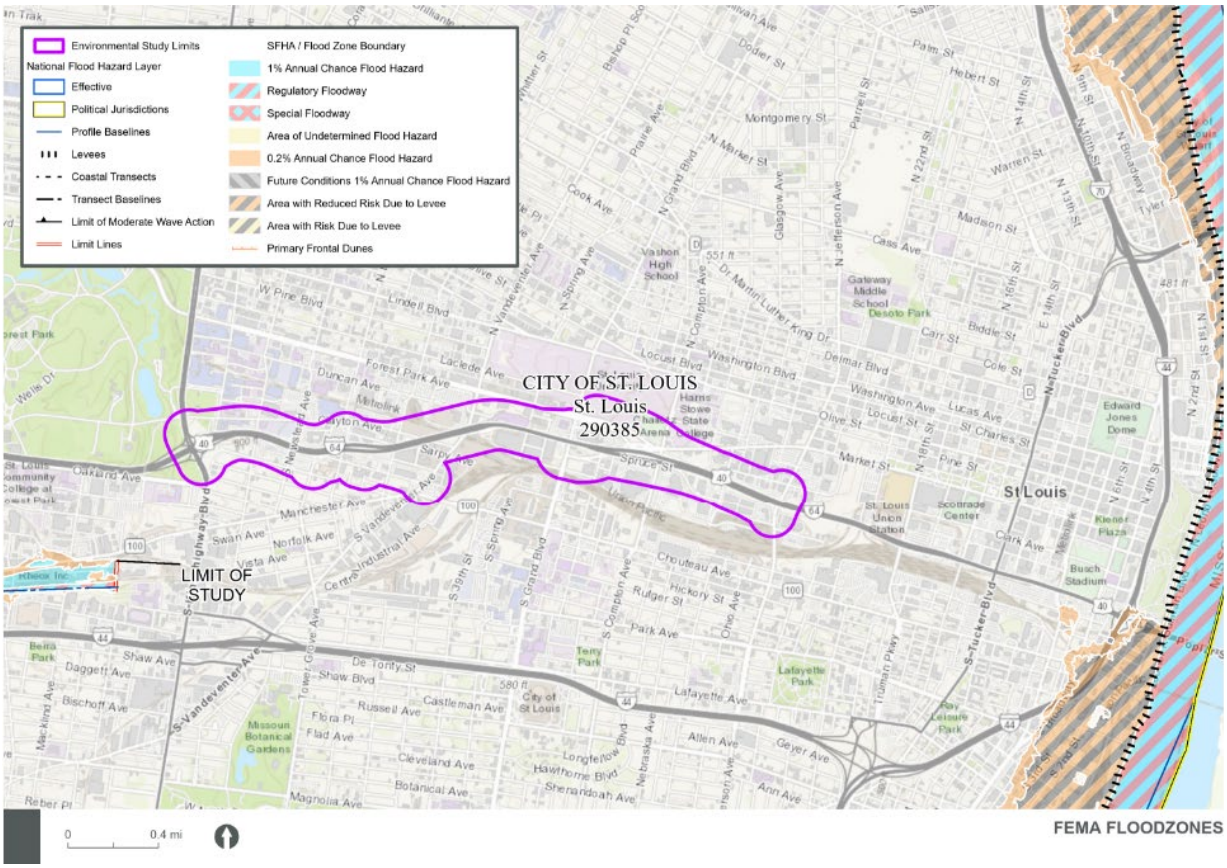
13.4 RESULTS

Based on a review of the floodplain mapping, there are no flood zones in the study area, as shown in Figure 34. The nearest floodplain is associated with the Mississippi River and is located 1.76 miles east of the study area.

13.5 RECOMMENDATIONS

Because there are no floodways in the study area, no agency coordination or permitting would be required for future transportation projects. MoDOT should not need to consider any impacts to this resource.

Figure 34. FEMA Floodplains and Floodways



Source: (FEMA, 2022).

14.0 WATER QUALITY

14.1 REGULATORY CONTEXT

Watersheds are specifically mentioned in the PEL regulations as a resource to be examined during the PEL study process. The CWA of 1972 requires that each state set water quality standards for all contaminants in surface waters. These standards are typically based on criteria recommended by the USEPA. The CWA also regulates the discharge of pollutants into state's waters. In Missouri, the USEPA has delegated the responsibility of monitoring and regulating water quality to the MDNR. Future transportation projects in the study area will require coordination with MDNR for stormwater permitting and stormwater pollution prevention plan (SWPPP) requirements.

Provisions of the CWA and related state rules and regulations require a municipal separate storm sewer system (MS4) permit when the facility serves a population of 50,000 or more within an urbanized area or is located outside an urbanized area serving a jurisdiction with a population of at least 10,000 and a population density of 1,000 people per square mile or more. The

Metropolitan St. Louis Sewer District (MSD) partners with 60 municipalities (co-permittees) to comply with stormwater permit requirements for the St. Louis Metropolitan Small MS4.

Furthermore, a municipal separate storm sewer means a conveyance or system of conveyances, including roads and highways with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, paved or unpaved channels, or storm drains designated and utilized for routing of stormwater. MoDOT's transportation separate storm sewer system (TS4) permit is an individual permit drafted to fill this obligation to better fit the operations of a transportation organization (MoDOT, 2022a).

14.2 RESOURCE DESCRIPTION

Relative to roadways and highways, FHWA describes stormwater management and water quality as when precipitation occurs over highways and other impervious surfaces, the resulting stormwater can carry debris, sediment, and chemicals into water sources, diminishing their quality. In addition, highway construction and maintenance activities have the potential to affect nearby bodies of water (FHWA, 2022a).

14.3 METHODOLOGY

Water resources are divided into watersheds, which are geographical divides where water travels in opposite directions across the landscape. Subwatersheds are further divisions of a watershed that more closely encompass the study area. Therefore, the study area for water quality is set to the subwatershed. The study area is primarily in Schoenberger Creek-Mississippi River subwatershed with a small western portion within the River des Peres subwatershed. Mandated by the CWA Section 305(b), MDNR maintains a database of all waterways monitored for pollutants in the state. Section 303(d) of the CWA requires a subset of the 305b list containing all the impaired waterways that will be referenced in the study area. MDNR also manages National Pollutant Discharge Elimination System (NPDES) permits, which regulate point sources that discharge pollutants to waters of the United States, and water quality monitoring stations around the study area.

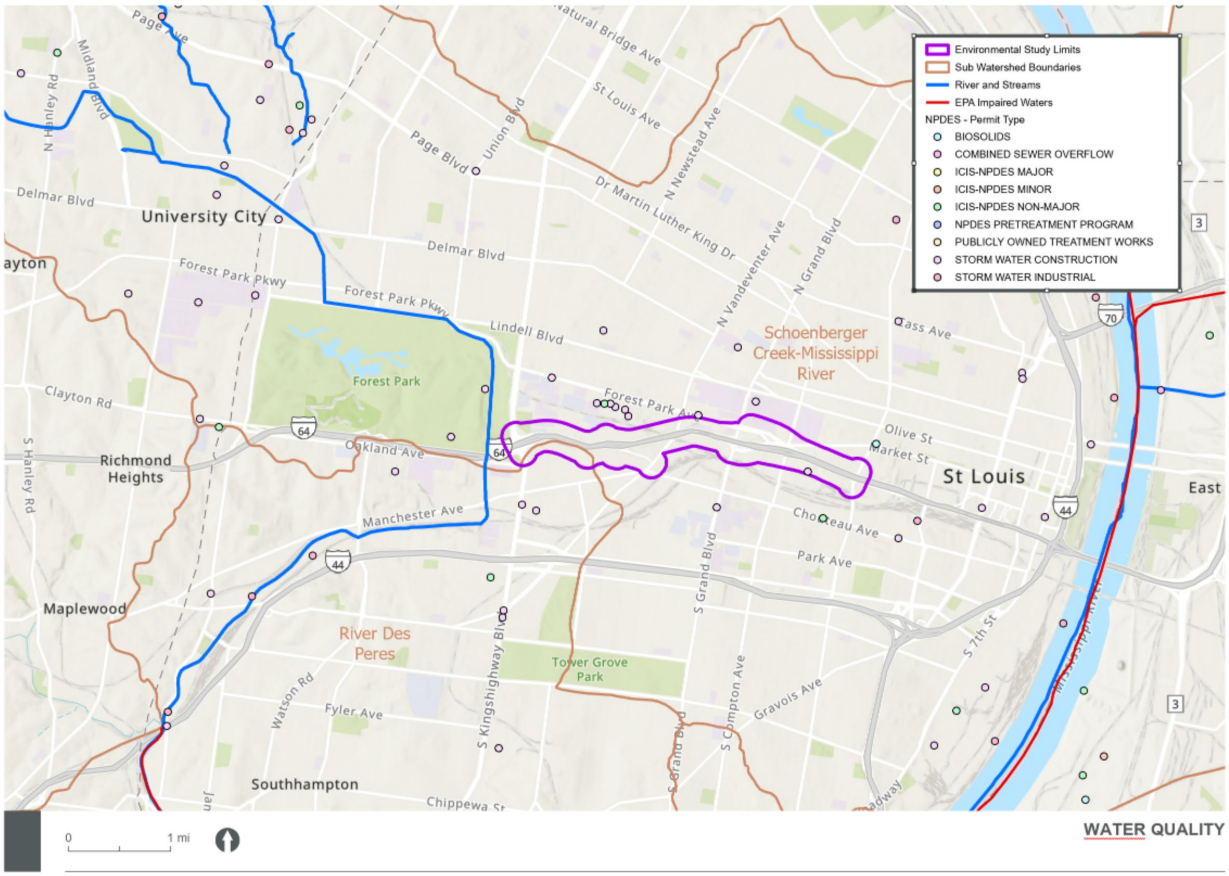
14.4 RESULTS

There are no waterways in the study area. However, within the Schoenberger Creek-Mississippi and River des Peres subwatersheds there are three impaired streams—Engelholm Creek, Rivers des Peres, and Mississippi River. Engleholm Creek and River des Peres flow north to south along the western edge of Forest Park, outside the study area. These creeks eventually merge into the River des Peres drainage channel that finally reaches the Mississippi River. Along the three impaired streams are several NPDES locations, as shown in Figure 35. There are no water quality monitoring stations within 4.3 miles of the study area. Stormwater runoff within study area will reach the Mississippi River.

14.5 RECOMMENDATIONS

Because stormwater will reach the Mississippi River, an impaired waterway, it is recommended that during future NEPA processes, MoDOT implement a SWPPP to meet regulatory requirements and water quality concerns for the Mississippi River.

Figure 35. Water Quality Features



Source: (EPA, 2022)

15.0 WETLANDS AND WATERS OF THE UNITED STATES

15.1 REGULATORY CONTEXT

Waters of the United States (WOUS) and adjacent wetlands are protected under the CWA. WOUS is the encompassing term for areas that qualify for federal regulation under Section 404 of the CWA. The CWA gives the USEPA and United States Army Corps of Engineers (USACE) regulatory and permitting authority of "navigable WOUS. If WOUS are identified in the study area and may be impacted by a project, a jurisdictional determination from the USACE would be required to assess the impacts and determine mitigation requirements.

15.2 RESOURCE DESCRIPTION

Wetlands are low lying areas that are inundated by water for periods of time, which allows the growth of hydrophytic plants and hydric soils to develop. FHWA describes wetlands as delicate natural resources that serve many functions. They provide habitat for aquatic species, and improve water quality and manage floodwaters (FHWA, 2022a). WOUS are generally defined as any navigable water way, or upstream tributary, that has a defined bed and bank.

15.3 METHODOLOGY

United State Geological Survey (USGS) topographic mapping (Webster Grove and Clayton MO, Cahokia and Granite City IL, 2021), USGS National Hydrologic Datasets (NHD), USFWS National Wetland Inventory (NWI), and Google Earth aerial imagery were referenced to identify wetlands and WOUS. NHD and NWI are datasets produced by the USGS and USFWS and contain locations of known or possible WOUS and wetlands. These datasets are only useful for identifying areas to ground truth because they are not always accurate and do not always include all WOUS and wetlands. Therefore, aerial imagery and site visits are necessary to confirm what is accurate on NHD and NWI mapping and what may not be documented. In the context of the Future64 PEL study, site visits were limited to windshield surveys to provide context for future projects.

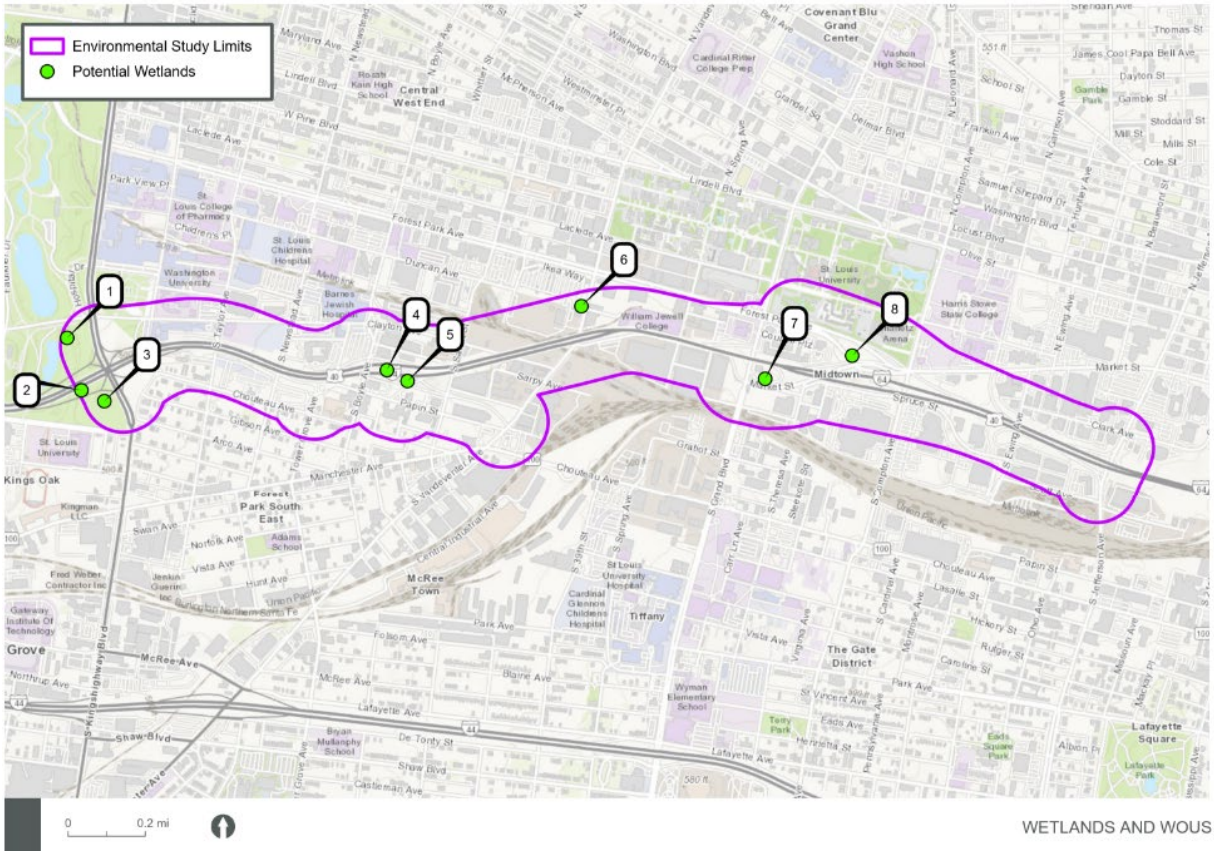
15.4 RESULTS

There were no wetlands or WOUS on USGS topographic, NHD, or NWI maps in the study area. However, several roadside ditches or swales were identified. These potential wetlands are mapped below in Figure 36 with corresponding Google Street imagery shown in Figure 37 through Figure 44 to provide context for each site. A field survey would be necessary to confirm these as wetlands and determine if they may be WOUS.

15.5 RECOMMENDATIONS

Google Earth imagery indicates several roadside ditches and swales that have potential to host wetlands and that may be WOUS. As future projects are outlined, MoDOT should conduct a field survey to delineate the identified features and any other unidentified wetlands that were not present on NHD or NWI mapping.

Figure 36. Potential Wetlands and Waters of the United States



Source: Google Earth aerial imagery.

Figure 37. Wetland 1: Swale Located in Forest Park at the Intersections of Kingshighway Blvd. and Clayton Ave.

Figure 38. Wetland 2: Roadside Ditch Along I-64 Eastbound Off-Ramp and S Kingshighway Blvd.

Figure 39. Wetland 3: Interchange Wetland Swale Between I-64 Eastbound Off-Ramp and Oakland Ave. at Kingshighway Blvd.

Figure 40. Wetland 4: Roadside Ditch Between I-64 Westbound and Eastbound at Boyle Ave.

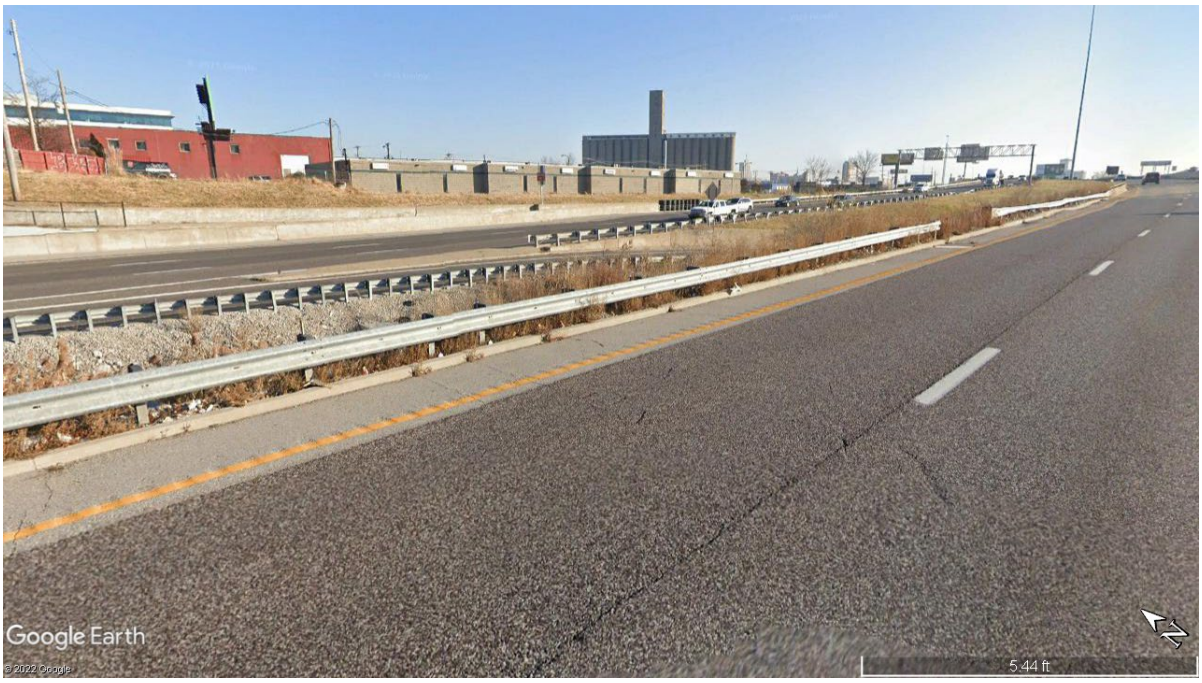


Figure 41. Wetland 5: Roadside Ditch North of the Vandeventer Ave. Off-Ramp

Figure 42. Wetland 6: Roadside Ditch Near IKEA Along Vandeventer Ave. and Forest Park Ave

Figure 43. Wetland 7: Roadside Ditch Along I-64 Eastbound Off-Ramp to Grand Blvd.

Figure 44. Wetland 8: Drainage Swale Located Between Forest Park Ave and Market St. West of Compton Ave.

16.0 PARKS AND RECREATION

16.1 REGULATORY CONTEXT

There is no specific requirement to consider parks and recreation resources during the PEL study process. Parks and recreation lands are public assets protected from transportation project impacts under Section 4(f) of the United States DOT Act of 1966. Some public parks and recreation lands can receive grants from the Land and Water Conservation Act fund for development, which designates further protection under Section 6(f) of the Act. If future improvements to I-64 require new right-of-way or an easement from parks, school facilities, or trails, the Section 4(f) process would be triggered. The process requires a Section 4(f) evaluation that identifies potential alternatives and potential impacts that is reviewed by FHWA.

16.2 RESOURCE DESCRIPTION

Parks, school playgrounds and sports fields, trails, and other public recreation facilities play a key role in public health and community. In an urban setting where land is a scarce commodity, it is paramount this resource is not impacted by transportation improvements unless no feasible and prudent alternative exists.

16.3 METHODOLOGY

MDNR, MDC, City of St. Louis, and Great Rivers Greenway parks and trails GIS layers were referenced to identify areas of concern. MDNR manages state parks in Missouri; MDC manages conservation areas, which are governed under separate laws than state parks; and the City of St. Louis manages city parks. The Great Rivers Greenway is a public agency created in 2000 whose goal is to connect St. Louis City, St. Louis County, and St. Charles County via greenways (i.e., bike paths and walking trails). Google Earth imagery was also used to identify other publicly accessible recreation facilities, such as schools.

16.4 RESULTS

There are three parks, three school facilities, and a public trail system in the study area. Brickline Greenway, a segment of the Great Rivers Greenway, begins near Forest Park Ave. and Spring Ave., continues south, and then heads west along the metro line. Portions of the Greenway are constructed, under construction, or in the planning phase. The Brickline Greenway is planned to connect Forest Park to the Gateway Arch (Great Rivers Greenway, 2022). Forest Park also has a trail system which connects into the study area by passing underneath Kingshighway Blvd. and into Hudlin Park. The trail also crosses I-64 via pedestrian bridge.

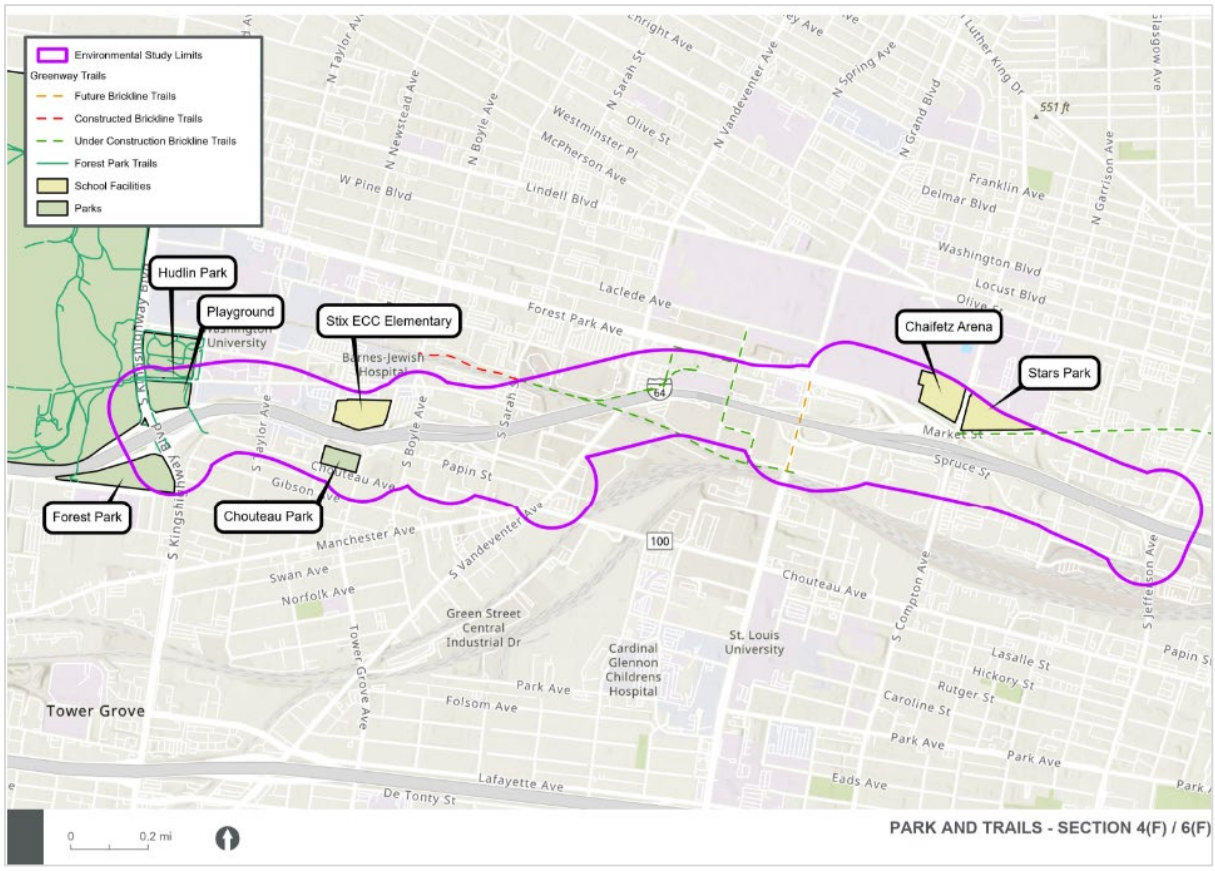
There are three city parks in the study area—Chouteau, Forest, and Hudlin. Chouteau Park is entirely within the study area and located along Chouteau Ave. and Newstead Ave. It has a dog park, several basketball courts, a playground, and open fields. Forest Park is primarily outside the study area, but portions of it extend into the study area near Kingshighway Blvd. between the on- and off-ramps to I-64. Because of its location, there is limited access to Forest Park, and it is not likely used by the public. Hudlin Park is along Kingshighway Blvd. and Clayton Ave. There are several tennis courts and shelters throughout, with a trail system around the periphery.

The three school facilities in the study area are Stix ECC Elementary, St. Louis University, and Harris-Stowe State University. Stix ECC Elementary is located north of I-64 between Newstead

Ave and Tower Grove Ave. There is an outdoor space west of the building with a playground. Both college facilities are near Compton Ave and Market St. St. Louis University operates Chaifetz Arena, an indoor sports venue, and has baseball fields just north of it. Stars Park has two baseball fields and is operated by Harris-Stowe State University.

The parks, trails, and school facilities in the study area are mapped in Figure 45. The Dwight Davis Tennis Court at Forest Park was developed using Land and Water Conservation Funds; therefore, Forest Park is subject to Section 6(f).

Figure 45. Parks, Schools, and Trails



Source: (MDNR, 2022b), (City of St. Louis, 2022b), and (Great Rivers Greenway, 2022).

16.5 RECOMMENDATIONS

MoDOT should coordinate with Great Rivers Greenway on the Brickline Greenway, which crosses I-64 at several locations. Furthermore, parks and school facilities should be identified with additional information during future NEPA projects. Impacts to these properties should be avoided if possible. If future improvements inhibit access or require new right-of-way or an easement from parks, school facilities, or trails, the Section 4(f) or 6(f) processes would be required, as applicable.

17.0 TRAFFIC NOISE

17.1 REGULATORY CONTEXT

Noise analysis is not required for PEL studies. Future transportation projects that are designated as Type 1 require a noise analysis during the NEPA process. Type 1 projects are proposed federal-aid projects for the construction of a highway on a new location, or there are significant changes to an existing highway that change the horizontal distance or elevation near noise-sensitive receptors. The noise survey and subsequent noise modeling during future NEPA processes can identify how a project may impact noise levels and locate the areas where noise abatement is necessary and feasible. If a future project in the study area qualifies as a Type 1 project, a detailed noise analysis must be performed, and concurrence must be obtained from FHWA for the proposed noise abatement or lack thereof.

17.2 RESOURCE DESCRIPTION

Transportation facilities can introduce excessive levels of noise into areas that are sensitive to the noise pollution. These sensitive noise receptors may include residential areas, active sports areas, hospitals, schools, hotels, and several others outlined in Table 8. Identifying where noise-sensitive receptors are located informs transportation project designs and, where noise abatement like walls may be constructed, to minimize noise impacts. Noise surveys that sample the ambient noise levels are also a common method for understanding current levels of noise in a study area, which informs project design and noise abatement locations. Surveys are generally conducted near noise-sensitive receptors.

17.3 METHODOLOGY

Information gathered from Google Maps, City of St. Louis city parcel data, and local stakeholders was used to identify sensitive receptors based on the activity categories in Table 8. Receptors placed in categories F or G are exempt from noise considerations. Based on these criteria, noise-sensitive receptors in the study area were mapped and are shown in Figure 46.

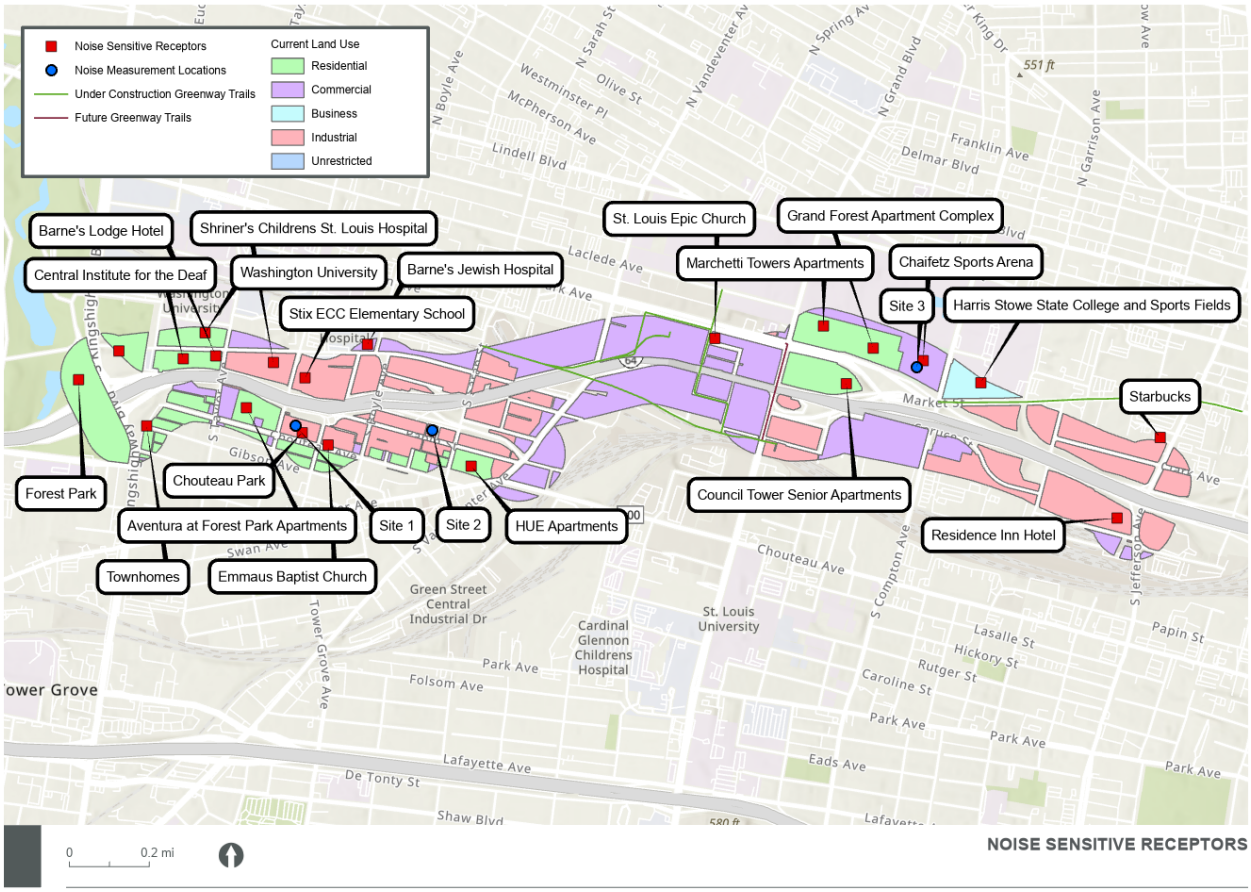
Table 8. Noise Abatement Criteria

Activity Category	Evaluation Location	Activity Description
A	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	Exterior	Residential. Includes undeveloped lands permitted for this activity category.
C[4]	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television, studios, trails, and trail crossings.
D[4]	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.

Activity Category	Evaluation Location	Activity Description
F	-	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	-	Undeveloped lands that are not permitted.

Source: (MoDOT, 2022a).

Figure 46. Noise-Sensitive Receptors



Source: (City of St. Louis, 2022b).

For NEPA projects, noise surveys may be conducted in 15-minute, 12-hour to 14-hour, and 24-hour durations depending on the purpose of the survey. Traffic noise is constantly increasing and decreasing depending upon the time of day and amount of traffic. FHWA describes the worst noise hour as occurring between 6:00 AM and 7:00 PM. local standard time. Since the worst noise hour does not occur overnight, a 24-hour noise survey is unnecessary. A 15-minute reading is generally used for calibrating a noise model and provides a high level of detail for a project.

Since this PEL study's purpose is to inform future NEPA projects, the cost-benefit of conducting several noise measurements and developing a noise model is not feasible and would need to be repeated for future NEPA processes. FHWA explains in its Noise Measurement Handbook how it's useful to have at least one noise survey location capture the worst noise hour, which a 12-hour to 14-hour survey would accomplish (FHWA, 2022b). Based on FHWA guidance and the informative purpose of this study, a 14-hour survey was proposed at Aventura at Forest Park Apartments, The Hue Apartment Complex, and Grand Forest Apartment complex for the following reasons.

- **Site 1: Chouteau Park**
  - Although this site is in an area unlikely to see additional transportation improvements, it is in a location with many noise-sensitive receptors. Having a reading in this site will allow MoDOT and the City of St. Louis to understand the current ambient noise levels, should a third party find it desirous to consider noise mitigation.
- **Site 2: Open field near The HUE Apartment Complex**
  - This block has recently been converted from commercial to residential and is home to several hundred residential units.
  - The complex is close to several residential flats along Sarah St. and along Choteau Ave. that likely experience very similar noise from the existing highway and may from future transportation improvements.
  - This location is very near a series of highway ramps connected to Papin St. and to Vandeventer Ave. for which the PEL study is likely to recommend changes.
  - The location of the reading is the closest available site which would grant access permissions for the survey. While the site is closer to the highway than The Hue Apartment Complex, it will still provide valuable data on general noise levels for the sensitive receptor and future development.
- **Site 3: Chaifetz Arena**
  - This site represents a sports complex and is likely to provide some information about the highway noise impacts to the nearby multifamily residential apartments.
  - This location is very near a series of highway ramps connected to Market St., Compton Ave., and Forest Park Ave. for which the PEL study is likely to recommend changes.

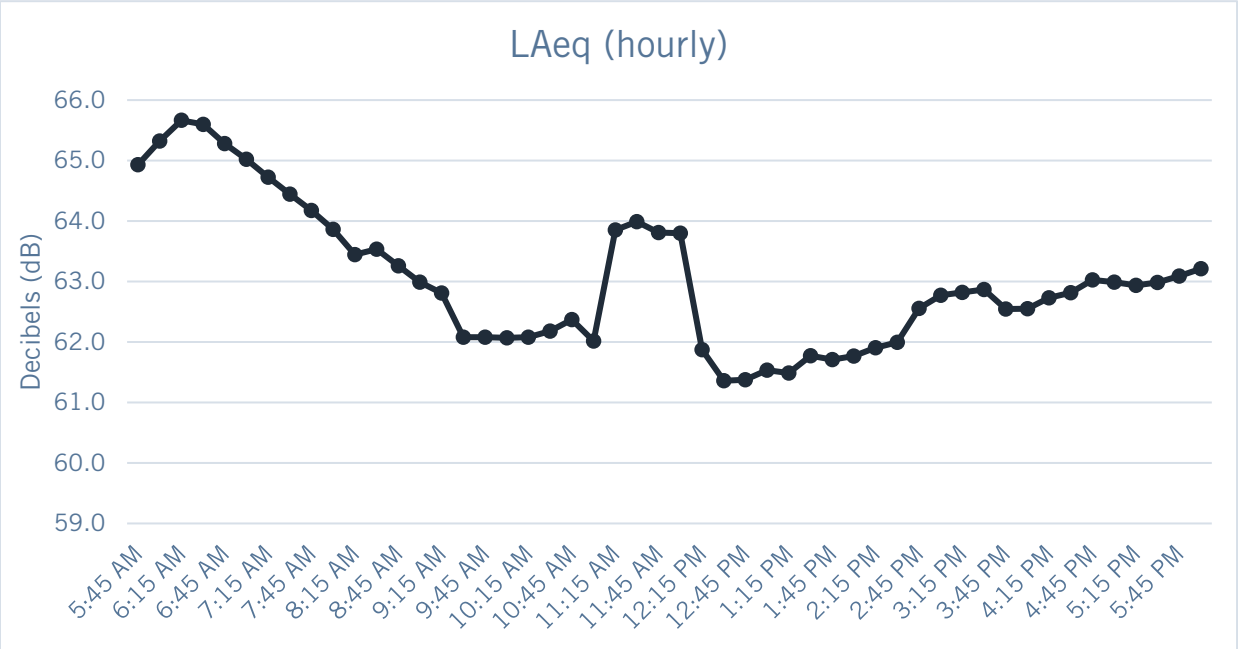
17.4 RESULTS

As shown in Figure 46, there were 21 noise receptors identified in the study area. The receptors are single-family and multifamily residential, schools, medical facilities, restaurants, churches, parks, and trails. Most of these receptors are on either end of the study area; a few are in the central part of the study area. HDR Engineering, Inc. conducted the long-term noise service at the locations on May 10, 2022. Below are the results from each site.

17.4.1 Site 1: Chouteau Park

- Fifteen-minute rolling average equivalent continuous sound levels (Leq) were calculated for the entire duration of the measurement starting at 5:45 AM and ending at 7:00 PM. This provided a noise levels data set for 13.5 hours (15-minute interval Leq).
- Despiking of noise levels was performed by comparing the A-weighted equivalent continuous sound level (LAeq) with the maximum A-weighted noise level (LAmax) and removing any values with a difference of 7% or more.
- Noise levels throughout the day ranged between 65.7 A-weighted decibels (dB[A]) and 61.4 dB(A).
- The loudest noise hour occurred during the morning from 6:15 AM to 7:15 AM (65.7dB[A]) and subsequently tapering down to 62 dB(A) by late morning. The mid-day noise levels increased to 64.0 dB(A) during the lunch hour after which the noise reduced to the lowest noise hour of the day to 61.4 dB(A). The noise levels continually increased later in the afternoon to the evening peak hour from 6:00 PM to 7:00 PM (63.2 dB[A]).
- The noise levels graph shown in Figure 47 indicates the noise levels were the highest in the morning and it decreased throughout the morning with a mid-day peak after which the noise levels consistently rose to evening peak hour noise levels.

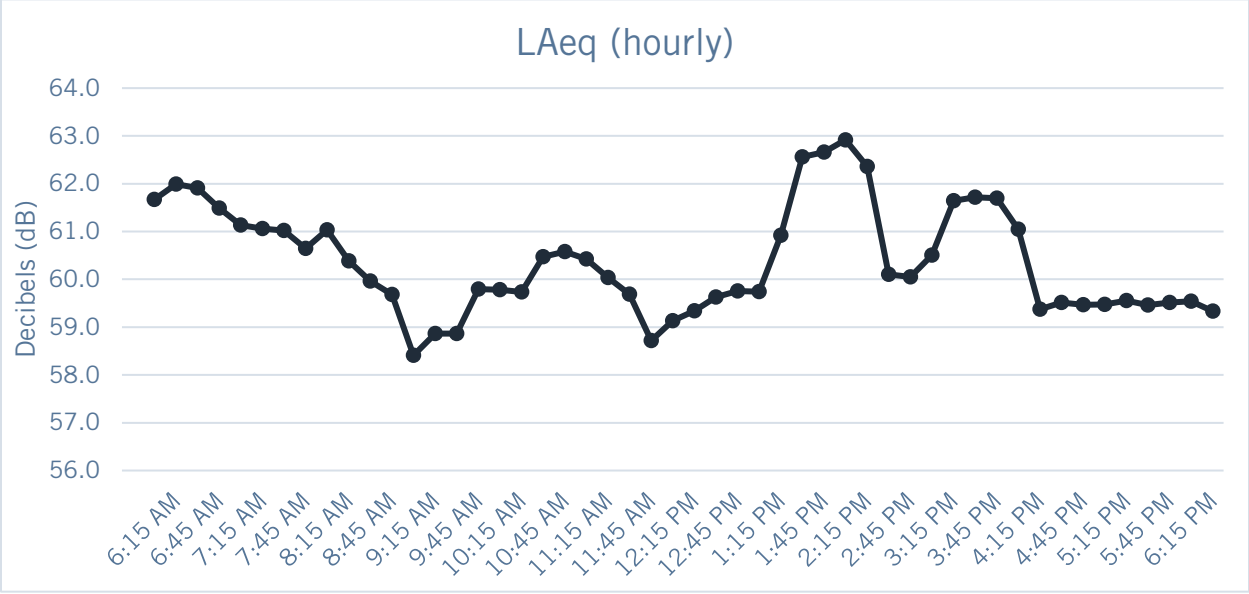
Figure 47. Noise Measurements for Site 1 Chouteau Park



17.4.2 Site 2: Open Field near The HUE Apartment Complex

- Fifteen-minute rolling average Leqs were calculated for the entire duration of the measurement starting at 6:00 AM and ending at 7:15 PM. This provided a data set for 13.25 hours (15-minute interval Leq).
- Despiking of noise levels was performed by comparing LAeq with LAmax and removing any values with a difference of 7% or more.
- Noise levels throughout the day ranged between 62.9 dB(A) and 58.4 dB(A).
- The loudest noise hour occurred during the mid-day hours from 2:00 PM to 3:00 PM (62.9 dB[A]). The morning peak hour noise levels occurred from 6:15 AM to 7:15 AM (62.0 dB[A]) and subsequently decreasing to the lowest levels of 58.4 dB(A) by late morning. The mid-day noise levels increased to 62.9 dB(A) after the lunch hour. The evening peak hour of the day occurred from 3:45 PM to 4:45 PM (61.7 dB[A]). After 5:00 PM, the site experienced steady noise levels of approximately 59.5 dB(A).
- The noise levels graph shown in Figure 48 indicates the noise levels fluctuated throughout the day. After the morning peak the noise levels consistently decreased until mid-day peak. Mid-day peak hour and evening peak hour occurred close to each other after which the noise levels reduced to consistent noise levels after 5:00 PM.

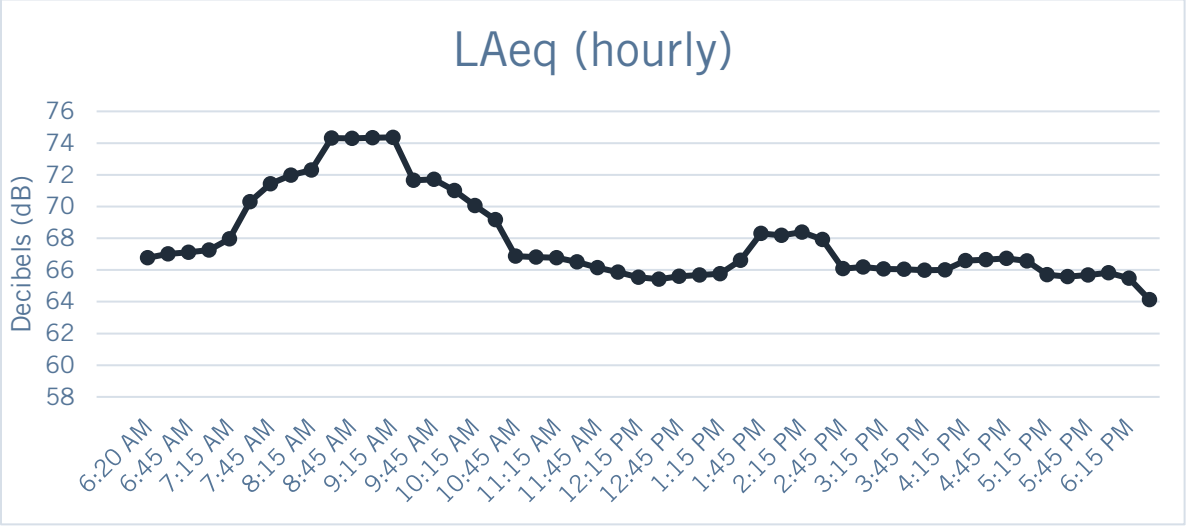
Figure 48. Noise Measurements for Site 2 Open Field near The HUE Apartment Complex



17.4.3 Site 3: Chaifetz Arena

- Fifteen-minute rolling average Leqs were calculated for the entire duration of the measurement starting at 6:20 AM and ending at 7:30 PM. This provided a data set for 13.10 hours (15-minute interval Leq).
- Despiking of noise levels was performed by comparing LAeq with LAmax and removing any values with a difference of 7% or more.
- Noise levels throughout the day ranged between 74.3 dB(A) and 64.1 dB(A).
- The loudest noise occurred during the morning from 8:30 AM to 9:30 AM (74.3 dB[A]) and then it tapered down to 65.4 dB(A) by late morning. The mid-day noise levels increased to 68.4 dB(A) past the lunch hour after which the noise reduced to the evening peak from 4:45 PM to 5:45 PM (66.7 dB[A]). The noise levels steadily decreased later in the evening to the lowest noise levels of the day at 64.1 dB(A).
- The noise levels graph shown in Figure 49 indicates the noise levels increased early in the morning to the peak hourly morning noise levels. The mid-day peak hour occurred after lunch. The evening noise levels were steady around 66 dB(A) and reduced to the lowest noise levels at the end of the day.

Figure 49. Noise Measurements for Site 3 Chaifetz Arena



17.4.4 Summary

Site 3 recorded the highest noise levels of 74.3 dB(A), followed by Site 1 noise levels of 65.7 dB(A), and then Site 2 of 62.9 dB(A). Summary of noise levels of each site is presented in Table 9. For context, see Figure 50 for common outdoor and indoor noises. FHWA states that the

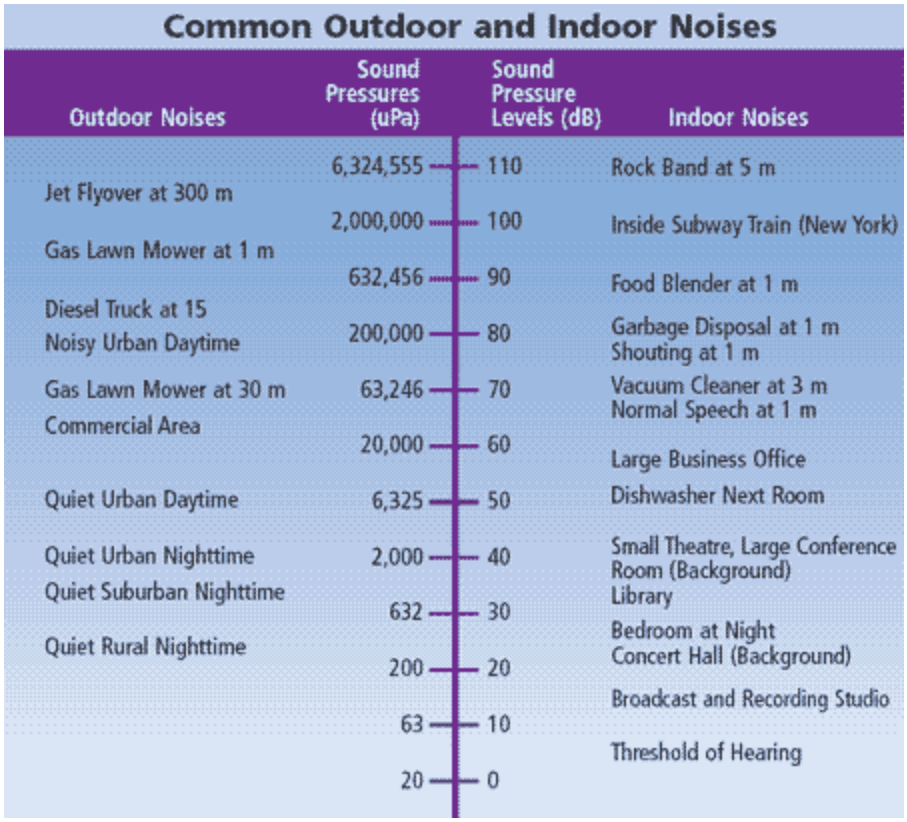
average highway traffic noise ranges from 70 to 80 dB(A) at a distance of 50 feet, which the three sites fall within (FHWA, 2022b).

Table 9. Noise Levels Summary

Site	Morning Peak Hour LAeq	Mid-Day Peak Hour LAeq	Evening Peak Hour LAeq	Lowest Noise Hour LAeq
Site 1	**6:15 AM – 7:15 AM 65.7 dB(A)***	11:30 AM – 12:30 AM 64.0 dB(A)	6:00 PM – 7:00 PM 63.2 dB(A)	12:30 PM – 1:30 PM 61.4 dB(A)
Site 2	6:15 AM – 7:15 AM 62.0 dB(A)	**2:00 PM – 3:00 PM 62.9 dB(A)**	3:45 PM – 4:45 PM 61.7 dB(A)	9:00 AM – 10:00 AM 58.4 dB(A)
Site 3	**8:30 AM – 9:30 AM 74.3 dB(A)**	2:15 PM – 3:15 PM 68.4 dB(A)	4:45 PM – 5:45 PM 66.7 dB(A)	6:30 PM – 7:30 PM 64.1 dB(A)

*Note: Noisiest hour of the day is bolded and highlighted yellow for each site.

Figure 50. Common Outdoor and Indoor Noises



Source: (FHWA, 2022b)

17.5 RECOMMENDATIONS

Noise from I-64 impacts 21 identified noise-sensitive receptors in the study area. If future projects qualify as Type 1 work, a noise analysis will be required. Alternatively, if projects do not qualify as Type 1, it is recommended MoDOT includes the public in discussions on noise in case third-party stakeholders want to fund noise abatement projects.

18.0 RIGHTSUMMARY OF RECOMMENDATIONS

Table 10 presents a summary of recommendations for the resources discussed in this document.

Table 10. Resource Recommendations

Resource	Recommendations
Land Use and Zoning	Local government and private stakeholders are investing heavily in the Future64 study area, which speaks the necessity for public engagement during the PEL study process. As this area continues to develop, MoDOT should identify changes to City of St. Louis zoning districts and SLUP plans as more residential and commercial properties are established.
Air Quality	The study area is in a nonattainment area for ozone. Therefore, the conformity requirements of the CAA apply. This means that any improvements that result from this PEL study process are subject to regional and local conformity requirements. Future transportation improvements must be included on a fiscally constrained metropolitan transportation plan and on a Transportation Improvement Program. During future NEPA processes, local air quality analysis is needed to assess whether future ozone conditions may cause an exceedance of the NAAQS. If so, mitigation will be required.
Hazardous Materials	With four active USTs and nine active or long-term hazardous sites in the study area, MoDOT must consider the potential impacts to these sites and any associated remedial action at the sites that could result from construction of future projects in the study area.
Visual Environment	Currently, the viewshed of I-64 has a moderate to high visual impact on the public within the environmental study area. The raised highway and bridges along the I-64 corridor represent the highest impact. The older bridges in the study area were built primarily for function and do not have visually appealing elements. The 21st century bridges incorporate various architectural styles that add unique character. These newer bridges epitomize the opportunity MoDOT could take as the older structures are reconstructed. I-64 also offers a particular viewshed of the cityscape that is not found elsewhere, which should be considered on future projects with elevation changes on the existing alignment. Noise walls may also be considered to in areas where the viewshed to the highway is determined to have a negative impact.
Socioeconomics	As future transportation projects transition to the NEPA phase, MoDOT should consider the modality of future projects and how they can improve connectivity across communities, specifically in disadvantaged areas, which is most of the CA area. Bike/ped routes play an important role in this as the data shows a prevalence of zero-car households. Covenant Blu-Grand Center and Jeff-Vander-Lou are two key communities which have high percentages of low-income and

Table 10. Resource Recommendations

Resource	Recommendations
	minority populations and should be a primary audience for focused outreach, such as pop-up events and local meetings, as well as the commercial areas that may experience impacts.
Historic Architectural	Most of the study area has historic resources, including, eight NHRP listed sites, 262 potentially historic buildings, and three historic districts. As projects move forward to NEPA, individual Section 106 studies and consultation with the Missouri SHPO will be necessary. Dependent upon the SHPO's determination, any direct or indirect visual impacts to unevaluated, eligible, or listed NRHP sites may require further survey and potential mitigation. The probability for impacts on these resources is high because they can be affected both directly and visually. Therefore, it is recommended that MoDOT keeps this resource under high consideration.
Archaeology	MoDOT and FHWA will require an archaeological survey that includes subsurface investigations during a future NEPA process. If previously recorded sites, including those that were impacted by previous projects, will be impacted, additional Phase II testing may be required.
Terrestrial Habitat and Ecological Significance	Because of the current land uses and high levels of development present in the study area, impacts to natural habitat communities associated with any future projects in the study area would be relatively minor. During future NEPA analysis, local agencies should consider ways to improve this resource in future projects through native landscaping, creating new parks, or other methods of adding ecological benefit.
Threatened and Endangered Species	Coordination should take place with USFWS and MDC on potential impacts to threatened and endangered species. It is unlikely though that any mitigation will be required because of the lack of habitat for the species listed in Table 7. It is recommended that MoDOT look for signs of bat roosting on bridges that are within 1,000 feet of suitable summer habitat.
Floodplains	Because there are no floodways in the study area, no agency coordination or permitting would be required for future transportation projects. MoDOT should not need to consider any impacts to this resource.
Water Quality	Because stormwater will reach the Mississippi River, an impaired waterway, it is recommended that during future NEPA processes, MoDOT implement a SWPPP to meet regulatory requirements and water quality concerns for the Mississippi River.
Wetlands and WOUS	Google Earth imagery indicates several roadside ditches and swales that have potential to host wetlands and that may be WOUS. As future projects are outlined, MoDOT should conduct a field survey to delineate the identified features and any other unidentified wetlands that were not present on NHD or NWI mapping.
Parks and Recreation	MoDOT should coordinate with Great Rivers Greenway on the Brickline Greenway, which crosses I-64 at several locations. Furthermore, parks and school facilities should be identified with additional information during future NEPA projects.

Table 10. Resource Recommendations

Resource	Recommendations
	Impacts to these properties should be avoided if possible. If future improvements to inhibit access or require new right-of-way or an easement from parks, school facilities, or trails, the Section 4(f) or 6(f) processes would be required, as applicable.
Traffic Noise	Noise from I-64 impacts 21 identified noise -sensitive receptors in the study area. If future projects qualify as Type 1 work, a noise analysis will be required. Alternatively, if projects do not qualify as Type 1, it is recommended MoDOT includes the public in discussions on noise in case third-party stakeholders wish to fund noise abatement projects.

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APPENDIX A.
COMMUNITY ASSESSMENT BASELINE TECHNICAL MEMORANDUM

TECHNICAL MEMORANDUM
COMMUNITY ASSESSMENT BASELINE

Prepared for:	Missouri Department of Transportation
Prepared by:	Development Strategies, Inc.
Project:	Future64: Communities » Transportation » Together *Kingshighway to Jefferson*
Date:	March 28, 2022

INTRODUCTION

This Future64 Community Assessment Technical Memorandum provides a thorough understanding of the place and the people living in and around the I-64 corridor study area. It will inform the development of the Future64 project Purpose and Need and development and evaluation of alternatives for the Future64 Planning and Environmental Linkages (PEL) study process.

BACKGROUND

Investment in improvements along I-64 has the potential to create positive social impact beyond the economic impact of construction spending and opportunities for real estate development. Such community benefits include improved access to jobs; improved neighborhood connectivity and improvements in the public realm that can enhance the marketability of redevelopment sites within the Future64 corridor; and improved access to regional multimodal transportation networks, including transit, greenways, and bicycle and pedestrian infrastructure. It is important to understand these social and market benefits in combination with the broader economic impacts that support community goals toward equity, environmental sustainability, and quality of place and life. Addressing these benefits is also a crucial component—a priority—for U.S. Department of Transportation (USDOT) discretionary grant funding programs like Rebuilding American Infrastructure with Sustainability and Equity (RAISE).

COMMUNITY ASSESSMENT FRAMEWORK

The Community Assessment Baseline is intended to provide a thorough understanding of the place and the people living in and around the I-64 corridor study area. In this memo, place is both the neighborhoods where people live, and the commercial districts and corridors where people work, shop, and recreate. Place is defined by the neighborhood boundaries; commercial and office clusters; and institutional, employment, and entertainment anchors. These distinct

places are populated by the people who live and work in the area and visit every day—people with unique characteristics, needs, and desires for the future of I-64.

The "place" for the Future64 PEL study is St. Louis' Midtown, one of the most rapidly changing areas in St. Louis (the City), and the surrounding neighborhoods. The economy and market conditions, as well as land use and development characteristics, provide context for the physical form, connectivity, public realm, and redevelopment potential within a defined area. Looking at demographic variables, including age, income, educational attainment, and physical ability, provides a lens to explore equity in mobility and access to opportunity.

The Community Assessment Baseline is a unique element of the Future64 PEL study. It goes beyond a traditional transportation study to include analysis of characteristics such as industry clusters, jobs and wages, and affordable housing to more fully understand the people and households who currently work and live within and around the study area, and might reasonably be expected to in the near future. This more diverse, deeper understanding of the economy, market, people, and neighborhood context provides in-depth insight into why people travel to, from and through the study area. Combined with community input and the study's technical traffic and transportation data, this community assessment baseline will help inform the Future 64 project Purpose and Need and the development of transportation alternatives to meet other study goals. It will also inform high-level screening criteria related to the economic, social and equity, and connectivity impacts and benefits of the transportation improvements under consideration.

MEMO ORGANIZATION

This Community Assessment Baseline consists of the technical memo and a comprehensive set of supplemental maps, data, and graphics. The technical memo highlights the key findings of the economic, real estate, people, and neighborhood analyses. The supplemental material is a comprehensive set of data that can provide additional insights. To assist the reader in the review of the supplemental material, page numbers in the supplemental material are provided in the technical memo as cross references—for example: (*page x*).

Following the Introduction to the Study Area *(pages 5-8)*, the rest of the Community Assessment Baseline is organized into two main sections—Economy and Market *(pages 9-36)*, and People and Neighborhoods *(pages 37-69)*. Each section details the key data points and characteristics around each of the topics.

MARKET AND ECONOMY

PEOPLE AND NEIGHBORHOODS

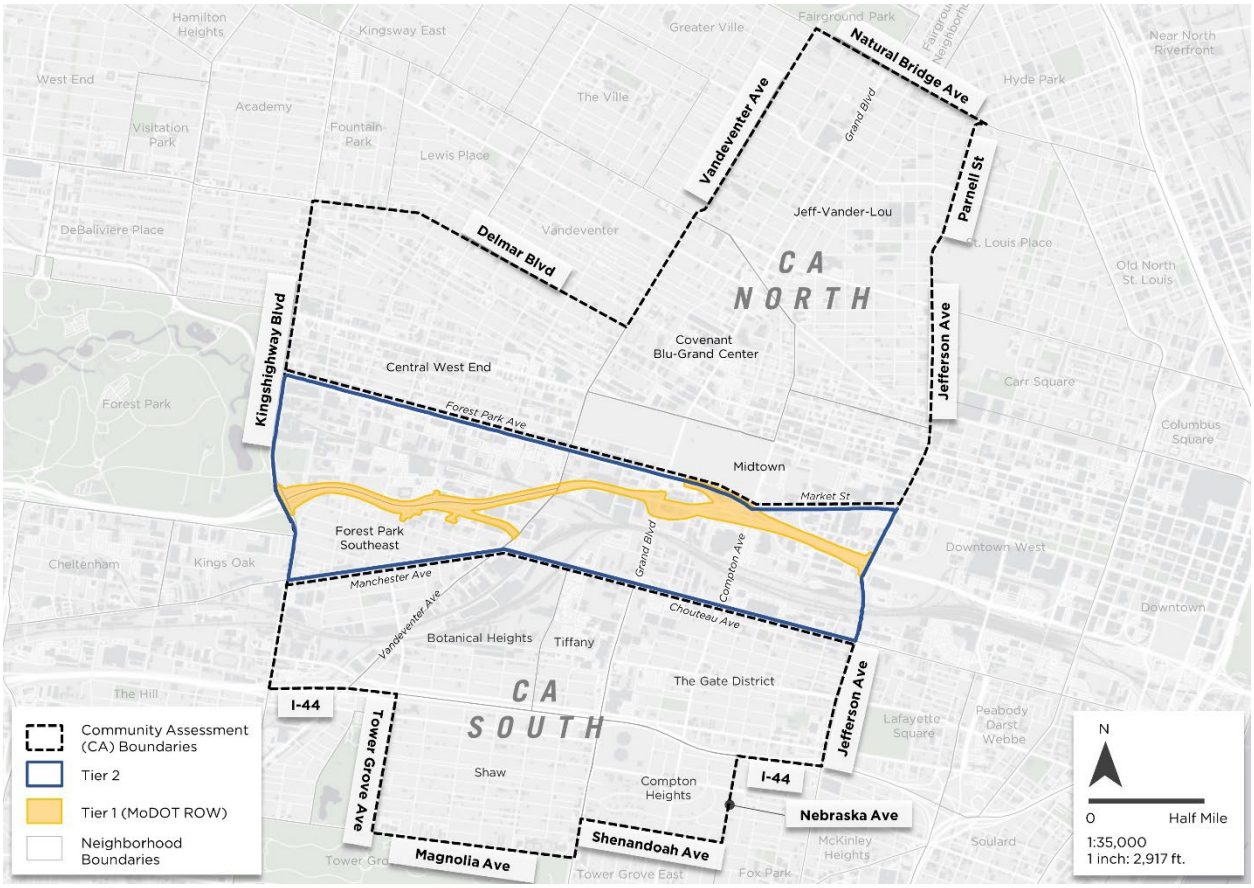
COMMUNITY ASSESSMENT BASELINE STUDY AREA

The limits for the Community Assessment Baseline are different than those of the Future64 PEL study. The I-64 study area is banded by Kingshighway Blvd to the west and Jefferson Ave to the east, and Forest Park Ave to the north and Route 100 (Chouteau Ave/Manchester Ave) to the south. The study area is broken into two tiers. The Tier 1 limits are defined as the area between Kingshighway Blvd and Jefferson Ave specific to the interstate system and contained within MoDOT right-of-way. The Tier 2 limits encompass a broader area where transportation improvements would be considered, as they provide greater connectivity and permeability with the I-64 corridor. The Tier 2 limits are Market Street and Forest Park Avenue to the north, and Chouteau Avenue and Manchester Avenue to the south.

For the Community Assessment (CA), a broader study area (not inclusive of the Tier 2 study area) was established that incorporates several of the neighborhoods north and south of the I-64 study area. The neighborhoods below represent the areas where people live and work immediately surrounding I-64. *(page 6)*

- Jeff Vander Lou
- Covenant Blu-Grand Center
- Central West End
- Midtown
- Forest Park Southeast
- Botanical Heights

STUDY AREA BOUNDARIES



- Tiffany
- The Gate District
- Shaw
- Compton Heights

RATIONALE FOR COMMUNITY ASSESSMENT AREA

The CA area is the primary analysis area for the CA, with most data and analysis being conducted here, or at boundaries dictated by available data geographies. This boundary was defined with the intention to ensure equitable transportation options in the future, to both residents and commuters travelling to and through the Tier 2 limits and neighborhoods. The CA area was established considering local commuting patterns, adjacent neighborhoods as defined by the City of St. Louis, and how residents of these neighborhoods access the I-64 corridor, or traverse north-south across the corridor, especially along Grand Blvd – one of St. Louis' busiest north-south thoroughfares.

KEY METRICS

In a region of 2.8 million people, the City of St. Louis has roughly 11 percent of the region's population, with 309,000 people. While the region has experienced 2 percent growth since 2010, the City has lost just over 3 percent of its population. (*page 7*)

The Future64 CA area has 42,100 people, or nearly 14 percent of the City's population. And while the City has lost population in the last decade, the CA area has grown by just over 3 percent. With 57,600 jobs, the CA area has 23 percent of all jobs within the City. At $49,300, the median household income for the CA area is also slightly higher than the City average of $48,000. *(page 8)*

MARKET AND ECONOMY

REGIONAL ECONOMIC OVERVIEW

The St. Louis regional economy is well-diversified and has experienced modest growth in the last 10 years. While total employment in the City of St. Louis is lower than in 2000, growth in Educational Services; Health Care and Social Assistance; and Professional, Scientific and Technical Services has helped diversify the local economy as it shifts away from a manufacturing employment base to more talent-driven knowledge-based sectors.

Key Industry Sectors

Based on location quotient, which is the distribution of regional employment by sector compared to the national distribution of employment by sector (a location quotient above 1.0 indicates a higher-than-average regional concentration of employment), the St. Louis regional economy is well-diversified with no significant concentrations (or deficiencies) in employment by sector. The sectors with the highest relative concentrations of employment include Transportation and Warehousing (1.20), Manufacturing (1.18), and Arts, Entertainment and Recreation (1.13). The region also has average concentrations of employment in Finance and Insurance (1.10), Management of Companies (1.10), and Healthcare (1.05). *(page 11)*

Employment Trends

Prior to the COVID-19 pandemic, economic growth in the St. Louis Metropolitan Statistical Area (MSA) had been relatively slow from 2010 to 2019 with total employment growth of 8.9 percent. This is considerably slower than the national growth rate of 16.9 percent, but generally consistent with statewide economic growth. Total employment growth in the City of St. Louis also followed regional trends during this 10-year time period. The City was more adversely impacted by the economic shutdowns from the pandemic with total employment losses of 6.1 percent from 2019 to 2020, compared to losses of 4.8 percent in the region and 5.4 percent nationally. The City of St. Louis has had stagnant economic growth dating back to 2001—total employment of just under 274,000 jobs in 2020 is lower than total employment of just under 290,000 jobs in 2001. *(page 12)*

Sector Analysis

From 2010 to 2019, despite losses of Government, Manufacturing, and Information jobs, the City of St. Louis added just over 24,000 net new jobs. Job growth in the City was in three of the

top "core" knowledge-based sectors—Educational Services (+10,300 jobs); Health Care and Social Assistance (+9,300 jobs); and Professional, Scientific and Technical Services (+4,600 jobs), which is consistent with national trends. The growth in Educational Services jobs can be attributed to employment growth at local institutions of higher learning, including St. Louis University, but also from a reclassification of jobs at Washington University's medical campus located in the City. Creating opportunities to accommodate knowledge-based sector job growth will be critical to the City and regional economy. *(pages 13, 14)*

Regional Growth Clusters

Greater St. Louis Inc.'s *STL 2030 Jobs Plan* identified five target clusters with the highest potential to drive the regional economy. Given the presence of CORTEX and BJC-Washington University Medical Campus, the Tier 2 Study Area is positioned to facilitate growth in two of these clusters—Advanced Business Services and Biomedical and Health Services. *(page 15)*

ECONOMIC TRENDS

Anchored by CORTEX, BJC-Washington University Medical Campus, and St. Louis University, the CA area continues to drive regional growth in innovation and entrepreneurship, technology, educational services, and healthcare jobs.

Employment Trends

Despite some of the economic challenges of the City, employment growth in the Tier 2 Study Area has exceeded City and regional employment growth. In fact, employment growth has declined in the City outside of the Tier 2 Study Area boundaries. According to OnTheMap, from 2010 to 2019, Tier 2 Study Area added just under 4,300 jobs for an increase of around 14 percent, while the MSA experienced employment growth of 9 percent and the reaming areas of the City outside of the Tier 2 Study Area had a decrease of 4 percent. *(page 17)*

Sector Trends

According to ESRI, the Tier 2 Study Area has nearly 27,000 employees representing nearly 11 percent of City employment. Most of these jobs (52 percent) are in Health Care and Social Assistance given the presence of the BJC-Washington University Medical Campus. There is also a concentration of Educational Services jobs (3,021); Administrative Support jobs (1,952); and Professional, Scientific, and Technical Services jobs (1,310) that could be attributed to the medical infrastructure, as well as CORTEX. *(page 18)*

Knowledge-Based Sectors

More than 70 percent of the jobs in the Tier 2 Study Area are in the knowledge-based sectors of Healthcare and Educational Services jobs as well as Professional sectors (Finance and Insurance; Management of Companies; Information; and Professional, Scientific and Technical Services), compared to a regional share of just under 39 percent. This demonstrates the competitive positioning of the study area as a regional hub of "new economy" jobs that are growing nationally and are drivers for regional talent attraction. *(page 19)*

Employment by Income

Based on distribution of employment by sector and average wages by sector, the average wage for workers in Tier 2 is just over $60,500, which is slightly below the City average, but higher than the regional average. More importantly, there is a much higher proportion of jobs that pay more than $50,000 annually in Tier 2 (84 percent) compared to 79 percent in the City and only 68 percent in the region. Only 7 percent of the jobs in Tier 2 pay less than $35,000, which can be attributed to the relatively low share of food service and retail jobs compared to the regional average. By comparison, 13 percent of the jobs in the City and 21 percent of the jobs in the region pay less than $35,000. *(page 20)*

Employment Distribution

The highest concentrations of employment are in and around the BJC-Washington University Medical Campus on the west side of the CA area. The center portion of the study area includes CORTEX, which has an estimated 6,000 workers with plans for expansion. East of Cortex is Ikea with 400 workers and the St. Louis University campus with university staff and its adjacent retail uses. There are concentrations of retail jobs along the Manchester Avenue ("The Grove") and Forest Park Avenue corridors, as well as Grand Center to the north. On the far eastern end of the study area is the Wells Fargo campus. *(pages 21, 22)*

Commuting Patterns

Ninety-nine percent of the workers in the Tier 2 Study Area and ninety-five percent of the workers in the CA area commute into these study areas, which can be attributed to the lack of local housing for the workforce. When considering the residents living within the CA area who work, 11 percent of them live and work in the CA area; emphasizing the importance of transit, and local pedestrian and bicycle connectivity. *(page 23)*

MARKET OVERVIEW

Regional Real Estate Trends

Despite the City losing population since 2010, 5,500 multifamily housing units have been constructed in the City contributing to 30 percent of the new regional supply and outpacing development in St. Louis County. Retail was strong in the City, adding 1.1 million square feet for an increase of 5 percent, outpacing growth in the region. The City lost a large share of its industrial building stock (6.6 million square feet) due to redevelopment activity. Office development continues to be stronger in suburban areas of St. Louis and St. Charles Counties, while the City's supply increased by only 0.3 percent (850,000 square feet constructed). *(page 25)*

Study Area Real Estate Trends

The Central Corridor that stretches roughly from downtown St. Louis to Forest Park along I-64 has seen tremendous growth and development over the past 20 years. With the support of Washington University, BJC Healthcare, St. Louis University, the City of St. Louis, and private developers, there has been substantial investment in the area. New businesses, especially those focusing on biotechnology, have been attracted to the new office and research facilities in proximity to major research institutions. Private developers have constructed over 1,800

multifamily units and around 1,800 student housing beds within the boundaries of the CA area and Tier 2 study area since 2010, to house workers and students. Development continues to occur, ranging from investments in new hospital infrastructure to private mixed-use development. *(pages 26-32)*

Multifamily Housing

The multifamily housing market is strong in the Tier 2 Study Area with vacancy rates lower than, and effective rents higher than, the Citywide and regional averages. Vacancy in the CA area has decreased significantly in the last few years as demand has increased for centralized and higher-quality housing in areas with high walkability. Of the 5,500 multi-family units delivered in the city since 2010, 1,130 or around 20 percent of this new supply is located within the CA area. Together with Tier 2, new supply totals over 1,800 units – a third of the city's new multifamily units since 2010. Most of these new multifamily housing supply has been constructed in the western portion of the CA area in Central West End and Forest Park Southeast.

Student Housing

Given the presence of St. Louis University, student housing development has been strong in and around the Tier 2 Study Area with four new properties constructed since 2010 and one property in the pipeline. Since 2010, around 1,300 new student beds have been added in the CA area – more than two-thirds of the city's new supply.

Retail

Tier 2 Study Area has had more than 900,000 square feet of retail constructed since 2010, which can be attributed to Ikea opening in 2014 and City Foundry opening in 2021. Retail vacancy increased significantly with the recently opened City Foundry that has had slow absorption given the COVID-19 pandemic's impacts on the retail market. This development also impacted average gross rents, with the property having some of the highest rents in the region.

Office

Since 2010, almost all the City's office development activity has been in the Tier 2 Study Area with significant activity in CORTEX and the Washington University Medical Campus. This new supply has led to an increase in average vacancy, but an increase in gross rents that are significantly above the regional average.

Industrial

While the CA area contains a large supply of industrial space, there has been no industrial development activity since 2010. Generally, the newest supply in the region has occurred in lower density areas that are more supportive of businesses transportation, warehousing, and logistics needs. Additionally, given the CA area's marketability for multifamily, hospitality, office, and retail uses, this has limited the market feasibility for industrial development. Moving forward, the industrial supply will likely continue to decline for adaptive reuse redevelopment opportunities.

Hotel

There have been several new hotels with a total of 760 rooms constructed in the CA area since 2010. Occupancy rate and average daily rate trends for the entire hotel supply have been generally consistent with the Citywide average.

Stakeholder Interviews

Development Strategies held multiple interviews with a range of real estate professionals familiar with the CA area. These interviews included discussions about current and future projects within and nearby the CA study area, impressions of how infrastructure is currently functioning in the CA area and how it could be improved, and the general impression of the development process within St. Louis. These conversations, in addition to the market and economic analysis, helped support the following Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis. *(page 33)*

SWOT Analysis

Strengths	**Weaknesses**
• Concentration of biotechnology-focused businesses will continue to attract new talent/businesses to the project area • Proximity to major educational and research institutions will attract students/faculty to live in the area • Availability of light-rail public transportation allows workers and residents easier access to employment, entertainment, and residential amenities	• A perception by developers that the City of St. Louis' shift in strategy to focus incentives elsewhere in the city may slow new development within the project area • A negative perception of St. Louis as a place to live may dissuade individuals and families from relocating to the area
Opportunities	**Threats**
• Ample developable sites remain within—and nearby—the project area • While national developers may be wary of investing in St. Louis, there exists a local development community that has proven a commitment to investing in the City of St. Louis and rehabilitating formerly blighted and contaminated sites • Pipeline of highly educated graduates to be employed at or live near the project area	• Continued investment in new development to the west of St. Louis threatens to move the 'center' of the region out of the City, stealing new businesses and residents • Changes in working patterns—partly due to the recent pandemic—may somewhat reduce the need for dedicated office space or residential space adjacent to employment centers • Increased competition from other cities (Kansas City, Chicago, Indianapolis, Nashville and beyond) may attract new businesses that would have otherwise chosen St. Louis • Adjustments to economic incentive programs (TIF, CID, TDD, etc.) may reduce the amount of assistance available to developers, rendering future projects financially infeasible.

ECONOMIC COMPETITIVENESS

Key Success Factors

The Tier 2 Study Area is essential for supporting regional economic development efforts given its diversified employment base in growing knowledge-based sectors, multimodal accessibility, and central urban location. The role of I-64 is also critical to its success—it provides vehicular accessibility to the regional labor force. However, creating and maintaining seamless connections across I-64 that link pedestrians, cyclists, and automobiles to and from employment opportunities, housing, retail, and recreational opportunities will be necessary for the area's livability.

The competitiveness of the study area is supported by the following success factors:

- **Central location.** Tier 2 Study Area is centrally located in St. Louis' Central Corridor that stretches from downtown St. Louis west to Forest Park. This area that includes the Tier 2 Study Area contains approximately 150,000 jobs, or around 60 percent of the jobs in the City. While employment is generally decentralized in the St. Louis region with 1.4 million jobs spread over a 15-county area, the Tier 2 study area has the highest employment density in the region with around 16,000 jobs per square mile, compared to the city's 3,800 jobs per square mile.

- **Employment growth.** Within the City, from 2010 to 2019, the largest net gains in employment by sector have been Educational Services; Healthcare and Social Assistance; Professional, Scientific, and Technical Services; and Finance and Insurance. All are key knowledge-based sectors that are growing nationally. The Tier 2 Study Area has also experienced considerable growth in these sectors and is critical to continuing to position the region for future economic growth and competitiveness.

- **Regional economic development alignment.** As part of the regional economic growth strategy (*STL 2030 Jobs Plan*), two of the key growth clusters are Advanced Business Services, which includes finance, insurance, and information technology, and Biomedical and Health Services. Both of these clusters have a strong institutional presence in the Tier 2 Study Area with Washington University Medical Campus, CORTEX, and BioSTL's BioGenerator. These three institutions, in addition to Washington University and St. Louis University, are positioned to drive high-growth innovation and entrepreneurship in the region.

- **Higher wages.** Based on average wage by sector, the Tier 2 Study Area has a much higher proportion of higher wage jobs compared to the City and the regional average and provides more paths to upward mobility. These types of jobs are also very attractive to talented and mobile workers.

- **Value of Forest Park.** While just beyond the Tier 2 Study Area, Forest Park is the recreational and cultural anchor for the entire region and has considerable value to

nearby residents and employers. It plays a vital role in attracting talent to the region, as well as promotion of health and wellness.

- **Accessibility and walkability.** With 96 percent of the workforce commuting into the Tier 2 Study Area, I-64 is critical to providing vehicular access and maintaining connectivity to adjacent neighborhoods. Tier 2 Study Area is unique in that it includes residential neighborhoods, a burgeoning main street retail district with dozens of locally owned businesses along Manchester Avenue, and a dense concentration of well-paid, knowledge-based jobs. North-south bike, pedestrian, and vehicular connectivity across I-64 will be critical to the long-term viability and competitiveness of the area. Seamless connections between housing and employment opportunities will support future investment in the neighborhoods.

The Study Area is also served by three MetroLink Stations, including Central West End Station, the busiest in the network in terms of average daily ridership. The CORTEX Station, built in 2018, was designed to alleviate platform congestion at the Central West End Station and provide direct access to CORTEX. This station further enhances the market potential for new mixed-use development.

Special Taxing Jurisdictions

There are numerous individual special taxing jurisdictions within the study area, ranging from individual parcel tax abatement to multi-acre Tax Increment Financing projects. The following highlights key projects within the area. *(page 35, 36)*

Tax Increment Financing

Tax Increment Financing, or TIF, is utilized to encourage redevelopment of blighted areas by capturing a portion of the new tax revenues generated by redevelopment. These monies are used to offset development costs over the lifetime of the project. Within the Study Area there is a handful of TIF districts—shown in Table 1. For example, Cortex, one of the oldest districts, was started to redevelop a large area into a biosciences research area and mixed-use residential neighborhood. To date, multiple phases of the redevelopment have been finished, and the area boasts significant growth over the last decade. Similarly, the City Foundry, Armory District, and 374 S. Grand projects also use TIF to help offset the costs of renovating older buildings, many of which had significant environmental issues.

Table 1. TIF Districts in the CA Area

Project Name	Acres	Use	Status
Cortex	167	Office/Bio Sciences/Mixed-Use	Multiple phases open; additional phases under construction or available for development.
City Foundry	18.7	Mixed-Use Residential/Office	Phase I open; Phase II in development

The Armory District	8.9	Entertainment/Mixed-Use Residential	Under Construction
374 S. Grand	5.95	Mixed-Use Residential	Complete
Chouteau Compton Industrial Center	20.1	Industrial/Retail	Unknown

Transportation Development District

Transportation Development Districts, or TDDs, are used to fund the construction of transportation related improvements. Generally, these are funded through an additional sales tax of up to 1.0 percent, special assessment, property tax, or toll. TDDs are often overlaid with a TIF and/or CID. The TDDs in the CA area are shown in Table 2.

Table 2. TTDs in the CA Area

Project Name	Acreage	Use	Status
212 S. Grand TDD	4.51	Mixed-Use Residential	Complete
Residence Inn Downtown TDD	3.14	Hospitality	Complete

Community Improvement District

Like a TDD, Community Improvement Districts, or CIDs, generate revenues through a sales tax, special assessment, or property tax. These revenues are used to fund a wide range or improvements within the TDD borders—ranging from pedestrian plazas to special events. If an area is deemed 'blighted' per Missouri Statutes, CID may also be used to fund the cost of demolition or structure renovations. The CIDs in the CA Area are shown in Table 3.

Table 3. CIDs in the CA Area

Project Name	Acres	Use	Status
212 S. Grand CID	4.51	Mixed-Use Residential	Complete
Residence Inn Downtown CID	3.14	Hospitality	Complete
Chouteau Crossing CID	9.73	Industrial/Training	Complete

Chapter 353 Redevelopment Area

Chapter 353 of the Revised Statutes of Missouri allows for real property tax abatement within blighted areas. St. Louis University established the large Midtown 353 area to address and have

control over the long-term redevelopment of the area. While the university owns some of the property within the area, many of the privately held parcels that will be developed in the future will likely seek property tax abatement through the Midtown 353. To date, multiple projects have been completed or are ongoing within the area. The Chapter 353 Redevelopment Area in the CA Areas is shown in Table 4.

Table 4. Chapter 353 Redevelopment Areas in the CA Area

Project Name	Acres	Use	Status
Midtown 353	350	Mixed-Use	Ongoing; Substantial parcels available for redevelopment

Real Estate Implications on Commercial Corridors

The Study Area has seen tremendous growth over the past decade, and projects continue to flourish in the area, despite the recent pandemic and sharp increase in construction costs. Phase II of the City Foundry project is underway, and construction is ongoing at the Armory District project, both located near Interstate 64. The Edwin, located near the corner of Grand and Chouteau Aves, is in development, and additional mixed-use development is underway at the Steelcote lofts.

Based on conversations with local real estate professionals, substantial redevelopment is highly likely to occur on key surface street corridors within the next 10 to 20 years. Large, developable parcels are available or already under developer control along Grand, Manchester, and Vandeventer Aves.

Taken as a whole, these ongoing development projects, combined with the expected future growth in the area, will continue to evolve the Study Area from a light-industrial corridor to a dense residential neighborhood.

PEOPLE AND NEIGHBORHOODS

COMMUNITY ASSESSMENT AREA SNAPSHOT

While the CA area has 42,100 people living in it, there are only 4,300 people living within the Tier 2 study area. This is due to its primarily commercial and industrial nature, and is reflected in a relatively low population density. As one moves north and south away from the I-64 corridor, the population density increases, with relatively high population density in the Central West End, the northern portion of Forest Park Southeast, and the Shaw neighborhood.

Unemployment rates are relatively low in and around the Tier 2 study area but increase significantly as one moves north within the CA area, in and around the Jeff Vander Lou neighborhood. These unemployment rates are reflected in other socioeconomic conditions, such as educational attainment, income, and poverty rate.

The Crime Index[i] scores are relatively high in block groups throughout the CA area, especially in the neighborhoods just south of the Tier 2 study area, further north into the Covenant Blu-Grand Center and Jeff Vander Lou neighborhoods.

NEIGHBORHOOD DEMOGRAPHICS

With the influx of new development within the Tier 2 study area over the past 10 years, the population growth rate of nearly 19 percent far exceeds the regional average. The average household size is smaller than the City average, given the concentration of students, singles, couples, and households without children. *(page 41)*

Looking at a high-level neighborhood comparison, Forest Park Southeast grew in population by more than 32 percent since 2010, one of the fastest growing neighborhoods in the City. Central West End has also experienced strong growth, while Grand Center experienced a slight population decline. Outside of the growth in Forest Park Southeast, population growth south of I-64 has been slower than areas to the north. Household sizes in these southern neighborhoods are more consistent, or even slightly higher, than the City average. *(page 42, 43)*

Educational Attainment

The western portions of the study area, including the neighborhoods immediately to the north and south, have higher concentrations of highly educated individuals. The areas to the east have lower levels of educational attainment but are consistent with the regional average. The neighborhoods to the far north of the CA area have a significantly lower share of population with a bachelor's degree or higher, showing a mismatch between the population living there and the educational requirement of the jobs within the study area. *(page 44)*

Age of Residents

The CA area has a relatively large college-age population (27 percent) given the presence of St. Louis University and the proximity of Washington University and Harris-Stowe State University. From 2010 to 2021, the Tier 2 study area had a large increase in its population age 65 and older, as well as increases in younger adult households, possibly attributed to the continued reinvestment in the Forest Park Southeast and Central West End neighborhoods. *(page 45)*

Income of Residents

While the median household income for the CA area ($49,000) is slightly higher than that of the City ($48,000), there is considerable variation and disparity throughout the CA area. While areas to the south of the Tier 2 boundary and just north in the Central West End generally have incomes comparable to, or even above, the regional median of $66,000, households to the east and northeast generally have incomes below $30,000. This can be attributed to the large student population and weaker market conditions in the Jeff Vander Lou and Covenant Blu-Grand Center neighborhoods. *(page 46)*

Race and Ethnicity

Racial composition in the Tier 2 study area and the CA area is similar to the City. Within the CA area, however, the Central West End and Shaw neighborhoods have relatively large white populations, while the areas to the north in and around Grand Center and Jeff Vander Lou are predominantly Black. *(page 47)*

Household Poverty

Concentrations of poverty vary throughout the CA area, with pockets of high concentrations of poverty both north and south. Generally, poverty levels are significantly higher and concentrated in the areas to the north around Covenant Blu-Grand Center and Jeff Vander Lou neighborhoods. When looking at households that receive food stamps/SNAP (Supplemental Nutrition Assistance Program), a slightly clearer picture emerges, as this data would generally exclude lower-income college students, and therefore better isolate traditional households living below the poverty line. *(page 48)*

Population of Children and Seniors

There are more children living in the northeast and southern portions of the CA area, whereas the Central West End and Midtown have relatively few children. This is in contrast to the higher concentrations of senior adults (age 65+) living in the Central West End and portions of the Covenant Blu-Grand Center and Midtown neighborhoods. *(page 49)*

HOUSING OVERVIEW

Population Change and Housing Units

Since 2010, population increased in most of the northwest, west, and southwest portions of the CA area, while the east and southeast portions had little to no increase, due in large part to the lack of new residential development. This is in contrast to the neighborhoods to the far north that experienced relatively greater population loss.

Housing density is higher in the western portions of the Tier 2 study area and in Central West End, due to a greater concentration of multifamily residences. Likewise, the areas just to the northeast of the Tier 2 study area have a higher housing density, reflecting the presence of multifamily housing aimed at students. *(page 51)*

Housing Composition

The Tier 2 study area has just over 2,500 housing units, adding more than 500 net new units since 2010, representing nearly 30 percent of the new housing in the CA area. The Tier 2 area

has a much higher proportion of multifamily units (56 percent) compared to the City (25 percent) and region (13 percent), and a higher share of renter-occupied units (81 percent).

Median housing values in Central West End ($378,000), Shaw ($313,000) and Compton Heights ($382,000) are significantly higher than the other neighborhoods and the City median ($166,000). Development activity has been strong in Central West End and Forest Park Southeast, adding approximately 1,200 and 660 new units, respectively. There has been limited new development in the neighborhoods to the south given the lack of larger-scale, development-ready parcels. *(page 52- 54)*

Owner-Renter and Vacancy

There is a significantly high concentration of renter-occupied housing north of the Tier 2 study area. The vacancy rate varies throughout the CA area. Midtown's high vacancy rate is skewed by its primarily industrial and institutional land uses and sizable renter population (94 percent renter-occupied units). The vast majority of the housing stock here consists of two housing towers (Midtown 300 and Council Tower Senior Apartments) and student housing. The relatively high vacancy rate in Forest Park South East can be attributed to decades of disinvestment in the neighborhood, and though some reinvestment activity has taken place in recent years, including new market rate infill housing development, many structures still need substantial rehabilitation. *(page 55)*

Home Value and Rent

Median home values are significantly higher in the northwest, west, and southwest portions of the CA area. While median gross rents vary widely throughout the CA area, they are somewhat consistent with home values in Central West End and Compton Heights. *(page 56)*

Housing Affordability

A high-level housing affordability analysis was conducted for the CA area and the Tier 2 study area. Housing demand is based on what a household could afford in terms of rent or purchase price, based on household income and a maximum of 30 percent of income being spent on housing (over 30 percent is considered housing cost burdened).

The demand analysis shows considerable demand for "deeply affordable" housing—with rents below $500 per month, and requiring direct subsidy to support— as well as demand at the mid-level (rents between $1,500 to $2,000). Demand for for-sale housing is considerable across the affordability spectrum, from affordable (less than $50,000) to luxury market rate (over $500,000).

The supply analysis is based on distribution of housing by value or rent. There is significant mismatch between demand and supply for affordable rental units, with an undersupply of deeply affordable (subsidized) units, and an oversupply of more moderately affordable rental units. This data suggests that lower-income renters are likely living in the more expensive housing, and are thus cost burdened (i.e., paying more than 30 percent of their household income on housing). On the for-sale side, there is a significant undersupply of housing across the affordability spectrum. *(page 57)*

TRANSPORTATION EQUITY

Transportation Costs and Vehicle Availability

Average annual transportation cost is determined by annual consumer spending on vehicle payments, fuel, maintenance, transit costs, etc. The distribution of transportation costs is generally consistent with the distribution of median household income, for example, higher-income households spend more on transportation. Conversely, lower-income households that may rely more on transit as their primary means for transportation may have lower overall transportation costs, although this is not an indication of the share of household income spent on transportation.

Data about households with no personal vehicle indicates the concentration of a transit-dependent population. There is a larger concentration of households without a vehicle in the east and northeast portions of the CA area, given in large part to the student population and weaker socioeconomic conditions. *(page 59)*

Households with Disabled Persons

The U.S. Census considers that someone has a disability if they have any one of six disability types: difficulty with hearing, vision, cognitive, ambulatory, self-care, and independent living. Within the CA area, the distribution of households with disabled persons (at least one disability) is generally consistent with the distribution of persons aged 65 and older. *(page 60)*

Share of Minority Population

Share of minority population is considered as the share of all non-white populations. The Tier 2 study area and Central West End have relatively high percentage of white populations. There are higher concentrations of minority populations (greater than 60 percent) immediately south of the Tier 2 study area, and further north around Covenant Blu-Grand Center and Jeff Vander-Lou. *(page 60)*

Various Methodologies for Understanding Transportation Equity

Beyond some of the key data points that are often considered when looking at transportation systems through an equity lens, there are various methodologies and composite indices that strive to bring in multiple social, economic, environmental, and public health factors as they relate to transportation access, mobility, safety, and access to opportunity. These include the following:

- The **USDOT defined Disadvantaged Communities (DAC)** considers 22 key indicators that are collected at the census tract level and grouped into six categories of transportation disadvantage. *(page 61)* With the exception of Shaw, Compton Heights, and Central West End, the entire CA area consists of USDOT-designated Disadvantaged Communities.

- The **Neighborhood Assessment** *(page 63)* looks at crime, poverty, home values, and population change as a way to understand the trajectory of neighborhoods, and the need and capacity for improvement. The Neighborhood Assessment creates an index and then

categorizes areas as Opportunity, Transitional, Stable, or Growing as a way to provide a quick snapshot of areas that might benefit from transportation investments that support greater community reinvestment.

- The **Vulnerability Index** *(page 64)* is a composite indicator focused on characteristics of people and households that may make individual mobility and accessibility a particular challenge, and that should be looked at to help ensure transportation investments benefit those that need it most. The index uses factors such as minority population, households without a personal vehicle, households with at least one disabled person, households with children or seniors, and household income. The Vulnerability Index provides a snapshot of where populations might benefit from greater investments in quality, safe, multimodal infrastructure.

- The **Housing and Transportation Affordability Index**, from the Center for Neighborhood Technology, comprehensively considers the true affordability of a place. *(page 65)* The index provides an expanded view of affordability, one that combines housing and transportation costs, and sets the benchmark at no more than 45 percent of household income. Using a variety of neighborhood and household characteristics to create the index, it offers a view of housing and transportation affordability, beyond the basic housing cost burden. It is important to consider this index in the context of the community and other available indices to draw the appropriate conclusions. For example, just because areas such as Midtown, Covenant Blu-Grand Center, and Jeff Vander Lou have low Housing and Transportation Affordability Index values does not mean they do not need ongoing multimodal transportation investments. It may mean that these more affordable neighborhoods need continued investment in transit and other pedestrian improvements as a means for keeping overall costs within a more affordable range.

- WalkScore and BikeScore *(page 66)* considers a variety of factors—such as availability of bicycle and pedestrian infrastructure, connectivity of infrastructure, accessibility (points of access to the infrastructure), the number and density of community destinations available along the infrastructure, and the quality of the built environment—to establish a score for neighborhoods. While walkability and bikeability vary across the CA area, several proposed projects will improve these active transportation scores in coming years.

TRAVEL PATTERNS

Travel patterns were analyzed using REPLICA data, which allows for analysis of mobility using cell phone data. Analysis was focused on understanding the trips that start and end in the neighborhoods north and south of the Future64 corridor, in order to assess connectivity and the need for permeability within the study area. While private auto trips, including auto trips with passengers, dominate the trips through the CA area, walking and biking trips account for between 6-7 percent of the trips taken. This not only shows a current desire for active transportation, but an opportunity to increase this share if infrastructure improvements can enhance the connectivity, safety, and accessibility for walkers and cyclists across I-64. *(pages 68 and 69)*

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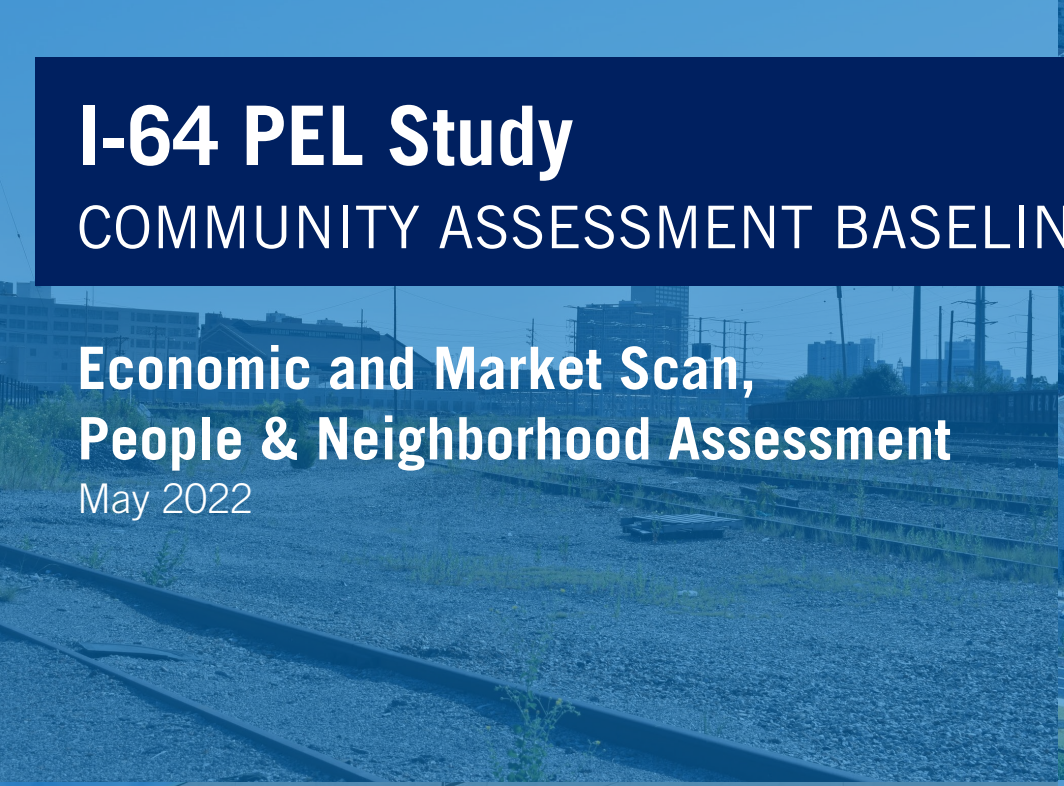
[i] Crime Index is a measure of relative risk in an area compared to the country (set at 100) as a whole. It is not a database of actual crimes. Updated semiannually, the index combines several sub-categories of both personal and property crimes.
Source: ESRI, 2021.
Methodology: https://appliedgeographic.com/wp-content/uploads/2021/11/AGS-CrimeRisk-Methodology-2021B.pdf

I-64 PEL Study

COMMUNITY ASSESSMENT BASELINE

Economic and Market Scan, People & Neighborhood Assessment

May 2022



DEVELOPMENTSTRATEGIES®

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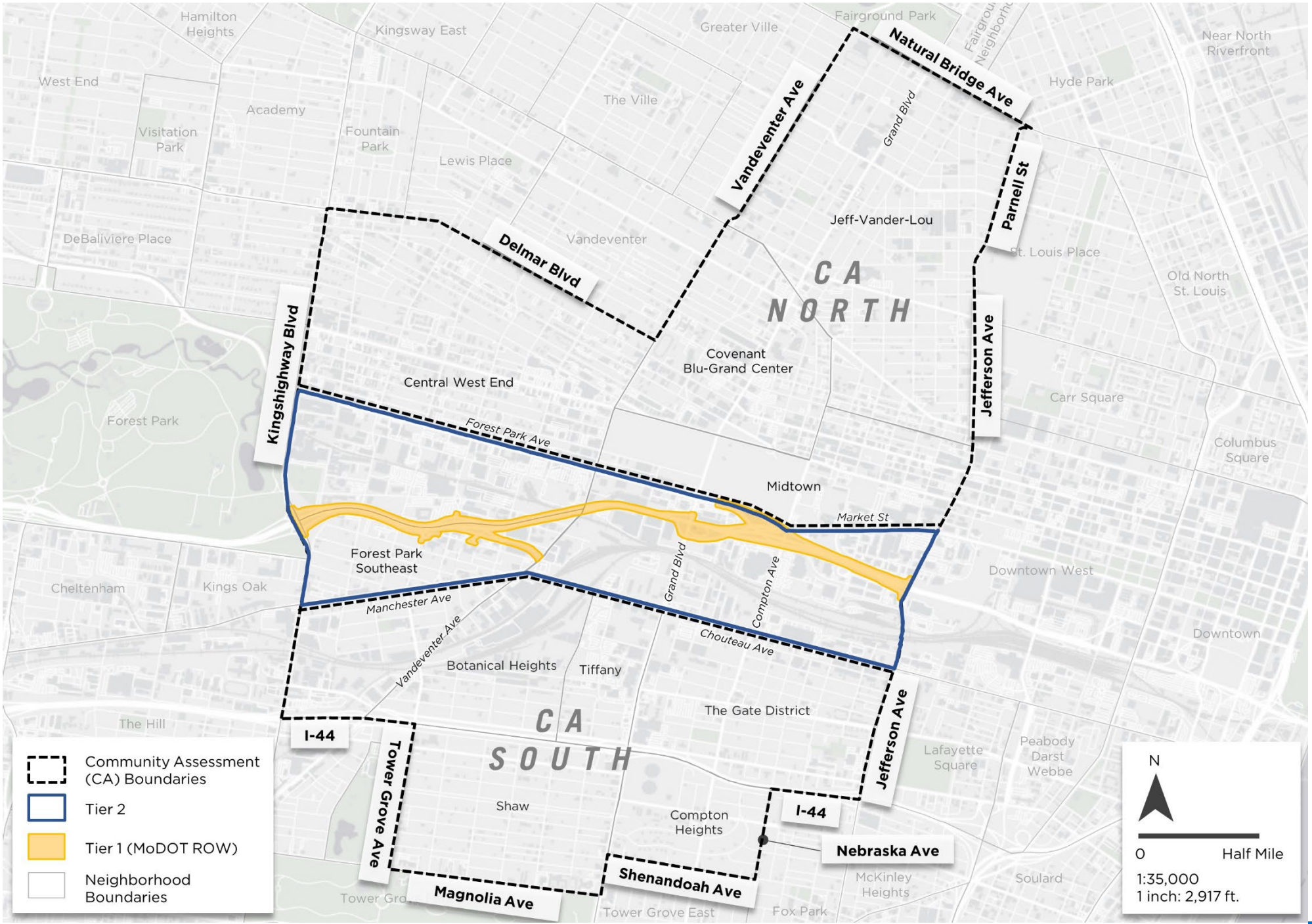
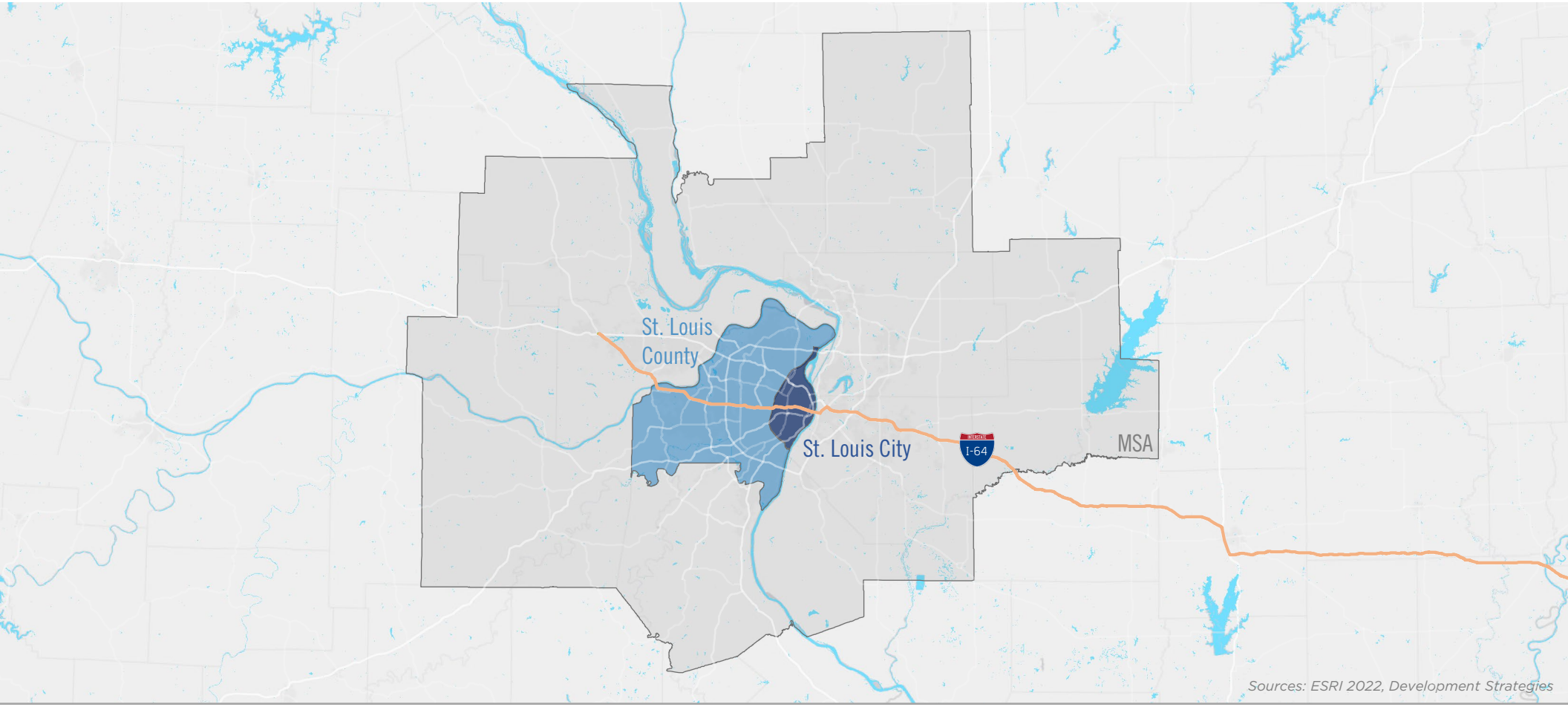
INTRODUCTION TO STUDY AREA

STUDY AREA BOUNDARIES



INTRODUCTION TO STUDY AREA

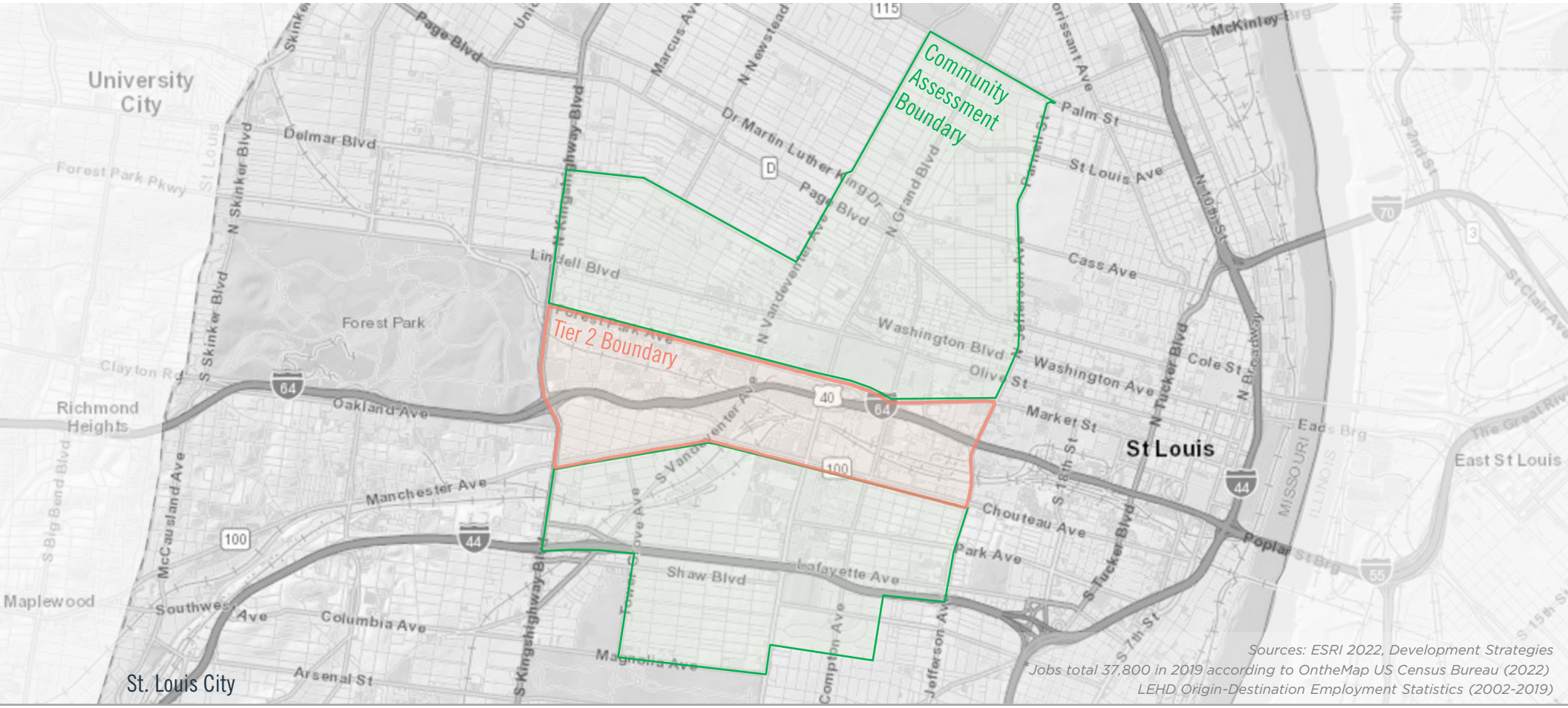
KEY METRICS – REGION, ADJOINING COUNTY, CITY



KEY METRICS	ST. LOUIS MSA	ST. LOUIS COUNTY	ST. LOUIS CITY
Population	2,843,000	997,500	309,000
Employment	1,409,000	628,000	249,000
Population Growth (2010-21)	2.0%	(0.2%)	(3.2%)
Median Household Income	$65,900	$70,000	$48,000
Total Households	1,274,000	444,500	176,000

INTRODUCTION TO STUDY AREA

KEY METRICS – CITY, COMMUNITY ASSESSMENT BOUNDARY, TIER 2 BOUNDARY



Sources: ESRI 2022, Development Strategies
**Jobs total 37,800 in 2019 according to OntheMap US Census Bureau (2022) LEHD Origin-Destination Employment Statistics (2002-2019)*

KEY METRICS	ST. LOUIS CITY	COMMUNITY ASSESSMENT BDRY	TIER 2 BDRY
Population	309,000	42,100	4,300
Employment	249,000	57,600	26,900*
Population Growth (2010-21)	(3.2%)	3.3%	18.7%
Median Household Income	$48,000	$49,300	$37,700
Total Households	176,000	24,300	2,500

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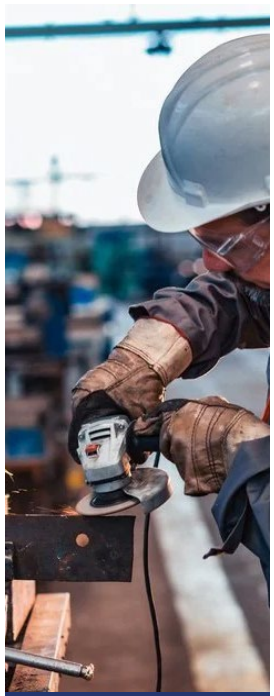
Regional Economic Overview

REGIONAL ECONOMY

KEY INDUSTRY SECTORS

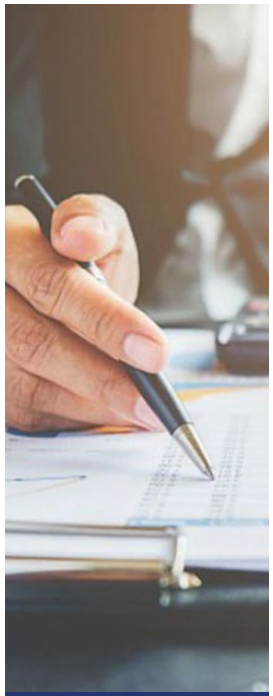
LOCATION QUOTIENT, ST. LOUIS MSA, 2021
Compared to National Employment Distribution
US Average = 1.0

Transportation & Warehousing
1.20

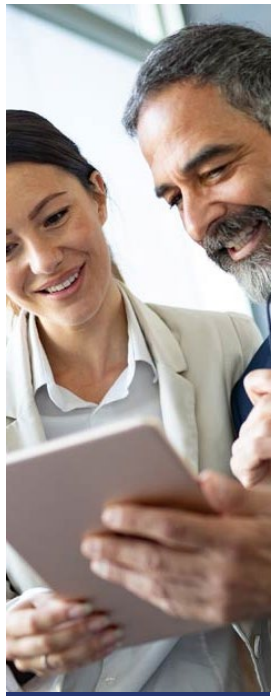


Manufacturing
1.18

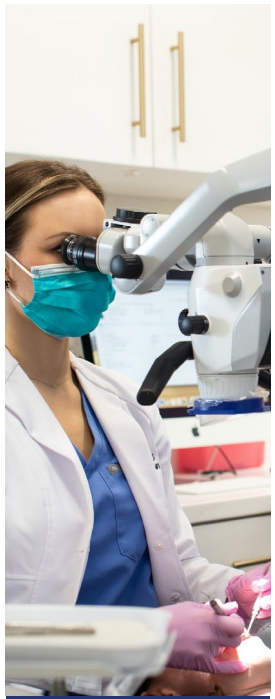
Arts, Entertainment, & Recreation
1.13



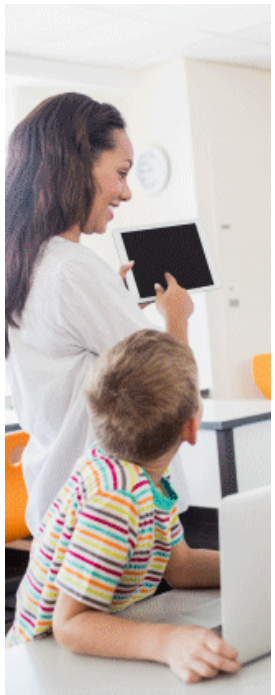
Finance & Insurance
1.10



Management of Companies
1.10



Healthcare & Social Assistance
1.05

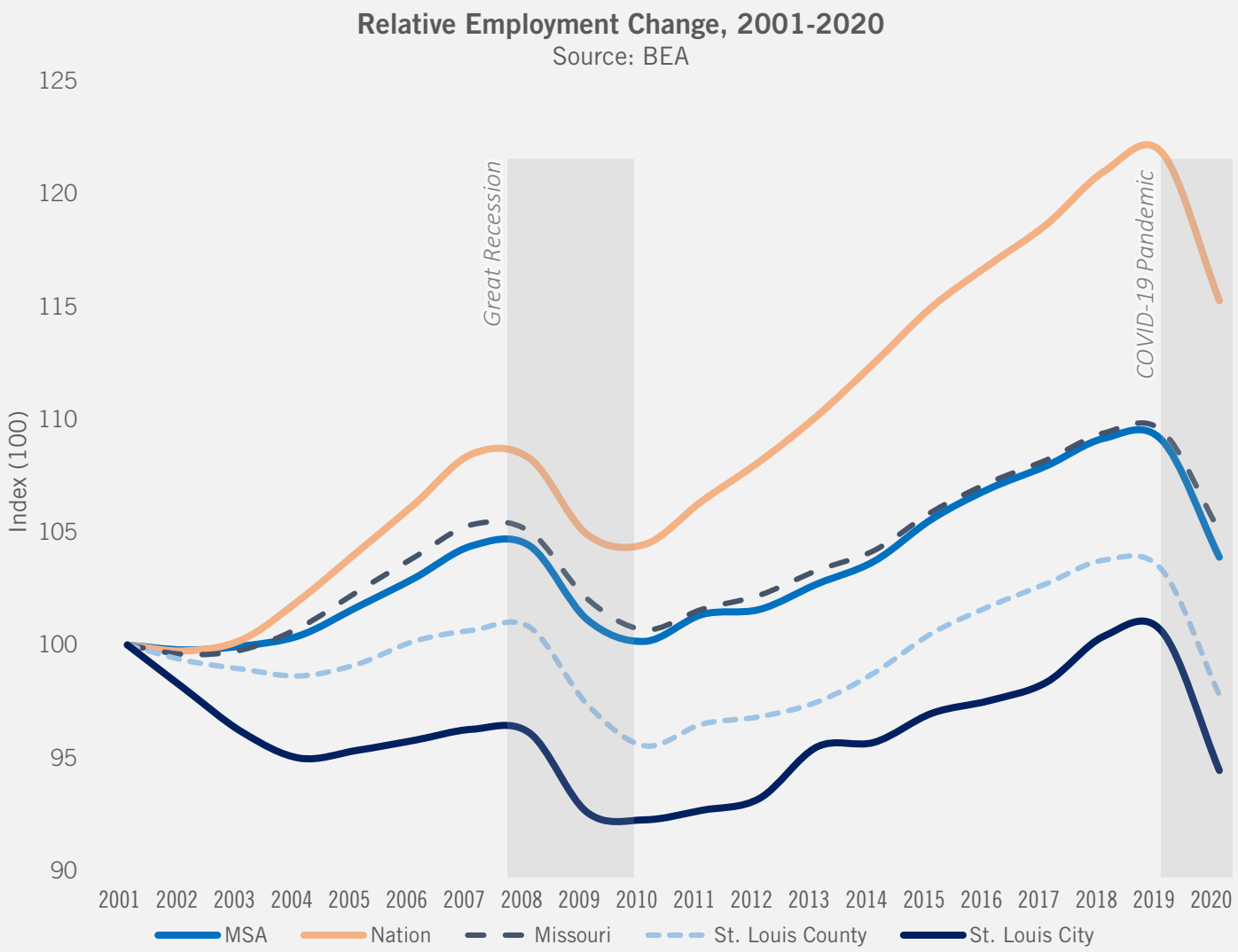


Educational Services
1.02

Based on location quotient, the St. Louis regional economy is **well-diversified with no significant concentrations** (or deficiencies) in employment by sector. The sectors with the highest relative concentrations of employment compares to the national average are Transportation and Warehousing and Manufacturing. The region also has an above average concentration of Finance and Insurance, Management of Companies, and Healthcare jobs.

REGIONAL ECONOMY

EMPLOYMENT TRENDS



	Pre-Recession 2001-2008	Recession 2008-2010	Post-Recession 2011-2019	COVID-19 2019-2020
St. Louis City	**-3.9%**	**-4.0%**	**8.5%**	**-6.1%**
St. Louis County	0.8%	-5.2%	7.1%	-5.4%
St. Louis MSA	4.4%	-4.1%	7.6%	-4.8%
Missouri	5.0%	-4.1%	7.8%	-4.1%
United States	8.3%	-3.5%	14.5%	-5.4%

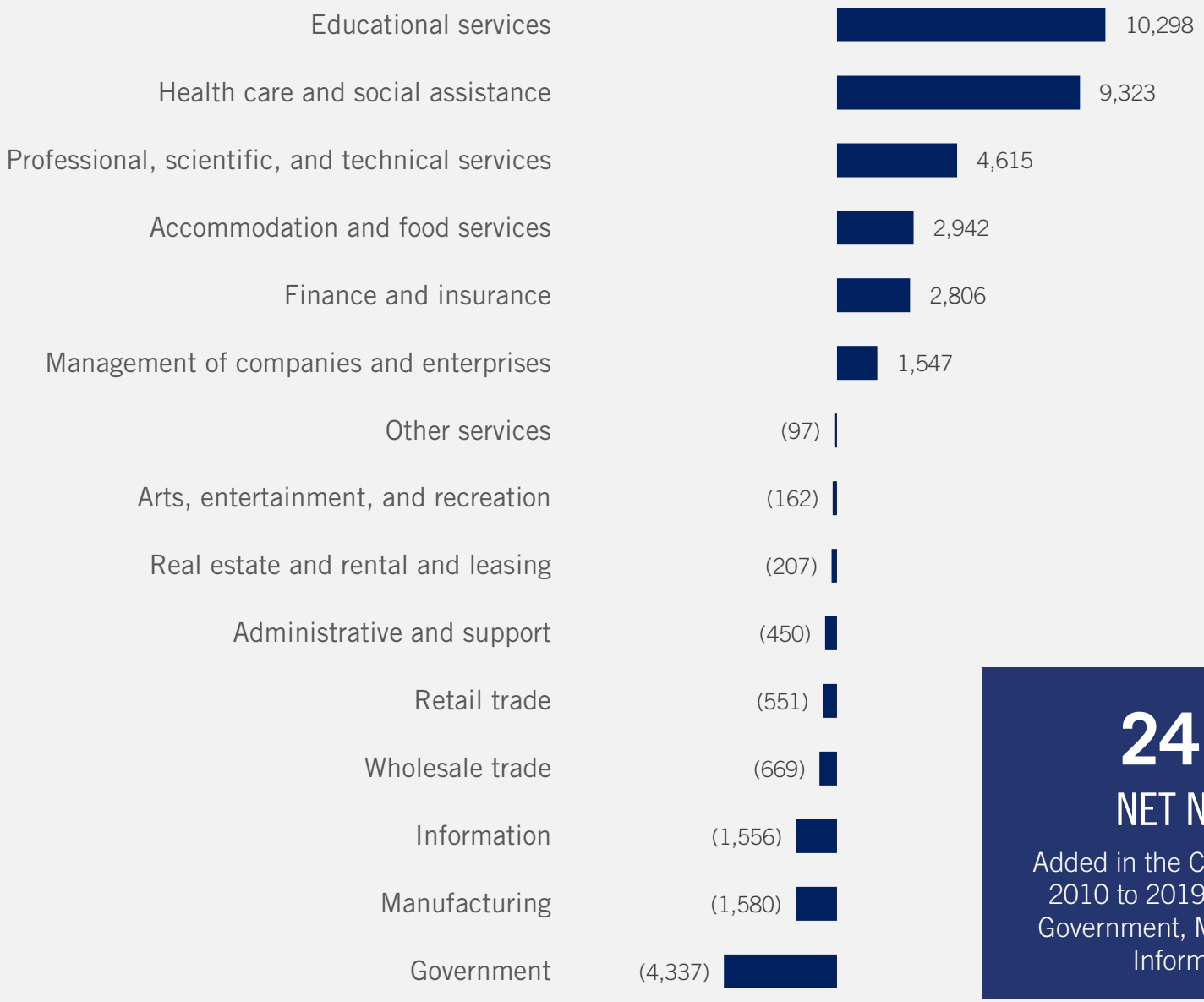
Prior to the COVID-19 pandemic, economic growth in the St. Louis MSA had been relatively slow from 2010 to 2019 with total employment growth of 8.9 percent. This is considerably slower than the national growth rate of 16.9 percent, but generally consistent with statewide economic growth.

Total employment growth in the city of St. Louis also followed regional trends during this time period, although the city was more adversely impacted by the pandemic. The city lost 6.1 percent of total employment from 2019 to 2020, compared to losses of 4.8 percent in the region and 5.4 percent nationally.

REGIONAL ECONOMY

EMPLOYMENT TRENDS BY SECTOR – CITY OF ST. LOUIS

Change in Employment, 2010-2019
City of St. Louis
Source: BEA



24,000

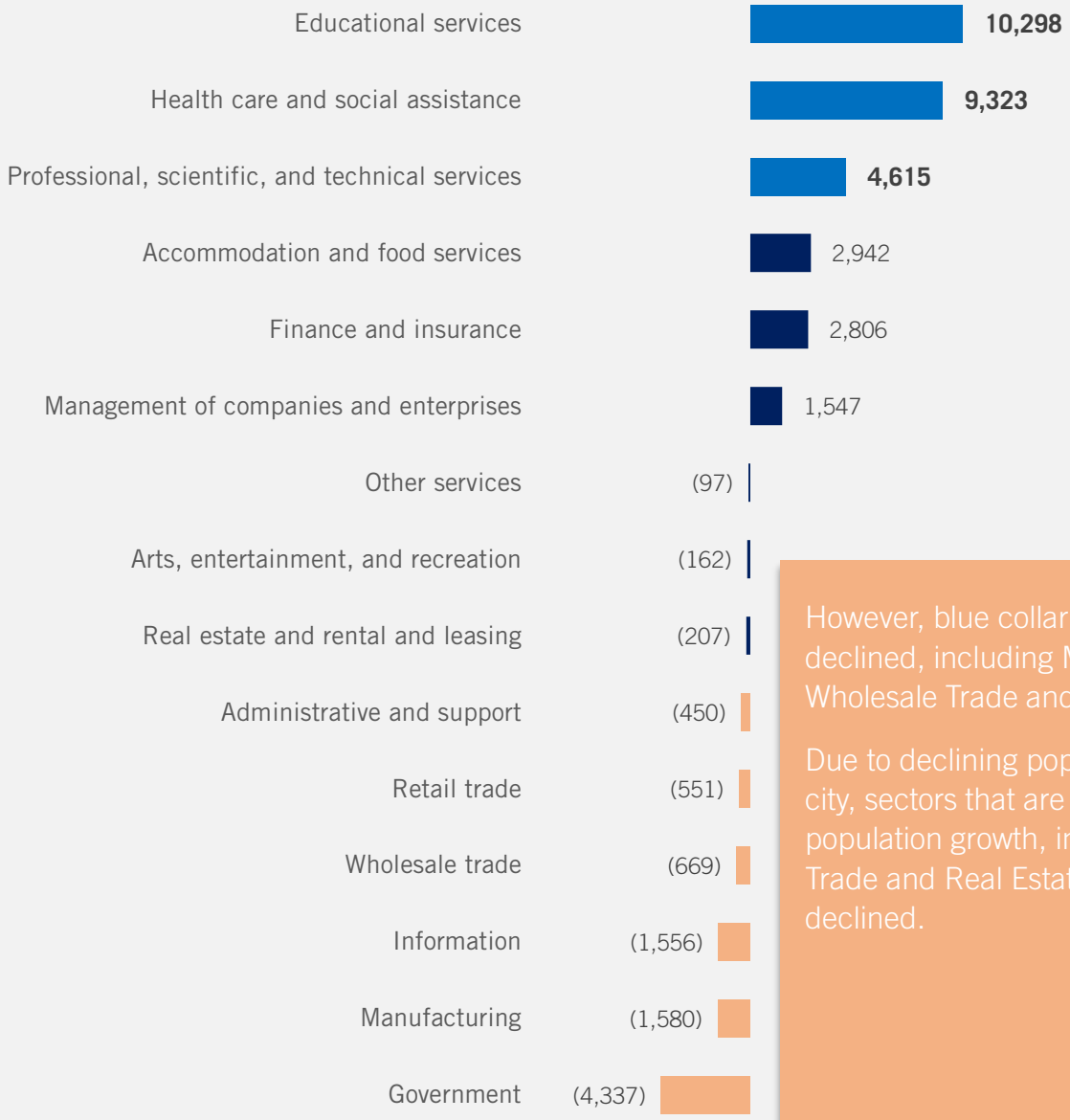
NET NEW JOBS

Added in the City of St. Louis from 2010 to 2019, despite losses of Government, Manufacturing, and Information jobs.

REGIONAL ECONOMY

EMPLOYMENT TRENDS BY SECTOR – CITY OF ST. LOUIS

Change in Employment, 2010-2019
City of St. Louis
Source: BEA



CORE KNOWLEDGE SECTORS

Job growth in the city was in three of the top "core" knowledge sectors—Education, Healthcare, and Professional/Scientific services. The growth in Educational service jobs could be attributed to employment growth at local institutions, including St. Louis University, but also from a reclassification of jobs at Washington University's medical campus.

Generally, knowledge sector employment growth in the city has followed national trends.

However, blue collar jobs have declined, including Manufacturing, Wholesale Trade and Construction.

Due to declining population in the city, sectors that are driven by population growth, including Retail Trade and Real Estate have declined.

Growth Rate 2010-2019

Educational Services
80% City | 20% National

Professional & Technical Services
26% City | 23% National

Healthcare Services
21% City | 21% National

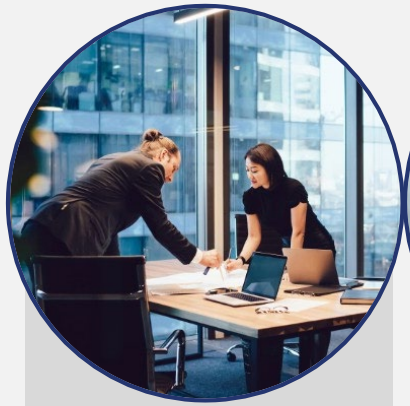
REGIONAL ECONOMY

REGIONAL GROWTH CLUSTERS

THE ST. LOUIS METRO IS HOME TO

FIVE STRONG CLUSTERS

THAT HAVE POTENTIAL TO DRIVE GROWTH IN THE FUTURE



ADVANCED BUSINESS SERVICES

A large finance and insurance sector with both retail-banking and investment services. This cluster benefits from close connections to the IT and software industry that advance the growing fintech ecosystem in the metro.

BIOMEDICAL AND HEALTH SERVICES

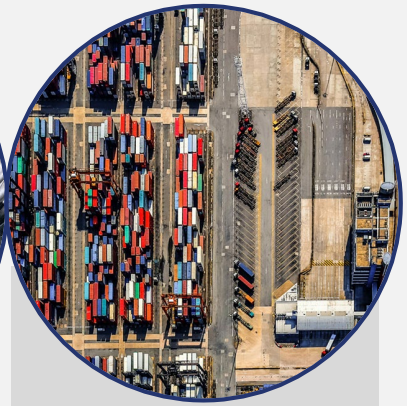
An advanced biomedical and pharmaceutical cluster that benefits from proximity to medical institutions and bioscience / agtech startups that use technology to create new products and services.

ADVANCED MANUFACTURING & PRODUCTION

A broad cluster of small-scale production and manufacturing. This cluster includes advanced software engineering, manufacturing, consumer products and food production.

AEROSPACE AUTOMOTIVE & DEFENSE

Anchored by Boeing and GM advanced manufacturing plants, this cluster gives the metro an edge in large-scale manufacturing, servicing and advanced production of defense technology.



TRANSPORTATION AND LOGISTICS

This cluster serves the metro's industries as well as global multimodal freight movement.
It is growing and creating jobs that pay well.

Greater St. Louis Inc.'s STL 2030 Jobs Plan identified five target clusters with the most potential to drive the regional economy. Given the presence of CORTEX and Washington University Medical Campus, the Study Area is positioned to facilitate growth in two of these clusters: Advanced Business Services and Biomedical and Health Services

Source: The STL 2030 Jobs Plan, New Localism Associates, 2021

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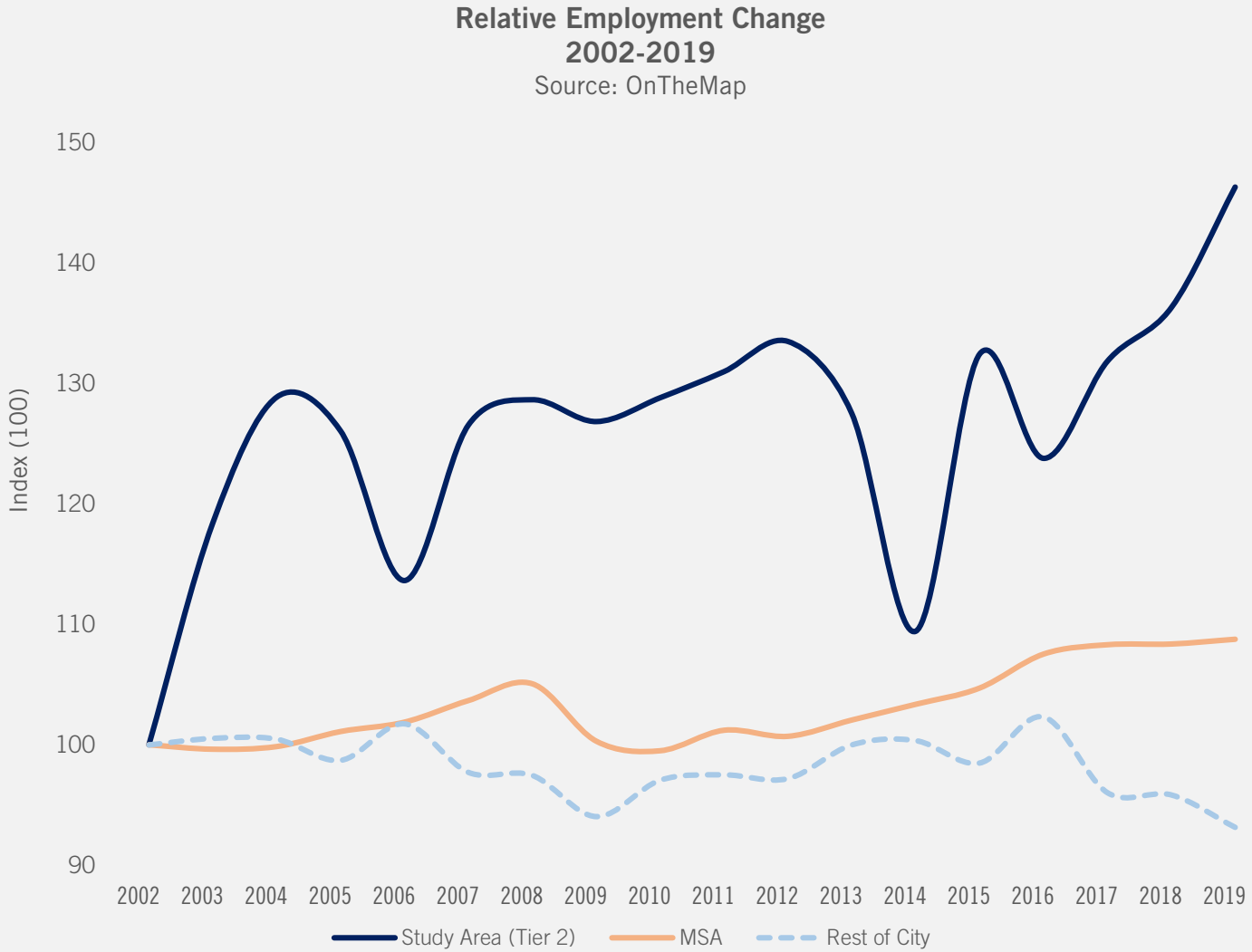
Study Area Economic Trends

STUDY AREA ECONOMIC TRENDS

EMPLOYMENT TRENDS – TIER 2 STUDY AREA



As presented previously, employment growth in the city been relatively slow and has been outpaced by regional employment growth. Most of the new office, industrial, and retail development in the region over the last 10 to 20 years has been out side of the city boundaries.

Despite the citywide economic challenges, employment growth in the Tier 2 Study Area has exceeded citywide and regional employment growth. In fact, employment growth has declined in the city outside of the Tier 2 Study Area boundaries. According to OnTheMap, from 2010 to 2019, Tier 2 Study Area has added just under 4,300 jobs for an increase of around 14 percent, while the MSA experienced employment growth of nine percent and the reaming areas of the city outside of the Study Area had a decrease of four percent.

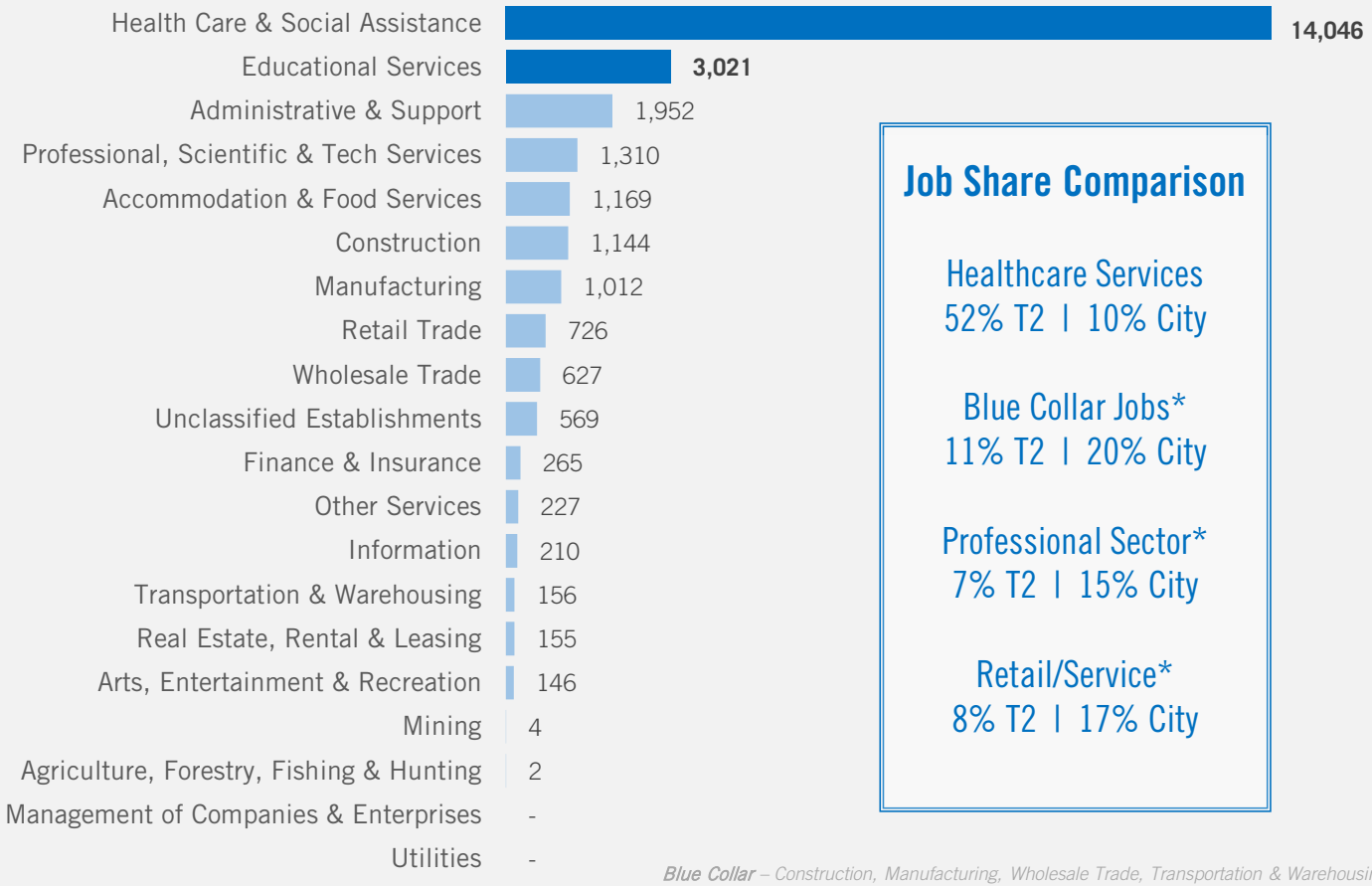
TIER 2
RELATIVE EMPLOYMENT GROWTH
2002-19
47%

VS **9%** IN THE REGION
-7% REST OF CITY

STUDY AREA ECONOMIC TRENDS

EMPLOYMENT BY SECTOR – TIER 2 STUDY AREA

Employment by Sector, 2022
Tier 2 Study Area
Source: ESRI



Job Share Comparison

Healthcare Services
52% T2 | 10% City

Blue Collar Jobs*
11% T2 | 20% City

Professional Sector*
7% T2 | 15% City

Retail/Service*
8% T2 | 17% City

Blue Collar – Construction, Manufacturing, Wholesale Trade, Transportation & Warehousing
Professional – Information, Finance & Insurance, Prof. & Technical Services, Management
Retail/Service – Retail Trade, Food & Accommodation, Other Services

According to ESRI, the Tier 2 Study Area has nearly 27,000 employees representing nearly 11 percent of citywide employment. The majority (52 percent) of these jobs are in Health Care and Social Assistance given the presence of the Washington University Medical Campus.

There is also a concentration of Educational Services jobs (3,021), Administrative Support jobs (1,952) and Professional, Scientific, and Technical Services jobs (1,310) that could be attributed to the medical infrastructure as well as CORTEX.

In addition to these professional sector jobs, the Tier 2 Study Area economy is relatively diverse and includes nearly 3,000 blue collar sector jobs in Construction, Manufacturing, and Wholesale Trade.

TIER 2
BOUNDARY HAS

57% OF THE HEALTHCARE JOBS IN THE CITY

10% OF THE HEALTHCARE JOBS IN THE REGION

STUDY AREA ECONOMIC TRENDS

SECTOR ANALYSIS

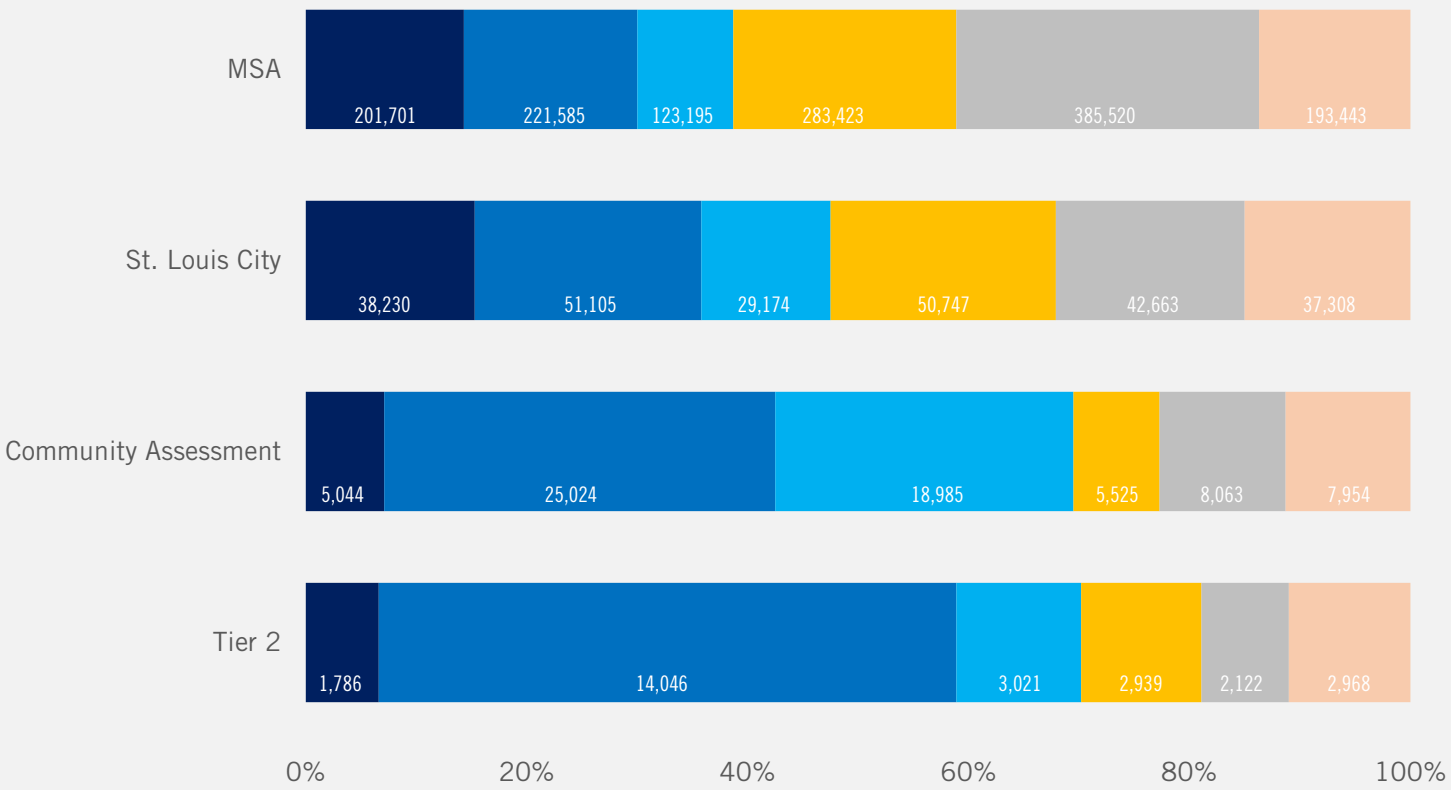
THE TIER 2 STUDY AREA IS A

REGIONAL HUB OF "NEW ECONOMY" JOBS

THAT ARE GROWING NATIONALLY

Employment Share by Area 2021

Source: ESRI 2021



KNOWLEDGE SECTOR

BUSINESS SECTOR DEFINITIONS

Knowledge Sector

Healthcare and Social Assistance, Educational Services, Information, Finance & Insurance, Prof. & Technical Services, Management of Companies

Blue Collar

Construction, Manufacturing, Wholesale Trade, Transportation & Warehousing

Retail/Service

Retail Trade, Food & Accommodation, Other Services

When considering Professional Sectors, Healthcare, and Educational Services jobs, more than 70 percent of the jobs in the study area are "knowledge sector" jobs compared to a regional share of just under 39 percent. This demonstrates the competitive positioning of the study area as a regional hub of "new economy" jobs that are growing nationally.

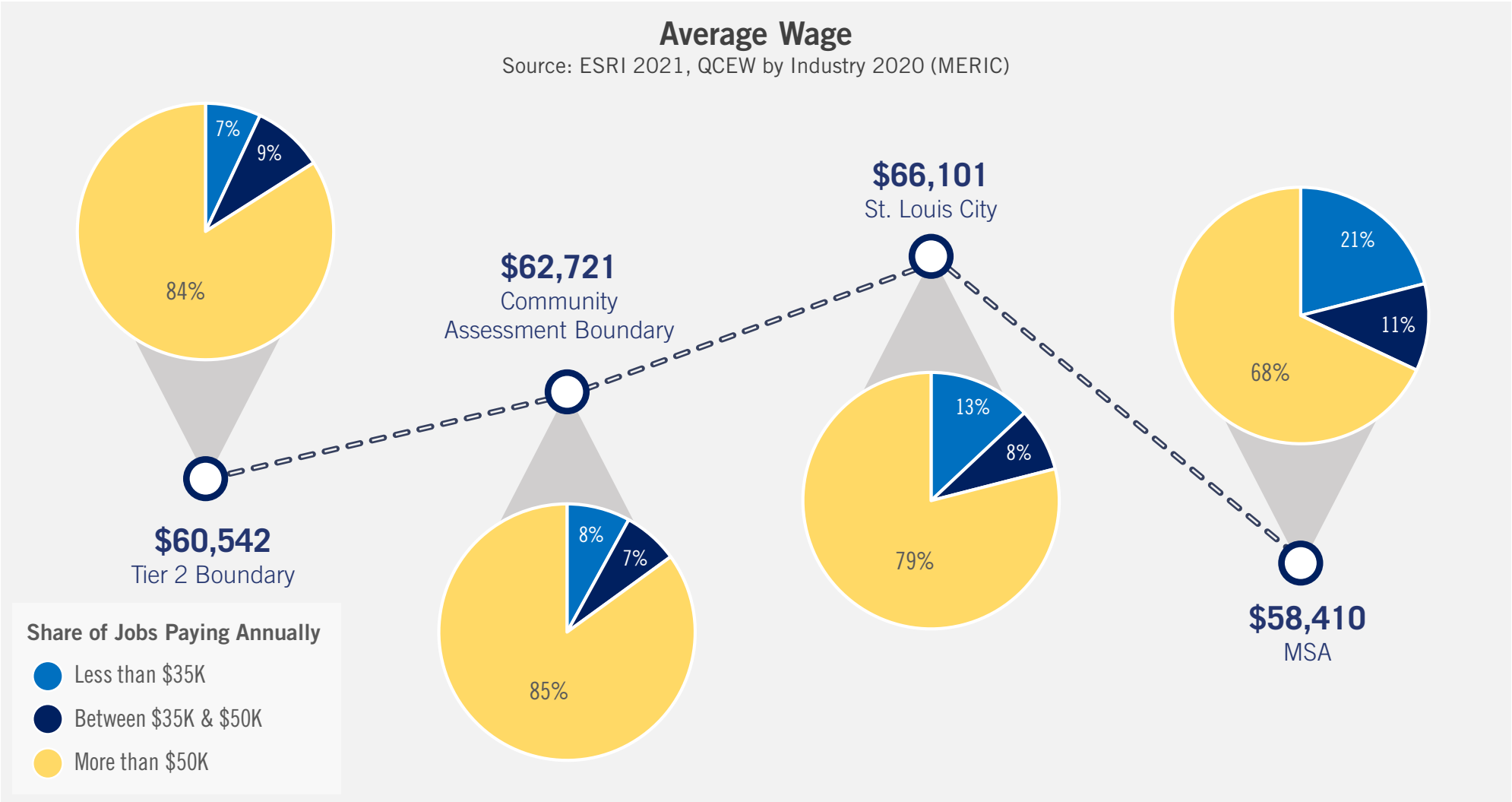
While the study area has some industrial land uses concentrated along the rail corridor, it continues to experience a shift from a Blue Collar workforce to a knowledge-based workforce. Most industrial real estate growth, especially for logistics and warehousing, has occurred in lower density areas of the region.

STUDY AREA ECONOMIC TRENDS

EMPLOYMENT BY INCOME

Average Wage

Source: ESRI 2021, QCEW by Industry 2020 (MERIC)

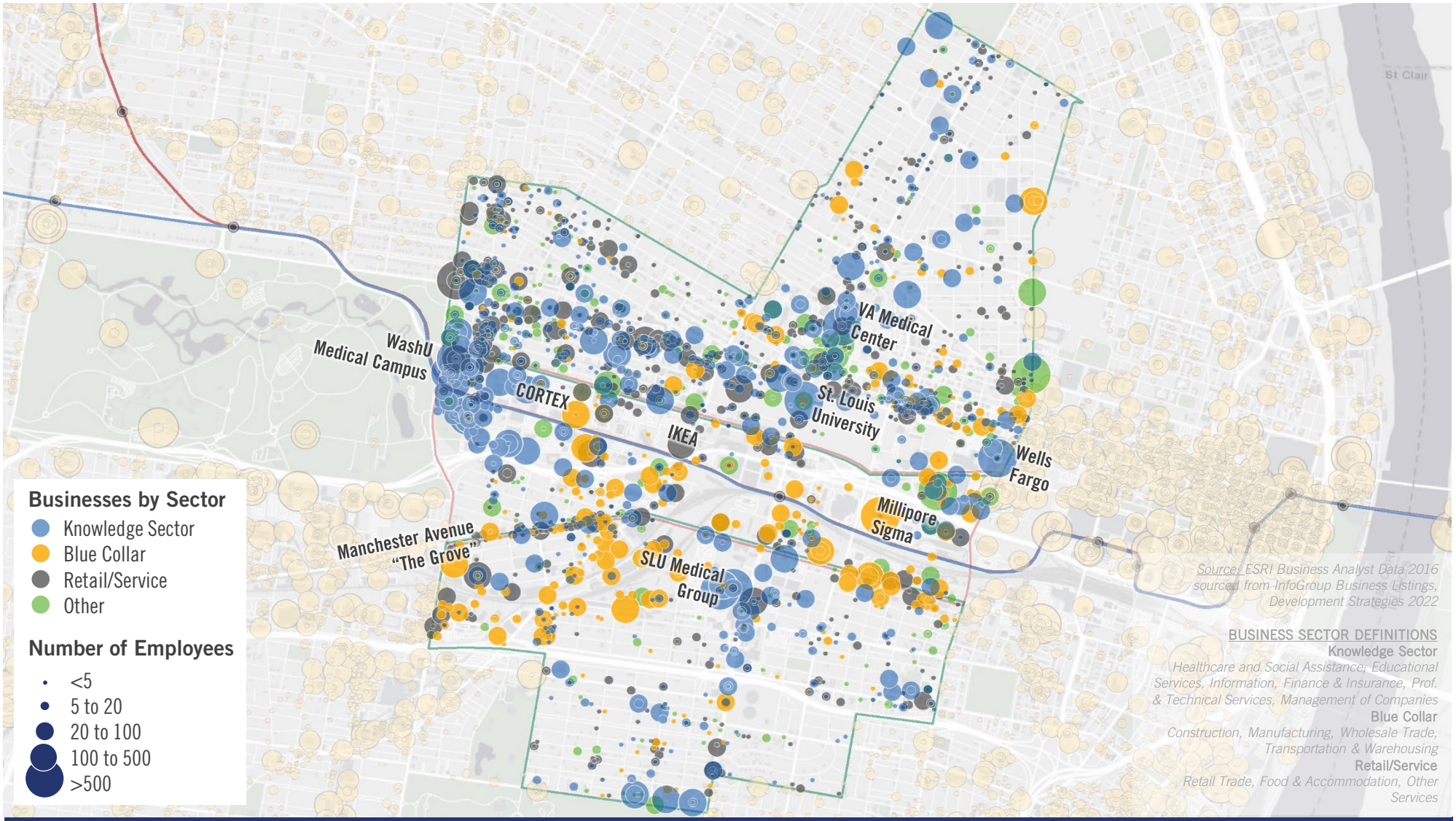


Based on distribution of employment by sector and average wages by sector, the average wage for workers in Tier 2 is just over $60,500, which is slightly below the city average, but higher than the regional average. More importantly, there is a much higher proportion of jobs that pay more than $50,000 annually in Tier 1 (84 percent) compared to 79 percent in the city and only 68 percent in the region.

Only seven percent of the jobs in Tier 1 pay less than $35,000, which can be attributed to the relatively low share of food service and retail jobs compared to the regional average. By comparison, 13 percent of the jobs in the city and 21 percent of the jobs in the region pay less than $35,000.

STUDY AREA ECONOMIC TRENDS

EMPLOYMENT DISTRIBUTION



The highest concentrations of employment are in and around the Washington University Medical Campus on the west side of the study area that include the BJC Medical Center. There are also a concentrations of retail jobs along the Manchester Avenue ("The Grove") and Forest Park avenue corridors.

The center portions of the study area include CORTEX which has an estimated 6,000 workers with plans for expansion.

East of Cortex is Ikea with 400 workers and the St. Louis University campus that includes university staff and its environs that include complementary retail uses.

STUDY AREA ECONOMIC TRENDS

KEY REGIONAL ANCHORS

1. BJC Healthcare

Visits: 434,000
Visitors:178,400
Bed Count: 1,275
Employees: 9,200
Patient Revenue: $6.5 Billion
Non-Patient Revenue: $154 Million
Total Revenue: $6.7 Billion
Total Patient Days: 346, 400

2. WashU Medical School & Center

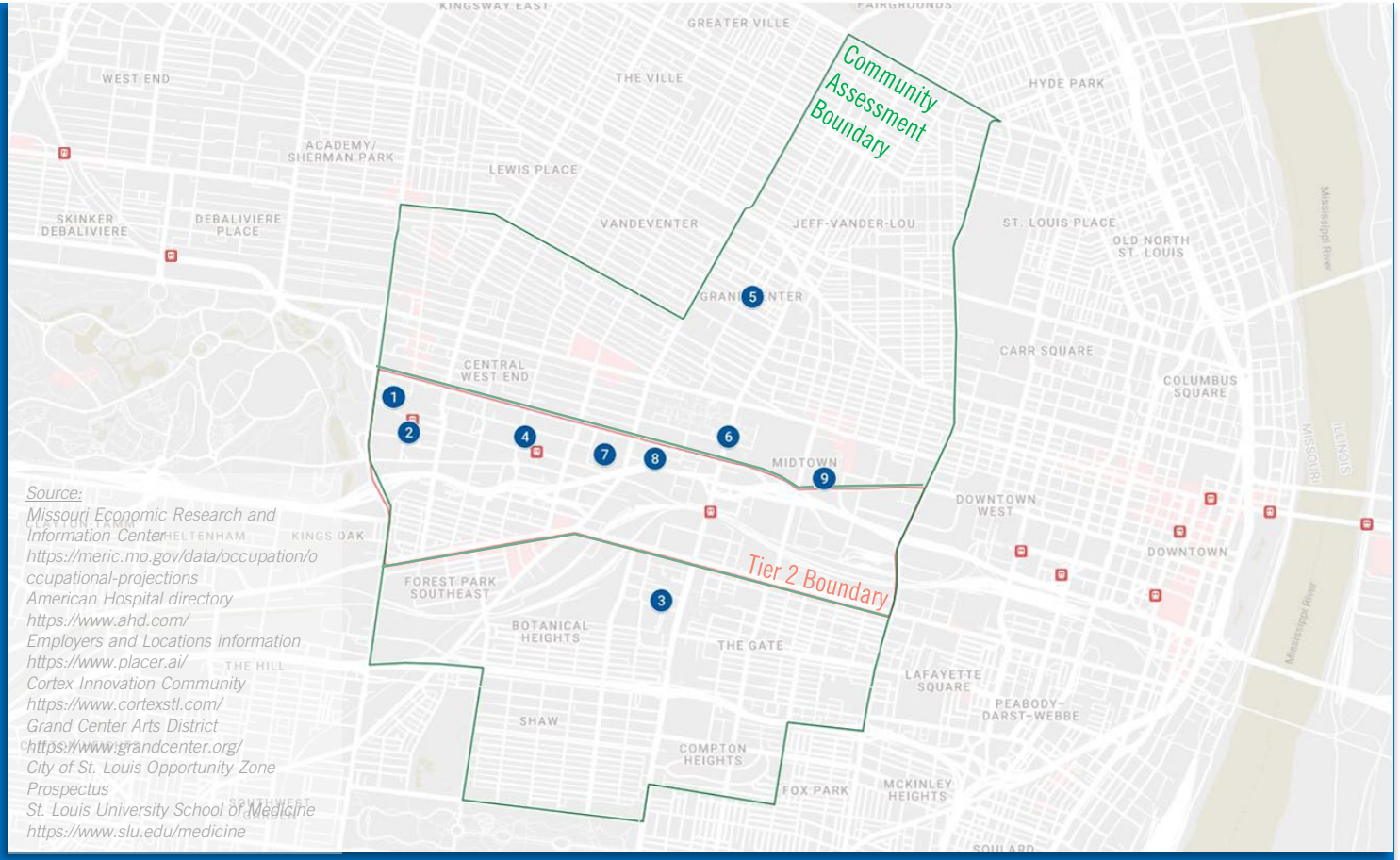
Visits: 629,400
Visitors: 239,700
Bed Count: 2,040
Patient/hospital revenues: $1.6 Billion
Other revenue: $300 Million
Tuition & fees Revenues: $452 Million
Employees: 21,000
Students: 1,350
Faculty: 2,630

3. SSM Health St. Louis University Hospital

Beds: 365 (adding 316 patient rooms with an investment of $550 Million)
Total Patient Revenue: $2.6 Billion
Students: 700
Faculty: 550
Residents: 550

4. Companies in Cortex

200-acre hub of business, innovation, and technology
Expansion to 4 million+ square feet of new rehabilitated facilities
425 Companies (Expansion to 600+)
11 Innovation Centers/Activators (Expansion to14+)
$950 million in leveraged investments in neighborhood retail and residential development
Employees: 6,000
Permanent Jobs Created: 15,000
Revenue Generated: $40 Million
Economic output to St Louis: $2.1 Billion
30-year TIF revenues projected: $775 Million



5. Grand Center

Landmark Destination for arts and culture
60+ Arts and Cultural organizations
16 theaters
12, 000 theater seats
17 museums/galleries
10 music venues
18 event space rentals
22 bars/restaurants
4 religious institutions
2 Hotels
Nearly 2 million patrons filter the area annually
Annual Revenue: $1.2 Million

6. St. Louis University

Student Population: 13,300
Academic Staff: 2,270
Administrative Staff: 6,000
Revenue: $775 Million

7. IKEA

Visits: 103,700
Visitors: 94,900
Employees: 400
Store Square Footage: 380,000
Annual Revenue: $100 million

8. City Foundry

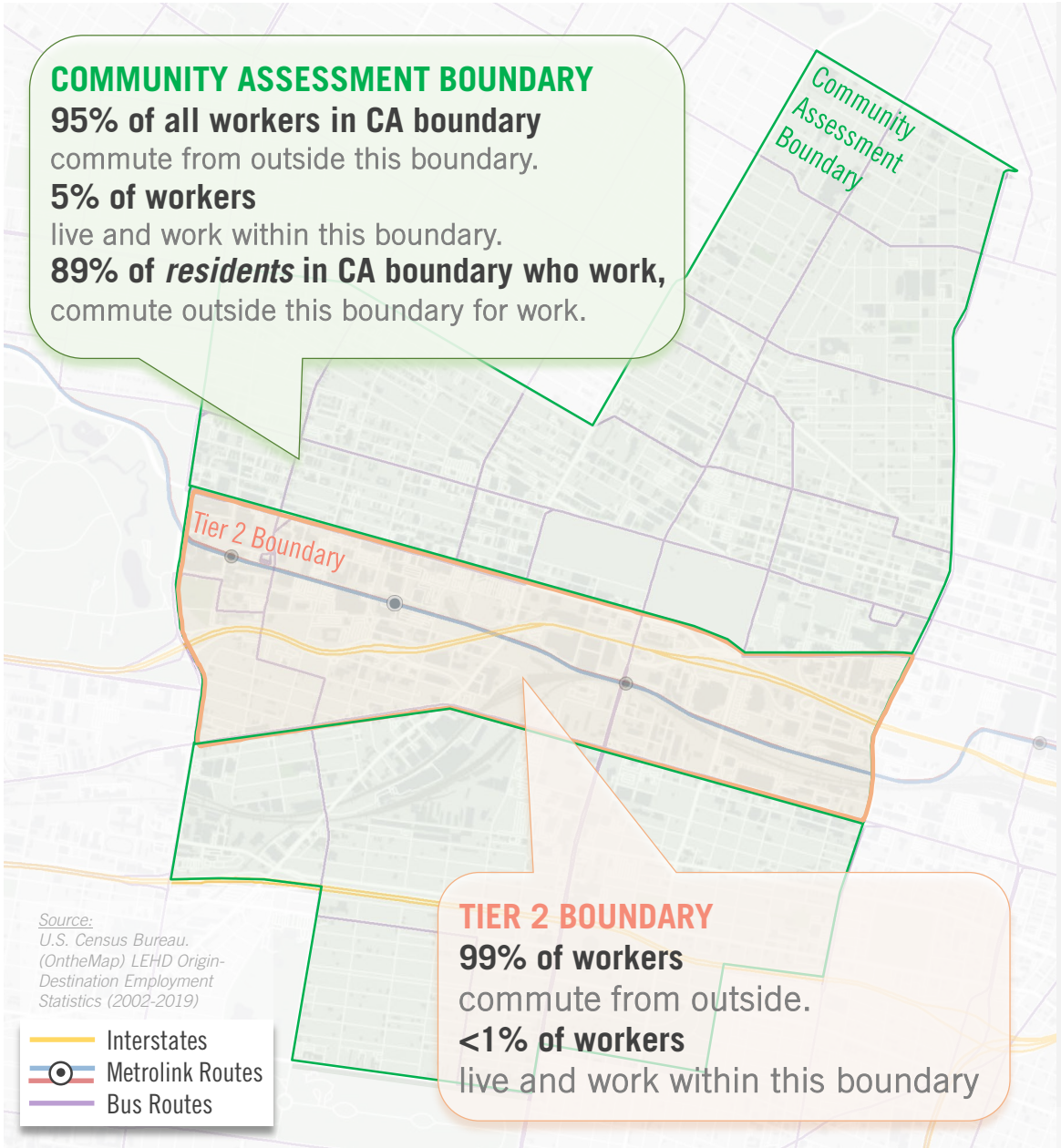
Weekly Visitors: 62,000
Restaurants: 11 kitchens
Square Footage: 300,000
400 Seats

9. Harris Stowe State University

Students: 1,630
Faculty: 367
Visits: 26,000
Visitors: 7,500
Endowment Revenue: $1.4 Million
Annual Revenue: $60 Million

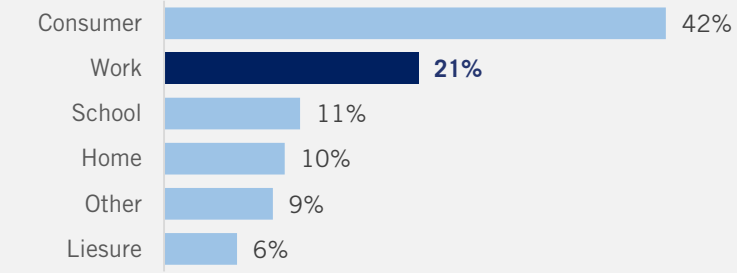
STUDY AREA ECONOMIC TRENDS

COMMUTING PATTERNS

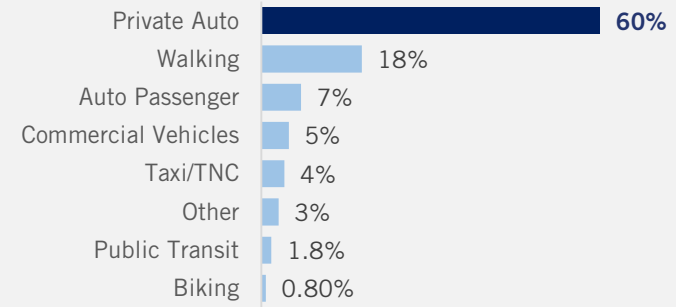


*On a typical workday, **~63K trips** are made by **~40K people** with **Tier 2 boundary** as destination*

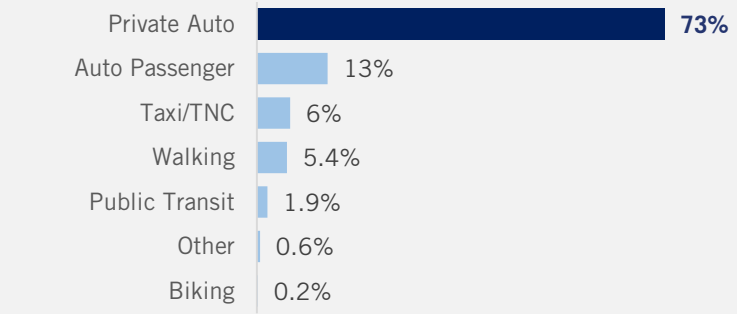
Trip Purpose



Mode Share for all Trips



Mode Share for Work Trips



Source: REPLICA, 2021

99 percent of the workforce in Tier 2 commute into the area, which can be attributed to the lack of housing stock to meet the needs of the workforce—future housing development will create more opportunities for commuters to walk/bike to work.

Community Assessment Framework

Introduction to Study Area

Market & Economy

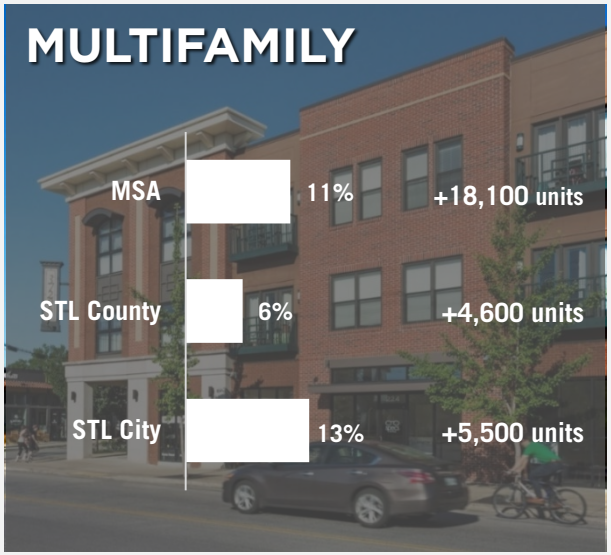
People & Neighborhoods

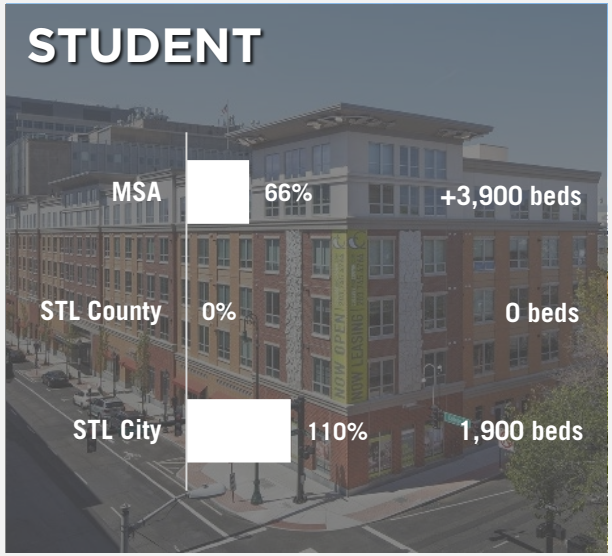
Real Estate Market Overview

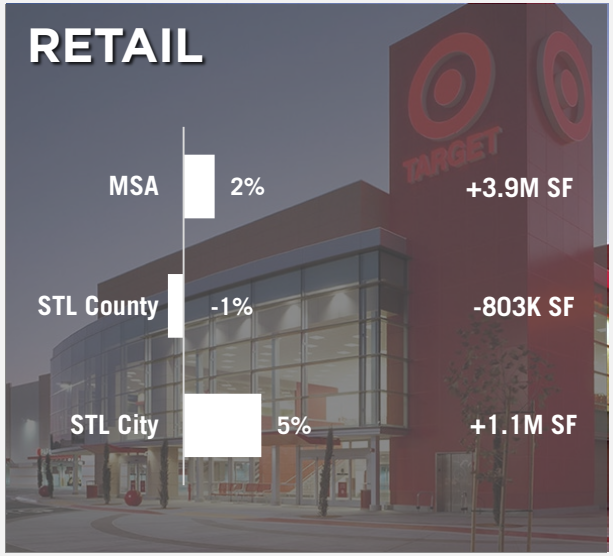
REGIONAL REAL ESTATE OVERVIEW

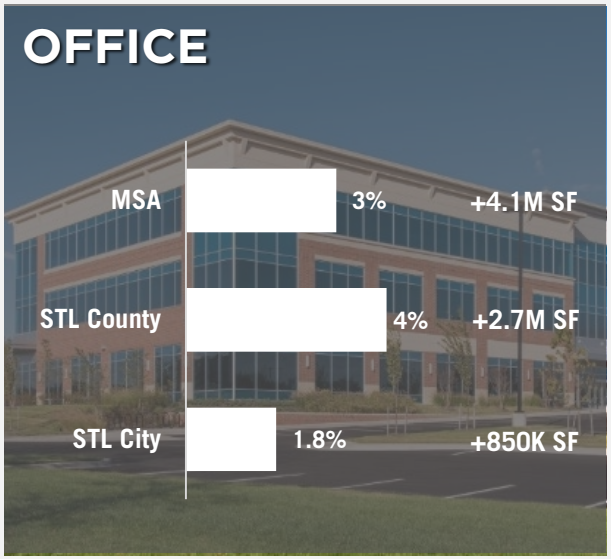
NEW DEVELOPMENT SINCE 2010

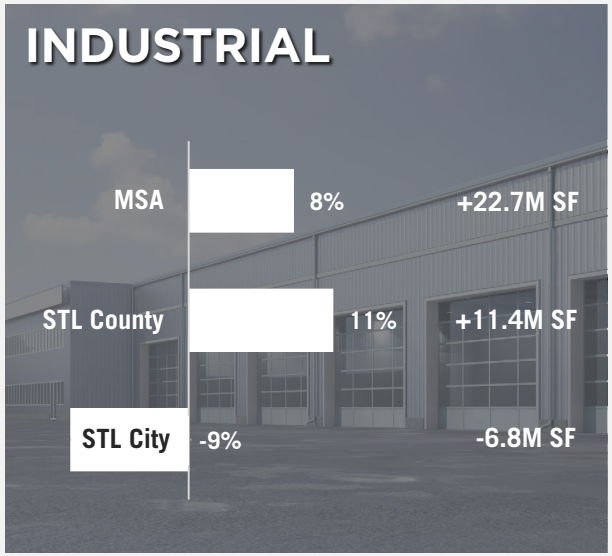
SINCE 2010











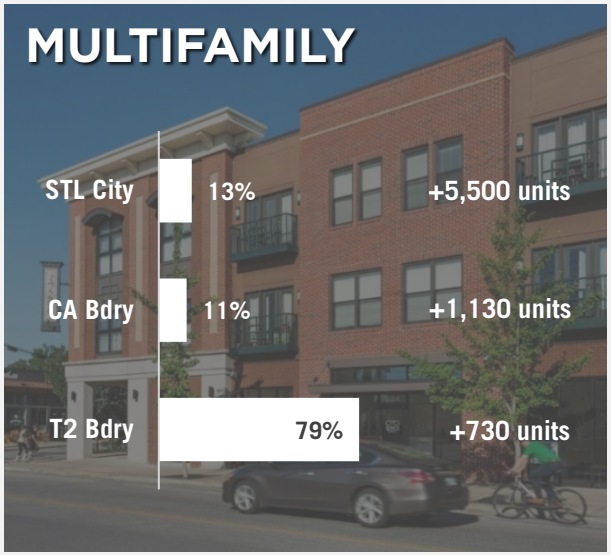
Despite the city losing population, 5,500 multi-family housing units have been delivered in the city since 2010, contributing to 30 percent of the new regional supply and outpacing development in the county. Retail and hotel development were strong in the city adding 1.1 million square feet and 1,200 rooms, respectively. The city lost a large share of its industrial building stock due to redevelopment activity. Office development in the city has been relatively limited.

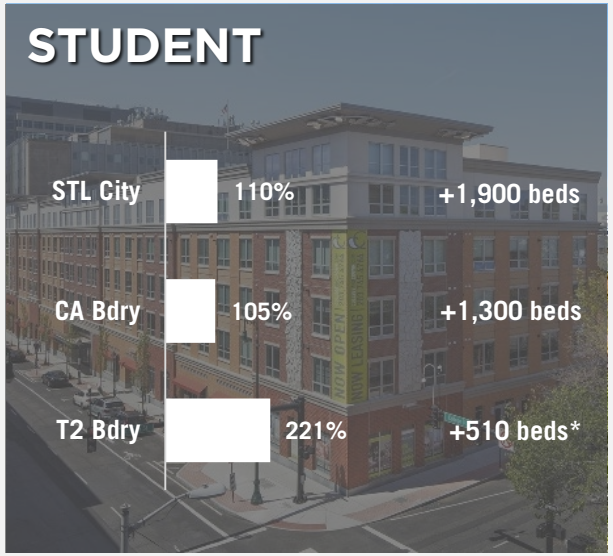
Source: CoStar 2022

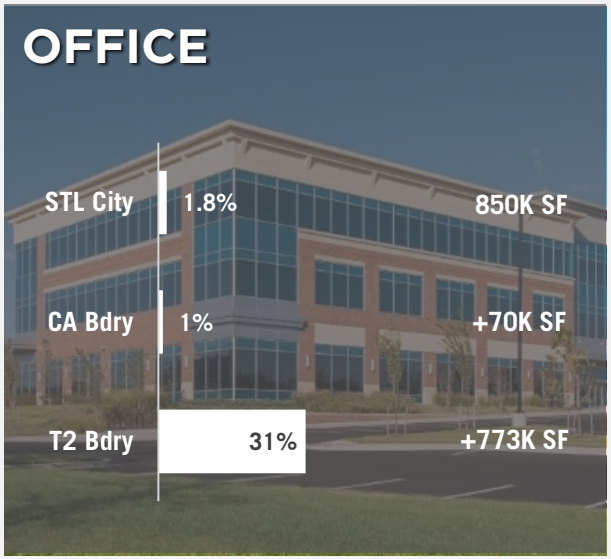
LOCAL REAL ESTATE OVERVIEW

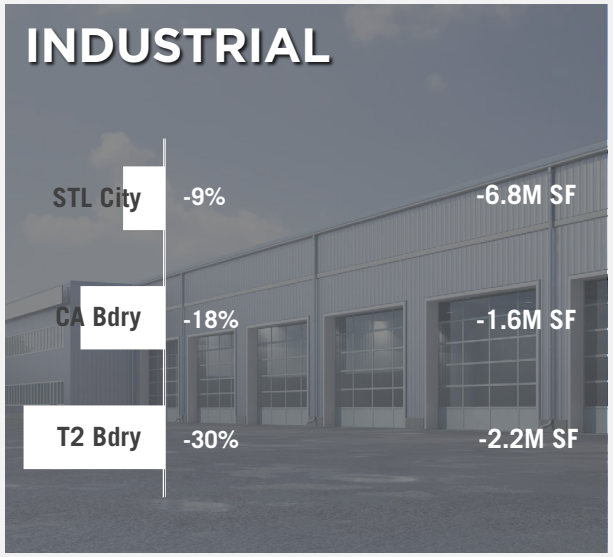
NEW DEVELOPMENT SINCE 2010: STUDY AREAS

SINCE 2010









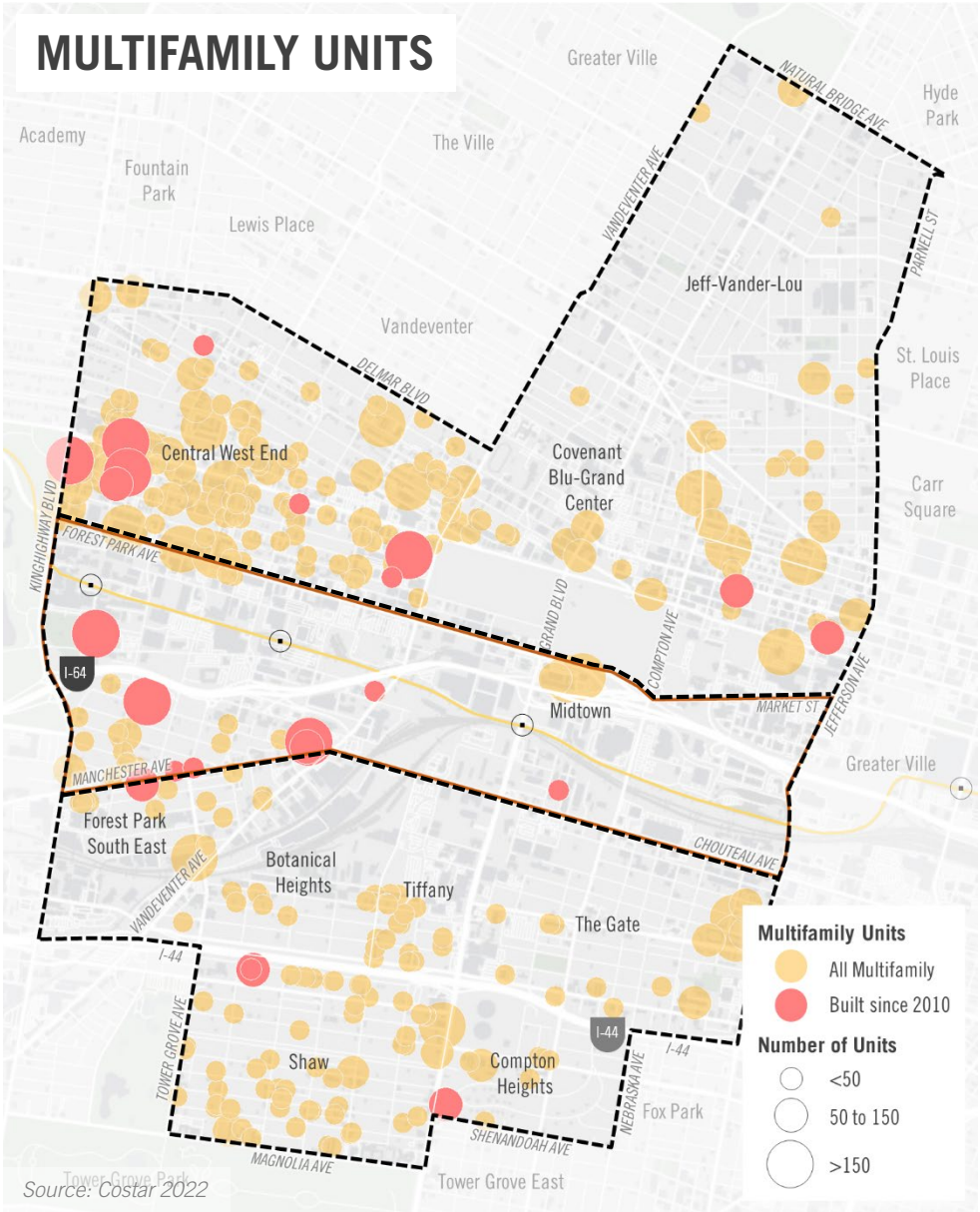
A third of the new multifamily units, 95 percent of the new student beds, and all of the new office supply added since 2010 in the city are located within the study areas. The Tier 2 Study Area delivered more than 900,000 square feet of retail (around 80 percent of the city's new retail supply), which can be attributed to IKEA opening in 2014 and Foundry opening in 2021. The study areas lost industrial supply, since no new space was delivered and vacant end-of-life properties were redeveloped into multi-family or other commercial uses.

**510 beds in pipeline*
Source: CoStar 2022

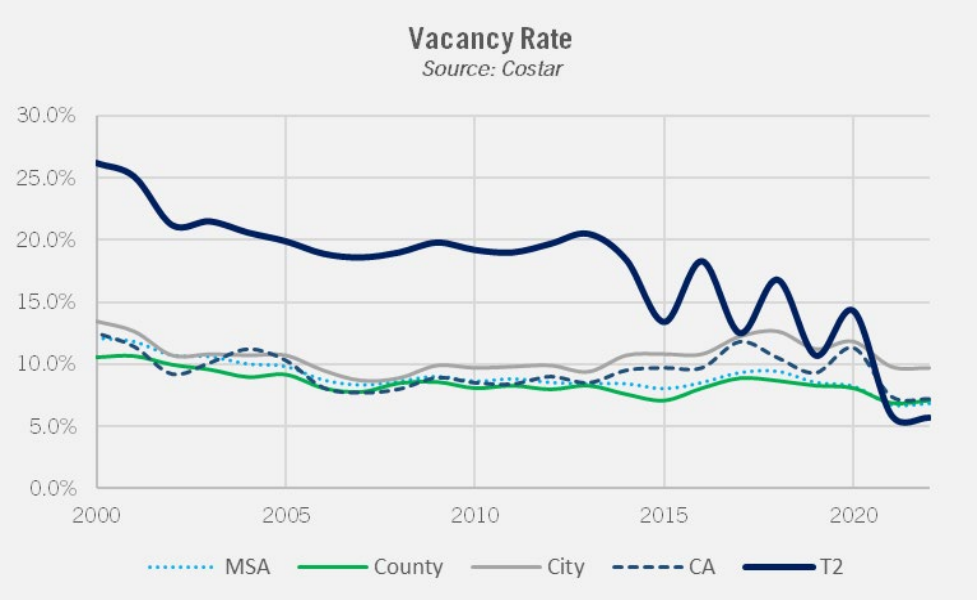
REGIONAL REAL ESTATE OVERVIEW

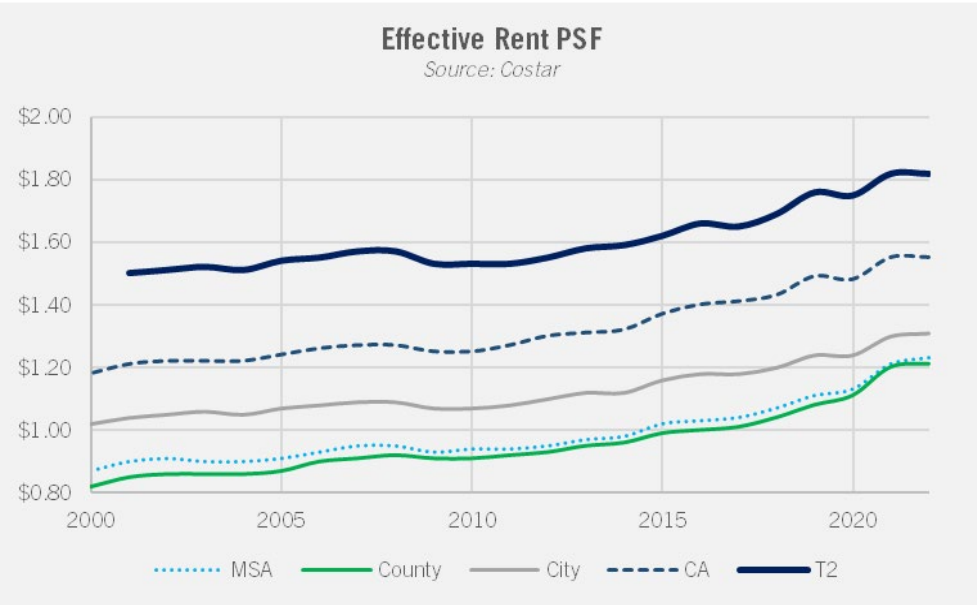
MULTIFAMILY TRENDS

MULTIFAMILY UNITS



Source: Costar 2022

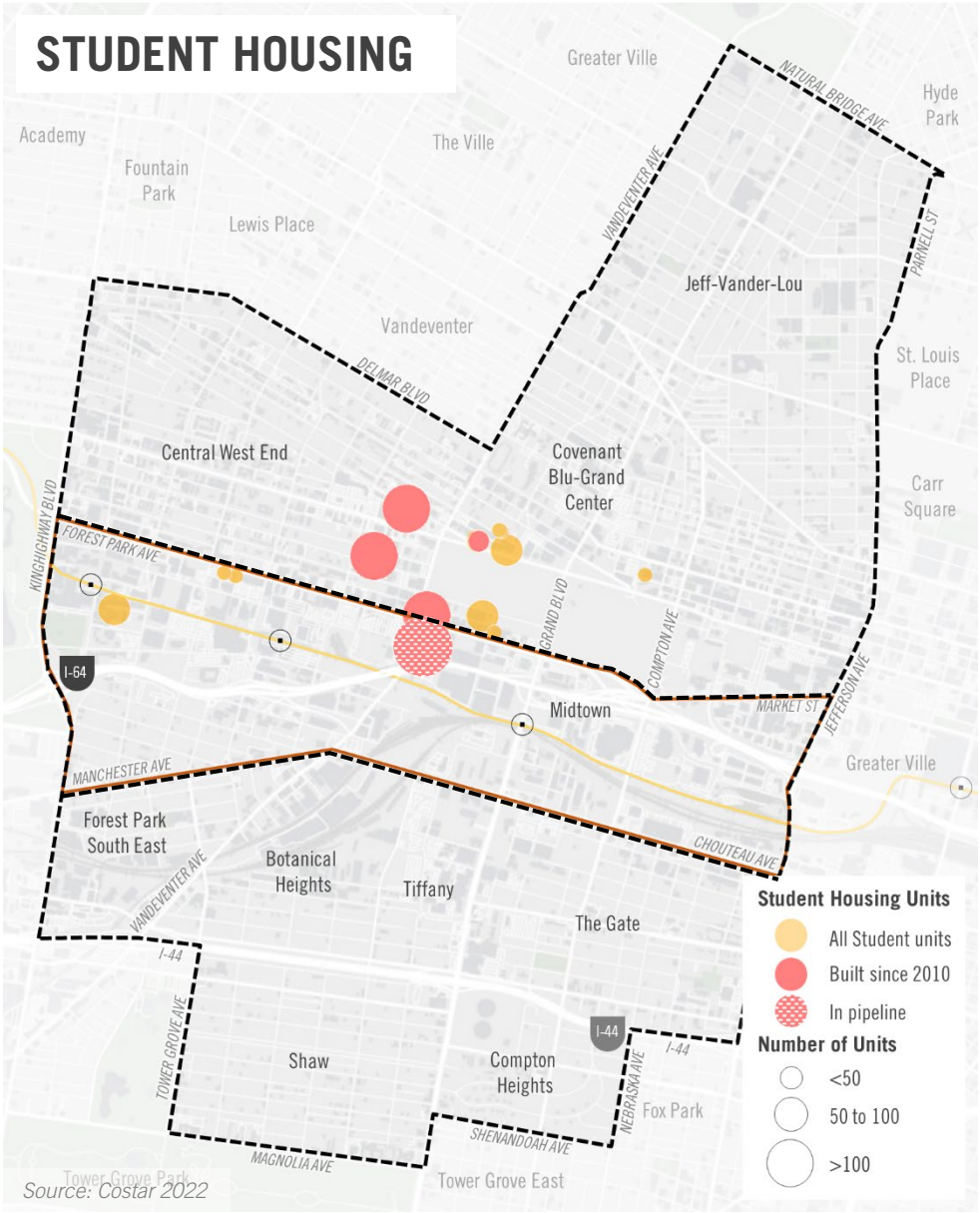


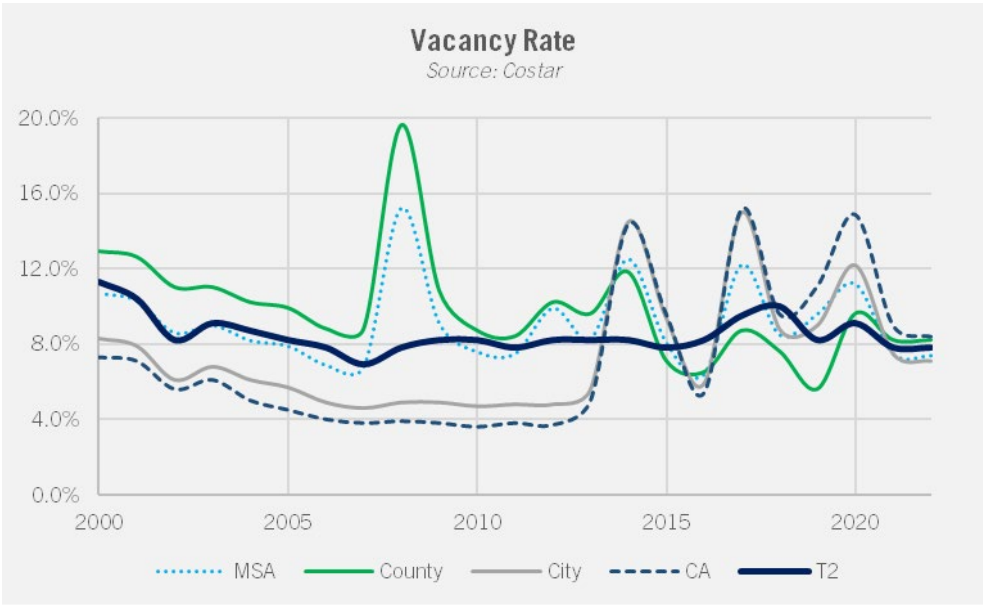


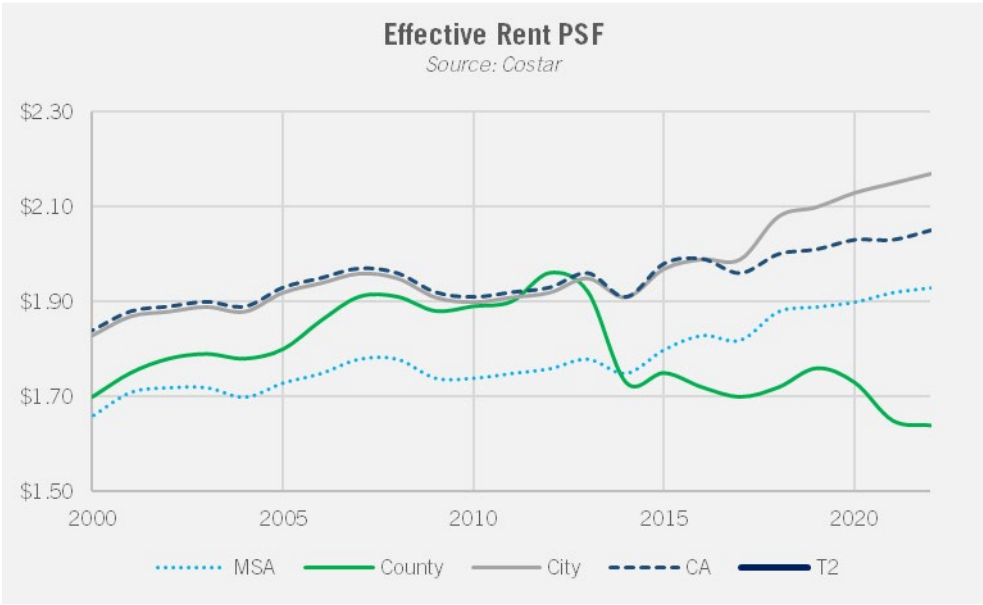
The Multifamily market is strong in the Tier 2 Study Area as demonstrated by lower vacancy rates and higher rents than the citywide averages. Vacancy in the study area has decreased significantly in the last few years as demand has increased for centralized and higher-quality housing in areas with high walkability. Most of the new multifamily supply has been delivered in the western portion of the Community Assessment Area in Central West End and Forest Park Southeast.

REGIONAL REAL ESTATE OVERVIEW

STUDENT HOUSING TRENDS



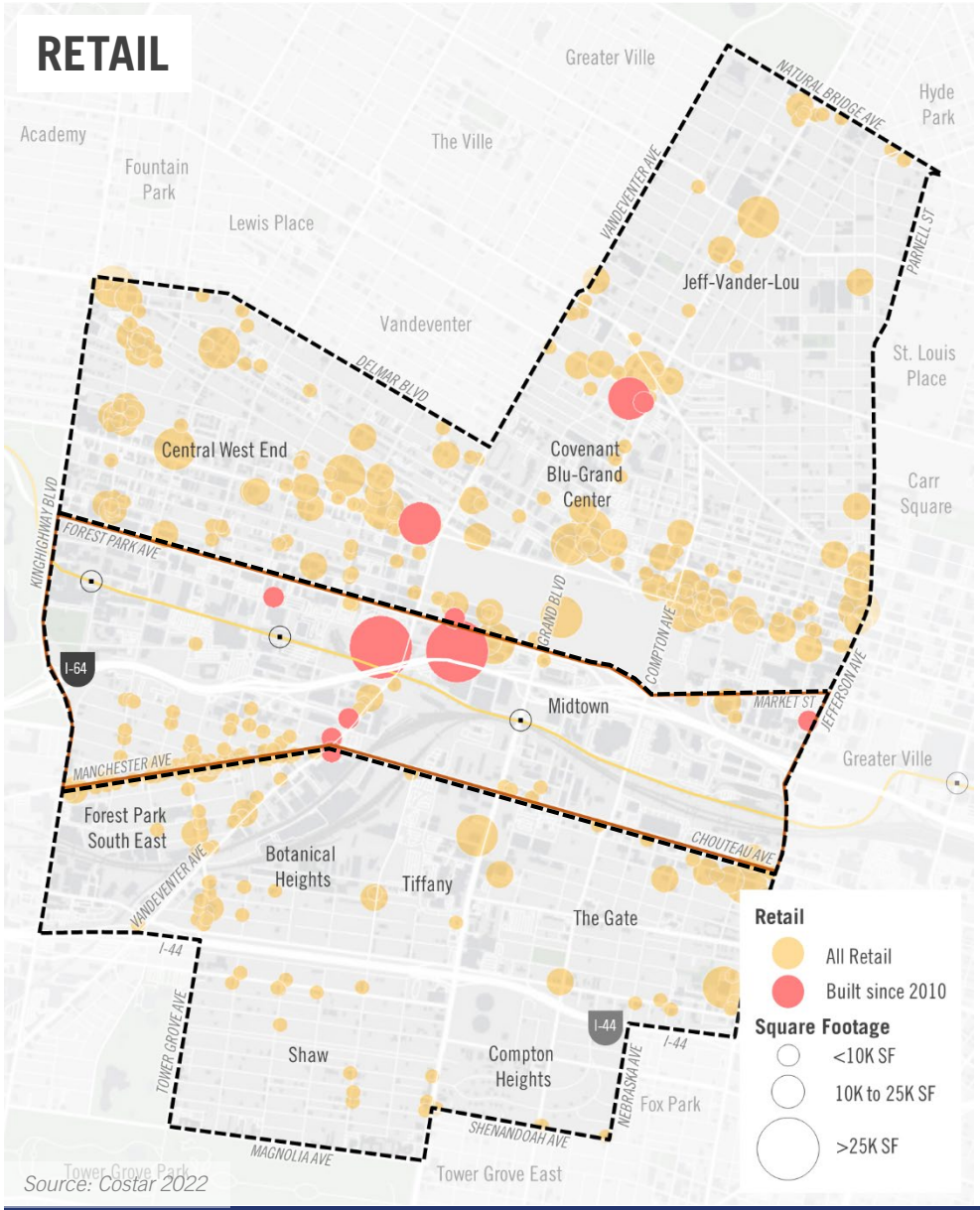


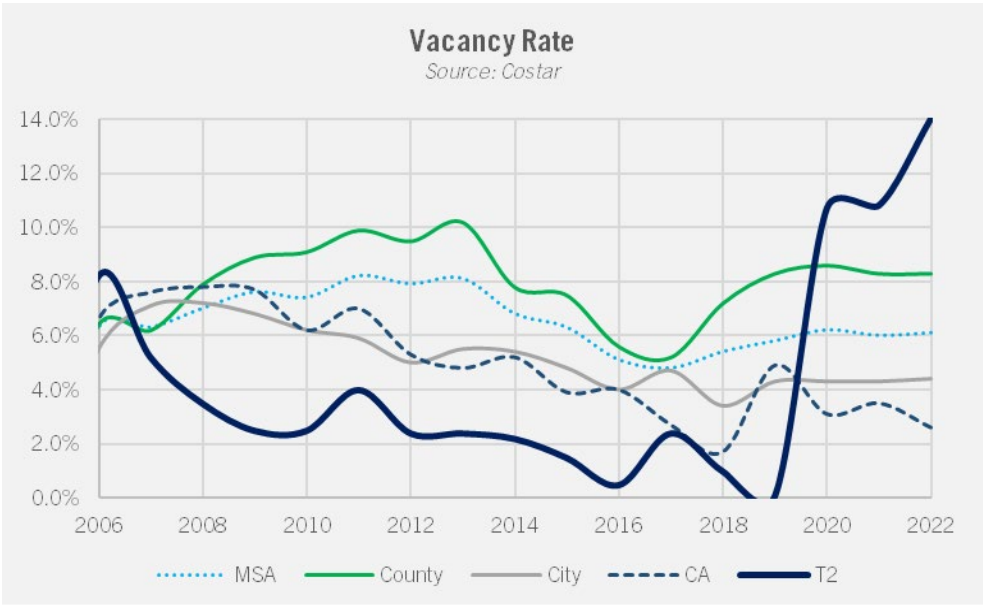


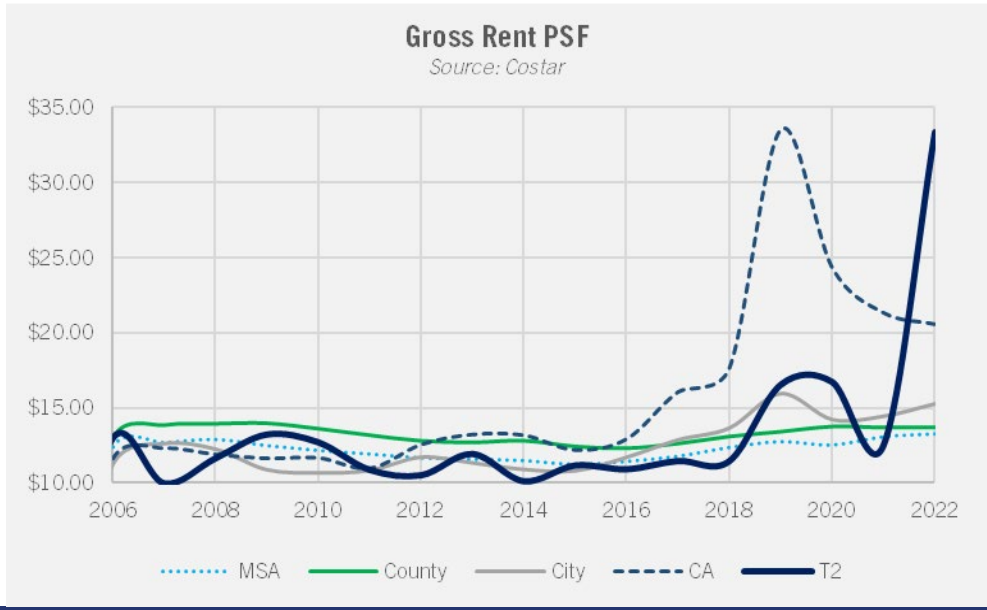
Given the presence of St. Louis University, student housing development has been strong in and around the Tier 2 Study Area with four new properties delivered since 2010 and one property in the pipeline.

REGIONAL REAL ESTATE OVERVIEW

RETAIL TRENDS



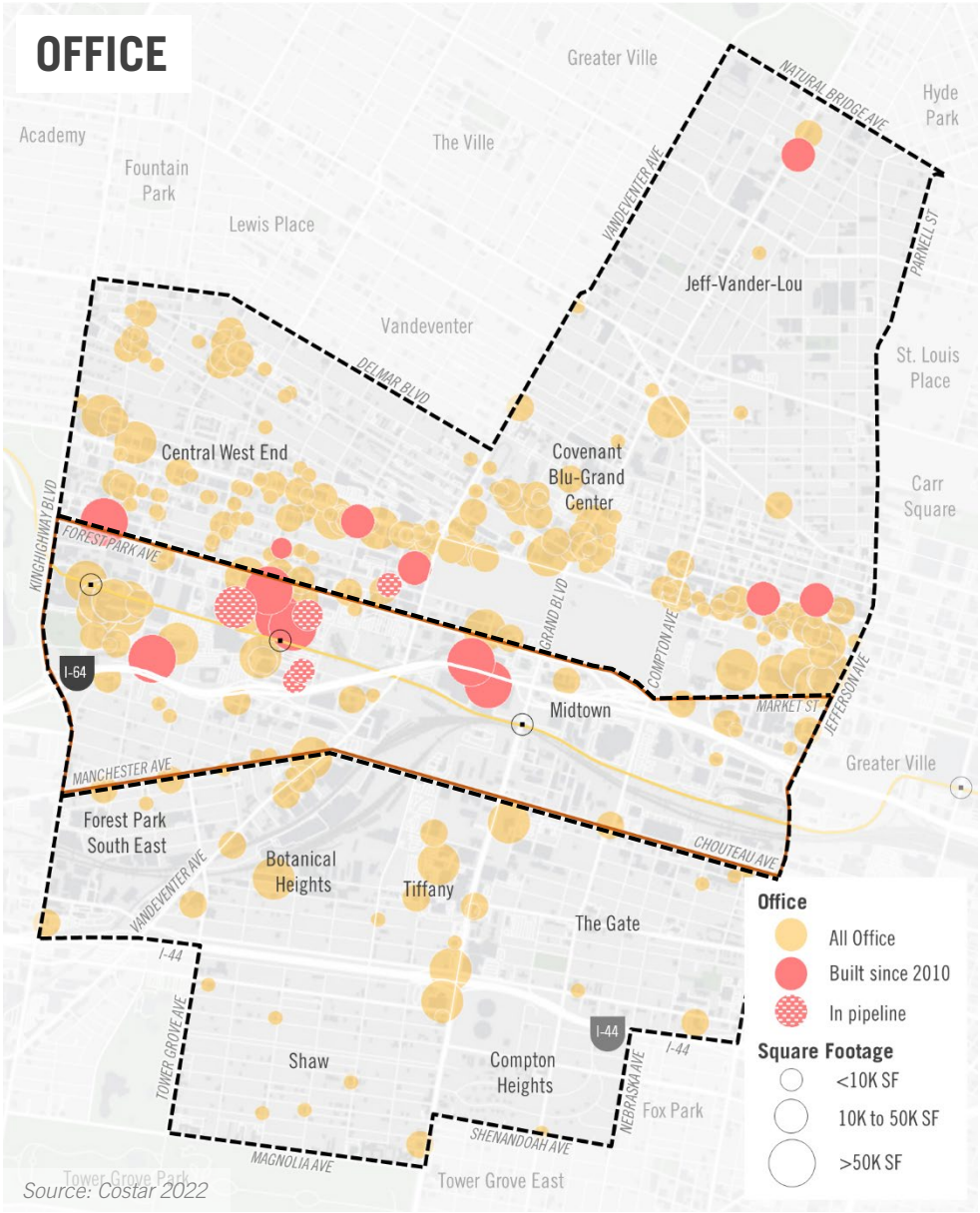




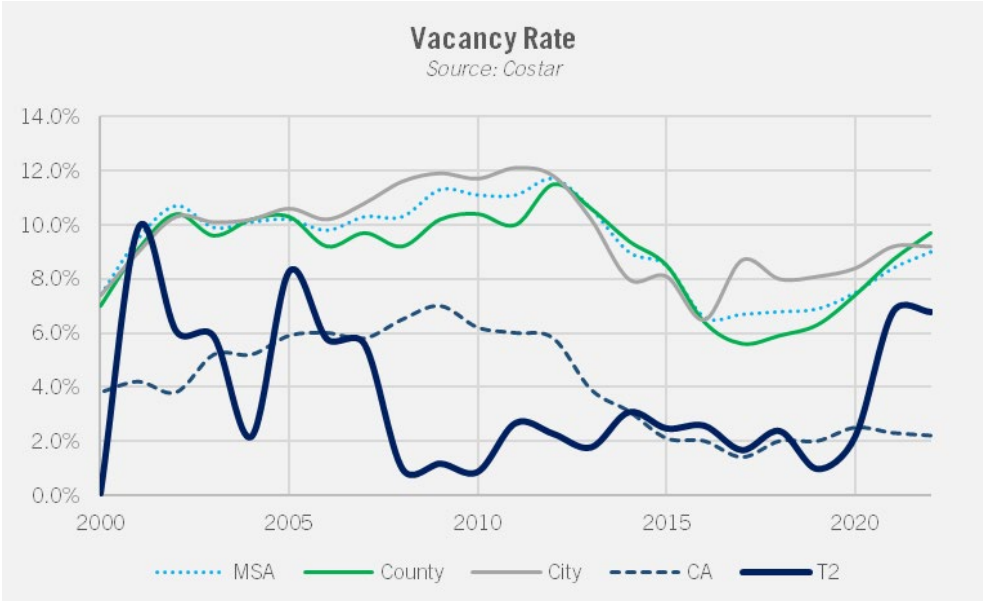
Retail vacancy increased significantly in the Tier 2 Study area given the recently delivered Foundry that has had slow absorption given the COVID-19 pandemic's impacts on the retail market. This development also impacted average gross rents with the property achieving some of the highest rents in the region.

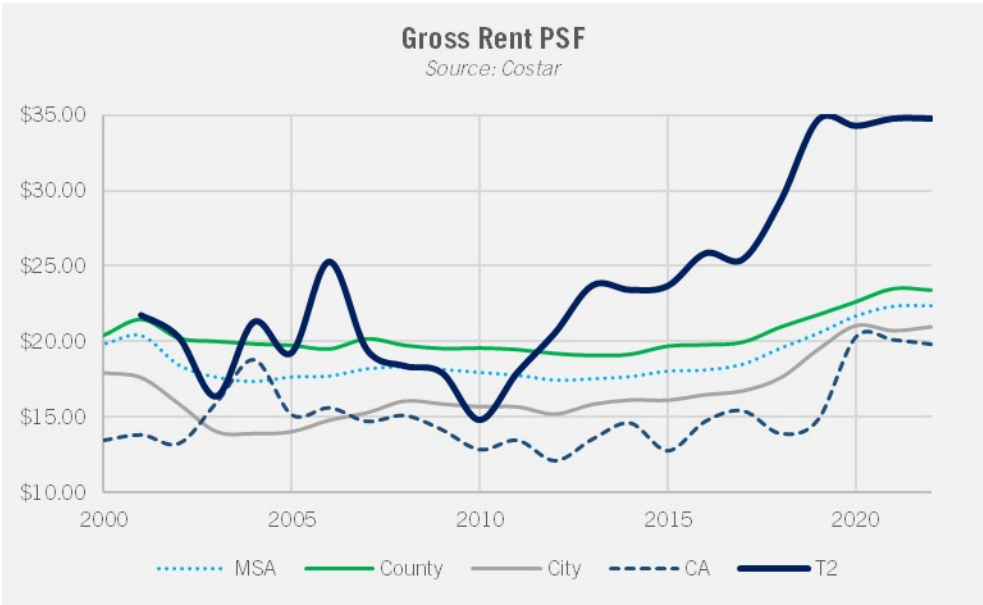
REGIONAL REAL ESTATE OVERVIEW

OFFICE TRENDS



Source: Costar 2022

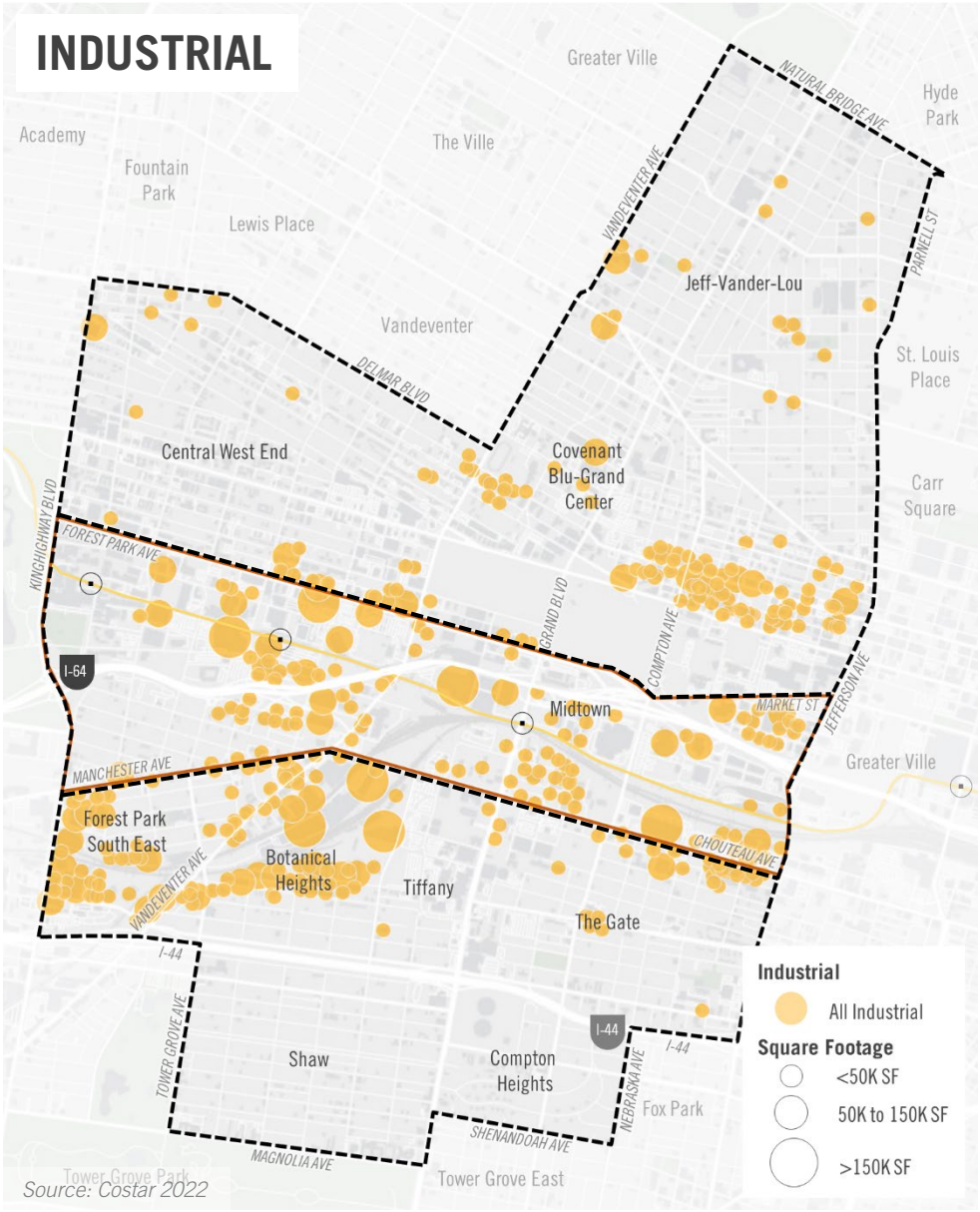


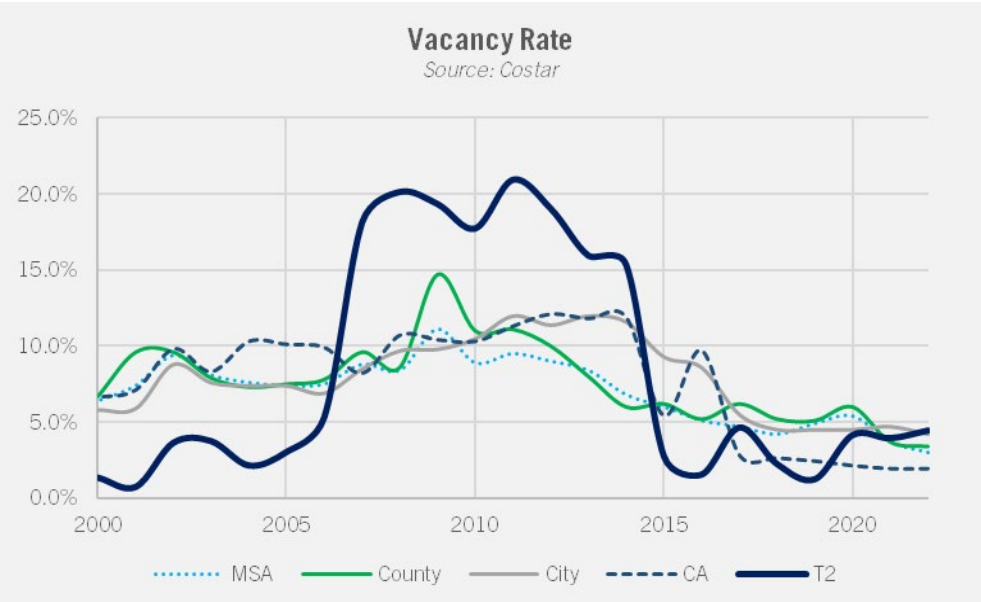


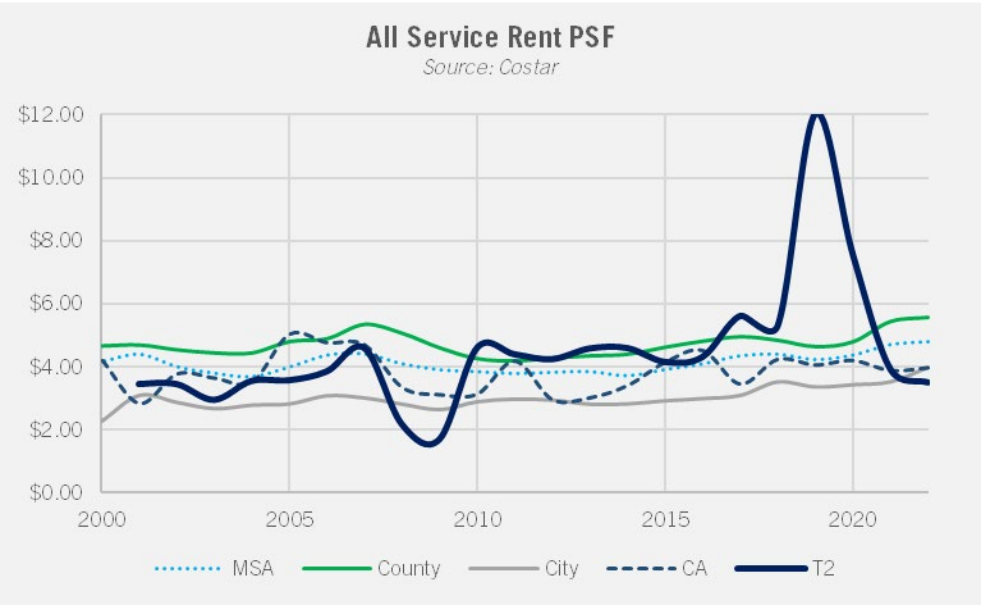
Since 2010, almost all of the city's office development activity has been in the Tier 2 Study Area with significant activity in CORTEX and Washington University Medical Campus. This new supply has led to an increase in average vacancy, but a significant increase in gross rents that are significantly above the regional average.

REGIONAL REAL ESTATE OVERVIEW

INDUSTRIAL TRENDS



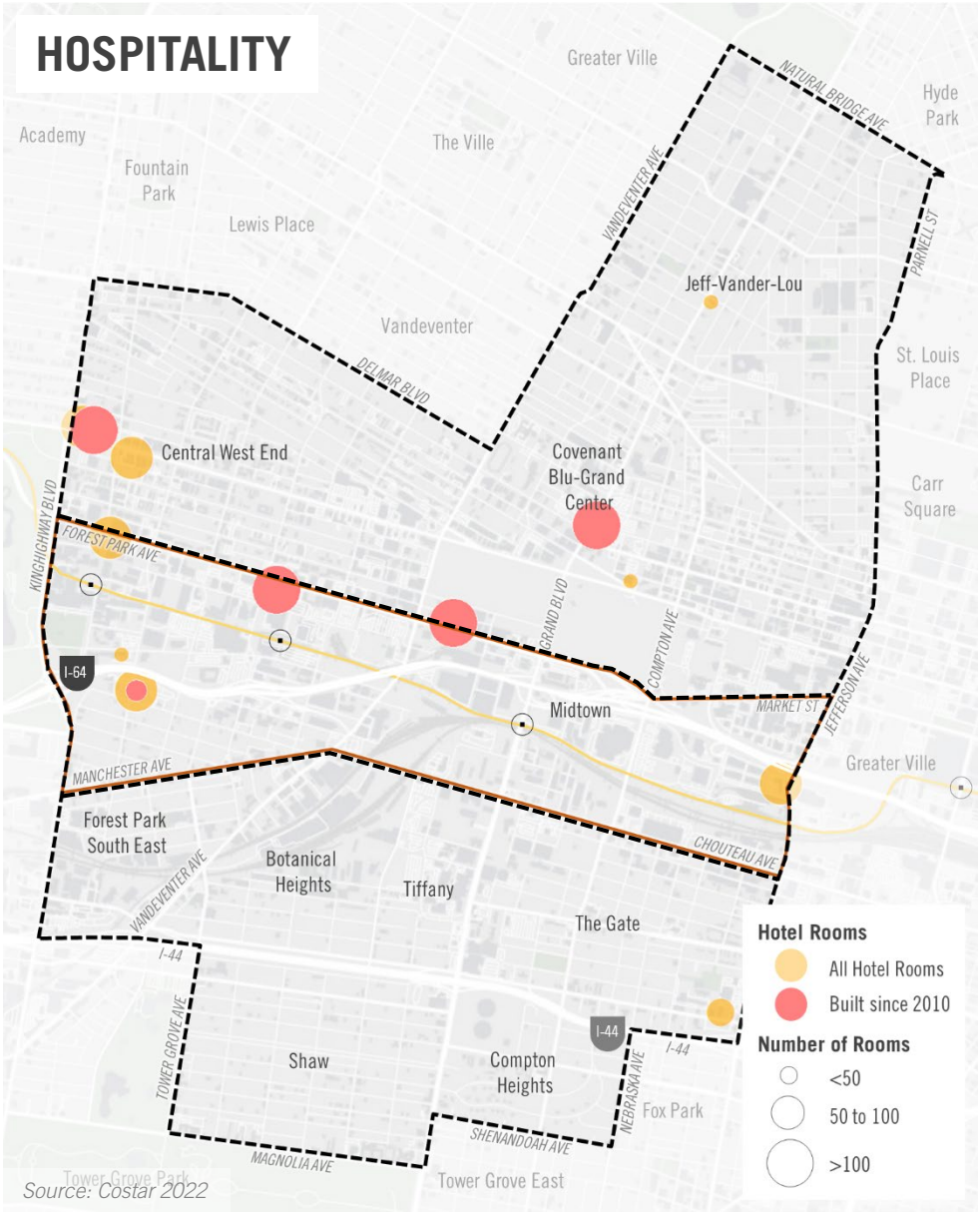


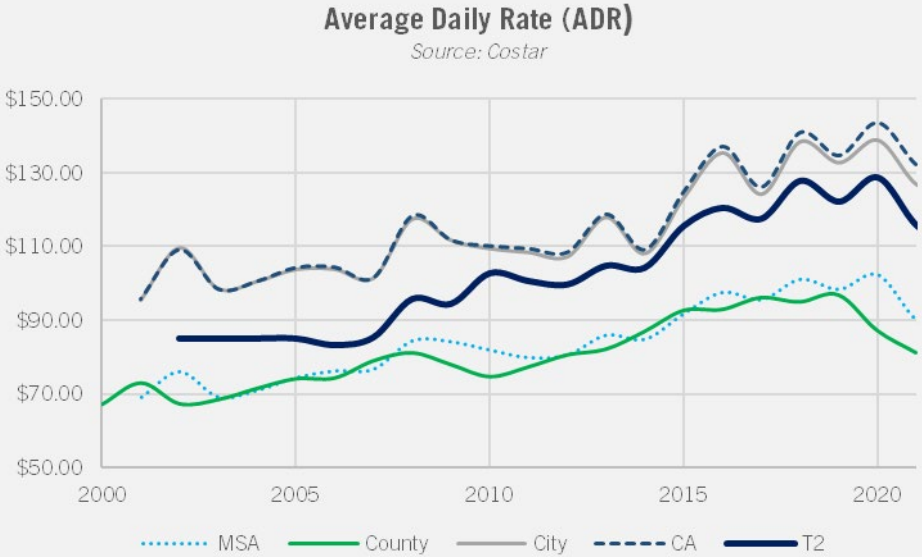


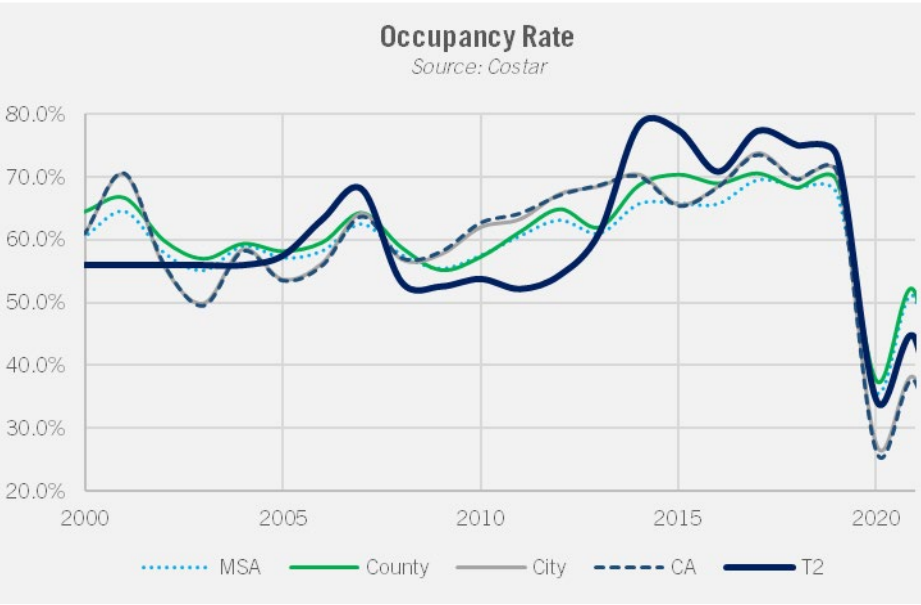
While the study areas contain a large supply of industrial space, there has been no industrial development activity since 2010 and the newest supply in the region has been in lower density areas that are more supportive of the real estate specifications for transportation, warehousing, and logistics. Additionally, given the areas' high marketability for multi-family, hospitality, office, and retail uses, this has limited the market feasibility for industrial. Moving forward, the industrial supply will likely continue to shrink for adaptive reuse redevelopment opportunities.

REGIONAL REAL ESTATE OVERVIEW

HOSPITALITY TRENDS







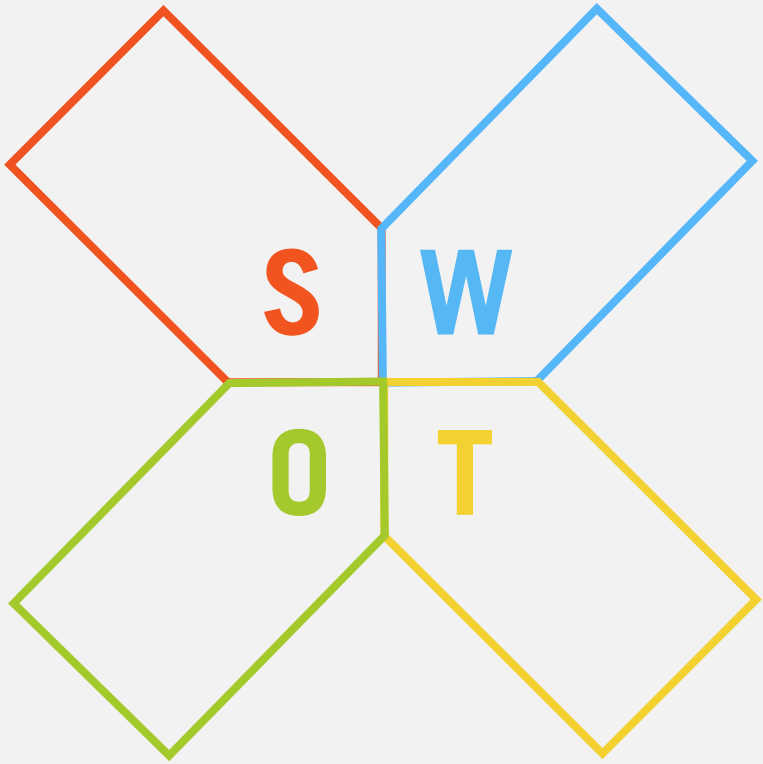
There have been several new hotels delivered (about 760 additional rooms) in the study areas since 2010, constituting around 64 percent of the city's new added rooms. Occupancy rate and average daily rate trends for the entire hotel supply have been generally consistent with the citywide average.

REGIONAL REAL ESTATE OVERVIEW

REAL ESTATE SWOT ANALYSIS

STRENGTHS

- Concentration of biotechnology-focused businesses will continue to attract new talent/businesses to the project area
- Proximity to major educational and research institutions will attract students/faculty to live
- Availability of light-rail public transportation allows workers and residents easier access to employment, entertainment, or residential amenities



WEAKNESSES

- A perception by developers that the City of St. Louis' shift in strategy to focus incentives elsewhere in the city may slow new development within the project area
- A negative perception of St. Louis as a place to live may dissuade individuals and families from relocating to the area

OPPORTUNITIES

- Ample developable sites remain within—and nearby—the project area
- While national developers may be wary of investing in St. Louis, there Exists a local development community that has proven a commitment to investing in the City of St. Louis and rehabilitating formerly blighted and contaminated sites
- Pipeline of highly-educated graduates to be employed at or live near the project area

THREATS

- Continued investment in new development to the west of St. Louis threatens to move the 'center' of the region out of the City, stealing new businesses and residents
- Changes in working patterns—partly due to the recent pandemic—may somewhat reduce the need for dedicated office space or residential space adjacent to employment centers
- Increased competition from other cities (Kansas City, Chicago, Indianapolis, Nashville and beyond) may attract new businesses that would have otherwise chosen St. Louis
- Adjustments to economic incentive programs (TIF, CID, TDD, etc.) may reduce the amount of assistance available to developers, rendering future projects financially infeasible

Community Assessment Framework

Introduction to Study Area

Market & Economy

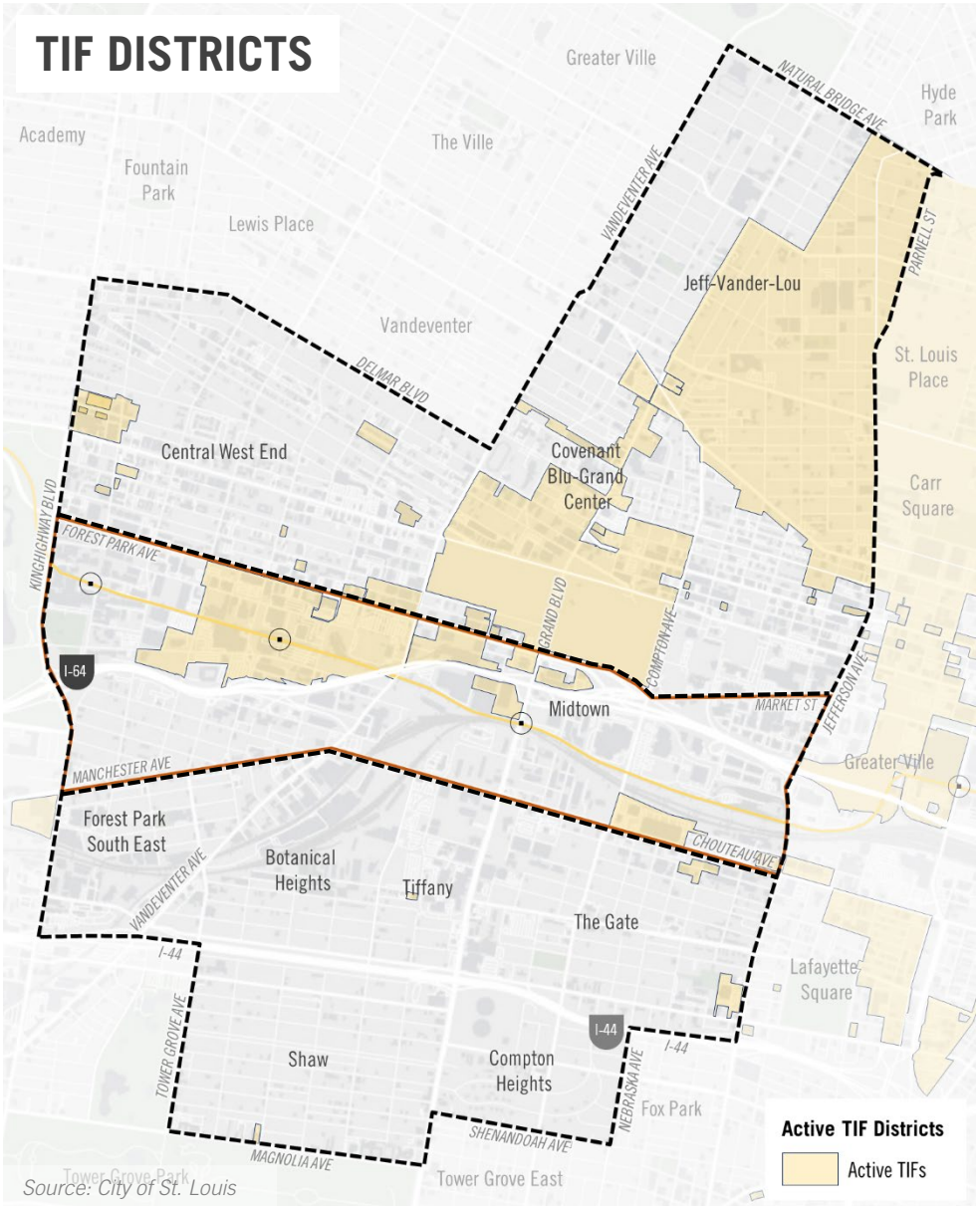
People & Neighborhoods

Economic Development

ECONOMIC DEVELOPMENT

TAX INCREMENT FINANCING (TIF) AND TRANSPORTATION DEVELOPMENT (TDD) DISTRICTS

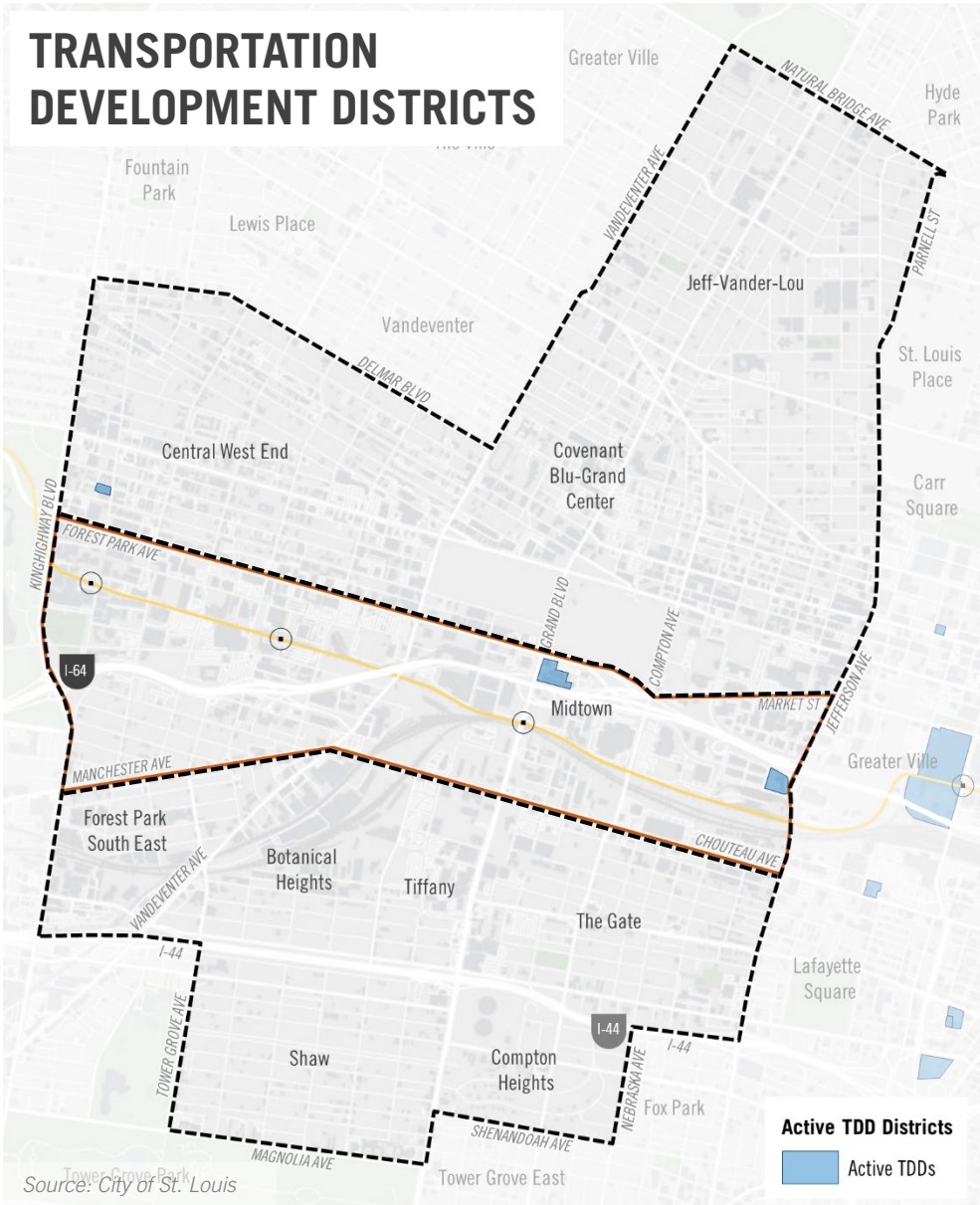
TIF DISTRICTS



Source: City of St. Louis

TIF has been utilized in large portions of the project area, most notably around Cortex and the Jeff-Vander-Lou areas. This has encouraged significant redevelopment to attract a wide range of users, and more growth is planned for the future, which will likely increase vehicular and pedestrian traffic.

TRANSPORTATION DEVELOPMENT DISTRICTS



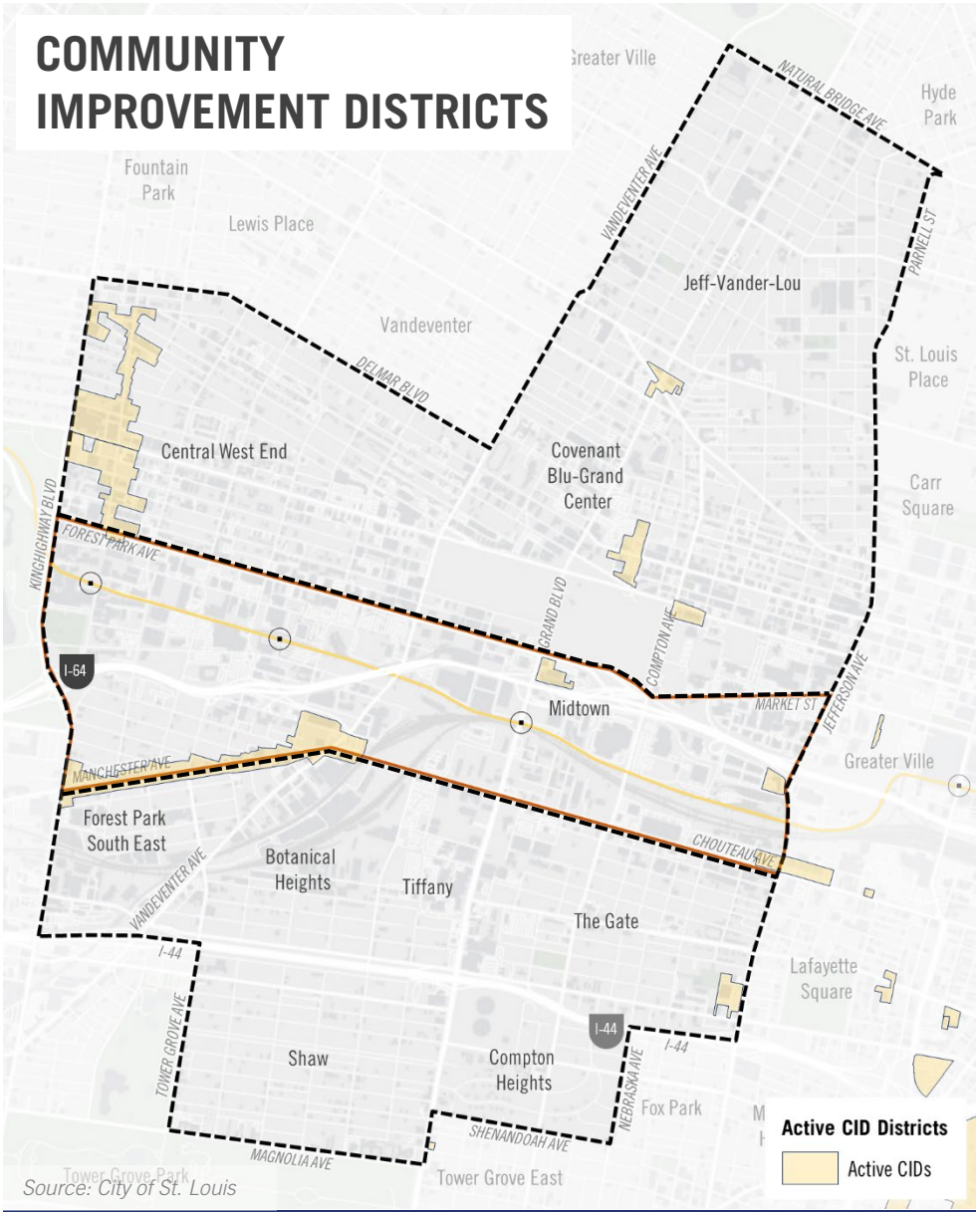
Source: City of St. Louis

TDD has been used in a limited amount in the project area, but has served to provide funding for needed transportation-related upgrades to attract redevelopment. Additional use of TDD to provide a funding mechanism for additional redevelopment is likely in the future, and that new growth will likely cause an increase in vehicular and pedestrian traffic.

ECONOMIC DEVELOPMENT

COMMUNITY IMPROVEMENT (CID) DISTRICTS, TAX ABATED PARCELS AND CHAPTER 353 DISTRICTS

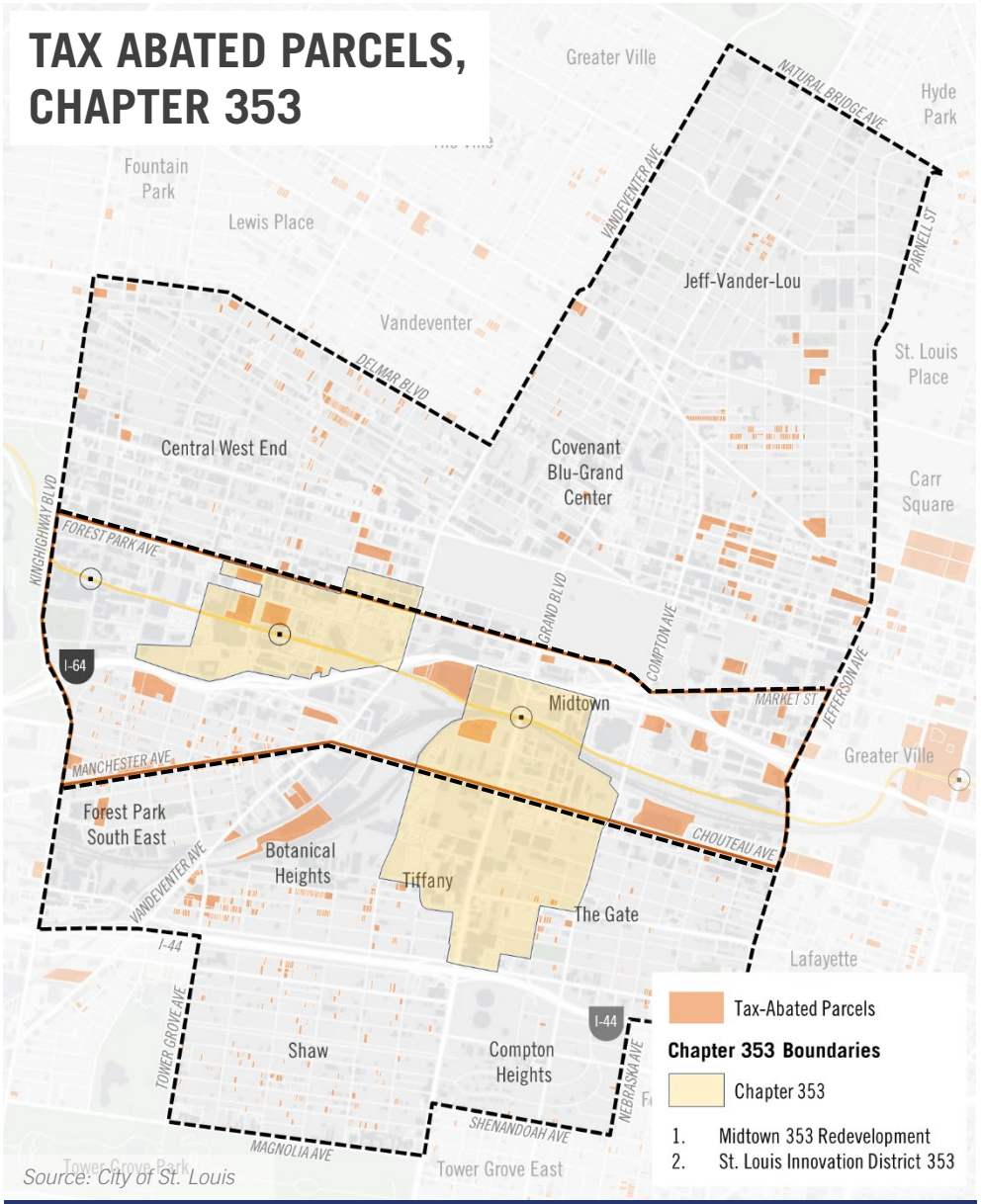
COMMUNITY IMPROVEMENT DISTRICTS



Source: City of St. Louis

CID has been used in targeted locations to improve the physical characteristics of those areas in order to lure new residents, business, and in many cases grow those areas into retail and entertainment destinations. This has resulted in an increase in traffic in certain CID boundaries.

TAX ABATED PARCELS, CHAPTER 353



Source: City of St. Louis

Tax abatement and Chapter 353 have been used throughout the area to encourage redevelopment, efficient use of existing building stock, and attract new residents and businesses to the area, thus increasing overall traffic in the area.

Community Assessment Framework

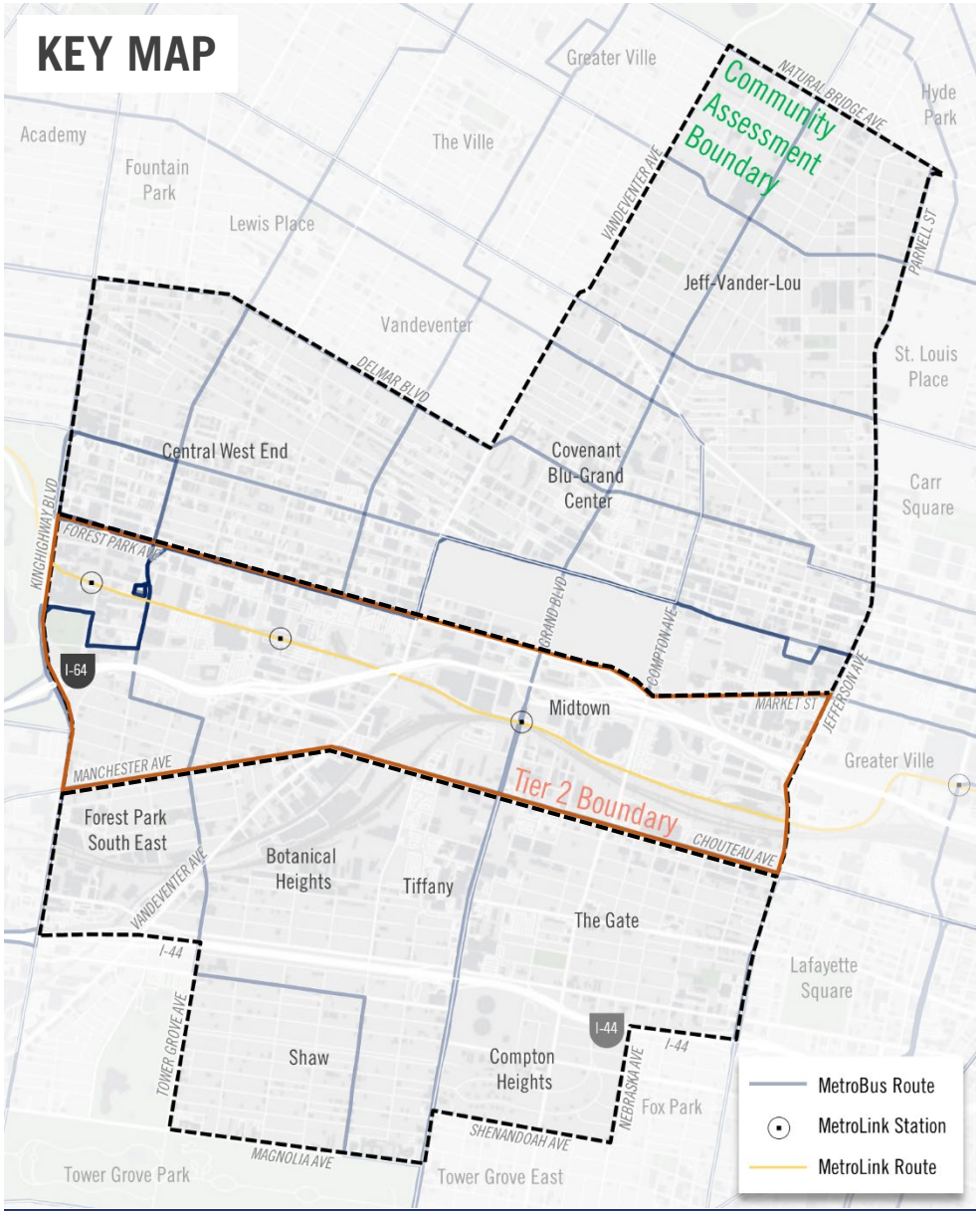
Introduction to Study Area

Market & Economy

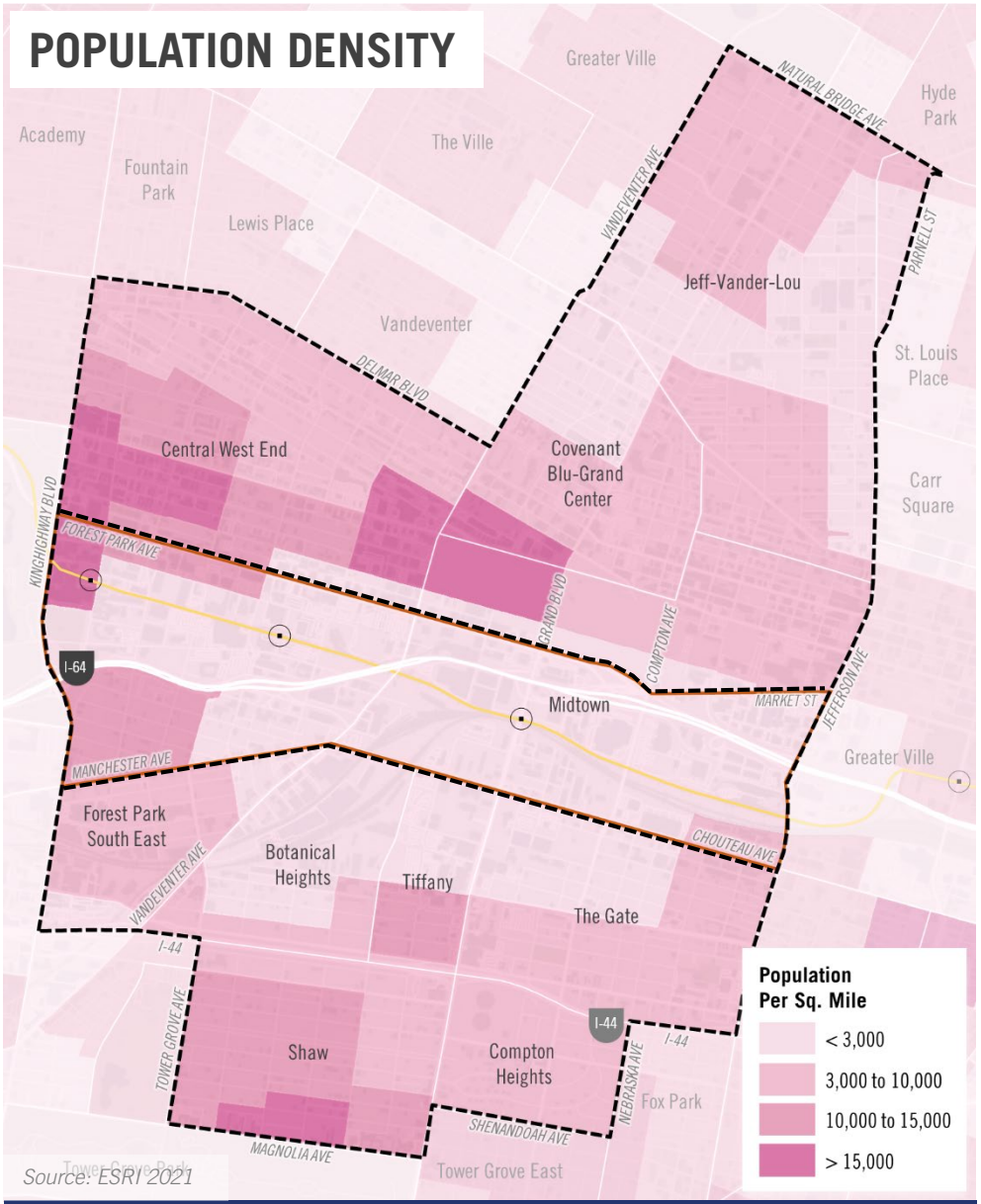
People & Neighborhoods

PEOPLE & NEIGHBORHOODS

POPULATION DENSITY



The Tier 2 Study Area is part if the City of St. Louis' Central Corridor bound by Kingshighway to the west, Manchester and Chouteau avenues to the south, Jefferson Avenue to the east, and Forest Park Avenue to the north.



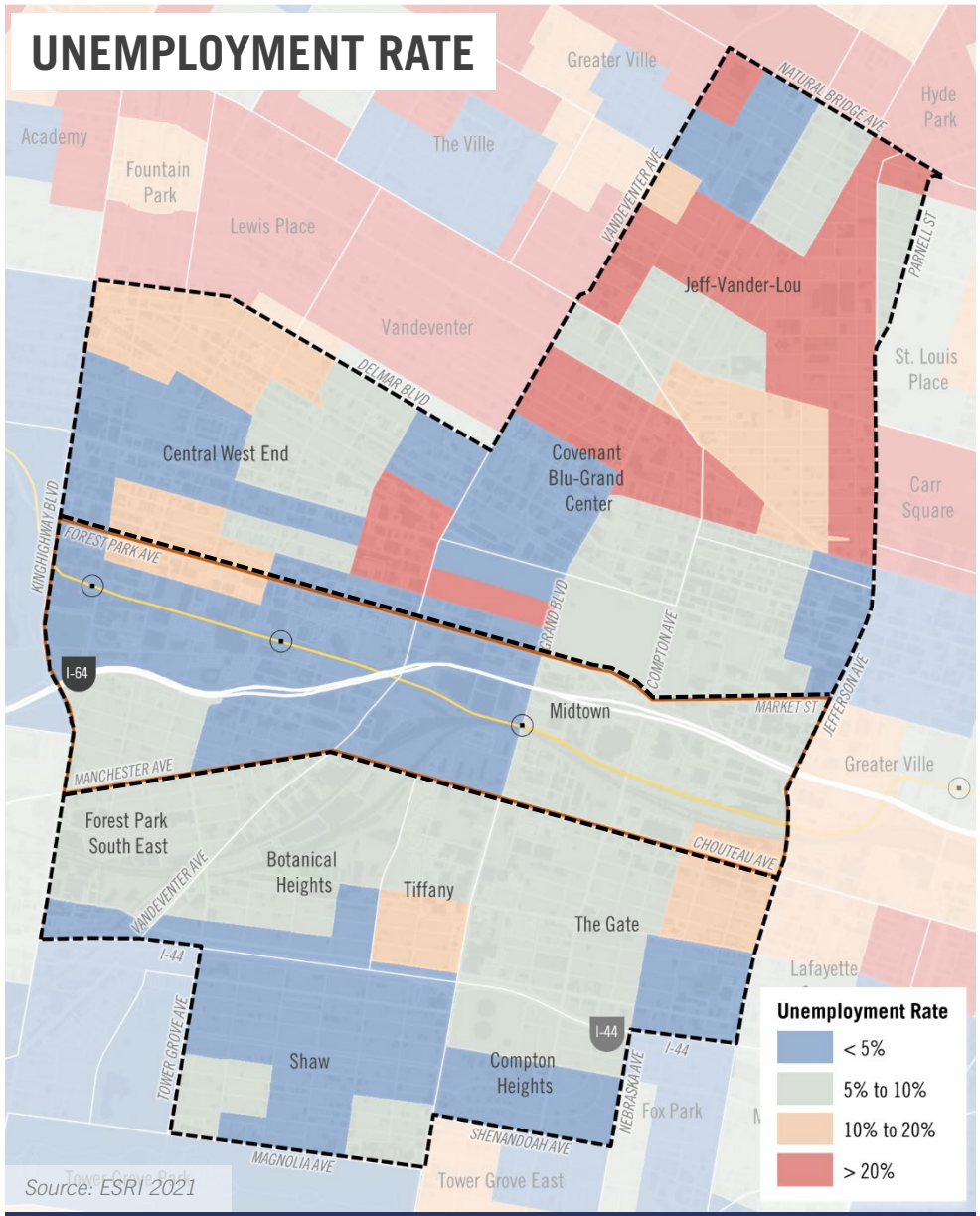
Source: ESRI 2021

Population density is relatively high in the Central West End just north of the Tier 2 Study Area. The study area has a low population density since it is primarily commercial and industrial.

PEOPLE & NEIGHBORHOODS

UNEMPLOYMENT RATE & CRIME RATE

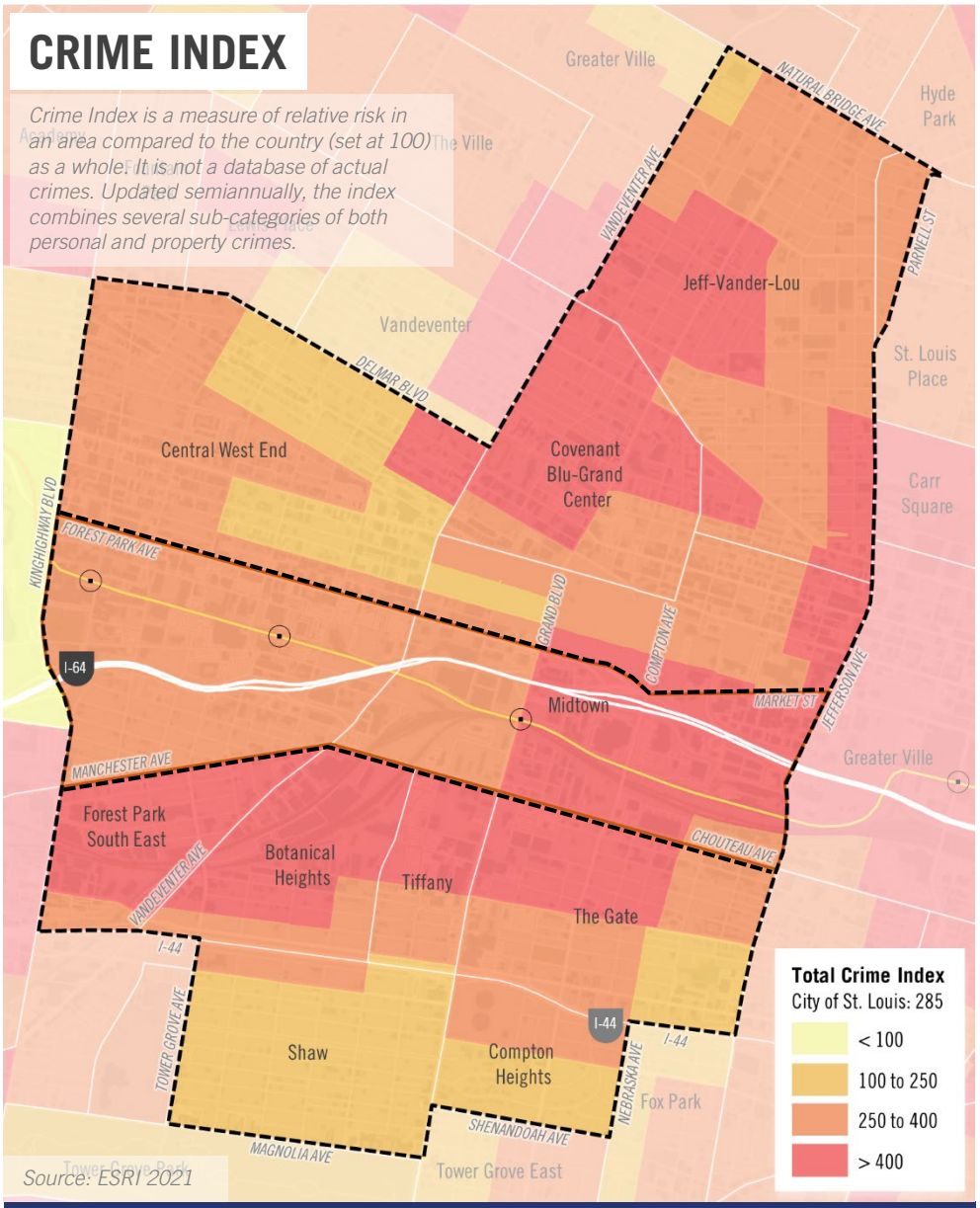
UNEMPLOYMENT RATE



Unemployment rates are relatively low in the and around the study area, but are significantly higher in and around Jeff-Vander-Lou neighborhood given weaker socio-economic conditions.

CRIME INDEX

Crime Index is a measure of relative risk in an area compared to the country (set at 100) as a whole. It is not a database of actual crimes. Updated semiannually, the index combines several sub-categories of both personal and property crimes.



Crime Index scores are relatively high in the neighborhoods immediately south of the study area and further north in Jeff-Vander-Lou. This can be attributed to socio-economic conditions and larger concentrations of commercial properties.

Community Assessment Framework

Introduction to Study Area

Market & Economy

People & Neighborhoods

Demographics: People & Households

DEMOGRAPHICS: PEOPLE & HOUSEHOLDS

POPULATION AND HOUSEHOLD COMPOSITION: STUDY AREAS

POPULATION AND HOUSEHOLD COMPOSITION

Description	Tier 2 Boundary	Community Assessment Boundary	St. Louis City, MO	St. Louis MSA	Missouri	USA
Population						
2026 Projection	4,874	42,659	303,000	2,878,100	6,382,800	345,887,500
2021 Estimate	4,279	42,115	309,000	2,843,300	6,250,000	333,934,100
2010 Census	3,605	40,762	319,200	2,787,700	5,988,900	308,745,500
2000 Census	3,438	42,849	348,000	2,675,000	5,595,000	281,422,000
Annual Change 2021-2026	2.6%	0.3%	-0.4%	0.2%	0.4%	0.7%
Total Change 2000-2010	4.9%	-4.9%	-8.3%	4.2%	7.0%	9.7%
Annual Change 2010-2021	1.5%	0.3%	-0.3%	0.2%	0.4%	0.7%
Total Change (2010-2021)	18.7%	3.3%	-3.2%	2.0%	4.4%	8.2%
Net Change (2010-2021)	674	1,353	-10,200	55,600	261,100	25,188,600
Households						
2021 Estimate	1,862	19,647	140,064	1,142,310	2,497,270	126,470,675
2010 Census	1,462	18,652	142,024	1,109,665	2,375,611	116,716,292
2000 Census	1,696	18,529	147,042	1,039,873	2,194,594	105,480,101
Annual Growth 2021-2026	3.4%	0.5%	-0.3%	0.3%	0.5%	0.7%
Annual Growth 2010-2021	2.2%	0.5%	-0.1%	0.3%	0.4%	0.7%
Households by Size (2015 - 2019)						
One-Person	58%	55%	45%	30%	29%	28%
Two-Person	32%	29%	31%	34%	36%	34%
Three-Person	4%	8%	11%	15%	15%	16%
Four-Person	6%	5%	7%	12%	12%	13%
Five-Person	0%	2%	3%	5%	5%	6%
Six-Person	0%	1%	1%	2%	2%	2%
Seven-Person +	0%	1%	1%	1%	1%	1%
Average Household Size						
2026 Projection	1.82	1.89	2.11	2.44	2.43	2.58
2021 Estimate	1.84	1.90	2.12	2.44	2.43	2.58
2010 Census	1.85	1.92	2.16	2.46	2.45	2.58

Because of the influx of new investment in the study area over the last 10 years, the total population growth rate of 18.7 percent has far exceeded the regional average. Average household sizes are lower than the regional average given the concentration of students, singles, couples, and smaller professional households, many without children.

DEMOGRAPHICS: PEOPLE & HOUSEHOLDS

POPULATION AND HOUSEHOLD COMPOSITION: NEIGHBORHOODS

POPULATION AND HOUSEHOLD COMPOSITION

Description	Central West End	Forest Park SE	Midtown	Covenant Blu-Grand Center	Jeff-Vander-Lou	St. Louis City, MO
Population						
2026 Projection	14,582	4,179	6,343	3,600	5,100	303,000
2021 Estimate	13,996	3,863	5,839	3,500	5,300	309,000
2010 Census	12,883	2,918	5,652	3,600	5,700	319,200
2000 Census	12,548	3,468	4,041	4,000	6,000	348,000
Annual Change 2021-2026	0.8%	1.6%	1.7%	0.6%	-0.8%	-0.4%
Total Change 2000-2010	2.7%	-15.9%	39.9%	-10.0%	-5.0%	-8.3%
Annual Change 2010-2021	0.7%	2.5%	0.3%	-0.1%	-0.6%	-0.3%
Total Change (2010-2021)	8.6%	32.4%	3.3%	-2.8%	-7.0%	-3.2%
Net Change (2010-2021)	1,113	945	187	-100	-400	-10,200
Households						
2021 Estimate	8,594	1,831	1,382	1,452	2,139	140,064
2010 Census	7,900	1,342	1,187	1,499	2,265	142,024
2000 Census	7,728	1,323	1,267	1,411	2,478	147,042
Annual Growth 2021-2026	1.0%	2.2%	3.4%	0.5%	-0.7%	-0.3%
Annual Growth 2010-2021	0.8%	2.8%	1.4%	-0.3%	-0.5%	-0.1%
Households by Size (2015 - 2019)						
One-Person	63%	48%	76%	56%	55%	45%
Two-Person	28%	38%	17%	26%	17%	31%
Three-Person	6%	6%	2%	9%	10%	11%
Four-Person	2%	8%	3%	6%	8%	7%
Five-Person	1%	0%	0%	1%	6%	3%
Six-Person	0%	0%	0%	0%	1%	1%
Seven-Person +	0%	0%	1%	2%	3%	1%
Average Household Size						
2026 Projection	1.44	1.92	2.39	1.95	2.38	2.11
2021 Estimate	1.44	1.96	2.46	1.98	2.39	2.12
2010 Census	1.43	2.01	2.52	1.92	2.41	2.16

Forest Park Southeast's population grew by more than 32 percent from 2010 to 2021, one of the fastest growing neighborhoods in the region. Central West End has also experienced strong growth, while Grand Center experienced a slight population decline given the lack of investment and development activity.

DEMOGRAPHICS: PEOPLE & HOUSEHOLDS

POPULATION AND HOUSEHOLD COMPOSITION: NEIGHBORHOODS

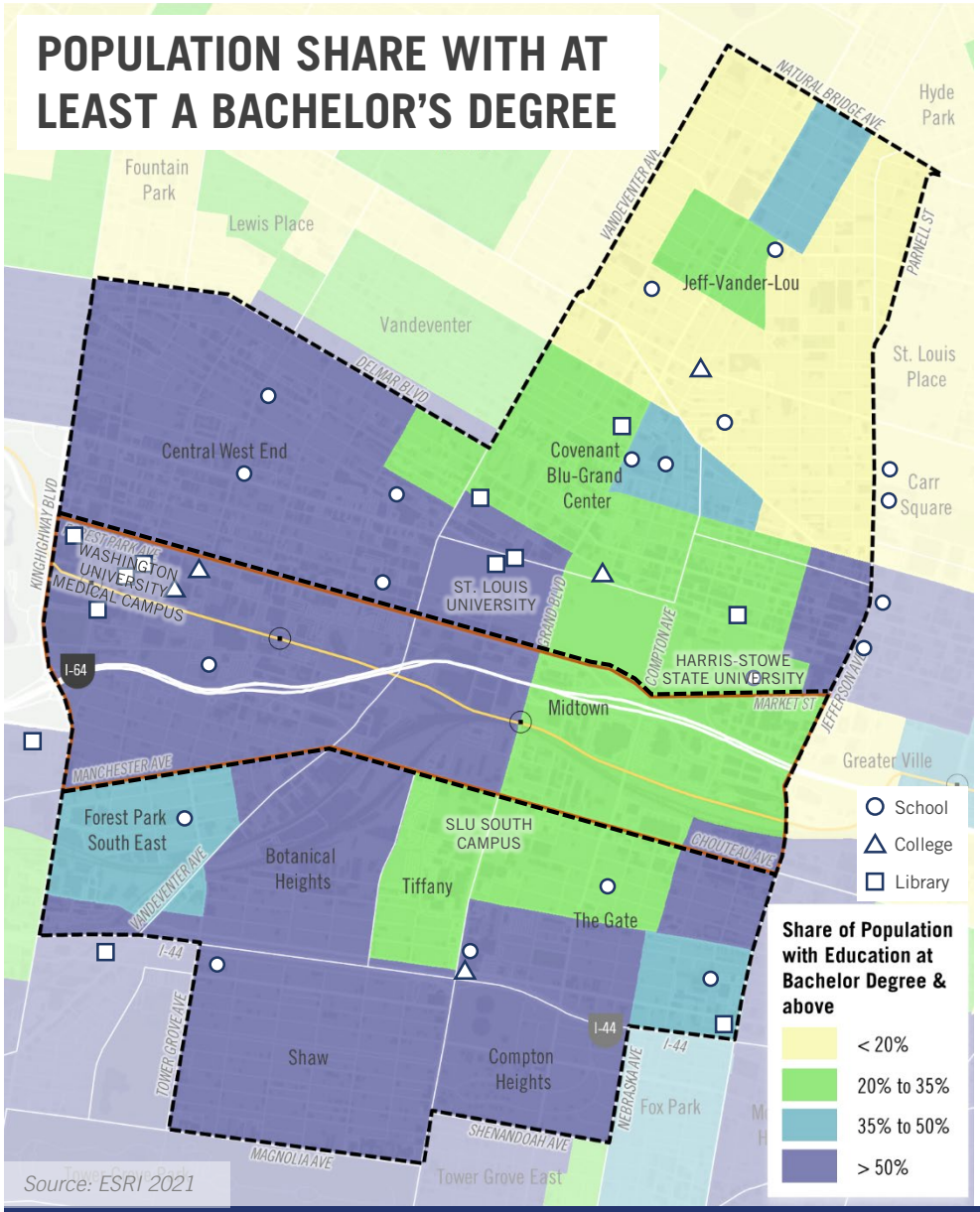
POPULATION AND HOUSEHOLD COMPOSITION

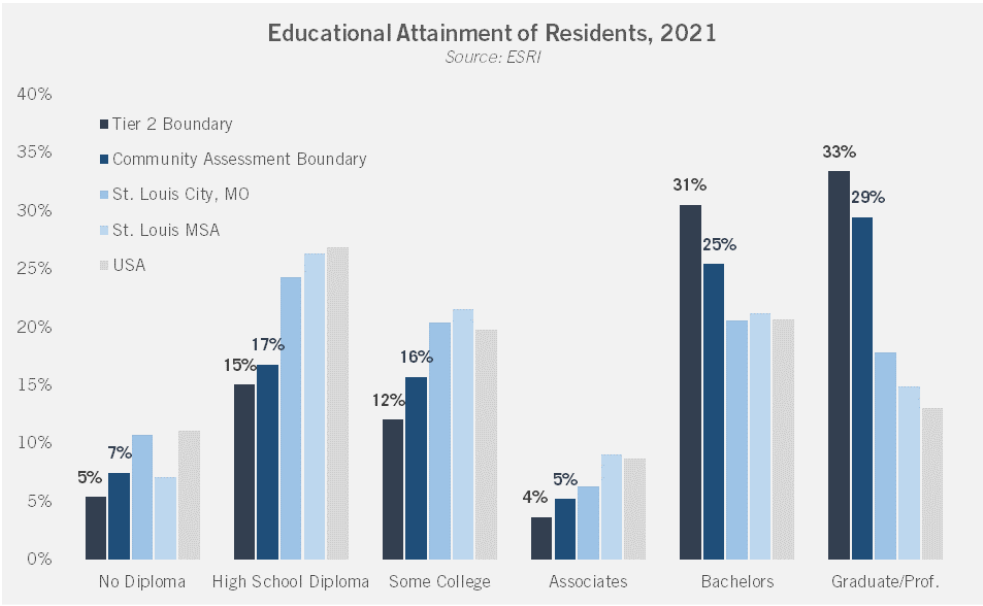
Description	Botanical Heights	Tiffany	The Gate	Shaw	Compton Heights	St. Louis City, MO
Population						
2026 Projection	1,120	1,085	3,218	6,900	1,500	303,000
2021 Estimate	1,118	1,096	3,276	7,000	1,400	309,000
2010 Census	1,037	1,060	3,456	6,800	1,300	319,200
2000 Census	1,598	1,300	3,498	8,000	1,000	348,000
Annual Change 2021-2026	0.0%	-0.2%	-0.4%	-0.3%	1.4%	-0.4%
Total Change 2000-2010	-35.1%	-18.5%	-1.2%	-15.0%	30.0%	-8.3%
Annual Change 2010-2021	0.7%	0.3%	-0.5%	0.2%	0.6%	-0.3%
Total Change (2010-2021)	7.8%	3.4%	-5.2%	2.9%	7.7%	-3.2%
Net Change (2010-2021)	81	36	-180	200	100	-10,200
Households						
2021 Estimate	422	472	1,479	3,062	676	140,064
2010 Census	383	449	1,532	2,939	618	142,024
2000 Census	471	495	1,340	3,156	554	147,042
Annual Growth 2021-2026	0.1%	-0.2%	-0.3%	-0.2%	0.8%	-0.3%
Annual Growth 2010-2021	0.9%	0.5%	-0.3%	0.4%	0.8%	-0.1%
Households by Size (2015 - 2019)						
One-Person	49%	17%	44%	43%	38%	45%
Two-Person	34%	49%	30%	34%	46%	31%
Three-Person	3%	12%	16%	8%	7%	11%
Four-Person	10%	9%	7%	7%	9%	7%
Five-Person	2%	5%	0%	6%	0%	3%
Six-Person	2%	8%	3%	1%	1%	1%
Seven-Person +	0%	0%	0%	0%	0%	1%
Average Household Size						
2026 Projection	2.64	2.31	2.12	2.18	2.04	2.11
2021 Estimate	2.65	2.31	2.13	2.19	2.04	2.12
2010 Census	2.71	2.35	2.17	2.23	2.08	2.16

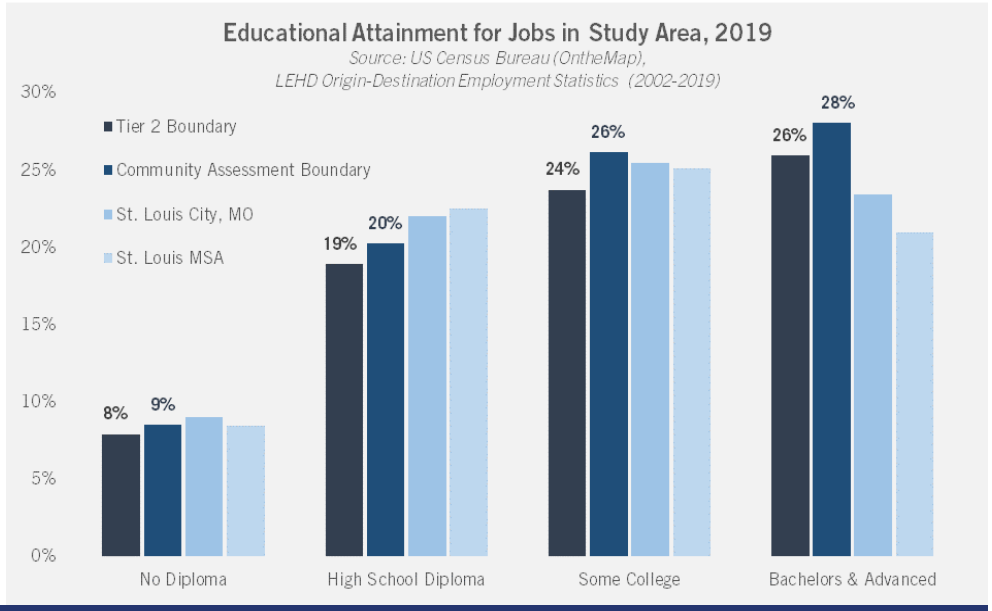
Population growth in the areas south of I-64 has been slower than the areas to the north for a variety of reasons, including: lack of readily developable parcels, overall marketability of existing units, and overall lower density of residential development. Household sizes in these neighborhoods are more consistent with the regional average given the single-family housing stock and larger unit sizes.

DEMOGRAPHICS: PEOPLE & HOUSEHOLDS

EDUCATIONAL ATTAINMENT



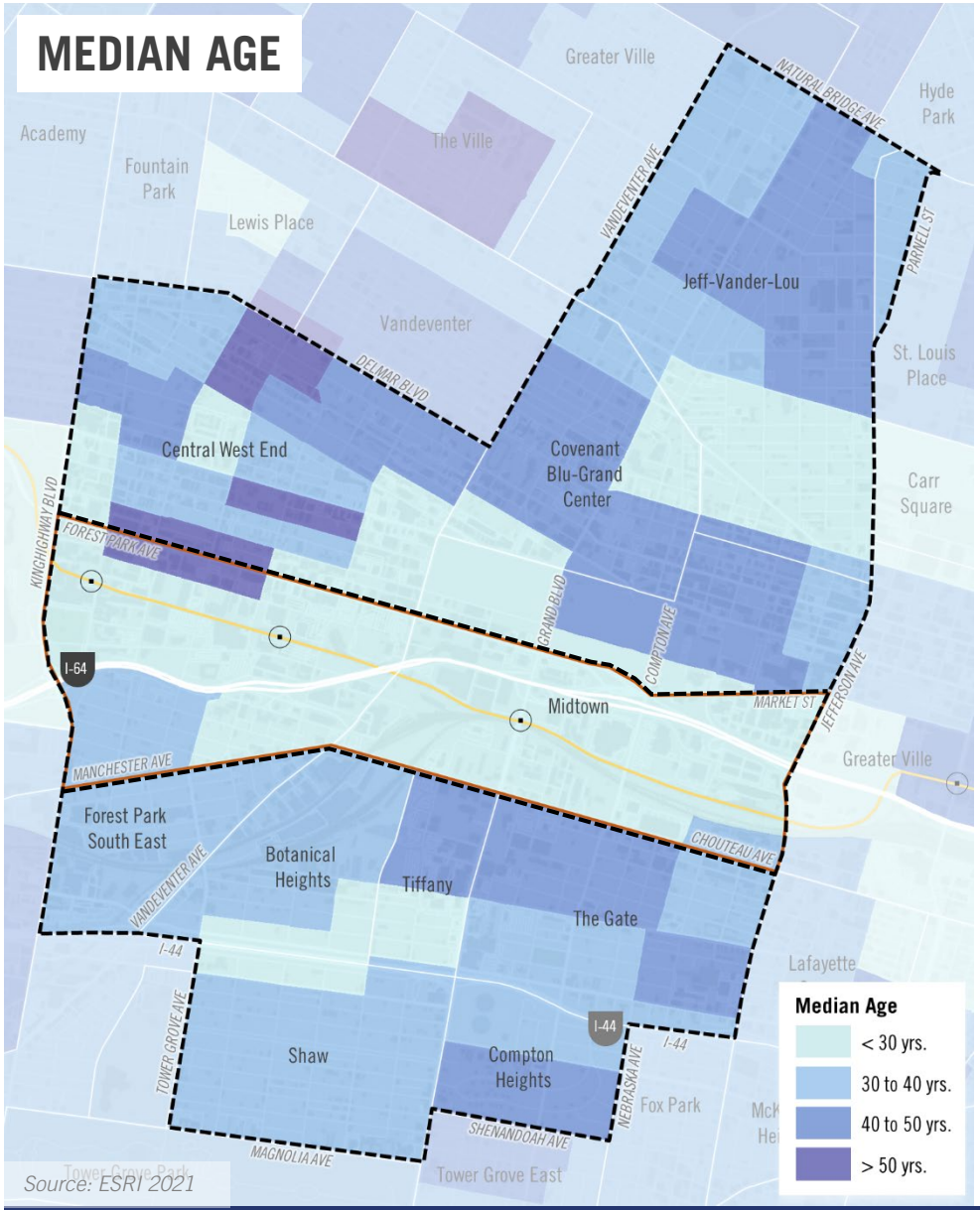




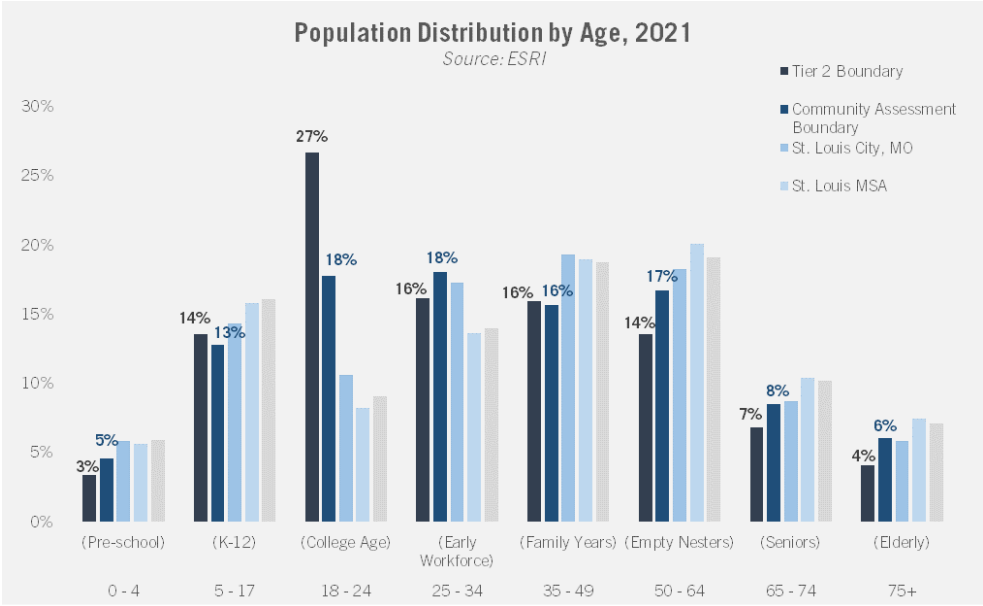
The western portions of the study area, including the neighborhoods to the north and south have higher concentrations of highly-educated individuals. The areas to the east have lower levels of educational attainment, but are consistent with the regional average.

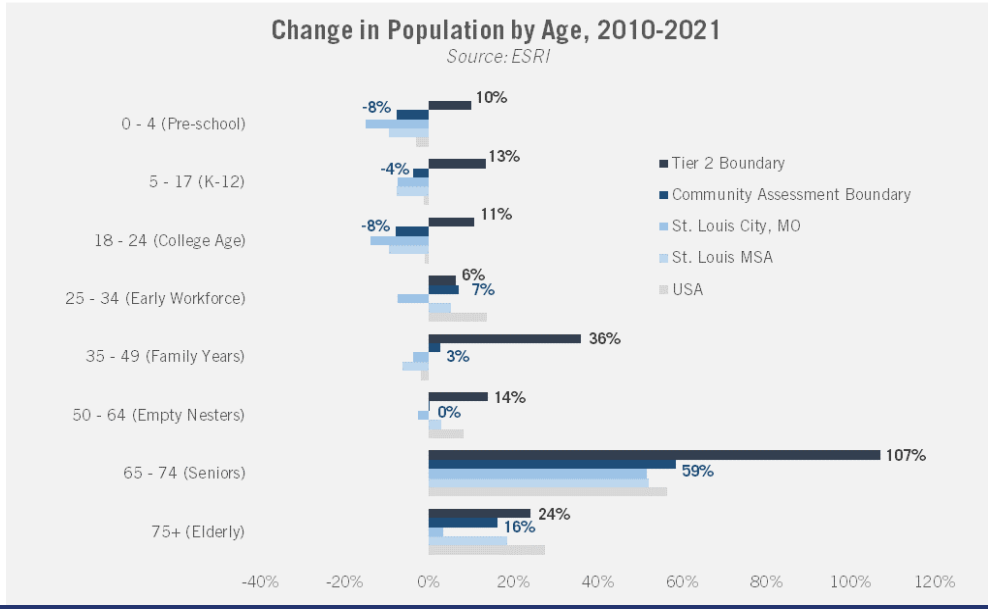
DEMOGRAPHICS: PEOPLE & HOUSEHOLDS

AGE OF RESIDENTS



Source: ESRI 2021



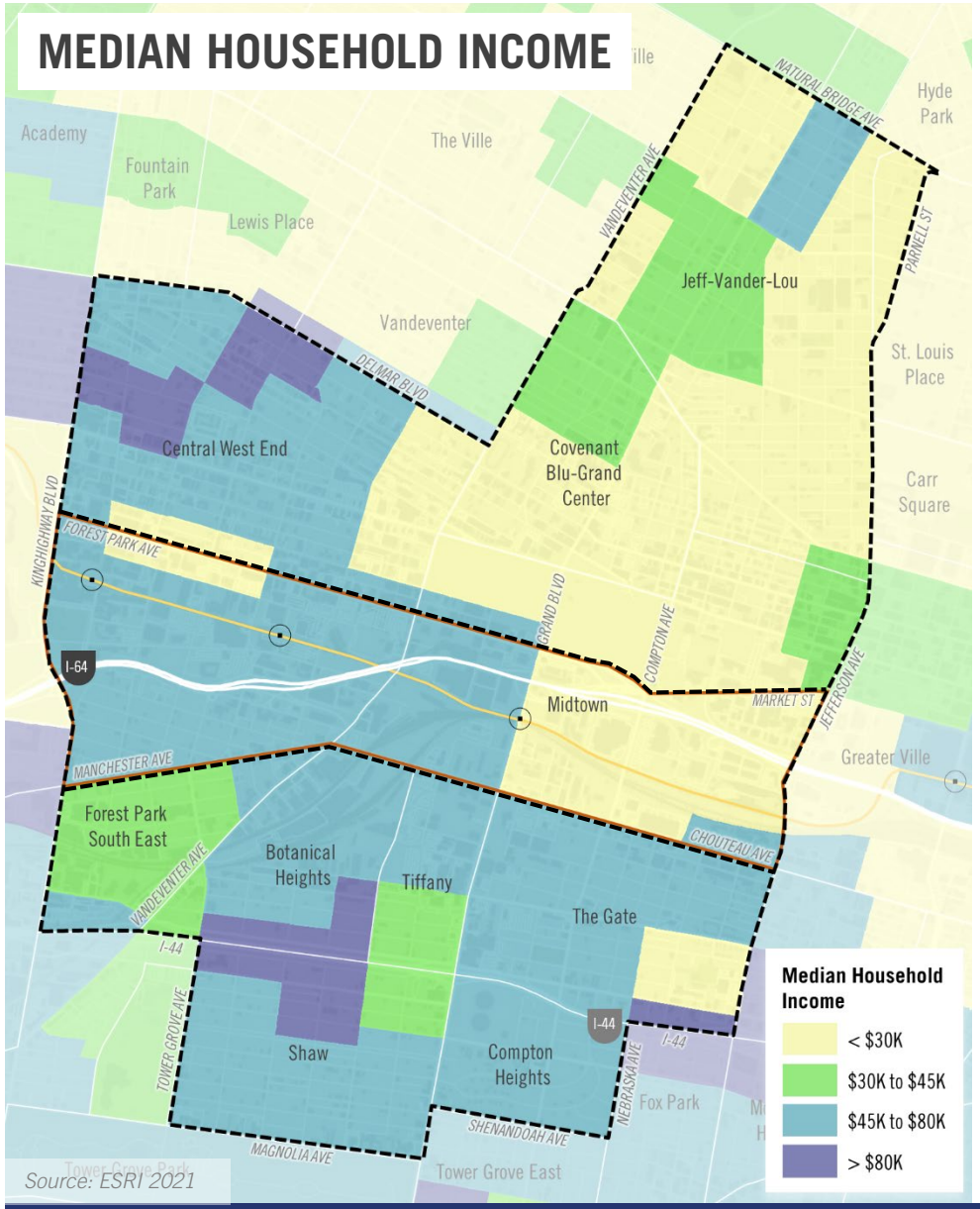


The Community Assessment Boundary has a relatively large college aged population (27 percent) given the presence of St. Louis University. Between 2010 and 2021, the Tier 2 Study Area had a large increase in its 65 and older population. The increase in younger households can be attributed to continued reinvestment in Forest Park South East and Central West End.

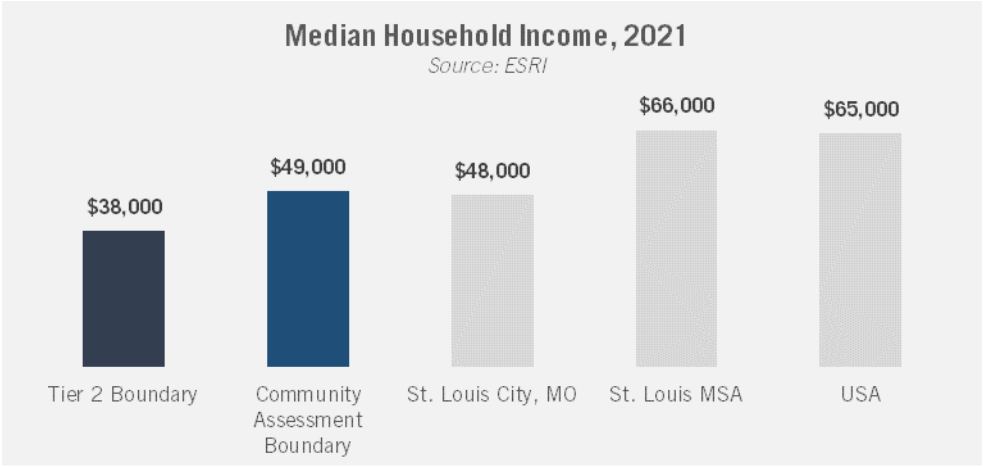
DEMOGRAPHICS: PEOPLE & HOUSEHOLDS

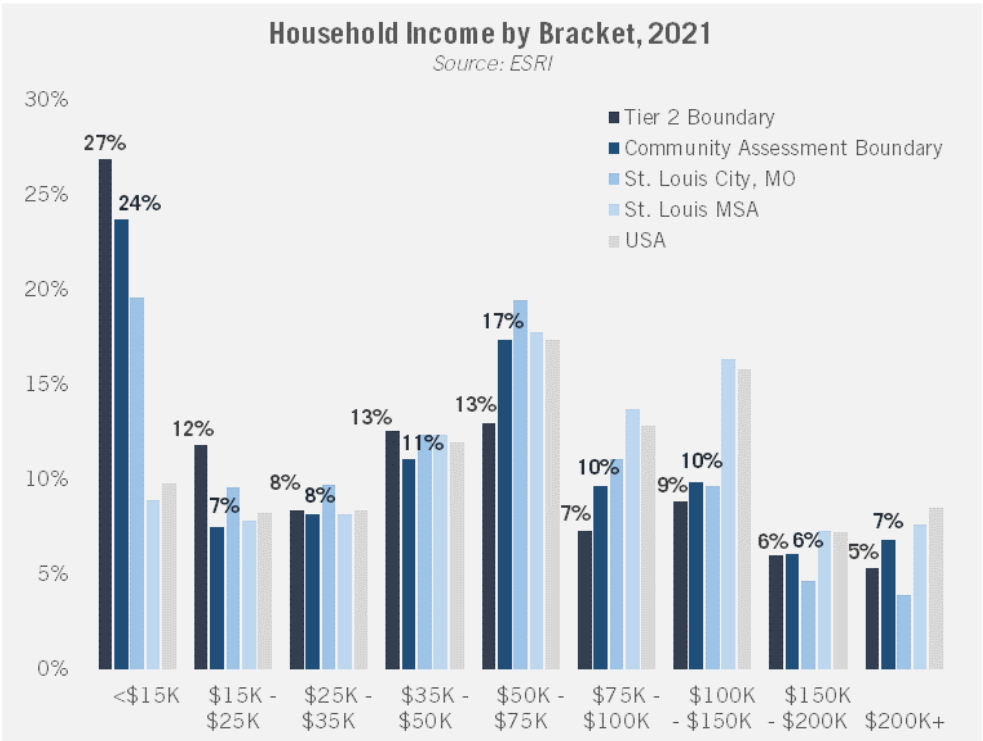
INCOME OF RESIDENTS

MEDIAN HOUSEHOLD INCOME



Source: ESRI 2021

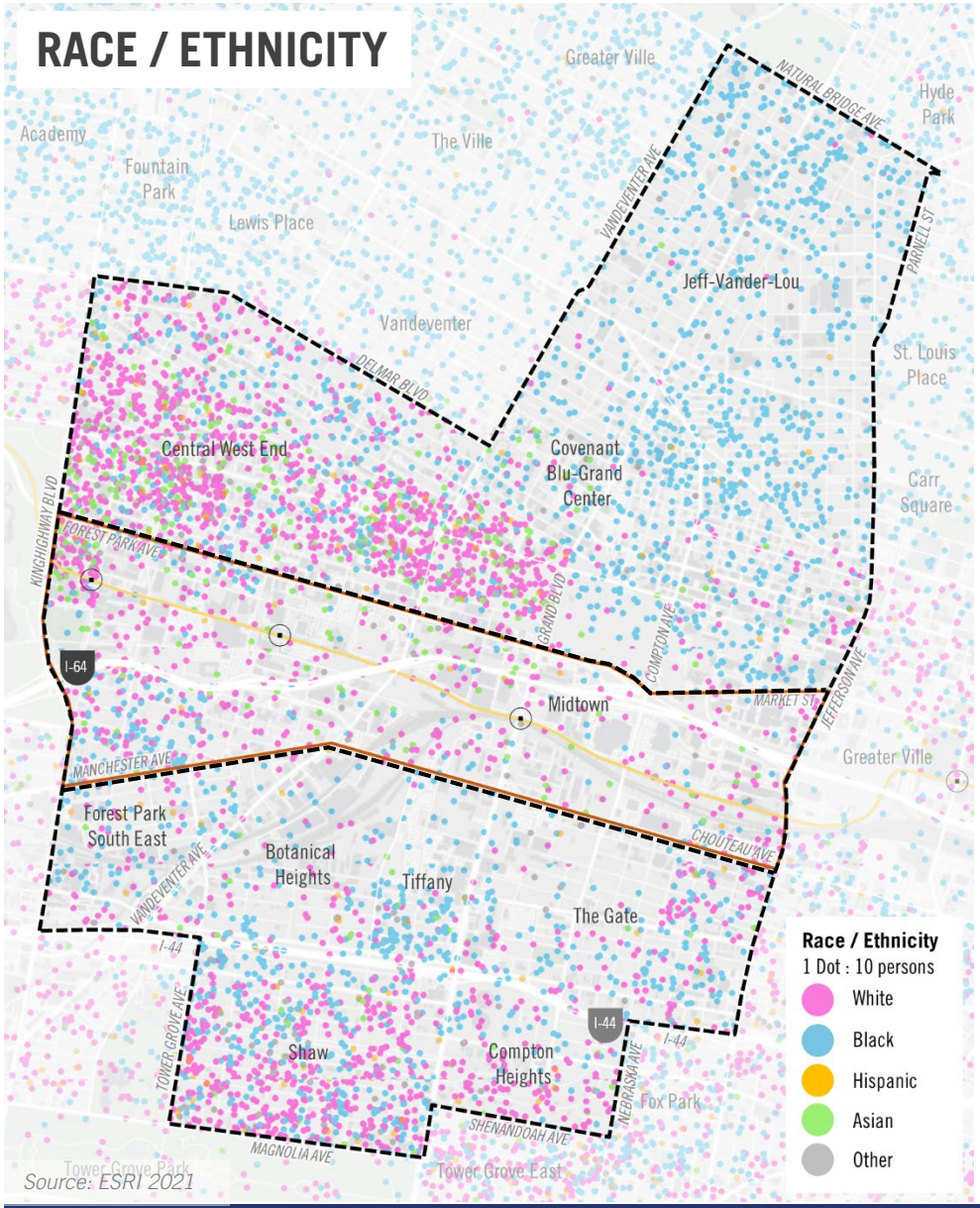


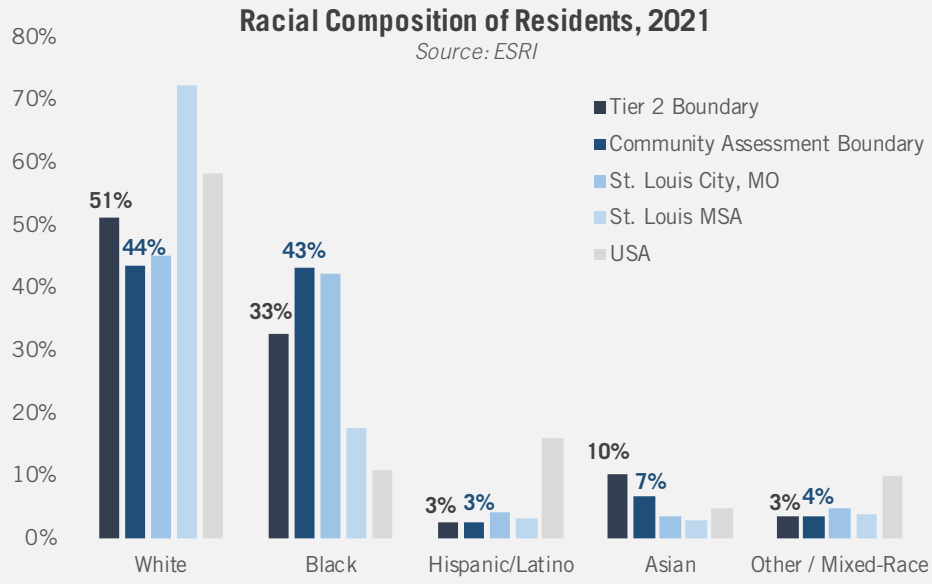


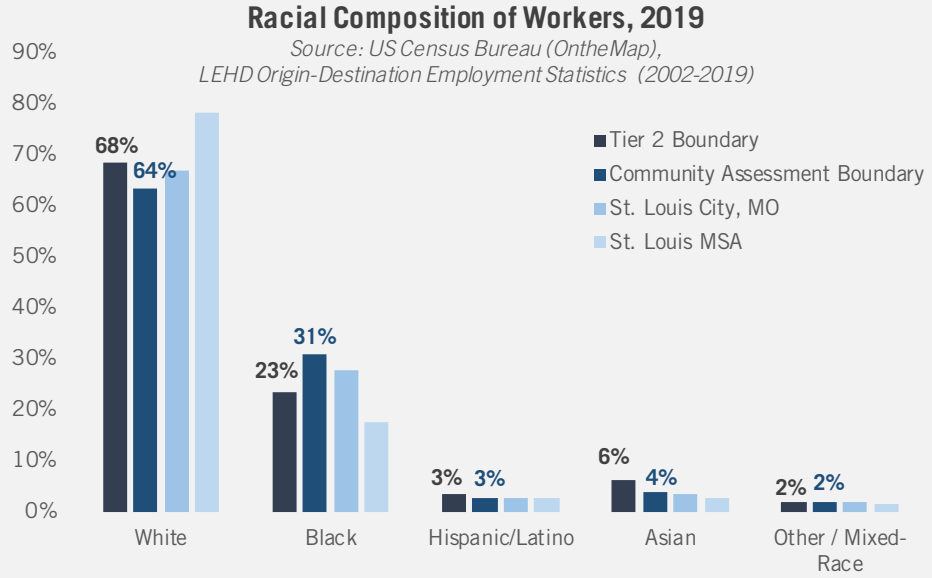
While households in the areas south of the Tier 2 Study Area and just north in Central West End generally have incomes comparable to, or above, the regional median, households living in the areas to the north and northeast generally have incomes below $30,000. This can be attributed to the large student population and weaker market conditions in Jeff-Vander-Lou.

DEMOGRAPHICS: PEOPLE & HOUSEHOLDS

RACE / ETHNICITY





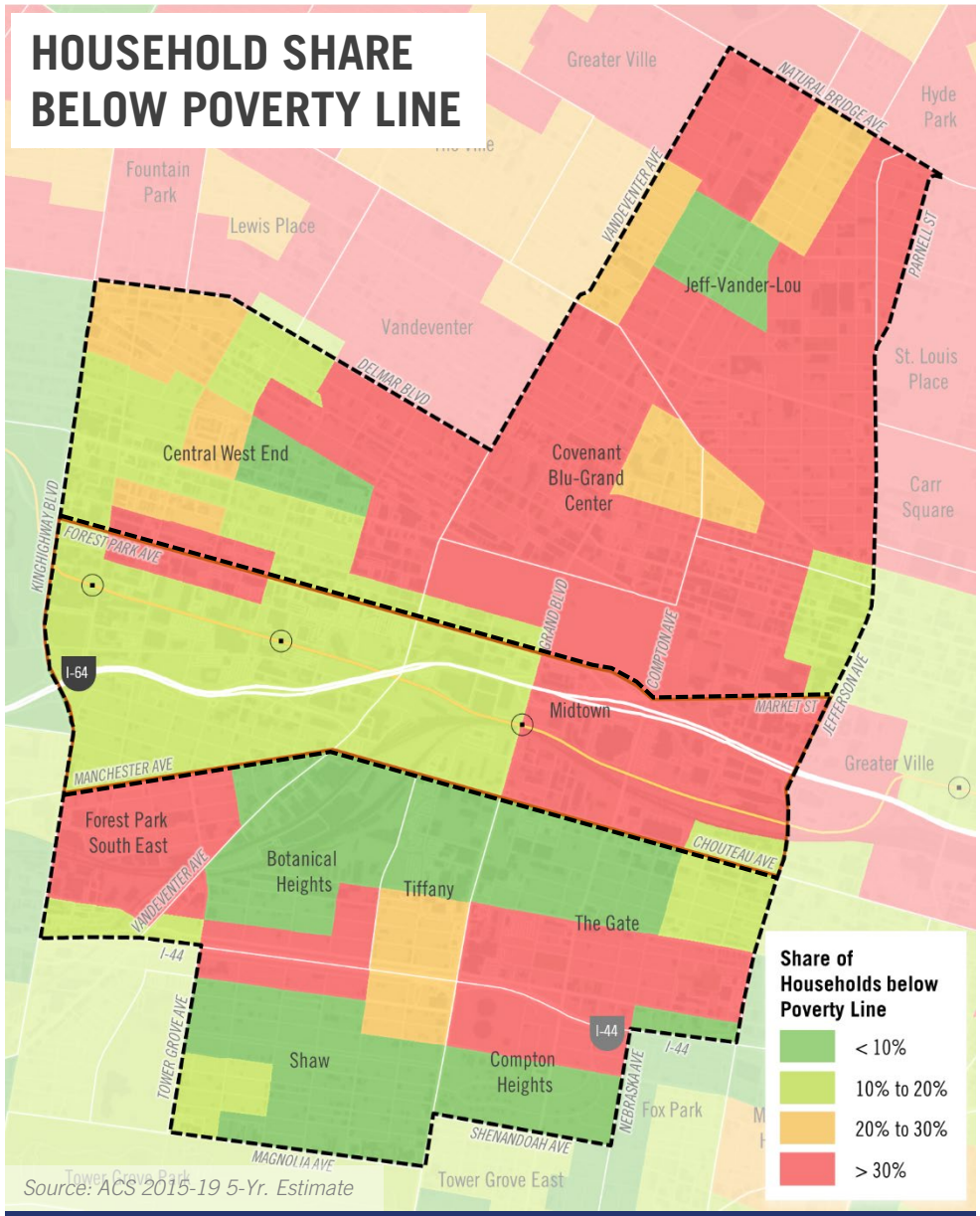


Overall racial composition in the Tier 2 Study Area and Community Assessment Boundary is similar to the city. But within the Community Assessment Boundary, there is greater diversity within neighborhoods. While Central West End and Shaw neighborhoods have relatively large White populations, there is a greater share of diversity. Areas to the north in and around Grand Center and Jeff-Vander-Lou are predominantly Black.

DEMOGRAPHICS: PEOPLE & HOUSEHOLDS

HOUSEHOLDS BELOW POVERTY LINE AND IN NEED OF ASSISTANCE

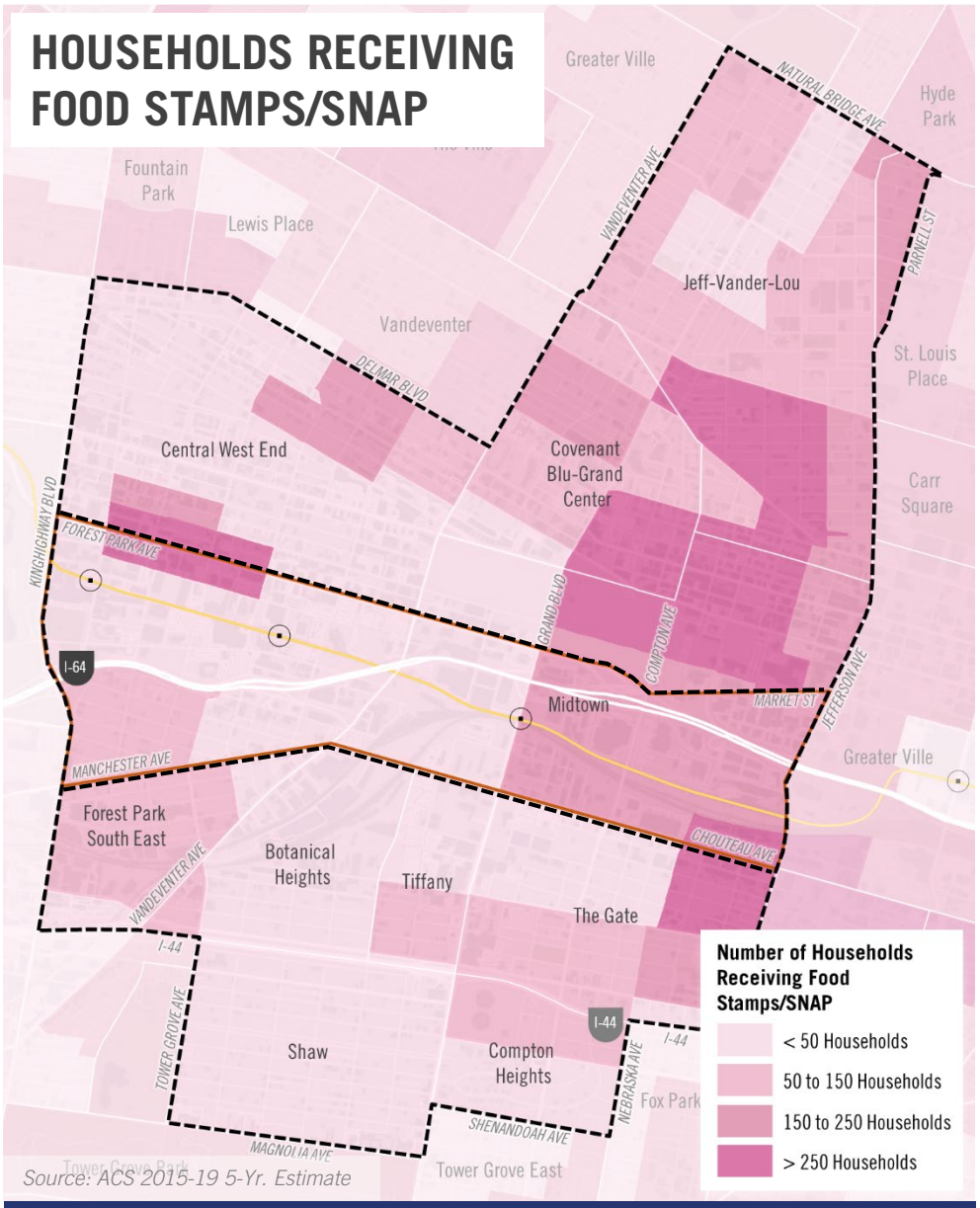
HOUSEHOLD SHARE BELOW POVERTY LINE



Source: ACS 2015-19 5-Yr. Estimate

Poverty levels are significantly higher in the areas to the north in and around Covenant Blu-Grand Center and Jeff-Vander-Lou, as well as, along I-44 and the southern parts of Forest Park South East.

HOUSEHOLDS RECEIVING FOOD STAMPS/SNAP



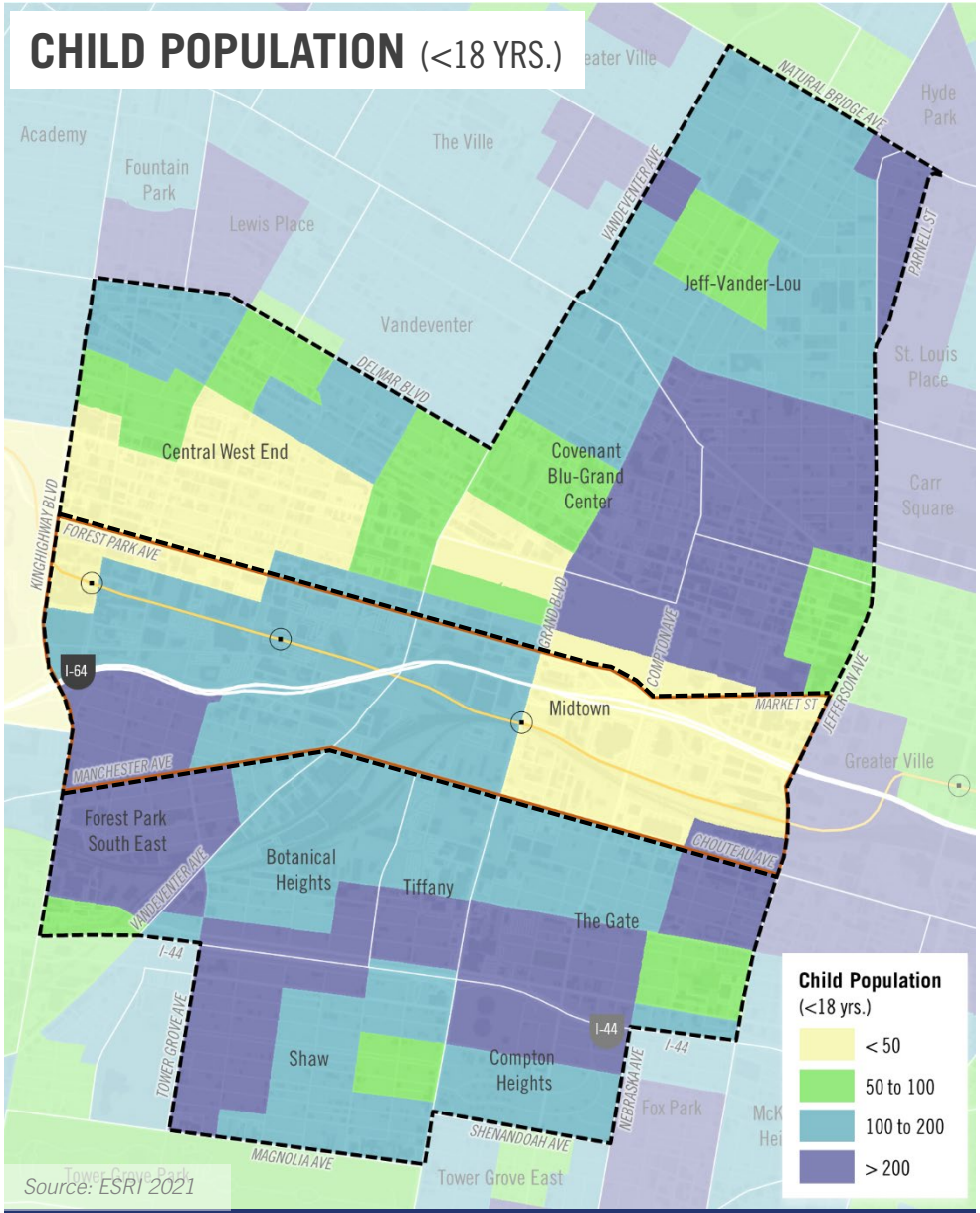
Source: ACS 2015-19 5-Yr. Estimate

Areas with higher numbers of households receiving food stamps are generally consistent with the distribution of households living below the poverty line.

DEMOGRAPHICS: PEOPLE & HOUSEHOLDS

POPULATION OF CHILDREN AND SENIORS

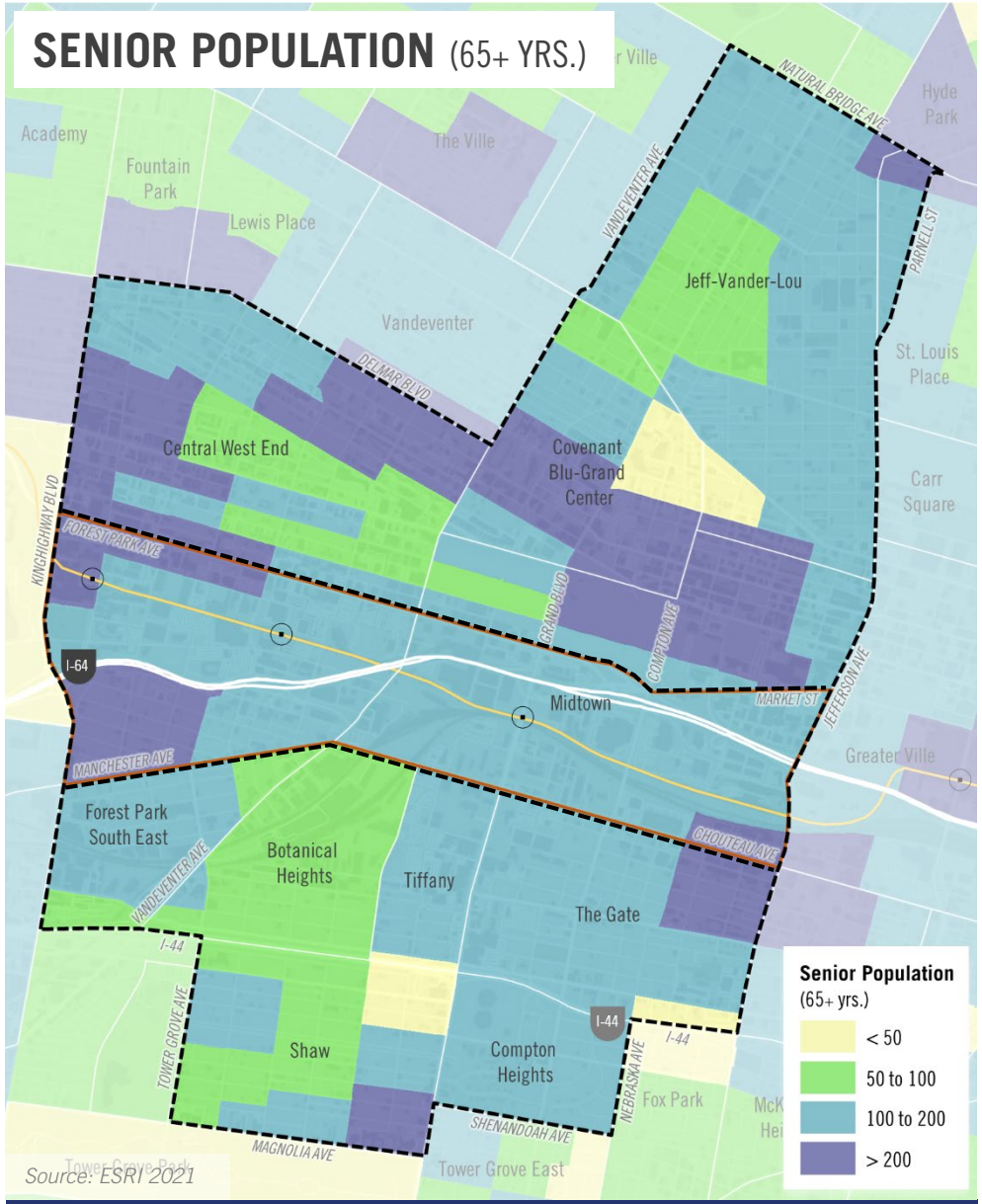
CHILD POPULATION (<18 YRS.)



Source: ESRI 2021

There are large concentrations of children in northeast and southern portions of the Community Assessment, whereas Central West End and Midtown have relatively few children.

SENIOR POPULATION (65+ YRS.)



Source: ESRI 2021

There is a larger senior population throughout the Community Assessment Area with higher concentrations in and around Central West End and Covenant Blue-Grand Center.

Community Assessment Framework

Introduction to Study Area

Market & Economy

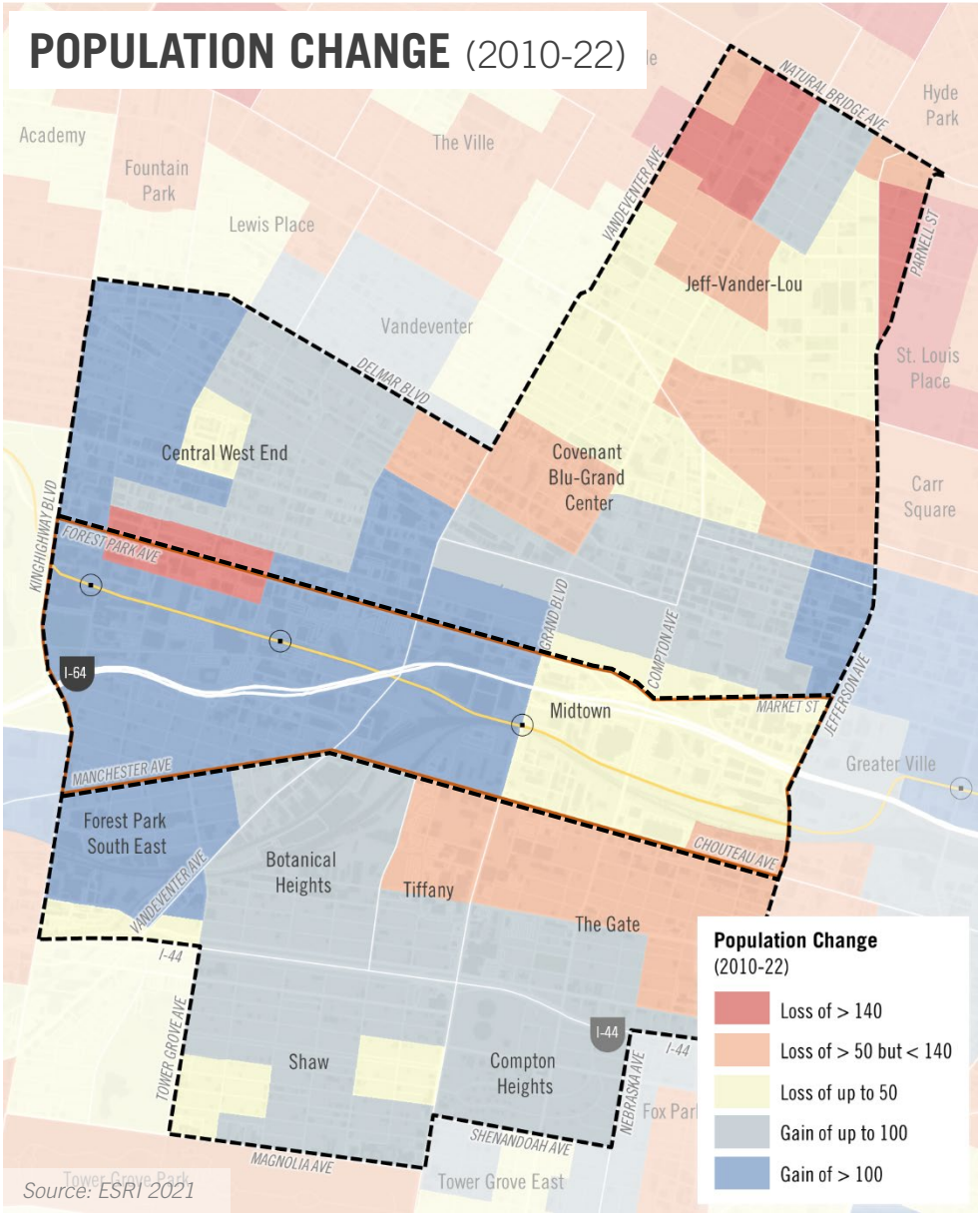
People & Neighborhoods

Housing Overview

HOUSING OVERVIEW

POPULATION CHANGE & HOUSING UNITS

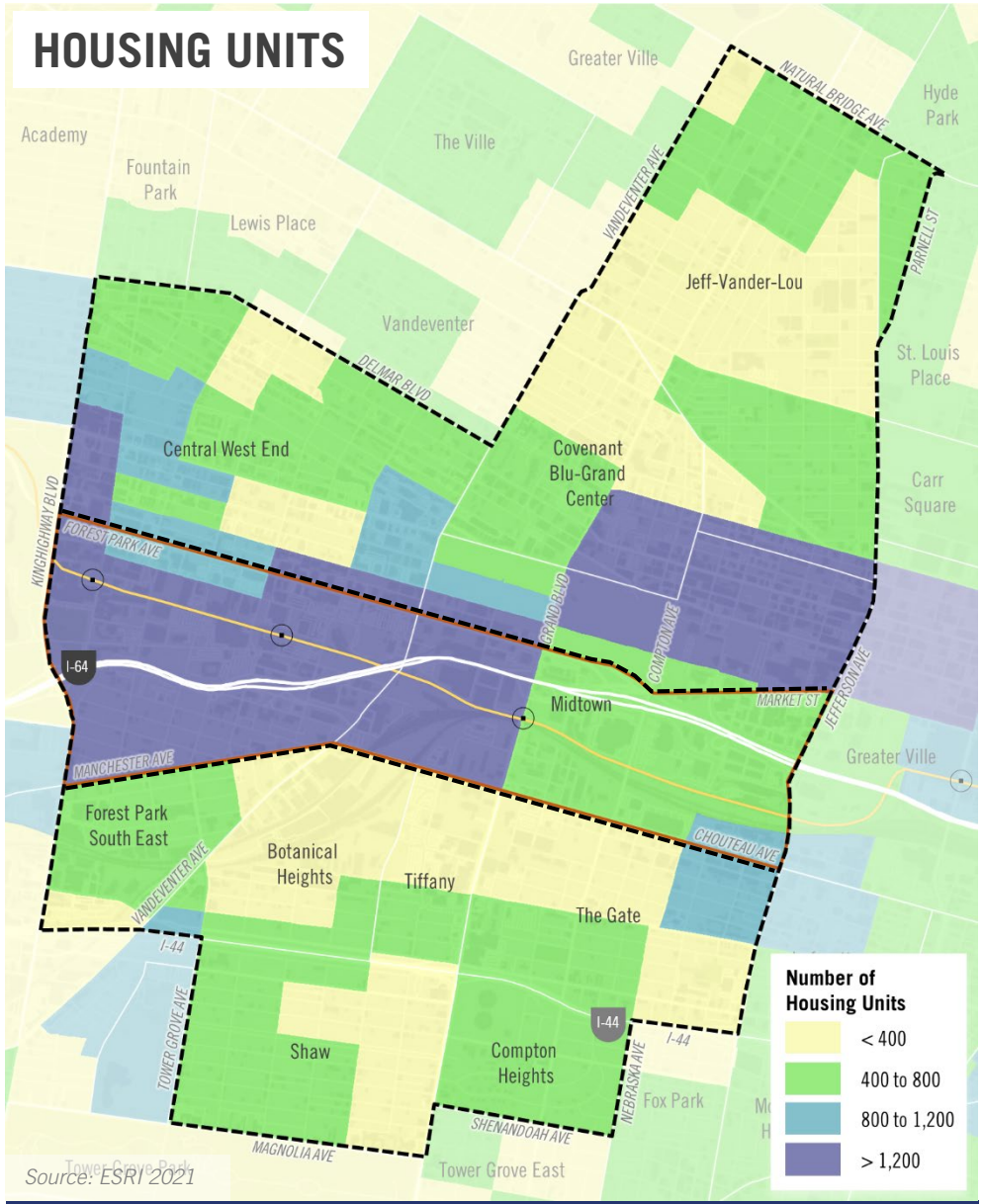
POPULATION CHANGE (2010-22)



Source: ESRI 2021

Since 2010, population increased in most of the northwest, west, and southwest portions of the Community Assessment Area, while the east and southeast portions had little to no increases given the lack of new residential development.

HOUSING UNITS



Source: ESRI 2021

Housing density is higher in the western portions of the Tier 2 Study Area and in Central West End.

HOUSING OVERVIEW

HOUSING COMPOSITION: STUDY AREAS

HOUSING COMPOSITION

Description	Tier 2 Boundary	Community Assessment Boundary	St. Louis City, MO	St. Louis MSA	Missouri	USA
Total Housing Units (2021)	2,512	24,326	175,958	1,273,801	2,873,544	142,853,336
Total Housing Units (2010)	1,986	22,474	175,951	1,225,205	2,712,729	131,704,730
Net Change	526	1,852	7	48,596	160,815	11,148,606
% Change	26.5%	8.2%	0.0%	4.0%	5.9%	8.5%
Occupied Housing Units (2021)	1,862	19,647	140,064	1,142,310	2,497,270	126,470,675
Occupancy Rate	74%	81%	80%	90%	87%	89%
Vacancy Rate	26%	19%	20%	10%	13%	11%
Total Vacant Units	482	3,779	28,572	117,918	327,003	14,503,870
Housing Units by Units in Structure (2015-2019)						
1, Detached	17%	22%	43%	70%	70%	62%
1, Attached	4%	5%	3%	4%	3%	6%
2 to 4 Unit	22%	21%	29%	9%	8%	8%
Smaller-scale Multi-family (5-19 units)	6%	14%	9%	8%	7%	9%
Larger-scale Multi-family (20+ units)	50%	38%	16%	5%	5%	9%
Households by Household Type (2015 - 2019)						
Family Households	30%	35%	46%	64%	64%	65%
Non-Family Households	70%	65%	54%	36%	36%	35%
Median Housing Value (2021)	$242,000	$307,000	$166,000	$208,000	$184,000	$264,000
Percent Renter Occupied Units						
2021	81%	69%	54%	29%	32%	35%
2010	76%	70%	55%	29%	31%	35%
Change in renter-occupied (2010-2021)	34.1%	7.4%	-1.6%	4.0%	7.0%	9.5%
Percent Owner Occupied Units						
2021	19%	31%	46%	71%	68%	65%
2010	24%	30%	45%	71%	69%	65%
Change in owner-occupied (2010-2021)	2.2%	10.1%	2.0%	4.0%	5.5%	7.9%

The Tier 2 Study area has just over 2,500 housing units, adding more than 500 net new units since 2010. The area has a much higher proportion of multi-family units (56 percent) compared to the city (25 percent) and region (13 percent) and a higher share of renter-occupied units (81 percent).

HOUSING OVERVIEW

HOUSING COMPOSITION: NEIGHBORHOODS

HOUSING COMPOSITION

Description	Central West End	Forest Park SE	Midtown	Covenant Blu-Grand Center	Jeff-Vander-Lou	St. Louis City, MO
Total Housing Units (2021)	10,380	2,532	1,823	1,644	2,951	175,958
Total Housing Units (2010)	9,162	1,871	1,514	1,663	3,084	175,951
Net Change	1,218	661	309	-19	-133	7
% Change	13.3%	35.3%	20.4%	-1.1%	-4.3%	0.0%
Occupied Housing Units (2021)	8,594	1,831	1,382	1,452	2,139	140,064
Occupancy Rate	83%	72%	76%	88%	72%	80%
Vacancy Rate	17%	28%	24%	12%	28%	20%
Total Vacant Units	1,479	507	334	170	589	28,572
Housing Units by Units in Structure (2015-2019)						
1, Detached	11%	31%	4%	10%	29%	43%
1, Attached	4%	6%	2%	9%	3%	3%
2 to 4 Unit	8%	32%	12%	17%	39%	29%
Smaller-scale Multi-family (5-19 units)	14%	7%	12%	16%	8%	9%
Larger-scale Multi-family (20+ units)	63%	23%	69%	48%	21%	16%
Households by Household Type (2015 - 2019)						
Family Households	22%	43%	19%	32%	53%	46%
Non-Family Households	78%	57%	81%	68%	47%	54%
Median Housing Value (2021)	$378,000	$237,000	$277,000	$113,000	$102,000	$166,000
Percent Renter Occupied Units						
2021	74%	73%	94%	93%	70%	54%
2010	74%	65%	93%	93%	71%	55%
Change in renter-occupied (2010-2021)	13.6%	53.2%	21.5%	-1.5%	-6.3%	-1.6%
Percent Owner Occupied Units						
2021	26%	27%	6%	7%	30%	46%
2010	26%	35%	7%	7%	29%	45%
Change in owner-occupied (2010-2021)	12.3%	2.5%	5.9%	4.1%	0.6%	2.0%

Median housing values in Central West End ($378,000) are significantly higher than the other study areas and city median ($166,000). Development activity has been strong in Central West End and Forest Park Southeast adding approximately 1,200 and 660 new units, respectively. The city's housing stock, on the other hand, generally did not experience a significant net increase given increasing vacancy in other parts of the city.

HOUSING OVERVIEW

HOUSING COMPOSITION: NEIGHBORHOODS

HOUSING COMPOSITION

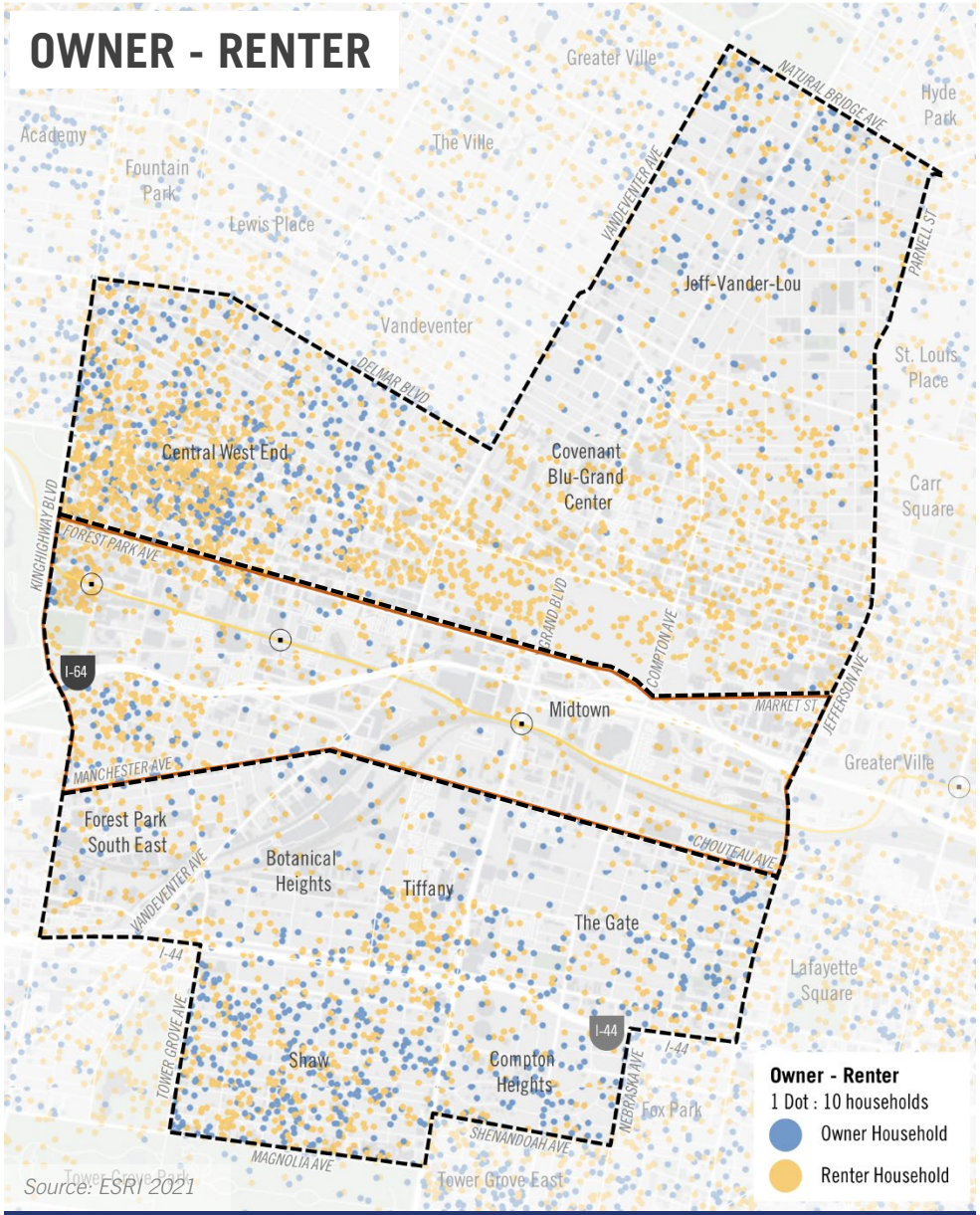
Description	Botanical Heights	Tiffany	The Gate	Shaw	Compton Heights	St. Louis City, MO
Total Housing Units (2021)	590	565	1,706	3,841	808	175,958
Total Housing Units (2010)	530	531	1,744	3,633	728	175,951
Net Change	60	34	-38	208	80	7
% Change	11.3%	6.4%	-2.2%	5.7%	11.0%	0.0%
Occupied Housing Units (2021)	422	472	1,479	3,062	676	140,064
Occupancy Rate	72%	84%	87%	80%	84%	80%
Vacancy Rate	28%	16%	13%	20%	16%	20%
Total Vacant Units	120	78	197	621	110	28,572
Housing Units by Units in Structure (2015-2019)						
1, Detached	34%	19%	39%	35%	54%	43%
1, Attached	5%	3%	12%	3%	1%	3%
2 to 4 Unit	53%	42%	12%	40%	7%	29%
Smaller-scale Multi-family (5-19 units)	6%	35%	17%	14%	15%	9%
Larger-scale Multi-family (20+ units)	2%	0%	19%	8%	22%	16%
Households by Household Type (2015 - 2019)						
Family Households	55%	55%	45%	48%	48%	46%
Non-Family Households	45%	45%	55%	52%	52%	54%
Median Housing Value (2021)	$291,000	$190,000	$260,000	$313,000	$382,000	$166,000
Percent Renter Occupied Units						
2021	60%	72%	49%	52%	43%	54%
2010	62%	74%	52%	55%	46%	55%
Change in renter-occupied (2010-2021)	7.4%	3.7%	-6.7%	0.6%	3.6%	-1.6%
Percent Owner Occupied Units						
2021	40%	28%	51%	48%	57%	46%
2010	38%	26%	48%	45%	54%	45%
Change in owner-occupied (2010-2021)	17.9%	14.1%	2.6%	11.9%	17.3%	2.0%

Housing values in the neighborhoods to the south are higher than the citywide median and Shaw and Compton Heights have values comparable to Central West End. There has been limited new development in these neighborhoods given the lack of larger-scale development-ready parcels.

HOUSING OVERVIEW

OWNER-RENTER & VACANCY

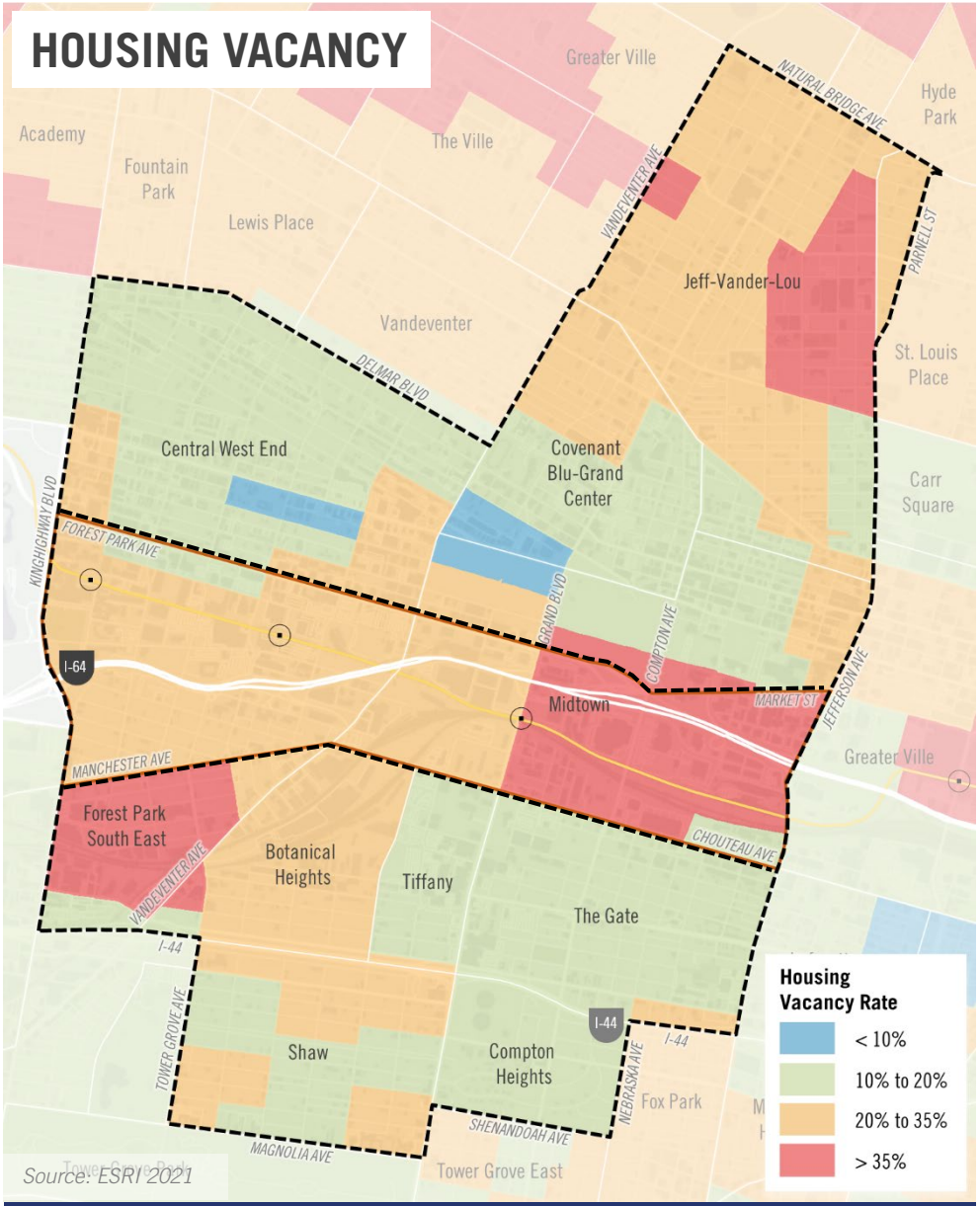
OWNER - RENTER



Source: ESRI 2021

There is a high concentration of renter-occupied housing north of the Tier 2 Study Area, whereas the area to the south has a higher concentration of owner-occupied housing.

HOUSING VACANCY



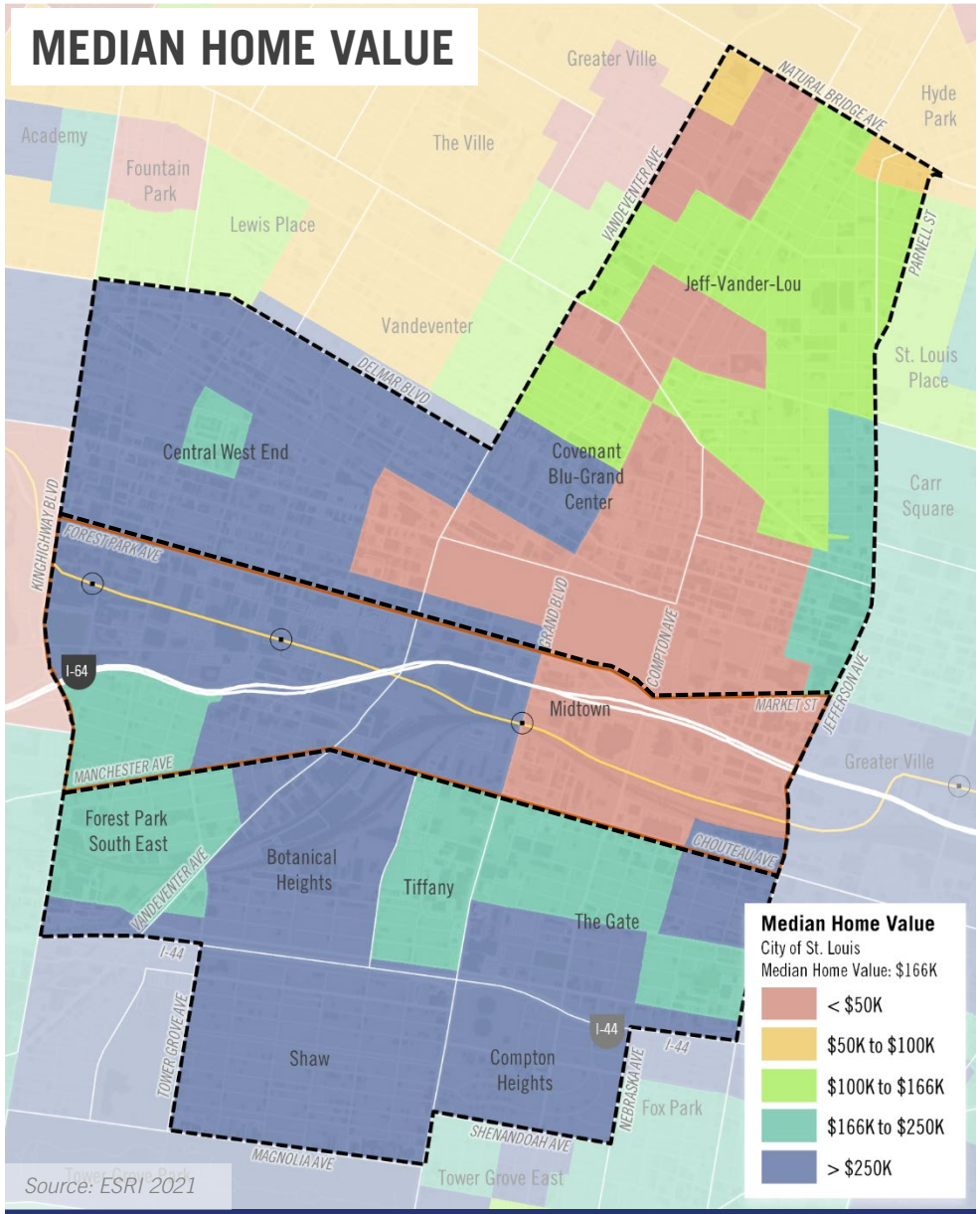
Source: ESRI 2021

The high vacancy rate in Forest Park South East can be attributed to decades of disinvestment, with the housing stock needing substantial rehabilitation to be marketable. Midtown's high vacancy rate is skewed by its primarily industrial and institutional land uses and sizable renter population.

HOUSING OVERVIEW

HOME VALUE & RENT

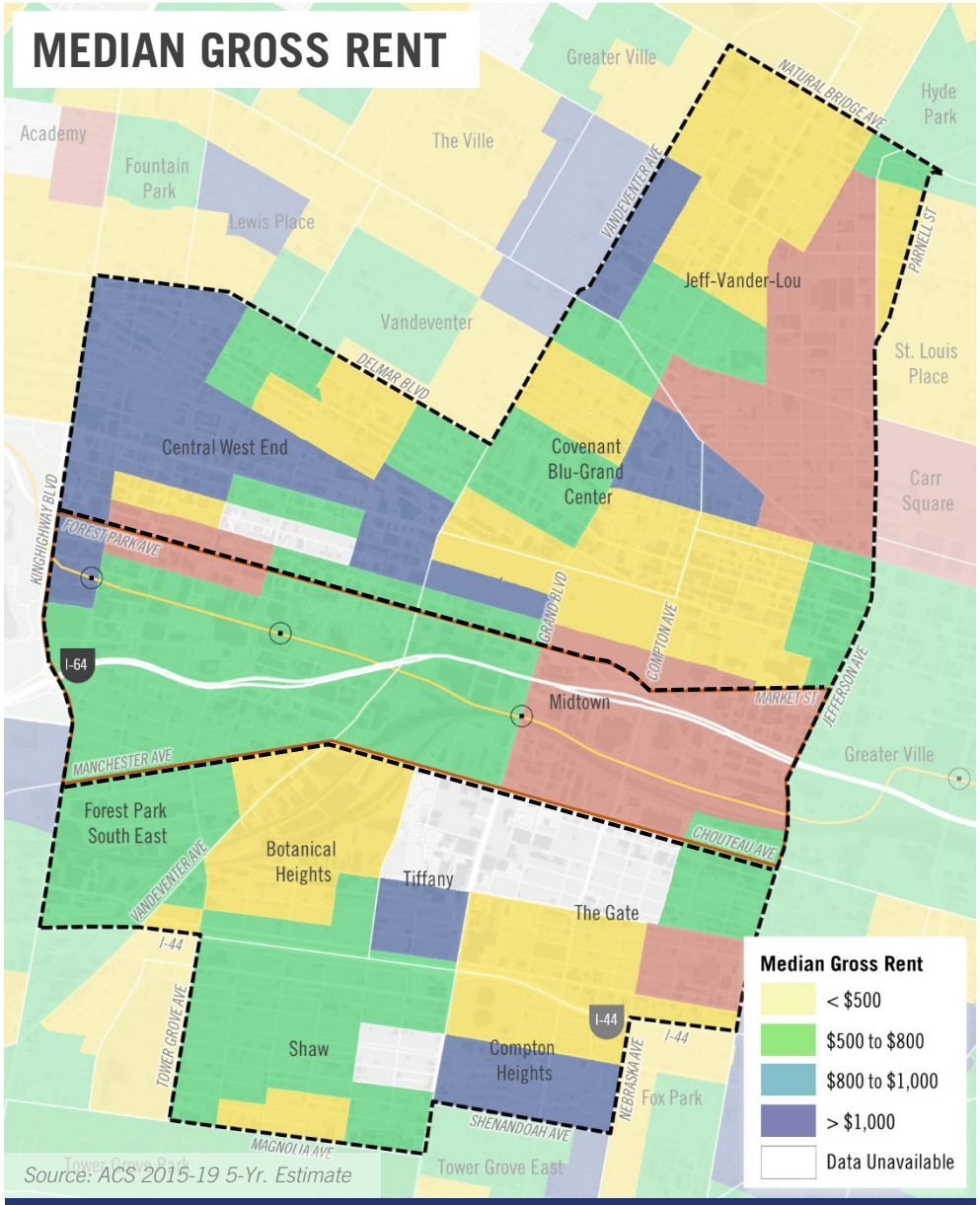
MEDIAN HOME VALUE



Source: ESRI 2021

Median home values are significantly higher in the northwest, west, and southwest portions of the Community Assessment Area.

MEDIAN GROSS RENT

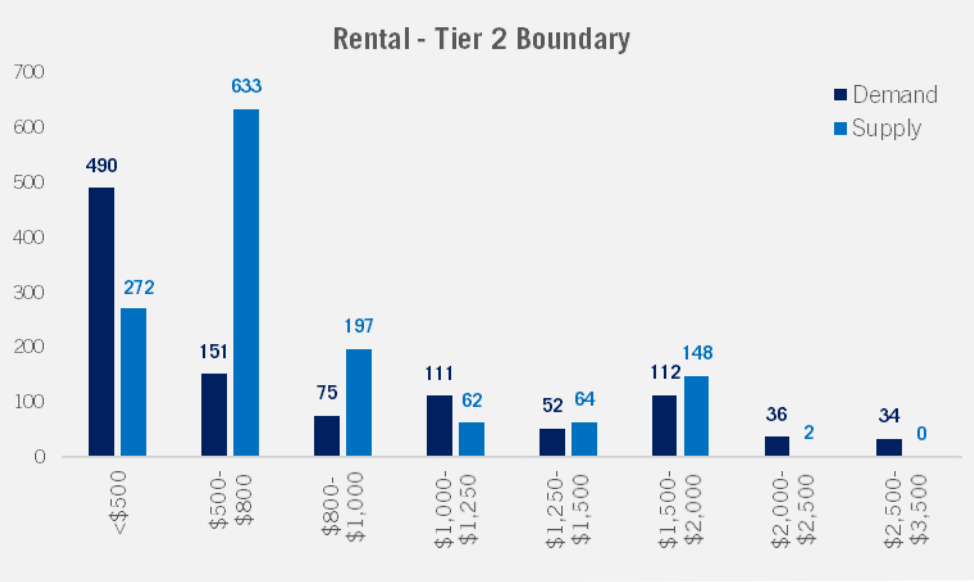


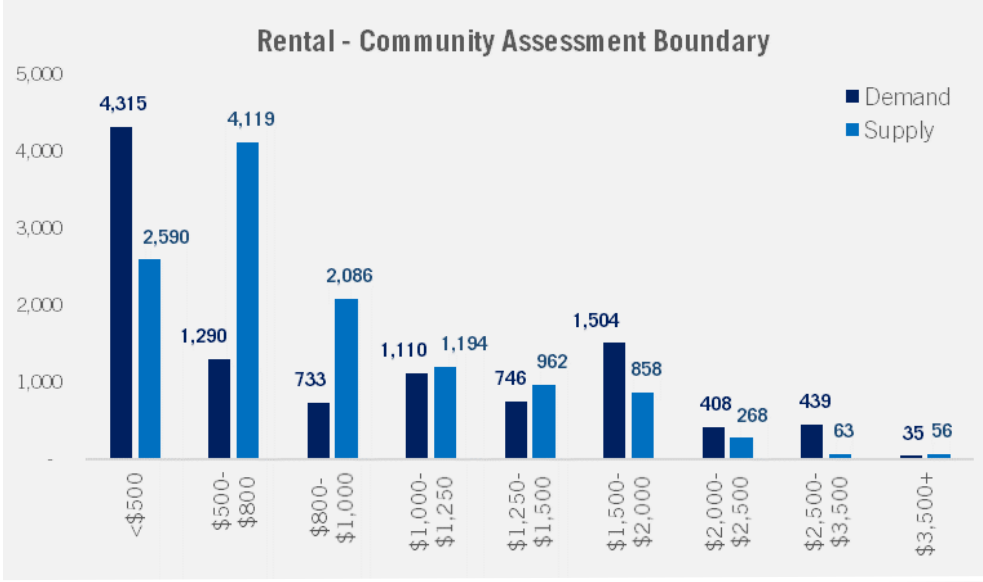
Source: ACS 2015-19 5-Yr. Estimate

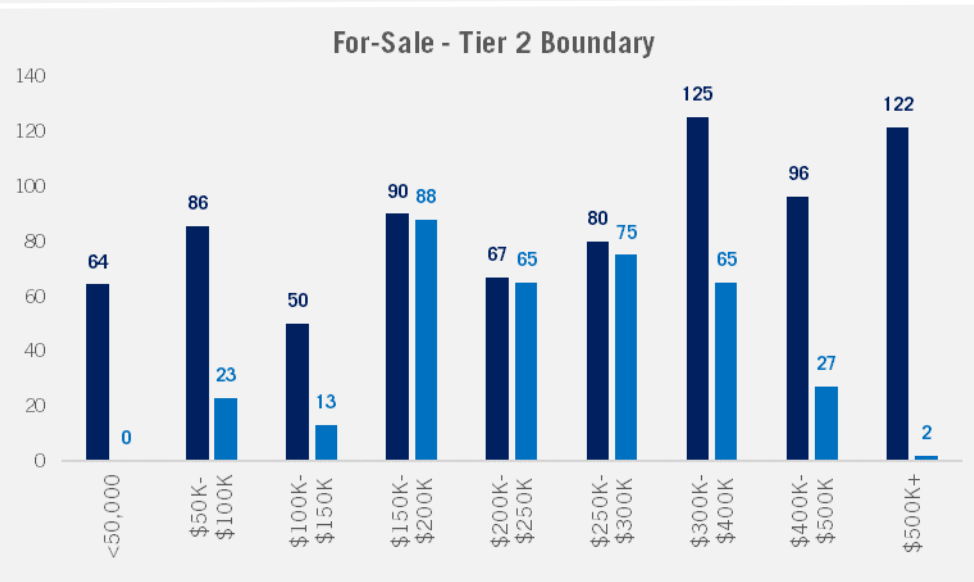
Median gross rents are somewhat consistent with home value with Central West End and Compton Heights achieving the highest rents.

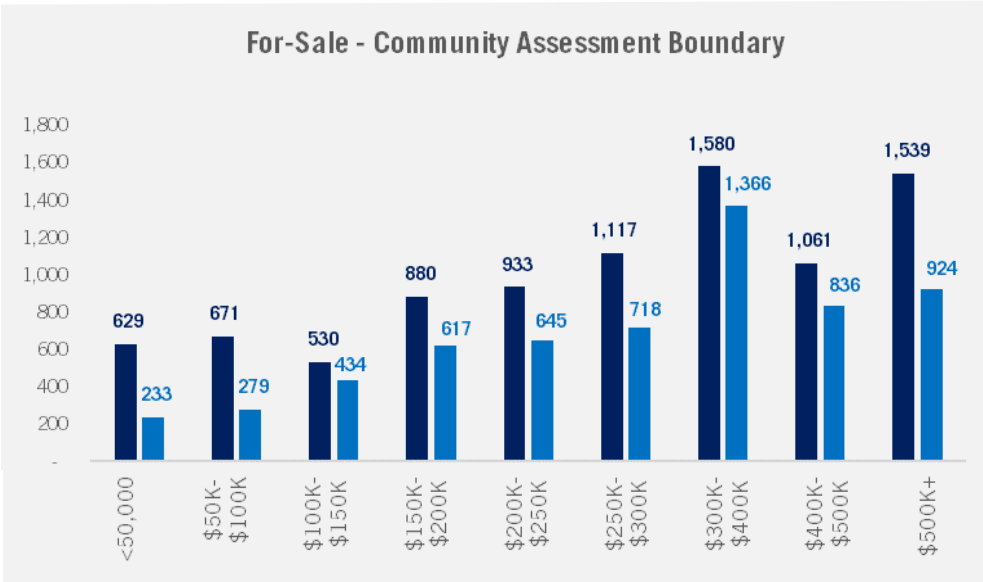
HOUSING OVERVIEW

HOUSING AFFORDABILITY AND VALUE









Source: Development Strategies 2022

Source: Development Strategies 2022

Supply is based on distribution of housing by value or rent according to ESRI.
Demand is based on what a household could afford in terms of rent or purchase price based on household income.

Community Assessment Framework

Introduction to Study Area

Market & Economy

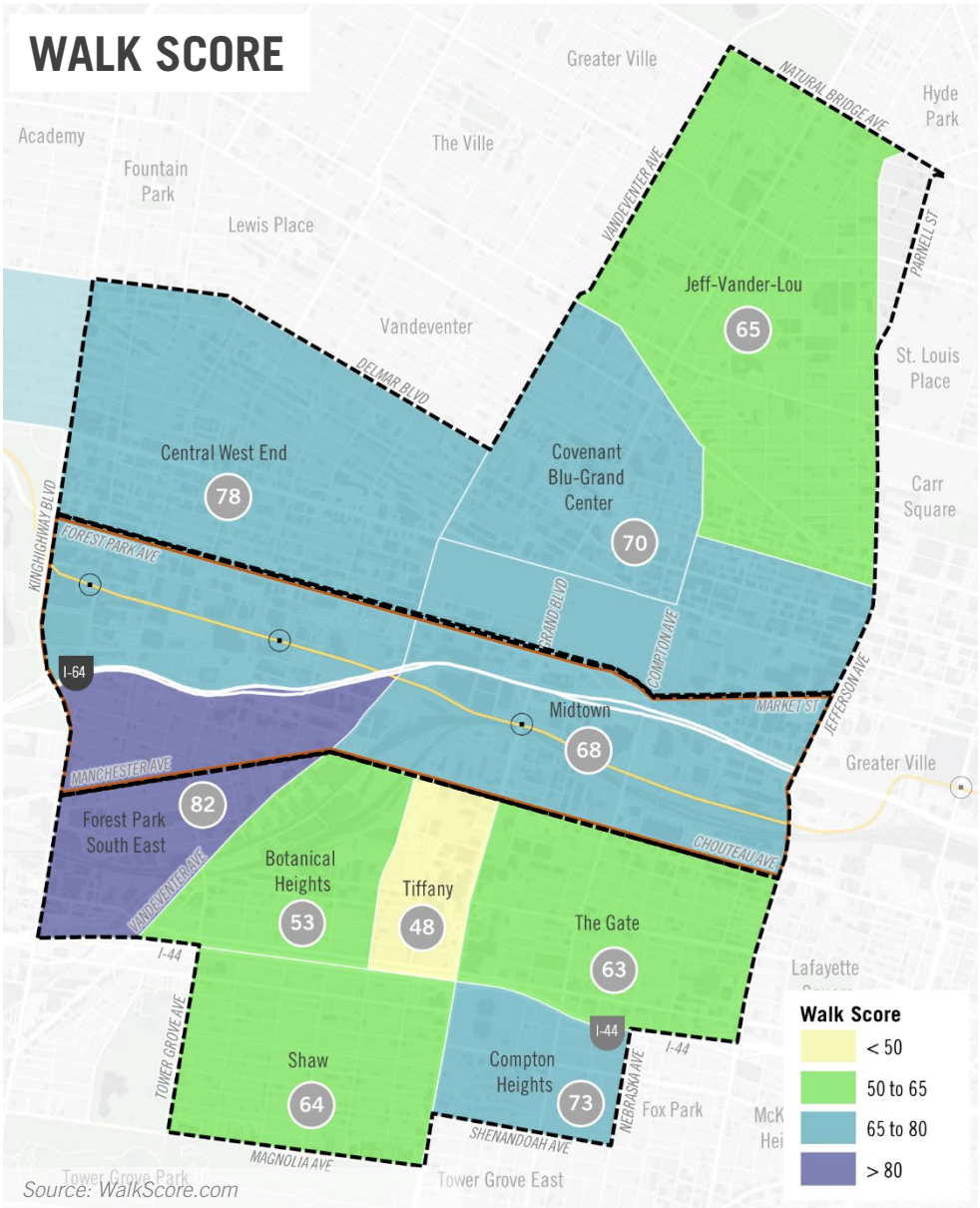
People & Neighborhoods

Transportation Equity

TRANSPORTATION EQUITY

NEIGHBORHOOD WALK SCORE AND BIKE SCORE

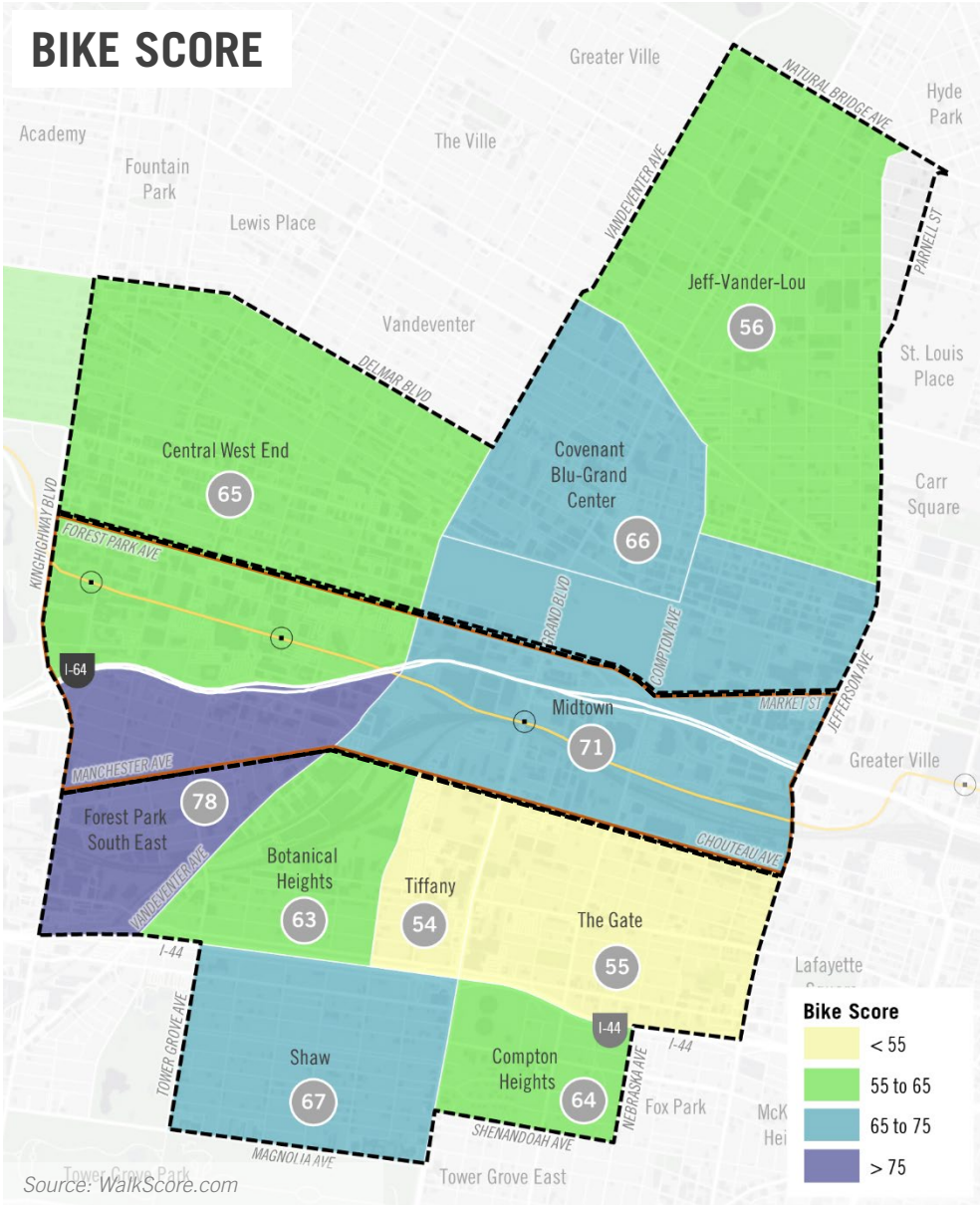
WALK SCORE



Source: WalkScore.com

The walkability of neighborhoods — which considers availability of infrastructure, connectivity, accessibility, and quality of the built environment — varies across the study area.

BIKE SCORE



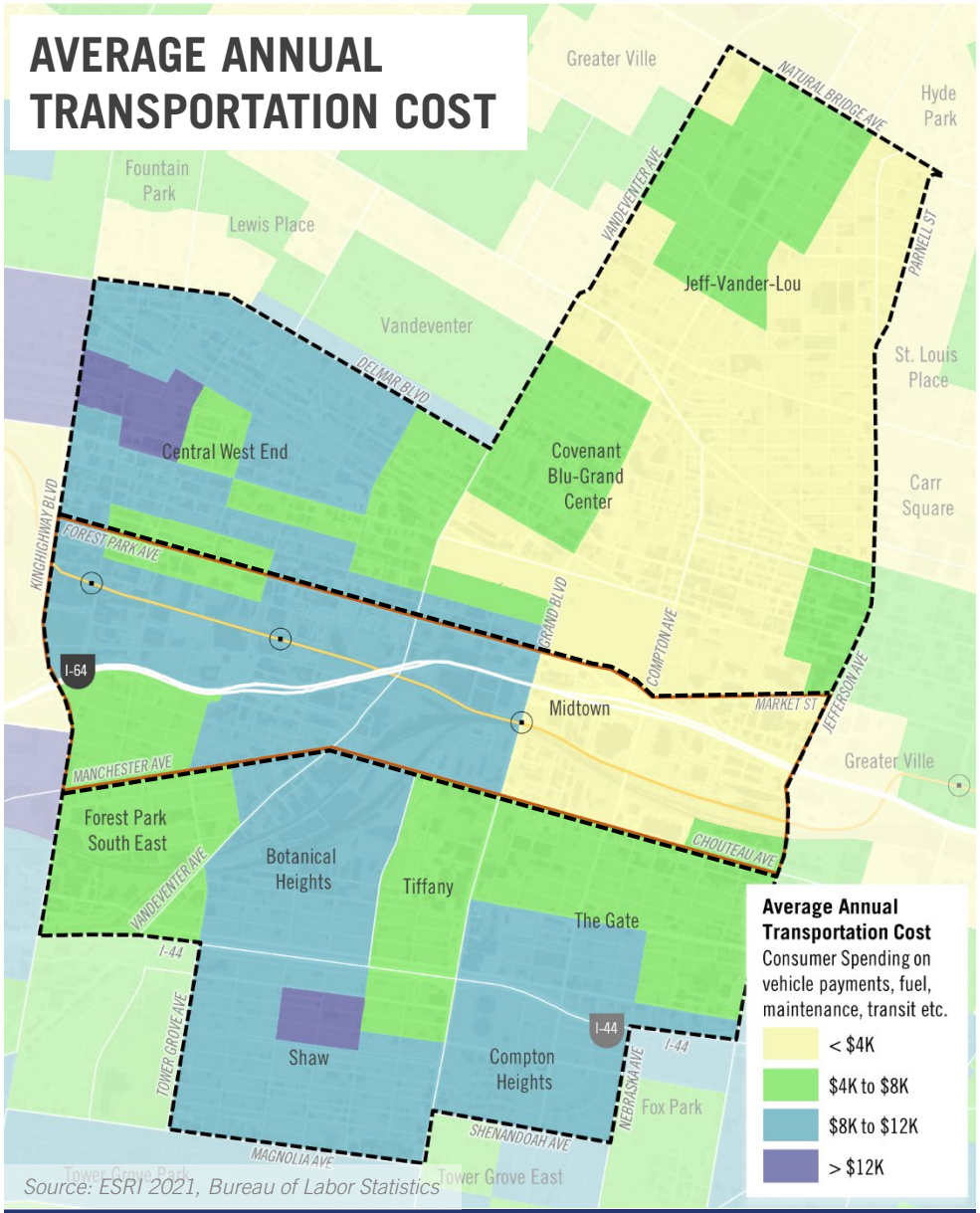
Source: WalkScore.com

With several projects proposed in the study area, scores measuring active transportation are poised to improve in the coming years.

TRANSPORTATION EQUITY

ANNUAL TRANSPORTATION COST & HOUSEHOLDS WITH NO PERSONAL VEHICLES

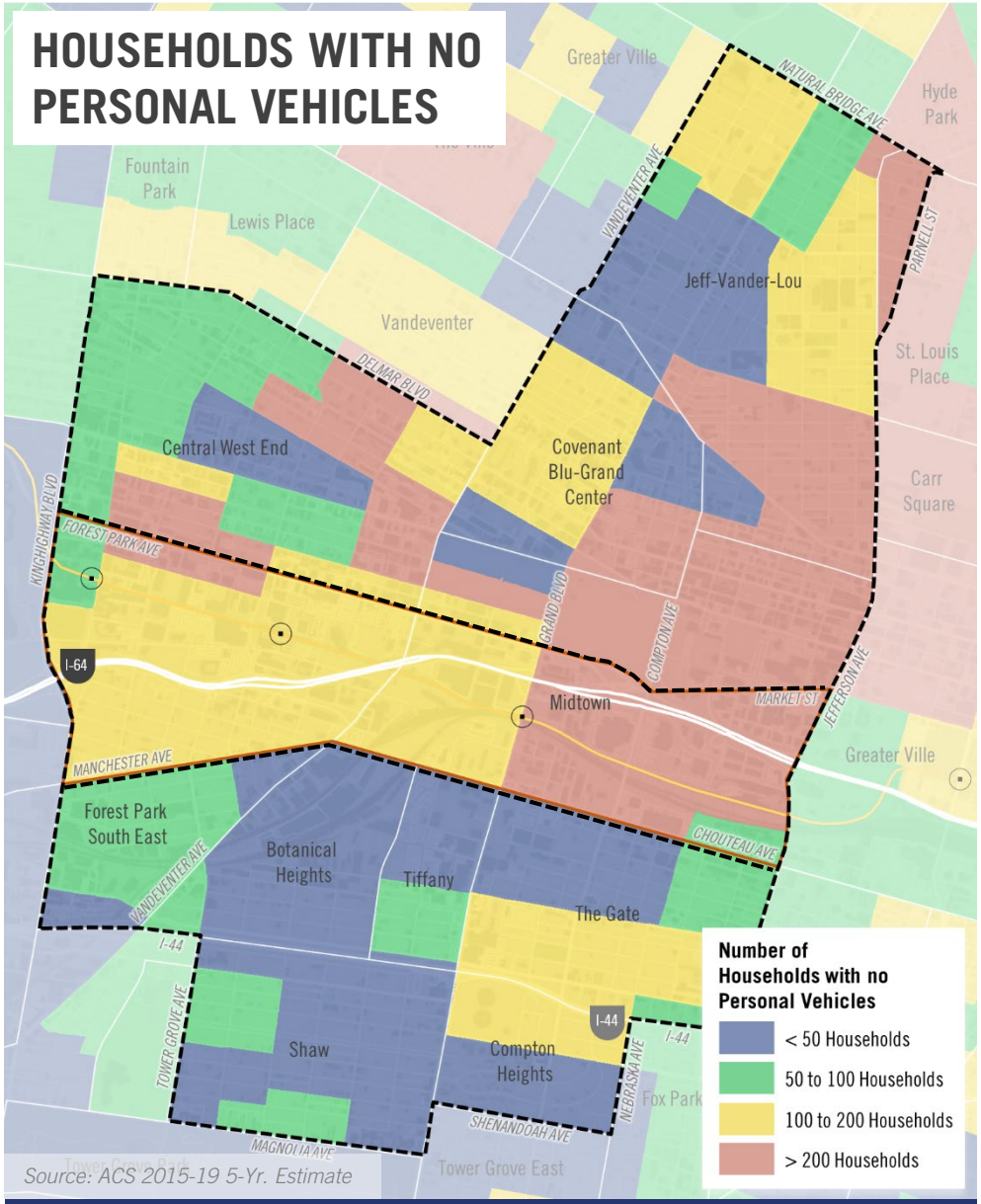
AVERAGE ANNUAL TRANSPORTATION COST



Source: ESRI 2021, Bureau of Labor Statistics

Distribution of housing transportation costs are generally consistent with the distribution of median household income (e.g. higher-income households spend more on transportation).

HOUSEHOLDS WITH NO PERSONAL VEHICLES

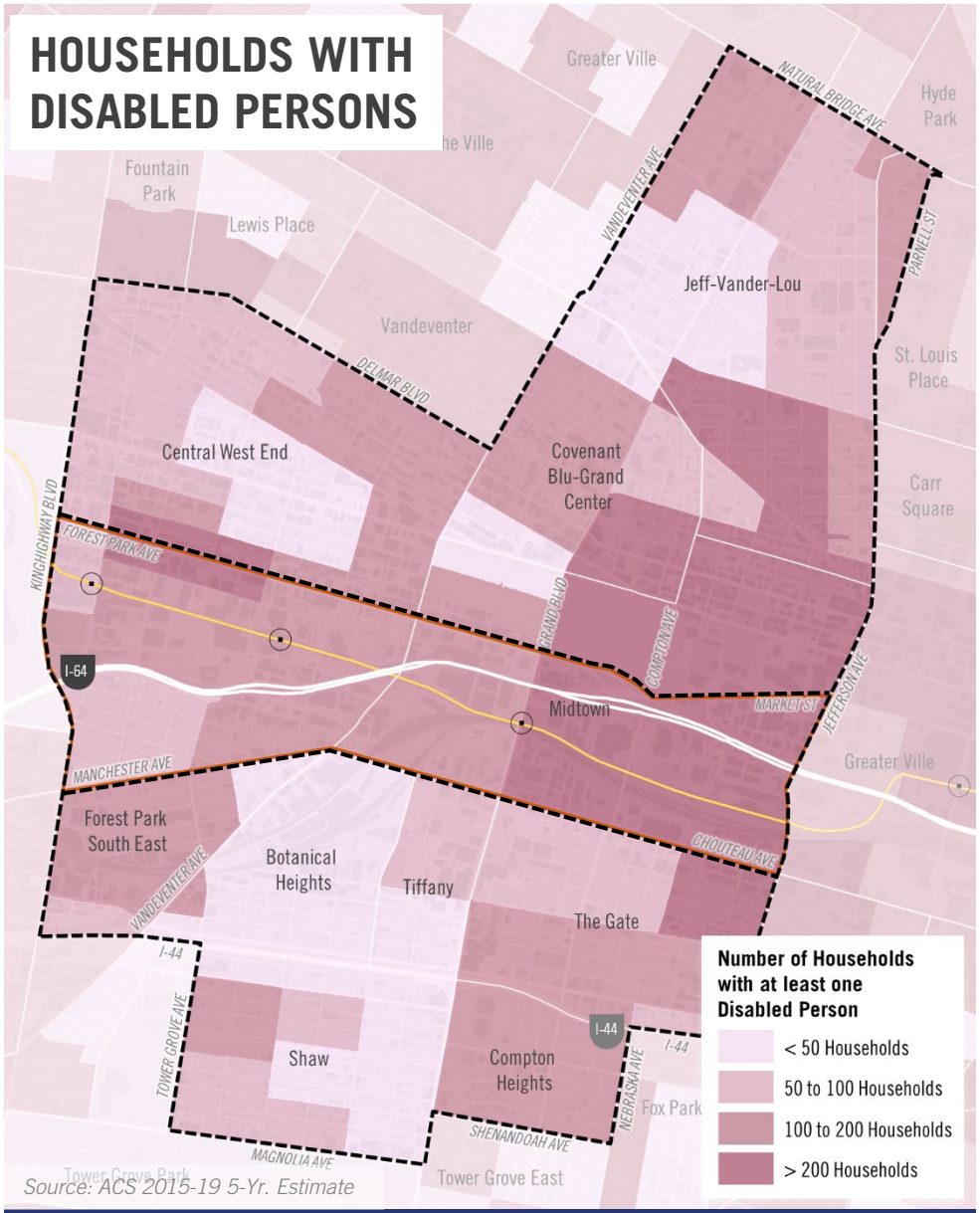


Source: ACS 2015-19 5-Yr. Estimate

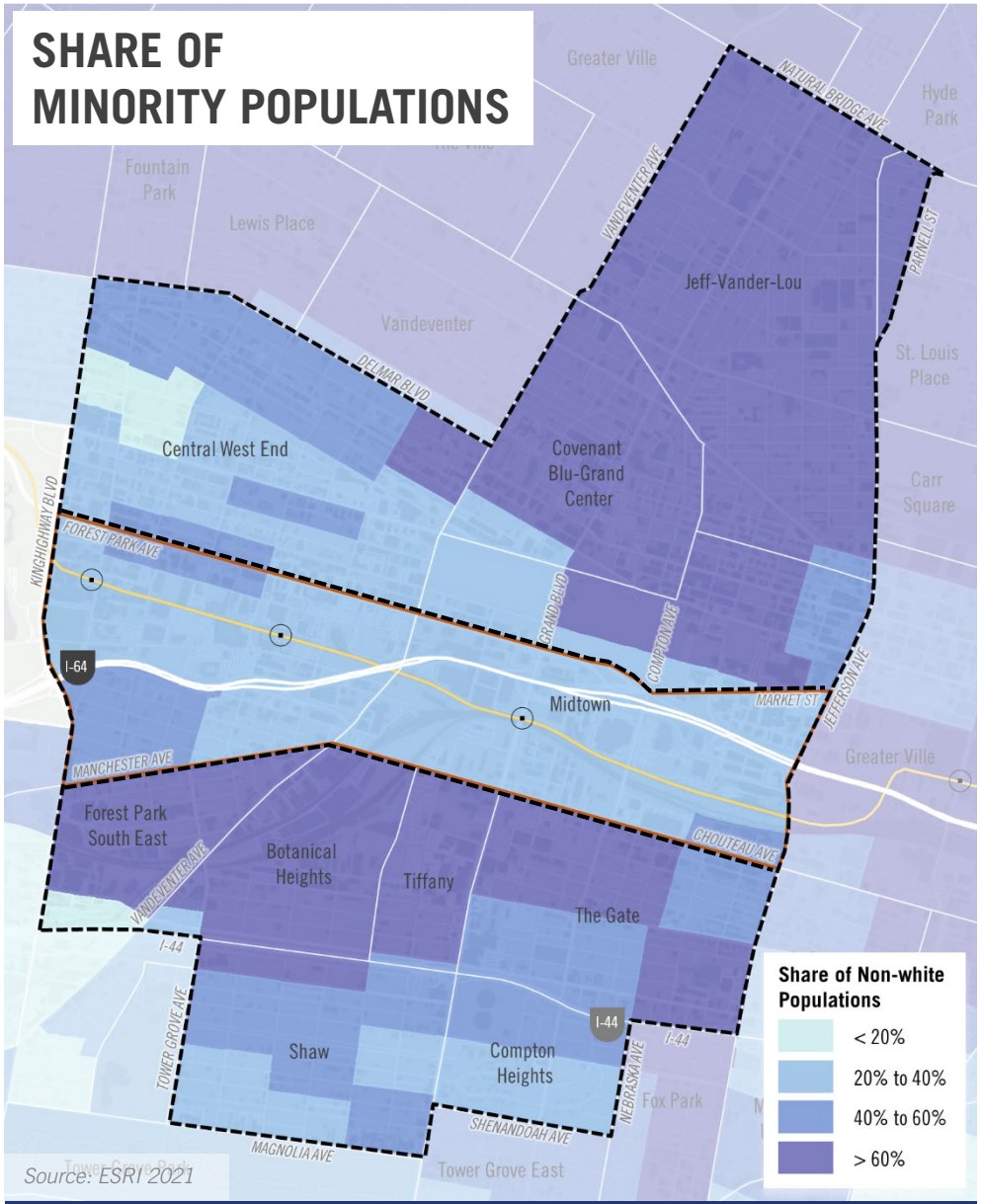
There is a larger concentration of households without a vehicle in the east and northeast portions of the Community Assessment Area given the student population and weaker socio-economic conditions.

TRANSPORTATION EQUITY

HOUSEHOLDS WITH DISABLED PERSONS & MINORITY POPULATIONS



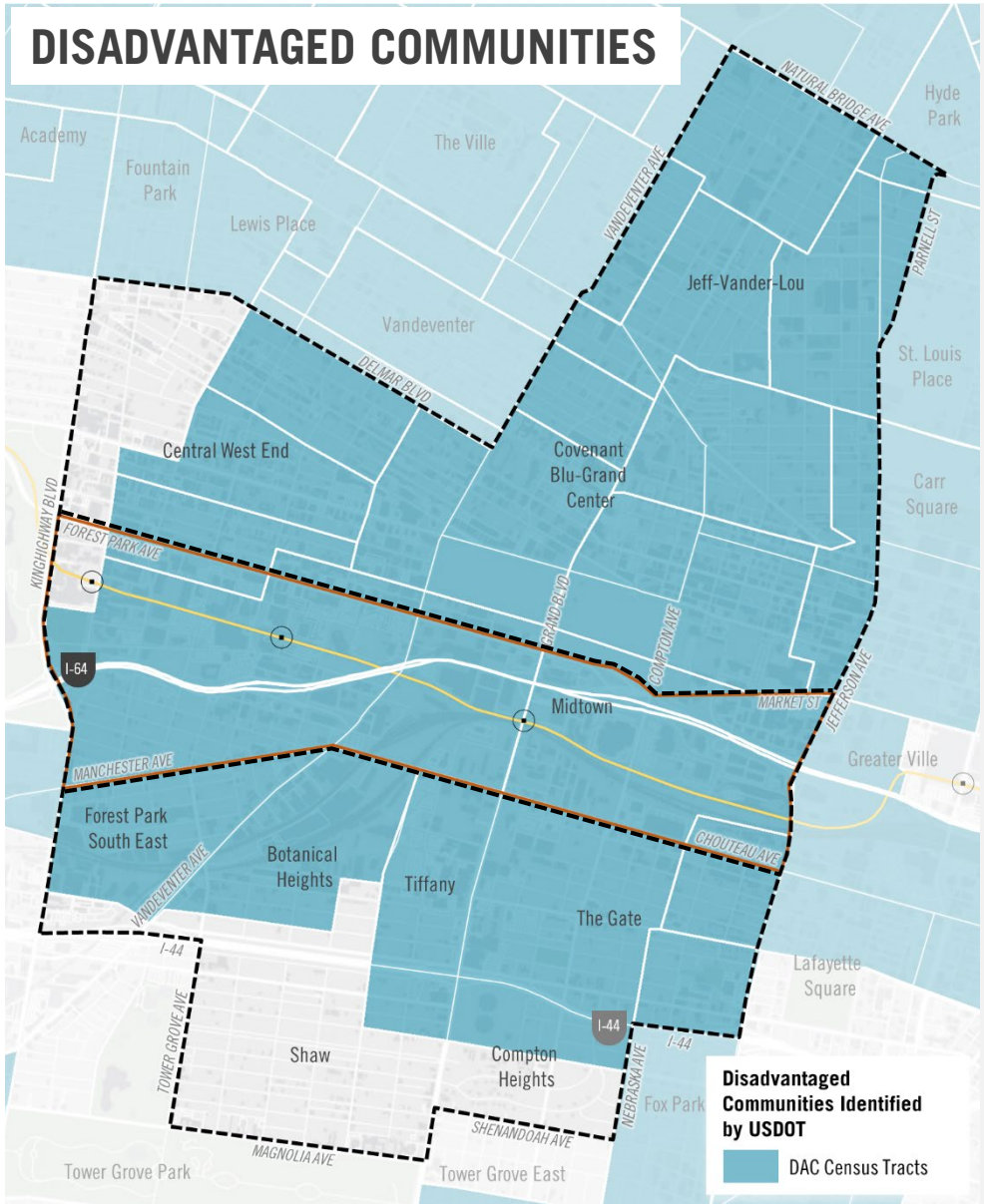
The distribution of households with disabled persons is generally consistent with the distribution of persons aged 65 and older.



The Tier 2 Study Area and Central West End have relatively low non-white populations with higher concentrations to the south and around Covenant Blu-Grand Center and Jeff-Vander-Lou.

TRANSPORTATION EQUITY

USDOT DEFINED 'DISADVANTAGED COMMUNITIES' (DAC)



The DOT DACs have been developed using data for 22 indicators collected at the census tract level and grouped into six (6) categories of transportation disadvantage. The numbers in parenthesis show how many indicators fall in that category:

- Transportation access disadvantage identifies communities and places that spend more, and take longer, to get where they need to go. (4)
- Health disadvantage identifies communities based on variables associated with adverse health outcomes, disability, as well as environmental exposures. (3)
- Environmental disadvantage identifies communities with disproportionately high levels of certain air pollutants and high potential presence of lead-based paint in housing units. (6)
- Economic disadvantage identifies areas and populations with high poverty, low wealth, lack of local jobs, low homeownership, low educational attainment, and high inequality. (7)
- Resilience disadvantage identifies communities vulnerable to hazards caused by climate change. (1)
- Social disadvantage identifies communities with a shared history of discrimination, or other forms of disadvantage that warrant consideration along with each/any of the above measures. (1)

With the exception of portions of Shaw, Compton Heights, and Central West End, the entire Community Assessment Area consists of USDOT designated Disadvantaged Communities (DACs).

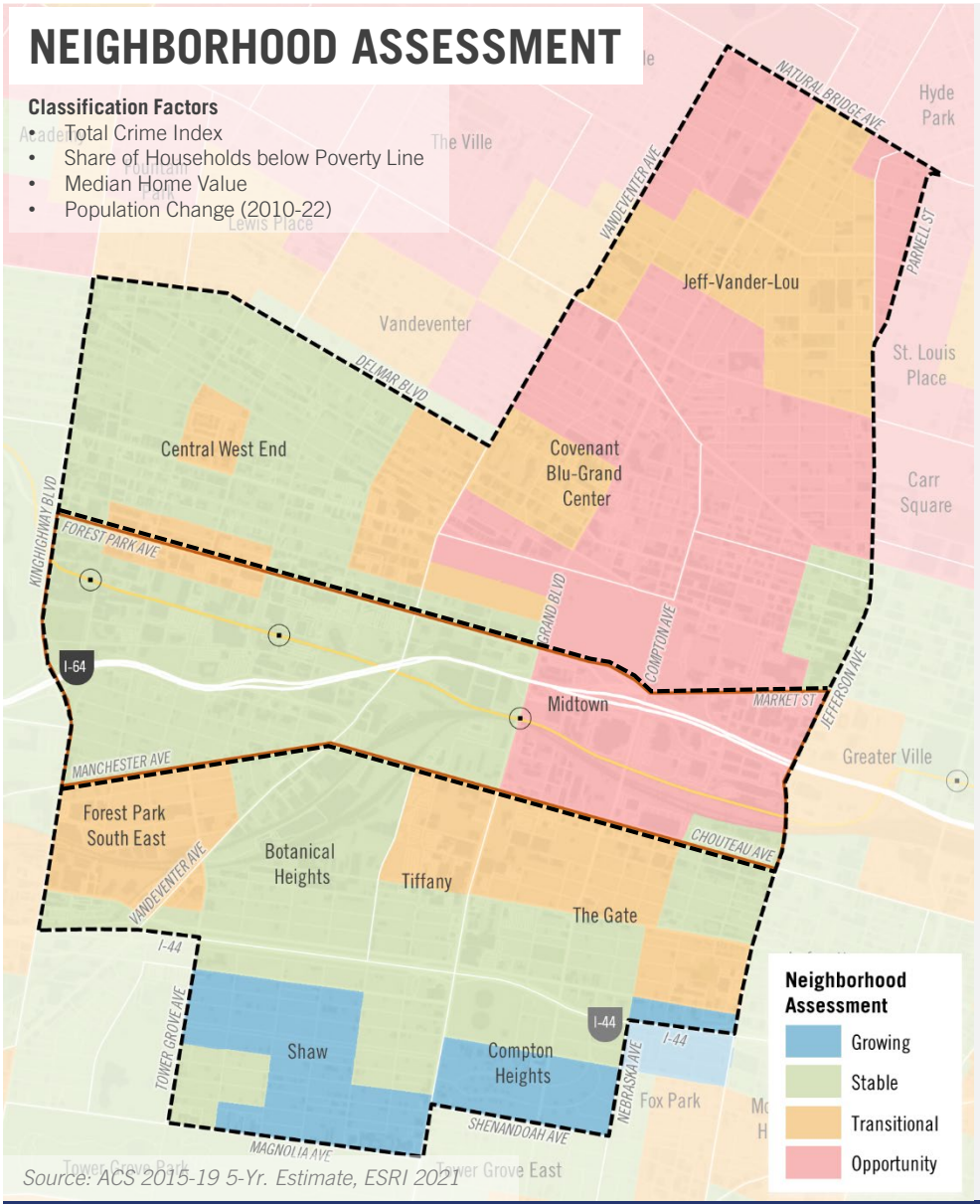
TRANSPORTATION EQUITY

UNDERLYING INDICATORS IN DOT DEFINITION OF DISADVANTAGED COMMUNITIES

Variable	Description
>30 min commute	Percent of total population with a drive time to employment greater than or equal to 30 minutes
No Vehicle	Percent of total population with no vehicle(s) available
Walkability	A composite index of economic and built environment characteristics representing the extent to which the location is supportive to walking
Transportation Burden	Transportation Costs % Income for the Regional Typical Household
Population 65 and older	Percent of total population over age 64
Uninsured	Percent of population without health insurance
Disability	Percent of the non-institutionalized population with any disability
Homes Built Before 1960	Percent of housing units built before 1960 (lead paint indicator)
Diesel	EJ Index for Diesel particulate matter level in air
Cancer	EJ Index for Air toxics cancer risk
Traffic Proximity	EJ Index for Traffic proximity and volume
PM25	EJ Index for PM2.5 level in air
Ozone	Ozone level in air
Less HS Education	Percent of total population, age 25 and older, whose reported education is short of a high school diploma
Renters	Proportion of occupied housing units not occupied by property owners
Unemployment	Percent of civilian labor force reported as unemployed
GINI Index	Endemic inequality
Low Income	Percent of total population reported at or below area median income
Poverty	Percent of population below Federal Poverty Level
Housing Costs	Housing Costs % Income for the Regional Typical Household
Climate Hazards	Expected annual loss of life (fatalities and injuries) from 18 climate hazards
Linguistic Isolation	Percent of households (interpreted as individuals) in linguistic isolation

TRANSPORTATION EQUITY

COMPOSITE INDICATORS: NEIGHBORHOOD ASSESSMENT



Source: ACS 2015-19 5-Yr. Estimate, ESRI 2021

Growing: Areas that has higher than average home price appreciation and demand, with positive socioeconomic indicators.

Stable: Areas that support market-driven developments and do not show signs of widespread disinvestment.

Transitional: Areas that have started to experience market-driven reinvestment, bust still require people-based, public realm, and catalytic investments to fully stabilize.

Opportunity: Areas facing complex challenges and in need of multi-faceted stabilization efforts, including investment in infrastructure, the public realm, and reinvestment in vacant lands and buildings.

Methodology

The composite map is created from additive scores of four factors that capture quality of life, households, and recent economic prospects. The categorization is based on the following scoring results:

Median Home Value
(1) >$250K
(2) $166K to $250K
(3) $100K to $166K
(4) $50K to $100K
(5) <$50K

Total Crime Index
(1) <100
(2) 100 to 250
(3) 250 to 400
(4) >400

Population Change (2010-22)
(1) Gain of >100
(2) Gain of up to 100
(3) Loss of up to 50
(4) Loss of >50 but <140
(5) Loss of >140

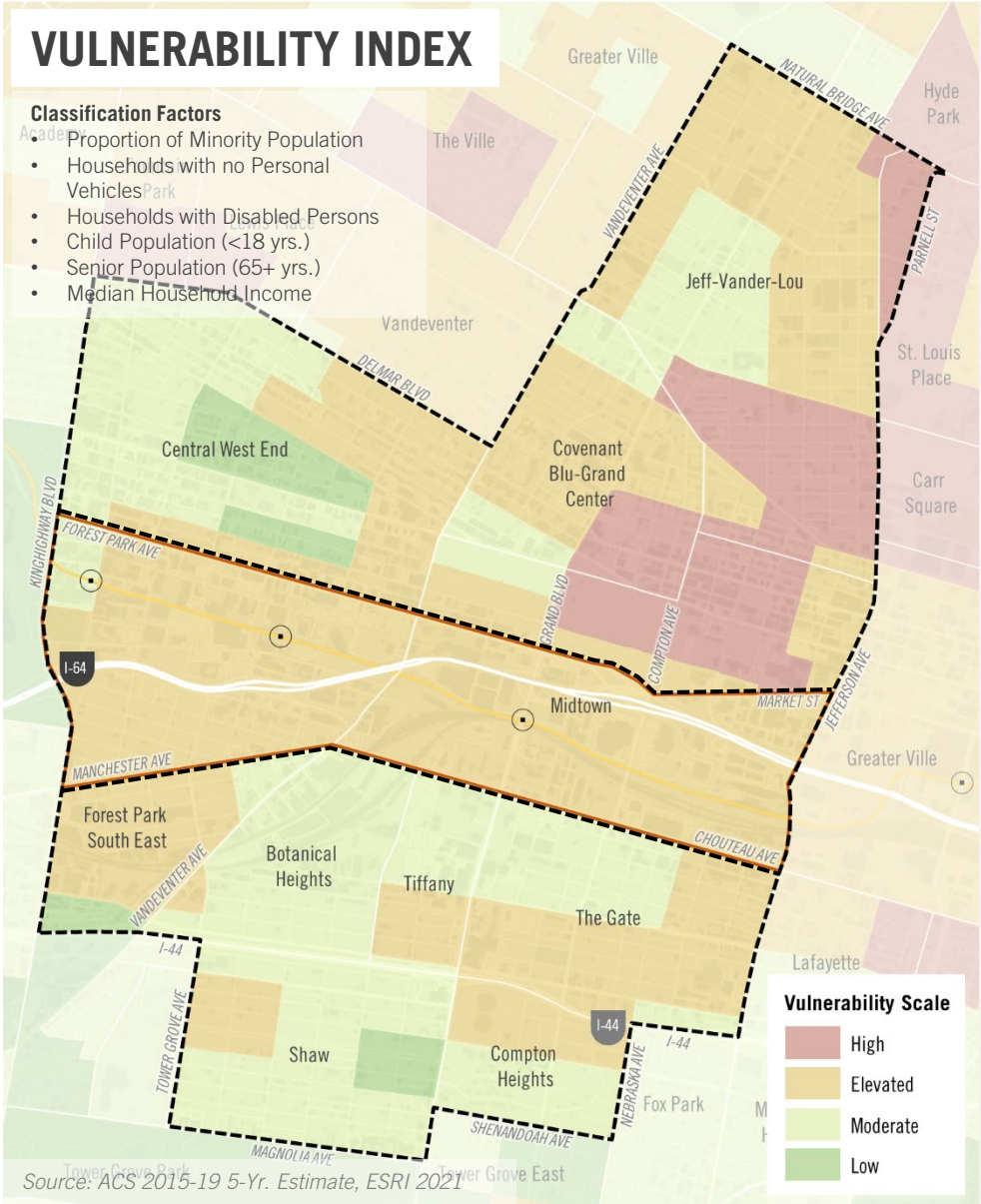
Household Share below Poverty Line
(1) <10%
(2) 10% to 20%
(3) 20% to 30%
(4) >30%

Category	Overall Score
Growing	4 to 6
Stable	7 to 10
Transitional	11 to 13
Opportunity	14 to 17

Generally, the areas to the west, northwest, and southwest are stable with Forest Park Southeast and portions of Central West end are transitional. The areas to the east and northeast are considered opportunity areas and in need of reinvestment.

TRANSPORTATION EQUITY

COMPOSITE INDICATORS: VULNERABILITY INDEX



Source: ACS 2015-19 5-Yr. Estimate, ESRI 2021

Vulnerability Index

The composite map is created from additive scores of six factors that capture populations that have historically been under-represented in transportation investments, or have higher dependence on public investments in transportation because of their income, age or disability.

The categorization is based on the following scoring results:

Share of Minority Population
(1) <20%
(2) 20% to 40%
(3) 40% to 60%
(4) >60%

Number of Households with no Personal Vehicles
(1) <50 Households
(2) 50 to 100 Households
(3) 100 to 200 Households
(4) >200 Households

Median Household Income
(1) >$80K
(2) $45K to $80K
(3) $30K to $45K
(4) <$30K

Number of Households with at least one Disabled Person
(1) <50 Households
(2) 50 to 100 Households
(3) 100 to 200 Households
(4) >200 Households

Senior Population Count
(1) <50
(2) 50 to 100
(3) 100 to 200
(4) >200

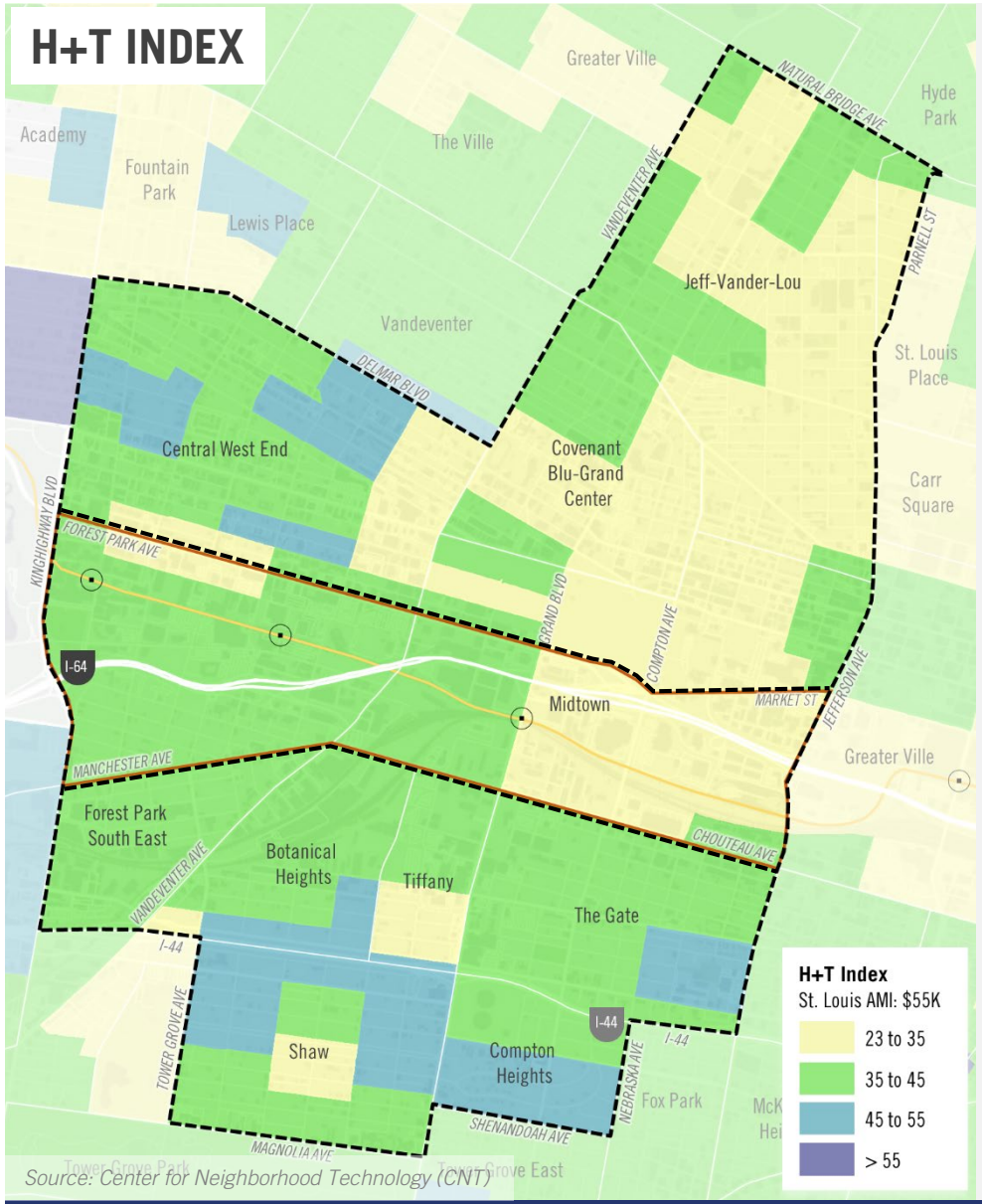
Child Population Count
(1) <50
(2) 50 to 100
(3) 100 to 200
(4) >200

Scale	Overall Score
High	21 to 24
Elevated	16 to 20
Moderate	12 to 15
Low	8 to 11

Given socio-economic conditions around Covenant Blu-Grand Center and continued development pressures, the area has elevated to high vulnerability indices.

TRANSPORTATION EQUITY

HOUSING AND TRANSPORTATION (H+T) AFFORDABILITY INDEX



Source: Center for Neighborhood Technology (CNT)

The Center for Neighborhood Technology's Housing and Transportation (H+T) Affordability Index provides a more comprehensive way of thinking about the true affordability of place - offering an expanded view of affordability, one that combines housing and transportation costs and sets the benchmark at no more than **45%** of household income.

Methodology

The Total Transportation Cost is arrived at by using key Neighborhood and Household Characteristics, combined with auto ownership, and auto and public transit usage data for the 2015 ACS and 2014 Longitudinal Employer-Household Dynamics Data. Metrics used:

Neighborhood Characteristics

- Gross Density
- Regional Household Intensity
- Fraction of Single-Family Detached Housing
- Block Density
- Employment Access Index
- Employment Mic Index
- Transit Connectivity index
- Transit Access Shed & Jobs
- Average Available Transit Trips per Week

Household Characteristics

- Median Household Income
- Average Commuters per Household
- Average Household Size

Given higher housing costs and population density in Central West End and neighborhoods south of the Tier 2 Study Area, there is a higher number of cost-burdened households in these areas compared to the areas around Covenant Blu Grand Center and Jeff-Vander-Lou.

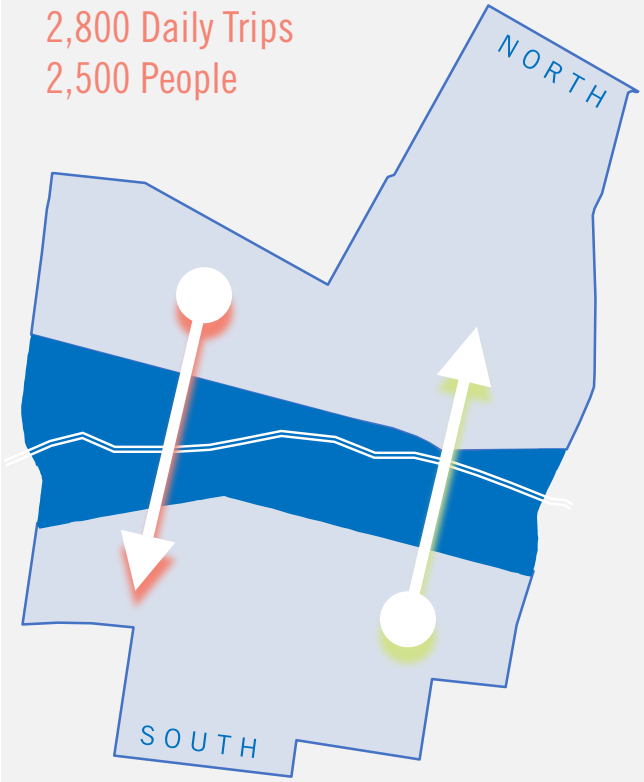
North - South Travel Patterns

TRAVEL PATTERNS

NORTH – SOUTH TRIPS ON A TYPICAL WEEKDAY

NORTH – SOUTH TRIPS
TYPICAL WEEKDAY

CA NORTH -> CA SOUTH
2,800 Daily Trips
2,500 People

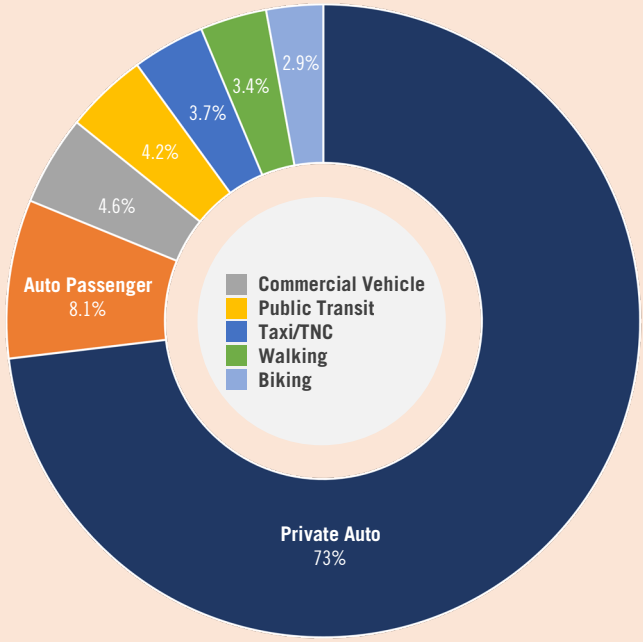


CA SOUTH -> CA NORTH
2,900 Daily Trips
2,600 People

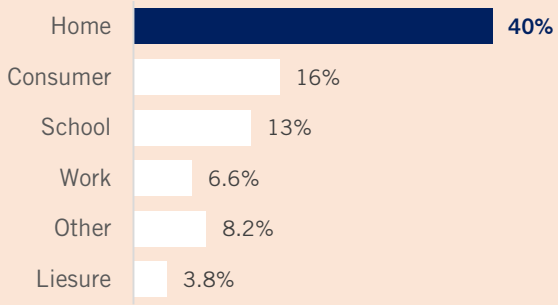
Source: REPLICA, 2021

CA NORTH -> CA SOUTH

Travel Mode

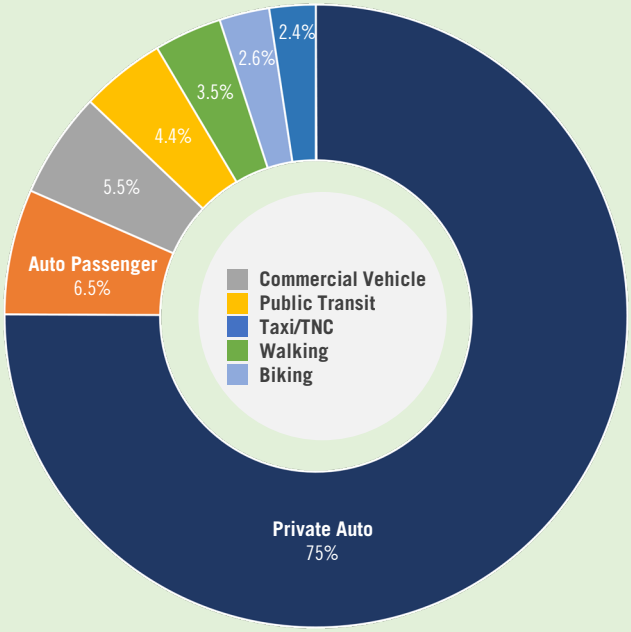


Trip Purpose

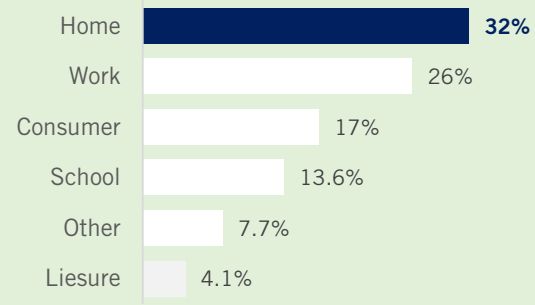


CA SOUTH -> CA NORTH

Travel Mode



Trip Purpose



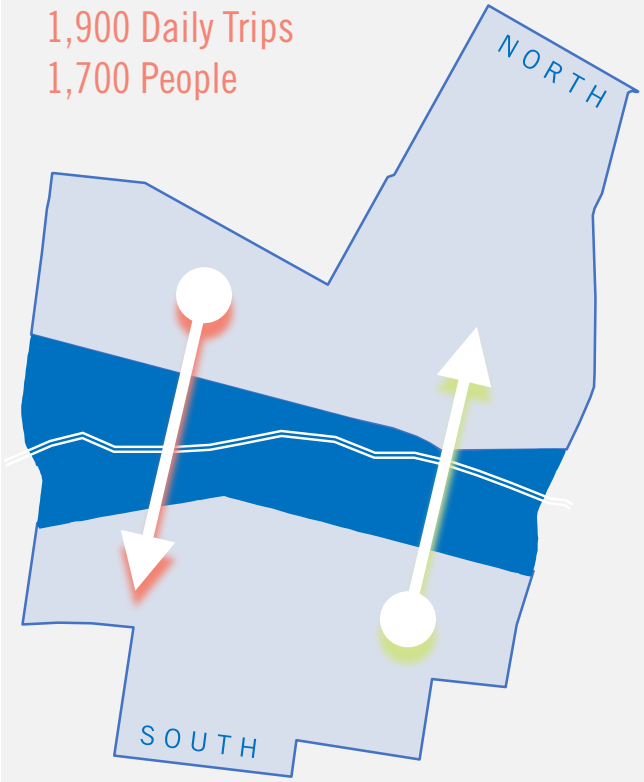
On a typical weekday, trips between the north and south neighborhoods are dominated by private auto, and biking and walking combine for just over 6 percent of the trips.

TRAVEL PATTERNS

NORTH – SOUTH TRIPS ON A TYPICAL WEEKEND

NORTH – SOUTH TRIPS
TYPICAL WEEKEND

CA NORTH -> CA SOUTH
1,900 Daily Trips
1,700 People

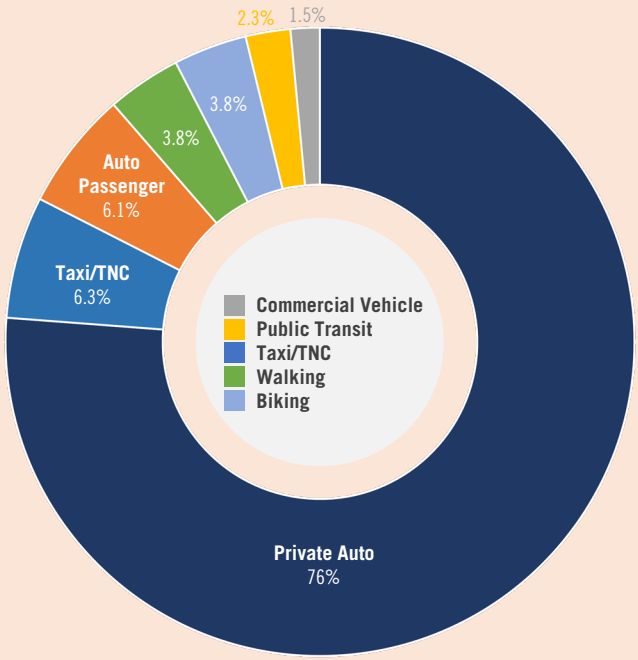


CA SOUTH -> CA NORTH
1,900 Daily Trips
1,700 People

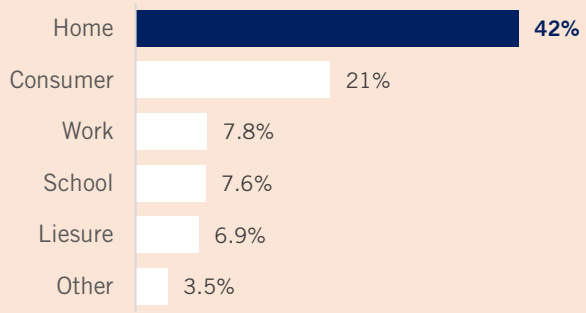
Source: REPLICA, 2021

CA NORTH -> CA SOUTH

Travel Mode

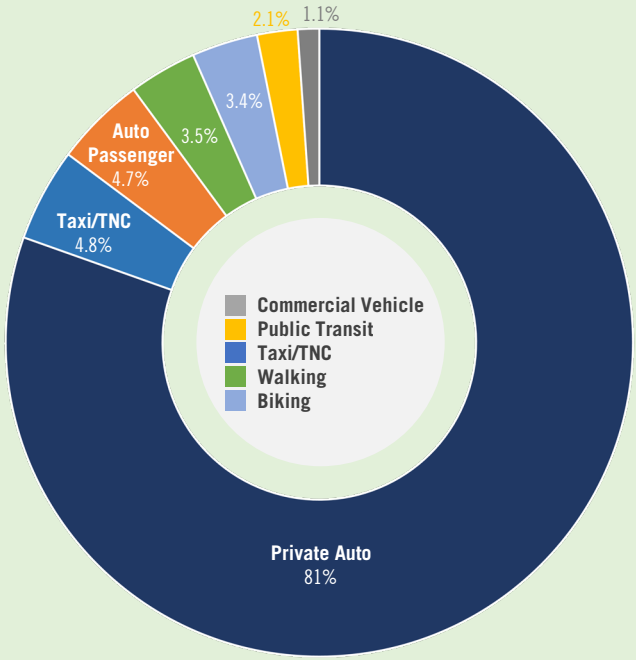


Trip Purpose

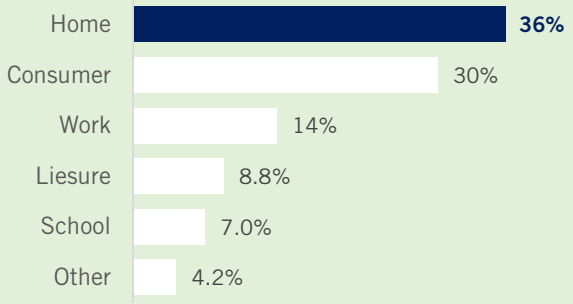


CA SOUTH -> CA NORTH

Travel Mode



Trip Purpose



While private auto trips still dominate for a typical weekend day, and actually increase in their share of trips, the share of biking and walking trips also increases slightly to just over 7 percent.