CHAPTER 2

Alternatives Considered

This chapter discusses the potential concepts and strategies for improvements to the I-70 FTEIS Study Area and how the Study Team developed, refined, and analyzed the strategies over the course of the study.

This chapter begins with a discussion of the concepts and initial strategies that were considered during the early part of the study in **Section 2.1 Initial Strategy Development**. The next part of this chapter, **Section 2.2 First Tier Strategies Development**, discusses the process used to narrow the initial strategies down to four First Tier Strategies and discusses the No-Build and three Build strategies carried forward for more detailed analysis. **Section 2.3 First Tier Strategies Traffic Modeling** discusses how the traffic model was developed and used for analysis. **Section 2.4 Evaluation Process for First Tier Strategies** discusses the more detailed evaluation process of the four First Tier Strategies. **Section 2.5 The Identified Preferred Strategy** discusses why the Study Team has identified the Improve Key Bottlenecks Strategy (in the downtown loop to east of I-435) and either the Improve Key Bottlenecks Strategy or the Add General Lanes Strategy between east of I-435 and I-470.

What is a concept?

A concept is a single idea for solving a transportation issue in the I-70 corridor. Several concepts joined together make an improvement strategy.

What is meant by improvement strategies?

Improvement strategies are general, high level transportation improvement opportunities to address the transportation issues along I-70. Improvement strategies may include a series of specific transportation improvements concepts such as adding lanes, fixing existing pavement and bridges, improving interchange ramps, and transit improvements.

What is a First Tier Strategy?

A First Tier Strategy is one of four strategies that is carried forward from the 15 initial strategies for more detailed evaluation.

2.1 Initial Strategy Development

This section discusses how the Missouri Department of Transportation (MoDOT) and the Federal Highway Administration (FHWA) worked with the local agencies, stakeholders, and the public to develop, refine, and evaluate potential strategies to improve I-70 and the downtown loop. The Study Team presented a wide set of concepts to the local agencies, stakeholders, and the public for improving I-70. The improvement concepts included such ideas as:

- Telecommuting
- Carpooling
- Incident management practices
- Bus/rail transit

What was the I-70 Major Investment Study (MIS)?

The I-70 MIS was a study to evaluate the long-term transportation needs in the I-70 corridor. The MIS also developed and analyzed potential major transportation system improvement strategies. The I-70 MIS was completed in 2004.

What is Transportation System Management (TSM)?

TSM is a series of programs and efforts to improve the existing roadway operations. Some examples include Motorist Assist and Kansas City Scout.

What is Transportation Demand Management (TDM)?

TDM is a series of programs and efforts to reduce the demand for using the roadway. Examples include carpooling, alternative work hours, and telecommuting.

What is Amendment 3?

Amendment 3 was a constitutional amendment that limited the amount of highway user fees, such as fuel tax, vehicle license fees, and vehicle registration fees that were paid to other state agencies.

- Improving roadway design
- Adding capacity on bridge structures
- Adding capacity in a tunnel

Chapter 4 identifies the local agency, stakeholder, and public involvement processes used throughout the study.

How were the Initial Strategy Packages Developed?

The Study Team combined various concepts to develop 15 Initial Strategy Packages based on initial engineering and environmental analysis, MARC's Congestion Management System (CMS) toolbox, as well as comments and feedback from local agencies, stakeholders, and the public. The first seven strategy packages evolved from the previously completed I-70 Major Investment Study (MIS). Eight other packages were focused goal oriented strategy packages meant to address specific needs or issues along I-70.

What were the Initial Strategy Packages Studied?

The following section is a brief summary of the 15 Initial Strategy Packages.

Initial Strategy Package 1: No-Build

The No-Build Package originated from the I-70 MIS and includes maintenance activities as needed and projects already committed to in MoDOT's five-year construction program, the Statewide Transportation Improvement Program (STIP). This package includes the following activities:

- Repaving I-70 through regular maintenance,
- Upgrading the downtown loop's northeast corner/Paseo Boulevard per the kcICON project,
- Upgrading the I-70 interchanges and bridges as identified in the STIP. Over time, maintenance throughout the Study Area would occur as needed.
- Planned upgrades to the I-435/I-70 Interchange which is an Amendment 3 and an Economic Recovery Project,
- Modifying the Manchester Trafficway Interchange,

- Transportation System Management and Transportation Demand Management activities,
- Maintaining the existing bus service provided by the Kansas City Area Transportation Authority.

Initial Strategy Package 2: Improve Key Bottlenecks

Package 2 originated from the I-70 MIS and included everything listed in Package 1 and activities such as:

- Rebuilding and/or rehabilitating I-70 to its existing configuration with a design life of 30 to 50 years, includes the downtown loop to I-470. This includes pavement, roadbed, and structure improvements.
- Improving lane balance in the downtown loop and at the I-435 Interchange.
- Improving interchanges to address ramp lengths, merge areas, and weave sections issues.
- Improving access to I-70 and the downtown loop by adding interchanges, modifying and/or consolidating interchanges with collector distributor roads, or eliminating interchanges.
- Improving the I-70 curves at Benton Boulevard and Jackson Avenue.
- Upgrading the Truman Road Interchange.
- Upgrading the I-435 Interchange to an ultimate interchange design such as the concept identified in the Access Justification Report I-70 and I-435 Interchange Area.
- Integrating Operation Green Light on parallel routes
- Coordinating with Smart Moves Regional Transit Vision
- Improving incident management response times to clear incidents and stalled vehicles to limit traffic backups.
- Investigating locations to implement additional Park and Ride lots as necessary.

Routine pavement and bridge maintenance will continually occur.

What is a bottleneck?

A bottleneck is a section of a road where movement of traffic is limited by the road design. This is often a section of road with a fewer number of lanes, a sharp curve, or access points where traffic is entering or exiting the road. A bottleneck is the most vulnerable point for congestion in a road network and is also referred to as a chokepoint.

What does lane balance mean?

A lane balance issue occurs when the number of through lanes on the highway changes through an interchange, usually as a result of a lane drop. An example of this is I-70 westbound at I-435.

What are collector distributor roads?

Collector distributor roads are lane(s) used to separate mainline traffic and traffic intending to enter/exit at cross streets.

Initial Strategy Package 3: Improve Key Bottlenecks plus HOV Lanes

Package 3 included everything from Package 2 in addition to adding high occupancy vehicle (HOV) lanes (toll optional) from the downtown loop to I-470. Package 3 originates from the I-70 MIS.

Congestion at Jackson Curve

HOV lanes are exclusive lanes for vehicles with two or more occupants. They are physically separated by a barrier, striping, or signing from the adjacent regular lanes that are used by passenger vehicles, buses and freight trucks. The toll option for this package included high occupancy toll (HOT) lanes, which are lanes for vehicles with high passenger occupancy, but may also be used by single occupancy vehicles for a toll.

Adding two HOV lanes was proposed between the downtown loop and I-470 for this strategy. They could be reversible with the flow of peak congested traffic. HOV lanes can move more people during congested periods with fewer vehicles because of the higher number of occupants.

Initial Strategy Package 4: Improve Key Bottlenecks, HOV Lanes, Unique Design Features (Tunnel)

What is a Community Bridge?

A Community Bridge is a concept that will connect neighborhoods across I-70 with the use of pedestrian, bicycle, or green space bridges.

This package includes everything from Package 3 in addition to incorporating a new alignment of I-70 and unique features. Unique features could include rebuilding I-70 on a new alignment in a tunnel from the downtown loop north leg to the upgraded 22nd/23rd Street Interchange at the Benton curve (express lanes in a tunnel); the construction of wider bridges in at least three locations to implement the Community Bridge concept; supporting the implementation of commuter rail on one or both of the two existing rail corridors that operate along the I-70 corridor; and integrating the operation of bus transit on U.S. 40 and other parallel roadways. Package 4 originated from the I-70 MIS.

Green space community bridge over I-696 in Detroit, Michigan

Initial Strategy Package 5: Add General Lanes

Package 5 originated from the I-70 MIS and was focused on improvements to the automobile/truck travel modes by adding general-purpose lanes. This package included everything from Package 1 in addition to widening I-70 to eight lanes from the downtown loop to I-470. Package 5 included activities such as:

- Rebuild and/or rehabilitate I-70 and the entire downtown loop with a design life of 30 to 50 years
- Rehabilitate and/or rebuild I-70 with four lanes in each direction from the downtown loop to I-470
- Improving lane balance in the downtown loop and at the I-435 Interchange.
- Improving interchanges to address ramp lengths, merge areas, and weave sections issues
- Improving access to I-70 and the downtown loop by adding interchanges, modifying and/or consolidating interchanges with collector distributor roads, or eliminating interchanges.
- Improving the I-70 curves at Benton Boulevard and Jackson Avenue.
- Upgrading the Truman Road Interchange.
- Upgrading the I-435 Interchange to an ultimate interchange design such as the concept identified in the

Access Justification Report I-70 & I-435 Interchange Area.

- Add collector distributor roads on I-70 and I-470 through the interchange
- Integrating Operation Green Light on parallel routes
- Coordinating with the Smart Moves Regional Transit Vision
- Improving incident management response times to clear incidents and stalled vehicles to limit traffic backups.
- Investigating locations for implementing additional Park and Ride lots as necessary.
- Adding southbound to westbound and eastbound to northbound directional ramps in the southwest corner of the loop.
- Adding the northbound to eastbound and westbound to southbound directional ramps at I-70 and Bruce R. Watkins (U.S. 71) Interchange in the southeast corner of the downtown loop.

What is the Smart Moves Regional Transit Vision?

Smart Moves is the region's long-range transit vision as developed and updated by the Mid-America Regional Council (MARC). The vision highlights corridors throughout the region and suggests service modes that could efficiently serve the populations along those corridors.

Initial Strategy Package 6: Capacity Increases (HOV Lanes) plus Transit Improvements

Package 6 originated from the I-70 MIS. This package was focused on increasing the number of persons served by the highway facility. This package included everything from Package 5 in addition to applying HOV lanes (toll optional) to the new lanes. Package 6 also included activities such as adding I-70 Community Bridges, coordinating with the Smart Moves Regional Transit Vision, adding bus rapid transit (BRT) on parallel arterial routes, supporting transit centers, and supporting commuter rail.

Initial Strategy Package 7: Transportation Improvement Corridor

Package 7, the recommended strategy of the I-70 MIS, consisted of a combination of certain parts of Packages 1 through 6.

The MIS recommended reconstructing I-70 to six lanes with provisions for a 48-foot future transportation improvement corridor from the downtown loop to U.S. 40 east Interchange. The transportation improvement corridor could potentially be

used for HOV lanes, HOT lanes, reversible lanes, bus only lanes, or truck-only lanes. Between I-435 and I-470, the MIS recommended rebuilding I-70 as eight lanes.

Package 7 also included activities such as:

- Rebuilding and/or rehabilitating I-70 including a transportation improvement corridor with a design life of 30 to 50 years, includes the downtown loop to I-470. This includes pavement, roadbed, and structure improvements.
- Improving lane balance in the downtown loop and at the I-435 Interchange.
- Improving interchanges to address ramp lengths, merge areas, and weave sections issues
- Improving access to I-70 and the downtown loop by adding interchanges, modifying and/or consolidating interchanges with collector distributor roads, or eliminating interchanges.
- Improving the I-70 curves at Benton Boulevard and Jackson Avenue.
- Upgrading the Truman Road Interchange.
- Upgrading the I-435 Interchange to an ultimate interchange design such as the concept identified in the Access Justification Report I-70 and I-435 Interchange Area.
- Integrating Operation Green Light on parallel routes.
- Coordinating with Smart Moves Regional Transit Vision
- Improving incident management response times to clear incidents and stalled vehicles to limit traffic backups.
- Investigating locations for implementing additional Park and Ride lots as necessary.

Electronic Message Board

What is ramp metering?

Traffic signals on freeway ramps to manage the flow of traffic entering a freeway.

What are traveler information systems?

Traveler information systems provide traffic information to travelers on the web, on wireless devices, or on message boards.

Initial Strategy Package 8: TSM/TDM plus BRT Solutions

Package 8 focused on a combination of improvement concepts specifically aimed at reducing vehicle emissions and automobile use in the I-70 corridor. This package included converting an existing lane on I-70 to BRT and HOV, emphasizing bicycle and pedestrian improvements, community bridges, and encouraging Transportation System

Management and Transportation Demand Management activities.

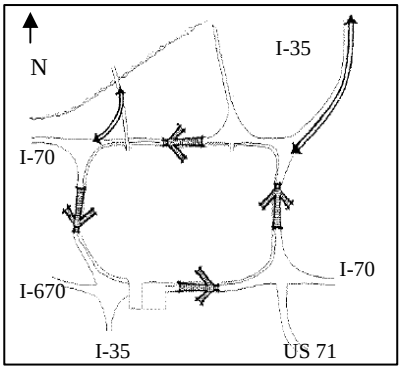
Transportation System Management programs identified in the MARC's CMS toolbox include traffic signal coordination, enhanced freeway incident detection and management, ramp metering, advance traveler information systems, and highway information systems. Two elements, enhanced freeway incident detection and management and advance traveler information systems such as electronic message boards are already in place along I-70. Transportation Demand Management concepts in MARC's toolbox include alternate work hours, telecommuting, ridesharing, and preferential carpool parking. These types of measures could also be implemented as part of the No-Build Strategy or other Build Strategies.

Initial Strategy Package 9: Unique Capacity Designs

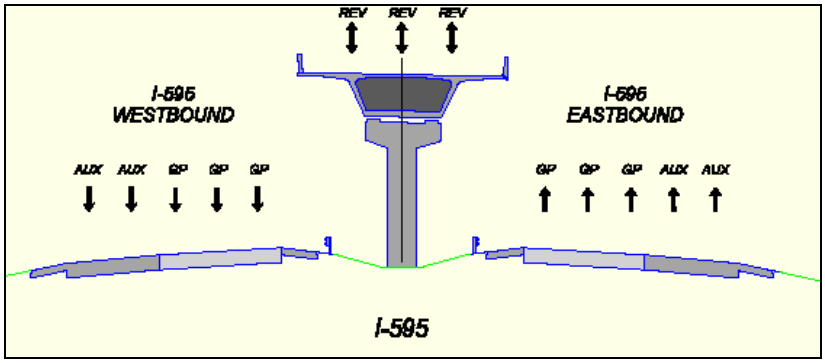
What are specialty lanes?

Specialty lanes are road lanes dedicated for a specific use, such as toll lanes, HOV lanes, bus only lanes, or truck only lanes.

Package 9 focused on unique design strategies to expand I-70 with general purpose lanes while minimizing new right of way needs. Effectively the package expanded the roadway vertically (up) instead of horizontally (out). This package included elevated/stacked highway lanes and a one-way downtown loop. Stacked lanes may be suited in the urban section of the corridor, especially through the Benton and Jackson curves.



One-Way Downtown Loop Concept



Stacked Lane Concept

The one-way loop option is a one directional loop around downtown using the existing downtown loop. Downtown access and an exact plan for the conversion from two-way traffic flow to one-way traffic flow would require further

development. Under the proposal, the entire downtown loop traffic flow would travel in a counter clockwise direction with the north side of the downtown loop traveling west; west side traffic would travel south; south side traffic would travel east; and east side traffic would travel north.

Initial Strategy Package 10: Rail Transit

Package 10 focused on rail transit strategies within the I-70 corridor right of way. This package included an exclusive rail corridor which may be commuter rail or light rail and enhanced park and ride facilities. Rail could either run the length of the corridor from I-470 to the downtown loop or connect with existing rail lines that run near to or cross I-70 and only run along I-70 for part of the corridor. There would be no expansion of general purpose lanes or major bottleneck fixes as part of this strategy although the speed reduced curves at Jackson Avenue and Benton Boulevard would have needed improvement to allow for rail lines.

Light rail transit could operate in the I-70 right of way in specialty lanes on one side of the roadway or in the median. Light rail would have a limited number of stops and provide travel time savings during peak congestion periods. Light rail would need to be coordinated with other regional light rail initiatives.

Light Rail Concept

Commuter rail transit generally uses existing rail lines to provide morning and afternoon service during the heaviest congestion periods and carries both freight and passenger cars on a daily basis. Because of the shared nature of the rail line between freight and commuter service, commuter rail would only run during the morning and afternoon peak commuter periods. There is an opportunity to use a combination of existing and new rail lines. A new commuter rail connection between the existing Rock Island line at Blue River and the Kansas City Terminal line near 18th Street is a possible combination. This alignment could use Union Station as a terminus point. However, the growing demand for freight rail (projected to increase 40 to 60 percent nationally in the next 20 years) could lead to rail congestion locally without investment in additional tracks. This may limit the opportunity for commuter rail to share the freight rail tracks.

Commuter Rail Concept

Initial Strategy Package 11: Freight Movement

What are truck-only lanes?

Truck-only lanes area dedicated lanes restricted for truck use only.

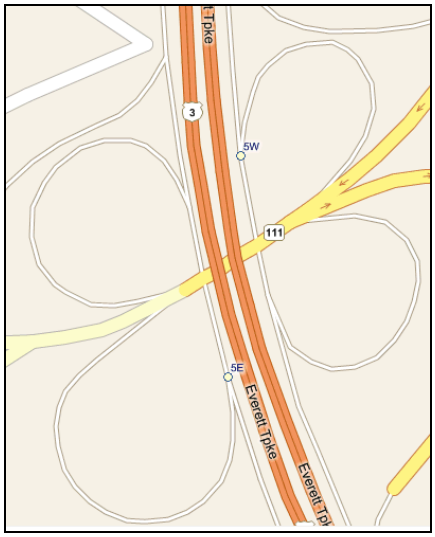
Package 11 focused on freight movement strategies to improve I-70 as a freight corridor. This package included exclusive truck-only lanes on the inside of the general purpose lanes. The existing freeway would need to be rebuilt and widened to accommodate truck-only lanes. Truck-only lanes would be best suited for the suburban section of the I-70 corridor (I-470 to I-435). They could provide access to I-435 without directing additional through trucks into the core of the city. The separation of truck-only lanes from the general purpose lanes could be accomplished with a physical barrier or a buffer area delineated with pavement markings. The additional width required for a truck-only lane would have extensive negative impacts through the downtown loop. A designated truck route and signage could be used to enhance truck flows through the downtown loop.

Initial Strategy Package 12: Collector Distributor Roads

Collector Distributor System Concept

A collector/distributor road, often abbreviated as C/D road, is a one-way road next to a freeway that is used for some or all of the ramps movements that would otherwise merge into or split from the main lanes of the freeway. Below is an example of a cloverleaf interchange that includes C/D roads to connect the ramps.

Package 12 focused on collector distributor roads to improve the I-70 corridor. This package included constructing a parallel collector distributor roadway system which would provide local access to cross streets and reduce the number of access points to/from I-70. The full collector distributor system would require two additional lanes in each direction at most locations.



Collector Distributor System – Everett Parkway and Highway 111 in Nashua, NH

With a collector distributor system, there would be designated freeway lanes and a collector distributor road system. The freeway lanes would carry the through traffic and only have access to the collector distributor road system every two to four miles. The collector distributor road system would provide access to the existing cross street interchanges. The cross street access with the collector distributor road may be in the form of an intersection or an interchange.

Initial Strategy Package 13: Privatization

Package 13 focused on involving the private sector in developing and funding strategies to improve the I-70 corridor. This package included selling or leasing I-70 to a

third party that would convert I-70 into a toll road and use the collected toll revenue to build, operate, and maintain the roadway. In order for this strategy to be feasible, the private sector needs a revenue stream from the project. This could include toll lanes or some form of a fee paid by the public sector based on usage of the facility. Tolls could be set at a fixed rate, on fixed mileage schedule, or determined by time of day and volume of traffic. Either the public or private sector could implement some form of congestion pricing.

Initial Strategy Package 14: Bus Transit Focus

Package 14 focused on bus transit strategies in the I-70 corridor right of way. This package included an exclusive corridor for BRT service, enhancing park and ride facilities, coordinating with the Smart Moves Regional Transit Vision, and enhancing transit applications such as advance traveler information systems.

Bus rapid transit would operate in a specialty corridor with limited stops. The BRT corridor would remove the buses from the congestion and slow downs in the general purpose lanes and have a travel time advantage over personal automobiles. In lieu of a dedicated corridor, some metropolitan areas are allowing buses to drive on the shoulder during congested periods of the day. This accomplishes travel time benefits for bus transit which may attract more riders. The Smart Moves Regional Transit Vision calls for a fixed route bus service along I-70; however, does not identify if that is in an exclusive BRT lane or in the general traffic flow.

Initial Strategy Package 15: Reduce Capacity

Package 15 focused on reducing the number of general purpose lanes and converting the interchanges to intersections. Effectively, I-70 would be reduced to a parkway and commuters would need to spread out to other roads or other modes of transportation. I-70 would require re-designation along other interstate facilities to maintain a connection with I-70 in Kansas. This package included bus service improvements, Transportation System Management, and Transportation Demand Management elements. This

package was considered from I-435 to the downtown loop and potentially for the north side of the downtown loop.

2.2 First Tier Strategies Development

This section discusses how well the 15 Initial Strategy Packages address the overall reasons for improvements within the Study Area. The Study Team also considered engineering issues and impacts to the environment in the evaluation. The Study Team screened the 15 Initial Strategy Packages down to four First Tier Strategies.

How were the Initial Strategy Packages Screened?

What is a screening process?

An evaluation that identifies which strategies best achieve the goals set forth by the project.

The 15 Initial Strategy Packages were evaluated against the purpose and need for improving I-70:

- Improve Safety
- Reduce Congestion
- Restore and Maintain Existing Infrastructure
- Improve Accessibility
- Improve Goods Movement

More detailed information on the purpose and need for improving I-70 is in **Chapter 1**. The Study Team also considered engineering issues and impacts to the human environment, the natural environment, and the cultural resources within the Study Area. Initial Strategy Packages were not carried forward if they did not meet the purpose and need, with the exception of No-Build Strategy. In addition, a package was not carried forward if it contained the same basic concepts as another package carried forward, was combined with other packages that were carried forward, or had engineering or costs estimates that were magnitudes higher than other packages. The complete Screening Memorandum is in **Appendix C**.

What are the four First Tier Strategy Packages?

The screening process resulted in four strategy packages being carried forward for further analysis. The packages carried forward included:

- Strategy Package 1 No-Build: This is a requirement of the National Environmental Policy Act process.
- Strategy Package 2 Improve Key Bottlenecks: This package was moved forward with the addition of bus transit on the shoulder, collector distributor road systems at key locations, and potential community bridges.
- Strategy Package 5 Add General Lanes: This package was moved forward with the addition of bus transit on the shoulder, collector distributor road systems at key locations, and potential community bridges.
- Strategy Package 7 Improve Key Bottlenecks plus Transportation Improvement Corridor: This package was moved forward with the addition of bus transit on the shoulder, collector distributor road systems at key locations, and a wider transportation improvement corridor to accommodate four lanes and shoulders.

The following sections describe the strategies in detail. A discussion of the strategies' elements within five different Sub-Areas is also included. The Sub-Areas are:

- Downtown Sub-Area: The downtown loop (the FTEIS Study Area west of Tracy Avenue)
- Urban Sub-Area: The downtown loop to west of I-435 (Tracy Avenue to Topping Avenue)
- I-435 Sub-Area: West of I-435 to east of I-435 (Topping Avenue to east of Blue Ridge Cutoff)
- Suburban Sub-Area: East of I-435 to west of I-470 (East of Blue Ridge Cutoff to east of Lee's Summit Road)
- I-470 Sub-Area: West of I-470 to east of I-470 (East of Lee's Summit Road to the east limits of the Study Area)

Figure 3.0 shows the five Sub-Areas.

Describe the No-Build Strategy

The No-Build strategy includes maintenance activities as needed and projects already committed as part of existing STIP. The No-Build Strategy includes a needed level of effort required to address the major safety and maintenance problems. **Figure 2.1** at the end of this chapter illustrates the

key parts of the No-Build Strategy. The following describes the parts of the No-Build Strategy by location:

Corridor Wide Improvements: The work will include routine maintenance activities to pavement and bridges as needed. Existing bus transit service would be maintained.

Downtown Sub-Area: Downtown loop improvements in the No-Build Strategy include lane balance and access improvements in the northeast corner of the downtown loop as part of the kcICON project.

Key Elements of the No-Build Strategy

- I-70 Pavement Maintenance
- Bridge Rehabilitations as needed
- kcICON Project

- Amendment 3 and Economic Recovery Project including the I-435/I-70 Interchange.

The South Loop Link Study is a City of Kansas City, Missouri study that is evaluating the possibility of enclosing the south leg of the downtown loop to expand development opportunities in the downtown. The South Loop Link would be considered as a separate project upon completion of its study.

Urban Sub-Area: The No-Build Strategy includes bridge rehabilitations from Van Brunt Boulevard to Paseo Boulevard per MoDOT STIP.

I-435 Sub-Area: As part of an existing project in the STIP, MoDOT has committed to modifying the freeway access along I-70 and I-435 to relieve congestion in the I-435 & I-70 interchange. The improvements include adding lanes to I-70; modifying ramps on I-70 EB into a collector-distributor system and extending ramps at several locations for additional weave, merge and diverge area; adding partial access at I-435 and US 40 and modifying access at I-70 and Manchester Trafficway; modifying the ramp terminals at US 40/31st Street; and replacing the Blue Ridge Cutoff Bridge. These improvements reduce congestion, improve safety and address two bridge maintenance needs in the interchange area.

Suburban Sub-Area: All bridges, except Noland Road, will be rehabilitated from I-435 to U.S. 40 east per MoDOT STIP.

I-470 Sub-Area: There are no improvements planned in the No-Build Strategy.

Describe the Improve Key Bottlenecks Strategy

The Improve Key Bottlenecks Strategy as shown in **Figure 2.2** and **Figure 2.3** includes the activities from the No-Build Strategy described above. **Figure 2.3** shows the existing right of way, the conceptual alignment, and the slope line. The slope line is the extent to which earth will be disrupted for the construction of a strategy. The slope line may be reduced as preliminary design occurs in the Second Tier studies. The following paragraphs discuss the locations of key improvements as discussed in the previous bullets points for the Improve Key Bottlenecks Strategy.

Corridor Wide Improvements: The Improve Key Bottlenecks Strategy rebuilds and/or rehabilitates I-70 and the downtown loop to its existing configuration with a design life of 30 to 50 years. This includes pavement, roadbed, and structure improvements. This strategy will evaluate interchange improvements to address ramp lengths, merge areas, and weave sections at all interchanges. Other corridor wide improvements in the Improve Key Bottlenecks Strategy include integrating Operation Green Light on parallel routes, improving incident management response times to clear incidents and stalled vehicles, coordinating with the Smart Moves Regional Transit Vision, improving non-motorized access across I-70 and the downtown loop with Community Bridges, and investigating locations to add Park and Ride lots as necessary.

Downtown Sub-Area: The downtown loop improvements in the Improve Key Bottlenecks Strategy include lane balance and improvements in the northeast corner of the downtown loop as part of the kcICON project. The strategy will also consider interchange additions, consolidations, modifications, and/or eliminations to improve traffic flow and safety.

The Improve Key Bottlenecks would consider the on-going South Loop Link Study to evaluate the possibility of enclosing the south leg of the downtown loop to expand development opportunities in the downtown. The Second Tier studies will coordinate with that planning effort and consider the recommended improvements from that study. In addition, the Wyandotte on-ramp to westbound I-670 was removed

Key Elements of the Improve Key Bottlenecks Strategy

- Rebuild and/or rehabilitate I-70 and the downtown loop with a design life of 30 to 50 years
- Downtown loop lane balance improvements
- Improve interchanges by addressing ramp lengths, merge areas, and weave sections
- Consider interchange additions, consolidations, modifications, or eliminations to improve traffic flow and safety
- Improve the Jackson and Benton curves
- Rebuild the I-70/I-435 Interchange to provide six lanes on I-70 and six lanes on I-435 through the interchange
- Add CD roads on I-70 and I-470 through the I-70/I-470 Interchange
- Enhance I-70 express bus service, provide for bus transit on shoulder, and explore locations to add park and ride lots as necessary

during the Bartle Hall expansion. There was a commitment to replace this ramp at a future date. The need to replace this connection and where the ramp would be located are issues that will be evaluated in the Second Tier studies.

Urban Sub-Area: I-70 would be rebuilt to provide for bus transit on the shoulder. The Improve Key Bottlenecks Strategy includes the bridge rehabilitation along I-70 from Paseo Boulevard to Van Brunt Boulevard. I-70 curves at Benton Boulevard and Jackson Avenue would be improved within the available right of way to the extent possible. The strategy will consider interchange consolidations, modifications with CD roads, and/or elimination of access at 18th Street to improve traffic flow and safety.

I-435 Sub-Area: I-70 would be rebuilt to provide for bus transit on the shoulder. In addition to the projects currently programmed in the STIP, MoDOT will continue to modify the freeway access along I-70 and I-435 to relieve congestion and improve the condition of the system in the I-435 and I-70 interchange area. Similar to the programmed STIP project, the proposed improvements include adding lanes to I-435; modifying ramps into a collector-distributor system on I-70 and I-435 and extending ramps at several locations for additional weave, merge and diverge area; reconstructing and relocating the fully directional ramps to eliminate left-side exits from the interstate. These proposed improvements reduce congestion, improve safety and address bridge maintenance needs in the interchange area.

To improve the traffic of on I-70, access improvements in the I-435 Sub-Area could include access modifications at Manchester Trafficway.

Suburban Sub-Area: I-70 would be rebuilt through this area to provide for bus transit on the shoulder. All bridges from Blue Ridge Cutoff to U.S. 40 east would be rehabilitated per MoDOT STIP. This strategy will consider interchange consolidations, modifications with CD roads, and/or eliminations through the Sterling Avenue, U.S. 40 east, and the Blue Ridge Boulevard interchanges to improve traffic flow and safety.

I-470 Sub-Area: I-70 would be rebuilt through the I-470 Interchange and would provide for bus transit on the shoulder. The Improve Key Bottlenecks Strategy would address short ramps and merging issues on I-70 and I-470 at the interchange between the two freeways. A collector distributor road system would be added on I-70 through the interchange and on I-470 between U.S. 40 and 39th Street.

Engineering and Footprint Issues: The Improve Key Bottlenecks Strategy key engineering locations are the two major I-70 interchanges at I-435 and I-470, 18th Street Interchange, the series of Sterling Avenue, U.S. 40 east, and Blue Ridge Boulevard interchanges, and the Jackson and Benton curves.

Some additional right of way may be needed throughout the corridor to implement these improvements. Impacts would most likely occur to those parcels adjacent to the existing highway.

The footprint in the Improve Key Bottlenecks Strategy would have a two foot wider shoulder than the existing typical section of I-70 to accommodate bus transit on shoulder operations. The primary impacts would be near the interchanges to improve ramp lengths and weave areas. During the Second Tier studies, the footprints and resulting impacts would be refined to minimize the overall right of way impacts.

Describe the Add General Lanes Strategy

The Add General Lanes Strategy as shown in **Figure 2.4** and **Figure 2.5** builds upon the elements from the Improve Key Bottlenecks Strategy. The Add General Lanes Strategy includes the activities described below.

Corridor Wide Improvements: The Add General Lanes Strategy rebuilds and/or rehabilitates I-70 and the downtown loop with a design life of 30 to 50 years. This includes pavement, roadbed, and structure improvements. This strategy would evaluate interchange improvements to address ramp lengths, merge areas, and weave sections at all interchanges. Other corridor wide improvements in the Add

Key Elements of the Add General Lanes Strategy

- Rehabilitate and/or rebuild I-70 and the downtown loop with a design life of 30 to 50 years
- Rehabilitate and/or rebuild I-70 with four lanes in each direction from the downtown loop to I-470
- Downtown loop lane balance improvements
- Add directional ramps in the southeast and southwest corners of the downtown loop as shown below

- Consider interchange additions, consolidations, modifications, or eliminations to improve traffic flow and safety
- Improve the Jackson and Benton curves
- Rebuild the I-70/I-435 Interchange to provide eight lanes on I-70 and six lanes on I-435 through the interchange
- Add CD roads on I-70 and I-470 through the interchange
- Enhance I-70 express bus service, provide for bus transit on shoulder, and explore locations to add park and ride lots as necessary

General Lanes Strategy include integrating Operation Green Light on parallel routes, improving incident management response times to clear incidents and stalled vehicles, coordination with Smart Moves Regional Transit Vision, improving non-motorized access across I-70 and the downtown loop with Community Bridges, and investigating locations to add Park and Ride lots as necessary.

Downtown Sub-Area: The downtown loop improvements in the Add General Lanes Strategy include lane balance and improvements in the northeast corner of the downtown loop as part of the kcICON project. The strategy would also consider interchange additions, consolidations, modifications, and/or eliminations to improve traffic flow and safety.

The Add General Lanes Strategy would add the missing westbound to southbound and the northbound to eastbound directional ramps to/from U.S. 71. This strategy would add the missing southbound to westbound and the eastbound to northbound directional ramps between I-35 and I-670 in the southwest corner of the downtown loop.

The Add General Lanes Strategy would also consider the on-going South Loop Link study to evaluate the possibility of enclosing the south leg of the downtown loop to expand development opportunities in the downtown. The Second Tier Studies will coordinate with that planning effort and consider the recommended improvements from that study. In addition, the Wyandotte on-ramp to westbound I-670 was removed during the Bartle Hall expansion. There was a commitment to replace this ramp at a future date. The need to replace this connection and where the ramp would be located are issues that will be evaluated in the Second Tier studies.

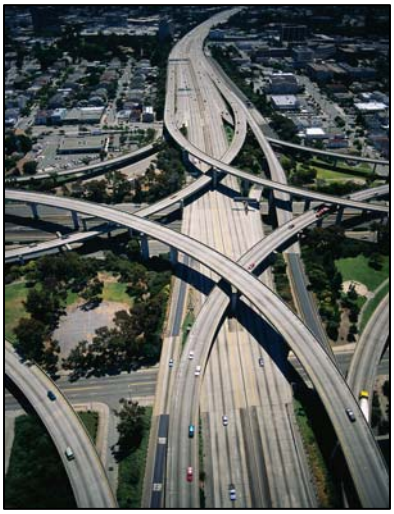
Urban Sub-Area: I-70 would be rebuilt to eight lanes and provide for bus transit on the shoulder. The Add General Lanes Strategy includes the rebuild and/or rehabilitation of all bridges to accommodate eight lanes on I-70. I-70 curves at Benton Boulevard and Jackson Avenue would be improved within the available right of way to the extent possible. The strategy will consider interchange consolidations, modifications with CD roads, and/or eliminations at 18th Street to improve traffic flow and safety.

I-435 Sub-Area: I-70 would be rebuilt to eight lanes and provide for bus transit on the shoulder. In addition to the projects currently programmed in the STIP, MoDOT will continue to modify the freeway access along I-70 and I-435 to relieve congestion and improve the condition of the system in the I-435 and I-70 interchange area. Similar to the programmed STIP project, the proposed improvements include adding lanes to I-435; modifying ramps into a collector-distributor system on I-70 and I-435 and extending ramps at several locations for additional weave, merge and diverge area; reconstructing and relocating the fully directional ramps to eliminate left-side exits from the interstate. These proposed improvements reduce congestion, improve safety and address bridge maintenance needs in the interchange area.

To improve the traffic of on I-70, access improvements in the I-435 Sub-Area could include access modifications at Manchester Trafficway.

Suburban Sub-Area: I-70 would be rebuilt with eight lanes and provide for bus transit on the shoulder. All bridges will be rebuilt and/or rehabilitated to accommodate eight lanes on I-70. The Add General Lanes Strategy will consider interchange consolidations, modifications with CD roads, and/or eliminations through the Sterling Avenue, U.S. 40 east, and the Blue Ridge Boulevard interchanges to improve traffic flow and safety.

I-470 Sub-Area: The Add General Lanes Strategy would address short ramps and merging issues on I-70 and I-470 at the interchange between the two freeways. I-70 would be rebuilt with eight lanes through the I-470 Interchange and would provide for bus transit on the shoulder. Interchange improvements would potentially include flyover or braided ramps to eliminate the some of the interchange weaving areas. I-470 may also require interchange improvements at U.S. 40 and 39th Street to maintain access for the new flyover ramps. I-470 mainline improvements would be required as the new ramps merge with I-470 traffic. I-70 would also require some ramp modifications.



Flyover Ramps

What is a Flyover Ramp?

A flyover ramp is a directional interchange ramp that passes over the through travel lanes at an interchange.

Engineering and Footprint Issues:

The Add General Lanes Strategy key engineering locations are the two major I-70 interchanges at I-435 and I-470, 18th Street Interchange, the series of Sterling Avenue, U.S. 40 east, and Blue Ridge Boulevard interchanges, and the Jackson and Benton curves.

Some additional right of way may be needed throughout the corridor. Impacts would most likely occur to those parcels adjacent to the existing highway.

The Add General Lanes Strategy is planning flyover ramps to eliminate weaving areas within the I-470 interchange area. In order to maintain access between I-70, I-470, U.S. 40, and 39th Street, the flyover ramps can be developed as braided ramps with the existing ramps or the circular ramps can be left in place. Some additional right of way would be needed throughout the corridor for this improvement. Impacts would most likely occur to those parcels adjacent to the existing highway.

The Add General Lanes Strategy footprint would be approximately 38 feet wider than the existing typical section of I-70 to accommodate the additional general use lanes and the bus on shoulder operations. During the Second Tier studies, the footprint and resulting impacts would be refined to minimize the overall right of way impacts.

Transportation Improvement Corridor Strategy

The Transportation Improvement Corridor Strategy as shown in **Figure 2.6** and **Figure 2.7** builds upon the elements of the Improve Key Bottlenecks Strategy plus it adds a transportation improvement corridor between the downtown loop and east of Lee's Summit Road. The transportation improvement corridor could be located between the eastbound and westbound lanes or on one side of the I-70 corridor. As currently proposed, the transportation improvement corridor would be barrier separated from the regular traffic lanes. The transportation improvement corridor could be used for congestion managed lanes, reversible lanes, HOV lanes, or bus lanes.

The Transportation Improvement Corridor Strategy includes the activities described below.

Corridor Wide Improvements: The Transportation Improvement Corridor Strategy rebuilds and/or rehabilitates I-70 and the downtown loop with a design life of 30 to 50 years. This includes pavement, roadbed, and structure improvements. This strategy would evaluate interchange improvements to address ramp lengths, merge areas, and weave sections at all interchanges. Other corridor wide improvements in the Transportation Improvement Corridor Strategy includes integrating Operation Green Light on parallel routes, improving incident management response times to clear incidents and stalled vehicles, coordination with Smart Moves Regional Transit Vision, improving non-motorized access across I-70 and the downtown loop with Community Bridges, and investigating locations to add Park and Ride lots as necessary.

Downtown Sub-Area: The downtown loop improvements in the Transportation Improvement Corridor Strategy include lane balance and improvements in the northeast corner of the downtown loop as part of the kcICON project. The strategy will also consider interchange additions, consolidations, modifications, and/or eliminations to improve traffic flow and safety.

The Transportation Improvement Corridor Strategy would also consider the on-going South Loop Link study to evaluate the possibility of enclosing the south leg of the downtown loop to expand development opportunities in the downtown. The Second Tier Studies will coordinate with that planning effort and consider the recommended improvements from that study. In addition, the Wyandotte on-ramp to westbound I-670 was removed during the Bartle Hall expansion. There was a commitment to replace this ramp at a future date. The need to replace this connection or not and where the ramp would be located are issues that will be evaluated in the Second Tier studies.

Urban Sub-Area: I-70 would be rebuilt with a transportation improvement corridor. The Transportation Improvement

Key Elements of the Transportation Improvement Corridor Strategy

- Rehabilitate and/or rebuild the entire downtown loop and I-70 to east of I-470
- Add dedicated lanes that could be used for trucks, HOV, or toll facilities located parallel to the general purpose lanes from the downtown loop to east of Lee's Summit Road
- Downtown loop lane balance
- Consider interchange additions, consolidations, modifications, or eliminations to improve traffic flow and safety
- Improve the Jackson and Benton curves
- Rebuild the I-70/I-435 Interchange to provide a transportation improvement corridor on I-70 and six lanes on I-435 through the interchange
- Add CD roads on I-70 and I-470 through the interchange
- Enhance I-70 express bus service, provide for bus transit on shoulder, and explore locations to add park and ride lots as necessary

Corridor Strategy includes the rebuild and/or rehabilitation of all bridges to accommodate a transportation improvement corridor on I-70. I-70 curves at Benton Boulevard and Jackson Avenue would be improved within the available right of way to the extent possible. The strategy will consider interchange consolidations, modifications with collector distributor roads, and/or elimination of access at 18th Street to improve traffic flow and safety.

I-435 Sub-Area: I-70 would be rebuilt with a transportation improvement corridor through this Sub-Area. In addition to the projects currently programmed in the STIP, MoDOT will continue to modify the freeway access along I-70 and I-435 to relieve congestion and improve the condition of the system in the I-435 and I-70 interchange area. Similar to the programmed STIP project, the proposed improvements include adding lanes to I-435; modifying ramps into a collector-distributor system on I-70 and I-435 and extending ramps at several locations for additional weave, merge and diverge area; reconstructing and relocating the fully directional ramps to eliminate left-side exits from the interstate. These proposed improvements reduce congestion, improve safety and address bridge maintenance needs in the interchange area.

To improve the traffic of on I-70, access improvements in the I-435 Sub-Area could include access modifications at Manchester Trafficway.

Suburban Sub-Area: I-70 would be rebuilt with a transportation improvement corridor. All bridges would be rebuilt and/or rehabilitated to accommodate a transportation improvement corridor on I-70. The Transportation Improvement Corridor Strategy would consider interchange consolidations, modifications with CD roads, and/or eliminations through the Sterling Avenue, U.S. 40 east, and the Blue Ridge Boulevard interchanges to improve traffic flow and safety.

I-470 Sub-Area: The Transportation Improvement Corridor Strategy would rebuild I-70 with eight lanes as I-70 transitions from the transportation improvement corridor east of Lee's Summit Road to general use lanes. This strategy would

address short ramps and merging issues on I-70 and I-470 at the interchange between the two freeways. Interchange improvements would potentially include flyover or braided ramps to eliminate the some of the interchange weaving areas. I-470 may also require interchange improvements at U.S. 40 and 39th Street to maintain access for the new flyover ramps. I-470 mainline improvements would be required as the new ramps merge with I-470 traffic. I-70 would also require some ramp modifications.

Engineering and Footprint Issues: The Transportation Improvement Corridor Strategy key engineering locations are the two major I-70 interchanges at I-435 and I-470, 18th Street Interchange, the series of Sterling Avenue, U.S. 40 east, and Blue Ridge Boulevard interchanges, and the Jackson and Benton curves.

Some additional right of way may be needed throughout the corridor. Impacts would most likely occur to those parcels adjacent to the existing highway.

The transportation improvement corridor would transition into general use lanes between Benton Boulevard and Paseo Boulevard on the west end of the corridor and between Lee's Summit Road and I-470 on the east end of the corridor. The transportation improvement corridor would need to provide adequate space ahead of the downtown loop and I-470 for vehicles in the transportation improvement corridor to maneuver into the proper lanes at these two interchanges.

The Transportation Improvement Corridor Strategy pavement would be approximately 88 feet wider than the existing typical section of I-70 to accommodate the transportation improvement corridor. During the Second Tier studies, the footprints and resulting impacts will be refined to minimize the overall right of way impacts.

Summary of First Tier Strategies

The strategies each build upon the other strategies by providing additional improvements. The Improve Key Bottlenecks Strategy includes the No-Build improvements and adds a series of additional bottleneck improvements.

Likewise, the Add General Lanes Strategy includes the Improve Key Bottlenecks Strategy improvements and adds additional improvements. Similarly, the Transportation Improvement Corridor Strategy adds improvements to the Improve Key Bottlenecks Strategy. This is displayed in **Table 2.1 Strategy Summary Table**.

Table 2.1 Strategy Summary Table

	No-Build	Improve Key Bottlenecks	Add General Lanes	Transportation Improvement Corridor
kcICON Project – Interchange improvements to accommodate six lanes on I-29/I-35 north of the downtown loop	√	√	√	√
I-435/I-70 Interchange Amendment 3 and Economic Recovery Project Improvements	√	√	√	√
Routine Maintenance Activities	√	√	√	√
Downtown Loop - Potential Access Consolidations		√	√	√
Downtown Loop - Ensure Consistent Number of Lanes on Freeways		√	√	√
Improve Benton and Jackson Curves		√	√	√
I-435/I-70 Compete Interchange Upgrade		√	√	√
Express Commuter Bus/Bus on Shoulder		√	√	√
Downtown Loop - Improve Interchanges to Add Missing Ramps			√	
Add One Lane in Each Direction			√	
Add Transportation Improvement Corridor				√

2.3 First Tier Strategies Traffic Modeling

What is a base year?

A base year is a recent year that serves as the starting point for a traffic forecast. It is typically a year in which a lot of traffic counts are available so that the model results can be compared to actual traffic data to ensure accuracy.

This section discusses how traffic models were developed and used by MoDOT in making their decision.

How were the First Tier Strategies Effects on Traffic Analyzed?

The Study Team used 2005 traffic counts as the base year and 2030 as the forecasted future year for assessing traffic levels on I-70. MoDOT provided historical Average Annual Daily Traffic (AADT) counts. The First Tier Strategies were modeled using a modified 2005 MARC regional travel demand model and the Highway Capacity Software (HCS). The modified MARC regional travel demand model was used

to identify the daily volumes on I-70 while HCS was used to evaluate the peak hour congestion through the corridor for each strategy.

The modified 2005 regional model output was compared to actual 2005 traffic counts along I-70 to determine the reasonableness of the 2005 base year prior to modeling for 2030 conditions. The Study Team made some localized edits to the regional model to improve where and how traffic would flow through the model's road network for a better representation of the actual traffic patterns. There was also a need to manually adjust the model output at a few locations to achieve a better replication of the actual traffic counts that were available. This process provided the Study Team with added confidence that the best available 2030 forecast volumes would be achieved.

What is Average Annual Daily Traffic (AADT)?

AADT is the average number of vehicles that use a road segment on an average day. It is an estimate of the number of vehicles that use a section of road during an entire year divided by 365.

How were the Effects of the First Tier Strategies on Traffic Levels Modeled?

The First Tier Strategy improvements were added to the regional model one strategy at a time. The Study Team ran the regional model for each strategy which resulted in 2030 traffic volumes for each of the First Tier Strategies including the No-Build Strategy.

The Study Team decided to conduct a detailed traffic analysis of the downtown loop as part of the Second Tier studies due to its complexity.

What is the MARC Travel Demand Model?

The MARC Travel Demand Model is a regional computer model that attempts to predict future traffic based on demographics, land uses, population, and traffic volumes. Future traffic demands are also based on regionally accepted land use and employment projections.

The traffic volumes from the modified 2005 MARC regional model output were compared to the 2030 regional model output volumes for each First Tier Strategy to determine the daily traffic increase. The amount of traffic increase for each strategy was then added to the actual 2005 traffic counts to arrive at the 2030 traffic estimates for the First Tier Strategies.

What is a Peak Hour?

The peak hour is the hour of the day when traffic volumes on a roadway are at their highest. The peak hour typically occurs during the morning or afternoon rush hour, when people are traveling to and from work.

On average, the traffic model forecast that traffic volumes along I-70 would increase between nine percent and 23 percent from 2005 and 2030. This is a relatively moderate level of traffic growth compared to the level of growth experienced in the past 20 years. For instance, between 1995 and 2005,

traffic volumes increased from nine percent near 23rd Street to over 70 percent between U.S. 40 east and Noland Road.

The daily traffic level estimates were converted to morning and afternoon peak hour volumes based on actual traffic count and peak hour volume data. The morning and afternoon peak hour volumes for each strategy were analyzed in HCS to identify congestion concerns on I-70 road sections.

The congestion results are discussed in **Section 2.4** for each of the First Tier Strategies.

2.4 Evaluation Process for First Tier Strategies

This section discusses how MoDOT screened the four First Tier Strategies to decide on an Identified Preferred Strategy. Each strategy is evaluated in terms of purpose and need, traffic, and engineering issues. The strategy evaluation matrix, **Table 2.2** is located at the end of this chapter. The environmental analysis of the strategies is contained in **Chapter 3**.

How well will the First Tier Strategies Improve Traffic Conditions and Goods Movement?

The Study Team used the modified MARC travel demand model as a tool to determine the expected change in traffic volumes on I-70. The Study Team also used HCS analysis to determine how well each strategy would reduce travel congestion.

Congestion is often expressed in terms of level of service (LOS) to describe how well roadways flow under various traffic flow conditions. The concept of LOS is defined as a qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. A LOS definition provides an index of the quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. Six levels of service are defined for each type of facility. They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F an undesirable, high level of congestion. The

Study Team has set a LOS goal for the peak hour analysis of LOS E in 2030 for the improvement strategies. A graphical example of LOS is displayed in **Figure 2.8.**

The general level of service descriptions are described as:

- LOS A represents free flow.
- LOS B is in the range of stable traffic flow at free flow speeds, but the presence of other users in the traffic stream begins to be noticeable.
- LOS C is in the range of stable traffic flow at free flow speeds, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream.
- LOS D represents high-density, but stable traffic flow with slight declines in the travel speed.
- LOS E represents operating conditions at or near the capacity level with noticeable declines in travel speed.
- LOS F is used to define forced or breakdown flow.

Since the LOS of a roadway is a function of the traffic flows driving on it, a road may operate at a wide range of LOS, depending on the time of day, day of the week, or season of the year.

The HCS analysis results are shown in **Table 2.3** which display the miles of undesirable congestion at LOS F.

Figure 2.8 Level of Service for Highways

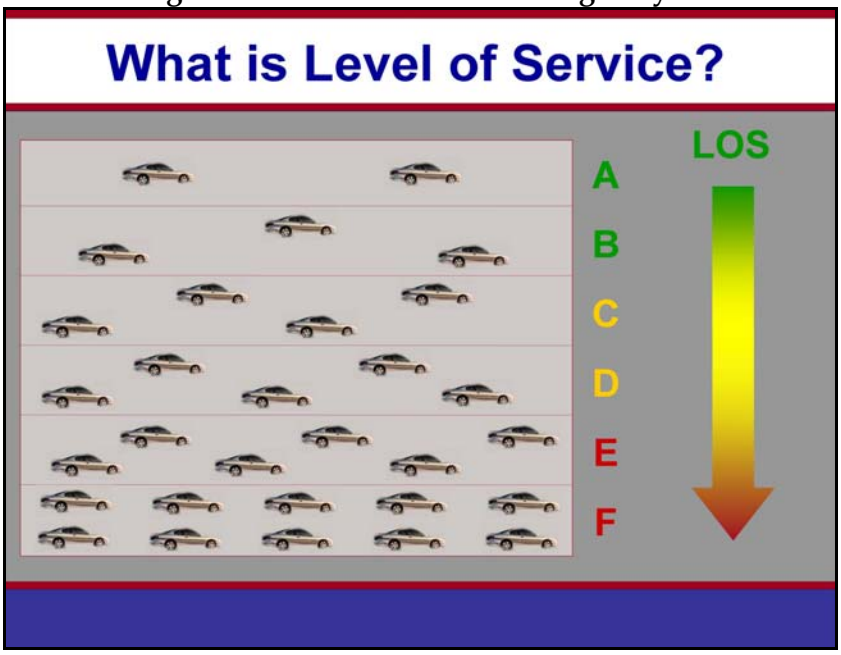


Table 2.3 2030 Peak Hour Miles of LOS F

Strategy	West of I-435 (10 miles)		East of I-435 (8 miles)	
	AM	PM	AM	PM
No-Build	2.3	0.0	4.2	6.0
Improve Bottlenecks	0.5	0.0	1.7	4.0
Add General Capacity	0.0	0.0	0.0	0.0
Improvement Corridor	0.0	0.0	0.0	0.0

No-Build Strategy: The No-Build Strategy does not improve the traffic congestion conditions or goods movement. The traffic conditions and goods movement continue to worsen in this strategy. Undesirable congestion is expected during the 2030 morning westbound commute at I-470, between Lee's Summit Road and Blue Ridge Cutoff, between Sterling Avenue and I-435, and from I-435 to Benton Boulevard. The morning commute is expected to have 6.5 miles of undesirable congestion. The 2030 eastbound evening commute is expected to have undesirable levels of congestion from I-435 to U.S. 40 east and from Blue Ridge Boulevard to I-470. The evening commute is expected to have 6.0 miles of undesirable congestion east of I-435. The high congestion for the No-Build Strategy would affect both the movement of passenger vehicles and trucks carrying goods to, within, and through the

Kansas City metropolitan area. The HCS results for the No-Build Strategy are shown graphically in **Appendix D**.

Improve Key Bottlenecks Strategy: For the Improve Key Bottlenecks Strategy there are two locations with undesirable congestion between the downtown loop and I-435 and undesirable congestion is still expected between I-435 and I-470. The Study Team believes that additional design considerations would be able to provide relief to the undesirable congestion at the two locations west of I-435 that indicate undesirable congestion. The two locations are the westbound weave area between U.S. 40 and Van Brunt Boulevard and the westbound weave area between 23rd Street and 18th Street. The morning commute is expected to have one half mile of undesirable congestion in 2030 west of I-435. East of I-435, there is 5.7 miles of undesirable congestion in 2030. These will be looked at in greater detail during the Second Tier studies.

The 2030 westbound morning commute would experience some congestion at the I-470 Interchange, from Noland Road and Lee's Summit Road, Sterling Avenue and Blue Ridge Cutoff, U.S. 40 west and Van Brunt Boulevard, and 23rd Street and 18th Street. The 2030 eastbound evening commute would also be improved with expected congestion from Sterling Avenue to Chrysler Avenue and Noland Road to I-470. The evening commute is expected to have four miles of undesirable congestion east I-435. The HCS results for the Improve Key Bottlenecks Strategy are shown graphically in **Appendix D**.

Reduced congestion would benefit goods movement along I-70. Some companies have limited truck deliveries during the commuter morning and afternoon commutes to avoid congested roadways like I-70, minimize lost time for drivers, and achieve more reliable delivery times. However, the overall improvements for the Improve Key Bottlenecks Strategy, particularly the improvements at the Benton and Jackson Curves, would assist with the movement of freight during all times of the day.

Add General Lanes Strategy: The Add General Lanes Strategy would improve the traffic flow. There are no expected

undesirable congestion locations in the 2030 future forecasts along the I-70 corridor. The HCS results for the Add General Lanes Strategy are shown graphically in **Appendix D**.

The reduced congestion from the Add General Lanes Strategy would also benefit goods movement along I-70. Some companies have limited truck deliveries during the peak tend to avoid congested roadways like I-70 during the commuter morning and afternoon commutes to minimize lost time for drivers and achieve more reliable delivery times. However, the additional lanes would assist the movement of freight during less congested times as well.

Transportation Improvement Corridor Strategy: The Transportation Improvement Corridor Strategy would improve the traffic flow. There are no expected congestion locations in the future forecasts along the I-70 corridor. The HCS results for the Transportation Improvement Corridor Strategy are shown graphically in **Appendix D**. The reduced congestion from the Transportation Improvement Corridor Strategy would also benefit goods movement along I-70. If the use of the Transportation Improvement Corridor is focused on improving transportation of people, such as transit solutions, car pool lanes, or other lanes that only passenger vehicles can use, then the benefits of the improvement would not be as high for goods movement. However, trucks would still benefit from less congestion on the regular lanes.

How well will the First Tier Strategies Improve Safety?

The Study Team completed a safety analysis that evaluated crash data covering a five year period (2003 to 2007). The safety analysis identified the downtown loop, five eastbound, and three westbound sections in the Study Area that exceeded the statewide average crash rate for urban interstates. The locations with crash rates more than 150 percent of the statewide average crash rate are highlighted in the crash summary shown in **Table 2.4**.

Table 2.4 I-70 FTEIS Crash Rate Summary

Analysis Sections		Length (miles)	2003 to 2007 Crash Rate (Crashes Per 100 Million Vehicle Miles of Travel)		5 Year Crash Rate versus Statewide Average Crash Rate* (107.82)	
			Eastbound	Westbound	Eastbound	Westbound
1	Downtown Loop	3.45	340.50		**316%**	
2	Paseo Blvd Interchange	0.86	161.41	227.10	150%	**211%**
3	Benton Curve	1.20	154.84	211.11	144%	**196%**
4	23rd St Interchange	0.67	93.76	61.35	87%	57%
5	Jackson Curve	0.88	234.57	90.07	**218%**	84%
6	Van Brunt Blvd Interchange	0.73	238.13	128.44	**221%**	119%
7	U.S. 40 West Interchange	0.59	186.80	98.21	**173%**	91%
8	Manchester Ave Interchange	0.57	211.48	114.95	**196%**	107%
9	I-435 Interchange	0.96	189.01	213.37	**175%**	**198%**
10	Blue Ridge Cutoff Interchange	1.28	136.12	149.12	126%	138%
11	U.S. 40 East Interchange	1.60	141.61	114.05	131%	106%
12	Noland Rd Interchange	1.50	140.11	132.24	130%	123%
13	Lee's Summit Rd Interchange	1.35	113.50	106.52	105%	99%
14	I-470 Interchange	1.51	131.95	111.28	122%	103%
	Totals		182.79		**170%**	

* Statewide average crash rate for urban interstates.

The Study Area sections with the highest crash rates include the downtown loop, westbound from the downtown loop to 23rd Street, and eastbound from I-435 to the Jackson curve. The Study Team then evaluated the strategies to determine if they provide improvements to address the high crash locations in the Study Area.

No-Build Strategy: The No-Build Strategy has improvements in two areas where safety is a concern along the corridor. The kcICON project will provide improvements in the northeast corner of the downtown loop and at the I-435 Interchange. None of the other high crash locations would be addressed. It is possible that overall safety would decline as the corridor becomes increasingly congested with stop and go traffic flows.

Improve Key Bottlenecks Strategy: The Improve Key Bottlenecks Strategy would provide improvements that would improve safety including: lane balance and access consolidation in the downtown loop, improvements to the Benton curve and the Jackson curve, upgrade the I-435

Interchange to an ultimate interchange design such as the concept identified in the Access Justification Report I-70 and I-435 Interchange Area, and ramp improvements at Paseo Boulevard, U.S. 40 west, and Manchester Avenue. These would be all of the locations where there are high crash concerns.

Add General Lanes Strategy: The Add General Lanes Strategy would provide improvements that would improve safety including: lane balance and access consolidation in the downtown loop, improvements to the Benton curve and the Jackson curve, upgrade the I-435 Interchange to an ultimate interchange design such as the concept identified in the Access Justification Report I-70 and I-435 Interchange Area, and ramp improvements at Paseo Boulevard, U.S. 40 west, and Manchester Avenue. These would be all of the locations where there are high crash concerns.

Transportation Improvement Corridor Strategy: The Transportation Improvement Corridor Strategy would provide improvements that would improve safety including: lane balance and access consolidation in the downtown loop, improvements to the Benton curve and the Jackson curve, upgrade the I-435 Interchange to an ultimate interchange design such as the concept identified in the Access Justification Report I-70 and I-435 Interchange Area, and ramp improvements at Paseo Boulevard, U.S. 40 west, and Manchester Avenue. These would be all of the locations where there are high crash concerns.

How well will the First Tier Strategies Enhance Accessibility Along and Across the Corridor?

For each of these strategies the Study Team evaluated locations that would provide potential for access improvements for local traffic, transit, pedestrians, and cyclists across and along the corridor. The design details of these improvements including potential rehabilitation of bridges across the interstate to enhance bicycle and pedestrian connections and the use of community bridges will be fully evaluated in the Second Tier studies.

No-Build Strategy: The No-Build Strategy does have committed improvements at the Blue Ridge Cutoff Bridge that will enhance the accessibility across the corridor via improved sidewalks. No other improvements for accessibility across the freeway are planned.

Improve Key Bottlenecks Strategy: The Improve Key Bottlenecks Strategy would enhance the accessibility along and across the corridor through improvements at Paseo Boulevard, Truman Road, 23rd Street, U.S. 40 west, and Blue Ridge Cutoff which would provide for improved pedestrian crossings. Improvements that would allow buses to use the shoulder of the freeway during congested times would also improve access along the corridor for transit users by making transit a more efficient way to get around.

Add General Lanes Strategy: The Add General Lanes Strategy would enhance the accessibility along and across the corridor through improvements at the interchanges and overpasses noted in the Improve Key Bottlenecks Strategy plus the interchanges at Woodland Avenue, Prospect Avenue, 18th Street, Jackson Avenue, Van Brunt Boulevard, U.S. 40 east, and Lee's Summit Road. In addition, four overpasses would be rebuilt at Cleveland Avenue, Chrysler Avenue, Pittman Road, and Phelps Road to accommodate the additional lanes. Rebuilt bridges across I-70 could also enhance bicycle and pedestrian connections. Improvements that would allow buses to use the shoulder of the freeway during congested times would also improve access along the corridor for transit users by making transit a more efficient way to get around.

Transportation Improvement Corridor Strategy: The Transportation Improvement Corridor Strategy would enhance the accessibility along and across the corridor through improvements at the interchanges and overpasses noted in the Improve Key Bottlenecks Strategy plus the interchanges at Woodland Avenue, Prospect Avenue, 18th Street, Jackson Avenue, Van Brunt Boulevard, U. S. 40 east, and Lee's Summit Road. In addition, four overpasses would be rebuilt at Cleveland Avenue, Chrysler Avenue, Pittman Road, and Phelps Road to accommodate the transportation improvement corridor. Rebuilt bridges across I-70 could also enhance bicycle and pedestrian connections. Bus uses in the

Transportation Improvement Corridor would also improve access along the corridor for transit users by making transit a more efficient way to get around.

How much would the First Tier Strategies Costs?

The following discussion includes estimated construction and right of way costs for the strategies. In the Second Tier studies, more detailed design would be completed that would result in more refined cost estimates and could reduce the right of way requirements and costs. All of the cost estimates are in current 2009 dollars.

No-Build Strategy: The No-Build Strategy would cost an estimated $8.1 million dollars a year in on-going maintenance and operational costs over the next 30 years. This represents a total cost of approximately $250 million between 2009 and 2035.

Improve Key Bottlenecks Strategy: The Improve Key Bottlenecks Strategy is estimated to cost $580 million to construct and an additional $157 million in right of way acquisition costs. The total estimated cost is $737 million.

Add General Lanes Strategy: The Add General Lanes Strategy is estimated to cost $680 million to construct and an additional $185 million in right of way acquisition costs. The total estimated cost is $865 million.

What is meant by Identified Preferred Strategy?

The Identified Preferred Strategy is not the Final Preferred Strategy. Comments on the DEIS and at the public hearing on the DEIS may result in changes to the Identified Preferred Strategy.

Transportation Improvement Corridor Strategy: The Transportation Improvement Corridor Strategy is estimated to cost $840 million to construct and an additional $208 million in right of way acquisition costs. The total estimated cost is $1,048 million.

2.5 The Identified Preferred Strategy

The I-70 FTEIS Identified Preferred Strategy is the Improve Key Bottlenecks Strategy in the downtown loop to east of I-435. From east of I-435 to I-470, the Identified Preferred Strategy is to carry either the Improve Key Bottlenecks Strategy or the Add General Lanes Strategy into the Second Tier studies. **Figure 2.9** at the end of this chapter shows the

Identified Preferred Strategy. The Transportation Improvement Corridor Strategy would be eliminated from consideration. The following paragraphs describe the Identified Preferred Strategy in the various Sub-Areas of the corridor.

Corridor Wide Improvements: The Identified Preferred Strategy would rebuild and/or rehabilitate I-70 and the downtown loop to its existing configuration with a design life of 30 to 50 years. This includes pavement, roadbed, and structure improvements. The Identified Preferred Strategy will evaluate interchange improvements to address ramp lengths, merge areas, and weave sections at all interchanges. Other corridor wide improvements in the Identified Preferred Strategy include integrating Operation Green Light on parallel routes, improving incident management response times to clear incidents and stalled vehicles, coordination with Smart Moves Regional Transit Vision, improving non-motorized access across I-70 and the downtown loop with a Community Bridges, and investigating locations to add Park and Ride lots as necessary.

Downtown Sub-Area: The downtown loop improvements in the Identified Preferred Strategy include lane balance and improvements in the northeast corner of the downtown loop as part of the kcICON project. This strategy would also consider interchange additions, consolidations, modifications, and/or eliminations to improve traffic flow and safety.

The Identified Preferred Strategy would consider the on-going South Loop Link Study to evaluate the possibility of enclosing the south leg of the downtown loop to expand development opportunities in the downtown. The Second Tier Studies will coordinate with that planning effort and consider the recommended improvements from that study. In addition, the Wyandotte on-ramp to westbound I-670 was removed during the Bartle Hall expansion. There was a commitment to replace this ramp at a future date. The need to replace this connection or not and where the ramp would be located are issues that will be evaluated in the Second Tier Studies.

Urban Sub-Area: The Identified Preferred Strategy includes the bridge rehabilitation from Paseo Boulevard to Van Brunt

Boulevard. I-70 would be rebuilt to provide for bus transit on the shoulder. I-70 curves at Benton Boulevard and Jackson Avenue would be improved within the available right of way to the extent possible. The strategy will consider interchange consolidations, modifications with CD roads, and/or elimination of access at 18th Street to improve traffic flow and safety.

I-435 Sub-Area: In addition to the project currently programmed in the STIP as described in the No-Build Strategy, MoDOT will continue to modify the freeway access along I-70 and I-435 to relieve congestion and improve the condition of the system in the I-435 and I-70 interchange area. Similar to the programmed STIP project, the proposed improvements include adding lanes to I-435; modifying ramps into a collector-distributor system on I-70 and I-435 and extending ramps at several locations for additional weave, merge and diverge area; reconstructing and relocating the fully directional ramps to eliminate left-side exits from the interstate. These proposed improvements reduce congestion, improve safety and address bridge maintenance needs in the interchange area.

The Identified Preferred Strategy would also evaluate the need to modify access at the Manchester Trafficway Interchange.

Suburban Sub-Area: The final improvement strategy decision would be made in the Second Tier studies. If the Improve Key Bottlenecks Strategy is selected, I-70 would be rebuilt through this area and provide for bus transit on the shoulder. All bridges from Blue Ridge Cutoff to U.S. 40 east would be rehabilitated per MoDOT programmed bridge projects, except the Noland Road Bridge which was recently rebuilt. The Identified Preferred Strategy would also evaluate the need to modify, consolidate, or eliminate the series of Sterling Avenue, U.S. 40 east, and Blue Ridge Boulevard interchanges.

If the Add General Lanes Strategy is selected, I-70 would be rebuilt with eight lanes through this area. I-70 between Blue Ridge Cutoff and I-470 would have bridge rehabilitation of all bridges from U.S. 40 east to I-435 per MoDOT programmed bridge projects, except the Noland Road Bridge which was recently rebuilt. All bridge structures would be rebuilt to

accommodate the additional lanes. Transit improvements would include bus on shoulder operations.

I-470 Sub-Area: The Identified Preferred Strategy would include modifications at the I-70/I-470 interchange that would work with either the Improve Key Bottlenecks Strategy or the Add General Lanes Strategy. Improvements at the I-70/I-470 interchange would also be designed to connect with improvements identified in the I-470 Purpose and Need Study or the I-70 Statewide Study. The Identified Preferred Strategy would address short ramps and merging issues on I-70 and I-470 at the interchange between the two freeways. I-70 would be rebuilt through the I-470 interchange and would provide for bus transit on the shoulder. Interchange improvements would include either a collector distributor road system or improvements to the interchange ramps to eliminate some of the interchange weaving areas. I-470 would require interchange improvements at U.S. 40 and 39th Street to maintain access if there are new ramps and I-470 mainline improvements to join the new ramps with I-470 traffic. I-70 would also require some ramp modifications.

What is the I-70 Statewide Study?

MoDOT is looking at how to best rebuild I-70 between Independence and Lake St. Louis. The purpose and need of the project include increasing roadway capacity, improving traffic safety, upgrading roadway design features, preserving the existing corridor, improving the efficiency of goods movement, improving access to recreational facilities, and improving this corridor for national security and disaster preparedness.

Why was the Identified Preferred Strategy Proposed?

This section discusses why MoDOT identified the Improve Key Bottlenecks Strategy in the downtown loop to east of I-435 and the decision to leave the final strategy open to either the Improve Key Bottlenecks Strategy or Add General Lanes Strategy from east of I-435 to I-470.

The Study Team identified the Improve Key Bottlenecks Strategy in the downtown loop to east of I-435 for the following reasons:

- It addresses the purpose and need for improving I-70 as identified in **Chapter 1**.
- It reduces peak hour congestion to LOS E or better.
- It has the lowest need to acquire properties and relocations of homes and businesses, especially in the environmental justice areas for the Build Strategies.
- It has the lowest human and natural environmental impacts for the Build Strategies.
- It has the lowest estimated cost of the Build Strategies.

- It improves access across the freeway.
- It improves transit service with bus on shoulder.
- It restores and/or rebuilds the existing infrastructure.

From east of I-435 to I-470, the Identified Preferred Strategy is to leave the decision open for the Second Tier studies to decide. The Identified Preferred Strategy is to carry both the Improve Key Bottlenecks Strategy and the Add General Lanes Strategy with an option to stripe a HOV/Bus lane forward to the Second Tier studies.

Identified Preferred Strategy Traffic Forecast

The Study Team decided to conduct traffic analysis on a combined strategy because the Improve Key Bottlenecks Strategy relieves congestion west of I-435, but not east of I-435. The Study Team evaluated a combination of the Improve Key Bottlenecks Strategy west of I-435 and the Add General Lanes Strategy east of I-435 to I-470. The combined traffic analysis results indicate the same two locations with undesirable congestion west of I-435 as were identified for the Improve Key Bottlenecks Strategy. Additional design measures in the Second Tier studies are anticipated to effectively address these two locations where congestion is still a concern. By using the Add General Lanes Strategy east of I-435, it continued to provide relief to all undesirable congestion east of I-435.

Although the traffic model indicates the need for additional lanes on I-70 from east of I-435 to I-470, several factors make this conclusion uncertain between now and 2030. As a result, the Study Team proposes leaving the final decision on adding lanes east of I-435 to the Second Tier studies. The factors and issues leading to this conclusion include:

- Uncertainty in how much traffic levels are going to increase. Higher gas prices have caused reductions in national and regional vehicle miles traveled in recent years.
- Uncertainty about the compatibility of the Add General Lanes Strategy with the sustainability goals of MARC's 2040 Long Range Transportation Plan update. If this plan results in a strategy for much more compact

development, additional road capacity may not be needed.

- Uncertainty of the Add General Lanes Strategy compatibility with future regional transit plan investments such as a fixed guide way system. Improving capacity in the I-70 corridor could potentially be solved be either adding new lanes to I-70 or through regional transit improvements. However, a significant investment to both potential highway and transit solutions is not necessary. If the region, supported by regional transit plans, concludes a significant transit investment would adequately address the traffic needs in the I-70 corridor, MoDOT, working with the region, would reevaluate the decision in the tiered environmental process.
- Potential federal climate change and vehicle emissions legislation. Congress is considering legislation that may focus transportation improvements on those that reduce driving instead of those that add capacity.

Delaying the final improvement decision until the Second Tier studies would be a cost effective use of public dollars given the uncertainties noted above. This strategy avoids committing to a solution that may be undesirable given future policy changes and thus requiring reopening this First Tier study.

The I-70 FTEIS would provide environmental evaluation for the wider of the two footprints (Add General Lanes Strategy) to ensure appropriate environmental impact analysis is conducted prior to the Second Tier studies.

The Transportation Improvement Corridor Strategy using fixed barriers for a specialty corridor was eliminated from further consideration. The option to stripe a HOV/Bus lane would be carried forward with the Add General Lanes Strategy. The barrier separated specialty corridor would not be carried forward for the following reasons:

- Over builds the freeway to more pavement than is needed. This is an inefficient use of limited public dollars.

- The highest property impacts and relocates the most homes and businesses.
- The most severe Environmental Justice area impacts.
- The highest human and natural environment impacts.
- The highest expected estimated cost.

What will the Identified Preferred Strategy Cost?

The Identified Preferred Strategy is estimated to cost between $740 and $760 million to construct depending on which scenario is selected east of I-435.

What are the Next steps in the Analysis?

A public comment period of no less than 45 days will follow the publication of this Draft FTEIS document. During the comment period MoDOT will hold a formal Public Hearing in the Study Area. MoDOT will also hold a series of Mobile Meetings, host an on-line presentation and comment option, and attend further speaking engagements to talk about the study. The public and stakeholders can attend any one of these events or send comments on this Draft FTEIS and the Strategies to the addresses listed on the first page of the document.

Following the Public Hearing and Comment period, the Study Team will use the input provided by the public, stakeholders, and agencies to help refine the Identified Preferred Strategy. The Study Team will produce a Final FTEIS document that updates the Identified Preferred Strategy and addresses the comments received. The Federal Highway Administration will then issue a Record of Decision that will formally select the strategy to move forward into the Second Tier studies. The next step would be to conduct the Second Tier studies which will further evaluate and refine the impacts of the Identified Preferred Strategy. The Second Tier studies will refine the right of way affected and acquired by the project to avoid, minimize, or mitigate the identified effects of the I-70 improvements where possible.

How would the Identified Preferred Strategy be divided into Second Tier studies?

For the Second Tier studies, the portion of I-70 covered by this FTEIS as well as the downtown loop will be divided into Sections of Independent Utility. At this time, the proposed Sections of Independent Utility are the five Sub-Areas in **Figure 3.0** at the end of **Chapter 3**. Descriptions of the five Sub-Areas are as follows:

- Downtown Sub-Area: The downtown loop (the FTEIS Study Area west of Tracy Avenue). This makes the Kansas City Downtown Loop its own Section of Independent Utility. This second tier study would consider the results of the South Loop Link Study and the replacement of the Wyandotte ramp to I-670 as committed during in the Bartle Hall expansion project.
- Urban Sub-Area: The downtown loop to west of I-435 (Tracy Avenue to Topping Avenue).
- I-435 Sub-Area: West of I-435 to east of I-435 (Topping Avenue to east of Blue Ridge Cutoff). This corresponds to the approximate limits of the existing I-435/I-70 interchange improvements that MoDOT is undertaking.
- Suburban Sub-Area: East of I-435 to west of I-470 (East of Blue Ridge Cutoff to east of Lee's Summit Road).
- I-470 Sub-Area: West of I-470 to east of I-470 (East of Lee's Summit Road to the east limits of the Study Area). This Section of Independent Utility would allow for incorporation of improvements on I-70, I-470, and MO-291 in the vicinity of the interchange.

The Study Team believes that these are logical Sections of Independent Utility that have rational endpoints (called logical termini). This is a preliminary recommendation on dividing the corridor into Second Tier studies that will be refined and expanded upon as the Identified Preferred Strategy is refined. There will be further discussion in the Final FTEIS.

What is a Section of Independent Utility?

A Section of Independent Utility (SIU) is a section of a larger project that can function on its own, without further construction of an adjoining road section required.

Table 2.2 First Tier Strategy Package Screening

Achieved = 100% or highest benefit

Mostly Achieved = 80% or moderately high benefit

Moderately Achieved = 50% or moderate benefit

Slightly Achieved = 20% or low benefit

Not Achieved = 0% or no benefit

Evaluation Factor	Definition/Clarification	Indicators	Strategy Package*				
			No-Build	Improve Key Bottlenecks	Add General Lanes Capacity	Transportation Improvement Corridor	Notes
Safety							
Crash Reduction	Evaluate with respect to reduction in crash rate	Addresses all or most of locations with crash rates above statewide average					
		Improves I-70 curves					
		Number of interchanges where geometrics are improved	3	10	19	17	
Compliance with MoDOT Access Management Guidelines	Evaluate how well the proposed strategy package provides for the opportunity to implement Access Management Guidelines						
Congestion Relief							
Traffic Operations/ Congestion Relief	Evaluate the strategies from a traffic operations standpoint based on Level of Service.	Miles of LOS F in 2030	Total 12.5 West of I-435 – 2.3 East of I-435 – 10.2	Total 6.2 West of I-435 – 0.5** East of I-435 – 5.7	Total 0.0	Total 0.0	**Can be corrected with a different bottleneck improvement
Restore/Maintain Existing Infrastructure							
Restore & Maintain Existing Infrastructure	Evaluate the Corridor wide rehabilitation and/or rebuilding of existing highway either in place or as part of capacity expansion	Rehabilitates and/or rebuilds existing highway in place or as part of capacity expansion					
Improve Accessibility							
Improve accessibility across/neighborhood	Evaluate how well strategy package improves neighborhoods and communities accessibility	Number of Interchange and Overpass Reconfigurations	3	10	24	22	
		Bicycle and/or Pedestrian accommodations and/or improvements proposed					
Improve Public Transportation	Evaluate potential for strategy package to improve public transportation	Adds Park & Ride					

Achieved = 100% or highest benefit

Mostly Achieved = 80% or moderately high benefit

Moderately Achieved = 50% or moderate benefit

Slightly Achieved = 20% or low benefit

Not Achieved = 0% or no benefit

Evaluation Factor	Definition/Clarification	Indicators	Strategy Package*				
			No-Build	Improve Key Bottlenecks	Add General Lanes Capacity	Transportation Improvement Corridor	Notes
		Support Operation Green Light					
		Integrate Smart Moves Transit Plan					
Improve Goods Movement							
Improve Goods Movement	Strategy package effectively serves freight movements in corridor	Improves Freight Movement					
Social and Economic							
Relocations	Evaluate the impact on residences and businesses to be displaced	Residential – Single family (each)	0	170	271	399	
		Residential – Multi-family (each)	0	18	32	45	
		Commercial/Industrial (each)	0	55	93	111	
		Churches (each)	0	0	4	7	
		Schools (each)	0	1	1	1	
Environmental Justice	Evaluate the impact to low income and/or minority areas	Area of property affected (each)	0 Single Family 0 Multi-family	51 Single Family 5 Multi-family	95 Single Family 18 Multi-family	160 Single Family 28 Multi-family	EJ area identified as west of the Blue River
Public Facilities & Services	Evaluate the impact to facilities and services used for public uses	Number of facilities (each)	0	3	11	12	
Environment							
Noise	Evaluate potential impact on existing sensitive receptors (residences, schools, churches, parks)	Proximity to sensitive noise receptor (number within 150 feet of proposed future edge of pavement)	664	465	335	282	
Parks/Recreational Land	Evaluate potential impact on parks	Number of park/recreational lands affected (each)	0	6	10	9	
Historic Property	Evaluate potential impact on historic properties	Number of historic properties impacted(buildings on or eligible for NRHP (each)	0	0	0	0	17 historic structures in the downtown area adjacent to the project area. None are expected to be directly impacted
Historic Districts	Evaluate potential impact on historic district	Area of historic district impacted (each)	0	0	0	0	Four Historic districts in the downtown area adjacent to the project area None are expected to be directly impacted
Archaeological Site	Evaluate potential impact to archeological sites	Number of potential archaeological locations (each)	0	7	9	9	These are not known sites but identified locations with potential for archaeological sites
Water Resources	Evaluate potential impact to rivers and streams	Encroachment on the Blue River (*Fatal Flaw, Large, Moderate,*	None	Minor	Minor	Minor	

Achieved = 100% or highest benefit

Mostly Achieved = 80% or moderately high benefit

Moderately Achieved = 50% or moderate benefit

Slightly Achieved = 20% or low benefit

Not Achieved = 0% or no benefit

Evaluation Factor	Definition/Clarification	Indicators	Strategy Package*				
			No-Build	Improve Key Bottlenecks	Add General Lanes Capacity	Transportation Improvement Corridor	Notes
		Minor, None)					
		Number of streams/tributaries crossed (each)	0	8	10	10	
Floodplains	Evaluate potential impact on floodplains	Area of floodplain affected (acres)	0	19 acres	21 acres	24 acres	
Wetlands	Evaluate potential impact on wetlands	Area of emergent wetland affected (acres)	0	0.9 acres	0.9 acres	0.9 acres	
		Area of forested/shrub wetland affected (acres)	0	0.48 acres	1.13 acres	1.09 acres	
Known Hazardous Waste Sites	Evaluate potential impact on known hazardous waste sites	Number of sites affected (each)	0	0	0	0	
Forested Areas	Evaluate potential impact on forested areas	Area of sites affected (acres)	0	57 acres	69 acres	69 acres	
Cost							
Land Acquisition Cost	Opinion of probable land acquisition cost	Right of Way Cost (millions)	$0	$157	$185	$205	
Construction Cost	Opinion of probable construction cost	Total Construction Cost (millions)	$8.1 annual maintenance	$580	$680	$840	
Total Costs	Opinion of total cost	Total Cost (millions)	$250	$737	$865	$1,045	Identified Preferred Scenario cost estimate is between $740 and $760 million depending on the scenario selected east of I-435

*The Strategy Packages that are a part of this screening process have been screened against the Purpose and Need in the Initial Screening Evaluation. The No-Build does not meet the goals of the Purpose and Need but is required by NEPA to be carried forward for further evaluation. A detailed description of how the evaluation factors were measured qualitatively using the Achieved to Not Achieved Scale is included in Appendix C.

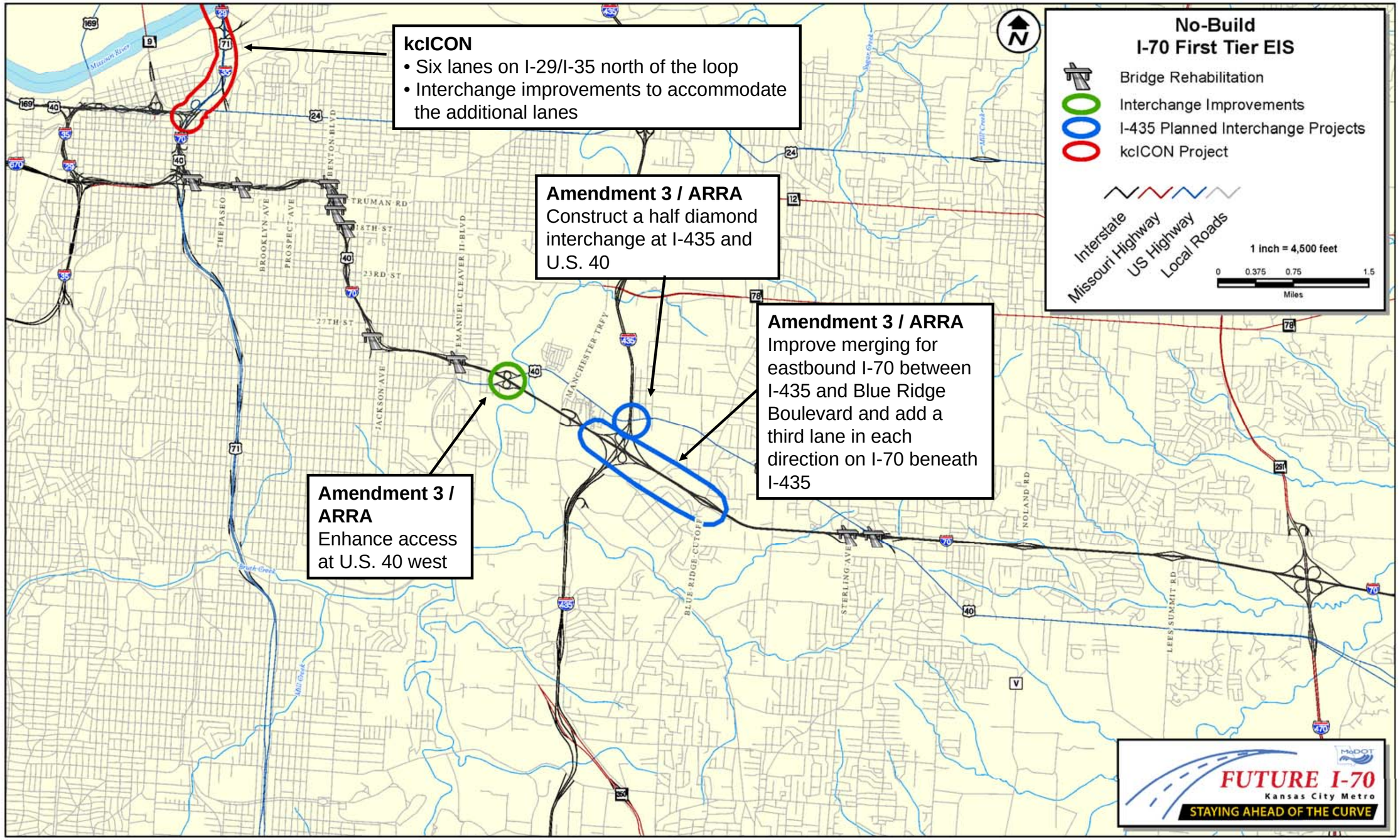


Figure 2.1 No-Build Strategy

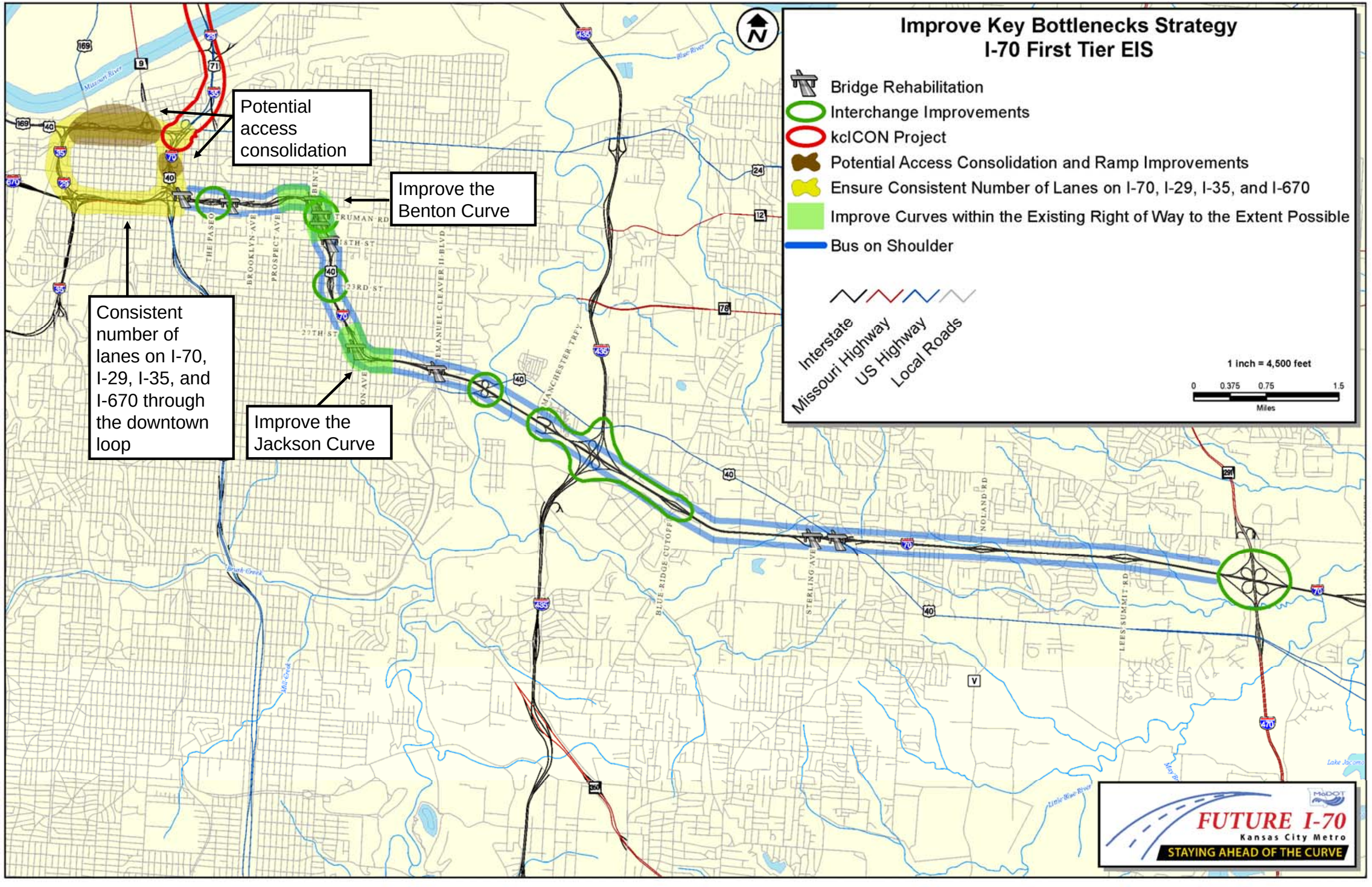


Figure 2.2 Improve Key Bottlenecks Strategy

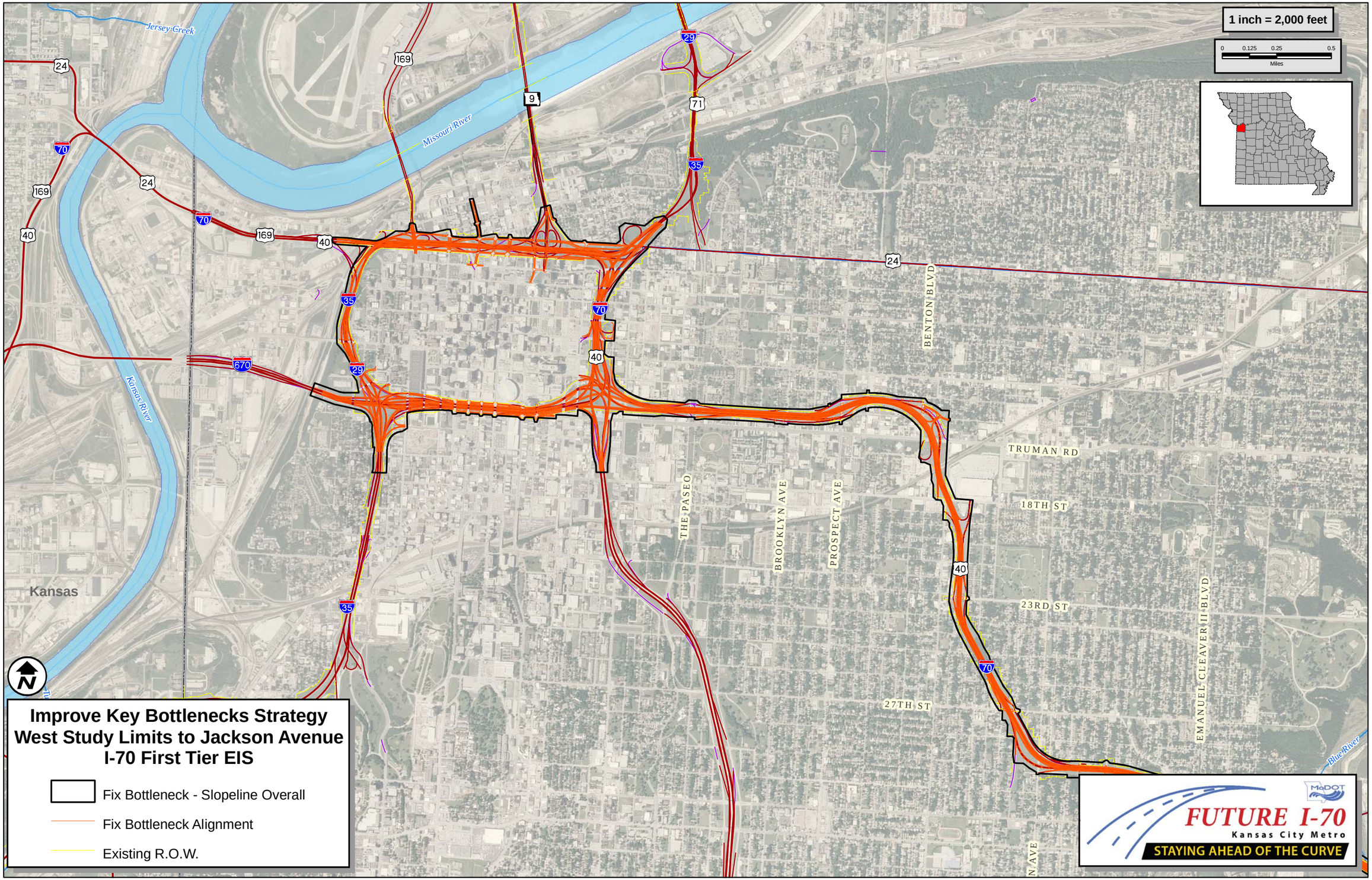


Figure 2.3 Improve Key Bottlenecks Strategy - West Study Limits to Jackson Avenue

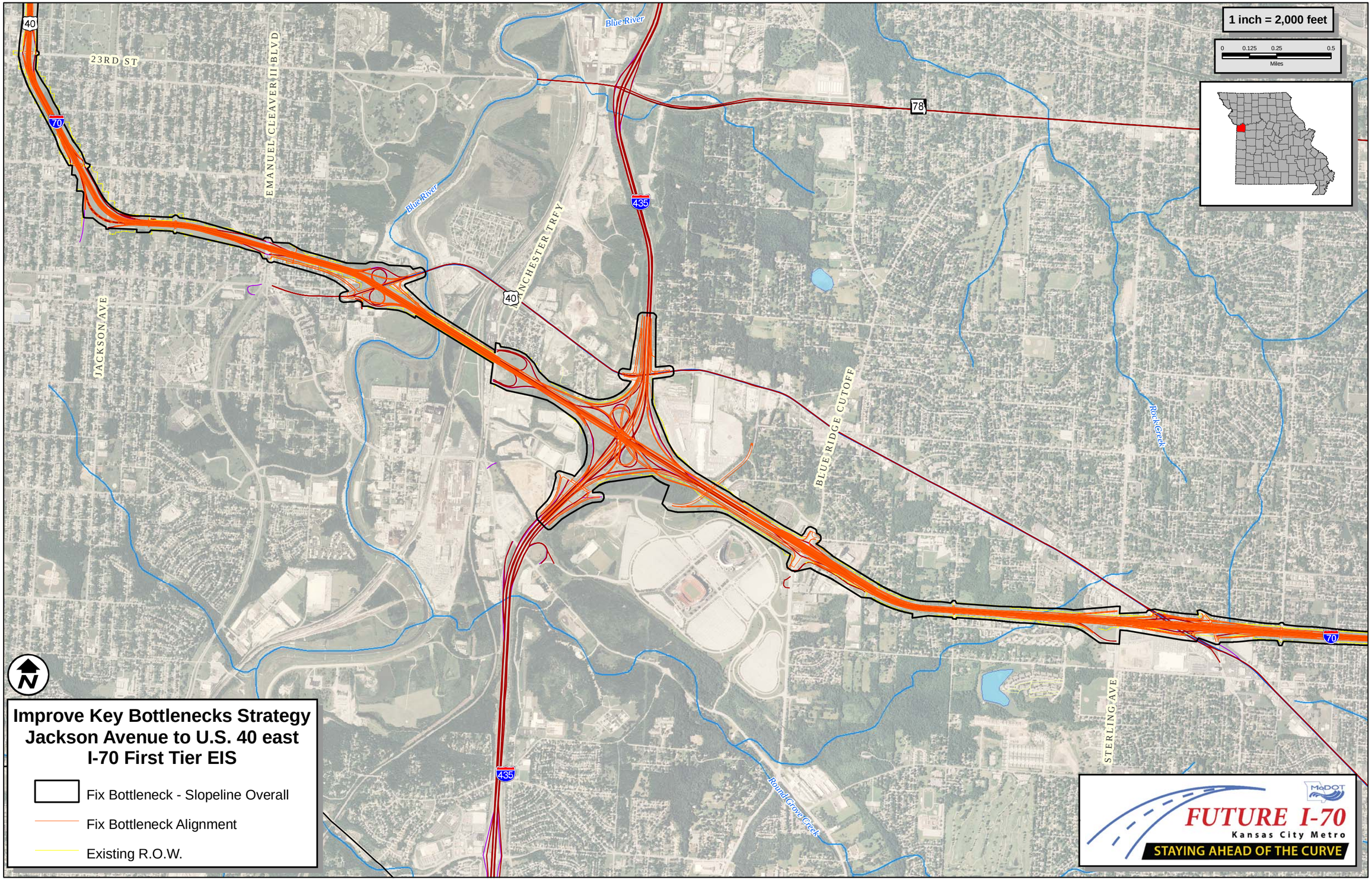


Figure 2.3 Improve Key Bottlenecks Strategy - Jackson Avenue to U.S. 40 east

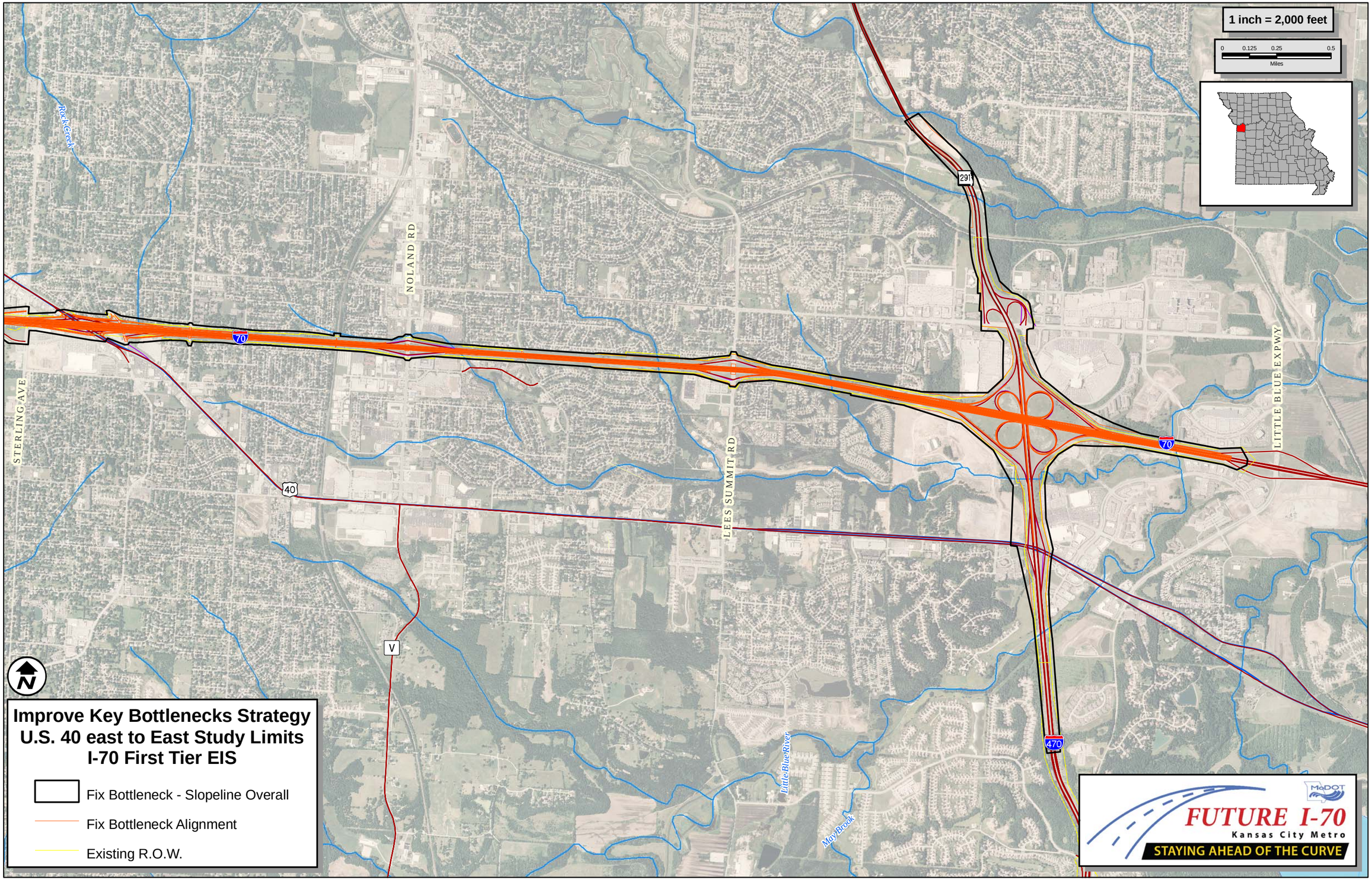


Figure 2.3 Improve Key Bottlenecks Strategy - U.S. 40 east to East Study Limits

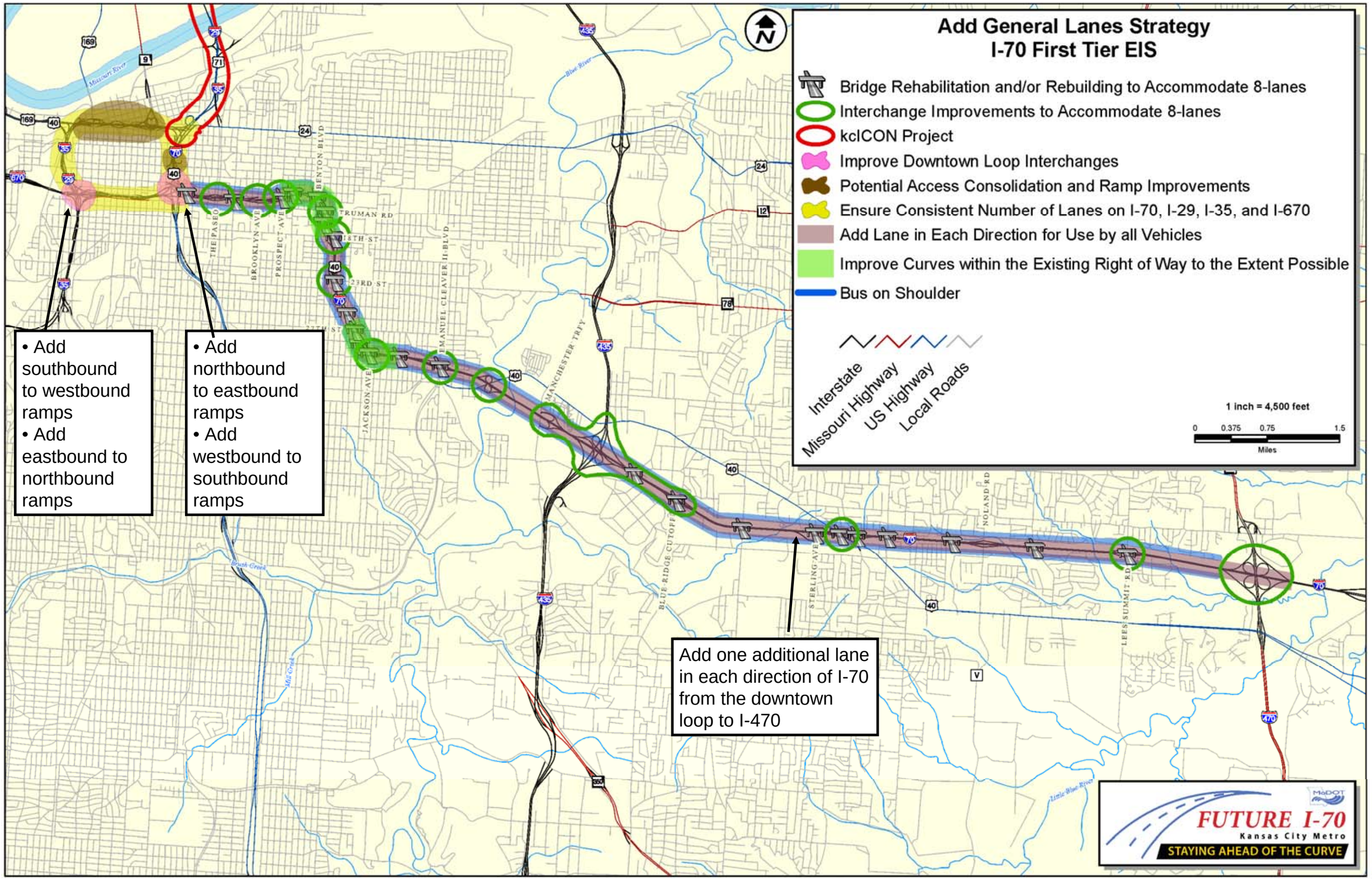


Figure 2.4 Add General Lanes Strategy

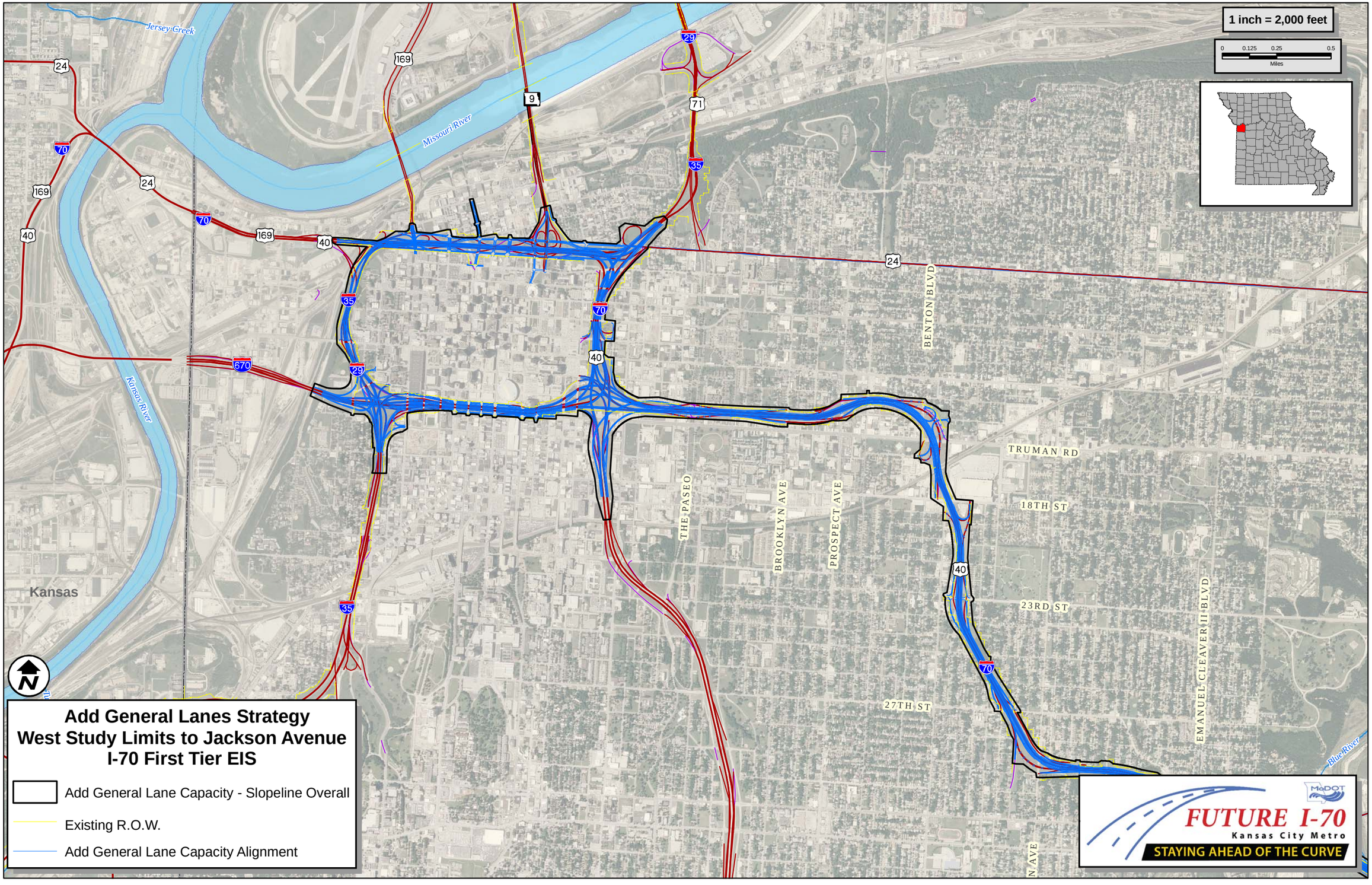


Figure 2.5 Add General Lanes Strategy - West Study Limits to Jackson Avenue

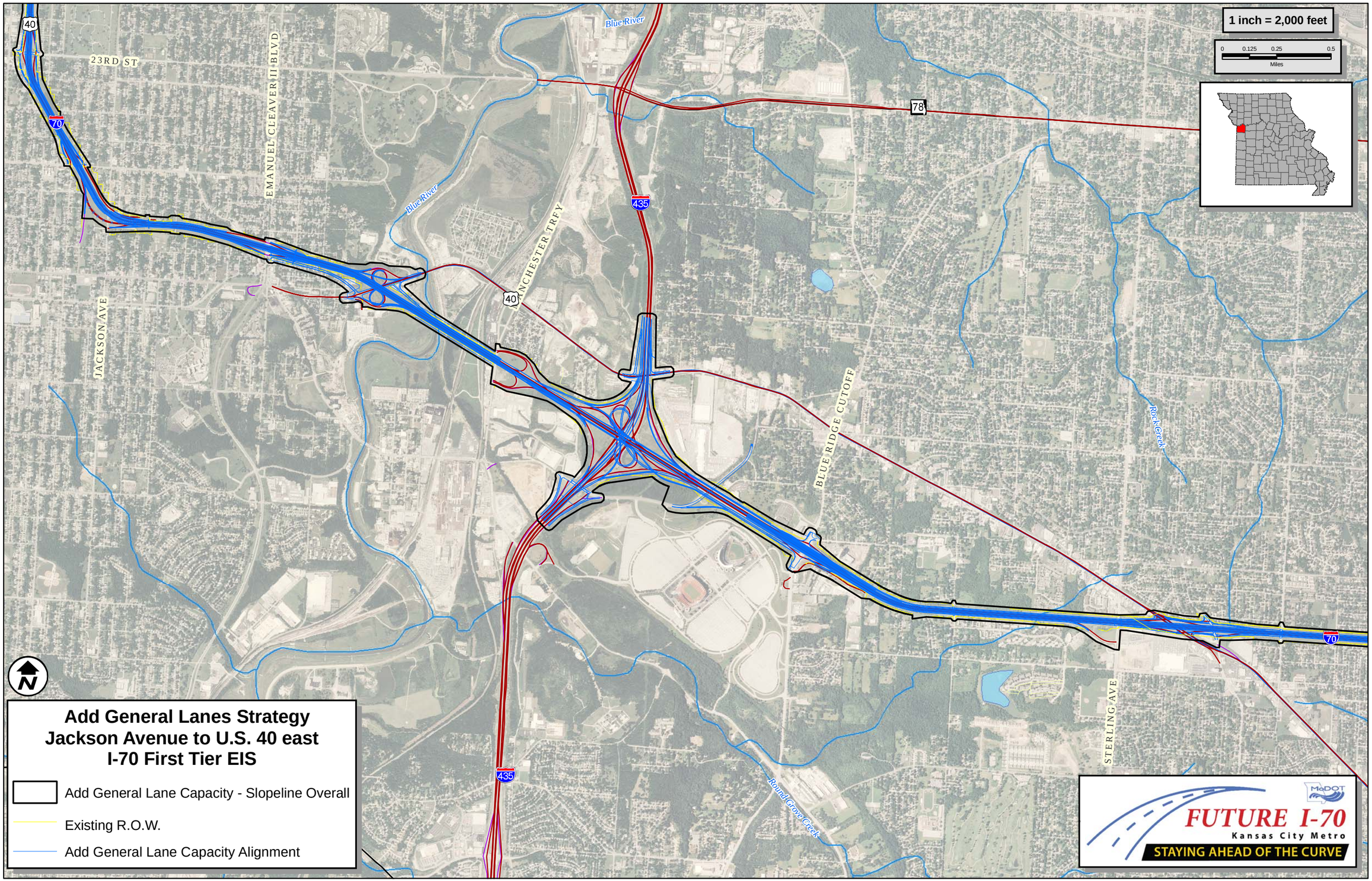


Figure 2.5 Add General Lanes Strategy - Jackson Avenue to U.S. 40 east

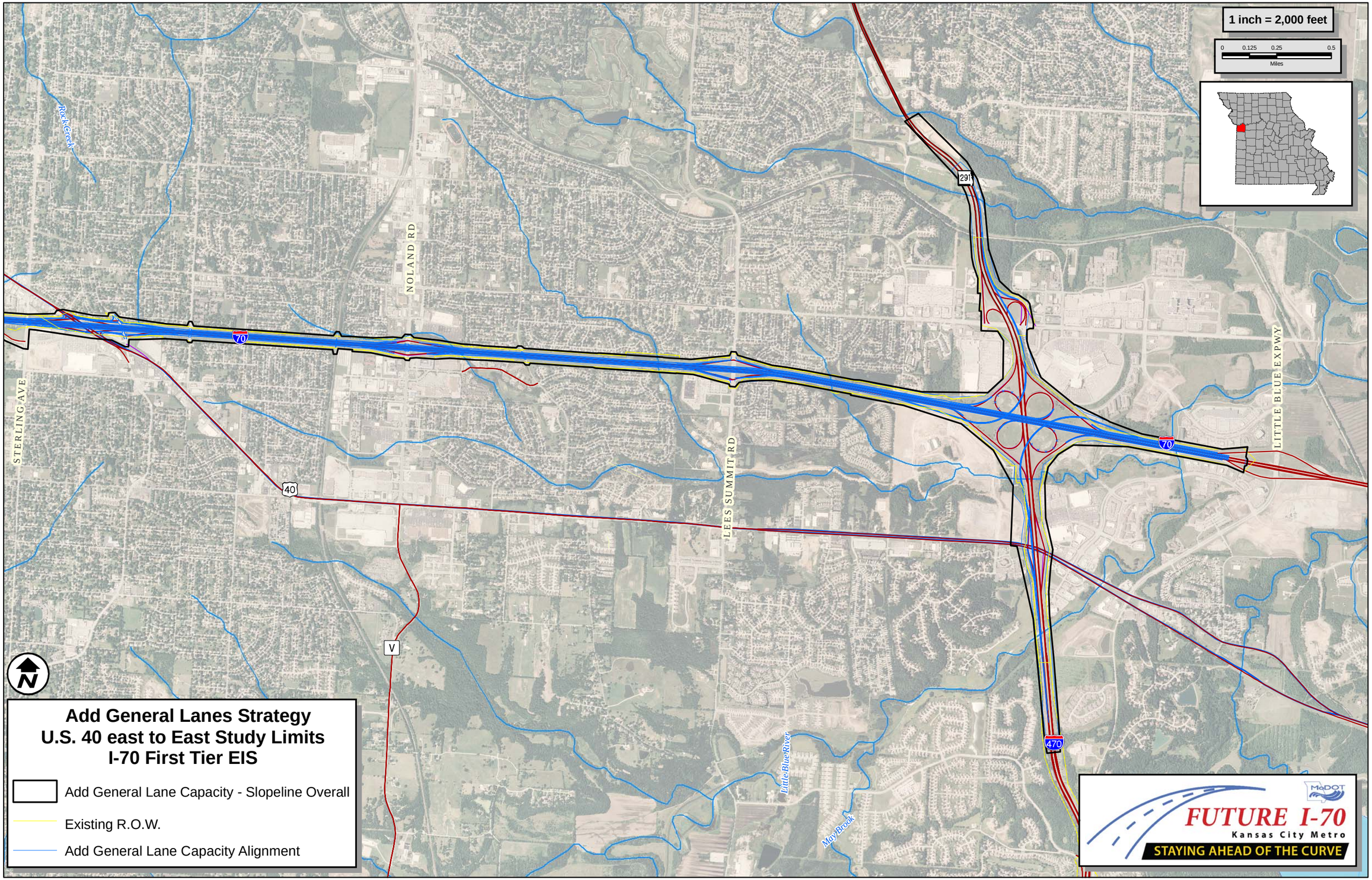


Figure 2.5 Add General Lanes Strategy - U.S. 40 east to East Study Limits

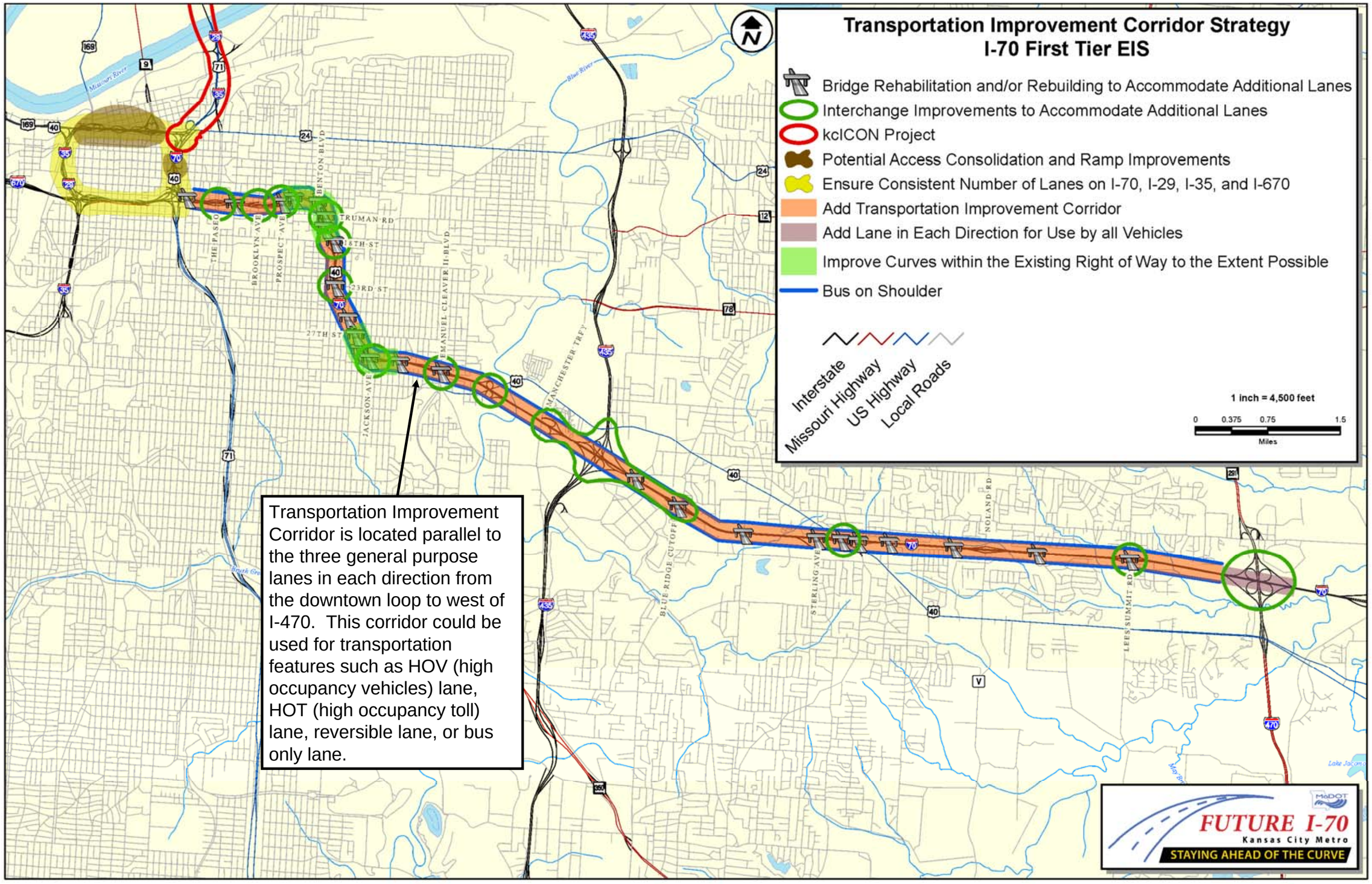


Figure 2.6 Transportation Improvement Corridor Strategy

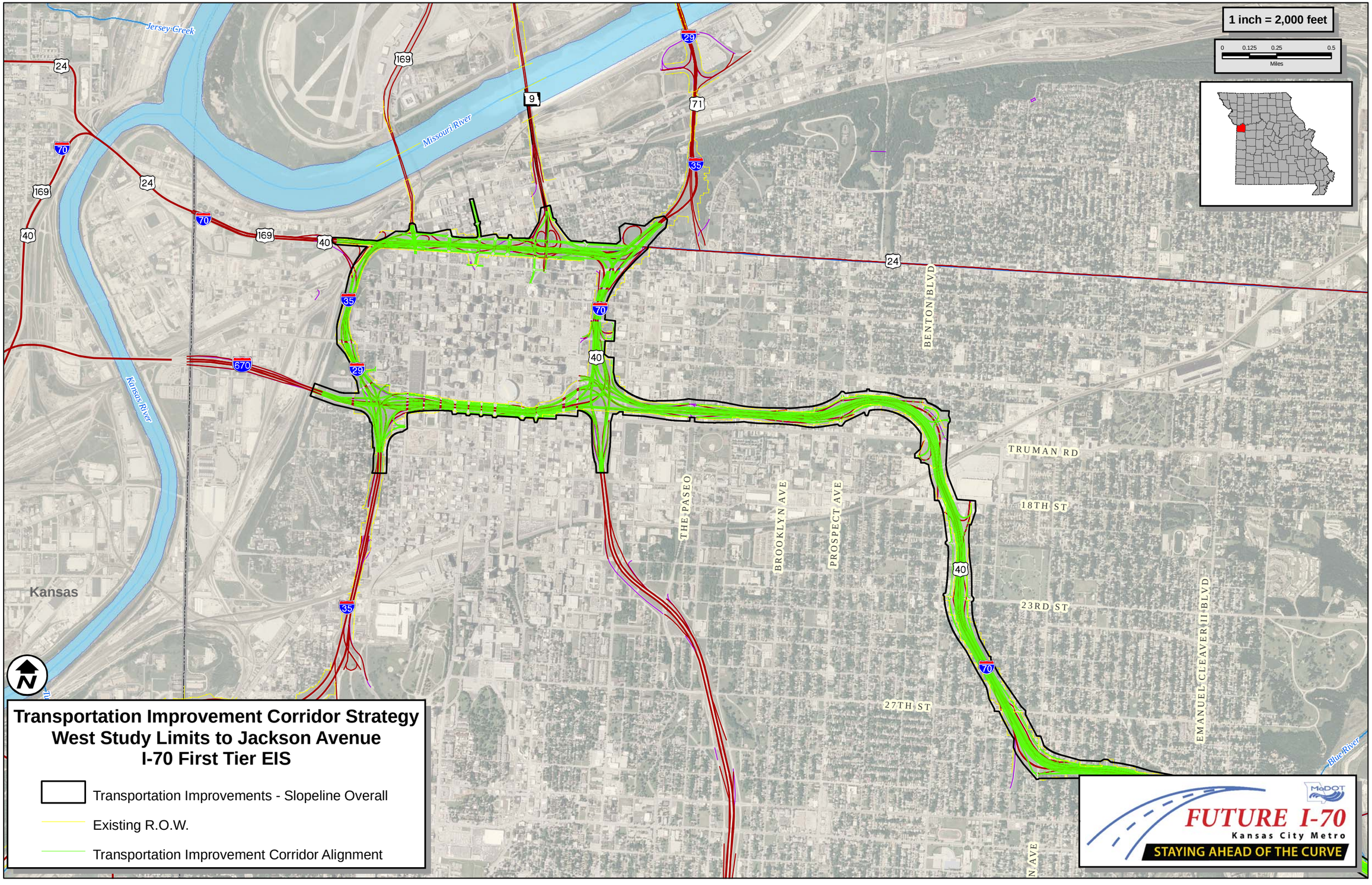


Figure 2.7 Transportation Improvement Corridor Strategy - West Study Limits to Jackson Avenue

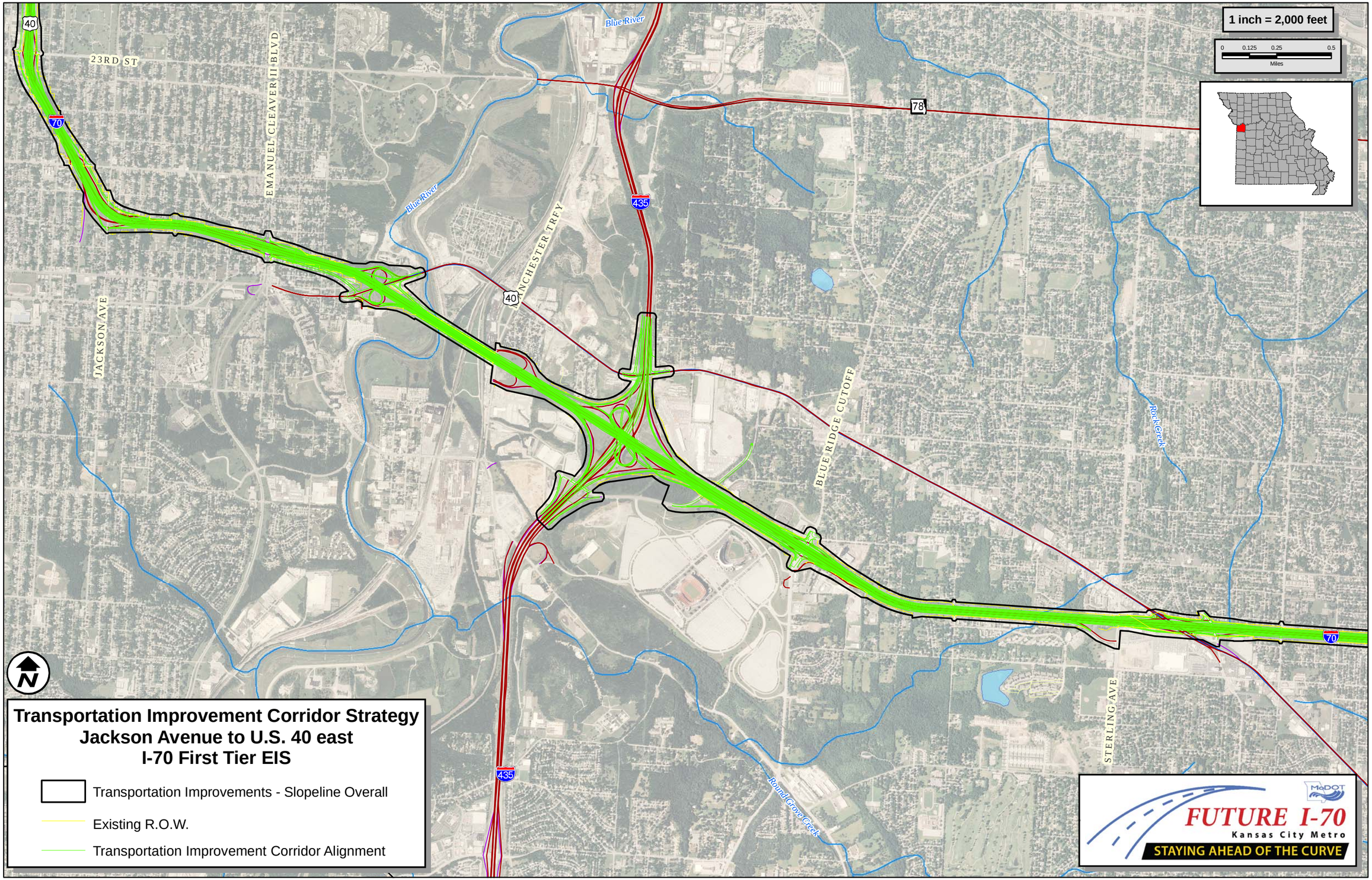


Figure 2.7 Transportation Improvement Corridor Strategy - Jackson Avenue to U.S. 40 east

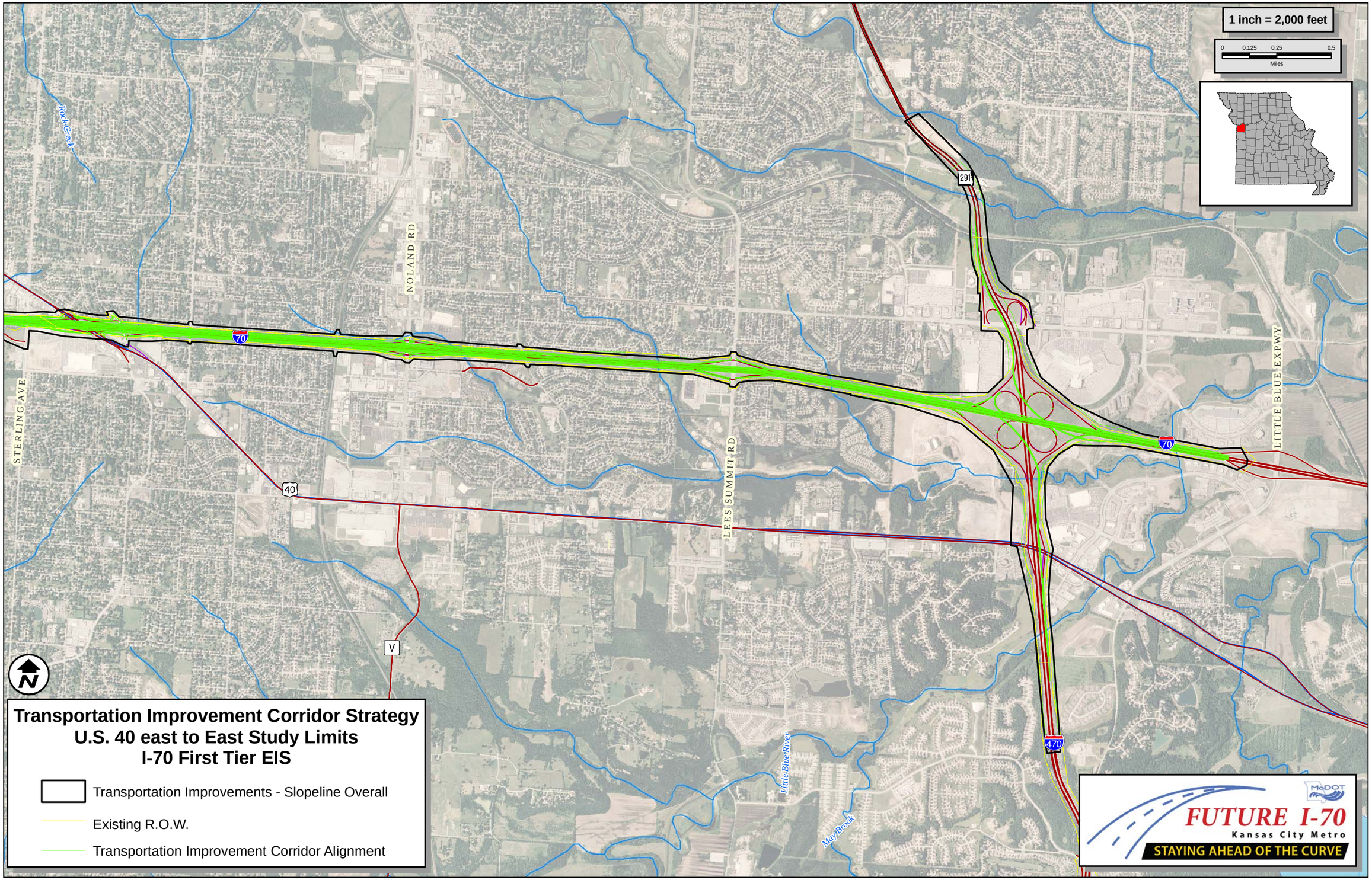


Figure 2.7 Transportation Improvement Corridor Strategy - U.S. 40 east to East Study Limits

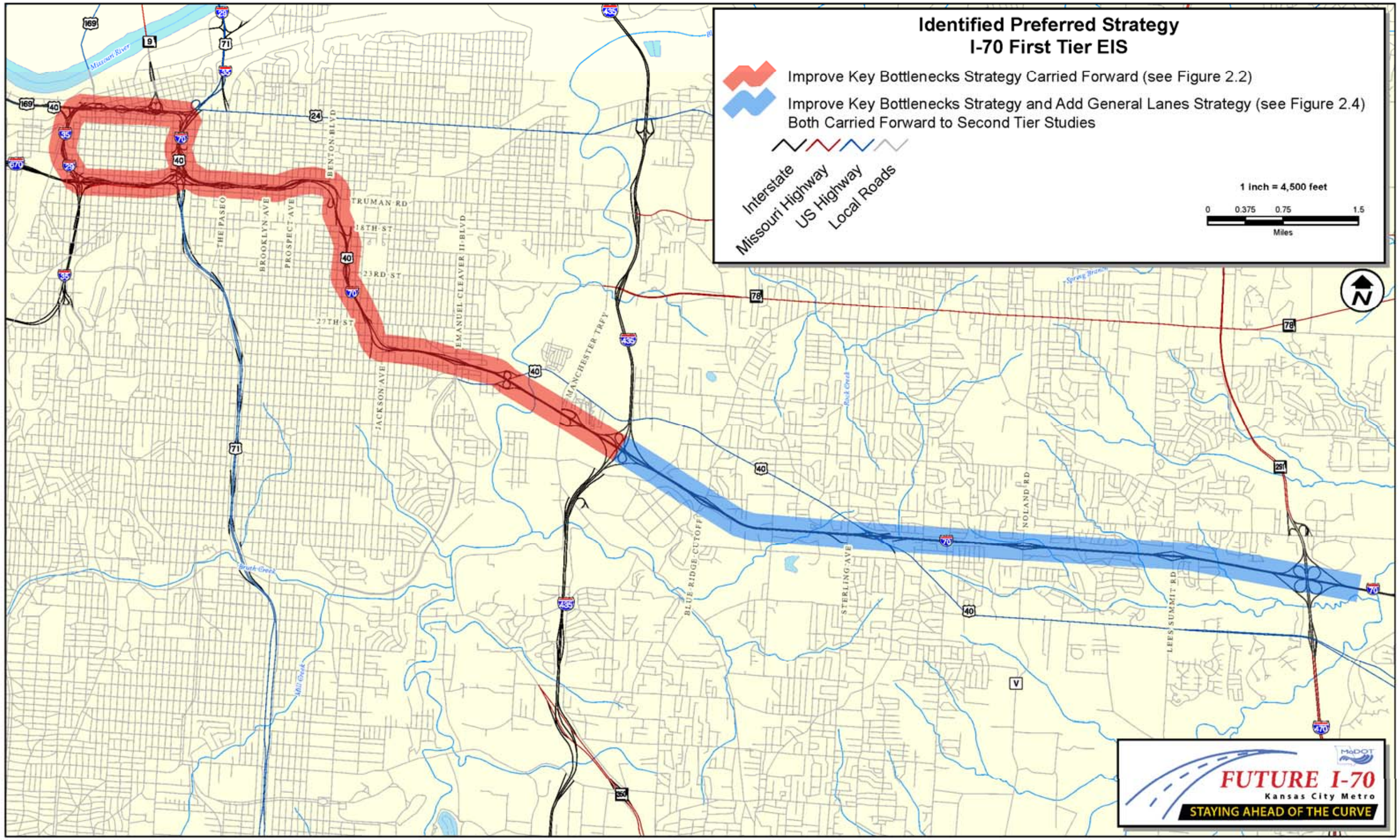


Figure 2.9 Identified Preferred Strategy