

Chapter I

Purpose and Need

The Missouri Department of Transportation (MoDOT) and the Federal Highway Administration (FHWA) propose improving the Interstate 70 (I-70) Corridor in Missouri, between the metropolitan areas of Kansas City and St. Louis, to meet the current and future needs of the traveling public and business community. To facilitate this action, MoDOT initiated a tiered environmental decision-making process in the Fall of 1999. The First Tier Environmental Impact Statement (First Tier EIS) was completed, with a Record of Decision, in the Fall of 2001. Additional information regarding the First Tier EIS is included in **Appendix A**.

Environmental tiering enables a decision-making process that focuses on corridor-wide issues that must be resolved prior to the detailed environmental review. The First Tier Study decisions frame and narrow the scope of Second Tier Studies and related documents. The First Tier Study produced the following outcomes:

- Approval of a general concept (i.e. preferred strategy) for improving I-70, including a prioritization plan for the corridor. The recommended preferred strategy was to widen and reconstruct the existing facility.
- Identification of seven Sections of Independent Utility (SIU) for the Second Tier Studies, including an action plan for the completion of the environmental process.
- Documentation that can be referenced by the Second Tier Studies to eliminate repetitiveness and record the First Tier decision.
- Development of agency and public consensus for the overall improvement plan.

The second tier environmental decision-making process (Improve I-70) began immediately after the completion of the First Tier EIS Record of Decision. This Purpose and Need chapter details the second tier environmental decision-making process specific to SIU 6 from of the U.S. 54 interchange at Kingdom City to Route 19 but not including the interchange near Montgomery City, based on information developed in the First Tier as well as more specific information collected and analyzed as part of the second tier process.

A. Project Overview

1. I-70 Background

Interstate 70 is an east-west roadway of national importance with an eastern terminus in Baltimore, MD and a western terminus at I-15 in south central Utah. Interstate 70 also passes through major metropolitan areas of note, such as Columbus, OH, Indianapolis, IN and Denver, CO. In Missouri, I-70 functions as the primary east-west interstate through the central part of the state. I-70 connects the state's two largest population centers, the Kansas City and St. Louis metropolitan areas, and passes through the Columbia metropolitan area. Within the state, I-70 connects with I-35 and I-55, both major north-south national interstates.

2. Project Description

The corridor for the I-70 SIU 6 improvements has been generally defined as an 850-foot (260 m) band centered along existing I-70 from the U.S. 54 interchange with I-70 (mile post 147) near Kingdom City to Route 19 but not including the interchange near Montgomery City (mile post 174). Two alternative corridor concepts (2,000 feet/610 meters in width) were also recommended in the First Tier through the Mineola Hill area (from just east of the Williamsburg interchange to the Danville interchange).

For all of this length, I-70 is a four-lane divided, fully access-controlled interstate facility. The 27-mile Corridor includes four diamond interchanges with I-70, two river crossings at Auxvasse Creek and the Loutre River, as well as two crossover structures without direct access to I-70. The communities of Kingdom City, Williamsburg, Mineola and Danville are located in, or adjacent to, the defined I-70 Corridor. The First Tier EIS also identified numerous environmental constraints, including the Graham Cave State Park, the historic Graham Farmstead, the Baker Plantation and Graham Rock. The SIU 6 project study area is illustrated in **Exhibit I-1**.

3. Existing and Committed Projects

A number of projects that have been proposed and studied by MoDOT could potentially have an impact on the I-70 Study Corridor. These projects are not limited to those that are included in the Missouri State Transportation Improvement Program, but rather reflect the reasonably anticipated long-range improvements to the various corridors outside of the I-70 Corridor. Inclusion in this list does not imply a commitment by MoDOT that construction of these improvements will occur prior to 2030. Rather, this list is based on needs identified and solutions proposed in either ongoing or completed studies for these projects. These assumed improvements establish a baseline condition for the tiered environmental process. These improvements are broken into two categories: improvements that may be located in other areas of the state, but could potentially affect travel in SIU 6 (known as statewide improvements) and improvements in or near the SIU 6 Corridor (known as SIU 6 specific improvements).

The statewide improvements include:

- **U.S. 36** – Widened and improved to a four-lane expressway for its entire length between I-29 and the Mississippi River. The U.S. 36/I-72 Corridor Transportation Corporation was officially formed on June 19, 2003 to create a transportation development district and seek local tax support for the 52-mile project. It has been proposed that U.S. 36 be designated as I-72 but no action has been taken in this regard and no timetable established.
- **I-64 Improvement to U.S. 40/61** – Improved to a six or eight-lane freeway from Downtown St. Louis to Route DD in St. Charles County and then six lanes to the connection with I-70.
- **U.S. 50** – Widened and improved to a four-lane highway to provide a freeway or expressway facility from I-435 in Kansas City to I-44 located southwest of St. Louis.
- **Route 13** – Four-lane highway from Springfield to Richmond.
- **U.S. 65** – Four-lane highway from Arkansas to Trenton.
- **U.S. 63** – Four-lane highway from West Plains to Kirksville.
- **U.S. 54** – Four-lane highway from Camdenton to U.S. 61.
- **Route 19** – Four-lane highway from U.S. 54 to U.S. 61.

The SIU 6 specific improvements include:

- **Route N Bridge Replacement** – Relocation and replacement of the existing Route N Bridge over the Loutre River on the western edge of Mineola scheduled for SFY 2005.
- **I-70 Guard Cable (MoDOT Project 3I0702)** – This project would extend guard cable in the median of I-70 from Danville to Jonesburg, was awarded in SFY 2004.

4. Proposed Action

The proposed action is to seek the most effective improvement alternative for SIU 6 that satisfies the statewide improvement needs for I-70, as well as the identified needs within the SIU 6 study area, including improvements within the Kingdom City interchange area and through Mineola Hill. The most effective improvement alternative should satisfy the identified purpose and need for the project while minimizing the overall impact to the social and natural environment.

B. Purpose and Need

The First Tier Study established the corridor-wide purpose and need for I-70 improvements between Kansas City and St. Louis. That document identified the goal of I-70 improvements is to provide a safe, efficient, environmentally sound and cost-effective transportation facility that responds to the needs of the study corridor in addition to the expectations of a nationally important interstate. The specific purpose and need for corridor-wide improvements can be summarized as follows:

- **Roadway Capacity** – Increase roadway system capacity in accordance with the projected travel demands to improve the general operating conditions of I-70.
- **Traffic Safety** – Reduce the number and severity of traffic-related crashes occurring along I-70 between Kansas City and St. Louis.
- **Roadway Design Features** – Upgrade current roadway design features along I-70, including interchanges, roadway alignment and roadway cross sections.
- **System Preservation** – Preserve the existing I-70 facility as needed to carry existing and future loads.
- **Goods Movement** – Improve the efficiency of freight movement using I-70.
- **Access to Recreational Facilities** – Facilitate the usage by motorists of nearby regional recreational facilities through improved accessibility.
- **National Security** – Improving I-70 will help to increase transportation system security in Missouri and in the nation as a whole.

The First Tier Study Summary, located in Appendix A, outlines the purpose and need for the entire corridor. Within SIU 6, the primary needs for improvement are based on roadway capacity, traffic safety, design features and system preservation conditions in the section. Goods movement was not identified as a SIU 6 improvement need. Each of the specific needs for this SIU is discussed in the following sections.

1. Roadway Capacity

a. Traffic Trends on I-70 in SIU 6

Existing traffic volumes for mainline I-70 were analyzed using historical traffic count data collected by MoDOT between 1990 and 2000. The mainline data was supplemented by field traffic counts taken at interchange ramp termini at each of the four SIU 6 interchanges.

Table I-1 displays the historical Annual Average Daily Traffic (AADT) for different links of SIU 6. The historical counts in the corridor were fairly inconsistent:

- From 1990 to 1995, only two count locations were consistently recorded,
- In 1996 and 1999 there were no volume counts conducted in the SIU 6 Corridor,
- In 1997 and 1998 only one location was counted, and
- In 2000, three locations were counted.

Table I-1: SIU 6 – Historic Average Annual Daily Traffic

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
U.S. 54 to State Rt. A/Z	22,120	22,690	23,650	23,050	23,410	24,370	--	28,616	29,046	--	29,890
State Rt. A/Z to State Rt. D	--	--	--	--	--	--	--	--	--	--	29,890
State Rt. D to State Rt. J	20,250	20,770	21,640	21,100	24,240	25,240	--	--	--	--	29,890
State Rt. J to State Rt. 19	--	--	--	--	--	--	--	--	--	--	32,585

Source: MoDOT Traffic Count Maps, 1990 – 2000

Notes:

(1) There were no traffic counts available between the Danville interchange (SR-J) and the eastern termini of SIU 6 (SR-19). The Year 2000 volume displayed for this link represents an average between the mainline count taken between SR-D and SR-J and the first available mainline count in SIU 7.

(2) Additional traffic counts have become available since the completion of this Purpose and Need chapter for the years 2001 and 2002. These forecasts have been reviewed and determined to be in line with the historic trend.

It should be noted that for the link between Calwood and Williamsburg (State Route A/Z to State Route J), the study team assumed that the volumes in a given year were similar to the actual volume counts for the U.S. 54 to State Route A/Z and State Route D to State Route J links. The assumption was based on the low amount of traffic entering and exiting the highway between the Kingdom City and Danville interchanges. As discussed later in this section, traffic counts conducted at the Calwood and Williamsburg interchanges indicated very low volumes entering and exiting the system at the two interchanges.

In order to forecast future volumes in SIU 6, the study team adapted the existing statewide model to replicate existing travel characteristics. The existing travel characteristics were then projected using anticipated future population growth and development. Traffic volumes were forecast out to the year 2030. The volumes presented in **Table I-2** represent the forecast traffic volumes on I-70. The forecast assumes that no capacity improvements would be made to the facility over the next 30 years.

Table I-2: 2030 Mainline I-70 Traffic Model Growth Forecasts

Location	2000 Volumes	2030 Forecasts	Percent Change (2000 – 2030)	Annual Growth Rate (2000-2030)
U.S. 54 to State Rt. A/Z	29,890	69,010	140.5%	3.0%
State Rt. A/Z to State Rt. D	29,890	70,250	137.8%	2.9%
State Rt. D to State Rt. J	29,890	70,290	137.7%	2.9%
State Rt. J to State Rt. 19	32,585	69,040	139.8%	3.0%

Source: Wilbur Smith Associates

The statewide traffic model also forecast the volumes on crossroads that have interchanges with mainline I-70. The crossroad 2030 traffic volume forecasts can be found in **Table I-3**.

Table I-3: Actual and Forecast AADT on SIU 6 Crossroads

Crossroad Interchange	2000 Volumes	2030 Volumes	Percent Change (2000-2030)	Annual Growth Rate (2000-2030)
U.S. 54 north at I-70	11,220	16,010	42.7%	1.2%
U.S. 54 south at I-70	14,010	19,650	40.3%	1.1%
State Rt. A/Z north at I-70	610	840	37.7%	1.1%
State Rt. A/Z south at I-70	1,310	1,460	11.5%	0.4%
State Rt. D/YY north at I-70	120	150	25.0%	0.7%
State Rt. D/YY south at I-70	--	--	--	--
State Rt. 161/J north at I-70	450	630	40.0%	1.1%
State Rt. 161/J south at I-70	650	1,480	127.7%	2.8%

Source: Wilbur Smith Associates

b. Highway Operations (Level-of-Service)

The study team next assessed current and forecast operations and capacity on I-70 utilizing the Highway Capacity Manual “Level of Service” scale. The Highway Capacity Manual and the “Level of Service” (LOS) scale were developed by the Transportation Research Board to characterize how motorists and passengers perceive operational conditions within a traffic stream. The descriptions of individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions and comfort and convenience. Six levels of service are defined for each type of facility as described below. Signalized and unsignalized intersections are also categorized by level of service classifications (A through F) based on the amount of delay experienced at the intersection.

- **Level of Service A** – Uninterrupted traffic flow, lower volumes and higher travel speeds.
- **Level of Service B** – Stable traffic flow, increasing traffic and reduced travel speeds due to congestion.
- **Level of Service C** – Stable flow, increasing traffic; travel speeds and maneuverability restricted by higher volumes.
- **Level of Service D** – Approaching unstable flow, tolerable travel speeds although considerably affected by changes in operating conditions.
- **Level of Service E** – Unstable flow, with possible stopped conditions, lower operating speeds than level of service D, volume approaching capacity of the roadway.
- **Level of Service F** – Unstable flow, with speeds at low or stopped condition for varying times caused by congestion when downstream traffic volumes are at or over the roadway capacity.

Along with the volume of traffic and the number of lanes on a roadway, the terrain that the roadway traverses also impacts how well traffic operates. Heavy trucks have a greater impact on traffic flow as roadway grades become steeper and longer. Grades can cause average truck speeds to be substantially reduced as compared to passenger car and light truck traffic. The reduced speeds result in trucks taking up a larger percentage of the available roadway capacity. The impact of terrain can result in I-70 roadway links with similar traffic volumes and the same number of lanes having different levels of service because the terrain is different.

Table I-4 describes the existing and forecast LOS for each mainline link of I-70 in SIU 6. MoDOT’s standard for the rural areas of I-70 is LOS of C. Current traffic levels on I-70 through SIU 6 result in a LOS rating of B for each link. The year 2030 travel demand scenarios forecast a range of LOS from D to F for these same links. As a result, year 2030 forecast LOS does not meet MoDOT requirements for level of service on mainline I-70.

Table I-4: I-70 SIU 6 – Daily Travel Demand and Roadway LOS

Location	Actual Volume 2000	Actual LOS 2000	Forecast Volume 2030	Forecast LOS 2030
U.S. 54 to State Rt. A/Z	29,890	B	69,010	E
State Rt. A/Z to State Rt. D	29,890	B	70,250	F
State Rt. D to State Rt. J	29,890	B	70,290	D
State Rt. J to State Rt. 19	32,585	B	69,040	D

Source: Wilbur Smith Associates

c. Interchange Operational Analysis

Utilizing the same Level of Service analysis methodology as used for mainline portions of I-70, each interchange within SIU 6 was analyzed for forecast capacity constraints. **Table I-5** shows the results of the interchange analyses using the same LOS scale as utilized with mainline I-70.

Table I-5: Level of Service at SIU 6 Interchanges

Interchange	Cross Road	Interchange Type	Signalized (Y/N)	Year 2030 Ramp LOS AM (PM)	Year 2030 Intersections LOS AM (PM)
Kingdom City	U.S. 54	Diamond	Yes	E/F (D/F)	E (E)
Calwood	MO A/MO Z	Diamond	No	A (A)	A (A)
Williamsburg	MO D/MO YY	Diamond	No	A (A)	A (A)
Danville	MO 161/ MO J	Diamond	No	B (B)	A (B)

Source: Wilbur Smith Associates

As shown in **Table I-5**, the Kingdom City interchange will have unacceptable ramp and intersection operations in 2030. The other three interchange ramps and intersections at ramp terminals are expected to perform at acceptable levels of service through the year 2030.

d. Need for Additional Capacity

Based upon level of service analyses and forecast volumes on mainline I-70, by 2030, all mainline links of SIU 6 would fail to meet MoDOT standards for level of service. With the exception of the U.S. 54 interchange at Kingdom City, SIU 6 interchanges are expected to operate at an acceptable level of service. By 2030, the forecast volumes at the Kingdom City/U.S. 54 interchange will lead to unacceptable levels of service. Capacity improvements for the Kingdom City interchange, as well as mainline I-70 are recommended.

2. Traffic Safety

a. Local Crash Statistics

Crash information was obtained through the MoDOT Traffic Management System database and data from the six-year period from 1995 to 2000 was analyzed. Crash rates are presented as the number of crashes per one hundred million vehicle miles traveled (HMVMT) to provide consistency in the reporting of rates. The study team analyzed SIU 6 in four links (from interchange to interchange) for the purpose of calculating crash rates. *It should be noted that crash statistics and safety data summarized or presented in this chapter are protected under federal law.* Please refer to **Appendix B** for more information.

Crash rates within SIU 6 are wide-ranging, with an overall average crash rate of 81 crashes per HMVMT. In comparison, the I-70 Corridor from Kansas City to St. Louis had an average crash rate of 87 crashes per HMVMT. The average crash rate for Missouri rural interstate highways was 69 crashes per HMVMT.

The highest crash rate in SIU 6 occurred between the Williamsburg and Danville interchanges. The average crash rate for this link of SIU 6 is 105.8 crashes per HMVMT. This portion of highway traverses the Loutre River Valley and Mineola Hill area. The terrain is characterized by rolling hills with relatively steep grades that result in speed differentials between cars and trucks. The steep grades in the Mineola Hill area can become unsafe for cars and trucks alike in both normal and inclement weather conditions. The location of existing rest areas in the Loutre Valley and Mineola Hill area also contributes to the above average crash rate due to weaving and acceleration/deceleration.

The lowest SIU 6 crash rate, 56 crashes per HMVMT, occurs between the Calwood and Williamsburg interchanges. This portion of highway traverses level terrain with little to no grade change, but does contain a narrow median width.

The two remaining links of I-70 in SIU 6 have crash rates at or below the average crash rate for the section and for Missouri rural interstates. The link from the Kingdom City interchange to the Calwood interchange has a crash rate of 83 crashes per HMVMT. This section contains the Kingdom City interchange, which is a popular stopping point for vacationers and truckers due to its concentration of highway-oriented businesses such as service stations, restaurants and hotels. The amount of truck and vehicle traffic merging and exiting the stream of traffic is a likely cause of the elevated crash rate in this primarily rural link.

The Danville to Route 19 link has a crash rate of 58 crashes per HMVMT. This rate is well below the average rate for the section. This link, like the link from Calwood to Williamsburg, is relatively flat terrain, but does include medians that are considered below current standards.

Table I-6: SIU 6 Crash Rates (Per HMVMT)

Link	PDO	Injury	Fatal	Total
U.S. 54 to State Rt. A/Z	59.6	22.2	1.5	83.3
State Rt. A/Z to State Rt. D	38.9	16.5	0.6	56.0
State Rt. D to State Rt. J	61.3	42.3	2.2	105.8
State Rt. J to State Rt. 19	35.1	19.3	3.2	57.6
SIU 6	52.3	27.4	1.9	81.6
5 Year Statewide Rate – Interstate	92.9	32.7	0.9	126.6
5 Year Statewide Rate (Rural) – Interstate	48.9	19.2	1.2	69.2
Mainline I-70 Corridor Average	--	--	1.4	87.0

Source: Wilbur Smith Associates

While the total average crash rate for SIU 6 is lower than the average rate for all of I-70, the same cannot be said for the average fatal crash rate. As displayed in **Table I-6**, the average fatal crash rate for SIU 6 is 1.9 fatal crashes per HMVMT, while the average for the entire corridor is 1.4 fatal crashes per HMVMT and the statewide average for rural interstates is 1.2 fatal crashes per HMVMT. Only one link of SIU 6 (Calwood to Williamsburg) had an average fatal crash rate below the I-70 Corridor and statewide rural average of 1.4. The Kingdom City to Calwood link was slightly higher than the corridor average. The link between State Route D and J (Mineola Hill area) had an average fatal crash rate more than 50 percent higher than the I-70 Corridor average and the final link between Danville and Route 19 had a crash rate more than 100 percent higher. The SIU 6 crash rates were determined using a six-year average from 1995 – 2000. Additional crash statistics have become available since the completion of this Purpose and Need chapter for the years 2001 through 2003. These statistics have been reviewed and determined to be in line with the historic trend.

b. Cross Median Crashes

Many stretches of I-70 were designed with 1960's-era standards that cannot sufficiently handle today's increased volumes, speeds and vehicle types. From the perspective of crash analysis, outdated standards such as narrow median widths contribute to out-of-control, high-speed vehicles easily crossing the median. With the exception of the Mineola Hill area, SIU 6 has narrow median widths that do not meet current criteria. Additionally, much of the corridor also has narrow clear zones between mainline I-70 and the frontage/service roads that do not meet existing standards. Narrow clear zones can contribute to head-on collisions when vehicles leave the roadway and continue in an outward direction.

Relative to the entire I-70 Corridor, SIU 6 experiences a higher than expected occurrence of cross-median crashes. The 27 miles of SIU 6 represents approximately 13.5 percent of the entire I-70 corridor, while approximately 20 percent of cross-median crashes in the I-70 Corridor occur within SIU 6. Of all crashes involving fatalities in SIU 6, nearly 38 percent were a result of a cross-median collision. Of all fatal crashes in the I-70 Corridor, 21 percent were a result of cross-median crashes. Over the six-year period for which data was analyzed, 41 cross-median crashes were recorded in SIU 6, and 31 of those crashes involved an injury or fatality.

c. Need for Safety Upgrades

According to the available crash data, SIU 6 is in need of several safety upgrades. Medians should be improved in areas where median widths are not up to existing standards to prevent cross-median crashes. Also, clear zone improvements between the mainline and frontage/service roads would reduce conflicts with vehicles on frontage roads. Widening the highway's median and outside shoulders would provide more room for disabled vehicles to be stored until they can be cleared. Currently, as an interim approach to addressing crossover crashes statewide, MoDOT is constructing guard cable in the median of I-70.

Localized safety improvements could include smoothing the grades in the Mineola Hill area, as well as relocating the existing rest areas, to allow for better slowing and stopping for all vehicle types (especially heavy trucks) during inclement weather, and would lessen climbing speed differentials for automobiles and tractor-trailers. In the Kingdom City area, longer ramps and merge/acceleration lanes would allow heavy trucks to better enter the flow of traffic, as this area tends to have higher volumes and a higher percentage of large trucks.

3. Roadway Design Features**a. Roadside Features**

Interstate 70 through SIU 6 is a four-lane divided freeway that traverses a combination of level and rolling terrain. The travel lanes are 12 feet (3.7 meters) wide, with 10 to 12 foot (3.0 to 3.7 meters) outside shoulders and 4 to 6 foot (1.2 to 1.8 meter) inside shoulders. The median typically measures 40 feet (12.2 meters) in width, though there are exceptions such as through the Loutre River Valley, where it is wider. Outer roads run parallel on one or both sides of the highway, except for across the Auxvasse Creek and Loutre River valleys.

b. Roadway Alignment Features

For the Improve I-70 Study, MoDOT has adopted a fairly stringent minimum design criteria. In general, design criteria were based on the MoDOT Policy Procedure and Design Manual and provisions of the AASHTO Policy on Geometric Design of Highway and Streets, 2001, Fourth Edition, where applicable. However, recognizing that the investments in I-70 will be long term,

more stringent and conservative design criteria have been defined in anticipation of future corridor needs and ever-evolving design parameters. **Table I-7** provides a comparison of the AASHTO standards, MoDOT standards and MoDOT’s criteria for the I-70 improvements.

Table I-7: Design Standards and Improve I-70 Criteria for 70 mph Freeways

Criterion	Existing MoDOT Standard (four lane freeway)	AASHTO Standard (four lane freeway)	Improve I-70 Design Criteria (six lane freeway)
Horizontal Alignment	≤ 5 degrees	3 degrees	1.5 degrees
Vertical Grades	Generally 3% or less 5-6% at Mineola Hill	3% for level terrain 4% for rolling terrain	Maximum of 3% grade for all terrain
Pavement and Shoulders	12-foot (3.7 meter) travel lanes 10-foot (3.0 meter) outside shoulder 4 foot (1.2 meter) median shoulder	12-foot (3.7 meter) travel lanes 10-foot (3.0 meter) right shoulder 4 to 8-foot (1.2 to 2.4 meter) median shoulder	12-foot (3.7 meter) travel lanes 12-foot (3.7 meter) shoulders both sides
Median Width	Approximately 40 feet (12.2 meter)	50-100 feet wide for rural areas in level or rolling topography	Minimum 60-130 feet (18.5-40.1 meter) depending on maintenance of traffic plan

With exceptions, the SIU 6 portion of mainline I-70 generally meets the MoDOT and AASHTO standards for four-lane freeways, but does not meet the higher standards that MoDOT established as part of the Improve I-70 design criteria for a six-lane freeway. The existing SIU 6 portions of I-70 that do not meet the desired Improve I-70 design criteria are displayed in **Table I-8**:

Table I-8: I-70 Geometric Deficiencies in SIU 6

County	Location	Horizontal Curves	Vertical Grades
Callaway	3.05 miles (4.0 km) east of Kingdom City	2 degree	---
Callaway	0.98 miles (1.6 km) east of Route D	2 degree	---
Callaway	2.14 miles (3.4 km) east of Route EE	2 degree	---
Montgomery	0.42 miles (0.7 km) east of Route N	2 degree	---
Montgomery	0.66 miles (1.1 km) west of Route J/161	1 degree 50'	---
Callaway	EB/WB lanes, west side of Auxvasse Creek Valley	---	4-6%
Montgomery	Both approaches to Loutre River Valley	---	4-6%

c. Typical Interchanges

There are four interchanges in SIU 6. Each of these is a standard diamond interchange as illustrated in the **Figure I-1**. Each interchange was evaluated to determine if it met current requirements for spacing between ramp termini and between ramp termini and outer roads. The evaluation concluded that none of the interchanges meet the I-70 Study minimum design criteria of 800-foot (244 meters) spacing between ramp termini and a minimum ramp spacing of 1,350 feet (412 meters) between ramp termini and outer roads or 800 feet (244 meters) between ramp termini and right turns, in accordance with MoDOT access management guidelines. The existing spacing between each interchange’s ramp termini, outer roadways and existing cross-road intersections is displayed in **Table I-9**.

Figure I-1: Standard Diamond Interchange

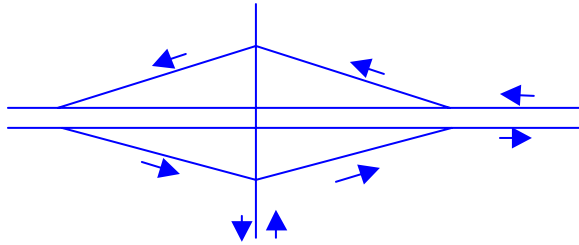


Table I-9: Existing Spacing between Ramp Termini, Outer Roads, and Driveways at SIU 6 Interchanges

Interchange	Ramp Termini Spacing (feet/meters)	Spacing Between Ramp Termini and Outer Road (feet/meters)	Spacing Between Ramp Termini and Driveway (feet/meters)
Kingdom City	545/166	---	---
EB on /off ramps	---	850/259	NA
WB on/off ramps	---	1500/457	500/152
Calwood	425/130	---	---
EB on /off ramps	---	400/122	NA
WB on/off ramps	---	310/94	NA
Williamsburg	440/134	---	---
EB on /off ramps	---	420/128	NA
WB on/off ramps	---	2050/625	410/125
Danville interchange	450/137	---	---
EB on /off ramps	---	160/49	NA
WB on/off ramps	---	160/49	NA

d. Outer Roadway Features

In SIU 6, outer roadways typically follow along one or both sides of I-70 to provide access to adjoining properties. Currently, outer roads do not exist in the following locations:

- No south outer road, west of Kingdom City
- No north or south outer road, in the Auxvasse Creek Valley
- No south outer road, west of the Williamsburg interchange
- No north outer road through the Loutre River Valley

Additionally, the existing outer roads are generally characterized by narrow travel lanes, limited or non-existent shoulders and less than standard roadway geometrics. With limited exceptions, existing outer roadways do not meet current AASHTO or MoDOT's preferred design criteria. The MoDOT preferred criteria for outer roads conform to standards for a two-lane, two-way, low-volume local road, including:

- Two 12-foot (3.7 meter) lanes and two eight-foot paved shoulders
- Shoulders could also serve as one-way bike lanes
- A 50 mph (80 kph) design speed, with reduced speed at crossroad connections
- A uniform 26-foot (8 meter) clear zone with 4:1 foreslopes

e. Need for Facility Upgrades

Portions of the existing I-70 through SIU 6 fail to meet current design standards as well as MoDOT's desired standards for the I-70 improvements. Any improvements to the highway should, at a minimum, meet current design standards. The MoDOT criteria for an improved I-70 require much wider shoulders and medians than were originally constructed on I-70. Facility upgrades to I-70 should include the following:

- **Roadway** – Widen the median and outside shoulders to meet Improve I-70 criteria. A 12-foot (3.7 meter) wide shoulder on both sides would allow for use as future through lanes or temporary lanes.
- **Median** – Improve the median to a minimum standard width that provides the necessary spacing for clear zones, standard slopes, ditch width and depth, and future improvements.
- **Vertical/Horizontal alignment** – Improve the vertical and horizontal curves that do not meet current AASHTO standards nor Improve I-70 criteria. At a minimum, vertical and horizontal curves should meet AASHTO standards, but Improve I-70 criteria are preferred to meet sight distance requirements.
- **Interchanges** – Reconstruction of each interchange to provide the minimum 800-foot (244 meter) spacing between ramp termini and 1,350 feet (411 meter) between ramp termini and outer roads with improved access control. Additionally, the Kingdom City interchange will need to be reconstructed to accommodate predicted future year traffic volumes.
- **Outer roads** – The majority of the outer roads in SIU 6 do not meet the standards for a two-way, two-lane, low-volume local road with a design speed of 50 miles per hour (80 kph).

4. System Preservation

a. Pavement Condition

The SIU 6 portion of I-70 was built in the early 1960s. The original design life for the facility was 20 years. Maintaining the usefulness of the facility has required numerous projects for rehabilitating and resurfacing the highway. In order to assess how well the facility has been maintained, in 2002 MoDOT compiled pavement ratings for the entire Improve I-70 Corridor including SIU 6. The rating information collected by MoDOT includes the following:

- **Ride Condition Index (RCI)** – An index measuring the overall condition of the ride using standardized procedures.
- **Condition Score** – The calculation for this score is the result of a formula that includes separate measures for surface roughness, surface distress and the Average Annual Daily Traffic (AADT).
- **Pavement Serviceability Rating (PSR)** – A subjective indicator of ride quality and surface roughness based on human observation utilized by FHWA prior to 1993.
- **International Roughness Index (IRI)** – An objective indicator of ride quality and surface roughness developed by the World Bank and utilized by FHWA starting in 1993.

Measurements for each rating were taken from MoDOT data at 0.02 mile (0.03 km) increments along the eastbound and westbound lanes of the existing highway. The average score for each rating was compiled for each county and for the entire corridor. Also for each rating, the length of roadway falling into five rankings (Very Poor, Poor, Fair, Good, Very Good) was compiled for

the entire corridor, including SIU 6. The following pavement ratings were collected in 2002. MoDOT is always resurfacing the poorest stretches of the roadway and the specific ratings for each SIU are continually changing, but in general, this data displays a need for new pavement along I-70. The SIU 6 specific information is summarized in **Tables I-10 and I-11**.

Table I-10: Rating Measurements for Existing SIU 6 Pavement

County	Average Score	Length in Each Condition Classification (in miles)					Total Length (EB/WB Miles)
		Very Good	Good	Fair	Poor	Very Poor	
Ride Condition Index (RCI)							
SIU 6	6.51	8.19	8.08	8.87	25.78	3.15	54.07
Entire Corridor	5.84	44.30	90.62	73.12	82.99	102.41	393.44
Condition Score							
SIU 6	15.68	0.52	0.00	5.96	23.00	24.59	54.07
Entire Corridor	15.54	10.39	12.15	47.50	119.44	203.96	393.44
Pavement Serviceability Rating (PSR)							
SIU 6	28.70	0.52	0.57	16.03	16.93	20.02	54.07
Entire Corridor	27.22	5.15	32.21	118.25	63.28	174.55	393.44
International Roughness Index (IRI)							
SIU 6	107.34	0.00	11.50	24.84	13.38	4.35	54.07
Entire Corridor	113.26	9.71	137.06	135.39	101.79	9.49	393.44

Source: MoDOT, 2002

Table I-11: SIU 6 Pavement Ratings

Rating	RCI	Condition Score	PSR	IRI
Very Good	15%	1%	1%	0%
Good	15%	0%	1%	21%
Fair	16%	11%	30%	46%
Poor	48%	43%	31%	25%
Very Poor	6%	45%	37%	8%

Source: MoDOT, 2002

As summarized in the **Table I-10**, on average the pavement in SIU 6 rated either Fair (IRI) or Poor (RCI). As displayed in **Table I-11**, depending on the rating, 33 percent to 88 percent of the pavement rated Poor or Very Poor. By contrast, between one and 30 percent of the pavement in SIU 6 was rated Good or Very Good, again depending on the rating used.

b. Condition of Bridges

There are 12 bridges within SIU 6. Interstate 70 travels over two bridges each at Auxvasse Creek and the Loutre River. There are eight bridges that I-70 passes under: at each of the four interchanges in the section, three grade separation crossings and one railroad crossing.

Table I-12 summarizes the conditions of bridges within SIU 6 and provides a description of the component ratings used in evaluations. Based on the 2002 data received by MoDOT, structures in the system are generally considered to be in Fair or Good condition. The exceptions are the decks of three bridges over I-70, each of which was built in 1963. Two of the bridges are the overpasses at the Calwood and Williamsburg interchanges, the other is the Route JJ overpass between Kingdom City and Calwood. With the exception of the Auxvasse Creek crossing, the structures in SIU 6 are 40 to 50-years old and require major rehabilitation or varying levels of maintenance. The three overpasses that have deck ratings of 3 require immediate repair or rehabilitation.

Table I-12 – SIU 6 Existing Bridges Average Ratings

MoDOT Bridge #	Location/ Mile	Over/ Under	Feature Crossed	Type	Built	Average Rating			Index
						Deck	Super-structure	Substructure	
L0965	147.691	Under	KC Southern	Gird	1963	---	---	---	NA
L0964	148.031	Under	U.S. 54 South	Slab	1963	7	7	7	Good
L1000	152.151	Under	RT JJ South	Strg	1963	3	7	7	Very Poor
A4810	153.353	Over WB	Auxvasse Creek	Strg	1963	6	6	6	Fair
A4810	153.353	Over EB	Auxvasse Creek	Strg	1989	7	7	9	Good
A0025	155.511	Under	RT Z North	Strg	1963	3	5	5	Very Poor
A0027	159.041	Under	RT D South	Strg	1963	5	7	7	Fair
A0028	161.401	Under	RT D South	Strg	1963	3	5	6	Very Poor
A0042	165.382	Under	RT N South	Strg	1963	6	6	6	Fair
L0395	167.721	Over	Loutre River	Slab	1951	7	7	7	Good
L0389	168.176	Over	Loutre River	Strg	1951	6	6	6	Fair
A0027	170.482	Under	MO 161 Sd	Slab	1963	5	5	7	Fair

Source: MoDOT, 2002

Bridge Component Ratings

No.	Description
9	New Condition
8	Good Condition - no repairs needed
7	Generally Good Condition - needs minor maintenance
6	Generally Fair Condition - needs major maintenance
5	Generally Fair Condition - needs major rehabilitation
4	Marginal Condition - needs major rehabilitation
3	Poor Condition - needs immediate repair or rehabilitation
2	Critical Condition - facility closed - needs urgent repair or rehabilitation
1	Critical Condition - facility closed - study to determine if repairs possible
0	Critical Condition - facility closed - needs urgent repair or rehabilitation

While the majority of bridges are in Fair to Good condition, each bridge would require replacement if the existing highway were improved to the preferred criteria. Existing crossroad overpasses are too short to accommodate the additional lanes and wider median. The Auxvasse Creek crossings are too narrow to accommodate additional lane and shoulder improvements. The Loutre River crossings are too narrow to accommodate additional lane and shoulder improvements.

c. Need for Preservation

Existing I-70 through SIU 6 has infrastructure needs that must be met. Improving the highway to the preferred criteria would require the reconstruction of all bridges, regardless of condition, as well as pavement repair and replacement. In the meantime, pavement rated fair or better and bridges rated seven or better should be maintained on an on-going basis to preserve the integrity and smoothness of the surface. Pavement rated poor or very poor and bridges rated six or below should be programmed for major maintenance, or if necessary, replacement.

5. National Security and Disaster Preparedness

a. Role of I-70 in National Security and Disaster Preparedness

From its inception, the Interstate Highway System was intended to play a key role in responding to incidents of major disaster or war. Today, I-70 is a key corridor in the Strategic Highway Network (STRANET) and a primary facility for moving personnel and equipment for deployment

and emergency response. Improving the I-70 Corridor's capabilities to handle mobility needs in the event of emergencies has two key components, the physical condition of the facility and the coordination between agencies to ensure that highway infrastructure, communication and technology can fully support emergency response plans. While this process does not address the policies related to agency coordination as it pertains to national security and disaster preparedness, it directly addresses the physical attributes of the system and the corridor's ability to handle diversion from other highway links should some type of disaster occur.

b. Condition of System

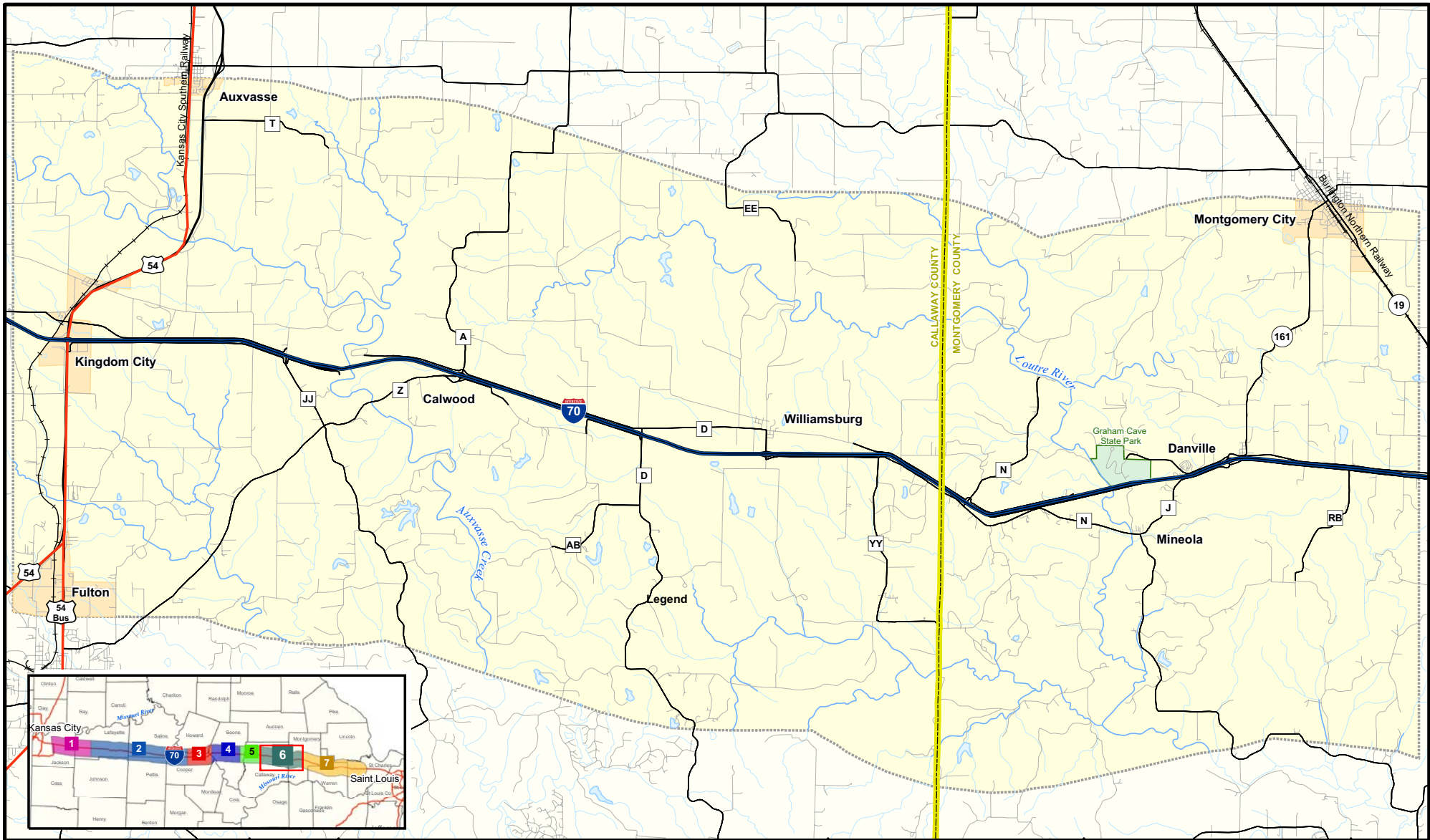
Within SIU 6 there are two important features that should be considered in assessing how improvements can enhance the ability of the I-70 Corridor to handle demands should some type of disaster occur. First the interchange at I-70 and U.S. 54 is an important node in the state's portion of the Strategic Highway Network. At the Kingdom City interchange, U.S. 54 links the resources located in the state capital and Fort Leonard Wood with I-70, which in turn, connects it to the broader state system. Second, I-70 crosses the Loutre River floodplain near the floodplain's widest point, a distance of 0.83 miles (1.34 km). This floodplain crossing was one of several locations threatened by flood waters during the 1993 floods. This crossing remains susceptible to flooding during events that exceed the 100-year flood predictions.

c. Need for National Security Improvements

The SIU 6 portion of the I-70 Corridor will continue to play an important role in responding to natural disasters and threats to national security. The enhancements offered by the typical section, including improvements to the Kingdom City interchange, would enhance the ability of the I-70 Corridor to support the system needs for disaster response and national security. Improving I-70 will help to increase transportation system security in Missouri and in the nation as a whole.

C. NEPA/404 Merged Process

The merged NEPA/404 process was not utilized for SIU 6 since the proposed construction schedule was not imminent and a 404 permit would not be necessary for several years.



SECTION 6
Kingdom City to Montgomery City

- Interstate
- US Route
- State Route
- Roads
- Railroad

- Legend**
- Study Area Boundary
 - City Boundary
 - County

- Lake
- Creek
- Park



Interstate 70 SIU 6
Second Tier
Environmental Study

EXHIBIT I-1