CHAPTER I
PURPOSE AND NEED

A. Project Background

To meet the current and future transportation needs in Missouri, the Missouri Department of Transportation (MoDOT) and the Federal Highway Administration (FHWA) propose improving the I-70 corridor in Missouri. The proposed improvements are generally located between the metropolitan areas of Kansas City and St. Louis. In compliance with the National Environmental Policy Act (NEPA), a First Tier Environmental Impact Statement (EIS) was prepared to aid in determining the most appropriate type of improvement concept for I-70. This chapter describes the First and Second Tier processes and provides the purpose and need for the proposed improvements.

The process for this project started in 1999 when MoDOT completed a feasibility study. The results of the feasibility study indicated that MoDOT should use a tiered NEPA approach to determine the impacts associated with such a project. In 2001, MoDOT completed the "First Tier" Final EIS as the first step to improving I-70. Details related to the NEPA tiering process are provided in Appendix B.

As a result of the First Tier EIS, a preferred strategy was selected and consisted of widening I-70 to three lanes in each direction. In addition, a "Second Tier" of environmental review was proposed for seven "Sections of Independent Utility" (SIU) along I-70. Figure I-1 presents the approximate western and eastern boundaries of each of the seven SIUs. Table I-1 presents the existing characteristics of I-70 within SIU 2.

Figure I-1: Western and Eastern Boundaries of the Seven SIUs

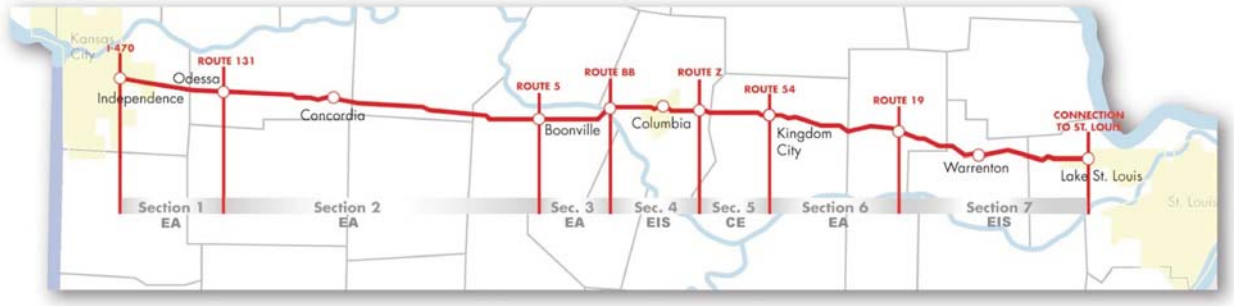

Table I-1: SIU 2 Existing Characteristics and Link Descriptions

I-70 Links/Roadway Subsections	Exit*		Length miles (kilometers)	No. of Lanes
	from	to		
CR 96 to Rt. O/M	39	41	2.9 (4.7)	4
Rt. O/M to Rt. E/H	41	45	4.2 (6.8)	4
Rt. E/H to Rt. 13	45	49	4.0 (6.4)	4
Rt. 13 to Rt. T	49	52	3.5 (5.6)	4
Rt. T to Rt. 23	52	58	5.7 (9.2)	4
Rt. 23 to Rt. Y/V V	58	62	4.0 (6.4)	4
Rt. Y/V V to Rt. 127	62	66	4.3 (6.9)	4
Rt. 127 to Rt. K/EE	66	71	4.5 (7.2)	4
Rt. K/EE to Rt. YY	71	74	3.2 (5.1)	4
Rt. YY to U.S. 65	74	76	3.6 (5.8)	4
U.S. 65 to Rt. J	76	84	6.4 (10.3)	4
Rt. J to Rt. K	84	89	5.3 (8.5)	4
Rt. K to Rt. 135/41	89	98	8.0 (12.9)	4
Rt. 135/41 to Rt. 5	98	99	3.8 (6.1)	4

* SIU 2 generally extends from Route 131 (but not including the interchange) near Odessa to Route 5 (but not including the interchange) near Boonville. The western terminus of SIU 2 is at mile marker 39 and the eastern terminus is at mile marker 99.

B. First Tier Summary, Purpose and Need for I-70 Improvements

The goal or purpose of the overall program of I-70 improvements is to provide a safe, efficient, environmentally sound and cost-effective transportation facility that responds to corridor needs as well as expectations of a national interstate.

Chapter II of this document presents a description of the proposed alternatives. Appendix A presents figures that illustrate the proposed improvements.

Appendix B presents a description of the First Tier decision, environmental process and approach; details about the overall purpose and need for the Improve I-70 Program; and initial findings for SIU 2.

The purpose and need for the Improve I-70 Program can be summarized as follows:

Purpose and Need Statement

- **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 through continued and ongoing rehabilitation and maintenance activities of pavement and bridges.
- **Goods Movement** – Improve the efficiency of freight movements using the I-70 corridor.
- **Access to Recreational Facilities** – Facilitate the usage by motorists of nearby regional recreational facilities through improved accessibility.

Each of the specific needs, as summarized above, has been addressed in detail during the First Tier EIS process. The ordering of these specific needs is not intended to imply any order of importance. Also, the array of individual needs is not intended to replace the findings of the Missouri Long-Range Transportation Direction regarding the prioritization of MoDOT's statewide needs.

C. Description of Project Corridor (SIU 2)

Section of Independent Utility 2 encompasses 60 miles (100 kilometers) of I-70 in Missouri generally between Route 131 (but not including the interchange) near Odessa to Route 5 (but not including the interchange) near Boonville (Figure I-2). Section of Independent Utility 2 passes through Lafayette, Saline and Cooper counties and directly serves the following communities: Higginsville, Aullville, Concordia, Emma, Sweet Springs, Sedalia, Marshall, Blackwater, Boonville and others located to the north and south of I-70.

Agricultural land, small communities and highway commercial and industrial development of relatively low density characterize this 60-mile (100 kilometer) section of I-70. Much of the land is flat with intervening natural drainages. Section of Independent Utility 2 passes over Mulkey, Coppers, Dry, Chouteau and Davis Creeks, the Blackwater and Lamine Rivers and numerous other intermittent watercourses. Additional detailed descriptions are provided throughout Chapter III of this document.

Section of Independent Utility 2 provides interchange connections between I-70 and 13 north/south connectors. These include: Route M/O, Route H, Route 13, Route T, Route 23, Route Y/V V, Route127, Route EE, Route YY, U.S. 65, Route J, Route K and Routes 135 and 41.

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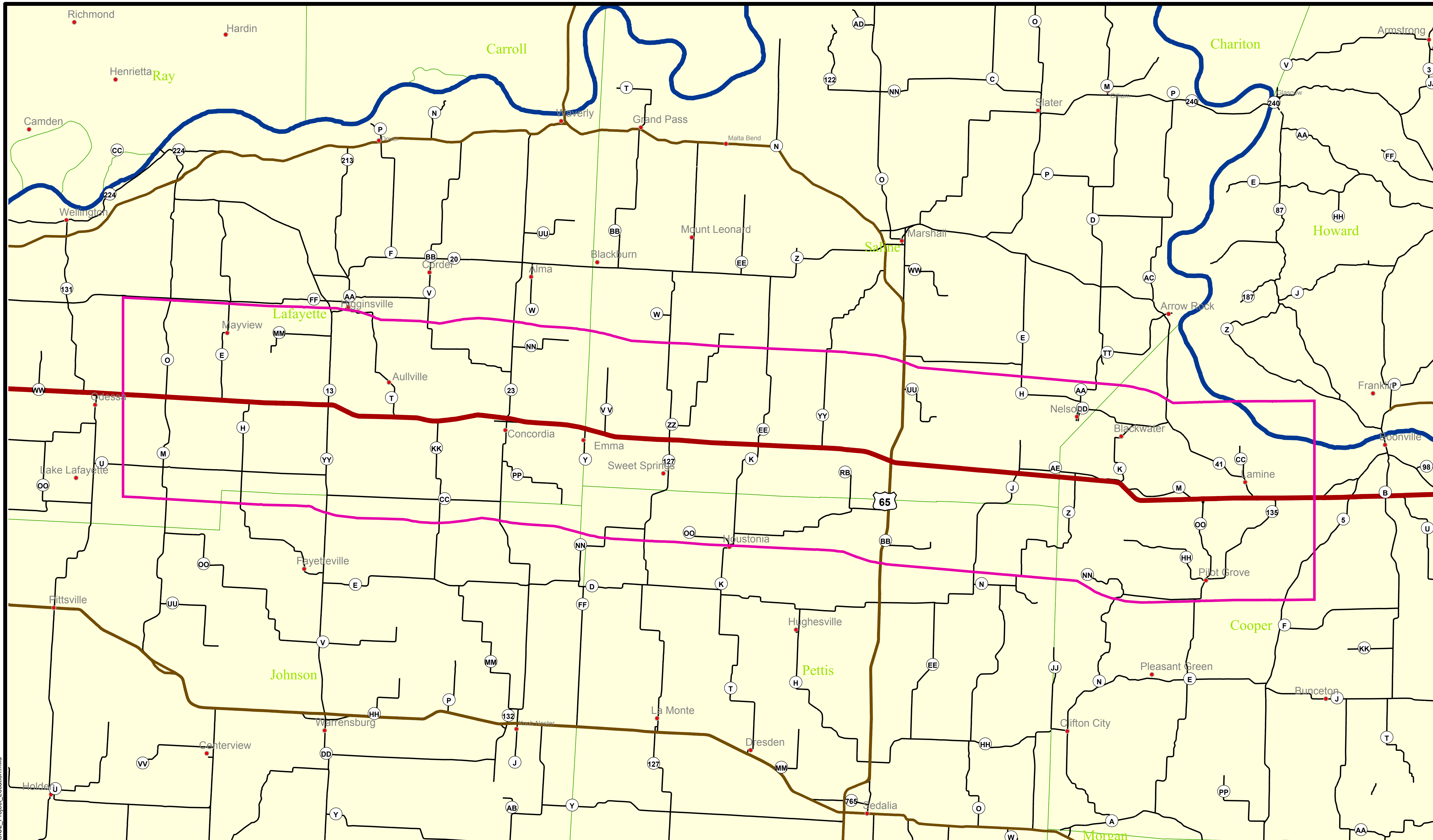

Section #2

Route 131
to
Route 5

Legend

- I-70 SIU#2 Corridor
- Missouri River
- Counties
- Cities
- State Route
- U.S. Highway

0 5 10
Miles
1:300,000

SIU 2
PROJECT LOCATION

FIGURE
I-2

In summary, the proposed improvements, primarily resulting from the findings of the First Tier process, include:

- Replacing all existing pavement and bridges with an improved geometric design involving reconstruction of four existing lanes and addition of one lane in each direction (mainline improvements). These improvements would increase safety and capacity on this freeway;
- Interchange reconstruction in compliance with MoDOT's current access management guidelines, to the extent practical, allowing increased capacity and complying with all current safety criteria;
- Completion of the long-term goal of a continuous frontage road system across the state of Missouri;
- Implementing the Rest Area Master Plan of consolidating the rest areas along I-70 into three improved and expanded rest areas to include all necessary Americans with Disabilities Act compliant accommodations and family restrooms;
- Reconstruction of the westbound weigh station facility due to road construction and
- Installation of electronic signage and other technology to assist motorists and improve traffic conditions (Intelligent Transportation Systems).

The characteristics of these improvements, the Build Alternatives under consideration and the No-Build Alternative are described in Chapter II.

The First Tier EIS stated the long-term goal of providing continuous frontage roads for the purposes of incident management - frontage roads could provide an alternative route should an incident occur on I-70. MoDOT is currently in the process of developing a statewide incident management plan, including a plan for I-70 across the state, to respond quickly and efficiently to incidents. Providing continuous frontage roads along the corridor, on at least one side or the other, would provide alternate routes within the system and would fully complement and further amplify the benefits of incident management. In the event of an incident, traffic can be efficiently rerouted to the adjacent frontage road system, as necessary, to maintain traffic flow in the corridor.

Though continuous frontage roads are a long-term goal and are included as part of the preferred alternative for environmental planning purposes, continuous frontage roads are not a high priority. Including continuous frontage roads as part of the preferred alternative provides a long-term master plan for the corridor, but MoDOT is not committed to building continuous frontage roads in the near term. MoDOT is committed, however, to construct frontage roads for the purposes of maintaining existing local service connections and maintaining existing access to adjacent properties.

Each frontage road will be assessed on an individual basis as to whether or not any existing discontinuities will be addressed as part of the initial construction. Improvement of existing discontinuities will depend on the availability of construction funding and relative priorities. For the purposes of this environmental document, since it is reasonably anticipated that full build-out of the frontage road system would occur at some point in the future, continuous frontage roads have been considered in the impact assessments as direct impacts. As such, the analysis of the improvement alternatives has fully considered the implications of the future continuous frontage system on the layout and configuration of the initial I-70 improvements (i.e., preferred alternative).

Recommendations for the improvements have been based on the anticipated full build-out of the corridor. Exhibits showing the improvements show the future frontage road construction in a format

different from the initial frontage road construction. Construction cost estimates do not include future frontage roads.

D. Purpose and Need

The basic purpose of the project is to preserve the system and provide a safe, efficient, economical and environmentally sound transportation facility consistent with the overall program of improvements for I-70 as set forth in the I-70 Improvement Study.

The overall purpose and need for the proposed improvements to SIU 2 has several components, including:

- Addressing Improvements Needed to Conform to Current Highway Design Standards;
- Improving Safety for the Traveling Public;
- Improving Efficiency of the Transportation System: Capacity and Travel Time;
- Addressing Economic Development and Related Transportation Requirements: Truck/Goods Movement and Seasonal Recreation Traffic;
- Meeting National Needs for a Strategic Highway Corridor Network

The first four components are described in the following discussions. Additional supporting information is provided in Section A of Chapters III and IV.

1. Addressing Improvements Needed to Conform to Current Highway Design Standards

Corridor Design Criteria

MoDOT, in coordination with FHWA, has established overall corridor-level design criteria and guidance for the Second Tier preliminary engineering studies of the I-70 improvements. These guidelines were established based on MoDOT's *Project Development Manual* and the American Association of State, the Highway Transportation Officials' (AASHTO) *Policy on Geometric Design of Highways and Streets* and the AASHTO Roadside Design Guide, 3rd Edition. However, recognizing that the investments in I-70 will be long term, more stringent and conservative design criteria and practices have been defined in anticipation of future corridor needs and ever-evolving design parameters. A more stringent design standard has been established as a desired goal to allow design flexibility within the corridor such that future design evolutions can be reasonably "absorbed" within the project. Furthermore, a more stringent design standard provides a more conservative estimate of the impacts of the project for the purposes of the environmental planning process and documentation.

As an example, the minimum vertical clearance of 19 feet (5.8 meters) at bridges is greater than the 16 feet (4.9 meters) as required by the currently adopted standards. This will allow the improvements to accept future changes in vertical clearance requirements. For all such instances, MoDOT will assess the program's overall design criteria and standards during subsequent design development to ensure the program strikes the right balance between meeting the needs of tomorrow and the additional costs and impacts of the more stringent design. MoDOT is committed to adhering, at a minimum, to the appropriate currently adopted criteria and design standards. The

goal will be to provide a consistent standard throughout the corridor. However, MoDOT recognizes that constraints in some areas, such as the urban areas, may affect the ability to reasonably accomplish the more stringent standards. If necessary, the rural areas may provide a more stringent design standard while the urban areas, due to tighter constraints, may hold to the minimum design standards.

The proposed improvement was designed using established Design Criteria. These design criteria are generally based on the MoDOT "Project Development Manual" and the AASHTO "Policy on Geometric Design of Highways and Streets, 2001", Fourth Edition. These criteria represent current engineering standards for the design of freeways of this type; as such it is considered a good practice not to deviate from these standards unless it is unusually difficult to construct a facility meeting the desired criteria.

Some selected criteria for the design of the Interstate are as follows:

- Design Year: 2030;
- Number of lanes (Basic): 6;
- Design speed: 75 miles per hour (120 kilometers per hour);
- Lane width: 12 feet (3.7 meters);
- Median Width: 120 to 130 feet (37 to 40 meters);
- Shoulder width: 12 feet (3.7 meters);
- Safety Clear Zone: 32 feet (9.75 meters)*;
- Maximum Horizontal Curve: 1 degree and 30 minutes;
- Vertical clearance over I-70: 19 feet (5.8 meters);
- Grade: 3 %;
- Crest Vertical Curve K-value: 312;
- Sag Vertical Curve K-value: 206.

*Note: The actual clear zone will vary somewhat based on other geometric conditions and design considerations. Some objects that are protected may be located within the clear zone.

For more detail of design criteria the Technical Memorandum titled "Median Area Study Design Criteria and Cost Estimating Guide" is available upon request.

Mainline Conditions

Within SIU 2, there are 77 primary locations along the mainline where the existing design does not meet the proposed design criteria and updated standards. These include both horizontal and vertical curve issues and maximum grades that are greater than those proposed by the design criteria. Forty-one of these locations are in Lafayette County, which encompasses 24 miles (38 kilometers) of SIU 2, 16 locations are in Saline County, which also includes 24 miles (38 kilometers) of SIU 2 and 20 are located in Cooper County, which includes 14 miles (23 kilometers). Of the 77 locations, 55 are related to the desired minimum vertical curve requirements. This means the existing vertical curves or hills have a rate of change in grades that does not allow for the desired sight distances at the specified design speed of 75 mph (120 kilometers/hour). Four of the 77 areas that do not meet the proposed design criteria are related to horizontal curve issues, which means the radius of the curves are shorter than the proposed design criteria. The remaining 18 are related to the desired maximum grade requirement.

In summary, there are 1.2 locations per mile along SIU 2. With safety being one of the primary purposes of the Improve I-70 program, this analysis supports the need for this project. In part, these issues could be related to the number and type of crashes that have occurred in SIU 2.

Pavement Condition

The majority of this section of roadway is currently paved with an Asphaltic Concrete overlay on top of a Portland Concrete base. The condition of pavement is typically evaluated using a system called the Present Serviceability Concept. This concept can be quantified by a value called the Present Serviceability Rating. Typically numerical ratings are assigned to each section of roadway, with higher numbers indicating the more satisfactory conditions. These rating can be then quantified into five general categories of pavement condition – very good, good, fair, poor and very poor.

The pavement condition of the roadway is poor. The underlying concrete base is in fair to good condition, indicating that the concrete slabs are generally structurally sound, but that the surface of the slab and the joints between the slabs are in only fair condition. Although routine improvements to the roadway and shoulder have been made, the asphaltic concrete overlay would likely need to be reconstructed or recycled within five years.

Bridge Conditions

Within SIU 2 along mainline I-70, there are nine pairs of bridges that extend over rivers, creeks or other features and 19 overpass bridges that span I-70. The American Association of Highway and Transportation Officials guidelines recommend that existing substandard structures be replaced or improved as part of any substantial highway improvement. Because of the high cost associated with bridge replacements, these standards allow for reasonably adequate bridges to be retained. Some of the non-technical factors to be considered when bridges are replaced are the aesthetic values and historical significance of such structures. However, within SIU 2, none of the bridges have aesthetic or historical value.

The useful life of highway bridges is generally considered to be 50 years. Most of the bridge structures within SIU 2 were constructed during the period of 1960 through 1964 and are therefore reaching the end of their expected design life.

Based on current bridge inspection reports, four of the bridges within SIU 2 have noteworthy structural deficiencies or defects based on the Missouri Bridge Priority Rating Index (Table I-2).

Table I-2: Substandard Bridges in SIU 2

Bridge Number	Direction	Mile Marker	Feature Crossed	Year Built	Priority*	Index
L0944	Eastbound	98.029	MO 135 S	1958	3	Poor
A0201	Eastbound	92.849	Lamine River	1962	2	Fair
A0201	Westbound	92.849	Lamine River	1962	2	Fair
A0207	Eastbound	77.078	Blackwater River	1960	2	Fair

* The priority rating is a rating of a bridge's condition, width and load carrying capacity. A bridge is rated in each of these areas. The lowest of these ratings is the overall priority rating. The overall priority is a numeric value from 1 to 4, with 1 being the highest priority and 4 being the lowest.

The majority of bridges within SIU 2 have bridge deck ratings of poor to very poor. In addition, all but two of the bridges in SIU 2 have railings or approach guard rails that do not meet the proposed design criteria. All of the bridges within SIU 2 have insufficient height clearance to meet the needs of the current 19-foot (6-meter) vertical clearance project design criteria. The existing overpasses in SIU 2 generally have a vertical clearance of 16 feet (5 meters), which meets the current AASHTO requirement, but does not meet the desired height clearance of 19 feet (6 meters).

Frontage Roads

Frontage roads provide many important functions along I-70. As previously stated, although continuous frontage roads across Missouri are a long-term goal and are included in the preferred alternative, they are not considered a high priority. Including continuous frontage roads as part of the preferred alternative provides a long-term master plan for the corridor, but MoDOT is not committed to building continuous frontage roads in the near term. MoDOT is committed however, to construct frontage roads for the purposes of maintaining existing local service connections and maintaining existing access to adjacent properties.

Within SIU 2, there are approximately 128 linear miles (206 kilometers) available for frontage roads on the north and south sides of I-70 and only 27.6 miles of frontage roads are currently in place. Of the 128 miles, 53 miles (85 kilometers) of frontage roads are proposed to be initially constructed as necessary to maintain access. Twenty-four miles (39 kilometers) of frontage roads along SIU 2 could be constructed at a later date, 27.6 miles (43 kilometers) of existing frontage roads could be utilized in place, 20.1 miles (32.3 kilometers) of existing roads could be used as alternative frontage roads and 3.2 miles (5.1 kilometers) of SIU 2 would lack frontage roads due to excessive topography and conflicts with terrain.

Interchanges

There are 13 interchanges within SIU 2. The nature and characteristics of these interchanges are described in Chapter II. For the purposes of design and evaluation, the 13 interchanges were grouped into seven standard interchanges that were designed around a typical diamond or modified diamond layout and six interchanges that were designed using various alternative interchange layouts.

The FHWA and MoDOT have developed access management guidance for new interchanges constructed along freeways. The access management guidance determines the location of interchanges, the placement and length of frontage roads around the interchanges and the location and lengths of entrance and exit ramps. None of the 13 existing interchanges within SIU 2 are consistent with the current MoDOT access management guidance. To the extent that is practical the proposed improvements would bring the existing interchanges into compliance with the guidance and consequently increase the safety and efficiency of interchanges within SIU 2 and along I-70 across the state of Missouri.

Existing Roadway Geometrics

The horizontal and vertical roadway alignments, shoulder widths and sight distances at several locations in the study area do not meet some of the design guidelines. These conditions may result in lower operating speeds and higher crash rates in the future as traffic demand grows. In addition, areas of the existing highway would have unacceptable levels of service for future projected traffic volumes, which typically increases traffic crash rates.

Older interstate freeways, such as I-70, have characteristics that contribute to higher crash rates compared to a freeway constructed to current design guidelines. The current design guidelines recommend wider shoulders, wider medians, significantly improved interchange guidelines and increased clear zone distances. Each of these improvements increases overall traffic safety. Wider shoulders, wider medians and increased clear zones provide roadside recovery zones for errant vehicles. They also provide additional storage area for vehicles experiencing mechanical breakdowns. Having room available for vehicles' experiencing mechanical difficulties to exit the roadway reduces the need for speed changes in the traffic flow caused by the stopped vehicle and lowers the chance of a crash occurring.

As traffic growth continues along the I-70 corridor, the potential for traffic crashes increases at an even faster rate. The denser the traffic on a given roadway, the greater chance of a crash for each vehicle mile traveled (AASHTO, 2001).

Providing engineered access management at the freeway interchanges also improves the overall safety of the freeway system. The two competing goals of traffic engineering are access and mobility. To a large extent these goals are incompatible when applied to any given roadway. Limiting access improves the mobility of the through traffic, improves the capacity of the roadway, minimizes congestion and greatly improves safety. However, limiting access can make it more difficult to develop adjoining properties and may cause local trips to be less direct. Access management is a method of applying the principles of traffic engineering to the competing needs of developing areas.

Access management issues include balancing the needs of motorists, pedestrians, bus riders, bicyclists, adjoining property owners and the general public. Adjoining property owners want to preserve their property values and protect residential areas, while the goals of the traffic engineers are to improve mobility, capacity and safety.

One of the key principles in access management engineering is creating safe left-turn movements. A high percentage of all crashes are related to left-hand turning movements. Vehicles stopped, waiting for the opposing traffic to clear before turning, constitute a major obstacle to through traffic. Since the speed of the stopped vehicle is zero, through traffic behind traveling at speed represents a possible rear-end collision hazard. Another key principle in access management is limiting speed differentials in the traffic stream. This can be accomplished through signal spacing to manage delays, crashes and spillback onto the interstate.

Road improvements limit speed differentials through the use of many methods such as controlling access on interchange crossroads for minimum distances, depending on the size of and volumes on the crossroad. This distance is typically one-quarter mile along the crossroad, after the ramp crossroad intersection. This minimum distance to the next full access intersection allows the exiting driver to adjust to the lower speeds and provides greater access on the non-interstate roadway. This distance also allows sufficient room for safe merging maneuvers prior to possible turning movements at the next full intersection. This safe merging length is also provided between ramp intersections by providing a minimum of 800 feet (244 meters) of separation between the two-ramp crossroad intersections.

2. Improve Safety for the Traveling Public

Crash statistics and safety data summarized or presented in this section are protected under federal law. See Appendix D.

In 1994, there were approximately 43,000 fatalities and 2,100,000 disabling injuries in the United States as a result of 11,200,000 crashes involving 20,000,000 vehicles. This resulted in a fatality rate of 1.83 deaths per 100 million vehicle miles and an involvement rate of 1.79 vehicles per crash (McShane, 1997).

Interstate freeways are generally considered the safest type of highways and I-70 has been no exception, having a crash rate less than that of the average highway in the U.S. The six-year crash data from 1995 to 2001 for SIU 2 are provided in the following table. Crash data for 2003 and 2004 was also evaluated and is consistent with the conclusions drawn from the 1995 to 2001 data. All rates are in crashes per 100 million vehicle miles. ADT is an abbreviation for “Average Daily Traffic”

which is defined as the average 24-hour traffic volume at a given location over a full, 365-day calendar year.

The following discussion incorporates text and findings from the traffic analysis results for SIU 2. These results are hereby incorporated by reference and summarized in the following discussion and elsewhere in this Environmental Assessment (EA).

Table I-3 presents a list of the crash totals grouped by roadway subsection. In summary, from 1995 through 2001, there were 2,349 total crashes, 53 of which were fatalities, in SIU 2. Twelve crashes resulted in fatalities during the last year that data are available. Table I-3 also shows that the fatal rate in SIU 2 is slightly higher, 1.42 fatalities per 100 million vehicle miles traveled, than the fatal rate of the I-70 corridor, 1.37 fatalities per 100 millions vehicles miles traveled.

Table I-3: Summary of Six Year (1995 to 2001)* Crash Data by SIU 2 Subsection**

Subsection Description*	Crashes	Total Fatal	ADT	Length miles (kilometers)	Crash Rate **	Fatal Rate
CR 96 to Rt. O/M	146	6	26,772	4.0 (6.4)	86	3.53
Rt. O/M to Rt. E/H	159	6	32,933	3.5 (5.6)	52	1.98
Rt. E/H to Rt. 13	179	6	31,608	5.7 (9.1)	65	2.17
Rt. 13 to Rt. T	203	3	24,796	4.0 (6.4)	107	1.58
Rt. T to Rt.-23	227	5	28,616	4.3 (6.9)	64	1.40
Rt. 23 to Rt. Y/V V	130	2	26,466	4.5 (7.2)	56	0.86
Rt. Y/V V to Rt. 127	111	3	23,169	3.2 (5.1)	51	1.37
Rt. 127 to Rt. K/EE	155	6	23,919	3.6 (5.8)	66	2.55
Rt. K/EE to Rt. YY	95	1	24,636	6.4 (10.3)	55	0.58
Rt. YY to U.S. 65	214	5	23,944	5.3 (8.5)	113	2.65
U.S. -65 to Rt. J	185	3	22,375	8.0 (12.9)	59	0.96
Rt. J to Rt. K	167	0	26,696	3.8 (6.1)	54	0.00
Rt. K to Rt. 135/41	245	5	28,726	4.0 (6.4)	49	0.99
Rt. 135/41 to Rt. 5	133	2	30,291	3.5 (5.6)	53	0.79
SIU 2 Total	2,349	53	377,488	63.4 (101)	63	1.42
I-70 Project Total	13,595	213	2,420,352	199 (318)	87	1.37

ADT = Average Daily Traffic

* SIU 2 generally extends from Route 131 (but not including the interchange) near Odessa to Route 5 (but not including the interchange) near Boonville. The western terminus of SIU 2 is at mile marker 39 and the eastern terminus is at mile marker 99.

** Crashes per 100 million vehicle miles of travel. Statewide rural interstate total crash rate = 69.22 per 100 million miles of travel. Statewide rural interstate fatal crash rate = 1.16 per 100 million miles of travel.

*** 2003 and 2004 crash data was evaluated and is consistent with the six-year data summarized in Table I-3.

Improving travel safety is a primary goal for transportation agencies when considering making improvements to roadways. Based on estimations, unless I-70 is improved, there could be an additional 111 fatalities in SIU 2 by the year 2030 (Table I-4). These crash and fatality rates and the anticipated trend toward more crashes and fatalities characterize the primary purpose and need of the Preferred Alternative. Concern about safety on I-70 has been and continues to be one of the most common comments received during the public involvement processes associated with the Improve I-70 Program. Crash data collected during 2002 and 2003 was evaluated against the six-year crash data from 1995 to 2001. This new data was considered to be consistent with six-year crash data.

Table I-4: Summary of Estimated Annual Crash Data in 2030 by SIU 2 Subsection Without I-70 Improvements

Subsection Description*	Yearly VMT**	Daily VMT	ADT**	2030 No-Build Projected Crashes		
				PDO** Crashes	Injury Crashes	Total Fatal
CR 96 to Rt. O/M	75,701,000	207,400	71,530	11	5	3
Rt. O/M to Rt. E/H	109,135,000	299,000	71,180	22	10	7
Rt. E/H to Rt. 13	103,514,000	283,600	70,900	20	9	6
Rt. 13 to Rt. T	87,344,500	239,300	68,390	15	6	4
Rt. T to Rt. 23	141,547,000	387,800	68,040	39	17	11
Rt. 23 to Rt. Y/V V	96,615,500	264,700	66,170	19	8	6
Rt. Y/V V to Rt. 127	103,842,500	284,500	66,170	22	9	6
Rt. 127 to Rt. K/EE	108,587,500	297,500	66,100	24	10	7
Rt. K/EE to Rt. YY	77,197,500	211,500	66,100	12	5	4
Rt. YY to U.S. 65	85,081,500	233,100	64,760	15	6	4
U.S. 65 to Rt. J	156,366,000	428,400	66,940	48	21	14
Rt. J to Rt. K	129,684,500	355,300	67,030	33	14	10
Rt. K to Rt. 135/41	197,647,500	541,500	67,680	76	33	23
Rt. 135/41 to Rt. 5	103,587,000	283,800	74,690	19	8	6
SIU2 Total	1,575,851,000	4,317,400	955,680	375	161	111

* SIU 2 generally extends from Route 131 (but not including the interchange) near Odessa to Route 5 (but not including the interchange) near Boonville. The western terminus of SIU 2 is at mile marker 39 and the eastern terminus is at mile marker 99.

** VMT = Vehicle Miles Traveled, ADT = Average Daily Traffic, PDO = Property Damage Only

3. Improve Efficiency of the Transportation System

Traffic trends indicate that congestion levels and travel times on I-70 outside of and within SIU 2 would increase in the future. Although transportation system efficiency degradation on the mainline of I-70 and at the interchanges within SIU 2 would be less severe than in some of the other SIUs, the changes would be substantial by 2030 in SIU 2. Over time, the levels of congestion, frequency that congestion is a problem and the duration of congested periods would all increase as volumes increase unless capacity improvements are made.

Using the base year (2000) and forecasted (2020 and 2030) traffic volumes along I-70, operational analyses were completed to determine the ability of the existing I-70 facility to serve the corridor's travel demands. The analysis was performed using the basic freeway segment methodologies from the *Highway Capacity Manual* (HCM). The analysis calculates a level of service (LOS) for freeway sections based upon hourly volumes, percent of heavy vehicles in the vehicle mix and the freeway segment attributes.

The hourly volumes used in the LOS analysis for the year 2020 and 2030 were derived from the average daily volumes forecast by the travel demand models. The year 2000 traffic counts and the model-generated volumes are for a 24-hour period, but hourly volumes are required for LOS analysis. Peak-hour traffic percentages were derived from traffic counts along I-70 and were applied to the 24-hour volumes. The peak hour adjustment percentages ranged from a high of 11 percent in Jackson County near Kansas City, to a low of seven percent in some of the more rural

areas of I-70. SIU 2 peak hour adjustment percentages ranged from 9 percent to 7 percent. In the urban areas, the peak directional split was 60 percent and in rural areas such as SIU 2 the split was 55 percent. Similarly, truck percentages were adjusted to reflect the higher percentage of trucks in the rural areas. Truck percentages throughout the I-70 Corridor ranged from 14 to 31 percent. In SIU 2 truck percentages ranged from 23 to 30 percent.

The quality of traffic flow is measured by comparing existing traffic flow to established levels of traffic service. These levels of service are defined in the HCM. The HCM defines LOS as a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions and comfort and convenience (HCM, 2000). The LOS ranges from the most desirable, LOS A, to the least desirable flow, LOS E. Non-flowing conditions are referred to as LOS F. A brief description of the six LOS levels follows:

- **LOS A**—uninterrupted traffic flow, lower volumes and higher travel speeds. Describes primarily free flow operations. Average travel speeds near 60 mph generally prevail on 70-mph freeway elements. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic flow.
- **LOS B**—stable traffic flow, increasing traffic and reduced travel speeds due to congestion. Describes reasonably free flow conditions and speeds of over 57 mph are maintained on 70-mph freeway elements. The ability to maneuver within the traffic stream is only slightly restricted and the general level of physical and psychological comfort provided to drivers is still high.
- **LOS C**—stable flow, increasing traffic; travel speeds and maneuverability restricted by higher volumes. Describes stable operations, but flows approach the range in which small increases in flow will cause substantial deterioration in service. Average travel speeds are still over 54 mph on 70-mph freeway elements. The freedom to maneuver within the traffic stream is noticeably restricted at LOS C and lane changes require additional care and vigilance by the driver.
- **LOS D**—approaching unstable flow, tolerable travel speeds although considerably affected by changes in operating conditions. Describes flow bordering on unstable. In this range small increases in flow cause substantial deterioration in service. Average travel speeds of 46 mph can still be maintained on 70-mph freeway elements. Freedom to maneuver within the traffic stream is severely limited and the driver experiences drastically reduced physical and psychological comfort levels.
- **LOS E**—unstable flow, with possible stopped conditions, lower operating speeds than LOS D, volume approaching capacity of roadway. Describes the boundary condition between LOS D and LOS F. Operations at this level are extremely unstable, because there are virtually no usable gaps in the traffic stream. Vehicles are spaced at approximately 80 feet (24 meters), or four car lengths, apart. This represents the minimum spacing at which stable flow can be maintained.
- **LOS 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. These conditions generally exist within queues formed by stopped traffic.

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 flows. 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.

Mainline Level of Service

The results of the roadway LOS analysis for mainline sections of I-70 in 2000, 2020 and 2030 are presented in Table I-5. The results of the LOS analysis indicates that in 2020, five of the segments in SIU 2 would have insufficient capacity (i.e., number of lanes) to adequately serve the daily traffic demand according to MoDOT's desired service standards – LOS C in more rural areas and LOS D in more urban areas. In 2030, this analysis indicates that all of the segments within SIU 2 would operate below LOS C. The shaded LOS designations in Table I-5 indicate those locations that are expected to operate at a level of service worse than C. These segments of I-70 would be near conditions of unstable flow, lowered operating speeds, congested stop-and-go travel and traffic volumes that exceed the capacity of the roadway. A better level of service in the rural areas reflects a driver's ability to tolerate less congestion on longer trips.

Table I-5: Forecast Daily Traffic and Peak Hour Level of Service Under No-Build Conditions

Subsection Description	Desirable LOS	2000 ADT**	2000 LOS	2020 Modeled ADT**	2020 LOS	2030 Modeled ADT	2030 LOS
CR 96 to Rt. O/M*	C	32,032	B	61,150	E	71,530	F
Rt. O/M to Rt. E/H	C	29,399	B	60,770	E	71,180	F
Rt. E/H to Rt. 13	C	28,178	B	60,520	E	70,900	F
Rt. 13 to Rt. T	C	25,570	B	57,960	E	68,390	F
Rt. T to Rt. 23	C	28,616	B	57,670	D	68,040	E
Rt. 23 to Rt. Y/V V	C	26,467	B	56,090	D	66,170	E
Rt. Y/V V to Rt. 127	C	24,317	A	56,090	C	66,170	D
Rt. 127 to Rt. K/EE	C	24,558	A	56,020	C	66,100	D
Rt. K/EE to Rt. YY	C	24,637	A	56,020	C	66,100	D
Rt. YY to U.S. 65	C	24,715	A	54,880	C	64,760	D
U.S. 65 to Rt. J	C	22,821	A	56,890	C	66,940	D
Rt. J to Rt. K	C	26,698	B	56,970	C	67,030	D
Rt. K to Rt. 135/41	C	28,726	B	57,520	C	67,680	D
Rt. 135/41 to Rt. 5	C	30,754	B	63,420	E	74,690	F

Indicates an undesirable Level of Service

* SIU 2 generally extends from Route 131 (but not including the interchange) near Odessa to Route 5 (but not including the interchange) near Boonville. The western terminus of SIU 2 is at mile marker 39 and the eastern terminus is at mile marker 99.

** ADT = Average Daily Traffic

Interchange Level of Service

The four I-70 ramps at each interchange connect to the north/south crossroads. The north/south crossroads distribute I-70 traffic onto and off of the local road network. Based on an analysis of the traffic volumes on the north/south crossroad and the traffic volumes on I-70, levels of service (LOS) for the ramps-merge and diverge lanes (Table I-6) and the overall intersection at each interchange were calculated. As shown in Table I-6, ramp interchange LOS B conditions in the year 2000 would fall to LOS D conditions or below (I-70/Route 13 Westbound-LOS F) at every interchange in SIU 2 except those with low crossroad volumes.

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Table I-6: Existing and Future Ramp LOS Conditions at Interchanges Under No-Build Conditions

Exit Number*	Interchange	Ramp Configuration	Direction	2000 LOS	No-Build 2030 LOS
41	I-70/Route M/O	On	Eastbound	B	D
41	I-70/Route M/O	On	Westbound	B	D
41	I-70/Route M/O	Off	Eastbound	B	D
41	I-70/Route M/O	Off	Westbound	B	D
45	I-70/Route H	On	Eastbound	B	D
45	I-70/Route H	On	Westbound	B	D
45	I-70/Route H	Off	Eastbound	B	D
45	I-70/Route H	Off	Westbound	B	D
49	I-70/Route 13	On	Eastbound	B	D
49	I-70/Route 13	On	Westbound	B	F
49	I-70/Route 13	Off	Eastbound	B	D
49	I-70/Route 13	Off	Westbound	B	D
52	I-70/Route T	On	Eastbound	B	D
52	I-70/Route T	On	Westbound	B	D
52	I-70/Route T	Off	Eastbound	B	D
52	I-70/Route T	Off	Westbound	B	D
58	I-70/Route 23	On	Eastbound	B	D
58	I-70/Route 23	On	Westbound	B	D
58	I-70/Route 23	Off	Eastbound	B	D
58	I-70/Route 23	Off	Westbound	B	D
62	I-70/Routes Y/V V	Low Volume Interchange**			
66	I-70 Route 127	On	Eastbound	B	D
66	I-70 Route 127	On	Westbound	B	D
66	I-70 Route 127	Off	Eastbound	B	D
66	I-70 Route 127	Off	Westbound	B	D
71	I-70/Route EE	Low Volume Interchange**			
74	I-70 Route YY	On	Eastbound	B	D
74	I-70 Route YY	On	Westbound	B	D
74	I-70/Route YY	Off	Eastbound	B	D
74	I-70/Route YY	Off	Westbound	B	D
76	I-70/U.S. 65	On	Eastbound	B	C
76	I-70/U.S. 65	On	Westbound	B	C
76	I-70/U.S. 65	Off	Eastbound	A**	C**
76	I-70/U.S. 65	Off	Westbound	A**	C**
84	I-70 Route J	On	Eastbound	B	D
84	I-70 Route J	On	Westbound	B	D
84	I-70 Route J	Off	Eastbound	B	D
84	I-70 Route J	Off	Westbound	B	D
89	I-70 Route K	On	Eastbound	B	D
89	I-70 Route K	On	Westbound	B	D
89	I-70 Route K	Off	Eastbound	B	D
89	I-70 Route K	Off	Westbound	B	D
98	I-70/Routes 135/41	On	Eastbound	B	D
98	I-70/Routes 135/41	On	Westbound	B	D
98	I-70/Routes 135/41	Off	Eastbound	B	D
98	I-70/Routes 135/41	Off	Westbound	B	D
	Indicates an undesirable Level of Service				

* SIU 2 generally extends from Route 131 (but not including the interchange) near Odessa to Route 5 (but not including the interchange) near Boonville. The western terminus of SIU 2 is at mile marker 39 and the eastern terminus is at mile marker 99.

** I-70/Route Y/V V and I-70/Route EE interchanges are low volume interchanges and although directional distribution data were not available, the No-Build LOS for these interchanges is anticipated to be acceptable in 2020 and 2030 based on the low crossroad volumes. U.S. 65 is an existing cloverleaf interchange and therefore LOS values are for the merge/diverge lanes from the cloverleaf.

While LOS D is tolerable for interchanges, according to transportation planning policy, the corridor wide changes to LOS D from LOS B represent a substantial degradation in system efficiency and would represent a substantial statewide problem if other SIU improvements are made and interchange improvements in SIU 2 lag or are not implemented in a timely manner.

The LOS at a two-way stop (sign or signal) controlled intersection of an interchange depends on the interaction of motorists on the ramp with motorists on the north/south crossroad. A LOS F occurs when there are not enough gaps of suitable size on the crossroad to allow the motorists on the ramps to safely cross through traffic on the crossroad (HCM, 2000). The LOS for the overall interchange was calculated as a combination of the interaction between the intersections at each interchange.

Table I-7: Comparison of Existing LOS Conditions Versus 2030 LOS Conditions at SIU 2 Interchange Intersections Under No-Build Conditions

Exit Number*	Interchange	Interchange Design	Type of Control	2000 LOS	No-Build 2030 LOS
41	I-70/Route M/O	Diamond	Stop	A	A
45	I-70/Route H	Diamond	Stop	A	A
49	I-70/Route 13	Diamond	Stop	F	F
49	I-70/Route 13	Diamond	Signal	NA	C
52	I-70/Route T	Diamond	Stop	A	A
58	I-70/Route 23	Diamond	Stop	C	F
58	I-70/Route 23	Diamond	Signal	NA	B
62	I-70/Routes Y/V V	Diamond	Stop	Low Volume**	Low Volume**
66	I-70 Route 127	Diamond	Stop	B	B
71	I-70 Route EE	Diamond	Stop	Low Volume**	Low Volume**
74	I-70 Route YY	Diamond	Stop	B	D
76	I-70/U.S. 65	Cloverleaf	No Control	B	C
84	I-70 Route J	Diamond	Stop	A	A
89	I-70 Route K	Diamond	Stop	A	A
98	I-70/Routes 135/41	Diamond	Stop	B	B
98	I-70/Routes 135/41	Diamond	Signal	NA	B
	Indicates an undesirable Level of Service				

* SIU 2 generally extends from Route 131 (but not including the interchange) near Odessa to Route 5 (but not including the interchange) near Boonville. The western terminus of SIU 2 is at mile marker 39 and the eastern terminus is at mile marker 99.

** I-70/Route Y/V V and I-70/Route EE interchanges are low volume interchanges and although directional distribution data were not available, the 2000 LOS and 2030 No-Build LOS for these interchanges are anticipated to be acceptable based on the low crossroad volumes at these interchanges.

4. Address Economic Development and Related Transportation Requirements

Interstate 70 serves a vital economic role within Missouri and the nation and serves a wide range of economic development interests along the way. More specifically, many communities along I-70 in SIU 2 and elsewhere have oriented their commercial and industrial development approvals and other planning decisions around existing interchanges. These communities depend on the services I-70 offers motorists (commuters, other drivers and truck drivers) and the corresponding tax revenue generated by businesses linked to travelers on I-70. This dependency, especially in relation to the economies and fiscal health of the relatively small communities within SIU 2 makes

them highly vulnerable to I-70 conditions. Inadequate access management at interchanges may lead to congestion that limits economic development. Across SIU 2, the dependencies to I-70 vary, but overall, they represent a substantial need to maintain and improve access conditions in the future.

Another key element of economic health in Missouri is tourism. SIU 2 through its connections with U.S. 65 and Route 13 provides access to the scenic Ozarks region, which includes statewide attractions such as Lake of Ozarks, Harry Truman Reservoir and Branson. Routes 23, 131 and U.S. 65 provide primary north-south connections to these tourism destinations and others both north and south of I-70. Adequate mainline and interchange access to and from I-70 is important to maintain and enhance tourism across Missouri.

While it is not the intent of MoDOT to improve I-70 to encourage economic development or determine where economic development should occur, the need to provide state and regional access is MoDOT's goal and adequate access for commerce would become increasingly unreliable in the future as travel efficiencies degrade. In summary, future improvements to I-70 are needed to maintain appropriate service for interstate commerce, adequate access for maintaining economic and fiscal health of communities within SIU 2 and to serve and sustain tourism in Missouri.

Additional socioeconomic information is provided in Chapters III A and IV A of this EA.

5. National Security

The need to have efficient, convenient and expeditious movement of large quantities of people and goods requires that transportation systems must have a high degree of access. In cases such as the highway system, access is almost unlimited. Along with the open access, most of the transportation infrastructure was designed and constructed long before concerns about national security and terrorism had arisen. Although the highway system has many of the same vulnerabilities as other surface transportation modal systems, the highway system provides an additional system if other transportation systems are impaired. To provide the necessary transportation system, the individual corridors must have the ability to meet the demands if other links are impacted. The other key to taking advantage of duplication in the system is the ability to provide systems status information. Current planning related to the highway system security is focusing on:

- Protecting critical mobility assets,
- Enhancing traffic management capabilities and
- Improving state department of transportations emergency response capabilities.

The American Association of State Highway and Transportation Officials' Transportation Security Task Force identified that investment in these three security initiatives will yield other general mobility benefits. The reverse is also true. Investments in general highway system enhancements, such as improving the I-70 corridor, will yield security benefits. Additional available capacity along the I-70 corridor would increase the ability of the corridor to handle diversion from other highway links should some type of disaster occur. The increased available capacity also enhances the ability to handle emergency responses.

The I-70 corridor is part of the Strategic Highway Network (STRAHNET) and two interchanges within SIU 2 (Route 13 and U.S. 65) provide connections to STRAHNET. The STRAHNET is designed to facilitate the movement of personnel and equipment for deployment and emergency response. Proposed intelligent transportation system (ITS) implementation along the corridor would

assist in protecting critical assets and would enhance traffic management capabilities. Closed-circuit television cameras could be used for surveillance of critical assets such as major bridges. Alarm systems can also be facilitated by the ITS communication network. The physical protection of assets would be considered as part of the design process. An example may be designing a barrier system to eliminate the ability of vehicles to park under critical bridges.

During the final design process, a risk assessment based approach would be used to determine the appropriate investment in security. One approach to the issue of transportation security is the concept of a layered security system, where multiple security features are connected and provide backup for one another. This approach offers the advantage that perfection from each element of the system is not required, as other elements can compensate for any deficiencies. At the same time, enhancements to one layer of the system could boost the performance of the system as a whole. Improving I-70 can help to increase transportation system security in Missouri and across the nation as a whole.