CHAPTER I
Project Description and Purpose and Need

A. Project Background and Tiered National Environmental Policy Act Process

Interstate 70 (I-70) is a major interstate highway crossing the United States in a general east-west direction. Interstate 70 is part of the Eisenhower Interstate System of Highways and retains its separate identity within the National Highway System. The National Highway System includes the Interstate Highway System as well as other roads important to the nation's economy, defense and mobility. Within Missouri, I-70 is a multi-lane, divided and fully access-controlled highway.

The Missouri Department of Transportation (MoDOT) and the Federal Highway Administration have proposed improvements to I-70 between the metropolitan areas of Kansas City and St. Louis (I-70 corridor) to meet the current and future transportation-related needs of the corridor. A tiered environmental process was used to evaluate the improvements within this I-70 corridor. A tiering process is a procedure that allows compliance with the National Environmental Policy Act by using two separate stages, or tiers, of decision making. The First Tier Environmental Impact Statement (EIS) (available upon request) and Record of Decision process represented a decision document for the overall transportation strategy, whereas the second tier process addresses narrower or more specific issues for each section established during the first tier process. The second tier process includes a more detailed consideration of alternatives, environmental impacts and possible mitigation and enhancement measures.

The First Tier Study process concluded with selecting the Widen Existing I-70 Strategy between Kansas City and St. Louis, Missouri. The findings of this study are documented in the First Tier EIS (Federal Highway Administration and MoDOT, 2001). A Record of Decision was issued for the First Tier EIS in December 2001. A summary of the First Tier EIS is presented in Appendix A. Additionally, the First Tier EIS divided the I-70 corridor from I-470 at Kansas City to the Lake St. Louis exit near St. Louis into seven sections of independent utility (SIUs) (Appendix A).

B. Logical Termini and Independent Utility

The proposed action evaluated in this environmental document is for SIU 3 and is part of the Second Tier Study environmental process. The study area for SIU 3 is defined as an approximate 700-foot (213.3-meter) wide corridor centered over existing I-70 within which alternatives will be developed (Figure I-1). The First Tier Study defined the logical termini for the SIU 3 study area to be Route 5 on the west and Route BB on the east. For purposes of quantifying costs, benefits and impacts for SIU 3 and to allow the consideration of potential effects of both crossings of the Katy Trail in the same SIU, the following boundaries were defined:

- approximately two miles (3.2 kilometers) west of the Route 5 interchange in Cooper County near mile marker 99 (western terminus); and
- 0.6 mile (0.97 kilometer) east of the Route BB interchange in Boone County at mile marker 115 (eastern terminus).

The distance between the project logical termini is approximately 16 miles (26 kilometers). The study area includes five interchanges and expands at each to account for improvements to the interchanges.

The project's independent utility, indicating that the proposed improvements in SIU 3 can be completed without construction of any additional aspects to the west or east of the project termini, is based off of the conclusions of the First Tier Study. Specifically, the proposed project meets the purpose and need even if no other improvements are made.

C. Proposed Action

There are currently four lanes of traffic within the study area (two lanes in each direction). As determined in the First Tier EIS, the selected strategy was the Widen Existing I-70 Strategy. For SIU 3 this action provides a widening of the existing I-70 section by an additional lane of traffic in each direction, for a total of six lanes. These improvements include upgrading the current roadway design features by widening the median, reconfiguring the five interchanges within the study area and constructing an additional bridge over the Missouri River at Overton Bottoms.

D. Purpose and Need for Action

The purpose of this project is to provide a safe, efficient, environmentally sound and cost-effective transportation facility that is responsive to the local and system-wide need and the expectations of a national interstate. The specific project purpose and need for this project can be summarized as follows:

- **Service Conditions and Existing Roadway and Bridge Geometry** – Upgrade current roadway design features including mainline roadway, interchanges and crossroads to account for additional I-70 lanes.
- **Roadway Capacity** – Increase roadway system capacity in accordance with the projected travel demands to improve the general operating conditions.
- **Traffic Safety** – Reduce the number and severity of traffic-related crashes.
- **Missouri River Bridge** – Address the functional and structural needs of the bridge over the Missouri River.
- **Goods Movement** – Improve the efficiency of freight movement on I-70.
- **Access to Recreational Facilities** – Facilitate the usage by motorists of nearby regional recreation facilities by maintaining clear accessibility.
- **National Security** – Provide a facility to accommodate potential modal shifts in transportation due to issues related to national security.

The system-wide purpose and need (substantiated in the First Tier EIS) are incorporated as a basis for the more local purpose and need of SIU 3. For example, the demonstrated need for added capacity within I-70 statewide inherently represents a need to widen I-70 within this section to accommodate the projected traffic volume and to provide for the needed system continuity with adjacent sections (SIU 2 and SIU 4). Similarly, planned improvements within this section also support regional and statewide needs to provide for more efficient goods movement, enhanced national security and access to recreational facilities.

The following discussion focuses on a more local purpose and need within SIU 3, but incorporates the other regional and systemic purpose and need identified in the First Tier EIS.

1. Existing Roadway and Bridge Geometry

a. Design Criteria

The Missouri Department of Transportation, in coordination with the Federal Highway Administration, has established overall program-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 Policy Procedure and Design Manual and American Association of State Highway and Transportation Officials' Policy on Geometric Design of Highways and Streets. 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. More stringent design criteria have 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, more stringent design criteria provide a more conservative estimate of the impacts of the project for the purpose of the environmental planning process and documentation.

As an example, the minimum vertical clearance at bridges is greater than what would be required per 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 and 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 criteria. If necessary, the rural areas may provide a more stringent design while the urban areas, due to tighter constraints, may hold to the minimum design standards.

The project improvements generally adhere to the following design criteria:

- design speed of 75 miles per hour (posted speeds will be 70 miles per hour);
- maximum degree of curvature 1° 30' (for the I-70 mainline);
- maximum grade of three percent (recommended);
- minimum median width of 84 feet (25.6 meters);
- required vertical clearance of 19 feet (5.8 meters);
- minimum of three 12-foot (3.7-meter) lanes in each direction;
- outside and inside shoulders of 12 feet (3.7 meters) wide;
- distance between ramp termini of 800 feet (243.8 meters);
- minimum length for deceleration lanes (800 feet [240 meters]); and
- minimum length for acceleration lanes (1,200 feet [360 meters]).

Criteria for crossroads and interchanges can be found in the Design Criteria and Cost Estimating Guide (available upon request).

b. Existing Mainline I-70

Pavement Section – Existing I-70 within the study area consists of a four-lane divided freeway. There are two, 12-foot (3.7-meter) travel lanes in each direction with 10-foot (3.1-meter) outside shoulders and four-foot (1.2-meter) inside shoulders. As determined in the First Tier EIS, a minimum of six traffic lanes on mainline I-70 are needed to accommodate anticipated traffic growth in the region and across the state. The inside and outside shoulders must also be widened to meet design criteria set forth in the First Tier EIS. Both are recommended to be 12 feet (3.7 meters) wide and full-depth to allow for use as a future through lane and/or a temporary lane during maintenance activities.

Median Width – The existing median is 40 feet (12.2 meters) wide (measured from the inside edge of the inner-most travel lane) and consists of the inside shoulders and the depressed grass area between the inside shoulders. The First Tier EIS determined a minimum 124-foot (37.8-meter) median for the SIU 3 study area. The additional width is needed for the staging of construction of the new mainline pavement, the reduced incidence and severity of cross-median crashes and to account for possible lane widening at a future date. An added benefit of the wider median is to accommodate future transportation uses. The minimum median width of 84 feet (25.6 meters) includes six to one slopes, an eight-foot (2.4-meter) flat-bottom ditch and a four-foot (1.2-meter) ditch depth.

Clear Zone – The First Tier EIS determined clear zone requirements to be 32 feet (9.8 meters) with six to one side slopes to meet requirements for the posted speed of 70 miles per hour (112.6 kilometers per hour).

Outer/Frontage Roads – 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 and system redundancy should an incident occur on I-70. Continuous frontage roads are a long-term goal and are included as part of the proposed action for environmental planning purposes. Including continuous frontage roads as part of the proposed action provides a long-term master plan for the corridor, but MoDOT is not committed to building continuous frontage roads in the near term. The Missouri Department of Transportation 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 construction. Improvement of existing discontinuities will depend on the availability of construction funding and relative priorities. It is MoDOT's desire to have continuous frontage roads on one side or the other before ultimately providing them on both sides. No frontage road is proposed across Overton Bottoms or the Missouri River as Route 5 provides an alternate river crossing that may be used for incident management.

Generally, outer roads will be reconstructed at each interchange where maintaining access to an adjacent property is required. However, there are a few areas where a frontage road needs to be reconstructed beyond the immediate vicinity of an interchange. These are listed below (from west to east):

- south of I-70 from Sunrise Valley Drive to Route 5, a distance of approximately 1.2 mile (1.9 kilometer);
- south of I-70 from Old Route 5 to Route B, a distance of approximately 0.8 mile (1.4 kilometer);
- north of I-70 from Old Route 5 to Route B, a distance of approximately 0.8 mile (1.4 kilometer);
- south of I-70 from Route B to Route U, a distance of approximately 1.1 mile (1.8 kilometer); and
- south of I-70 (Gooches Mill Road) from Woodland School Drive to a point 3,100 feet (945 meters) east, a distance of approximately 0.6 mile (0.9 kilometer).

c. Interchanges and Crossroads

There are five interchanges in the study area:

- Route 5 (Exit 101);
- Route B (Exit 103);
- Route 87 (Exit 106);
- Route 179 (Exit 111); and
- Route BB (Exit 115).

With the exception of the Route BB interchange, all of the interchanges are in Cooper County. The Route BB interchange is in Boone County. All five interchanges consist of a standard diamond configuration.

Access Management

The First Tier EIS established access management guidelines to be observed at each interchange. The intent of these guidelines is to achieve a design layout that maintains good transition in traffic flow between mainline I-70, the crossroads and the adjacent development at each interchange.

These access management guidelines set forth a minimum spacing of 800 feet (243.8 meters) between ramp terminals at diamond interchanges. Additionally, a minimum spacing of 1,320 feet (402.3 meters) is suggested along the crossroad from the ramp terminal to the first public road intersection, median opening or left turn opportunity. A minimum spacing of 750 feet (228.6 meters) is suggested along the crossroad from the ramp terminal to the first right-in/right-out driveway. As presented in Table I-1, none of the interchanges in the study area currently adhere to these guidelines. These interchanges, where practicable, should meet the access management guidelines from the First Tier Study. If costs or adjacent impacts become excessive, the applicability of the guidelines should be reevaluated and exceptions to the guidelines may be warranted.

Table I-1: Distance to First Intersection at Each Interchange within SIU 3

Interchange	Location	Distance	
		Feet	Meters
Route 5	North	506	145.2
	South	579	176.5
Route B	North	381	116.1
	South	165	50.3
Route 87	North	382	116.4
	South	185	56.4
Route 179	North	400	103.6
	South	390	118.9
Route BB	North	556	169.5
	South	418	127.4
Source: MACTEC, 2004			

Interchange Bridges

Bridge condition and sufficiency is expressed as a percentage in which 100 percent represents an entirely sufficient bridge and 0 percent represents an entirely insufficient or deficient bridge. This bridge sufficiency rating is based on three separate factors: (1) structural adequacy and safety, (2) serviceability and functional obsolescence and (3) essentiality of public use. The maximum contributions from each of the factors are 55 percent, 30 percent and 15 percent, respectively. A fourth factor, special reductions, can be applied to account for other characteristics of the bridge that can have a negative impact on its sufficiency, including the length of any required detours, the main structure type and traffic safety features on the structure. The sufficiency rating is used for establishing eligibility for replacement of bridges under the Highway Bridge Replacement and Rehabilitation Program. Sufficiency ratings below 50 percent generally would warrant complete replacement. Ratings between 50 and 80 percent would indicate that improvements could be made through rehabilitation, unless replacement could be shown as more cost effective.

Two of the interchange bridges spanning I-70 are currently structurally deficient. The interchange bridge at Route B has a sufficiency rating of four percent. This bridge is structurally deficient and in need of replacement based on the poor condition of the deck and superstructure. This two-lane bridge cannot accommodate additional lanes. Additionally, traffic volume on Route B is projected to grow to a level that necessitates a turn lane. Thus, the bridge is also functionally deficient based on future traffic levels. The interchange bridge at Route 179 is also structurally deficient with a rating of 47 percent. This structure is deficient based on the condition of the bridge deck.

With respect to the proposed roadway section of I-70 (six lanes with a 124-foot [37.8-meter] median), all of the existing interchange bridges and all grade-separated crossroad bridges are functionally deficient as they do not accommodate the required spans. Thus, they all need to be reconstructed.

Traffic volume on Routes 5 and 87 is also projected to increase to levels that necessitate a turn lane at the interchange. These bridges have insufficient width for a third lane and are functionally deficient based on future traffic levels.

d. Rest Areas

There are two safety rest areas in the study area located between Route B and Route 87 in Cooper County with one serving eastbound traffic (on the south side of I-70) and the other providing service to westbound traffic (on the north side of I-70). These facilities include separate truck and car parking areas, rest rooms, picnic tables, pay telephones and vending machines. These facilities are heavily used, with truck parking often filled. A lack of available truck parking has resulted in trucks using the shoulders of nearby interchange ramps to park and rest. A purpose of this project is to meet the need for improvement of these safety rest areas along mainline I-70 and to provide adequate parking for vehicles, particularly trucks. Improvements to rest area ramp diverging and merging movements are also needed for safety reasons (see Chapter I.D.3 – Traffic Safety).

Particular consideration during the Second Tier Studies has been given to the development of a Mid-Missouri Visitor Center. This concept was evaluated in conjunction with the development of a rest area by the Overton Bottoms Subcommittee of the Study Management Group. A combined development consisting of a visitor center and a rest area is not part of the proposed I-70 improvements at this time as there is no commitment for joint agency funding for such a facility. While a Mid-Missouri visitor center may be considered in the future (depending upon joint funding), the proposed action does consider replacement of the existing rest area within SIU 3.

2. Roadway Capacity

a. Mainline I-70 Capacity Analysis

Existing Traffic

The existing (2000) annual average daily traffic (AADT) counts on I-70 were provided by MoDOT from its automatic count recorders. Based on these counts, mainline I-70 currently carries approximately 30,000 vehicles per day (vpd) between Route 5 and Route 179 and about 35,000 vpd between Route 179 and Route BB. Trucks account for about 25 percent of this traffic.

Future Traffic

Travel demand forecasts were developed for two future conditions – 2020 and 2030. In order to develop these forecasts, a statewide Travel Demand Model for I-70 was developed using the TransCAD software package as described in "Model Validation Report, I-70 Missouri Statewide Traffic Model" (Wilbur Smith Associates, 2002). This model includes both an automobile forecasting submodel as well as a truck (freight) submodel. In this way, future year truck traffic was evaluated explicitly. As discussed in the "I-70 SIU 3 Traffic Forecasts and Operations Technical Memorandum" (available upon request), the initial forecasts were compared to historical growth trends dating back to the early 1970s and the results compared favorably. Resulting growth rates are approximately three percent per year. Table I-2 summarizes the existing and forecasted traffic volumes on mainline I-70.

Table I-2: Average Daily Traffic (ADT) on Mainline I-70

	From Route 5 to Route B	From Route B to Route 87	From Route 87 to Route 179	From Route 179 to Route BB
2000 ADT	29,950	29,820	29,540	35,640
2000 Truck ADT	7,790	7,750	7,390	8,550
2000 % Trucks	26%	26%	25%	24%
2020 ADT	63,080	62,290	67,190	69,160
2020 Truck ADT	18,290	18,060	18,140	18,670
2020 % Trucks	29%	29%	27%	27%
2030 ADT	74,300	73,360	79,100	81,440
2030 Truck ADT	21,550	21,270	22,150	21,990
2030 % Trucks	29%	29%	28%	27%
Source: Wilbur Smith Associates, October 2002				

In the summer of 2004, the existing (2000) data for mainline I-70 was updated to reflect more current (2002) data. The resulting changes in the data do not change any of the conclusions made in the forecasts for either 2020 or 2030. These results are summarized in Table I-3.

Table I-3: Average Daily Traffic Changes, 2000 to 2002

	From Route 5 to Route B	From Route B to Route 87	From Route 87 to Route 179	From Route 179 to Route BB
Exit				
From	101	103	106	111
To	103	106	111	115
Length, miles (kilometers)	1.8 (2.9)	2.8 (4.5)	5.0 (8.0)	4.1 (6.6)
Year 2000 ADT	29,950	29,820	29,540	35,640
Year 2002 ADT	27,947	--	31,927	30,624
Percent Change	-6.7	--	8.1	-14.1
Year 2000 Vehicle Miles of Travel	53,915	0	147,720	146,112
Year 2002 Vehicle Miles of Travel	50,305	0	159,635	125,558
Source: HNTB, 2004				

Level of Service (LOS)

Level of Service is a qualitative measure used to assess the functional operability of a transportation facility based on facility characteristics and existing or anticipated traffic volumes. Levels of service are defined in the Highway Capacity Manual published in 2000 by the Transportation Research Board. The Highway Capacity Manual is used universally by highway and traffic engineers to measure roadway capacity and operational characteristics. The levels of service defined in the Highway Capacity Manual are a means of referencing traffic conditions encountered by a driver traveling through an intersection, interchange or open section of roadway given various traffic and geometric conditions. Level of service is a function of traffic volume, percentage of trucks in the traffic flow, number of lanes, roadway alignment and geometry and other physical factors. Level of service ratings range from a LOS A (a free flow operation of vehicles) to a LOS F (complete congestion). A LOS C or better is considered an acceptable operational condition, with LOS D permissible in urban conditions. The perception of acceptable traffic service varies widely by area. Specifically, less delay is usually tolerated in rural regions as compared to metropolitan areas. Based on the character of this area, an overall LOS C would be an appropriate target for peak period traffic operations. The LOS characteristics for freeways are summarized in Table I-4.

Table I-4: Level of Service Characteristics for Freeways

LOS	Characteristics
A	Free flow speeds, low volumes and drivers can maneuver freely
B	Stable flow, nearly free flow speeds and only limited constraints to maneuver
C	Stable flow, nearly free flow speeds and ability to maneuver is noticeably restricted
D	Speeds begin to lower from free flow and ability to maneuver is noticeably restricted
E	Unstable flow, low varied speeds and volumes at or near capacity
F	Forced flow, low speeds to stoppages and demand exceeds capacity
Source: Transportation Research Board, Highway Capacity Manual, page 23-3, 2000	

The LOS analysis was performed previously for mainline I-70 using the Highway Capacity Manual methodology and is summarized in Table I-5. This analysis assumed the following as determined from existing field conditions:

- eight percent of ADT in the peak hour;
- 55 to 45 percent directional split;

- 0.92 peak hour factor; and
- rolling terrain.

Table I-5: Level of Service Analysis Summary for Mainline I-70

		Route 5 to Route B	Route B to Route 87	Route 87 to Route 179	Route 179 to Route BB
2000 Peak Hour Directional Volume		1,320	1,310	1,300	1,570
2000 LOS	No-Build Alternative	B	B	B	B
2020 Peak Hour Directional Volume		2,775	2,770	2,960	3,040
2020 LOS	No-Build Alternative	**E**	D	**E**	**E**
2030 Peak Hour Directional Volume		3,270	3,230	3,481	3,390
2030 LOS	No-Build Alternative	**F**	**F**	**F**	**F**
Source: HNTB, 2003					

It can be seen that increased traffic volumes result in degradation of the LOS to F for mainline traffic flow by the year 2030 under the No-Build Alternative.

Along with the volume of traffic and the numbers of lanes on a roadway, the terrain also impacts how well the 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.

b. Crossroad Capacity Analysis

<u>Existing Traffic</u>

The existing ADT on Route 5, Route B, Route 87, Route 179 and Route BB at I-70 were provided by MoDOT from its traffic count program. Further peak hour turning movement counts were made at each of the interchanges to verify traffic data. The ADT derived from these traffic counts are presented in Table I-6.

Table I-6: Average Daily Traffic on Study Crossroads

		Route 5	Route B	Route 87	Route 179	Route BB
2000 ADT	North of I-70	4,590	8,270	4,110	1,200	1,200
	I-70 Bridge	5,200	6,220	4,200	1,960	1,100
	South of I-70	2,360	7,290	3,400	2,100	630
2020 ADT	North of I-70	7,320	13,230	7,010	1,920	1,920
	I-70 Bridge	8,000	9,950	7,000	3,100	1,500
	South of I-70	3,790	11,660	5,440	3,360	800
2030 ADT	North of I-70	8,690	15,710	8,330	2,280	2,280
	I-70 Bridge	9,000	11,800	8,250	3,700	2,050
	South of I-70	4,491	13,850	6,460	3,990	950
Source: Crawford Bunte Brammeier, 2003						

Future Traffic

As with mainline traffic, travel demand forecasts were developed for two future conditions: 2020 and 2030. These forecasts were also generated with the statewide Travel Demand Model for I-70 and compared to historical growth trends. As discussed in the "I-70 SIU 3 Traffic Forecasts and Operations Technical Memorandum," (available upon request) previously derived crossroad forecasts from the First Tier EIS differ from those in the Second Tier Study due to differences in the level of calibration of the model for these routes. The First Tier model predicted growth rates of between one and two percent per year, whereas historical trends show growth ranging from two to five percent per year. Based on historical trends, the travel demand model and anticipated development in the corridor, three percent annual growth was assumed for the crossroads. Table I-6 summarizes the existing and forecasted traffic volumes on the crossroads.

Level of Service

A LOS analysis for the crossroads was completed for each ramp terminal intersection based on signalized and unsignalized intersection procedures in the Highway Capacity Manual 2000. The thresholds, which define LOS, are based upon the type of traffic control used at an intersection (i.e. whether it is signalized or unsignalized). For signalized intersections, the average control delay per vehicle is estimated for each movement and aggregated for each approach and the intersection as a whole. At intersections with partial (side-street) stop control, the delay for each minor movement is determined instead of the intersection as a whole since motorists on the main road are not required to stop.

Level of service is directly related to control delay. At signalized intersections, the LOS criteria differ from that at unsignalized intersections primarily because different transportation facilities create different driver expectations. The expectation is that a signalized intersection is designed to carry higher traffic volumes and, consequently, may experience greater delay than an unsignalized intersection. Table I-7 summarizes the LOS thresholds used in the analysis.

Table I-7: Level of Service Thresholds for Intersections

LOS	Delay per Vehicle (seconds per vehicle)	
	Traffic Signals	Unsignalized Intersections
A	≤ 10	0-10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

Source: Transportation Research Board, Highway Capacity Manual, pages 16-2 and 17-2, 2000

Level of service is reported in Table I-8 for each interchange based on the critical LOS for all movements during the peak hour. The following assumptions were made for the No-Build Alternative.

- **No-Build Alternative** – Conditions assume no change from existing geometric conditions or traffic control. This includes two-lane bridges and two-way stop controlled intersections at all ramp termini.

Table I-8: Level of Service Analysis Summary for Study Crossroads

		Route 5	Route B	Route 87	Route 179	Route BB
2000 LOS	No-Build Alternative	B	C	B	A	A
2020 LOS	No-Build Alternative	**F**	**F**	C	B	A
	Local Improvements	A*	D	B	B	A
	Build Alternative	A*	A*	B	B	A
2030 LOS	No-Build Alternative	**F**	**F**	D	B	A
	Local Improvements	B*	D*	B	B	A
	Build Alternative	A*	A*	B	B	A

** Note – Analysis assumes future signalization*
Source: Crawford Bunte Brammeier, 2003

3. Traffic Safety[1]

Six-year crash data (1995-2000) and analysis (for total and fatal crashes) were supplied by the General Engineering Consultant for mainline I-70 (between Route 5 and Route BB) and crossroads (up to one-mile [1.6-kilometers] north and south of I-70). During this period, there were a total of 571 crashes on I-70 in the study area, which resulted in 12 fatalities. Most of the crashes on the mainline (41 percent) were out of control crashes, followed by rear end crashes. The unusually large number of rear end crashes on the mainline is caused primarily by inattention (25 percent of rear end crashes), occurrence of congestion ahead (20 percent), following too closely (12 percent of rear end crashes) and occurrence of an accident ahead (10 percent). There were nine median crossover crashes on mainline I-70 during this period. The section between Route B and Route 87 had the highest fatality rate at 2.1 fatalities per hundred million vehicle miles traveled (HMVMT). Of note is that eastbound and westbound rest areas exist in this section of highway. The overall crash rate was 62 crashes per HMVMT and the overall fatal rate was 1.29 fatalities per HMVMT. The overall crash rate for the I-70 corridor from the First Tier Study is 87 crashes and 1.37 fatalities per HMVMT, slightly higher than the SIU 3 rates. The section between Route 179 and Route BB has the highest crash rate of 71 per HMVMT (lower than the I-70 average).

The total number of crashes on the crossroads was 244, of which one was fatal. The fatal accident occurred at Route B south of I-70 due to failure of a vehicle to yield right of way during a right turn. The overall crash rate on the crossroads was 368 crashes per HMVMT and the overall fatality crash rate was 1.51 per HMVMT. As compared to the First Tier EIS, the crash rate is approximately 50 percent of that for the entire I-70 corridor, whereas the fatality rate is higher than that reported corridor wide.

In the summer of 2004, the annualized crash data for 1995 to 2000 was updated with annualized data for 2001 to 2003. The updated data does not change any of the conclusions made in the above discussion. This is summarized in Table I-9.

[1] Crash statistics and safety data summarized or presented here are protected under federal law (Appendix B).

Table I-9: Crash Data Changes, 2001 to 2003

	From Route 5 to Route B	From Route B to Route 87	From Route 87 to Route 179	From Route 179 to Route BB	Total
Exit					
From	101	103	106	111	
To	103	106	111	115	
Length, miles (kilometers)	1.8 (2.9)	2.8 (4.5)	5.0 (8.0)	4.1 (6.6)	13.7 (21.9)
1995 to 2000					
Total Crashes	77	109	168	217	571
Total Fatal	1	4	4	3	12
6-Year Total Crash Average Annual	13	18	28	36	95
6-Year Fatal Average Annual	0.17	0.67	0.67	0.50	2.00
2001 to 2003					
Total Crashes	23	59	103	123	308
Total Fatal	1	3	2	3	9
6-Year Total Crash Average Annual	8	20	34	41	103
6-Year Fatal Average Annual	0.33	1.00	0.67	1.00	3.00
Percent Change					
Average Annual Total Crashes	-40.3%	8.3%	22.6%	13.4%	7.9%
Average Annual Fatal Crashes	100.0%	50.0%	0.0%	100.0%	50.0%
Source: HNTB, 2004					

4. Missouri River Bridge

a. Bridge Geometry and Configuration

The existing Missouri River bridge was completed in 1960. It has been repaired several times since its opening. A rehabilitation including deck replacement was completed in 1993. Currently, the bridge carries two, 12-foot (3.7-meter) lanes of traffic in each direction, with a 2-foot (0.6-meter) center barrier. Inner shoulders are two feet (0.6 meter) wide and outer shoulders are approximately three feet two inches (one meter) wide, giving a total face to face outer barrier width of 60 feet four inches (18.4 meters).

The existing structure consists of a 1,508-foot (459.6-meter) long west approach, a 1,102-foot (335.9-meter) through-truss unit over the Missouri River and a 408-foot (124.4-m) long east approach. The approaches are separate, two girder systems for each roadway. The deck is supported on longitudinal stringers, supported by transverse floor beams, which frame into the supporting longitudinal girders. The main bridge unit is a two-span continuous through truss, with nearly equal 550-foot 11-inch (167.6-meter) and 550-foot 8-inch (167.6-meter) spans.

A major roadway change planned as part of the Improve I-70 project is widening of the roadways to three, 12-foot (3.7-meter) lanes in each direction. Even before including shoulders, this would require a width greater than that provided by the existing bridge.

Improvements to the bridge are needed in conjunction with the need to provide increased capacity on I-70 within this section. The main span structure cannot be widened to carry six lanes of traffic without either providing unacceptable highway geometry (splitting the roadways into two lanes within the truss lines and one single lane carried to the outside of each truss line on cantilever brackets) or total reconstruction of the entire structure. Each of these measures would require a total closure of the bridge to traffic for the duration of the reconstruction (at least two years). This long closure period is also unacceptable.

b. Existing Structural Condition

Sufficiency Rating

The majority of the information regarding the condition of the existing structure is provided by the Structural Inventory & Appraisal (SI&A) maintained by MoDOT Bridge Inventory and Inspection System. The SI&A prepared by MoDOT for the submittal year 2001 indicates a sufficiency rating of 54 percent for the current bi-directional four-lane configuration of the Missouri River bridge. Based on the review of the bridge condition data, it is estimated that the entire rating is based on structural adequacy. Factors related to the serviceability of the bridge, whether it is functionally obsolete and whether it is essential for public use, did not contribute to the sufficiency rating. The bridge currently has no restrictions, indicating the bridge can carry Missouri legal loads and therefore no load postings are necessary. The operating rating and inventory ratings are 45 tons and 22 tons, respectively, based on the allowable stress method for rating. The SI&A does not indicate which superstructure members control the rating. The 2000 AADT is 35,637 for the year 2000. The AADT truck percent is 29 percent as indicated on the appraisal. The SI&A also provides future AADT projections. The projected 2022 AADT is 64,146. The main factors for the low rating (54 percent) are the ADT, indicated as almost 36,000 and lane and shoulder widths on the structure.

The bridge condition data was also reviewed for a proposed condition of three, 12-foot (3.7 m) lanes and full-width shoulders. Since the bridge can adequately carry the proposed three-lane configuration, the serviceability and functional obsolescence could see an additive increase in sufficiency rating by approximately 10 percent, even at higher ADT levels. Contributions to the essentiality for public use would also be improved approximately five percent. Conditions of the bridge were reviewed in order to determine if the bridge was acceptable for reuse. The following notable conditions are indicated on the SI&A:

Deck Condition Rating:	7 Good Condition – some minor problems
Superstructure Condition Rating:	6 Satisfactory Condition – structural elements show some minor deterioration
Substructure Condition Rating:	7 Good Condition – some minor problems.
Channel/Channel Protection Condition Rating:	4 Poor Condition – advanced section loss, deterioration, spalling or scour

Appraisal ratings were also reviewed. The following notable appraisals are indicated on the SI&A.

Structural Evaluation Appraisal Rating:	5 (function of load capacity and ADT)
Deck Geometry Appraisal Rating:	4 (function of lane/shoulder width and ADT)
Underclearance Appraisal Rating:	3 (function of vertical and lateral clearances of facility under structure)
Waterway Adequacy Appraisal Rating:	8 (function of road overtopping)
Approach Road Appraisal Rating:	8 (no speed reductions necessary)
Scour Assess Appraisal Rating:	6 (scour not calculated)

Provided the structural adequacy of the existing structure can be maintained, the sufficiency rating for the existing structure under the proposed conditions would be near 70 percent. This shows that the bridge is a candidate for rehabilitation, but that replacement is probably unnecessary.

Remaining Life

Estimates of typical bridge life vary. Seventy-five years is often given as an estimated life. However, major river crossings, because of their importance and high replacement costs, are often rehabilitated several times over their life, extending it beyond 75 years. The existing I-70 structure was completed in 1960 and has already been rehabilitated once (in 1993).

Fatigue plays an important role in determining the remaining life of a structure. As component fatigue life is exhausted, maintenance becomes costly and more frequent inspection is required. In some cases, the required fatigue maintenance repairs are not economically feasible. The existing structure plans were given a cursory review for fatigue-sensitive details.

The existing main span has Category E′ fatigue details on the main floor beams where cover plate welds are terminated. A brief evaluation of the estimated remaining fatigue life of this detail indicated that it should be retrofitted if the bridge is going to be used in the long-term future. Relatively low-cost retrofits are currently being developed for this type of detail and should be commercially viable in the near future. In addition, the main girders of the approach spans are fracture critical. However, since they are built-up riveted sections with internal redundancy, this is not a significant concern.

As with any older structure, rehabilitation needs will increase as the bridge ages. However, based on a review of the bridge details and inspection records, it does not appear that this structure will require more maintenance than other similar bridges carrying similar traffic volumes. Therefore, the long-term performance of the existing bridge as part of a two-structure system should be satisfactory.

Based on the age of the structure, a potential reuse scenario for the existing bridge is:

1. Construct parallel, complementary structure.
2. Temporarily shift all traffic to the new structure.
3. Rehabilitate existing structure (including deck replacement as part of modification into new one-way traffic configuration).
4. Shift traffic into final configuration (two single-direction structures).

It can be assumed that the approximate scope of the rehabilitation in step three above is similar to the 1993 deck replacement.

5. Goods Movement

The important role of the I-70 corridor in the movement of goods by trucks is documented in the First Tier EIS. Within the study area, trucks account for 25 percent of the existing traffic. Total traffic is anticipated to increase from an existing AADT of 29,500 to 79,100 in 2030. Of this total, truck traffic is anticipated to increase from approximately 25 percent in 2000 to 28 percent in 2030. This results in an increase in truck traffic volume from approximately 7,400 AADT in 2000 to approximately 22,100 AADT in 2030, or nearly triple the volume in 2000. Congestion within the study area would add traveling time to trucks. This decrease in travel efficiency would result in higher freight transport costs. An improved transportation facility would meet the needs of projected traffic increases and facilitate the flow of goods into, out of and within Missouri and could support local and regional economic growth. Improved interchanges would also improve truck movement from I-70 to adjacent businesses along the crossroads.

6. Access to Recreational Facilities

One of the identified purposes of this project is to maintain and improve (where possible) access to publicly owned facilities located within the study area and within the region. Access could be improved by upgrading interchange layouts, upgrading service roads from gravel to paved roadways and alleviating congestion along the mainline and at interchanges.

There are three publicly owned facilities located within the study area: Katy Trail (two crossings), Overton Bottoms Wildlife Conservation Area managed by the Missouri Department of Conservation and Big Muddy National Fish and Wildlife Refuge managed by the U.S. Fish and Wildlife Service. Access to these recreational facilities is provided from I-70 via state highways and smaller access roads. Improved access to both local and regional recreational attractions (i.e., Lake of the Ozarks and Branson, Missouri) would be provided by increased system and local capacity.

7. National Security

Following the tragic events of Sept. 11, 2001, when the United States was attacked by terrorists, changes in travel patterns along I-70 were observed. Due to the interruption of air transportation service in response to the terrorist action and hesitancies by the traveling public to utilize air travel due to the perceived threat of terrorism, a modal shift of regional travel from air to surface occurred. Through these tragic events, the important and critical role of I-70 in national defense was highlighted as it relates to a need to accommodate these modal shifts in regional travel. Additionally due to the proximity of Whiteman Air Force Base to I-70, improvements to I-70 may also support national security by facilitating the more efficient transportation of military troops and personnel.

Note:

Aerial photographs were flown in November 2000.

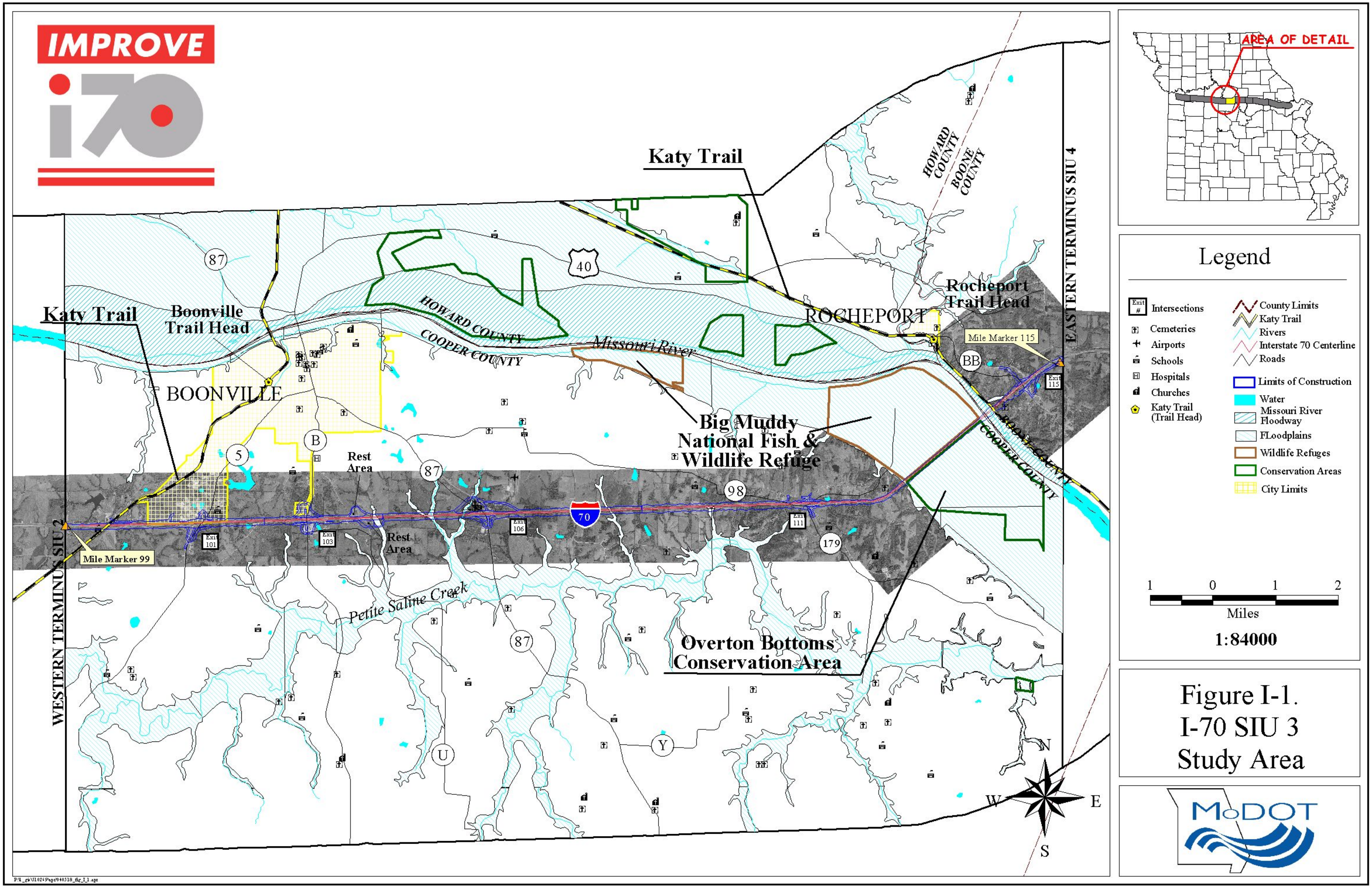

Figure I-1.
I-70 SIU 3
Study Area